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Minerals Yearbook

1984

Volume III

AREA REPORTS: INTERNATIONAL

Prepared by staff of the

BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR • Donald Paul Hodel, Secretary

BUREAU OF MINES • Robert C. Horton, Director

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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Foreword

This edition of the Minerals Yearbook discusses the performance of the worldwide minerals industry during 1984 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, a chapter on mining and quarrying trends, and a chapter discussing the statistical surveying methods used by the Bureau of Mines.

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 minerals industry in general and its relationship to the world economy.

The Bureau of Mines continually strives to improve the value of its publications to 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 International Minerals, 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 William L. Zajac[2]

The world mineral industry in 1984 continued its recovery from the very poor times of 1981, 1982, and early 1983, with most standard gauges of activity registering gains, but 1984 performance in most areas still fell short of the historic highs of 1979 and 1980. Furthermore, the prospects for the immediate future were somewhat less than ideal in comparison with the outlook for other sectors of the economy. There were upturns in production, trade, and consumption of many mineral commodities, but in contrast with that of 1983, when there were a number of modest price advances, 1984 saw small drops to significant drops in prices for a number of commodities, most notably copper, gold, crude oil, and silver. Similarly, investment in mineral industry ventures seemed restrained, probably largely as a result of the apparent opportunity for greater gains from investment in other sectors of the economy, coupled with the continued existence of substantial amounts of idle productive capacity in existing plants.

A glut in world oil supplies continued through the year, and there seemed little chance for an alteration of this situation in 1985 as the developing world producers individually strove to maximize their own incomes, many of them forced into this type of action because of rising foreign exchange debts. These rising debts also contributed to restriction of investments in some world areas. In developed market economy countries, development activities relating to mines and plants emphasized the substitution of new, more efficient installations for old uneconomic or marginally profitable facilities. In the centrally planned economy countries, new additional capacity for mining and processing of minerals continued to come on-stream, but the growth in effective capacity fell short of plans in many instances, often as the result of both overly optimistic time schedules and the inability of the new facilities to reach design capacities as a result of technical problems.

International political events, most notably the continuing Iran-Iraq war, and the unstable situation in the eastern Mediterranean countries (Israel, Lebanon, and Syria) continued to adversely affect mineral industry performance there, although some gains in output levels were discerned in Iran and Iraq. The hostilities between these countries caused considerable worry to tanker operators in the Persian Gulf, with several vessels being damaged and one sunk. Aircraft of both countries attacked vessels registered in other countries over the course of the year, but despite these attacks, tankers continued to move oil out of the gulf throughout the year. In Central America, continued internal and international problems continued to adversely affect mineral industry operations, and in Afghanistan, continued confrontations between the local citizenry and the occupying Soviet troops made development work outside of major cities hazardous if not impossible.

PRODUCTION

The estimated value of world crude mineral production in 1984 was $518,900 million in terms of constant 1978 dollars, 3% higher than the revised 1983 level, but still far short of the historic high of 1979, as can be seen in the following tabulation:

Year	Billion constant 1978 dollars: Value of 53[1] major crude mineral commodities[2]	Billion constant 1978 dollars: 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]	525.2	591.9
1980[r]	514.4	579.7
1981[r]	489.7	551.9
1982[r]	449.1	506.1
1983[r]	446.0	502.6
1984	460.4	518.9

[r]Revised.
[1]The list of commodities included appears in table 3 in the 1980 edition of this chapter; one commodity covered in 1950-68 (beryl) is excluded from the 1973-84 figures, but the overall impact of this omission is regarded as insignificant.
[2]Data for all years prior to 1979 are as reported in Annales des Mines, Nov.-Dec. 1980, p. 173; data for 1979-84 are extrapolated from the 1978 Annales des Mines figures on the basis of the United Nations index of extractive industry production, which is given in the United Nations Monthly Bulletin of Statistics, Aug. 1985, p. xiv.
[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" in the 1980 edition of this chapter.

The foregoing data on value of crude mineral output fall far short of accurately portraying the role of the whole mineral industry in the world's economy, in that they represent only the value of those materials as they are extracted from the earth, rather than the considerably enhanced value that results from beneficiation, smelting, refining, and other equivalent downstream processing to which those raw materials are subjected while they remain within the facilities that are commonly accepted to be mineral industry plants. Comprehensive data on the value added by such downstream processing are not available on a worldwide basis, but a total on the order of $1,220,000 million (constant 1978 dollars) for 1984 would be a conservative estimate of the value of the products of the world's mineral industry plants that were derived wholly from primary or newly mined raw material only. To this, an additional unestimated increment should be added for processed minerals and metals derived from secondary raw materials—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 supply for all manufacturing operations but also, in the form of fertilizers, are an essential raw material to ensure continued high production by the agricultural-forestry sector. Moreover, the mineral industry, through its output of the various fuel materials, provides all significant supplies of energy for the transportation and transformation of crude nonfuel minerals to finished industrial and consumer goods, as well as for the transportation and transformation of all nonmineral raw materials and products.

PRODUCTION INDEX PATTERNS

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

Year	Index numbers (1980=100)			
	Coal	Crude petroleum and natural gas	Metals	Extractive industry total
Annual averages:				
1978	93.7	92.4	95.2	93.1
1979	96.8	104.0	98.1	102.1
1981	100.3	92.7	100.4	95.2
1982	102.1	82.4	94.2	87.3
1983	101.4	81.8	91.1	86.7
1984	99.4	85.4	93.2	89.5
Quarterly results:				
1983:				
1st quarter	103.1	75.3	89.1	82.0
2d quarter	101.0	75.1	92.9	82.3
3d quarter	98.3	85.0	89.6	88.3
4th quarter	103.1	91.8	92.6	94.0
1984:				
1st quarter	104.5	81.2	94.6	87.0
2d quarter	97.6	75.1	94.8	82.7
3d quarter	98.9	89.3	91.0	91.8
4th quarter	96.6	96.1	92.5	96.4

Source: United Nations. Monthly Bulletin of Statistics. V. 39, No. 8, Aug. 1984, p. xiv.

The index figures reported in the foregoing tabulation are in terms of a base year of 1980 and, as such, do not correspond directly to those presented in the previous edition of this chapter, for which the base year was 1975.

Clearly, although there were marked differences in the performance of the three major component sectors of the extractive industry through late 1983 and through 1984, there was an overall improvement for the extractive industry as a whole, with a downturn in early 1984 that was more than compensated by results in the second half of the year. The reported 1984 annual average and quarterly data beyond the first quarter for coal seem unduly low in comparison with quantitative data on coal industry activities compiled by the U.S. Bureau of Mines and presented subsequently in this chapter. It appears possible that these low figures may be the result of incomplete and/or erroneous reporting to the United Nations.

Comparison of the foregoing tabulation of extractive industry indexes with the following tabulation of indexes from the same source for the processing sectors of the mineral industry demonstrates that the processing sectors have in general recovered from the slump of 1980-82 more effectively than did the extractive sectors:

Year	Index numbers (1980=100)		
	Non-metallic mineral products	Chemicals, petroleum, coal, rubber products	Base metals
Annual averages:			
1978	95.8	95.6	99.9
1979	99.6	100.6	104.5
1981	97.9	100.6	99.2
1982	94.6	99.5	88.9
1983	97.1	104.5	91.4
1984	101.0	110.7	97.9
Quarterly results:			
1983:			
1st quarter	91.7	102.6	89.5
2d quarter	100.5	106.1	93.5
3d quarter	98.0	102.9	88.2
4th quarter	98.4	106.3	94.4
1984:			
1st quarter	96.8	110.9	100.3
2d quarter	104.1	111.8	101.1
3d quarter	101.5	109.3	93.2
4th quarter	101.5	111.0	96.9

Source: United Nations. Monthly Bulletin of Statistics. V. 39, No. 8, Aug. 1984, p. xv.

The slump in the index for base metals in the latter half of 1984 seems noteworthy.

Both of the foregoing tabulations of indexes reflect the aggregation of results from many world areas that individually showed quite variable results, both from area to area and across the year 1984 from quarter to quarter. For regional details too extensive to include here, the reader is referred to the source publication for these tabulations.

QUANTITATIVE COMMODITY OUTPUT

Of the 97 distinct mineral commodities and/or forms of mineral commodities for which total world production, as measured by the U.S. Bureau of Mines, is presented in table 1 for 1980-84,[3] 76 registered increases in 1984 relative to the 1983 level of production. Of the remainder, 19 registered declines and 2 were unchanged relative to the 1983 performance. This was a substantial improvement over that of 1983, when gains over the 1982 performance levels were achieved by 51 commodities with 45 registering declines, and over that of 1982, when only 27 commodities exceeded 1981 levels, with 69 recording declines.

Of the 76 commodities showing gains in output between 1983 and 1984, 34 registered declines between 1982 and 1983, 31 showed increases for the second year in a row, 4 registered increases for the third consecutive year, 4 recorded increases for the fourth consecutive year, and 3 showed increases for the fifth consecutive year. Of the 19 commodities recording declines, 10 had recorded gains between 1982 and 1983, 2 recorded declines for a second year, 3 registered declines for a third year, and 4 showed lower output levels for a fourth consecutive year. Of the 2 commodities with no gain or loss registered between 1983 and 1984, 1 showed a decline between 1982 and 1983, and the other showed no change.

Of the 50 listed metallic commodities, 40 were produced in greater quantities in 1984 than in 1983, while only 10 registered declines. Aside from downturns in beryl concentrate, secondary smelter and secondary refined copper, mine lead, primary smelter and primary refined lead, mercury, mine and smelter tin, and uranium, all metals showed gains, many of them significant, and 42 of them recording increases for a second year or more. Gains were shared between the 27 metallic mine products and the 23 processed metallic commodities listed: 20 of the former and 18 of the latter recorded gains.

Of the 36 nonmetallic commodities surveyed, 26 showed gains between 1983 and 1984, 9 recorded declines, and 1 registered an output equal to that of 1983. Virtually all major nonmetals showed gains, including cement, nitrogen, phosphate rock, potash, salt, and total sulfur (a decline in sulfur in pyrite being more than offset by increases in elemental and byproduct sulfur). Feldspar and magnesite were the most significant nonmetals in the small group recording declines.

Of the 11 mineral fuel commodities surveyed (excluding uranium, which is included under metals), 9 recorded gains, with only natural gas liquids registering a decline and production of nonmetallurgical coke remaining unchanged. Even crude oil, which showed declines since 1979, registered a gain, but it was an increase of under 2%.

The overall performance of the nonfuel mineral industry can only be summarized in terms of the value of production, and for these commodities, exactitudes on worldwide value on a commodity-by-commodity basis are not available for any year subsequent to 1978. Among the fuel commodities, however, the overall pattern of output change can be demonstrated using United Nations data, in which all fuels are adjusted to a common energy equivalent basis. The following tabulation summarizes world energy commodity output for 1979-83 as reported by the United Nations, with U.S. Bureau of Mines estimates for 1984:

Year	Million metric tons of standard coal equivalent				
	Coal	Crude petroleum and natural gas liquids	Natural gas	Hydro and nuclear electricity	Total[1]
1979	2,583	4,718	1,855	288	9,445
1980	r2,626	r4,497	r1,840	301	r9,265
1981	r2,632	4,247	r1,861	320	r9,062
1982	r2,707	r4,080	r1,865	334	r8,986
1983	2,710	4,043	1,858	359	8,968
1984e	2,828	4,114	1,981	386	9,309

eEstimated. rRevised.
[1]Data may not add to totals shown because of independent rounding.

Sources: 1979—United Nations. 1982 Energy Statistics Yearbook. New York, 1984, p. 2; 1980-83—United Nations. 1983 Energy Statistics Yearbook. New York, 1985, p. 2; and 1984—U.S. Bureau of Mines estimates.

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

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite, gross weight[2] thousand metric tons	90,800	87,006	79,724	80,446	86,250
Alumina, gross weight do	33,382	32,076	28,007	29,518	32,980
Unalloyed ingot metal do	15,383	15,083	13,455	13,945	15,521
Antimony, mine output, metal content metric tons	63,619	57,687	55,323	50,536	53,470
Arsenic, white[3,4] do	31,199	30,870	29,625	26,210	32,674
Beryl concentrate, gross weight[3,4] do	9,303	9,582	8,036	9,366	8,763
Bismuth[3] do	3,608	3,750	3,961	3,824	3,935
Cadmium, smelter do	18,238	17,381	16,378	16,725	17,687
Chromite, gross weight[4] thousand metric tons	9,902	9,275	8,340	8,516	9,500
Cobalt:					
Mine output, metal content metric tons	31,329	30,744	24,298	20,048	30,965
Metal, refined do	30,252	25,825	19,312	17,597	22,229
Columbium-tantalum concentrate[4,5] do	36,657	35,533	25,401	21,176	21,443
Copper:					
Mine output, metal content thousand metric tons	7,404	7,814	7,583	7,625	7,838
Metal:					
Smelter:					
Primary[6] do	7,146	7,488	7,364	7,498	7,688
Secondary[7] do	504	513	546	593	570
Refined:					
Primary[6] do	7,529	7,903	7,720	7,893	8,051
Secondary[7] do	1,340	1,268	1,257	1,224	1,104
Gold, mine output, metal content thousand troy ounces	39,179	41,257	43,083	44,882	46,035
Iron and steel:					
Iron ore, iron ore concentrates, iron ore agglomerates, gross weight thousand metric tons	891,129	856,609	779,692	735,358	799,667
Metal:					
Pig iron do	514,056	502,245	457,541	463,123	489,169
Ferroalloys do	15,946	15,044	13,745	13,613	15,069
Steel, crude do	716,512	707,252	644,054	662,587	706,352
Lead:					
Mine output, metal content do	3,470	3,370	3,442	3,366	3,190
Metal:					
Smelter:					
Primary[6] do	3,181	3,120	3,186	3,230	3,132
Secondary[7] do	2,217	2,256	2,109	2,037	2,186
Refined:					
Primary[6] do	3,169	3,127	3,170	3,231	3,153
Secondary[7] do	2,260	2,212	2,059	2,023	2,136
Magnesium metal, smelter, primary[8] metric tons	316,099	305,226	251,357	259,898	324,404
Manganese ore, gross weight thousand metric tons	26,388	23,492	24,126	21,857	23,023
Mercury, mine output, metal content 76-pound flasks	197,426	210,897	197,933	180,824	174,488
Molybdenum, mine output, metal content metric tons	110,565	108,868	97,432	63,637	94,649
Monazite concentrate (source of rare-earth metals and thorium) do	20,619	19,608	16,410	25,892	26,555
Nickel:					
Mine output, metal content thousand metric tons	779	730	612	657	745
Metal, smelter do	731	692	577	640	684
Platinum-group metals, mine output thousand troy ounces	6,848	6,931	6,424	6,524	7,053
Selenium, smelter[4,5] metric tons	1,276	1,275	1,132	1,321	1,340
Silver, mine output, metal content thousand troy ounces	342,804	359,571	381,533	392,268	398,554
Tellurium, smelter[3,4,5] metric tons	110	105	102	86	98
Tin:					
Mine output, metal content do	244,726	251,939	236,052	210,653	207,842
Metal, smelter do	250,594	249,918	234,741	211,756	209,049
Titanium concentrate, gross weight:					
Ilmenite[4,9] thousand metric tons	3,726	3,650	3,030	2,691	2,888
Rutile[3,4] do	436	362	340	318	355
Titaniferous slag do	1,192	1,129	1,050	1,052	1,143
Tungsten, mine output, metal content metric tons	51,895	49,088	45,686	39,430	44,939
Uranium oxide, mine output, U_3O_8 content[4,5] do	53,158	51,712	43,835	40,855	37,790
Vanadium, mine output, metal content do	36,751	36,052	33,276	27,994	32,139

See footnotes at end of table.

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

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Zinc:					
Mine output, metal content thousand metric tons	5,954	5,845	6,054	6,160	6,419
Metal, smelter:					
Primary[6] do	5,755	5,761	5,502	5,841	6,085
Secondary[7] do	294	324	359	360	362
Zirconium concentrate[3] do	680	645	711	640	674
NONMETALS					
Asbestos do	4,699	4,348	4,015	4,207	4,263
Barite do	7,495	8,215	7,280	5,430	5,727
Boron minerals do	2,610	2,558	2,271	2,209	2,306
Bromine[4] do	343	344	375	358	388
Cement, hydraulic do	883,106	886,484	882,236	914,822	960,456
Clays:[4]					
Bentonite[5] do	6,427	6,854	5,208	5,178	5,433
Fuller's earth[5] do	1,762	1,921	2,010	2,257	2,291
Kaolin do	21,097	20,985	19,504	19,646	22,043
Corundum, natural metric tons	29,081	22,420	18,796	18,231	17,805
Diamond:[4]					
Gem[e] thousand carats	10,446	10,261	10,363	22,437	25,595
Industrial[e] do	32,531	31,346	33,004	33,382	38,235
Total do	42,977	41,607	43,367	55,819	63,830
Diatomite[4] thousand metric tons	1,524	1,500	1,518	1,513	1,510
Feldspar[4] do	3,202	3,261	3,506	3,703	3,639
Fluorspar do	5,006	4,956	4,391	4,230	4,599
Graphite[3] metric tons	596,681	589,845	563,532	577,872	573,198
Gypsum thousand metric tons	78,363	76,214	72,314	78,357	81,213
Iodine metric tons	11,605	12,025	12,254	12,541	12,363
Lime[4] thousand metric tons	120,466	117,433	109,630	110,628	113,151
Magnesite[3] do	11,517	11,183	11,162	11,176	10,844
Mica[4] do	228	236	214	240	261
Nitrogen: N content of ammonia do	73,635	76,629	75,217	77,384	84,275
Perlite do	1,526	1,442	1,403	1,307	1,315
Phosphate, gross weight:					
Phosphate rock do	144,193	143,087	127,335	139,265	150,571
Thomas slag do	4,710	3,381	2,825	2,398	2,415
Guano do	29	8	21	7	7
Potash, marketable, K_2O equivalent do	27,857	27,079	24,665	27,426	28,638
Pumice[4 5] do	12,430	12,207	12,394	11,254	12,125
Salt do	168,878	171,638	163,223	159,268	167,141
Sodium compounds, n.e.s.:[4]					
Carbonate do	28,346	28,097	27,430	28,387	28,575
Sulfate do	4,529	4,616	4,053	4,001	3,959
Strontium minerals[4 5] metric tons	94,976	124,562	113,906	136,932	134,926
Sulfur, elemental basis:					
Elemental[10] thousand metric tons	17,227	16,240	13,941	12,730	14,072
From pyrites do	10,338	10,198	9,895	9,887	9,558
Byproduct[11] do	27,418	26,934	26,917	27,698	28,254
Total do	54,983	53,372	50,753	50,315	51,884
Talc, soapstone, pyrophyllite do	7,536	7,274	7,041	7,076	7,178
Vermiculite[4 5] metric tons	538,019	523,265	508,391	447,176	498,739
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[4 5] thousand metric tons	4,185	4,179	4,009	4,251	4,558
Coal:					
Anthracite million metric tons	291	292	298	307	318
Bituminous do	2,562	2,558	2,658	2,665	2,775
Lignite do	967	994	1,031	1,045	1,099
Total do	3,820	3,844	3,987	4,017	4,192
Coke:[12]					
Metallurgical thousand metric tons	367	358	340	330	342
Other do	11	11	11	11	11
Gas, natural, marketed billion cubic feet	53,772	54,149	54,617	55,105	58,746
Natural gas liquids[4] million 42-gallon barrels	1,272	1,345	1,375	1,469	1,462
Peat thousand metric tons	307,117	351,320	376,085	373,640	374,730

See footnotes at end of table.

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

Commodity	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude _______ million 42-gallon barrels__	21,876	20,628	19,520	19,414	19,786
Refined ____________________do____	22,281	21,465	20,894	20,903	21,435

[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, 1984 edition.
[2]Includes bauxite equivalent of nepheline syenite concentrate and alunite ore 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 "Coke: Metallurgical."

VALUE OF WORLD MINERAL PRODUCTION

The value of world crude mineral output in 1984 was estimated at $518.9 billion constant 1978 dollars. 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 1984 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

For 1983, the aggregate value of total world international trade in mineral commodities was estimated at $630,900 million (current dollars), 8.7% below the 1982 level and 20.7% below the record high set in 1980. Comparable data for 1984 were not available for inclusion in this chapter, but available partial information suggests that the 1984 level probably declined from that registered for 1983. The following tabulation summarizes the development pattern in mineral commodity trade for 1979-83, 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)
1979	$581,200	+42.6	35.5
1980	795,900	+36.9	39.9
1981[r]	762,500	-4.2	38.9
1982[r]	691,300	-9.3	37.5
1983	630,900	-8.7	34.9

[r]Revised.

Table 2, which serves as a basis for the estimates of total mineral trade that appear in the foregoing tabulation, provides reported data on the value in major mineral commodity groups and total commodity trade for 1979-83. Major mineral commodity trade by region (such as provided by tables 8-10 in the 1976 edition of this chapter) may be obtained for more recent years directly from the United Nations Monthly Bulletin of Statistics for May 1985.

CONSUMPTION

NONFUEL MINERAL COMMODITIES

Consumption of the great majority of nonfuel mineral commodities for which worldwide data are compiled increased in 1984, continuing and broadening the trend of 1983 and in sharp contrast with the almost universal drops noted for 1982. Of the 14 nonfuel commodities covered in table 5, all but 2 showed higher consumption levels in 1984 than in 1983, the exceptions being cadmium (unchanged from that of 1983) and tin (down very marginally from that of 1983). As demonstrated in the table, however, there were some significant differences in the trends of change of nonferrous metals consumption between the market economy world and the centrally planned economy world, and in part for this reason, the style of presentation of this data adopted in the 1982 edition of this chapter has been continued. This style has also been followed because there are substantial differences between production estimates for the centrally planned economy countries made by the U.S. Bureau of Mines and those made by Metallgesellschaft AG, the source for these consumption figures. Inasmuch as these production figures are used to calculate the published apparent consumption figures, a considerable difference will result if the Bureau production figures were to be substituted. For instance, if the Bureau estimate of aluminum production were substituted, centrally planned countries' consumption of aluminum in 1984 would be about 320,000 tons lower than that reported in table 5. Similarly, 1984 copper consumption for these countries would be about 440,000 tons lower, lead consumption would be 45,000 tons lower, nickel consumption would be 20,000 tons higher, tin consumption would be 19,000 tons higher, and zinc consumption would be 105,000 tons lower. There would be no significant differences for cadmium or magnesium.

MINERAL FUEL COMMODITIES

Table 5 also includes data on mineral fuel consumption, with use of each fuel expressed in terms of standard coal equivalent to make interfuel comparisons clear, as well as to permit their summation to show total energy use. The declining trend in consumption of liquid fuels that has continued since 1978 was at long last reversed, but the 1.5% increase registered for liquid fuels fell far short of the 3.7%, 6.3%, and 7.2% increases recorded for solid fuels, natural gas, and hydro, geothermal, and nuclear power, respectively, and significantly under the 3.5% growth shown for total energy materials.

INVESTMENT

Comprehensive world mineral industry investment data do not exist, but available figures generally indicate a small increase in the rate of investment. Data published by the U.S. Department of Commerce germane to U.S. foreign investment in 1984, however, showed an increase of 21% in capital outlays relative to those of 1983.

Available reports on steel industry investment by members of the Organization for Economic Cooperation and Development show a decrease of 12% in capital investment for 1983, the latest year for which information is available, following increases in the past 3 years. Slight increases in investments by France, the Netherlands, and Turkey were offset by decreases in investments by the other 18 members with investments dropping by 23% by the United States.

Information relative to capital expenditures and exploration expenditures for the petroleum industry of market economies during 1984 continued the downward trend from the high of $149,200 million recorded for 1981. In the United States, capital expenditures in 1984 increased slightly relative to that of 1983 to $45,850 million, but capital expenditures for exploration decreased by 4% during the same period to $4,075 million. Data covering the 1980-84 period on capital expenditures in market economy countries by the petroleum industry are presented in table 7 of this chapter for the first time in several years.

TRANSPORTATION

MARINE TRANSPORT

Bulk carriers, freighters, and tankers are the three classes of vessels engaged in transporting mineral commodities. It should be noted that vessels in each of the three categories are not devoted wholly to mineral commodity transport. 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. Tankers, although largely engaged in moving crude oil and refinery products, also transport liquid chemicals, wine, molasses, and whale oil.

Although physical characteristics of vessels—size, draft, age, crew requirements, type of propulsion system, etc.—as well as fuel costs have an undeniable influence on shipping industry performance, problems of and changes in the quantity and type of material moved also significantly affect the shipping sector of the world economy. Unfortunately, comprehensive data in this regard are not available.

Bulk Carriers.—During 1984, the world's bulk carrier fleet increased relative to that of 1983 by 176 vessels, compared with vessel increases of 169 and 228 in 1983 and 1982, respectively, a 3.3.% increase in the number of vessels. Again in 1984, as in the past 4 years, there was a very small increase in the deadweight tonnage of bulk carriers. The following tabulation shows the distribution of the bulk carrier fleet of the world for 1984:

Country	Number of vessels	Deadweight tonnage (thousand metric tons)
Liberia	781	41,166
Greece	843	29,428
Panama	877	28,086
Japan	472	23,286
Norway	121	8,489
Korea, Republic of	172	6,460
United Kingdom	116	6,021
Italy	107	5,926
India	118	5,004
China	152	4,914
Taiwan	68	4,646
U.S.S.R.	203	4,532
Brazil	83	4,316
Singapore	87	3,741
Cyprus	115	3,348
Philippines	93	3,093
France	43	2,619
Belgium	34	2,515
Spain	76	2,298
Romania	57	2,022
Poland	82	1,996
Turkey	52	1,796
Yugoslavia	58	1,789
Australia	32	1,631
Germany, Federal Republic of	26	1,434
Other	692	24,940
Total	5,560	225,496

Freighters.—The world's freighter fleet decreased in 1984 by 249 vessels, to the fewest vessels since 1977. Compared with that of 1983, however, both the average gross and the average deadweight tonnages increased slightly. The following tabulation shows the distribution of the freighter fleet of the world by country of registry for 1984:

Country	Number of vessels	Deadweight tonnage (thousand metric tons)
Panama	2,090	17,575
U.S.S.R.	1,809	11,511
Greece	916	9,995
United States	421	6,613
Japan	675	6,507
China	616	6,189
Liberia	412	5,025
Germany, Federal Republic of	335	3,341
Singapore	323	3,305
United Kingdom	224	2,965
Cyprus	392	2,682
India	203	2,593
Netherlands	353	2,338
Denmark	171	2,065
Korea, Republic of	254	1,886
Yugoslavia	191	1,883
France	151	1,880
Brazil	184	1,649
Poland	194	1,639
Other	4,105	33,117
Total	14,019	124,758

Tankers.—During 1984, the world's tanker fleet decreased by 66 vessels, and average gross and deadweight tonnages decreased 5.1% and 5.6%, respectively. The following tabulation presents the distribution of the tanker fleet of the world by country of registry for 1984:

Country	Number of vessels	Deadweight tonnage (thousand metric tons)
Liberia	726	78,468
Japan	476	29,738
Greece	324	21,980
Norway	223	18,627
Panama	502	17,312
United States	265	15,877
United Kingdom	261	14,631
France	92	10,540
U.S.S.R.	474	7,727
Cyprus	78	6,837
Spain	106	6,631
Italy	226	6,594
Bahamas	37	5,402
Denmark	83	4,876
Singapore	103	4,149
Brazil	76	3,369
Saudi Arabia	64	3,188
Netherlands	65	3,181
Other	1,301	45,462
Total	5,482	304,589

The overall size of the world's tanker fleet, measured in terms of deadweight tonnage, reached an historic peak in 1977 and has generally declined since that year. Lagging slightly behind this decline, there has been a reversal in the trend toward constant increase in the size of tankers. In 1979, vessels with a deadweight tonnage of over 200,000 tons accounted for 57.7% of the total deadweight tonnage of tankers; this figure has declined in each year since, falling to 51.9% by 1984. Correspondingly, there has been a consistent increase in the shares of total deadweight tonnage accounted for by each of the three smallest size classes of tankers shown in the following tabulation, which is based upon data published on page 18 in the British Petroleum Co. PLC annual publication, BP Statistical Review of the World Energy, June 1985:

Size group (deadweight metric tons)	Percent of total				
	1980	1981	1982	1983	1984
10,000-25,000	4.3	4.3	r4.5	4.6	4.7
25,000-45,000	7.6	8.1	9.0	9.7	9.8
45,000-65,000	4.9	5.2	5.3	5.4	5.8
65,000-125,000	16.2	17.3	17.1	17.1	17.1
125,000-200,000	10.2	9.7	9.9	10.2	10.7
200,000-320,000	47.8	45.8	44.2	42.5	41.4
320,000 and over	9.0	9.6	10.0	10.5	10.5

rRevised.

This same source shows that there was a significant growth in the deadweight tonnage of tankers scrapped between 1979 and 1984; this figure was 6 million deadweight tons in 1979, increasing to 7.7 million tons during 1980, 12 million tons during 1981, 21.6 million tons during 1982, and peaking at 23.5 million tons during 1983, with a decline to 17.6 million tons during 1984. Beginning in 1980, well over one-half of the tonnage of vessels scrapped was provided by vessels exceeding 160,000 deadweight tons. In 1984, of the 17.6 million tons total, 63% of the tonnage scrapped was from 160,000-ton-plus vessels. The deadweight tonnage of tankers under construction and on order at yearend 1984 totaled 11.3 million tons, of which 4.9 million tons was in vessels of 10,000 to 65,000 tons, 4.4 million tons was in vessels of 65,000 to 125,000 tons, and 2.0 million tons was in vessels larger than 125,000 tons.

OCEAN FREIGHT RATES

Data on 1984 ocean freight rates were not available in time for inclusion in this chapter. The United Nations last published ocean freight rate information in the December 1984 edition of the Monthly Bulletin of Statistics.

PANAMA AND SUEZ CANALS

Data on 1984 mineral commodity shipments through the Panama Canal were not available sufficiently early for inclusion in this chapter, but data on 1983 shipments that have become available since the publication of the previous edition of this chapter showed a sharp decline in the level of shipment of mineral commodities, as shown in the following tabulation:

	Fiscal year[1]				
	1979	1980	1981	1982	1983
Number of transits:					
Commercial ocean traffic	12,935	13,507	13,884	14,009	11,707
Other traffic	1,427	1,218	1,166	1,262	1,247
Total	14,362	14,725	15,050	15,271	12,954
Cargo moved (thousand metric tons):					
Commercial ocean traffic:					
Mineral commodities	90,082	99,520	99,969	111,493	72,428
Other commodities	66,503	70,379	74,001	76,936	75,499
Subtotal	156,585	169,899	173,970	188,429	147,927
Other traffic	370	403	308	291	364
Total	156,955	170,302	174,278	188,720	148,291

[1]Year ending Sept. 30 of that stated.

In fiscal year 1983, mineral commodities accounted for only 49% of all commercial traffic through the Panama Canal, a figure far lower than the 59.1% recorded for 1982 and lower than the level for many prior years. Table 10 distributes mineral commodity trade through the canal during 1981-83 by major group.

In terms of major mineral commodity groups, fuels were dominant in each year, but in 1983 they were only 63.7% of the total, compared with 74% of the 1982 total and 70.8% in 1981, a decline in the fuels' share to a level lower than that of 1980. Metallic commodities ranked second, accounting for 18.5% of total mineral commodity tonnage, with nonmetals ranking third with only 17.8%. Steel semimanufactures were the dominant single metals class; fertilizer materials were the overwhelmingly dominant nonmetals class; crude petroleum was the dominant single fuel commodity. The decline in the level of total mineral commodity trade was chiefly the result of much lower levels of shipment of crude oil and coal and coke; transits of crude fell to 42% of the 1982 level, while those of coal dropped to 51% of the level of 1982.

For greater detail on mineral movements through the Panama Canal, including direction of movements to and from the canal, the reader is referred to the Panama Canal Annual Report.

In contrast, the Suez Canal showed an upturn in mineral commodity trade in 1983, and this trend continued in 1984, as shown in the following tabulation:

	1981	1982	1983	1984
Number of transits:				
Commercial ocean traffic	20,395	21,398	21,026	20,147
Other traffic	1,182	1,147	1,198	1,214
Total	21,577	22,545	22,224	21,361
Cargo moved (thousand metric tons):				
Commercial ocean traffic:				
Mineral commodities	104,309	136,267	153,497	159,000
Other commodities	92,119	95,126	103,208	104,728
Total	196,428	231,393	256,705	263,728

In 1984, mineral commodities accounted for 60.3% of all commercial traffic through the Suez Canal, and the 1984 level was 3.6% above that of 1983.

Table 11, which distributes mineral commodity trade through the Suez Canal by commodity and by direction, shows that the fuels are also the single largest major group of mineral commodities moved through the canal, with the metals group ranking second and the nonmetals group ranking third. As in past years, iron ore was the most significant component of the metallic commodity group, and fertilizer materials ranked first among nonmetals, as was the case for the Panama Canal. Greater detail on Suez Canal mineral shipments can be found in the Suez Canal Annual and Monthly Reports.

OVERLAND TRANSPORT

Limitations of time have precluded comprehensive assessment of overland international transport of mineral commodities, whether by rail or by pipeline. International rail shipments of mineral commodities on a large scale are confined chiefly to those movements from Canada and Mexico to the United States and to transfers of mineral commodities within European countries south of the Baltic. Notable exceptions are the shipment of large quantities of iron ore from Sweden to Narvik, Norway, for loading on ships there, and to the flow of a variety of minerals from southern Africa into the Republic of South Africa for export through that nation's ports.

Major international pipeline movements of oil and natural gas, generally speaking, are confined to the same areas as are rail transport of minerals. Deliveries of oil from the Persian Gulf fields to the Eastern Mediterranean have been impossible for several years owing to the political and/or military problems of that area, and similarly, the deliveries of Iranian natural gas to the U.S.S.R. have been stopped since 1980, and there appears no likelihood of reestablishment of this trade.

Information on rail and pipeline transport of mineral commodities within individual countries is covered in the appropriate country chapter.

PRICES

Comprehensive data on world prices for crude minerals and for mineral products around the world are not available, but prices of major commodities for selected markets are regularly published and serve as indicators of general price trends. Tables 12, 13, and 14 summarize prices for selected metals in the United States, the United Kingdom, and Canada, respectively, for 1980-84, inclusive, with monthly data provided for 1984. Review of the data in these tables reveals increases in lead and zinc prices during 1984 in each of these markets and a fair gain in the cadmium price on the U.S. market (the only one for which cadmium is reported). For other commodities shown, results were less favorable. The aluminum price advanced by 5 cents per pound on the U.S. market but fell in the United Kingdom; silver for 1984 averaged slightly above the 1983 level in the United States but registered drops in Canada and the United Kingdom; copper prices declined in all three markets; tin prices were lower in both the United States and the United Kingdom (Canada reports no tin price); the cobalt price (reported only for the United States) fell in December by $0.80, lowering the annual average for that metal; and the annual average London gold price was almost $64 per troy ounce lower for 1984 than for 1983. Problems arising in the mineral industry as a result of these generally lower prices were compounded by continuing inflation, although certainly the inflation rate was far below the double-digit levels of the recent past.

Among the major nonmetals, the price of sulfur advanced significantly during 1984. Contract prices in the first half of 1984 ranged from $85 to $105 per ton, f.o.b. loading port, depending on the marketing country and the grade of the sulfur, compared with a range of $105 to $125 for the second half of the year. In contrast, the prices for most fertilizer products, after registering gains in the early and midyear months of 1984, registered declines thereafter.

Comparison of reported crude oil prices, mainly officially set state selling prices, between yearend 1983 and yearend 1984, shows that for Persian Gulf crudes, prices were unaltered, ranging between $26.00 and $29.56 per barrel, f.o.b. Similarly, Algerian and Libyan prices, $30.50 and $30.15 per barrel, respectively, were unchanged, as were Venezuelan prices that ranged from

$27.03 to $31.09 per barrel, Mexican prices that ranged from $25.50 to $29.00 per barrel, and the Indonesian price of $29.53 per barrel. The Canadian wellhead price was unaltered in terms of Canadian dollars at $29.75, but this meant a decline in the U.S. dollar price of Canadian crude from about $24.14 per barrel to $22.97 because of the variance in the official exchange rate. In contrast to the fixed prices elsewhere, Nigerian crude oil prices were reduced in October from a range of $29.02 to $30.02 to a range of $27.52 to $28.02. At the same time, the British North Sea crude price was lowered from $30.00 to $28.65, with the Norwegian North Sea crude price dropping from $30.25 to $28.95 in the month of November. It should also be noted with regard to Persian Gulf crude oil prices, that although the official sales prices did not decline, there were drops in spot prices that ranged from 5 cents per barrel to $1.40 per barrel during 1984 for some selected types. In the United States, the posted price per barrel for sweet crude was listed as $30.35 at the end of 1983 and $28.00 at yearend; corresponding figures for sour crude were $29.00 and $27.50.

STATISTICAL SUMMARY OF WORLD PRODUCTION AND TRADE OF MAJOR MINERAL COMMODITIES

The final 24 tables of this chapter, tables 15-38, 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 1976-83 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 1984 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 15-38 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 International Minerals.

[2]Chief, Branch of Geographic Data, Division of International Minerals.

[3]Table 1 contains 100 data lines, but 3 of these are totals of others; these total lines are not included in the total of 97 distinct commodities or forms of commodities counted here.

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

(Million U.S. dollars)

Commodity group	1979	1980	1981[r]	1982[r]	1983
Metals:					
All ores, concentrates, scrap	23,559	29,401	26,438	22,272	22,868
Iron and steel	70,399	75,695	73,298	70,026	60,939
Nonferrous metals	37,129	52,437	38,807	34,294	38,679
Total	131,087	157,533	138,543	126,592	122,486
Nonmetals, crude only	9,598	11,678	11,412	9,906	8,974
Mineral fuels	333,031	479,545	471,518	426,918	382,685
Grand total	473,716	648,756	621,473	563,416	514,145
All commodities	1,636,398	[r]1,994,190	1,958,432	1,843,560	1,807,262

[r]Revised.

[1]Data presented are for selected major commodity groups of the Standard International Trade Classification Revised (SITCR) and as such exclude some mineral commodities classified in that data array together with other (nonmineral) commodities. SITCR 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. 39, No. 5, May 1985, p. cxxiii.

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

(Percent)

Commodity group	1979	1980	1981[r]	1982[r]	1983
Metals:					
All ores, concentrates, scrap	5.0	4.5	4.3	4.0	4.4
Iron and steel	14.9	11.7	11.8	12.4	11.9
Nonferrous metals	7.8	8.1	6.2	6.1	7.5
Total	27.7	24.3	22.3	22.5	23.8
Nonmetals, crude only	2.0	1.8	1.8	1.7	1.7
Mineral fuels	70.3	73.9	75.9	75.8	74.5

[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	1979	1980	1981[r]	1982[r]	1983
Metals:					
All ores, concentrates, scrap	+42.6	+24.8	-10.1	-15.8	+2.7
Iron and steel	+23.2	+7.5	-3.2	-4.5	-13.0
Nonferrous metals	+33.8	+41.2	-26.0	-11.6	+12.8
All metals	+29.3	+20.2	-12.1	-8.6	-3.2
Nonmetals, crude only	+23.1	+21.7	-2.3	-13.2	-9.4
Mineral fuels	+49.4	+44.0	-1.7	-9.5	-10.4
All major mineral commodity groups	+42.6	+36.9	-4.2	-9.3	-8.7
All commodities	+26.1	+21.9	-1.8	-5.9	-2.0

[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	1980	1981	1982	1983	1984[p]
Ferrous metals: World:					
Iron ore, gross weight[e] million metric tons	883	862	776	[r]780	800
Iron and steel scrap, gross weight do	[r]342	[r]328	[r]318	284	295
Nonferrous metals:					
Market economy countries:					
Aluminum, refined	[r]11,991	[r]11,196	[r]10,803	11,988	12,656
Cadmium	13	[r]13	[r]13	14	14
Copper, refined	7,088	[r]7,236	[r]6,755	6,780	7,549
Lead, refined	3,882	[r]3,813	[r]13,765	3,778	3,949
Magnesium, primary	204	179	166	177	194
Nickel[1]	[r]528	[r]476	[r]456	485	580
Tin, refined	[r]180	172	[r]159	160	158
Zinc, slab	[r]4,407	[r]4,274	[r]4,159	4,521	4,653
Centrally planned economy countries:					
Aluminum, refined	[r]3,311	[r]3,283	[r]3,308	3,374	3,303
Cadmium	4	4	4	4	4
Copper, refined	[r]2,274	[r]2,273	[r]2,262	2,268	2,240
Lead, refined	1,466	1,461	1,472	1,462	1,451
Magnesium, primary	80	[r]81	[r]83	88	94
Nickel[2]	189	186	192	195	197
Tin, refined	[r]55	54	[r]57	60	60
Zinc, slab	[r]1,732	[r]1,729	[r]1,775	1,792	1,759
World total:					
Aluminum, refined	[r]15,302	[r]14,479	[r]14,111	15,305	15,959
Cadmium	17	[r]17	[r]17	18	18
Copper, refined	[r]9,362	[r]9,509	[r]9,017	9,048	9,789
Lead, refined	5,348	[r]5,274	[r]5,237	5,250	5,400
Magnesium, primary	284	[r]260	[r]249	265	288
Nickel[2]	[r]717	[r]662	[r]648	680	777
Tin, refined	235	226	216	220	218
Zinc, slab	[r]6,139	[r]6,003	[r]5,934	6,313	6,412
Nonmetals: World:					
Fertilizers:					
Nitrogenous[3] million metric tons of contained N	57,433	60,551	[r]60,498	61,073	66,941
Phosphatic[3] million metric tons of contained P_2O_5	31,171	31,572	[r]30,844	30,981	33,013
Potassic[3] million metric tons of K_2O equivalent	24,039	24,325	[r]23,673	22,721	25,472
Sulfur million metric tons of elemental sulfur equivalent	55,943	54,668	[r]51,453	53,713	[e]59,200
Mineral fuels: World:					
Solid fuels million metric tons of standard coal equivalent	[r]2,631	[r]2,650	[r]2,685	2,753	2,856
Liquid fuels do	[r]3,778	[r]3,645	[r]3,567	3,537	3,591
Natural gas do	[r]1,834	[r]1,840	[r]1,844	1,876	1,995
Hydro, geothermal, nuclear electricity do	301	320	[r]333	358	384
Total do	[r]8,544	[r] [4]8,456	[r]8,429	8,524	8,826

[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.

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

Sources: Based on data provided by the World Bureau of Metal Statistics (market economy countries, 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 1979); 1982 United Nations Energy Statistics Yearbook (all mineral fuels for 1980-82); and British Petroleum Co., p. 1c (mineral fuels data for 1983). Data on iron ore and iron and steel scrap compiled from a variety of sources by the U.S. Bureau of Mines.

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

(Million dollars unless otherwise specified)

Country or country group	1979	1980	1981	1982	1983
EEC[1]	3,025	3,111	2,754	2,427	1,984
EFTA[2]	509	840	537	r291	211
Other countries:					
Australia	122	220	355	217	64
Canada	319	487	698	r483	165
Japan	2,916	2,865	3,610	r3,720	3,720
New Zealand	6	NA	NA	NA	NA
Spain	294	237	183	r204	131
Turkey	NA	NA	NA	58	103
United States	3,367	3,400	3,365	r4,203	3,235
Total	10,558	11,160	11,502	r11,603	9,613

rRevised. NA Not available.

[1]Source reports that values for European Economic Community (EEC) countries are in terms of "million units of account." For this tabulation the units in the source have been converted to U.S. dollars using the following factors supplied by the International Monetary Fund: U.S. dollars per European units of account (ECU) at the end of the 1979 period—1.4419; 1980—1.3096; 1981—1.0852; 1982—0.9677; and 1983—0.8274.

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

Sources: Organization for Economic Cooperation and Development. The Iron and Steel Industry in 1980. Paris, 1982, p. 25; The Iron and Steel Industry in 1981. Paris, 1983, p. 32; The Iron and Steel Industry in 1982. Paris, 1984, p. 32; The Iron and Steel Industry in 1983. Paris, 1985, p. 32.

Table 7.—Market economy country petroleum industry capital and exploration expenditures, by geographical area

(Million dollars)

Area and type of expenditure	1980	1981	1982	1983	1984
United States:					
Capital	42,900	63,000	63,550	45,600	45,850
Exploration	3,850	5,700	4,500	4,250	4,075
Total	46,750	68,700	68,050	49,850	49,925
Other Western Hemisphere:					
Capital	16,525	19,550	21,275	19,175	18,675
Exploration	1,675	1,975	2,025	1,475	1,500
Total	18,200	21,525	23,300	20,650	20,175
Western Europe:					
Capital	18,625	17,950	17,450	13,950	12,725
Exploration	750	1,025	1,275	1,100	1,275
Total	19,375	18,975	18,725	15,050	14,000
Africa:					
Capital	5,275	8,100	7,575	6,500	6,300
Exploration	500	800	675	525	450
Total	5,775	8,900	8,250	7,025	6,750
Near East:					
Capital	11,525	14,625	12,950	11,150	10,875
Exploration	200	250	325	375	425
Total	11,725	14,875	13,275	11,525	11,300
Far East:					
Capital	7,875	11,125	12,875	11,475	10,575
Exploration	650	850	800	700	650
Total	8,525	11,975	13,675	12,175	11,225
Foreign flag tankers	2,800	4,250	3,750	3,925	1,775
World:					
Capital (including foreign flag tankers)	105,525	138,600	139,425	111,775	106,775
Exploration	7,625	10,600	9,600	8,425	8,375
Grand total	113,150	149,200	149,025	120,200	115,150

Source: Chase Manhattan Bank, Energy Economics Div. 1984 Capital Investments of the World Petroleum Industry. New York, Sept. 1985, Schedule 4.

Table 8.—Salient statistics on U.S. foreign investment in mineral industry activities

(Million dollars)

	1982	1983[r]	1984
Direct foreign investment:			
Mining, smelting, refining	6,292	6,805	7,053
Petroleum	56,642	60,330	63,319
Reinvested earnings of foreign affiliates:			
Mining, smelting, refining	-207	-46	-85
Petroleum	1,141	2,532	4,107
Equity and intercompany account flows:			
Mining, smelting, refining	W	537	-397
Petroleum	r2,003	564	-3,254
Income:			
Mining, smelting, refining	163	245	277
Petroleum	10,059	9,548	10,065

[r]Revised. W Withheld to avoid disclosing company proprietary data.

Source: U.S. Department of Commerce. Survey of Current Business, v. 64, No. 8, Aug. 1984; and v. 65, No. 8, Aug. 1985.

Table 9.—World merchant fleet distribution, by type[1]

	1980	1981	1982	1983	1984
Number of vessels:					
Bulk carriers	4,798	4,987	5,215	5,384	5,560
Freighters[2]	14,242	14,201	14,280	14,268	14,019
Tankers	5,359	5,517	5,583	r5,548	5,482
Other[3]	468	405	404	379	363
Total	24,867	25,110	25,482	r25,579	25,424
Gross tonnage:					
Bulk carriers thousand metric tons	106,927	111,820	119,341	124,000	129,274
Freighters[2] do	90,674	92,142	93,323	94,222	94,549
Tankers do	183,858	184,551	180,082	173,335	164,451
Other[3] do	4,252	3,867	3,898	3,768	3,705
Total do	385,711	392,380	396,644	395,325	391,979
Deadweight tonnage:					
Bulk carriers do	185,311	194,368	208,153	r216,468	225,496
Freighters[2] do	121,252	123,119	124,994	r125,646	124,758
Tankers do	346,329	346,439	336,142	r322,617	304,589
Other[3] do	2,017	1,827	1,805	1,673	1,579
Total do	654,909	665,753	671,094	r666,404	656,422

[r]Revised.
[1]Maritime Administration classification. Tankers include whaling tankers. Vessels shown here as "Other" include combination passenger and cargo and combination passenger and refrigerated cargo. Data are as of Dec. 31 of year indicated.
[2]Includes refrigerated freighters.
[3]Excludes refrigerated freighters.

Source: U.S. Department of Transportation, Maritime Administration. Merchant Fleets of the World. Annual issue for 1983 and unpublished data supplied by the same agency for 1984.

Table 10.—Movement of mineral commodities through the Panama Canal

(Thousand metric tons)

	1981			1982			1983		
	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total
METALS									
Ore and concentrate:									
Bauxite and alumina	572	541	1,113	372	183	555	381	109	490
Chromite	3	114	117	4	51	55	--	11	11
Copper	49	607	656	29	742	771	1	421	422
Iron	8	430	438	24	266	290	70	55	125
Lead	19	112	131	36	151	187	18	126	144
Manganese	256	103	359	187	69	256	135	89	224
Tin	--	50	50	--	44	44	--	31	31
Zinc	64	403	467	38	564	602	58	476	534
Other and unspecified	148	1,998	2,146	64	2,133	2,197	99	1,666	1,765
Subtotal	1,119	4,358	5,477	754	4,203	4,957	762	2,984	3,746
Ingots and semimanufactures:									
Aluminum	297	62	359	317	65	382	403	58	461
Copper	8	967	975	4	959	963	43	1,181	1,224
Iron and steel[1] [2]	3,603	5,035	8,638	2,953	5,366	8,319	3,776	3,683	7,459
Lead	4	63	67	18	98	116	14	131	145
Tin[1]	62	44	106	33	29	62	15	21	36
Zinc	34	141	175	6	212	218	13	131	144
Other	32	170	202	43	96	139	77	81	158
Subtotal	4,040	6,482	10,522	3,374	6,825	10,199	4,341	5,286	9,627
Total	5,159	10,840	15,999	4,128	11,028	15,156	5,103	8,270	13,373
NONMETALS									
Borax	4	546	550	2	433	435	12	387	399
Cement	224	10	234	61	7	68	65	7	72
Clays, fire and china	365	11	376	452	9	461	386	28	414
Fertilizer materials	7,397	1,290	8,687	7,013	1,578	8,591	8,078	1,491	9,569
Salt	87	299	386	120	594	714	124	5	129
Sulfur	44	2,388	2,432	2	2,616	2,618	11	1,976	1,987
Other[3]	242	239	481	195	276	471	146	166	312
Total	8,363	4,783	13,146	7,845	5,513	13,358	8,822	4,060	12,882
MINERAL FUELS									
Carbon black	34	30	64	6	106	112	4	1	5
Coal and coke	18,827	1,707	20,534	21,590	1,301	22,891	10,098	1,591	11,689
Petroleum:									
Crude	5,237	31,760	36,997	4,481	40,762	45,243	4,620	14,350	18,970
Refined	6,371	6,858	13,229	9,438	5,295	14,733	9,341	6,168	15,509
Subtotal	11,608	38,618	50,226	13,919	46,057	59,976	13,961	20,518	34,479
Total	30,469	40,355	70,824	35,515	47,464	82,979	24,063	22,110	46,173
Grand total	43,991	55,978	99,969	47,488	64,005	111,493	37,988	34,440	72,428

[1]Tinplate is included under "Tin" rather than under "Iron and steel" in source publication.

[2]Includes a category identified simply as "Scrap" in source publication, which may include scrap other than iron and steel scrap.

[3]Comprises asbestos, diatomite, soda and other sodium compounds, brick and tile, marble and other stone, slag, clinkers, and dross.

Source: Panama Canal Commission Annual Report 1982 and 1983.

Table 11.—Movement of mineral commodities through the Suez Canal

(Thousand metric tons)

	1982			1983			1984		
	North-bound	South-bound	Total	North-bound	South-bound	Total	North-bound	South-bound	Total
METALS									
Aluminum ore (bauxite)	2,120	(1)	2,120	1,352	(1)	1,352	1,849	(1)	1,849
Antimony	13	(1)	13	118	(1)	118	15	(1)	15
Chromium ore, concentrate, metal	160	(1)	160	61	(1)	61	95	(1)	95
Copper ore, concentrate, metal	131	(1)	131	201	(1)	201	419	(1)	419
Iron and steel:									
Iron ore	6,262	(1)	6,262	5,319	(1)	5,319	6,953	(1)	6,953
Scrap	2	NA	2	7	NA	7	9	NA	9
Pig iron	(1)	625	625	(2)	1,087	1,087	(2)	925	925
Unwrought	(2)	1,739	1,739	(2)	3,404	3,404	(2)	2,170	2,170
Plates and sheets	(2)	972	972	(2)	1,359	1,359	(2)	1,170	1,170
Lead ore, concentrate, metal	247	(1)	247	121	(1)	121	448	(1)	448
Manganese ore, concentrate, metal	630	(1)	630	544	(1)	544	684	(1)	684
Tin ore, concentrate, metal	16	(1)	16	28	(1)	28	30	(1)	30
Titanium ore (ilmenite and rutile)	265	(1)	265	447	(1)	447	627	(1)	627
Tungsten[3]	13	(1)	13	12	(1)	12	3	(1)	3
Zinc ore, concentrate, metal	205	(1)	205	149	(1)	149	322	(1)	322
Other and unspecified:									
Ores	1,321	1,068	2,389	792	788	1,580	771	827	1,598
Metals	2,804	2,723	5,527	1,922	4,563	6,485	2,063	4,275	6,338
NONMETALS									
Cement	--	12,107	12,107	38	13,180	13,218	2	11,182	11,184
Fertilizer materials:									
Nitrogenous:									
Urea	(4)	3,149	3,149	(4)	3,093	3,093	(4)	4,744	4,744
Ammonium nitrate	(4)	324	324	(4)	305	305	(4)	252	252
Ammonium sulfate	(4)	305	305	(4)	359	359	(4)	305	305
Phosphatic	(4)	2,894	2,894	(4)	2,812	2,812	(4)	3,433	3,433
Potassic	(4)	1,492	1,492	(4)	1,447	1,447	(4)	1,594	1,594
Other and unspecified	1,911	3,411	5,322	2,223	3,531	5,754	2,542	4,058	6,600
Total	1,911	11,575	13,486	2,223	11,547	13,770	2,542	[5]14,366	16,908
Salt	2	43	45	--	29	29	--	30	30
Minerals and rocks	663	462	1,125	588	1,002	1,590	815	857	1,672
MINERAL FUELS									
Coal and coke	3,996	446	4,442	4,251	399	4,650	7,315	307	7,622
Petroleum:									
Crude	49,074	6,353	55,427	63,753	2,831	66,584	64,248	2,022	66,270
Refinery products:									
Gasoline	249	1,020	1,269	184	1,156	1,340	351	841	1,192
Naphtha	(6)	(6)	(6)	(6)	(6)	(6)	2,654	(6)	2,654
Kerosine	275	2,443	2,718	278	3,313	3,591	111	2,914	3,025
Distillate fuel oil	1,003	7,373	8,376	1,784	5,323	7,107	3,181	3,031	6,212
Residual fuel oil	5,020	1,051	6,071	7,975	1,874	9,849	11,425	582	12,007
Lubricating oil	(6)	161	161	(6)	[r]216	[r]216	(6)	233	233
Asphalt	(6)	94	94	(6)	2	2	NA	NA	NA
Petroleum residues	41	(6)	41	17	(6)	17	12	(6)	12
Other and unspecified	7,518	2,071	9,589	7,249	2,513	9,762	4,658	1,666	6,324
Total mineral commodities	83,941	52,326	136,267	99,413	[5]54,084	[5]153,497	111,602	47,398	159,000
All goods	124,805	106,588	231,393	141,002	115,703	256,705	154,237	109,491	263,728

[r]Revised. NA Not available.

[1]Included under "Other and unspecified: Ores."

[2]Included under "Other and unspecified: Metals."

[3]Reported simply as "Tungsten," but believed to consist mainly of tungsten concentrates, with a small amount of metal included.

[4]Included under "Fertilizer materials: Other and unspecified."

[5]Total as reported in source publication. Suez Canal Authority Annual Report 1984.

[6]Included under "Petroleum: Other and unspecified."

Table 12.—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]
1980	169.566	[r]101.416	42.456	37.428	7.734	20.632	3.415	2.843	25.00
1981	76.000	[r]83.744	36.531	44.555	6.554	10.519	3.429	1.870	([10])
1982	76.000	[r]72.909	25.542	38.473	5.869	7.947	3.200	1.113	12.50
1983	77.667	[r]77.861	21.677	41.386	6.013	11.441	3.200	1.129	12.50
1984:									
January	81.000	67.392	25.124	49.216	5.690	8.180	3.200	1.250	12.50
February	81.000	69.348	24.073	50.607	5.750	9.130	3.200	1.250	12.50
March	81.000	73.911	25.030	51.068	5.820	9.650	3.200	1.500	12.50
April	81.000	75.988	26.431	51.902	5.840	9.220	3.200	2.250	12.50
May	81.000	70.829	25.372	52.773	5.860	8.970	3.200	2.250	12.50
June	81.000	60.409	28.161	52.452	5.880	8.740	3.200	2.250	12.50
July	81.000	63.002	30.509	49.515	5.750	7.420	3.200	2.027	12.50
August	81.000	63.135	28.238	47.845	5.660	7.610	3.200	1.550	12.50
September	81.000	62.008	24.175	46.416	5.560	7.260	3.200	1.550	12.50
October	81.000	60.639	22.328	44.190	5.400	7.320	3.200	1.550	12.50
November	81.000	64.250	25.251	43.603	5.530	7.490	3.200	1.487	12.50
December	81.000	62.138	21.888	43.624	5.400	6.690	3.200	1.400	11.70
Average	81.000	66.757	25.548	48.601	5.680	8.140	3.200	1.693	12.43

[r]Revised.
[1]U.S. list price, North American producer.
[2]Electrolytic, f.o.b. refinery.
[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 Jan.-Feb. 1981; $20 in Mar.-Aug. 1981, inclusive; and suspended from Sept. 1981 through Jan. 1982, inclusive.

Source: American Bureau of Metal Statistics Inc.

Table 13.—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]
1980	80.753	99.297	612.562	41.213	20.872	7.631	34.482
1981	57.274	79.488	459.715	33.296	10.524	6.500	38.932
1982	44.966	67.192	375.792	24.656	7.920	5.810	33.734
1983	65.342	72.153	424.180	19.273	11.454	5.913	34.727
1984:							
January	70.218	62.402	370.888	18.013	8.200	5.544	43.411
February	67.764	64.855	385.921	18.331	9.110	5.610	45.260
March	66.002	68.094	394.264	20.823	9.650	5.637	47.162
April	62.068	69.517	381.364	21.831	9.250	5.666	45.519
May	58.484	64.449	377.402	20.535	8.950	5.723	45.375
June	57.799	61.932	377.665	21.947	8.770	5.756	42.673
July	52.729	60.365	347.468	22.368	7.450	5.655	38.698
August	51.519	60.669	347.680	21.182	7.600	5.583	37.807
September	45.802	58.675	341.093	18.199	7.240	5.487	39.313
October	46.625	57.743	340.174	18.673	7.290	5.345	38.092
November	52.247	61.011	341.177	19.964	7.500	5.457	38.667
December	49.676	59.922	320.159	18.828	6.670	5.334	38.874
Average	56.526	62.562	360.438	20.117	8.140	5.566	40.459

[1]London Metal Exchange.
[2]Unalloyed ingot, 99.5%.
[3]Electrolytic wirebars, monthly average settlement price.
[4]U.S. dollars per troy ounce, final price.
[5]Refined lead, monthly average cash price.
[6]U.S. dollars per troy ounce, 0.999 fine, spot price.
[7]U.S. dollars per pound, Straits tin.
[8]Monthly average cash price: 1980-Aug. 1984 inclusive, slab; Sept. 1984-Dec. 1984, high grade.

Source: American Bureau of Metal Statistics Inc.

Table 14.—Nonferrous metal prices in Canada

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

Year and month	Copper[1]	Lead[2]	Silver[3]	Zinc[4]
1980	100.596	42.174	20.637	37.453
1981	83.973	37.183	10.528	44.778
1982	72.395	26.279	7.951	39.437
1983	75.936	21.929	11.458	42.329
1984:				
January	64.311	25.099	8.187	50.465
February	66.258	24.038	7.313	50.881
March	69.917	24.648	9.657	52.016
April	70.393	25.789	9.223	52.360
May	65.339	25.494	8.965	51.762
June	62.938	27.498	8.745	51.161
July	60.486	31.098	7.377	49.479
August	61.286	28.420	7.616	48.524
September	59.298	24.864	7.267	46.616
October	58.331	23.884	7.320	44.924
November	61.669	25.320	7.480	44.996
December	60.156	23.504	6.708	44.883
Average	63.365	25.805	7.988	49.006

[1]For 1980-82, Canadian domestic producer delivered price for cathode; 1983-84, Hudson Bay Mining and Smelting Co. Ltd. delivered price for cathode.
[2]Producers' price, carload quantities, pig lead, Cominco Ltd.
[3]U.S. dollars per troy ounce.
[4]Producers' price, carload quantities, regular high grade, Cominco Ltd.

Source: American Bureau of Metal Statistics Inc.

Table 15.—Leading world producers of bauxite[1]

(Thousand metric tons, gross weight)

Country	1980	1981	1982	1983[p]	1984[e]
Australia	[r]27,179	[r]25,441	23,625	24,540	29,300
Guinea[e]	11,862	11,112	11,827	[r]12,421	[2]13,160
Jamaica	12,054	11,682	8,361	7,683	[2]8,734
U.S.S.R.[e 3]	6,180	6,180	6,180	[r]6,185	6,185
Brazil	5,538	5,770	6,289	7,199	5,239
Suriname	4,646	4,100	3,059	2,886	[2]3,454
Yugoslavia	3,138	3,249	3,668	3,500	3,347
Hungary	2,950	2,914	2,627	2,917	[2]2,994
Greece	3,286	3,216	2,853	2,455	2,800
India	1,785	1,923	1,854	1,923	1,994
China[e]	1,500	1,500	1,500	[r]1,600	1,600
Guyana	1,844	1,681	1,783	1,791	[2]1,556
France	1,921	[r]1,827	1,662	1,716	1,528
Total	[r]83,883	[r]80,595	75,288	76,816	81,891
Other	[r]6,917	6,411	4,436	3,630	4,359
Grand total	[r]90,800	[r]87,006	79,724	80,446	86,250

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available as of July 2, 1985.
[2]Reported figure.
[3]Includes bauxite equivalent of nepheline syenite concentrates and alunite ore (produced in the U.S.S.R. only).

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

(Thousand metric tons)

Country	1980	1981	1982	1983[p]	1984[e]
United States	4,654	4,489	3,274	3,353	[2]4,099
U.S.S.R.[e]	1,760	1,800	1,875	2,000	2,100
Canada	1,068	1,116	1,065	1,091	1,200
Norway	653	633	637	715	[2]761
Australia	303	379	381	478	758
Germany, Federal Republic of	731	729	723	743	750
Brazil	261	256	299	401	[2]412
Spain	386	397	367	358	[2]381
China[e]	360	360	[r]380	380	380
France	432	436	390	361	[2]342
Venezuela	328	314	274	[e]332	310
Yugoslavia	161	173	246	284	[2]302
United Kingdom	374	339	241	256	[2]287
Japan	1,091	771	351	252	286
India	185	213	217	204	270
Netherlands	259	262	251	235	248
Romania	241	251	208	223	244
New Zealand	155	154	167	220	[2]243
Total	13,402	13,072	11,346	11,886	13,373
Other	[r]1,981	[r]2,011	2,109	2,059	2,148
Grand total	[r]15,383	[r]15,083	13,455	13,945	15,521

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 28, 1985.
[2]Reported figure.

Table 17.—Leading world producers of chromite[1]

(Thousand metric tons, gross weight)

Country	1980	1981	1982	1983[p]	1984[e]
South Africa, Republic of	3,414	2,870	2,164	2,232	[2]3,006
U.S.S.R.[e]	[r]2,900	[r]2,900	[r]2,940	[r]2,940	3,000
Albania[e]	760	[r]870	[r]870	900	870
Turkey	[r]273	423	407	512	[2]608
Zimbabwe	[r]553	536	432	432	450
India	[r]319	335	339	422	440
Brazil	313	[r]237	276	276	280
Philippines	496	439	322	267	270
Finland	362	412	345	246	254
Total	[r]9,390	[r]9,022	8,095	8,227	9,178
Other	[r]512	[r]253	245	289	322
Grand total	[r]9,902	[r]9,275	8,340	8,516	9,500

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 2, 1985.
[2]Reported figure.

Table 18.—Leading world producers of mine copper[1]

(Thousand metric tons, Cu content of ore)

Country	1980	1981	1982	1983[p]	1984[e]
Chile[2]	1,068	1,081	1,242	1,257	[3]1,290
United States[2]	1,181	1,538	1,147	1,038	[3]1,091
Canada[2]	716	691	612	653	712
U.S.S.R.[e 2]	[r]590	[r]570	[r]560	[r]570	590
Zambia	596	588	568	574	[3]541
Zaire	540	555	519	535	540
Peru[2]	367	342	357	322	364
Poland	346	[r]315	338	349	360
Australia	244	231	245	262	236
Philippines	305	302	292	273	[3]226
South Africa, Republic of	201	209	189	205	198
Mexico	[r]184	[r]233	229	196	180
China[e]	[r]165	[r]170	[r]175	[r]175	180
Papua New Guinea	147	165	170	202	[3]164
Total	[r]6,650	[r]6,990	6,643	6,611	6,672
Other	[r]754	[r]824	940	1,014	1,166
Grand total	[r]7,404	[r]7,814	7,583	7,625	7,838

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 25, 1985.
[2]Recoverable.
[3]Reported figure.

Table 19.—Leading world producers of gold[1]

(Thousand troy ounces)

Country	1980	1981	1982	1983[p]	1984[e]
South Africa, Republic of	21,669	21,121	21,355	21,847	[2]21,905
U.S.S.R.[e]	8,300	8,425	8,550	8,600	8,650
Canada	1,627	1,673	2,081	2,363	2,614
United States	970	1,379	1,466	1,956	[2]2,059
China[e]	225	1,700	1,800	[r]1,850	1,900
Brazil[e]	1,300	1,200	1,500	[r]1,750	1,750
Australia	548	591	867	984	1,200
Papua New Guinea	452	540	564	582	835
Philippines	644	753	834	812	[2]773
Colombia	510	529	473	439	735
Chile	220	400	544	571	560
Zimbabwe	368	371	426	453	470
Total	36,833	38,682	40,460	42,207	43,451
Other	[r]2,346	[r]2,575	2,623	2,675	2,584
Grand total	[r]39,179	[r]41,257	43,083	44,882	46,035

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 4, 1985.
[2]Reported figure.

Table 20.—Leading world producers of iron ore, iron ore concentrates, and iron ore agglomerates[1]

(Thousand metric tons, gross weight)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R	244,713	242,417	244,411	245,200	247,000
Brazil	114,732	[r]99,499	93,899	89,200	90,000
Australia	95,534	84,661	87,694	71,625	90,000
China[e]	68,000	66,000	69,000	71,000	75,000
United States	70,730	74,348	36,002	38,165	[2]50,459
India	41,936	[r]41,351	40,902	38,800	[2]41,026
Canada	48,754	51,985	35,592	30,326	37,785
South Africa, Republic of	26,312	28,319	24,554	16,605	[2]24,496
Sweden	27,184	23,225	16,143	13,212	[2]17,556
Liberia	18,187	19,704	18,165	14,937	[2]15,100
France	28,981	21,598	19,391	15,966	[2]15,030
Venezuela	16,102	15,531	11,200	9,715	12,723
Mauritania	8,936	8,704	8,255	7,385	[2]9,527
Mexico	7,631	8,020	8,155	8,040	8,555
Korea, North[e]	8,000	8,000	8,000	8,000	8,000
Spain	9,227	8,565	8,270	7,449	[2]7,260
Chile	8,270	7,743	5,805	5,174	[2]5,587
Yugoslavia	[r]4,478	4,794	5,106	5,018	[2]5,321
Total	[r]847,707	[r]814,464	740,544	695,817	760,425
Other	[r]43,422	[r]42,145	39,148	39,541	39,242
Grand total	[r]891,129	[r]856,609	779,692	735,358	799,667

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 2, 1985.
[2]Reported figure.

Table 21.—Leading world producers of crude steel[1]

(Thousand metric tons)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R	147,941	148,445	147,165	152,514	154,000
Japan	111,395	101,676	99,548	97,179	[2]105,586
United States	101,455	109,613	67,655	76,762	[2]83,940
China	37,120	35,600	37,160	39,950	43,370
Germany, Federal Republic of	43,838	41,610	35,880	35,729	[2]39,389
Italy	26,501	24,777	23,981	21,674	[2]24,026
France	23,176	21,258	18,416	17,623	[2]18,996
Brazil	15,339	13,230	12,990	14,659	[2]18,385
Poland	19,485	15,719	14,795	16,236	16,500
United Kingdom	11,278	15,576	13,704	14,986	[2]15,121
Czechoslovakia	15,225	15,270	14,992	15,024	[2]14,831
Canada	15,887	14,811	11,762	12,828	[2]14,715
Spain	12,586	12,912	13,160	12,731	[2]13,484
Korea, Republic of	8,558	10,754	11,753	11,915	[2]13,033
Romania	13,175	13,025	13,055	12,593	13,000
Belgium	[r]12,425	[r]12,379	9,916	10,157	[2]11,292
India	[r] [e]9,423	[e]10,380	10,715	10,305	10,084
South Africa, Republic of	9,068	9,004	8,271	7,004	[2]7,827
Mexico	7,156	[r]7,663	7,056	6,978	[2]7,543
German Democratic Republic	7,308	7,467	7,169	7,219	7,500
Total	[r]648,339	[r]641,169	579,143	594,066	632,622
Other	[r]68,173	[r]66,083	64,911	68,521	73,730
Grand total	[r]716,512	[r]707,252	644,054	662,587	706,352

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Steel ingots and castings. Table includes data available through June 18, 1985.
[2]Reported figure.

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

(Thousand metric tons, Pb content of ore)

Country	1980	1981	1982	1983[p]	1984[e]
Australia	398	388	455	481	446
U.S.S.R.[e]	420	425	430	435	440
United States[2]	[r]573	[r]459	530	466	333
Canada	297	332	341	252	[3]259
Peru	189	193	176	205	196
Mexico[2]	[r]147	[r]149	170	184	195
China[e]	160	160	160	160	160
Morocco	115	116	104	98	[3]101
Yugoslavia	122	119	[e]115	[r] [e]114	100
Total	[r]2,421	[r]2,341	2,481	2,395	2,230
Other	[r]1,049	[r]1,029	961	971	960
Grand total	[r]3,470	[r]3,370	3,442	3,366	3,190

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 18, 1985.
[2]Recoverable.
[3]Reported figure.

Table 23.—Leading world producers of manganese ore[1]

(Thousand metric tons, gross weight)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R	9,750	9,150	9,821	9,876	10,100
South Africa, Republic of	5,695	5,040	5,217	2,886	[2]3,049
Brazil	2,281	2,042	2,341	2,092	2,200
Gabon	2,147	1,488	1,512	1,867	[2]2,119
Australia	1,999	1,411	1,123	1,353	1,700
China[e]	1,600	1,600	1,600	1,600	1,600
India	1,692	1,526	1,448	1,320	1,300
Mexico	447	578	509	350	518
Ghana	[r]250	223	160	173	120
Japan	80	87	78	77	62
Hungary	83	71	83	59	60
Morocco	131	110	97	74	57
Total	[r]26,155	23,326	23,989	21,727	22,885
Other	[r]233	[r]166	137	130	138
Grand total	[r]26,388	[r]23,492	24,126	21,857	23,023

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 4, 1985.
[2]Reported figure.

Table 24.—Leading world producers of mine nickel[1]

(Thousand metric tons)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R.[e]	154	158	165	170	175
Canada	185	160	89	122	174
Australia	74	74	88	77	75
Indonesia	53	49	46	49	62
New Caledonia	87	78	60	40	41
Cuba[e]	37	39	36	[r]38	32
South Africa, Republic of	26	26	[e]22	[r e]20	25
Dominican Republic	16	19	6	21	[2]24
Total	632	603	512	537	608
Other	[r]147	[r]127	100	120	137
Grand total	[r]779	[r]730	612	657	745

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 7, 1985.
[2]Reported figure.

Table 25.—Leading world producers of mine tin[1]

(Metric tons, Sn content of ore)

Country	1980	1981	1982	1983[p]	1984[e]
Malaysia	61,404	59,938	52,342	41,367	[2]41,307
U.S.S.R.[e]	[r]34,000	[r]34,000	[r]35,000	[r]35,000	36,000
Thailand	33,685	31,474	26,109	19,943	[2]21,920
Indonesia	32,527	35,392	33,806	26,553	21,530
Bolivia	27,291	29,830	26,773	25,278	[2]21,100
Brazil	[r]6,377	[r]8,253	9,293	13,418	[2]16,021
China[e]	14,600	15,000	15,000	15,000	15,000
Australia	11,588	12,267	12,126	9,275	9,300
United Kingdom	2,982	3,869	4,208	4,025	4,600
Zaire	3,159	3,321	3,144	[r e]3,000	3,000
Peru	1,077	1,519	1,672	2,368	2,990
South Africa, Republic of	2,913	2,811	3,035	2,668	2,200
Total	[r]231,603	[r]237,674	222,508	197,895	194,968
Other	[r]13,123	[r]14,265	13,544	12,758	12,874
Grand total	[r]244,726	[r]251,939	236,052	210,653	207,842

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 11, 1985.
[2]Reported figure.

Table 26.—Leading world producers of mine zinc[1]

(Thousand metric tons, Zn content of ore)

Country	1980	1981	1982	1983[p]	1984[e]
Canada	1,059	1,096	1,036	988	[2]1,213
U.S.S.R.[e]	785	790	800	805	810
Australia	495	518	665	703	634
Peru	488	499	507	576	558
Mexico	236	207	242	266	289
United States	[r]348	[r]343	326	297	[2]278
Japan	238	242	251	256	253
Spain	183	182	167	168	226
Sweden	167	181	185	203	[2]206
Ireland	229	120	167	186	206
China[e]	160	160	160	160	160
Poland	188	[r]146	145	149	153
Korea, North[e]	140	140	140	140	140
South Africa, Republic of	79	87	92	110	[2]106
Germany, Federal Republic of	121	111	106	114	[2]92
Yugoslavia	95	89	84	87	87
Brazil	[r]67	[r]71	71	73	72
Greenland	86	80	80	73	[2]71
Total	[r]5,164	[r]5,062	5,224	5,354	5,554
Other	[r]790	[r]783	830	806	865
Grand total	[r]5,954	[r]5,845	6,054	6,160	6,419

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 9, 1985.
[2]Reported figure.

Table 27.—Leading world producers of hydraulic cement[1]

(Thousand metric tons)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R	125,049	127,169	123,681	128,156	130,000
China	79,860	84,000	94,072	108,250	121,080
Japan	87,958	[r]84,827	80,688	80,891	[2]78,851
United States (including Puerto Rico)	69,589	66,163	58,369	64,725	[2]71,395
Italy	41,772	41,553	39,728	39,217	40,000
Germany, Federal Republic of	[r]34,186	[r]31,498	30,078	30,466	[2]31,500
Spain (including Canary Islands)	28,010	28,571	29,569	30,637	[2]30,000
India	17,700	20,760	22,498	25,356	[2]29,030
Brazil	27,193	26,051	25,644	20,870	25,000
France	29,104	28,229	26,150	24,352	24,000
Korea, Republic of	[r]15,612	15,617	17,887	21,282	20,413
Mexico	[r]16,243	[r]17,978	19,298	17,068	18,000
Poland	18,443	[r]14,226	16,100	16,200	16,700
Turkey	[r]12,875	15,043	15,778	13,596	15,738
Taiwan	14,062	14,342	13,432	14,810	[2]14,234
Romania	15,611	14,746	14,995	13,968	[2]14,016
United Kingdom	[r]14,805	[r]12,729	12,962	12,430	12,700
German Democratic Republic	12,440	12,204	11,721	11,782	11,800
Czechoslovakia	[r]10,546	10,646	10,325	10,498	10,530
Iran[e]	8,000	8,000	9,500	10,000	10,500
Total	[r]679,058	[r]674,352	672,475	694,554	725,487
Other	[r]204,048	[r]212,132	209,761	220,268	234,969
Grand total	[r]883,106	[r]886,484	882,236	914,822	960,456

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 2, 1985.
[2]Reported figure.

Table 28.—Leading world producers of diamond[1]

(Thousand carats)

Country	1980	1981	1982	1983[p]	1984[e]
Zaire	10,235	9,000	[e]9,000	11,982	[2]18,459
Botswana	5,101	4,961	7,769	10,731	12,914
U.S.S.R.[e]	10,850	10,600	10,600	10,700	10,700
South Africa, Republic of	8,520	9,526	9,154	10,311	10,143
Australia	48	205	557	6,155	5,690
Angola	1,480	1,400	1,225	1,034	1,000
China[e]	[r]900	[r]950	[r]1,000	[r]1,000	1,000
Namibia	1,560	1,248	1,014	963	930
Total	[r]38,694	[r]37,890	40,319	52,876	60,836
Other	4,283	3,717	3,048	2,943	2,994
Grand total	[r]42,977	[r]41,607	43,367	55,819	63,830

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Gem and industrial grades undifferentiated. Table includes data available through May 28, 1985.
[2]Reported figure.

Table 29.—Leading world producers of nitrogen in ammonia[1]

(Thousand metric tons, N content)

Country	1980	1981	1982	1983[p]	1984[p]
U.S.S.R	12,600	12,900	14,000	14,500	[e]15,000
China[e]	9,990	12,193	12,711	[r]13,800	13,970
United States	[r]14,736	[r]14,272	11,820	10,248	12,074
India[2]	2,221	3,193	3,469	3,525	3,715
Canada	2,096	2,176	2,062	2,374	2,872
Romania	2,248	2,381	2,587	2,600	[e]2,650
France[e]	2,085	[r]2,270	[r]2,000	1,900	2,350
Netherlands	1,874	1,814	1,655	1,747	2,318
Germany, Federal Republic of	2,044	1,962	1,570	1,703	1,964
United Kingdom	1,633	1,780	1,716	1,720	1,836
Mexico	1,548	[r]1,795	2,029	1,936	1,773
Japan	2,110	1,833	1,652	1,545	1,687
Indonesia	938	920	1,028	1,149	1,660
Poland	1,478	1,389	1,423	1,425	1,542
Italy	1,397	1,207	1,046	1,060	1,490
German Democratic Republic	1,182	1,205	1,170	1,211	[e]1,200
Total	[r]60,180	[r]63,290	61,938	62,443	68,101
Other	[r]13,455	[r]13,339	13,279	14,941	16,174
Grand total	[r]73,635	[r]76,629	75,217	77,384	84,275

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 14, 1985.
[2]Data given are for years beginning Apr. 1 of that stated.

Table 30.—Leading world producers of phosphate rock[1]

(Thousand metric tons, gross weight)

Country	1980	1981	1982	1983[p]	1984[e]
United States	54,415	53,624	37,414	42,573	[2]49,197
U.S.S.R.[e]	[r]30,300	[r]30,700	[r]31,300	[r]31,600	31,900
Morocco[3]	18,824	18,562	17,754	20,106	[2]21,245
China[e]	10,726	11,500	11,720	12,500	11,800
Jordan	3,911	4,244	4,390	4,749	[2]6,263
Tunisia	4,582	4,596	4,196	5,924	[2]5,346
Brazil	2,612	3,238	2,732	3,208	3,855
Israel	2,307	1,919	2,148	2,969	[2]3,312
Togo	2,933	2,215	2,800	2,081	2,696
South Africa, Republic of	3,185	2,718	3,173	2,742	[2]2,585
Total	[r]133,795	[r]133,316	117,627	128,452	138,199
Other	[r]10,398	[r]9,771	9,708	10,813	12,372
Grand total	[r]144,193	[r]143,087	127,335	[r]139,265	150,571

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes only phosphate rock; Thomas slag and guano are excluded. Table includes data available through Apr. 19, 1985.
[2]Reported figure.
[3]Includes output from Western Sahara.

Table 31.—Leading world producers of marketable potash[1]

(Thousand metric tons, K_2O equivalent)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R	8,064	8,449	8,079	9,294	9,500
Canada (sales)	7,532	6,549	5,309	6,938	[2]7,685
German Democratic Republic	3,422	3,460	3,434	3,431	3,450
Germany, Federal Republic of	2,737	[r]2,591	2,056	2,419	2,280
United States	2,239	2,156	1,784	1,429	[2]1,564
France	1,894	1,831	1,704	1,536	1,500
Israel	797	839	1,004	[e]1,000	1,100
Total	26,685	[r]25,875	23,370	26,047	27,079
Other	1,172	1,204	1,295	1,379	1,559
Grand total	27,857	[r]27,079	24,665	27,426	28,638

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 23, 1985.
[2]Reported figure.

Table 32.—Leading world producers of salt[1]

(Thousand metric tons)

Country	1980	1981	1982	1983[p]	1984[e]
United States (including Puerto Rico)	36,630	35,303	34,392	31,393	[2]34,803
U.S.S.R.[e]	14,600	15,200	15,800	16,200	16,500
China	17,280	18,320	16,384	[r e]16,100	16,000
Germany, Federal Republic of	11,396	12,541	10,978	10,402	11,200
Canada	7,029	7,240	7,940	8,602	[2]10,294
India	8,008	8,932	7,042	7,013	7,500
France	7,103	6,636	6,703	6,951	7,130
United Kingdom	7,154	6,720	7,637	6,311	6,500
Mexico	6,575	7,953	5,561	5,703	6,000
Australia	5,665	[r]6,716	4,811	[r e]5,000	5,000
Romania	5,056	[r]5,033	4,756	4,596	4,500
Italy[e]	5,297	4,574	4,605	[r]4,554	4,255
Brazil	3,838	3,605	3,724	[3]4,187	4,250
Netherlands	3,464	3,578	3,191	3,124	3,650
Poland	4,533	4,271	3,856	[r e]3,630	3,600
German Democratic Republic	3,128	3,112	[r e]3,115	[r e]3,126	3,105
Spain	3,509	3,693	3,289	3,158	3,100
Turkey	1,179	1,396	1,314	[e]1,400	1,400
Japan	1,112	[r]1,002	966	1,200	1,200
Total	[r]152,556	[r]155,825	146,064	142,650	149,987
Other	[r]16,322	[r]15,813	17,159	16,618	17,154
Grand total	[r]168,878	[r]171,638	163,223	159,268	167,141

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 11, 1985.
[2]Reported figure.
[3]Sales.

Table 33.—Leading world producers of elemental sulfur[1]

(Thousand metric tons)

Country	1981				1982			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[2]6,348	307	5,490	12,145	4,210	265	5,312	9,787
U.S.S.R.[e]	[3]2,800	3,600	3,290	9,690	[3]2,700	[r]3,500	3,340	[r]9,540
Canada	--	[e]10	6,789	6,799	--	[e]9	6,272	6,281
Poland	[e 3]4,773	--	[e]350	5,123	[e 3]4,935	--	[e]350	5,285
China[e]	200	1,800	300	2,300	200	1,800	300	2,300
Japan	--	293	2,316	2,609	--	276	2,319	2,595
Mexico	[2]1,652	--	[e]526	[e]2,178	[2]1,391	--	[e]525	[e]1,916
France	--	--	2,042	2,042	--	--	2,061	2,061
Germany, Federal Republic of	--	213	[e]1,519	[e]1,732	--	229	[e]1,592	[e]1,821
Spain	--	1,118	150	[e]1,268	--	1,029	[e]138	[e]1,167
Saudi Arabia[e]	NA	--	600	600	--	--	900	900
South Africa, Republic of	--	502	127	629	--	465	160	625
Iraq[e]	[2 4]200	--	[4]40	[4]240	[2]300	--	40	340
Finland	--	184	[e]264	[e]448	--	177	[e]280	[e]457
Italy	20	261	[e]230	511	10	269	[e]210	489
Yugoslavia	--	274	[e]204	[e]478	--	340	[e]204	[e]544
Sweden	--	[r]202	[e]168	[r]370	--	204	[r e]153	357
German Democratic Republic[e]	--	10	350	360	--	--	360	360
Romania[e]	--	300	150	450	--	200	150	350
Brazil	--	44	119	163	--	54	130	184
Bulgaria[e]	--	200	70	270	--	200	70	270
Norway	--	[r]210	[e]46	[r e]256	--	216	[e]46	[r e]262
Belgium[e]	--	--	270	270	--	--	[r]270	[r]270
Korea, North[e]	--	225	30	255	--	200	30	230
Turkey	28	29	120	177	29	30	126	185
Netherlands[e]	--	--	145	145	--	--	165	165
Greece	--	[e]60	11	[e]71	--	[e]60	105	[e]165
India	--	23	[e]96	[e]119	--	22	[r e]105	[r e]127
Total	16,021	[r]9,865	[r]25,812	[r]51,698	13,775	9,545	25,713	49,033
Other	[r]219	[r]333	[r]1,122	[r]1,674	166	350	1,204	1,720
Grand total	[r]16,240	[r]10,198	[r]26,934	[r]53,372	13,941	9,895	26,917	50,753

See footnotes at end of table.

Table 33.—Leading world producers of elemental sulfur[1]—Continued

(Thousand metric tons)

Country	1983[p]				1984[e]			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[2]3,202	W	6,088	9,290	[2] [4]4,193	W	[4]6,459	[4]10,652
U.S.S.R.[e]	[3]2,600	[r]3,400	3,390	[r]9,390	[3]2,600	3,300	3,440	9,340
Canada	--	[e]5	6,568	6,573	--	7	6,602	6,609
Poland	[r] [e] [3]4,999	--	[e]350	5,349	[3]5,000	--	350	5,350
China[e]	200	[r]2,300	[r]350	[r]2,850	200	2,100	350	2,650
Japan	--	272	2,341	2,613	--	260	2,312	2,572
Mexico	[2]1,225	--	[r] [e]477	[r] [e]1,702	[2]1,364	--	561	1,925
France	--	--	1,931	1,931	--	--	1,900	1,900
Germany, Federal Republic of	--	([5])	[r] [e]1,322	[r] [e]1,322	--	--	1,490	1,490
Spain	--	1,073	[e]131	[r] [e]1,204	--	1,100	130	1,230
Saudi Arabia[e]	--	--	[r]695	[r]695	--	--	720	720
South Africa, Republic of	--	474	157	631	--	440	150	590
Iraq[e]	[2]300	--	40	340	[2]500	--	70	570
Finland	--	224	[r] [e]275	[r] [e]499	--	230	270	500
Italy	5	192	[e]210	407	[4]8	282	200	490
Yugoslavia	--	357	[e]183	[e]540	--	320	163	483
Sweden	--	206	[r] [e]160	366	--	200	160	360
German Democratic Republic[e]	--	--	360	360	--	--	350	350
Romania[e]	--	200	150	350	--	200	150	350
Brazil	[2]1	55	260	316	NA	NA	NA	NA
Bulgaria[e]	--	200	70	270	--	200	70	270
Norway	--	220	[e]50	[r] [e]270	--	200	50	250
Belgium[e]	--	--	250	250	--	--	240	240
Korea, North[e]	--	200	30	230	--	200	30	230
Turkey	[e]31	[e]25	132	188	35	30	130	195
Netherlands[e]	--	--	[r]205	[r]205	--	--	195	195
Greece	--	[e]60	[r] [e]120	[r] [e]180	--	60	125	185
India	--	25	[r] [e]114	[r] [e]139	--	27	120	147
Total	12,563	9,488	26,409	48,460	13,900	9,156	26,787	49,843
Other	167	399	1,289	1,855	172	402	1,467	2,041
Grand total	12,730	9,887	27,698	50,315	14,072	9,558	28,254	51,884

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available. W Withheld to avoid disclosing company proprietary data.

[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 Aug. 1985.

[2]Entirely Frasch process sulfur.

[3]Includes Frasch process sulfur as follows, in thousand metric tons: Poland (estimated): 1981—4,295, 1982—4,441, 1983—4,499 (revised); and 1984—4,500; the U.S.S.R. (estimated): 1981—800, 1982—800, 1983—800, and 1984—800; and total of individually listed countries and grand total: 1981—13,295, 1982—11,142, 1983—9,807, and 1984—11,357.

[4]Reported figure.

[5]Revised to zero.

Table 34.—Leading world producers of coal (all grades)[1]

(Million metric tons)

Country	1981 Lignite	1981 Bituminous and anthracite	1981 Total	1982 Lignite	1982 Bituminous and anthracite	1982 Total	1983[p] Lignite	1983[p] Bituminous and anthracite	1983[p] Total	1984[e] Lignite	1984[e] Bituminous and anthracite	1984[e] Total
United States	46	701	747	48	712	760	52	658	710	[2]57	[2]750	[2]807
China	([3])	621	621	([3])	651	651	([3])	715	715	([3])	[2]772	[2]772
U.S.S.R	160	544	704	163	555	718	158	558	716	[2]158	[2]554	[2]712
German Democratic Republic	267	--	267	276	--	276	278	--	278	300	--	300
Poland	36	163	199	38	189	227	43	191	234	50	192	242
Germany, Federal Republic of	131	88	219	127	89	216	124	82	206	[2]127	[2]79	[2]206
South Africa, Republic of	--	130	130	--	144	144	--	145	145	--	162	162
Australia	33	111	144	38	119	157	34	120	154	[2]35	[2]125	[2]160
India	6	125	131	7	128	135	7	136	143	8	146	154
Czechoslovakia	96	27	123	99	27	126	102	26	128	[2]103	[2]26	[2]129
Yugoslavia	52	([4])	52	54	([4])	54	58	([4])	58	[2]65	([2] [4])	[2]65
Canada	7	33	40	7	35	42	8	37	45	[2]10	[2]48	[2]58
United Kingdom	--	[r]127	[r]127	--	125	125	--	119	119	--	52	52
Korea, North[e]	([4])	45	45	([4])	45	45	([4])	45	45	([4])	45	45
Spain	21	14	35	24	15	39	25	15	40	[2]24	16	40
Romania	27	[e]8	35	31	[e]8	39	[e]31	9	40	30	9	39
Bulgaria	29	([4])	29	32	([4])	32	32	([4])	32	34	([4])	34
Greece	27	--	27	27	--	27	31	--	31	32	--	32
Hungary	23	3	26	23	3	26	22	3	25	[2]22	3	25
France	3	19	22	3	17	20	3	17	20	2	17	19
Total	964	[r]2,759	[r]3,723	997	2,862	3,859	1,008	2,876	3,884	1,057	2,996	4,053
Other	[r]30	[r]91	[r]121	34	94	128	37	96	133	42	97	139
Grand total	[r]994	[r]2,850	[r]3,844	1,031	2,956	3,987	1,045	2,972	4,017	1,099	3,093	4,192

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 10, 1985.
[2]Reported figure.
[3]Output small; included under "Bituminous and anthracite."
[4]Less than 1/2 unit.

Table 35.—Leading world producers of marketed natural gas[1]

(Billion cubic feet)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R	[r]15,405	16,430	17,682	18,918	[2]20,730
United States	[r]19,403	[r]19,181	17,758	16,033	[2]17,231
Netherlands	3,211	2,981	2,548	2,707	[2]2,733
Canada	3,068	2,399	2,683	2,465	[2]2,506
Algeria	411	466	1,048	1,581	1,700
United Kingdom	1,317	1,321	1,341	1,472	[2]1,484
Indonesia	696	720	926	1,032	[2]1,367
Mexico	1,129	1,214	1,279	1,274	[2]1,194
Romania	1,199	[e]1,200	[r e]1,100	1,100	1,120
Norway	[r]917	[r]924	925	904	[2]970
Germany, Federal Republic of	658	666	569	622	[2]581
Venezuela	589	584	527	508	[2]518
Italy	443	496	512	459	485
Australia	338	401	409	420	446
China	504	450	414	431	438
Total	[r]49,288	[r]49,433	49,721	49,926	53,503
Other	4,484	4,716	4,896	5,179	5,243
Grand total	[r]53,772	[r]54,149	54,617	55,105	58,746

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Comprises all gas collected and utilized as a fuel or 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 to the atmosphere, flared, and/or reinjected to reservoirs. Table includes data available through Oct. 9, 1985.
[2]Reported figure.

Table 36.—Leading world producers of natural gas liquids[1]

(Million 42-gallon barrels)

Country[2]	1980	1981	1982	1983[p]	1984[e]
United States	576	587	566	569	[3]597
Algeria	68	78	105	180	[3]192
U.S.S.R.[e]	127	134	145	[r]155	160
Canada	115	120	117	114	[3]139
Mexico	71	88	[e]95	[e]95	100
Saudi Arabia	135	164	157	[e]125	95
United Arab Emirates (Abu Dhabi, Dubai, Sharjah)[e]	[3]36	40	54	71	68
United Kingdom	[r]12	[r]11	21	30	35
Total	[r]1,140	[r]1,222	1,260	1,339	1,386
Other	[r]132	[r]123	115	130	76
Grand total	1,272	[r]1,345	1,375	1,469	1,462

[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 Oct. 9, 1985.
[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 37.—Leading world producers of crude oil[1]

(Million 42-gallon barrels)

Country	1980	1981	1982	1983[p]	1984[e]
U.S.S.R.	4,434	4,475	4,503	4,528	[2]4,506
United States	3,146	3,129	3,157	3,171	[2]3,250
Saudi Arabia[3]	3,614	3,580	2,366	1,834	[2]1,663
Mexico	708	844	1,002	973	983
United Kingdom	582	[r]649	741	817	[2]893
China	773	739	745	774	[2]836
Iran	550	692	873	892	[2]791
Venezuela	793	768	692	657	[2]658
Canada	523	468	464	495	[2]560
Indonesia	577	585	488	490	[2]517
Nigeria	753	525	472	452	502
United Arab Emirates (Abu Dhabi, Dubai, Sharjah)	624	548	456	409	424
Iraq	969	326	310	[e]400	410
Libya	670	408	[e]418	402	[2]391
Total	18,716	[r]17,736	16,687	16,294	16,384
Other	[r]3,160	[r]2,892	2,833	3,120	3,402
Grand total	[r]21,876	[r]20,628	19,520	19,414	19,786

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 9, 1985.
[2]Reported figure.
[3]Includes the country's share of production from the Kuwait-Saudi Arabia Partitioned Zone.

Table 38.—Leading world producers of refined oil[1]

(Million 42-gallon barrels)

Country	1980	1981	1982	1983[p]	1984[e]
United States (including Puerto Rico and Virgin Islands)	5,619	5,358	5,113	4,995	[2]5,186
U.S.S.R.[e]	[r]3,263	[r]3,332	[r]3,393	[r]3,454	3,516
Japan	1,611	1,464	1,337	1,308	[2]1,399
Germany, Federal Republic of	875	752	719	687	[2]682
Italy	[r]719	741	693	649	[2]629
United Kingdom	647	592	590	594	[2]627
France	881	720	617	564	[2]570
China[e]	470	450	475	500	550
Mexico	425	471	462	467	[2]487
Canada	694	696	589	516	[2]481
Saudi Arabia[3]	347	348	338	354	425
Netherlands	[r]394	[r]360	365	402	419
Spain (including Canary Islands)	367	357	337	337	[2]327
Venezuela	341	319	318	323	[2]325
Brazil	[r]405	385	380	305	[2]315
Singapore	262	312	305	306	[2]293
Total	[r]17,320	[r]16,657	16,031	15,761	16,231
Other	4,961	[r]4,808	4,863	5,142	5,204
Grand total	[r]22,281	[r]21,465	20,894	20,903	21,435

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 9, 1985.
[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]

Albania remained a leading world producer of chromite, apparently ranking third behind the U.S.S.R. and the Republic of South Africa in output of marketable grade ore. The country was also a net exporter of energy, supplying both petroleum refinery products, from domestic crude, and electricity to neighboring countries in exchange for hard currency. In 1984, export and production plans for a variety of ores and mineral fuels were not met but few actual production results were published in official sources for the year. Officially, published yearend plan results pointed to significant shortfalls of output and exports of both chromite and petroleum.

Albania's planned 8.5% growth of industrial production was not achieved; instead a 3.3% increase was reported. As in 1983, drought was held responsible for many bottlenecks in the economy and mineral industry. However, as in past years, lack of adequate infrastructure and low productivity precluded the achievement of several mineral output goals.

Most investment activity during the year concentrated on renovation and expansion of existing industrial facilities as well as the completion of ongoing projects. Facility expansion was completed at the Kalimash chromite beneficiation plant as well as at the Reps and Fushë-Arrëz copper concentrators. A second continuous casting unit was installed at the Elbasan iron and steel complex, and the Ballsh gas purification plant was reportedly provided with additional capacity.

Government Policies and Programs.—The Albanian Government continued to maintain a policy of self-sufficiency for most mineral commodities and to stress exports of raw materials and fuels as a means of achieving surpluses of convertible currency. The country's centrally planned industrialization program required large-scale infusions of foreign technology in the past and would require significant foreign capital inputs during the 1986-90 5-year plan period.

The plan for 1985 called for a 6.2% increase in industrial production compared with that of 1984, which was more modest than the same target set for 1984. To assure fulfillment of the plan for 1985, Albanian authorities indicated that greater discipline would be stressed at the workplace. Industries that were marked for particular attention were petroleum extraction, chromite and coal mining, copper smelting, and iron and steel making. Planned increases in the energy sector were to include a 6.4% increase in coal mining and a 5.1% increase in electric power output, compared with those levels achieved in 1984.

PRODUCTION

Albania continued to experience difficulties with a lack of effective management and skilled labor in its mineral industries. Transportation bottlenecks reportedly occurred in some areas, such as copper concentrate deliveries. However, absenteeism and low morale, especially among the younger workers, appeared to have been an important factor in planned production shortfalls in the country's mineral industry.[2] Reportedly a substantial amount of workers have been leaving the mining and petroleum sectors because of difficult working conditions.

Production statistics for most of Albania's mineral commodities are estimated owing to a lack of detailed annual production data. Incomplete statistical reports have been published at approximately 5-year intervals, and available published percentage increases were used to estimate the country's mineral production.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Asphalt and bitumen, natural[3] thousand tons	1,780	1,800	1,800	1,800	1,600
Cement, hydraulic do	1,000	1,100	1,000	1,100	1,100
Chromium:					
Chromite, gross weight do	1,077	1,140	1,200	1,200	1,200
Marketable ore do	[r]760	875	900	900	875
Coal: Lignite[e] do	1,540	1,600	1,740	1,800	2,030
Cobalt, mine output, metal content[4]	330	340	340	350	360
Copper:					
Mine output, metal content	15,300	15,500	16,200	16,500	16,800
Metal, primary and secondary:					
Smelter	9,900	10,000	11,200	11,500	13,000
Refined	7,700	9,000	9,000	10,000	11,400
Gas, natural, gross production[5] million cubic feet	13,200	13,500	15,800	15,000	15,000
Iron and steel:					
Iron ore, nickeliferous:					
Gross weight	550,000	600,000	600,000	650,000	650,000
Iron content	192,500	200,000	200,000	220,000	200,000
Ferroalloys, ferrochromium	3,500	28,000	30,000	35,000	40,000
Semimanufactures	30,000	31,000	34,000	35,000	40,000
Nickel, mine output, metal content	5,500	5,600	5,800	6,000	6,000
Nitrogen: N content of ammonia	75,000	76,000	76,000	76,000	80,000
Petroleum:					
Crude:					
Weight thousand tons	1,700	[r]1,600	1,700	1,500	1,400
Converted thousand 42-gallon barrels	11,300	11,300	11,300	9,900	9,800
Refinery products:					
Gasoline do	1,700	1,700	1,700	1,500	1,500
Kerosine do	540	600	600	500	500
Distillate fuel oil do	2,400	2,300	2,300	2,000	2,000
Residual fuel oil do	3,800	3,500	3,500	3,000	3,000
Lubricants do	105	120	120	100	100
Other do	2,700	3,000	3,000	2,600	2,400
Total[6] do	11,245	11,220	11,220	9,700	9,500
Salt	66,500	66,500	66,500	70,000	70,000
Sodium compounds, n.e.s.: Sodium carbonate, calcined (soda ash)	25,000	25,500	25,000	25,000	25,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 1985.
[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

Chromite and petroleum refinery products remained the country's most important export items and chief sources of foreign exchange. Albania's yearend planned foreign trade results were not published, and apparently, the results were less than satisfactory. The country maintained a policy that forbade foreign credit borrowing and used barter as the chief basis of commercial transaction.

Commercial agreements for 1985 were reached during 1984 with a number of centrally planned economy countries in Europe. The agreement with Romania called for exports of Albanian chromite, bitumen, sulfur, semifabricated copper products, pyrite concentrate, and other commodities, in exchange for oilfield equipment and spare parts, lubricants, pipes, steel, machinery, and other durables. The trade agreement with Bulgaria provided for Albanian exports of copper products, bitumen, and consumer goods, and imports of rolled steel, pipes, and nonferrous metals. The agreement with Yugoslavia included Albanian exports of chromite and ferrochromium and imports of aluminum, copper, and steel products. Similarly, the trade agreement with Poland for 1985 included Albanian exports of asphalt and semimanufactured copper products and imports of cold-rolled steel, mining equipment, and other durables; that with the German Democratic Republic indicated substantial exports of Albania's chromite in exchange for a wide variety of capital goods.

Commercial agreements with market economy countries such as the Federal Republic of Germany, Italy, and France provided Albania with its main source of investment technology: plants, power stations, etc. The resumption of trade with China in 1983 provided Albania with another outlet for chromite sales. Reportedly, 200,000 tons of chromite was shipped to China in 1984.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	74	17	--	All to Thailand.
Semimanufactures	5	NA		
Chromium: Ore and concentrate	426,945	584,111	5,407	Yugoslavia 144,631; Italy 120,233; Sweden 110,293.
Copper:				
Matte and speiss including cement copper	99	NA		
Metal including alloys:				
Unwrought	199	49	--	All to Italy.
Semimanufactures	251	364	--	Yugoslavia 324; Austria 40.
Iron and steel: Metal, ferrochromium	25,651	21,038	3,521	Sweden 7,569; Belgium-Luxembourg 5,654; Italy 2,746.
Nickel:				
Ore and concentrate	458	93	--	All to West Germany.
Matte and speiss	314	907	--	Do.
Ash and residue containing nickel	165	NA		
Metal including alloys, unwrought	--	[2]800	--	NA.
Platinum-group metals: Waste and sweepings ..... value, thousands	$169	$160	--	All to Italy.
Tin: Metal including alloys, unwrought	5	NA		
NONMETALS				
Cement	75,847	112,996	--	Algeria 78,203; Malta 24,334.
Fertilizer materials: Manufactured, nitrogenous	1,000	NA		
Pyrite, unroasted	6,248	48,294	--	All to Italy.
Salt and brine	3,503	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	521	1,653	--	Yugoslavia 949; Italy 495.
Worked	--	1	--	All to Yugoslavia.
Dolomite, chiefly refractory-grade	--	459	--	All to Algeria.
Quartz and quartzite	--	1,348	--	All to Italy.
Sulfur: Elemental, crude including native and byproduct	--	2,313	--	All to Yugoslavia.
Other: Slag and dross, not metal-bearing	--	3,558	--	All to Italy.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	500	--	All to Yugoslavia.
Coal: Anthracite and bituminous	--	11,265	--	All to West Germany.
Petroleum refinery products:				
Gasoline ..... thousand 42-gallon barrels	1,128	452	--	Italy 277; Yugoslavia 10'
Kerosine and jet fuel ..... do.	2	2	--	All to Hungary.
Distillate fuel oil ..... do.	222	183	--	Greece 145; Italy 38.
Bitumen and other residues ..... do.	231	351	--	Greece 348.
Unspecified ..... do.	300	256	--	All to Poland.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Albania, ' taken as a complete presentation of this country's mineral trade. Unless otherwise specifie compiled from United Nations information and data published by the partner trade countries.
[2]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	955	832	--	Hungary 695; West Germany 99.
Semimanufactures	1,994	1,775	--	Yugoslavia 908; Hungary 771.
Copper: Metal including alloys:				
Unwrought	339	158	--	All from West Germany.
Semimanufactures	781	506	--	West Germany 147; Yugoslavia 130; Greece 123.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	61,908	63,745	--	All from Algeria.
Pyrite, roasted	97,012	NA		
Metal:				
Pig iron, cast iron, related materials	2,950	1,505	--	Brazil 1,500.
Ferroalloys:				
Ferromanganese	350	330	--	All from Yugoslavia.
Unspecified	1,461	800	--	Do.
Steel, primary forms	96	164	--	Italy 99; Sweden 65.
Semimanufactures:				
Bars, rods, angles, shapes, sections	17,348	9,225	--	Yugoslavia 5,374; Hungary 2,093.
Universals, plates, sheets	24,464	12,331	--	Hungary 4,105; Poland 3,738.
Hoop and strip	1,119	927	--	West Germany 600; Greece 259.
Rails and accessories	3,009	1,431	--	Yugoslavia 1,407.
Wire	1,990	536	--	Austria 179; Hungary 155.
Tubes, pipes, fittings	19,085	12,406	--	Japan 4,873; West Germany 2,444; Italy 2,156.
Unspecified	43,734	42,262	--	Czechoslovakia 23,000; Poland 19,262.
Lead: Metal including alloys:				
Unwrought	--	24	--	All from Belgium-Luxembourg.
Semimanufactures	136	NA		
Magnesium: Metal including alloys, unwrought	9	8	--	All from Yugoslavia.
Manganese: Oxides	--	27	--	All from Greece.
Nickel: Metal including alloys:				
Unwrought	5	NA		
Semimanufactures	19	6	--	Italy 5.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$109	$61	--	All from West Germany.
Tin: Metal including alloys:				
Unwrought	45	13	--	Do.
Semimanufactures	2	NA		
Titanium: Ore and concentrate	170	NA		
Other: Oxides and hydroxides	137	5	--	Do.
NONMETALS				
Abrasives, n.e.s.:				
Artificial: Corundum	273	128	--	All from Hungary.
Grinding and polishing wheels and stones	54	50	--	Italy 38; Yugoslavia 12.
Asbestos, crude	120	1,964	--	Yugoslavia 1,705; Italy 259.
Cement	2,260	NA		
Clays, crude	389	40	--	All from Yugoslavia.
Diamond: Gem, not set or strung value, thousands	$29	NA		
Feldspar	608	NA		
Fertilizer materials: Manufactured:				
Nitrogenous	--	5	--	All from Italy.
Potassic	38	5	--	All from West Germany.
Fluorspar	544	58	--	Yugoslavia 53.
Graphite, natural	146	65	--	West Germany 60.
Magnesium compounds	530	410	--	Yugoslavia 400.
Phosphates, crude	52,805	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	47	58	--	West Germany 39; Italy 19.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2	53	--	All from Italy.
Worked	40	71	--	Do.
Sand other than metal-bearing	4,179	3,660	--	Yugoslavia 3,510; Italy 150.
Sulfur: Sulfuric acid	7	47	--	All from West Germany.
Talc, steatite, soapstone, pyrophyllite	1,055	943	--	Yugoslavia 940.
Other: Crude	25	93	--	Greece 92.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	62	43	--	West Germany 41.
Coal: Anthracite and bituminous	308,081	327,392	46,890	West Germany 141,502; Poland 139,000.
Coke and semicoke	7,000	NA		
Petroleum refinery products:				
Gasoline ... 42-gallon barrels	4,285	187	--	All from Italy.
Mineral jelly and wax ... do	7,052	94	--	West Germany 87.
Lubricants ... do	15,344	5,376	--	Italy 2,569; Austria 2,331.
Bitumen and other residues ... do	19	NA		
Bitminous mixtures ... do	74	NA		

[p]Preliminary. NA Not available.

[1]Table prepared by Jozef Plachy. 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 othewise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

COMMODITY REVIEW

METALS

Albania produced a variety of metallic ores, which included chromite, copper, nickeliferous iron, and bauxite, in sufficient amounts to meet both domestic and export needs.

Chromite.—Albania continued to experience production shortfalls in 1984. Management and productivity problems, as in 1983, remained the chief issues. Construction delays were reported at a chromite mine in Bulquizë because of extensive delays in site clearing and preparation. Production shortfalls were most severe in the first half of 1984 and were largely responsible for the disruption of Albania's chromite exports during the second half of the year. Shipments to China and Japan of 200,000 tons and 15,000 tons, respectively, were reportedly delayed for an extended period of time. In some cases, 1984 consignments were not delivered until after the end of the year. Market prices for high-grade Albania chromite, 48% to 50% chromium oxide, rose from $72 per ton in 1983 to $96 per ton in 1984.

Major events in Albania's chrome industry in 1984 included expansion at the Kalimash chromite concentrator and the production of chrome-magnesite refractories for the first time at Elbasan, which in past years had to be imported. Ferrochromium production at Burrel in the Mat District increased by about 19% compared with that of 1983, and exports increased by over 20%. Almost all of Albania's ferrochromium production was marketed abroad. Negotiations were reportedly conducted between Albania's Ministry of Foreign Trade and Voest-Alpine AG of Austria regarding a number of possible construction projects in Albania including a new ferrochromium plant.

Copper.—The annual production plan for copper was met. Albania reported a 14% increase in the production of blister copper and a 19% increase in the output of wire and cable output compared with 1983 figures. The production increases were, in part, due to the completion of new facilities at the Reps and Fushë-Arrëz copper concentrators during the year, which provided increased smelter feed. Mine output at the major Gjegjan copper mine and at five smaller mines in the Kukës District was reportedly 3% above planned quotas in the first quarter of 1984.

Research conducted by the Institute for Research and Design in Mechanical Engineering at Tirana has reportedly improved copper ore processing to allow the byproduct extraction of zinc and pyrite.

Iron Ore.—Work continued on the expansion and modernization of the Prrenjas iron ore mine, to be completed in 1985. The mine produces nickeliferous iron ore, which contains sufficient amounts of nickel and cobalt to warrant extraction.

Iron and Steel.—The major event in the industry was the addition of a second continuous casting unit at the Elbasan steel complex. Elbasan, in addition to iron and steel production, produced nickel carbonate containing about 50% nickel and 1% cobalt.

MINERAL FUELS

Albania remained self-sufficient in energy production and was a net exporter of electric power and petroleum refinery products. The major activity in the energy field continued to be the construction of the Koman hydroelectric powerplant, with a rated operational capacity of 600 megawatts. The two other hydroelectric power stations already in operation had a combined rating of about 750 megawatts.

Coal.—The production of lignite increased 13% over that of 1983. A further 6.4% coal production increase was scheduled for 1985. The country's lignite was consumed largely by municipal and heavy industrial powerplants.

Petroleum and Natural Gas.—Shortfalls of planned petroleum production continued to be a serious problem in 1984. The Albanian Government indicated that improvement of that sector would be a major task in 1985. Greater effort and capital would be dedicated to increasing reserves and rectifying shortcomings in drilling technology and production efficiency. A new gas refinery at Ballsh was commissioned during the year. Also, tool manufacturing for the petroleum industry underwent expansion.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Zeri Popullit, July 24, 1984, and Rruga e Partise, Aug. 1984.

The Mineral Industry of Algeria

By Peter J. Clarke[1]

Algeria's mineral sector and its overall economy remained dominated by hydrocarbon production. Exports of oil and gas accounted for 98% of the country's export earnings and 55% of all Government revenues. Algeria's major mineral commodities in 1984 were natural gas and liquefied natural gas (LNG), crude oil and condensate, liquefied petroleum gas (LPG), refined petroleum products, nitrogenous fertilizer, phosphate rock and phosphatic fertilizer, iron and steel, as well as copper, lead, zinc, and mercury. Although the nonfuel sector remained important for domestic consumption needs such as fertilizers, and iron and steel and cement for construction, its importance pales in comparison to the over $12 billion[2] in revenues generated from exports of hydrocarbons. Export revenues from this sector were up considerably from the 1983 level of $11.1 billion, mainly as a result of increased LNG deliveries to Italy through the Trans-Mediterranean pipeline. The pipeline began operating in July 1983 and transported an estimated 265 billion cubic feet of LNG to Europe in 1984, more than Algeria's exports to any other customer except France. This export surge was partially mitigated by less than expected exports to Spain and Belgium, Algeria's other large European customers, and no deliveries to Trunkline LNG Co. of the United States, which suspended purchases of Algerian gas in 1983 over a contract dispute.

The breakup of Société Nationale pour la Recherche, la Production, le Transport, la Transformation, et la Commercialisation des Hydrocarbures (SONATRACH), Algeria's Government-owned oil company, into a less centralized multidivisional organization highlights Algeria's increased focus on marketing its products and diversifying away from strictly crude oil exports. Crude oil production continued its 7-year decline in 1984, while LNG, condensate, and LPG output substantially increased. At current production rates, Algeria's crude oil reserves expected to be depleted in 20 years, while natural gas was expected to last in excess of 70 years, guaranteeing a source of inexpensive energy in Algeria and providing a financial base for future economic development.

PRODUCTION AND TRADE

Production of most of Algeria's nonfuel minerals remained constant in 1984, with the slight exception of increases in the production of mercury, zinc, and phosphates and fertilizer. The most significant increases came in the production of LNG, condensate, and LPG, which have all increased over 100% since 1980. In 1984, crude oil was the sole hydrocarbon registering a production decline, although the drop was only marginal. Crude oil production has fallen over 30% since 1980, a result of reserve depletion and a lowering of Algeria's production quota to 663,000 barrels per day from 725,000 barrels per day in accordance with the policies of the Organization of Petroleum Exporting Countries (OPEC), of which Algeria is a member. Production of LPG in 1984 increased the most, a result of a completion of SONATRACH's 4-million-ton-per-year processing plant at Betheavan.

Exports of LNG was by far Algeria's primary foreign exchange earner. The largest importers of Algerian gas were France and

Italy, where combined deliveries were estimated at 590 billion cubic feet. The other large importers of Algerian gas were Spain and Belgium, although combined deliveries to these two countries were only 105 billion cubic feet, or about 43% of the volume specified in the contracts with these countries. Exports of LPG went predominantly to Japan, while only about 40 million barrels of crude oil and 42.3 billion cubic feet of gas were delivered to the United States. Because the Algerian Government controls all sectors of the economy, imports have been restricted to about $10 to $11 billion per year, generally resulting in a $1 to $3 billion merchandise trade surplus. This is, however, more than offset by a large negative services balance, resulting in a current account deficit of about $3 billion. To reduce the deficit, Algeria was actively promoting its hydrocarbon exports with export seminars and the use of convertible dinar accounts for firms that export their products. Export performance was expected to remain tied to the situation of the world energy market, with Algerian gas playing a significant role in that market.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Cadmium, refined[e]	60	65	65	[r]50	50
Copper concentrate:					
Gross weight	1,048	688	627	600	[3]820
Metal content	240	158	144	130	115
Iron and steel:					
Iron ore, gross weight thousand tons	3,454	3,480	3,705	3,684	3,660
Metal:					
Pig iron do.	669	897	[e]900	[e]950	800
Steel, crude do.	384	522	570	540	[3]755
Lead, metal content of concentrate	1,800	5,100	4,900	6,000	6,000
Mercury 76-pound flasks	24,403	[e]25,000	[e]11,000	10,000	[3]23,000
Silver[e] thousand troy ounces	100	110	110	120	120
Zinc:					
Metal content of concentrate	15,400	20,000	22,000	12,096	[3]14,560
Smelter	[e]30,000	31,000	[r]28,900	31,200	[3]33,500
NONMETALS					
Barite, crude	98,255	89,000	102,000	[e]110,000	110,000
Cement, hydraulic thousand tons	4,156	4,460	[e]4,500	[e]4,800	4,800
Clays:					
Bentonite	34,620	[e]35,000	[e]35,000	[e]30,000	[3]24,500
Fuller's earth[e]	5,000	5,100	5,100	5,000	[3]3,500
Kaolin	8,251	[e]19,000	[e]15,000	17,000	[3]8,000
Diatomite	4,093	[e]4,500	[e]4,500	4,500	[3]1,600
Gypsum and plaster[e] [4] thousand tons	200	200	200	250	250
Lime, hydraulic[e] do.	40	40	40	40	40
Nitrogen: N content of ammonia	29,937	[r]42,638	[r] [e]110,000	131,500	150,000
Phosphate rock thousand tons	1,025	916	947	893	[3]1,000
Salt do.	[r]140	128	[e]140	[e]150	[3]175
Sodium compounds: Caustic soda[e]	700	700	700	700	700
Strontium minerals: Celestite, gross weight[e]	5,400	5,400	5,400	5,400	5,400
Sulfur, elemental[e]	14,000	15,000	10,000	15,000	20,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	1,497,511	1,613,873	2,897,731	3,172,866	3,350,000
Marketed (including liquefied) do.	411,414	466,151	1,048,276	1,580,924	1,700,000
Natural gas plant liquids (condensate)[e] thousand 42-gallon barrels	68,168	78,252	104,839	179,675	192,218
Petroleum:					
Crude do.	361,599	294,850	257,325	251,850	250,828
Refinery products:					
Asphalt do.	NA	511	694	1,115	1,500
Gasoline do.	9,516	12,483	12,155	[e]12,500	13,000
Jet fuel and kerosine do.	3,294	4,380	4,891	[e]5,000	5,500
Distillate fuel oil do.	26,352	33,763	51,246	[e]52,000	53,000
Residual fuel oil do.	18,375	24,930	35,697	[e]36,000	37,000
Liquefied petroleum gas do.	NA	5,256	6,497	[e]7,000	7,500
Lubricants do.	732	365	292	329	350

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products —Continued					
Naphtha thousand 42-gallon barrels	21,594	21,864	34,602	[e]37,000	37,500
Refinery fuel and losses do.	3,294	NA	NA	NA	NA
Total do.	83,157	103,552	146,074	[e]150,944	155,350

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 1, 1985.
[2]In addition to the commodities listed, secondary aluminum, secondary lead, and secondary copper may be produced in small quantities; crude construction materials presumably are produced for local consumption, but output is not reported, and available information is inadequate to make reliable estimates of output level.
[3]Reported figure.
[4]Includes approximately 50,000 tons of plaster each year.

Table 2.—Algeria: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	10	199	--	France 189; West Germany 10.
Copper:				
Ore and concentrate	800	1,128	--	All to Sweden.
Matte and speiss including cement copper	153	--		
Metal including alloys:				
Scrap	1,303	3,389	--	All to France.
Semimanufactures	--	2	--	Do.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	1,491,991	1,398,182	--	Belgium-Luxembourg 952,953; Czechoslovakia 194,523.
Metal:				
Scrap	56,148	55,388	--	Spain 38,160; Greece 6,122.
Pig iron, cast iron, related materials	174,482	212,615	--	Japan 77,575; Italy 67,189; Bulgaria 21,755.
Steel, primary forms	12,159	31,001	--	Italy 13,916; United Kingdom 10,275.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1	--		
Universals, plates, sheets	11,839	10,688	--	Italy 6,294; Tunisia 4,394.
Tubes, pipes, fittings	52	--		
Lead:				
Ore and concentrate	6,485	2,655	--	France 1,598; Tunisia 1,057.
Metal including alloys, scrap	--	568	--	All to France.
Mercury 76-pound flasks	7,310	14,562	3,800	West Germany 4,989; East Germany 2,930; Japan 1,363.
Nickel: Metal including alloys, semimanufactures value, thousands	--	$3	--	All to France.
Zinc: Metal including alloys:				
Scrap	--	45	--	Do.
Unwrought	8,124	31,011	3,000	Netherlands 9,745; Yugoslavia 7,252; Japan 5,802.
NONMETALS				
Diamond: Industrial stones value, thousands	--	$129	--	All to Ireland.
Fertilizer materials: Manufactured:				
Ammonia	114,618	105,003	--	Spain 36,651; Italy 17,885; Turkey 17,005.
Nitrogenous	6,648	--		
Graphite, natural	--	120	--	All to France.
Phosphates, crude	641,031	599,586	--	France 127,906; Hungary 107,469; Poland 98,295.

See footnotes at end of table.

Table 2.—Algeria: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS —Continued				
Salt and brine	3,589	--		
Stone, sand and gravel: Sand other than metal-bearing	--	50	--	All to West Germany.
Other: Crude	--	4,000	--	All to Cuba.
MINERAL FUELS AND RELATED MATERIALS				
Coke and semicoke	5,107	5,173	--	All to Tunisia.
Gas, natural:[2] Liquefied thousand tons	7,246	11,904	2,511	France 7,736.
Petroleum:				
Crude[3] thousand 42-gallon barrels	176,098	179,611	42,247	France 39,723; Italy 18,749; Netherlands 17,341.
Refinery products:				
Gasoline, motor do	77,540	67,128	2,665	France 27,965; Netherlands 15,308; Italy 10,059.
Kerosine and jet fuel do	2,926	1,910	--	France 848; Mozambique 371; United Kingdom 194.
Residual fuel oil do	30,667	32,009	26,419	United Kingdom 2,201; Netherlands 1,220.

[1]Table prepared by Virginia A. Woodson.
[2]Includes unspecified quantity of liquefied petroleum gas.
[3]Includes partly refined.

Table 3.—Algeria: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	470	--		
Oxides and hydroxides	135	1,233	296	France 924.
Metal including alloys:				
Scrap	76	65	--	All from West Germany.
Unwrought	3,858	3,414	--	West Germany 1,829; France 1,418.
Semimanufactures	9,000	14,122	2	France 5,428; Italy 2,643; West Germany 1,701.
Beryllium: Metal including alloys, all forms value, thousands	--	$1	--	All from France.
Chromium: Oxides and hydroxides	26	50	--	China 40.
Cobalt: Oxides and hydroxides value, thousands	$2	--		
Copper:				
Matte and speiss including cement copper	14	25	--	All from West Germany.
Metal including alloys:				
Scrap	--	1	--	All from France.
Unwrought	2,251	724	3	France 537; West Germany 174.
Semimanufactures	19,279	18,807	4	West Germany 5,013; Belgium-Luxembourg 4,894; Yugoslavia 3,928.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite value, thousands	$2	--		
Metal:				
Scrap	127	66	--	France 65.
Pig iron, cast iron, related materials	10,438	13,128	71	West Germany 6,063; France 3,805.
Ferroalloys:				
Ferromanganese	8,681	919	--	Belgium-Luxembourg 806; France 101.
Unspecified	8,415	6,083	--	Norway 3,196; Spain 720; France 601.
Steel, primary forms	375,915	133,239	--	West Germany 97,828; Spain 23,707.

See footnotes at end of table.

Table 3.—Algeria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	741,826	1,033,948	63	Spain 379,075; Brazil 209,247; Mexico 65,271.
Universals, plates, sheets	164,365	121,557	NA	West Germany 64,463; Netherlands 12,758; Spain 5,172.
Hoop and strip	11,236	6,584	1	West Germany 3,566; France 2,147.
Rails and accessories	6,527	30,735	--	Austria 25,996; France 3,905.
Wire	25,483	21,993	73	Belgium-Luxembourg 7,682; West Germany 5,609; Spain 4,261.
Tubes, pipes, fittings	282,437	199,080	1,280	France 78,948; Spain 29,955; Italy 27,603.
Castings and forgings, rough	3,629	1,340	22	France 590; West Germany 373; Spain 171.
Lead:				
Ore and concentrate	--	7	--	All from France.
Oxides	1,450	1,081	--	France 681; Switzerland 250.
Metal including alloys:				
Unwrought	7,597	4,838	--	Tunisia 4,226; Belgium-Luxembourg 595.
Semimanufactures	83	347	--	Belgium-Luxembourg 269; France 74.
Magnesium: Metal including alloys, semimanufactures	36	58	--	Japan 46; France 10.
Manganese: Oxides	1,844	1,282	--	Greece 630; West Germany 252.
Mercury 76-pound flasks	29	32	--	All from Switzerland.
Molybdenum: Metal including alloys, all forms	3	2	--	France 1.
Nickel:				
Ore and concentrate value, thousands	$1	--		
Matte and speiss	22	2	NA	All from France.
Metal including alloys:				
Unwrought value, thousands	$3	$3	--	All from United Kingdom.
Semimanufactures	815	170	NA	France 103; West Germany 53.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$264	$1,273	--	France $1,254.
Silver: Metal including alloys, unwrought and partly wrought do	$2,539	$4,279	$10	France $1,495; Belgium-Luxembourg $1,432.
Tin: Metal including alloys:				
Scrap	167	114	--	Malaysia 100; Belgium-Luxembourg 12.
Semimanufactures	67	75	NA	Belgium-Luxembourg 61; West Germany 12.
Tungsten: Metal including alloys, all forms	3	2	NA	Mainly from West Germany.
Zinc:				
Ore and concentrate	18,491	35,630	5,848	Ireland 18,275; Sweden 5,044.
Oxides	747	460	--	China 300; France 70; West Germany 65.
Metal including alloys:				
Scrap value, thousands	--	$1	--	All from France.
Unwrought	3	18	--	Italy 16.
Semimanufactures	866	398	--	France 311; Belgium-Luxembourg 67.
Other:				
Ores and concentrates	160	100	--	All from Australia.
Oxides and hydroxides	111	272	8	France 228; West Germany 21.
Base metals including alloys, all forms	22	23	--	Italy 11; West Germany 7.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	36,483	75,152	--	Italy 53,756; Greece 21,380.
Artificial: Corundum	1,116	1,383	--	Austria 1,288; France 78.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$4	$17	--	All from France.
Grinding and polishing wheels and stones	710	751	9	Italy 371; France 182.
Asbestos, crude	3,079	27,181	--	United Kingdom 16,100; Canada 5,500; Republic of South Africa 5,207.
Barite and witherite	--	4	--	All from Italy.

See footnotes at end of table.

Table 3.—Algeria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	135	--		
Oxides and acids	397	165	--	Spain 101; China 32; France 27.
Cement thousand tons	2,953	3,354	8	Turkey 647; Greece 592; France 274.
Chalk	7,781	10,108	--	France 7,576; Italy 2,481.
Clays, crude	9,485	10,660	2	France 3,617; United Kingdom 3,153; West Germany 2,867.
Diamond:				
Gem, not set or strung value, thousands	$11	$3	$1	West Germany $1.
Industrial stones do	$927	$764	--	Zaire $739.
Diatomite and other infusorial earth	267	67	1	West Germany 36; France 30.
Feldspar, fluorspar, related materials	8,523	3,655	--	Italy 2,000; France 949; West Germany 700.
Fertilizer materials: Manufactured:				
Ammonia	87	25	--	France 24.
Nitrogenous	49,390	7,306	NA	Romania 6,759; France 405.
Phosphatic	19,369	40,255	--	All from Tunisia.
Potassic	30,651	39,713	--	Italy 20,427; Spain 19,185.
Unspecified and mixed	21,862	88	--	Denmark 83.
Graphite, natural	137	263	--	United Kingdom 220; West Germany 25.
Gypsum and plaster	168	111	--	All from France.
Magnesite	531	238	--	Austria 137; Czechoslovakia 50; West Germany 38.
Mica:				
Crude including splittings and waste	20	11	--	France 10.
Worked including agglomerated splittings	3	6	--	West Germany 4.
Phosphates, crude	3	--		
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$521	$1,079	$13	Austria $1,066.
Salt and brine	27,572	17,623	--	Tunisia 17,615.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	15,777	21,115	--	Turkey 13,600; France 5,970; West Germany 917.
Sulfate, manufactured	25,309	5,539	--	Spain 3,500; Romania 1,001.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	29	27	--	Italy 25.
Worked	7	91	--	Italy 85.
Dolomite, chiefly refractory-grade	2,391	2,099	--	West Germany 956; France 640; Albania 459.
Gravel and crushed rock	62,575	55,583	--	Italy 54,221.
Quartz and quartzite	1,500	1,059	--	West Germany 619; Belgium-Luxembourg 301.
Sand other than metal-bearing	4,188	4,829	455	Belgium-Luxembourg 3,793; West Germany 452.
Sulfur:				
Elemental:				
Crude including native and byproduct	40,667	73,796	8,878	Saudi Arabia 59,650; France 5,267.
Colloidal, precipitated, sublimed	7,003	2,507	--	Spain 2,500.
Sulfuric acid	42	38	--	France 27; Belgium-Luxembourg 4; West Germany 4.
Talc, steatite, soapstone, pyrophyllite	1,302	1,531	--	Italy 777; France 369; Spain 300.
Other: Crude	104	34	--	France 32.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	487	382	44	Netherlands 320.
Carbon black	2,527	2,038	8	France 705; Netherlands 700; West Germany 495.
Coal: Anthracite and bituminous thousand tons	682	1,170	896	West Germany 141; Poland 82.
Coke and semicoke	61,623	1,882	--	All from France.
Peat including briquets and litter	2	150	--	Austria 104; France 23.
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	18,046	6,078	--	Italy 2,465; Netherlands 1,352; France 1,292.
Mineral jelly and wax do	62,960	60,158	79	West Germany 41,467; Japan 17,794.
Kerosine and jet fuel do	48,546	71,161	--	U.S.S.R. 37,479; Belgium-Luxembourg 29,504.
Lubricants do	444,871	656,754	560	France 361,284; United Kingdom 149,226.
Residual fuel oil do	972	433	--	All from France.
Bitumen and other residues do	521,136	568,779	--	Spain 229,401; Italy 145,307.
Bituminous mixtures do	65,975	65,933	7,351	France 39,826; Austria 17,192.

NA Not available.
[1]Table prepared by Virginia A. Woodson.

COMMODITY REVIEW

METALS

Iron and Steel.—Algeria scaled back its ambitious plans for expanding the country's iron and steel sector and limited its development work to the existing steel complex of El Hadjar and the planned Jijel direct-reduction iron and steel plant. Among the projects terminated in Algeria's reassignment was the La Macta steel project, which was planned for construction near the border with Western Sahara and Mauritania. The plan was to construct a 10-million-ton steel mill complete with coking plants, several blast furnaces, oxygen steel units, and rolling mills, with iron ore to be supplied by the Gara Djebelet iron ore deposit. The Gara Djebelet deposit contained an estimated 800 million tons of reserves averaging 58% iron and 0.8% phosphorus. A $32 million feasibility study by Bechtel Civil & Minerals Corp. of the United States had been completed, and in 1979, Nippon Steel Corp. signed a $191 million contract to assist in planning and building La Macta. The project was shelved in 1984 because of the estimated $12 to $15 billion required to build a town, a 1,500-kilometer railroad, and the plant. In addition to the La Macta plant, a planned 180,000-ton-per-year specialty steel plant at Ain Mellila was also shelved.

The El Hadjar steel complex continued to be Algeria's primary steel producer. Total capacity of the plant was raised to 2 million tons per year of crude steel in 1982. Iron ore for the plant was supplied from the Ouenza and Boukhadra Mines, located 150 kilometers south of Annaba, where the El Hadjar complex is located. The mines supply the full iron ore requirement of the plant, but coking coal is imported from the United States, the Federal Republic of Germany, Poland, and Canada. The El Hadjar plant operated at only about 40% of capacity in 1984, owing to labor shortages, lack of spare parts, and a shortage of qualified maintenance personnel. The inefficient operation of El Hadjar contributed significantly to the decision to shelve many of Algeria's planned steel projects.

Construction of the Jijel direct-reduction plant and steel mill at Bellara was scheduled to begin in 1985. The plant is to consist of a direct-reduction unit for sponge iron production, a pelletization plant, an oxygen furnace, and an electric arc furnace. Initial capacity was planned for 1 million tons per year of 80% billets and 20% blooms, to be expanded to 2 million tons per year within 10 years. The construction contract had yet to be awarded, although several Japanese, West German, and Austrian firms had submitted bids in 1984.

Other Metals.—In addition to iron and steel, Algeria produced copper, lead, zinc, silver, mercury, and cadmium. Lead and zinc were produced from two mines, El-Abed and Kherzet-Youcef, and a small quantity from D'ain Barbar. The mines were located in western Algeria near the Tunisian border. Zinc concentrate from the 750-ton-per-day concentrator at Kherzet-Youcef is transported to Ghazaout for smelting in Société Nationale de Recherches et d'Exploitations Minières (SONAREM) smelter. Mercury production was from two adjacent mines, M'Rasma and Ismail, located 80 kilometers southwest of Annaba. Mercury production rose substantially in 1984, to 23,000 flasks, but remained below its peak of 31,000 flasks reached in 1970. Pure mercury was produced from a multiple hearth furnace at Azzaba, installed in 1971.

NONMETALS

Cement.—Cement production in Algeria remained stable at the 4.8-million-ton-per-year level. Capacity of the industry was boosted in 1983 when production commenced at the 1-million-ton-per-year Sour El Ghozlane plant. Algerian imports of cement increased to over 3.3 million tons in 1984, despite this new capacity. In order to satisfy domestic demand, a new 1-million-ton-per-year plant was under construction at Ain Touta. Major equipment for the project was being supplied by F. L. Smidth. The plant was scheduled to come on-stream in late 1985 or 1986.

Fertilizer Materials.—*Nitrogenous.*—The ammonium nitrate complex constructed by Creusot Loire S.A. of France and M. W. Kellogg Co. of the United States in 1979, began producing ammonium nitrate late in 1984, a full 5 years after plant management was handed over to SONATRACH. Although the ammonium nitrate unit was operational, the 1,000-ton-per-day ammonia unit was not. Completion of this portion of the project was scheduled for early 1985, making the entire complex at Annaba in northeast Algeria operational.

SONATRACH's ammonia, ammonium nitrate, and nitric acid facility at Arzew in northwest Algeria was able to increase production slightly in 1984, although output remained at about 70% of capacity. The Arzew facility consisted of a 272,000-ton-per-year ammonia unit, a 330,000-ton-per-year ammonium nitrate facility, and a 120,000-ton-per-year nitric acid unit. Creusot Loire was also nearing completion of a modernization project at Arzew designed to raise production to near capacity by 1985.

Phosphatic Fertilizer.—Algeria's phosphatic fertilizer output was from a single facility at Annaba. Capacity of the plant was 200,000 tons per year of triple superphosphate, 125,000 tons per year of diammonium phosphate, 180,000 tons per year of phosphoric acid, 540,000 tons per year of sulfuric acid, 150,000 tons per year of nitrogen-phosphorus-potassium mixed fertilizer, and 75,000 tons per year of nitrogen-phosphorus fertilizer. All of the phosphate rock raw material for the plant was derived from the Djebel Onk phosphate mine near the Tunisian border in northeast Algeria. Phosphate rock was transported approximately 150 kilometers by rail to Annaba. Reserves at Djebel Onk were estimated at 300 million tons of 53.8% bone phosphate of lime content. A second planned phosphate fertilizer plant, at Tebessa adjacent to the Djebel Onk Mine, was shelved in 1983, while efforts were underway to bring the Annaba facility up to capacity.

MINERAL FUELS

Natural Gas.—Natural gas and condensate clearly eclipsed crude oil as Algeria's primary energy mineral in 1984. Since 1979, crude oil output has declined over 40%, while condensate production has increased 210%; natural gas production, 118%; and LPG, 86%. Natural gas production in 1984 averaged 9.2 billion cubic feet per day, up about 5.5% from the 1983 level. Of this production, roughly 50% was reinjected, while only 4% of the total gas production was flared, compared with 22% in 1980.

Nearly 80% of Algeria's natural gas output was from the Hassi R'Mel nonassociated gasfield, located 640 kilometers south of Algiers. Associated gas was also produced from the Hassi Messaoud Oilfield and from other smelter oilfields. Algeria's reserves of natural gas were estimated at 109.1 trillion cubic feet, the fourth largest in the world behind those of the U.S.S.R., Iran, and Saudi Arabia.

Algerian gas is pipelined to one of four liquefaction plants, three of which were located at Arzew, and the other at Skikda in northeast Algeria. The two newer units at Arzew, SONATRACH's LNG 1 and LNG 2, each have annual processing capacity for 325 billion cubic feet of gas. The Skikda plant, which was to consist of six parallel processing trains when fully operational, will have a total processing capacity for 300 million cubic feet per year. The Skikda unit, under construction by Pullman Power Products Corp. and M. W. Kellogg, both of which are subsidiaries of the Signal Companies Inc. of the United States, was 50% complete in 1984.

LNG was exported by tanker or pipeline, mainly to Western Europe. LNG exports in 1983 totaled 915 billion cubic feet. France was Algeria's largest LNG consumer, with a contract obligation for 323 billion cubic feet of gas annually. Spain and Belgium were Algeria's other main contract customers, but contract disputes with the Spanish natural gas company and Distrigaz S.A. of Belgium have reduced deliveries to these countries, especially Spain, where actual deliveries of gas were only 33% of the quantity specified in the contract. Algerian exports to Belgium were similarly reduced in 1984 to 53 billion cubic feet per year, or 60% of the contract volume, after the contract was renegotiated in 1983 to 50% of its original volume. The U.S. firm Trunkline, a subsidiary of Panhandle Eastern Corp., suspended its purchases of Algerian gas in 1983 following contract disputes and, while negotiations between SONATRACH and Trunkline continued in 1984, no settlement was reached, and no gas was purchased by Trunkline. Distrigas of Boston continued to import about 35 billion cubic feet per year of Algerian gas for use during peak consumption periods.

Shipments of Algerian gas to Italy via the Trans-Mediterranean pipeline began in July 1983. The pipeline extends a total of 2,500 kilometers from the Hassi R'Mel Gasfield, across Tunisia, under the Mediterranean to Sicily, to Calabria in southern Italy, and then up the coast of Italy to Minerbio, north of Rome. The 48-inch-diameter line has an annual capacity of 425 billion cubic feet of gas. Deliveries of gas to Italy in 1984 were estimated at 265 billion cubic feet, nearly triple the amount transported in 1983.

Meanwhile, Algeria continued to develop its domestic gas production, gathering, and processing capacity. Gas collection units at Hassi R'Mel were being modernized, a gas reinjection plant was under construction at the Hassi Messaoud Oilfield, and a gas collection and treatment plant was under construction at the Rhourde-Nouss Gasfield, adding 84 billion cubic meters of gas to Algeria's current capacity.

Petroleum.— *Condensate.*— Production and exports of condensate have been expanding rapidly over the past several years, and represent another successful phase of Algeria's diversification of its hydrocarbon resources. The increase in condensate production has been particularly welcome because nearly all of the 350,000 barrels per day of production is exported. Production of condensate is not covered under Algeria's crude oil production quota maintained in accordance with OPEC policy. Condensate was priced at an average of $27 per barrel in 1984, creating revenues in excess of $3 billion.

Similarly, production and exports of LPG have increased dramatically, from exports of 4.88 million barrels in 1980 to exports of 24 million barrels in 1984. The increase was a result of the startup of SONATRACH's LPG processing plant at Bethioua, near Arzew. The plant has a total operating capacity of 45 million barrels per year of LPG. With the plant fully operational in 1985, LPG exports could exceed 64 million barrels.

Crude.—Production of crude oil continued its decline in 1984, the seventh consecutive year that production has decreased. Production averaged 687,000 barrels per day in 1984, down less than 1% from that of 1983. The Hassi Messaoud Oilfield was Algeria's most prodigious producer, with approximately 400 operating wells. About 40% of domestic crude oil production is exported, with approximately 110,000 barrels per day of Algeria's light crude oil being exported to the United States. Besides the Government-owned SONATRACH, CFP-Total of France, Petróleo Brasileiro S.A. of Brazil, and Royal Dutch/Shell of the Netherlands were actively exploring for crude oil in 1984. The gas reinjection project at Hassi Messaoud, being implemented by the Italian firm Nuovo Pignone, should increase output and extend the life of Algeria's most important oilfield.

Refined.—Algeria's four petroleum refineries processed a total of 425,000 barrels per day of crude oil in 1984, roughly 60% of the country's crude oil output. Of this amount, exports of refined products totaled approximately 380,000 barrels per day, leaving the balance for domestic consumption. Algeria's largest refinery, at Skikda, had a daily capacity of 325,000 barrels of crude oil input, although it continued to operate below capacity. The other refineries were located at Arzew and Maison Carree, each with a 60,000-barrel-per-day capacity, and at Hassi Messaoud, with a 24,000-barrel-per-day capacity. A new lubricants plant was under construction at the Arzew refinery, designed to produce 120,000 tons per year of lubricating oils, a product that Algeria had to import in 1984.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Algerian dinars (DA) to U.S. dollars at the rate of DA4.98=US$1.00.

The Mineral Industry of Angola

By Thomas O. Glover[1]

In 1984, mineral industry activity was predominantly in the established diamond mining areas of Lunda Norte Province and in the offshore Cabinda Enclave for petroleum. Angola exported 200,000 barrels per day of crude oil. Annual exports of crude oil were 30% higher in 1984 compared with those of 1983. The increase came as a result of the beginning of the development of the Takula Field, in Block 1, in the Province of Cabinda.

There was a general lack of information concerning production and projections for the mining industry. With the few reports that were published, a deterioration of the mineral industry, other than petroleum, was evident. Migration to the cities of the general population owing to the continuous civil strife and poor working conditions impacted production. Expenditures for defense continued to consume much of Angola's foreign exchange.

After prolonged negotiations, the Angolan Government agreed to build one of the largest hydroelectric dams in Africa, with Brazilian and Soviet financing. The Kapanda Dam on the Kwanza River in Malanje Province will cost $900 million[2] when completed. Approximately $650 million was covered by sales of oil to Brazil. The Soviet Union was contributing drawings and equipment financing for the 520-megawatt powerplant project.

PRODUCTION AND TRADE

Petroleum represented approximately $1.8 billion in revenue, or approximately 90% of the country's export revenue. Angola was reported as having no interest in becoming a member of the Organization of Petroleum Exporting Countries. Angola diversified its exports and sought closer cooperation with the European countries for the development of its sales. An average of 82,000 barrels per day of petroleum exports went to the United States, 30,000 to Spain, 20,000 to Japan, and 10,000 to Brazil.

Reliable production and trade data were not available. Production levels were estimated on the basis of the best available information.

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

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Iron and steel: Steel, crude[e] ----- metric tons--	10,000	10,000	10,000	10,000	10,000
NONMETALS					
Cement, hydraulic[e] --- thousand metric tons--	240	250	250	220	350
Diamond:					
Gem[e] --- thousand carats--	1,110	1,050	915	775	750
Industrial[e] --- do----	370	350	310	259	250
Total --- do----	1,480	1,400	1,225	1,034	1,000
Gypsum[e] --- metric tons--	25,000	20,000	20,000	20,000	20,000
Salt[e] --- do----	50,000	50,000	58,000	55,000	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--	58,000	55,000	52,000	55,000	55,000
Marketable --- do----	2,500	2,500	2,500	2,500	2,500
Petroleum:					
Crude --- thousand 42-gallon barrels--	55,034	[e]52,000	50,700	58,400	73,000
Refinery products:					
Gasoline --- do----	NA	NA	NA	NA	NA
Jet fuel --- do----	NA	NA	NA	NA	NA
Kerosine --- do----	NA	NA	NA	NA	NA
Distillate fuel oil --- do----	NA	NA	NA	NA	NA
Residual fuel oil --- do----	NA	NA	NA	NA	NA
Other --- do----	NA	NA	NA	NA	NA
Refinery fuel and losses --- do----	NA	NA	NA	NA	NA
Total --- do----	NA	NA	[e]7,240	NA	NA

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through May 29, 1985.
[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 mining will not resume for at least another year in Angola. Austromineral GmbH, a subsidiary of Voest-Alpine AG (VA) of Austria, was commissioned by the state iron ore company, Ferrangol, to rehabilitate the Cassinga mines in Huila. The mines have been out of operation since 1975. A new target date for relaunching mining operations has been set for August 1985. Civil strife in the area has hampered the rehabilitation process. The Austrian company plans to exploit 21.7 million tons of detrital iron ore at Cassinga North (Jamba) at a rate of 2 million tons per year. This ore, containing about 44% iron, will be fed into a plant at Jamba, which will yield about 1.1 million tons per year of hematite concentrate grading 62% to 63% iron content.

A contract was also awarded to VA to reequip and modernize the state-owned steel mill, Siderurgia Nacional, to raise output to 30,000 tons per year of billets.

NONMETALS

Cement.—Cement production in Angola was estimated to be 350,000 tons in 1984, with Cimangola contributing 300,000 tons and Encime the balance of 50,000 tons.

Diamond.—Companhia de Diamantes de Angola (DIAMANG) operates the country's 40 diamond mines. The Angolan Government has a 77.21% share of DIAMANG, with the balance being held principally by the Belgian Société Générale des Mines. The state share was held by a parastatal, Empresa Nacional de Diamantes de Angola. Angola's diamonds continue to be marketed through the Central Selling Organization. A De Beers subsidiary, Mining and Technical Services Ltd., provides technical assistance for the mines.

Owing to the civil strife in Angola, the Cuango Mine was closed for most of 1984, and unlikely to reopen in the near future. With Cuango closed, which normally accounts for one-third of the total value of diamond production, DIAMANG could not produce the 1984 planned earnings of $99 million. The estimated production was approximately 1 million carats. The price per carat has fallen far below the 1982 value of $85 per carat, because the closed Cuango produces Angola's best quality gems. Large-scale diamond theft and smuggling of the better stones, supply difficulties, and labor morale contributed to low production.

Steps were taken to offset the Cuango division's closure by increasing both the volume and value of the Andrada and Lucapa divisions. A new kimberlite pipe was opened up in the Andrada division.

Phosphate Rock.—A state firm, Fosfang, was set up in 1980 to exploit the phosphate rock deposits in Kindonakasi, Zaire Province, where there are reserves of 200 million tons of high-quality phosphate. A Bulgarian firm, Bulgareomina, began production in 1982 at the Kindonakasi deposits. In 1983, a Yugoslav company, Energoprojekt, discovered phosphate deposits at Mongo-Tando in Cabinda. In 1984, the company reported that 400,000 to 600,000 tons per year could be mined at the deposit.

Salt.—Government-owned saltworks at Cabo Negro, Pinda, Rocha Bentiaba, and Boa Vista, operated by Empromar Kalahari and Kuroca enterprises, were being renovated. The saltworks had been virtually unproductive. The process of restoration was conducted under a contract with a Portuguese expert on salt mining. The salt industry deterioration was basically attributed to a failure to develop the industry properly, constant breakdowns of the pumps, and a shortage of skilled technicians.

MINERAL FUELS

Angola produced 200,000 barrels per day of crude oil in 1984, which was more than a 30% increase over its 1983 average. The production of crude oil was approximately 73 million barrels in 1984, with export earnings of about $1.8 billion. Angola's oil reserves were in excess of 1 billion barrels, a 2.5% increase over the past 5 years.

Petroconsultants, a Geneva-based firm, has predicted a near trebling of Angola's 1984 oil production to almost 570,000 barrels per day by 1991, with all but 14,000 barrels per day offshore. Angola became the second ranked oil producer in sub-Saharan Africa next to Nigeria.

Three foreign oil companies are now producing in Angola: Cabinda Gulf Oil Co. (CABGOC) of the United States, Finapetróleous de Angola of Belgium, and Texaco Petroleos de Angola of the United States. CABGOC was the largest producer with 75% of the production. CABGOC's fields are all offshore Cabinda, where production started in 1968. The expansion in production was due largely to the development of the huge Takula Field, which was discovered in 1980 and has gradually been brought into production since yearend 1982. By 1986, CABGOC's forecasted production should reach 200,000 barrels per day. The company was investing $645 million between 1983 and 1986, and production was expected to continue rising substantially through the latter half of the 1980's. Angola's first liquefied petroleum gas exports began from the Malonga Fields in 1983 and reached approximately 1 million barrels per year in 1984.

Petrofina of Belgium was responsible for all of Angola's onshore production in the Zaire and Kwanza Basins. Production in these fields is expected to decline gradually. In the Kwanza Basin, almost 85% of the recoverable oil has already been exploited. In the Zaire Basin, production was expected to decline to 26,000 to 30,000 barrels per day by 1985.

Texaco, besides holding a minority interest in onshore production, was producing offshore oil in Block 2 off the mouth of the Zaire River. In 1984, two fields (Cuntala and Essungo) were in production at a rate of 15,000 barrels per day. Five other fields (Etele, Sulele, Maranga, Maleva North, and Lombo East) were discovered in Block 2. Texaco has a 40% share as operator in Block 2.

Azienda Generali Italiana Petroli S.p.A. (AGIP) of Italy struck oil with its third exploration well in Block 1 off Zaire Province. Six more wells are planned by AGIP under its exploration program. AGIP as operator has a 50% share in Block 1.

Angola has only one refinery near Luanda. Following negotiations with Petrofina, the Government took a 60% share of a new enterprise to run the Luanda refinery while Petrofina retained 40%. Crude throughput at the refinery rose to approximately 10.5 million barrels in 1984.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been estimated to be convertible from Angolan kwanzas to U.S. dollars at the rate of 30.214 kwanzas=US$1.00 for 1984.

The Mineral Industry of Argentina

By Pablo Velasco[1]

The mineral industry of Argentina was of minor importance in the production of metallic and nonmetallic minerals; its contribution to the gross domestic product (GDP) was 2.2%, unchanged from that of 1983. However, Argentina was self-sufficient in energy resources—petroleum, gas, coal, and uranium and had a large electrical production capacity. Exploration for petroleum and natural gas onshore and offshore continued. Argentina also had the most advanced nuclear energy program in Latin America. With two nuclear plants built and another under construction, nuclear power provided about 11% of Argentina's energy needs, and Argentina was an important exporter of nuclear technology and assistance to neighboring countries. The mineral resources of Argentina were potentially important but remained partially developed and explored.

Mining generated 0.5% of Argentina's foreign exchange earnings, but only 0.2% of Argentina's labor force was employed in the sector. The principal minerals exported, in order of importance, were iron ore pellets, coal, lead concentrates, portland cement, and boron products. Approximately 3,000 small- and medium-size mines were registered in Argentina, but only a few have been developed into operations of any significance, and most of them were concentrated in the nonmetallics and construction materials sector.

The Argentine economy grew about 2.0% over that of 1983. This increase represented a continuation of the recovery that had begun the preceding year when economic activity increased 3.1% over that of 1982. However, inflation continued to increase and by October 1984 exceeded 700%. Nevertheless, the upward trend in the rate of inflation leveled off to some extent in November when a more restrictive economic policy was applied. Preliminary 1984 figures released by the Central Bank of Argentina indicated a favorable trade balance of $3.5 billion, which was up from a $3.3 billion surplus in 1983. In 1984, exports increased 4% to $8.15 billion and imports grew 3.3% to $4.65 billion.

Argentina was the world's fourth largest producer of borax. There were limited coal and uranium mining activities by the state-owned Yacimientos Carboníferos Fiscales (YCF) and Comisión Nacional de Energía Atómica (CNEA). The metal mining industry was very limited and could be divided into two categories, base metals (including silver) and iron ore. In the base metal sector, there was only one company of any significance, Cía. Minera Aguilar S.A. (CMASA), a subsidiary of St. Joe International Corp., owned by the Fluor Corp. In the iron ore sector there were four underground mines, three small and one medium-size, which were owned and operated by the Government agency Dirección General de Fabricaciones Militares (DGFM).

Government Policies and Programs.—Argentina's Secretariat of Mining concluded that previous mining policies had been unable to attract foreign investment and had emphasized exploration rather than development. The Secretariat decided to promote small- and medium-size mining projects with existing reserves. To reduce dependency on mineral imports, projects to replace these minerals with domestic production would be favored. Idle ownership of mines would not be permitted. The Secretariat also announced plans to develop a new approach to foreign investment that would stimulate new investment and offer consistent, favorable regulations. This new approach was to be completed and released in 1985. An inventory of mining projects and a model contract were being developed to assist potential investors.

PRODUCTION

According to the Argentine Secretariat of Mining, the total volume of Argentina's mineral production, including metallic, nonmetallic, and construction materials, declined an estimated 3%, compared with the 1983 output. Mining output continued to be dominated by construction materials, which represented 87% of the total output, followed by the nonmetallic minerals with 10% and the metallics with 3%.

The base metals group production was led in volume by iron ore, followed by uranium, silver, tungsten, zinc, and lead minerals. Output of all these minerals except zinc and lead showed decreases compared with that of 1983. The output of nonmetallic minerals was led in volume by cement, followed by ball clay, salt, gypsum, silica, kaolin, bentonite, and boron minerals.

The downturn in the housing and construction industry had an adverse impact on almost all the construction materials. Cement producers were operating their plants at 44% capacity at yearend.

Steel production decreased 10.9% compared with that of 1983, owing to restrictive measures by foreign importers and decreased domestic consumption. In the energy sector, production of coal decreased from 491,000 tons in 1983 to 450,000 tons in 1984. Crude oil production declined 2.2% to about 175 million barrels. Increased pipeline capacity, more discoveries of natural gas in Neuquén and Campo Durán in the north of the country, and the Government's plan to shift its industrial use from oil to natural gas resulted in a 7% increase in production of natural gas to 512 billion cubic feet.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Primary	133,100	133,900	137,600	132,800	[3]133,700
Secondary	7,000	5,000	6,000	7,000	[3]7,000
Beryllium: Beryl concentrate:					
Gross weight	31	7	6	24	15
BeO content	3	1	1	2	1
Cadmium: Smelter	18	--	21	19	20
Chromium: Chromite, gross weight	169	NA	NA	NA	NA
Copper: Mine output, metal content	182	80	38	507	500
Gold: Mine output, metal content troy ounces	10,622	14,757	20,319	23,374	24,000
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	437	398	587	609	512
Metal:					
Pig iron and sponge iron do	1,793	1,720	1,896	1,862	1,821
Ferroalloys, electric-furnace:					
Ferromanganese	23,234	22,423	24,201	25,004	24,500
Silicomanganese	11,835	12,779	15,679	13,523	13,500
Ferrosilicon	11,781	10,286	16,870	15,454	15,400
Other	2,226	2,771	4,246	4,000	4,000
Total	49,076	48,259	60,996	57,981	57,400
Steel, crude thousand tons	2,685	2,526	2,913	2,943	2,622
Semimanufactures[4] do	2,643	2,193	2,667	2,492	2,367
Lead:					
Mine output, metal content	32,606	32,652	30,115	31,284	34,000
Metal:					
Smelter, primary	23,200	19,000	17,000	16,000	19,000
Refined:					
Primary	23,200	19,000	17,000	16,000	19,000
Secondary	18,500	15,600	14,600	15,000	17,000
Total	41,700	34,600	31,600	31,000	36,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Manganese ore and concentrate:					
Gross weight	6,146	2,706	3,900	6,926	6,000
Metal content	1,454	507	789	1,385	1,200
Silver, mine output, metal content thousand troy ounces	2,357	2,518	2,684	2,500	2,500
Tin:					
Mine output, metal content	351	413	304	291	300
Metal, smelter[e]	300	200	200	150	150
Tungsten, mine output, W content	44	11	17	41	40
Uranium, mine output, U_3O_8 content kilograms	284,900	221,000	470,462	135,000	100,000
Zinc:					
Mine output, metal content	33,409	35,150	36,381	36,586	37,000
Mine, smelter, primary	38,700	26,800	28,900	32,000	35,000
NONMETALS					
Abrasives: Garnet	7,200	NA	NA	NA	NA
Asbestos	1,261	1,280	1,218	1,240	1,250
Barite	49,623	49,279	36,597	61,094	60,000
Boron materials, crude	155,849	125,617	123,492	113,123	120,000
Cement, hydraulic thousand tons	7,133	6,651	5,624	5,623	[3]5,120
Clays:					
Ball clay (plastic clay), n.e.s do	1,953	1,681	1,362	1,853	1,800
Bentonite	131,384	122,719	123,254	135,569	130,000
Foundry earth	44,871	41,799	91,533	115,260	114,000
Fuller's earth (decolorizing clay)	4,772	5,246	11,795	6,741	6,500
Kaolin	91,417	66,821	72,421	145,098	140,000
Laterite (aluminous)	73,110	86,853	7,060	23,881	23,000
Refractory	176,682	105,741	99,959	73,352	70,000
Other[5]	693,950	407,014	372,807	459,208	455,000
Diatomite	6,527	4,972	6,729	10,981	10,000
Feldspar	32,529	26,118	15,091	20,065	20,000
Fluorspar	15,468	20,755	23,727	28,985	28,000
Graphite	5	2	12	20	20
Gypsum, crude	932,149	670,544	615,540	510,935	500,000
Lithium: Spodumene, amblygonite, gross weight	80	25	113	152	150
Mica:					
Sheet	218	44	24	28	25
Waste and scrap	616	459	218	285	270
Nitrogen: N content of ammonia	65,355	40,300	58,000	57,500	[3]51,000
Phosphates: Thomas slag[6]	3,621	673	600	600	500
Pigments, mineral, natural: Ocher	955	739	932	853	800
Precious and semiprecious stones: Amethyst kilograms	1,000	1,500	23,043	26,000	24,000
Pumice and related volcanic materials	36,509	51,161	53,540	68,624	65,000
Salt:					
Rock thousand tons	1	1	1	1	1
Solar do	1,003	937	594	677	650
Total do	1,004	938	595	678	651
Sand and gravel:					
Sand:					
Construction do	17,017	15,273	14,297	12,524	10,000
Ferruginous-titaniferous	2	3	1	([7])	NA
Silica sand (glass sand) thousand tons	202	265	227	314	300
Gravel do	10,657	9,522	8,240	5,878	5,800
Stone:					
Alabaster	--	--	NA	NA	NA
Basalt thousand tons	3,721	3,762	4,182	2,894	2,800
Calcareous:					
Calcite, nonoptical	17,888	13,920	6,789	7,520	7,400
Calcium carbonate (chalk)	32,706	4,673	17,604	8,325	8,000
Dolomite	220,521	212,928	257,158	239,496	200,000
Limestone thousand tons	14,322	14,491	12,651	12,318	12,000
Marble:					
Aragonite, broken	7,342	3,689	3,323	4,782	4,500
Onyx, in blocks and broken	23,638	15,911	11,420	16,359	15,000
Travertine, in blocks and broken	16,297	12,144	14,399	5,686	5,000
Unspecified, in blocks and broken	105,415	82,379	51,342	74,284	70,000
Flagstone	162,219	73,243	114,519	80,508	75,000
Granite:					
In blocks	41,005	46,812	33,374	41,554	40,000
Crushed thousand tons	7,837	6,235	5,439	5,712	5,000
Quartz, crushed	76,692	180,091	76,149	81,615	80,000
Quartzite, crushed thousand tons	1,675	1,183	1,048	765	750
Rhodochrosite	87	30	35	45	40
Sandstone	187	160	NA	28	20
Serpentine, crushed	30,248	28,467	21,284	22,460	21,000
Shell, marl	671,336	800,728	819,009	718,000	700,000
Tuff and tufa thousand tons	1,974	3,118	1,135	1,031	1,000
Strontium minerals: Celestite	268	310	776	673	600

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Sulfates, natural:					
Aluminum (alum)	34,735	4,186	3,850	3,983	3,500
Iron (melanterite)	100	NA	NA	NA	NA
Magnesium (epsomite)	8,556	1,000	2,321	828	800
Sodium (mirabilite)	37,868	52,018	42,257	45,065	45,000
Sulfur: Native from caliche	--	10	--	--	--
Talc and related materials:					
Pyrophyllite	5,226	1,026	2,687	4,925	4,000
Steatite	2,930	1,452	1,490	1,387	1,300
Talc	24,575	33,741	24,716	23,379	23,000
Total	32,731	36,219	28,893	29,691	28,300
Vermiculite	9,907	3,277	3,354	3,951	3,600
Water, mineral-containing	125,746	98,735	88,476	76,819	75,000
Zeolite	30	40	50	60	50
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural	992	1,186	2,480	5,852	5,800
Coal, bituminous thousand tons	389	498	515	491	450
Coke, all types including breeze do.	546	451	536	450	437
Gas, natural:					
Gross million cubic feet	475,535	r481,305	543,875	477,543	512,027
Marketed do.	270,000	r294,147	333,848	78,649	78,081
Natural gas liquids:					
Butane thousand 42-gallon barrels	1,670	2,211	r e3,400	r e3,600	3,800
Propane do.	2,069	3,019	r e4,700	r e4,900	5,100
Total do.	3,739	5,230	r e8,100	r e8,500	8,900
Peat, agricultural	4,560	2,460	3,800	3,726	3,500
Petroleum:					
Crude thousand 42-gallon barrels	179,676	181,352	179,072	179,097	175,200
Refinery products:					
Gasoline do.	44,009	43,658	44,315	43,663	43,180
Kerosine do.	4,587	3,298	3,387	4,095	3,565
Jet fuel do.	6,072	6,102	5,104	4,852	5,257
Distillate fuel oil do.	55,100	56,232	56,095	56,342	56,251
Residual fuel oil do.	51,159	51,132	46,835	43,285	41,213
Lubricants do.	1,939	1,871	2,199	1,968	2,076
Other do.	13,629	12,808	13,966	7,145	8,574
Refinery fuel and losses do.	13,121	14,874	11,284	14,612	10,404
Total do.	189,616	189,975	183,185	175,962	170,520

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 30, 1985.
[2]In addition to the commodities listed, bismuth, carbon black, columbite, lime, natural gasoline, perlite, and potassium sulfate (kalinite) are or are believed to be produced, but output is not reported quantitatively and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Hot-rolled semimanufactures only; excludes castings and cold-rolled semimanufactures produced from imported hot-rolled semimanufactures.
[5]Includes plastic, semiplastic, and/or ferruginous clays used totally in the manufacture of portland cement.
[6]Thomas slag production was estimated from the Thomas crude steel reported in La Siderurgia Argentina 1980-81 annual publication and from a percentage of slag produced from Thomas crude steel reported during 1974-76; for 1980 and 1981 from the reports published by the Instituto Argentino de Siderurgia in 1982.
[7]Revised to zero.

TRADE

The estimated mineral trade balance excluding petroleum and natural gas was a negative $24 million, which was down from $35.5 million in 1983. The leading exports by volume were iron ore pellets, coal, cement, lead ore and concentrates, and boron products. Exports of minerals and products have been decreasing for 4 consecutive years. The decrease was attributed to higher domestic costs, combined with lower international prices. Imports of mineral commodities included manganese ore and concentrates, iron ore and iron ore pellets, bauxite, asbestos, clays, sand, and sulfur.

Both the gross tonnage and the value of Argentine mineral imports in 1984 showed a reduction from their 1983 levels. Imports of metallic minerals were valued at $92 million, while imports of nonmetallic minerals were valued at $36 million; however, if imports of manufactured metal products and chemicals were included, the total increases to about $800 million. Argentina is still heavily dependent on foreign sources of minerals, metal products, and chemicals. The reduction in imports reflects the decrease of economic activity, which resulted in a reduction in per capita demand for steel.

Imports of crude and refinery products showed a sharp decline, mainly because of a significant slowdown in the Argentine economy, which resulted in a reduction in demand for fuels and the substitution of fuel oil by natural gas in many industrial applications.

Argentina's imports of natural gas from Bolivia declined 0.7% in volume and fell 0.6% in value to $376 million compared with that of 1983.

Argentina and Brazil were studying a major natural gas supply project to transport Argentine gas to Brazil's industrial heart of São Paulo via a 932-mile pipeline. The project calls for transporting about 706 to 882 billion cubic feet per day from northern Argentina's Salta Province through Paraguay to São Paulo in southern Brazil. Argentina was to finance construction of the pipeline.

Table 2.—Argentina: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983
METALS		
Aluminum: Ore and concentrate	18,105	16,736
Chromium: Ore and concentrate	6,198	14,103
Iron: Ore and concentrate	1,504	1,431
Manganese:		
Ore and concentrate	126,250	63,425
Oxides	2,429	1,497
Tin: Ore and concentrate	320	--
Titanium: Ore and concentrate	1,930	2,402
Other: Ores and concentrates	204	131
NONMETALS		
Abrasives	165	436
Asbestos, crude	15,461	14,152
Barite and witherite	677	708
Cement	1,695	1,516
Chalk	271	54
Clays, crude	13,051	25,761
Cryolite and chiolite	18	34
Diatomite and other infusorial earth	913	925
Graphite, natural	241	312
Gypsum and plaster	3	13
Magnesite	8,887	19,304
Mica: Crude including splittings and waste	44	52
Pyrite, unroasted	[r]29	56
Salt and brine	54	142
Stone, sand and gravel:		
Dolomite, chiefly refractory-grade	595	902
Gravel and crushed rock	45	74,470
Quartz and quartzite	68	539
Sand other than metal-bearing	78,975	150,966
Sulfur: Elemental, crude including native and byproduct	81,020	100,532
Talc, steatite, soapstone, pyrophyllite	337	728
Other: Crude	142	176

[r]Revised.
[1]Table prepared by Harold Willis. Source data for 1983 were not available at the time this table was prepared.

COMMODITY REVIEW

METALS

Aluminum.—Production of primary aluminum, estimated at 133,700 tons, was 0.7% higher than in 1983. Aluminios Argentinos S.A.I.C., the largest aluminum producer in the country, continued operating the Puerto Madryn plant at full capacity despite the depressed economic situation of the nation. However, the aluminum-transforming industry, led by Camea and the Kicsa Co., was subject to official price controls, which seriously affected their productive capacity because the cost of prime materials had risen on an average of 136%; labor, 166%; electrical power, 162%; and natural gas, 147%. Kicsa began a $4 million expansion program to increase its plant production capacity by about 20% to 25%. This project was scheduled for completion in April 1985. The decision to expand its production capacity was based on expected continuous growth of the market in the near future.

Metalurgia Oliva, another aluminum-transforming company, decided to build a new plant to manufacture foundry and rolling products from primary aluminum. Production from this $2 million project was expected to start in late 1985 or early 1986.

Exports of aluminum ingots decreased about 14% to 30,100 tons owing mainly to delays in shipments. Exports of processed aluminum products increased 72% to 25,000 tons, compared with the 1983 level, because of increased foreign demand, principally from the United States and neighboring Latin American countries.

Copper.—The new Argentine Government, through its Secretariat of Mining, announced under its new mining expansion plan that the Government will emphasize development of mineral deposits for export. Special priority is to be given to the development of the much delayed Bajo la Alumbrera porphyry copper-gold-silver-molybdenum deposit in northwest Catamarca Province.

The project was owned by the state mining company Yacimientos Mineros de Agua de Dionisio (YMAD), itself controlled by DGFM. The Government, however, was forcing DGFM to relinquish control over the deposit, opening the way for international tenders. The tenders, aside from developing the work described in the drawings and specifications, will construct all infrastructure such as access roads, bridges, and mine utilities, etc.

The Bajo la Alumbrera deposit contains reserves estimated at 350 million tons with an average ore grade of 0.49% copper, 0.62 gram of gold, 2.5 grams of silver per ton, and 0.008% molybdenum. Yields were projected at 60,000 tons per year of copper, 10.5 tons per year of silver, 0.6 ton per year of gold, and 500 tons per year of molybdenum. The Government will grant rebates to promote exports once local needs are met. The Government also intends to call for an International Bank for Reconstruction and Development loan to help finance a new feasibility study and to call for tenders for development of the project. The total required investment could reach about $650 million.

The El Pachón project of CMASA in San Juan Province remains on the shelf; this project has reserves of over 800 million tons averaging 0.67% copper and 0.016% molybdenum. The parent company, St. Joe, continued investigating lower cost extraction technology such as in situ leaching, which could eventually be applied to the El Pachón deposit.

Preliminary exploration for molybdenum and copper in the Famatina District in La Rioja Province resulted in disappointingly low grades. Nevertheless, preliminary estimates conducted in one-fourth of the mineralized area of the Nevados del Famatina deposit showed 200 million tons of reserves averaging 0.06% molybdenum and 0.17% copper. The State of La Rioja has high hopes of increasing the reserves and ore grades once the exploration drilling in the remaining area is completed.

Gold.—The Secretariat of Mining announced that it will call for tenders for the exploration and exploitation of the Huemules gold deposit located in the Province of Chubút. The deposit was estimated to have 3 million tons of ore containing about 2.3 troy ounces of gold, 6 troy ounces of silver, 8.8% zinc, 6.0% lead, and about 2.0% of copper per ton. Initial exploration of the deposit was conducted by the United Nations Revolving Fund, which also provided much of the initial costs. Ore reserves have to be developed, and the property-project requires a careful and thorough evaluation. This announcement was the first result of the policy shift directly aimed at obtaining an assessment of the economic potential of mineral deposits instead of the previous practice of only making an inventory of deposits. Similar calls for tenders were expected for the Ofir (gold and other metals) Mine in La Rioja and the Ofir Mine in San Juan.

Gold production in Argentina had been increasing steadily,since 1978 when production reached 5,600 troy ounces to an estimated figure of 23,374 troy ounces in 1983. The 1984 output of gold was about the same level as in 1983 and was equally divided between Mina Ángela owned by Cía. Cerro Castillo S.A., in Chubút Province, and Farallón Negro Mine of YMAD in Catamarca Province. The YMAD bullion refinery installation at the Farallón Negro Mine was scheduled for completion in 1985. Earlier the bullion had been processed in Buenos Aires. Production was expected to reach approximately 16,000 troy ounces of gold and 80,000 troy ounces of silver per year.

Two private companies were granted the Famatina gold concessions to exploit the alluvial gold deposits of Los Roblones, Playa Amarilla, and Mariposa de Oro in La Rioja Province. According to La Rioja government prefeasibility studies, the alluvial gold deposit reserves were estimated to be about

30 million tons of ore, containing approximately 160,000 troy ounces of gold for a total estimated value of $65 million.

Iron Ore.—Argentina's largest iron ore mining company, Hierro Patagónico S.A. Minera (HIPASAM), which operates the Sierra Grande Mine in Río Grande Province, produced 723,000 tons of iron ore grading 29% iron and 465,000 tons of iron ore pellets grading 65% iron. HIPASAM reportedly only used 50% of its plant capacity, owing to depressed demand in the local market. Sociedad Mixta Siderúrgica Argentina S.A. (SOMISA) and HIPASAM were conducting technical and economical feasibility studies on HIPASAM's iron ore in order to reduce the phosphorus content, which created problems in SOMISA's direct-reduction blast furnaces. In addition, SOMISA's No. 2 blast furnace, which was shut down during the second half of the year for maintenance and for economical reasons, created difficulties in planning and forecasting demand and production of HIPASAM's iron ore pellets. The Altos Hornos Zapla smelter, in Jujuy Province, owned and operated by DGFM, had processed about 330,000 tons of low-grade iron ore from its three small mines: Cerro Labrado (35% iron), 9 de Octubre (33% to 48% iron), and Puesto Viejo (30% to 38% iron). The 0.6% to 0.7% phosphorus content in the iron ore from these mines resulted in high-phosphorus pig iron, which was treated in the Thomas converters.

Imports of iron ore and pellets came mostly from Brazil (73%) and Peru (27%). They totaled 1.6 million tons, which was 30% less than in 1983. Production of iron ore in Argentina decreased 16% compared with that of 1983.

Iron and Steel.—The Argentine steel industry experienced an unfavorable market situation because of lower consumer demand. Total consumption (direct and indirect) declined 12% compared with that of 1983. Production of crude steel, primary iron (pig and sponge), and semimanufactures decreased 10.9%, 2.2%, and 5%, respectively, compared with that of 1983. Argentina was the only steel producer among the most important Latin American producers that experienced a decline both in production and consumption of steel. Among the reasons for these declines were the depressed economic situation of the country, insufficient investments, and the flight of capital accompanied by a drastic fall in internal savings. The economy of the steel industry was also affected very seriously by the Government's price policy, which had maintained the steel producers at low production-capacity levels and high production costs.

The price policy was changed at yearend, but the accumulated losses remained unchanged. The international market for steel was a significant issue in 1984. The U.S. International Trade Commission voted in November that imports of wire rod from Argentina and Spain had injured the U.S. steel producers and gave the go-ahead to the U.S. Department of Commerce to impose antidumping duties up to 119% on the material. Between 1983 and 1984, the U.S. steel imports from Argentina increased to 1.4% of the U.S. consumption from 0.3%. The U.S. steel imports were valued at $14 million in 1983. In 1984, Altos Hornos Zapla smelter officials announced that about 12,000 tons of steel would be shipped to China during the first quarter of 1985. This shipment would be the first part of a 50,000-ton contract with China whereby the steel was to be delivered in 1985. Similar negotiations are underway with India and other countries in the Pacific and Indian Oceans and the Far East in an attempt to relieve the current steel crisis caused in part by the U.S. import limitations.

Lead, Silver, Zinc, and Others.—St. Joe's Aguilar Mine was operating at a rate of 688,000 tons of ore annually. Proven and probable reserves totaled 6.2 million tons of ore grading 5.8% lead, 6.9% zinc, and 3.5 troy ounces of silver per ton.

Aguilar produced concentrates containing approximately 32,000 tons of lead, 37,000 tons of zinc, and 1.6 million troy ounces of silver. Part of the concentrates normally sold to smelters and refineries in Argentina have been exported for the past 4 years.

St. Joe holds 50% ownership in Sulfacid, the principal active zinc refinery in Argentina. During the past 3 years, zinc capacity at Sulfacid has been increased from 25,800 to 31,700 tons annually. The electrolytic zinc plant also produces about 70,000 tons per year of sulfuric acid.

During 1984, six exploration projects from the small-mining sector received credit loans for a total amount of 31 million pesos, as part of Argentina's new "Mining Expansion Plan." These exploration projects were for feasibility studies for possible exploitation of metallic reserves, which currently the country has to import from other nations.

Manganese.—The Secretariat of Mining had approved a 2.6 million pesos loan to Cía. I.S. Grassi S.A., to explore the Tres Lomitas manganese deposit in Córdoba Province.

An agreement between the Province of Córdoba and the Secretariat of Mining was signed on November 20, 1984, for the construction and operation of a manganese gravity concentration plant at the El Pozo Nuevo in the Sobremonte Department. The manganese plant will have a 200-ton-per-day processing capacity, and it was estimated to recover about 80 tons of manganese concentrate daily grading 34.5% manganese. Argentina's current production of manganese comes from mines in Córdoba, Mendoza, and Santiago del Estero Provinces.

The Farallón Negro Mine in the YMAD District in Catamarca has been yielding manganese for several years, but the manganese is not recovered while the gold and silver ores are processed. The tailings from this process are being stored for future recovery of manganese.

Production of manganese in Argentina decreased from 1978 to 1981, but experienced a modest recovery in the past 3 years. Consumption of manganese in steel and ferroalloy plants continued to be high, and it was estimated that Argentina in 1984 imported $9 million worth of manganese.

Tin.—For the past several years, Argentina has been producing tin and silver from the Grupo Minero Pirquitas Mines, owned and operated by the private consortium Sociedad Minera Pirquitas-Picchetti y Cía. S.A. These tin deposits were discovered in 1932 and are in the Department of Rinconada, Jujuy Province, 60 kilometers from the Bolivian border. Sociedad Minera Pirquitas owns two fully integrated smelters, a tin smelter and refinery known as Estansa S.A. and La Cuprífera Argentina S.A.I.C., located in Reyes and Palpalá Districts in Jujuy Province. Monthly production of concentrates from the Pirquitas' mines are about 50 tons of tin and 1,000 kilograms of silver. Approximately 80% of the concentrates are processed in the local smelters with an 80% to 85% recovery. The remainder, as well as slags from previous smelting processes, are sent to Belgium. The Estansa smelter was designed for processing low-grade tin sulfide ores and has an operating capacity of 480 tons of tin metal per year. Most of the feed will be provided from Sociedad Minera Pirquitas' mines in Jujuy; however, the company officials indicated that additional feed for the plant could be imported from Potosí, Bolivia.

Titanium.—At yearend 1984, the Secretariat of Mining announced that it was seriously considering the development of mineral sands that contain ilmenite, zircon, and rutile. These sand deposits are located at San Blas Faro Segundo on the Atlantic coast near Buenos Aires. Reserves of about 12 million tons of ore grading 2.5% titanium oxide, 11% iron, and zircon in minor quantities were identified in a 1-kilometer-wide strip extending about 45 kilometers.

Tungsten.—Tungsten output increased for the past 2 years but leveled out in 1984. Most of the output comes from mines in Córdoba, San Luis, and Río Negro Provinces. Exploration conducted in two mines (San Martín and Cerrito Blanco) in San Luis Province showed 2,000 tons of WO_3, with great potential to increase reserves as study and drilling proceeds. Argentina has three tungsten plants, including one recently installed at La Toma in San Luis Province with a processing capacity of 300 tons of ore per day. Officials from San Luis indicated that there were several small producers of tungsten that could produce an additional 50 tons of ore per day. Based on plant capacity, these plants could produce 35 to 45 tons of WO_3 concentrate per month.

NONMETALS

Aluminum Sulfate.—The Secretariat of Mining of Argentina and the Secretary of Mining, Industry and Commerce of Jujuy Province signed a contract for the installation of an integral aluminum sulfate plant and the evaluation of reserves in the District of Tafna, Department of Yavi, which is located close to the border with Bolivia.

Production of natural aluminum sulfate in Argentina currently comes from deposits located in the Province of San Juan and has been decreasing since 1979 when it reached a record high of 48,000 tons. The 1984 production was only 3,500 tons. In September, an extended contract for the next 10 years was signed to supply the nation with this important commodity, instead of importing it from foreign countries.

Boron.—Production of boron minerals increased 6% to 120,000 tons, compared with that of 1983. The largest boron mineral producer in Argentina was Cía. Boroquímica S.A.M.I.C.A.F., owned by Rio Tinto Zinc Corp. Ltd. This company produced and processed borate from ulexite minerals, a hydrous borate sodium and calcium locally called "tinkal." The primary importers of boron minerals and boron products from Argentina were Brazil, Uruguay, and, in lesser quantities, the United States.

Cement.—The Argentine Cement Industry had been expanding and increasing its installed capacity for several years. Nineteen cement plants operated during 1984. These were located in 11 provinces and had a total installed annual capacity of over 11 million tons. All were privately owned. Domestic demand for cement fell and exports decreased. Total cement plant capacity use continued decreasing from 50% in 1982 to 48% in 1983 to 44% at yearend. Production of cement decreased 9% compared with the 1983 level. The reasons for the drastic decline in the Argentine cement industry were the generally depressed economy, the rigid price control policy, the high rate of inflation, and low demand in the construction sector.

Potassium Salts.—The Secretariat of Mining was supporting projects that can be mined at lower cost than the cost of imports. Among these was the potassium salt project located in Malargue, Mendoza Province. This project was officially inaugurated in 1983 and owned by Empresa Minera Tea S.A. Under this program, Empresa Minera Tea was granted an additional loan to explore further the potassium chloride deposits in Malargue. Argentina believes this project will allow the country to achieve self-sufficiency in this basic fertilizer mineral.

Sodium Carbonate.—There were two projects under study for the development and exploitation of sodium carbonate in Argentina. The first project considered for exploitation by the Government and the private firm, Empresa Alcalís de la Patagonia S.A., was the San Antonio del Oeste in the Río Negro Province and the second in Malargue, Mendoza Province, by the Centro Minero Departamental. Both projects would recover sodium carbonate (soda ash) by the "Solvay" process.

The other project in Malargue, Mendoza, was still under consideration for possible negotiation with the Polish Government. The Polish Government indicated an interest in a feasibility study regarding a possible joint venture between the two Governments and that Poland would be interested in receiving Argentine fishing vessels in exchange for its assistance.

MINERAL FUELS

Coal.—Argentina's only coal mining complex, Río Turbio, located in the southern Province of Santa Cruz, produced about 450,000 tons of coal, which was slightly below output in 1983.

Argentina shipped 33,000 tons of coal to a utility in Denmark as part of an experimental program to export coal to Europe. However, because of the current depressed economy of the country and the need to curb imports of coal and to maintain a favorable balance of payments, it is unlikely that the planned marketing program to sell coal to foreign countries will be successful. YCF officials indicated that Argentina will give priority to meeting domestic demand for coal rather than exporting and that there is no certainty that YCF will be able to meet projected Argentine internal demand for coal during the next few months because of the need for substantial investment to expand the Río Turbio output above 1.5 million tons per year. In addition, the Government was also planning a major shift in industrial energy from oil to natural gas and coal.

One of YCF's biggest clients, the Argentine state electricity company, Agua y Energía Eléctrica (AEE), plans to have a total of 620 megawatts in extra capacity coming on-stream at its Bahía Blanca power station in about 2 years. Coal requirements at Bahía Blanca were estimated to rise about 1.5 million tons per year, once the new plant comes on-stream, all of which was supposed to have come from Río Turbio.

AEE currently uses about 300,000 tons of coal per year, but another project at San Nicolás in Buenos Aires Province will require an additional 500,000 tons per year during the second half of the 1980's. The Argentine steel industry is gradually demanding more coal from Río Turbio. SOMISA alone uses about 70,000 tons of coal per year, which currently is imported from foreign countries.

Natural Gas.—Natural gas deliveries by pipeline amounted to 512 billion cubic feet, which was an increase of 7% compared with 1983 pipeline deliveries. Natural gas production has been increasing since 1978, mainly due to major discoveries in Neuquén and increased pipeline capacity. Reserves of natural gas were 24.4 trillion cubic feet. Based on current consumption of 512 billion cubic feet per year, the reserves will last for almost 50 years. Existing contracts for the purchase of Bolivian gas through 1992 would increase these reserves by approximately 625 billion cubic feet.

Production of liquefied petroleum gas increased 4.7% compared with that of 1983, and imports of natural gas from Bolivia declined 0.7% to 78 billion cubic feet. The original contract for importing Bolivian natural gas was signed in 1969. The contract requires Bolivia to supply Argentina with 212 million cubic feet of gas per day. Current contract price is $4.28 per million British thermal units (Btu). The initial price in 1972 was $0.22 per million Btu for gas delivered to Campo Durán. Bolivia has fulfilled the contract terms in supplying gas, but Argentina has fallen behind in its payments to Bolivia.

There were ongoing discussions with Chile concerning exports of natural gas from Loma de La Lata Gasfield in Neuquén Province by pipeline to Santiago, Chile. There were also general discussions with Brazil on natural gas exports via a pipeline from Campo Durán to São Paulo, Brazil.

Argentina was proposing a 5-year, $1.4 billion plan stressing natural gas development and exporting oil derivatives. As part of that plan, the Soviet Union has reportedly offered to design and construct 370 miles of natural gas pipeline. This proposal would carry 500 million cubic feet of gas per day. It would run east from the Neuquén gasfields to the Atlantic Ocean near Bahía Blanca. In a separate project, two processing plants would be built at the end of the gasline to produce 800 tons per day of propane, butane, and ethane for export.

Petroleum.—Oil production in Argentina has shown a downward trend in recent years. This is a result of both a downturn in the economy, resulting in reduced demand, and a reduction in new investment by production contractors unhappy with the prices paid by YPF for their crude. The decrease in demand also resulted in a reduction in imports. Exports remained stable and were sufficient to offset the value of imports.

Argentina's oil production in 1984 fell 2.2% below the 1983 level to 175 million barrels. Oil reserves totaled 2.4 billion barrels. At the present level of production of 175 million barrels per year, these reserves are sufficient for about 14 years.

During the last 4 years, Argentina changed from a net importer to a net exporter of refined petroleum products. In 1983, Argentina produced enough domestic crude oil to satisfy its needs and continued to do so in 1984. This was not because crude oil production increased but rather was due to the drop in demand for petroleum products because of an economic recession. However, Argentina's new Government has announced that it will promote a steady increase in new reserves and production, principally through YPF, although private company (both domestic and foreign) participation will be welcome.

Production contracts signed in 1976-77 and renegotiated in 1983 were to be reviewed, and in some cases, revised by the new administration during the 120 days allotted for a renegotiated contract.

During 1984, 18 contracts were renegotiated and reshaped into service contracts with the price of oil varying between $10.50 and $18.76 per barrel; the previous price was $17.59 per barrel.

An agreement was signed between YPF and Shell Cía. Argentina de Petróleo S.A., a subsidiary of the Royal Dutch/Shell Group, to develop offshore oil reserves east of the Tierra del Fuego. Shell will invest $290 million to attempt to develop reserves in the 4,895-square-kilometer block off the Magallanes Strait in the extreme south of Argentina. Under the proposed contract, YPF will pay shell 75% of the international market price for oil produced up to a target rate of 19,000 barrels per day from the Magallanes Field. According to YPF, Shell will pay $308 million in operating costs and $336 million in taxes to the Government, and YPF will receive $371 million in profits during the 10-year life of the contract. The price agreed upon between YPF and Shell was about $22.52 per barrel for oil produced up to a target of 4.4 million barrels per year.

YPF and Petróleos Paraguayos (Petropar) have signed a contract for monthly and quarterly supplies of petroleum products. Bridas S.A.P.I.C. announced an oil and gas discovery at Aguaray, north of Salta Province. A provisional estimate indicates potential production of 2,830 barrels of crude oil daily and 10.6 million cubic feet per day of natural gas. Exxon Corp., together with a local firm, was conducting an exploration program in Río Negro and Chubút Provinces. A seismic survey was followed by the drilling of three wells, which cost a total of $7 million. YPF planned additional drilling in the Formosa Province, near the border with Paraguay. YPF discovered oil in the area with its Largo X-1 wildcat, which reportedly yielded 3,150 barrels per day.

Uranium.—*Nuclear Energy.*—The CNEA budget for 1984 was cut to $250 million, which was scarcely one-third of its needs. If the original program had been maintained, CNEA would have required a budget of $950 million for maintenance and construction in 1984 (excluding interest and amortization). Financing of the Argentine nuclear program was seriously affected by the budget cut, which practically eliminated the program. It halted almost all construction, and the postponement of planned projects caused plants to perform at levels far below their full capacity.

The CNEA's financial position would have been less serious had the Secretariat of Energy not also implemented a policy that reduced considerably the income earned by the Atucha I and Embalse nuclear powerplants. Even though they were in excellent operating condition, during the year they had operated at an average of less than 60% of their potential.

The situation of the projects under development was even worse. Very little progress was made on these projects. The most important ones were the Atucha II (690-megawatt-capacity plant, $1.7 billion investment), the Arroyito heavy water plant (annual output of 250 tons, $600 million investment), the spent fuel reprocessing plant (annual output of 40 tons, $500 million investment), and the uranium enrichment plant (output of 500 kilograms of U-235 enriched to 20%, $130 million investment).

The effect of budget cuts on the uranium and fuel production sectors was less serious because lower load factors meant the use of smaller amounts of fuel. Moreover, the available stock (about 130,000 tons) plus the 1983 production (another 70,000 tons) provided a comfortable reserve. Total production of yellow cake reached 138,909 kilograms by November 30.

Production of uranium dioxide (the actual nuclear fuel) was 78,700 kilograms by the conversion process at the Córdoba plant. Through a consortium of contractors, the CNEA drilled in Patagonia 80% of the 40,000 meters of exploratory holes that it had planned. As a result, possible uranium deposits were detected near Los Adobes in Chubút Province. In Sierra Pintada (the main deposit discovered so far), CNEA began operations in late December to extract 560,000 tons of uranium ore, as part of a program to accumulate, over a period of 18 months to 2 years, the amount of uranium ore calculated to cover the needs for the production of yellow cake for 3 years. The production of uranium in 1984 was considered sufficient; however, if they wished the nuclear plants to return to their normal level of operation, production would have to increase substantially.

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The Mineral Industry of Australia

By Travis Q. Lyday[1]

Australia was one of the world's major producers of minerals and metals. It had significant deposits of bauxite, coal, copper, iron ore, manganese, mineral sands, nickel, and uranium, which have thrust the country into world prominence as a source of basic raw materials. Additionally, Australia was virtually self-sufficient in most mineral commodities, with the notable exception of chromium, mercury, petroleum, phosphate rock and potassium fertilizers, platinum, and sulfur. Still, about 85% of the country's consumption of crude oil was supplied by domestic production in 1984 and there are abundant but undeveloped domestic phosphate deposits.

The Australian mineral industry was export oriented, as the country was relatively unimportant as a mineral consumer, with about one-half of the country's mineral production, representing about 40% of the value of total exports, being exported to over 100 countries. Australia was the world's largest exporter of alumina, ilmenite, refined lead, monazite, rutile, and zircon; oscillates with Brazil as the leading exporter of iron ore; and was among the world's leading suppliers of bauxite, coal, cobalt, lead, manganese, nickel, salt, tungsten concentrate, zinc ore and concentrate, and refined zinc.

The estimated value of Australia's nonfuel production in 1984 ranked fifth in the world after the U.S.S.R., the United States, the Republic of South Africa, and Canada. The value of mineral production including fuels was estimated to rank 10th in the world.

Australia was one of the few market economy countries that was a net exporter of mineral fuels. Abundant coal, natural gas, liquefied petroleum gas, and uranium supplies have enabled Australia to establish a consistently favorable balance of trade in energy products. Most of Australia's energy exports go to the circum-Pacific region, particularly Japan, which received almost 55% of Australia's coal exports.

Government Policies and Programs.—The Australian Government's long-awaited profit-based resource rent tax (RRT) on new offshore oil development went into effect July 1.

In early July, the Australian Labor Party (ALP) National Convention reaffirmed the prouranium mining policy initially set by an ALP caucus vote in November 1983.[2]

In accordance with policy also reiterated at the National Convention in July to ban exports of uranium to France as long as the French continue to test nuclear weapons in the South Pacific, the Government deferred in October a 100-ton shipment of uranium oxide (U_3O_8) scheduled to be shipped to France's Électricté de France from Queensland Mines Ltd.'s (QML) Nabarlek Mine. Australia's nuclear safeguards policy, based on strong support of the Nuclear Non-Proliferation Treaty, which Australia signed in 1973, includes an undertaking not to permit the use of Australian-origin nuclear material for military or explosive purposes. Nuclear safeguards agreements incorporating all the requirements of the Government's policy have been signed with nine countries, including France, as well as the European Atomic Energy Community.

During 1984, the Government licensed the export of excess production of light crude oils and condensates, predominantly from the Bass Strait fields offshore between Tasmania and the mainland, and at year-end was shipping about 25,000 barrels per day to Japan and the United States.

The Government provided a tax concession long sought by the mineral exploration industry when it allowed money spent on general mining exploration to be deductible against income from any source. The tax system also was changed to allow companies to transfer their losses between different members of their company groups where there was 100% common ownership.

PRODUCTION

Generally, 1984 proved to be a disappointing year for the Australian mining industry. Difficult marketing conditions, especially in coal and iron ore, the two largest mineral commodities in terms of value produced in Australia, and higher domestic costs prevailed throughout the year. Although overall revenue from mining and smelting grew strongly in the aftermath of the recent recession, largely owing to an increase in commodity sales, especially iron ore and coal, after several years of stagnation, unit prices were for the most part lower than in 1983, meaning that many companies in the mineral industry lost money or saw their earnings for the year substantially reduced. Labor disputes, relatively low in 1983, rose in 1984. Time lost as a result of strikes increased almost 50% over that of 1983.

Of the major mineral commodities, only coal had a record high production level for the year, although several others had increased production over that of 1983, including alumina, bauxite, ilmenite, iron ore, manganese, rutile, uranium, and zirconium concentrate.

During 1982, the latest year for which official data are available, the value of coal production exceeded that of any other commodity and accounted for 33% of the total value of mine output. Iron ore increased its second-place share to 15% of total value with a strong performance in 1982. These were followed by crude oil, 6%; lead-silver-zinc, 6%; uranium, 4%; gold, 3%; copper, 3%; and natural gas, 3%. Following in descending order were lignite, tin, limestone, salt, rutile, manganese, zircon, opal, ilmenite, tungsten, sapphire, and brick clay.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite, gross weight ----- thousand tons--	27,179	25,441	23,625	24,539	[2]32,180
Alumina ---------- do----	7,246	7,079	6,631	7,230	[2]8,435
Metal, refined ---------- do----	303	379	381	478	[2]758
Antimony, Sb content of antimony and lead concentrates ----------	1,379	1,126	1,146	532	[2]920
Bismuth, mine output, metal content[e] ----------	900	850	[3]1,540	[3 4]1,500	[3 4]1,500
Cadmium:					
Mine output, metal content ----------	1,684	1,753	2,193	2,318	[2]2,315
Metal, smelter (refined) ----------	1,012	1,031	1,010	1,104	[2]1,049
Chromium: Chromite, gross weight ----------	1,718	--	--	--	--
Cobalt:					
Mine output, analytic content of:					
Nickel ore ----------	2,640	2,219	2,511	1,705	[2]1,565
Nickel concentrate ----------	983	609	967	1,016	1,000
Zinc concentrate ----------	81	74	70	83	[2]55
Total ----------	3,704	2,902	3,548	2,804	2,620
Recoverable cobalt ----------	1,975	1,466	1,810	[5]1,820	[2]1,620
Columbium-tantalum concentrate, gross weight --	202	264	116	[r e]200	[2 5]241
Copper:					
Mine output, metal content ----------	243,540	231,339	245,322	261,476	[2]235,821
Metal:					
Smelter:					
Primary ----------	174,920	172,181	175,536	173,620	[2]180,972
Secondary ----------	7,104	5,015	4,809	[e]5,000	[2]8,285
Refined:					
Primary ----------	144,828	164,241	160,195	165,492	[2]171,705
Secondary ----------	20,634	15,297	17,905	27,255	[2]18,551
Gold:					
Mine output, metal content --- troy ounces--	547,687	590,737	866,815	983,522	1,200,000
Metal, refined (excluding recovery from scrap) do----	474,576	481,971	826,627	953,140	[2]1,189,672

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Iron and steel:					
Iron ore:					
Gross weight thousand tons	95,534	84,661	87,694	71,625	[2]88,969
Iron content do	60,437	53,361	55,566	46,191	[2]56,817
Metal:					
Pig iron do	6,959	6,830	5,956	5,045	[2]5,329
Ferroalloys:[6]					
Ferromanganese	94,146	67,563	54,717	49,000	75,000
Ferrosilicon	18,435	18,313	19,678	[r][e]22,000	25,000
Silicomanganese	18,376	29,916	29,548	22,000	31,000
Total	130,957	115,792	103,943	[r][e]93,000	131,000
Steel, crude thousand tons	7,594	7,635	6,371	5,625	[2]6,299
Semimanufactures do	5,513	[e]5,100	[e]5,500	NA	NA
Lead:					
Mine output, metal content	[5]397,491	388,122	455,338	480,626	[2]440,293
Metal:					
Primary:					
Bullion, for export	160,286	162,564	181,592	182,168	[2]183,970
Refined	200,454	207,669	218,812	196,335	[2]196,199
Total	360,740	370,233	400,404	378,503	[2]380,169
Secondary excluding remelt[e]	33,200	31,500	28,300	28,000	21,500
Manganese ore (metallurgical):					
Gross weight thousand tons	1,999	1,411	1,123	1,353	[2]1,829
Manganese content do	[r]964	[r]684	539	672	[2]864
Nickel:					
Mine output, metal content	74,323	74,355	87,552	76,625	[2]76,889
Metal, smelter (refined metal and metal content of oxide)	35,309	42,505	45,931	41,800	[2]76,684
Platinum-group metals:[7]					
Palladium, metal content troy ounces	10,545	[r]12,896	13,379	[e]12,000	12,000
Platinum, metal content do	2,058	[r]2,093	2,388	[e]1,900	1,900
Total do	12,603	[r]14,989	15,767	[e]13,900	13,900
Rare-earth metals, monazite concentrate:					
Gross weight	14,079	13,282	9,562	15,305	16,700
Monazite content	13,075	12,337	8,889	14,040	15,500
Silver:					
Mine output, metal content thousand troy ounces	24,654	23,906	29,156	33,528	[2]31,183
Metal, refined do	[r]10,776	[r]11,995	11,113	11,189	[2]9,677
Tin:					
Mine output, metal content	11,588	12,267	12,126	[8]9,275	[2]7,822
Metal, refined:					
Primary	4,819	4,286	3,105	2,913	[2]2,899
Secondary[e]	490	410	[r]380	400	400
Titanium concentrates, gross weight:					
Ilmenite thousand tons	1,385	1,321	1,149	893	[2]1,144
Leucoxene	23,943	19,261	19,739	[e]13,000	16,000
Rutile	311,744	230,817	220,697	163,374	181,500
Tungsten, mine output, metal content	[r]3,575	[r]3,517	2,618	2,013	[2]1,779
Uranium, mine output, metal content	1,561	2,860	4,422	3,225	4,390
Vanadium, mine output, metal content	--	[r]70	23	--	--
Zinc:					
Mine output, metal content	495,312	518,297	664,800	703,252	[2]658,747
Metal, smelter:					
Primary	300,959	295,852	291,390	298,518	[3]301,942
Secondary[e]	5,000	4,500	4,500	4,800	4,500
Zirconium concentrates, gross weight	491,547	434,246	462,476	382,305	454,600
NONMETALS					
Abrasives, natural:					
Beach pebble	2,200	2,178	1,169	[e]2,300	2,500
Garnet (sales)	925	[r]3,020	3,266	[r][e]3,300	3,500
Asbestos	92,418	45,494	15,587	3,723	--
Barite	38,633	41,266	28,064	11,751	12,000
Cement, hydraulic thousand tons	5,387	5,946	5,744	4,836	[2]5,463

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Clays:					
Bentonite and bentonitic clay	10,988	[r]16,905	29,212	[r] [e]30,000	30,000
Brick clay and shale ______ thousand tons	8,871	7,910	8,210	6,714	[2]7,898
Cement clay and shale ______ do	263	[r]386	413	[e]450	400
Damourite clay (sales)	3,194	3,011	2,473	[e]3,300	3,000
Fire clay[9]	88,212	142,989	71,092	[e]150,000	150,000
Kaolin and ball clay	219,070	170,472	152,133	[e]225,000	150,000
Other[9] ______ thousand tons	[r]1,876	[r]2,374	1,641	[e]2,000	2,000
Diamond:					
Gem ______ thousand carats	--	21	251	2,770	3,400
Industrial ______ do	48	184	306	3,385	2,300
Total ______ do	48	205	557	6,155	[2]5,700
Diatomite	3,010	2,073	1,561	7,785	1,000
Feldspar including nepheline syenite	3,648	3,868	4,335	[e]3,000	3,500
Gem stones, other than diamond:					
Opal ______ value, thousands	$108,267	$97,332	$78,158	NA	NA
Sapphire ______ do	$40,652	$39,378	$47,614	NA	NA
Other ______ do	$655	$736	$412	NA	NA
Total ______ do	[r]$149,574	$137,446	$126,184	NA	NA
Gypsum ______ thousand tons	1,309	1,752	1,864	1,390	1,500
Lime[3]	[r]849,688	874,761	948,000	[e]900,000	950,000
Magnesite	32,198	26,445	29,671	22,015	25,000
Nitrogen: N content of ammonia	353,000	319,000	244,900	385,000	350,000
Perlite, crude	2,249	1,476	1,148	[r] [e]1,500	1,500
Phosphate rock	6,621	21,997	211,463	21,000	11,000
Pigments, mineral, natural: Ocher	53	839	([10])	([10])	--
Salt ______ thousand tons	5,665	6,716	4,811	[r] [e]5,100	5,000
Sillimanite	661	331	783	121	200
Sodium compounds, n.e.s.: Sodium carbonate[e] thousand tons	185	190	180	200	NA
Spodumene, concentrate[3]	--	--	[e]80	1,000	[2]6,500
Stone, sand and gravel:					
Construction sand[9] ______ thousand tons	25,694	28,001	28,718	[e]28,000	30,000
Gravel[9] ______ do	15,667	[r]14,639	16,813	[e]17,000	18,000
Dolomite ______ do	843	757	602	572	600
Limestone:[e]					
For cement ______ do	8,132	8,382	[r]9,268	8,500	9,000
For other uses ______ do	3,598	3,601	[r]3,430	3,800	4,000
Silica in the form of quartz, quartzite, glass sand ______ do	[r]1,828	[r]1,743	1,813	[e]1,400	2,000
Other:[e]					
Crushed and broken stone ______ do	57,737	58,110	[r]57,100	60,000	NA
Dimension stone ______ do	116	125	[r]129	175	NA
Unspecified ______ do	35,299	[r]37,378	[r]31,524	38,000	NA
Sulfur: Byproduct:					
Metallurgy[e]	[r]167,000	[r]171,000	[r]157,000	[r]160,000	160,000
Petroleum	12,791	14,321	17,496	12,897	13,000
Total[e]	[r]179,791	[r]185,321	[r]174,496	[r]172,897	173,000
Talc, soapstone, pyrophyllite	170,964	82,986	152,792	185,940	180,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous and subbituminous thousand tons	93,632	110,945	119,015	120,493	[2]124,547
Lignite ______ do	32,895	32,990	37,811	33,790	[2]35,108
Total ______ do	126,527	143,935	156,826	154,283	[2]159,655
Coke, metallurgical[11] ______ do	5,023	4,959	3,761	3,018	[2]3,288
Fuel briquets ______ do	1,230	1,008	854	689	[2]810
Gas natural, marketed ______ million cubic feet	337,995	400,648	409,439	420,115	[2]445,966
Natural gas liquids thousand 42-gallon barrels	24,153	23,524	18,255	23,000	[2]21,175
Peat	12,211	[r] [e]13,000	[r] [e]10,200	[r] [e]13,000	14,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude thousand 42-gallon barrels	139,885	143,672	136,251	152,417	[2]181,863
Refinery products:					
Gasoline:					
Aviation do.	730	92,922	1,095	1,023	[2]1,281
Motor do.	88,885		94,206	94,214	[2]96,642
Jet fuel do.	14,040	15,136	15,330	14,836	[2]16,452
Kerosine do.	1,891	2,984	3,084	761	[2]812
Distillate fuel oil do.	53,257	51,899	53,533	53,128	[2]55,273
Residual fuel oil do.	22,258	21,732	21,678	19,898	[2]18,086
Lubricants do.	3,638	34,809	3,556	3,324	[2]3,753
Liquefied petroleum gas do.	3,828	3,816	6,171	4,027	[2]4,600
Bitumen do.	3,044	2,875	3,115	2,766	[2]3,171
Unspecified do.	7,222	7,365	4,219	10,879	[2]9,943
Refinery fuels and losses do.	14,274	15,000	17,696	NA	NA
Total do.	[r]213,067	[r]248,538	223,683	204,856	[2]210,013

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Aug. 20, 1985.
[2]Reported figure.
[3]Data are for years ending June 30 of that stated.
[4]Bismuth-rich residues reportedly have been stockpiled owing to weak demand and low prices.
[5]Exports.
[6]Data are for years ending Nov. 30 of that stated for plants owned by The Broken Hill Pty. Co. Ltd.
[7]Western Australia only. Metal content of nickel ore.
[8]Excludes tin content of copper-tin concentrates.
[9]Excludes production from Western Australia.
[10]Revised to zero.
[11]Gashouse coke series revised to zero.

TRADE

With the major exception of petroleum where Australia imports about 15% of its needs, production of minerals is greatly in excess of the country's own requirements and therefore are largely exported. Australia consequently ranked near the top in the world trade of many mineral commodities in 1984, including alumina, bauxite, coal, iron ore, lead, mineral sands (ilmenite, monazite, and rutile), nickel, and zinc.

Japan continued to be the dominant market for Australia's mineral exports, accounting for about one-half of the value. It remained the largest buyer of aluminum, coal, copper, iron ore, manganese ore, salt, and zinc, as well as a major purchaser of other minerals. China continued to be the greatest export growth market during the year and signed new contracts with Australian companies for iron ore, manganese, and steel.

Because of the importance of trade to the Australian economy—mineral exports provided about 40% of the export revenues in 1984—Australia was a member of several international commodity agreements, including the International Tin Agreement, and less formal consultative groups on lead and zinc and tungsten.

Although the Government would prefer to enter into commodity arrangements having the active support of both producers and consumers, where such arrangements do not exist, Australia has joined producer-only organizations. Australia was a member of the International Bauxite Association, the International Council of Copper Exporting Countries, and the Association of Iron Ore Exporting Countries. Australia, however, remained opposed to the formation of commodity cartels and to any moves to fix prices unilaterally on the part of producers.

Table 2.—Australia: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides thousand tons	5,973	6,379	--	NA.
Metal including alloys:				
Scrap	28,335	25,964	5	Japan 23,941.
Unwrought	156,612	238,674	--	Japan 41,756; unspecified 163,356.
Semimanufactures	37,007	50,360	--	NA.
Chromium: Ore and concentrate	31	102	--	Japan 80; Papua New Guinea 22.
Copper:				
Ore and concentrate	208,108	264,425	5,204	Japan 243,204; Republic of Korea 10,000.
Metal including alloys:				
Scrap	405	646	--	India 172; United Kingdom 162.
Unwrought	53,126	86,928	70	United Kingdom 33,091; Netherlands 18,858; France 12,805.
Semimanufactures	37,568	29,204	1,305	New Zealand 11,118; Saudi Arabia 10,126.
Gold: Metal including alloys:				
Content of ores and concentrates troy ounces	r104,551	92,337	NA	NA.
Unwrought and partly wrought do	r314,884	570,450	NA	United Kingdom 488,691; Hong Kong 67,131.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	78,183	76,507	--	Japan 50,602; Republic of Korea 4,860; West Germany 4,386.
Metal:				
Scrap do	1,133	562	--	NA.
Pig iron, cast iron, related materials	91,410	468,958	--	Japan 369,593; Singapore 77,620.
Ferroalloys:				
Ferromanganese	16,682	28,556	5,000	Qatar 9,229; Indonesia 6,426; Malaysia 4,143.
Unspecified	25,716	22,279	8,073	Japan 9,148; Singapore 2,268; Indonesia 1,026.
Steel, primary forms	710,192	609,587	4,774	Iran 149,676; China 74,840; Philippines 69,017.
Semimanufactures:				
Bars, rods, angles, shapes, sections	202,729	123,782	23,871	New Zealand 20,839; China 20,308; Republic of Korea 15,130.
Universals, plates, sheets	505,010	473,069	145,222	China 68,277; New Zealand 56,843; Indonesia 29,150.
Hoop and strip	302,903	35,069	525	Greece 13,005; New Zealand 9,466; Italy 6,874.
Rails and accessories	19,876	2,120	4	Indonesia 1,815; New Zealand 196.
Wire	9,837	10,038	1,354	New Zealand 3,209; Papua New Guinea 1,811; Fiji 1,333.
Tubes, pipes, fittings	31,868	35,800	18	NA.
Castings and forgings, rough	5,313	3,361	398	Malaysia 1,004; Singapore 701; Indonesia 343.
Lead:				
Ore and concentrate	94,607	93,351	34,259	Japan 25,705; Belgium-Luxembourg 16,003.
Oxides	2,644	4,245	--	Indonesia 587; Thailand 336; Singapore 321.
Metal including alloys:				
Scrap	2,056	4,633	17	Philippines 1,466; Republic of Korea 967; India 308.
Unwrought	358,679	352,563	14,882	United Kingdom 139,104; India 40,704; Japan 32,366.
Semimanufactures	218	432	--	Singapore 130; Malaysia 99; New Zealand 65.
Manganese: Ore and concentrate thousand tons	r906	1,004	NA	NA.
Nickel:				
Ore and concentrate	395	4,838	4,362	Belgium-Luxembourg 433.
Matte and speiss value, thousands	r$264,222	$149,178	NA	NA.
Metal including alloys:				
Scrap	740	565	57	Japan 254; India 101; United Kingdom 67.
Unwrought and semimanufactures value, thousands	$136,150	$119,264	NA	NA.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought ----- value, thousands--	$2,004	$1,226	$153	United Kingdom $380; Hong Kong $317; West Germany $154.
Silver:				
Ore and concentrate[2] ----- do----	$85	$684	$29	West Germany $570; Fiji $69.
Waste and sweepings[2] ---- do----	$382	$611	--	United Kingdom $595.
Metal including alloys, unwrought and partly wrought ---- do----	$67,901	$94,943	$6	United Kingdom $69,748; Japan $16,675.
Tin:				
Ore and concentrate ----------	33,279	100,173	--	Malaysia 99,327.
Metal including alloys:				
Scrap----------------	656	350	232	Japan 55; Belgium-Luxembourg 54.
Unwrought --------------	682	501	396	New Zealand 78.
Semimanufactures --------	325	271	19	New Zealand 78; Papua New Guinea 74; Fiji 51.
Titanium: Ore and concentrate thousand tons--	r1,093	1,058	374	United Kingdom 159; U.S.S.R. 104; Japan 98.
Tungsten:				
Ore and concentrate ----------	81,801	14,094	148	NA.
Metal including alloys, all forms ---	9	49	--	Austria 35.
Uranium and thorium: Ore and concentrate ----- value, thousands--	$510,127	$273,454	$57,266	West Germany $74,332; United Kingdom $57,851; France $45,097.
Zinc:				
Ore and concentrate thousand tons--	1,020	810	--	Japan 432; Belgium-Luxembourg 149; Republic of Korea 124.
Oxides------------------	274	153	--	India 88; Fiji 26; Papua New Guinea 18.
Metal including alloys:				
Scrap----------------	1,480	1,587	--	Japan 546; India 218; Republic of Korea 190.
Unwrought -------------	236,258	260,545	26,861	Indonesia 55,127; Hong Kong 45,250; China 29,440.
Semimanufactures --------	18,137	12,308	--	United Kingdom 10,346.
Zirconium: Ore and concentrate -----	r405,215	379,975	20,109	Japan 163,032; Netherlands 44,814; Italy 44,420.
Other: Base metals including alloys, all forms -------------------	3,435	1,471	669	Japan 331.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc-------------------	2,261	343	38	Japan 130; United Kingdom 78; Singapore 54.
Artificial: Corundum ----------	5	55	--	NA.
Dust and powder of precious and semiprecious stones including diamond --- value, thousands--	$24	$54	$20	Philippines $30.
Grinding and polishing wheels and stones------------------	169	628	--	Papua New Guinea 412; New Zealand 88; Pakistan 68.
Asbestos, crude ---------------	15,697	4,583	1	Singapore 1,644; Thailand 1,070; Indonesia 469.
Barite and witherite ------------	636	823	NA	Papua New Guinea 330; New Zealand 276; Republic of South Africa 198.
Cement --------------------	294,683	183,856	22,018	Bahrain 93,139; Singapore 26,611; Papua New Guinea 23,753.
Clays, crude ----------------	5,011	7,782	--	Malaysia 2,831; United Kingdom 1,600; Japan 952.
Diamond:				
Gem, not set or strung value, thousands--	$5,389	$32,966	$625	Switzerland $24,113.
Industrial stones ------- do----	$2,910	$9,645	$12	United Kingdom $4,778; Switzerland $3,649.
Diatomite and other infusorial earth --	58	100	--	Philippines 40; New Zealand 31.
Fertilizer materials:				
Crude, n.e.s----------------	3,097	1,350	--	Philippines 787; Oman 228; Malaysia 152.
Manufactured:				
Ammonia --------------	980	75,635	--	Republic of Korea 43,075; India 25,066; Philippines 6,343.
Nitrogenous -----------	10,745	20,515	--	Republic of Korea 15,029; New Zealand 2,810.
Phosphatic ------------	2,090	1,002	--	Papua New Guinea 499; Fiji 208; China 162.
Potassic ---------------	4	16	--	Kiribati 7; China 4.
Unspecified and mixed ------	1,053	17,309	15,769	Papua New Guinea 879; Japan 303.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Graphite, natural	8	130	--	United Kingdom 51; New Zealand 23.
Gypsum and plaster	607,017	803,180	--	Republic of Korea 207,512; Indonesia 174,852; Singapore 112,541.
Lime	931	283	--	Papua New Guinea 262.
Magnesite	2,816	2,812	--	New Zealand 2,476; Philippines 295.
Mica: Worked including agglomerated splittings	216	47	1	Papua New Guinea 17; Indonesia 16; New Zealand 13.
Nitrates, crude	1	1	--	Mainly to Papua New Guinea.
Phosphates, crude	26,905	4,620	--	Indonesia 2,350; Republic of Korea 2,200.
Pigments, mineral: Iron oxides and hydroxides, processed	191	80	49	Indonesia 11.
Precious and semiprecious stones other than diamond: Natural and synthetic value, thousands	$33,975	$35,966	$3,490	Thailand $9,573; Japan $6,422; Hong Kong $6,180.
Salt and brine thousand tons	4,144	4,582	--	Japan 3,078; Republic of Korea 599.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	84	1,224	--	Italy 1,178.
Worked	28	56	--	Papua New Guinea 43.
Dolomite, chiefly refractory-grade	16	27	--	All to Japan.
Gravel and crushed rock	530,157	784,921	40,767	Japan 629,423; Republic of Korea 80,985.
Limestone other than dimension	15	79	--	All to Papua New Guinea.
Sulfur:				
Elemental, crude including native and byproduct	583	418	--	New Zealand 169; Malaysia 70; Fiji 54.
Sulfuric acid	189	300	--	Fiji 97; Papua New Guinea 85; Philippines 36.
Talc, steatite, soapstone, pyrophyllite	93,878	131,940	9,991	Japan 93,988; Netherlands 14,655.
Other:				
Crude	1,630	2,301	252	New Zealand 823; Japan 718.
Slag and dross, not metal-bearing	34	21	--	Mainly to Papua New Guinea.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	35,468	27,845	--	Indonesia 16,346; New Zealand 5,466.
Coal:				
Anthracite and bituminous thousand tons	46,658	61,081	21	Japan 36,972; Republic of Korea 5,093; United Kingdom 2,614.
Lignite including briquets do	56	54	(3)	Republic of Korea 42.
Coke and semicoke do	56	38	(3)	Japan 15; Norway 7; Belgium-Luxembourg 6.
Petroleum:				
Crude 42-gallon barrels	--	686,540	--	Japan 586,779; New Zealand 99,753.
Refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	15,864	17,500	NA	NA.
Gasoline do	2,814	3,784	--	New Zealand 2,274; Papua New Guinea 478; Iran 391.
Mineral jelly and wax do	14	20	--	New Zealand 7; Republic of Korea 4; Malaysia 3.
Kerosine do	4,719	5,234	--	New Zealand 959; bunkers 3,451.
Distillate fuel oil do	5,566	7,785	4	Singapore 1,501; Papua New Guinea 1,228; bunkers 1,715.
Lubricants do	1,576	1,271	21	Singapore 294; New Zealand 248; Hong Kong 125.
Residual fuel oil do	7,145	8,472	645	Japan 1,084; bunkers 5,625.
Bitumen and other residues do	230	1	--	Mainly to Kiribati.
Bituminous mixtures do	4	5	--	Samoa 3; Tonga 1.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Import data were not available at the time of publication.
[2]May include platinum-group metals.
[3]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Alumina, Aluminum, and Bauxite.—Australia continued to be the undisputed leading producer of alumina and bauxite. Production of alumina and bauxite was estimated to have risen about 17% and 31%, respectively, over the 1983 levels, reflecting the commissioning of the two new alumina refineries in Western Australia, Wagerup and Worsley, together with an expansion of capacity at the Gladstone refinery operated by Queensland Alumina Ltd. (QAL). Alcoa of Australia Ltd.'s (51% Aluminum Co. of America and 49% local interests) Wagerup refinery south of Perth was officially opened on April 11, following the signing of sufficient contracts for alumina exports to guarantee its operation. The refinery, Alcoa's third in the region, and associated bauxite mine were completed in June 1982 but mothballed immediately owing to the world recession. On May 10, 1984, the Worsley bauxite mining and refining complex organized by Reynolds Alumina Australia Ltd. and located 120 kilometers south of Perth was dedicated. Participants in the Worsley project were Reynolds (40%), Shell Co. of Australia Ltd. (30%), BHP Minerals Ltd. (20%), and Kobe Alumina Associates (Australia) Pty. Ltd. (10%). Aluminum production increased by almost 60% in 1984, the result of the commissioning of second potlines at both the Boyne Island, Queensland, smelter operated by Boyne Smelters Ltd., a consortium of Comalco Pty. Ltd. (50%), Kaiser Aluminum & Chemical Corp. (20%), and Japanese interests (20%), and the Tomago smelter near Newcastle, in the Hunter Valley of New South Wales, operated by Tomago Aluminium Co. Pty. Ltd.

Bauxite production during the year was derived from two mines operated by Comalco at Weipa, in the north of the Cape York Peninsula, Queensland; a mine at Gove in Arnhem Land, Northern Territory, operated by Nabalco Pty. Ltd.; Alcoa's Del Park, Huntly, and Willowdale Mines in the Darling Range of Western Australia; and Reynold's Mount Saddleback Mine 200 kilometers south of Perth. Two other bauxite deposits were held under lease, but had not yet been developed. Initial studies for a mine and refinery had been made for the Mitchell Plateau leases, 52% held by Mitchell Plateau Bauxite Co. Pty. Ltd., a CRA Ltd. company in the Kimberley region of northwestern Western Australia and Aurukun Associates (Tipperary Corp., 40%; Shell, 40%; and Pechiney Aluminium Pty. Ltd., 20%) held leases over the Aurukun area south of Weipa on the Cape York Peninsula.

Australia's alumina refineries were comprised of Alcoa's Kwinana, Pinjarra, and Wagerup facilities in Western Australia, QAL's Gladstone plant, Nabalco's refinery at Gove, and Reynold's new Worsley operation.

During 1984, primary aluminum in Australia was produced at four smelters: Point Henry, Geelong, Victoria (Alcoa); Bell Bay, Tasmania (Comalco); Boyne Island, Queensland (Boyne Smelters); and Tomago, New South Wales (Tomago Aluminium). Owing to the continued low international market price for primary aluminum ingot, Alcan Australia Ltd. announced in September the postponement of production from its new 50,000-ton-per-year potline at the Kurri Kurri smelter at Newcastle, New South Wales, which was scheduled for startup prior to the end of the year. Construction was started on a sixth smelter, Alcoa's long-delayed facility at Portland, Victoria, in November. The plant was deferred in 1982 owing to slumping aluminum prices and a dispute with the Victoria State government over the cost of electricity. As a result of successful negotiations, however, the Victoria government became a 25% partner in the smelter, and electric costs will be based on a complex system of flexible charges contingent on world aluminum prices. The first potline was expected to become operational in November 1986, with a second potline planned to be completed by July 1988. At full capacity, the smelter will produce 300,000 tons of aluminum per year. Additionally, the Western Australian government, through its Aluminum Task Force, was studying the feasibility of a proposed new 220,000-ton-per-year smelter at Kemerton, south of Perth, involving the Republic of Korea's Kukje-ICC Group (50%), Reynolds (25%), and the State-run Griffin Corp. (25%) in joint venture. BHP withdrew from the consortium in November. The go-ahead for a detailed feasibility study was given in the last quarter of the year. The State Energy Commission already had given a letter of intent to Kukje-ICC for a $450 million[3] contract to build a powerplant near the smelter, which would provide electricity for smelting aluminum.

Comalco and the Martin Marietta Corp. of Bethesda, Maryland, announced in October an "agreement in principle" whereby Comalco would purchase most of Martin Marietta's aluminum interests in the United States. The $400 million purchase reportedly would include a 200,000-ton-per-year aluminum rolling mill and a 110,000-ton-per-year scrap recycling facility at Lewisport, Kentucky; a 160,000-ton-per-year aluminum smelter at Goldendale, Washington; and a bulk loading terminal for alumina at Portland, Oregon, as well as the raw materials and inventories of these facilities. The agreement was expected to be finalized in early 1985 pending approval by the Australian Government and the boards of both companies.

The bauxite, alumina, and aluminum industry's contribution to Australia's export revenues remained second only to that of the coal industry.

Copper.—As a result of lower output by almost all producers in response to continued low prices owing to reduced demand, estimated mine production of copper decreased 10% from last year's all-time record high. Despite reduced production by the closing in July of Mount Morgan Ltd.'s flash smelter along the coast in eastern Queensland, blister production increased 5% because of increased production at Mount Isa Mines Ltd.'s facility at Mount Isa, also in Queensland. Primary refined metal output increased by 4% over the 1983 level primarily because of higher output from Copper Refineries Pty. Ltd.'s Townsville, Queensland, refinery.

Mount Isa Mines, Australia's largest copper producer and a wholly owned subsidiary of M.I.M. Holdings Ltd., suspended mining and milling operations for the last 2 weeks in April because of the low prices and buildup of stockpiled concentrates. Seltrust Holdings Ltd. closed its mine at Teutonic Bore, Western Australia, in October owing to ore depletion. Sufficient stockpiled ore remained, however, to continue concentrate production through 1985. Exploration to date has not identified any additional reserves. The Mount Gunson Mine in South Australia was closed in June 1984 rather than the previously planned early 1985 date, owing to ore exhaustion. In August, the mine was sold by Mount Gunson Mines Pty. Ltd., a wholly owned subsidiary of CSR Ltd., to the EMAC-Gunson Partnership, which continued to recover and treat remnant ore at slightly reduced prices.

Australia's second leading copper producer, Renison Goldfields Consolidated Ltd.'s (RGC) Mount Lyell Mine at Queenstown, Tasmania, announced it might be forced to close either by the end of 1985 or at the latest 1988, depending on circumstances, because of continued financial losses as a result of the low copper prices. Because of the mine's importance to the Tasmanian economy, the State government was considering assistance to keep it operating until 1988. In 1984, RGC also operated a bacterial leaching process at the Gunpowder Mine near Mount Isa in northern Queensland but, again owing to the low price of copper, the mine was closed down and plant and equipment sold. Low prices also continued to hamper Peko-Wallsend Ltd.'s operations at Tennant Creek. The company's Gecko Mine and the flash smelter were closed previously, and mining operations at the Warrego Mine were limited in midyear to 250,000 tons per year of high-grade, copper-containing gold ore.

Other major copper producing mines in Australia were CRA's large mine at Cobar, western New South Wales, and its smaller Woodlawn Mine just northeast of Canberra; Aberfoyle Ltd.'s Que River Mine in Tasmania; and Electrolytic Zinc Co. of Australia Ltd.'s (EZ) predominantly lead-zinc Rosebery and Hercules Mines, also in Tasmania.

Australia remained the world's 10th largest copper producer and was estimated to rank as the 8th largest copper exporter. Japan imported most of Australia's exports of concentrates and blister. Belgium-Luxembourg, the Federal Republic of Germany, France, Japan, and the United Kingdom accounted for most of Australian refined copper exports. There were also substantial shipments of semimanufactured products, mainly as wire rod, to New Zealand, Saudia Arabia, and Singapore.

Gold.—Estimated gold production increased for the fourth successive year, exceeding 1983's output by 22%. Western Australia was again the leading producer, accounting for about 80% of the total. Gold production came from all six States and the Northern Territory, with that from New South Wales, South Australia, and Tasmania almost entirely recovered as a byproduct of base metal mining operations. Western Mining Corp. Holdings Ltd. (WMCH), through its wholly owned Great Boulder

Holdings Ltd., remained Australia's top producer with operations in the Kambalda and Kalgoorlie Districts. The gold circuit at the Kambalda, south-central Western Australia operations displaced Newmont Holdings Pty. Ltd.'s Telfer Mine in north-central Western Australia as Australia's largest gold producer, with the year's output of over 140,000 troy ounces. Mount Morgan, with Australian Anglo-American Gold Pty. Ltd. as a 40% partner, remained the largest producer in Queensland, with gold being recovered from retreatment of mine tailings at the mined out Mount Morgan Mine on the east coast near Rockhampton. The Stawell Mine, in which WMCH (75%) and Central Norseman Gold Corp. Ltd. (25%) were in joint venture, commenced production and became Victoria's major producer. Peko-Wallsend's Warrego Mine at Tennant Creek remained the Northern Territory's leading producer.

Exploration for gold, particularly in Western Australia, flourished predominantly for small- to medium-size deposits that can be mined by low-cost open pit methods. Many new mines were commissioned, and attendant production capacity expanded. Although the strong gold prices of the early 1980's, which gave the momentum to gold mining and exploration in Australia, were sharply down throughout 1984, the industry continued to be quite viable owing to the absence of any income tax on gold mining, the exemption of royalty payments in most areas, and by the depreciation of the Australian dollar against the U.S. dollar.

In addition to the Stawell Mine in Victoria, though not an exhaustive listing, the following mines commenced operation during the year, all of which were in Western Australia except Queensland's Croydon Mine: Croydon Mine (Central Coast Exploration NL); Great Victoria Mine (Great Victoria Gold Mines Ltd.); Bamboo Creek Mine (joint venture with Kitchener Mining NL as the majority holder); Porphyry Mine (Edjudina Gold Mines Pty. Ltd.); Sons of Gwalia Mine (Sons of Gwalia NL); Nevoria Mine (Southern Goldfields Ltd., 40%, and Jingellic Minerals NL, 60%); Tower Hill (Forest Gold); leases within the Kalgoorlie town area (Central Kalgoorlie Gold Mines NL); Reedy Mine (Metana Minerals NL); retreatment of Wiluna Mine tailings (Western Alluvials Pty. Ltd.); and retreatment of Lawlers Mine tailings (Forsayth Oil and Gas NL).

Barrack Mines Ltd. completed the expansion of its treatment plant at its Horseshoe Lights Mine, 150 kilometers north of Meekatharra, to a capacity of 360,000 tons per year. Otter Exploration NL expanded ore throughput at its treatment plant to 400 tons per day at its Griffin's Find Mine, 300 kilometers southeast of Perth.

Kidston Gold Mines Ltd.'s Kidston Mine, in a semi-arid area 500 kilometers west of Townsville on the east coast of Queensland, was expected to come on-stream in early 1985, several months ahead of schedule. The mine was slated to become Australia's largest gold mine, producing 281,000 troy ounces in the first year.

The consortium of Esso Exploration and Production Australia Inc., Carr Boyd Minerals Ltd., Aztec Exploration Ltd., and Harbour Lights Mining Ltd. was expected to commission its large Harbour Lights Mine at Leonora, Western Australia, in mid-1985.

H.M.C. Australasia expected to begin production in June 1985 at its open pit at Broad Arrow, north of Kalgoorlie, Western Australia. Gold resources at yearend were estimated by Australia's Bureau of Mineral Resources, Geology & Geophysics to be demonstrated economic (measured plus indicated), 526 tons; demonstrated subeconomic, 513 tons; and inferred, 60 tons.

Iron and Steel.—A steady increase in demand during 1984 for Australian iron and steel products reflected growth in consumer durable industries and the end of stock reduction by consumers. Although demand for Australian iron ore increased significantly coincident with the recovery of world steel output, lower prices resulted in a substantial decrease in the value of exports. Iron ore production rose by about 24%, mainly to meet the increased export demand.

Australia's iron ore export trade, vying with Brazil to be the world leader, was based on the iron deposits of the Pilbara District of Western Australia, which produced more than 95% of the country's total. Four companies, with a total production capacity of 110 million tons per year, operated in Western Australia during the year. These were Cliffs Robe River Iron Associates, with mines at Robe River (Pannawonica) and Deepdale; Goldsworthy Mining Ltd. at Shay Gap and Sunrise Hill; Hamersley Iron Pty. Ltd. at Mount Tom Price and Paraburdoo; and Mount Newman Iron Ore Pty. Ltd. at Mount Whaleback, the world's largest single iron ore mine. The companies transported their ore to loading facilities by privately owned railways: Cliffs Robe River to Port Walcott; Goldsworthy and Mount Newman Iron Ore to Port Hedland; and Hamersley Iron to Dampier. Hamersley Iron and Mount Newman Iron Ore continued as the second and third largest iron ore mining companies, respectively, in the world after Brazil's state mining company Cia. Vale do Rio Doce.

BHP mined iron ore at Cockatoo Island and Koolan Island, Yampi Sound, Western Australia, but owing to the exhaustion of economic resources, production ceased at Cockatoo at yearend. Shipments from stockpiled ore, however, were expected to continue for another 2 years.

Outside Western Australia there were two other centers for iron mining in Australia: The Broken Hill Pty. Co. Ltd. produced from the Iron Baron group of mines (Iron Baron, Iron Baron South, Iron Prince, Iron Queen, and Cavalier) and from the Iron Monarch and Iron Knob Mines in the Middleback Ranges, South Australia, for the Australian steel industry; and Savage River Mines Ltd. produced from its Savage River Mine in Tasmania. Concentrate from Savage River was pumped as a slurry by pipeline 85 kilometers for pelletizing at Port Latta and subsequent export to Japan.

All iron ore mined in Australia was hematite, except that produced at the Robe River and Savage River mines, which was limonite and magnetite, respectively. All the ore mined was high-grade, ranging from 59% to 69% iron, except for the magnetite from Savage River, which was between 36% and 39% iron.

Production of pig iron increased by 6%, consistent with increased steel output, but lower than was possible owing to maintenance stoppages early in the year, which adversely affected production. Crude steel production by BHP increased 10% overall; the Whyalla Steelworks, South Australia, increased 17%; the Port Kembla Steelworks, Wollongong, New South Wales, increased 10%; and the Newcastle Steelworks, New South Wales, increased 8%.

BHP announced in August its intention to build a $35 million steel minimill in two stages at Acacia Ridge in the Brisbane, Queensland, area. Initially, a steel rolling mill would be built to produce merchant and reinforcing bar products using semifinished billets supplied by BHP's plants at Newcastle and/or Port Kembla. The second stage would be an expansion of the mill, through installation of an electric arc furnace and continuous casting facilities. Although mill capacity was not finalized, it was expected to be in the 250,000-ton-per-year range. Reportedly, the Queensland government endorsed plans for a 100-ton-per-year steel mill to be established near Brisbane by Quest Corp. Pty. Ltd. at a cost of about $60 million. The mill would manufacture steel from scrap using an electric arc furnace and produce reinforcing bar and small fabrication sections.

The possibility for increased iron ore and steel trade with China emerged in midyear. An agreement on economic cooperation in the iron and steel industry was signed by Australia and China in August. Hamersley Iron and the China Metallurgical Import and Export Corp. agreed, also in August, to study the feasibility of joint development of an iron ore mine in the Pilbara District. The proposed project would be based on iron ore reserves in the Mount Channar area, 20 kilometers east of Paraburdoo, where a large exploration program to investigate concealed hematite ore bodies was carried out in 1983. The project would make maximum use of surplus capacity at Hamersley Iron's plant at Paraburdoo, rail and port facilities at Dampier, and other infrastructure. Anticipated production was 5 million tons of ore per year, rising to 10 million tons as China's ore demand increased to support its expanding steel industry. Negotiations were also held with China for possible supply of iron ore from other sites, and the possibility of reopening the Kwinana blast furnace, closed in 1982, so that exports of pig iron to China could resume, was investigated. Reportedly, the improved prospects for iron ore exports led to a new study into the feasibility of developing the Marandoo deposit in the Pilbara District.

Lead and Zinc.—All of Australia's lead and zinc was produced from mines that produced both commodities, as the two metals occur in associated minerals in the same ore bodies, with the exception of the copper-silver-zinc Teutonic Bore Mine in Western Australia, a joint venture of Seltrust Holdings (60%) and M.I.M. (40%). Estimated mine production decreased for both commodities, 8% for lead and 6% for zinc. Large decreases in output were recorded at the Broken Hill, New South Wales, mining center, which was comprised of the three mines owned by New Broken Hill Consolidated Ltd. (NBHC), North Broken Hill Holdings Ltd., and Zinc Corp. Ltd., and at EZ's mines on the west coast of Tasmania because of labor disputes. NBHC's and the Zinc Corp.'s mines were worked as one operation managed by Australian Mining & Smelting Ltd. Production also fell at the Woodlawn Mine, New South Wales, owned and operated by the equal joint venture partners St. Joseph International Explorations Ltd., Phelps Dodge Exploration Corp., and NBHC. In September, Phelps Dodge agreed in principle to sell its one-third interest in the mine to the co-venturer NBHC for $5 million. The sale was expected to be completed in the first quarter of 1985. The Woodlawn Mines joint venture agreement stipulated that any party wishing to sell its interest had to offer the remaining parties the option of each acquiring up to one-half that interest. NBHC therefore offered St. Joseph the option of acquiring one-half the Phelps Dodge interest, leaving the two remaining partners with equal shares in the project, but it was unclear at yearend whether Phelps Dodge entered into this option.

M.I.M.'s Mount Isa Mine in western Queensland remained the largest lead-zinc producer, producing about 33% of the country's lead and 40% of the zinc. Production for the year was slightly more than the record high 1983 total. The mines at Broken Hill produced about one-half of the remaining output of both metals.

In addition to the mines above, other major lead-zinc producers were Cobar Mines Pty. Ltd.'s mine in eastern New South Wales; EZ's new Elura, New South Wales, underground mine; and Aberfoyle's Que River Mine in northwestern Tasmania.

Primary refined lead production at The Broken Hill Associated Smelters Pty. Ltd.'s (BHAS) Port Pirie refinery, Australia's only producer, remained at a similar level to that of 1983, although production was well short of the goal owing to supply interruptions owing to the midyear strike at Broken Hill. Primary refined zinc was produced at three plants during the year: Sulphide Corp. Pty. Ltd.'s Cockle Creek, New South Wales, refinery; BHAS' refinery at Port Pirie; and EZ's refinery at Risdon, Tasmania.

EZ was taken over by NBHC. Aberfoyle announced the discovery of a major new lead-silver-zinc deposit, known as the Hellyer deposit, adjacent to its Que River Mine. Aberfoyle outlined 10 million tons of inferred reserves, with grades similar to those of Que River, based on 15,000 meters of drilling in 50 holes.

Manganese.—Groote Eylandt Mining Co. Pty. Ltd., a wholly owned subsidiary of BHP, continued to produce virtually all of Australia's manganese ore from its Groote Eylandt operation in the Gulf of Carpentaria, Northern Territory. Production increased 35% over that of 1983 owing primarily to a resurgence in demand generated by the continued recovery in world steel output.

Exports of manganese ore increased by 46%. Exports to China and Portugal began with the former becoming the third largest market after Japan and the Federal Republic of Germany. Major increases in shipments were to Japan, up 30% to 572,187 tons; the Federal Republic of Germany, up 170% to 192,677 tons; France, up 264% to 40,171 tons; and Taiwan, up 96% to 18,810 tons. The U.S.S.R., up 8% to 112,715 tons, continued to be a major purchaser. Shipments resumed to Spain, 74,527 tons; Czechoslovakia, 32,991 tons; and Pakistan, 37,393 tons. Exports to the Republic of Korea and Belgium-Luxembourg offset the general increase and fell by 14% and 48% to 105,577 tons and 15,142 tons, respectively. Additionally, there were no shipments to the Netherlands, Yugoslavia, and Switzerland.

Shipments of manganese ore from Groote Eylandt for domestic consumption, mainly in manganese alloy, manganese alloy sinter, and pig iron production, increased to 419,317 tons in 1984 from 245,418 tons in 1983.

Ferromanganese and silicomanganese production at Bell Bay, Tasmania, by Tasmanian Electro Metallurgical Co. Pty. Ltd., also a wholly owned subsidiary of BHP, increased by 53% and 41% to 75,000 tons and 31,000 tons, respectively. Increased demand enabled the recommissioning in January of the 16,000-kilowatt No. 1 furnace, which had been closed since 1982.

At yearend, it was announced that production capacity for manganese alloys at Bell Bay was to be increased from 135,000 to 190,000 tons per year as part of a 3-year project projected to cost $37 million.

Nickel.—All of Australia's nickel was produced at mines in Western Australia except for Queensland Nickel Pty. Ltd.'s opencut operation at Greenvale, Queensland, a joint venture of Metals Exploration Ltd. and Freeport-McMoran Inc. of the United States. Western Mining Corp. Ltd. (WMC) remained the country's largest producer, operating 13 mines at Kambalda-St. Ives in the Kalgoorlie District of Western

Australia as well as the Windarra Mine. WMC also operated a smelter at Kalgoorlie and a refinery at Kwinana, both in Western Australia. Queensland Nickel operated a refinery at Yabulu near Townsville in northern Queensland.

Australian mine production of nickel increased slightly. Production decreased at the Greenvale Mine and at the Agnew Mine, a joint venture of Seltrust Holdings (60%) and M.I.M. (40%). Seltrust-M.I.M. in October suspended operations associated with expanding mine and mill capacity from 600,000 to 800,000 tons per year of ore at Agnew. The planned increase in capacity was to help maintain nickel production as ore grades declined and the hardness of the ore increased. Metal Exploration's Nepean Mine, closed in February 1983, was being maintained so that production could resume when markets warrant. Shaft and mine workings were kept dewatered and in condition to permit ore deliveries within 3 months of a production commencement decision.

Nickel oxide production, all from the Yabulu refinery, increased reflecting improved recovery at lower throughput and higher grades of ore mined. Refined nickel production, all from the Kwinana refinery, was 13% lower that of 1983.

Tin.—Mine production of tin in Australia was again severely hampered by the decision of the International Tin Council in late 1982 to impose export quotas. This reduced Australia's permissible exports of tin to 2,125 tons per quarter.

The bulk of Australia's tin production continued to be from the Renison Bell, Mount Cleveland, and Ardlethan Mines. The Renison Bell Mine, on the west coast of Tasmania and owned by RGC, remained the world's largest hard-rock underground tin mine. Aberfoyle operated the Ardlethan Mine in southern New South Wales and the Mount Cleveland Mine at Lunina, Tasmania. The balance of production was derived from a number of smaller mines and alluvial operations in Queensland, New South Wales, Tasmania, and Western Australia. Endeavour Resources Ltd. began production during the first quarter at its alluvial operation at Moolyella in the Pilbara District of Western Australia. Endeavour ceased production at Emmaville, New South Wales, where it had been retreating tailings, in March because of depletion of suitable material. Loloma Ltd. sold its tin interests at Emmaville and at Ewan, Queensland, to Great Northern Mining Corp. NL at yearend. Metals Exploration transferred its plant from its north Queensland operation to Gibsonvale, New South Wales. The plant was commissioned in May using old tailings, and mining of alluvium began in August. Greenbushes Tin Ltd. announced a two-stage development plan, including opening a new open pit, extension of the existing underground mine, and completion of new plant facilities at its Greenbushes tin-tantalite-lithium mine in southern Western Australia. Second-stage development would involve a further doubling of mine processing capacity to 600,000 tons per year.

Australia had two primary tin refinery operations in 1984. The larger of the two, Associated Tin Smelters Pty. Ltd.'s plant operating at Alexandria near Sydney, New South Wales, received its raw materials from producers in eastern Australia. The other was operated by Greenbushes adjacent to its mine at Greenbushes. There were also three secondary tin refineries that recovered tin from scrap.

NONMETALS

Diamond.—Diamond production from Argyle Diamond Mines Pty. Ltd.'s Upper Smoke Creek and Limestone Creek alluvial deposits and the Argyle pipe scree in the eastern Kimberley region of northern Western Australia was slightly lower in 1984 owing to the depletion of high-grade material. Output for the year was 5.7 million carats from 1.5 million tons of ore. The grade of diamonds remained essentially the same, however, with about 60% gem and cheap gem quality and 40% industrial grade. The Argyle joint venture consisted of CRA (56.8%), Ashton Mining NL (38.2%), and the Western Australian government-owned Northern Mining Corp. NL (5%).

Work on the second stage of the Argyle ore body, that of the AK-1 kimberlite pipe, proceeded on schedule during the year toward a yearend 1985 commissioning. About 20% of the construction of a 3-million-ton-per-year treatment plant and ancillary infrastructure had been completed. Prestripping of about 20 million tons of waste from the southern end of the pipe was under way with completion scheduled for October 1985.

Argyle Diamond Sales Ltd. (ADS) continued to market diamonds to De Beers Central Selling Organization on behalf of the CRA-Ashton joint venture, with gem diamonds and 75% of cheap gem and industrial diamonds sold at 5-week intervals. Since

July, ADS retained 25% of cheap gem and industrial diamonds for sale to other customers. ADS was also considering establishing a small-scale pilot cutting and polishing operation in Perth, Western Australia, to test the economic viability of these activities in Australia.

Continued exploration led to the discovery of additional diamondiferous alluvial deposits adjacent to Argyle a few kilometers up Limestone Creek. Freeport of Australia Pty. Inc. quoted a grade of 0.1 to 3.2 carats per ton, lower than the Argyle deposit but much higher than most deposits in Africa.

Gem Stones.—Australia's gem stone industry, aside from diamond, consisted almost entirely of the production of opal and sapphire. Small quantities of amethyst, chrysoprase, garnet, nephrite jade, rhodonite, and zircon were also produced.

Australia continued to be the world's leading producer of opal, accounting for over 80% of the market. The majority of the opal mined in Australia was from the three South Australian fields at Andamooka, Coober Pedy, and Mintabie. The Lightning Ridge District in central-northern New South Wales accounted for a small percentage of total production, and most of the boulder opal was from Queensland where opal occurs irregularly in a broad zone between Opalton in the north to Yowah near the New South Wales boundary.

Australia produced over 70% of the world's uncut sapphires, from the Anakie District, central Queensland, and from the Inverell-Glen Innes District of New South Wales.

Phosphate Rock.—Australian production of phosphate rock was estimated to be 11,000 tons, all from South Australia. Because of its high iron and aluminum content, this material was not suitable for manufacturing superphosphate and was mainly used in organic fertilizers.

Queensland Phosphate Ltd.'s (QPL) Phosphate Hill operation 65 kilometers south of Duchess, northwest Queensland, remained in care and maintenance throughout the year. QPL's parent company, WMCH, reported that investigations concerning commercial and technical aspects of the potential for upgrading its large, low-grade resources by chemical means were continuing.

Phosphate rock imports decreased about 25%, partly reflecting a shift away from manufacturing fertilizer in Australia in favor of importing the manufactured product. However, consumption of phosphate rock for production of manufactured fertilizers and superphosphate was virtually unchanged.

MINERAL FUELS

Coal.—Both production and exports of black coal attained record high levels for the second successive year despite continued worldwide oversupply and depressed export prices. There was negligible expenditure on exploration activity again in 1984 as a result of these adverse conditions.

New South Wales was Australia's largest coal producing State, followed by Queensland, Western Australia, South Australia, and Tasmania. New South Wales and Queensland together produced more than 95% of Australia's coal and accounted for 100% of the country's coal exports. Victoria only produced lignite, and the Northern Territory had no production of any type of coal.

Increased raw coal production was due mainly to an estimated record high output of 66 million tons, 37% higher than that of 1983, in Queensland. Although only slightly higher than that of 1983, raw coal production in New South Wales also resulted in a record high production of 68 million tons, a 3% increase. The increased production was due largely to expanded steaming coal production for export from new opencuts in both States. Total opencut production rose almost 40% in Queensland and 15% in New South Wales. Production from underground mines increased about 8% in Queensland, but continued to decline in New South Wales, falling another 3%.

Overall domestic coal consumption increased 7% to an estimated 39 million tons, 90% of which was used for electricity generation and in the iron and steel industry. Most of the growth was attributable to increased use for electricity generation. Consumption in Queensland, 10 million tons, increased 14% to the highest level ever achieved within the State. Coal consumption in New South Wales, 23 million tons, increased 6% over that of 1983, but was well below the levels recorded in 1981 and 1982.

Both Queensland and New South Wales recorded substantial growth in 1984 exports, with an overall increase of 25% to a record high of 76 million tons. Queensland exports rose 35% to 40 million tons from 30 million tons in 1983, and New South Wales exports increased 16% to about 36 million tons from 31 million tons in 1983. Most of the growth was due to increased shipments of steaming coal, which in 1984 comprised

60% of all New South Wales shipments and was increasing in importance in Queensland as mines at Newlands and Blair Athol worked up to capacity.

In April, BHP Minerals finalized its acquisition of a major share of Utah International Inc., a former subsidiary of the U.S.-based General Electric Co. and the parent company of Utah Development Co., which operated several large coal mines in Australia. The purchase resulted in BHP becoming the operator at the mines formerly managed by Utah as well as an increase in ownership of the mines through the Gregory joint venture and the Central Queensland Coal Associates joint venture.

Australian export capacity increased when the Abbot Point deepwater port on the northern Queensland coast and the Kooragang Island facility at Newcastle became operational. Abbot Point, which was operated by Abbot Point Bulk-Coal Pty. Ltd., a subsidiary of M.I.M., had an annual capacity of 6.5 million tons. Kooragang Island was operated by a consortium comprised of BHP, 30%; Newcastle Coal Shippers, 27.5%; Maritime Services Board of New South Wales, 20%; Howard Smith Ltd., 12.5%; and Japanese interests, 10%.

BP Australia Ltd. concluded a contract in September to ship 250,000 tons of steaming coal to China in December. The coal, coming from the Clutha Mines south of Sydney and the Nardell Mine in the Hunter Valley north of Sydney, was the first to be purchased by China from an Australian firm in 45 years. Japan remained the primary market for Australian coal, receiving 54% of total coal exports.

Petroleum and Natural Gas.—Australia's output of crude oil and condensate increased to a record high 182 million barrels in 1984, a 19% increase over the 1983 level. More than 90% of production was from the Gippsland Shelf Field in the Bass Strait between the mainland State of Victoria and the island State of Tasmania. Remaining production came from the Barrow Island Field off the coast of Western Australia and from the Cooper Basin in South Australia. Australia increased its petroleum self-sufficiency to about 85%, but Australian production was expected to start declining by 1990 unless significant new fields are discovered.

Although below the levels of the 2 previous years, hydrocarbons exploration and development drilling flourished in 1984. Exploration companies completed 247 exploration wells, of which 204 were onshore and 43 offshore. In addition, 110 development wells were completed, of which 74 were onshore and 36 offshore. Seismic activity included 57,966 line kilometers being shot, of which 19,229 kilometers were offshore.

A major disappointment in the offshore area was the failure of the followup drilling program in the Timor Sea to establish the Jabiru Field as a major oil province comparable to that of the Gippsland Shelf. A consortium led by BHP Petroleum Pty. Ltd. drilled three appraisal wells between May and September, with Jabiru 2 a dry hole and Jabiru 3 and 4 containing only hydrocarbon indications. Although the magnitude of Jabiru reserves was still subject to appraisal, Jabiru 1A drilled in 1983 was expected to be in production by early 1986.

The consortium's efforts in the Timor Sea were finally rewarded in November with flows of up to 6,744 barrels per day from the Challis 1 well, indicating the presence of a commercial reservoir adjacent to the Jabiru Field.

Other drilling successes off the coast of Western Australia during the year included Talisman 1 and Lenita 1.

Western Australia's huge $11 billion offshore North West Shelf natural gas project was progressing to full realization at yearend. The $2 billion first phase, or domestic gas stage, was formally dedicated on September 4, as commercial gas flowed to users in Perth. The first phase will eventually supply 385 million cubic feet of gas per day to Western Australian markets.

The much larger $9 billion second phase, involving the sale of 320 billion cubic feet of liquefied natural gas (LNG) annually for 19 years to Japan, was beginning to move ahead after several years of deadlock. The eight Japanese customers, five electric power and three gas companies, and the LNG marketing company were expected to sign purchase contracts in early 1985. The marketing company was comprised of the following six companies, each with a one-sixth share: Woodside Petroleum Ltd.; Mitsubishi Corp. and Mitsui Co. Ltd.; Shell; BHP Petroleum; BP International Ltd.; and Chevron Oil Trading Co.

Major cost cutting innovations of up to $1 billion, including switching the LNG plant from a seawater cooling system to an air cooling operation, selecting gas turbines rather than steam turbines to power the compressors at the LNG plant, and the prospect of not separating out the butane and propane from the LNG for separate marketing, apparently made the second phase of the project more attractive to investors.

After more than a year of discussion and speculation, the Australian Government's RRT, or "excess profits-based tax," on new offshore oil development went into effect July 1. The major provisions of the taxation structure, including the RRT, for the country's petroleum exploration and development sector were—

1. The previous levy or excise tax on "old" oil, oil discovered before September 1975, for both offshore and onshore projects remained applicable on pretax earnings of companies from oilfields producing more than 3.1 million barrels per year of old oil.

2. A new levy on "new" oil, oil discovered after September 1975 for both onshore and offshore projects in production on July 1, became effective on pretax earnings of companies from oilfields producing more than 5 million barrels per year of new oil.

3. The long-awaited RRT applies only to offshore oil projects that were not developed as of July 1, projects called "greenfields." The threshold for the RRT to take effect was about a 30% net rate of return, or profit, to the company, depending on the interest rate of long-term bonds, plus 15%. The long-term bond rate was 15% on July 1, making the threshold 30% on that date. The RRT rate on earnings over the threshold was 40%, compared with up to an 87% levy on large, old oil production, as was occurring at some of the Bass Strait fields separating the Australian mainland from Tasmania. Additionally, exploration expenses in areas that ultimately enter into production will be deductible for RRT purposes against receipts derived from that production.

The RRT will be levied prior to the payment of company income tax and RRT payments will be a deduction for company tax purposes.

4. Oil developments will continue to be subject to the previous company tax on earnings; oil companies incorporated in Australia paid a 45% rate, while those incorporated overseas paid 55%.

5. The existing royalty tax of 10% to 12.5% on the net wellhead value of oil production remained for old and new oil production, but will not become applicable to greenfields upon their development.

Uranium.—Production of U_3O_8 was greater in 1984 than in 1983 owing to significant increases in production at both of Australia's uranium mines. Energy Resources of Australia Ltd. reported that production at its Ranger opencut mine in the Alligator River's region of the Northern Territory was 3,776 tons of U_3O_8. Much of the feed to the mill was obtained from existing ore stockpiles. QML reported that total production from the stockpiled ore at the Nabarlek treatment plant, also in the Alligator River's region, for 1984 was 1,401 tons of U_3O_8. Ore at the Nabarlek opencut was mined and stockpiled in 1979.

In accordance with announced policy, exports of uranium to France were banned until such time as France discontinued testing nuclear weapons in the South Pacific. To protect the profit and cash flow position of QML, agreement was reached with the Government that each of the scheduled shipments of uranium that were or will be postponed would be purchased by the Government for the original delivery price.

Uranium exports for 1984 were 3,308 tons of concentrate.

The prouranium mining policy initially set by an ALP caucus vote in November 1983 was adopted in July at the ALP National Convention. This policy will enable the Ranger and Nabarlek Mines to continue to meet existing contracts as well as to seek further overseas sales. It also allows development of the Olympic Dam copper-gold-uranium project at Roxby Downs Station, South Australia, to proceed. No other new mines will be given export permits.

Exploratory development and underground drilling were continued by WMCH at Olympic Dam during the year in order to establish a proven ore reserve. Exploratory drilling emphasis shifted from the surface to underground as drill sites became available. The metallurgical pilot plant was commissioned during the year. Production of copper concentrate from a 5-ton-per-hour grinding-flotation circuit and the recovery of ammonium diuranate from a 3-ton-per-hour acid leaching and solvent extraction circuit was proceeding at yearend.

Mining at Olympic Dam was targeted at yearend for a 1987 startup, rather than the early 1990's as earlier announced, but at a significantly lower production rate than originally planned. Mining would begin on a small, high-grade gold section of the ore body, and mining of the copper-uranium ore would start the following year, also concentrating on a high-grade section. Mining of the high-grade gold ore should yield approximately 100,000 troy ounces per year. The initial copper-uranium mining was expected to yield 55,000 tons of copper and 2,000 tons of uranium per year. Production would be increased in stages to the original target of 6.5 million tons of ore per year as the market permits. Any additional supply of uranium would negatively impact the depressed domestic uranium industry, which was facing the lowest prices for U_3O_8 in concentrates since early 1975. The exchange value price, or spot price, quoted by the Nuclear Exchange Corp., fell from $22.00 on December 31, 1983, to $15.25 on December 31, 1984.

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[1]Physical scientist, Division of International Minerals.

[2]Lyday, T. Q. The Mineral Industry of Australia. Ch. in BuMines Minerals Yearbook 1983, v. 3, pp. 63-78.

[3]Where necessary, values have been converted from Australian dollars (A$) to U.S. dollars at the rate of A$1.26=US$1.00 as of Dec. 31, 1984.

The Mineral Industry of Austria

By George A. Rabchevsky[1]

The mining and mineral processing industries continued to play an integral and visible part in the Austrian economy. On the average, the Austrian mining industry, including mineral fuels, contributes about \$800 million to \$1 billion[2] to the general economy of the country. Ore mining usually makes up about 8% to 9% of the revenues, while oil and gas make up almost 50% of the total. Austria has a long mining tradition, and even though the country has a variety of various mineral resources, the country is small and reserves, necessarily limited in scope, have declined considerably. In 1984, base metals, graphite, iron ore, magnesite, and tungsten were the backbone of the mining industry, while steelmaking and the production of antimony, with some lead and zinc, were the main processing industries contributing to the economy. In order to support the expansive minerals processing industry, Austria had to supplement much of its domestic requirements through imports, including iron ore from the U.S.S.R. Basic refractories continued to be among the principal industrial mineral exports.

The Austrian economy, in general, remained about the same as in the past 3 years, the real gross domestic product growing by 2.5% each year. Unemployment, one of the lowest in the world, remained at 4.5%. Continued economic recovery led employment to rise to a total of 2,744,000 persons in 1984. There were almost 10,000 workers employed by the mining industry, a figure that was declining gradually each year. Over 65% of these workers were employed by the mineral fuels sector and only about 13% by the metal mining industries. Almost 20% were working in underground mines.

The industrial sector in Austria was dominated by two factors: The "Social Contract," or wage and price agreements, among government, industry, and unions, and the fact that a major part of the industry was nationally owned. The state-owned holding company, Österreichische Industrieverwaltungs AG (OIAG), for example, is a vast concern that employed about 10,000 people and included Voest-Alpine AG (VA), an iron and steel producer; Österreichische Mineralölverwaltungs AG (OMV), oil production and refining; Chemie-Linz AG, chemicals, fertilizers, and metallic compounds; engineering companies such as Simmering-Graz-Pauker AG; Bleiberger Bergwerks-Union AG, a base metal mining and refining company; and Vereinigte Metallwerke Ranshofen-Berndorf AG, aluminum production. Most of OIAG'S companies were profitable or broke even in 1984. The Government funneled about \$770 million into OIAG in 1984 for a major reconstruction plan, to end in 1986.[3]

PRODUCTION

Production by the Austrian mining industry remained almost the same as in 1983, with small increases in some metal and nonmetal commodities, and continued incremental decreases in the state-owned oil and gas industries. The upward trend in total industrial output, which began in 1983, continued in 1984 with a real growth of 5%. There were 85 operating mines and quarries in Austria, of which 22 were underground mines. There were 55 rock quarries and 7 underground industrial minerals mines.

Because Austria was deficient in a number of important raw materials, an exploration and evaluation program was inaugurated by the Ministry of Trade, Commerce and Industry and the Ministry of Science and Research. The aerial geophysical and geochemical survey resulted in thousands of rock and data samples, which were being examined. Among the more important of the ongoing projects were lead-zinc mineralization at Silberberg-Stubing, north of Gratz, lithium-bearing pegmatites at Koralpe on the Styria-Corinthia border, and copper and barite in dolomite formations at Schwaz in the Tyrol.[4]

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum metal:					
Primary	94,393	[r]94,219	93,908	94,200	95,352
Secondary	31,926	46,343	39,066	56,785	56,579
Total	126,319	140,562	132,974	150,985	151,931
Antimony, mine output, metal content of concentrate	662	603	667	659	523
Cadmium metal	36	55	48	46	49
Copper:					
Smelter, secondary	26,100	27,100	30,000	28,000	[e]33,000
Refined:					
Primary	[r]8,887	[r]8,804	[r]8,802	8,769	9,592
Secondary	[r]34,658	[r]30,313	[r]32,757	33,131	33,255
Total	[r]43,545	39,117	41,559	41,900	42,847
Germanium, metal content of concentrates kilograms	4,500	4,000	4,000	6,000	[e]5,000
Iron and steel:					
Iron ore and concentrates:					
Gross weight thousand tons	3,200	3,050	3,330	3,540	3,600
Metal content do.	986	948	1,045	1,107	[e]1,110
Metal:					
Pig iron do.	3,485	[r]3,477	3,115	3,320	3,745
Ferroalloys, electric-furnace do.	10	12	14	14	[e]14
Steel, crude do.	[r]4,623	4,656	4,258	4,411	4,868
Semimanufactures do.	3,818	3,477	3,381	3,555	3,842
Lead:					
Mine output, metal content of concentrate	4,316	4,320	4,086	4,290	4,151
Metal: Smelter:					
Primary	5,418	3,343	3,410	4,210	[e]4,900
Secondary	11,547	12,789	14,512	12,860	[e]13,000
Total	16,965	16,132	17,922	17,070	[e]17,900
Manganese, Mn content of domestic iron ore	47,216	55,876	61,549	65,284	67,101
Tungsten, mine output, metal content of concentrate	2,150	1,435	1,714	1,408	1,632
Zinc:					
Mine output, metal content of concentrate	19,117	18,181	19,065	19,432	20,879
Metal refined	22,102	22,674	23,000	23,000	24,000
NONMETALS					
Barite	249	--	--	--	--
Cement, hydraulic thousand tons	[r]5,457	5,288	5,012	4,907	4,899
Clay:					
Illite	504,812	331,448	441,497	381,598	285,553
Kaolin:					
Crude	340,980	315,560	351,392	402,511	455,695
Marketable	83,882	79,064	77,288	83,558	99,541
Other	61,635	52,173	15,598	32,946	18,058
Feldspar, crude	10,946	10,357	2,960	1,063	2,554
Graphite, crude	36,699	23,807	24,451	40,418	43,789
Gypsum and anhydrite, crude	833,417	800,515	727,520	750,921	740,117
Lime thousand tons	1,005	1,034	1,027	1,140	1,262
Magnesite:					
Crude do.	1,318	1,159	1,031	1,006	1,183
Sintered or dead-burned do.	427	361	370	320	377
Caustic calcined do.	132	102	98	89	93

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Nitrogen: N content of ammonia thousand tons	490	486	485	495	[e]500
Pigments, mineral: Micaceous iron oxide	10,959	11,320	9,570	11,734	[e]11,500
Pumice (trass)	8,162	8,308	10,551	2,458	9,666
Salt:					
Rock thousand tons	1	1	1	1	1
In brine:					
Evaporated do.	410	462	434	359	419
Other do.	261	264	214	141	239
Total do.	672	727	649	501	659
Sand and gravel:					
Quartz sand do.	878	869	864	816	782
Other do.	[r]18,637	[r]17,210	[r]15,192	15,336	[e]15,500
Total do.	[r]19,515	[r]18,079	[r]16,056	16,152	16,282
Sodium compounds, n.e.s.:[e]					
Carbonate, synthetic do.	170	170	170	170	150
Sulfate, synthetic do.	55	55	55	55	50
Stone:[2]					
Dolomite do.	1,017	1,227	1,029	938	[2]981
Quartz and quartzite do.	219	184	177	171	[2]223
Other including limestone and marble do.	[r]14,501	[r]13,645	[r]12,559	11,964	[e]12,000
Total do.	[r]15,737	[r]15,056	[r]13,765	13,073	13,204
Sulfur:					
Byproduct:					
Of metallurgy	8,731	9,133	9,504	9,429	10,113
Of petroleum and natural gas	18,733	27,861	38,243	32,000	28,480
From gypsum and anhydrite	23,836	25,143	27,102	26,122	26,449
Total	51,300	62,137	74,849	67,551	65,042
Talc and soapstone	[r]116,698	116,425	117,092	122,128	134,011
MINERAL FUELS AND RELATED MATERIALS					
Coal, brown and lignite thousand tons	2,865	3,061	3,297	3,041	2,928
Coke do.	[r]1,729	[r]1,686	1,622	1,725	1,854
Gas, natural:					
Gross million cubic feet	67,211	50,730	46,758	42,850	44,933
Marketed do.	55,443	41,835	38,088	34,205	[e]36,000
Oil shale	950	970	1,010	1,060	[e]1,000
Petroleum:					
Crude thousand 42-gallon barrels	10,290	9,324	8,994	8,847	8,407
Refinery products:					
Gasoline do.	15,409	16,251	15,378	16,407	[e]16,200
Kerosine and jet fuel do.	1,053	1,242	1,059	1,079	[e]1,050
Distillate fuel oil do.	18,970	15,767	15,484	15,267	[e]15,200
Residual fuel oil do.	28,974	21,821	17,740	11,646	[e]12,000
Lubricants do.	1,070	767	538	603	[e]600
Liquefied petroleum gas do.	4,470	4,808	3,876	4,966	[e]4,500
Bitumen do.	2,173	1,657	1,605	1,218	[e]1,300
Unspecified do.	506	1,283	270	676	[e]700
Refinery fuel and losses do.	3,565	3,320	3,072	3,064	[e]3,100
Total do.	76,190	66,916	59,022	54,926	54,650

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 1985.
[2]Excluding stone used by the cement and iron and steel industries.

TRADE

Trade in processed minerals played an important role in the country's economy, even though tourism was the major industry in Austria. Austrian industrial exports to Western Europe in 1983 were 69% of the total, to the Council of Mutual Economic Assistance (CMEA) countries excluding Yugoslavia (12%), and 18.5% went to the rest of the world.[5] Austria depended on imports for about 75% of its mineral raw material requirements. Certain key metals and minerals had to be totally imported: alumina, tin, copper, chromium, manganese, molybdenum, cobalt, nickel, and rare-earth metals. Imported industrial minerals were asbestos, fluorspar, potash, phosphates, and cryolite. Coking and metallurgical coals were imported primarily from CMEA countries. Over the last 10 years, Austria's dependence on CMEA energy imports had risen markedly, from 27% in 1973 to almost 33% in 1983, and further increased in 1984.[6] Overall Austrian imports grew by 13.4%, or about 9% in real terms.

Table 2.—Austria: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	29	47	--	NA.
Metal including alloys:				
Scrap	51,406	59,547	--	West Germany 29,923; Italy 27,989.
Unwrought	27,635	30,153	20	West Germany 8,801; Japan 7,789.
Semimanufactures	68,667	89,207	1,696	West Germany 24,467; Switzerland 5,618; Italy 5,135.
Antimony:				
Ore and concentrate	--	4	NA	NA.
Oxides kilograms	15,400	100	--	NA.
Metal including alloys, all forms do.	--	500	--	NA.
Cadmium: Metal including alloys, all forms	53	51	--	Italy 25; United Kingdom 15.
Chromium:				
Ore and concentrate	49	622	--	Greece 288; East Germany 240.
Oxides and hydroxides	8	4	--	Mainly to Yugoslavia.
Columbium and tantalum: Metal including alloys, all forms, tantalum	10	12	NA	NA.
Copper:				
Matte and speiss including cement copper	4	24	--	All to West Germany.
Oxides and hydroxides	--	7	--	NA.
Sulfate	24	41	NA	Denmark 30.
Metal including alloys:				
Scrap	5,021	9,075	--	West Germany 6,316; Belgium-Luxembourg 1,407.
Unwrought	19,574	23,028	--	Italy 11,530; West Germany 7,591.
Semimanufactures	17,063	15,879	94	West Germany 5,949; Italy 2,876; France 1,861.
Gold:				
Waste and sweepings value, thousands	$42	$27	--	All to West Germany.
Metal including alloys, unwrought and partly wrought troy ounces	r17,972	20,094	NA	West Germany 13,600; Italy 4,212.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	(2)	50	--	All to West Germany.
Metal:				
Scrap	8,840	12,642	--	Italy 4,787; West Germany 3,290.
Pig iron, cast iron, related materials	4,470	4,841	118	West Germany 1,394; Bulgaria 861.
Ferroalloys	12,085	12,771	625	Romania 2,184; Italy 1,418; Poland 1,197.
Steel, primary forms	276,759	342,849	4,573	West Germany 149,425; Iran 61,835; East Germany 59,956.
Semimanufactures:				
Bars, rods, angles, shapes, sections	340,387	379,621	5,264	West Germany 91,285; Italy 77,804; East Germany 75,636.
Universals, plates, sheets	1,296,220	1,350,701	8,166	U.S.S.R. 417,078; West Germany 332,555.
Hoop and strip	97,199	126,174	839	West Germany 36,783; East Germany 17,170.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Rails and accessories	88,870	72,232	429	Algeria 29,011; Switzerland 18,803.
Wire	58,141	59,595	810	West Germany 30,181; Italy 6,611.
Tubes, pipes, fittings	307,510	383,556	2,005	U.S.S.R. 183,406; West Germany 67,025.
Castings and forgings, rough	14,584	13,285	388	West Germany 5,443; Italy 1,390.
Lead: Metal including alloys:				
Scrap	111	2	--	NA.
Unwrought	837	767	--	Greece 344; Italy 250; Hungary 100.
Semimanufactures	26	58	--	U.S.S.R. 17; Iraq 10; Yugoslavia 5.
Magnesium: Metal including alloys:				
Scrap	630	340	--	West Germany 185; Italy 146.
Unwrought	133	656	--	West Germany 528; Italy 103.
Semimanufactures	495	761	NA	NA.
Manganese: Oxides	39	70	--	Yugoslavia 55.
Mercury .... 76-pound flasks	102	104	NA	West Germany 67.
Molybdenum:				
Oxides and hydroxides	--	6	--	All to West Germany.
Metal including alloys, all forms	r1,047	1,201	NA	NA.
Nickel:				
Matte and speiss	(2)	5	--	All to Yugoslavia.
Metal including alloys:				
Scrap	255	457	--	West Germany 267; United Kingdom 98.
Unwrought	8	6	--	Yugoslavia 4.
Semimanufactures	382	430	23	Iran 144; West Germany 77.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	r10,770	11,478	--	West Germany 8,745; Sweden 643; Greece 611.
Rare-earth metals including alloys, all forms	378	385	NA	NA.
Silver:				
Waste and sweepings value, thousands	$126	$445	--	United Kingdom $303; West Germany $136.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,880	1,703	--	West Germany 966; Yugoslavia 433; Switzerland 230.
Tin:				
Oxides	11	12	--	Bulgaria 6; Poland 6.
Metal including alloys:				
Scrap	20	17	--	All to West Germany.
Unwrought	20	49	--	United Kingdom 18; West Germany 12; Yugoslavia 5.
Semimanufactures	6	53	--	Yugoslavia 50; West Germany 2; Italy 1.
Titanium: Oxides	14	3	NA	NA.
Tungsten:				
Ore and concentrate	(2)	73	--	Hungary 39; West Germany 34.
Oxides and hydroxides	(2)	53	--	All to West Germany.
Metal including alloys, all forms	663	874	NA	NA.
Zinc:				
Oxides	1,306	1,748	--	Yugoslavia 933; Hungary 622.
Blue powder	18	--		
Metal including alloys:				
Scrap	558	448	NA	West Germany 434.
Unwrought	2,835	4,861	--	Yugoslavia 2,351; Czechoslovakia 900.
Semimanufactures	448	1,074	(2)	Iran 745; Yugoslavia 162.
Other:				
Ores and concentrates	184	130	14	West Germany 51; Czechoslovakia 41.
Ashes and residues	107,004	111,179	--	Italy 87,662; West Germany 21,132.
Waste and sweepings of unspecified precious metals value, thousands	r$4,847	$3,254	--	West Germany $2,873; France $294.
Base metals including alloys, all forms	r3	2,209	194	Italy 1,725; United Kingdom 168.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	110	95	--	West Germany 64.
Artificial, silicon carbide	33	23	NA	West Germany 20.
Grinding and polishing wheels and stones	11,922	11,862	52	West Germany 1,997; Italy 1,054; France 954.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Asbestos, crude	10	31	--	Switzerland 24.
Barite and witherite	20	48	--	All to West Germany.
Cement	23,960	15,644	--	West Germany 12,832; Italy 779.
Chalk	1,987	1,335	--	Hungary 956; Italy 184.
Clays, crude:				
Bentonite	(2)	26	--	NA.
Chamotte earth	7	39	--	NA.
Dinas earth	711	NA		
Kaolin	27,863	35,664	--	Hungary 15,752; West Germany 10,384.
Unspecified	383	13,500	--	West Germany 12,658.
Diamond:				
Gem, not set or strung value, thousands	$523	$196	$6	West Germany $105; Hungary $50.
Industrial stones do	$52	$47	--	Yugoslavia $35.
Diatomite and other infusorial earth	815	1,357	--	Yugoslavia 689; Czechoslovakia 203.
Feldspar	14	1	NA	NA.
Fertilizer materials:				
Crude, n.e.s	294	278	--	Switzerland 129; West Germany 124.
Manufactured:				
Phosphatic	50,348	30,831	--	Hungary 30,262; Italy 543.
Potassic	3	1,702	--	All to West Germany.
Unspecified and mixed	816,997	866,399	15	West Germany 427,621; East Germany 203,338.
Graphite, natural	13,384	11,404	10	Poland 4,899; West Germany 3,397.
Gypsum and plaster	166,522	190,463	--	West Germany 187,180; Italy 2,492.
Lime	1,727	1,732	--	West Germany 1,355; Hungary 310.
Magnesium compounds	160,567	131,043	1,016	West Germany 37,456; France 18,510; Venezuela 12,533.
Mica:				
Crude including splittings and waste	602	829	--	Greece 448; Spain 187.
Worked including agglomerated splittings	152	189	--	West Germany 57; Yugoslavia 20; Finland 17.
Phosphates, crude	--	929	--	West Germany 923.
Pigments, mineral:				
Natural, crude	7,683	7,507	106	West Germany 2,440; United Kingdom 1,709.
Iron oxides and hydroxides, processed	693	1,185	NA	West Germany 1,164.
Potassium salts, crude	82	--		
Precious and semiprecious stones other than diamond:				
Natural kilograms	800	341	9	West Germany 257; France 24.
Synthetic do	2,830	4,025	506	India 1,687; Thailand 399; Algeria 356.
Pyrite, unroasted	23	46	--	Italy 24; Netherlands 20.
Salt and brine	1,443	1,014	--	West Germany 818.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	r36	26	NA	NA.
Sulfate, manufactured	73,349	72,748	NA	West Germany 33,337; Italy 20,895.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	116,684	96,948	--	West Germany 81,636; Switzerland 14,943.
Worked	24,193	27,573	256	West Germany 20,644; Switzerland 6,297.
Dolomite, chiefly refractory-grade	4,165	3,826	--	West Germany 3,063; France 426.
Gravel and crushed rock	705,792	620,554	--	West Germany 311,407; Switzerland 296,994.
Limestone other than dimension	7,997	914	--	West Germany 911.
Quartz and quartzite	332	86	--	Netherlands 50; West Germany 35.
Sand other than metal-bearing	157,374	158,753	--	West Germany 78,578; Switzerland 74,985.
Sulfur:				
Elemental:				
Crude including native and byproduct	22	575	--	Yugoslavia 563.
Colloidal, precipitated, sublimed	(2)	2	NA	NA.
Sulfuric acid	13,547	9,961	NA	Italy 5,452; West Germany 3,289.
Talc, steatite, soapstone, pyrophyllite	98,656	104,252	--	West Germany 58,820; Italy 13,235.
Other:				
Crude	r14,008	17,530	NA	West Germany 6,522; Switzerland 105.
Slag and dross, not metal-bearing	139,773	113,327	--	West Germany 106,908; Italy 4,767.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	457	23	--	Bulgaria 7; U.S.S.R. 7.
Carbon: Carbon black	17	27	NA	West Germany 24.
Coal:				
Anthracite	10	6	--	All to Switzerland.
Bituminous	79	741	--	West Germany 505; Italy 228.
Briquets of anthracite and bituminous coal	44	114	--	Switzerland 99; Yugoslavia 15.
Lignite including briquets	15,349	9,489	--	West Germany 9,422; Switzerland 66.
Coke and semicoke	331	283	--	West Germany 180; Switzerland 103.
Peat including briquets and litter	5,359	6,262	--	Italy 4,852; Switzerland 568.
Petroleum:				
Crude 42-gallon barrels	7	7	--	Mainly to West Germany.
Refinery products:				
Liquefied petroleum gas do.	593,108	572,076	--	Italy 403,581; Yugoslavia 87,967.
Gasoline: Motor do.	116,977	127,585	--	West Germany 82,662; Hungary 44,642.
Mineral jelly and wax do.	194,712	211,797	--	Netherlands 147,833; West Germany 37,777.
Kerosine and jet fuel do.	20,569	59,628	--	Yugoslavia 35,155; West Germany 19,104.
Distillate fuel oil do.	7,139	6,751	--	Yugoslavia 5,058; Czechoslovakia 1,306.
Lubricants do.	r325,426	338,275	21	Czechoslovakia 131,973; Hungary 105,325.
Residual fuel oil do.	38,828	110,037	--	Yugoslavia 81,079; Poland 28,565.
Asphalt do.	61,796	2,082	--	West Germany 2,074.
Bitumen and other residues do.	r27,795	85,539	--	Libya 46,607; Algeria 29,616.
Bituminous mixtures do.	41,596	49,474	--	Algeria 14,388; West Germany 13,890.
Nonlubricating oils do.	64,386	62,258	--	Iran 23,100; Yugoslavia 16,100.
White oils do.	336	2,401	--	Poland 2,254; Iraq 63.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Austria: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	59	36	--	West Germany 19; France 11; United Kingdom 6.
Alkaline-earth metals	2	7	--	West Germany 6.
Aluminum:				
Ore and concentrate	24,945	27,762	NA	NA.
Oxides and hydroxides	219,984	217,800	NA	Hungary 3,400; undetermined 210,967.
Metal including alloys:				
Scrap	67,352	68,354	NA	NA.
Unwrought	43,909	52,155	--	West Germany 30,362; Norway 11,961.
Semimanufactures	42,040	48,326	33	West Germany 22,347; Switzerland 8,585.
Antimony:				
Ore and concentrate	211	--	--	
Oxides	161	212	NA	Belgium-Luxembourg 116; U.S.S.R. 80.
Metal including alloys, all forms	48	32	NA	China 10; Hong Kong 10.
Arsenic: Oxides and acids	14	2	--	NA.
Beryllium: Metal including alloys, all forms value, thousands	$1	$35	$30	NA.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Cadmium: Metal including alloys, all forms	3	2	--	Mainly from United Kingdom.
Chromium:				
Ore and concentrate	49,906	40,390	NA	Republic of South Africa 30,754.
Oxides and hydroxides	328	456	NA	West Germany 184; U.S.S.R. 120.
Cobalt: Oxides and hydroxides	3	5	--	Mainly from West Germany.
Columbium and tantalum: Metal including alloys, all forms, tantalum	30	12	5	West Germany 5.
Copper:				
Ore and concentrate	--	1	--	All from United Kingdom.
Matte and speiss including cement copper	11	2	--	All from West Germany.
Oxides and hydroxides	44	44	--	Belgium-Luxembourg 41.
Sulfate	536	634	--	Italy 488; Belgium-Luxembourg 53.
Metal including alloys:				
Scrap	29,009	27,728	--	West Germany 11,515; U.S.S.R. 8,859.
Unwrought	15,407	10,833	20	Namibia 4,194; Republic of South Africa 3,872.
Semimanufactures	56,352	60,025	34	West Germany 32,370; Italy 8,283.
Gold: Metal including alloys, unwrought and partly wrought ___ troy ounces	r116,482	142,074	3,440	Switzerland 55,460; Republic of South Africa 35,462.
Iron and steel:				
Iron ore concentrate:				
Excluding roasted pyrite ___ thousand tons	3,241	2,391	--	U.S.S.R. 998; Sweden 724; Brazil 336.
Pyrite, roasted ___ do	34	21	--	West Germany 10; Yugoslavia 7.
Metal:				
Scrap	380,562	218,822	56	West Germany 91,635; U.S.S.R. 59,829.
Pig iron, cast iron, related materials	77,847	38,200	4	Canada 11,297; U.S.S.R. 8,943.
Ferroalloys:				
Ferrochromium	23,625	18,524	--	Yugoslavia 5,184; U.S.S.R. 4,502.
Ferromanganese	24,466	22,710	--	Norway 14,729; West Germany 3,808.
Ferromolybdenum	59	67	--	West Germany 30; Sweden 17.
Ferronickel	NA	3,337	--	Indonesia 1,417; Greece 1,389.
Ferrosilicon	14,413	13,670	--	Yugoslavia 4,851; U.S.S.R. 3,719.
Unspecified	9,088	5,420	45	Czechoslovakia 3,501; West Germany 604.
Steel, primary forms	142,291	125,210	27	West Germany 54,342; Hungary 37,644.
Semimanufactures:				
Bars, rods, angles, shapes, sections	229,781	230,552	25	West Germany 96,001; Italy 74,905.
Universals, plates, sheets	225,949	259,666	63	West Germany 108,369; Belgium-Luxembourg 35,125.
Hoop and strip	70,751	77,810	1	West Germany 52,689; Italy 7,521.
Rails and accessories	4,494	2,996	--	West Germany 1,642; Italy 523.
Wire	29,644	35,419	6	West Germany 11,289; Belgium-Luxembourg 11,056.
Tubes, pipes, fittings	148,717	151,704	48	West Germany 74,956; Italy 18,093.
Castings and forgings, rough	12,416	13,811	18	West Germany 10,682; Switzerland 693.
Lead:				
Ore and concentrate	6,993	4,611	--	Italy 3,832; Canada 778.
Oxides	1,080	460	NA	France 246; West Germany 212.
Metal including alloys:				
Scrap	2,367	2,925	--	West Germany 888; Hungary 835.
Unwrought	32,549	31,362	684	West Germany 13,574; United Kingdom 5,878.
Semimanufactures	609	792	--	West Germany 724; Belgium-Luxembourg 29.
Magnesium: Metal including alloys:				
Scrap	25	116	--	West Germany 78; Italy 23.
Unwrought	1,650	2,301	684	Italy 947; Norway 411.
Semimanufactures	147	135	22	West Germany 79; Switzerland 16.
Manganese:				
Ore and concentrate, metallurgical-grade	439	362	--	Netherlands 151; Australia 150.
Oxides	77	180	NA	West Germany 88; Belgium-Luxembourg 58.
Mercury ___ 76-pound flasks	290	368	75	West Germany 119; Sweden 102.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Molybdenum:				
Oxides and hydroxides	1,896	1,768	NA	NA.
Metal including alloys:				
Scrap	4	31	22	West Germany 7.
Unwrought	3	6	--	West Germany 5.
Semimanufactures	30	106	1	France 75; West Germany 29.
Nickel:				
Ore and concentrate kilograms	--	400	NA	NA.
Matte and speiss	833	622	7	Cuba 251; Netherlands 244.
Metal including alloys:				
Scrap	357	490	17	U.S.S.R. 107; West Germany 60.
Unwrought	1,129	2,620	404	Republic of South Africa 544; Zimbabwe 369; Canada 228.
Semimanufactures	534	510	88	West Germany 148; United Kingdom 75.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	28,711	16,493	NA	West Germany 12,667; Yugoslavia 1,350.
Rare-earth metals including alloys, all forms	149	91	--	West Germany 60; U.S.S.R. 30.
Silver:				
Waste and sweepings value, thousands	$22	$4	--	NA.
Metal including alloys, unwrought and partly wrought thousand troy ounces	[r]7,040	4,348	37	West Germany 3,541; Switzerland 485.
Tin:				
Oxides	10	5	--	West Germany 4; United Kingdom 1.
Metal including alloys:				
Scrap kilograms	--	500	--	NA.
Unwrought	455	438	([2])	Bolivia 146; West Germany 123.
Semimanufactures	182	181	1	West Germany 157; Netherlands 11.
Titanium: Oxides	8,549	9,215	NA	West Germany 6,015; Belgium-Luxembourg 706.
Tungsten:				
Ore and concentrate	2,413	3,090	NA	NA.
Oxides and hydroxides	70	67	NA	NA.
Metal including alloys:				
Scrap	248	344	8	West Germany 188; Belgium-Luxembourg 41.
Unwrought	58	77	11	Republic of Korea 32; Israel 19.
Semimanufactures	10	7	NA	West Germany 6.
Zinc:				
Ore and concentrate	9,323	6,649	--	Italy 3,694; Canada 2,933.
Oxides	951	1,472	--	West Germany 1,305; Italy 130.
Blue powder	945	1,250	NA	Belgium-Luxembourg 789; Norway 218.
Metal including alloys:				
Scrap	291	265	--	West Germany 113; Yugoslavia 100.
Unwrought	4,114	6,139	--	West Germany 5,092; Belgium-Luxembourg 265.
Semimanufactures	1,821	2,486	--	West Germany 1,614; France 527.
Other:				
Ores and concentrates	11,218	10,189	1,554	Netherlands 4,487; Republic of South Africa 1,155.
Ashes and residues	168,128	181,217	2,349	U.S.S.R. 114,685; East Germany 20,454.
Base metals including alloys, all forms	[r]4,553	1,949	69	U.S.S.R. 947; West Germany 205.
Waste and sweepings of unspecified precious metals value, thousands	$76	$182	--	Turkey $70; Denmark $63.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	322	340	4	Italy 191; West Germany 44.
Artificial:				
Corundum	9,666	11,735	1,046	West Germany 4,480; France 2,643; Hungary 1,641.
Silicon carbide	2,583	2,701	NA	West Germany 1,538; Norway 357; Italy 237.
Dust and powder of precious and semiprecious stones including diamond kilograms	348	722	657	West Germany 43; Switzerland 17.
Grinding and polishing wheels and stones	1,148	1,410	3	West Germany 655; Spain 284; Italy 242.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Asbestos, crude	27,082	26,076	2	Canada 12,747; U.S.S.R. 5,584; Italy 4,036.
Barite and witherite	6,649	9,278	--	West Germany 4,184; Ireland 3,080.
Boron materials:				
Crude natural borates	17,028	17,307	3,899	Turkey 13,198; Belgium-Luxembourg 125.
Oxides and acids	851	796	NA	France 383; Italy 238.
Cement	38,428	35,229	--	Yugoslavia 8,701; Italy 8,065; West Germany 7,697.
Chalk	3,177	2,319	--	France 1,348; West Germany 830.
Clays, crude:				
Bentonite	839	1,733	NA	West Germany 1,517; France 121.
Chamotte earth	15,240	13,688	--	Czechoslovakia 12,304; West Germany 1,139.
Kaolin	94,299	95,034	8,721	Czechoslovakia 31,154; United Kingdom 25,126.
Unspecified	r78,903	73,731	84	West Germany 52,288; Czechoslovakia 14,616.
Cryolite and chiolite	178	228	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$4,728	$6,208	$193	Israel $2,369; Belgium-Luxembourg $1,629.
Industrial stones do	$358	$445	$17	Republic of South Africa $159; Hungary $73; Zaire $71.
Diatomite and other infusorial earth	7,958	11,395	2,657	Hungary 2,704; Czechoslovakia 2,372; Denmark 2,302.
Feldspar, fluorspar, related materials:				
Feldspar	5,095	4,300	--	Sweden 2,178; West Germany 1,732.
Fluorspar	10,617	11,894	--	East Germany 7,786; West Germany 3,300.
Fertilizer materials:				
Crude, n.e.s	3,978	5,873	26	West Germany 2,538; Italy 1,804.
Manufactured:				
Ammonia	8,036	24,980	--	Czechoslovakia 20,699; East Germany 1,982.
Nitrogenous	118,135	167,983	--	West Germany 95,838; France 27,535.
Phosphatic	79,771	69,309	739	France 45,438; West Germany 16,886.
Potassic	261,875	245,624	--	West Germany 9,885; undetermined 235,739.
Unspecified and mixed	147,886	193,808	5,383	West Germany 134,578; Italy 23,223.
Graphite, natural	2,653	3,738	(2)	Italy 1,276; China 933; North Korea 771.
Gypsum and plaster	9,627	8,917	18	West Germany 8,067; Italy 683.
Iodine	4,306	2,033	--	Yugoslavia 1,390; Italy 362.
Magnesium compounds:				
Magnesite	97,529	94,529	1	China 4,399; undetermined 88,421.
Oxides and hydroxides	2,165	1,027	--	West Germany 491; Japan 385.
Mica:				
Crude including splittings and waste	222	203	(2)	West Germany 73; Norway 40; France 38.
Worked including agglomerated splittings	159	173	2	France 92; Belgium-Luxembourg 44.
Nitrates, crude	1,142	1,550	--	All from West Germany.
Phosphates, crude	351,615	442,367	160,393	Israel 82,139; Jordan 51,282.
Pigments, mineral:				
Natural, crude	2,035	1,976	--	France 890; Spain 560.
Iron oxides and hydroxides, processed	3,279	4,486	--	West Germany 4,218; United Kingdom 187.
Potassium salts, crude	10,963	16,598	--	West Germany 12,965; East Germany 3,633.
Precious and semiprecious stones other than diamond:				
Natural kilograms	4,202	4,507	19	West Germany 2,003; Thailand 655; U.S.S.R. 583.
Synthetic do	14,220	11,577	990	Switzerland 6,298; U.S.S.R. 1,803; France 1,577.
Pyrite, unroasted	650	804	--	Italy 545; West Germany 259.
Salt and brine	164	232	(2)	West Germany 226.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	1,297	3,179	--	West Germany 1,631; East Germany 801.
Sulfate, manufactured	232	666	--	West Germany 493; U.S.S.R. 120.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	36,284	43,327	--	Italy 23,976; Republic of South Africa 6,496.
Worked	38,713	48,052	1	Italy 34,195; West Germany 7,750.
Dolomite, chiefly refractory-grade	3,240	3,993	--	West Germany 1,874; Italy 1,735.
Gravel and crushed rock	258,387	263,112	--	West Germany 238,207; Italy 18,476.
Limestone other than dimension	282	372	--	West Germany 337; Sweden 34.
Quartz and quartzite	34,701	42,601	--	Hungary 29,158; West Germany 12,313.
Sand other than metal-bearing	444,378	453,435	24	West Germany 253,081; Czechoslovakia 167,008.
Sulfur:				
Elemental:				
Crude including native and byproduct	84,658	93,489	--	Poland 34,625; West Germany 30,606.
Colloidal, precipitated, sublimed	96	248	--	Hungary 192.
Sulfuric acid	19,492	13,243	--	West Germany 11,966; Czechoslovakia 916.
Talc, steatite, soapstone, pyrophyllite	2,623	1,729	--	India 718; Norway 616.
Other:				
Crude	r71,941	67,698	1,535	West Germany 28,494; Hungary 20,275.
Slag and dross, not metal-bearing	29,352	33,382	5	Italy 24,673; Belgium-Luxembourg 2,060.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,779	1,762	42	Trinidad and Tobago 1,696.
Carbon: Carbon black value, thousands	r$17,309	$15,512	$37	West Germany $7,967; Italy $5,211.
Coal:				
Anthracite	18,003	26,735	--	U.S.S.R. 18,388; West Germany 8,276.
Bituminous thousand tons	2,834	2,933	341	Poland 1,048; Czechoslovakia 839; U.S.S.R. 421.
Briquets of anthracite and bituminous coal	24,834	22,039	--	West Germany 18,797; France 2,344.
Lignite including briquets	1,046,771	791,442	17	Yugoslavia 348,504; East Germany 304,255.
Coke and semicoke	873,945	890,187	--	Czechoslovakia 316,612; West Germany 238,398.
Gas, natural: Gaseous million cubic feet	106,870	88,125	--	U.S.S.R. 86,575; West Germany 1,550.
Peat including briquets and litter	65,491	65,496	--	West Germany 42,062; U.S.S.R. 13,389.
Petroleum:				
Crude thousand 42-gallon barrels	45,479	39,552	--	U.S.S.R. 10,235; Saudi Arabia 9,162; Algeria 5,046.
Refinery products:				
Liquefied petroleum gas do.	610	940	9	West Germany 472; U.S.S.R. 223.
Gasoline do.	5,181	5,000	(2)	Italy 2,402; West Germany 2,101.
White spirit oil do.	8	16	--	West Germany 9; Belgium-Luxembourg 5.
Mineral jelly and wax do.	103	107	(2)	West Germany 70; Poland 12.
Kerosine and jet fuel do.	r57	450	(2)	Hungary 203; U.S.S.R. 185.
Distillate fuel oil do.	1,773	4,266	(2)	Hungary 1,491; West Germany 1,039.
Lubricants do.	r987	1,460	6	Hungary 561; East Germany 159.
Nonlubricating oils do.	93	108	1	Czechoslovakia 56; West Germany 43.
Residual fuel oil do.	7,495	6,309	--	West Germany 2,194; Czechoslovakia 1,425.
Asphalt do.	1,076	1,280	--	West Germany 490; Yugoslavia 455.
Bitumen and other residues do.	r424	629	--	Yugoslavia 388; West Germany 94.
Bituminous mixtures do.	38	32	(2)	West Germany 20; Netherlands 5.
Petroleum coke do.	415	509	153	West Germany 311; United Kingdom 21.
Unspecified do.	35	83	--	Yugoslavia 42; West Germany 18.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Iron and Steel.—The Austrian steel industry, consisting largely of state-owned VA, had expanded its crude steelmaking capacity for several years up to 1976 by installing new basic oxygen converters. Since then, however, it has maintained capacity at about 5 million tons per year during its restructuring process, which included the closure of the world's first Linz-Donowitz shops at the end of 1977. In 1982, the remaining open-hearth furnaces were shut down. The ratio of continuous casting capacity to total crude steel capacity had been rapidly increased to 89% by 1984.

The steel industry continued to do well in 1984 after its temporary drop in 1982. Austria was 25th in world output of steel. Over 90% of crude steel was produced by the oxygen-blown method, and 89% of steel was cast by the continuous method. The production capacity remained almost the same as in 1983, at 5 million tons of crude steel, and 4.3 million tons of pig iron and blast furnace ferroalloys. About 94% of available steel capacity was held by the Government and the rest by private firms. The steel industry employed 34,944 workers, a 2.4% decrease from that of 1983, and a 17% decrease since 1974.

Over 80% of Austrian steel production was exported, and VA entered into contracts with various foreign governments for contracting services. VA had previously well-established trade connections with the U.S.S.R. and in 1984 was working on construction of a steel tire-cord plant at Zhlobin, near Minsk in Belorussia, the first steelworks the U.S.S.R. has bought from market economy countries on a turnkey basis. VA was also installing two 1.4-million-ton-per-year continuous slab casters at the Misurata steelworks in Libya; modernizing Saudi Arabia's steelworks at Al Jubail; and refurbishing the German Democratic Republic's VEB Eisenhüttenkombinat Ost. On the other hand, the German Democratic Republic's VEB Edelstahlwerke "8 Mai 1945" at Freital provided technology to VA for the installation at Linz of the world's largest plasma steelmaking furnace. The 45- to 60-ton unit cost an estimated $5 million. Most of VA's construction projects at the beginning of 1984 came from the Arab countries, 49.7%, and CMEA countries, 38.8%. The United States and Asia were, however, becoming significant trading partners. VA, for example, held a 31% interest in the Bayou Steel Corp. of La Place, in Louisiana (United States).

In 1984, 90% to 95% of VA's crude steel capacity was used for the production of carbon steel, and 5% to 10% for the manufacture of commercial grades of unalloyed and alloyed specialty steel. Specialty steel production was carried out almost exclusively by VA's subsidiary Vereinigte Edelstahlwerke AG (VEW). Stainless steel represented about 40% of production, and Austria was the 12th largest stainless steel producer in the world.

Lithium.—One of the largest lithium deposits in the world was reported to have been discovered in pegmatites of the Koralpe area, a mountain range in the south of Austria.[7] Mineral-Exploration GmbH (Minarex), a subsidiary of OIAG, had been investigating the deposit for several years and estimated it to contain 5 million tons of lithium-bearing spodumene ore, apparently large enough to satisfy worldwide requirements for 12 years.[8] The deposits are at a 1,700-meter altitude and will be mined underground. Feldspar and quartz of high quality, to be used in ceramics and white glass, will be produced as byproducts. An investment of $30 to $50 million will be required to establish mining and processing facilities. The company expected that within 4 to 5 years, 150 to 200 workers would be involved in production. Minarex had already received $900,000 from the Austrian Government for its research, and is to receive another $1.3 to $1.5 million to accomplish the mine development phase.

Refractory Metals.—Metallwerk Plansee GmbH, based at Reutte in the heart of a Tyrolean valley near Innsbruck, was one of Austria's most successful private minerals processing companies. The company was a world leader in refractory and alloy metals produced by powder metallurgy. The company had annual sales of about $125 million, mainly of hard metals and high-melting-point metals and composites based on tungsten, molybdenum, tantalum, rhenium, and columbium. The process demands extensive research and development, which at Plansee accounted for about 7% of annual sales of $80 million, more than twice the Austrian average. The company turned out about 50,000 different products, including cutting tools, X-ray tube electrodes, noncorrosive pipe, fittings, and long-wear components. Sintered iron and steel products were the speciality of the Plansee affiliate company, Sinterstahl GmbH, based in Fussen.[9]

Plansee employed about 2,500 people, 1,850 of whom were in the two main Reutte plants. The company also had three plants in the Federal Republic of Germany and another at Linz, upper Austria, jointly owned with VA.

More than 90% of Plansee's production was exported, mainly to the Federal Republic of Germany, 23%; the United States, 18%; and Japan, 15%. About 11% of sales was to Eastern Europe and the U.S.S.R.

Tungsten.—Wolfram Bergbau-und Hüttengesellschaft mbH operated its scheelite mine at Mittersill near Salzburg to capacity, increasing its production for the second year. Consumption of tungsten increased also, and ore output was supplemented by scrap and concentrate imports to meet strong European demand for tungsten powders.

The production in the open pit at Ostfeld was about 150,000 tons per year, and surface mining was planned to terminate in 1985. The production from the underground mine at nearby Westfeld was approximately 220,000 tons. The underground mine will eventually operate yearround to compensate for the loss of surface operation at Ostfeld. Since the discovery of the scheelite deposit in 1967, the Mittersill Mine has become one of the largest in market economy countries.[10]

NONMETALS

Industrial and Building Materials.—The production of industrial and building materials is important to the Austrian economy. Among the industrial minerals, significant production was obtained of brine salt, magnesite, dolomite, quartz and quartz sand, gypsum, and anhydrite. Kaolinite, illite clay, talc, and graphite were also mined. Talc was produced from surface and underground mining operations at Rabenwald, Lassing, and Weisskirchen. In total, there were six operating mines, which employed 258 people, of which 212 were miners. Crushed stone, sand and gravel, and dimension stone were the main construction and building materials.

Sodium Sulfate.—Two companies produced sodium sulfate in Austria, Chemiefaser Lenzing AG (CL) at Lenzing, and Erste Österreichische Glanzstoff-Fabrik AG at St. Polten, at a combined production capacity of 100,000 tons per year. CL was the largest producer, with a production capacity of 90,000 tons per year. The sodium sulfate was produced as a byproduct from its rayon production facility at Lenzing, based on a standard crystallization process. Sodium sulfate content of the product was 99.8%, and 80% of production was sold to the detergent industry, with the remainder going to the pulp, glass, and textile industries.

MINERAL FUELS

Austria imported over 72% of its total energy requirements. Indigenous oil production covered about 17% of total oil requirements, most of it produced by the state-owned company OMV, which was also the leading oil and gas exploration company.

The production of all mineral fuels, except gas, continued to decline, while imports rose and consumption of most forms of energy increased. The production of natural gas rose in 1984, after several years of decline. Energy imports for the first 9 months of 1984 increased by 17%, almost as much as total imports for 1983. In the first 10 months of 1984, coal imports were up 21.9%; natural gas, 68.1%; oil and oil products, 6.6%; and electricity, 25.9%. The steep rise in electricity imports was accompanied by a fall of 15.2% in exports. This still left Austria a net exporter of electricity, but the difference between imports and exports was narrowing.[11] Hydropower was the main indigenous energy source, and accounted for 60% of total domestic energy production.

Energy imports from CMEA countries accounted for over 42% to 50% of total energy needs, compared with 32.6% for that of 1983. Of this, coal imports accounted for 62.6%; oil and oil products, 27.5%; natural gas, 85.6%; and electricity, 6.7%. Oil imports remained stable. Austria's dependence on CMEA countries increased, largely owing to changes in the structure of energy consumption toward greater use of gas. Because gas from the Netherlands was too expensive, the U.S.S.R. was the only country from which gas imports were viable.

The future of several large energy projects continued to be uncertain, including the hydroelectric powerplant and dam at Hainburg, an almost completed coal-fired plant at Durnrohr, a planned pump-storage plant at Dorfetal, and the completed nuclear plant at Zwentendorf, which was built in 1978 but has never been used because a national referendum decided against commissioning it, owing to environmental concerns.

Coal.—The Austrian coal mining industry was of modest importance. In 1983, Austria depended on imports for nearly 60% to 70% of its coal and coke requirements, much of it from the CMEA countries. The increase in CMEA's share of coal and coke imports was due to substantial coal purchases from Poland. Electricity utilities have concluded a 2-year contract with Poland for 20 million tons. During the first half of 1984, Austria imported 824,000 tons of Polish coal, 41% of its total coal imports, compared with 31% in 1983, and 22% in 1982. The dependence on Polish and other CMEA coal was continuing at a high level because of the transport cost advantage and long-term contracts. Other main suppliers were Czechoslovakia, the German Democratic Republic, the Federal Republic of Germany, and the United States.

Most of the Austrian coal deposits were in Styria and Upper Austria, the reserves amounting to about 220 million tons, 140 million of which were minable. There were three operating coal mining companies, two of which were state-owned,[12] employing almost 5,400 workers. Salzach-Kohlenbergbau GmbH, in Upper Austria near the Bavarian border, was the only privately owned coal company. The company mined about 18% of domestic coal.[13]

Natural Gas.—Austria imported about one-half of its natural gas requirements, most of it from the U.S.S.R., except very small quantities from the Federal Republic of Germany. Austria was the first market economy country to purchase Soviet gas in 1968. In 1984, additional contractual obligations for gas imports from the U.S.S.R. via the new pipeline from Siberia were signed, including a contract on the supply of natural gas from 1984 to 2008, which provides for a gradual increase until 1989, and from 1990, it calls for a supply of 53 billion cubic feet, with an option for an additional increase of up to 35 billion cubic feet per year.

In order to diversify gas supply sources, contacts with northern European suppliers and Algeria continued but have not led to contractual agreements. The Austrian authorities have made considerable efforts to strengthen the country's ability to deal with possible supply disruptions. If this were to occur, supply would have to be based on increased domestic production and stock drawdowns, while gas supplies to consumers would be reduced. Between 1980 and 1983, gas storage capacities were increased from 34,250 to 81,200 million cubic feet. Storage capacity was able to handle 6 months of gas consumption.

Petroleum.—The domestic production of oil and refinery products continued to decline steadily. Over 80% of domestic crude oil was produced by OMV and the rest by multinational oil companies, operating under the name of Rohöl-Aufsuchungs GmbH. OMV employed 9,500 workers throughout the country, in all its concerns. OMV's and Austria's only refinery at Schwechat produced almost 40% of Austria's petroleum products.

Austria imported approximately 83% of its oil needs, of which over 30% was from Saudi Arabia, the largest supplier, and about 23% from the U.S.S.R. Libya was also a significant supplier of crude oil. As announced in Baumgarten at the 10th anniversary of the Trans-Austria gasoline line, the natural gas line from the Soviet Union through Austria and into the European grid is to be expanded. The recently concluded contract for additional gas from the Soviet Union for Italy will necessitate the construction of a parallel pipeline through Austria, to move up to 212 billion cubic feet of gas per year, compared with a 1984 transport capacity of 353 billion cubic feet per year. Austria played an increasingly important role in the European gas grid system, which has been in operation since 1974 and has transported almost 2 billion cubic feet of Soviet natural gas. Although the majority of the gas was destined for Italy, deliveries were also made to France, Yugoslavia, and the southern provinces of Austria.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Austrian schillings (S) to U.S. dollars at the rate of S20.01=US$1.00, the average rate in 1984.

[3]Mining Journal (London). Austria—More than Mountains. June 14, 1985, pp. 417-419.

[4]Page 419 of work cited in footnote 3.

[5]Neue Zurcher Zeitung (Zurich). Mar. 21, 1985, p. 17.

[6]Proske, D. The Austrian Economy in Early 1985. Landerbank Rep. (Vienna), Apr. 1985, p. 7.

[7]Wiener Zeitung (Vienna). Sept. 8, 1984.

[8]Montan-Rundschau. Austria's Mining Industry. Berg- und Hüttenmännische Monatashefte (Vienna). Heft 10, 1984, p. 397.

[9]Metal Bulletin Monthly (London). Plansee—Investing for the Future. Dec. 1984, pp. 69-73.

[10]Pages 352 through 360 of work cited in footnote 8.

[11]Blum, P. Energy—Austria. Financial Times (London), Mar. 6, 1985, Sec. 4, p. 5.

[12]Tilmann, W. Der Braunkohlenbergbau in Österreich. Braunkohle (Vienna), Heft 4, Apr. 1984, pp. 85-90.

[13]Pages 360 through 366 of work cited in footnote 8.

The Mineral Industry of Belgium-Luxembourg

By George A. Rabchevsky[1]

BELGIUM

Belgium, geographically a small country, was ranked 16th among the industrial nations and had few indigenous raw materials. As in previous years, however, the metals and minerals processing industries were significant contributors to the economy. The Belgian iron and steel and nonferrous metals industries did well in 1984 and contributed significantly to the gross national product (GNP). The GNP rose by 7.5% in current prices, while consumer prices declined by 6.5%. The nonmetals and mineral fuels sectors also did well, except the subsidized coal industry, which continued to be erratic. The unemployment problem remained, rising to 14.1%, one of the highest of the European Economic Community (EEC) countries.

Industry, including the minerals processing sector, played a leading role in Belgian investment, contributing to the 1984 recovery. Preliminary estimates indicated that total industrial investment was up 8% in real terms.

PRODUCTION

The traditional strength of the Belgian economy has long been the transformation of imported raw materials into finished products for export. As a result of the increase in new investments and a favorable export market, production rose again, 5.3% in 1984, with the metalworking and steel sectors leading the way. The metal production and processing industries were the largest contributors to the Belgian GNP from the mineral industry sector. Mining was an insignificant contributor. Industrial minerals and coal were the only commodities that were mined in significant quantities.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum	4,056	3,408	4,188	5,784	[3]5,706
Cadmium, smelter	1,524	1,176	996	1,260	[3]1,472
Copper:					
Blister:[e]					
Primary	700	3,100	2,500	[r]2,800	2,700
Secondary	49,300	47,500	47,500	[r]47,500	47,500
Total	50,000	50,600	50,000	[r]50,300	50,200
Refined, primary and secondary, including alloys	373,700	[r]428,493	457,800	404,500	[3]427,607
Iron and steel:					
Pig iron thousand tons	10,536	9,729	7,836	8,028	[3]8,968
Ferroalloys: Electric-furnace ferromanganese do	85	90	[e]90	[e]90	95
Steel:					
Crude do	[r]12,425	[r]12,379	9,916	10,157	[3]11,292
Semimanufactures do	9,552	8,892	7,368	7,057	[3]8,138
Lead:					
Smelter:[e]					
Primary[4]	53,900	60,200	52,950	[r]54,500	55,000
Secondary[5]	30,000	28,000	28,020	[r]30,000	32,000
Total	83,900	88,200	80,970	[r]84,500	87,000
Refined:					
Primary	75,900	73,900	66,000	96,300	95,000
Secondary	52,008	36,032	33,720	37,848	32,959
Total[6]	127,908	109,932	99,720	134,148	[3]127,959
Selenium[e]	60	60	60	60	65
Tin:					
Primary	2,822	65	--	--	--
Secondary	2,230	2,443	2,208	2,220	[3]2,408
Total	5,052	2,508	2,208	2,220	[3]2,408
Zinc:					
Slab:					
Primary	247,600	[r]234,700	228,300	262,600	[3]270,700
Secondary (remelted zinc)	1,616	10,200	12,552	13,245	14,622
Total	249,216	[r]244,900	240,852	275,845	[3]285,322
Powder	30,120	26,208	23,532	25,104	26,500
Other, nonferrous: Precious metals, unworked, n.e.s.[7] thousand troy ounces	52,123	37,563	33,237	37,152	[3]40,814
NONMETALS					
Barite[e]	29,900	39,900	39,900	39,900	39,000
Cement, hydraulic thousand tons	7,482	6,691	6,320	5,719	[3]5,715
Clays: Kaolin do	61	54	53	60	[3]69
Gypsum and anhydrite, calcined	174,084	154,428	([8])	([8])	([8])
Lime and dead-burned dolomite:					
Quicklime thousand tons	2,328	2,004	1,368	1,596	1,480
Dead-burned dolomite do	165	148	159	174	140
Nitrogen: N content of ammonia do	542	589	509	449	455
Phosphates: Thomas slag, gross weight do	893	496	393	250	350
Sodium compounds:					
Carbonate	326,928	273,000	327,648	259,764	283,200
Sulfate[e]	250,000	250,000	250,000	250,000	250,000
Stone, sand and gravel:					
Calcareous:					
Dolomite thousand tons	3,224	2,697	2,581	2,713	2,230
Limestone do	29,664	27,588	24,660	22,044	[3]20,517
Marble:					
In blocks cubic meters	4,452	5,976	7,848	1,332	[3]2,906
Crushed and other	996	312	108	108	[3]102
Petit granit (Belgian bluestone):					
Quarried thousand cubic meters	878	804	626	507	[3]473
Sawed do	72	63	56	48	[3]49
Worked do	10	9	8	9	[3]16
Crushed and other do	955	807	610	545	[3]763
Porphyry, all types thousand tons	[r]5,457	[r]4,929	4,929	4,002	[3]3,423
Quartz and quartzite	222,863	193,417	216,643	469,720	[3]349,720

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone, sand and gravel —Continued					
Sandstone:					
Rough stone including crushed thousand tons	2,276	2,014	2,036	1,962	[3]2,288
Paving	21,960	15,264	11,112	12,444	[3]10,771
Sand and gravel:					
Construction sand thousand tons	7,584	6,516	6,348	6,768	6,600
Foundry sand do	768	660	624	540	600
Dredged sand do	2,183	889	1,244	1,368	1,300
Glass sand do	1,992	1,860	1,716	1,668	1,700
Other sand do	1,716	1,332	1,572	1,644	1,540
Gravel, dredged do	4,452	4,284	3,984	4,788	4,800
Sulfur, byproduct:[e]					
Elemental do	110	110	110	[r]105	105
Other forms do	160	160	160	[r]145	135
Total do	270	270	270	[r]250	240
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	2,000	2,000	2,000	2,000	1,750
Coal:					
Anthracite thousand tons	375	[r]317	263	187	[3]102
Bituminous do	5,949	5,815	6,277	5,909	[3]6,195
Total do	6,324	[r]6,132	6,540	6,096	[3]6,297
Coke, all types do	6,048	6,000	5,220	5,112	[3]5,926
Fuel briquets, all kinds do	82	54	50	46	[3]45
Gas:					
Manufactured million cubic feet	23,820	24,371	20,987	21,989	25,000
Natural do	1,352	1,342	1,165	1,100	1,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	46,801	40,571	31,243	33,514	33,540
Jet fuel do	13,656	14,264	13,492	11,333	9,500
Kerosine do	178	256	295	295	300
Distillate fuel oil do	75,704	65,469	59,277	56,271	45,000
Residual fuel oil do	61,672	55,648	47,271	55,648	37,000
Lubricants do	440	280	300	252	260
Other do	25,837	28,223	26,210	15,479	16,000
Refinery fuel and losses do	14,840	14,304	10,680	10,690	11,000
Total do	239,128	219,015	188,768	183,482	152,600

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 31, 1985.
[2]In addition to the commodities listed, Belgium produced a number of other metals for which only aggregate output figures are available.
[3]Reported figure.
[4]Data not reported; derived by taking reported primary lead output, plus exports of lead bullion, minus imports of lead bullion.
[5]Data represent secondary refined lead output minus remelted lead: as such the figures are probably high, because they include some lead that was sufficiently pure as scrap that it did not require resmelting, but information is inadequate to permit differentiation.
[6]Includes remelted lead as follows, in metric tons: 1980—22,000; 1981—8,000; 1982—5,700; 1983—7,700; and 1984—5,000 (estimated).
[7]Known to include gold, silver, and platinum-group metals.
[8]Revised to zero.

TRADE

For the third year in a row, exports contributed significantly to the Belgian economy. Some estimates cited an increase of 5.6% in volume over the 1983 level, virtually eliminating the deficit in the trade account. Imports, including raw materials, declined overall because of the continued fall in private consumption. Because of the persistent high value of the U.S. dollar, imports from the United States also declined, while Belgian exports to the United States increased by a high 25%. The United States still had a trade surplus of $2.63 billion[2] with Belgium in 1983, which included goods and metals reexported by Belgium to other European countries.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	51	24	--	NA.
Alkaline-earth metals	25	--		
Aluminum:				
Ore and concentrate	1,216	1,699	--	France 1,614.
Oxides and hydroxides	470	757	(2)	France 376; United Kingdom 122.
Ash and residue containing aluminum	6,976	9,817	NA	West Germany 5,001; Netherlands 2,062.
Metal including alloys:				
Scrap	40,444	46,727	17	France 17,163; West Germany 12,596.
Unwrought	13,754	17,009	--	West Germany 5,563; France 4,690.
Semimanufactures	243,129	267,841	18,674	France 53,861; West Germany 42,929.
Antimony: Metal including alloys, all forms	1	301	--	Iran 300.
Arsenic: Oxides and acids	--	12	NA	NA.
Cadmium: Metal including alloys, all forms	547	556	15	France 262; West Germany 192.
Chromium:				
Ore and concentrate	--	8	--	All to France.
Oxides and hydroxides	316	336	--	France 264.
Metal including alloys, all forms	281	65	18	West Germany 11; undetermined 35.
Cobalt: Metal including alloys, all forms	--	36	18	Romania 15.
Columbium and tantalum:				
Ash and residue containing columbium and/or tantalum	140	336	--	NA.
Metal including alloys, all forms:				
Columbium (niobium) value, thousands	$14	$48	--	NA.
Tantalum	--	1	--	All to Austria.
Copper:				
Ore and concentrate	630	674	2	Netherlands 335; West Germany 182.
Oxides and hydroxides	1,189	1,689	NA	West Germany 575; France 272; Denmark 250.
Sulfate	7,840	7,428	NA	Netherlands 2,514; West Germany 2,376.
Ash and residue containing copper	3,972	3,945	NA	France 1,031; Spain 355.
Metal including alloys:				
Scrap	30,552	27,835	--	West Germany 9,758; Netherlands 6,188.
Unwrought	306,476	240,906	6,448	France 71,273; West Germany 64,377.
Semimanufactures	258,986	238,160	720	West Germany 81,620; France 53,543.
Gold:				
Waste and sweepings value, thousands	$3,908	$26,785	--	United Kingdom $14,387; Switzerland $6,833.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,639	784	103	Switzerland 437; United Kingdom 164.
Hafnium: Metal including alloys, all forms kilograms	--	3	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	401	1,432	--	France 717; Netherlands 524.
Pyrite, roasted	173,758	60,061	--	West Germany 26,186; France 16,113.
Metal:				
Scrap	497,556	681,749	--	West Germany 209,073; Netherlands 160,243.
Pig iron, cast iron, related materials	8,266	8,947	--	France 4,349; Netherlands 3,008.
Ferroalloys:				
Ferrochromium	1,960	3,909	NA	France 1,325; West Germany 1,306.
Ferromanganese	13,230	13,892	24	West Germany 7,567; France 4,074.
Ferromolybdenum	18,546	15,947	NA	NA.
Ferronickel	7	177	NA	France 152.
Ferrosilicon	4,270	2,627	NA	France 1,839; West Germany 712.
Silicon metal	29	39	--	France 26; Japan 8.
Unspecified	2,854	2,799	NA	West Germany 829; Netherlands 658.
Steel, primary forms thousand tons	2,225	2,675	47	France 1,121; West Germany 553.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	3,011	3,064	246	West Germany 863; France 476.
Universals, plates, sheets do	4,381	4,271	224	France 1,016; West Germany 934.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Hoop and strip thousand tons	462	460	1	West Germany 199; France 98.
Rails and accessories do	79	70	6	France 30; Italy 11.
Wire do	287	302	29	West Germany 64; France 36.
Tubes, pipes, fittings do	397	526	29	U.S.S.R. 227; West Germany 62.
Castings and forgings, rough do	36	10	([2])	Netherlands 5; France 3.
Lead:				
Ore and concentrate	75	37	--	All to France.
Oxides	4,663	4,846	14	West Germany 3,450: Netherlands 751.
Ash and residue containing lead	6,641	3,663	NA	France 2,913; Denmark 152.
Metal including alloys:				
Scrap	13,811	6,063	--	France 4,043; West Germany 711.
Unwrought	74,647	76,388	519	Netherlands 22,689; West Germany 17,376; France 17,029.
Semimanufactures	9,978	17,470	30	Netherlands 5,653; France 3,401.
Lithium: Oxides and hydroxides	67	2	--	NA.
Magnesium: Metal including alloys:				
Scrap	119	334	--	West Germany 125; Netherlands 113.
Unwrought	66	220	--	Italy 139; West Germany 30.
Semimanufactures	125	335	--	Italy 181; West Germany 110.
Manganese:				
Ore and concentrate, metallurgical-grade	8,546	2,882	--	United Kingdom 1,978.
Metal including alloys, all forms	266	1,186	NA	West Germany 784; Italy 102.
Mercury 76-pound flasks	992	2,239	--	Netherlands 1,943.
Molybdenum:				
Ore and concentrate	9,300	8,649	NA	United Kingdom 2,449; West Germany 1,936; France 1,507.
Oxides and hydroxides	53	35	NA	United Kingdom 24; France 9.
Metal including alloys:				
Scrap	3	11	--	West Germany 10.
Unwrought	6	27	--	Netherlands 24.
Semimanufactures	56	52	--	Netherlands 46.
Nickel:				
Ore and concentrate	--	51	--	All to Netherlands.
Matte and speiss	17	3	--	All to West Germany.
Oxides and hydroxides	1	26	--	Turkey 16; Netherlands 5.
Ash and residue containing nickel	7,825	5,938	NA	Canada 3,447; Finland 1,618.
Metal including alloys:				
Scrap	984	708	143	West Germany 228; Netherlands 154.
Unwrought	689	441	--	Netherlands 267; Turkey 46.
Semimanufactures	590	232	([2])	Italy 56; Netherlands 48.
Platinum-group metals:				
Waste and sweepings value, thousands	$5,100	$10,136	NA	United Kingdom $5,278; West Germany $4,004.
Metals including alloys, unwrought and partly wrought thousand troy ounces	209	1,194	218	West Germany 922.
Rare-earth metals including alloys, all forms	15	([2])	--	NA.
Rhenium: Metal including alloys, all forms value, thousands	$42	$17	--	NA.
Silicon, high-purity	5	1	--	All to France.
Silver:				
Waste and sweepings value, thousands	$4,796	$5,843	NA	United Kingdom $4,765; West Germany $777.
Metal including alloys, unwrought and partly wrought thousand troy ounces	30,732	34,381	12,542	United Kingdom 11,283; Switzerland 4,768.
Tellurium and arsenic, elemental	7	46	NA	United Kingdom 27; West Germany 10.
Tin:				
Oxides	48	19	--	All to West Germany.
Ash and residue containing tin	1,985	2,189	--	United Kingdom 1,942.
Metal including alloys:				
Scrap	86	107	--	Netherlands 94.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys —Continued				
Unwrought	411	1,160	224	West Germany 294; Netherlands 277; United Kingdom 264.
Semimanufactures	60	105	55	West Germany 25; Greece 7.
Titanium:				
Ore and concentrate	24	13	NA	NA.
Oxides	32,145	37,690	9,614	West Germany 8,864; Italy 2,180.
Metal including alloys:				
Scrap	21	25	--	NA.
Unwrought	10	3	--	NA.
Semimanufactures	82	109	NA	Italy 38; Spain 29.
Tungsten:				
Ore and concentrate	10	--		
Oxides and hydroxides	--	(2)	--	NA.
Ash and residue containing tungsten	25	--		
Metal including alloys:				
Scrap	37	18	--	NA.
Unwrought	20	8	NA	Philippines 2; France 1.
Semimanufactures	70	72	NA	Netherlands 55; France 16.
Uranium and/or thorium:				
Oxides and other compounds value, thousands	--	$30	NA	NA.
Metal including alloys, all forms, uranium do.	$3	--		
Vanadium:				
Ore and concentrate	--	4	--	NA.
Oxides and hydroxides	35	83	--	Spain 40; United Kingdom 20.
Ash and residue containing vanadium	1,884	1,163	--	NA.
Metal including alloys, all forms	186	15	--	All to West Germany.
Zinc:				
Ore and concentrate	18,409	41,821	--	France 38,450.
Oxides	4,031	3,227	--	West Germany 1,167; France 786.
Blue powder	16,372	17,877	NA	West Germany 7,791; France 3,496.
Matte	1,694	2,925	--	France 2,024; West Germany 682.
Ash and residue containing zinc	45,907	53,959	NA	West Germany 25,717; France 17,757.
Metal including alloys:				
Scrap	12,471	13,165	238	Netherlands 5,114; France 4,958.
Unwrought	151,194	190,151	22,309	West Germany 60,102; France 33,279.
Semimanufactures	10,428	9,495	59	West Germany 7,203.
Zirconium:				
Ore and concentrate	83	30	--	NA.
Metal including alloys, all forms	15	1	--	NA.
Other:				
Ores and concentrates	25	141	--	Netherlands 109; France 24.
Oxides and hydroxides	6,687	3,953	180	Netherlands 1,961; West Germany 894.
Ashes and residues	10,340	10,218	224	Netherlands 5,776; France 1,125.
Base metals including alloys, all forms	313	289	10	Austria 87; West Germany 63.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,791	10,688	--	Netherlands 10,065.
Artificial:				
Corundum	1,051	737	--	Netherlands 311; France 289.
Silicon carbide	1,623	1,786	NA	France 986; Netherlands 410.
Dust and powder of precious and semi-precious stones including diamond kilograms	812	692	132	Netherlands 101; Israel 86.
Grinding and polishing wheels and stones	2,402	2,443	25	France 1,322; West Germany 338.
Asbestos, crude	1,084	568	--	Austria 273; West Germany 153.
Barite and witherite	13,098	30,948	1	United Kingdom 11,137; Netherlands 10,187.
Boron materials:				
Crude natural borates	15,180	23,613	1,446	Netherlands 10,353; West Germany 8,955.
Elemental	7	2	--	NA.
Oxides and acids	185	103	--	Argentina 20; Greece 20.
Bromine	--	2	--	NA.
Cement thousand tons	2,707	2,634	10	Netherlands 1,509; West Germany 531.
Chalk	86,273	80,630	--	West Germany 16,838; Saudi Arabia 15,913; Netherlands 14,734.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Clays, crude:				
Bentonite	4,804	6,192	--	West Germany 3,467; Hong Kong 2,030.
Chamotte earth	2,451	4,556	--	West Germany 3,152; France 748.
Dinas earth	232	953	--	NA.
Kaolin	16,324	25,080	--	Netherlands 14,459; West Germany 4,743.
Unspecified	1,176	645	--	Netherlands 428; France 106.
Cryolite and chiolite	33	69	--	United Kingdom 38; Pakistan 20.
Diamond:				
Gem, not set or strung thousand carats	37,255	37,238	1,315	India 18,825; United Kingdom 10,729.
Industrial stones do	9,027	9,469	1,256	United Kingdom 5,055; West Germany 603.
Diatomite and other infusorial earth	65,126	229,664	--	Netherlands 228,258.
Feldspar, fluorspar, related materials:				
Feldspar	26	--		
Fluorspar	3,431	3,524	--	West Germany 3,360.
Unspecified	249	15	--	NA.
Fertilizer materials:				
Crude, n.e.s	36,453	33,751	--	France 19,100; Netherlands 11,120.
Manufactured:				
Ammonia	23,485	31,918	--	France 25,266; Netherlands 5,652.
Nitrogenous thousand tons	2,401	2,122	29	France 834; West Germany 540.
Phosphatic do	945	680	(2)	West Germany 420; France 154.
Potassic do	30	27	--	Netherlands 16; West Germany 4.
Unspecified and mixed do	1,737	1,896	6	France 888; West Germany 355.
Graphite, natural	31	2,746	1	Netherlands 2,474.
Gypsum and plaster	114,144	136,928	--	Netherlands 75,159; West Germany 59,771.
Iodine	155	171	NA	Spain 58; United Kingdom 58.
Kyanite and related materials	179	627	--	France 570.
Lime	614,823	689,984	--	Netherlands 465,276; West Germany 158,839.
Magnesium compounds:				
Magnesite	1,436	531	--	NA.
Oxides and hydroxides	92	31	--	NA.
Other	1,392	1,045	1	France 402; United Kingdom 199.
Mica:				
Crude including splittings and waste	18	32	--	France 11; Netherlands 9.
Worked including agglomerated splittings	19	11	9	NA.
Nitrates, crude	17,236	12,180	--	West Germany 4,441; Italy 3,488.
Phosphates, crude	10,379	28,715	--	West Germany 19,331; France 8,430.
Pigments, mineral:				
Natural, crude	224	139	NA	Algeria 34; Philippines 33.
Iron oxides and hydroxides, processed	12,319	8,899	262	West Germany 3,156; France 1,935.
Potassium salts, crude	391	468	--	Netherlands 389.
Precious and semiprecious stones other than diamond:				
Natural kilograms	6,989	795	23	West Germany 67; Thailand 56; undetermined 500.
Synthetic do	3,592	14,353	NA	Republic of Korea 10,422.
Pyrite, unroasted	1,223	1,051	--	West Germany 1,030.
Quartz crystal, piezoelectric kilograms	685	(2)	(2)	NA.
Salt and brine	124,876	170,974	22	France 97,467; Netherlands 59,717.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	17,009	3,703	--	France 1,435; Sweden 726.
Sulfate, manufactured	969	651	--	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	418	439	(2)	Netherlands 428.
Worked do	20	24	(2)	West Germany 10; Netherlands 8.
Dolomite, chiefly refractory-grade do	1,129	1,304	--	Netherlands 742; West Germany 300; France 240.
Gravel and crushed rock do	8,160	9,223	(2)	Netherlands 5,692; France 3,077.
Limestone other than dimension do	507	507	--	Netherlands 181; France 180; West Germany 142.
Quartz and quartzite do	12	83	(2)	France 72; West Germany 7.
Sand other than metal-bearing do	2,933	3,036	(2)	France 1,009; Netherlands 1,005.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	7,135	7,479	--	West Germany 2,707; Netherlands 1,972.
Colloidal, precipitated, sublimed	117	79	6	Venezuela 33; Honduras 10.
Sulfuric acid	86,668	77,137	--	France 29,681; Netherlands 21,584.
Talc, steatite, soapstone, pyrophyllite	24,183	25,510	([2])	West Germany 5,248; Sweden 4,771.
Vermiculite, perlite, chlorite	10,696	20,016	--	France 11,133; United Kingdom 8,068.
Other:				
Crude	[r]976,034	544,509	17	Netherlands 499,157.
Slag and dross, not metal-bearing thousand tons	2,180	2,484	--	France 916; Netherlands 760; West Germany 726.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	62,341	67,579	--	France 63,042.
Carbon black	748	948	1	West Germany 377; France 213.
Coal:				
Anthracite	71,561	78,985	--	France 48,921; United Kingdom 11,276.
Bituminous	676,746	721,856	--	West Germany 403,550; France 173,595.
Briquets of anthracite and bituminous coal	12,517	16,791	--	France 14,070.
Lignite including briquets	1,997	467	--	France 367.
Coke and semicoke	481,927	480,607	--	France 175,250; West Germany 91,907.
Gas, natural: Gaseous million cubic feet	561	([2])	--	NA.
Peat including briquets and litter	5,202	7,037	--	France 4,893; Netherlands 2,066.
Petroleum:				
Crude thousand 42-gallon barrels	1,325	546	--	West Germany 307; Greece 238.
Refinery products:				
Liquefied petroleum gas do	3,394	3,350	--	Netherlands 2,118; United Kingdom 307.
Gasoline do	26,813	31,963	228	West Germany 10,612; Netherlands 6,350.
Mineral jelly and wax do	57	59	4	France 15; West Germany 10; Italy 6.
Kerosine and jet fuel do	13,042	11,252	12	West Germany 3,099; bunkers 3,518.
Distillate fuel oil do	27,488	31,142	--	West Germany 17,711; Netherlands 5,742.
Lubricants do	2,543	2,374	1	Netherlands 635; West Germany 211.
Residual fuel oil do	40,890	38,554	6,306	Netherlands 6,331; United Kingdom 6,249; bunkers 9,226.
Bitumen and other residues do	998	2,531	4	United Kingdom 1,338; France 538.
Bituminous mixtures do	88	84	--	Netherlands 35; France 26.
Petroleum coke do	227	101	--	France 74; Austria 12.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	28	306	20	NA.
Alkaline-earth metals	77	85	NA	France 79.
Aluminum:				
Ore and concentrate	26,574	34,802	--	West Germany 18,816; China 8,422; Guyana 5,157.
Oxides and hydroxides	22,887	26,597	932	West Germany 20,935.
Ash and residue containing aluminum	762	4,589	NA	West Germany 3,652; France 872.
Metal including alloys:				
Scrap	51,239	53,085	751	France 27,263; Netherlands 10,893.
Unwrought	267,444	288,993	25	Netherlands 139,061; Norway 37,928.
Semimanufactures	86,927	90,226	546	West Germany 39,658; France 21,363.
Antimony:				
Ore and concentrate	3,962	4,265	NA	Bolivia 3,428; Republic of South Africa 218.
Oxides	283	272	--	United Kingdom 138; France 104.
Metal including alloys, all forms	198	540	NA	China 325; Turkey 140.
Arsenic: Oxides and acids	80	39	NA	NA.
Beryllium: Metal including alloys, all forms	5	6	--	All from Netherlands.
Cadmium: Metal including alloys, all forms	1,199	1,663	NA	Netherlands 594; West Germany 476.
Cesium and rubidium: Metal including alloys, all forms	1	11	--	NA.
Chromium:				
Ore and concentrate	2,108	3,848	--	Netherlands 3,753.
Oxides and hydroxides	863	993	--	West Germany 617; Italy 235.
Metal including alloys, all forms	298	284	NA	West Germany 83; Japan 67.
Cobalt:				
Ore and concentrate	--	20	--	All from Finland.
Oxides and hydroxides	62	34	--	United Kingdom 13; France 10.
Metal including alloys, all forms	--	15	--	West Germany 11.
Columbium and tantalum:				
Ore and concentrate	1,685	997	NA	Canada 990.
Ash and residue containing columbium and/or tantalum	371	581	--	West Germany 560.
Metal including alloys, all forms:				
Columbium (niobium)	3	1	--	Mainly from West Germany.
Tantalum	--	17	4	West Germany 13.
Copper:				
Ore and concentrate	15,960	10,706	--	Canada 6,953; Chile 2,118.
Oxides and hydroxides	207	200	NA	West Germany 98; Netherlands 49.
Sulfate	1,089	1,531	NA	Netherlands 907; France 225.
Ash and residue containing copper	45,409	37,102	2,845	France 10,495; Morocco 2,517.
Metal including alloys:				
Scrap	113,628	131,918	4,842	France 43,256; United Kingdom 25,115.
Unwrought	473,709	339,285	1,333	Zaire 171,107; Republic of South Africa 42,873.
Semimanufactures	41,021	43,649	199	West Germany 22,398; France 8,295.
Gold:				
Waste and sweepings value, thousands	$1,981	$1,616	NA	France $732; Netherlands $654.
Metal including alloys, unwrought and partly wrought thousand troy ounces	9,092	7,741	2,469	Switzerland 981; West Germany 310.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	18,613	17,519	--	France 4,990; Brazil 3,083; Sweden 2,759.
Pyrite, roasted	60,066	40,672	--	West Germany 38,721.
Metal:				
Scrap	887,417	1,045,194	8,207	West Germany 435,962; France 306,842.
Pig iron, cast iron, related materials	98,058	55,247	88	France 24,316; West Germany 14,565.
Ferroalloys:				
Ferrochromium	26,231	34,836	NA	Albania 5,654; U.S.S.R. 4,760.
Ferromanganese	54,012	53,479	133	France 26,357; Norway 19,000.
Ferromolybdenum	254	312	NA	Netherlands 132; West Germany 100.
Ferronickel	3,316	6,407	NA	Dominican Republic 1,429; France 1,311.
Ferrosilicochromium	1,229	1,909	NA	West Germany 1,821.
Ferrosilicomanganese	19,609	21,326	NA	Norway 14,453; France 4,201.
Ferrosilicon	33,831	33,056	NA	West Germany 10,542; Norway 9,658.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal—Continued				
Ferroalloys —Continued				
Silicon metal	326	452	NA	France 389.
Unspecified	2,400	7,702	51	France 1,331; United Kingdom 747.
Steel, primary forms	803,853	1,018,175	58	West Germany 394,696; France 199,783.
Semimanufactures:				
Bars, rods, angles, shapes, sections	875,386	1,012,103	578	France 308,498; West Germany 230,577.
Universals, plates, sheets	618,749	716,088	224	Netherlands 275,859; France 139,743.
Hoop and strip	119,869	123,628	81	France 58,208; West Germany 48,392.
Rails and accessories	12,582	8,496	21	France 6,296; West Germany 1,029.
Wire	60,053	64,155	80	West Germany 40,715; France 10,793.
Tubes, pipes, fittings	271,929	302,937	1,102	West Germany 104,118; Netherlands 62,962.
Castings and forgings, rough	60,398	54,496	370	France 20,241; West Germany 16,001.
Lead:				
Ore and concentrate	106,078	85,480	36	Peru 38,357; Canada 16,096; Greece 15,470.
Oxides	1,857	1,589	(2)	France 848; West Germany 706.
Ash and residue containing lead	65,782	71,773	2,119	Italy 12,173; France 10,910; Spain 10,420.
Metal including alloys:				
Scrap	11,238	13,485	22	Netherlands 6,856; France 1,933.
Unwrought	43,890	63,301	149	United Kingdom 25,019; France 16,793.
Semimanufactures	1,478	1,771	96	West Germany 1,149; Netherlands 349.
Lithium:				
Oxides and hydroxides	209	160	7	West Germany 110.
Metal including alloys, all forms	16	2	--	Mainly from France.
Magnesium: Metal including alloys:				
Scrap	183	132	--	Italy 28; Nigeria 23; Finland 21.
Unwrought	1,838	2,317	24	Italy 812; Norway 633.
Semimanufactures	308	458	104	France 80; Yugoslavia 75.
Manganese:				
Ore and concentrate, metallurgical-grade	227,058	162,653	1	Republic of South Africa 69,820; Zaire 27,011; Brazil 22,484.
Oxides	7,773	4,007	(2)	Greece 3,484; Netherlands 205.
Metal including alloys, all forms	1,467	1,757	807	France 500; Republic of South Africa 135.
Mercury 76-pound flasks	8,296	7,604	58	Spain 2,775; Finland 1,595.
Molybdenum:				
Ore and concentrate	20,469	22,976	2,734	Netherlands 5,948; Canada 5,448; Chile 3,786.
Oxides and hydroxides	192	298	--	Netherlands 116; West Germany 111.
Metal including alloys:				
Scrap	21	26	NA	West Germany 15; France 6.
Unwrought	28	42	NA	West Germany 27.
Semimanufactures	114	209	NA	Netherlands 130; Mexico 70.
Nickel:				
Ore and concentrate	25	--		
Matte and speiss	338	423	6	Netherlands 177; West Germany 126.
Oxides and hydroxides	88	349	NA	West Germany 112; Netherlands 92.
Ash and residue containing nickel	1,269	1,799	586	West Germany 363; United Kingdom 307.
Metal including alloys:				
Scrap	499	327	14	Netherlands 193; France 39.
Unwrought	4,117	4,340	1,016	West Germany 1,464; Netherlands 663.
Semimanufactures	1,572	812	45	West Germany 441; United Kingdom 157.
Platinum-group metals:				
Waste and sweepings value, thousands	$6,321	$6,378	NA	Netherlands $5,152.
Metals including alloys, unwrought and partly wrought troy ounces	91,534	66,056	NA	United Kingdom 45,472.
Selenium, elemental	68	26	--	NA.
Silicon, high-purity kilograms	400	100	--	NA.
Silver:				
Ore and concentrate[3] value, thousands	$12,080	$5,342	$3,169	Mali $1,860.
Waste and sweepings do	$14,689	$3,861	$2,541	Switzerland $678.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Silver —Continued				
Metal including alloys, unwrought and partly wrought thousand troy ounces	42,773	51,433	31,917	Netherlands 15,788.
Tellurium and arsenic, elemental	86	100	--	Sweden 99.
Tin:				
Ore and concentrate	151	2,692	--	Netherlands 1,321; Argentina 1,196.
Oxides	19	17	--	Netherlands 8; France 3.
Ash and residue containing tin	220	26	--	NA.
Metal including alloys:				
Scrap	62	98	1	Netherlands 33; France 31.
Unwrought	2,396	2,286	23	Netherlands 1,029; Malaysia 466.
Semimanufactures	273	288	(2)	Netherlands 133; West Germany 88.
Titanium:				
Ore and concentrate	71,301	104,128	NA	Canada 96,980.
Oxides	8,417	8,334	1,652	West Germany 5,395; France 538.
Metal including alloys:				
Scrap	685	579	485	NA.
Unwrought	173	35	NA	United Kingdom 32.
Semimanufactures	157	176	11	West Germany 46; United Kingdom 41.
Tungsten:				
Oxides and hydroxides	18	15	--	All from China.
Ash and residue containing tungsten	262	59	--	All from Netherlands.
Metal including alloys:				
Scrap	45	39	NA	Netherlands 17; France 12.
Unwrought	25	40	NA	Austria 23; France 8.
Semimanufactures	85	109	NA	Netherlands 106.
Vanadium:				
Ore and concentrate	5,026	24	--	Netherlands 23.
Oxides and hydroxides	2,964	4,062	NA	China 2,488; Netherlands 934.
Ash and residue containing vanadium	6,905	3,137	--	Republic of South Africa 2,156.
Metal including alloys, all forms	69	29	NA	West Germany 16; Netherlands 10.
Zinc:				
Ore and concentrate	422,736	572,584	--	Canada 208,635; France 85,026; Peru 53,816.
Oxides	6,632	10,801	167	Netherlands 3,370; France 3,235.
Blue powder	329	494	NA	Netherlands 201; Italy 138.
Matte	3,916	5,466	NA	West Germany 2,674; France 1,968.
Ash and residue containing zinc	61,388	42,223	5,267	West Germany 18,563; France 4,756.
Metal including alloys:				
Scrap	7,150	10,978	26	West Germany 4,835; Netherlands 2,830.
Unwrought	42,605	53,149	805	Netherlands 32,361; France 9,467.
Semimanufactures	19,388	19,485	13	France 17,646.
Zirconium:				
Ore and concentrate	6,039	3,818	NA	Netherlands 2,756; West Germany 831.
Metal including alloys:				
Scrap	20	28	--	France 20; United Kingdom 6.
Unwrought	1	(2)	--	NA.
Semimanufactures	148	107	23	France 80.
Other:				
Ores and concentrates	110,093	88,041	18	Norway 87,859.
Oxides and hydroxides	1,113	836	NA	West Germany 471.
Ashes and residues	23,154	16,398	9,699	Spain 349; West Germany 207.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	15,153	13,949	116	West Germany 11,983; Italy 709.
Artificial:				
Corundum	6,103	5,487	9	France 2,276; West Germany 1,575.
Silicon carbide	3,816	3,212	NA	West Germany 1,552; Spain 648.
Dust and powder of precious and semiprecious stones including diamond kilograms	2,302	3,681	1,473	Switzerland 764; Ireland 654.
Grinding and polishing wheels and stones	3,211	3,054	67	West Germany 843; Italy 508.
Asbestos, crude	27,745	35,332	59	Canada 14,720; Hungary 4,848.
Barite and witherite	8,427	7,250	--	West Germany 5,951; France 846.
Boron materials:				
Crude natural borates	82,794	97,434	--	Netherlands 58,374; Turkey 37,544.
Oxides and acids	1,738	1,885	--	France 1,362; Turkey 410.
Bromine	794	911	--	Israel 741; United Kingdom 69.
Cement	195,292	191,177	32	Netherlands 91,684; West Germany 89,396.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Chalk	137,110	155,989	37	France 135,809; Netherlands 19,397.
Clays, crude:				
Bentonite	21,336	24,828	NA	West Germany 13,668; Greece 3,500.
Chamotte earth	67,594	52,760	1,959	West Germany 32,210; France 13,087.
Dinas earth	1,556	7,979	121	Netherlands 7,476.
Kaolin	267,577	247,264	NA	United Kingdom 84,179; Netherlands 74,452.
Unspecified	235,156	146,699	727	West Germany 113,055; France 10,882.
Cryolite and chiolite	46	54	2	Denmark 52.
Diamond:				
Gem, not set or strung thousand carats	31,721	34,309	230	United Kingdom 19,990; Zaire 2,910.
Industrial stones do	18,313	14,148	2,849	Ireland 2,692; Congo 1,875; Zaire 1,811.
Diatomite and other infusorial earth	6,535	6,400	791	France 4,493; Denmark 827.
Feldspar, fluorspar, related materials:				
Feldspar	21,355	21,895	--	France 17,939.
Fluorspar	11,988	7,744	--	France 2,541; East Germany 1,563; West Germany 1,322.
Unspecified	33,540	32,157	--	Norway 28,371.
Fertilizer materials:				
Crude, n.e.s	77,121	72,289	--	Netherlands 62,801.
Manufactured:				
Ammonia	2,786	2,468	--	Netherlands 1,940.
Nitrogenous	507,370	512,537	32,696	West Germany 178,210; Netherlands 123,853.
Phosphatic	151,029	91,702	18,998	Netherlands 33,556; Senegal 23,977.
Potassic	915,448	1,025,938	7,606	West Germany 504,192; U.S.S.R. 222,823.
Unspecified and mixed	468,808	571,125	169,358	West Germany 210,589; France 104,902.
Graphite, natural	811	963	1	West Germany 661; Netherlands 190.
Gypsum and plaster	371,184	364,263	114	France 286,546; Netherlands 32,355.
Iodine	134	226	NA	Japan 169.
Kyanite and related materials	3,792	2,829	147	West Germany 1,956.
Lime	92,899	103,078	6	France 72,547; West Germany 29,100.
Magnesium compounds:				
Magnesite	4,396	9,457	NA	Italy 3,332; Greece 1,478.
Oxides and hydroxides	4,860	2,614	87	United Kingdom 1,148; West Germany 399.
Other	8,268	5,944	39	Austria 2,963; Netherlands 1,874.
Mica:				
Crude including splittings and waste	1,803	4,731	10	India 3,202; Madagascar 603.
Worked including agglomerated splittings	66	34	(²)	Switzerland 18; West Germany 8.
Nitrates, crude	25,861	23,720	--	All from Chile.
Phosphates, crude thousand tons	2,089	2,317	272	Morocco 1,601; Togo 187.
Phosphorus, elemental	280	306	NA	United Kingdom 143; France 99.
Pigments, mineral:				
Natural, crude	384	338	NA	Republic of South Africa 157; Canada 91.
Iron oxides and hydroxides, processed	5,958	7,373	446	West Germany 5,835; France 302.
Potassium salts, crude	28,137	28,880	--	West Germany 18,025; France 8,954.
Precious and semiprecious stones other than diamond:				
Natural kilograms	18,789	10,230	16	Switzerland 2,250; Brazil 2,000.
Synthetic do	534	720	273	Switzerland 200; Ireland 66.
Pyrite, unroasted	235,540	276,252	--	Spain 192,289; Norway 44,574.
Quartz crystal, piezoelectric kilograms	5	2	--	NA.
Salt and brine thousand tons	1,073	1,102	(²)	Netherlands 740; West Germany 333.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	70,318	123,687	--	West Germany 58,014; France 48,546.
Sulfate, manufactured	2,068	1,590	--	West Germany 1,567.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	101	95	(²)	France 34; West Germany 24.
Worked do	97	86	--	France 24; Netherlands 18.
Dolomite, chiefly refractory-grade do	42	44	--	West Germany 21; France 14.
Gravel and crushed rock do	6,018	4,899	(²)	Netherlands 2,099; United Kingdom 1,362.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Limestone other than dimension thousand tons	308	176	--	United Kingdom 143; France 32.
Quartz and quartzite do	89	82	([2])	West Germany 63; France 9.
Sand other than metal-bearing do	9,254	8,482	3	Netherlands 7,077; West Germany 1,040.
Sulfur:				
Elemental:				
Crude including native and byproduct	358,718	399,067	170,494	Netherlands 61,138; Poland 60,458.
Colloidal, precipitated, sublimed	1,071	1,505	3	West Germany 887; France 468.
Dioxide	5,042	4,748	--	West Germany 3,461; Netherlands 827.
Sulfuric acid	494,347	561,044	--	France 167,488; West Germany 164,797; Netherlands 135,904.
Talc, steatite, soapstone, pyrophyllite	58,751	34,390	193	France 13,325; Australia 7,245; Spain 6,842.
Vermiculite, perlite, chlorite	58,827	83,043	NA	U.S.S.R. 65,938; Greece 8,889.
Other:				
Crude thousand tons	r958	1,344	4	France 618; West Germany 355; Spain 213.
Slag and dross, not metal-bearing do	1,311	1,062	--	France 778; Netherlands 143; West Germany 139.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	64,547	70,036	382	France 68,126.
Carbon black	39,214	46,533	561	Netherlands 17,398; West Germany 16,718.
Coal:				
Anthracite thousand tons	1,527	1,217	13	West Germany 805.
Bituminous do	9,398	6,748	2,386	Republic of South Africa 1,924; West Germany 1,120.
Briquets of anthracite and bituminous coal do	91	86	--	West Germany 74.
Lignite including briquets do	213	226	--	West Germany 202.
Coke and semicoke do	2,263	1,973	17	West Germany 1,434; Netherlands 305.
Gas:				
Manufactured million cubic feet	223	--		
Natural, gaseous do	307,504	324,735	--	Netherlands 219,380; France 55,776.
Peat including briquets and litter	136,923	130,826	--	Netherlands 81,350; West Germany 32,159.
Petroleum:				
Crude thousand 42-gallon barrels	173,032	114,614	--	United Kingdom 28,260; Saudi Arabia 17,867; Libya 15,391.
Refinery products:				
Liquefied petroleum gas do	5,484	5,354	76	Netherlands 2,506; United Kingdom 1,815.
Gasoline do	19,867	22,308	258	Netherlands 11,950; Algeria 2,083.
Mineral jelly and wax do	169	139	2	West Germany 80; France 33.
Kerosine and jet fuel do	1,604	1,134	1	Netherlands 895; United Kingdom 114.
Distillate fuel oil do	28,963	35,497	226	Netherlands 19,963; U.S.S.R. 10,460.
Lubricants do	3,880	3,592	204	Netherlands 1,251; France 908.
Residual fuel oil do	40,932	50,788	--	Netherlands 23,118; U.S.S.R. 9,987.
Bitumen and other residues do	376	460	--	West Germany 214; Netherlands 141.
Bituminous mixtures do	92	69	3	France 34; Netherlands 15.
Petroleum coke do	2,003	1,464	1,069	Netherlands 141; Argentina 129.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

Metals.—*Iron and Steel.*—World raw steel output rose by about 7% to 779 million tons. Belgium's production rose by over 11% and ranked in 16th place worldwide. With capacity of over 13 million tons per year, the Belgian steel industry operated at 75% of capacity. Cockerill-Sambre SA (CS) remained the largest producer at 58% of domestic capacity, followed by Sidmar SA at 22%, Boel SA at 13%, and Clabecq SA at 7%. The number of employees in the iron and steel industry dropped by over 6% in 1983 to about 41,000 and to 39,000 by March 1984.

CS operated at 72% of capacity and produced 4.84 million tons of raw steel, a 3% increase over that of 1983. Its world ranking slipped, however, to 23d place from 22d in 1983.

Exports of rolled steel products within the EEC in 1983 rose by over 2.3% over those of 1982. The percentage of Belgian products within the EEC increased slightly from 9% to 9.5%, with the Federal Republic of Germany showing the largest gain from 8.8% to 10.5%. Exports to developing countries from Belgium increased by 7% in 1983, whereas those of the EEC countries increased simultaneously by 9%. Significantly less was exported from Belgium to the United States owing to quota restrictions. This decrease, however, was partially offset by increased deliveries to Western and Eastern Europe.

The EEC Commission in 1984 approved restructuring plans for the steel industry in several member countries. The Belgian steel industry called for major capacity cutbacks and proposed a linkup between CS and Luxembourg's Arbed SA. Early in 1984, a steel rationalization plan was agreed on between Belgium and Luxembourg. The plan involved the closure of Arbed's 735,000-ton-per-year hot Steckel mill at Dudelange; closure of CS's 900-millimeter heavy-section mill at Charleroi, which had capacity of 525,000 tons per year; and the closure of the Valfil wire rod mill in Liège, owned by CS (85%), Klöckner Werke AG of the Federal Republic of Germany (10%), and Hoogovens BV of the Netherlands (5%). The 10-year restructuring agreement is based on establishing product specializations for the steelworks: Arbed's Luxembourg works will specialize in nonflat products; Arbed's Belgian subsidiary, Sidmar, in flat products; and CS's Charleroi works, in hot-rolled flat products.

According to Government sources, Belgium would meet the EEC deadline for phasing out state subsidies to steel companies by January 1, 1986, because of its restructuring actions. Belgium was one of only three EEC member states that met Commission targets for capacity reduction by the end of 1984.

CS expected to reach a break-even point in 1984, following losses totaling about $173 million in 1983, by cutting its deficit to only $69 million. The company's turnover was projected to decrease, however, from $1,237 million in 1983 to about $1,180 million in 1984. The favorable performance of CS was attributed by many to the financial restructuring undertaken by the Belgian Government in December 1983, which paid off the company's debts and added $415 million worth of new capital for current rationalization plans. According to the EEC plan, CS's steel capacity was eventually to drop to 4.5 million tons per year. The company had already cut its capacity for raw steel from about 10 million tons per year in 1980 to 7 million tons per year in 1984. CS produced about 3.3 million tons of flat and 1.7 million tons of nonflat products in 1984.

Steelmaking at CS's Seraing works in Liège ceased by yearend and was to stop at the Montignies works in Charleroi by the end of 1985. The Seraing LD (basic oxygen) shop had two 240-ton converters with a capacity of 1.6 million tons per year. The 4-year-old Valfil 4-strand wire rod mill in Liège, with a capacity of 1.1 million tons per year, was also closed by the end of 1984, with the whole restructuring package amounting to over 8,000 in job losses.

The financial reconstruction program also helped Tubemeuse SA, the only Belgian seamless tubemaker. About 95% of Tubemeuse's output was exported, with the company holding about 4% of the total world seamless tube market.

Nonferrous Metals.—Nonferrous metals were the primary metallurgical products of Belgium, produced mostly by Métallurgie Hoboken-Overpelt SA (MHO). The Belgian nonferrous industry ranked fifth among the world's producers. MHO specialized particularly in the extraction of rare metals from imported scrap, secondary materials, and ores. The company celebrated its 75th anniversary in 1983 and, to commemorate this occasion, published a book outlining the history of the company and detailing its current metal production activities.[3] MHO's smelter and refinery was 58% owned by Union Minière SA, which by itself was a

100% subsidiary of the Société Générale de Belgique. MHO's production facilities were based at the Hoboken, Olen, and Overpelt plants where smelting and refining of base, minor, and precious metals are carried out. MHO produced the following metals: antimony, cadmium, cobalt, columbium, copper, germanium, gold, indium, lead, nickel, palladium, platinum, selenium, tantalum, and tellurium, and several compounds.

Aluminum semimanufactures were produced at Duffel by Sidal NV, a mill jointly owned by the Netherlands' Flemish regional government (26.7%), and the Hoogovens Group of the Netherlands. The cold-rolling mill was modernized to obtain end products within optimized strip flatness and thickness tolerances. The new mill was intended for rolling light-gauge aluminum strip at speeds of up to 1,800 meters per minute. Belgian refined copper production and consumption reversed slightly the downward trend of 1983. The country was in fifth place in world output of refined copper; almost 90% of domestic output was produced by MHO at its refinery in Olen. In the 1977-82 period, Belgium averaged the highest production of refined copper in Western Europe, as shown in the following tabulation, in thousand metric tons:[4]

	Production	Consumption
Belgium	456	280
Germany, Federal Republic of	440	770
Spain	156	120
Sweden	65	90
France	46	380
Other	141	180

Belgian zinc production continued its slow but steady recovery for the second consecutive year. In addition to Vieille-Montagne SA's improvement and expansion program in 1983, Union Zinc Inc. (UZ), a subsidiary of Union Minière, purchased the final 60% interest in Jersey Minière Zinc Co. (JMZ) from Gulf + Western Industries Inc., giving the Belgian company control of the U.S. zinc producer. UZ had previously owned 40% of JMZ, which was annually producing close to its full 82,000-ton capacity of zinc at its electrolytic refinery in Clarksville, Tennessee, of the United States.

Sté. Européene de Galvanisation, a joint venture of Phenix SA, Sidmar, and Hoogovens, was constructing a galvanizing plant at Liège, alongside Phenix's Ramet plant. Construction began at the end of 1984, and the plant was due to be commissioned in July 1985. This would be the company's second galvanizing works on the right bank of the Meuse River. The cost of the plant, which will have the capacity to galvanize 200,000 tons per year of 0.3- to 1.5-millimeter gauge coil up to 2 meters wide, was set at $49 million. The plant is expected to produce one- and two-sided galvanized coils.

Nonmetals.—Industrial minerals were the only significant nonmetals mined in Belgium. The production of industrial minerals in Belgium came almost wholly from economically depressed Wallonia, except for some coastal sand and gravel in Flanders.

Diamonds.—Belgium had no indigenous diamond production, but the Belgian-based traders continued to handle sizable quantities of diamond stocks, thus affecting prices on the world market. According to the 1984 report of the Antwerp High Diamond Council (HDC), diamond trade was up 19% to $5 billion. Exports to the United States increased, imports from the U.S.S.R. doubled, and purchases of rough diamonds from De Beers Ltd. of the Republic of South Africa declined significantly.

Total Belgian diamond exports rose by 18% to $2.8 billion, and the United States remained the most important market, making up 44% of the cut diamond trade. Exports to the United States grew 15% in real terms and 25% in value. Belgian imports of diamonds increased even more rapidly. The U.S.S.R., with a growth of over 95% compared with that of 1983, replaced India as Antwerp's most important supplier of diamonds, with a value of $284 million. Furthermore, for the first time, the share of De Beer's Belgian diamond trade in 1984 dropped to below 50% of rough stones compared with 68% in 1981. The most important factor contributing to this was, reportedly, the increased imports from Zaire, which nearly doubled compared with those of 1983. Antwerp was estimated to have taken about two-thirds of Zaire's total official output.

The prices of cut diamonds continued to decline on the Antwerp market. The HDC's index for 1-carat stones, for example, dropped by 12% on a December-to-December basis. The result has been declining employment to a record low of 7,500 in the local diamond-cutting industry and the official bankruptcy of 4 companies with outstanding debts estimated at over $40 million.

Limestone and Marble.—Although a wide

variety of limestone and marble types were available, the most popular and widely known variety was petit granit, which is actually a dark blue crinoidal limestone. Other popular marbles included the Belgian red or rouge de flandres, which contains fossils in large reeflike mud mounds. Another rock type was the Belgian black limestone, 472 cubic meters of which was mined in 1982.

Belgian dimension stone production declined during the 1978-83 period. However, this decline has not been limited to recent years. Between the two World Wars, the introduction of substitutes and increasing wages promoted a market decline, as did the increasing popularity of the imported lighter colored marbles and limestones.

Petit granit was principally produced in the three Walloon Provinces of Namur, Liège, and Hainaut. About 80% of the annual production was concentrated in Hainaut in the regions of Neufvilles, Soignies, and Ecaussines. Four of the largest producers in the country were SA Carrières Gauthier & Wincqz, SA Carrières du Hainaut, SA Carrières du Clypot, and SA Comarbel.

Gauthier operated quarries near Soignies and produced 8,000 to 10,000 cubic meters per year of rough blocks, cut slabs, and finished products that were prepared and fashioned at the company's own works. The main uses of the stone were cut stone, used for building roads and pavements; building stone, used for funeral monuments and sculpture; and polished stone, used for interior tiling, staircases, windowsills, and furniture. The production of dimension stone by Gauthier generated large volumes of waste stone, some of which was marketed as rough stone and rubble. Much of the waste stone was used in the construction of waterways such as parts of the new port installations at Zeebrugge.

Comarbel operated three quarries with a combined capacity of 16,000 tons per year, near the town of Phillipeville in southern Belgium. The stone is Frasnian (Devonian) in age and is known as rochefontaine or rouge royal, depending on color. The company, which was formed by the merger of several other stone companies in 1979, exported almost 90% of the stone it produced.

Clypot extracted petit granit at its quarry near Soignies, about 30 kilometers from Brussels. Approximately 15,000 cubic meters of stone was cut and polished. The company produced about 25% of Belgian petit granit.

Hainaut operated one quarry near Soignies, which produced about 100,000 tons per year of petit granit. The company produced 70% to 75% of Belgian petit granit, although a future expansion of the company's quarry may increase its capacity. Other marble-producing areas are known also in Liège and Namur.[5]

Mineral Fuels.—Lacking sizable mineral fuel resources, Belgium's indigenous production of energy, other than nuclear power, covered less than 13% of domestic energy requirements. Coal mining was small and continued to decline, while imports of crude oil increased. As with most nonfuel raw materials, Belgium processed the imported oil in its own refineries for domestic use and export; this was an important factor in the country's trade economy. By 1984, imported oil accounted for nearly 60% of domestic energy needs.

As a result of the Government's program to curtail the use of oil, in 1984 less than 45% of total energy requirements were covered by oil, while coal, natural gas, and nuclear power provided a substantial portion of the total. The petroleum industry in Belgium was still the only energy sector that was entirely privately owned.

The use of electricity rose in almost all industrial sectors. Most of the rise, however, was attributed to the metallurgical and chemical industries. For the first time, the generation of electricity by nuclear energy increased by 15.5% and accounted for 51% of total production. Thermal powerplants generated 46.5% of electricity, of which 28% was from coal, 10% from gas, 9% from oil, and the rest from hydropower.[6] Overall primary energy requirements, however, dropped for the fifth consecutive year, falling by about 5.2%. The decline in energy demand resulted from decreases in the industrial and other sectors, as well as from further contraction in oil refinery and coal production. The 5.5% decline in industrial energy use was caused by the decline in output rather than by changes in efficiency.

Belgian energy research and development activities continued to concentrate on the development of nuclear energy and energy conservation. In the coal industry, the underground coal gasification project at Thulin continued jointly with the Federal Republic of Germany.

Coal.—Coal production continued to be stagnant because of the emphasis by the Government on the production of electricity by nuclear energy. The iron and steel industry was also an important consumer of coal.

Owing to the scarcity of easily accessible indigenous coal deposits, however, and the high cost and difficulty of extraction of coal from deep mines, Belgian coal mining continued to be heavily subsidized, and over 48% of domestic consumption was imported. Owing to coal depletion and mining complexity, one mine reportedly had to be closed. On September 30, 1984, the last underground mine in the south, the Roton Mine at Farciennes, was shut down.

The coal seam thickness in northern Belgian fields ranges from 0.80 to 2 meters, and the average working thickness is slightly below 1.5 meters. The seam dip is between 5° and 20°, and the coal is of average hardness. The working depth of the mines was between 600 and 1,050 meters below ground level. Because the folded and faulted coalbeds are geologically complex, the coal was mined in small panels, 500 meters in length, even though the average face length was relatively great, being on the average 240 meters. The surrounding strata, especially the mine floor, were very soft. Because of the overlying thickness, face supports were often subjected to high pressure, resulting in floor swelling and face collapse. Most coal production came from longwall faces, all of which were mechanized.

Table 4.—Belgium: Coal production, by mine

(Thousand metric tons)

Location and mine	1982	1983	1984[e]
North (Limburg): Kempische Steenkool	6,278	5,908	6,147
South (Farciennes): Roton	262	188	150
Total	6,540	6,096	6,297

[e]Estimated.

In 1984, research continued on the underground gasification of coal. The Institut pour le Developpement de la Gazeification Souterraine, located in Liège next to the Institut National des Industries Extractives, headed the joint Belgian-West German project to gasify deep coal reserves. The coalbeds are from 500 to 1,500 meters deep, and reserves at the Thulin site were estimated at 15 to 20 billion tons of coal. Reportedly, linked channeling by reverse combustion was unsuccessful, presumably owing to the high rock pressures at such great depths. Directional drilling on in-seam mining may be attempted as a way to link injection and production wells, spaced at least 150 meters apart for economic and technical viability of the process.

Natural Gas.—Belgium continued to produce very small quantities of domestic gas; essentially all gas was imported. For the second year, Algeria provided 20% of Belgian gas requirements. The remainder came from Belgium's main supplier, the Netherlands, 61%, and from Norway, 19%. Algeria's gas was delivered by tanker to Montoir, France, but a study was commissioned by the Government to compare the economics of continued delivery to Montoir with that of delivery through the regasification plant at Zeebrugge in Belgium, whose construction was to be completed in 1987.[7] In 1984, negotiations were underway with the Netherlands for increases in gas deliveries under a long-term supply contract. The contract with Algeria, which was signed in 1975, extends for 20 years, starting from the date of first deliveries in 1982. The level of deliveries was to be 88 billion cubic feet per year through 1985, and 177 billion cubic feet per year for the remainder of the 20 years, at a price higher than the current cost of Netherlands or Norwegian gas. Volumes for 1983 and 1984 were renegotiated to 53 billion cubic feet per year. The contract allowed renegotiations on prices, and perhaps volumes, for the period after 1985. In 1984, Norway delivered 25 billion cubic feet of gas to Belgium, and the Netherlands delivered 177 billion cubic feet. With 88 billion cubic feet of imports from Algeria, the total amounted to 290 billion cubic feet.

Nuclear Power.—Nuclear power's share of electricity generation in Belgium rose to 46% in 1983 and 51% in 1984, the highest in Western Europe. The last two of the six nuclear plants under construction in 1984, Doel 4 and Tihange 3, at 980 megawatts each, were scheduled for completion by 1985.

Petroleum.—Although in 1984 the privately held Belgian oil refineries relied totally on imports for supplies of crude oil, the country remained an important refining center in Western Europe. Because of a continuing drop in domestic and foreign consumption, the refining industry suffered significantly and its capacity was underutilized. Reportedly, at least two of the six major refineries discontinued operations during 1984.

At the end of 1984, a U.S. firm, Coastal Gas and Petroleum Inc., closed its small refinery in Antwerp. The closure resulted in the discharge of 210 local workers. Continuing losses, estimated at over $50 million for the last 5 years, and reportedly the loss of crude supplies from Venezuela were cited as reasons for the company's problems. The refinery, locally known as RBP, recently celebrated its 50th anniversary and was notorious for the bitter labor disputes that had surrounded previous attempts to close it. In 1978-79, for example, the refinery was occupied by workers for months, the largest such action in Belgian labor history, which occurred before Coastal purchased it from Occidental Petroleum Corp.

LUXEMBOURG

The Grand Duchy of Luxembourg is a small, prosperous county, which continued to practice an open and free market economy, with easy access to all of its neighbors. The large industrial sector, dominated by steel, was being diversified by new investments. The service sector, however, particularly banking and tourism, was beginning to employ a growing portion of the skilled work force.

Economic growth resumed slightly in 1984, after having declined steadily since 1980, largely because of a decrease in steel production. The reversal came about because of a pickup in demand for steel, as the European economy stabilized.

Table 5.—Luxembourg: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic	325	342	344	353	380
Gypsum and anhydrite, crude ____ tons	856	702	443	[e]400	450
Iron and steel:					
Iron ore and concentrate	560	429	--	--	--
Metal:					
Pig iron (including blast furnace ferroalloys)	3,568	2,889	2,587	2,316	[3]2,768
Steel:					
Crude	4,619	3,790	3,510	3,294	[3]3,987
Semimanufactures	3,746	3,088	2,945	2,828	[3]3,550
Phosphates: Thomas slag, gross weight	688	595	572	586	600
Sand and gravel:					
Foundry sand ____ tons	--	3,500	3,100	--	3,000
Other sand except glass sand	710	713	783	703	750
Gravel	216	191	203	129	150
Stone:					
Construction:					
Crushed ____ thousand cubic meters	675	713	888	1,135	1,000
Dimension:					
Rough cut ____ do	[r]15	9	4	12	10
Facing ____ square meters	4,238	([4])	974	598	600
Finished ____ cubic meters	282	564	584	623	600
Flagstone:					
Polished ____ tons	[r]2,303	1,943	1,225	1,775	2,000
Rough ____ do	297	275	225	299	250
Slate slabs ____ thousand pieces	1,212	1,298	1,199	834	900
Industrial:					
Dolomite	385	295	331	330	350
Quartzite	21	6	24	[e]20	25

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 31, 1985.
[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]Reported figure.
[4]Revised to zero.

Luxembourg traditionally has had a very low level of unemployment, owing, in part, to the continued employment of nonessential workers in the steel industry's Anti-Crisis Division, a public works unit financed jointly by the industry and the Luxembourg Government. Official statistics for 1983 reported unemployment at 2,476 persons, or 2% of the total work force. Including the 600 persons still assigned to the Anti-Crisis Division, real unemployment for 1983 was about 3%. This represented little change from the 1982 level. In spite of this low level, by Common Market standards, the country in 1984 was facing its most serious unemployment crisis in over a decade.

Luxembourg's economy continued to be heavily oriented toward free trade. Over 80% of its GNP was related to foreign trade. For example, imports provided almost 90% of domestic consumer goods. Most trade, 40%, was with the Federal Republic of

Germany, 35% with Belgium, and 15% with France. Trade with the United States amounted to less than 4% of total foreign trade.

Luxembourg's trade account has had a persistent deficit since 1974, and during 1983, the country incurred its largest deficit since the end of World War II, with a total trade account deficit of $367 million. The primary reason was the continued drop in industrial exports, primarily steel, and the continued increase in the importation of expensive, high-quality consumer goods.

COMMODITY REVIEW

Metals.—*Aluminum.*—Luxembourg's National Aluminium SA's (Luxalum) new foil plant, at Dudelange in the south, came onstream in the summer of 1984. Luxalum is a subsidiary of National Aluminum Inc. (NA) of Pittsburgh, Pennsylvania, of the United States. The $40 million, 15,000-ton-per-year plant is to produce foil of a lighter gauge and greater width than many of the existing mills. This is NA's first European plan.

The annealing furnaces at the plant were supplied by the United Kingdom's Efco Furnaces Ltd. under a turnkey contract. Luxalum has two electrically heated bogie hearth-type coil annealing furnaces and six batch-type foil annealing furnaces, all of which are equipped with automatic controls and a traversing charging machine. Each of the foil annealing furnaces is rated at 475 kilowatts and has a design capacity of 18 tons. The furnaces are loaded and unloaded by a "pass-over" type traversing charging machine. The two bogie hearth coil annealers were rated at 1,450 killowatts and have a design capacity of 68 tons. Both the foil and coil furnaces are of horizontal batch type with a door at one end, designed for gas-tight operation with inert gas atmosphere. Lifting equipment is mounted on the roof of each furnace.[8]

Steel.—Arbed, the only steel producer in Luxembourg, did well financially in 1984, following the second stage of its financial reorganization. After a 4-year decline in raw steel output, Arbed registered a 21% increase, in spite of another cut in employment. The company's labor force diminished by 10.3% to just over 14,000; the aim was to stabilize employment at about 12,500 by 1987. Arbed ranked as Europe's 3d largest steel group and the 10th largest steel producer in the world, and Luxembourg as the 28th largest country producer.

The Arbed Group, with plants in Belgium and the Federal Republic of Germany, also increased its raw steel production by almost 13% in 1984, somewhat more than the average 10% rise of most EEC producers.

Arbed in 1984 continued to restructure and refinance its operations. The company reportedly had already reduced rolled steel capacity by almost 25% since 1980, more in percentage terms than any other EEC country, while receiving less state aid for its size than the EEC average. Annual capacity of Arbed's plants in Luxembourg was as follows:

Location	Number of converters	Metric tons per heat	Annual capacity (metric tons)
Differdange	1	160	2.45
Dudelange	1	77	1.05
Esch-Belval	2	150	2.45
Esch-Schifflange	1	80	.96
Do	1	80	.59
Total			7.50

Arbed's income of about $7.8 million in 1984 was its first net profit in 10 years. The company, however, was still in heavy debt. At the end of the year, short-, medium-, and long-term debt totaled over $1 billion. The steelmaker was the biggest employer in the Grand Duchy and the largest single exporter. But, since the start of the international crisis in the steel industry, the number of jobs that have disappeared at Arbed is the equivalent of about 10% of the total Luxembourg labor force.

About 75% of Arbed's sales in 1983 was in the EEC and a valuable 5.9% was in North America. Even though steel imports by the United States doubled between 1980 and 1984, only 15% of that total was supplied by Arbed. The company specialized in the production of custom-made beams used in the construction industry. Its office in New York had orders, however, that it was not able to fulfill, and these were taken up by producers in Mexico and elsewhere.

The company in 1984 installed a roll-type cold-bending and cambering machine on the beam finishing lines at its Differdange works. The hydraulic-powered machine operates at working pressures of up to 175 bars and can bend T-shaped, U-shaped, and square sections, as well as flats, tubes, angles, and nails used in civil and general engineering, to a wide range of specified curvatures. The new equipment provides an economical alternative to forged, welded, and cast structures and can reduce production time by up to 50%. Because it is located close to and can accept beams and other sections directly from the work's rolling mills, handling and transport costs are reduced, and delivery times are only between 8 and 10 days.

Table 6.—Luxembourg: Arbed Group steel production

(Thousand metric tons)

Unit and location	Raw steel		Rolled steel	
	1983	1984	1983	1984
Arbed SA, Luxembourg	3,294	3,987	2,774	3,411
Arbed Saarstahl AG, Federal Republic of Germany	2,397	2,462	1,950	2,134
Belgo-Mineira SA, Belgium	813	842	693	717
Lech Stahlwerk AG, Federal Republic of Germany	418	343	382	315
Sidmar SA, Belgium	2,813	3,356	2,182	2,443
Total	[1]9,736	10,990	7,981	9,020

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

Nonmetals.—The extraction of a small quantity of domestic industrial minerals continued, without any appreciable changes. All production was for domestic consumption, which had to be supplemented with imports, primarily from the Federal Republic of Germany and the Netherlands.

Mineral Fuels.—Luxembourg is the smallest of the EEC countries and is also the most dependent on energy imports. With the exception of the small portion of electricity requirements supplied by local hydropower, all primary energy requirements were imported. Since 1973, however, primary energy usage has dropped nearly 37%, and oil imports have declined. During the same period, coal use decreased dramatically, by 47%. This large reduction was reportedly due to lowered demand from the steel industry, the country's biggest coal user. The steel industry accounted for over 80% of total industry energy demand. However, while oil and coal use decreased, gas and electricity demand rose, reflecting the switch from oil to alternative fuels. Gas requirements increased by about 19% between 1973 and 1984, and electricity consumption increased by about 21%.

Gas was imported primarily from Belgium and some from France. Luxembourg had no oil refineries, and most oil products were imported from Belgium. Coal was imported from EEC countries and other minor sources.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Belgian francs (BF) to U.S. dollars at the 1984 average exchange rate of BF57.8=US$1.00. Luxembourg francs (LuxF) were converted at the rate of LuxF64.0=US$1.00.

[3]Métallurgie Hoboken-Overpelt SA. Hoboken-Antwerpen, 1983.

[4]Chadwick, J. European Exploration. Int. Min. (London), Oct. 1984, p. 45.

[5]Industrial Minerals (London). Belgium—Marble and Little "Granite." July 1984, pp. 23-24.

[6]De Standard (Brussels). Fifty-one Percent of Belgian Electricity From Nuclear Energy; Consumption Up 5 Percent in 1984. Jan. 2, 1985, p. 3.

[7]La Libre Belgique (Brussels). A Terminal Risen From the Sands. Nov. 8, 1984.

[8]Metal Bulletin Monthly (London). Foil Annealing at Luxembourg's New Mill. Sept. 1984, pp. 40-41.

The Mineral Industry of Bolivia

By Pablo Velasco[1]

The Bolivian mining industry continued its sharp decline for the third year in a row with production dropping 24% compared with that of 1983. A combination of reasons contributed to this decline: lack of a clearly defined mining and economic policy, labor unrest, no foreign exchange to purchase spare parts or equipment, minimal export incentives for private mining companies, and continued management and labor problems at the Corporación Minera de Bolivia (COMIBOL), the Government mining corporation.

The Bolivian minerals economy continued to be highly dependent upon a single mineral commodity, tin, which has been in a production decline since 1977. Nevertheless, Bolivia retained its position as the world's fourth largest tin producer after Malaysia, the U.S.S.R., and Indonesia. Bolivia also remained a major world exporter of antimony and tungsten and an exporter of lesser importance of bismuth, lead, silver, and zinc. Mining provided about 4.5% of the total national employment (73,000 jobs) and 6.5% of the gross domestic product (GDP). Production and export of natural gas declined 2.7% and 0.8%, respectively, relative to those of 1983.

Revenues from the sales of natural gas to Argentina decreased 0.7% compared with those of 1983 to $375.7 million.[2] Natural gas contributed 47% of the nation's total export value, exceeding the mineral export revenue for the second consecutive year. The Bolivian economy continued its downward trend with a real GDP estimated to have declined by 3.7% from that of 1983 to $607 million at constant 1970 prices. Per capita income fell for the fifth consecutive year to 5.8% under that of 1983.

In April, the Government made an attempt to arrest the economic decline by devaluing the peso by 75% to 2,000 per U.S. dollar and reducing subsidies on consumer products. These measures were not followed by further essential adjustments until November when the peso was again devalued by 78% to 9,000 pesos per U.S. dollar together with substantial increases in energy, transport, and food prices. However, the measuress were offset by a 655% increase in the minimum wage, which produced an average increase in wages of 300%. This not only aggravated a serious fiscal deficit problem, but also substantially increased the already soaring inflation rate, which exceeded several thousand percent per year.

Because of social unrest, reflected in an ever increasing number of sectoral and general strikes, the Government decided to hold elections in July 1985, a year in advance of the scheduled end of the administration's term in office. Bolivia's external debt, as of December 31, 1984, amounted to $4.1 billion, equivalent to about 5 years of export revenues. The total deficit of COMIBOL, the country's largest mineral producer and state-owned mining corporation, had reached $460 million, or more than one-half year's export earnings.

Government Policies and Programs.—In 1981, the Bolivian Government approved a new mining and metallurgy policy, but it was never implemented. The Government in 1983 prepared another policy, unapproved as yet by the Congress, which proposed more state control, a state marketing monopoly of minerals, and coparticipation of the workers in the management of the state mining corporations, and a control obrero (labor union representative in management) in the private mining sector.

The two largest foreign investors in the mineral fuels industry were the U.S. firms Occidental Petroleum Corp. and Tesoro Bolivia Petroleum Co. with investments of $250 million and $120 million, respectively. In July 1984, the Government passed a decree lowering the prices that the national oil company Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) would pay the two U.S. firms for domestically sold fuels. Crude oil prices were dropped from $29 to $11 per barrel, and natural gas prices were reduced considerably. This action worsened an already deteriorating investment climate.

PRODUCTION

According to preliminary production statistics released by the Ministry of Mining and Metallurgy of Bolivia for the months of January through October, expanded to yearend, the output of mineral commodities once again experienced a vertical drop during the year, compared with that in previous years. COMIBOL continued as the country's major mineral producer, and the state-owned smelting corporation Empresa Nacional de Fundiciones (ENAF) was the most important generator of foreign exchange after the hydrocarbon sector. The private mining sector composed of the medium-scale mines, small-scale mines, and mining cooperatives maintained, within a minor range, its traditional mineral production and sales to ENAF and Banco Minero de Bolivia (BAMIN).

The hydrocarbon sector continued to be the most stable element in the Bolivian economy. The long-term future of the Bolivian economy will continue to depend on the foreign exchange earnings from the two traditional export sectors, mining and petroleum. The future of the hydrocarbon sector will depend heavily upon exports of natural gas. The eventual building of a gas pipeline to the São Paulo area of Brazil is the only new viable sales outlet; however, the fate of this project rests with future Brazilian policies and energy needs.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS[3]					
Antimony:					
Mine output, metal content	15,465	15,301	13,978	9,951	9,400
Metal	5,099	5,116	[e]1,820	2,001	--
Arsenic, mine output, white arsenic equivalent[e]	81	127	261	107	130
Bismuth:					
Mine output, metal content	11	11	5	6	3
Metal	41	6	18	([4])	--
Cadmium, mine output, metal content[5]	173	165	134	143	130
Copper, mine output, metal content	1,884	2,637	[e]2,270	1,982	1,800
Gold, mine output, metal content[6] troy ounces	52,075	66,372	40,146	49,217	42,000
Iron ore:[7]					
Gross weight	5,600	6,477	7,832	10,939	--
Metal content	3,570	4,113	4,891	7,001	--
Lead:					
Mine output, metal content	17,747	16,757	12,433	11,838	8,400
Metal including alloys	500	232	236	300	205
Manganese ore:					
Gross weight[e]	924	543	120	[r]61	--
Metal content	425	250	55	28	--
Silver, mine output, metal content thousand troy ounces	6,099	6,394	5,472	6,025	4,920
Tin:					
Mine output, metal content	27,291	29,830	26,773	25,278	21,100
Metal, smelter	18,191	20,005	19,032	14,164	16,400
Tungsten, mine output, metal content	2,732	2,779	2,534	2,449	2,100
Zinc, mine output, metal content	50,260	47,029	45,667	47,132	40,500
NONMETALS					
Barite	8,694	2,130	607	516	700
Calcite	297	271	267	165	150
Cement, hydraulic	296,223	374,862	324,923	327,300	327,000
Feldspar-related minerals: Sodalite	--	2	1	--	--
Gypsum, crude	1,200	748	756	[e]750	700
Salt[e]	10,000	10,000	10,000	10,000	10,000
Sulfur	11,244	10,202	5,914	3,010	2,290
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	168,818	175,478	188,198	178,059	[8]173,211
Marketable do.	78,632	77,542	81,116	78,650	[8]78,047

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	767	767	710	728	[8]601
Liquefied petroleum gas do.	585	1,112	234	509	[8]1,136
Petroleum:					
Crude do.	8,704	8,091	8,918	8,100	[8,7]7,621
Refinery products:					
Gasoline do.	3,684	3,330	3,562	2,917	[8]3,007
Jet fuel do.	713	704	531	569	[8]593
Kerosine do.	1,021	725	699	647	[8]675
Distillate fuel oil do.	1,587	1,390	1,701	1,544	[8]1,662
Residual fuel oil do.	97	87	850	928	672
Lubricants do.	181	150	171	115	[8]130
Liquefied petroleum gas do.	584	1,112	615	475	[8]455
Unspecified do.	[9]1,898	1,360	1,099	550	[8]562
Refinery losses[10] do.	12	9	77	66	[8]12
Total do.	9,777	8,867	9,305	7,811	[8,7]7,768

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 1985.
[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 Corporación Minera de Bolivia (COMIBOL) and small- and medium-scale mines.
[4]Revised to zero.
[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]Reported figure.
[9]Includes topped crude (presumably further processed outside of refineries reported in this table or used without further processing) of 481,000 42-gallon barrels.
[10]Refinery fuel not reported separately, if at all, in recorded data.

TRADE

Total exports and imports declined an estimated 2.0% and 6.3%, respectively, compared with those in 1983. An overvalued exchange rate, weak international demand for primary materials, and frequent labor disruptions have resulted in declining exports in each of the past 4 years. Nevertheless, Bolivia has maintained a positive trade balance of approximately $300 million, largely because the decrease in foreign exchange earnings has been accompanied by corresponding declines in imports during the past 3 years.

Minerals and hydrocarbons continued to lead Bolivian exports with minerals accounting for 92% of the c.i.f. (cost, insurance, and freight) value of the nation's foreign revenues (minerals, 45%, and hydrocarbons, 47%). Both mine production and mineral exports fell sharply, yet the Bolivian mining industry remained the mainstay of the national economy. Bolivian mineral exports (c.i.f. value) increased by 5.0% from $347.3 million in 1983 to $363.7. The 1984 increase in mineral exports was caused by utilizing accumulated stocks during depressed world market prices and the low cost of financing owing to periodic devaluation of the Bolivian peso. For the first 9 months of 1984, the largest declines in exports were in lead, 71%; silver, 47%; sulfur, 38%; copper, 25%; antimony, 14%; tungsten, 8%; and zinc, 5%. Tin exports increased 19.3% as world market prices improved; however, there was a continued fall in production and exports of some minerals in spite of their price recovery on the world market, as was the case with antimony and zinc.

Tin, traditionally Bolivia's main export, totaled an estimated 20,000 tons valued at $248 million, an increase of 25% and 19% over 1983 figures in volume and value, respectively.

COMIBOL's yearend deficit was $150 million, and the total deficit since 1980 amounted to $460 million. By decree, COMIBOL assumed complete control over the marketing of tin produced by ENAF. The decree also established a system where concentrates produced by private miners and by COMIBOL would be sent to ENAF for smelting.

Representatives of the Association of Tin Producing Countries, comprised of Australia, Bolivia, Indonesia, Malaysia, Nigeria, Thailand, and Zaire, met on October 4 for a 2-day conference in Santa Cruz, Bolivia. Talks were aimed at intensifying investigation into new uses of tin to establish new markets for the mineral and analyze world supply and demand as well as reserves.

The distribution of export values of mining and metallurgical products in 1984 was as follows: European Economic Community, 47%, and the United States, 34%. The remaining 19% was distributed among the European Free Trade Association, Council for Mutual Economic Assistance, Asia, Andean Pact, Latin American Integration Association, and others.

Table 2.—Bolivia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984
Antimony:		
Ore and concentrate	8,728	10,027
Trioxides	2,559	664
Regulus (impure metal)	1,562	9
Alloys, all forms	71	187
Arsenic: Ore and concentrate	51	20
Barite and witherite	516	984
Copper: Metal including alloys, all forms	1,926	1,333
Gold: Metal including alloys, unwrought and partly wrought troy ounces	1,417	29,283
Lead: Metal including alloys, all forms	9,342	2,361
Lime	165	--
Manganese: Metal including alloys, all forms	28	--
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	5,074	2,561
Sulfur, all forms	3,010	1,878
Tin:		
Ore and concentrate	2,509	4,663
Metal including alloys, all forms	13,967	16,006
Tungsten: Concentrate (WO_3)	2,584	2,471
Zinc: Metal including alloys, all forms	41,352	36,868

[1]Table prepared by Harold D. Willis. Table includes partial provisional export data; information on export destinations and on imports was not available at the time of publication.

COMMODITY REVIEW

METALS

Antimony.—Bolivia maintained its position as the world's leading antimony producer, although its output decreased 5.5% below that of 1983. For the past 10 years, Bolivia has led the world in antimony output, followed by China and the Republic of South Africa. Antimony peaked in 1980 at 15,465 tons and has declined since then to about 9,400 tons because of depressed world demand and lowered world prices. In 1984, antimony prices improved, but Bolivian output was down because of strikes at the major producer, Empresa Minera Unificada S.A. (EMUSA) and the closing of the Caracota Mine for 2 years. Slightly over three-fourths of the antimony output came from private sector medium-size mines and the balance from small private producers. During the past 5 years, Bolivia has been producing increasing amounts of antimony metal and oxides since they are more profitable than ores and concentrates. By 1983, Bolivian metallic antimony exports to the United States were 77% metals and oxides and 64% antimony alloys, but 1984 exports were 97% metals and oxides, and 73% antimony alloys, mostly from the Palala smelter since ENAF produced no antimony metal in 1984.

Empresa Minera Hermanos Bernal S.A., owner of the Palala antimony smelter in Tupiza, Potosí Department, completed part of its smelter capacity expansion, which will increase Bolivia's exports of refined antimony oxide. The first phase of the expansion consisted of the addition of four rotary furnaces. Another four are to be added in 1985 plus a new cupel furnace to fume antimony metal to oxide. This new equipment would give the company the capability to produce high-grade antimony products with greater added value than its traditional crude oxide products.

The overall expansion would increase the yearly output of oxides to 4,000 tons while metal production would remain unchanged at 400 tons per year. Nearly all of the oxide and metal would be exported to the United States. But beginning in 1985, 1,000 tons of dedusted antimony oxide will be exported to West German consumers. In order to feed the expanded Palala smelter, the company has been developing its own Rosa de Oro Mine in Tupiza, which is scheduled to begin production in 1985 at the rate of 1,500 tons per year of concentrate. In addition, the company was also planning to buy 2,300 tons of ore annually from BAMIN, another 4,000 tons per year from EMUSA, and 2,000 tons from other producers.

Higher antimony prices in 1984 caused substantial reduction in stockpile levels. By yearend, Consolidated Murchison Ltd. stocks declined to 7,600 tons from 10,800 tons at yearend 1983.

Bismuth.—Bolivia has not produced metallic bismuth since 1982, when world prices dropped sharply. Since prices began to revive at the end of 1984, COMIBOL was planning to resume production. The 600-ton-per-year Telamayu smelter is to be reopened, and development work is under way at the Tasna and Quechisla Mines. COMIBOL plans indicate that future annual output could reach 500 tons.

Gold.—Bolivia's gold output was down about 15% below the 1983 production level of 49,217 troy ounces. Most of Bolivia's gold is produced in mining cooperatives, of which there are 341 employing a total of about 23,000 miners. Nearly 80% of the cooperatives are mining gold; however, the country's major gold source was from 68 cooperatives working at Guanay, Huayti, Mapiri, Teoponte, and Tipuani and a South American Placers Inc. (SAPI) dredge working the Kaka River. Illegal trading of gold is extensive in Bolivia.

In 1983, the Bolivian Government started a program to develop the country's gold resources. This program was to explore the river Itenez-Guaporé along the Bolivian-Brazilian border. Several placer deposits were selected for investigation. They were Riverón, located next to the waterfall Esperanza on the Madre de Dios River, and Periquitos on the Madera River.

Iron Ore.—Small-scale exploitation of the Mutún iron ore deposits began late in the year to satisfy a contract to supply 60,000 tons of iron ore to Argentina. The Mutún deposits are near the Río Paraguay in eastern Bolivia near the Brazilian and Paraguayan borders and have been under consideration for development for many years, but high phosphorus content and poor location hindered their exploitation. The $840,000 contract was awarded to Empresa Siderúrgica Boliviana S.A. by the Altos Hornos Zapla smelter, which has been buying Bolivian iron ore for several years.

Iron and Steel.—In November, plans were approved by the Bolivian Government for a $200 million integrated iron and steel project that would produce 100,000 tons of crude steel annually from a direct reduction, minimill steel plant to be located in Santa Cruz. The raw material source would be the Mutún iron and manganese ore deposits. Plans included using wood charcoal for the plant, which would produce 70,000 tons of plate steel and 60,000 tons of light steel and wire products for domestic consumption.

Lead, Silver, and Zinc.—Production of all three commodities was down substantially compared with that of 1983. Lead in ore and concentrate declined 29% to 8,400 tons, silver was down 18%, and zinc was down 14%. Metallic lead output declined 32% below that of 1983. COMIBOL was the dominant lead, silver, and zinc producer with its mines producing 75% of the lead, 80% of the silver, and 45% of the zinc output. The major producers were the Empresa Minera Quechisla, Empresa Minera Bolivar, and Empresa Minera San José. Most of the rest of the nonferrous output was by the medium-scale miners, with Cía Quioma S.A. and San José de Berqué Ltda. being the major producers.

COMIBOL was seeking new tenders for the Bolivar silver-lead-zinc project, which was a $56.9 million expansion project at the Bolivar Mine near Oruro. The expansion included a new 750-ton-per-day flotation plant and the development of reserves in a new mine area that contained 3 million tons grading 0.91% tin, 15.2% zinc, 1.12% lead, and 5.25 grams of silver per ton. The project would produce 9,000 tons per year of lead-silver concentrate (28.4% lead), 75,000 tons of zinc-silver concentrate, and 41,000 tons of tin preconcentrates grading 4%. COMIBOL reportedly invited major mineral concerns from Argentina, the Federal Republic of Germany, Finland, and Japan as well as the Czechoslovak and Soviet trade delegations in La Paz to submit proposals. The closing date for these tenders was January 9, 1985. This Bolivar project is to eventually be the primary source of feed for COMIBOL's Karachipampa metallurgical complex. This

Soviet-built processing facility, originally due on-stream in December 1982, was to commence operations in early March 1985. According to company officials, the latest delays were due to financial problems, but startup capital had been provided by the Bolivian Central Bank. The complex will be fed also by some of COMIBOL's small- and medium-scale mines, and output will include mainly lead-silver, but also quantities of antimony, copper, tin, and zinc.

Tin.—The tin mining industry had another extremely difficult year with weak prices and increased mining costs that paralleled the country's devastating inflation. Bolivia's tin mines, which are all high-cost underground mines, suffer a serious cost disadvantage when compared with low-cost surface mining of alluvial deposits used in all the other major tin producing countries. Preliminary statistics extrapolating output based on January-October production indicated that tin ore and concentrate output was down 17% compared with that of 1983 to about 21,000 tons, and metal output was up 16% over that of 1983 to 16,400 tons. COMIBOL produced almost two-thirds of the total output; the medium mines, 22%; and small mines, the balance.

Tin exports were estimated at 18,000 tons valued at $247.9 million, which represented 68% of the total mineral exports.

The decline in tin output and productivity has been caused by numerous factors. Several of the most important reasons were declining ore grades, lack of exploration programs, obsolete equipment use, and continuing labor unrest. COMIBOL mines have been running at a loss since 1980. Estimates of losses for 1984 were $150 million. Since 1980, the mining work force has increased by 5%. Profitable mines were subsidizing the unprofitable ones. Worker participation in management further increased problems. To resolve these problems, a rehabilitation plan was under study for 3 years, then approved by the Government, but never implemented because of lack of funding.

Since mid-1982, Bolivia has not been a member of the International Tin Council (ITC). However, Bolivia joined the Tin Producers Association in late 1983 and hosted its conference of mining ministers in early October in Santa Cruz. A 10-point communique was issued from the conference that stressed continuing export controls by the ITC and a request for lessened output by Brazil and other producers. Preliminary discussions with Brazilian officials indicated that they intended to voluntarily reduce their tin output in 1985. In the past few years, Brazil's output of tin has increased very rapidly; its output is now a close second to that of Bolivia.

In 1984, tin smelting and refining continued to be controlled by the state-owned ENAF, although there were some small private tin fuming operations and a private antimony smelter and refinery in Tupiza. ENAF operates two tin smelters both built by the German firm KHD Humboldt Wedag AG with a combined capacity of almost 31,000 tons per year. Total output for the year was 16,400 tons. ENAF's high-grade tin smelter at Vinto, near Oruro, is rated at 20,830 tons annually and was designed to process 42% tin concentrates. The low-grade tin smelter for concentrates of 8% to 15% tin is rated at 10,024 tons annually and is located at Vinto, near Oruro. The smelter was completed in 1980, but for technical reasons was unable to reach its rated capacity until mid-1983. There is also the La Palca tin volatilization plant at Potosí, which treats 400 tons per day of 3% to 6% tin material to produce 3,500 tons per year of 50% tin powder that is further processed at the Vinto smelter.

A similar tin volatilization plant is under construction at Machacamarca, near Oruro. This plant will have a capacity of 200 tons per day, and its feed will come from nearby mines. Both the La Palca and Machacamarca tin processing plants were designed by the Soviet firm Machinoexport. The Machacamarca plant will cost an estimated $90 million. Its product will be slightly higher (58.8% tin powder) in grade than the La Palca plant. There are also two smaller private tin smelters, one in Oruro and the other in La Paz. Neither had a substantial output during the year.

Tungsten.—Tungsten output declined for the third consecutive year to an estimated 2,100 tons, about 14% below that of 1983. COMIBOL's output dropped from 1,308 tons in 1983 to slightly over 1,100 tons. In the first 10 months of 1984, Bolivia exported 2,364 tons of WO_3 tungsten concentrate valued at $18.1 million, which was 8% lower in output and 9% in value below the same period in 1983. COMIBOL's principal tungsten producers were the Kami, Tasna, and Bolsa Negra Mines. In the medium mines sector, there were seven significant mines in production and one mine, Chicote Grande, owned by the U.S. firm Anschutz Mining Corp., under development.

NONMETALS

Bolivia's large salt lake, the Salar de Uyuni, located about 250 miles south of La Paz, contains enormous lithium, potassium, and boron resources, which have been under consideration for exploitation for a number of years. In June 1984, the Government formed a multiagency commission to recommend future action to be taken on the Salar de Uyuni. The commission was preparing bid packages and specification terms to call for an international tender for the exploration, development, and exploitation of the Salar de Uyuni. By yearend, the Bolivian Congress was reviewing proposals to create a new company named "Complejo Industrial de los Recursos Evaporíticos del Salar de Uyuni (CIRESU)," that will be the state agency for the exploitation of the brines and salt of the Salar de Uyuni deposit. The law would allow the new agency to call for international bids and joint ventures and to sign contracts on behalf of the state to explore, exploit, industrialize, and market these resources.

The lake covers 9,000 square kilometers. Brine samples indicate that the average chemical composition was sodium, 8.49%; potassium, 0.86%; lithium, 380 parts per million; magnesium, 6.81%; calcium, 0.56%; sulfate, 0.92%; chloride, 15.96%; and boron, 0.025%. Resources calculated on current available data were lithium, 5 to 9 million tons of lithium content; potassium, 110 to 200 million tons of K_2O; and boron, 3.2 to 6.0 million tons of boron content. Lithium resources of this magnitude would more than double the world's lithium supplies. The Foote Mineral Co., Lithium Corp. of America, and Amax Chemicals Inc. of the United States and COMINCO Ltd. of Canada, jointly with S. J. Groves Ltd. of the United States, have expressed an interest in this project and have maintained close contact with CIRESU in this matter.

MINERAL FUELS

The country is self-sufficient in mineral fuels. Hydrocarbon exports, primarily natural gas, contributed 47% of the total export value for 1984, which was $801.3 million.

Natural Gas.—Output decreased 2.7% below that of 1983, primarily owing to the natural decline of some of the gasfields. The Vuelta Grande Gasfield, operated by YPFB, became the most important producer. About 40.6% of total gas output was exported to Argentina, amounting to 78.1 billion cubic feet; domestic consumption of gas required 3.4% and the balance was reinjected into the gasfields. Revenues from sales of gas to Argentina were over $375 million, slightly below the 1983 value. Natural gas sales contract prices were reached between Argentina and Bolivia for 1984 at $4.28 per million British thermal units. Meetings were also held in February between the Brazilian and Bolivian Presidents to discuss possible sales of Bolivia's natural gas to Brazil. A Santa Cruz-São Paulo natural gas pipeline has been under consideration for many years. In 1980, total costs for this pipeline were estimated at $1.1 billion; costs by 1986 would escalate to an estimated $1.8 billion.

Petroleum.—Output of petroleum declined to 7.6 million barrels, about 5.9% below that of 1983. Production comes from 20 oilfields, all owned by YPFB, of which 11 fields are declining in output. Sale prices for refined petroleum products were raised twice in 1984. Nevertheless, comparative prices for fuels in Bolivia were below world and regional standards with premium gasoline (92 octane) selling at $0.80 per gallon. Press reports indicated modest (1,500 barrels per day) black market sales from Bolivia to neighboring countries.

Exploration and development drilling increased slightly over that of 1983, which had been the lowest level of activity since the country opened exploration areas to foreign contractors in 1973. No new fields were found, although new productive activity was initiated as secondary recovery methods were introduced in old producing oilfields. Bolivia Andina Petroleum Corp., a subsidiary of the Anschutz Mining of Denver, Colorado, and the Shell Exploradora y Productora de Bolivia B.V., a subsidiary of the Shell International Exploration N.V. of the Netherlands, continued its exploration activity, which started in 1983. Of the previous 20 operational contracts signed with YPFB, two additional companies remained active in the country: Occidental Boliviana Inc. and Tesoro. Both companies have become important suppliers of condensate and natural gas to domestic and export markets. On September 28, the Government of Bolivia issued a supreme resolution that called for the renegotiation of the operating contracts of these companies. It stated that Bolivia's economic and social conditions demanded more favorable contractual terms and that the renegotiation be conducted by representatives of YPFB and the Ministry of Energy and Hydrocarbons. The supreme resolution also stipulates that any agreement concluded with the above foreign oil companies was subject to presidential approval. In view of the announced presidential elections for July 1985, the eventual disposition of these renegotiations is uncertain.

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[1]Physical scientist, Division of International Minerals.

[2]International Monetary Fund (IMF) and Central Bank of Bolivia. The Bolivian peso ($b) was officially converted to U.S. dollars at the rate of $b9,000=US$1.00 (yearend).

The Mineral Industry of Botswana

By Thomas O. Glover[1]

Higher-than-expected mineral revenues contributed to a budget surplus of $80 million[2] and to an overall economic growth rate of 4%, down from 12% in 1983. The mining sector as a whole was estimated to have grown by 12% in 1984, to a value of $149 million. The growth was attributed to increased production and the strength of the U.S. dollar. The growth in diamond production came principally from the Jwaneng and Letlhakane Mines. The grade of diamonds at the Jwaneng Mine also improved considerably. The Selebi-Phikwe nickel-copper mines continued to operate with efficiency but owing to the soft market conditions continued to lose money.

Construction of Botswana's first national power infrastructure was underway. The Morupule power station is 10 kilometers west of Palapye in the central district. Its approximately 370-kilometer-long overhead transmission lines and related substations will connect the power station to the existing northern and southern stations when completed. The Morupule plant, when completed, will initially consist of three 30-megawatt generating units to be fueled by coal supplied from the Morupule Mine located 1 kilometer away.

Plans are still underway for Botswana to take over from the Government of Zimbabwe the National Railways of Zimbabwe, the railway line running through its territory from the Plumtree border post to Ramathlhabama on the South African frontier by early 1987. The takeover involves the construction of repair shops, re-laying of trackage, and personnel training.

The feasibility study of the Trans-Kalahari railway was completed in 1984. Several alternative western routes were considered through Botswana as well as an eastern route that would go over existing railway to Richards Bay in the Republic of South Africa. The cost of the Trans-Kalahari railway was estimated at $1 billion by Travers Morgan International (United Kingdom). Considering the projected price of coal and the soft market relationship of coal, the new railway is not likely to be built during this century.

PRODUCTION

Diamonds led the country's growth as production increased 20% over that of 1983. The growth was attributed mainly to the increased output of the new diamond mine at Jwaneng. The Bamangwato Concessions Ltd. (BCL) nickel-copper mines, at Selebi-Phikwe, continued to produce efficiently, but incurred a loss of $2.85 million owing to low world commodity prices. Similarly, low prices for coal caused the Government to temporarily halt its plans late in 1984 for the proposed Kgaswe coal project.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[p]
Coal, not further described	370,914	379,270	414,778	395,127	[2]392,851
Cobalt, Co content of nickel-copper (smelter product)[3]	226	254	[4]254	[4]223	[2] [4]259
Copper:					
Mine output, metal content[5]	20,841	19,954	21,161	24,411	[2]25,868
Cu content of nickel-copper (smelter product)	15,553	17,819	[4]18,375	[4]20,261	[2] [4]21,471
Diamond:					
Gem[e] thousand carats	765	[r]744	1,165	4,829	5,810
Industrial[e] do	4,336	[r]4,217	6,604	5,902	7,104
Total do	5,101	[r]4,961	7,769	10,731	[2]12,914
Gem stones, semiprecious, rough, not further described kilograms	20,000	--	1,100	NA	[2]36,700
Nickel:					
Mine output, metal content[5]	23,637	21,925	20,669	21,431	[2]21,887
Ni content of nickel-copper (smelter product)	15,442	18,278	[4]17,756	[4]18,216	[2] [4]18,604
Nickel-copper matte, gross weight	40,099	46,565	45,685	48,083	[2]51,845
Sand and gravel cubic meters	201,925	156,921	NA	NA	[2]188,498
Stone, crushed, not further described do	222,033	184,355	NA	NA	[2]436,604
Talc	78	70	--	--	--

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through May 9, 1985.
[2]Reported figure.
[3]Figures approximate recoverable mine output and have been used in world production tables appearing in volume 1 of Minerals Yearbook.
[4]Smelter product was all matte prior to 1982, a combination of matte and pellets in 1982 and 1983, and all pellets in 1984.
[5]Analytic content of ore milled.

TRADE

The economy of Botswana has leveled off, and no major growth was expected for the next few years. In 1984, Botswana maintained a positive balance of payments, holding considerable foreign currency reserves. The Government encouraged private investment, both foreign and domestic. Investments were encouraged through the system of tax breaks and grants called the financial assistance policy. Customs duties were imposed within the framework of the Southern African Customs Union, of which Botswana is a member. All goods were taxed at the point of entry, and no further duties are imposed within the customs union. Exports were the Government's principal source of income. Botswana's two major export commodities were diamond and nickel-copper pellets. Botswana exported all of the production from the Selebi-Phikwe nickel-copper mines to the United States. The value of the smelter product exported was approximately $78 million.

COMMODITY REVIEW

METALS

Financial assistance amounting to $24 million was provided by the Botswana Government, Anglo American Corp. of South Africa Ltd. (AAC), and AMAX Inc. to Botswana Roan Selection Trust Ltd. (BRST) managing company of the BCL nickel-copper mines. The assistance was needed because BRST had suffered another operating loss in 1983. The Government owned 15% of BCL, and BRST the remaining 85%. BRST was controlled by AAC and AMAX. BRST has accumulated operating deficits of approximately $326 million since the operation began in 1973. The BCL Selebi-Phikwe nickel-copper mines continued to be beset by poor copper and nickel market conditions. AMAX took all the production of pellets in 1984 for its Port Nickel, Louisiana, refinery.

Comparing 1984 and 1983 production, copper content of the smelter product increased 6% to 21,471 tons, nickel content increased 2% to 18,604 tons, and cobalt increased 16% to 259 tons. As of December 31, 1982, reserves in the Selebi deposits were estimated to be 23 million tons averaging 0.77% nickel and 1.02% copper; at the Phikwe deposit, reserves were estimated to be 22 million tons, averaging 1.09% nickel and 1.02% copper.

NONMETALS

Diamond.—Botswana produced approximately 12.9 million carats of diamond in 1984, about 2.2 million carats above that of 1983. The increase was attributed to output from the Jwaneng Mine that opened in 1982. Botswana first became a diamond producer in 1971 with the opening of the Orapa Mine. Its second producer was the Letlhakane Mine starting in 1977. By the end of 1984, Botswana had produced approximately 64.5 million carats of gem and industrial diamond since mining commenced in 1971.

The new Jwaneng Mine, jointly owned by DeBeers Consolidated Mines Ltd. and the Botswana Government, produced 27% more diamonds in 1984 than in 1983. Both the number of tons of material treated and the carats recovered per tons treated increased. The Jwaneng Mine produced 149.02 carats per 100 tons of processed material, compared with 121.51 carats in 1983, recovering about 7.5 million carats in 1984.

The Orapa Mine produced 4.7 million carats, raising the number of carats per 100 tons of material processed from 56.4 in 1983 to 60.95 carats in 1984. The Letlhakane Mine produced 757,054 carats in raising the number of carats per 100 tons of material processed from 23.49 in 1983 to 30.63 carats in 1984. All three diamond mines produced about 12.9 million carats, making Botswana second in world production of total diamonds, first in gem diamonds, and second in industrial diamonds. Botswana produced 22.3% of total diamonds, 24.2% of gem diamonds, and 20.9% of industrial diamonds of world production.

Soda Ash.—Work on the Sua Pan soda ash mining project in the Makgadikgadi salt pans commenced in June 1984 with the startup of a pilot-scale processing plant. The plant, a complete success, was owned and operated by Soda Ash Botswana (Pty) Ltd. affiliated with British Petroleum Ltd. Further work was planned for 1985. Sua Pan is 110 miles northwest of Francistown in eastern Botswana.

MINERAL FUELS

Botswana has the second largest deposits of coal in Africa, amounting to 17 billion tons of identifiable coal resources. Coal deposits in western Botswana are of very poor quality; however, deposits in eastern Botswana are of better quality. The coal was all categorized as steam coal.

In 1984, Shell Coal Botswana Ltd. was investigating the possibility of developing an underground coal mine and a rail complex linked either to Richards Bay in the Republic of South Africa or Swakopmund in Namibia. The project, if developed, would be known as the Kgaswe Coal Scheme and Rail Link. Walvis Bay near Swakopmund on the Atlantic Ocean was ruled out because the harbor was too shallow and would have to be dredged at great cost.

The underground coal mine would be located west of the present Morupule coal mine and would initially produce 5 million tons per year and then increase production to 10 million tons per year. A joint venture company would be known as the Kgaswe Coal Development Co. (Pty.) Ltd., in which Botswana would have 15% equity shareholding and Shell Coal would hold 85% equity.

The only active coal mine in Botswana is the Morupule surface mine near Palapye. Owned by AAC, it produced 392,851 tons of coal in 1984 valued at $4.3 million. All of the coal produced at the Morupule Mine was consumed within Botswana.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Botswana pula (P) to U.S. dollars at the rate of P1=US$0.7789.

The Mineral Industry of Brazil

By H. Robert Ensminger[1]

Brazil was the world leader in the production of beryllium and columbium. It was third in the production of bauxite, iron ore, manganese, sheet mica, and tantalum. In addition, it was in the top 10 in chromium, diatomite, feldspar, lime, lithium, magnesium compounds, rare earths, silicon, tin, and tungsten.

The extractive mineral industry expanded its output by 27.3% over that of 1983. The resultant increase in the value of mineral production contributed 4.65% to the gross domestic product (GDP). The Departamento Nacional da Produção Mineral (DNPM) estimated the total value of mineral production at approximately $9.2 billion,[2] up 21% over the figure for 1983.

The economy showed a marked improvement after 5 years of recession. Exports rose, imports fell, and the trade surplus doubled over that of 1983. Industrial production rose 5.9% over that of 1983 while the GDP rose 4.5% after a 3.2% drop in 1983. The inflation rate for 1984 was 224%, only slightly under the 230% registered in 1983. Brazil's important state enterprises presented a mixed picture by yearend. Publicly owned holding companies such as Petróleo Brasileiro S.A. (PETROBRÁS), Cia. Vale do Rio Doce (CVRD), and Telefonico Brasileiro S.A. (TELEBRÁS) have been generally self-financing, receiving few subsidies from the central Government. However, state enterprises such as Siderúrgia Brasileira S.A. (SIDERBRÁS), Electrico Brasileiro S.A. (ELECTROBRÁS), and Nuclear Brasileiro S.A. (NUCLEABRÁS) have borrowed heavily, and were deeply in debt; therefore, they received large subsidies.

Foreign investment in the Brazilian minerals and related sectors was $2.4 billion as of March 1984, with the metallurgical sector accounting for $1.3 billion. The United States was the leading investor in the minerals sector, and as of March 31, 1984, had accounted for $761 million (31.1%) of the total investment in the sector. Japan was second with $430 million.

Government Policies and Programs.— DNPM announced that since 1975 investment in basic mineral research declined 385%. There was also a decline of 33% in the number of research studies prepared and a decrease of 83% in the number of approved mining concessions granted during that period. DNPM reported that by yearend 1984, 40% of the country had been mapped at a scale of 1:250,000, 12% at a scale of 1:100,000, and 12% at a scale of 1:50,000.

Cia. de Pesquisa de Recursos Minerais (CPRM), the state mineral resources research company, invested approximately $1.2 million in mineral research. Of the total invested, approximately $600,000 was invested in copper, lead, and zinc projects at Palmeiropolis, Goiás, and Serra da Samambaia, São Paulo. CPRM also invested in the following: eight diamond projects, $221,000; seven tin ventures, $150,000; a titanium and chromium project, $27,500; and a phosphate and limestone venture, $13,300.

CPRM greatly expanded its overseas business to approximately $21.6 million, almost double the earnings for the period 1980-83. The most prominent projects were a joint venture with Libya, which resulted in a uranium discovery in that country, and the preparation of a study for the Latin American Energy Organization. In addition, CPRM signed 98 contracts for drilling services, mineral technology, geologic mapping, geophysics, cartography, and consultants.

The Carajás Railroad and the preliminary stages of the iron ore and manganese mining projects were completed by yearend. Their inauguration is scheduled to take place early in 1985. The cost at this stage of the projects' development was $3.5 billion, compared with $5.07 billion forecast in 1981.

PRODUCTION

The DNPM estimated the value of mineral production at approximately $9.2 billion, which was an increase of $1.95 billion (21%) over that of 1983. The top 10 mineral commodities accounted for 86.3% of the value of the total production, with petroleum and natural gas comprising $5.4 billion of the total. The total production breakdown by category of the top 10 mineral commodities was as follows: fossil fuels, 70.6%; metallics, 25.3%; and nonmetallics, 4.1%. Iron ore replaced gold as the most valuable mineral in Brazil, excluding petroleum. Estimates for 1984 revealed that the value of Brazilian mineral production increased 221% in current prices and 34% in constant prices (base year 1977) over the 1983 level.

CVRD announced a new iron ore production schedule for the Grande Carajás project. The 25-million-ton-per-year production level should be attained in July 1986, instead of January 1987. By July 1987, CVRD projected production to reach 35 million tons, 6 months ahead of the original production schedule.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite, dry basis, gross weight	5,537,676	5,770,448	6,289,713	7,198,671	5,239,000
Alumina	[r]516,967	496,639	606,177	786,648	800,000
Metal:					
Primary	[r]290,730	256,418	299,054	400,744	412,000
Secondary	[r]50,100	[r]36,040	46,280	[e]43,016	45,000
Antimony, mine output, metal content	46	269	--	--	--
Beryllium: Beryl concentrate, gross weight	550	853	1,062	[e]1,250	[3]1,252
Cadmium, metal, primary	40	45	73	189	225
Chromium:					
Crude ore	833,935	926,413	668,000	468,737	500,000
Concentrate	187,396	152,859	158,500	110,978	120,000
Marketable product[4]	313,067	236,390	275,500	[e]276,000	280,000
Columbium-tantalum ores and concentrates, gross weight:					
Columbite and tantalite	538	299	201	264	275
Djalmaite concentrate	18	13	4	[e]7	10
Pyrochlore concentrate	30,700	29,886	19,593	16,828	24,839
Copper:					
Mine output, metal content	[r]402	[r]11,777	24,482	40,000	58,500
Metal, secondary	63,000	45,000	57,000	39,920	39,000
Gold:[e 5]					
Mine output troy ounces	131,500	150,000	260,421	NA	NA
Garimpeiros (prospectors) do	1,168,500	1,050,000	1,186,361	NA	NA
Total do	1,300,000	1,200,000	1,446,782	[r]1,750,000	[3]1,768,305
Iron and steel:					
Ore and concentrate, (marketable product):[4]					
Gross weight thousand tons	114,732	[r]99,500	93,900	89,200	90,000
Iron content do	74,576	[r]64,675	61,035	57,980	58,500
Metal:					
Pig iron[6] do	[r]12,685	[r]10,796	10,827	12,945	17,200
Ferroalloys, electric-furnace:					
Chromium metal	--	6	6	7	[3]123
Ferroboron	27	--	--	--	[3]11
Ferrocalcium silicon	8,025	7,481	9,657	7,400	[3]17,755
Ferrochromium	93,443	118,780	96,646	77,326	[3]125,125
Ferrochromium-silicon	8,086	8,655	2,598	5,526	[3]7,628
Ferrocolumbium	17,530	14,632	11,506	9,665	[3]16,522
Ferromanganese	140,496	107,872	120,743	103,271	[3]106,459

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Iron and steel —Continued					
Metal —Continued					
Ferroalloys, electric-furnace —Continued					
Ferromolybdenum	802	797	337	126	[3]437
Ferronickel	11,280	10,744	10,597	25,991	30,000
Ferrophosphorus	354	346	22	1,211	[3]926
Ferrosilicon	109,140	120,662	115,314	156,683	[3]157,873
Ferrosilicon magnesium	13,734	11,002	11,275	10,698	[3]15,429
Ferrosilicon zirconium	488	497	503	85	[3]244
Ferrotitanium	698	498	430	166	[3]551
Ferrotungsten	217	95	74	228	[3]239
Ferrovanadium	807	296	238	102	[3]456
Inoculant	--	1,428	1,393	[e]1,400	1,500
Silicomanganese	134,243	142,743	172,358	[e]167,333	175,000
Silicon metal	13,302	18,957	17,921	20,602	[3]26,783
Total	552,672	565,491	571,618	587,820	683,061
Steel, crude, excluding castings thousand tons	15,339	13,230	12,999	14,660	[3]16,021
Semimanufactures, flat and nonflat do.	13,307	11,346	11,642	12,486	[3]18,385
Lead:					
Mine output, metal content	[r]21,754	[r]21,650	19,360	18,821	19,000
Metal:					
Primary	44,519	34,567	21,943	20,581	[3]25,982
Secondary	40,431	[r]31,029	27,407	28,939	30,000
Manganese ore and concentrate, marketable, gross weight[4]	2,281,450	2,042,144	2,340,979	2,091,631	1,900,000
Nickel:					
Mine output, metal content	4,291	6,811	13,093	10,741	13,200
Ferronickel, Ni content	2,504	2,340	4,813	10,741	12,720
Rare-earth metals: Monazite concentrate, gross weight	2,532	[r]2,460	1,814	15,256	5,000
Silver[7] thousand troy ounces	[r]784	765	760	743	[3]804
Tin:					
Mine output, metal content	[r]6,377	[r]8,253	9,293	13,418	17,700
Metal, smelter, primary	8,792	7,639	9,298	12,741	18,100
Titanium concentrates, gross weight:					
Ilmenite	16,839	[r]19,889	13,181	48,193	55,000
Rutile	428	[r]205	225	1,058	1,200
Tungsten, mine output, metal content	[r]1,116	[r]1,576	1,574	1,056	[3]998
Zinc:					
Concentrate and salable ore	392,148	400,631	596,971	662,126	675,000
Mine output, metal content	67,000	71,000	71,000	73,000	72,000
Metal, smelter:					
Primary	78,303	91,944	95,528	99,913	[3]106,927
Secondary	17,666	19,000	14,400	11,045	12,000
Zirconium: Zircon concentrate, gross weight[8]	3,410	6,000	4,966	13,790	13,000
NONMETALS					
Asbestos:					
Crude ore	2,602,501	1,992,766	2,092,087	2,090,472	2,000,000
Fiber	170,403	138,417	145,998	158,855	131,000
Barite:					
Crude	108,015	178,895	98,931	69,341	75,000
Beneficiated	62,085	98,804	122,219	100,106	125,000
Marketable product[4]	104,752	116,340	120,000	118,000	150,000
Calcite	41,842	30,912	72,507	48,993	50,000
Cement, hydraulic thousand tons	27,193	26,051	25,644	20,870	25,000
Clays:					
Bentonite	247,954	166,338	164,060	128,691	135,000
Kaolin:					
Crude	1,156,447	1,063,480	1,243,520	1,241,252	1,250,000
Beneficiated	410,197	469,757	493,186	420,120	450,000
Marketable product[4]	477,858	556,753	550,000	[e]490,000	500,000
Other:					
Crude thousand tons	5,582	21,601	22,160	21,784	22,000
Beneficiated do.	1,656	2,229	1,442	1,034	1,100
Diamond:[e]					
Gem thousand carats	253	163	80	100	220
Industrial do.	414	926	450	450	330
Total[9] do.	667	1,089	530	550	550
Diatomite:					
Crude	12,963	13,202	106,581	22,431	22,000
Beneficiated	10,807	8,858	13,131	8,663	8,500
Marketable product[4]	14,828	8,973	13,146	[e]16,000	NA

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Feldspar and related materials:					
Feldspar, marketable product[4]	123,263	118,407	131,853	[e]150,000	NA
Leucite, marketable product[4]	6,796	536	209	3,588	NA
Sodalite, crude, marketable product	561,875	859,125	[e]400	[e]500,000	NA
Total	691,934	978,068	132,462	[r] [e]653,588	NA
Fluorspar:					
Crude	86,347	174,665	201,971	239,522	240,000
Concentrates, marketable product:					
Acid-grade	32,729	36,226	32,000	43,000	45,000
Metallurgical-grade	22,640	17,403	19,000	26,000	27,000
Total	55,369	53,629	51,000	69,000	72,000
Graphite:					
Crude	234,883	464,089	359,991	442,810	445,000
Marketable product:					
Direct-shipping crude ore	6,000	16,318	6,131	NA	NA
Concentrate	21,294	17,499	15,413	16,498	18,000
Total	27,294	33,817	21,544	NA	NA
Gypsum and anhydrite, crude	[r]545,501	[r]597,461	680,800	555,907	556,000
Kyanite:					
Crude	18,296	[r]2,155	1,076	735	700
Marketable products[4]	[r]4,056	1,590	423	429	500
Lime, hydrated and quicklime[e] ---- thousand tons	4,810	5,000	5,000	5,000	NA
Lithium mineral concentrates:					
Amblygonite	182	277	66	113	120
Lepidolite	51	2	74	1	5
Petalite	2,487	2,080	2,293	1,892	2,000
Spodumene	98	243	341	116	120
Total	2,818	2,602	2,774	2,122	2,245
Magnesite:					
Crude	788,365	618,251	505,385	486,374	500,000
Beneficiated	315,851	285,792	225,533	231,000	235,000
Mica, all grades[10]	4,817	[r]787	878	3,595	3,500
Nitrogen: N content of ammonia	351,600	375,700	503,200	738,100	750,000
Phosphate rock including apatite:					
Crude:					
Mine product ---- thousand tons	16,533	16,441	25,070	19,898	23,900
Of which, sold directly ---- do	50	53	7,395	NA	NA
Concentrate:					
Gross weight ---- do	[r]2,562	[r]2,658	2,767	3,208	3,855
P_2O_5 content ---- do	[r]1,489	[r]1,083	887	1,069	1,345
Pigments, mineral: Other, crude	6,465	4,153	5,272	[e]6,000	6,000
Precious and semiprecious stones except diamond, crude and worked:[10]					
Agate ---- kilograms	1,738,890	1,424,381	1,038,287	966,095	NA
Amethyst ---- do	310,594	234,198	195,502	244,269	NA
Aquamarine ---- do	6,739	3,807	24,479	4,727	NA
Cat's-eye ---- do	--	30	NA	2	NA
Citrine ---- do	62,971	52,094	29,760	30,572	NA
Emerald ---- do	9,126	10,538	7,646	9,640	NA
Garnet ---- do	54	2	16	241	NA
Opal ---- do	2,169	103	46	48	NA
Ruby ---- value	--	--	NA	$17,868	NA
Sapphire ---- do	--	--	NA	$9,814	NA
Topaz ---- kilograms	7,189	4,011	3,631	3,822	NA
Tourmaline ---- do	3,938	4,319	2,669	12,498	NA
Turquoise ---- value	NA	NA	--	$1,051	NA
Other ---- kilograms	292,677	249,660	188,674	620,796	NA
Quartz crystal, all grades[10]	5,753	5,154	7,421	9,681	10,000
Salt:					
Marine ---- thousand tons	3,042	2,766	2,888	3,259	3,300
Rock ---- do	796	839	836	928	950
Silica (silex)	10,245	4,517	7,978	2,200	2,500
Sodium compounds:					
Caustic soda	691,000	759,000	760,000	728,000	750,000
Soda ash, manufactured (barilla)	176,000	188,000	199,000	210,000	190,000
Stone, sand and gravel:					
Dimension stone:					
Marble, rough-cut ---- cubic meters	[r]67,844	[r]66,839	122,114	141,380	NA
Slate	7,679	19,464	4,411	98,009	NA
Crushed and broken stone:					
Basalt ---- cubic meters	483,617	438,391	329,564	153,733	NA

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone, sand and gravel —Continued					
Crushed and broken stone —Continued					
Calcareous shells	1,244,464	1,212,252	1,328,960	1,214,171	NA
Dolomite thousand tons	1,354	1,961	1,954	1,714	NA
Gneiss cubic meters	434,001	218,025	249,798	190,563	NA
Granite thousand cubic meters	47,032	49,225	43,720	35,261	NA
Limestone thousand tons	50,170	52,066	49,027	44,918	50,625
Quartz[11]	133,068	144,707	67,527	83,590	NA
Quartzite:					
Crude	245,592	795,104	636,797	250,352	NA
Processed	139,282	122,700	102,826	93,246	NA
Sand thousand cubic meters	22,014	35,876	40,088	24,450	NA
Sulfur:					
Frasch thousand tons	--	--	--	1	1
Pyrites do	25	44	54	55	55
Byproduct:					
Metallurgy do	--	17	30	150	150
Petroleum do	131	102	100	110	110
Total do	156	163	184	316	316
Talc and related materials:					
Talc, marketable product[4]	338,450	325,191	328,644	NA	NA
Pyrophyllite, marketable product[4]	74,606	178,464	76,624	NA	NA
Other: Agalmatolite, marketable product	131,034	49,147	63,068	NA	NA
Vermiculite:					
Crude	35,466	77,997	43,316	42,337	45,000
Marketable product[4]	12,181	14,307	14,059	[e]15,000	15,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous, marketable[4] thousand tons	8,300	5,300	6,200	6,270	[3]7,153
Coke, metallurgical, all types do	4,049	5,700	NA	NA	NA
Gas, natural:					
Gross million cubic feet	77,868	88,286	106,968	141,700	[3]173,119
Marketed do	[e]50,000	NA	NA	NA	NA
Natural gas liquids thousand 42-gallon barrels	2,063	2,426	2,950	[e]3,700	4,000
Petroleum:					
Crude do	68,496	77,895	94,738	123,700	[3]169,031
Refinery products:					
Gasoline do	68,301	71,100	74,539	64,300	69,999
Jet fuel do	20,278	23,360	19,975	17,600	18,000
Kerosine do	4,095	NA	4,024	4,500	5,000
Distillate fuel oil do	121,846	216,502	122,105	113,900	126,784
Residual fuel oil do	105,392	NA	89,397	80,300	90,000
Lubricants do	4,233	3,755	4,801	4,800	5,500
Other do	69,692	NA	NA	NA	NA
Refinery fuel and losses do	11,252	NA	NA	NA	NA
Total do	405,089	NA	NA	NA	NA

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

[1]Table includes data available through Sept. 7, 1984.

[2]In addition to the commodities listed, bismuth, molybdenite, 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]Direct sales and beneficiated.

[5]Officially reported figures are as follows, in troy ounces: major mines: 1980—131,432; 1981—140,691; 1982—148,408; 1983—199,206; and 1984—not available. Small mines (garimpos): 1980—310,704; 1981—414,744; 1982—671,982; 1983—1,526,775; and 1984—not available.

[6]Includes sponge iron as follows, in thousand metric tons: 1980—275; 1981—226; 1982—226 (estimated); 1983—255 (estimated); and 1984—246 (estimated).

[7]Partially revised officially reported output; of total production, the following quantities are identified as placer silver (the balance being silver content of other ores and concentrates), in thousand troy ounces: 1980—47; 1981—144; 1982—123; 1983—247; and 1984—not available.

[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 thousand carats: 1980—158; 1981—136; 1982—not available; 1983—not available; and 1984—not available.

[10]Exports.

[11]Apparently includes crude quartz used to produce quartz crystal (listed separately in this table) as well as additional quantities of common quartz.

TRADE

Brazil recorded a record high overall trade surplus of approximately $13.1 billion, which was double the surplus of 1983. Much of the increased surplus was due to the increase in domestic petroleum production, which satisfied 60% of the domestic demand. The metallic mineral exports totaled $1.63 billion, which comprised approximately 6% of the total export value. Of the metallic mineral export total, iron ore comprised 65% based on 87.2 million tons exported.

Coal accounted for approximately 91% of mineral sales by the United States to Brazil. In 1983, the United States exported 92 commodities to Brazil, while the number decreased to 43 in 1984. In 1983, the United States supplied Brazil with 79% of its mining equipment imports. In 1984, the U.S. share decreased to 57%.

Brazil was the principal source to the United States for columbium and industrial quartz crystal. In addition, Brazil also supplied the United States with beryllium, silicon, and tantalum.

CPRM plans to expand markets in Latin America, northern Africa, southern Africa, and the Middle East in 1985. The company is forming joint ventures in Algeria, Colombia, Iraq, Libya, Mexico, Morocco, Mozambique, Nicaragua, Paraguay, Peru, Tanzania, and Uruguay.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	2,991	3,989	853	Canada 1,554; Venezuela 1,121.
Oxides and hydroxides	4,939	7,102	--	Argentina 6,631; Paraguay 377.
Metal including alloys:				
Unwrought	3,676	116,325	14,506	Japan 88,026; Taiwan 9,511.
Semimanufactures	8,451	38,324	7,846	Japan 8,335; Saudi Arabia 5,495.
Antimony: Oxides	4	56	--	All to West Germany.
Beryllium: Ore and concentrate	1,063	943	943	
Chromium:				
Ore and concentrate	240	--		
Oxides and hydroxides kilograms	50	100	--	All to Paraguay.
Metal including alloys, all forms	3	10	--	Mainly to Argentina.
Cobalt: Metal including alloys, all forms	7	34	17	Netherlands 17.
Columbium and tantalum: Ore and concentrate	167	129	76	Netherlands 48.
Copper:				
Matte and speiss including cement copper	700	246	--	All to Belgium-Luxembourg.
Metal including alloys:				
Unwrought	9	21	18	Argentina 3.
Semimanufactures	10,016	16,042	13,334	Canada 512; Colombia 403.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	--	6	6	
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	80,927	74,200	1,568	Japan 25,823; West Germany 12,680; Romania 3,910.
Metal:				
Pig iron, cast iron, related materials	r679,265	1,803,332	185,066	China 395,724; Japan 266,481.
Ferroalloys:				
Ferrochromium	51,770	38,048	9,900	Japan 27,200; Argentina 717.
Ferrocolumbium	11,036	9,256	1,964	Netherlands 1,880; Japan 1,742.
Ferromanganese	26,435	49,511	37,000	Japan 5,000; Turkey 3,000.
Ferromolybdenum	33	1	--	All to Bolivia.
Ferronickel	1,529	15,494	2,662	West Germany 7,546; Sweden 3,688.
Ferrosilicomanganese	59,301	123,708	47,049	Japan 62,376; China 6,850.
Ferrosilicon	64,518	111,846	37,205	Japan 68,268; China 1,690.
Ferrotungsten	60	222	--	Japan 140; Netherlands 70; Argentina 12.
Silicon	11,827	14,486	5,362	Japan 8,207; West Germany 101.
Unspecified	r7,784	7,538	5,459	Japan 450; Netherlands 447.
Steel, primary forms	224,131	465,467	31,331	Nigeria 52,315; Taiwan 41,245; Saudi Arabia 40,000.

See footnotes at end of table.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	627,422	1,430,204	170,397	Saudi Arabia 194,056; China 158,659.
Universals, plates, sheets	1,301,758	2,955,593	907,173	Iran 500,608; Japan 367,527; China 310,144.
Hoop and strip	14,128	22,001	2,143	West Germany 11,919; Singapore 1,501.
Rails and accessories	1,884	240	--	Paraguay 141; Netherlands 82.
Wire	18,755	35,166	15,012	Nigeria 5,998; Panama 2,463.
Tubes, pipes, fittings	172,383	229,479	170,091	Colombia 8,375; Venezuela 5,584.
Castings and forgings, rough	1,772	4,614	1,649	Belgium-Luxembourg 1,777; Bahamas 500.
Lead:				
Oxides kilograms	--	105	--	All to Bolivia.
Metal including alloys, all forms	6	31	1	Paraguay 24; Ecuador 3.
Lithium:				
Ore and concentrate	2,347	17	--	All to Italy.
Oxides and hydroxides kilograms	2,018	5	--	All to Argentina.
Magnesium: Metal including alloys, semimanufactures do.	--	152	--	All to Paraguay.
Manganese:				
Ore and concentrate, metallurgical-grade	990,052	747,436	79,863	United Kingdom 116,400; Czechoslovakia 108,175.
Oxides	3,045	1,884	--	Argentina 966; Colombia 400; Mexico 247.
Metal including alloys, all forms kilograms	498	10	--	All to Iraq.
Molybdenum: Metal including alloys, all forms do.	46	152	--	Turkey 81; Chile 71.
Nickel: Metal including alloys:				
Unwrought	52	45	(2)	Argentina 32; United Kingdom 13.
Semimanufactures	42	36	4	Argentina 29; Colombia 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, platinum troy ounces	38,774	6	--	All to Argentina.
Silver: Metal including alloys, unwrought and partly wrought do.	29,579	51,763	3,344	West Germany 48,323.
Tin: Metal including alloys:				
Unwrought	4,346	8,820	5,887	Italy 1,310; Hungary 619.
Semimanufactures	63	1	(2)	Mainly to Uruguay.
Titanium:				
Oxides kilograms	4,500	350	--	Paraguay 300; Uruguay 50.
Metal including alloys, semimanufactures do.	160	--		
Tungsten:				
Ore and concentrate	1,860	1,482	237	West Germany 765; Netherlands 250.
Metal including alloys, all forms	1	1	--	Mainly to Mexico.
Zinc:				
Oxides	(2)	27	--	Mainly to Chile.
Metal including alloys:				
Unwrought	2,500	20	--	All to Bolivia.
Semimanufactures	18	25	--	Paraguay 24.
Other:				
Ashes and residues	436	1,979	183	Japan 946; United Kingdom 322; Norway 190.
Base metals including alloys, all forms	r8	15	9	Netherlands 6.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc kilograms	1,334	2,038	100	Bolivia 1,509; Paraguay 400.
Artificial:				
Corundum	10,343	18,576	4,498	Argentina 4,609; Japan 3,458.
Silicon carbide	691	5,575	951	Japan 3,799; Singapore 158.
Grinding and polishing wheels and stones	1,402	877	359	Chile 101; Hong Kong 86.
Asbestos, crude	7,022	11,750	--	Argentina 4,205; Mexico 2,836; India 2,690.
Barite and witherite	19,730	6,300	--	All to Venezuela.
Cement	10,524	19,553	--	Paraguay 15,824; Bolivia 1,839.
Chalk	--	10	--	All to Venezuela.
Clays:				
Bentonite	180	1,890	--	Oman 1,875; Paraguay 15.
Kaolin	175,121	181,555	--	Belgium-Luxembourg 94,011; Japan 38,817; Italy 31,006.
Unspecified	901	573	--	Uruguay 350; Argentina 190.

See footnotes at end of table.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung ---- carats--	18,160	23,305	1,490	West Germany 21,530.
Industrial stones --------do----	200	--		
Dust and powder --------do----	200	--		
Feldspar --------------------	5	4,000	--	All to Italy.
Fertilizer materials: Manufactured:				
Ammonia ----------------	136	125,191	--	Mozambique 27,000; Italy 23,000; France 18,000.
Nitrogenous ----------------	2,010	142,414	31,864	China 50,000; Taiwan 25,000.
Phosphatic ----------------	6,766	7,624	--	Argentina 4,220; Paraguay 2,104; Uruguay 1,300.
Potassic ------------------	195	953	--	Argentina 521; Uruguay 397; Paraguay 35.
Unspecified and mixed ---------	23,827	115,214	11,400	Italy 57,500; Argentina 26,394.
Graphite, natural --------------	5,396	5,578	3,437	Japan 735; Republic of South Africa 578.
Gypsum and plaster -------------	112	54	--	Paraguay 50; Mozambique 3.
Lime -----------------------	5,624	3,665	--	Paraguay 3,621; Bolivia 44.
Magnesium compounds:				
Magnesite ------------------	--	4	--	Argentina 2; Uruguay 2.
Oxides and hydroxides ---------	95,808	73,735	6,000	Poland 45,691; Argentina 12,023.
Other ---------------------	--	67	--	Argentina 49; Paraguay 15.
Meerschaum, amber, jet ----------	457	--		
Mica: Crude including splittings and waste -------------------	1,078	3,407	408	United Kingdom 1,402; West Germany 798.
Pigments, mineral:				
Natural, crude --------------	--	12	--	All to Bolivia.
Iron oxides and hydroxides, processed	404	352	102	Paraguay 79; Chile 56.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands--	$38,420	$23,905	$8,879	Japan $5,156; West Germany $4,060.
Synthetic ------------do----	$3	$23	--	All to Japan.
Salt and brine ----------------	186,180	243,224	144,800	Uruguay 73,499; Paraguay 15,454.
Sodium compounds, n.e.s.:				
Carbonate, manufactured --------	r22	7	--	Bolivia 4; Paraguay 2.
Sulfate, manufactured ---------	42	2	--	All to Paraguay.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked -----	75,917	101,556	133	Italy 72,876; Japan 15,484.
Worked ----------------	9,058	7,671	4,482	Japan 1,663; Paraguay 531.
Dolomite, chiefly refractory-grade --	250	646	--	Argentina 610; Uruguay 36.
Gravel and crushed rock --------	13,525	2,634	--	Bolivia 2,557; Argentina 55.
Limestone other than dimension ---	1,060	1,026	--	All to Paraguay.
Quartz and quartzite ----------	7,579	10,226	109	West Germany 5,903; Belgium-Luxembourg 2,069.
Sand other than metal-bearing ----	4,275	5,675	--	Argentina 2,227; Colombia 1,931; Bolivia 763.
Sulfur:				
Elemental, all forms -----------	20	34	--	Mainly to Uruguay.
Sulfuric acid ---------------	161	292	--	Argentina 200; Bolivia 81.
Talc, steatite, soapstone, pyrophyllite --	99	1,295	75	Venezuela 951; Paraguay 91.
Vermiculite -----------------	1,502	999	981	Australia 18.
Other:				
Crude -------------------	r153	199	--	Liberia 89; Argentina 68; Bolivia 35.
Slag and dross, not metal-bearing ---	101	200	--	All to Argentina.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural -------	600	--		
Carbon: Carbon black ------------	617	469	--	Costa Rica 212; Angola 90; Chile 84.
Coal: Anthracite ---------------	560	717	--	Argentina 625; Paraguay 92.
Coke and semicoke --------------	--	28	--	All to Paraguay .
Petroleum:				
Crude- thousand 42-gallon barrels--	7,955	370	370	
Refinery products:				
Liquefied petroleum gas do----	356	493	--	Paraguay 224; Suriname 124; Japan 104.
Gasoline ---------do----	9,612	18,956	14,979	Zaire 787; Mozambique 581.
Mineral jelly and wax --do----	199	284	103	Mexico 69; Colombia 24.
Kerosine and jet fuel ---do----	4,786	4,296	377	Zaire 1,356; Italy 803.
Distillate fuel oil -----do----	7,635	5,022	--	Zaire 2,070; Mozambique 1,085.
Lubricants ---------do----	682	1,068	56	Mexico 599; Zaire 138.
Nonlubricating oils ----do----	79	69	--	Mexico 35; Taiwan 24; Japan 9.
Residual fuel oil ------do----	9,573	20,109	19,103	United Kingdom 579.

rRevised.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

Table 3.—Brazil: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	8,598	5,020	2,500	Guyana 2,500.
Oxides and hydroxides	86,995	202,824	55,280	Netherlands 66,292; Jamaica 44,611.
Metal including alloys:				
Scrap	3,750	4,128	187	Italy 3,941.
Unwrought	10,766	2,958	48	Argentina 935; Norway 698; Italy 432.
Semimanufactures	2,783	1,330	580	West Germany 249; Japan 192.
Beryllium: Metal including alloys, all forms value, thousands	$3	$1	--	All from West Germany.
Chromium:				
Ore and concentrate	4,381	5,897	4,210	Republic of South Africa 1,683.
Oxides and hydroxides	40	50	([2])	United Kingdom 18; Poland 16.
Cobalt: Oxides and hydroxides	21	21	13	West Germany 4.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$100	$83	$74	West Germany $6.
Copper:				
Ore and concentrate	10,544	89,159	--	All from Chile.
Metal including alloys:				
Scrap	1,437	441	--	Mainly from Chile.
Unwrought	204,748	56,442	47	Chile 37,649; Peru 7,971; Bahamas 3,835.
Semimanufactures	1,803	1,957	1,023	West Germany 246; United Kingdom 242.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	12	14	8	Switzerland 5.
Metal:				
Scrap	7,186	--		
Pig iron, cast iron, related materials	r58,885	4,840	2,182	West Germany 972; Canada 833.
Ferroalloys	1,228	520	31	Belgium-Luxembourg 188; Republic of South Africa 181.
Steel, primary forms	214,019	6,813	3	West Germany 6,284; France 268; Japan 216.
Semimanufactures:				
Bars, rods, angles, shapes, sections	26,049	15,175	590	United Kingdom 7,929; West Germany 3,437.
Universals, plates, sheets	122,451	30,775	681	France 11,772; Japan 8,421.
Hoop and strip	4,339	4,430	1,114	West Germany 2,228; United Kingdom 375.
Rails and accessories	27,488	19,688	816	Japan 13,493; Belgium-Luxembourg 5,010.
Wire	1,679	1,509	87	Italy 952; Japan 277.
Tubes, pipes, fittings	24,172	5,487	717	France 1,476; West Germany 1,420.
Castings and forgings, rough	225	79	2	West Germany 64; Italy 10.
Lead:				
Ore and concentrate	--	6,591	1,295	Ireland 3,007; Peru 2,288.
Oxides	335	488	5	Mexico 283; Peru 200.
Metal including alloys:				
Scrap	--	2,849	2,849	
Unwrought	669	649	--	All from Mexico.
Magnesium: Metal including alloys:				
Scrap	582	183	--	Netherlands 71; Republic of South Africa 71.
Unwrought	5,583	6,191	4,005	Norway 2,186.
Manganese:				
Ore and concentrate, metallurgical-grade	11,324	19,206	7,800	Gabon 6,000; Mexico 3,913.
Oxides	13	54	52	Belgium-Luxembourg 1.
Mercury 76-pound flasks	3,655	2,669	116	Mexico 2,494; China 58.
Molybdenum: Metal including alloys, all forms	42	41	14	Netherlands 12; West Germany 9.
Nickel:				
Matte and speiss value, thousands	$145	$28	$18	West Germany $10.
Metal including alloys:				
Scrap	50	--		
Unwrought	1,735	174	104	Norway 44; Canada 13.
Semimanufactures	556	177	43	West Germany 81; France 20.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2,014	$2,566	$184	West Germany $1,880; Japan $267.
Silver: Metal including alloys, unwrought and partly wrought do	$23,013	$38,433	$903	Peru $29,660; Mexico $7,505.
Tin: Metal including alloys, semimanufactures	15	9	([2])	Netherlands 5; West Germany 4.
Titanium: Oxides	1,843	1,475	45	West Germany 597; France 471.

See footnotes at end of table.

Table 3.—Brazil: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Tungsten:				
Ore and concentrate	1,303	1,465	41	Chile 1,423.
Metal including alloys, all forms	36	80	12	Netherlands 40; West Germany 15.
Zinc:				
Ore and concentrate	55,672	58,695	8,173	Peru 45,068; Canada 2,754.
Oxides	494	288	8	Netherlands 174; West Germany 77.
Blue powder	3	17	15	West Germany 2.
Metal including alloys:				
Unwrought	7,403	3,599	1	Mexico 3,180; Zaire 189.
Semimanufactures	91	14	--	Belgium-Luxembourg 12.
Other:				
Ores and concentrates	r68,579	30,009	2,085	Australia 22,399; Thailand 486.
Ashes and residues	1,236	3,692	3,692	
Base metals including alloys, all forms	2,130	2,742	454	Republic of South Africa 879; West Germany 301.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	198	707	142	Italy 503; West Germany 41.
Artificial: Corundum	248	151	11	France 56; Japan 44.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$2,744	$3,883	$3,000	Ireland $621; West Germany $219.
Grinding and polishing wheels and stones	198	114	49	West Germany 44; United Kingdom 5.
Asbestos, crude	13,193	7,772	67	Canada 6,015; Italy 1,186.
Barite and witherite	60	44	--	West Germany 30; Switzerland 14.
Boron materials:				
Crude natural borates	7,332	5,964	--	Peru 3,554; Argentina 2,410.
Oxides and acids	4,082	2,993	360	Argentina 2,281; France 155.
Cement	21,274	2,399	1,237	France 680; Argentina 300.
Chalk	94	49	--	All from France.
Clays, crude	11,914	12,934	7,585	Argentina 4,794; France 406.
Cryolite and chiolite	31	21	--	Denmark 20; West Germany 1.
Diamond:				
Gem, not set or strung value, thousands	$1,598	$691	--	Israel $368; Belgium-Luxembourg $170.
Industrial stones do	$808	$509	$433	West Germany $40; Ireland $36.
Diatomite and other infusorial earth	1,829	2,217	1,132	Mexico 765; West Germany 263.
Feldspar, fluorspar, related materials	--	5	--	All from West Germany.
Fertilizer materials: Manufactured:				
Ammonia	57,007	16,000	(2)	Mainly from U.S.S.R.
Nitrogenous	881,420	429,342	272,131	Netherlands 85,725; West Germany 42,071.
Phosphatic	106,931	1,325	--	Uruguay 1,250; Netherlands 75.
Potassic	1,493,776	1,216,753	14,822	East Germany 685,710; Canada 309,296.
Unspecified and mixed	156,893	86,500	43	Chile 86,447.
Graphite, natural	42	2	(2)	West Germany 1.
Gypsum and plaster	801	1	1	
Lime	40	71	--	All from Belgium-Luxembourg.
Magnesite	1,447	697	502	West Germany 184.
Mica:				
Crude including splittings and waste	76	109	--	All from Canada.
Worked including agglomerated splittings	61	43	12	France 12; Belgium-Luxembourg 9.
Nitrates, crude	15,580	9,667	--	All from Chile.
Phosphates, crude	234,643	5	5	
Pigments, mineral: Iron oxides and hydroxides, processed	1,531	1,328	154	West Germany 1,130; Spain 42.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$309	$37	$28	Israel $5; Switzerland $4.
Synthetic do	$32	$19	--	Switzerland $16.
Pyrite, unroasted	90	31	31	
Sodium compounds, n.e.s.:				
Carbonate, manufactured	117,655	70,224	52,596	France 11,879; Belgium-Luxembourg 2,002.
Sulfate, manufactured	106,576	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7	--		
Worked	6	6	--	All from Portugal.

See footnotes at end of table.

Table 3.—Brazil: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	2,280	1,419	--	Italy 1,418.
Gravel and crushed rock	209	--		
Quartz and quartzite	14	35	11	Switzerland 20.
Sand other than metal-bearing	510	490	40	Argentina 450.
Sulfur:				
Elemental:				
Crude including native and byproduct	882,540	953,789	108,106	Canada 492,688; Poland 313,446.
Colloidal, precipitated, sublimed	479	537	525	West Germany 8.
Sulfuric acid	97,256	54,134	3	Spain 36,157; Sweden 11,533.
Talc, steatite, soapstone, pyrophyllite	35	36	25	France 5; Norway 5.
Other:				
Crude	6,372	10,159	61	Argentina 8,662; Australia 1,211.
Slag and dross, not metal-bearing	14,092	27,414	--	Republic of South Africa 26,218; West Germany 1,192.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	405	139	95	Argentina 44.
Carbon: Carbon black	3,656	3,049	814	West Germany 1,156; Japan 374.
Coal: All grades excluding briquets thousand tons	4,361	6,295	3,295	Poland 1,800; Australia 432.
Coke and semicoke	126,044	220,531	([2])	Japan 105,000; West Germany 89,874; Poland 25,157.
Petroleum:				
Crude thousand 42-gallon barrels	290,888	267,243	--	Saudi Arabia 72,694; Iraq 65,820; Venezuela 23,246.
Refinery products:				
Liquefied petroleum gas do	7,726	5,873	254	Saudi Arabia 2,679; Angola 1,100; Algeria 833.
Gasoline do	783	965	105	Netherlands Antilles 592; Italy 158.
Distillate fuel oil do	1,795	1,706	([2])	Argentina 718; Mexico 438; Venezuela 297.
Lubricants do	298	159	28	Romania 111; Netherlands Antilles 17.
Nonlubricating oils do	82	81	([2])	Mainly from Romania.
Residual fuel oil do	10,859	4,128	282	Venezuela 1,073; Kuwait 1,010; Argentina 711.
Petroleum coke do	385	105	83	Japan 11; United Kingdom 11.

[r]Revised. NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Alumina, Aluminum, and Bauxite.—Aluminum production reached 457,000 tons, approximately 3% greater than that of 1983. Brazil exported approximately 222,000 tons of aluminum, valued at $323.65 million. This was an increase in value of 18% over that of 1983.

In August 1984, the Alumínio do Maranhão S.A. complex was inaugurated at São Luis, Maranhão. The first stage of production is to reach 500,000 tons of alumina and 100,000 tons of aluminum per year in 1985. The second stage planned for 1986 will have an annual production level of 3 million tons of alumina and 245,000 tons of aluminum.

Reynolds Metals, Co. (United States) proposed doubling of capacity of the Vale do Sul Alumínio S.A. (VALESUL) smelter to 180,000 tons per year at a cost of $180 million. Reynolds is a 4% shareholder in VALESUL with CVRD (51%) and Shell do Brasil S.A. (45%).

In January 1984, The Hanna Mining Co. Inc. of the United States agreed to sell its minority interest in Alcoa Alumínio do Brasil S.A. to joint owner Aluminum Co. of America (United States) for $55 million. Hanna received $35 million in payment in August with the remaining $20 million of the purchase price to be paid over a 4-year period.

Toward yearend, the consortium of Alumínio Brasileiro S.A. and Alumina do Norte do Brasil S.A. (ALUNORTE) was dissolved, with ALUNORTE concentrating solely on alumina production. When completed, ALUNORTE will have a capacity of 800,000 tons per year and will have required an investment of about $700 million. Nippon Amazon Aluminum Co. (NALCO) by yearend was considering pulling out of the ALUNORTE project. ALUNORTE officials expected a final decision by the Japanese no later than September 1985. NALCO is comprised of 33 Japanese firms headed by the Export-Import Bank of Japan and has a 49% share in the project. ALUNORTE stated that the project ultimately will produce 800,000 tons per year, with or without Japanese participation.

A Brazilian group, Indústrias Quimicas Cataguazes and CVRD were analyzing a bauxite deposit at Cataguazes, Minas Gerais, at yearend. This deposit has indicated reserves of approximately 39 million tons of excellent-grade bauxite. In the same region, Cia. Brasileira de Alumínio and the Aluminum Co. of Canada have measured reserves of 45 million tons of the same grade bauxite. CVRD discovered a bauxite deposit with measured reserves of 50 million tons located at kilometer 350 on the Carajás-Itaqui Railroad. The deposit is an extension of the Paragomina, Pará, bauxite reserves.

Total Brazilian bauxite reserves at yearend were determined to be approximately 4.5 billion tons, of which 2.4 billion tons was in the Carajás region. This ranked Brazil third in the world after New Guinea and Australia for major bauxite reserves.

Cobalt.—Cia. Níquel Tocantins announced plans to begin cobalt production in 1985. Brazil is totally dependent on imported cobalt, and from January through August 1984, imported 170 tons valued at $2.7 million. In Brazil, cobalt is always found in association with manganese and nickel in the States of Goiás, where Tocantins has nickel reserves, and in Bahia, Minas Gerais, Amazonas, and Rondônia.

Columbium.—Cia. Brasileira de Metalurgia e Mineração (CBMM), the world's largest producer of ferrocolumbium and columbium oxide, produced 13,500 tons of contained columbium in ferrocolumbium and 680 tons of columbium in columbium oxide.

A major columbium ore deposit was discovered in the Amazonas region, about 100 kilometers from the Venezuelan border. The discovery, made in the township of São Gabriel do Cachoeira, is estimated to have added approximately 2.9 million tons to Brazil's existing 4.6 million tons of reserves of the metal. This figure constitutes about 95% of the Western World's reserves. CPRM is expected to invest about $1.12 million to develop the project, known as Uapes. The ore grades, on average, 2.81% pyrochlore.

CBMM completed a $200 million deal with the U.S.S.R. to export 200 tons per year of columbium oxide. The last Brazilian exports to the U.S.S.R. were made in 1981 with a shipment of 40 tons. Brazil's largest importer of columbium in 1984 was the United States with 1,000 tons.

Copper.—The failure of Brazil to reach its production target of 115,000 tons in 1984 meant that the shortfall had to be imported. Because of shutdowns, owing to problems at the smelter and at the sulfuric acid plant, production was reduced to about 97,500 tons. CVRD plans to start producing 16,000 tons annually of copper and zinc from reserves at Pojuco in the Carajás region in 1985.

In 1984, Brazil's third copper mine began production. The Pedra Verde Mine, at Viçosa do Ceará, 370 kilometers northeast of Fortaleza, Ceará, is operated by Guanordeste Mineração e Cómercio Ltda. The small mine should reach a production level of 80 tons per month of contained copper. An additional 16 copper deposits are known in Brazil with the deposits at Salobo, Mara Rosa, Caraíba, and Camaqua accounting for 90% of the total reserves. At yearend, the reserves were estimated at about 12.6 million tons of contained copper with the Salobo 3A deposit at Carajás comprising 73% of the total.

CVRD was negotiating the transfer of mining technology for the Salobo copper deposit, 60 kilometers northeast of the Carajás railhead, with the U.S.S.R. state company, Stuet-Pramet-Export.

Gold.—The 1984 gold production figures were very problematical. Much of the domestic production never found its way into the official gold market. Production from Serra Pelada diminished to a little over 64,302 troy ounces, because it was closed from November 1983 to September 1984. The two reasons for the closing were to implement earth-leveling safety procedures and the awaiting of new legislation, which would allow the garimpeiros (small miners) to continue for another 3 years at the site.

In June 1984, Mineração Morro Velho S.A. celebrated its 150th anniversary. The mining company, controlled by Bozanno Simonsen (51%) and Anglo American Corp. of South Africa Ltd. (49%), reported production of 183,259 troy ounces of gold.

CVRD commenced production at its Araci gold deposit in the State of Bahia. The company is utilizing for the first time in Brazil the heap-leaching recovery technique on ore recovered from the weathered portion of the ore body. Production for the year reached 100 kilograms. CVRD forecasted production of 500 kilograms of gold per year to the end of the decade, when additional investment and development will become necessary.

The South African group General Mining Union Corp. Ltd. formed an association with Amira Trading S.A. for the development of its gold property at São Bento, Minas Gerais. The deposit is estimated to contain reserves of 6 million tons of ore grading 11 grams of gold per ton. Brazil's measured gold reserves were reported by DNPM to be 11.4 million troy ounces of contained gold.

Iron Ore.—Iron ore production showed a slight increase to 90 million tons, with mineral income from iron ore exports continuing in the number one position. Brazil exported a total of approximately 87 million tons of iron ore to 33 countries. This exceeded the 1983 figure by 13 million tons. The iron ore export receipts were $1.6 billion, which exceeded the 1983 figure by $146 million. The top five exporting companies were as follows: CVRD, 65.7%; Minerações Brasileiras Reunidas S.A., 13.7%; Ferteco Mineração S.A., 8.8%; Samarco Mineração S.A., 7.9%; and S.A. Mineração da Trinidade, 2.8%. The four major export markets for Brazilian iron ore were Japan, $504.9 million; the Federal Republic of Germany, $280.7 million; Italy, $112.8 million; and France, $12.2 million.

The Carajás iron ore project was, with the completion of the 890-kilometer railroad to São Luiz, inaugurated in February. The iron ore pilot plant went into operation in August with a capacity of 80,000 tons per month. CVRD expected to reach maximum capacity production of 35 million tons per year by 1990, with contract sales already negotiated for 28 million tons per year. At yearend 1984, the total Carajás iron ore reserves were estimated at approximately 17.8 billion tons grading 66% iron, which included 2.5 billion tons in the proven category. An initial investment of $5.1 billion to bring Carajás on-stream was reduced to $3.5 billion. This was attained by a reduction in the size and amount of mining and metallurgical equipment necessary to initiate production.

Nippon Steel Corp. of Japan signed a contract for 2 million tons per year of Carajás iron ore to be delivered over a 10-year period commencing in 1986. CVRD confirmed that China was interested in becoming involved in the Timbopeba iron mine, which was inaugurated in June 1984. Production forecasts point to a level of 7.5 million tons annually by 1985.

Steel.—Brazil's steel sector utilized 90% of its capacity and increased crude steel production by about 9% to approximately 16 million tons. This production figure placed Brazil eighth in the Western World. Despite important restrictions imposed on Brazilian steel exports by the United States, a 25% increase was achieved. Brazil exported 6.5 million tons of steel valued at $1.71 billion in 1984. Exports in the form of manufactured products alone rose 60%, while domestic consumption of all steel products rose 15%.

Manganese.—The manganese production of 1.9 million tons almost matched the figure for 1983. Indústria e Comércio de Minérios S.A. (ICOMI) continued to be the largest producer. CVRD continued to increase its production of electrolytic manganese from the Igarape Azul Mine in the Carajás region. The Igarape Azul deposit contains estimated reserves of 65 million tons including 11 million tons of 42% manganese.

CVRD began experimenting with manganese ores from the Corumbá mineral province, Mato Grosso, and the Carajás region. They blended Corumbá ore, rich in iron, sodium, and potassium, with Carajás ore, rich in alumina, in an effort to find a product that would be viable on the domestic market.

Bethlehem Steel Corp. of the United States, a partner for 35 years in the Serra do Navio Amapa joint venture, sold its 49% interest for $12 million to Cia. Auxiliar de Empresas de Mineração (CAEMI). The mine is now under the control of ICOMI, a subsidiary of CAEMI.

Nickel.—Metallic nickel content of ferronickel production rose approximately 18% over that of 1983 to about 12,700 tons. Major company production levels were as follows: Empresa de Desenvolvimento de Recursos Minerais S.A., 6,900 tons; Tocantins, 3,500 tons; and Morro do Níquel Ltda., 2,300 tons.

Tocantins, the only producer of electrolytic nickel in Latin America, plans to double its capacity to 10,000 tons per year, at a cost of $30 million. Caraíba Metais S.A. Indústria e Comércio plans to produce, as a byproduct of copper production, 700 tons of nickel sulfate in 1985, 950 tons in 1986, and 1,100 tons in 1987.

Tin.—Brazil's tin production rose rapidly in 1984, putting it in fourth place in world production and ahead of Bolivia for the first time. Smelter production was in excess of 18,000 tons, about 42% above the 1983 figure. Paranapanema S.A. Mineração, Indústria e Construção was by far the largest producer with 71% of the total.

Brazil has no plans to become a member of the International Tin Council, but it does plan to curtail the rate of increase of tin production in 1985 to alleviate pressure on the international market.

Titanium.—CVRD commenced pilot plant production of titanium oxide (TiO_2) from its anatase deposit at Tapira, Minas Gerais. The mine has measured reserves of 350 million tons grading about 20% TiO_2.

Titanio do Brasil is expanding its production capacity from 50,000 tons per year of ilmenite by 1987 and installing equipment designed to recover 15,000 tons of zirconite as a byproduct. The mine at Matarca, Pernambuco, has reserves of 2.8 million tons containing 57% TiO_2, accounting for approximately 92% of Brazil's ilmenite reserves.

Zinc.—Brazil's zinc production increased by 7% to about 106,900 tons. Cia. Mineira de Metais (CMM) produced 64,750 tons, Cia. Paraibuana de Metais (Paraibuana), 29,400 tons, and Cia. Industriel e Mercantil Inga S.A. (Inga), 12,300 tons of the total production.

Mineração Morro Aguda S.A., whose mine is at Paracatu, Minas Gerais, came under new ownership in 1984. It was taken over by the three major zinc producers, CMM, Paraibuana, and Inga, for $12 million with all having equal shares. The Paracatu deposit has measured reserves of 13.6 million tons grading 5.17% zinc and 1.48% lead. At full capacity, it is expected to produce 21,500 tons of zinc and 7,000 tons of lead per year.

NONMETALS

Diamond.—Two diamond producers expanded their operations and, correspondingly, increased diamond production. Mineração Tejucana S.A. increased industrial diamond production from 10,400 to 52,100 carats per year, and Cia. Minera Morro Vermelho Ltda. opened a mine in Nortelandia, Mato Grosso, that will produce 540 carats of industrial diamonds and 4,600 carats of gem diamonds per year.

CPRM put up bids for various areas for diamond exploration at Piata and Varique in Bahia, Coromandel in Minas Gerais, and Tibage in Paraná. Domestic production for 1984 was estimated at 550,000 carats with 60% being industrial diamonds and the remainder being of gem quality.

Phosphate Rock.—Phosphate rock concentrate production was approximately 3.9 million tons, which was 20% greater than the figure for 1983. Domestic consumption for the same period increased 28%, from 3.3 million tons to 4.3 million tons. Phosphoric acid production was 661,000 tons, up 13% over the figure for 1983.

Brazil's largest producer, Fertilizantes Fosfatados S.A. (FOSFÉRTIL), a subsidiary of PETROBRÁS, is negotiating with Banco Nacional do Desenvolvimento Económico e Social and the International Bank for Reconstruction and Development for funds to expand its phosphoric acid plant at Uberaba, Minas Gerais. FOSFÉRTIL also is planning to expand its phosphate mine in Tapira, Minas Gerais, at a cost of about $45 million.

Goiás Fertilizantes S.A. (GOIÁSFERTIL), which produces 20% of national production, announced plans to expand its capacity from 620,000 to 1.2 million tons per year over the next 2 years. GOIÁSFERTIL is developing the technology for the recovery of fine phosphate (5 micrometers) from rejects.

Quartz.—Brazil circulated a national plan for quartz production among various research organizations. The plan called for an investment of $21.5 million to enable Brazil to obtain the technological capacity to produce cast quartz, synthetic quartz, and silicon. As of 1984, Brazil has about 90% of the world's reserves of quartz. The largest reserves are in the States of Minas Gerais and Santa Catarina, with smaller reserves in Bahia and São Paulo.

MINERAL FUELS

Coal.—Coal production reached 7.2 million tons, which was 14% greater than that of 1983. Steam coal production was about 6 million tons while metallurgical coal attained an output of approximately 1.2 million tons.

In December, the Fontanella Mine near Criciuma, Santa Catarina, began producing 100,000 tons of steam coal per month. It is coal without a market because the mine was developed to supply the Jorge Lacerda IV thermoelectric plant, which will not begin generating electricity until 1989.

Late in 1984, CPRM announced the discovery of three coal deposits in Rio Grande do Sul that could permit Brazil to produce high-quality coking coal within 3 or 4 years. The three deposits are Morungaba, Chico

Loma, and Santa Terezinha, and combined contain inferred reserves of 2.5 billion tons of metallurgical coal. Of the total reserves, 40% are considered to be reject. CPRM estimated that it would cost $80 million to develop a coal mine that could produce 1.2 million tons per year of coal yielding 500,000 tons of coke.

At yearend, Brazil's total coal reserves were estimated at 22 billion tons. To give greater incentives for production, a Government decree was signed in 1984 allowing equipment to be imported duty free for use in the coal sector.

Natural Gas.—Natural gas production reached 173 billion cubic feet, which exceeded that of 1983 by 22%. A number of major gas strikes during the year helped to boost Brazil's reserves of recoverable natural gas. In December, the biggest strike of the year was recorded at the Lagoa Suruaca onshore oil and gas field in the State of Espírito Santo. The development well tested 14 to 18 million cubic feet of nonassociated gas per day. PETROBRÁS stated that this was the largest gas flow recorded to date in Brazil.

PETROBRÁS confirmed a new discovery gas well in the region of Juruá in upper Amazonia. The well displayed a daily flow rate of 7 million cubic feet per day. Proven gas reserves at Juruá were determined to be between 247 and 353 billion cubic feet, with potential reserves figured at about 4.24 trillion cubic feet. Additional important gas strikes occurred in northeast Bahia, and in the Campos Basin.

A natural gas pipeline from the Campos Basin receiving terminal to Greater Rio de Janeiro was to be inaugurated early in 1984, but a jurisdictional squabble between PETROBRÁS and the State of Rio de Janeiro Gas Co. postponed the inauguration until June.

Petroleum.—According to PETROBRÁS, production of petroleum was 169 million barrels. This was a 37% increase over the figure for 1983. The average production was 462,000 barrels per day compared with 339,000 barrels per day for 1983. On June 28, 1984, Brazil passed the milestone of 500,000 barrels per day. This production mark had been scheduled for late 1984. Upon reaching the single-day milestone, Brazil moved ahead of Argentina into third place in Latin America behind Mexico and Venezuela. In October, Brazil reached its peak daily production for the year of 540,000 barrels. PETROBRÁS projected a 600,000-barrel-per-day target by mid-1985.

Petroleum imports decreased to approximately 237 million barrels, which was about 11% below that of 1983. Petroleum derivative imports showed a 53% decrease from the figure for 1983, while petroleum derivative exports increased 53% for the same period.

PETROBRÁS extended the world's record water depth for a production well to 410 meters (1,345 feet) in the Campos Basin. Petrobrás Internacional S.A., the services export subsidiary of PETROBRÁS, signed a significant agreement with the West Engineering Group of Norway to begin prospecting for oil in the deep waters of the North Sea. It is hoped that by this association, recovery techniques will be developed and acquired by PETROBRÁS for subsequent usage in the deep waters of the Campos Basin. The Campos Basin accounted for 57% of Brazil's total petroleum production in 1984.

Uranium.—Petróleos Fertilizantes Brasileiro S.A. signed an agreement for the development of the Itatata deposit. It is a large uranium-rich phosphate deposit at Santa Quiteria, Ceará. The total measured reserves of uranium at yearend were approximately 301,500 tons, of which 91,200 tons was from the Itatata deposit.

NONMINERAL ENERGY SOURCES

Alcohol.—Brazil produced approximately 9.2 billion liters (2.4 billion gallons) of alcohol, almost entirely ethanol from sugar cane, in 1984. For the same period, domestic consumption of alcohol was approximately 9.4 billion liters (2.5 billion gallons). The 1984 production was approximately 15% above the estimated figure for 1983. Since 1979, when the program was initiated, to yearend 1984, Brazil produced almost 1.8 million alcohol-powered automobiles. The engines use a mix of 20% anhydrous alcohol and 80% gasoline. In 1984, through the use of gasohol, Brazil conserved an estimated 12.8 million barrels of gasoline.

Hydroelectric.—The Itaipu hydroelectric project, on the Parana River between Brazil and Paraguay, transmitted its first electric power in October. By 1990, the powerplant will have an output of 12.6 billion watts. At yearend, the cost had risen to an estimated $15.3 billion. The Tucurui hydroelectric project, on the Rio Tocantins River, 300 kilometers south of Belem, Pará, was inaugurated in November. When the powerplant reaches full capacity in 1990, it will have a maximum output of 7.9 billion watts.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Brazilian cruzeiros (Cr$) to U.S. dollars at the rate of Cr$1,848=US$1.00 as an average for 1984.

The Mineral Industry of Bulgaria

By Tatiana Karpinsky[1]

In 1984, the most important mineral production of Bulgaria was of copper, lead, zinc, some iron and manganese, fertilizers, cement, steel, kaolin, and certain rare elements. Principal sources of fuel supply were coal basins, scattered throughout the country, that contained lower rank lignite and brown coal. Domestic reserves of petroleum and natural gas were insignificant. Bulgaria produced more than 70% of its needs for rolled steel, fully satisfied its needs for refined lead and zinc, produced 98% of its refined copper, 91% of rolled heavy nonferrous metals, and 100% of rolled aluminum, mostly from imported raw materials. The iron and steel and nonferrous metals industries, including mining, provided about 7% of Bulgaria's industrial production. The total volume of capital investment amounted to more than 8 billion leva (L).[2] Over 74% of the investment was devoted to electric power production, coal mining, metal-processing industry, the chemical industry, and iron and steel production. Major projects put into operation included the Vasil Kolarov State cement plant at Temilkovo for the production of 560,000 tons per year of cement, extension of the chemical plant at Stara Zagora for the production of an additional 55,000 tons per year of ammonia, and the 104 kilometers of the new U.S.S.R.-Bulgaria gas pipeline. The total number of employees in state enterprises was 1.4 million at yearend 1983. The coal industry employed 46,500; iron and steel production (including ore mining), 36,800; manufacturing and metal working, 241,600; and the production of electric energy and steam heat, 22,500. In 1985, national income is to increase by 4% compared with that of 1984, output of coal is planned to rise substantially by 14%, and output of electric energy is to rise by 3.5%. Output in the iron and steel industry is to rise by 7.5%. In 1985, Bulgaria is to also receive 5.5 billion cubic meters of natural gas from the Soviet Union.

PRODUCTION

Total industrial production did not quite reach the target of 5% above that of 1983; a 4.5% growth was reported. The state plan goals were met for the production of coal, hot-rolled steel, and nitric and phosphorus fertilizers and were not met for production of cold-rolled steel in sheets, tin-coated steel in sheets, calcinated soda, cement, and bricks. About 30% of Bulgaria's electric energy was produced from domestic low-calorie lignite, 29% from nuclear energy, 8% from hydroelectric power, 4% from gas, and 3% from oil. The remainder was from imported sources, mainly coal.

The country's only nuclear powerplant, at Kozlodoui on the Danube, operated four 440-megawatt reactors. The first 1,000-megawatt reactor would become operational with Soviet assistance in 1986; in 1988, a second 1,000-megawatt reactor was scheduled to come on-stream. Bulgaria's second nuclear powerplant was to be built at Beline, with most of the equipment for four 1,000-megawatt reactors coming from the U.S.S.R.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Cadmium metal, smelter[e]	210	210	[r]200	[r]200	200
Copper:					
Mine output, metal content	62,000	62,000	70,000	80,000	80,000
Metal, primary and secondary:					
Smelter	59,000	62,000	62,000	60,000	60,000
Refined	63,000	62,000	65,000	62,000	62,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	1,886	1,754	1,552	1,803	1,500
Fe content do	590	537	474	554	450
Iron concentrates do	896	797	732	824	700
Metal:					
Pig iron do	1,527	1,512	1,558	1,623	1,500
Ferroalloys, electric furnace, all types do	45	55	55	55	55
Steel, crude do	2,567	2,483	2,584	2,831	2,800
Semimanufactures, rolled do	3,213	3,351	3,253	3,235	3,235
Lead:					
Mine output, metal content	116,000	116,000	95,000	95,000	95,000
Metal, smelter, primary and secondary	119,000	119,000	118,000	116,000	116,000
Manganese ore:					
Gross weight	49,000	45,321	45,000	45,000	45,000
Mn content	14,200	13,207	13,207	13,100	13,200
Molybdenum, mine output, metal content[e]	150	150	150	150	150
Silver, mine output, metal content[e] thousand troy ounces	930	930	930	930	930
Zinc:					
Mine output, metal content	70,000	[e]65,000	66,000	68,000	68,000
Metal, smelter, primary and secondary	90,000	90,000	90,000	91,000	91,000
NONMETALS					
Asbestos	700	400	600	700	600
Cement, hydraulic thousand tons	5,359	5,433	5,614	5,644	[3]5,717
Clays: Kaolin	208,000	221,422	237,000	242,000	240,000
Gypsum and anhydrite:					
Crude thousand tons	311	350	376	386	370
Calcined	88	94	104	116	100
Lime: Quicklime thousand tons	1,848	1,758	1,776	1,634	1,700
Nitrogen: N content of ammonia	827,216	838,764	847,000	921,292	830,000
Pyrites, gross weight[e]	680,000	680,000	680,000	680,000	680,000
Salt, all types[e]	87,000	87,000	87,000	87,000	87,000
Sodium carbonate, calcined thousand tons	1,479	1,469	1,459	1,271	1,460
Sulfur:[e]					
S content of pyrites	300,000	300,000	300,000	300,000	300,000
Byproduct, all sources	70,000	70,000	70,000	70,000	70,000
Total	370,000	370,000	370,000	370,000	370,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, marketable:					
Anthracite thousand tons	97	89	80	83	80
Bituminous do	170	157	161	160	160
Brown do	5,793	5,657	5,537	5,342	6,700
Lignite do	24,153	23,338	26,437	26,805	26,860
Total do	30,213	29,241	32,215	32,390	33,800
Coke do	1,348	1,381	1,274	1,270	1,300
Gas, natural, marketed million cubic feet	6,714	4,840	[e]4,840	[e]4,800	4,800
Petroleum:					
Crude:					
As reported[e] thousand tons	180	180	180	180	180
Converted[e] thousand 42-gallon barrels	1,314	1,314	1,314	1,314	1,314
Refinery products do	84,448	[r]94,535	NA	NA	NA

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

[1]Table includes data available through July 12, 1985.

[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 1984, the value of exports was L12,966 billion, reflecting an increase of about 10% compared with that of 1983, and the value of imports was L12,795 billion, reflecting an increase of about 7%. Imports of fuel, minerals, and metals accounted for about 47% of the value of Bulgaria's total imports. Exports of fuel, minerals, and metals comprised only about 11%. Trade with centrally planned economy countries accounted for 76.4% of the country's total turnover, about 57.5% with the U.S.S.R. The Soviet Union supplied Bulgaria with iron ore, ferrous and nonferrous metals, natural gas, crude oil, petroleum products, coal for producing coke, and electric energy.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	--	2,017	--	Italy 1,817; West Germany 200.
Unwrought	3,594	6,067	--	Japan 5,367; Italy 670.
Semimanufactures	625	9	--	Belgium-Luxembourg 5; Japan 2.
Cadmium: Metal including alloys, all forms	35	33	--	All to Czechoslovakia.
Copper:				
Sulfate	400	1,665	--	All to West Germany.
Metal including alloys:				
Scrap	216	26	--	All to Sweden.
Unwrought	71	NA		
Semimanufactures	194	745	--	Yugoslavia 662; Italy 46; Jordan 25.
Gold:				
Waste and sweepings value, thousands	$398	NA		
Metal including alloys, unwrought and partly wrought troy ounces	1,994	NA		
Iron and steel: Metal:				
Scrap	57,000	38,000	--	Yugoslavia 29,519.
Pig iron, cast iron, related materials	[2]18,931	[3]38,200	--	Yugoslavia 7,818; undetermined 29,144.
Ferroalloys:				
Ferrochromium	2,216	5,040	--	Belgium-Luxembourg 3,830; Sweden 644.
Ferromanganese	[2]7,566	NA		
Ferrosilicon	6,622	2,588	--	West Germany 1,738; Austria 850.
Silicon metal	2	NA		
Unspecified	11,594	685	--	Belgium-Luxembourg 637; Italy 48.
Steel, primary forms	242,168	162,000	--	West Germany 43,342; Italy 28,780; Yugoslavia 23,987.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	59	66	--	NA.
Universals, plates, sheets do	527	555	--	Cuba 57; Pakistan 37; undetermined 284.
Hoop and strip do	3	4	--	Mainly to Greece.
Rails and accessories do	4	5	--	NA.
Wire do	35	43	--	Hungary 3; Yugoslavia 3; undetermined 37.
Tubes, pipes, fittings do	61	44	--	Poland 13; Cuba 11; Hungary 2.
Castings and forgings, rough do	([4])	1	--	NA.
Lead:				
Oxides	[2]843	728	--	Yugoslavia 716; Greece 12.
Metal including alloys, unwrought	4,358	1,141	--	All to Greece.
Lithium: Oxides and hydroxides	--	38	--	All to Italy.
Manganese: Ore and concentrate, metallurgical-grade	10,000	[3]28,500	--	All to Czechoslovakia.
Molybdenum: Ore and concentrate	291	321	--	All to West Germany.
Nickel: Metal including alloys:				
Scrap	3	NA		
Unwrought	4	110	--	All to Yugoslavia.
Semimanufactures	76	NA		
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$81	NA		

See footnotes at end of table.

Table 2.—Bulgaria: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings value, thousands	$461	$390	--	West Germany $297; Belgium-Luxembourg $93.
Metal including alloys, unwrought and partly wrought do.	$445	$156	--	All to West Germany.
Zinc: Metal including alloys:				
Unwrought	14,323	13,456	--	Czechoslovakia 10,000; Yugoslavia 1,337.
Semimanufactures	25	30	--	All to Cyprus.
Other:				
Ores and concentrates	--	23	--	All to Belgium-Luxembourg.
Ashes and residues	18	NA		
Base metals including alloys, all forms	47	23	--	All to West Germany.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	(4)	24	--	Yugoslavia 13; Italy 11.
Barite and witherite	[2]141,049	NA		
Boron materials: Crude natural borates	--	1,085	--	All to West Germany.
Cement[2]	473,621	509,100	--	Libya 118,200; Hungary 114,000; Switzerland 96,000.
Clays, crude:				
Kaolin	[2]20,250	5,002	--	All to Poland.
Unspecified	1,973	4,574	--	Greece 4,238; Italy 336.
Diamond: Industrial stones value, thousands	$3,779	$176	--	All to Belgium-Luxembourg.
Fertilizer materials: Manufactured:				
Ammonia	117	NA		
Nitrogenous[2]	539,987	694,872	--	NA.
Phosphatic	2,150	NA		
Potassic	1,570	5,027	--	All to Indonesia.
Unspecified and mixed	106,344	44,467	--	All to Pakistan.
Mica:				
Crude including splittings and waste	29	NA		
Worked including agglomerated splittings	2	NA		
Nitrates, crude[2]	6,870	6,723	--	U.S.S.R. 2,720; Czechoslovakia 807; Spain 700.
Pigments, mineral: Iron oxides and hydroxides, processed	105	33	--	All to Yugoslavia.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$18	$168	--	All to Italy.
Synthetic do.	$466	$291	--	All to West Germany.
Salt and brine	411	NA		
Sodium compounds, n.e.s.: Carbonate, manufactured[2] thousand tons	1,120	945	--	U.S.S.R. 476; Hungary 115; Czechoslovakia 37.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	[2]8,423	7,678	--	Hungary 4,794; Italy 1,222; Poland 1,038.
Worked	[2]181,745	1,275	NA	All to West Germany.
Gravel and crushed rock	202	69	--	Italy 47; Greece 22.
Quartz and quartzite	8	NA		
Sand other than metal-bearing	29,409	12,350	--	All to Greece.
Sulfur: Elemental, crude including native and byproduct	13,413	NA		
Other:				
Crude	14,745	12,562	--	Hungary 11,201; West Germany 1,361.
Slag and dross, not metal-bearing	--	3,687	--	All to Italy.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	81	32	--	Do.
Coal: Anthracite and bituminous	[3]246,000	[3]223,000	--	Belgium-Luxembourg 76,670; Sweden 21,035; undetermined 113,765.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	504	625	--	Yugoslavia 274; Italy 258.
Gasoline do.	712	477	--	West Germany 299; Italy 143.
Mineral jelly and wax do.	6	23	--	Italy 22.

See footnotes at end of table.

Table 2.—Bulgaria: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983 United States	Destinations, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Kerosine and jet fuel thousand 42-gallon barrels	108	30	--	Hungary 18; Italy 12.
Distillate fuel oil do	957	397	--	West Germany 221; Yugoslavia 109.
Lubricants do	255	202	--	Yugoslavia 128; Belgium-Luxembourg 49.
Residual fuel oil do	4,088	2,011	--	Italy 1,251; West Germany 430; Greece 176.
Unspecified do	110	146	--	All to Poland.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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 and data published by the trading partner countries.
[2]Official Trade Statistics of Bulgaria.
[3]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[4]Less than 1/2 unit.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	247	418	--	Italy 310; Japan 94.
Metal including alloys:				
Unwrought	6,993	14,804	--	Hungary 9,826; Yugoslavia 4,475.
Semimanufactures	5,745	5,688	--	Hungary 2,312; West Germany 1,524; Yugoslavia 778.
Bismuth: Metal including alloys, all forms	8	NA		
Chromium: Oxides and hydroxides	202	110	--	All from Poland.
Cobalt:				
Oxides and hydroxides	2	NA		
Metal including alloys, all forms	11	2	--	All from Finland.
Copper:				
Matte and speiss including cement copper	--	347	--	All from Yugoslavia.
Sulfate[2]	7,712	3,569	--	All from U.S.S.R.
Metal including alloys:				
Unwrought	1,992	700	--	All from Belgium-Luxembourg.
Semimanufactures	2,495	1,993	--	West Germany 1,568; Japan 133; Austria 110.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	277	579	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	2,360	2,313	--	U.S.S.R. 2,206.
Metal:				
Scrap	2,220	NA		
Pig iron, cast iron, related materials[2]	399,488	407,482	--	U.S.S.R. 375,728; Algeria 21,755.
Ferroalloys:				
Ferromanganese	--	3,000	--	West Germany 815.
Ferromolybdenum	5	NA		
Ferrosilicomanganese	[2]2,216	NA		
Ferrosilicon	[2]5,063	NA		
Silicon metal	200	NA		
Unspecified	[2]14,314	23,000	--	NA.
Steel, primary forms	[2]675,415	571,000	--	NA.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	334	382	--	Hungary 68; U.S.S.R. 48; undetermined 195.
Universals, plates, sheets[2] do	244	191	--	U.S.S.R. 122; West Germany 29; Czechoslovakia 15.
Hoop and strip[2] do	4	6	--	U.S.S.R. 4; Poland 1.
Rails and accessories do	90	63	--	NA.
Wire do	15	15	--	Austria 7; West Germany 1.
Tubes, pipes, fittings do	70	73	([3])	West Germany 9; Japan 9; undetermined 43.
Castings and forgings, rough do	13	6	--	NA.
Lead:				
Ore and concentrate	6,985	4,000	--	All from Italy.
Oxides	3	--		
Metal including alloys, unwrought	1	[4]700	--	NA.
Magnesium: Metal including alloys:				
Unwrought	40	NA		
Semimanufactures	2	22	--	All from Yugoslavia.
Manganese:				
Ore and concentrate, metallurgical-grade	[5]81,900	[5]96,800	--	U.S.S.R. 81,000.
Oxides	20	35	--	Ireland 20; Japan 15.
Metal including alloys, all forms	5	NA		
Mercury 76-pound flasks	59	NA		
Molybdenum:				
Ore and concentrate	152	147	--	All from West Germany.
Metal including alloys, all forms	1	NA		
Nickel:				
Oxides and hydroxides	10	NA		
Metal including alloys:				
Unwrought	1	1	--	Do.
Semimanufactures	89	117	--	West Germany 104; Sweden 13.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,198	$1,850	--	West Germany $1,321; Italy $528.
Silver: Metal including alloys, unwrought and partly wrought do	$204	$481	--	West Germany $384; Austria $97.
Tin:				
Oxides	--	6	--	All from Austria.
Metal including alloys:				
Unwrought	--	2	--	Do.
Semimanufactures	3	NA		
Titanium:				
Ore and concentrate	3,588	2,600	--	All from West Germany.
Oxides	258	265	--	West Germany 255.
Metal including alloys, all forms	17	4	--	All from West Germany.
Tungsten: Metal including alloys, all forms	6	16	([3])	Italy 12; Japan 2.
Zinc:				
Ore and concentrate	32,959	9,934	9,934	
Metal including alloys, semimanufactures	6	3	--	Yugoslavia 2; Belgium-Luxembourg 1.
Zirconium: Ore and concentrate	1,718	1,779	--	All from West Germany.
Other:				
Ores and concentrates	--	10	--	All from Canada.
Oxides and hydroxides	524	58	--	All from West Germany.
Base metals including alloys, all forms	30	1	--	Do.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1	21	--	Italy 20.
Artificial:				
Corundum	2,512	1,730	--	Italy 1,259; Hungary 470.
Silicon carbide	1,657	642	--	All from Italy.
Dust and powder of precious and semiprecious stones including diamond value, thousands	--	$5	$5	
Grinding and polishing wheels and stones	1,178	1,199	--	Yugoslavia 429; Austria 419; Italy 328.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Asbestos, crude	[2]18,116	1,715	--	Greece 1,020; Canada 695.
Boron materials: Oxides and acids	1	1	--	All from West Germany.
Cement[2]	110,197	48,122	--	U.S.S.R. 34,643; Czechoslovakia 12,879.
Chalk	20	NA		
Clays, crude:				
Chamotte earth	9	NA		
Unspecified	2,439	8	--	All from West Germany.
Diamond:				
Gem, not set or strung value, thousands	$66	NA		
Industrial stones do	$9,780	$2,859	--	West Germany $2,858.
Diatomite and other infusorial earth	395	156	--	Austria 96; West Germany 60.
Fertilizer materials: Manufactured:				
Ammonia	6	5	--	All from West Germany.
Nitrogenous	1	NA		
Phosphatic	[2]322,876	[5]600,000	89,832	NA.
Potassic, K_2O content	[2]243,155	[5]241,071	--	U.S.S.R. 132,500.
Unspecified and mixed	214	814	--	Belgium-Luxembourg 465; West Germany 198.
Fluorspar	262	196	--	All from West Germany.
Graphite, natural	513	409	--	Do.
Lime	21	30	--	Do.
Magnesium compounds:				
Magnesite	7,000	8,000	--	All from Czechoslovakia.
Oxides and hydroxides	213	46	--	All from Japan.
Other	92	125	--	All from Yugoslavia.
Mica:				
Crude including splittings and waste	15	5	--	All from West Germany.
Worked including agglomerated splittings	8	18	--	Austria 14; West Germany 4.
Phosphates, crude[2] thousand tons	1,538	1,658	--	U.S.S.R. 883; Morocco 147; Tunisia 98.
Pigments, mineral: Iron oxides and hydroxides, processed	315	349	18	West Germany 276; Japan 55.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$103	NA		
Synthetic do	$81	$81	--	West Germany $80.
Pyrite, unroasted	257,000	262,000	--	All from U.S.S.R.
Salt and brine	[2]206,313	1,501	--	All from West Germany.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	1	NA		
Sulfate, manufactured	1,000	502	--	Do.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	40	--	Yugoslavia 38.
Worked	5	75	--	Greece 60; Italy 13.
Dolomite, chiefly refractory-grade	--	166	--	All from Poland.
Gravel and crushed rock	940	713	--	Yugoslavia 698; Italy 15.
Quartz and quartzite	855	1,104	--	All from Sweden.
Sand other than metal-bearing	133	13	--	Yugoslavia 11.
Sulfur:				
Elemental:				
Crude including native and byproduct	73,927	55,000	--	All from Poland.
Colloidal, precipitated, sublimed	10	NA		
Sulfuric acid	7,155	12,351	--	Yugoslavia 12,316.
Talc, steatite, soapstone, pyrophyllite	158	192	--	Austria 98; Finland 85.
Other: Crude	550	654	--	Greece 560; West Germany 94.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6	3	--	Finland 2; West Germany 1.
Carbon: Carbon black[2]	31,908	30,280	--	U.S.S.R. 29,118; East Germany 530.
Coal: Bituminous[2] thousand tons	5,480	5,367	--	U.S.S.R. 5,227.
Coke and semicoke[2] do	483	502	--	U.S.S.R. 274; Poland 99; Czechoslovakia 35.
Gas, natural: Gaseous million cubic feet	NA	19	--	All from U.S.S.R.
Peat including briquets and litter	18	NA		

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983 United States	Sources, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	--	35	--	All from Austria.
Gasoline do	169,881	19,958	--	Italy 12,810; Austria 4,726.
Mineral jelly and wax do	5,801	850	--	Italy 622; West Germany 228.
Kerosine and jet fuel do	20,724	93	--	Yugoslavia 70; West Germany 23.
Distillate fuel oil do	2,829	440	--	Italy 343; West Germany 97.
Lubricants do	33,530	30,772	NA	West Germany 16,604; Austria 7,084; Greece 3,752.
Residual fuel oil do	142,411	243,356	--	All from Greece.
Bitumen and other residues do	38,803	30,809	--	Hungary 30,264; West Germany 515.
Bituminous mixtures do	6,491	170	--	Austria 158.
Petroleum coke do	--	3,086	--	All from West Germany.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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 and data published by the trading partner countries.
[2]Official Trade Statistics of Bulgaria.
[3]Less than 1/2 unit.
[4]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.
[5]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

COMMODITY REVIEW

METALS

Copper.—Copper production was mainly obtained from open pit operations in the central Srednogorie region. The Medet strip mine has been in operation for about 20 years, producing about 8 million tons per year of ore at a low 0.3% copper content. Nearby was the Elatsite strip mine, in operation for about 5 years with an output of 6 million tons per year of copper ore of 0.4% copper content. A new surface mine was being developed at Assarel, some 12 kilometers from Elatsite, with planned output of 15 million tons of ore per year grading about 0.3% copper content. These surface mines were designed with benches 15 meters high and 25 to 30 meters wide and use 4.6-cubic-meter shovels in conjunction with 27-ton and 40-ton dump trucks. Under an agreement signed in 1979 between Bulgaria and Finland, Outokumpu-Ahlstrom Oy and Rauma-Repola Oy (AOR) was installing Outokumpu flash-smelting technology at the Georgi Damyanov copper plant; the program was scheduled for completion at yearend 1985. In addition to the smelter, a new electrolytic refinery and a power station were under construction. The new smelter will produce anode copper from concentrates grading 13.85% copper and produce a matte containing 45% to 55% copper.

Iron and Steel.—The surface mine at Kremikovtsi in the Sofia region produced about 75% of the country's iron ore. The balance came from underground operations at the Martinovo and Kroumovo Mines. Bulgaria's output of iron ore was insufficient to satisfy domestic needs, and about 2.3 million tons of iron ore was imported from the U.S.S.R. Two large metallurgical complexes, the Lenin Metallurgical Complex at Pernik and the Kremikovtsi Complex near Sofia, were in operation. Kremikovtsi's rolling mills were to be further modernized and production of tinplate and plastic-coated coil increased. Argon refining was introduced at the plant, and the No. 4 coke oven battery, with a capacity of 650,000 tons per year, was started up. The proportion of high-grade steels to total production was planned to reach 40% within 5 years, from the 1984 level of 17.8%.

Lead and Zinc.—Bulgaria's lead-zinc production was based on underground operations at G. Dimitsov, Gorubso, Kolarov, Madjarovo, Ossogovo, and a few other mines. About 85% of all the country's lead-zinc deposits were concentrated in the Gorubso lead-zinc area in the Rhodopes region in the vicinity of Madan and Rudozen. The typical minerals were galena, sphalerite, chalcopyrite, and pyrite, plus a few others. The ore of the Gorubso mines averaged approximately 2% lead and 1.5% zinc. Lead concentrate and zinc concentrate were processed mainly at the Plovdiv and Kurdjali smelters. A new concentrator to increase output was under construction at Ossogovo.

NONMETALS

Fertilizer Materials.—Exports of urea increased because of the commissioning of the third Vratsa urea unit, originally scheduled to come on-stream at the end of 1981 but which eventually took place in January 1983. This expanded Bulgarian urea capacity by 92,000 tons per year of nitrogen, to 687,000 tons per year.

Kaolin.—Deposits of kaolin occurred in the northeast part of Bulgaria in Vijatovsky, Senovsky, Kaolinovsky, and Dulovsky regions. The deposits were identical in geological structures and origin. It was estimated that total reserves of kaolin in Bulgaria were enough for surface exploitation for the next 50 years. About one-third of the reserves were estimated to be suitable for the porcelain industry, and two-thirds, for the refractory industry. The kaolin deposits were located at depths of about 0.5 to 30 meters, with a thickness of 40 to 50 meters. The deposits contained 14% to 22% pure kaolin.

MINERAL FUELS

Bulgaria had about 5 billion tons of lignite available for exploitation, which with promising probable reserves could be increased by about 1 billion tons. The biggest reserves of lignite were found at the East Maritsa lignite basin, near the town of Zagora, with over 2.9 billion tons of reserves, of which 2.1 billion tons were suitable for surface mining. Other lignite reserves, about 180 million tons, were at Maritsa-Zapad, and about 500 million tons were near Sofia. The brown coal reserves were mainly in the Bobov Dol, Pernik, and Pirin Basins and were estimated at 300 million tons. A new mine named Marshal Tolbukhin was opened at Pernik in September. Hard coking coal reserves were found in the Balkan Coalfield and were estimated at 30 million tons. The country had 33 mines in production, including 7 open pits that produced about 81% of the total. In 1983, the East Maritsa Field, where lignite output was surface mined, produced 69% of the total coal output. At full development of the two largest mines at East Maritsa, Troyanovo-Sever and Troyanovo-Yug, their annual capacity will reach 19.5 million and 26 million tons, respectively. Over the next 15 years, it was planned to double output to 57 million tons per year. The greater part of this expansion will be in open pit operations of the East Maritsa, Elhova, Lom, and Sofia Basins. The first mine in the Dobrudja Basin was planned to reach a capacity of 3.5 million tons per year by the end of the century. Two other deep mines with similar capacity were planned for the future.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Official exchange rate for the Bulgarian lev (L) for 1984 was L0.97=US$1.00, but values were not converted to dollars because the lev is not freely convertible.

The Mineral Industry of Burma

By Gordon L. Kinney[1]

Burma continued its development activities in the mineral field with the assistance of foreign loan and aid programs. Overall, the mining sector grew by 24% in fiscal year (FY) 1982,[2] with export earnings rising 45% to $41 million.[3] In FY 1983, copper ore production led in tonnage[4] of metallic minerals, while tin ore was first in value. Ores of lead, silver, tungsten, zinc, and a number of industrial minerals also were produced in amounts economically significant to the Government, which owns and operates all the important mines. In all, about 30 minerals were produced in commercial quantities during 1984. Only the tin and tungsten output, however, could be considered as being of consequence on the world market. Burma continued to allocate about 10% of its capital budget to the mining sector and planned to continue with this policy. The capital budget for FY 1984 was targeted at $137 million including local currency expenditures, but because of a tight foreign exchange situation, expenditures were probably closer to $100 million with foreign exchange requirements of $50 to $60 million.

Burma continued to put priority on its search for additional petroleum deposits. Petroleum production has not kept up with the country's expanding needs. The Government's persistent policy of not importing crude oil has led to shortages that have steadily worsened. This has adversely affected economic development as a whole and some mineral development in particular.

The mining industry increased overall employment in FY 1983 by more than 2,000 persons, to a total of 85,000. Approximately 72,000 of these were employed by the state-owned mining operations or 4.6% of the total Government employment.[5] Overall, the mining sector accounted for 0.6% of national employment and 1.2% of the value of the net output of goods and services at current prices.

Since 1976, Burma's economy has grown at an average rate of 6% per year, after a decade of decline or stagnation. Changes in Government policies since about 1975 have been a key factor in this rate of growth. In 1983 and 1984, however, Burma faced deteriorating terms of trade for rice, its major export earner. This led to serious problems of foreign exchange availability. These difficulties could persist at least over the next few years.

The policy of the Government of Burma was to avoid direct participation by foreign investors. The Burmese legal system does, however, permit joint ventures between Burmese state companies and foreign interests. Several such arrangements were operating, but none were known for any onshore mining projects. Foreign aid has contributed greatly to the economic growth rate, especially in the industrial and mining sectors. In 1983, multilateral sources supplied over $200 million and bilateral sources provided approximately $300 million.[6] This aid has financed mineral-related projects in copper, lead-zinc, tin-tungsten, and petroleum. These positive results have been offset, at least in part, by three important factors. First, Burma's debt service ratio was approaching 30%. It must, therefore, satisfy most of its future needs for foreign exchange through loans made on concessional terms, or through projects with clear commercial viability. The high international demand for concessional loans limits what Burma can expect to receive, and few commercially viable projects have been identified as yet. Second, even with dramatic increases in rice production already achieved, Burma may be unable to increase its earnings from international rice sales. Excellent international rice crops were likely to depress prices in the short term, and prospects for increased rice export earnings were limited. Third, despite successes in the rice program, the Government has been reluctant to introduce market-type incentives in the industrial and mining sector.[7]

In the short term, Burma's economic outlook was therefore somewhat clouded. In the longer term, the major internationally financed projects should start to generate revenue, and the economic situation should improve markedly.

The electric power sector continued to show substantial gains as the Government made strong efforts to stay ahead of the rapidly increasing demand for stable and predictable power supplies. Net value of the sector increased 11% in FY 1983 and installed capacity was increased more than 13% to 818 megawatts. Continuing work on major projects to increase power output and expand transmission facilities contributed to the growth. These projects included a Czechoslovak steam-powered generating plant, British-aided gas-powered units, Austrian-aided hydropower miniplants and West German-aided installation of transmission lines.[8]

The Government's Electric Power Corp. operated 635 megawatts of the total, with the remainder in captive power in state organizations. Over 47% of Electric Power's installed capacity was in natural gas fueled, gas turbine powered generators. No other country in the area utilized its natural gas production for such a high percentage of its electric power needs.

PRODUCTION

The value to the Burmese economy of the output of the mining sector increased for the eighth straight year in FY 1983. According to a Government source, the nonfuel mining output at current prices topped $122.5 million.[9]

Burmese mineral production tonnage and value figures are difficult to evaluate because data are often changed, mostly by reducing the previous year's figure. The result is that each current year's output is more favorable compared with those of other years.

Crude oil and natural gas continued to be by far the most valuable mineral commodities. Copper, tin, and tungsten were the most important in value of the metallics. Limestone topped the list of both value and tonnage for the nonmetallics.

Burma has changed its method of reporting annual tin and tungsten production figures. Instead of one tonnage figure each for tin, tungsten, and a mixed tin-tungsten concentrate, tin was reported as 65%- and 74%-tin concentrate; tungsten as 65%- and 67%-tungsten concentrate; and a percentage figure was not reported for mixed tin-tungsten-scheelite concentrate. In addition, the tonnage of scheelite concentrate, undefined, was reported in FY 1983 for the first time.[10] Monthly reported figures from the Central Statistical Organization have retained the old reporting system, leading to further complications. Widely differing interpretations of these figures are expected in the mining literature when metal content totals are extracted.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Antimony, mine output:					
Gross weight	1,094	[r]250	--	--	--
Sb content[e]	440	[r]100	--	--	--
Copper:					
Mine output, metal content	56	77	101	4,200	12,000
Matte, gross weight	123	170	223	173	173
Iron and steel: Pig iron	--	3,753	13,328	15,200	7,764
Lead:					
Mine output, metal content	[e]14,200	[e]16,100	[e]16,050	23,146	21,937
Metal:					
Refined including secondary	6,014	4,068	7,829	7,636	6,996
Antimonial lead (18% to 20% Sb)	185	254	279	254	254
Nickel:					
Mine output, metal content[e]	14	20	20	20	20
Speiss, gross weight	57	80	81	80	80
Silver, mine output ...... thousand troy ounces	587	450	526	558	576
Tin, mine output, metal content:					
Of tin concentrate	540	596	804	629	745
Of tin-tungsten concentrate	750	842	877	1,013	1,283
Total	1,290	1,438	1,681	1,642	2,028
Tungsten, mine output, metal content:					
Of tungsten concentrate	305	248	243	235	216
Of tin-tungsten concentrate	518	577	601	695	880
Total	823	825	844	930	1,096
Zinc, mine output, metal content	4,079	3,556	5,382	4,537	5,320
NONMETALS					
Barite[3]	4,819	6,933	16,029	[e]11,200	11,000
Cement, hydraulic	386,159	317,434	344,225	334,685	311,179
Clays:[3]					
Ball clay	4,390	793	409	404	110
Bentonite	1,347	2,317	1,463	[e]1,710	1,710
Fire clay[4]	3,711	1,755	1,633	[e]1,780	1,020
Industrial white clay	4,626	813	813	810	810
Feldspar[3]	1,689	4,267	2,540	2,700	6,220
Graphite[3]	199	1,422	279	200	234
Gypsum[3]	37,132	31,095	26,079	34,278	39,200
Nitrogen: N content of ammonia[e]	59,900	59,300	51,000	53,900	57,800
Pigments, mineral, natural: Iron oxide	330	350	[e]350	[e]350	300
Precious and semiprecious stones: Jadeite[3] kilograms	7,953	8,891	9,682	29,107	20,694
Salt[5] ...... thousand tons	268	270	269	288	280
Stone:[3]					
Dolomite	2,450	6,381	3,250	4,400	4,000
Limestone, crushed and broken ... thousand tons	1,151	1,219	1,221	1,247	1,210
Quartz	143	37	39	--	--
Talc and related materials: Soapstone[3]	333	128	128	128	128
MINERAL FUELS AND RELATED MATERIALS					
Coal, lignite	26,919	38,100	38,200	34,500	43,200
Gas, natural:					
Gross[e] ...... million cubic feet	[r]16,000	[r]16,000	[r]19,000	[r]20,000	26,000
Marketed[3] ...... do	14,837	14,878	17,400	18,190	24,796
Petroleum:					
Crude (gross wellhead) thousand 42-gallon barrels	10,110	10,447	9,789	10,168	11,761
Refinery products[e] ...... do	7,300	7,670	7,000	7,000	8,000

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

[1]Table includes data available through June 5, 1985.

[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]Brine salt production as reported by the Burmese Government was as follows: 1980—80,701; 1981—83,795; 1982—73,901; 1983—200,944; and 1984—100,000 (estimated).

TRADE

Burma's export earnings from minerals during FY 1983 totaled $41 million, exclusive of the gem and jewelry trade. This was a 46% increase over the 1982 figure. The initial sale of copper concentrate was not made as reported in 1983. Delivery was delayed because the Ministry of Mines was weighing the four bids that had been tendered for the concentrate. A Japanese firm finally received the contract for delivery by yearend 1984.

Overall, FY 1983 imports decreased to $327 million from $846 million in FY 1982, while exports increased to $409 million from $391 million in FY 1982. The large swing in imports gave Burma a favorable balance of trade for the first time in many years. Partial figures for 1984 showed a strong favorable trade balance in the first third of the year, then a gradual swingback toward a possible small trade surplus. Current year trade data for Burma is seldom available early enough for even this preliminary appraisal.[11]

In 1983, the 20th annual Government gem and jewelry sale to foreign dealers showed a significant increase over the 1982 sale. Proceeds reached $8.8 million in the 1983 sale compared with $5.4 million in its 1982 sale.

COMMODITY REVIEW

METALS

Copper.—The No. 1 Mining Corp.'s Monywa Copper Mine near Monywa, Sagaing Division, hit a production level of 8,000 tons per day in 1984. The latest ore reserve figures were reported to be 117 million tons at an average grade of 0.734% copper. Projected project life would be 48 years at current levels. A Japanese firm bought the first year's production of copper concentrate, which averaged 22% copper and 25 to 30 grams of silver per ton.

The Government proposed building a small smelter near Monywa and opening up a second copper deposit located at Letpadaung, near the Monywa Mine.[12]

Iron and Steel.—The second electric arc furnace at Anisakan near Mandalay was reportedly completed and a test run made. The second furnace was to be used for steel billet production, while the first would continue to be used to supply pig iron to the several small foundries in Burma. Both furnaces use 100% direct-reduced iron feed from the adjacent direct-reduction plant, which uses the Italian Kinglor Metor process. The second direct-reduction module was believed to still be under construction at Anisakan.

Kobe Steel Ltd. of Japan was to lead a Japanese consortium in renovating the 26-year-old Ywama steelworks near Rangoon. The contract was signed 17 months after the Metal Industries Corp. called for international bids on the job. The contract was to provide for design, engineering, equipment supply, supervision of construction, and the training of Burmese personnel in Japan. The renovation will include work on the electric furnace, the wire mill, and the rolling mills. A two-strand continuous billet caster of 12,000 tons per year capacity was also to be installed. Work is to begin in April 1985, with startup scheduled for mid-1987.[13]

Lead, Zinc, and Silver.—The Bawdwin Mine in Shan State, the only domestic source of lead, zinc, and silver, continued to represent a substantial source of foreign exchange earnings. The mine now consists of a combined underground and open pit operation. Limited production from its open pit began in 1984, and equipment was still being procured and assembled at yearend. The underground mine was being worked concurrently to a depth of 520 meters on 14 levels. With the startup of the open pit, the combined ore production was about 1,000 tons per day. The mine and nearby Namtu smelter and refinery together employed 7,122 workers.

The Federal Republic of Germany funded the development of the open pit operation and, in addition, provided a $1.7 million[14] credit to No. 1 Mining to expand the Bawdwin ore-dressing facility. Klöckner Industrie Anlagen GmbH of the Federal Republic of Germany was reportedly selected to supply equipment for the 500-ton-per-day extension of the flotation mill.

Tin and Tungsten.—The increasing tin production reflected investments funded by the International Development Association under the tin-tungsten expansion project. Performance was marred, however, by a mechanical problem with the new dredge operating near the Tenasserim coast. It was not known if the dredge would have to be towed to Penang, Malaysia, for repairs or if they could be made locally. Late 1984, production would have suffered if the repairs were not made quickly.

Development of five new gravel pump mines, which were to be funded by a $16 million Asian Development Bank (ADB) loan, has apparently been canceled at the request of Burmese authorities. The apparent cancellation was because of a dispute over the suitability of a Mining Corp. No. 2 controlled consulting group for the project. The ADB maintained that the consultants did not have the expertise required. The new mines would have raised the country's tin and tungsten output significantly.

Following severance of diplomatic relations with North Korea, the plan to expand the tin smelter at Syriam, Pegu Division, from 1,000 to 2,000 tons per year was shelved.[15] The Burmese Government report to the legislature for 1984 indicated that the smelter had been producing refined tin satisfactorily but had not reached design capacity yet.

NONMETALS

Cement.—Despite a modest production increase in cement raw materials and portland cement, Burmese consumers faced constant shortages because of the heavy demand from large Government projects like the Kinda and Sedawgyi Dams. Plans for increased production were dealt a severe blow in October 1983 when the French-aid-supported mill that was under construction at Myaingalay, Kawthule State, near Pa-an, was severely damaged by insurgents. As of June 1984, repairs had not been started. The Government had been counting on the plant to begin supplying 840 tons per day by yearend.

A plant expansion project was still underway at the Kyangin cement plant. A capacity of 1,400 tons per day was scheduled for completion during 1984, but apparently was not yet operational. The only new facility now likely to open within the next few years is the 800-ton-per-day plant planned for Kyaukse in Mandalay Division.

Fertilizer Materials.—The Government-owned Petrochemical Industries Corp. (PIC) began plans for the fertilizer complex part of the Martaban gas development project. PIC proposed to build a large ammonia and urea complex and also a large methanol plant whose output would be for export. A European consortium was reported to be interested in building the plants if financing can be arranged. PIC wanted to develop a site on the eastern bank of the Irrawaddy Delta southwest of Rangoon, but the site proved to be too soft for economical construction. The consortium favored a site on the western side of the delta at the end of the Arakan Hills where the ground would be more suitable for heavy construction. A feasibility study would have to be made of the new site before any definite financial commitments could be made with the world lending organizations.

In other developments, Voest-Alpine AG of Austria had nearly completed a $3 million modernization of the 20-year-old urea plant at Sale in the Chauk Oilfield in Magwe Division. The project was scheduled for startup before yearend after incurring major delays because of a cement shortage.

Uhde GmbH of the Federal Republic of Germany was building a 91,000-ton-per-year nitrogen-ammonia-urea plant in Kyaw Zwa near Prome, Pegu. The plant was in its final construction stages and was due for startup early in 1985.

MINERAL FUELS

Coal.—A Government report showed that lignite production has been climbing steadily since 1980, and the FY 1984 plan continued the trend with a 22% increase. Mining Corp. No. 3 planned to develop lignite deposits in northern Burma for power production in order to bridge the gap between declining petroleum production and gradually increasing hydropower. The project has been hindered by the remote and rough terrain where the sites are located and the high capital costs, which when compared with other alternatives make the project marginally attractive in economic terms. The project was unlikely to move ahead quickly unless Burma's energy problems worsen dramatically.

Oil and Natural Gas.—The Burmese Government was developing plans to exploit natural gas deposits discovered in the Gulf of Martaban. The overall project would require an expenditure of more than $1 billion and would depend heavily on foreign funding for its execution. The gas deposits were discovered in 1982 by the Burma Petroleum Development Co., a 60:40 joint venture between the Government-owned Myanma Oil Corp. (MOC) and the Japan National Oil Corp. Depending on the source of the estimate, the reserves have been quoted at from 3 to 8 trillion cubic feet. Basically, the project would consist of developing the fields, bringing a pipeline to shore, and building a methanol, a urea, and two ammonia plants to utilize the gas.[16] Two gas-fired powerplants would supply the project's electricity needs and the surrounding areas. Since the gas from the Gulf of Martaban is apparently available in considerable volume, the Burmese planners felt that its development would furnish a source of foreign exchange, which has been in short supply during recent years. All of the methanol and most of the fertilizer would be exported.

Burma has been unsuccessful in finding significant commercial deposits of crude oil in its recent exploration attempts. Crude oil production onshore has continued to cause economic problems. The Government policy of not importing crude oil had led to serious shortages because domestic production has been stagnant for the last several years. Production figures vary considerably depending on the sources, but it was certain that whatever the actual figures were in 1983 and 1984, production was not enough for the needs of the Burmese economy, and the country's refineries operated at less than 50% of capacity.

There was one encouraging find at Payagon near Kyailat in the Irrawaddy Delta. It reportedly flowed 300 barrels per day of crude and 9 million cubic feet per day of gas from a limestone and sandstone formation similar to that found in the Gulf of Martaban.[17] MOC was drilling a well on a small island in the estuary in an attempt to confirm the probability that this formation forms a continuous structure between Payagon and the Martaban discovery. Prospects of significant oil production would be much better if the beds and reservoir conditions are continuous.

Burma has purchased its first offshore drilling rig, the jackup "Trident I," and renamed it "Rewati I." MOC generally leases the use of offshore rigs for its exploration drilling.

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[1]Physical scientist, Division of International Minerals.

[2]The Burmese fiscal year begins Apr. 1 of the year stated.

[3]Values have been converted from Burmese kyats (K) to U.S. dollars at the average rate in FY 1982 of K7.76=US$1.00; FY 1983, K8.25=US$1.00; and FY 1984, estimated at K8.25=US$1.00.

[4]Metric tons are used throughout this chapter.

[5]Ministry of Planning and Finance. Report to the Pyithu Hluttaw on the Economic and Social Condition of the Socialist Republic of the Union of Burma for 1984-85. 1984, p. 15.

[6]U.S. Embassy, Rangoon, Burma. State Dep. Airgram A-13, Oct. 25, 1984, p. 2.

[7]Page 3 of work cited in footnote 6.

[8]Far Eastern Economic Review. Asia 1985 Yearbook. P. 128.

[9]Page 19 of work cited in footnote 5.

[10]Page 116 of work cited in footnote 5.

[11]Central Statistical Organization, Rangoon, Burma. Selected Monthly Economic Indicators. Statistical Paper No. 3, Sept.-Oct. 1984, p. 1.

[12]U.S. Embassy, Rangoon, Burma. Industrial Outlook Report—Minerals. State Dep. Airgram A-007, June 1, 1984, p. 2.

[13]Metal Bulletin (London). No. 6924, Sept. 28, 1984, p. 33.

[14]Value was converted from deutsche marks (DM) to U.S. dollars at the rate of DM2.846=US$1.00.

[15]Page 3 of work cited in footnote 12.

[16]Far Eastern Economic Review. V. 126, No. 92, Oct. 18, 1984, p. 66.

[17]Petroleum News. V. 15, No. 10, Jan. 1985, p. 19.

The Mineral Industry of Canada[1]

By Harold R. Newman[2]

The major efforts of the Canadian mineral industry to increase productivity and efficiency and initiate cost-reduction measures were largely successful. There were productivity gains in 1984, which reduced unit costs. Although mineral output showed a healthy increase over that of 1983, low prices for several commodities such as copper, gold, iron ore, molybdenum, nickel, and silver resulted in a slower paced recovery than anticipated. Generally low mineral commodity prices, sluggish demand, and tighter inventory controls by consumers resulted in moderate growth and partial economic recovery for Canadian mineral producers. Many companies, having high debt-to-equity ratios, were using their increased earnings to reduce debts. Most new capital investments were directed toward cost-reduction measures. The new capital investment in the mineral industry was $7.7 billion,[3] up from $7.3 billion in 1983.

Canada continued to rank third in the world as a mineral producer behind the United States and the U.S.S.R. The country continued as a leading producer of asbestos, nickel, potash, and zinc and the second largest producer of molybdenum and uranium. Also, Canada ranked first in the world in mineral exports. Over 80% of the country's mine output was shipped to more than 100 countries. The United States was the principal customer for Canadian mineral products. These products accounted for nearly 27% of total national exports and, directly and indirectly, about 6% of all employment.

Government Policies and Programs.— The Canadian mining industry is dependent on foreign markets, since about 80% of its output is exported. The greater portion of these exports go to the United States. Periodic talks have been held between Canada and the United States to address the question of free trade between the two countries and to examine the benefits and costs. In November 1984, Canada's Minister for International Trade outlined possible issues for discussion that included (1) a comprehensive trade agreement that would remove all barriers on bilateral trade, or a sectoral free trade agreement wherein products in certain defined sectors are traded free of barriers, and (2) a trade arrangement whereby the present trade regime is maintained with provisions for a balance of advantage for the two countries. These and other possibilities were expected to be the subjects of future discussions between the two countries.

The national elections in 1984 brought a change of administration in the Federal Government. The newly elected Conservative Party was conducting an extensive review of the National Energy Program and the Federal Investment Review Agency. Tax incentive measures and other actions to increase profitability and attract investments in the mining industry were under review by the Federal Government.

Five new Mineral Development Agreements (MDA) between the Federal Government and the Provinces of Manitoba, New Brunswick, New Foundland, Nova Scotia, and Saskatchewan were signed. The total Federal commitment for the five MDA's was $49 million, and the Provincial commitment was $29 million. Discussions with other Provinces were continuing. Work under the MDA's provide geoscience data, mining and processing technology, and market and economic studies to identify new development opportunities.

In early 1984, the government of Quebec announced grants for a total of $45 million to accelerate mineral resource projects that would have been delayed owing to the economic situation. Companies that were reported to have received funds were Les Mines Selbaie ($19 million), Northgate Patino Mines Inc. ($12 million), Gaspe Copper Mines Ltd. ($9.8 million), Camchib Resources Inc. ($2 million), Les Mines d'Argent Abcount Inc. ($1.7 million), and Aiquebelle Resources Inc. ($600,000). The grants were contingent upon the above companies investing $196 million.

PRODUCTION

According to the Canadian Department of Energy, Mines and Resources (EMR), the total value of Canada's mineral production, including fuel and nonfuel minerals, in 1984 was $32.6 billion compared with $29.2 billion in 1983. The 10 leading minerals were petroleum, natural gas, natural gas byproducts, coal, iron ore, zinc, copper, gold, nickel, and uranium, which represented 87% of the total value of output of the industry. All of these commodities except copper, gold, and silver showed increases in value over those of 1983. The metallic sector's value of output was $6.4 billion, a 15% increase over that of 1983. Nonmetallics and industrial materials totaled $3.2 billion, up 13.5% over that of 1983. The fuel sector's value totaled $22.7 billion, an increase of 10.5% over that of 1983.

The largest share of the total value of output was produced by the Province of Alberta, whose $19.7 billion represented 60% of the total value. Of this share, $11.4 billion was for crude petroleum, $5.3 billion for natural gas, $3.3 billion for natural gas byproducts, $442 million for sulfur, and $364 million for coal. Ontario was second in output with $3.4 billion, which represented 10% of the total value. Output was up significantly in Saskatchewan with a 33% increase over that of 1983 to almost $3 billion. British Columbia's mineral output was up slightly with a total of $2.5 billion, while Quebec's output remained relatively unchanged at $1.5 billion. The Northwest Territories' output of $560 million showed the sharpest increase because of the reopening of some mining operations that had been closed because of economic conditions.

According to a survey by The Northern Miner,[4] Canadian companies were planning to bring at least 40 underground and open pit mines into production in Canada and the United States before 1992. Capital investment requirements were estimated at about $2 billion, with more than one-half of the potential mines expected to be gold producers.

The value of mineral output increased in 9 of 10 Provinces. It increased in the Northwest Territory and decreased in the Yukon Territory. The Province of Alberta with its large oil and gas output accounted for approximately 60% of Canada's total mineral value. Production values of the Provinces and Territories follow:

Province or Territory	Value, billion U.S. dollars	
	1983	1984[p]
Alberta	18.3	19.7
Ontario	2.8	3.4
Saskatchewan	2.1	2.9
British Columbia	2.2	2.5
Quebec	1.5	1.5
Newfoundland-Labrador	.6	.8
Northwest Territories	.5	.6
Manitoba	.5	.5
New Brunswick	.4	.4
Nova Scotia	.2	.2
Yukon Territory	(1)	(1)
Prince Edward Island	(1)	(1)
Total	29.2	32.6

[p]Preliminary.
[1]Less than 1/2 unit.

Source: Department of Energy, Mines and Resources, Ottawa, Canada. Canadian Mineral Survey, 1984.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Alumina, gross weight ____ thousand tons	1,202	1,208	1,127	1,116	1,126
Metal:					
Primary	1,068,198	1,115,691	1,064,795	1,091,231	1,231,000
Secondary	65,147	59,281	62,000	63,000	64,000
Antimony[e] [2]	2,361	([3])	--	--	510
Bismuth[4]	150	168	189	202	220
Cadmium[5]	1,303	1,298	[r]854	1,456	1,602
Calcium ____ kilograms	531,000	469,403	W	W	W
Cobalt:					
Mine output, metal content[6]	2,118	2,080	1,404	1,584	2,325
Metal[7]	1,018	1,277	1,041	1,324	1,890
Columbium and tantalum:					
Columbium concentrate (pyrochlore):					
Gross weight[e]	3,884	4,100	4,758	3,100	4,368
Cb content	1,722	1,916	2,145	1,300	1,965
Tantalum concentrate:					
Gross weight[e]	550	289	258	--	--
Cb content	8	9	8	--	--
Ta content	94	94	77	--	--
Copper:					
Mine output, recoverable metal content[8]	716,400	619,328	612,455	653,040	712,374
Metal, primary and secondary:					
Blister and anode	492,710	479,046	366,625	375,000	452,000
Refined	505,238	476,655	337,780	464,333	515,000
Gold ____ thousand troy ounces	1,552	1,673	2,081	2,363	2,614
Iron and steel:					
Iron ore:[9]					
Gross weight ____ thousand tons	48,154	51,985	35,425	33,495	37,188
Iron content ____ do	30,803	32,642	22,530	21,300	23,566
Metal:					
Pig iron ____ do	11,183	9,743	8,000	9,443	10,629
Ferroalloys ____ do	289	282	218	269	216
Steel, crude ____ do	15,887	14,811	11,762	12,828	14,715
Semimanufactures[10] ____ do	13,030	13,186	9,556	NA	NA
Lead:					
Mine output, Pb content	296,641	332,045	[r]341,212	251,467	259,402
Metal, refined:					
Primary	162,463	168,450	174,310	178,043	173,000
Secondary	72,117	69,658	67,566	63,914	79,000
Magnesium metal, primary	8,899	8,548	7,900	6,000	8,000
Molybdenum	12,198	12,850	13,961	10,194	10,965
Nickel:					
Mine output, metal content[11]	184,802	160,247	88,581	128,113	174,195
Metal, smelter	152,299	109,303	58,636	87,200	104,000
Platinum-group metals ____ troy ounces	410,757	382,667	228,426	223,925	348,216
Selenium, refined[12] ____ kilograms	453,600	350,010	222,000	266,000	448,000
Silver ____ thousand troy ounces	34,401	36,311	42,246	35,559	37,568
Tellurium, refined[12] ____ kilograms	45,000	21,297	[e]18,000	[r e]16,000	15,000
Tin, mine output, metal content	243	239	135	141	217
Titanium:					
Ilmenite, gross weight ____ thousand tons	1,853	2,008	1,735	1,600	1,800
Sorel slag (80% TiO_2)[13]	847,710	759,191	669,000	630,000	720,000
Tungsten, mine output, W content	3,179	1,993	2,842	328	3,690
Uranium oxide (U_3O_8)	7,947	8,853	7,643	8,483	9,693
Zinc:					
Mine output, Zn content	1,058,714	1,095,958	1,189,000	987,713	1,213,000
Metal, refined, primary	591,565	618,650	511,870	617,033	685,000
NONMETALS					
Asbestos ____ thousand tons	1,323	1,122	834	858	922
Barite	94,317	86,117	27,744	45,000	48,000
Cement, hydraulic[14] ____ thousand tons	10,497	10,145	8,426	7,871	8,619
Clays and clay products[15] ____ value, thousands	$133,611	$119,116	$95,993	$127,400	$105,700
Diatomite[e]	3,615	2,600	2,000	2,000	2,000
Gypsum and anhydrite ____ thousand tons	7,209	7,025	5,987	7,507	8,725
Lime ____ do	2,554	2,555	2,197	2,232	2,261
Magnesite, dolomite, brucite ____ value, thousands	$10,405	$11,472	$8,216	$7,825	$7,590
Mica, scrap and flake	9,979	10,881	9,979	10,433	10,881
Nepheline syenite	592,000	587,565	[r]550,000	528,000	485,000
Nitrogen: N content of ammonia	2,095,577	2,176,249	2,062,100	2,887,870	3,493,464
Pigments, mineral: Iron oxides, natural	[e]2,800	([3])	--	--	--
Potash, K_2O equivalent ____ thousand tons	7,532	6,549	5,309	5,708	6,324
Pyrite and pyrrhotite, gross weight	32,000	10,198	19,268	[e]5,000	5,000
Salt ____ thousand tons	7,700	7,240	7,940	8,602	10,294
Sand and gravel ____ do	276,452	259,661	207,227	233,408	220,649
Silica (quartz)	2,525	2,238	1,797	2,303	2,624

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Sodium compounds, n.e.s.:					
Sodium carbonate[e]	450,000	475,000	475,000	425,000	365,000
Sodium sulfate	480,666	535,214	542,839	454,000	387,000
Stone[16] thousand tons	103,366	85,041	61,929	74,466	78,315
Sulfur:					
Elemental byproduct:					
Of smelter gases do	903	783	627	678	875
Of sour natural gas do	5,899	5,599	5,226	5,390	5,260
Of refineries[e] do	160	160	160	170	165
Of tar sands do	286	247	259	330	302
S content of pyrite and pyrrhotite[e] do	14	10	9	5	7
Talc, soapstone, pyrophyllite	91,848	82,715	72,182	97,000	126,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	135,000	130,000	130,000	135,000	176,500
Coal:					
Bituminous and subbituminous	30,717,000	33,290,000	35,317,000	37,048,000	47,510,000
Lignite	5,971,000	6,798,000	7,494,000	7,760,000	9,918,000
Coke, high-temperature	5,250,000	4,659,000	4,000,000	4,120,000	4,900,000
Gas, natural:					
Gross million cubic feet	3,541,024	3,019,191	3,076,002	3,372,670	3,173,000
Marketed do	3,067,711	2,399,415	2,682,747	2,465,100	2,506,000
Natural gas liquids:					
Gross:					
Butane thousand 42-gallon barrels	21,292	20,443	20,375	19,793	30,492
Propane do	34,188	33,016	33,547	30,211	37,322
Pentanes plus do	38,089	36,420	35,366	33,371	34,513
Ethane do	20,475	29,541	26,698	29,577	35,765
Condensate do	1,188	1,881	936	880	1,057
Total do	115,232	121,301	116,922	113,832	139,149
Peat	[r]488,000	461,993	[e]487,000	544,000	499,000
Petroleum:					
Crude[17] thousand 42-gallon barrels	523,441	467,701	464,122	494,617	560,360
Refinery products:					
Gasoline:					
Aviation do	1,472	1,480	1,066	1,081	1,313
Other do	241,778	239,707	212,126	215,000	221,300
Jet fuel do	30,537	28,841	25,153	18,232	17,235
Kerosine do	24,184	18,575	16,256	13,803	13,819
Distillate fuel oil do	181,930	171,907	146,938	81,708	54,484
Residual fuel oil do	102,124	100,707	74,472	76,000	56,472
Lubricants do	5,720	5,898	4,860	4,940	5,806
Liquefied petroleum gas do	13,520	16,337	16,101	15,600	21,008
Petrochemical feedstocks do	32,894	32,366	28,900	26,962	25,701
Asphalt do	20,907	19,139	16,065	16,656	16,096
Petroleum coke do	1,218	} 20,327	10,623	9,870	10,127
Unspecified do	5,310				
Refinery fuel and losses do	32,035	40,360	36,186	36,000	38,000
Total do	693,629	695,644	588,746	515,852	481,361

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available. W Withheld to avoid disclosing company proprietary data.

[1]Table includes data available through May 31, 1985.

[2]Sb content of antimonial lead alloys, flue dust, and doré slag estimated on the basis of reported gross production.

[3]Revised to zero.

[4]Refined metal and bullion from domestic ores plus recoverable Bi content of exported concentrates.

[5]Refined metal from domestic ores plus recoverable Cd content of exported ores and concentrates.

[6]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.

[7]Actual output not reported. Data represent the output within Canada of metallic cobalt from ores of both Canadian and non-Canadian origin.

[8]Blister copper from domestic ores plus recoverable Cu content of exported matte and concentrates.

[9]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: 1980—49,068; 1981—44,551; 1982—35,425; 1983—24,988; and 1984—31,235.

[10]Includes shipment of ingots from primary plants for rolling elsewhere.

[11]Refined nickel from domestic ores plus Ni content of oxide produced and recoverable Ni content of exported matte.

[12]From all sources, including imports and secondary sources.

[13]Refined Sorel slag contained 72% TiO_2 in 1980-82; 74% TiO_2 in 1983; and 80% TiO_2 in 1984.

[14]Cement shipped and/or used by producers.

[15]Includes bentonite,products from common clay, stoneware clay, fire clay, and other clays.

[16]Crushed, building, ornamental, paving, and similar stone.

[17]Including synthetic crude (from oil shale and/or tar sands).

Table 2.—Canada: Mineral production in 1984, by commodity

(Percent)

Commodity	Share of total[p]
Petroleum, crude	41.5
Natural gas	17.4
Natural gas products	6.5
Coal	4.2
Copper	3.5
Gold	3.2
Iron ore	2.8
Uranium	2.8
Nickel	2.1
Cement	1.9
Potash	1.6
Other	12.5
Total	100.0

[p]Preliminary.

Sources: Department of Energy, Mines and Resources, Canada, and Statistics Canada, 1984.

Mining activities were conducted in every region of the country. The values of principal mineral production follow:

Commodity	Value, million U.S. dollars	
	1983	1984[p]
METALS		
Iron ore	963	1,115
Zinc	861	1,090
Copper	1,034	1,024
Gold	933	931
Nickel	592	883
Uranium (U)	507	695
Silver	421	310
Lead	122	196
Molybdenum	68	83
Total	5,501	6,327
NONMETALS		
Asbestos	296	634
Cement	460	506
Potash, K_2O equivalent	490	313
Salt	131	163
Lime	119	132
Clay products	100	107
Gypsum	45	52
Total	1,641	1,907
MINERAL FUELS		
Petroleum	13,649	13,564
Natural gas	5,366	5,699
Coal	989	1,376
Total	20,004	20,639

[p]Preliminary.

Source: Department of Energy, Mines and Resources, Ottawa, Canada. Canadian Mineral Survey, 1984.

TRADE

Minerals have been a central element of trade for many years and accounted for nearly 27% of total exports in 1984. The Canadian material sector's trade surplus usually offsets the cumulative deficit from other sectors. However, the mineral sector, like other sectors, has had to contend with protectionist pressures as well as stiffer competition from exporting countries whose currencies have depreciated relative to the Canadian dollar. Canada had the second strongest currency in the world in 1984, and this created problems with mining costs and metal prices. EMR estimated that, in terms of local currency, the price of copper, in less than 4 years, has dropped 33% for producers in the United States, dropped 25% for Canadian producers, and has risen 100% for producers in Chile. Exchange rate depreciation leads to higher prices in Canada not only for imports but also for Canadian mineral production that can be exported. Countries with external debt problems that must maintain production of minerals to earn foreign exchange further stressed the international market and made it increasingly difficult for Canadian producers to maintain their share of the market. The Canadian mineral industry, being mainly export oriented, was able to contend with the changes and adjustments taking place worldwide. The improved aspects of the international market in 1984 led to an increase in mineral exports. EMR reported that in the first 9 months, exports of crude and fabricated materials totaled almost $17 billion, a 20% increase over that of the same period in 1983. Of these exports, 75% went to the United States. The growth of the export market led to increased production in some mineral commodities such as coal, copper, iron ore, nickel, and some nonmetallic minerals. Mineral imports showed a 23% increase in value, totaling over $7 billion for the first 9 months of 1984. If mineral fuels were excluded, 71% of these mineral imports were from the United States.

Table 3.—Canada: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	28,367	46,001	41,356	United Kingdom 2,075; Italy 581.
Metal including alloys:				
Scrap	62,796	81,425	72,440	Japan 7,844; Taiwan 275.
Unwrought	896,462	925,449	581,171	NA.
Semimanufactures[2]	43,999	66,332	57,212	Indonesia 1,460; Costa Rica 1,429.
Cadmium: Metal including alloys, all forms	770	1,365	776	United Kingdom 495; Netherlands 88.
Cobalt:				
Oxides and hydroxides	212	192	8	United Kingdom 184.
Metal including alloys, all forms	585	887	656	United Kingdom 108; Belgium-Luxembourg 68.
Copper:				
Ore and concentrate including matte, Cu content	257,934	313,796	12,255	Japan 212,094; Republic of Korea 38,716; Taiwan 23,761.
Ash and residue containing copper	1,356	1,708	1,708	
Metal including alloys:				
Scrap	51,745	53,469	46,092	Japan 2,643; Taiwan 1,189.
Unwrought	233,118	298,555	93,166	China 67,137; United Kingdom 46,444.
Semimanufactures	32,727	39,357	32,274	Venezuela 1,623; Israel 1,162.
Gold:				
Ore and concentrate, Au content troy ounces	164,419	201,681	45,011	Japan 114,199; Taiwan 12,089.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,842	2,550	2,402	Japan 74; Hong Kong 18.
Iron and steel:				
Iron ore and concentrate thousand tons	27,281	25,528	8,924	United Kingdom 5,041; Japan 3,184; West Germany 2,160.
Metal:				
Scrap	627,007	874,603	641,976	Japan 79,748; Republic of Korea 65,673.
Pig iron, cast iron, related materials	514,726	385,252	82,263	Netherlands 150,341; Japan 58,005.
Ferroalloys:				
Ferromanganese	11,739	4,160	4,160	
Ferrosilicon	40,860	45,728	27,133	Japan 14,909; West Germany 1,560.
Unspecified	5,129	5,188	3,272	West Germany 797; Republic of Korea 373.
Steel, primary forms	255,611	579,096	565,485	Philippines 5,987; Italy 5,231.
Semimanufactures:				
Bars, rods, angles, shapes, sections	602,064	807,983	699,111	Algeria 20,265; Saudi Arabia 19,358.
Universals, plates, sheets	1,717,136	873,346	683,316	Mexico 31,959; Thailand 27,409.
Rails and accessories	106,986	38,322	37,640	Dominican Republic 478.
Wire	97,256	129,573	127,873	Republic of South Africa 442.
Tubes, pipes, fittings	293,278	251,908	228,513	Syria 8,534; Iran 5,008.
Castings and forgings, rough	101,755	113,274	111,516	Mexico 1,049.
Lead:				
Ore and concentrate, Pb content	106,744	85,548	6,528	Belgium-Luxembourg 53,545; West Germany 15,049.
Metal including alloys:				
Scrap	15,895	8,535	5,913	Spain 758; Republic of Korea 756.
Unwrought	146,168	147,281	63,679	United Kingdom 28,780; Belgium-Luxembourg 13,008.
Semimanufactures	6,679	11,411	10,720	Taiwan 299; Italy 251.
Magnesium: Metal including alloys, all forms	4,536	2,577	1,037	Japan 797; United Kingdom 470.
Molybdenum: Ore and concentrate including scrap, Mo content	17,429	11,349	438	United Kingdom 2,451; Netherlands 2,098; West Germany 2,006.
Nickel:				
Ore and concentrate including matte	27,037	40,087	4	Norway 22,812; United Kingdom 17,271.
Oxides and hydroxides, N content	13,127	11,186	5,501	NA.
Metal including alloys:				
Scrap	3,283	2,988	2,525	Netherlands 329; Austria 61.
Unwrought	62,436	67,386	37,706	NA.
Semimanufactures	10,524	10,451	7,818	Republic of South Africa 676; Belgium-Luxembourg 603.
Platinum-group metals:				
Ore and concentrate, metal content troy ounces	230,585	185,092	2,636	United Kingdom 182,455.
Metal including alloys:				
Waste and scrap do	50,895	39,192	32,119	United Kingdom 7,073.
Unwrought and partly wrought do	30,672	101,307	88,189	United Kingdom 11,349; Japan 965.

See footnotes at end of table.

Table 3.—Canada: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Selenium, elemental	214	707	87	Belgium-Luxembourg 453; United Kingdom 111.
Silver:				
Ore and concentrate, Ag content thousand troy ounces	19,390	14,176	2,886	Japan 5,968; Belgium-Luxembourg 3,020.
Metal including alloys, unwrought and partly wrought do.	36,596	33,804	33,669	Japan 42; Brazil 25.
Tin: Ore and concentrate, Sn content	608	381	58	United Kingdom 271; Spain 52.
Uranium and/or thorium: Ore and concentrate value, thousands	$290,655	$50,775	$20,610	United Kingdom $30,165.
Zinc:				
Ore and concentrate, Zn content	457,757	660,792	8,939	Belgium-Luxembourg 334,672; West Germany 113,698; Japan 47,817.
Blue powder	2,316	4,415	4,090	Colombia 169; United Kingdom 128.
Metal including alloys:				
Scrap	73,611	17,996	12,608	United Kingdom 2,549; West Germany 1,610.
Unwrought	470,415	500,609	309,509	China 54,244; United Kingdom 25,697.
Semimanufactures	1,112	1,997	1,768	Chile 80; Hong Kong 74.
Other:				
Ores and concentrates	124,684	100,174	29,456	West Germany 44,065; France 9,635.
Ashes and residues	24,305	24,868	14,958	Taiwan 5,649; Japan 3,965.
Precious metals, unspecified: Metals:				
Waste and sweepings value, thousands	$44,135	$75,072	$32,658	United Kingdom $27,148; West Germany $12,726.
Unwrought and partly wrought do.	$97	$21	$20	Bermuda $1.
Base metals including alloys, all forms	2,840	2,548	1,546	U.S.S.R. 500; United Kingdom 316.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	77	795	733	Japan 24; Peru 20.
Artificial:				
Corundum	110,665	110,226	104,163	United Kingdom 5,990.
Silicon carbide	58,951	68,476	68,476	
Grinding and polishing wheels and stones value, thousands	$3,103	$4,146	$2,894	West Germany $566; Finland $287.
Asbestos, milled including crude	880,764	753,911	182,851	Japan 90,403; India 43,675.
Barite and witherite	481	795	795	
Cement thousand tons	1,752	1,561	1,500	Saudi Arabia 40; Algeria 19.
Clays, crude	573	293	273	Australia 20.
Diamond:				
Gem, not set or strung carats	62,578	36,894	16,720	Belgium-Luxembourg 10,091; Israel 7,161.
Industrial stones do.	344,780	299,340	204,130	Ireland 78,642; United Kingdom 11,501.
Dust and powder do.	191,879	77,850	77,850	
Feldspar, fluorspar, and related materials: Nepheline syenite	414,785	398,390	345,336	Netherlands 20,995; Australia 8,943.
Fertilizer materials: Manufactured:				
Ammonia	519,725	674,974	674,974	
Nitrogenous thousand tons	1,562	1,556	1,489	Costa Rica 23.
Potassic do.	7,222	8,964	5,657	Japan 869; China 537.
Unspecified and mixed do.	99	116	113	United Kingdom 1.
Gypsum and plaster	4,776	5,817	5,816	Bermuda 1.
Lime	281,251	215,946	215,520	Bermuda 177.
Pigments, mineral: Iron oxides and hydroxides, processed	14,642	13,768	13,408	Venezuela 286.
Precious and semiprecious stones other than diamond value, thousands	$5,843	$8,336	$4,617	Italy $1,176; Switzerland $790.
Salt and brine thousand tons	1,734	1,916	1,909	Guyana 2.
Sodium compounds, n.e.s.: Sulfate, manufactured	367,986	265,895	265,668	Panama 150.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	19,176	58,781	51,897	Italy 4,297; Japan 2,319.
Limestone other than dimension	1,517,538	1,390,819	1,390,819	
Quartz and quartzite	65,334	103,960	103,944	Italy 16.
Sand and gravel	169,099	95,652	83,950	Bermuda 11,497.

See footnotes at end of table.

Table 3.—Canada: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental, all forms thousand tons	6,112	5,671	1,113	Brazil 573; Australia 364.
Sulfuric acid	259,740	250,715	250,704	Ecuador 9.
Other: Crude value, thousands	$90,474	$87,362	$33,630	West Germany $21,644; France $16,835.
MINERAL FUELS AND RELATED MATERIALS				
Coal, all grades including briquets thousand tons	15,529	16,979	183	Japan 10,966; Republic of Korea 2,357; West Germany 779.
Coke and semicoke	130,040	45,777	45,777	
Gas, natural million cubic feet	713,329	707,111	707,111	
Peat, agricultural	356,028	396,883	375,478	Japan 17,395; Saudi Arabia 2,937.
Petroleum:				
Crude thousand 42-gallon barrels	76,509	105,529	104,153	Japan 1,376.
Refinery products:				
Liquefied petroleum gas do	50,859	41,176	38,418	Japan 2,632; Mexico 125.
Gasoline do	3,373	7,800	7,777	St. Pierre and Miquelon 20.
Distillate fuel oil do	4,285	10,457	10,204	St. Pierre and Miquelon 247.
Lubricants do	115	178	163	Trinidad and Tobago 3; Brazil 2.
Residual fuel oil do	13,064	13,613	13,307	Japan 277.
Asphalt do	2,136	1,316	1,293	Cameroon 12; United Kingdom 8.
Petroleum coke do	586	360	289	Japan 71.

[r]Revised. NA Not available.
[1]Table prepared by Tracy Leffingwell.
[2]May include shapes not normally included among semimanufactures.

Table 4.—Canada: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	2,575	2,330	25	Brazil 1,264; Guinea 614; Guyana 337.
Oxides and hydroxides do	939	1,063	13	Jamaica 424; Japan 261; Australia 257.
Metal including alloys:				
Scrap	36,756	54,666	53,940	United Kingdom 252; Netherlands 240.
Unwrought	27,799	33,391	23,960	United Kingdom 3,155; West Germany 1,945.
Semimanufactures	97,812	119,200	97,989	West Germany 8,319; France 5,162.
Antimony: Oxides	780	1,001	263	United Kingdom 576; Belgium-Luxembourg 141.
Chromium:				
Ore and concentrate, Cr content	8,053	9,759	3,690	Republic of South Africa 3,444; New Caledonia 2,625.
Oxides and hydroxides	1,162	1,718	999	United Kingdom 472; West Germany 159.
Cobalt: Oxides and hydroxides	30	29	5	United Kingdom 22.
Copper:				
Ore and concentrate, Cu content	12,361	24,535	845	Chile 22,980; Peru 571.
Oxides and hydroxides	287	201	174	West Germany 20; Norway 6.
Sulfate	4,537	873	186	Belgium-Luxembourg 560; Netherlands 72.
Metal including alloys:				
Scrap	41,127	71,528	70,875	United Arab Emirates 87; West Germany 76.
Unwrought	28,028	24,559	6,461	Zaire 8,255; Chile 5,758.
Semimanufactures	27,594	38,571	26,715	West Germany 2,565; Japan 2,481.
Gold:				
Ore and concentrate, Au content troy ounces	14,307	29,514	24,852	Peru 4,598.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,661	2,123	1,669	Costa Rica 114; Nicaragua 104.

See footnotes at end of table.

Table 4.—Canada: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite ___ thousand tons	3,359	4,013	3,978	Brazil 35.
Metal:				
Scrap	409,403	665,867	665,646	United Kingdom 65.
Pig iron, cast iron, related materials	8,519	11,470	7,296	Brazil 4,098.
Ferroalloys:				
Ferrochromium	21,785	32,565	5,506	Republic of South Africa 20,608; Yugoslavia 2,522.
Ferromanganese	25,088	18,263	8,505	Mexico 3,640; West Germany 2,300.
Ferrosilicomanganese	2,877	464	457	Brazil 7.
Ferrosilicon	9,860	13,088	12,632	Brazil 228; West Germany 173.
Unspecified	5,052	7,231	4,227	Brazil 875; Dominican Republic 601.
Steel, primary forms	60,690	91,895	60,400	France 27,041; Belgium-Luxembourg 1,768.
Semimanufactures:				
Bars, rods, angles, shapes, sections	339,987	440,387	162,296	Belgium-Luxembourg 60,236; Japan 57,463.
Universals, plates, sheets	505,275	497,311	244,203	Japan 64,071; West Germany 34,394.
Hoop and strip	35,943	37,001	30,622	Sweden 2,052; France 1,374.
Rails and accessories	31,728	20,060	5,173	France 4,632; United Kingdom 4,208.
Wire	49,305	63,278	11,944	United Kingdom 11,074; Belgium-Luxembourg 5,228.
Tubes, pipes, fittings	249,582	217,379	82,774	Japan 65,370; West Germany 13,240.
Castings and forgings, rough	25,757	37,680	32,204	Italy 1,191; Sweden 690.
Lead:				
Ore and concentrate, Pb content	34,411	18,548	8,687	Republic of South Africa 5,263; Peru 2,530.
Oxides	839	1,409	1,194	United Kingdom 75; Republic of South Africa 66.
Metal including alloys:				
Scrap	54,525	58,072	57,980	Belgium-Luxembourg 49.
Unwrought	5,661	2,551	2,179	Mexico 350.
Semimanufactures	1,753	1,298	1,253	Hong Kong 18.
Magnesium: Metal including alloys, all forms	2,572	4,787	4,520	United Kingdom 111; Norway 84.
Manganese:				
Ore and concentrate, metallurgical-grade, Mn content	71,658	42,260	3,316	Gabon 20,931; Brazil 9,976; Republic of South Africa 8,037.
Oxides	4,067	4,852	3,562	Japan 757; Greece 526.
Metal including alloys, all forms	781	2,652	265	Republic of South Africa 2,051; China 300.
Mercury ___ 76-pound flasks	1,534	2,147	1,624	Spain 493.
Molybdenum: Oxides and hydroxides	193	141	122	United Kingdom 19.
Nickel:				
Ore and concentrate including matte, Ni content	22,355	29,281	12,316	Australia 6,601; Belgium-Luxembourg 3,650.
Metal including alloys:				
Scrap	18,991	24,386	12,242	Belgium-Luxembourg 3,650; Norway 2,730.
Unwrought	2,431	2,357	654	U.S.S.R. 1,045; United Kingdom 444.
Semimanufactures	4,128	3,193	1,653	West Germany 686; Dominican Republic 347.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	14,854	18,294	11,960	United Kingdom 5,755; Switzerland 579.
Silver:				
Ore and concentrate including waste, metal content[2]	3,127	4,889	4,647	Peru 85; Chile 36.
Metal including alloys, unwrought and partly wrought thousand troy ounces	15,567	10,913	9,026	Chile 1,077; El Salvador 525.
Tin:				
Ore and concentrate, Sn content	23	29	29	
Metal including alloys:				
Unwrought	3,235	3,749	1,393	Brazil 980; Bolivia 798.
Semimanufactures	308	349	320	West Germany 9; United Kingdom 7.
Titanium:				
Oxides	5,737	12,968	7,101	West Germany 2,797; France 790.
Metal including alloys, all forms	504	275	227	United Kingdom 20; Japan 18.
Tungsten: Ore and concentrate, W content	8	12	9	China 3.
Uranium and/or thorium: Ore and concentrate ___ value, thousands	$102,783	$90,784	$1,654	Australia $47,042; Republic of South Africa $42,087.

See footnotes at end of table.

Table 4.—Canada: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate, Zn content	29,492	78,100	36,110	Peru 28,148; Honduras 6,229.
Oxides	1,367	1,257	1,084	Netherlands 124; Mexico 39.
Blue powder	616	445	445	
Metal including alloys:				
Scrap	1,038	298	298	
Unwrought	689	9,964	1,795	West Germany 2,729; Netherlands 2,297.
Semimanufactures	1,350	1,492	1,242	West Germany 134.
Zirconium: Metal including alloys, all forms	243	191	144	France 43; West Germany 3.
Other:				
Ores and concentrates, metal content	80,508	80,408	71,071	Australia 6,309; Republic of South Africa 2,725.
Ashes and residues	8,330	10,979	10,979	
Base metals including alloys, all forms	1,134	1,392	1,173	Japan 61; United Kingdom 47.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	30,504	29,493	28,829	Greece 617.
Grinding and polishing wheels and stones value, thousands	$13,519	$14,529	$9,748	Italy $1,422; West Germany $979.
Asbestos, crude	573	454	304	Republic of South Africa 150.
Barite and witherite	23,456	29,952	4,602	Ireland 24,690; Netherlands 655.
Boron materials: Oxides and acids	7,140	4,773	4,452	France 132; Italy 69.
Cement	231,834	253,015	251,168	Japan 1,367.
Clays, crude:				
Bentonite	238,031	187,221	109,713	Greece 77,472.
Chamotte earth	5,339	4,655	4,655	
Fire clay	33,575	30,066	29,841	United Kingdom 225.
Fuller's earth	1,081	536	536	
Kaolin	205,955	249,834	248,425	United Kingdom 1,408.
Unspecified	105,859	89,119	88,992	United Kingdom 72; Switzerland 24.
Cryolite and chiolite	4,646	568	208	Denmark 220; Netherlands 140.
Diamond:				
Gem, not set or strung thousand carats	201	276	54	Belgium-Luxembourg 147; Israel 47.
Industrial stones do	1,091	1,168	993	Ireland 108; U.S.S.R. 20.
Dust and powder do	886	1,578	680	U.S.S.R. 894; United Kingdom 2.
Diatomite and other infusorial earth	23,310	23,298	23,298	
Fertilizer materials:				
Crude, n.e.s	25,098	41,059	40,757	West Germany 152.
Manufactured:				
Ammonia	32,603	41,193	41,193	
Nitrogenous	158,716	226,733	166,764	Netherlands 47,797; Belgium-Luxembourg 10,291.
Phosphatic	249,833	360,304	356,319	Netherlands 2,927.
Potassic	79,577	65,055	65,048	United Kingdom 7.
Unspecified and mixed	49,007	39,821	39,399	Netherlands 171.
Fluorspar	126,594	141,928	7,001	Mexico 79,178; Morocco 27,010.
Gypsum and plaster	93,843	100,939	3,479	Mexico 97,444.
Iodine	111	193	66	Japan 102; Chile 20.
Lime	15,963	22,844	22,822	France 22.
Magnesium compounds: Oxides and hydroxides	37,657	42,054	31,628	Netherlands 6,266; Italy 2,500.
Mica:				
Crude including splittings and waste	2,860	2,791	2,790	India 1.
Worked including agglomerated splittings value, thousands	$2,242	$2,170	$1,124	France $907.
Nitrates, crude	5,571	1,934	1,212	Chile 722.
Phosphates, crude thousand tons	2,477	2,663	2,663	
Pigments, mineral: Iron oxides and hydroxides, processed	6,181	6,436	4,911	West Germany 454; United Kingdom 422.
Precious and semiprecious stones other than diamond value, thousands	$18,800	$26,258	$10,281	Japan $3,736; Hong Kong $1,858.
Salt and brine thousand tons	1,527	814	464	Mexico 267; Spain 45.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	121,958	126,047	126,035	West Germany 7.
Sulfate, manufactured	17,293	22,479	713	United Kingdom 21,715.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	45,133	44,323	19,362	Republic of South Africa 14,369; Italy 6,930.
Worked value, thousands	$18,589	$14,116	$4,674	Italy $8,548.
Dolomite, chiefly refractory-grade	7,595	2,418	2,418	
Gravel and crushed rock	71,379	43,986	43,889	Italy 63.
Limestone other than dimension	1,485,420	1,799,861	1,799,861	
Quartz and quartzite	242	271	248	Japan 20.
Sand other than metal-bearing	1,968,043	1,861,276	1,861,113	West Germany 92.

See footnotes at end of table.

Table 4.—Canada: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental, all forms	2,159	2,364	2,353	Italy 11.
Sulfuric acid	192,497	126,573	116,567	West Germany 7,484; Norway 2,522.
Talc, steatite, soapstone, pyrophyllite	34,521	35,390	35,300	United Kingdom 46; Italy 42.
Vermiculite	24,077	20,907	17,023	Republic of South Africa 3,884.
Other:				
Crude value, thousands	$10,859	$7,556	$7,066	Mexico $191; West Germany $62.
Slag and dross, not metal-bearing	106,267	141,461	139,489	United Kingdom 1,797.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,623	1,949	1,913	Trinidad and Tobago 36.
Carbon: Carbon black	7,505	8,183	7,828	Mexico 200; United Kingdom 92.
Coal: All grades including briquets thousand tons	15,716	14,731	14,725	Republic of South Africa 6.
Coke and semicoke	413,721	585,861	557,739	West Germany 28,122.
Gas, natural: Gaseous million cubic feet	90,087	37,292	37,292	
Petroleum:				
Crude thousand 42-gallon barrels	123,728	90,653	11,151	Venezuela 23,276; Mexico 18,799; Iraq 14,440.
Refinery products:				
Mineral jelly and wax do	63	54	49	West Germany 2.
Kerosine and jet fuel do	56	2,900	812	Venezuela 744; Algeria 435.
Distillate fuel oil do	3	1,147	474	Venezuela 671.
Residual fuel oil do	9,934	7,273	3,842	Venezuela 2,605; Bahamas 437.
Bitumen and other residues do	229	204	204	
Petroleum coke do	3,578	4,178	3,705	NA.

[r]Revised. NA Not available.
[1]Table prepared by Tracy A. Leffingwell.
[2]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Production of primary aluminum, estimated at 1.2 million tons, was about 13% higher than in 1983. The total primary aluminum smelting capacity was 1.2 million tons per year, and at the end of 1984, all smelters were operating at capacity, except for the Aluminum Co. of Canada Ltd.'s (ALCAN) Arvida plant at Jonquiere, Quebec, which was operating at about 87% of its installed capacity. Canada continued plans to increase aluminum capacity through new construction. In early 1984, Aluminium Pechiney S.A. of France signed an agreement with Société Générale de Financement (SGF), an industrial holding company owned by the Quebec government, and Alumax Ltd., which is jointly owned by AMAX Inc. of the United States and Mitsui & Co. of Japan, to build a $1.5 billion, 230,000-ton-per-year aluminum smelter at Becancour, Quebec. The operating company will be known as Alumirie de Becancour Inc., with 50% interest held by Aluminium Pechiney and 25% interest each held by Alumax and SGF. The first 115,000-ton-per-year potline was expected to be in production by mid-1986, and the second, by the end of 1987. The project has a long-term power contract with Hydro-Quebec for supply of 400 megawatts of electricity, with an option for an additional 200 megawatts later. The agreement also included a 50% discount on power rates for the first few years of operation.

In late 1984, Aluminum Co. of America (Alcoa) withdrew from a joint venture with the Province of Manitoba to build a $700 million aluminum smelter in the Province. The reason for Alcoa's decision was thought to be low metal prices and the company's decision to concentrate on its fabricating business instead of primary aluminum production. ALCAN was reported as shelving its $3 billion Kemano project in northwestern British Columbia because of poor market conditions in the aluminum industry.

Kaiser Aluminum & Chemical Corp. and the Quebec Provincial government undertook a prefeasibility study for a new aluminum smelter near Sept-Îles, Quebec. A favorable decision for construction of the smelter could have significant effect on the town of Sept-Îles, whose future was uncertain because of the cutback in activity by Iron Ore Co. of Canada (IOC). Sept-Îles was a major port on the St. Lawrence River for IOC's shipments of iron ore concentrate and pellets.

Copper.—The Canadian copper industry continued its efforts to reduce costs and increase efficiency. In some instances, this meant shutting down operations. Producers were facing excess production capacity, uncertain market conditions, and large pollution control costs. Because of the poor markets facing producers, Canadian copper reserves were estimated to have dropped about 5%. Ore development activities were apparently curtailed for cost-reduction purposes and did not keep pace with production. Some smelters had to contend with concentrate shortages and competition from foreign markets.

Falconbridge Ltd. resumed development work on its Ansil copper deposit near Noranda, Quebec, after receiving a $19 million grant from the Quebec Provincial government. Work to be done includes sinking a 5,300-foot-deep shaft, underground development, and exploration. If the mine is not brought into production by the end of 1991, the company will repay the grant without interest charges. If the mine is brought into production before the end of 1991, then the company will repay the difference between the $19 million grant and 20% of the total costs incurred to bring the mine into production.

After Sherritt Gordon Mines Ltd. failed to find an investor for a portion of the $20 to $25 million costs to develop deeper, higher grade ore at its Ruttan Mine in Manitoba, the Provincial government of Manitoba agreed to contribute $8 million to help finance a portion of the development costs. The company rescinded its original decision to close the mine and was expected to start mining the deeper ore in late 1985.

Westmin Resources Ltd. was expecting its H-W ore body project at the Buttle Mine to be operational in early 1985 with the completion of construction of a new 2,700-ton-per-day concentrator.

A special report entitled "Canada's Nonferrous Metal Industry: Nickel and Copper" was prepared by EMR with assistance from industry, labor, and the Provinces. The report, released in May 1984, addressed the implications associated with sulfur dioxide emissions reductions and was to provide a basis for the development and implementation of an overall strategy that would permit resolution of the economic and environmental problems facing Canada's nickel and copper producers and foster an internationally viable and growing nonferrous metals industry.

Kidd Creek Mines Ltd. announced plans to expand its continuous copper smelter and refinery. The $41 million project to be initiated in 1985 would increase capacity from 59,000 to 90,000 tons per year by 1988.

Esso Minerals Canada permanently closed its Granduc Mine near Stewart, British Columbia, for economic reasons. Teck Corp., in late 1984, closed its Highmont Mine in British Columbia indefinitely.

Gold.—The volume of gold production at an estimated 2.6 million troy ounces increased 10.6% over that of 1983. The largest increase in production occurred in Quebec, Ontario, and the Northwest Territory. The Province of Quebec, whose production of 942,000 troy ounces represented a 7% increase over that of 1983, was Canada's largest gold producer. This was the result of several new mines that came on-stream in 1984. Canadian gold reserves were estimated to have increased 38% mainly because of inclusion of three deposits in the Hemlo gold camp and other new deposits in Ontario, Quebec, Saskatchewan, and the Northwest Territories that were committed for production in 1984 and early 1985. The Hemlo area near Marathon, Ontario, had three mines that were nearing completion: a joint venture between Teck and International Corona Resources; Noranda Mines Ltd.; and Lac Minerals Ltd. The first two projects were scheduled to start production in 1985, with Lac Minerals expected to begin production in 1987. The Teck-International Corona Resources project had estimated proven reserves of 8.4 million tons grading 11.2 grams of gold per ton; Noranda's project had estimated proven reserves of 24 million tons grading 8.7 grams of gold per ton; and Lac Minerals' project had estimated proven reserves of 42 million tons grading 7.2 grams of gold per ton.

Pamour Porcupine Mines Ltd. was the third recipient of a grant for custom gold milling facilities under an incentive program of the Ontario Ministry of Natural

Resources. The grant provides up to $760 million in the form of an interest-free, forgivable loan to upgrade Pamour Porcupine's Schumacher mill at Timmins, Ontario, to treat smaller companies material on a custom basis. New grinding and flotation circuits and new facilities to crush and sample ore will be added to the Schumacher mill and will be adjustable to treat different types of ore as required.

The Inco Ltd. and Queenston Gold Mines Ltd. joint venture McBean Mine, near Kirkland Lake, Ontario, produced its first gold bar in mid-1984. The open pit operation was expected to produce 20,000 troy ounces per year. In late 1984, Flin Flon Mines opened its Rio gold mine and facilities near Creighton, Saskatchewan, at a cost of over $5 million. The Rio Mine's reserves were estimated to be 163,000 tons grading 9 grams per ton. This operation is Saskatchewan's first producing gold mine in more than 40 years. Louvem Mining Co. Inc. opened its Chimo Mine at Val d'Or, Quebec, in late 1984. Ore reserves were estimated at 950,000 tons grading 7.8 grams per ton.

Iron Ore.—The Quebec-Labrador Trough, an area rich in iron ore reserves, once had the capacity to supply 60 million tons of concentrate and 25 million tons of pellets per year to the world market. Now this capacity has been reduced to about 40 million tons of concentrate per year. The iron ore sector was reported to be operating at less than two-thirds capacity at the close of 1984. Mine closures continued with only nine mines operating at yearend. Sidbec-Normines Inc. announced it would close the Fire Lake Mine and the Lac Jeannine concentrator at Gagnon, Quebec, by yearend. The Fire Lake pelletizing plant, with a capacity of 6 million tons per year, would remain operational and would be fed ore from Quebec Cartier Mining Co.'s (QCM) Mount Wright Mine. QCM will expand its operation to include pellets, whereas in the past the company had sold only concentrates on the world market. Sidbec-Normines would cease to exist as an operating entity. The parent company, Sidbec, a Quebec government Crown corporation, was intending to withdraw from the raw material business and concentrate on its steel mill operation. The Canadian iron ore industry faced increased competition from Australian and Brazilian iron ore producers that produced higher grade ore at lower costs.

In late 1984, Stelco Inc. delayed permanent closure of the Griffith Mine at Bruce Lake, Ontario, for 1 year. The delay was reportedly tied to minor concessions from the Ontario government to reduce the cost to the company for prolonging operation of the mine and mill.

Iron and Steel.—There was a modest improvement in the iron and steel sector as the demand for automobiles and other consumer goods increased. There was a 14.7% increase in crude steel production with a 12% increase in exports. Canada was a net exporter of steel with a majority of the exports shipped to the United States. The average utilization rate of production capacity was a reported 68%. There were rebuilding and modernization projects planned throughout the industry, which should result in increased capital spending. Dofasco Inc., Stelco, and Sydney Steel Corp. all have upgrading programs underway. Fierce competition was expected to persist in the near future, and the Canadian steel industry intended to remain a force in the market.

Lead and Zinc.—There was a moderate rise in lead production and a sharp increase in zinc production. Refined primary lead production was about 5,000 tons less than in 1983, while refined primary zinc production estimated at 685,000 tons was up considerably from the 617,000 tons produced in 1983. Overcapacity continued to be a serious problem.

Dome Petroleum Ltd. was considering mothballing its Cyprus Anvil Mine at Faro, Yukon Territory. The mine was closed in mid-1982 when it became uneconomical to operate. The company stated that labor, power, and transportation costs must be reduced before the mine can be reopened. Production at Abitibi-Price Ltd. and ASARCO Incorporated's Buchans Mine in New Foundland closed permanently in September 1984 because of exhaustion of ore reserves. Cominco Ltd.'s Polaris Mine, in the Canadian Arctic Islands on Little Cornwallis Island, is in its second year of commercial production and was reported to be operating at more than the rated production capacity. The mine was designed to produce 195,000 tons per year of zinc concentrate and 4,500 tons per year of lead concentrate. Actual production was considerably greater. Most of the zinc concentrate and all of the lead concentrate was sold to European smelters. A small amount of zinc concentrate was tolled at a custom smelter in Europe. A major portion of Cominco's exploration and development spending has been directed toward zinc. Cominco's Polaris Mine in the Canadian Arctic Islands, Pine Point in the Northwest Territories, the Sullivan Mine in British Columbia, and other mines in Greenland and Spain accounted for about 10% of the Western World's zinc. Cominco is also the biggest zinc producer in Canada and was planning to expand and modernize its lead smelter at Trail, British Columbia, raising the furnace capacity from 127,000 to 160,000 tons per year.

In early 1984, Environment Canada, a Federal Government agency, officially published its intention to reduce the maximum allowable amount of lead in leaded gasoline.

Nickel.—Canadian nickel producers continued to carry out cost-saving programs. Inco and Falconbridge both have substantially reduced operating costs by improving mining and processing techniques, installing improved equipment, and introducing selective mining. Development work was continuing on Inco's Thompson Mine in Manitoba. Production from the open pit operation was planned for mid-1986. In late 1984, Inco suspended electrolytic nickel production indefinitely at Port Colbourne, Ontario. Utility-grade nickel was still produced. Falconbridge closed its Falconbridge Mine at Sudbury, Ontario, in mid-1984, after a series of rockbursts occurred. The mine had been in operation for 55 years.

Silver.—Canadian silver production was basically unchanged from 1983 to 1984. Canada was reported to have dropped to fifth place behind Mexico, Peru, the U.S.S.R., and the United States as a major silver producer. Equity Silver Mines Ltd., in British Columbia, is the major primary silver producer in Canada. Silver was also produced as a byproduct of base metal mines with a small amount produced as a byproduct of gold mining. United Keno Hill Mines Ltd. reopened its operation near Elsa, Yukon Territory.

Other Metals.—Tin production was limited to byproduct recovery by Cominco at Trail, British Columbia, and Kidd Creek Mines at Timmins, Ontario; however, Rio Algom Ltd. was continuing to develop its tin project at East Kemptville, Nova Scotia. The deposit, acquired 2 years ago from Shell Canada Ltd., has estimated reserves of 56 million tons grading 0.17% tin. Ore reserves were considered sufficient for 17 years of operation. The $114 million project, scheduled for startup in late 1985, would be North America's first major primary tin mine and concentrating plant. Initial annual production from the open pit operation would be 4,500 tons of tin, 2,400 tons of zinc, and 1,500 tons of copper, all in concentrates. Rio Algom planned to send the tin concentrates to England for smelting.

Cobalt production increased in 1984 owing to increased nickel production. Cobalt was recovered as a byproduct of nickel-copper production from the mining operations of Inco and Falconbridge. Inco also operated a cobalt refinery at Port Colborne, Ontario. The plant produced near its capacity of 900 tons per year of electrolytic cobalt for most of 1984.

Molybdenum production remained basically unchanged from that of 1983. Noranda's Boss Mountain Mine in British Columbia remained closed on a standby basis. Teck's Highmont Mine, also in British Columbia, closed indefinitely. Brenda Mines Ltd. operated for about 6 months in 1984, and Noranda reopened its Gaspe, Quebec, operation in September 1984 after an extended shutdown.

QIT-Fer et Titane Inc., after completing construction of an upgrading plant for its titanium operation, announced a $114 million capital improvement program to add basic oxygen furnaces and upgrade its electric furnaces. The rated capacity of the modified plant, expected to be operational in 1986, will be 850,000 tons per year of 80% titanium dioxide Sorel slag.

Canada has two producing tungsten mines: Canada Tungsten Mining Corp. Ltd.'s (Cantung) operation at Tungsten, Northwest Territories, and Mount Pleasant Mines Ltd.'s tungsten-molybdenum operation at Mount Pleasant, New Brunswick. After being closed for most of 1983, Cantung resumed operation in December 1983 and by August 1984 was operating at full capacity. Production was estimated at 1,500 tons per day on a 5-day basis. The mine produces three different tungsten concentrates. The highest grade concentrate averages 78% tungsten trioxide (WO_3), which is recovered as a byproduct from magnetic separation. Finally a flotation concentrate averaging 30% WO_3 is also recovered. The company was aggressively pursuing a cost-cutting program, which had led to a 30% decrease in production costs in 1984. The life of the mine was estimated at 8 years, although recent discoveries of additional reserves could increase that figure. Current reserves have an average grade of 1.3% tungsten oxide. Mount Pleasant's mine and mill were reported operating at about 50% capacity because of low metal prices and some technical problems.

Canada'a ferrosilicon industry was operating at near capacity in 1984 with the exception of the Beauharnois, Quebec, facility of Elken Metal Canada Inc. This plant remained closed; however, Elken continued to operate its ferrosilicon plant at Chicoutimi, Quebec.

NONMETALS

Asbestos.—Production of asbestos was estimated at 922,000 tons, with most of this produced from mines in Quebec. About 95% of the production was exported. Continued concerns regarding health hazards led to measures to minimize the use of asbestos in some countries. This, in addition to shortages of foreign exchange in developing countries, has had a significant impact on Canadian asbestos production. The Canadian industry was also facing increased competition on the world market. The Asbestos Institute was officially opened in 1984. The Institute will be responsible for health and product research, marketing information, and distribution of information regarding safe uses of asbestos.

Potash.—Production of potash estimated at almost 8 million tons was reported up more than 10% over that of 1983. This was encouraging to an industry that continued to face several years of excess capacity. According to EMR, Canadian-installed potash production capacity was 9.2 million tons, of which about 9 million tons was in Saskatchewan and 100,000 tons was in New Brunswick. The largest share of capacity (41.7%) is held by the Potash Corp. of Saskatchewan (PCS) a Provincial Crown corporation, followed by International Minerals & Chemical Corp. (IMC) with 20.2%. IMC is the largest private producer of potash in the Western World. Both PCS and IMC have curtailed all new expansion programs until there is an improvement in the market. However, PCS was continuing with its ongoing expansion program at the Lanigan Mine. This work was 80% complete at the end of 1984 with final completion scheduled for 1986. The Province of Manitoba was continuing in its efforts to secure investors for the development of the Canamex Resources Inc. deposit near Russell, Manitoba. The property was expected to produce 2 million tons per year with a mine life of 35 years. Development costs were estimated at $400 million. Discussions between Canamex Resources and the governments of Manitoba, China, and India were ongoing. Although Canadian potash is exported by Canpotex, a marketing agency made up of seven Canadian potash companies, the Province of Manitoba was considering establishing government-to-government sales if the project was developed by a foreign investor.

Sulfur.—Sulfur production in Canada primarily comes from the Province of Alberta, which supplies more than 85% of total Canadian production. Canterra Energy Ltd., Calgary, Alberta, is the largest Canadian producer and accounted for about 928,000 tons in the first half of 1984. The Province also supplies about one-third of the sulfur traded around the world and therefore directly affects the international market. Sulfur recovery from sour natural gas was the major source of sulfur production, with about 46 plants in Alberta.

Other Nonmetals.—The cement industry exhibited a slight recovery in 1984 after 4 consecutive years of decline. A few plants remained closed throughout 1984, and the industry was reported operating at about 50% capacity. There was an increase in Canadian gypsum production as a result of increased activity in the housing industry. There was an estimated 25% increase in exports to the United States to satisfy increased wallboard demand. The production of salt continued to rise with an estimated 10.3 million tons produced. Rock salt was produced from four salt mines, and two potash mines produced rock salt as a byproduct. Production of salt from brine accounted for nearly 25% of total production. Mines Seleine Inc. completed its second full year of production. Full production capacity of 1.2 million tons per year was scheduled for 1986. Marietta Resources International Ltd. operated Canada's only mica mine in 1984, near Parent, Quebec. Estimated mica production, all phlogopite mica, was 10,881 tons, a 4% increase over that of 1983. Major expansion and development programs were underway by Canadian talc producers to increase their rated capacity and improve the grade of their talc products.

Talc and pyrophyllite shipments were reported up 30% to about 126,000 tons, which was a record-high level. Asbury Graphite Quebec Inc.'s mine near Notre-Dame-du-Laus, Quebec, is the only Canadian producer of natural flake graphite. Production was estimated at 3,000 tons, a majority of which was exported to the United States. Exploration for crystalline flake graphite was continuing in Ontario and Quebec. Bishop Fibretech Inc. was intending to develop a diopside deposit at Wakefield, Quebec, for the production of rock fibers. The 20,000-ton-per-year plant, at an estimated cost of $4.5 million, was scheduled for completion in 1986. Diopside fibers are used as a reinforcing component in plastics and concrete.

Asarco's closing of the Buchans lead-zinc mine, in Newfoundland, was not expected to affect the seasonal recovery of barite from the mine's tailings. Buchans barite is the only commercial source of barite in Newfoundland, and in 1984, was approved by the Canada Oil and Gas Lands Administration for use in offshore drilling.

MINERAL FUELS

Coal.—Five new mines in British Columbia and two new mines in Alberta came onstream in 1983 and completed a full year's operation in 1984, which added considerably to Canadian coal production capacity. Production in 1984 was estimated at 57 million tons, a 28% increase over that of 1983. Alberta continued as the leading coal-producing Province with almost 23 million tons output, the majority of which was used by utility companies to produce electricity. British Columbia was second with an estimated 21 million tons produced. Coal is also produced in New Brunswick, Nova Scotia, and Saskatchewan. Alberta and British Columbia were the only Provinces that exported coal to the United States. Most of British Columbia's exported coal is destined for Asian markets. Canada remained a net exporter of coal, with exports estimated at 17 million tons and imports estimated at 14.7 million tons.

Gulf Canada Resources Inc. was considering the development of a major anthracite coal open pit mine at Mount Klappan in northwestern British Columbia. The property had inferred reserves of 900 million tons, and development costs were estimated at $425 million. The company was planning to export the anthracite coal to European markets. No anthracite coals had been mined in Canada since the Canmore Mines in Alberta closed in 1979.

The $215 million Ridley Island coal terminal near Vancouver, British Columbia, began operation in 1984 to handle coal shipments to Japan and other markets. The terminal exported about 5 million tons of coal.

Natural Gas.—Announcements by Petro-Canada and Mobil Oil Canada Ltd. that they concluded sales contracts with Tenneco Pipeline Co. and New England Supply Corp. for Venture natural gas have refocused attention on this major offshore project. The Venture offshore natural gas project is on Sable Island, about 250 kilometers east of Halifax, Nova Scotia. Exploration began in 1967. By the end of July 1983, 95 wells had been drilled, 12 of which were classified as significant discoveries. They were mainly natural gas wells. Exploration and drilling continued in the Sable Island area. The Venture project is comprised of Mobil Oil Canada with 42% of the project; Petro-Canada, 30%; Texaco Canada Resources Ltd., 18%; Nova Scotia Resources Ltd., a Crown corporation of the Nova Scotian government, 9%; and East Coast Resources Inc., 1%. The Venture project participant's would be required to submit applications for export of Canadian natural gas to the National Energy Board and the Economic Regulatory Administration of Canada and to the Federal Energy Regulatory Commission of the United States for approval to import gas into the United States.

Petroleum.—The estimated production of petroleum in Canada was 1.8 million barrels per day. Most of this output was from western Canada with Alberta being the largest producer of oil and natural gas. It was reported that the industry drilled 9,763 wells in Canada during 1984, an almost 38% increase over that of 1983. Exploratory drilling was reported up 45% over that of 1983 with 2,953 wells drilled. Although there was increased activity in exploration and development for oil, several refineries in eastern Canada closed owing to decreased demand for oil, and others reduced operations to fully utilize capacity. Another problem eastern Canadian refineries faced was the drop in demand of heavy fuel oil. Demand was estimated to have dropped from 90 million barrels in 1979 to 45 million barrels in 1983. Natural gas and hydroelectric power was increasingly being substituted for heavy fuel oil.

Alberta's vast Athabasca oil sand deposits continue to be developed. Suncor Inc. was planning a $3.8 million expansion program to boost total capacity of its plant at Fort McMurray, Alberta, to 55,500 barrels per day. Syncrude Ltd. also was planning to expand the capacity of its plant at Fort McMurray to 130,000 barrels per day. Other developments included Imperial Oil Ltd.'s intention to expand its operation at Cold

Lake, Alberta, and a joint venture between BP Resources Canada Ltd. and Petro-Canada to spend an estimated $117 million on a 7,000-barrel-per-day plant at Wolf Lake, Alberta.

Uranium.—The Athabasca sandstone basin of northern Saskatchewan continued to be the source of significant high-grade ore discoveries. These ore bodies are "unconformity-type" deposits that occur at or near the contact between the rocks of the Athabasca Group and the crystalline basement. The Key Lake Mining Corp.'s Key Lake Mine, the world's largest uranium producer, went on-stream in late 1983 and reached almost 90% of its design capacity of 12 million pounds uranium oxide (U_3O_8) per year. To the north of Key Lake, a major new discovery at Cigar Lake was being developed. With reserves estimated at 115,000 tons of ore grading 10% uranium, Cigar Lake was considered one of the world's richest uranium deposits. Saskatchewan Mining Development Corp., a Saskatchewan Crown corporation, is the majority shareholder in the venture. The other major center of uranium in Canada is the Elliot Lake area in Ontario. The two producers at Elliot Lake are Denison Mines and Rio Algom with a joint production capacity of about 7,500 tons of U_3O_8 per year. Most of these companies' output is under long-term contracts to Japanese companies. Total Canadian uranium production in 1984 was estimated at 9,700 tons U_3O_8, most of which was exported.

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[1]For more detailed information on the mineral industry of Canada see the Canadian Mineral Surveys for 1982 and 1983, both of which were prepared by the Mineral Policy Sector and the Energy Sector, Department of Energy, Mines and Resources, Ottawa, 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; Michigan Technical Library, Houghton; 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, NJ; New Mexico Institute of Mining and Technology, Socorro; Columbia University, New York, NY; 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, OR; 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, Mayaguez.

[2]Physical scientist, Division of International Minerals.

[3]Where necessary, values have been converted from Canadian dollars (CAN$) to U.S. dollars at the rate of CAN$1.3188=US$1.00, the average exchange rate for 1984.

[4]Whiteway, P. New Mining Projects. The North. Miner (Toronto, Canada), July 19, 1984, p. B1.

The Mineral Industry of Chile

By Pablo Velasco[1]

Chile retained its dominant role as one of the world's leading metal producers and maintained its rank as the largest world producer and exporter of copper for the third consecutive year, reaching a production level of 1.29 million tons. The mineral industry's contribution to the gross domestic product (GDP) rose 3.9% over that of 1983, up from a negative 1.9% in 1983 compared with that of 1982. In addition, Chile ranked 2d in world output of iodine, molybdenum, and rhenium; 3d in lithium; 8th in selenium and silver; and 10th in gold production.

Chile is also an important exporter of nitrates and is a small but growing exporter of lead and zinc. The Corporación Nacional del Cobre de Chile (CODELCO-Chile) produced about 81% of the total Chilean copper output in 1984, which represented about 16% of the Western World's copper production. Chile's total copper reserves represented 33% of the Western World's reserves.

Despite the increase in production, the value of copper exports fell 15% below that of 1983 to $1.57 billion.[2] CODELCO-Chile produced molybdenum, gold, and silver as copper byproducts. CODELCO-Chile has been making investments that will result in increased production of roughly 2% per year despite falling copper ore grades. CODELCO-Chile remained profitable in 1984 despite weak copper prices, which by yearend were the lowest, in real terms, since the Great Depression. These positive results were attributed to having the lowest cost production in mining copper in the world and to relatively high copper grades. Most copper projects remained in abeyance pending higher copper prices.

Owing to depressed prices for copper, gold, silver, and other minerals, total mineral export values declined 13.7% below those of 1983 to $1.98 billion, which represented 54% of Chile's total exports. This compared with a decrease of 60% in 1983 below 1982 levels. Copper, the country's largest export commodity, declined to 43% of 1984 exports compared with a 77% export share in 1974.

A number of exploration and development projects for precious metals were undertaken by private companies in 1984. Lithium production was initiated in May, under a joint venture between Foote Mineral Co. of the United States and Corporación de Fomento de la Producción (CORFO), the Chilean Government development agency. CORFO announced that AMAX Chemical Inc. of the United States and a Chilean consortium, Molibdenos y Metales S.A. (Molymet), were awarded the exploitation rights on the Atacama potassium salts and boric acid project.

Sociedad Contractual Minera El Toqui Ltda. began exporting zinc concentrate and lead and silver concentrates valued at $10 million and $500,000, respectively, for the first time from its mine, El Toqui. Cía. de Aceros del Pacífico S.A. de Inversiones (CAP), the Chilean state-owned steel company, which also operates the iron ore mines and pelletizing plant, reported profits of $5.7 million in 1984, despite losses of $15.5 million by Cía. Minera del Pacífico S.A. (CMP), CAP's subsidiary.

A new activity in exploration and evaluations of deposits of cobalt, gypsum, lapis lazuli, phosphate, sulfur, and tungsten were undertaken by CORFO and the private sector. Empresa Nacional del Petróleo (ENAP), the sole producer of crude oil and natural gas in Chile and owner of the country's two refineries, was planning to invest $160 million over the next 3 years in exploring, refining, expanding, and installing a gas pipeline to supply gas to a new planned methanol and urea-ammonia plant near the Strait of Magellan.

The inauguration and startup of the 490-megawatt first stage of the Colbun-Machicura hydroelectric plant was scheduled for the second quarter of 1985. The conversion to domestically produced coal for power generation at CODELCO-Chile's Tocopilla plant was completed during the year.

Chile's GDP grew by 6.3% over that of 1983, which was the highest rate in Latin America. Chile's GDP equaled just under $21 billion[3] at current prices. Chile was the only country in Latin America that nearly complied with the terms of the 1984 International Monetary Fund (IMF) Stand-By Program, although unemployment and underemployment remained a serious socioeconomic problem despite some improvements owing to economic growth. Direct unemployment declined to 16% by the end of 1984 from 19% in 1983. The annual rate of inflation was 23%, unchanged from that in 1983 and relatively low by Latin American standards. Chile's foreign debt, not including IMF credits, equaled $19.5 billion at current prices at yearend, or nearly the same as the country's GDP.

The Inter-American Development Bank (IDB), the International Bank for Reconstruction and Development (World Bank), the Export-Import Bank of the United States, and the U.S. Commodity Credit Corp. have boosted lending to Chile considerably in recent years. Both the IDB and the World Bank are exploring cofinanced projects, under which the multilateral institutions would provide direct credits and also guarantee new credits of private lenders.

Foreign investors in Chile receive nondiscriminatory treatment. A number of firms have contracted for investment insurance with the U.S. Overseas Private Investment Corp. Since 1974, the Chilean Government has authorized about $7.3 billion in foreign investment, but only about $2 billion has actually been invested, mostly in the mining sector. U.S. investors accounted for about 50% of the actual investment. In 1984, net direct foreign investment fell to $67 million compared with a $152 million increase in 1983 and a $384 million increase in 1982.

Government Policies and Programs.—Chile's new mining law, designed to attract more overseas investment in copper, has stirred up a storm of protest during the year from those who charge that its terms are overly generous to foreigners. The national law, put into effect on December 13, 1983, reaffirms the free-market principles of the current regime. Domestic critics objected most to a clause that gives investors irrevocable concession rights on a mining claim in return for an annual fee, even if the mining concession is not developed. Under the mining law, a concession holder was required to meet a preset schedule of investment to keep the holding. Although the new law does not eliminate Chile's right to expropriate a mine, it provides for an indemnity that is much more favorable to the mine owner. Instead of paying mining concerns the book value of their investments, the Government must pay the commercial value of the mine, which takes into account its profit potential. The public outcry makes it doubtful that the new law will be allowed to stand when Chile returns to a representative government.

The foreign investment statute and the foreign exchange law govern the entry of foreign capital into Chile and its subsequent repatriation. Under the foreign investment statute, Decree Law 600, foreign capital may enter Chile in the form of freely convertible foreign exchange, tangible assets, technology to be capitalized, and loans tied to foreign investment projects.

The foreign investor's rights and guarantees are contained in a contract between the investor and the state of Chile, which may not be abrogated during the contract term even if new legislation with different rules is enacted. The contract also establishes the timing of capital investment in Chile. The statute guarantees the investor free access to foreign exchange markets to repatriate capital and profits. To repatriate capital, foreign currency may be acquired only from the sale of shares or rights representing the foreign investments, or the sale or liquidation of the investor's business.

The foreign exchange law applies to individuals or entities that invest capital through the Central Bank of Chile, which issues a certificate upon registration. Registered investors may repatriate capital and profits under the specific Central Bank regulations in force when the foreign exchange was converted to local currency. At present, these regulations provide that capital must not be repatriated before 3 years and that profits may be repatriated at any time.

PRODUCTION

According to the Central Bank of Chile, the total export value of Chile's mineral production, including fuels and nonfuel minerals, was $1.98 billion, representing a 13.7% decline in export value below that of 1983. The 15 leading minerals produced in Chile were coal, copper, gold, iodine, iron ore, lead, limestone, manganese, molybdenum, nitrate, petroleum and natural gas, petroleum byproducts, silver, sodium sulfate, and zinc, which represented 54% of the total export shipments value. Output of all these minerals except gold, iodine, and crude petroleum showed increases over that of 1983.

Chile's production of fine copper increased 2.6% over that of 1983 to 1.29 million tons. Output of both copper and copper's principal byproduct, molybdenum, reached record high levels. Molybdenum production rose 10.5% over that of 1983.

CODELCO-Chile produced 81% of the total Chilean copper production and 100% of the total output of molybdenum, which was sold mainly as a concentrate and an oxide. The medium- and small-scale mining sector produced the remaining 19% of the total copper output.

Chuquicamata, the largest division of CODELCO-Chile, once again accounted for 54% of CODELCO-Chile's total copper output, followed by El Teniente, with 27%; Andina, 10%; and El Salvador, 9%. Copper production increases in Chile were the result of several expansion projects that began in the 1960's.

The average grade of ore dropped from 1.73% in 1976 to 1.55% in 1984. To avoid the consequent decrease in production, it was necessary for CODELCO-Chile to increase processing capacities in the mines and concentrators. As a result, CODELCO-Chile invested $1.75 billion from 1976 through 1983 and has set up a production policy to maintain its present level of production of about 1 million tons of fine copper per year. Increases in this level of production will be made only when the copper market expands, which will allow Chile to maintain its current share of the market.

In order to increase existing production capacity, CODELCO-Chile requires a capital cost that is between one-seventh and one-third of normal costs that would be required to start up a new project elsewhere. This is due to CODELCO-Chile's high efficiency ratios, low production costs, and large reserves of high-quality copper ores.

Chilean gold production declined 5% below that of 1983. Domestic crude oil production fell 2% below that of 1983 to 14 million barrels, which is equivalent to an estimated 31% of the total domestic consumption. Production of natural gas increased by 2% over that of 1983 to 173 billion cubic feet, of which 71% was reinjected into the gasfields and the remainder was marketed or flared.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Copper:					
Mine output, metal content[3]	1,067,900	1,081,100	1,242,200	1,257,100	1,290,000
Metal:					
Smelter, primary[4]	953,100	953,800	1,046,800	1,058,100	1,097,800
Refined:[5]					
Fire, primary refined	147,100	140,600	153,288	175,014	184,632
Electrolytic	663,600	635,000	699,212	658,386	694,568
Total	810,700	775,600	852,500	833,400	879,200
Gold, mine output, metal content troy ounces	r219,825	r400,548	543,678	571,108	540,141
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	r8,835	r8,514	6,470	5,174	5,584
Iron content[e] do	r5,344	r5,190	r3,874	3,120	3,367
Metal:					
Pig iron do	648	582	454	540	593
Ferroalloys:					
Ferromanganese	5,684	5,254	2,982	5,209	4,890
Ferrrosilicomanganese	219	104	NA	NA	NA
Ferrosilicon	5,385	2,477	1,413	4,885	NA

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Iron and steel —Continued					
Metal —Continued					
Ferroalloys —Continued					
Other	515	656	1,456	1,712	1,469
Total	11,803	8,491	5,851	11,806	6,359
Steel, crude[6] thousand tons	704	644	492	618	692
Semimanufactures (hot-rolled) do	516	495	233	371	599
Lead, mine output, metal content	315	223	1,552	1,679	4,499
Manganese ore and concentrate:					
Gross weight	27,701	25,557	16,111	26,052	26,172
Metal content	9,040	8,596	5,207	8,584	8,475
Molybdenum, mine output, metal content	13,668	15,360	20,048	15,264	16,861
Rhenium, mine output, metal content pounds	8,500	10,300	17,921	12,516	14,198
Selenium kilograms	17,100	33,665	23,011	43,869	25,450
Silver thousand troy ounces	[r]9,600	[r]11,612	12,290	15,058	15,785
Vanadium, mine output, metal content[e 7]	272	127	--	--	--
Zinc, mine output, metal content	1,134	1,516	5,656	5,993	18,906
NONMETALS					
Barite	225,529	259,349	292,402	114,595	21,722
Borates, crude, natural (ulexite)	3,275	3,277	291	1,301	3,985
Cement, hydraulic thousand tons	1,583	1,863	1,132	1,255	1,390
Clays:					
Kaolin	59,452	56,778	21,086	40,812	48,608
Other (unspecified)	[r]155,168	[r]177,397	34,072	31,876	36,543
Diatomite	1,147	358	387	741	1,712
Feldspar	2,150	2,506	469	2,356	3,026
Gypsum:					
Crude	198,115	237,853	89,636	66,337	167,477
Calcined	74,435	103,344	41,304	53,425	44,818
Iodine, elemental	2,601	2,688	2,596	2,793	2,661
Lime, hydraulic[e] thousand tons	778	648	645	[r]723	769
Lithium carbonate	--	--	--	--	2,110
Lapis lazuli kilograms	--	--	--	--	9,000
Nitrogen: Natural crude nitrates:					
Sodium	440,000	471,170	420,750	470,500	538,600
Potassium-enriched	180,400	153,230	156,000	152,000	174,000
Phosphates:					
Guano	--	1,100	50	129	NA
Rock	--	--	1,377	935	4,606
Total	--	1,100	1,427	1,064	4,606
Pigments, mineral, natural: Iron oxide	4,451	4,890	2,445	6,751	16,113
Potash, K_2O equivalent	25,300	21,400	21,800	21,280	24,360
Pumice (includes pozzolan)	249,805	277,359	172,382	173,789	172,150
Quartz, common	162,663	165,393	185,556	221,757	271,674
Salt, all types	441,105	290,279	674,002	714,598	625,760
Sodium compounds, n.e.s.:					
Carbonate[e]	10,800	10,000	NA	NA	NA
Sulfate[8]	71,315	58,677	48,146	51,943	57,696
Stone:					
Limestone thousand tons	[r]1,988	[r]2,275	1,022	1,419	1,509
Marble	2,505	1,879	963	1,200	1,440
Sulfur:					
Native, other than Frasch:					
Refined	13,925	4,659	6,615	15,688	13,685
Caliche	73,510	109,965	98,372	83,060	40,279
Byproduct (from industrial gases)	[e]26,700	28,000	31,828	32,364	32,135
Total	114,135	142,624	136,815	131,112	86,099
Talc	1,139	665	283	637	422
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous and lignite thousand tons	1,024	1,169	997	1,095	1,328
Coke: Coke oven do	286	300	242	279	278
Gas, natural:					
Gross million cubic feet	[r]190,544	179,367	178,851	169,609	172,957
Marketed do	[e]135,000	130,000	124,661	52,760	50,125
Natural gas liquids:					
Condensate thousand 42-gallon barrels	650	NA	NA	NA	NA
Natural gasoline do	937	931	969	937	900
Liquefied petroleum gas do	2,717	2,849	2,893	2,855	2,800
Total do	4,304	3,780	3,862	3,792	3,700

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude ______ thousand 42-gallon barrels__	12,159	15,104	15,626	14,365	14,069
Refinery products:					
Gasoline:					
Aviation ______do____	25	44	101	94	124
Motor ______do____	8,290	8,806	7,146	8,136	8,491
Jet fuel ______do____	1,226	1,510	1,145	1,230	1,038
Kerosine ______do____	1,799	1,662	633	1,164	997
Distillate fuel oil ______do____	8,839	7,874	6,122	7,543	7,957
Residual fuel oil ______do____	10,617	9,158	6,321	6,391	5,978
Liquefied petroleum gas______do____	2,887	2,641	2,051	5,048	5,014
Unspecified ______do____	2,489	1,902	2,866	988	1,469
Refinery fuel and losses ______do____	277	1,857	1,280	22	--
Total ______do____	36,449	35,454	27,665	30,616	31,068

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 1985.
[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 nonduplicate copper content of ore, concentrates, cemented copper, slags and minerals, copper as a byproduct of gold and silver precipitate, and other copper-bearing products measured at the last stage of processing as reported in available sources.
[4]Figures are total blister, fire-refined, electrolytic, and equivalent copper output including that blister subsequently refined in Chile and copper produced by electrowinning. Detailed statistics on electrowinning are not available; although based on current plant capacities, electrowon copper production is estimated to be approximately 55 metric tons per year.
[5]Figures are total refined copper distributed into two classes according to method of refining, fire-refined and electrolytic, which includes electrowon copper refined in Chile.
[6]Excludes castings.
[7]Estimated on the basis of reported vanadium content of vanadiferous slags imported by the United States from Chile.
[8]Includes natural sodium sulfate and anhydrous sodium sulfate, coproducts of the nitrate industry.

TRADE

Mining exports accounted for 54% of the country's export earnings and have been reduced because of depressed copper prices and high interest rates. Lower copper prices, which averaged 62.4 cents per pound compared with 72.2 cents per pound in 1983, accounted for much of the decline. During the period from 1979 to 1983, export earnings from mining increased by an annual average of 10.4%, despite a domestic inflation rate of 300% and a 200% devaluation of the currency within the same period. However, Chilean Central Bank figures in 1984 showed a sharp 13.7% reduction in earnings below those of 1983 to $1.98 million.

Copper, the country's largest export commodity, accounted for 43.4% of 1984 exports compared with 77% in 1974. Imports rose 17.2% from $2.97 billion in 1983 to $3.48 billion in 1984; intermediate goods accounted for 62% while consumer and capital goods contributed 15% each.

Imports of crude oil and lubricants increased 1% over those of 1983 to $582.5 million. Chile remains among the most open markets in Latin America. Imports from the United States in 1984 rose 14% over those of 1983 to $750 million and accounted for 22.3% of total imports compared with 23.7% in 1983. The decline in market share reflects the appreciation of the U.S. dollar, to which the peso is tied, against European and Japanese currencies. Chile's need to earn or conserve foreign exchange creates sales opportunities in export-oriented industries, as well as in import-substitution industries. Good prospects may be found in mining, fishing, agriculture, and forestry.

Chile's main importance to the U.S. economy lies in its copper exports. In 1984, Chilean copper exports to the United States fell 39% to 200,800 tons of fine copper. The United States was the second largest Chilean copper export market after Japan.

Despite the devaluation of the Chilean currency by 25% last September and tariff increases, Chile's f.o.b. merchandise trade surplus shrank to $293 million in 1984 compared with a $1 billion trade surplus in 1983. This amount of surplus was not sufficient to service the country's external debt.

Table 2.—Chile: Exports of copper and molybdenum ore, by destination[1]

Destination	Copper (thousand metric tons)			Molybdenum (metric tons)
	Ore and concentrate, Cu content	Blister	Refined	Ore and concentrate, Mo content
1983:				
Argentina	--	--	31.6	--
Belgium-Luxembourg	1.1	12.2	5.6	--
Brazil	29.0	2.2	31.1	--
Canada	22.6	--	7.0	2,571
China	2.1	12.9	40.5	--
Finland	13.0	--	--	--
France	--	--	84.6	--
German Democratic Republic	--	3.0	7.2	--
Germany, Federal Republic of	2.3	22.3	127.5	--
Greece	--	--	7.1	--
Italy	--	2.7	88.8	--
Japan	78.6	5.5	31.6	--
Korea, Republic of	13.4	2.0	5.2	--
Netherlands	.4	4.0	40.6	381
Romania	--	6.0	--	--
Spain	1.0	22.3	16.6	--
Sweden	7.4	--	13.6	318
Taiwan	4.6	.7	1.3	--
Turkey	--	18.1	--	--
United Kingdom	3.7	25.5	22.5	555
United States	2.2	79.6	266.3	--
Yugoslavia	--	5.0	.5	--
Other	3.8	.4	1.1	5
Total	185.2	224.4	830.3	3,830
1984:				
Argentina	--	--	38.2	--
Belgium-Luxembourg	.1	9.7	7.5	--
Brazil	28.3	11.4	70.6	--
Canada	15.1	--	1.4	1,710
China	--	19.1	30.0	--
Finland	7.4	--	--	--
France	--	--	98.9	--
German Democratic Republic	--	3.0	8.5	--
Germany, Federal Republic of	.3	24.4	84.8	452
Greece	--	--	11.6	--
Italy	--	8.9	94.1	--
Japan	87.8	8.9	105.1	6
Korea, Republic of	21.3	--	20.4	--
Netherlands	.1	.8	--	2,318
Portugal	--	2.0	6.6	--
Romania	--	5.9	--	--
Spain	.2	20.4	9.9	--
Sweden	--	--	12.5	232
Taiwan	3.5	--	33.7	--
Turkey	5.4	13.7	--	--
United Kingdom	(2)	25.2	29.6	--
United States	.3	45.0	155.2	--
Yugoslavia	--	11.9	--	--
Other	.2	.3	11.6	--
Total	170.0	210.6	830.2	[3]4,717

[1]Table prepared by W. L. Zajac.
[2]Less than 50 tons.
[3]Data do not add to total shown because of independent rounding.

Source: Estadisticas del Cobre, 1984 and 1985 monthly editions, Comisión Chilena del Cobre.

COMMODITY REVIEW

METALS

Copper.—Chile's copper production increased 2.6% compared with that of 1983 to 1.29 million tons. Chile has been the world's largest producer and exporter of copper since 1982. In 1984, production of copper and copper byproducts remained profitable despite the world's depressed prices, in contrast to the United States, which was forced to shut down two-thirds of its copper operations.

Of the total copper produced in Chile, 68% was refined copper; 17%, blister copper; and 15%, cement copper, concentrate, slags, and minerals and copper derived from the gold and silver processes. CODELCO-Chile was the country's dominant copper producer whose output was 81% of domestic output, which equaled about 16% of the Western World's total output. CODELCO-Chile's production of copper was divided among four divisions.

The Chuquicamata Div. planned to expand capacity by adding a new crusher and a flash furnace as well as a sulfuric acid plant.

The El Teniente Div. will expand capacities of its mine and concentrator by 1986 from 69,000 to 82,000 tons of ore per day. It will also add solvent extraction and electrowinning facilities to recover the copper contained in the mine drainage waters.

The Andina Div. has both underground and surface mining operations. Its production represented 10% of CODELCO-Chile's total output in 1984. Andina was planning a small investment to expand its ore processing capacity from 20,000 to 26,000 tons of ore per day by 1987 and will enlarge the tailing storage capacity of Los Leones Dam.

The El Salvador Div. is completing the installation of a modified converter similar to El Teniente's to increase by 10% the capacity of the Potrerillos smelter.

In the medium- and small-scale mining sector, Empresa Nacional de Minería (ENAMI), the national mining company, led the group of copper producers with 8.8%, followed by Exxon Minerals Chile Inc.'s Cía. Minera Disputada de las Condes S.A. with 4.8%, and Cía. Minera Mantos Blancos S.A. with 3.0% of the total. CODELCO-Chile's total sale of copper dropped 15.7% below that of 1983 to $1.25 billion, and income before and after taxes declined 36.9% and 34.8%, respectively, compared with 1983 figures.

CODELCO-Chile, which contributed $556.5 million to the Chilean economy, did not receive any subsidies from the state. Chile's principal source of foreign exchange comes from copper exports; however, in recent years, copper's contribution of the total has decreased from 82% in 1973 to 43% in 1984.

From 1979 through 1983, refined copper exports to the United States increased 124% to nearly 460,000 tons. In 1983, exports to the United States increased, despite a decline in U.S. consumption. In 1983, with 40% of the U.S. mine capacity shut down and more than 18,000 copper workers out of work, exports continued to rise, capturing all the growth in copper demand as the U.S. economy started its recovery from the recession. Faced with this deteriorating situation, 11 U.S. copper companies filed a petition for import quotas with the U.S. International Trade Commission (ITC).

The U.S. copper industry asked ITC to recommend a quota that would roll back U.S. imports to their 1979-81 level, thus limiting total U.S. imports of refined and blister copper from Chile to approximately 350,000 tons per year.

On June 27, 1984, ITC unanimously agreed that the U.S. copper industry had been seriously injured by foreign imports. In recommending remedies for this injury, two Commissioners recommended the imposition of quotas, and two, the imposition of tariffs. On September 6, the President of the United States rejected the ITC recommendation, indicating that import restrictions on copper are not in the overall national economic interest. "Import restrictions would adversely affect the export earnings of the foreign copper-producing countries, many of which are heavily indebted and highly dependent on copper exports."

Among Chile's private sector copper projects, the Escondida copper-molybdenum project is one of the most favorable for development. It has proven reserves of 560 million tons of ore averaging 2.16% copper, which is better than that at Chuquicamata. The total reserves are estimated at about 1.5 billion tons of 1.6% copper ore, which also contains 0.24% molybdenum.

Preliminary feasibility studies indicate that this open pit mine could produce 240,000 tons per year of copper and about 10 million pounds of molybdenum per year. Current plans call for a $1.0 and $1.2 billion investment, respectively, to develop the project. However, development of this mine has been delayed because of changes in ownership of its original developers, Utah International Inc. (Minera Utah de Chile Inc.) and Getty Mining (Chile) Inc. Utah International has been purchased by Broken Hill Pty. Co. Ltd. (BHP) of Australia, and the Getty Oil Co., parent company of Getty Mining, has been acquired by the Texaco Oil Co.

The Cerro Colorado copper project is wholly owned by Rio Algom Ltd., a Canadian subsidiary of Rio Tinto Zinc Corp. Ltd. of the United Kingdom. Rio Algom announced that negotiations to secure $300 million in loans have been completed in order to start operations of its Cerro Colorado mining property. Detailed engineering and construction of the mine is expected to take 33 months from the time the final decision is taken. Mining operations should begin in 1988. The credits have been negotiated with a number of financial sources abroad, mainly in Canada, Finland, and the Federal

Republic of Germany. A $30 million loan by CORFO has been granted conditionally.

The largest privately held copper mine in Chile is the Mantos Blancos operation, which employs 2,100 persons and produced 64,000 tons of copper. Owned by the Hochshild Group, all of Mantos Blancos' Latin American holdings were sold to a South African group, Anglo-American Corp., and two associated companies. The World Bank, through its affiliate the International Finance Corp., also owns 12% of Mantos Blancos.

Gold and Silver.—Chile's gold production declined 5% below that of 1983 to 540,141 troy ounces, while silver increased by 5% over that of 1983 to 15.8 million troy ounces. According to Sociedad Nacional de Minería officials, Chile has about 15,000 small mines with great potential for gold mining between Regions II (Antofagasta) and XII (Magallanes) that are not producing any gold for lack of capital investment, despite favorable international gold and silver prices. The Chilean Government through ENAMI has been encouraging gold production in different regions of the country and has employed about 10,000 miners in this activity.

The country's largest gold and silver producers were the El Indio Mine and ENAMI, with sales of 294,000 troy ounces of gold and 1 million troy ounces of silver compared with 362,000 troy ounces of gold and 926,000 troy ounces of silver in 1983. Gold production declined because of unusually severe weather that forced the El Indio Mine to close for over a month and because of a decline in average gold content of the ore.

In 1982, the Chilean Government reoriented ENAMI's policy to its original role. ENAMI reopened its regional offices, rapidly increased its demand for ore, and operated as a kind of banking and credit institution for the small-scale mining sector, providing low-cost loans to miners and accepting ore as collateral. In 1984, ENAMI provided about $10 million in loans to the small-scale mining sector. Also, its Las Ventanas smelter produced 172,069 tons of electrolytic copper, 4.8 million troy ounces of silver, and 203,000 troy ounces of gold. The increases in gold and silver production by Chile's small- and medium-scale mining sector reflected a shift away from copper toward an emphasis on precious metals production because of higher prices of gold and silver compared with depressed copper prices.

Consolidated Gold Fields Ltd. of the United Kingdom was reviewing exploration work being carried out by its subsidiary, Exploraciones y Minerales Sierra Morena at Copiapó (Region III), 900 kilometers north of Santiago. The company indicated that $16 million had already been invested in the Copiapó sector, and a budget of an additional $5 million had been authorized for the year. Consolidated Gold Fields has been evaluating possibilities of applying heap-leaching technology to recover gold from low-grade ores found in the Atacama Province.

Iron Ore.—Iron ore and pellets production increased by 8% over that of 1983 to 5.58 million tons. CMP concentrated its activities on improvements in efficiency and production in both the pellet plant and the El Romeral Mine. Pellet production during the year using iron ore from the El Algarrobo Mine was 3.37 million tons. Iron ore and sinter output from the El Romeral Mine was 2.21 million tons.

Shipments of iron ore and pellets to domestic and foreign markets reached 2.5 million tons and 3.8 million tons, respectively, a 12% increase over that of 1983. About 83% of the iron ore and pellets produced in Chile was exported to Japanese markets, and the remainder was consumed domestically. CMP, despite the increases in ore and pellet production shipments, lost $15.5 million, an increase of 52% over 1983 losses. Losses were due to the 14% drop in iron ore prices. CMP also shut down the Santa Fé (Los Colorados) iron ore mine, which was unprofitable owing to a decrease in ore reserves and ore grade.

Iron and Steel.—In 1984, CAP, which also operates the iron ore mines and pelletizing plant, reported earnings of $5.7 million compared with $5.1 million in 1983. Compañía Siderúrgica Huachipato S.A., a CAP subsidiary, had record high profits of $15.9 million, $4.3 million over those of 1983. Steel production increased 12% over that of 1983 to 692,000 tons. The plant operated at 75% to 80% of its capacity, showing a slow recovery of the Chilean economy from the 1982-83 recession. The plant maintained profitability primarily through decreases in production costs and cost saving investments, including reduction of energy consumption (down 26% since 1974), improvement in productivity, and substantial growth in domestic steel consumption.

Sales of steel products, both domestic and foreign, increased 14% over those of 1983 to $233.5 million. CAP planned several investment projects in the near future, and one of the most important is the installation of a new $145 million coke plant. CAP steel production was primarily oriented to satisfy domestic consumption, while most of the iron ore and pellet output was exported to Japan. Ecuador was the largest export market for Chilean steel, which supplied roughly one-half of Ecuador's steel consumption.

Lead and Zinc.—The El Toqui Mine, the largest lead and zinc producer in Chile, was owned and operated by the private consortium Sociedad Contractual Minera El Toqui Ltda. The El Toqui Mine in the southernmost Province of Aysen, Region XII, was officially inaugurated in November 1983. The mine and mill installed capacity was 750 tons of ore per day, and the yearly output expected was 42,000 tons of 54% zinc concentrate and 13,000 tons of 76% lead concentrate carrying 1 kilogram of silver per ton. According to company officials, Minera El Toqui completed successfully its first year of production and exported 40,000 tons of zinc concentrate worth $10 million and $500,000 worth of lead and silver concentrates. Exports were made from the Chacabuco Port destined primarily for Japan, the Republic of Korea, Spain, and Taiwan. Minera El Toqui currently operates the Zuniga and the San Antonio polymetallic mines and was exploring and evaluating two other additional deposits, Las Estatuas and Katerfeld II.

Manganese.—Manganesos Atacama S.A. (86.6% owned by CAP) operates a mine in the vicinity of Andacollo, which supplied all the ore needs of Huachipato and its own ferromanganese plant at Conquimbo. Roughly 90% of the ferromanganese production was consumed by CAP at the Huachipato steel mill. The remainder was sold to small-scale steel producers in Chile or exported. The Huachipato steel mill purchased 16,400 tons of medium-grade manganese ore and 4,200 tons of its ferromanganese for its blast furnace. Manganesos Atacama plans to increase its manganese dioxide production for export, and the company will begin production of silicomanganese in 1985. Sales earnings amounted to $552,000 in 1984 and output levels were the same as those of 1983.

Molybdenum.—CODELCO-Chile was the only molybdenum producer in Chile. Total production of molybdenum as a byproduct of copper increased 10.5% over that of 1983 to 16,861 tons. Of the output, 65% was in the form of concentrate, and the remainder, trioxide.

Chuquicamata, the largest CODELCO-Chile division, has its own roaster plant, which reportedly converted two-thirds of its molybdenum production into oxide. CODELCO-Chile shipped 5,500 tons of concentrate to Molymet for conversion into oxide and ferromolybdenum as part of a toll agreement between the two companies. Some concentrates were also sent to Western Europe to be roasted and marketed as oxides. Other concentrates were shipped to Canada for transshipment to Japan. Sales of concentrates, oxide, and ferromolybdenum amounted to $145 million, slightly higher than 1983 sales. The Santiago Molymet plant converted molybdenum concentrates supplied by CODELCO-Chile and imports from Canada, Peru, and the United States. The total plant output was 18.5 million pounds of oxides, 3.2 million pounds of ferromolybdenum, and 14,000 pounds of ammonium perrhenate, which was sold overseas.

Tungsten and Cobalt.—CORFO was conducting feasibility studies for the exploration, development, and exploitation of tungsten and cobalt deposits found in Region III, Copiapó Province, located 800 kilometers north of Santiago.

CORFO and a consortium of five national mining companies were investing $10,000 in studying the project; results found so far were described by officials as interesting and will be made public to provide guides for any company interested in mining these commodities. A 1982 study indicated ore reserves of 8 million tons of 2% tungsten. The CORFO study envisages the production of 200 tons per year of 60% tungsten trioxide requiring a fixed investment of $800,000. The earlier cobalt study plans the production of 800 tons per year of 8% cobalt concentrate for a fixed investment of $500,000. The latest cobalt study was anticipated to be completed by yearend 1984, and the tungsten study, by late 1986.

NONMETALS

Gypsum.—Chile's production of crude and calcined gypsum increased 77% over that of 1983 to 212,295 tons. The main producers were Cemento el Melón S.A. and Cemento Cerro Blanco de Polpaico S.A. A large gypsum, limestone, and dolomite deposit has been discovered in Juncal near the town of Los Andes (north of Santiago) in Region V. Preliminary estimates released by the Institute of Geological Research indicated that there were about 6 billion tons of reserves that predominantly contained pure gypsum. The estimate was based on partial drilling of the deposit, which could lead to further exploration and to the installation of a new cement plant. Output from this facility could be exported as well as supply Chile's central-zone consumption. Gypsum products and marble may also be manufactured owing to the high purity of the gypsum. The sizable amount of reserves of this deposit already has opened the door to a number of attractive and challenging investment possibilities.

Lapis Lazuli.—For the first time, Chile has reported the production of 9,000 kilograms of lapis lazuli (lazurite), which is a natural sodium aluminum sulfosilicate. It is usually somewhat impure; is deep blue to greenish blue in color; has been found in Afghanistan, California, and the U.S.S.R., as well as in Chile; and is used as an ornamental stone. In an official announcement citing its beauty and rarity, lapis lazuli was recently proclaimed as Chile's national gem. Its relative abundance in Chile has led to an extractive and artisan activity of significant proportions with production of 10,000 to 20,000 kilograms of lapis lazuli each year.

In 1984, Chile's exports of precious, semiprecious, ornamental, and collectable stones amounted to $500,000, and there are promising signs that these exports will increase in 1985. An agreement with Japan was signed to increase the quantities of collectable stone exports. These minerals were found in the desert zones of Antofagasta, Calama, and Copiapó. About 50 workers mine these stones and a handful of artisans work them into jewelry and art objects.

Lithium.—In April 1984, the company jointly owned by Foote Mineral of the United States, and CORFO, Sociedad Chilena de Litio Ltda. (SCL) inaugurated the $48 million lithium carbonate plant facility at La Negra near the port city of Antofagasta. This plant processes concentrated brines rich in lithium carbonate, sodium, potassium, and magnesium chloride from the Salar de Atacama. In mid-July, SCL made its first export shipment of lithium carbonate. The first shipment was destined for the United States, and total sales for the year amounted to 4.6 million pounds. Annual sales are expected to reach 12 million pounds in 1985, or 14% of the predicted world market, and then 14 million pounds in 1986, which will be about 18% of the world market.

SCL's lithium export debut marks not only its entry into the world market, almost 4 years after the creation of the company on August 13, 1980 (with 55% participation by Foote Mineral and 45% by CORFO), but also the beginning of what CORFO intends to be the "integrated development" of the mineral-rich Salar de Atacama.

On August 21, CORFO announced that first option on a second salt project in the Salar had been granted to AMAX Chemicals Inc. of the United States, in conjunction with the Chilean company, and CORFO itself. This project, which should begin production within about 6 years, assuming that the next stage of tests and negotiations are successful, initially will produce potassium salts, boric acid, and lithium. The contract with Foote Mineral permits SCL to extract a maximum of 200,000 tons of lithium within a maximum of 30 years, and the contract terms may be extended by mutual consent. SCL was given exclusivity of Chilean lithium production for 8 years, which would allow the new mixed salts project to produce lithium almost from its inception, because of the length of time required for research and development of the mixed salt project.

Nitrates.—The inorganic salt mining sector in Chile was dominated by the state-owned enterprise Sociedad Química y Minera de Chile (SOQUIMICH), which controls all significant nitrate mines and beneficiation plants in the country. In addition to nitrates, SOQUIMICH also produces iodine and sodium sulfate.

Total nitrate production increased to 712,600 tons, up 14% over that of 1983, and earned a net income of $9.5 million, up 19% over that of 1983. Sales for SOQUIMICH were about $130 million. This represents a significant improvement over the company's poor record during the last 10 years. The reason for these increases in production and profit was the increase in domestic demand for fertilizer and the devaluation of the Chilean peso. Major export markets for Chilean nitrates were Brazil, Japan, the United States, and Western Europe.

The nitrate deposits of Chile are situated on the plateau lying between the coastal ranges and the Andes, principally in the Atacama Desert in northern Chile. Current production of nitrates is centered on the Tocopilla District in Antofagasta Province.

SOQUIMICH operates two large plants, the Pedro de Valdivia and María Elena. The Pedro de Valdivia plant treats 30,000 tons per day of ore to produce sodium nitrate (16% N) and iodine (99% I). The María Elena plant treats 9,500 tons per day of ore to produce potash nitrate, iodine, and anhydrous sodium sulfate.

Phosphate.—Chile's phosphate rock (apatite) production increased to 4,606 tons from 935 tons in 1983. CORFO, through its affiliated agency El Comité de Sales Mixtas, was inviting domestic and foreign investors to submit bids by June 1985 for the purchase of two phosphate rock mining concessions in Mejillones, near Antofagasta Province in northern Chile. Included in the bids was a feasibility study for the construction of a triple superphosphate processing plant with an operating capacity of 100,000 tons of P_2O_5 equivalent per year. Prefeasibility studies conducted by CORFO in conjunction with a Brazilian consortium, Natron Co., indicated that the Mejillones deposit has an estimated 56 million tons of phosphate ore grading between 17% and 18% P_2O_5.

Comparison of this proposed project with the 10% to 18% P_2O_5 range for deposits currently mined worldwide strongly suggests that this deposit offers an attractive investment potential. In addition, the proposed project could eventually produce uranium concentrate (U_3O_8) and fluorine as byproducts. Total investment required was estimated at less than $90 million. Chile currently imports 95% of this type of fertilizer per year. The plant capacity will approximately match Chile's domestic demand for this product. Sales would be about $60 million per year, and the prospective bid winner will enjoy a virtually guaranteed market.

Sulfur.—Chile's native sulfur output derived from caliche declined 52%, and refined native sulfur fell 13% below that of 1983. Chile's total production of sulfur comes from Region II near Antofagasta and Calama Provinces.

During 1984, Empresa Azufrera Ltda. announced that it was planning to invest $20 million to initiate the development and exploitation of the Tacora sulfur deposit located at a 4,500-meter altitude on the upper slopes of the dormant volcano of Tacora, near the town of Parinacota, Region I, Iquique Province. The surface mining operation planned was scheduled to commence during mid-1985 and, in the first year of exploitation, was expected to produce about 500,000 tons. Reserves are adequate at this level for over 50 years. This new operation would benefit this isolated region extensively because of the new jobs and the extension of the railroad line to transport the sulfur.

MINERAL FUELS

Coal.—Bituminous and lignite coal production increased 21% over that of 1983 to 1.3 million tons. Increased coal output was the result of greater demand for coal from the copper industry in their program to substitute coal for more expensive fuel oil in the production of electricity. The Chilean coal company Compañía de Carbones de Chile Ltda. (COCAR), a joint venture of Compañía de Petróleos de Chile S.A. and the British firm Northern Strip Mining Ltd., outbid four competing coal companies to supply 4.3 million tons of coal to CODELCO-Chile's Tocopilla thermoelectric plant for the next 6 years. At present, CODELCO-Chile requires about 250,000 tons of coal per year. However, the planned startup of three additional power units at Tocopilla would boost demand to more than 1 million tons by 1987. Based on current CODELCO-Chile forecasts, monthly savings of $1.5 million will be achieved by 1988.

Formal agreements on the sale were being drawn, and contracts were expected to be signed in January 1985. To provide this coal, COCAR proposed to develop the Pecket strip mine situated near Punta Arenas in the Magallanes region. The deposit has estimated reserves of 83 million tons of subbituminous coal. COCAR also expects to make additional investments totaling $70 million that will include machinery and equipment and the construction of a special supplementary port facility.

Small coal mines from Concepción and Arauco Provinces in Region VIII are currently supplying domestic coal to the Tocopilla thermoelectric power station until the Pecket Mine begins exploitation. As a part of the coal conversion project, CODELCO-Chile was accepting bids for the construction of a port and a coal handling system at Tocopilla as well as an ash disposal site. The new facility, to be completed in 1986, will bring efficiency to a growing operation as well as additional employment opportunities. As Chile's energy demands increase, COCAR expects to be in a favorable position to service the country and to expand sales through exports to Argentina, Bolivia, southern Brazil, Peru, and Uruguay.

Petroleum and Natural Gas.—ENAP, the national petroleum company, reported that production of crude oil in Chile declined 2% below that of 1983 to 14.1 million barrels. Output of natural gas increased by 2% over that of 1983 to 173 billion cubic feet. Production of crude oil from offshore operations fell 21% below that of 1983 but still accounted for 65% of the total output. Output from Tierra del Fuego provided 19%, and onland, 16%.

Onshore natural gas production accounted for 67% of domestic output, followed by Tierra del Fuego with 27%, and the remainder from offshore wells. Out of the total natural gas produced in 1984, 71% was reinjected to the gasfields, and the remainder was marketed or flared.

ENAP currently provides about 31% of the national petroleum consumption, and the balance is imported from countries such as Gabon, Saudi Arabia, and Venezuela. Production of crude from existing oilfields in the Strait of Magellan peaked in 1984. It is hoped to avoid a sharp decline in output by introducing secondary recovery techniques and drilling new wells from existing platforms currently in production. Both approaches have worked well in preliminary testing. Most of ENAP's exploration activity offshore was concentrated in the deeper west side of the Strait of Magellan and south of Tierra del Fuego, although ENAP is also emphasizing new development and exploration in other parts of the country. Through this program, ENAP hopes to avert the severe drop in production that could occur in about 3 years as presently known reserves are being depleted.

Proven reserves of natural gas in the region were estimated at 2.6 trillion cubic feet, which is sufficient to supply the gas requirements of two proposed petrochemical plants for over 40 years at planned rates of consumption. Crude oil reserves were estimated to be about 220 million barrels, which is sufficient for about 15 more years at current extraction levels.

ENAP officials indicated that they will continue investing about $125 million per year in petroleum activities. Unlike the development of the two petrochemical projects in the Strait of Magellan area, ENAP has adopted a new approach. This consists of identifying the resources, followed by the preparation of a prefeasibility study. At this stage, interested parties are sought who might be interested in developing the project.

ENAP plans to explore the following areas: (1) the Diego Ramirez Islands, south of Tierra del Fuego; (2) offshore basins near Valdivia, Arauco, and the Isla Mocha; (3) around Puerto Montt, Llanquihue, and Cuenca de Osorno; (4) near the Salar del Tamarugal, the Salar de Pedernales, and the Salar de Atacama northern desert region, where officials believe there may be a basin similar in size to the adjacent Argentine reserves; and (5) geological studies in the Golfo de Penas.

Signal Methanol Inc., a subsidiary of Signal Companies, signed a 20-year contract with ENAP to purchase natural gas and to construct a $300 million methanol plant near Punta Arenas, south in Region XII. The plant was expected to use 540 billion cubic feet of natural gas over the 20-year contract and produce 2,300 tons of methanol per day. Construction of the plant was scheduled for completion by the end of 1987. Another $1 billion contract was signed with the Konvey Co. for the construction of a 450,000-ton-per-year ethylene and ammonia plant at Copiapó. The project will use natural gas feed and is presently in the engineering stage. It is scheduled for completion by the end of 1988.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Chilean pesos (Ch$) to U.S. dollars at the average rate of Ch$98.5=US$1.00, as of Dec. 31, 1984.

[3]Value and percentage of the 1984 gross domestic product were given as estimated figures in billions of 1984 dollars by the Central Bank of Chile.

The Mineral Industry of China

By E. Chin[1]

China is a major world producer of metals, industrial minerals, and fuels. It is the second largest world producer of coal and the seventh largest producer of crude oil. For industrial minerals, China ranks within the top five world producers for barite, cement, fluorspar, magnesite, marble, and talc. China produces large quantities of iron ore and manganese, although of low grade. It is the sixth largest steel producer in the world and the third largest vanadium producer. There is significant mine output of antimony and tungsten, which is historically associated with China, as well as tin. China is perhaps the sixth largest gold producer in the world. In addition, it is expanding its production capacity of aluminum, copper, lead and zinc, and nickel.

China has a large mineral reserve base, and the latent potential to increase production substantially is an undisputed reality. However, because of its huge population, a billion-plus people, per capita consumption of minerals, metals, and fuels is quite small compared with that of developed countries. The Government plans to quadruple the value of industrial output by the year 2000. Notwithstanding large increases in production capabilities, the growth of China's per capita consumption of its mineral wealth will be moderated by its export drive to garner foreign exchange necessary for modernization and growth.

In 1979, the Government initiated reforms to moderate the emphasis on developing heavy industry by increasing investments in the agricultural and light industrial sectors. By 1984, the economic readjustment program included far-reaching reforms such as dismantling the commune system, substitution of taxes for profit remittances to the state, replacing budget allocations with bank loans, reintroduction and participation of private enterprise in the economy, reintroduction of a free market system, and a reform of industrial management. Other measures to stimulate the economy included investment of $45 billion for new technology during 1981-84, and inviting wider economic and technical exchanges with foreign countries and companies. In addition, the shift in output by defense industries produced civilian goods valued at $2 billion[2] in 1984. During 1979-81, China's industry grew at an average rate of 7.1% compared with 10.6% for 1982-84. Industrial output grew by 13.6%, reaching $350 billion in 1984. According to China's State Statistical Bureau, light industry registered a 13.4% increase over that of 1983 compared with 13.8% for heavy industry, which was considered a balanced growth.[3]

Production of coal was 772 million tons; crude oil, 115 million tons; and steel, 43 million tons. In addition, the country's railways handled 1.2 billion tons of freight and 1.1 billion passengers, representing an increase of 4.4% and 6.9%, respectively. Output of 48 of the 100 major industrial products surveyed by the State Statistical Bureau had reached the target level set for 1985, the last year of China's sixth 5-year plan (1981-85). By region, industrial production maintained momentum in Fujian, Guangdong, Jiangsu, Zhejiang, and other coastal Provinces where output increased between 19% and 24%. In traditionally less developed areas such as Guizhou, Ningxia, Qinghai, and Yunnan, production increases ranged from 13% to 17%.

The Chinese press considered the following achievements significant in 1984 toward China's modernization program: launching an experimental communications satellite; opening of 14 coastal cities (excluding the 4 previously established special economic zones) and Hainan Dao to foreign investment; participation in the 23d Olympiad; signing of the Sino-British joint declaration regarding the status of Hong Kong; and the decision by the Central Committee to adopt formally reforms to China's economic structure. Other heralded achievements included (1) the new level of output for grain and cotton; crude oil, coal, and electricity; and select consumer products, (2) the increase in domestic retail sales, and (3) the high level of individual savings.

In June 1983, China replaced its profit-appropriation system with the first phase of its new taxation system. In this phase, enterprises paid both taxes and a portion of the profits to the state. The second phase went into effect in October 1984 whereby the enterprises paid only taxes to the state. Any remaining profits left after taxation were to be used by the enterprise. Taxes levied by the state included a product tax—an economic lever to prevent enterprises from producing only high-profit items; taxes on products that yield small profits or losses are reduced or exempt. A value-added tax system was imposed because of the imbalance in tax burden throughout the stages of production—from the initial processing of raw materials, through the manufacture of components, to assembly of finished products. A tax rate system was to be imposed on domestic commodity sales. For small enterprises, an income tax was levied, and for high-profit enterprises, a regulation tax was to be levied. The tax on salt was to regulate uniformly the price between user and producer throughout the country because of the disparity of salt reserves and quality in various localities. In the mining sector, a resource tax was imposed to adjust the wide profit rate for mine products and the difference in mineral resources available.[4]

Another reform initiated was in the wage system whereby an enterprise imposed no wage ceiling and minimum. The existing wage system, based on grade, was to give way to remuneration based on performance. For instance, to raise efficiency and productivity at the Xinqui surface coal mine in Liaoning, wages were based on each ton of coal produced, with penalties imposed when coal quality and safety standards were not met.

In early 1984, the State Council decided to open 14 port cities and Hainan Dao to foreign investors. As with the four special economic zones, foreign investors will receive preferential tax treatment, simplified entry-exit procedures, and rights to establish wholly owned enterprises. Furthermore, foreign management of joint ventures is subject to renewal through negotiation. Approval for construction projects using foreign investment and technology was to be decentralized. To accelerate and expand economic cooperation and technology exchange, the State Council issued temporary provisions on tax reduction and exemption in the special economic zones and for the 14 port cities.[5] In addition, the Government was to promulgate a law on protecting the rights of enterprises wholly owned by foreign investors. The first wholly owned foreign company in China was 3M China Ltd., a subsidiary of a U.S. company.

China enacted its own patent law, detailing rules and regulations to protect patent rights. In addition, the Government applied in late 1984 for membership to the Paris Convention for the protection of industrial property. In the interim, the terms for patent protection were to be stipulated in a technology transfer agreement or in the license agreement as well as stipulate compensation for violation or infringement of the patent right.

In addition to Hainan Dao (Guangdong), the 14 coastal cities opened to foreign investment were, from north to south, Dalian, Qinhuangdao, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang, and Beihai. Special foreign investment policies will be applied to the 14 cities and Hainan Dao, as well as to the special economic zones. In addition, the autonomous power for decision making of these places would be expanded. Although the population of the 14 cities collectively constitute close to 8% of the nation's total, the gross value of its industrial production ($713 million) accounted for almost 25% of the country's aggregate output. For instance, industrial production in Shanghai is estimated at approximately $320 million annually, followed by Tianjin, $115 million, and Guangzhou, $60 million. In addition, the 14 coastal cities account for 97% of the nation's total volume of freight carried by land and sea.[6]

Dalian, Liaoning, the second largest port in China, has 7 operational areas with 48 berths, 23 of which have a 10,000-ton handling capacity. Dalian has a comprehensive industrial foundation that includes machinery, metallurgy, petrochemicals, shipbuilding, and textiles. Dalian Chemical Industrial Co. produces over 40% of the country's sodium carbonate, while the Dalian steel mill accounts for about one-third of the national output of high-speed tool steel and wire. In China, Dalian is referred to as the "bay of blue" and also as the "pearl of the Yellow Sea."

The Great Wall winds along the shore of Bo Hai to the mountain top at Yansai Lake in Qinhuangdao, Hebei. The industries here include construction materials, machinery, and metallurgy. However, Qinhuangdao is best known for glass production, in addition to tourism. The old Yaohua glass factory produces about 3.4 million standard cases of plate glass. Output of this enterprise is supplemented by 15 factories. Qinhuangdao Municipal Glass Factory, the newest producer, which began production in 1983, has an annual production capacity of 940,000 standard cases of plate glass and glass fibers. Qinhuangdao accounts for 70% of China's glass exports. Qinhuangdao is serviced by the Beijing-Shenyang Railway, Beijing-Shenyang Highway, Beijing-Qinhuangdao electrified railway, and Datong-Qinhuangdao Railway (under construction). The railways play an important part in the export of coal produced in Shaanxi and Nei Monggol, as well as for crude oil from Daqing, and shipment of local output of salt.

Tianjin, capable of handling 15 million tons of cargo per year, is the largest trading port in north China (Hebei) with 34 berths, 20 of which are capable of accommodating ships over 10,000 tons. Tianjin is serviced by an airport, one of the largest in the nation, and the Beijing-Shenyang and Beijing-Shanghai Railways' trunk lines. Nearby, the Dagang Oilfield produces petroleum and natural gas for domestic consumption and a lesser amount for export. Salt production along Bo Hai accounts for about 25% of the national output. "Changlu" salt is well known domestically and in export markets.

Yantai is at the eastern end of Shandong, facing Dalian. Yantai is linked by rail with Beijing, Jinan, and Qingdao. Yantai has 15 berths capable of handling 5 million tons of freight per year. Qingdao, ranking sixth in national export freight, has 9 wharves with 49 berths, 15 of which are capable of accommodating vessels exceeding 10,000 tons. Airline connections extend to Shanghai, Beijing, and Dalian, and the airport was to be converted into an international airport. A new port was scheduled to be built at Huangdao; a railway was to be constructed between Huangdao and Jiaoxian; a ferry boat service was to be started between Qingdao and Huangdao; and a rail service was to be reestablished between Jiaozhou and Jinan.

Lianyungang is the starting point of the Longhai Railway linking northern Jiansu, southern Shandong, northern Anhui, Henan, Shanxi, and Shaanxi as well as points in Sichuan, Gansu, Qinghai, Xinjiang, and Ningxia. There are highway connections to Nantong, Nanjing, Xuzhou, and Qingdao. Lianyungang has five 10,000-ton, two 5,000-ton, and two 3,000-ton class berths. Construction west of the present harbor area to be completed in 1985 will quadruple coal handling capacity. Lianyungang is known for "Huai" salt, produced by the Huaibei saltworks (one of the four sea evaporite producing operations in the country), and Jingping phosphate, produced at one of six large phosphate mines in the nation, on the southern slope of the Jingping Mountain Range.

Nantong, Jiangsu, is on the northern shore of the lower reaches of the Chang Jiang, and is capable of berthing 30,000- to 50,000-ton seagoing vessels. The canals from Nantong extend to Ganyu, Yangzhou, and northern Jiangsu. Upriver, Nantong services the economically important areas of Jiangsu, Anhui, Jiangxi, Hubei, Hunan, and Sichuan.

Shanghai, referred to as the "thoroughfare to the eight provinces," is the gateway from the Chang Jiang to the East China Sea. Shanghai is heavily industrialized with cottage businesses to petrochemicals. The Baoshan iron and steel complex, scheduled for completion in 1985, is nearby. Economic development and trade zones are being constructed at Minxing and Hongqaio. As China's largest trade port, Shanghai Hongqiao handles close to 92 million tons of cargo annually in its berths.

Ningbo, Zhejiang, about 110 nautical miles south of Shanghai, has three harbor areas—Beilun, Ningbo, and Zhenhai. Altogether, the harbors have an annual freight volume of 27 million tons. The newly established Beilun Harbor area and the second-phase construction of the Baogang facility at Shanghai form China's largest transshipment wharfage for mineral ores. Industries in Ningbo include electronics, machinery, petrochemicals, and textiles.

Wenzhou, Zhejiang, has wharves accessible to 7,000-ton vessels at high tide, and 40 more were being planned for berthing 10,000-ton ships. Wenzhou is referred to as "the alumstone capital." The reserves of alunite along the banks of the Ou Jiang at Wenzhou are estimated at 300 million tons. Farther south is Fuzhou, the capital city of Fujian. Fuzhou's industry includes chemicals, electronics, machinery, papermaking, and textiles. Fuzhou's port at Nawei is accessible to 10,000-ton vessels at high tide.

Guangzhou, Guangdong, is on the northern edge of the Zhu Jiang Delta, facing the South China Sea. Three rail lines feed into Guangzhou—the Beijing-Guangzhou Railway, Guangzhou-Shenzhen Railway, and Guangzhou-Sansui Railway. Both the inner Port of Guangzhou and the outer Port of Huangpu are open to ocean traffic. For many years, Guangzhou served as the outlet of Chinese goods by hosting the Canton trade fairs. Zhanjiang, southwest of Guangzhou and also in Guangdong, is a deepwater harbor and is China's base for offshore oil exploration in the South China Sea. In 1984, six deepwater berths to accommodate vessels exceeding 10,000 tons were under construction.

The Beihai Port serves as an outlet for the export of goods from Guangxi, Yunnan, Guizhou, and Sichuan. Beihai is known for its clays, coal, pearls, potter's clay, and quartz. Because of its geographical position, Beihai serves as a base for oil drilling in Beibu Wan.

Hainan, with a coastline measuring about 1,400 kilometers, is largely underdeveloped except for fishery. The other traditional industry in Hainan is agricultural, featuring tropical plants and fruits. Because of its lush vegetation and rare birds and animals, Hainan was to develop infrastructure for tourism. Aside from the iron ore deposit at Shiliu, minerals of cobalt, manganese, quartz, and titanium in Hainan are largely underdeveloped.[7]

By opening the 4 economic zones (Shantou, Shenzhen, Xiamen, and Zhuhai), the 14 coastal cities, and Hainan Dao to foreign investment, China expected to accelerate the development of its economy and society. By expanding foreign trade, domestic production would increase and provide foreign exchange. The use of foreign investment capital would free domestic funds, the introduction of which could be allocated for other uses. China's open-door policy would encourage advanced technology from foreign countries. Industry personnel would benefit in learning managerial skills. Exchange and cooperation would immediately infuse up-to-date scientific and technological knowledge.[8]

As part of the Government reorganization plan, the Ministry of Foreign Economic Relations and Trade would divorce itself from decision making in the producing sector. The functions of the Ministry would include formulating guidelines, policies, and regulations; issuing trade licenses; and establishing quality specifications for trade items.[9]

During the course of the sixth 5-year plan (1981-85), 890 projects were to be completed, 169 of which were considered key projects by the State Planning Commission. Although construction on all projects was to begin during 1981-85, some projects were to be completed in the next 5-year plan. Sixty of the key projects are energy development projects, whose completion will raise the country's coal production capacity by 84.3 million tons, crude oil extraction capacity by 31.3 million tons, and power generation capacity by 24.3 million kilowatts. Thirty-nine projects were for railway electrification and double tracking, port construction, and communications, while 33 involved raw materials. Sixteen involved educational and medical projects; 8, national defense; and 13, automotive and light industry.

Developing transportation infrastructure is crucial in China's modernization program for movement of goods between the inland and the coast. In 1984, 15,000 kilometers of new highways were added making a total of 930,000 kilometers open to traffic. About 29,000 kilometers was rebuilt during the year, and a 1,700-kilometer stretch between Qinghai and Xizang was asphalted. Construction began on a 20-kilometer Jiading Expressway in Shanghai, the first in China, which is scheduled for completion in 1987. The International Bank for Reconstruction and Development agreed to provide $70 million for highway construction in Shaanxi and Shandong. Funds for the Guangzhou Expressway were being solicited.

Construction of 86 highway bridges was completed in 1984. These included the 1,116-meter Dalinghe Bridge in Liaoning, the longest; Oujiang Bridge in Zhejiang; Weihe River Bridge in Shaanxi; and the Shanhongqi Bridge in Guangdong. In addition, 112 highway bridges were under construction. The 5,560-meter Huang He Bridge, to be the longest in the country, was to be completed by 1987.[10]

During 1984, China added 355 kilometers of railway, double tracked 418 kilometers, and electrified 681 kilometers. China has a total of 52,000 kilometers of railway.[11] In 1984, passenger volume was 1.1 billion, and cargo transport, 1.2 billion tons. During the year, 652 locomotives (diesel, electric, and steam), 17,900 freight cars, and 1,180 passenger cars were built.

China has shipping agreements with 32 countries. Its 550-vessel ocean fleet includes roll-on and roll-off ships, container and general cargo ships, bulk carriers, passenger vessels, and oil tankers.[12] The fleet handles 37% of China's foreign trade volume and annually transports more than 10 million tons of cargo for developing countries. Also, the fleet transports additional cargo in accordance with foreign trade agreements. In 1984, cargo tonnage transported was about 42 million tons.

China promulgated and put into effect a series of laws and regulations for environmental protection. These included the Water Pollution Prevention and Control Law, Regulations for Strengthening Environmental Control of Rural Township and Street Enterprises, Prevention of Soot Pollution, and Trial Targets for Examining Environmental Protection in Industrial Enterprises. Draft legislation was prepared for noise and air pollution. During the year, 22 atmospheric observation stations were installed, bringing the total number to 1,143 nationwide. More than 150 projects to clean up obvious pollution were under way. Legislation was also drafted on managing nature preserves and on protecting rare and endangered animals and plants. China has 106 protected districts with a total area of about 3.9 million hectares, which accounts for about 0.4% of the nation's territory.[13]

A law was drafted on the use and protection of China's mineral resources. The law covers everything from prospecting, exploration, and geologic studies to management and conservation of the nation's resources. Chinese geologists have verified reserves of 136 minerals in China. According to the Ministry of Geology and Resources, geologic prospecting in 1984 was successful in that finds of coal, gas, and oil were larger than expected. Estimates of the coal finds would add 13.2 billion tons to the country's reserves of 727 billion tons. A deep well drilled in the northern part of the Tarim Basin (Xinjiang) yielded a flow of 6,000 barrels of oil and 2 million cubic meters of gas per day. Deposits of emeralds and sapphires were also discovered. Estimated finds for zinc during the year were 3.1 million tons; lead, 1.2 million tons; copper, 1.1 million tons; nickel, 92,300 tons; and silver, 5,600 tons.[14] During the past 5 years, the area covered in geologic exploration included 2.7 million square kilometers of aerial remote magnetic surveying, 430,000 square kilometers of aerial remote sensing, and 1.2 million square kilometers subjected to geochemical sampling. Proven reserves of antimony, asbestos, fluorspar, graphite, iron, lead, magnesite, mercury, molybdenum, phosphorus, sulfur, tin, titanium, tungsten, vanadium, and zinc in China rank first worldwide.[15]

The use of geologic remote sensing has grown rapidly in China. This technique is used by the Ministries of Coal Industry, Metallurgical Industry, Water Conservancy and Power, Geology and Minerals, Nuclear Industry, Petroleum Industry, and Railways; the State Seismological Bureau; the Chinese Academy of Sciences; and various universities and colleges. For instance, the Ministry of Nuclear Industry conducted computer processing of satellite data in Nei Monggol that resulted in the location of sedimentary uranium deposits. The Ministry of Metallurgical Industry studied the image characteristics of copper and iron deposits in the lower Chang Jiang; molybdenum deposits of Jinduicheng, Shaanxi; the tin deposits in Gejiu, Yunnan; and the copper deposits of Dexing, Jiangxi. The Ministry of Coal Industry used remote sensing for coal studies in Da Hinggan Ling, Nei Monggol, and Taiyüan, Shanxi; and for peat in Chao Hu, Anhui, and Roigi, Sichuan. The Ministry of Petroleum Industry with the U.S. Geological Survey used remote sensing to study gas-bearing structures in the Qaidim Basin, Qinghai. Thus, remote sensing has become an effective tool in China's geologic studies.[16]

In 1984, supervision and administration of China's nonferrous metals industry was separated from the Ministry of Metallurgical Industry and placed under the aegis of a company, the China National Nonferrous Metal Industry Corp. (CNNMIC). CNNMIC, which reports to the State Council, administers nonferrous metals prospecting, development and operation of mines, mineral processing plants, smelters, and metal processing facilities. In addition, its function extends to the import and export of nonferrous metal products. On December 11, 1984, the China Nonferrous Metal Society was inaugurated. In this instance, nonferrous activity was removed from the umbrella of the Chinese Society of Metals.

China's economic growth in 1984 was close to 14%, and the value of industrial output was estimated at $350 billion. The Government attributed the growth to rural economic reforms, industrial restructuring, investments in new technology, increased activities in foreign economic and technical exchanges, and growing consumer demand in the domestic market.

PRODUCTION

China's mineral resources are large and multifarious, and mining can be expanded. However, China has only been recently active in the surveying, delineation, and cataloging of its mineral wealth. China is a major producer of mineral fuels, ranking second in the world for coal, and seventh for oil. It is among the world's top producing countries in the output of antimony, barite, cement, fluorspar, iron and steel, magnesite, phosphate, rare earths, salt, talc, tungsten, and vanadium. It is also a notable producer of fertilizers, gold, gypsum, ilmenite, manganese, peat, silver, and tin. In 1984, the national production of coal and oil reached new highs. Electricity generation increased 14% in 1984. Pig iron production was up 7%, and crude steel output increased 8%. Output of major nonferrous metals increased 8%, and gold production was up close to 11%, according to other sources.

The sixth 5-year plan (1981-85) reflects a realistic pace for China's modernization. The overall plan was to balance the development of heavy industry to support growth in light industry and agriculture. Increased trade was stressed to stimulate production. Other stimulants for growth included giving bonuses for increased productivity and giving recognition and monetary awards for quality products. Increased efficiency in manufacturing was to be accomplished through integration. Short-term constraints to industry were the introduction of pollution standards and energy conservation. However, output of many major commodities in the penultimate year of the current economic plan exceeded the target set for 1985.

Table 1.—China: Estimated production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Bauxite, gross weight	[r]1,500,000	[r]1,500,000	[r]1,600,000	1,600,000	1,600,000
Alumina, gross weight	750,000	750,000	[r]800,000	800,000	800,000
Metal, refined, primary	360,000	[r]380,000	380,000	380,000	380,000
Antimony, mine output, metal content	10,000	10,000	12,000	15,000	15,000
Bismuth, mine output, metal content	260	260	260	260	260
Cadmium, smelter	250	270	300	300	300
Copper:					
Mine output, metal content	[r]115,000	[r]170,000	[r]175,000	175,000	180,000
Metal:					
Smelter, primary and secondary	[r]175,000	[r]190,000	[r]205,000	195,000	210,000
Refined, primary and secondary	[r]295,000	[r]300,000	300,000	310,000	310,000
Gold, mine output, metal content troy ounces	225,000	1,700,000	[r]1,800,000	1,850,000	1,900,000
Iron and steel:					
Iron ore, gross weight[3] thousand tons	75,000	75,000	75,000	75,000	75,000
Pig iron do.	38,020	34,170	35,535	37,380	39,980
Ferroalloys do.	1,000	940	880	900	900
Steel, crude do.	37,120	35,600	37,160	40,020	43,370
Steel, rolled do.	27,160	26,700	29,008	30,720	33,710
Lead:					
Mine output, metal content	160,000	160,000	160,000	160,000	160,000
Metal, refined, primary and secondary	175,000	175,000	175,000	195,000	195,000
Magnesium metal, primary	7,000	7,000	7,000	7,000	7,000
Manganese ore, gross weight thousand tons	1,600	1,600	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	12,000	13,000	15,000
Smelter	11,000	11,000	12,000	13,000	14,000

See footnotes at end of table.

Table 1.—China: Estimated production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS —Continued					
Silver, mine output, metal content thousand troy ounces	r2,500	r2,500	r2,500	2,500	2,500
Tin:					
Mine output, metal content	r14,600	r15,000	r15,000	15,000	15,000
Metal, smelter	r15,000	r15,000	r15,000	15,000	15,000
Tungsten, mine output, metal content	15,000	13,500	12,500	12,500	13,500
Zinc:					
Mine output, metal content	r160,000	160,000	160,000	160,000	160,000
Refined, primary and secondary	160,000	r160,000	r160,000	175,000	185,000
NONMETALS					
Asbestos	131,700	106,000	110,000	160,000	160,000
Barite	680,000	r800,000	900,000	1,000,000	1,000,000
Cement, hydraulic thousand tons	79,860	84,000	94,072	108,250	121,080
Fluorspar	480,000	480,000	550,000	650,000	650,000
Graphite	160,000	184,000	185,000	185,000	185,000
Gypsum thousand tons	r3,300	r3,400	r3,500	4,300	4,800
Kyanite and related materials	2,500	2,500	2,500	2,500	2,500
Lithium minerals, all types	14,000	14,000	14,000	15,000	15,000
Magnesite thousand tons	2,000	2,000	2,000	2,000	2,000
Nitrogen: N content of ammonia do	9,990	12,193	12,711	13,766	14,000
Phosphate rock and apatite, P_2O_5 equivalent do	2,360	2,530	2,580	2,750	3,540
Potash, marketable, K_2O equivalent do	12	20	26	29	41
Salt do	17,280	18,320	16,384	16,130	16,000
Sodium compounds: Sodium carbonate, natural and synthetic do	1,613	1,652	1,734	1,793	1,880
Sulfur:					
Native	200,000	200,000	200,000	200,000	200,000
Content of pyrite	1,700,000	r1,800,000	r1,800,000	2,300,000	2,300,000
Byproduct, all sources	r300,000	r300,000	r300,000	350,000	350,000
Total	r2,200,000	2,300,000	2,300,000	2,850,000	2,850,000
Talc and related materials	915,000	r900,000	950,000	950,000	950,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite thousand tons	r124,000	r124,000	r130,000	143,000	154,000
Bituminous and lignite do	r496,000	r497,000	r521,000	572,000	618,000
Total do	620,000	621,000	651,000	715,000	772,000
Coke, all types do	34,050	31,720	33,245	34,510	35,000
Gas, natural:					
Gross billion cubic feet	555	495	455	480	490
Marketed do	504	450	414	431	438
Petroleum:					
Crude (including crude from oil shale) thousand 42-gallon barrels	773,435	738,906	744,994	774,311	836,069
Refinery products do	470,000	450,000	475,000	500,000	550,000

[p]Preliminary. [r]Revised.

[1]Table includes data available through Sept. 6, 1985.

[2]In addition to the commodities listed for which quantitative estimates of output have been made, China is known or believed to have produced other commodities for which no estimates have been prepared.

[3]In terms of 50% Fe ore.

TRADE

The value of China's trade in 1984 was $43.3 billion. Exports increased 33% to $20.9 billion, and imports, 47% to $22.4 billion. China's largest trading partners were Japan, accounting for 26% of China's total trade, followed by Hong Kong and Macao, 19%; the United States, 12%; member countries of the European Economic Community, 10%; member countries of the Association of South East Asian Nations, 6%; Canada and the U.S.S.R., 3% each; and Australia and Brazil, 2% each.

China's principal export classes were mineral fuels, valued at $4.8 billion; heavy industry products, $3.0 billion; industrial materials, $1.6 billion; and chemical products, $0.8 billion. In comparison, China imported heavy industrial products, valued at $11.5 billion; chemical products, $3.4 billion; and industrial materials, $2.1 billion.

By type of product, China's main export materials were coal, crude oil, and petroleum products. Imports were dominated by fertilizer, iron and steel, machinery and transport equipment, metalliferous ores, and nonferrous metals.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals	77	116	--	Hong Kong 48; West Germany 39; Netherlands 19.
Aluminum:				
Ore and concentrate	198,155	274,764	65,075	West Germany 55,494; Japan 37,030; France 27,350.
Oxides and hydroxides	115,081	13,946	--	Thailand 3,877; Indonesia 2,900; Hong Kong 2,234.
Metal including alloys:				
Scrap	146	147	--	All to Hong Kong.
Unwrought	48,836	14,358	--	Japan 10,579; Hong Kong 2,445.
Semimanufactures	4,983	8,674	211	Hong Kong 7,633; Indonesia 304.
Antimony:				
Ore and concentrate	1,386	2,106	--	Japan 1,356; West Germany 700.
Oxides	2,407	1,472	--	Japan 1,014; West Germany 406.
Metal including alloys, all forms	3,244	4,644	--	Japan 3,469; United Kingdom 439.
Arsenic:				
Ore and concentrate	--	5	--	All to Thailand.
Oxides and acids	2,155	135	--	Japan 67; Hong Kong 46; Philippines 17.
Beryllium: Oxides and hydroxides	50	30	--	All to Japan.
Cadmium: Metal including alloys, all forms	186	177	--	West Germany 137; Netherlands 40.
Chromium:				
Ore and concentrate	1,148	3,632	--	Ireland 3,273; France 359.
Oxides and hydroxides	1,503	1,390	241	West Germany 430; United Kingdom 293.
Metal including alloys, all forms	68	180	--	West Germany 163.
Cobalt:				
Oxides and hydroxides	36	84	--	Indonesia 60; West Germany 16.
Metal including alloys, all forms	6	--		
Columbium and tantalum: Ore and concentrate ---- value, thousands	$1	--		
Copper:				
Oxides	24	3	--	All to Hong Kong.
Sulfate	279	306	--	Japan 220; Hong Kong 86.
Metal including alloys:				
Scrap	241	304	--	Hong Kong 257; Japan 47.
Unwrought	3,504	51	--	Hong Kong 27; Japan 22.
Semimanufactures	7,746	10,767	(2)	Hong Kong 10,070; Singapore 210.
Germanium: Metal including alloys, all forms	1	1	--	All to Japan.
Gold: Metal including alloys, unwrought and partly wrought ---troy ounces	273,966	2,636	--	All to Hong Kong.
Indium: Metal including alloys, all forms kilograms	--	305	--	All to Japan.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	--	85	--	All to West Germany.
Metal:				
Scrap	98,317	36,562	(3)	Hong Kong 14,072; Japan 13,391; Thailand 5,049.
Pig iron, cast iron, related materials	902,871	56,036	--	Japan 38,332; Indonesia 9,249; Hong Kong 7,797.
Ferroalloys:				
Ferromanganese	4,515	2,042	--	Pakistan 1,394; Philippines 324; Indonesia 202.
Ferrosilicon	37,513	4,729	--	Japan 2,933; Indonesia 960; Hong Kong 600.
Silicon metal	--	17,883	--	All to Japan.
Unspecified	34,031	3,413	--	Japan 2,660; Singapore 305.
Steel, primary forms	172,087	11,937	--	Singapore 10,008; Pakistan 1,669.
Semimanufactures	805,393	482,031	3,824	Hong Kong 404,645; Singapore 38,316.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	54	407	--	All to Thailand.
Oxides	690	846	--	Japan 334; Pakistan 259; Indonesia 101.
Metal including alloys:				
Scrap	50	--		
Unwrought	2,241	3,078	--	Thailand 1,827; Hong Kong 723; Philippines 320.
Semimanufactures	127	247	--	Indonesia 231.
Lithium: Oxides and hydroxides	308	342	--	France 145; West Germany 63; United Kingdom 47.
Magnesium:				
Oxides	50	--		
Metal including alloys, all forms	443	559	47	West Germany 324; Japan 144.
Manganese:				
Ore and concentrate	20,325	22,713	--	Japan 20,643; West Germany 1,401.
Oxides	4,393	4,903	--	Hong Kong 2,491; Singapore 1,447; Indonesia 671.
Metal including alloys, all forms	93	856	--	West Germany 363; Canada 300; Netherlands 102.
Mercury 76-pound flasks	8,694	6,338	--	Hong Kong 2,573; Pakistan 1,363; Japan 1,071.
Molybdenum:				
Ore and concentrate	(4)	60	--	United Kingdom 40; Finland 10; Japan 10.
Oxides and hydroxides	6	6	--	All to Netherlands.
Metal including alloys, all forms	16	NA		
Nickel:				
Oxides	19	55	--	All to Hong Kong.
Metal including alloys, all forms	3	24	--	Pakistan 18; Thailand 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$3,170	$4,186	$2,390	West Germany $844; United Kingdom $385.
Rare-earth metals	100	126	120	Japan 6.
Silicon, elemental	13,333	120	--	Mainly to France.
Silver:				
Waste and sweepings[5] value, thousands	$285	$1,302	--	West Germany $894; United Kingdom $391.
Metal including alloys, unwrought and partly wrought do	$1,158	$5,931	--	France $5,329; Hong Kong $600.
Tin:				
Ore and concentrate	10	--		
Metal including alloys:				
Scrap	434	1	--	All to Hong Kong.
Unwrought	4,263	2,846	1,938	Hong Kong 634; West Germany 186; Yugoslavia 65.
Semimanufactures	435	1,282	--	Japan 861; Hong Kong 389.
Titanium:				
Oxides	2,259	1,810	36	Hong Kong 820; Japan 606; France 143.
Slag	--	10	--	All to Japan.
Metal including alloys, all forms	108	--		
Tungsten:				
Ore and concentrate	2,762	3,836	229	West Germany 2,042; Japan 1,006; Sweden 293.
Oxides and hydroxides	13	15	--	All to Belgium-Luxembourg.
Metal including alloys, all forms	169	216	1	Japan 150; Singapore 62.
Uranium and/or thorium:				
Ore and concentrate	34	760	--	France 717; Japan 28.
Metal including alloys, all forms	44	10	--	All to Indonesia.
Vanadium: Oxides and hydroxides	2,928	3,860	--	Belgium-Luxembourg 2,488; Japan 768; West Germany 306.
Zinc:				
Oxides	5,168	2,824	159	Japan 631; West Germany 331; Algeria 300.
Metal including alloys, all forms	12,761	3,329	--	Japan 2,275; Hong Kong 768.
Other:				
Ores and concentrates	7,808	14,981	715	Italy 5,196; West Germany 4,404; Indonesia 2,000.
Oxides and hydroxides	9,481	1,691	565	West Germany 781.
Ashes and residues	14,778	7,974	--	All to Hong Kong.
Base metals including alloys, all forms:				
Quantity, reported	1,365	1,608	--	Japan 592; Hong Kong 344; Brazil 125.
Value only, reported thousands	$4,892	$4,010	$3,923	New Zealand $87.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,787	2,638	--	Hong Kong 1,268; Japan 1,003.
Artificial:				
Corundum	10,204	10,275	1	Hong Kong 7,032; West Germany 1,829; Japan 1,092.
Silicon carbide	1,462	650	--	All to Hong Kong.
Dust and powder of precious and semiprecious stones value, thousands	$34	$48	$48	
Grinding and polishing wheels and stones	3,762	2,784	NA	Hong Kong 1,093; Indonesia 1,021; Singapore 188.
Asbestos, crude	5,065	3,050	--	Singapore 1,212; Indonesia 1,205; Japan 460.
Barite and witherite	833,164	781,830	705,749	Japan 44,652; West Germany 11,699; Netherlands 11,545.
Boron materials:				
Crude natural borates	323	62	1	Mainly to Pakistan.
Oxides and acids	3,718	2,349	--	Japan 1,548; Pakistan 232; Hong Kong 173.
Cement	604,987	290,073	520	Hong Kong 285,559; Pakistan 3,600.
Chalk	4	--		
Clays, crude	210,703	213,873	38	Japan 114,573; Hong Kong 86,649; West Germany 4,042.
Cryolite and chiolite	267	83	83	
Diamond:				
Gem, not set or strung value, thousands	$7,799	$8,012	$108	Belgium-Luxembourg $5,750; Hong Kong $1,420; Japan $663.
Industrial stones do	$1,294	$1,698	$102	Belgium-Luxembourg $1,588.
Diatomite and other infusorial earth	32	2	--	All to Sweden.
Feldspar, fluorspar, related materials	423,245	367,474	27,514	Japan 265,107; West Germany 45,424; Hong Kong 16,267.
Fertilizer materials: Manufactured:				
Ammonia	1,059	1,671	--	All to Hong Kong.
Nitrogenous	1,465	1,386	--	Hong Kong 1,280.
Phosphatic	13,047	15,796	--	Japan 15,791.
Potassic	28	2	2	
Unspecified and mixed	1,366	2,725	2	Japan 2,597; Netherlands 100.
Graphite, natural	48,334	46,291	9,205	Japan 27,769; United Kingdom 4,795; France 1,455.
Gypsum and plaster	4,336	6,310	--	Hong Kong 4,974; Indonesia 555; Singapore 480.
Kyanite and related materials	--	50	--	All to Japan.
Lime	36,985	37,473	--	Hong Kong 35,394; Singapore 2,069.
Magnesium compounds:				
Magnesite	304,976	285,387	7,688	Japan 178,963; West Germany 36,831; Hong Kong 18,571.
Oxides and hydroxides	2,911	19,073	--	United Kingdom 10,733; Japan 6,376; France 1,064.
Mica:				
Crude including splittings and waste	11,801	14,029	--	United Kingdom 11,173; West Germany 1,595.
Worked including agglomerated splittings	65	243	NA	United Kingdom 89; Indonesia 78; France 24.
Nitrates, crude	29	--		
Phosphates, crude	30	5	--	All to New Zealand.
Phosphorus, elemental	2,850	NA		
Pigments, mineral:				
Natural, crude	1,820	1,852	--	Japan 907; Indonesia 520; Hong Kong 355.
Iron oxides and hydroxides, processed	4,728	4,162	--	Indonesia 1,397; Hong Kong 1,223; Pakistan 695.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$3,844	$3,142	$557	Hong Kong $1,340; Japan $1,051.
Synthetic do	$106	$111	$17	Netherlands $51; Hong Kong $36.
Salt and brine	113,120	737,929	--	Japan 607,955; Hong Kong 94,458; Philippines 29,955.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	3,679	5,848	--	Hong Kong 4,997; Philippines 400.
Sulfate, natural and manufactured	61,529	58,814	--	Japan 29,615; Hong Kong 14,494; Singapore 8,280.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	69,518	84,812	--	Japan 73,589; Hong Kong 7,278.
Worked	20,617	15,646	(6)	Japan 6,979; Singapore 4,362; Hong Kong 3,155.
Dolomite, chiefly refractory-grade	100	NA		
Gravel and crushed rock	561,888	1,414,351	2	Hong Kong 1,410,946.
Limestone other than dimension	37,670	28,625	--	Hong Kong 28,525.
Quartz and quartzite	35,979	13,580	5	Japan 11,347; Hong Kong 1,743.
Sand other than metal-bearing	827,579	987,318	--	Hong Kong 987,268.
Sulfur:				
Elemental:				
Crude including native and byproduct	725	43	--	Hong Kong 40.
Colloidal, precipitated, sublimed	103	4	--	All to Pakistan.
Sulfuric acid	3,439	3,914	--	All to Hong Kong.
Talc, steatite, soapstone, pyrophyllite	523,065	528,124	48	Japan 469,810; Hong Kong 14,770; Indonesia 14,019.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,441	13,698	--	Pakistan 11,700; Japan 1,302.
Carbon: Carbon black	5,610	2,352	--	Hong Kong 996; Indonesia 609; Japan 400.
Coal:				
Anthracite and bituminous thousand tons	3,693	4,411	18	Japan 3,799; Hong Kong 451; France 107.
Lignite including briquets	1,108	933	--	All to Japan.
Coke and semicoke	44,793	28,340	1	Thailand 26,095; Hong Kong 676; Indonesia 500.
Petroleum:				
Crude thousand 42-gallon barrels	93,320	92,694	2,642	Japan 68,015; Brazil 19,689.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	12	38,558	--	All to Japan.
Gasoline thousand 42-gallon barrels	20,180	23,341	10,682	Japan 10,914; Singapore 1,175; Hong Kong 423.
Mineral jelly and wax do	615	753	(7)	Singapore 311; Hong Kong 93; Pakistan 90.
Kerosine, jet fuel, white spirit do	4,186	4,130	--	Hong Kong 2,670; Japan 1,064.
Distillate fuel oil do	10,290	8,844	--	Hong Kong 5,118; Singapore 2,122; Japan 850.
Lubricants do	477	417	--	Hong Kong 163; Thailand 150; Singapore 46.
Residual fuel oil do	2,355	2,615	--	Japan 1,368; Hong Kong 1,243.
Bitumen and other residues do	82	82	--	Hong Kong 56; Pakistan 25.
Bituminous mixtures do	1	2	--	Mainly to Hong Kong.
Petroleum coke do	761	758	--	All to Japan.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. 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]Unreported quantity valued at $4,000.

[3]Unreported quantity valued at $81,000.

[4]Unreported quantity valued at $1,000.

[5]May include platinum-group metals.

[6]Unreported quantity valued at $1,074,000.

[7]Less than 1/2 unit.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals	24	1	--	Mainly from Italy.
Aluminum:				
Oxides and hydroxides	31,100	73,580	--	All from Japan.
Metal including alloys:				
Scrap	63	170	--	Netherlands 155.
Unwrought	17,583	63,207	55,950	Yugoslavia 3,085.
Semimanufactures	13,777	14,499	16	Japan 5,066; New Zealand 5,046; Brazil 1,488.
Chromium:				
Ore and concentrate	108,361	131,356	--	Turkey 124,300; Philippines 7,056.
Oxides and hydroxides	346	636	452	Japan 180.
Cobalt: Oxides and hydroxides kilograms	20	NA		
Copper:				
Ore and concentrate	54,597	43,861	--	Philippines 26,974; Papua New Guinea 14,371.
Metal including alloys:				
Scrap	11,892	85,858	--	Japan 84,775.
Unwrought	35,708	96,289	2,155	Canada 67,137; West Germany 18,132; Belgium-Luxembourg 8,727.
Semimanufactures	1,567	3,117	24	Japan 1,958; Hong Kong 1,021.
Gold: Metal including alloys unwrought and partly wrought troy ounces	32,674	20,869	--	Philippines 16,193; Hong Kong 4,474.
Iron and steel:				
Iron ore and concentrate	NA	5	--	All from Brazil.
Metal:				
Scrap	2,269	1,382	643	Hong Kong 708.
Pig iron, cast iron, related materials	326	797,250	NA	Brazil 395,724; Japan 293,144; Pakistan 108,155.
Ferroalloys:				
Ferromanganese	--	500	--	Japan 250; Norway 150; West Germany 100.
Unspecified	3	20,790	--	Brazil 8,540; Norway 7,153; Japan 2,000.
Steel, primary forms	270,012	601,097	--	Japan 548,578; Hong Kong 22,617; Netherlands 14,839.
Semimanufactures thousand tons	3,172	8,259	10	Japan 6,124; West Germany 630; Brazil 469.
Lead:				
Oxides	29	NA		
Metal including alloys:				
Unwrought	120	1,327	2	Canada 999; Japan 299.
Semimanufactures	21	30	--	Japan 23; Hong Kong 7.
Lithium: Oxides and hydroxides	2	NA	--	
Manganese: Oxides	288	1,030	NA	Japan 1,018.
Molybdenum: Metal including alloys, all forms kilograms	12	191	--	Mainly from Japan.
Nickel:				
Ore and concentrate	NA	38,322	--	New Caledonia 38,317.
Metal including alloys, all forms	274	853	--	United Kingdom 766.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	64	295	([2])	Japan 166; West Germany 129.
Rare-earth metals kilograms	NA	1,500	--	All from Japan.
Silver:				
Ore and concentrate do	NA	789	--	All from Canada.
Metal including alloys, unwrought and partly wrought thousand troy ounces	([3])	1,440	1	United Kingdom 1,402.
Tin:				
Oxides	15	26	--	All from Japan.
Metal including alloys:				
Unwrought	45	12	--	Japan 8; Hong Kong 4.
Semimanufactures	56	49	3	Hong Kong 39.
Titanium: Oxides	8,891	5,260	734	Japan 4,378; Hong Kong 146.
Tungsten: Metal including alloys, all forms	1	4	NA	Mainly from Japan.
Uranium and/or thorium: Ore and concentrate value, thousands	NA	$1	$1	
Zinc:				
Ore and concentrate	NA	15,843	--	All from Canada..
Oxides	13	256	--	Hong Kong 127; Japan 76; Singapore 52.
Metal including alloys, all forms	27,215	86,134	91	Canada 54,244; Japan 11,670; West Germany 4,847.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	4	143	103	Hong Kong 34.
Artificial: Corundum	21	69	20	Hong Kong 27; West Germany 18.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$68	$30	$25	Hong Kong $5.
Grinding and polishing wheels and stones	75	137	1	Hong Kong 91; Japan 40.
Asbestos, crude	114	834	--	Canada 734; Japan 86.
Barite and witherite	1,138	NA		
Boron materials: Oxides and acids	10	20	--	Italy 18.
Cement	245,216	1,328,842	--	Japan 879,673; Hong Kong 243,806; U.S.S.R. 204,000.
Clays, crude	3,640	2,096	721	Japan 1,186; Singapore 126.
Diamond:				
Gem, not set or strung value, thousands	$2,848	$2,869	$109	United Kingdom $1,602; Belgium-Luxembourg $995; Hong Kong $155.
Industrial stones do	$4,129	$5,696	$31	Belgium-Luxembourg $5,639; United Kingdom $23.
Diatomite and other infusorial earth	136	99	72	West Germany 15; Japan 9.
Feldspar, fluorspar, related materials	--	300	--	All from Hong Kong.
Fertilizer materials: Manufactured:				
Ammonia	5	8	--	West Germany 5; Hong Kong 3.
Nitrogenous thousand tons	1,343	982	284	Singapore 115; Italy 106; Hong Kong 105.
Phosphatic	[4]104,050	533,808	280,958	Morocco 219,050; Turkey 33,800.
Potassic	112,102	650,545	--	Canada 536,539; West Germany 68,400; Singapore 38,085.
Unspecified and mixed	702,734	833,545	584,556	Italy 72,627; Finland 66,326; West Germany 63,673.
Graphite, natural	9	78	31	Japan 44.
Gypsum and plaster	87	5,578	16	Thailand 5,500.
Lime	319	26	3	Hong Kong 23.
Magnesium compounds: Magnesite	--	19	--	All from West Germany.
Mica:				
Crude including splittings and waste	19	18	--	All from Hong Kong.
Worked including agglomerated splittings	3	13	--	Mainly from Hong Kong.
Phosphates, crude	354,136	49,738	--	Algeria 49,517.
Pigments, mineral: Iron oxides and hydroxides, processed	112	713	102	Hong Kong 501; Belgium-Luxembourg 99.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$5,278	$3,994	$4	Hong Kong $2,734; West Germany $823; Switzerland $353.
Synthetic do	$27	$14	--	Japan $13.
Salt and brine	503	247	--	Hong Kong 241.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	6,315	225,360	59,698	Poland 71,644; Hong Kong 35,615; West Germany 30,000.
Sulfate, natural and manufactured	5	8	--	Hong Kong 6; Japan 2.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	25	1,058	--	Brazil 665; Hong Kong 179; Italy 124.
Worked	394	1,219	NA	Hong Kong 1,201.
Limestone other than dimension	143	243	--	All from Hong Kong.
Sand other than metal-bearing	88	255	--	Hong Kong 191; Japan 29.
Sulfur:				
Elemental, crude including native and byproduct	2,103	301,556	511	Canada 217,027; Poland 82,000.
Sulfuric acid	102,825	243,666	--	Japan 213,780; Philippines 29,815.
Talc, steatite, soapstone, pyrophyllite	139	230	--	All from Hong Kong.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	14	30	--	Do.
Carbon: Carbon black	688	947	--	West Germany 555; Japan 370.
Coal:				
Anthracite and bituminous	59,833	19,108	1,636	Canada 17,472.
Lignite including briquets	62	--		
Coke and semicoke	--	3,806	--	Japan 3,800.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude ----- 42-gallon barrels--	(5)	--		
Refinery products:				
Liquefied petroleum gas value, thousands--	$399	$685	$3	Hong Kong $677.
Gasoline 42-gallon barrels--	4,607	10,758	42	Hong Kong 8,969; West Germany 960; Algeria 756.
Mineral jelly and wax do----	787	2,175	16	Hong Kong 1,509; West Germany 362.
Kerosine and jet fuel do----	17,236	18,625	--	Yugoslavia 15,159; Hong Kong 3,466.
Distillate fuel oil---do----	41,149	146,164	--	Hong Kong 145,873.
Lubricants ------do----	37,013	47,361	(6)	Hong Kong 20,182; Japan 14,607; Singapore 4,900.
Residual fuel oil ---do----	314,938	521,109	--	Hong Kong 509,503; Ivory Coast 11,076.
Bitumen and other residues do----	254	1,600	--	West Germany 1,327; Hong Kong 273.
Bituminous mixtures do----	454	618	--	West Germany 364; Canada 158.
Petroleum coke ---do----	1,100	--		
Unspecified------do----	12,278	189	--	All from Hong Kong.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. 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 imports. These data have been compiled from United Nations information and data published by the partner trade countries.
[2]Unreported quantity valued at $157,000.
[3]Unreported quantity valued at $842,000.
[4]Excludes unreported quantity imported from the United States valued at $6,202,000.
[5]Revised to zero.
[6]Unreported quantity valued at $402,000.

China's minerals and metals trade in 1984 was as follows, in metric tons:

Commodity	Quantity
EXPORTS	
Aluminum products	5,772
Antimony	16,727
Cement	174,119
Coal	7,212,000
Coke	349,000
Copper products	7,777
Petroleum, crude	20,747,000
Petroleum products	5,538,000
Salt	1,038,000
Steel products	223,223
Tin	2,736
Tungsten:	
Metal	78
Ore	18,803
Zinc	1,431
IMPORTS	
Aluminum	252,000
Cement	3,022,000
Coal	2,379,000
Copper	264,000
Iron ore	5,720,000
Soda ash	851,351
Steel products	12,036,000
Zinc	225,000

COMMODITY REVIEW

METALS

China's mineral industry accounted for about 32% of the country's gross value of industrial output, estimated to have been $350 billion in 1984. Input to the gross value of industrial output by the mining and metallurgical sector was as follows: chemicals, 12%; metallurgical industry, 9%; petroleum, 5%; building materials, 4%; and coal, 3%. During the year, production of energy resources reached peak levels, while output by the building, chemical, and metallurgical industries increased 10% to 15%. Administration of minerals and metals in China is invested with the Ministries of Geology and Minerals, Building Materials Industry, Coal Industry, Chemical Industry, Metallurgical Industry, Nuclear Industry, Petroleum Industry, and the China National Nonferrous Metals Corp. (CNNM).

CNNM, which reports to the State Council, is responsible for 236 enterprises, of which 132 are metal producing companies. The marketing arm of CNNM is the China National Nonferrous Metals Import-Export Corp., and the engineering arm is China Nonferrous Metals International Engineering Corp. Specialized companies include the China Huaxing Tungsten Corp., Jiangxi Copper Corp., Jinchuan Gold Corp., Shaanxi Jindiupo Molybdenum Corp., Silver Nonferrous Metals Corp., and Yunnan Tin Corp. General entities include Beijing Nonferrous Metals Industrial Corp., Guangdong Nonferrous Metals Prospecting Corp., Guangxi Prospecting Corp., Nanning Corp., and Shenyang Corp.[17]

By Chinese classification, the 10 major nonferrous metals are aluminum, antimony, copper, lead, magnesium, mercury, nickel, tin, titanium, and zinc. In addition, ferroalloying metals are considered by definition in the nonferrous category. China has not disseminated numeric data on nonferrous metals production. Total output is estimated at about 1.3 million tons in 1984. China's production of nonferrous metals ranks sixth in world output.[18] Output in 1984 was 8% higher than in 1983. Between 1985 and 1990, output is expected to grow at an annual rate of 10% as a result of expanding primarily aluminum, copper, lead, and zinc production. China has rich resources of nonferrous metals in terms of variety and quantity. Although output is inadequate to meet domestic demand, there is the potential for significant production increases.

Aluminum.—China's aluminum consumption is probably close to 600,000 tons per year, with two-thirds provided by domestic production and the remainder from imports. China has large aluminum resources with reserves of 1.2 billion tons of bauxite. The largest reserves are in Shanxi, which accounts for about 25% of the total reserves in the country.

China's newest alumina-aluminum complex is in Guiyang, Guizhou, which was a whole plant purchase from Nippon Light Metal Co. Ltd. of Japan. Although construction was completed in April 1983, metal output has not reached the installed capacity of 80,000 tons per year. Difficulties at the alumina plant were being rectified, and alumina had to be imported for feed to the electrolytic cells. Both in 1983 and 1984, production of alumina failed to meet the annual planned quotas.

The aluminum facility at Zhengzhou, Henan, was undergoing modification to expand capacity. Construction of China's largest plant was under way at Xiaoyi, Shanxi. A small 10,000-ton-per-year refinery was being planned for construction at Lanzhou, Gansu. An aluminum plant was to be constructed at Baiyin, Gansu, in the seventh 5-year plan (1986-90).

Reserves of bauxite in western Henan are estimated at 380 million tons. Plans were being considered to develop a mine of 30,000 to 60,000 tons annual output near Xinan, which has 120 million tons of bauxite grading 50% to 80% alumina. A small electrolytic plant (10,000 to 20,000 tons annually) as well as an alumina plant was to be included in the project. China was also to receive technical assistance from Japanese companies for updating the smelting technology at the Qingtongxia works in Ningxia.

A bauxite deposit with a reserve of more than 200 million tons was to be developed in the seventh 5-year period (1986-90) in Pingguo, Guangxi. There is shallow overburden making the operation suitable to surface mining. Water, electricity, transportation, and other infrastructure are available to the area. An aluminum plant, described as one of China's largest, was also included in the plan. CNNM and the regional government are to finance the initial phase of the project's construction.

Copper.—In 1984, China produced about 400,000 tons of copper and imported about 264,000 tons, according to other sources. Yongping Mine in Jiangxi is one of China's key projects. Production level at full capacity, expected in 1985, will be 86,000 tons of concentrate per year (19,000 tons of copper content). The major components installed include a washing plant, a flash smelter, acid producing equipment, a powerplant, a 110,000-volt transmission line to the mine and plant, a mine railway, and a highway bridge spanning the Xinjiang River south of the plant. The Yongping facility is part of the Dexing copper complex, which will be one of the nation's largest copper producing facilities with eventual output of copper at 200,000 tons per year. The copper sulfide deposits in the mountains of northeastern Jiangxi constitute one-fifth of China's reserves of copper. The smelter of Guixi, Jiangxi, a whole plant purchase from Japan, will produce 70,000 tons of copper per year. The Guixi facility processes Dexing concentrate to produce 360,000 tons of copper sulfate annually. Initial metal production from Guixi is expected in September 1985.

With Japanese cooperation, detailed exploration of copper occurrences in Anqing, Anhui, was to be completed by July 1985. Surveying was to include 850 meters of drift work and 4,200 meters of boring. Foreign participation was expected in developing a copper mine at Anqing, as well as for a copper mine at Duobao, Heilongjiang. The porphyry copper mining project in Heilongjiang (Nenjiang County) would have an ore dressing capacity of 30,000 tons per day. The output of copper, gold, and silver would be for the domestic market, and byproduct molybdenum would be exported.

Gold and Silver.—According to China Gold Co., gold output has increased substantially in China, reaching an annual growth rate of 10%.[19] Permission was granted in 1984 for individuals to mine gold. The Chinese Government estimated that the production of gold by 40,000 individuals and an equal number working in mines run by local governments or collectives account for nearly one-half of the country's total production.

Gold production in 1984 was estimated at 1.9 million troy ounces with 25% of the output from Shandong. Gold production in Heilongjiang increased to about 137,000 troy ounces compared with 121,400 troy ounces in 1983. The drive to increase gold production is a Government effort to ease its financial burden in China's modernization program. At yearend, China's gold bullion reserves remained at 12.67 million troy ounces.

Gold was found in Hitai, northwest of Zhaoqing, Guangdong. Seven gold veins were discovered having lengths of 100 to 600 meters, a width of 0.6 to 2.5 meters, containing about 10 grams of gold per ton. At Gaocun, Guangdong, there is a gold occurrence in which one vein measures 550 meters by 3 meters. This deposit has 13 grams of gold per ton and is estimated to have gold reserves of 6 tons.

There is a long history of gold mining in the Greater Hinggan Mountains in Heilongjiang. A 450-kilometer trail from Mohe, the northernmost town in China, is referred to as the "Gold Road," along which gold has been tapped in the Laogon Gully and Mount Fuke. In this area, three mines were slated for expansion—Laogon placer mine, the Tuanjiegon Gully Mine, and the Fuke Shan placer mine.

The Zhaoyuan gold mine in Shandong is China's largest gold mine with an annual gold production capacity of 80,000 troy ounces. Other large gold mines in Shandong are Canzhuang, Fushan, Jiaojia, Rushan, Weifang, Xincheng, and Yinun. For the past 6 years, gold production in Shandong has increased an average of 8.3% per year with output in 1984 up by 11%. Five mines—Jiaojia, Rushan, Xincheng, Yinan, and Zhaoyuan—collectively have a daily ore handling capacity of 2,250 tons. Development of the Sanshandao Mine facing Laizhou Bay was expected to be completed in 1987. This mine was to produce 1,500 tons of ore per day.

In 1984, a gold occurrence was found in southwest Shaanxi on the upper reaches of the Jialing River near Lueyang County. A deposit measured 20 kilometers long, 100 meters wide, and 10 meters thick. The deposit, with an estimated reserve of 10 tons of gold, was reported in the southern foot of the eastern face of Yuheng Mountain in Fanshi, Shanxi.

Geologic surveys conducted in 1984 reported new discoveries of silver with an estimated reserve of 5,600 tons. In addition, the lead-zinc deposit in Guixi, Jiangxi, could contain as much as 10,000 tons of silver.

The first set of gold coins was issued by the Bank of China in September 1979 to mark the 30th anniversary of the founding of the People's Republic of China. By the end of 1983, the bank had issued 18 sets of gold and silver coins and souvenir badges, including 3 sets of gold and silver coins of the giant panda. In 1984, three sets of commemorative coins were issued. A set of silver coins to mark China's participation in the 23d Olympiad; a set of gold and silver coins for the 10th anniversary of International Women; and a set of gold coins of the giant panda. Coins issued by the Bank of China have averaged 22 karats for gold and 90% for silver.

Iron and Steel.—The Ministry of Metallurgical Industry, which encompassed all metallurgical enterprises in China until it was restructured in 1983, only had jurisdiction for dolomite, iron, and steel in 1984. China was the world's fourth largest producer of steel. There were 13 large iron and steel complexes, each with an annual capacity over 1 million tons. The Anshan iron and steel complex, the largest, produces about 6.9 million tons annually, followed by Wuhan, 3 million tons; Capital, 2.1 million tons; Manshan, 1.4 million tons; and Shanghai Municipality, with 10 mills collectively producing close to 4.8 million tons. In addition, there are 38 mills, each with the capability of producing 100,000 tons to 1 million tons of steel annually. A few of these have only the technical levels of the 1930's, while most of them have the technical level prevailing in the 1950's and 1960's.

Pig iron production in 1984 was close to 40 million tons. Presently, iron ore consumption per ton of pig iron produced averages about 1,830 kilograms. China's iron ore is low grade, averaging 30% to 35% iron content. Annually, mine production is close to 120 million tons, according to other sources. In 1984, China imported 5.7 million tons of iron ore to supplement domestic production. China has contracts with Australian companies for the purchase of 4 million tons of iron ore, and when the Baoshan iron and steel complex is completed in September 1985, Australia will be one of China's leading iron ore suppliers.

Of the nation's iron ore output, 80% is captive production by the large iron and steel complexes. Iron deposits are unevenly distributed in the country. There are over 43 billion tons of iron ore deposits in Anshan (Liaoning), Baotou (Nei Monggol), Benxi (Liaoning), Panzhihua (Sichuan), Qianan and areas in eastern Hebei, Shanxi, and eastern Shandong while other areas have little or none. Ore deposits also differ in quality. Deposits in Qianan (Hebei) and areas in eastern Hebei are large, shallow, and easy to mine and separate. Producing 1 ton of 68% iron ore in these areas costs about $15. On the other hand, the cost to produce a 65% ore in Ekon, Shanxi, is about $30.

Moreover, technology and equipment lag by 20 to 30 years. Mine equipment has small capacity, poor performance, and low efficiency. The annual output of ore in the large mines is 6 to 7 million tons, while for others, it is less than 1 million tons. Major mines are equipped with 4- to 4.6-cubic-meter electric shovels and 20- to 32-ton trucks. Only the Benxi iron and steel complex has begun equipping its strip mine at Nanfen (Liaoning) with 7.6-cubic-meter electric shovels and 100- to 200-ton electric trucks. China's small- and medium-size mines are equipped usually with 1- to 4-cubic-meter electric shovels and 8- to 20-ton trucks. Because of the uniformity in equipment, the productivity of the large mines was not much more than small mines. In addition, inadequate equipment has limited the excavation rate in Chinese strip mines.

In mining and ore dressing, equipment size was to be commensurate with capacity. The Shuichang (Beijing Shi) Mine of the Capital steel complex and the Qidashan Mine of the Anshan steel complex are expanding the capacity of its mines and ore dressing plants to 20 to 30 million tons annually. These operations were not installing the 200- to 400-ton ball mills, but were installing the 100-ton ball mills for use throughout the country. To raise efficiency, the iron ore sector was to consider using modern equipment, using larger equipment, increasing the utilization rate of equipment, and lengthening the replacement time. In addition, it was proposed that the mining enterprises and iron and steel complexes should be managed separately. This would ensure greater decision making power in increasing production, raising efficiency, and ensuring even distribution.[20]

An iron ore deposit was discovered in Heishan County, Liaoning. The deposit, estimated to contain 22 million tons of iron ore, measured 45,000 meters long by 1,000 meters wide.

After 7 years of surveying, a 300-million-ton iron ore reserve was verified in the west section of the Makeng Mine in Longyan, Fujian. In 1972, more than 100 million tons was identified in the middle section of the Makeng Mine.

In 1984, the Jiuquan steel mill in Gansu installed a high-intensity magnetic separation line to handle 1.4 million tons of low-grade hematite per year to produce 500,000 tons of concentrate. Previously, the low-grade hematite, which represented 45% of the ore resources, was rejected.

Materials consumed in iron and steel production were as follows:

Per ton of pig iron:	
Iron ore ---- kilograms--	1,830
Fuel ---- do----	575
Coke ---- do----	390
Per ton of steel:	
Iron and steel (open hearth) ---- do----	1,095
Iron and steel (electric furnace) ---- do----	1,034
Power (electric furnace) -- kilowatt hours--	625
Iron and steel (side-blown converter) kilograms--	1,171
Iron and steel (top-blown converter) -do----	1,143

In addition to the major iron and steel enterprises, China has 1,078 medium- and small-scale iron and steel enterprises, of which 56 are considered key enterprises, 25 are classified as independent key mines, and 21 employ 10,000 or more people. Total employment in these enterprises numbered 1.1 million.

Table 4.—China: Number of small- and medium-size iron and steel enterprises in 1984, by area and kind

Area[1]	Iron ore mines	Coal and coke	Pig iron	Iron and steel	Rolling mills	Finished products
East	42	13	39	160	39	8
North	32	6	51	53	31	4
Northeast	13	2	15	93	69	13
Northwest	7	8	12	25	6	1
South-central	32	8	38	101	36	10
Southwest	11	--	45	40	12	3
Total	137	37	200	472	193	39

[1]Excludes municipalities of Beijing, Shanghai, and Tianjin.

By the end of 1980, total investment throughout the country was about $9 billion, which included installation of 660 blast furnaces with an average individual inner volume of 28 cubic meters, 420 steel rolling mills, 144 coke ovens, and 55 sintering installations. Equipment at China's small- and medium-size iron and steel enterprises was as follows:

	Small	Medium
Blast furnaces:		
Number ----	604	75
Volume thousand cubic meters--	150	140
Converters:		
Number ----	54	82
Capacity ---- metric tons--	171	625
Electric furnaces:		
Number ----	302	80
Capacity ---- metric tons--	638	331
Open-hearth furnaces:		
Number ----	--	2
Capacity ---- metric tons--	--	53
Rolling mills: Number ----	381	130
Sintering plants: Number ----	46	43
Coke ovens: Number ----	88	49

By percent of national output, the small- and medium-size iron and steel enterprises accounted for the following outputs in 1984: steel products, 32%; coke, 30%; pig iron, 27%; iron ore, 25%; and steel, 18%. The Government encouraged this sector of the iron and steel industry to lower coke consumption to reduce the cost of steel production, to integrate crude steel output with production of semimanufactures, and to balance consumer cost with true cost of production.[21]

In recent years, the iron and steel sector has stepped up energy management for fuel conservation. The steel industry accounted for about 12% of the total national energy consumption. China's energy consumption per ton of steel is higher than that in foreign countries. The higher average energy consumption figures relative to Japan were as follows: steel rolling, 166%; prerolling, 109%; sintering, 40%; iron smelting, 17%; steel smelting in Bessemer converters, 14%; and coking process, 12%. Consumption of scrap steel is 10% to 20% lower than in most of the major steel producing countries. As such, there is a higher usage of molten iron and, hence, higher energy consumption. The average energy consumption per ton of steel produced has decreased 21% from 1977 to 1979. However, further decreases are necessary to make China's industry competitive with foreign operations.[22]

China's largest steel producer is the Anshan iron and steel complex in Liaoning. Anshan has five mines with a collective annual capacity of 23 million tons of iron ore. The complex has 20 open-hearth furnaces, 13 rolling mills, 10 blast furnaces, and 3 steel foundries. Annual output capacity is 7 million tons for steel and 4.4 million tons for rolled steel. Technical renovation at Anshan began in 1981 with the introduction of computers to automate steelmaking and other processes. Technology and equipment for Anshan's modernization have been purchased from the Federal Republic of Germany, Japan, and the United States. Installation of equipment, to be completed late in the decade, will raise annual steel production capacity to 8 million tons in 1990.

In the early 1970's, the Wuhan steel mill in Hubei imported equipment for its rolling mill from the Federal Republic of Germany and Japan. Because of the shortage of power, raw materials, and spare parts, the mill has not been able to operate at full capacity. The State Economic Commission convened a conference in midyear 1984 with officials from various ministries to coordinate resolving the difficulties. Lack of power causes the rolling mill to suspend operations for 3 hours daily. Problems at the mill were reported to be resolved to allow full operation by 1985.[23]

Construction of China's newest iron and steel complex occupies a 12-square-kilometer site at Baoshan, outside of Shanghai. First-phase construction was expected to be completed in September 1985 and includes installation of a 22-million-ton-handling-capacity wharf, a 4,063-cubic-meter blast furnace, a 4.9-million-ton sintering plant, a 3-million-ton blooming mill, a powerplant, a converter, a steel rolling mill, and a 500-ton-per-year seamless steel tube facility. Steel output capacity at Baoshan upon completion of the first-phase construction will be 3.35 million tons of steel. The Baoshan site was chosen because convenient shipping conditions make it easy to obtain iron ore and other materials from other areas of China and from Australia and Brazil. In addition, most of the steel output will be consumed in Shanghai, China's largest industrial center.

In November 1984, an economic and technical cooperation agreement was concluded between Australia and China for building a steelworks in the Beicang Port area of Tianjin. Planned annual capacity for the mill is 500,000 tons of crude steel.

Other activities in the iron and steel sector included purchase of technology and equipment for wire rod production at the Xiangtan iron and steel mill in Hunan; acquisition of an electromelt arc furnace for the ferroalloy plant at Nangxi in Zhejiang; powder metallurgy equipment for the steel mill at Jinan, Zhejiang; cold-rolling, tube casting, and other equipment for the steel plant at Dalian, Liaoning; testing and measuring equipment for the Wuxi steel mill in Anhui; rolling equipment for the Shenyang rolling mill in Liaoning; high-speed wire rod equipment and continuous casting machinery for the Qingdao steel plant in Shandong; expansion of the production capacity of hot-rolled seamless steel tube at the Chongqing steel complex in Sichuan; equipment purchase for wire rod and special steel wire production at the Shaanxi steel plant; and plans for production of 100,000 tons per year of ferrosilicon at the Gansu ferroalloy plant.

Lead and Zinc.—China has large resources of lead and zinc, which are widely distributed throughout the country. Reserves of contained lead in ore are estimated to exceed 20 million tons and for contained zinc, over 53 million tons. Geologic surveys in 1984 have uncovered new reserves of 2 million tons of lead and 3 million tons of zinc.

Development of two large lead-zinc mines continued. Completion of the lead-zinc mine in Cheng Xian, Gansu, was expected in 1985. This mine has confirmed reserves of 4 million tons of high-grade ore and inferred reserves of 10 million tons. When completed, Cheng Xian will have an annual output of 110,000 tons of lead-zinc concentrate.

Development of the lead-zinc deposit at Xitieshan, Qinghai, began in May 1982 and was also expected to be completed in 1985. Xitieshan was described as a large-scale mining project and to have rich reserves of high-grade lead-zinc ores mixed with small amounts of copper, gold, and silver.[24]

Two lead-zinc deposits were to be developed in Zhejiang. At Huangyan, plans were made to open a mine with a daily production capacity of 2,500 tons of lead and zinc. At Tiantai, the daily production capacity was to be 200 tons of lead, silver, and zinc. Construction was expected to begin in 1986. Beneficiation and extraction equipment was to be installed at the Qibaoshan iron sulfide mine in Hunan for the extraction of germanium, nickel, and zinc.

China's annual capacity to produce refined lead and zinc is estimated at 250,000 and 300,000 tons, respectively. The larger lead refinery capacity is in Shenyang, Liaoning, and Zhuzhou, Hunan; and for zinc, in Huhidao and Shenyang, Liaoning; Shaoguan, Guangdong; and Zhuzhou, Hunan. At the end of the sixth 5-year plan, China's annual capacity to refine lead was to reach 300,000 tons, and zinc, 375,000 tons.

Nickel.—China's largest nickel mine is at Jinchuan, Gansu, with reserves of 5 million tons of contained nickel. There are four main mining areas; mine No. 2 and the Longshou Mine are underground operations. The metallurgical complex began producing electrolytic nickel in 1964 as well as byproduct copper, gold, platinum-group metals, and silver. Production of electrolytic nickel surpassed the 10,000-ton-per-year barrier for the first time in 1983. Output in 1984 was expected to reach 17,000 tons. Jinchuan signed a licensing agreement with Outokumpu Oy of Finland for a flash smelter utilizing 350,000 tons per year of nickel concentrate. Jinchuan's cobalt extraction unit went into operation on July 10, 1984, and on August 13, the first batch of 200 kilograms of granular cobalt was produced.

A large nickel deposit was discovered in northern Xinjiang near the Ertix River. The deposit contains associated values of cobalt, gold, platinum-group metals, and silver. The Provincial government was expected to develop the deposit to boost output by its metallurgical industry.

Yunnan Province was seeking financial and technical assistance to establish a plant to produce 40,700 tons of sulfuric acid, 1,200 tons of nickel, 740 tons of copper, and 2.5 tons of cobalt annually. The output would be available for both domestic and foreign sales.

Rare-Earth Minerals.—China has rich resources of rare earths with verified reserves of 36 million tons, 90% of which are in the Baiyun Ebo Mine in Baotou, Nei Monggol. Production of rare-earth products is centered in Baotou, Nei Monggol; Lanzhou, Gansu; and Shanghai, with lesser production in Guangdong and Jiangxi Provinces. Annual production capacity for rare-earth chlorides in Gansu is 9,000 tons. China ranks second in the world in rare-earth production capacity and third in the world in total consumption.[25]

The consumption of rare earths is largely limited to electronics and metallurgy. China has been a pioneer to expand application and use of rare earths. For instance, rare-earth additives in fertilizers were studied in Hunan in the early 1970's. Initial studies demonstrated that these additives increased crop yield. A research center was established in Changsa, Hunan, to continue the study, and experiments were being conducted in Heilongjiang as well as Hunan to measure increased crop yield for cotton, paddy rice, peanuts, rubber, soybeans, sugar beets, and wheat.

Tin.—China's tin producing area stretches from Hunan and Jiangxi, south to Guangdong, and west to Guangxi and Yunnan, with the latter two being the main tin producing areas. The Gejiu tin mine in Yunnan was refurbished, and annual mine output raised to over 11,000 tons.[26] Guangdong ranked fourth in tin reserves in China, and the distribution of tin deposits was generally as follows: in the Lianhuashan northeasterly fault (cassiterite-sulfide ore); between the Heyuan and Lianhuashan Faults (cassiterite-quartz vein); in the east-westerly tectonic zone (tungsten-tin-quartz vein and skarn); and alluvial occurrences in eastern and western Guangdong. During a Provincial geological survey (1:200,000), measurings from river tailings and of soil revealed excellent prospects for finding new tin resources.

The Dayishan Xiangyuan tin mine in Hunan was seeking assistance in obtaining mining and beneficiation equipment and tin smelting technology. A mixed deposit with an estimated reserve of 1.3 million tons of lead, tin, and zinc was found at Nandan, in northwest Guangxi.

Other Metals.—The Anhua antimony mine in Hunan was to import equipment and technology to refine antimony ore.

Xinjiang was seeking fluorination equipment and technology for beryllium refining. Yunnan was seeking processing technology and equipment for annual production of 1 ton of germanium. The Gansu ferroalloy plant was seeking assistance for producing 100,000 tons per year of ferrosilicon. Heilongjiang was to develop a molybdenum deposit in Wudaoshan. The Guangzhou titania plant was to import technology and equipment to produce titania by the sulfate process.

NONMETALS

China possesses large resources of a wide variety of nonmetallic minerals. Output of many of these minerals are significant by world standards. Production of cement, dolomite, fertilizers, and limestone are primarily consumed domestically while much of the output of barite, fluorspar, magnesite, marble, and talc are exported.

Barite.—China's barite resources are in Fujian, Guangxi, Hubei, and Shandong. Guangxi is the largest producer, accounting for perhaps two-thirds of China's total output. Current production satisfies both domestic and export needs. Exports of barite peaked in 1982, reaching close to 1.1 million tons with about 65% of the shipments to the United States.

Cement.—In 1984, output of cement in China increased 12%, reaching 121 million tons. Because of increasing demand resulting from China's modernization and construction program, annual production of cement increased rapidly since 1981. Three large cement plants, each with an annual capacity of more than 1 million tons, are included in the key construction projects—the Jidong plant in Tianjin, the Huaichai in Jiangsu, and the Ningguo in Anhui. Construction of the 1.6-million-ton Jidong plant was completed in 1984. China's cement industry is large and widespread, but is dominated by small producing units. About 2,500 small enterprises account for 55% of the annual national output.

Two large cement plants were planned for construction in Anhui, both with a proposed 1-million-ton-per-year capacity. The Taoshan plant, Wuhu County, is convenient to limestone resources, water, and transport facilities. The Digang plant in Fanchang County borders the Chang Jiang and is also near rich limestone deposits. Both plants were also to have bagging facilities for shipping their output of cement.

Coal accounts for about 90% of the energy supply for China's cement industry. To increase energy conservation, efforts were being made to use rotary kilns with preheaters or precalcining burners. For instance, the Changxing Yangjiashan cement plant in Zhejiang was to install a coal-fired rotary kiln with a daily production capacity of 2,000 tons. On a smaller scale, the Guangji cement plant in Hubei was to install a vertical kiln with an annual capacity of 120,000 tons.

Clays (Bentonite).—Large occurrences of bentonite in China are in Liaoning, Guangxi, and Gansu. Heishan County, Liaoning, is a major producing area. The Heishan bentonite mine produces both calcium and sodium bentonite. The Heishan Mine and the Linan Mine in Zhejiang were importing equipment to expand the product line output of sodium bentonite. A bentonite deposit at Hexibao, Gansu, was scheduled for development.

Fertilizer Materials.—During the fourth 5-year plan, China purchased 13 large ammonia units, each with a daily capacity of 1,000 tons of ammonia. Installation of these plants was completed by September 1979. Despite these whole-plant purchases, China continued to be a large importer of nitrogenous fertilizers as well as phosphate and potash. Three nitrogenous fertilizer plants, all key construction projects, were scheduled to be completed in 1985 in Shanxi, Zhejiang, and Xinjiang. Domestic production in 1984 included 14 million tons of nitrogenous fertilizer, 3.5 million tons of phosphatic fertilizer, and 40,700 tons of potassic salts. In comparison, a total of 18 million tons of chemical fertilizer was applied during the year.

To balance the fertilizer ingredient ratio, phosphate production in Hubei, Guizhou, and Yunnan was being expanded. During the year, over 1 billion tons of new reserves of phosphate was reportedly found. Output of potash at the Qaihan Qinghai plant was to reach 200,000 tons in 1985 while two iron sulfide mines in Guangzhou and Nei Monggol were to be opened. In addition, equipment to produce 300,000 tons of ammonia annually was to be installed in the Ningxia chemical plant, an equal production capacity for the Guanzhou fertilizer plant in Guangdong, the chemical fertilizer plant at Ningbo, Zhejiang, and the Weihe chemical fertilizer plant in Heilongjiang. The Jinan plant in Zhejiang was to be refitted with new compression, pumping, and other piping equipment. Plans were also made to develop the Chengbu and Qibaoshan iron sulfide deposits in Hunan and the Xinan deposit in Henan.

Other Nonmetals.—During the year, geologic surveys uncovered new deposits of meerschaum, alkaline salts, and emeralds and sapphires in Hunan, Henan, and Jiangsu, respectively. In addition, new reserves of gypsum totaled 2.2 billion tons, of which 1.5 billion tons was contained in one large minefield in Jiangsu. New reserves of talc totaled 2.8 million tons; detailed exploration of the Liboshi occurrence in Shandong revealed a deposit of 1.5 million tons.

A 10,000-ton-per-year diatomite mine was to be developed in Changbai, Jilin. Mining and processing equipment were to be installed to exploit high-grade flake graphite at Yichang, Hubei, and the amorphous graphite deposit at Lutang, Hunan. Hunan was to obtain technology and processing equipment to process and produce meerschaum from the Liuyang sepiolite deposit.

China is a large producer of magnesite, and its resources and production at Da Shih-Qiao, Liaoning, is well established. Development of high-grade magnesite in Fushun, Liaoning, was under way to produce 50,000 tons per year beginning in 1985.

MINERAL FUELS

Coal.—China's coal resources are more than 3 trillion tons. Proven coal reserves are estimated at 780 billion tons (includes new finds in 1984), sufficient for a thousand years of mining at the present rate of production. Although coal is widely dispersed throughout the country, the richest resources are in Shanxi and Nei Monggol, which have collectively about one-half of China's proven reserves of coal. Shaanxi ranks third; its Shinmu Coalfield has 100 billion tons of coal reserves.

The new coal finds in 1984 were mainly in Anhui, Hebei, Heilongjiang, Henan, Liaoning, Nei Monggol, Shandong, and Shanxi. The Huodong Coalfield in southern Shanxi has 6 billion tons of coking coal. This rich deposit will be developed as a new base for coking coal. The stress on geologic prospecting was being placed on eastern China, which has developed industries and better transportation facilities. Surface mine development will be centered in Shinmu and four other coalfields.

Annual coal mining capacity added in 1984 totaled 18 million tons. New capacity included the south open pit of the Huolinhe Coalfield, Nei Monggol, with an output of 3 million tons, and the Xiqupingdong Mine, Gujiao Coalfield, Shanxi, 3 million tons. The Gujiao Coalfield was being developed into a large coking coal mining center. Opening of the Dongpeng coal dressing plant in the Xingtai mining area in Hebei increased annual dressing capacity by 1.8 million tons.

China has 1,834 coal mines. The major mines have output distributed by the state. Output by the numerous locally run mines is equivalent to 48% of national production. Production by local mines grew 11% to 370 million tons in 1984.

Shanxi was China's largest coal producing Province. Output in 1984 was over 160 million tons with over 110 million tons shipped out of the Province for consumption. Accordingly, 85% of Shanxi's rail freight volume and 70% of the road traffic was for coal transport. The planned coal output in 1985 was 164 million tons, and by the year 2000, the output was expected to be 360 to 400 million tons.

Capacity for the large coal producing areas in Shanxi for 1984 and 2000 was as follows, in million metric tons:

Area	1984	2000	
		Expansions	New mines
Datong	26.0	3.0	8.6
Yangquan	13.0	3.0	16.7
Xishan	10.0	2.4	--
Luan	5.5	2.6	12.0
Jincheng	5.0	2.2	12.0
Fenxi	5.0	3.0	7.2
Xuangang	1.8	--	.9
Huoxian	1.6	1.7	5.7
Pingshou	--	--	45.0
Xiangning	--	--	8.0
Lishi	--	--	5.0

Coal production in Shanxi is limited as a result of inadequate rail facilities. To overcome this restraint, transformation of the railways was to include electrification, double tracking, and new trunk lines and branches. The freight volume of Shanxi's railways was expected to grow from 137 million tons in 1983 to 400 million tons at the end of the century. As part of the overall development scheme, large powerplants were to be constructed and some existing ones expanded. In 1983, Shanxi produced 15 billion kilowatt hours; planned output in 2000 was 85 to 100 billion kilowatt hours.

Although groundbreaking for the Pingshuo Antaibao surface coal mine was scheduled for July 1, 1985, construction had begun on developing infrastructure for the project. Pingshuo, in Shanxi Province about 500 kilometers west of Beijing, is a joint venture between Occidental Petroleum Corp. of the United States and Chinese concerns. The minesite covers an area of 19 square kilometers and has eight coal seams with a total thickness of 40 meters. Coal reserves were estimated at 500 million tons. Total investment to develop the 15-million-ton-per-year mine was $650 million. According to the Ministry of Coal Industry, this is the largest U.S.-Sino cooperative project for coal mine development in China. Initial production was expected to begin in late 1986 with full production by 1987.

The development of five mines at the Gujiao Coalfield in Shanxi Province was to be completed by 1992, and total annual output capacity of the coalfield was to be 16.5 million tons with five coal washing plants. Covering 360 square kilometers, Gujiao Coalfield has six shallow and gently inclining coal seams with verified reserves of 4.5 billion tons, 70% of which is high-grade coking coal. The coal is low in ash and sulfur content and has a calorific value of more than 4,000 kilocalories per kilogram.

The 3-million-ton-per-year Xiqu Mine of the Gujiao Coalfield was put into production in December 1984. Output of this mine was to be used by the new iron and steel complex at Baoshan, near Shanghai, which was to begin operation in September 1985. Development of the Zherchengdi Mine was started at the end of 1982, and production was expected to begin in late 1986. Tunneling of the Malan Mine started in November 1983 and upon completion in 1987 will produce 4 million tons of coal per year. Development of the Dongqu Mine was expected to begin in late 1985 or early 1986, and for the Tunlan Mine in 1987. Part of the mining equipment has been purchased from the Federal Republic of Germany, the United Kingdom, and the United States.

To enhance transport from the Gujiao Coalfield to Taiyüan, the capital of the Province, a 15-kilometer feeder line was under construction; a new highway was being built; and the two existing highways were being widened. By 1990, annual coal transport capacity from the mines to Taiyüan was to be 20 million tons.

Large peat deposits were discovered on the Zoige Plateau, bordering Sichuan, Gansu, and Qinghai. There are 19 beds covering 4,000 square kilometers with an estimated reserve of 7 billion cubic meters of peat. The peat contains over 10% oil and has a heat value of 2 to 4 kilocalories per gram.

Petroleum.—China has 5.4 million square kilometers of oil- and gas-bearing sedimentary rock basins, accounting for more than one-half of the country's territory. Estimates of China's onshore oil reserves range from 1 billion to 5 billion tons. In 1984, crude oil output was close to 115 million tons. About one-half of the production was from Daqing, Heilongjiang. Exploration was being conducted to find new reserves at Daqing and its periphery from Nei Monggol down to the Liaohe Basin in Liaoning.

The most active exploration and development work being conducted was in the Bohai Basin, which has both onshore and offshore areas and includes Bohai, Dagang, Huabei, Liaohe, Shengli, and Zhongyuan Fields. During drilling in 1984, two high-yield wells were reported for Shengli, and one each for Liaohe and Zhongyuan.

Tarim Basin in Xinjiang is China's largest sedimentary rock basin. China was actively surveying Tarim. Surveys indicated more than 170 oil-bearing structures, 100 oil and gas prospects, and 2 medium-size oil-and-gas fields.

Seismic surveys were being conducted at Beishawo, Xinjiang, near the old Karamay Field in the Junggar Basin. Seismic surveys were also being conducted in the Erlian Basin, while exploration data was being collected for the northern section of the Ordos Basin, both in Nei Monggol. Oil finds were reported in the Jianghan Basin, which straddles Hunan and Hubei. To date, there has been little activity in southern China. However, oil exploration was being carried out in Guangdong, Hainan, and Shiwan Dashan in Guangxi.

China has 1.3 million square kilometers of offshore Continental Shelf at a water depth of less than 200 meters. In offshore exploration, seismic test lines with a total length of 108,000 kilometers were completed, and 300 reservoir structures were uncovered; 200 of these were considered promising reservoirs. Of 70 exploratory wells drilled, about one-half showed oil or gas.

Sino-Japanese exploration has been conducted since 1980 offshore Bohai. Although this area has the highest success rate for oil finds, drilling and appraisal was expected to continue only until 1988. Detailed exploration was being concentrated in a 600- to 700-square-kilometer area in the cooperative zone. Trial production in this area was planned for 1988.

Sino-French exploration began in 1981 in the Beibu Gulf. In this zone, oil was found in a fault reservoir, and full appraisal of the oil-bearing structure has not yet been completed. Beginning in mid-1986, drilling was to begin on six wells for a trial production period. Much of the data to be collected will be for an analysis of reservoir behavior in this complicated structure.

Gas finds were reported in the Dongpu Depression in Henan; the Shaanxi-Gansu-Ningxia Basin; the North China Basin in Nei Monggol; the Songhua-Liaohe Basin in Heilongjiang; the Suqiao area in central Hebei, and in the Sichuan Basin. Gas reserves at Dongpu were estimated at more than 10 billion cubic meters. In the Shaanxi-Gansu-Ningxia Basin, drilling yielded a well with a daily output of 258,000 cubic meters of gas. A well in the Lishu Depression of the southern part of the Songhua-Liaohe Basin yielded 60,000 cubic meters of gas per day.

Second-round bidding for offshore oil exploration and development was opened on November 22, 1984. The new tracts include 100,000 square kilometers in the eastern part of Yingge Basin of the Nan Hai, 50,000 square kilometers in Zhujiang Basin, and 43,000 square kilometers in the south Huang Hai. Bids and proposals were to be presented before July 1, 1985, and licenses were expected to be awarded by late 1985.

Petrochemicals.—China's annual refinery capacity is about 85 million tons. A total of about 80 million tons of crude oil was refined in 1984. Output of diesel oil, gasoline, kerosene, and lubricants was about 37 million tons. In addition, China produces about 5.6 million tons of ammonia, 1.1 million tons of plastic resins, 677,000 tons of detergents, 650,000 tons of ethylene, 400,000 tons of synthetic fibers, and 167,000 tons of synthetic rubber. Refining operations in China are under the aegis of the China National Petrochemical Corp., a national enterprise established in July 1983.

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[1]Physical scientist, Division of International Minerals.

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The Mineral Industry of Colombia

By Orlando Martino[1]

Output from Colombia's mineral industries registered notable improvements in 1984, especially because of a number of large investments in mineral fuels. As in 1983, the mineral sector was the most dynamic in the nation's economy, registering a growth rate of about 14% over that of 1983 compared with the 13% increase in 1983 over that of 1982. Leading the mineral growth were crude oil, coal, and the precious metals industries—gold and silver.

The continued upsurge in mineral output was thus an important factor in Colombia's improved economic performance. In real terms, gross domestic product (GDP) in 1984 grew by 3% over that of 1983 to an estimated $40 billion[2] compared with the 1% growth rate in 1983 over that of 1982. This growth rate was supported by a good recovery of 6% in the manufacturing industries and a 4.5% increase in construction activities. The expansion of manufacturing and construction, in turn, increased the demand for mineral-related commodities such as steel and cement. Colombia's economy was further stimulated by a 7% increase in exports compared with that of 1983, which included increased quantities of fuel oil, coal, and ferronickel.

The value of Colombia's mineral output, including coal but excluding crude oil and natural gas, was $525 million compared with $400 million in 1983. Mineral output value had grown from $51 million in 1970 to the peak of $530 million in 1980. The Ministry of Mines and Energy reported[3] that in 1983 precious metals accounted for 45% of mineral output value, followed by coal, 25%; nonmetallics, 18%; emerald, 8%; and other metals, 4%. In 1984, the relative importance of gold and silver probably increased because of the sharp increases in output, despite the significant drop in world prices for gold and silver. This dominance was expected to be diminished with the projected large expansion of coal output from El Cerrejón in 1986 and thereafter.

Although Colombia produces a diversity of metallic and nonmetallic commodities and mineral fuels to meet the demands of world markets and an active economy, it has not achieved world rank in any particular commodity. The only exception is emerald, the high quality of which has gained Colombia world renown. Colombia is also a small but notable producer of platinum.

Within the Latin American region, Colombia stands out as an important producer of gold, coal, ferronickel, asbestos, cement, kaolin, salt, and sodium carbonate. In 1984, Colombia ranked seventh among the 13 crude oil producing countries of Latin America and accounted for only 3% of the region's total output, which was dominated by Mexico and Venezuela.

Energy developments augured well for great improvements in Colombia's energy balance over the next decade. Large increases in coal and crude oil production were expected to provide vital underpinning for the national economic development program. The joint venture of Carbones de Colombia S.A. (CARBOCOL) and Exxon Corp. in the El Cerrejón project was expected to be one of the world's lowest cost producers of steam coal. This coal will be very competitive in world markets, including the United States, which traditionally have been supplied by their domestic coal mining companies. In addition to its low price, Colombian coal is of high quality with low ash, low sulfur, and high heating value.

State-owned Empresa Colombiana de Petróleos (ECOPETROL) and associated foreign oil companies had a banner year in 1984 with oil reserves more than doubling because of large oil discoveries in the Llanos Basin. This success was a direct result of increased investment in exploration made possible by infusion of foreign capital under association contracts with ECOPETROL. Colombia continued the reversal of the serious downtrend in its crude oil output and on the basis of the newly discovered oil reserves could entertain the prospect of resuming its role as oil exporter by the end of this decade. As Colombia's largest economic entity, ECOPETROL's revenues increased 27% over that of 1983 to $1.7 billion while net income increased 250% over that of 1983 to almost $26 million.

Government Policies and Programs.— The Government was pursuing a balanced development of its energy resources involving oil, natural gas, coal, and hydroelectric power. One priority project within the overall program, estimated to cost $980 million, was being implemented by ECOPETROL. This large petroleum project consisted of four components: (1) secondary oil recovery in the Middle Magdalena Basin using water injection, (2) field development in the Llanos Basin under association contracts, (3) construction of the 290-kilometer pipeline to move oil from Caño Limón in the Llanos across the Andes Mountains to Río Zulia to connect with existing pipelines, and (4) technical assistance, training, and studies for ECOPETROL's enhanced oil recovery unit. In November, the International Bank for Reconstruction and Development (World Bank) approved a $130 million loan to participate in ECOPETROL's project.

The Ministry of Mines and Energy together with the National Planning Department was sponsoring special studies as a basis for formulating a national mining development plan for the near, medium, and long term. The plan would seek to evaluate Colombia's mineral potential, reduce dependency on mineral imports, and promote mineral exports. In May 1983, the Colombian consortium of consultants, IEC-INTEGRAL, was directed to begin the studies, scheduled for completion in May 1985. By yearend 1984, the contracted studies were more than 50% completed.

The National Development Plan "Change with Equity" indicated that lack of mineral development in Colombia was due to inadequate information on the basic geology and mineral potential of the country. To fill this gap, the Instituto Nacional de Investigaciónes Geólogico-Mineras (INGEOMINAS), founded in 1919, was engaged in an aggressive program of exploration, especially in basic metals. In addition, INGEOMINAS continued its longstanding program to develop geological maps and in 1983 published its first comprehensive geological map of Colombia with the cooperation of the U.S. Geological Survey. This map was designed to facilitate the selection of areas for mineral exploration.

Empresa Colombiana de Minas (ECOMINAS), in operation since 1979, was engaged in a variety of minerals projects as the state mining company set up in Bogotá to implement Colombia's mineral policies and to formulate and execute the national mining development plan when finalized. ECOMINAS was especially involved with the country's new development projects covering bauxite, copper-molybdenum, gold, and phosphate rock.

PRODUCTION

Colombia succeeded in expanding output of all its mineral fuels. Production of crude oil continued its rebound with a significant 12% increase over that of 1983. Particularly notable was the 36% increase over that of 1983 in steam coal production to a record high of almost 7 million tons, because of further contributions from the El Cerrejón coal operation. Natural gas output was at a record high. The trend of gas output has not followed that of crude oil. When crude oil peaked in 1970, gas output continued its upward trend. Consumption of natural gas as an alternate energy source has tripled since 1970.

Gold production increased sharply by 82% over that of 1983 in response to Government price incentives. As for the other precious metals, silver output increased by 31%, while platinum output was virtually unchanged.

Increased production of mineral-related commodities in the construction and iron and steel sectors reflected the improvement in Colombia's economy. Output of pig iron and steel increased while Cerro Matoso's third year output of ferronickel expanded by 31% over that of 1983 as the new plant moved closer to design capacity. Cement and gypsum output increased 9% and 16%, respectively, compared with that of 1983.

Emerald output dropped sharply, showing the risks and uncertainties connected with its mining operations. As for other nonmetallics, salt production continued to rebound from the depressed 1982 level, but was considerably below the 1976 level when more than 1 million tons was produced, mostly from marine sources.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum, bauxite	--	50	560	560	560
Copper, mine output, metal content	111	113	113	113	150
Gold troy ounces	510,439	529,214	472,674	438,579	[2]799,889
Iron and steel:					
Iron ore and concentrate thousand tons	506	[r]433	470	456	[2]441
Pig iron do.	279	233	246	241	[2]271
Ferroalloys: Ferrosilicon[e]	1,200	1,200	1,200	1,200	1,200
Steel, crude thousand tons	[r]420	[r]402	423	482	[2]499
Semimanufactures, hot-rolled do.	320	[r]314	333	374	[2]412
Lead:					
Mine output, metal content	187	154	235	185	[2]94
Refined (secondary)[e]	3,000	3,000	3,000	3,000	3,000
Manganese ore, gross weight	21,400	20,300	(3)	(3)	--
Nickel, Ni content of ferronickel	--	--	1,320	13,060	17,064
Platinum-group metals troy ounces	14,345	14,804	11,886	10,303	[2]10,108
Silver do.	151,542	142,740	136,043	98,945	[2]130,022
Zinc, mine output, metal content	152	152	--	--	--
NONMETALS					
Asbestos[e] [4]	--	[r]5,400	[r]5,400	[r]5,400	[2]9,982
Barite	3,200	[r]3,160	3,500	3,839	[2]3,340
Cement, hydraulic thousand tons	4,351	4,459	5,031	4,721	[2]5,158
Clays: Kaolin	786,384	810,000	855,684	762,000	[2]938,307
Feldspar	27,150	27,500	30,091	31,400	[2]32,766
Gypsum thousand tons	262	298	281	224	[2]260
Lime, hydrated and quicklime[e] do.	1,300	1,300	1,300	1,300	1,300
Mica	--	52	78	NA	NA
Nitrogen: N content of ammonia	70,000	91,500	97,800	101,900	93,700
Phosphate rock	6,370	17,329	20,393	16,944	20,000
Precious and semiprecious stones: Emerald carats	275,111	299,006	395,960	1,011,345	[2]394,181
Salt:					
Rock thousand tons	347	316	301	266	[2]273
Marine do.	491	399	202	291	[2]469
Total do.	838	715	503	557	[2]742
Sodium compounds, n.e.s.: Sodium carbonate	124,629	[r]106,220	110,800	118,290	[2]129,440
Stone and sand:					
Calcite	8,620	8,740	8,700	6,454	[2]4,575
Dolomite thousand tons	14	[r]16	20	12	[2]15
Limestone do.	9,760	10,053	10,620	10,685	[2]11,565
Marble	17,000	16,660	16,843	15,500	[2]15,171
Sand excluding metal-bearing	492,000	502,300	497,118	507,000	[2]521,578
Sulfur:					
Native (from ore)	25,647	26,300	32,601	31,476	[2]36,245
Byproduct, from petroleum	1,959	2,200	[e]3,000	[e]3,000	3,000
Total	27,606	28,500	[r e]35,601	[r e]34,476	39,245
Talc, soapstone, pyrophyllite	5,900	6,050	6,240	6,639	6,785
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades thousand tons	[r]3,902	[r]3,990	4,422	5,053	[2]6,862
Coke, all types[e] do.	500	500	550	550	550
Gas, natural:					
Gross million cubic feet	160,666	174,800	174,540	184,950	[2]189,000
Marketed do.	118,534	120,000	120,560	132,640	[2]135,600
Natural gas liquids:					
Propane[e] thousand 42-gallon barrels	[2]2,712	2,800	2,800	2,800	[2]2,840
Butane[e] do.	[2]577	600	600	600	600
Natural gasoline[e] do.	[2]790	800	800	800	800
Total do.	[2]4,079	4,200	4,200	4,200	4,240

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude ______ thousand 42-gallon barrels__	45,944	[r]48,852	51,769	54,244	[2]60,824
Refinery products:					
Gasoline:					
Aviation ______________do____	428	[r]378	404	423	[2]374
Motor ________________do____	[r]18,421	[r]20,945	21,062	21,259	[2]20,422
Jet fuel __________________do____	3,521	[r]3,896	4,185	4,201	[2]3,495
Kerosine _________________do____	2,730	[r]2,613	2,258	2,279	[2]2,040
Distillate fuel oil _____________do____	8,584	[r]9,665	9,653	10,337	[2]10,384
Residual fuel oil ____________do____	[r]16,988	[r]16,300	17,815	19,487	[2]19,278
Lubricants[e] _______________do____	[2]403	550	550	550	550
Liquefied petroleum gas (propane) do____	[r]1,614	[r]1,844	1,847	2,730	[2]2,840
Asphalt and bitumen ________do____	942	[r]1,133	1,114	898	[2]249
Refinery fuel and losses and unspecified products ________________do____	[r]5,651	[r]5,019	4,403	6,320	[2]12,298
Total ________________do____	[r]59,282	[r]62,343	63,291	68,484	[2]71,930

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 2, 1985.
[2]Reported figure.
[3]Revised to zero.
[4]Startup of open pit asbestos mine was in 1981.

TRADE

The role of mineral commodities in Colombia's international trade has increased markedly because of the new appearance of exports of ferronickel and coal. Nonetheless, Colombia continued to be heavily dependent on exports of coffee, which accounted for about 50% of total exports. The share of mineral exports has increased from 12% of the total in 1982 to almost 23% in 1984, as shown in the following table, in million dollars:

Commodity	1982	1983	1984
Fuel Oil ______________	284	378	444
Ferronickel ____________	6	56	81
Coal _________________	17	29	59
Cement _______________	55	34	38
Emeralds ______________	41	33	31
Total ______________	403	530	653
Total exports _________	3,283	3,176	2,900

Colombia's large coal reserves offer the possibility of a new export industry enabling Colombia to significantly diversify its export sector. Colombia was expected to become a strong contender in world steam coal markets. CARBOCOL and Exxon had considerable success in marketing coal from El Cerrejón. In the near future, increased coal exports and eventually the resumption of crude oil exports were expected to have a very positive impact on Colombia's balance of payments.

Colombia's first coal shipment ever to the United States took place in August 1984. The high quality and accessibility of Colombia's steam coal will facilitate penetration of traditional U.S. and European markets.

Colombia's energy trade deficit continued, although at a lower level. Crude oil imports amounted to 9.8 million barrels, and imports of petroleum products totaled 5.7 million barrels. Output increases of coal and crude oil were expected to give the country an energy trade surplus in 1986.

As for imports, Colombia's overall trade deficit persisted in 1984. Imports consisted mostly of raw materials, including fossil fuels, and intermediate goods for industrial use. The steel sector has supplied generally one-half of domestic demand. In 1983, imports of ingot steel were 32,000 tons and those of steel products were 282,600 tons. Of total imports by Colombia in 1984, 36% came from the United States.

Colombia's gross external debt increased to $9.1 billion by yearend, the debt service of which amounted to 69% of total exports. The gross foreign debt was 26% of the GDP.

Colombia enacted barter laws in February with the signing of Presidential Decree 370. It was the first time a Western Hemisphere government passed legislation requiring that a number of international trade transactions be conducted through barter. The Government identified 30 products whose importation into Colombia was conditioned to exports of Colombian goods for equivalent value. The Institute of Foreign Trade explained that the barter laws were designed to save hard currency and promote exports.

Table 2.—Colombia: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	2	4	--	All to Ecuador.
Metal including alloys:				
Scrap	1	80	70	Japan 10.
Semimanufactures	57	27	--	Ecuador 16; Peru 6; Honduras 5.
Copper:				
Ore and concentrate	857	615	--	All to Japan.
Metal including alloys, semimanufactures	20	6	(2)	Venezuela 4; Panama 2.
Iron and steel: Metal:				
Ferroalloys	1,303	28,064	7,222	Netherlands 15,057; Italy 2,385.
Semimanufactures	502	425	9	Venezuela 246; Ecuador 113; Nicaragua 27.
Lead:				
Ore and concentrate	331	--		
Metal including alloys, semimanufactures	15	2	--	All to Venezuela.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$911	$911	
Silver:				
Ore and concentrate[3]	112	142	13	Sweden 96; Canada 33.
Metal including alloys, unwrought and partly wrought value, thousands	$185	$695	$330	Panama $365.
Zinc:				
Ore and concentrate	303	--		
Oxides	190	235	--	All to Ecuador.
Metal including alloys, semimanufactures	1	--		
Other: Ashes and residues	70	61	61	
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	6	2	--	All to Venezuela.
Grinding and polishing wheels and stones	5	1	--	NA.
Cement	671,556	485,561	78,803	Trinidad and Tobago 255,310; Suriname 62,001.
Chalk	4,268	1,152	--	Dominican Republic 420; Ecuador 310; Venezuela 260.
Clays, crude	1,511	645	--	Ecuador 468; Venezuela 177.
Fertilizer materials: Manufactured:				
Ammonia	25,064	25,055	13,373	Belgium-Luxembourg 7,569; France 4,015.
Nitrogenous	--	3,000	--	All to El Salvador.
Phosphatic	--	(2)	--	All to Ecuador.
Unspecified and mixed	25	14,704	--	El Salvador 13,584; Suriname 1,100; Ecuador 20.
Gypsum and plaster	463	200	--	Venezuela 120; Ecuador 80.
Magnesium compounds	79	--		
Phosphates, crude	1,100	804	--	All to Venezuela.
Precious and semiprecious stones other than diamond: Natural value, thousands	$40,220	$35,196	$2,584	Japan $31,468; Switzerland $575.
Salt and brine	7,500	25,250	25,000	Ecuador 250.
Sodium compounds, n.e.s.: Carbonate, manufactured	1,360	970	--	Argentina 870; Venezuela 100.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	60	--		
Worked	110	--		
Gravel and crushed rock	132	162	--	All to Trinidad and Tobago.
Sand other than metal-bearing	27	36	--	Ecuador 15; Peru 13; Panama 8.

See footnotes at end of table.

Table 2.—Colombia: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Sulfur: Elemental, crude including native and byproduct	5,858	1,869	--	Ecuador 1,835; Peru 34.
Talc, steatite, soapstone, pyrophyllite	61	10	--	All to Venezuela.
Other: Crude	390	1,160	--	All to Ecuador.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	68	--	Do.
Carbon: Carbon black	3,309	4,790	100	Ecuador 3,737; Chile 600; Guatemala 345.
Coal: All grades excluding briquets	174,909	277,526	163,915	Mexico 80,262; Venezuela 29,250.
Coke and semicoke	24,005	16,675	--	Venezuela 15,318; Dominican Republic 700; Ecuador 250.
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	--	6,273	NA	NA.
Mineral jelly and wax do	25,680	6,304	5,556	Netherlands 394; Italy 212.
Kerosine and jet fuel thousand 42-gallon barrels	--	1,173	NA	NA.
Distillate fuel oil do	--	25	NA	NA.
Residual fuel oil do	r9,716	14,510	5,597	Italy 4,102; Netherlands Antilles 2,010.
Lubricants 42-gallon barrels	567	189	--	Venezuela 84; Ecuador 56; El Salvador 28.
Bituminous mixtures do	4,254	430	--	Venezuela 376; Panama 36; Peru 18.

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.
[3]May include platinum-group metals.

Table 3.—Colombia: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	3,033	5,794	5,466	West Germany 229; Brazil 49.
Oxides and hydroxides	1,529	2,202	250	West Germany 1,752; Netherlands 100.
Metal including alloys:				
Scrap	--	105	105	
Unwrought	14,265	17,967	454	Venezuela 9,603; Canada 5,490; Yugoslavia 1,980.
Semimanufactures	6,620	8,394	858	Venezuela 3,695; Brazil 1,140.
Chromium: Oxides and hydroxides	90	51	36	West Germany 12; Spain 3.
Cobalt: Oxides and hydroxides	10	4	1	United Kingdom 2; Netherlands 1.
Copper: Metal including alloys:				
Unwrought	888	3,271	21	Peru 1,320; Belgium-Luxembourg 1,202; Chile 691.
Semimanufactures	12,862	12,404	328	Chile 7,477; Peru 2,123; Mexico 1,063.
Iron and steel:				
Iron ore and concentrate, including roasted pyrite	282	251	113	United Kingdom 138.
Metal:				
Scrap	26,982	46,199	23,606	Netherlands Antilles 17,429; Spain 2,600.
Pig iron, cast iron, related materials	r490	1,339	135	Brazil 1,096; Netherlands 45; West Germany 41.
Ferroalloys:				
Ferromanganese	2,500	2,332	70	Mexico 966; Brazil 610; Netherlands Antilles 450.
Ferrosilicon	1,506	NA		
Unspecified	2,084	3,102	140	Brazil 1,745; Chile 687; Argentina 341.
Steel, primary forms	50,716	29,114	948	Venezuela 10,326; Japan 7,116; Spain 6,999.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	72,502	56,497	1,645	Japan 14,943; Venezuela 11,422; Brazil 7,088.
Universals, plates, sheets	304,807	257,555	3,323	Japan 171,322; Venezuela 28,790; West Germany 11,775.
Hoop and strip	5,568	6,009	535	United Kingdom 2,489; Japan 2,162; West Germany 565.
Rails and accessories	1,993	33,936	5,449	United Kingdom 28,277; Belgium-Luxembourg 109.
Wire	7,875	4,591	215	Venezuela 1,623; Brazil 1,619; Japan 682.
Tubes, pipes, fittings	131,463	79,573	6,318	Japan 51,278; Brazil 9,228.
Castings and forgings, rough	902	401	105	Belgium-Luxembourg 182; Peru 75.
Lead:				
Oxides	934	844	--	Peru 732; Mexico 112.
Metal including alloys:				
Unwrought	1,504	1,328	--	Peru 1,010; Denmark 110; Mexico 100.
Semimanufactures	401	46	10	Belgium-Luxembourg 29; West Germany 6.
Magnesium: Metal including alloys:				
Unwrought	27	37	31	Norway 5; United Kingdom 1.
Semimanufactures	--	155	138	Canada 17.
Manganese:				
Ore and concentrate, metallurgical-grade	4,284	1,477	--	All from Mexico.
Oxides	1,536	731	48	Brazil 466; Belgium-Luxembourg 145; Japan 60.
Mercury .... 76-pound flasks	812	1,595	1,363	Spain 116; Mexico 58.
Molybdenum: Metal including alloys, all forms	1	1	(2)	Mainly from Japan.
Nickel:				
Ore and concentrate	5	20	--	All from West Germany.
Metal including alloys:				
Scrap	16	165	--	All from Canada.
Unwrought	121	231	32	Canada 177; United Kingdom 12.
Semimanufactures	133	177	93	Canada 35; West Germany 22.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$20	$81	$14	West Germany $67.
Silver: Metal including alloys, unwrought and partly wrought .... do	$71	$73	$4	Spain $33; West Germany $17; Canada $13.
Tin: Metal including alloys:				
Scrap	--	(2)	--	All from France.
Unwrought	375	242	--	Bolivia 241; Panama 1.
Semimanufactures	15	19	NA	Mainly from Bolivia.
Titanium: Oxides	526	375	104	West Germany 161; United Kingdom 74.
Zinc:				
Oxides	304	300	3	Peru 126; Venezuela 120; West Germany 45.
Metal including alloys:				
Unwrought	15,180	13,113	--	Peru 10,862; Canada 989; Mexico 856.
Semimanufactures	103	204	173	Costa Rica 22; Norway 7.
Other:				
Ores and concentrates	777	343	18	Netherlands 256; France 69.
Base metals including alloys, all forms	81	71	49	Bolivia 10; Peru 5.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	162	201	97	Ecuador 90; Spain 9.
Artificial: Corundum	697	608	23	Brazil 432; West Germany 145.
Grinding and polishing wheels and stones	57	60	23	Spain 17; Italy 12.
Asbestos, crude	25,945	13,170	125	Canada 9,866; Switzerland 450; Italy 395.
Barite and witherite	6,497	7,903	--	Peru 7,325; Suriname 578.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Boron materials:				
Crude natural borates	853	954	34	Peru 920.
Oxides and acids	351	357	187	Peru 116; West Germany 38.
Cement	15,308	8,423	1,534	Cuba 2,295; Panama 1,650.
Chalk	21	70	--	Switzerland 50; United Kingdom 20.
Clays, crude	14,522	8,619	8,323	Peru 95; Japan 50; Spain 50.
Diamond:				
Gem, not set or strung value, thousands	$4	$9	$9	
Industrial stones do.	$5	--		
Diatomite and other infusorial earth	1,232	630	527	Mexico 68; United Kingdom 30.
Feldspar, fluorspar, related materials	r388	453	385	Italy 44; Netherlands 20.
Fertilizer materials:				
Crude, n.e.s	67,760	--		
Manufactured:				
Ammonia	19,522	12,406	6	Venezuela 12,379; West Germany 17.
Nitrogenous	197,780	209,864	41,066	Venezuela 132,641; Romania 20,903.
Phosphatic	16,571	7,538	7,521	Mexico 14; Japan 3.
Potassic	161,814	132,636	19,462	East Germany 54,044; Spain 48,091.
Unspecified and mixed	139,133	120,818	120,480	Belgium-Luxembourg 264; West Germany 48.
Graphite, natural	57	54	41	United Kingdom 10; West Germany 3.
Gypsum and plaster	63,860	40,522	129	Dominican Republic 36,380; Jamaica 3,993.
Lime	70	256	187	West Germany 69.
Magnesium compounds	135	326	7	France 154; Austria 108; West Germany 43.
Mica:				
Crude including splittings and waste	980	105	67	France 20; Suriname 18.
Worked including agglomerated splittings	5	16	14	Spain 1.
Nitrates, crude	475	--		
Phosphates, crude	67,285	51,444	51,444	
Pigments, mineral: Iron oxides and hydroxides, processed	1,539	1,202	106	West Germany 961; Mexico 36.
Precious and semiprecious stones other than diamond value, thousands	$15	$16	--	Taiwan $6; Canada $5; Panama $2.
Salt and brine	4,477	1,666	104	Ecuador 1,507; West Germany 52.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	4,015	10	8	West Germany 2.
Sulfate, manufactured	11,894	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	6,123	3,203	35	Peru 1,770; Italy 880; Yugoslavia 158.
Worked	900	788	5	Italy 761; Spain 14.
Dolomite, chiefly refractory-grade	3,454	6,167	2,718	Belgium-Luxembourg 3,250; Spain 199.
Gravel and crushed rock	1,396	5,093	157	Venezuela 4,148; Brazil 652.
Sand other than metal-bearing	250	4,467	39	Brazil 4,416; Sweden 10.
Sulfur:				
Elemental:				
Crude including native and byproduct	31,783	26,378	13,178	Netherlands Antilles 13,200.
Colloidal, precipitated, sublimed	136	85	85	
Sulfuric acid	56	43	10	West Germany 29; Italy 4.
Talc, steatite, soapstone, pyrophyllite	2,733	2,193	1,225	Italy 805; United Kingdom 80.
Other: Crude	6,909	8,143	5,777	Mexico 1,280; Belgium-Luxembourg 793.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	169	496	348	Venezuela 148.
Carbon: Carbon black	1,148	796	295	West Germany 454; Japan 25.
Coal:				
Anthracite	20	--		
Lignite including briquets	r2	17	17	

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	5,993	15,091	21	Venezuela 10,743; Ecuador 4,327.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	220	70	--	All from France.
Gasoline thousand 42-gallon barrels	6,132	7,317	583	Netherlands Antilles 5,133; Mexico 1,104.
Mineral jelly and wax do	24	85	36	Brazil 44; West Germany 3.
Kerosine and jet fuel do	333	(2)	(2)	
Distillate fuel oil do	r4,203	856	--	All from Venezuela.
Lubricants do	263	155	71	Netherlands Antilles 36; Venezuela 32.
Nonlubricating oils do	7	--		
Bitumen and other residues 42-gallon barrels	15,677	12,211	6	Venezuela 12,205.
Bituminous mixtures do	679	467	291	West Germany 152; United Kingdom 24.
Petroleum coke do	1,419	847	847	

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—In October 1984, Colombia and Jamaica signed a trade agreement considering the feasibility of the construction of Colombia's first aluminum plant on the north coast of Colombia. Jamaican alumina would be shipped to Colombia for processing into aluminum in exchange for Colombian coal for Jamaica. The aluminum plant will have a capacity of 140,000 tons per year, of which 30,000 tons would be consumed by Colombia. The project, as currently conceived, would require Colombia to ship from 300,000 to 500,000 tons of coal per year to Jamaica in exchange for Jamaican alumina needed for the aluminum smelter.

A committee will be set up to evaluate the technical and economic feasibility of the $500 million project with the participation of CARBOCOL, the Ministry of Mines and Energy, and probably other agencies of Colombia and representatives from the Jamaican Government. A proposed aluminum plant to be sited on the north coast of Colombia is not a new idea, having been discussed 5 years ago.

Since Colombia does not have aluminum smelter capacity, fabrication of aluminum products has been based on aluminum ingot imported mostly from Venezuela and Canada at a level of about 15,000 tons per year. Colombia has two major manufacturers of aluminum fabricated products. One joint venture involves Reynolds Metals Co. and is in the Caribbean Port of Barranquilla. The other is linked to the Aluminum Co. of Canada Ltd. (ALCAN) and is in Cali. Both plants are well situated to cover a good portion of the domestic market as well as markets in Venezuela and Ecuador.

Colombia does have domestic bauxite clay resources, which are estimated at 275 million tons located at Morales-Cajibío and San Antonio in the Departments of Cauca and Valle del Cauca, respectively. These resources continued under study with respect to their geology and beneficiation.

Copper-Molybdenum.—Studies of the Mocoa deposit, under investigation with the participation of the United Nations Development Program since 1977, were completed during the year. As a result of these prefeasibility studies, the Ministry of Mines and Energy reported an increase of estimated reserves to 275 million tons of ore in the Mocoa copper-molybdenum deposit in the Department of Putumayo near the Ecuadorian border. Ore grades average 0.43% copper and 0.06% molybdenum.

Gold.—Colombia achieved a record high in its gold output of about 800,000 troy ounces, establishing its second rank as a gold producer in Latin America after Brazil. The previous record high of 656,000 troy ounces was established in 1941. During the last decade, gold output has been in an upward trend, increasing from about 216,000 troy ounces in 1973 to about 510,000 troy ounces in 1980. The value of gold output has increased from $12 million in 1970 to an estimated $260 million in 1984. The sharp growth in income reflects the increases in output and world prices.

The revival in gold mining has been stimulated by a 30% premium over world prices offered by the Government since March 1984. The Central Bank of Colombia paid miners in local currency for the domestically mined gold. It was speculated that some gold may have been smuggled into Colombia to take advantage of the premium prices.

Colombia has two of the notable placer gold districts of the world in the Departments of Antioquia and Chocó. According to official 1983 data, Antioquia produced 78% of the country's total followed by Chocó, 8%, and Cauca, 2%.

There has been a reversal in the structure of gold mining. In 1970, large mining companies accounted for 70% of output, while in 1983, small producers accounted for almost 85% of national output. Companies like Mineros de Antioquia, Frontino Gold Mining Co., and Mineros del Chocó S.A. produced 69,100 troy ounces, or only 15% of the total in 1983.

The Government accepted the Minera Phelps Dodge de Colombia S.A. proposal to reopen the Marmato gold-silver mines in Caldas Department, which have been shut down since 1925. The proposed $6 million investment includes construction of a 300-ton-per-day ore-processing plant. The lower zone of the deposit has indicated reserves of 350,000 tons of ore grading between 0.225 and 0.322 ounce of gold per ton. Phelps Dodge will hold 49% of the equity, while 51% will be held by the Government and private Colombian investors: ECOMINAS, Corporación Financiera de Caldas, and Empresa Minera de Antioquia (private). The mining license is for 20 years, after which the property reverts to the state.

Bijou Mines and Oils Ltd. of Trenton, Ontario, Canada, obtained permission to exploit a placer gold property as a 100% foreign-owned company in a joint venture with Combined Placer Resources Ltd. of Ogden, Utah, which will introduce new technology in Colombia for breaking up the clay to retain the fine gold. The fine gold recovery system was airlifted from Salt Lake City, Utah, to Colombia and began producing in May 1984. The placer property is 73 kilometers from Medellín, the capital of Antioquia.

Iron and Steel.—Output of pig iron continued to rebound from the depressed level of 1981 while crude steel production reached the record high of about 500,000 tons despite the strike in March. Colombia's crude steel was produced by fully integrated Acerías Paz del Río S.A. (APR) in the Department of Boyacá and six semi-integrated companies close to the important population centers. Colombia produces about 50% of its ingot steel consumption, which in 1982 amounted to 1.2 million tons.

APR was experiencing financial difficulties that impeded implementation of its expansion plans. It was negotiating with its international creditors to reschedule its medium-term foreign debt. APR's plans for a 2-month shutdown of the blast furnace in early 1985 will cause an output loss of 50,000 tons of steel and require an increase of imports of ingot steel.

Nickel.—In late January, the Cerro Matoso ferronickel plant near Monte Libano, Córdoba, resumed production after a shutdown in late 1983 for major electrical repairs. Cerro Matoso S.A. is owned by Empresa Colombiana de Niquel Ltda. (Econiquel), Billiton Overseas Ltd., and Niquel Colombiana S.A. (80% owned by The Hanna Mining Co.). Billiton was responsible for the marketing arrangements. Hanna provided technical services for the mine and smelter operations under a contract that expires in 1990.

The new company has not operated at full capacity since startup in mid-1982. Output could be increased from 42.5 million pounds of nickel in ferronickel to 53 million pounds in a few years depending on market conditions. Cerro Matoso provides employment for 740 Colombians.

The most important development in 1984 was the startup of production and shipment of ferronickel pellets with the same specifications as the ferronickel cast into ingots weighing 22 kilograms each. The pellet technology was supplied by Uddeholm Licensing AB. Depending on future market demand, up to 100% of Cerro Matoso's ferronickel output can be in pellet form.

In 1984, Colombia replaced Brazil as the second-rank producer of nickel in Latin America after Cuba. Earnings from ferronickel exports have grown from $6 million in 1982 to $56 million in 1983 and $81 million in 1984. Major markets are Europe, 70%; and the United States, India, and Japan, 30%. Only 20,000 to 30,000 pounds of ferronickel was consumed in Colombia.

Cerro Matoso joined a list of major world nickel mines reporting financial difficulties because of depressed nickel prices and demand and high interest rates. The $400 million project lost $83.7 million in 1983 and $60 million in 1984. The company was not expected to become profitable until 1986. Cerro Matoso was negotiating with 13 commercial banks to reschedule $43 million of its total debt of $224 million. The Colombian Government was involved through the 47.5% equity interest of Econiquel, a subsidiary of the state Industrial Development Institute.

Silver and Platinum.—Production of silver increased notably to 130,000 troy ounces. Silver is often associated with Colombia's placer gold operations, and production has roughly followed the increasing trend of gold output and has been in a generally rising trend since the depressed level of 1978.

The main producing Departments in 1983 were Antioquia, 56%; Santander, 23%; and Nariño, 6%. The structure of silver mining differs from that of gold in that the large companies account for 58% of national output while the small mines account for 42%. The major silver producer in 1983 was Frontino Gold Mining with 52,600 troy ounces.

Colombia was the only producer of placer platinum in Latin America with an output of 10,108 troy ounces. Output has been in a downtrend since 1969 when 27,800 troy ounces was produced.

NONMETALS

Asbestos.—Colombia has become the second most important asbestos producer in Latin America after Brazil. A small open pit mine was started up in late 1981 near Campamentos, Antioquia, 135 kilometers north of Medellín. The mine is operated by Minera las Brisas S.A., 70% owned by Eternit Colombiana S.A., a well established asbestos cement producer, and the balance by the Colombiana Financial Corp. of Bogotá. Although the deposit was discovered in 1950, its commercial value was not established until 1973 with construction beginning in 1979. Initial capacity of 5,400 tons of chrysotile fiber was increased to 9,000 tons per year by early 1984. Nonetheless, Colombia remains a net importer of asbestos for domestic consumption, which was estimated at 22,000 tons of fiber per year. Asbestos reserves at Las Brisas were estimated at 6.5 million tons of ore with a 6.2% fiber content. Based on a plant recovery rate of 90%, total recoverable fiber is estimated at 360,000 tons.

Cement.—Productive annual capacity of the cement industry in Colombia was about 7 million tons, according to a report of the Colombian Institute of Cement Producers. Since this capacity exceeds domestic needs, Colombia has been a notable exporter of portland cement to countries in the Caribbean Basin. Until the growth of coal exports in 1984, cement exports ranked third among the mineral exports of Colombia after fuel oil and ferronickel.

Because of reduced cement imports by Venezuela, one of Colombia's major export markets, Colombia sought diversified markets in 1984, especially in the United States. Colombia's major cement producer and exporter, Compañía de Cemento Argos S.A., exported a record high of 200,000 tons to the United States in 1984. Argos operated eight cement plants and accounted for 55% of domestic output.

Argos was implementing a new dry-process plant with a capacity of 500,000 tons per year scheduled for availability in 1986. Cemento Ríoclaro S.A. was constructing a 584,000-ton-per-year plant to be ready in mid-1986, and Cementos Boyacá S.A. was installing a new line at its Nobsa plant to produce 365,000 tons per year. APR, the steel producer, has developed a slag-modified cement that the company reports is being well accepted in its marketing area.

Phosphate Rock.—The Government, operating through ECOMINAS, proceeded with its plans to construct a two-stage phosphate rock facility to exploit the Pesca deposit in Boyacá and the Sardinata deposit in Norte de Santander. The first stage, estimated to cost $162 million, would provide 50,000 tons per year of phosphorus pentoxide. This output level would cover only a fraction of Colombia's demand for phosphate rock fertilizers. Colombia imported most of its phosphate materials from the United States. The World Bank completed a review of the feasibility studies on these deposits presented to the Government by a consortium of consultants in 1983, and was preparing its own complementary study in order to evaluate the possibilities of foreign financing. The $3.2 million study was financed by the Government and the Inter-American Development Bank.

Growth in the use of fertilizer materials has been very dynamic in Colombia as agricultural output expanded. The use of nitrogenous fertilizers grew four times between 1965 and 1981, while potash use grew 3-1/2 times and phosphates about 2-1/2 times. Phosphate fertilizers have been somewhat underutilized. Nonexistent before 1963, Colombia's modern fertilizer industry is centered mainly along the northern coast where significant natural gasfields support the manufacture of nitrogenous fertilizers.

Consumption of potash materials, all imported, fell from 108,000 tons in 1982 to 88,200 tons in 1983.

MINERAL FUELS

Colombia was engaged in a number of programs to reduce the disparity between the sources of its energy potential and the sources used to satisfy actual energy demand. Colombia has achieved some success in reducing the demand for petroleum and substituting the increased use of natural gas and coal in the energy balance, as shown in the following table, in percent:

Energy source	Energy potential	Demand	
		1980	1983
Hydroelectric	55.0	7.6	7.4
Coal	39.5	11.9	14.0
Natural gas	3.9	16.6	18.7
Petroleum gas	1.6	44.2	41.4
Firewood	--	19.0	17.8
Bagasse	--	.7	.7
Total	100.0	100.0	100.0

Colombia's total energy production grew by 4.8% in 1982 and 6.1% in 1983, as a result of increases in the output of crude oil, natural gas, and coal. The notable increases in output of coal and natural gas have caused a decline in the relative importance of oil in the country's energy balance. Despite this energy growth, Colombia remained a net importer of energy, mostly petroleum products. However, the energy deficit diminished by 73% between 1980 and 1983. Colombia was not expected to regain self-sufficiency in oil until 1986.

Colombia continued to enlarge its electrical generating system, which by yearend 1983 had an installed capacity of 5,540 megawatts, 64% based on hydroelectric plants. During 1984, the San Carlos I hydroelectric station in Antioquia began operation, adding 620 megawatts to the country's total capacity. There were 13 plants under construction with a total capacity of 5,177 megawatts, of which 3 are thermoelectric. The largest hydroelectric plants under construction were Guavio (1,000 megawatts) and Urra I and II (1,200 megawatts each).

Coal.—The Government's coal policy within the National Development Plan was to increase coal output from its abundant coal reserves to increase foreign exchange earnings, to substitute petroleum use in present thermoelectric and industrial plants, and to promote use of coal in new thermoelectric plants.

Colombia's consumption of coal has grown from 2.5 million tons in 1970 to 4.8 million tons in 1983. Available data for 1983 show that coal use in thermoelectric plants has increased 300% and in industry by 90% while coal use to produce coke grew moderately. Within industry, coal was used primarily for the production of cement, glass, brick, paper, and textiles.

The most important coal developments in 1984 related to the two minesites in the El Cerrejón coal basin in the Guajira Peninsula, Cerrejón Central Zone, and Cerrejón North Zone, where Colombia's largest high-quality bituminous coal reserves have been identified.

Steam coal output from the Cerrejón Central Zone, initiated in 1982, increased from 351,000 tons in 1983 to 980,000 tons in 1984, of which 630,000 tons was exported. The Central Zone was scheduled to produce at the level of 1.5 million tons per year, reserving 360,000 tons for the nearby thermoelectric plant of Termoguajira and the balance of 1,140,000 tons for export markets. The Central Zone was administered independently by CARBOCOL under contract with the Colombian-Spanish consortium, DOMI-PRODECO-AUXINI. CARBOCOL contracted Montreal Engineering Co. Ltd. of Canada to prepare a feasibility study for expanded output to 3.5 million tons per year, mainly for export.

Construction of the $3.2 billion Cerrejón North Zone project, comprised of a surface mine, a 150-kilometer railroad, and an export terminal at Port Bolívar, was nearing completion at yearend. The mine came onstream in February, a year ahead of schedule, and began stockpiling coal. The heavy-duty railway had limited operational status in October with final completion scheduled for September 1985. An "early coal" facility was virtually finished to permit limited coal shipments in early 1985 until the main port facilities are ready in late 1985.

The North Zone mine, with an eventual capacity of 15 million tons per year of steam coal, is a joint venture of CARBOCOL and International Colombia Resources Corp. (INTERCOR), a subsidiary of Exxon. Under terms of the association agreement, INTERCOR will be operator of the coal mine for the first 23 years, with CARBOCOL and INTERCOR sharing in costs and revenues. A 15% royalty will be paid by INTERCOR on its share of the mined coal.

Morrison-Knudsen Co. Inc. of Boise, Idaho, has provided since 1977 a wide range of services including design, engineering, procurement, and construction under contract with the joint venture.

Besides El Cerrejón, the Government was studying possibilities of new coal production at Alto San Jorge in Córdoba Department and La Loma-El Descanso in the César Department with estimated capacities respectively of 10 million tons per year and 5 million tons per year primarily for the export market.

Until the El Cerrejón mines become fully operational, the Departments of Boyacá and Cundinamarca each account for one-half of national coal output. The National Coal Census listed 1,450 active mines in Colombia, of which 47% were in Boyacá and 33% in Cundinamarca. Of the total number of mines, 82% are very small operations producing less than 2,000 tons per year. As for coal type, 84% of the active mines produce steam coal, 11% produce coking coal, and 5%, both types. The coal industry in 1983 employed more than 160,000 persons.

Another historical event in 1984 was the first major shipment ever of steam coal from Colombia to the United States in August. The spot 30,000-ton shipment was mined by Prodeco Coal of Colombia at its Lenguazaque Mine in Boyacá and exported from Santa Marta to Florida Power Co.

Natural Gas.—Colombia's marketed natural gas production more than doubled between 1977 and 1984 from 163 to 372 million cubic feet per day, a record high. This is equivalent to about 64,000 barrels of oil and represents 31% of Colombia's total demand for hydrocarbons. Although natural gas represents only 4% of Colombia's total energy potential, it accounted for 10% of current energy demand.

During the 1977-83 period, natural gas output expanded rapidly at an average rate of almost 16%, with 1978 a notable year with a 38% growth over that of 1977. However, growth in 1984 was moderate at about 2.2% over that of 1983. Gas production increases were the result of the Government's decision in 1974 to purchase domestic output at world prices from foreign operators in Colombia.

Of the three producing areas, 72% of the marketed gas was from the Atlantic coast area, particularly from the Guajira offshore field, which accounted for almost 60% of national output. The Guajira gas was produced by ECOPETROL in association with the Texas Petroleum Co. Also, most of the expanded output during 1977-84 came from the Guajira reserves and was transported to consumers via pipeline from Ballenas to Barranquilla. ECOPETROL purchases natural gas from foreign producers at 40% of the export value of the fuel oil it replaces.

Of the total natural gas produced in 1983, only 72% was marketed to consumers, and the balance was flared, 14%; used in the fields, 7%; injected, 5%; and other uses, 2%.

Natural gas prices to consumers in Colombia were highly subsidized with the average sales price about 54% of ECOPETROL's purchase cost. The gas price in 1984 was $1.58 per million British thermal units. ECOPETROL was expanding gas lines to increase residential and commercial consumption in the north coast areas and thus facilitate substitution of fuel oil by natural gas.

Petroleum.—Further drilling in the Llanos Basin during 1984 by ECOPETROL in association with Occidental Petroleum Corp. confirmed the magnitude of the Caño Limón Field in Arauca Department, which was discovered in July 1983. The Caño Limón Field was estimated to contain 1.36 billion barrels of oil, but estimates of recoverable reserves varied from 600 million barrels to 1 billion barrels.

Chiefly as a result of the Caño Limón development and other oil discoveries in 1984 at Rancho Hermoso and Rubiales in Casanare Department and Guayuriba in Meta Department, ECOPETROL at yearend 1984 was able to report a doubling of crude oil reserves of 1.23 billion barrels compared with the revised figure of 635 million barrels in 1983. Of this reserve total, 275 million barrels was directly controlled by ECOPETROL, 825 million barrels was held by ECOPETROL and associated foreign oil-companies, and 130 million barrels by foreign companies under concessionary arrangements entered into before 1974. Foreign oil companies have made the major new discoveries and were most actively exploring high-risk, high-potential sedimentary basins. Since 1983, the number of association contracts with ECOPETROL has risen from 19 to 55. At yearend 1984, 16 concession contracts remained in effect.

To enable marketing of the new crude oil from the Llanos Basin, ECOPETROL was implementing a 700-kilometer pipeline project from Arauca to Coveñas on the Caribbean coast south of Cartagena. The construction contract for the eastern segment from Arauca to Río Zulia was awarded in late 1984 to a European consortium headed by Mannesman Anlagenbau AG of Dusseldorf, Federal Republic of Germany. Completion was scheduled for December 1985 when shipments from Caño Limón could begin via an existing pipeline between Río Zulia and Coveñas. The contract for constructing a new parallel pipeline between Río Zulia and Coveñas, the second segment of the 700-kilometer line, was under negotiation with Bechtel Inc. of San Francisco, California.

Colombia's crude oil output continued the upward trend underway since 1979. Production was up 12% over that of 1983. The production rate increased to 167,000 barrels per day, but was still well below the historic high of 218,000 barrels per day achieved in 1970. When the new Arauca-Coveñas oil pipeline is available by late 1986, crude oil production was projected to jump to 386,000 barrels per day. ECOPETROL accounted for 42% of Colombia's 1984 oil output while the foreign companies produced the balance.

Oil output from the Llanos Basin has grown sharply from 183,200 barrels in the initial year of 1977 to more than 5 million barrels in 1984. The expanding output from the three main basins accounted for 82% of total output in 1983. The Llanos Basin was expected to soon become the dominant producing basin in Colombia.

ECOPETROL had good results using secondary recovery techniques in its Casabe Field in the Middle Magdalena. During 1984, the company planned to inject water into 500 wells, with output expected to increase from 5,000 to 26,000 barrels per day. Secondary recovery was planned for seven other oilfields.

Colombia has been a net importer of oil products since 1974. After a period of large deficits in its petroleum trade, Colombia achieved a small positive balance in 1984. The trade account shows that Colombia exported enough fuel oil to pay for imports of crude oil and gasoline, 26,800 and 15,000 barrels per day, respectively. Colombia was expected to resume its position as a crude oil exporter in 1987, and by 1988, exports of crude were expected to surpass 170,000 barrels per day.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Colombian pesos (Col$) to U.S. dollars at the average exchange rate for 1984 of Col$100.82=US$1.00. On Dec. 31, 1984, the rate was Col$113.89=US$1.00.

[3]Ministerio de Minas y Energía. Memoria al Congreso 1983/1984 and Anexo Estadístico. Bogotá 1984.

Table 4.— Colombia: Production and trade in crude petroleum and refinery products

(Thousand 42-gallon barrels)

	1978	1979	1980	1981	1982	1983	1984
Petroleum, crude:							
Production	47,742	45,298	45,944	48,852	51,769	54,244	60,824
Imports	8,834	8,995	7,339	7,714	7,327	13,819	9,811
Refinery products:							
Production	57,452	56,246	59,282	62,343	63,291	68,484	71,930
Exports[1]	11,153	9,037	9,485	10,432	11,900	15,653	16,853
Imports	7,784	10,341	12,997	11,025	11,033	7,450	5,749

[1]Principally residual fuel oil. Also includes petrochemicals.

Source: Revista del Banco de la República (Bogotá). Apr. 1985, p. 131.

The Mineral Industry of Cyprus

By Thomas O. Glover[1]

Owing to the depletion of known exploitable mineral deposits, mining continued to decline in importance. Since the midseventies, employment in the mining sector decreased by almost one-half, while all sectors showed an unemployment rate of 3.3%.

The Cypriot gross national product (GNP) in 1984 was $802.8 million[2] which showed a 2.1% negative growth rate. Annual per capita income was $4,000 with an average inflation rate of 5.1%. The national debt was 33% of the GNP.

Cyprus, geopolitically divided since 1974 between the Greek and Turkish Cypriots, was involved in peace initiatives late in 1984. The meetings between the two factions were scheduled to continue in 1985. The northern two-fifths of the country was controlled by the Turkish Cypriots, while the southern three-fifths was controlled by the Greek Cypriots. Only the southern sector was considered in this chapter because little if any mineral resources are produced in the northern sector.

PRODUCTION AND TRADE

The production of minerals has continued to decline since 1970, according to the Cyprus Mines Service. Mining of copper minerals ceased in 1979; however, new exploration for copper pyrites was to be conducted in the near future in the foothills of the Troodos Mountains. In 1984, an agreement was signed with the French Bureau de Recherches Géologiques et Minières (BRGM) to conduct the exploration, at a cost of $500,000. Efforts have been undertaken to extract cement copper from mine drainage waters and waste dump leach solutions.

For the second consecutive year, there was no production of chromite. Asbestos production decreased about 57% from that of 1983, and the output of sulfur-bearing pyrites decreased by over 50% in 1983-84. The production of cement copper increased by approximately 10%. Among the industrial minerals, most showed decreases in production except bentonite and calcined gypsum, which showed small gains. In 1984, the mineral industry of Cyprus showed no signs of arresting its continuing downward trend.

Cyprus' balance-of-trade deficit was $850 million, 17.7% above that of 1983. Despite the deteriorating balance of trade, the current-account deficit was slightly worse than in 1983, rising from $170 million in 1983 to $179 million in 1984. Trade balance with the United States showed a $63 million deficit.

Mineral export values continued to drop, owing to the sluggish world economy and the decrease in production of most of the export commodities. Asbestos continued to be the major mineral exported.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[p]
METALS					
Chromium ore and concentrate, marketable	16,280	10,381	2,878	--	--
Copper: Cement copper	--	470	1,530	2,088	2,290
NONMETALS					
Asbestos, fiber produced	34,397	25,568	18,952	17,288	7,429
Cement, hydraulic thousand tons	1,233	1,035	1,068	943	853
Clays, crude:					
Bentonite	24,000	47,000	13,000	32,000	32,400
Other:					
For brick and tile manufacture thousand tons	380	165	187	230	220
For cement manufacture do	276	253	250	250	[e]250
Total do	656	418	437	480	[e]470
Gypsum:					
Crude	43,550	40,000	30,000	32,000	22,100
Calcined	17,850	23,000	25,000	10,000	11,900
Lime, hydrated	18,500	12,920	11,900	8,500	7,380
Mineral pigments:					
Umber	27,000	20,000	20,000	16,000	13,100
Yellow ocher	200	250	--	--	--
Total	27,200	20,250	20,000	16,000	13,100
Pyrites	61,752	15,866	55,525	46,665	23,322
Salt, marine	7,462	9,299	9,857	--	7,399
Stone, sand and gravel:					
Dimension stone: Marble	66,200	56,000	75,000	90,000	87,500
Crushed and broken stone:					
Havara (crushed limestone) thousand tons	5,100	4,350	3,475	4,500	3,560
Limestone:					
For cement production do	1,073	1,039	1,000	NA	NA
Other	13,984	11,320	10,000	NA	NA
Marl, for cement production	600,000	565,387	550,000	533,970	NA
Unspecified building stone	105,000	760,000	980,000	500,000	450,000
Sand and aggregate thousand tons	4,700	3,857	3,975	4,100	4,075
Sulfide concentrates containing precious metals	376	514	116	--	--
Sulfur, S content of marketable pyrites	24,885	9,478	[e]25,500	21,430	10,495
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	239	215	193	227	218
Gasoline do	857	813	805	890	856
Kerosine and jet fuel do	434	434	377	468	463
Distillate fuel oil do	1,141	1,036	1,019	1,147	1,160
Residual fuel oil do	1,415	988	1,068	1,101	1,148
Asphalt do	100	148	136	165	174
Unspecified do	3	4	--	--	--
Refinery fuel and losses do	188	220	229	207	201
Total do	4,377	3,858	3,827	4,205	4,220

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through May 21, 1985.
[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.

Table 2.—Cyprus: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	269	528	--	Netherlands 179; Belgium-Luxembourg 120; Sweden 69.
Semimanufactures	93	80	--	Saudi Arabia 34; Lebanon 31.
Chromium: Ore and concentrate	11,681	10,896	--	Greece 8,228; Austria 1,793.
Copper:				
Matte and speiss including cement copper	1,979	1	--	All to West Germany.
Metal including alloys, scrap	396	449	--	Belgium-Luxembourg 170; Greece 89; United Kingdom 52.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	1,099	10,857	--	Italy 6,329; West Germany 4,528.
Metal:				
Scrap	7,225	8,568	--	Greece 4,776; Italy 3,787.
Semimanufactures:				
Bars, rods, angles, shapes, sections	678	10	--	Jordan 5; Libya 5.
Wire	97	5	--	Mainly to United Arab Emirates.
Tubes, pipes, fittings	253	60	--	Libya 58.
Lead:				
Oxides	76	18	--	All to Saudi Arabia.
Metal including alloys, scrap	59	31	--	All to Italy.
Silver: Ore and concentrate[2] value, thousands	$711	--		
Zinc: Metal including alloys, scrap	106	131	--	All to West Germany.
NONMETALS				
Asbestos, crude	18,813	13,416	NA	United Kingdom 3,387; Greece 1,672; Belgium-Luxembourg 1,599.
Cement	510,597	395,499	NA	Lebanon 235,042; Syria 136,785.
Clays, crude	17,259	23	--	United Kingdom 18.
Diamond: Gem, not set or strung value, thousands	$15	$39	--	Israel $36.
Fertilizer materials: Manufactured, unspecified and mixed	90	8,660	--	Greece 3,209; Belgium-Luxembourg 2,439; Italy 2,000.
Gypsum and plaster	7,509	4,854	NA	Malawi 2,953; Saudi Arabia 1,524.
Pigments, mineral:				
Natural, crude	5,578	--		
Iron oxides and hydroxides, processed	2	--		
Precious and semiprecious stones other than diamond: Natural value, thousands	$27	--		
Pyrite, unroasted	1,082	10,857	--	Italy 6,329; West Germany 4,528.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	32	134	--	United Kingdom 80; Saudi Arabia 45.
Gravel and crushed rock	405	359	--	Saudi Arabia 341; Israel 18.
Sand other than metal-bearing	--	10	--	All to Libya.
Sulfur: Sulfuric acid	--	11,300	--	Italy 6,050; Greece 5,250.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	23	81	NA	NA.
Gasoline, motor do.	27,455	28,195	NA	NA.
Mineral jelly and wax do.	150	--		
Kerosine and jet fuel do.	544,314	563,861	NA	NA.
Distillate fuel oil do.	11,972	143,135	NA	NA.
Lubricants do.	2,674	3,521	NA	NA.
Residual fuel oil do.	65,681	145,508	NA	NA.
Bituminous mixtures do.	182	--		

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]May include platinum-group metals.

Table 3.—Cyprus: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	3,908	4,179	2	Greece 2,157; France 499; Italy 366.
Copper: Metal including alloys:				
Unwrought	17	23	--	Denmark 11; Spain 6; United Kingdom 6.
Semimanufactures	908	773	37	West Germany 238; Greece 143; United Kingdom 96.
Gold: Metal including alloys, unwrought and partly wrought ___troy ounces	22,611	27,112	NA	United Kingdom 25,569; West Germany 1,472.
Iron and steel: Metal:				
Scrap	40	27	--	United Kingdom 25.
Pig iron, cast iron, related materials	683	1,404	--	Bulgaria 1,209; U.S.S.R. 100.
Ferroalloys, ferromanganese	40	20	--	All from France.
Steel, primary forms	--	8	--	Italy 6; Denmark 2.
Semimanufactures:				
Bars, rods, angles, shapes, sections	83,309	74,949	--	U.S.S.R. 11,071; United Kingdom 10,352; Spain 9,244.
Universals, plates, sheets	17,840	19,389	--	West Germany 4,557; Greece 3,751; Belgium-Luxembourg 2,608.
Hoop and strip	5,409	7,329	--	Greece 5,908; Austria 1,004.
Rails and accessories	110	2	--	West Germany 1; Spain 1.
Wire	3,650	2,949	--	Hungary 994; United Kingdom 718; Belgium-Luxembourg 669.
Tubes, pipes, fittings	16,845	13,849	([2])	Greece 5,820; France 3,149; United Kingdom 1,540.
Castings and forgings, rough	56	34	--	Sweden 27; United Kingdom 6.
Lead:				
Oxides	46	120	--	All from United Kingdom.
Metal including alloys:				
Scrap	--	6	--	All from Denmark.
Unwrought	153	198	--	United Kingdom 111; Netherlands 75.
Semimanufactures	1,063	617	256	United Kingdom 233; Cuba 50.
Manganese: Oxides	28	14	--	All from United Kingdom.
Nickel: Metal including alloys, all forms	16	11	--	West Germany 6; Japan 1; Spain 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified ___troy ounces	3,342	([3])		
Silver:				
Ore and concentrate ___value, thousands	$9	--		
Metal including alloys, unwrought and partly wrought ___troy ounces	197,267	([4])		
Tin: Metal including alloys:				
Unwrought ___value, thousands	$8	$1	--	All from United Kingdom.
Semimanufactures	5	5	--	United Kingdom 3; Denmark 2.
Titanium: Oxides	493	444	--	United 319; Finland 56.
Zinc:				
Oxides	31	19	--	West Germany 18.
Metal including alloys:				
Unwrought	280	4	--	All from United Kingdom.
Semimanufactures ___value, thousands	$5	$266	--	Zaire $154; West Germany $35.
Other:				
Ores and concentrates	55	110	--	Australia 91; Austria 18.
Oxides and hydroxides	54	1	--	All from Norway.
Base metals including alloys, all forms ___value, thousands	$3	$17	$12	United Kingdom $3.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones ___value, thousands	$272	$199	$1	Italy $54; West Germany $41.
Asbestos, crude	367	369	--	Botswana 210; Zimbabwe 159.
Barite and witherite	22	6	--	West Germany 5.
Cement	12,681	13,207	--	Greece 6,836; United Kingdom 2,596; U.S.S.R. 1,426.
Chalk	769	1,562	NA	Greece 1,180; United Kingdom 368.
Clays, crude	1,193	1,197	NA	Greece 1,010; United Kingdom 51.
Diamond: Gem, not set or strung ___value, thousands	$850	1,007	NA	United Kingdom $437; Belgium-Luxembourg $286.
Diatomite and other infusorial earth	196	120	94	West Germany 20.
Feldspar, fluorspar, related materials	41	20	--	All from West Germany.

See footnotes at end of table.

Table 3.—Cyprus: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials: Manufactured:				
Ammonia	38	5,110	--	U.S.S.R. 3,000; Libya 1,903.
Nitrogenous	13,760	19,411	4	Romania 5,692; Italy 4,425; Yugoslavia 2,109.
Phosphatic	1,766	1,470	--	Tunisia 870; Israel 600.
Potassic	2,195	272	--	Israel 255; United Kingdom 14.
Unspecified and mixed	25,912	799	17	Romania 362; Netherlands 158.
Gypsum and plaster	29	40	--	United Kingdom 24; West Germany 10.
Magnesite	129	126	--	Netherlands 125.
Mica: Crude including splittings and waste	34	29	--	United Kingdom 15; Greece 12.
Nitrates, crude	50	--		
Phosphates, crude	20,071	4,223	NA	Algeria 4,200.
Pigments, mineral: Iron oxides and hydroxides, processed	42	21	--	United Kingdom 11; West Germany 6.
Precious and semiprecious stones other than diamond:				
Natural ..... value, thousands	$369	$474	NA	West Germany $239; Thailand $74; United Kingdom $69.
Synthetic ..... do.	$47	$131	NA	Switzerland $48; Japan $31; France $21.
Salt and brine	693	772	--	United Kingdom 511; Netherlands 255.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	586	NA	NA	NA.
Sulfate, manufactured	1,512	541	--	United Kingdom 320; West Germany 98.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,533	3,338	NA	Italy 2,313; Greece 1,004.
Worked ..... value, thousands	$505	$624	--	Italy $409; Greece $200.
Dolomite, chiefly refractory-grade	78	41	--	All from Norway.
Gravel and crushed rock	1,065	661	--	Italy 564; Greece 82.
Quartz and quartzite	42	37	--	All from West Germany.
Sand other than metal-bearing	581	364	--	West Germany 103; Netherlands 102.
Sulfur:				
Elemental, crude including native and byproduct	1,905	3,090	--	Lebanon 2,489; Poland 600.
Sulfuric acid	1,463	274	--	Greece 260; Belgium-Luxembourg 12.
Talc, steatite, soapstone, pyrophyllite	270	412	--	Greece 250; Norway 72; Italy 37.
Other:				
Crude	2,241	2,233	--	Greece 2,200.
Slag and dross, not metal-bearing	12	--		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	31	188	--	Greece 127; United Kingdom 61.
Carbon black	27	6	--	West Germany 4.
Coal:				
Anthracite and bituminous	4,117	180	--	France 100; Belgium-Luxembourg 55.
Briquets of anthracite and bituminous coal	40	--		
Lignite including briquets	254	207	--	All from Greece.
Coke and semicoke	270	50	--	Belgium-Luxembourg 25; West Germany 25.
Peat including briquets and litter	727	1,451	--	West Germany 1,111; Ireland 172.
Petroleum:				
Crude thousand 42-gallon barrels	3,749	2,939	--	Iran 2,084; Libya 550.
Refinery products:				
Liquefied petroleum gas ..... do.	200	238	--	Italy 94; Greece 87.
Gasoline, motor ..... do.	80	54	--	Mainly from Italy.
Mineral jelly and wax ..... do.	3	3	--	West Germany 1; Hungary 1.
Kerosine and jet fuel ..... do.	460	525	NA	Greece 201; France 167; Italy 86.
Distillate fuel oil ..... do.	163	223	NA	Italy 72; Greece 64.
Lubricants ..... do.	[5]49	51	1	Belgium-Luxembourg 16; United Kingdom 16; Italy 6.
Residual fuel oil ..... do.	2,574	2,035	--	Romania 896; Syria 599; France 197.
Petroleum coke ..... do.	--	21	18	Belgium-Luxembourg 3.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Value only reported at $1,000.
[3]Value only reported at $222,000; $95,000 was imported from West Germany and $94,000 from the United Kingdom.
[4]Value only reported at $1,434,000; $1,227,000 was imported from the United Kingdom, $144,000 from West Germany, and $52,000 from the United States.
[5]Excludes unreported quantity valued at $155,616.

COMMODITY REVIEW

METALS

Hellenic Mining Co. Ltd. (Helco) produced no chromite for the second consecutive year. Chromite exploration in the area of Akapnou Forest continued during the year with field mapping and drilling. Additional analytical laboratory work was conducted by BRGM in Orleans, France.

NONMETALS

Asbestos.—Production of asbestos in Cyprus comes from one mine in a serpentinite deposit within the Troodos Massif. The mine, at Amaindos, was owned and operated by Cyprus Asbestos Mines Ltd. Despite the absence of domestic competition, the outlook for the mine could be better. Production of fiber had fallen from 36,700 tons in 1977 to 7,400 tons in 1984. The company produced only two grades of asbestos prior to the summer of 1984, but owing to declining quality, the company introduced two new grades. The new grades had a better prospect of sales in Middle East markets. The commercial sales of the two new grades was scheduled to commence in 1985. The majority of the production was to be exported, with approximately 1,000 tons per year being supplied to the domestic market for the manufacture of asbestos cement pipe.

Cement.—Two cement plants, operated by Vassiliko Cement Works Ltd. and Cyprus Cement Co. Ltd., produced 853,000 tons of cement in 1984. Vassiliko commenced operation in 1967 and had a capacity of 1.2 million tons per year in 1984. The plant produced three types of cement; portland, pozzolanic, and sulfate resisting grade. Vassiliko was using oil at its cement plant but was scheduled to begin using coal by early 1985. Cement sales were concentrated in the Middle East and North Africa.

Clays.—*Bentonite.*—Production of bentonite in 1984 was 32,400 tons, slightly higher than for 1983. Production of bentonite in Cyprus accounts for less than 0.5% of the total world production. Peletico Plasters Ltd. produced approximately 80% of Cyprus' bentonite. Its deposits are in the Pentakomo area, approximately 15 miles northeast of Limassol. In 1982-83, Peletico completed a new 60,000-ton-per-year bentonite plant in close proximity to the mines at Pentakomo, and planned to double the capacity of that plant in 1985. Other companies involved in bentonite production are Bentex Minerals Co. Ltd. and Egeko Ltd. Drapia Mining also had a license to extract bentonite from a deposit near Kalavasos, close to the port of Zyyi. The company planned to construct a new plant in 1985 at the site.

Fertilizer Materials.—Hellenic Chemical Industries Ltd., which commissioned its new phosphoric acid and complex fertilizer plant in March 1983 at Vassiliko, suspended operations in early 1984 owing to the low market price of fertilizer.

Gypsum.—The production of gypsum dropped 31% to 22,100 tons. Exports of raw and calcined gypsum remained small. Most of the gypsum produced was destined for usage by the producers themselves for the manufacture of downstream products. Peletico identified vast reserves of high-purity gypsum in the area of Aradippou, a village about 5 miles northwest of Larnaca.

MINERAL FUELS

Cyprus Petroleum Refinery Ltd. produced small quantities of gasoline, jet fuel and kerosine, fuel oil, liquefied petroleum, and asphalt at its only refinery at Larnaca. The crude oil was imported from Iraq, Libya, and Saudi Arabia. The refinery had a daily throughput capacity of 16,000 barrels of crude oil.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Cypriot pounds (£C) to U.S. dollars at the rate of £C1=US$1.7039.

The Mineral Industry of Czechoslovakia

By Tatiana Karpinsky[1]

In 1984, Czechoslovakia continued to be an important producer of coal, graphite, kaolin, lignite, magnesite, and steel. Resources of petroleum and gas were limited. Uranium mines at Hamar Na Jezere in north Bohemia were considered relatively large and were expected to last for several decades of exploitation. Czechoslovakia was not self-sufficient in raw materials and fuels. Coal met over 60% of Czechoslovakia's energy needs. Because of delays in the construction of nuclear power stations, coal supplies were used to guarantee increases in the country's electric energy generation. The country received more than one-third of its overall fuel and energy requirements from outside.

In 1983, mining and quarrying contributed 3.9% of the total industrial production in Czechoslovakia,[2] of which the share of coal was 2.9%; crude oil, 0.1%; metallic ores, 0.5%; and other mining, 0.4%. Production of petroleum products contributed 3.5% to the total industrial output, the iron and steel industry contributed 8.8%, the nonferrous processing industry contributed 2.2%, and the nonmetallic mineral processing industry contributed 2.6%. Out of an industrial force of 2.9 million, 187,000 persons were employed directly in coal and petroleum production and processing; 62,000 were employed in power and heat generation; 169,000 were in ferrous metallurgy, including ore mining; and 41,000 were in nonferrous metallurgy, also including ore mining.

Under a contract signed by Czechoslovakia with the U.S.S.R. in July 1982, Czechoslovakia's enterprises participated in the construction of the fourth pipeline to transmit additional quantities of Soviet natural gas through Czechoslovak territory to the countries of Western Europe. Construction started early in 1983 and continued in 1984. As payment for these services, Czechoslovakia will annually receive extra amounts of Soviet natural gas.

Geologists proved the existence of a new deposit of polymetallic ores in the Jeseniky Mountains, discovered a deposit of tin and tungsten ores in the Krusne Hory Mountains, and found copper near Novoveska Huta in the eastern Slovakia region. In addition, a deposit of polymetallic ores was found near Krizanovice in the Zelezne Hory Mountains and in Zlata Bana in the Presov District.

The Plenum of the Communist Party of Czechoslovakia Central Committee on December 4 and 5, 1984, outlined the report on the State Plan for Economic and Social Development for 1985. According to the plan outlined, brown coal and lignite output was to reach 100 million tons, and bituminous coal was to reach 28 million tons; electric energy production was planned to reach 80 to 83 billion kilowatt hours, including 15 billion kilowatt hours generated at nuclear powerplants. Steel production was to reach 16 million tons. During the 1980-85 period, a special effort was placed on the production of equipment for nuclear powerplants.

PRODUCTION

The annual extraction plan was fulfilled in all branches of the mining industry.[3] Steel production decreased 1.3%, and nonferrous metal production, 0.6%. The plan was fulfilled in all coal and lignite basins, and coal production slightly increased. The electric energy sector produced 78 billion kilowatt hours, an increase of about 3%. Czechoslovakia was expanding its cement, kaolin, and magnesite production capacities. The output of pig iron increased, as provided by the plan. In steel production, the production of rolled steel and sheets increased.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Alumina[e]	100,000	100,000	100,000	100,000	100,000
Aluminum ingot, primary only	38,304	32,684	33,830	36,156	34,000
Antimony, mine output, metal content[e]	[2]530	500	500	500	500
Copper:					
Mine output, metal content	6,639	[e]5,218	[e]5,200	[e]5,200	5,200
Metal:					
Smelter, primary only[e]	7,600	7,400	7,400	7,400	7,400
Refined including secondary	25,559	25,513	25,636	25,746	25,500
Iron and steel:					
Iron ore:					
Gross weight thousand tons	1,969	1,935	1,861	1,903	1,900
Metal content do.	512	502	483	490	490
Metal:					
Pig iron do.	9,819	9,393	9,525	9,466	[2]9,561
Ferroalloys: Electric furnace do.	173	173	164	162	164
Steel, crude do.	15,225	15,270	14,992	15,024	[2]14,831
Semimanufactures do.	12,302	12,323	12,185	12,258	12,500
Lead:					
Mine output, metal content	3,349	3,400	3,132	3,162	3,160
Metal including secondary	20,014	20,663	21,071	21,030	[2]21,009
Manganese ore, gross weight[e] [3]	900	900	900	900	900
Mercury 76-pound flasks	[r]4,612	[r]4,438	4,380	4,177	4,300
Nickel metal, primary[e]	2,241	[e]2,200	2,200	2,200	2,200
Silver[e] thousand troy ounces	1,300	1,300	1,300	1,300	1,300
Tin:					
Mine output, metal content	322	433	[r] [e]400	[e]440	400
Metal including secondary	215	289	295	307	300
Tungsten: Mine output, metal content[e]	80	50	50	50	50
Zinc:					
Mine output, metal content	7,239	6,790	6,929	7,064	7,000
Metal including secondary	9,600	9,004	9,184	[e]9,100	9,100
NONMETALS					
Barite[e]	[2]61,052	61,000	61,000	60,000	60,000
Cement, hydraulic thousand tons	10,546	10,646	10,325	10,498	[2]10,530
Clays: Kaolin do.	[r]513	508	527	662	600
Fluorspar[e] do.	96	96	96	96	96
Graphite[e] do.	[r]50	[r]50	[r]50	[r]50	50
Gypsum and anhydrite, crude do.	757	767	794	848	800
Lime, hydrated, and quicklime do.	3,018	3,234	3,088	3,100	[2]3,117
Magnesite, crude do.	666	664	672	662	660
Nitrogen: N content of ammonia[e] do.	[2]844	850	850	850	850
Perlite	40,302	42,336	[e]42,000	44,019	44,000
Pyrite, gross weight[e] thousand tons	140	140	140	140	140
Salt do.	277	311	327	240	240
Sodium compounds, n.e.s.:					
Caustic soda do.	325	331	325	332	300
Carbonate, manufactured do.	123	118	106	95	100
Stone:					
Limestone and other calcareous stone do.	23,884	24,155	23,818	23,519	23,500
Quarry stone, not further described thousand cubic meters	36,499	36,220	32,988	32,844	32,500
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.	1,284	1,317	1,252	1,244	1,245

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous ---- thousand tons--	27,710	27,007	27,059	26,427	[2]26,421
Brown and lignite ---- do----	95,726	96,365	98,944	102,416	[2]102,857
Coke:					
Metallurgical ---- do----	8,611	8,575	8,670	8,529	[2]8,502
Unspecified ---- do----	1,712	1,748	1,896	1,811	1,800
Fuel briquets from brown coal ---- do----	1,159	1,069	1,111	1,104	1,100
Gas:					
Manufactured, all types - million cubic feet--	274,360	268,639	275,737	268,532	270,000
Natural, marketed[e 4] ---- do----	26,000	26,000	26,000	26,000	26,000
Petroleum:					
Crude:					
As reported ---- thousand tons--	93	89	89	93	90
Converted - thousand 42-gallon barrels--	629	603	603	629	602
Refinery products ---- do----	122,842	120,311	117,530	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 19, 1985. In addition to the commodities listed, arsenic, feldspar, gold, uranium, 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.

TRADE

The planned tasks in foreign trade were reportedly fulfilled. Trade between the Soviet Union and Czechoslovakia totaled almost 13 billion rubles[4] and increased 13% from that of 1983. Trade with the Soviet Union accounted for 45% of Czechoslovak foreign trade. The U.S.S.R. supplied Czechoslovakia with fuel and raw materials to satisfy its demands: 100% of its natural gas requirements, 97% of crude oil, 81% of iron ore, 100% of pig iron and nitrogen fertilizers, and the greater part of nonferrous metals, ferroalloys, manganese, and chrome ores.

Exports of fuels, mineral raw materials, and metals contributed about 14% to the total export value and 42% of total imports. The Ferromet enterprise contracted with Italy's Sider-Export and the West German firm Hoesch-Export to supply 98,500 tons of large-diameter steel pipes to Czechoslovakia in 1985 at a cost of over Kcs1 billion.[5] The pipes will be used in construction of an 850-kilometer extension to the Czechoslovak gas transit system that carries Soviet gas to East and West European customers.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides ----	--	26	--	Italy 24.
Ash and residue containing aluminum	1,386	2,813	--	All to West Germany.
Metal including alloys:				
Scrap ----	7,312	189	--	Do.
Unwrought ----	15,182	21,588	--	Japan 17,632.
Semimanufactures ----	2,098	2,762	--	Poland 1,837; Hungary 577.
Chromium: Ore and concentrate ----	--	8,960	--	All to Poland.
Copper:				
Ore and concentrate ----	517	NA		
Sulfate ----	2,137	2,648	--	West Germany 1,775; Italy 560.
Metal including alloys:				
Scrap ----	474	930	--	West Germany 781; Austria 84.
Semimanufactures ----	20	29	--	Yugoslavia 21.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Gold: Waste and sweepings value, thousands	$85	NA		
Iron and steel: Metal:				
Scrap	96,903	124,437	--	Italy 71,367; Austria 32,015.
Pig iron, cast iron, related materials	3,720	2,154	--	Sweden 847; West Germany 830.
Ferroalloys:				
Ferrochromium	305	3,510	--	All to Austria.
Ferromanganese	75	NA		
Ferromolybdenum	--	46	--	All to Sweden.
Ferrosilicomanganese	10,718	13,053	--	West Germany 10,908; Italy 2,145.
Ferrosilicon	4,935	347	--	West Germany 189; Austria 158.
Silicon metal	90	1	1	
Unspecified	6,395	5,627	--	Austria 3,501; Belgium-Luxembourg 1,272.
Steel, primary forms[2] thousand tons	294	270	--	Yugoslavia 227; Italy 15.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	1,195	1,319	17	West Germany 172; unspecified 978.
Universals, plates, sheets do	959	974	(3)	Yugoslavia 105; West Germany 95; U.S.S.R. 65.
Hoop and strip do	148	156	--	West Germany 16; unspecified 123.
Rails and accessories do	31	30	--	NA.
Wire do	120	138	--	West Germany 25; unspecified 78.
Tubes, pipes, fittings[2] do	532	718	(3)	U.S.S.R. 419; East Germany 127.
Castings and forgings, rough do	43	25	--	NA.
Unspecified do	157	--		
Lead:				
Ore and concentrate	5,664	5,692	--	All to West Germany.
Oxides	200	NA		
Metal including alloys, scrap	394	198	--	All to Austria.
Mercury 76-pound flasks	87	NA		
Nickel:				
Oxides and hydroxides	--	35	--	All to West Germany.
Metal including alloys:				
Scrap	13	NA		
Unwrought	--	[4]600	--	NA.
Semimanufactures	6	NA		
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$212	$123	--	All to West Germany.
Silver:				
Waste and sweepings[5] do	$451	$413	--	West Germany $291; Canada $122.
Metal including alloys, unwrought and partly wrought do	$1,598	$41	--	All to West Germany.
Tin:				
Ore and concentrate	151	NA		
Metal including alloys:				
Scrap	2	NA		
Semimanufactures	--	2	--	All to Yugoslavia.
Titanium: Oxides	2,119	2,239	--	West Germany 1,036; Italy 1,001.
Zinc:				
Ore and concentrate	12,594	14,621	--	Yugoslavia 12,747.
Oxides	1,226	1,441	--	Yugoslavia 1,280; West Germany 111.
Ash and residue containing zinc	3,878	4,723	--	All to West Germany.
Metal including alloys:				
Unwrought	2,299	NA		
Semimanufactures	1	550	--	All to Yugoslavia.
Other:				
Ores and concentrates	--	917	--	Austria 517; Yugoslavia 400.
Oxides and hydroxides	2,600	20	--	All to Italy.
Ashes and residues	2,552	1,514	--	Austria 1,510.
Base metals including alloys, all forms	4	11	--	West Germany 10.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	20	--	All to Sweden.
Artificial:				
Corundum	4,829	3,794	--	Italy 2,931; West Germany 642.
Silicon carbide	1,119	791	--	West Germany 744.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Abrasives, n.e.s. —Continued				
Dust and powder of precious and semiprecious stones including diamond value, thousands	--	$2	--	All to Sweden.
Grinding and polishing wheels and stones	535	368	NA	Yugoslavia 92; Italy 89; West Germany 74.
Barite and witherite	2,620	1,994	--	All to Austria.
Boron materials: Crude natural borates	22	NA		
Cement[2] thousand tons	350	270	--	Hungary 114; West Germany 93.
Clays, crude:				
Chamotte earth	118,494	115,040	--	Hungary 66,641; West Germany 36,095.
Fire clay	29,078	21,498	--	All to West Germany.
Kaolin[2]	369,000	390,000	--	West Germany 138,000; Poland 84,000.
Unspecified	179,779	127,575	--	West Germany 53,233; Hungary 53,202.
Diamond: Gem, not set or strung value, thousands	$6	$5	--	All to Belgium-Luxembourg.
Diatomite and other infusorial earth	2,058	2,396	--	Austria 2,372.
Feldspar, fluorspar, related materials	676	2,656	--	Greece 2,416.
Fertilizer materials: Manufactured:				
Ammonia	7,548	22,405	--	Austria 20,699.
Nitrogenous, N_2 content[6]	196,000	251,000	--	NA.
Potassic	2,904	208	--	All to Yugoslavia.
Unspecified and mixed	23,420	529	--	Yugoslavia 435.
Graphite, natural	1,968	3,445	--	Yugoslavia 2,000; Poland 1,405.
Lime	5,401	24,626	--	Hungary 16,969; West Germany 7,657.
Magnesium compounds:				
Magnesite[2] thousand tons	303	291	--	Hungary 73; Poland 64; West Germany 48.
Other	560	NA		
Mica: Worked including agglomerated splittings	59	65	--	Yugoslavia 44.
Nitrates, crude	252	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	443	1,245	--	Italy 845; Yugoslavia 360.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$27	$4	--	West Germany $3.
Synthetic do	--	$117	$2	Yugoslavia $78; Canada $37.
Pyrite, unroasted	44	NA		
Salt and brine	93	1,802	--	All to Hungary.
Sodium compounds, n.e.s.: Carbonate, manufactured	14,269	[6]10,300	--	West Germany 8,526; Yugoslavia 1,718.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,230	43,772	--	Hungary 41,630; West Germany 1,796.
Worked	10,354	13,546	18	West Germany 13,519.
Gravel and crushed rock	13,498	10,581	--	West Germany 9,216.
Limestone other than dimension	16,717	23,031	--	All to West Germany.
Sand other than metal-bearing	265,958	269,000	--	Austria 167,008; Hungary 101,967.
Sulfur:				
Elemental:				
Crude including native and byproduct	40	16,268	--	Austria 15,896.
Colloidal, precipitated, sublimed	27	20	--	All to Italy.
Sulfuric acid	4,519	[6]10,500	--	Yugoslavia 8,287.
Talc, steatite, soapstone, pyrophyllite	6,815	7,829	--	Poland 7,659.
Vermiculite, perlite, chlorite	--	1,359	--	All to Austria.
Other:				
Crude	97,142	32,813	--	Hungary 23,087; West Germany 7,815.
Slag and dross, not metal-bearing	20,671	13,555	--	All to West Germany.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	36	38	--	Do.
Coal:				
Anthracite and bituminous[2] thousand tons	2,882	2,928	--	Austria 849; East Germany 594; Hungary 481.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal —Continued				
Briquets of anthracite and bituminous coal thousand tons	(3)	(3)	--	All to Greece.
Lignite including briquets[2] do	2,710	2,679	--	West Germany 2,642.
Coke and semicoke[2] do	1,371	1,247	--	East Germany 527; Austria 313; Romania 188.
Gas, natural: Gaseous million cubic feet	9,817	9,994	--	NA.
Peat including briquets and litter	19	NA		
Petroleum:				
Crude[6] thousand 42-gallon barrels	3,535	3,146	--	NA.
Refinery products:				
Liquefied petroleum gas do	886	806	--	West Germany 496; Italy 230.
Gasoline do	[6]1,105	[6]1,369	--	West Germany 790; Austria 341.
Mineral jelly and wax do	(3)	1	--	All to Italy and Yugoslavia.
Kerosine and jet fuel do	389	658	--	West Germany 285; Austria 229.
Distillate fuel oil do	[6]3,484	[6]5,491	--	West Germany 1,441; Austria 654.
Lubricants do	677	578	--	Austria 338; West Germany 113.
Residual fuel oil do	2,096	2,954	--	West Germany 1,529; Austria 1,425.
Bitumen and other residues do	15	15	--	All to Austria.
Bituminous mixtures do	--	(3)	--	All to West Germany.
Unspecified	5,479	NA		

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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 and data published by trading partner countries.
[2]Official trade statistics of Czechoslovakia.
[3]Less than 1/2 unit.
[4]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.
[5]May include other precious metals.
[6]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate[2] thousand tons	474	469	--	Hungary 270; Yugoslavia 195.
Oxides and hydroxides	16,362	19,818	--	Hungary 15,629; Yugoslavia 4,162.
Metal including alloys:				
Scrap	1,821	876	--	Austria 619; West Germany 233.
Unwrought[2] thousand tons	66	88	--	U.S.S.R. 73; Yugoslavia 13.
Semimanufactures	16,543	16,222	--	Yugoslavia 15,356; Hungary 529.
Beryllium: Metal including alloys, all forms kilograms	4	25	25	
Bismuth: Metal including alloys, all forms do	--	1,482	--	All from Japan.
Cadmium: Metal including alloys, all forms[2]	220	201	--	Finland 46; Bulgaria 33; Yugoslavia 25.
Chromium:				
Ore and concentrate[2] thousand tons	204	185	--	U.S.S.R. 116; Albania 25.
Oxides and hydroxides	86	576	--	U.S.S.R. 501; Poland 75.
Metal including alloys, all forms	20	NA		
Cobalt:				
Oxides and hydroxides	5	NA		
Metal including alloys, all forms	39	19	--	All from Finland.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Columbium and tantalum: Metal including alloys, all forms, columbium (niobium) kilograms	397	738	--	All from West Germany.
Copper:				
Ore and concentrate	1,404	2,067	--	Finland 2,064.
Metal including alloys:				
Scrap	886	197	--	Austria 95; West Germany 83.
Unwrought[2] thousand tons	59	66	--	U.S.S.R. 40; Poland 10.
Semimanufactures	22,415	20,043	--	Poland 15,299; Yugoslavia 4,079.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	129	514	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	11,640	11,683	--	U.S.S.R. 9,991; Brazil 1,051; India 201.
Metal:				
Scrap	73,823	156,610	--	U.S.S.R. 116,000; West Germany 40,610.
Pig iron, cast iron, related materials[2]	901,000	780,000	--	U.S.S.R. 777,000.
Ferroalloys:				
Ferrochromium	1,135	1,207	--	All from West Germany.
Ferromanganese	992	410	--	Do.
Silicon metal	1,663	NA		
Unspecified	2,371	411	--	West Germany 316.
Steel, primary forms	16,000	22,000	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	183	186	--	NA.
Universals, plates, sheets do	111	150	--	West Germany 12; unspecified 118.
Hoop and strip do	25	22	--	West Germany 3; Hungary 3.
Rails and accessories do	3	3	--	NA.
Wire do	3	3	--	Yugoslavia 2.
Tubes, pipes, fittings do	32	146	--	West Germany 115.
Castings and forgings, rough do	14	16	--	NA.
Lead:				
Oxides	3,485	1	--	All from Yugoslavia.
Metal including alloys:				
Scrap	168	238	--	All from West Germany.
Unwrought[2] thousand tons	30	28	--	U.S.S.R. 10; Yugoslavia 8.
Semimanufactures	1	1	--	All from Yugoslavia.
Magnesium: Metal including alloys:				
Scrap	2	4	--	All from West Germany.
Semimanufactures	122	24	--	Do.
Manganese:				
Ore and concentrate, metallurgical-grade[2] thousand tons	502	506	--	U.S.S.R. 258; Bulgaria 39; Brazil 26.
Mercury 76-pound flasks	29	232	--	All from Algeria.
Molybdenum:				
Ore and concentrate	221	790	--	Belgium-Luxembourg 599; West Germany 191.
Metal including alloys, all forms kilograms	2,846	417	--	All from Japan.
Nickel:				
Matte and speiss	1,062	976	--	All from Cuba.
Oxides and hydroxides	2,049	2,172	--	Do.
Metal including alloys:				
Unwrought[2]	6,741	8,060	--	U.S.S.R. 5,038; United Kingdom 1,150.
Semimanufactures	48	39	--	All from West Germany.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, value, thousands	$326	$139	--	Do.
Silver: Metal including alloys, unwrought and partly wrought do	$3,558	$4,751	--	Yugoslavia $4,653.
Tin: Metal including alloys:				
Unwrought[2]	3,088	2,933	--	Indonesia 1,010; Malaysia 801.
Semimanufactures	1	NA		
Titanium:				
Oxides	742	255	--	All from West Germany.
Metal including alloys, all forms	1	NA		
Tungsten:				
Ore and concentrate	52	NA		
Metal including alloys, all forms kilograms	1,532	1,495	8	West Germany 1,000; Japan 487.
Vanadium: Oxides and hydroxides	140	42	--	All from Finland.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983p	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc:				
Oxides	288	NA		
Metal including alloys:				
Scrap	--	100	--	All from West Germany.
Unwrought[2] -- thousand tons	57	56	--	Finland 12; Bulgaria 10; U.S.S.R. 10.
Semimanufactures	6,576	6,960	--	Yugoslavia 5,506; Poland 1,429.
Zirconium: Ore and concentrate	2,156	2,208	63	West Germany 2,145.
Other:				
Ores and concentrates	54,136	60,614	--	Norway 60,553.
Oxides and hydroxides	22,115	577	--	West Germany 557.
Base metals including alloys, all forms	23	34	--	Yugoslavia 25; Austria 8.
Nonferrous metals and alloys, rolled[2]	27,000	9,000	--	All from U.S.S.R.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	655	444	--	Italy 436.
Artificial:				
Corundum	3,185	2,805	--	Hungary 1,609; Yugoslavia 1,187.
Silicon carbide	293	293	--	All from Italy.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$326	$84	$84	
Grinding and polishing wheels and stones	520	495	1	West Germany 259; Austria 110.
Asbestos, crude[2]	48,699	41,681	--	U.S.S.R. 32,362; Canada 4,892.
Barite and witherite	125	45	--	All from West Germany.
Boron materials:				
Crude natural borates	7,243	NA		
Oxides and acids	920	2,283	--	All from Italy.
Cement[2] thousand tons	57	187	--	East Germany 107; U.S.S.R. 28.
Chalk	1,217	542	--	Belgium-Luxembourg 432; Austria 110.
Clays, crude	16,021	6,956	--	Hungary 5,302; Poland 1,441.
Diamond:				
Gem, not set or strung value, thousands	$18	$76	--	All from Belgium-Luxembourg.
Industrial stones do	$2,330	$687	--	Belgium-Luxembourg $686.
Diatomite and other infusorial earth	515	2,464	--	Iceland 2,151; Austria 203.
Feldspar, fluorspar, related materials	765	938	--	Finland 870; West Germany 48.
Fertilizer materials:				
Crude, n.e.s	9,201	NA		
Manufactured:				
Ammonia	1,960	268	--	Hungary 267.
Nitrogenous, N_2 content[2] thousand tons	105	133	--	All from U.S.S.R.
Phosphatic, P_2O_5 content[3] do	74	149	19	Yugoslavia 16; unspecified 114.
Potassic, K_2O content[2] do	639	580	--	East Germany 449; U.S.S.R. 131.
Unspecified and mixed	20,373	3	--	All from West Germany.
Graphite, natural	530	521	--	Japan 288; West Germany 225.
Gypsum and plaster[2] thousand tons	21	21	--	East Germany 20.
Lime	--	28	--	All from West Germany.
Magnesium compounds	876	1,275	--	West Germany 775; Greece 500.
Mica:				
Crude including splittings and waste	141	NA		
Worked including agglomerated splittings	9	11	--	Austria 10.
Nitrates, crude	--	807	--	All from Bulgaria.
Phosphates, crude, P_2O_5 content[2] thousand tons	280	281	--	U.S.S.R. 170; Morocco 59.
Pigments, mineral:				
Natural, crude	--	22	--	All from West Germany.
Iron oxides and hydroxides, processed	1,288	1,083	18	West Germany 1,055.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$70	$51	--	West Germany $49.
Synthetic do	$22	$11	$1	Japan $6; West Germany $4.
Pyrite, unroasted	20	40	--	All from Italy.
Salt and brine	176,171	140,149	--	U.S.S.R. 120,339; Poland 19,801.
Sodium compounds, n.e.s.:				
Carbonate, manufactured[2] thousand tons	182	174	--	East Germany 65; Romania 47; Bulgaria 34.
Sulfate, manufactured	1,938	NA		

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	11,361	10,614	--	Yugoslavia 7,928; Hungary 2,684.
Worked	4,022	5,495	--	Yugoslavia 5,032; Italy 463.
Dolomite, chiefly refractory-grade	3,049	1,988	--	Poland 1,837.
Gravel and crushed rock	1,157	265	--	Yugoslavia 245.
Quartz and quartzite	1,765	1,032	--	All from West Germany.
Sand other than metal-bearing[4]	463	676	--	West Germany 308; Belgium-Luxembourg 254.
Sulfur:				
Elemental:				
Crude including native and by-product[2] thousand tons	503	525	--	Poland 481.
Colloidal, precipitated, sublimed	34	NA		
Dioxide	364	425	--	All from West Germany.
Sulfuric acid[2]	71,731	61,270	--	U.S.S.R. 57,406.
Talc, steatite, soapstone, pyrophyllite	365	883	--	Belgium-Luxembourg 412; Austria 199.
Other:				
Crude	9,040	8,174	--	Hungary 6,124; West Germany 1,454.
Slag and dross, not metal-bearing	1,414	50	--	All from Austria.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	50	60	--	All from West Germany.
Carbon: Carbon black[2]	22,555	17,961	--	U.S.S.R. 12,165; Romania 3,299.
Coal:[2]				
Anthracite and bituminous thousand tons	4,980	5,028	--	U.S.S.R. 3,252; Poland 1,678.
Lignite including briquets do	652	676	--	All from Poland.
Gas, natural: Gaseous million cubic feet	318,714	327,367	--	U.S.S.R. 327,332.
Peat including briquets and litter	588	NA		
Petroleum:				
Crude thousand 42-gallon barrels	127,155	125,685	--	Mainly from U.S.S.R.
Refinery products:				
Liquefied petroleum gas do	8	9	--	All from West Germany.
Gasoline do	[3]3,978	[3]3,613	--	Mainly from U.S.S.R.
Mineral jelly and wax do	10	9	--	Mainly from West Germany.
Kerosine and jet fuel do	83	65	--	West Germany 51.
Distillate fuel oil do	[3]1,417	[3]1,223	--	Mainly from U.S.S.R.
Lubricants do	258	227	([5])	Austria 133; Yugoslavia 68.
Residual fuel oil do	252	([5])	--	All from West Germany.
Bitumen and other residues do	62	([5])	--	All from Austria.
Bituminous mixtures do	1	([5])	--	Mainly from Austria.
Petroleum coke do	28	23	--	All from West Germany.
Unspecified do	648	503	--	NA.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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 and data published by the trading partner countries.
[2]Official trade statistics of Czechoslovakia.
[3]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[4]Totals are incomplete owing to unreported quantities.
[5]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Czechoslovakia's sole producer of aluminum, Zavod SNP Ziar nad Hronom, exported products worth Kcs205 million. About 75% went to Council for Mutual Economic Assistance countries, mostly to the U.S.S.R., Bulgaria, and Hungary. Afghanistan received aluminum worth Kcs50 million. Imported bauxite and alumina were used in aluminum production. The electric energy for alumina production was 90% from thermal and 10% from hydraulic sources. Indigenous bauxite was found in the vicinity of Markusovae and Moldava on the Bodva River.

Antimony.—Antimony ores in Slovakia were mined at Dubrava in the granitoid pluton of the Low Tatra Mountains and near Pezinok in the Male Karpaty Mountains. Extraction of antimony ore was expected to be increased at Dubrava and Pezinok after 1985.

Copper.—Deposits of copper ore were located in Slovakia at Rudnany, and there were smaller reserves at Smolnik, Jedlovec, and Roznava. Some copper ores were also mined near Banska Stiavnica, about 140 kilometers northeast of Bratislava. The Zlate Hory deposit in Moravia was one of the most significant copper, lead, and zinc deposits in operation.

The ore veins of the Slovinska District were mined by Zeleznorudne Bane Slovinky. The Big Vein, in a west-east direction, had a length of 4.5 kilometers and dipped south at 50° to 90°. The thickness of mineralization averaged 1.5 meters but ranged up to 9 meters. Chalcopyrite was the main source of copper; its average copper content was 0.7%. The chalcopyrite was accompanied by quartz, ankerite, siderite, pyrite, arsenopyrite, and other minerals. New exploration of copper ore deposits in Permian clastic formations at Spania Dolina Valley, Stare Hory, and Lubietova in central Slovakia showed that there were greater reserves of low-grade, but economically significant, copper ores. The Zlate Hory deposit was stratiform and contained the following dominant minerals: pyrite, sphalerite, chalcopyrite, galena, and pyrrhotite. The ore zone was 300 meters long, 5 to 14 meters wide, and was traced to 1,000 meters in depth. Ore reserves were about 3 million tons, sufficient for about 10 years operating at 1984 mining rates. Average copper content was estimated at 0.2% to 0.5%. The mill produced a 15% to 24% copper concentrate that contained from 50 to 300 grams of silver per ton. A nearby deposit, known as the Zapod deposit, was estimated to have 20 million tons of ore reserves averaging 0.35% copper, 0.4% zinc, 0.5% lead, 12.8 grams of gold per ton, and 15 grams of silver per ton.

Gold.—Important gold deposits were reportedly discovered at Celina and Moursko in the Dobrus District of Bohemia, 40 kilometers south of Prague.

Iron and Steel.—Reserves of iron ore in Czechoslovakia were limited and were estimated at 400 to 600 million tons. The principal iron ore reserves were located in eastern Slovakia and in central Czechoslovakia. In 1983, about 6% of iron ore came from Bohemia, and 94%, from Slovakia. Siderite iron ore, with 38% to 40% iron, in Slovakia was the principal iron ore resource of the country. Production of iron ore was concentrated at Rudnany, Nizna Slana, and other vein deposits in Slovakia; however, the main production of steel was based on imported U.S.S.R. iron ore from Krivoy Rog. The main metallurgical complexes were located near Ostrava in north Moravia, at Kladno, north Bohemia, and at Kosice, east Slovakia. The Czechoslovak steel industry produced 7.69 million tons of crude steel and 4.9 million tons of pig iron in the first half of 1984, increases of 1.8% and 3.2%, respectively, over the first half of 1983. Rolled production in the first 6 months rose by 4.2% to 5.5 million tons. The metallugical industry in Czechoslovakia, including ore mining, increased its total output by 2.8% in the 6 months, despite the 1.1% reduction targeted in the 1984 state plan. Production of crude steel registered only moderate growth; the production growth of rolled stock from high-grade steel, which increased by 6.4%, was much faster.

The enterprise at Kladno near Prague, where special steels were made, marked its centenary on June 2. In 1983, production in Kladno reached 1 million tons of various kinds and shapes of steel. An oxygen converter plant with an initial capacity of 650,000 tons per year was put into operation at the Trinic steel plant in north Moravia in January. Final capacity of 2.6 million tons was planned for 1987. Considerable savings of metal, fuel, and dust were claimed. A continuous-casting plant to complement this unit was under construction at Trinic. At the Hradek Steel enterprise near Rokycany, another continuous caster was under construction. At the Vitkovice steel plant, a new electric steelworks was commissioned in 1983 with a 60-ton furnace, a transformer station, new scrapyards, and other facilities.

The West German Technica Guss Co. received an order from Czechoslovakia for a horizontal continuous caster for 100- to 200-millimeter square or round billets.

Lead and Zinc.—The ore continued to be mined at Pribram and Kutna Hora (central Bohemia), Horni Benesov (Moravia), and Banska Stiavnica (central Slovakia). In general, mining activities were increasing in the area. New exploration revealed extensive possible reserves of base metal in east Slovakia, particularly at Zlata Bana in the

Slanske Hills. In Banska Stiavnica, the veins dipped 60% to 80% east and southeast. They represented a parallel vein system 8 kilometers long and with depth of mineralization to 1,300 meters. Economically significant ore mineralization was in veins several tens of meters long and up to 15 meters thick. The main minerals were galenite, sphalerite, and chalcopyrite with low gold and silver contents. At Horni Benesov, about 30 kilometers southeast of Jesenik, the ore body was stratabound in Devonian rocks and ranged from 3 to 40 meters wide, extending to a depth of 1,000 meters. The mine began production in 1964 and had produced more than 4 million tons of ore to 1984. Annual ore production was about 300,000 tons, resulting in an annual production of about 4,000 tons of zinc, 1,300 tons of lead, and 140,000 ounces of silver in concentrates per year. Ore reserves were estimated to be sufficient for 15 to 20 years at 1984 production rates. The ore reserves were estimated to average 1.5% zinc, 0.5% lead, and 15 grams of silver per ton. The mine employed about 400 workers and 76 white-collar employees. Ore veins of Turkank Zone, belonging to the so-called quartz-pyrite silver-lead-zinc formation, were mined in the district of Kutna Hora. Ore veins up to several meters thick were developed in a complex of rocks mainly in a north-south direction dipping 70° to 90° west. The shaft reached a level of 570 meters below the pit-bank.

NONMETALS

Barite.—The main occurrences of barite were in Slovakia, where it was associated with siderite. In Bohemia, barite was obtained as a byproduct in the exploitation of fluorite. The largest reserves of barite were in the Rudnany deposit. The most significant vein at the Rudnany Mine was about 7 kilometers long. The average thickness was 7 meters to a maximum 30 meters. Mining operations extended 500 to 600 meters below the surface. Barite was separated electromagnetically from siderite and by flotation from sulfides. During this process, the barium sulfate content was increased from 35% in the ore to 96% in the concentrate. Drilling tests showed the vein continued 1,000 to 1,200 meters in depth. The new exploration drilling was planned to be extended down to about 2,500 meters.

Clays (Kaolin).—Kaolin for the ceramic industry was mined in the Karlovy Vary area, and kaolin for the paper industry was mined in the Plzen Basin. Kaolin production, based on large deposits, put Czechoslovakia in fourth place among producers of raw materials for the manufacture of china ware. The country rock was granitoid, kaolinized during the Upper Mesozoic to Tertiary Ages to a depth of about 20 to 30 meters. The intensity of kaolinization decreased at depth. Mining was by open pit methods with benches from 2 to 7 meters high. The ore was trucked to washing plants at Bozicany and Osmosa where four grades were produced. About 600,000 tons of crude kaolin was mined annually. Reportedly, reserves of the deposits in production reach 60 million tons of kaolin.

Graphite.—The production of graphite was concentrated in two areas—south Bohemia, where fine flake graphites were extracted, and north Moravia, yielding foundry graphite near Stare Mesto. The Velke-Kostantin deposit near Stare Mesto of microcrystalline graphite (39% carbon) in north Moravia was 2 to 6 meters thick. It was exploited in an opencast mine. The graphitic slate and graphitic gneiss that formed the bulk of the graphite raw material were associated with amphibolite, quartzite, and carbonate. Approximately 500,000 tons of graphite reserves were in evidence at the deposit, of which 250,000 tons were workable by open pit methods, and the rest, by quarrying combined with mining. The pit under exploitation was about 150 meters deep; additional deepening of the pit was not expected to be more than 15 to 20 meters. The operation had 24 employees and produced about 20,000 tons of ore per year. The graphite was processed in a new flotation plant at Male Vrbno, which produced six types of graphite with a graphite content from 40% to 65%. The products were used mainly for foundry purposes.

Magnesite.—There were many magnesite deposits in the Spissko-Gemerske' Rudohorie Mountains in Upper Carboniferous carbonate rocks in Slovakia. Large mining plants were at Jelsava, Kosice, Lubenik, and Podrezany. The annual production was more than 3 million tons.

Magnesite was mined at the Dubrava, Mikova, and Jedlovec deposits, which represented tectonically separated blocks of one huge magnesite complex. The magnesite formed bodies of varying thickness in the dolomite. The western body, Dubrava, was on the average about 400 meters thick and covered 3.2 million square meters. In the central block, Mikova, the maximum real thickness of the deposit was up to 70 meters; in the eastern segment, Jedlovec, several lenticular magnesite bodies occurred that were 20 to 50 meters thick. The Jelsava complex of deposits represented the largest reserves of the so-called calcareous magnesite with a low silica content. The average composition of magnesite raw material was as follows: magnesite, 41.42%; ferric oxide, 4.28%; calcium oxide, 3.55%; silica, 0.95%; manganese oxide, 0.28%; alumina, 0.24%; and loss on ignition, 49.28%. Magnesite was extracted in up to 60 meter high underground chambers, using blasting and electric shovels. The transport of the raw material was provided by Tatra trucks or 50-ton Kirune trucks. From the storage bin, the raw material was transported on rails to a cone crusher on the surface. Several fractions between dust and 200 millimeters were recovered from the crushed material. The 60- to 200-millimeter fraction was suitable for shaft kilns.

Sand.—The Hrdonovice deposit was the most important deposit of the glass and foundry sand in Czechoslovakia. The quarry contained 40-meter-thick zones of well-sorted, high-purity quartz sandstone interbedded with relatively thin, red silty sandstones. The operation produced about 1 million tons of high-quality sand per year, most of which was used for manufacturing synthetic foundry glass and white glass. One 30-meter-thick sandstone bed near the bottom of the quarry was the raw material for making the world-famous Bohemian crystal glass. The sand was crushed, washed to get rid of fines, magnetically beneficiated, sized, and shipped. All products were said to exceed 99.5% silica content.

MINERAL FUELS

Coal.—The bulk of Czechoslovak coal was classified either as lignite, brown, or bituminous coal. Anthracite was included in bituminous coal production, because anthracite production and reserves were very limited and the distinction was not stressed in the customary European practice. Brown coal referred to a high-grade lignite coal. The total output of bituminous coal, lignite, and brown coal increased by 2.4% compared with 1983 production. However, production of bituminous coal decreased slightly. The bulk of the country's bituminous coal output, about 89%, came from the Ostrava-Karvina Basin, which forms part of the large Upper Silesian coal deposits. About 63% of bituminous coal produced represented coking coal. Bituminous coal measured, indicated, and inferred reserves were estimated at about 4.5 billion tons, and that of brown coal, 6.5 billion tons. Bituminous coal production came from deep mines, and about 90% of the brown coal production came from surface mines. The country imported substantial quantities of bituminous coal, estimated at 3.3 million tons, from the U.S.S.R. and 1.7 million tons from Poland. Total exports of bituminous coal reached 2.9 million tons, mainly to Austria, the German Democratic Republic, Hungary, and Romania. The major part of the brown coal output, about 73%, was supplied from the North Bohemian Basin, and lignite was produced mainly in the southern Moravian region.

Coal production in Czechoslovakia was highly mechanized. Machine coning of bituminous coal in Ostrava-Karvina accounted for about 91% of the total production of coal in that area. Continuous miners produced about 86.1%; scrapers, 2%; and plows, 11.9%. Hydraulic mining was not used. About 91% of all coal was mechanically loaded.

Czechoslovakia was intensifying coal prospecting efforts. Reportedly, 4 bituminous coal mines in the north Bohemia region, 14 brown coal open pit mines, and 7 other mines will be exhausted. The most intensive prospecting in 1984 was carried out in the Ostrava-Karvina Basin in north Moravia, where the 592-million-ton Frenstat East coal deposit was already under development. A new deposit of 38.8 million tons was discovered at Syrenov in the Giant Mountains in northeast Bohemia and exploration was completed in the Melnik-Benat area, north of Prague.

Gas.—Czechoslovakia's small indigenous gas reserves were dwindling; the country imported 300 billion cubic feet of gas from the U.S.S.R. Czechoslovakia was in a good position to receive major increases in Soviet gas deliveries in exchange for the use of an expanding network of pipelines crossing Czechoslovak territory to gas customers in Eastern and Western Europe. The existing system comprised three pipelines with a total annual capacity of over 1,413 billion cubic feet per year, which will double to 2,826 billion cubic feet by 1988 with the laying of a fourth pipeline. Construction of the gas pipelines on Czechoslovak territory cost about Kcs3,600 million in the 1980-83 period. Another Kcs3,700 million was scheduled to be invested by the end of the seventh

(1981-85) 5-year plan, and the additional cost in the 1985-87 period was expected to be Kcs5,400 million. Indigenous deposits of natural gas discovered in the western part of Zdanice, south Moravia, were promising.

Petroleum.—Crude oil production in Czechoslovakia continued to be insignificant by world standards. Production was expected to remain unchanged, at about 1,700 barrels per day through 1985-90. Imports of crude oil from the U.S.S.R. decreased from 131 million barrels in 1980 to 116 million barrels in 1983. Exports of petroleum products also decreased from 9 million barrels in 1980 to 8 million barrels in 1983. Representatives of Chemapol, Praga Foreign Trade Co. Ltd., and Soyuznefteeksport, Moscow, in 1984 signed a contract for the annual import of Soviet crude oil and petroleum products to a total value of 3 billion rubles. Czechoslovakia will also import 5.2 million barrels of Iranian oil per year under terms of a supply deal signed in the summer of 1984. Total refinery capacity of Government-owned refineries at Bratislava, Kolin, Kralup, Pardubice, Strazke, Zaluzi, and Zyolen was estimated at 455,000 barrels per day in January.

Exploration for oil and gas deposits was carried out mostly in southern Moravia. According to the director of the Moravian Crude Oil Mines enterprise of Hodonin, the new oil deposits were discovered near Gajary and Zdanice in the Hodonin area at a depth of almost 2,000 meters; deposits were estimated to contain more than 6.8 million barrels of recoverable crude oil.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Statistika Rocenka Ceskoslovenske Socialisticke Republiky (Statistical Annual of the Czechoslovakia Socialist Republic) (Prague). 1984, p. 363.

[3]Rude Provo (Prague). Jan. 28, 1985, pp. 1, 3.

[4]The Soviet ruble is not convertible, and the official exchange rate cannot be used as a measure of relative value. The official exchange rate in 1984 for Soviet rubles (R) to U.S. dollars was approximately R1.00=US$1.15.

[5]The Czechoslovak koruna (Kcs) is not convertible, and the official exchange rate cannot be used as a measure of relative value. Values given in this chapter are therefore not converted to dollars. The average official exchange rate in 1984 was Kcs6.78=US$1.00.

The Mineral Industry of Denmark and Greenland

By Richard H. Singleton[1]

DENMARK

Denmark has no commercial metallic ore deposits. Known reserves of a few low-unit-value nonfuel mineral commodities include clays, diatomaceous earth and moler, limestone, peat, salt, and sand and gravel. Significant petroleum resources exist, particularly in the North Sea. Denmark was not a significant producer of mineral commodities for export in 1984 and imported about one-half of its consumption of these materials.

Despite increases in its steel production, Denmark's only steel producer operated at a loss after having made a small profit in 1983. Total sales and exports of lime and salt increased. Exports of chalk increased while those of cement decreased. Denmark's leading fertilizer producer purchased a large U.S. fertilizer company, thereby increasing its fertilizer production capacity by 50% and improving the stability of its supply of fertilizer raw materials.

Approximately 18% of total primary energy requirements was provided from indigenous fuels as Denmark's North Sea oil production continued to increase. Nearly all powerplants had been converted to imported coal, and about one-third of all forms of energy was derived from coal. Production of natural gas began during the second half of 1984 from the Tyra Gasfield in the North Sea, and long-term delivery contracts were made with the Federal Republic of Germany and Sweden; Denmark thus became a significant producer of natural gas as well as oil. Large sections of oil and gas pipeline were completed from the North Sea to the mainland. The Government spurred exploration and production of petroleum by granting for the first time exploration licenses to private oil companies. Previously, a Government-controlled company had been the sole concessionaire. The Government urged this company to produce more oil and gas from its existing wells.

Buoyed by strong consumer demand, a record high grain crop, a continuing trade surplus, and increasing exports, the Danish economy continued to gain momentum, reaching a growth rate of 4.25% in 1984, almost twice the West European average. The restrictive and painful conservation policies of the Government, including a freeze on Government spending and wage and price controls, had reduced the annual budget deficit from 15% of the gross domestic product (GDP) in 1982 to 8% in 1984 and the rate of inflation from 12% in 1982 to 6% in 1984. Denmark continued to enjoy a trade surplus, about $1 billion[2] in 1984. However, the high negative balance of payments, the result of two decades of recurrent deficits, continued and was 38% of the GDP with no reduction made during the year.

PRODUCTION

Production of petroleum and salt increased as did sales of steel and lime. Production and sale of natural gas began. Although available standard Danish Government tabulations did not include production data on most mineral commodities, they did contain sales data. Commodities for which production was known to exceed sales include limestone, moler, and peat. These materials were utilized by producers to manufacture materials and articles for construction and other uses.

Table 1.—Denmark: Sales of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
Cement, hydraulic thousand tons	1,917	1,602	1,770	1,657	1,668
Clays:					
Kaolin	[e]20,000	[r] [e]10,000	[r]4,996	[r] [e]10,000	[e]14,000
Other	NA	20,525	4,514	[e]10,000	4,168
Diatomaceous materials:					
Diatomite	[e]25,000	3,465	3,903	[e]6,000	[e]7,700
Moler	[e]125,000	63,406	70,484	[e]65,000	63,745
Gas, natural: Marketed million cubic feet	--	--	--	--	7,800
Iron and steel:					
Iron ore (less than 42% Fe):					
Gross weight thousand tons	8	8	8	--	--
Metal content of ore do.	3	3	3	--	--
Steel, crude do.	734	612	560	493	548
Semimanufactures do.	655	[r]560	[r]467	410	[e]467
Lead metal including alloys, secondary	24,500	[r]24,030	[r]15,927	10,052	13,019
Lime, hydrated and quicklime thousand tons	[r]123	[r]99	100	108	128
Nitrogen: N content of ammonia	31,200	31,200	30,700	11,700	[e]15,000
Peat thousand tons	31	33	[r]36	[e]34	31
Petroleum:[2]					
Crude thousand 42-gallon barrels	2,272	5,815	[r]12,721	[e]15,800	16,975
Refinery products:					
Gasoline do.	9,367	9,852	8,475	10,548	10,438
Jet fuel do.	80	48	176	264	664
Kerosine do.	202	101	233	333	1,077
Distillate fuel oil do.	20,821	19,926	19,389	22,358	23,350
Residual fuel oil do.	14,099	11,995	[r]12,334	13,740	14,486
Other do.	3,272	3,095	[r]4,124	4,494	5,166
Refinery fuel and losses do.	2,053	2,287	[r]2,430	2,602	2,670
Total do.	49,894	47,304	[r]47,161	54,339	57,851
Salt[2] thousand tons	347	398	[r]399	452	523
Sodium carbonate	134	149	119	144	[e]150
Stone:					
Crushed:					
Flint thousand cubic meters	NA	[e]70	[e]75	[e]60	47
Limestone:					
Agricultural thousand tons	[e]2,100	1,611	[r]2,164	[e]2,200	2,163
Industrial do.	NA	200	144	[e]140	145
Chalk do.	[e]120	112	154	[e]180	220
Other thousand cubic meters	NA	948	893	[e]1,000	1,183
Dimension (mostly granite): do.	NA	60	[r]55	[e]100	154
Sulfur, byproduct	8,000	[r]5,575	[r]7,421	[e]9,000	10,859

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 23, 1985.
[2]Data represent production.

TRADE

Denmark remained a net importer of steel semimanufactures, but net imports decreased significantly in 1983. Exports of chalk and lime each increased strongly and represented about one-quarter and one-eighth, respectively, of total sales. Exports of salt increased strongly and represented about 40% of production. Exports of cement, representing approximately one-quarter of sales, decreased 17% in 1983. Noteworthy import changes in 1983 were significant decreases in receipts of salt and steel semimanufactures. Denmark continued to import all of its coal and most of its oil, and imports of both of these commodities increased in 1984.

Table 2.—Denmark: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	2,366	414	5	Finland 381.
Oxides and hydroxides	442	167	71	Sweden 24; West Germany 15.
Ash and residue containing aluminum	144	30	--	NA.
Metal including alloys:				
Scrap	11,762	15,002	--	West Germany 10,259.
Unwrought	8,284	8,986	258	West Germany 2,836; Belgium-Luxembourg 2,381.
Semimanufactures	19,448	24,636	90	Sweden 7,798; West Germany 5,689.
Cadmium: Metal including alloys, all forms	--	1	NA	NA.
Chromium:				
Oxides and hydroxides	5	8	--	Sweden 7.
Metal including alloys, all forms	--	1	--	NA.
Copper:				
Matte and speiss including cement copper	--	5	--	All to Netherlands.
Oxides and hydroxides	13	4	--	NA.
Sulfate	--	20	NA	NA.
Ash and residue containing copper	1,541	1,022	--	West Germany 722; Sweden 215.
Metal including alloys:				
Scrap	11,905	15,707	84	West Germany 13,345.
Unwrought	1,281	1,894	--	West Germany 871; Sweden 747.
Semimanufactures	6,806	3,661	([2])	West Germany 1,433; Ireland 813.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	14,566	11,565	--	West Germany 6,503; United Kingdom 2,753.
Metal:				
Scrap	117,750	174,803	2	West Germany 150,914.
Pig iron, cast iron, related materials	816	323	--	Sweden 172; West Germany 117.
Ferroalloys:				
Ferrosilicomanganese	--	1	--	All to West Germany.
Silicon metal	3	6	6	
Unspecified	1	--		
Steel, primary forms	5,750	3,848	--	Belgium-Luxembourg 2,357.
Semimanufactures:				
Bars, rods, angles, shapes, sections	73,465	70,598	28	West Germany 27,783; Sweden 17,974.
Universals, plates, sheets	290,755	295,742	10	West Germany 83,794; Sweden 63,950.
Hoop and strip	26,917	23,406	1	Sweden 12,062; United Kingdom 6,883.
Rails and accessories	1,558	2,071	23	Italy 1,928.
Wire	3,884	3,487	281	Sweden 1,751; West Germany 461.
Tubes, pipes, fittings	72,448	395,011	156	Norway 319,866; Sweden 38,353.
Castings and forgings, rough	25,461	27,305	--	West Germany 11,787; Sweden 9,114.
Lead:				
Ore and concentrate	--	220	--	All to West Germany.
Oxides	2	20	--	Norway 10; Japan 7.
Ash and residue containing lead	2,373	1,127	--	Belgium-Luxembourg 903.
Metal including alloys:				
Scrap	5,993	8,025	--	West Germany 6,033; East Germany 1,382.
Unwrought	9,942	7,924	18	Norway 2,680; Japan 1,693.
Semimanufactures	65	66	--	Netherlands 11; Iceland 7.

See footnotes at end of table.

Table 2.—Denmark: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Scrap	143	172	--	West Germany 164.
Unwrought	46	2	--	All to Sweden.
Semimanufactures	5	6	--	West Germany 3.
Mercury 76-pound flasks	116	145	NA	West Germany 87.
Nickel:				
Ash and residue containing nickel	61	77	--	United Kingdom 57.
Metal including alloys:				
Scrap	47	58	--	West Germany 35; Sweden 19.
Semimanufactures	7	7	--	West Germany 5.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2,434	$1,766	--	Sweden $1,380.
Selenium, elemental	--	1	NA	NA.
Silver:				
Waste and sweepings[3] value, thousands	$7,347	$11,681	--	United Kingdom $4,742; France $2,188.
Metal including alloys, unwrought and partly wrought do.	$7,195	$4,606	--	Sweden $2,001; Switzerland $1,243.
Tellurium, elemental and arsenic	3	5	NA	NA.
Tin:				
Ore and concentrate	--	27	--	All to Finland.
Ash and residue containing tin	1,246	859	--	West Germany 853.
Metal including alloys:				
Scrap	21	7	--	All to West Germany.
Unwrought	673	1,191	9	Sweden 603; Netherlands 187.
Semimanufactures	41	38	(2)	Norway 27.
Titanium:				
Oxides	277	101	--	West Germany 45; Italy 23.
Metal including alloys, all forms	9	4	--	Sweden 3.
Tungsten: Metal including alloys, all forms	9	5	--	All to West Germany.
Vanadium:				
Ash and residue containing vanadium	--	34	--	Do.
Metal including alloys, all forms	--	5	--	Do.
Zinc:				
Ore and concentrate	280	--		
Oxides	35	64	1	West Germany 20; Malta 16.
Matte	903	999	--	Norway 436; West Germany 349.
Ash and residue containing zinc	509	723	--	Norway 635.
Metal including alloys:				
Scrap	3,635	3,666	--	West Germany 2,169; Norway 1,197.
Unwrought	243	330	--	Sweden 174; Finland 50.
Semimanufactures	187	339	--	West Germany 281.
Other:				
Ores and concentrates	369	438	--	Sweden 209; Norway 174.
Oxides and hydroxides	2	2	--	NA.
Ashes and residues	1,691	3,214	--	NA.
Base metals including alloys, all forms	45	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	15	41	--	Sweden 23.
Artificial: Corundum	1	--		
Grinding and polishing wheels and stones	1,365	2,370	2	Iran 1,241; Ethiopia 371.
Barite and witherite	35	77	--	Netherlands 54.
Boron materials: Oxides and acids	68	24	--	Finland 10; Sweden 8.
Cement	504,225	416,650	17,512	Saudi Arabia 98,068; Nigeria 95,875; Israel 36,682.
Chalk	27,811	46,829	--	Finland 30,545; Sweden 5,481.
Clays, crude:				
Kaolin	644	639	3	Sweden 299.
Unspecified	r1,021	1,068	5	Sweden 347; Norway 254.
Cryolite and chiolite	14,415	28,225	NA	NA.
Diamond: Gem, not set or strung value, thousands	$286	$782	$20	Sweden $597.
Diatomite and other infusorial earth	64,438	65,458	10	West Germany 21,538; United Kingdom 11,584.
Feldspar	1	26	--	West Germany 25.

See footnotes at end of table.

Table 2.—Denmark: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	50	40	--	Sweden 39.
Manufactured:				
Ammonia	644	574	--	Sweden 476.
Nitrogenous	53	79	--	Sweden 47.
Phosphatic	58,930	34,379	--	NA.
Potassic	6,336	29	--	Norway 25.
Unspecified and mixed	387,405	456,246	20	NA.
Graphite, natural	15	(2)	--	NA.
Gypsum and plaster	371	688	--	West Germany 340; Brunei 101.
Iodine	--	2	NA	West Germany 1.
Kyanite and related materials	1	20	NA	NA.
Lime	8,794	15,294	--	Norway 7,995; Finland 5,685.
Magnesium compounds:				
Oxides and hydroxides	3	64	--	United Kingdom 47.
Other	16	10	--	Saudi Arabia 5.
Mica: Crude including splittings and waste	7	13	--	Sweden 7; Japan 5.
Phosphates, crude	3	333	73	United Kingdom 235.
Pigments, mineral:				
Natural, crude	10	10	--	NA.
Iron oxides and hydroxides, processed	295	245	24	Sweden 105.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$52	$41	--	Norway $14; Sweden $12.
Synthetic ---- do	$15	$11	--	West Germany $6.
Salt and brine	114,533	191,422	--	Sweden 152,392; Norway 23,808.
Sodium compounds, n.e.s.: Carbonate, manufactured	r151	74	--	Iceland 23; Finland 20.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	57,182	64,423	--	West Germany 63,375.
Worked	7,517	8,281	1	West Germany 7,186.
Dolomite, chiefly refractory-grade	95	398	--	Sweden 256.
Gravel and crushed rock	832,217	884,049	--	West Germany 867,665.
Limestone other than dimension	132,713	133,545	--	West Germany 83,147; Sweden 29,753.
Quartz and quartzite	60	46	--	Saudi Arabia 15; Sweden 15.
Sand other than metal-bearing	187,992	169,039	12	Sweden 133,638.
Sulfur:				
Elemental:				
Crude including native and byproduct	80	3,430	--	West Germany 3,378.
Colloidal, precipitated, sublimed	--	1	--	All to Ghana.
Dioxide	2	1	NA	NA.
Sulfuric acid	387	676	--	West Germany 413; Norway 129.
Talc, steatite, soapstone, pyrophyllite	86	98	--	Sweden 29; Ecuador 23.
Vermiculite, perlite, chlorite	9	24	--	NA.
Other:				
Crude	r1,340	896	(2)	West Germany 684.
Slag and dross, not metal-bearing	50,165	142,701	--	Norway 105,823; France 14,220.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	169	90	--	Sweden 50.
Carbon: Carbon black	135	31	--	Sweden 12.
Coal: Bituminous	1,170	3,091	--	Ireland 2,450.
Coke and semicoke	41,049	37,756	--	Sweden 24,575; Norway 8,699.
Gas, natural: Gaseous thousand cubic feet	106	53	--	NA.
Peat including briquets and litter	3,989	3,220	--	Netherlands 1,415; Norway 631.
Petroleum:				
Crude thousand 42-gallon barrels	42	8,551	--	Netherlands 2,481; France 2,385; West Germany 2,119.
Refinery products:				
Liquefied petroleum gas do	175	174	--	Sweden 100; Netherlands 30.
Gasoline do	3,228	3,498	--	Sweden 3,254.
Mineral jelly and wax do	6	5	--	Sweden 4.
Kerosine and jet fuel do	10	112	--	Greenland 53; Norway 51.
Distillate fuel oil do	3,525	4,894	--	Sweden 3,717; Greenland 632.
Lubricants do	215	160	(2)	Norway 115; Greenland 11.
Residual fuel oil do	1,792	3,695	--	United Kingdom 1,899; Sweden 510.
Bitumen and other residues do	164	93	--	Finland 89.
Bituminous mixtures do	16	72	--	Norway 61.
Petroleum coke do	8	38	--	Norway 36.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Denmark: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	253	287	--	West Germany 283.
Alkaline-earth metals	3	1	--	All from West Germany.
Aluminum:				
Ore and concentrate	--	18	--	All from United Kingdom.
Oxides and hydroxides	3,522	4,000	1,107	United Kingdom 1,820.
Ash and residue containing aluminum	20	623	--	Sweden 488.
Metal including alloys:				
Scrap	2,623	3,292	19	West Germany 1,472; Norway 951.
Unwrought	22,095	24,716	--	Norway 14,258; West Germany 4,651.
Semimanufactures	56,667	62,808	102	West Germany 16,077; Norway 10,929.
Antimony:				
Oxides	39	36	--	United Kingdom 33.
Metal including alloys, all forms	10	54	--	NA.
Arsenic: Oxides and acids	10	19	--	United Kingdom 14.
Beryllium:				
Oxides and hydroxides	4	51	--	All from West Germany.
Metal including alloys, all forms	2	5	--	Do.
Bismuth: Metal including alloys, all forms	2	3	--	West Germany 2.
Cadmium: Metal including alloys, all forms	3	2	NA	NA.
Chromium:				
Ore and concentrate	329	1,532	--	All from West Germany.
Oxides and hydroxides	253	582	(2)	West Germany 522.
Metal including alloys, all forms	--	2	--	NA.
Cobalt:				
Oxides and hydroxides	10	8	--	United Kingdom 5.
Metal including alloys, all forms	16	24	--	Belgium-Luxembourg 15.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$38	$10	$2	Switzerland $5.
Copper:				
Matte and speiss including cement copper	1	1	--	All from Netherlands.
Oxides and hydroxides	601	1,063	--	West Germany 551.
Sulfate	1,304	1,449	--	Belgium-Luxembourg 996.
Ash and residue containing copper	1,166	1,437	--	All from West Germany.
Metal including alloys:				
Scrap	4,232	3,029	--	Sweden 1,472; West Germany 430.
Unwrought	909	1,311	(2)	West Germany 477; United Kingdom 368.
Semimanufactures	28,491	31,659	45	West Germany 11,712; Sweden 6,897.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	183,114	62,855	--	Sweden 62,832.
Pyrite, roasted	15,304	13,977	--	Norway 13,927.
Metal:				
Scrap	87,493	67,374	361	United Kingdom 51,196.
Pig iron, cast iron, related materials	66,080	32,435	3	Brazil 7,943; U.S.S.R. 7,610.
Ferroalloys:				
Ferroaluminum	1,618	158	--	West Germany 87; Spain 47.
Ferrochromium	371	812	--	Sweden 810.
Ferromanganese	3,091	1,967	--	Norway 1,952.
Ferromolybdenum	13	18	--	Sweden 17.
Ferrosilicochromium	--	5	--	All from Sweden.
Ferrosilicomanganese	2,892	2,911	--	Norway 2,885.
Ferrosilicon	3,500	3,250	--	Norway 2,748.
Silicon metal	406	440	--	France 214; Norway 168.
Unspecified	r97	100	--	Brazil 35; West Germany 28.
Steel, primary forms	81,413	94,449	(2)	Finland 28,027; U.S.S.R. 16,734.
Semimanufactures:				
Bars, rods, angles, shapes, sections	316,097	304,042	9	Sweden 84,370; West Germany 73,618.
Universals, plates, sheets	726,473	714,294	26	West Germany 169,745; Sweden 127,943.
Hoop and strip	56,725	62,979	2	West Germany 33,996; Sweden 10,605.
Rails and accessories	14,670	11,886	--	West Germany 6,866; Austria 3,058.
Wire	31,806	31,689	17	West Germany 11,525.
Tubes, pipes, fittings	495,482	239,888	185	West Germany 92,719; United Kingdom 29,947.
Castings and forgings, rough	4,465	4,011	--	West Germany 1,752; Norway 1,009.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	507	214	--	West Germany 161.
Ash and residue containing lead	6,104	3,354	614	Netherlands 773; United Kingdom 737.
Metal including alloys:				
Scrap	7,702	6,749	304	Norway 4,098; Sweden 650.
Unwrought	7,470	13,181	--	West Germany 10,041.
Semimanufactures	3,794	4,107	(2)	West Germany 3,924.
Lithium: Metal including alloys, all forms	6	1	1	
Magnesium: Metal including alloys:				
Scrap	1	96	--	Sweden 76; Norway 20.
Unwrought	181	175	--	Norway 172.
Semimanufactures	61	86	34	Switzerland 29.
Manganese:				
Ore and concentrate, metallurgical-grade	510	322	--	Netherlands 239.
Oxides	1,655	1,601	--	Belgium-Luxembourg 1,103.
Metal including alloys, all forms	17	201	NA	Sweden 185.
Mercury 76-pound flasks	232	232	--	Turkey 87; Sweden 58.
Molybdenum:				
Oxides and hydroxides	1	8	--	Netherlands 7.
Metal including alloys, all forms	11	1	--	Mainly from West Germany.
Nickel:				
Ore and concentrate	--	12	--	West Germany 10.
Matte and speiss	6	26	5	Sweden 10.
Metal including alloys:				
Scrap	--	2	--	All from Norway.
Unwrought	161	244	--	Canada 124; Finland 39.
Semimanufactures	155	119	8	West Germany 67.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$4,985	$5,409	$99	Netherlands $2,593; Switzerland $1,273.
Selenium, elemental	1	1	--	NA.
Silver:				
Waste and sweepings[3] value, thousands	$430	$485	--	Sweden $300; Netherlands $107.
Metal including alloys, unwrought and partly wrought do	$10,988	$11,592	$12	United Kingdom $3,154; West Germany $3,107.
Tellurium, elemental and arsenic	11	1	--	All to United Kingdom.
Tin:				
Oxides	4	14	--	Belgium-Luxembourg 13.
Ash and residue containing tin	507	1,322	406	Netherlands 484.
Metal including alloys:				
Scrap	68	364	36	West Germany 192; Netherlands 73.
Unwrought	264	519	27	Netherlands 265.
Semimanufactures	53	31	--	West Germany 13.
Titanium:				
Oxides	5,643	7,210	46	Norway 2,652; United Kingdom 1,578.
Metal including alloys, all forms	50	86	2	Switzerland 50; West Germany 29.
Tungsten: Metal including alloys, all forms	11	10	(2)	Sweden 5; West Germany 4.
Vanadium: Metal including alloys, all forms	7	2	--	West Germany 1.
Zinc:				
Oxides	2,419	2,752	3	West Germany 1,570; France 569.
Ash and residue containing zinc	303	301	--	West Germany 293.
Metal including alloys:				
Scrap	73	92	--	Finland 50; Netherlands 25.
Unwrought	12,168	11,969	--	Norway 5,204; Finland 4,910.
Semimanufactures	4,459	4,618	--	France 1,995; West Germany 1,204.
Zirconium: Ore and concentrate	231	219	--	West Germany 174.
Other:				
Ores and concentrates	1,011	383	--	Sweden 211; Finland 135.
Oxides and hydroxides	170	192	6	NA.
Ashes and residues	63	658	--	Norway 611.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5,139	12,203	6	Iceland 11,417.
Artificial:				
Corundum	528	534	--	West Germany 507.
Silicon carbide	271	656	--	Norway 642.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$286	$247	$35	Switzerland $209.
Grinding and polishing wheels and stones	985	1,024	4	West Germany 334; Austria 289.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Asbestos, crude	9,701	16,585	--	Canada 15,567.
Barite and witherite	18,269	23,726	--	Netherlands 22,867.
Boron materials:				
Crude natural borates	4,423	4,107	3,076	West Germany 530.
Elemental	--	5	--	NA.
Oxides and acids	444	351	70	Italy 145; France 102.
Bromine	77	52	--	Israel 33; United Kingdom 17.
Cement	23,954	36,087	1	West Germany 14,510; Poland 11,276.
Chalk	11,181	9,763	21	West Germany 5,612; France 2,622.
Clays, crude:				
Bentonite	3,555	3,726	180	West Germany 1,550; Italy 750.
Chamotte earth	544	283	--	West Germany 259.
Kaolin	37,452	37,689	64	United Kingdom 32,766.
Unspecified	r6,885	7,501	316	West Germany 6,002.
Cryolite and chiolite	46,472	46,450	--	All from Greenland.
Diamond:				
Gem, not set or strung value, thousands	$3,235	$2,137	--	Belgium-Luxembourg $1,107; United Kingdom $363.
Industrial stones do	$47	$15	--	Switzerland $10.
Diatomite and other infusorial earth	7,632	7,966	1,553	Iceland 2,665; Greece 2,270.
Feldspar, fluorspar, related materials:				
Feldspar	5,896	3,873	--	Norway 2,586; Sweden 1,145.
Fluorspar	502	615	--	East Germany 417; France 145.
Unspecified	r813	71	--	West Germany 66.
Fertilizer materials:				
Crude, n.e.s	68	486	--	West Germany 454.
Manufactured:				
Ammonia	330,650	363,677	--	West Germany 144,198; Trinidad and Tobago 116,966.
Nitrogenous	81,603	115,771	1,665	Norway 33,296; undetermined 37,442.
Phosphatic	18,818	5,698	--	Tunisia 3,145; West Germany 1,807.
Potassic	234,414	261,952	23,793	West Germany 145,447; East Germany 74,417.
Unspecified and mixed	385,417	694,506	34,073	Norway 382,740; West Germany 113,293.
Graphite, natural	1,254	1,225	46	West Germany 1,136.
Gypsum and plaster	218,989	273,701	16	Spain 195,740; Sweden 71,523.
Iodine	2	2	--	West Germany 1.
Kyanite and related materials	422	270	86	West Germany 157.
Lime	6,285	6,973	--	West Germany 6,390.
Magnesium compounds:				
Magnesite	r72	163	--	Austria 142.
Oxides and hydroxides	615	464	71	Italy 177; West Germany 133.
Other	9,202	10,426	--	Austria 2,848; Spain 2,830.
Mica:				
Crude including splittings and waste	167	223	--	United Kingdom 86; Norway 80.
Worked including agglomerated splittings	68	60	--	Belgium-Luxembourg 50.
Nitrates, crude	1,420	49	--	All from West Germany.
Phosphates, crude	260,205	286,185	--	Morocco 137,773; Republic of South Africa 95,796.
Pigments, mineral:				
Natural, crude	163	463	--	West Germany 242; Cyprus 219.
Iron oxides and hydroxides, processed	4,025	4,551	32	West Germany 3,707.
Potassium salts, crude	1,775	1,275	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,502	$1,312	$47	United Kingdom $523; West Germany $317.
Synthetic do	$54	$75	$26	France $23; West Germany $12.
Pyrite, unroasted	202	112	--	Sweden 86.
Salt and brine	313,456	168,465	45	West Germany 60,355; U.S.S.R. 36,209.
Sodium compounds, n.e.s.: Carbonate, manufactured	61,050	46,610	(2)	East Germany 16,457; West Germany 13,530.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	171,125	268,247	--	Sweden 133,231; Norway 125,933.
Worked	27,454	29,663	--	Sweden 10,066; Italy 4,050.
Dolomite, chiefly refractory-grade	28,911	21,314	--	Norway 11,688; Sweden 5,437.
Gravel and crushed rock	710,593	782,840	--	Sweden 694,334; Norway 76,507.
Limestone other than dimension	181,410	166,979	--	United Kingdom 86,874; Sweden 79,376.
Quartz and quartzite	8,235	8,431	56	Sweden 6,870; Norway 885.
Sand other than metal-bearing	70,735	67,100	(2)	Sweden 30,776; Belgium-Luxembourg 27,466.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	63,585	60,905	--	West Germany 60,570.
Colloidal, precipitated, sublimed	143	103	--	All from West Germany.
Dioxide	1,255	1,122	--	Sweden 578; West Germany 529.
Sulfuric acid	7,326	15,532	--	Norway 11,004; Finland 2,965.
Talc, steatite, soapstone, pyrophyllite	7,441	8,466	3	Norway 3,693; Finland 2,965.
Vermiculite, perlite, chlorite	3,516	927	--	Republic of South Africa 765.
Other:				
Crude	r54,370	79,901	455	East Germany 57,024.
Slag and dross, not metal-bearing	6,703	4,041	--	West Germany 2,079.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	8,678	6,466	237	Sweden 4,166; Netherlands 1,344.
Carbon: Carbon black	4,306	4,292	154	Sweden 2,082; West Germany 1,082.
Coal:				
Anthracite	37,267	8,316	86	France 4,696; West Germany 3,523.
Bituminous thousand tons	9,626	8,529	71	Poland 67; undetermined 8,376.
Briquets of anthracite and bituminous coal	73	145	--	United Kingdom 138.
Lignite including briquets	59,349	41,786	--	East Germany 31,141.
Coke and semicoke	88,376	54,696	1,407	France 26,844; United Kingdom 10,328.
Gas, natural: Gaseous million cubic feet	41	478	--	West Germany 477.
Peat including briquets and litter	22,227	21,676	--	Sweden 12,366; U.S.S.R. 5,415.
Petroleum:				
Crude thousand 42-gallon barrels	32,782	38,810	--	United Kingdom 17,936; Kuwait 7,849; U.S.S.R. 5,681.
Refinery products:				
Liquefied petroleum gas do	1,876	1,686	(2)	United Kingdom 939.
Gasoline do	7,149	6,211	(2)	Sweden 2,907; Finland 985.
Mineral jelly and wax do	105	84	1	West Germany 56.
Kerosine and jet fuel do	5,890	6,087	67	Netherlands 3,710.
Distillate fuel oil do	21,698	16,712	137	Sweden 9,591.
Lubricants do	1,214	1,231	8	U.S.S.R. 484; Netherlands 228.
Residual fuel oil do	14,651	10,909	--	Sweden 4,336; East Germany 3,420.
Bitumen and other residues do	1,205	1,171	(2)	Netherlands 445.
Bituminous mixtures do	16	10	(2)	West Germany 5.
Petroleum coke do	1,238	1,607	1,026	Netherlands Antilles 299.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

Metals.—Production of steel semimanufactures increased by about 14%. Output of the Danish steel industry, which was based mainly on scrap and imported ore and produced a quantity of rolled products equal to about one-third of Denmark's consumption in 1984, had decreased by about one-third during the previous 5 years. The sole producer, Danish Steel Works Ltd., continued to make technological improvements in electric arc furnace design. One of its two arc furnaces was closed permanently in September. Modernization of the heavy plate mill, which accounted for about 70% of the rolled product, was completed, giving improvements in quality and lowering production costs. Despite these improvements plus increased productivity and the economic upturn, the company operated at a loss because of a 45% increase in the year's average price of scrap, together with low capacity utilization and imports from developing countries and European countries with government-subsidized industries.

Nonmetals.—*Construction Raw Materials.*—Significant volumes of construction aggregate were produced primarily for domestic consumption. Total 1984 production of sand, gravel, and pebbles was about 24 million cubic meters; of this, approximately 85% was from about 900 gravel pits, and the remainder included pebbles and nearly 2 million cubic meters of offshore sand mainly for land filling. Based on total federal taxes of 0.50 krone for each cubic meter of raw material extracted from the ground, excluding salt, it is estimated that a total of about 30 million cubic meters was mined in 1984, mostly construction materials. This included moler, clays, peat, and stone as well as sand, gravel, and pebbles.

Fertilizer Materials.—Superfos A/S, Denmark's large fertilizer producer and one of Europe's largest, purchased near yearend for $112 million, Royster Co., a large U.S. fertilizer enterprise with major facilities in Florida. This was Denmark's largest investment ever in the United States, and the procurement was expected to stabilize Superfos' supply of raw materials for fertilizer manufacture. Sales by Superfos reached a record high level of 1.4 million tons in 1984 with nitrogen-phosphate-potash (NPK) fertilizers comprising 60% of the total, a little over one-half of which was exported. The other fertilizers made in Denmark by Superfos were P and PK. Royster had a 700,000-ton-per-year production capacity of NP, as diammonium phosphate, for export from the United States and NPK for U.S. consumption.

Mineral Fuels.—Total energy consumption increased 3% to 17.5 million tons of oil equivalent after 4 years of consecutive reductions totaling 15%. Approximately 18% of total primary energy requirements was supplied from indigenous resources; of this, about three-quarters was oil and the remainder was wind power, waste products including straw and wood shavings, electricity, and natural gas. The remaining 82% was supplied primarily by imported coal and coke, crude oil, and oil products, in order of contained energy equivalent. Oil continued to account for about 60% of Denmark's energy consumption; of this, 22% was supplied from domestic sources. Imported coal and coke continued to supply about one-third of Denmark's primary energy requirements.

The Government effected more efficient utilization of indigenous energy resources by pressuring the original sole oil and gas concessionnaire, the Dansk Undergrunds Consortium (DUC), to perform more aggressively and efficiently and by inviting other private prospectors to search for new deposits.

Environmental measures adopted by Parliament in May were to reduce sulfur emissions from smokestacks by 40% over a 10-year period. In addition, the sulfur contents of fuel oil and gas were to be lowered. Industry estimated that these measures would add $100 million per year to the total cost of fuels and could affect fuels competition.

Coal.—Denmark has no coal deposits. Total coal imports increased by 11% to 9.9 million tons in 1984. Imports from Poland nearly doubled to one-third of total imports, and that from Australia tripled to one-sixth of total imports. Nearly all powerplants and district heating plants had been converted to coal following the oil crises of 1973 and 1979. The United States became Denmark's leading supplier of petroleum coke primarily for fuel in the Danish cement industry. U.S. petroleum coke deliveries to Denmark in 1984 were 240,000 tons and accounted for more than 70% of Danish imports of this material.

Natural Gas.—The sole natural gas operator, DUC, initiated production of natural gas in August from the Tyra Gasfield in the Danish North Sea. The gas was extracted from a depth below the ground of 2 kilometers, from 36 holes under 4 platforms. Total production by yearend was about 30 billion cubic feet, but about three-quarters of this was reinjected. The distributor, Dansk Olie og Naturgas A/S (DONG) completed by midyear construction of a pipeline from the field across Denmark to the eastern coast to be linked to the Swedish network. Approximately 40 kilometers of faulty pipe had to be replaced. The pipeline and the domestic distribution system, including a line to the Federal Republic of Germany, became operational October 1, 1984, and a total of nearly 8 billion cubic feet of gas had been distributed by yearend both domestically and to the Federal Republic of Germany. Long-term contracts had been made with Sweden and the Federal Republic of Germany for delivery of a total of about 20 billion cubic feet per year through the year 2003. This gas was expected to come from the Tyra and Roar Gasfields as well as from oilfields. The Roar Gasfield was scheduled to be operational by 1989. Many Danish households had resisted conversion to gas. However, progress was made in boosting potential domestic sales by modification of domestic prices and gas taxes and planned conversion of some coal-fired powerplants to gas. It was anticipated by the Government that one-third of Danish homes would soon be using gas. Gas reserves had more than doubled as a result of drilling in 1983, to about 8 trillion cubic feet.

Nuclear Energy.—A parliamentary decision at yearend 1984 abandoned nuclear energy as part of future Danish energy planning, and this form of energy remained nonexistent in Denmark.

Petroleum.—Production of crude oil from the Danish North Sea's Gorm, Skjöld, and Dan Fields continued to increase, although at a slower rate than the sharp increases of the previous 3 years. The oil pipeline from these fields to the refinery in Fredericia went on-stream in 1984. Net imports of crude oil increased by about one-tenth to approximately 34 million barrels. Net imports of refined products decreased by about one-third to approximately 23 million barrels, primarily because of increased exports. Decreased imports of refined products from the United Kingdom were replaced by increased imports from Kuwait. In 1983, Kuwait had purchased Gulf Oil A/S Denmark, including the Gulf refinery. One-half of imports of refined products continued to be from Sweden.

After having enjoyed for many years an exclusive concession to explore for petroleum products in Danish territory, DUC had been forced in 1983 to relinquish 74,000 square kilometers, about one-half of the total designated exploration area. A first licensing round covering about 9,000 square kilometers was concluded in the spring. This consisted of granting 15 licenses offshore and on land to 7 oil industry groups comprising 10 private Danish firms and 12 foreign firms including 7 U.S. firms. Five of the U.S. firms were potential operators. Two firms had begun exploration by yearend 1984. Dansk Olie og Gasproduktion, a division of Government-owned DONG, carried a 10% to 20% interest at the exploration stage, rising in the case of large finds to 40% to 50% at the production stage. DUC relinquished another 35,000 square kilometers of exploration territory in 1984, and a second round of licensing was scheduled for 1985.

In anticipation of curtailment of its exploration activities by an expected forced relinquishment of the remaining 25% of its exploration territories in 1985, DUC accelerated efforts to increase production from its oilfields, especially the Dan Field, which was the oldest Danish North Sea field, having produced since 1972, although production had declined significantly after peaking in 1977. DUC planned to install in the Dan Field 1 processing platform and 2 new production platforms and to drill, from each of the latter, 12 exploratory wells. The Skjöld Field was also to be further developed, and the new, smaller Rolf Field was to be developed, both by DUC. Production of some oil by DUC from its Tyra Gasfield was also expected. Although it was anticipated that production from the Gorm Field would decrease, it was expected that Denmark's crude oil production would increase by 60% by 1987 to 27 million barrels. Prior to development in 1984 of the Tyra Gasfield and completion of the gas collection network in the North Sea, oil production had been limited by laws preventing gas burning at the well. Consequently, an indirect result of the Tyra Gasfield development was to increase oil production in the Danish North Sea.

GREENLAND

The lead-zinc and cryolite mines were depleting rapidly, and it appeared that without further discoveries of significant reserves these operations would cease or decrease significantly by the end of the decade. Exploration for these and other nonfuel mineral commodities continued at a slow pace. The Greenland population was keenly aware of the environmental damage potential of minerals exploration.

The Geological Survey of Greenland discovered significant tungsten mineralization near the capital coastal city of Nuuk on the west coast of Greenland. The mineralization occurs as scheelite, $CaWO_4$. Although sufficient grab samples were analyzed to show that the strike was extensive, covering a 1000-square-mile area, no systematic drilling and sampling was done. The genesis and modes of occurrence resemble in many respects the Mittersill tungsten deposit in Austria that was being mined by Wolfram Bergbau und Hüttengesellschaft mbH. The most promising occurrence was found in a coastal area within 3 miles of Nuuk.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
Cryolite, crude ore[2]	48,700	44,200	43,900	46,500	67,200
Lead: Concentrate, metal content	[r]29,600	[r]26,900	26,500	20,300	17,500
Silver: In lead concentrate, metal content thousand troy ounces	[r]566	543	759	608	791
Zinc: Concentrate, metal content	85,700	79,700	80,000	73,100	71,300

[p]Preliminary. [r]Revised.
[1]Table includes data available through Aug. 23, 1984.
[2]Data represent shipments.

Table 5.—Greenland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
Cryolite and chiolite	43,910	46,450	--	All to Denmark.
Lead: Ore and concentrate	104,144	34,216	--	France 23,572; Belgium-Luxembourg 5,342.
Zinc: Ore and concentrate	354,341	152,599	--	France 47,238; Finland 40,499.

[1]Table prepared by Jozef Plachy.

Table 6.—Greenland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	64	55	(2)	Denmark 54.
Copper: Metal including alloys, semimanufactures	93	59	(2)	Denmark 59.
Iron and steel: Metal, semimanufactures	5,106	4,651	2	Denmark 3,962.
Lead: Metal including alloys, all forms	17	5	--	All from Denmark.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1	$21	--	Do.
Silver: Metal including alloys, unwrought and partly wrought do	$12	$22	--	Do.
Zinc: Metal including alloys, semimanufactures	--	12	--	Do.
Zirconium: Metal including alloys, all forms	16	--		
NONMETALS				
Cement	9,400	10,292	--	Denmark 10,291.
Clays, crude	17	25	--	All from Denmark.
Diamond: Gem, not set or strung value, thousands	$10	$15	--	Do.
Fertilizer materials: Manufactured	961	923	--	Canada 650; Denmark 267.
Gypsum and plaster	16	4	--	All from Denmark.
Lime	436	1,232	--	Do.
Salt and brine	6,278	3,255	--	Denmark 2,555; Canada 700.
Sodium compounds, n.e.s.: Carbonate, manufactured	13	11	--	All from Denmark.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	12	1	--	Do.
Worked	--	16	--	Do.
Sand other than metal-bearing	77	227	--	Do.
Sulfur: Sulfuric acid	24	15	--	Do.

See footnotes at end of table.

Table 6.—Greenland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	49	(2)	--	All from Denmark.
Coal: Anthracite and bituminous	1,167	637	--	Do.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1	1	--	Do.
Gasoline do.	59	48	--	Do.
Kerosine and jet fuel do.	52	103	--	Denmark 53.
Distillate fuel oil do.	1,124	1,103	--	Denmark 632; Netherlands 191.
Lubricants do.	16	11	(2)	Denmark 11.
Bitumen and other residues do.	2	(2)	--	All from Denmark.
Bituminous mixtures do.	1	1	--	Do.

[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

Metals.—Production of lead and zinc concentrates from the Black Angel Mine decreased for the fifth successive year because the ore continued to become leaner. Sales decreased for the third consecutive year. Reserves continued to fall despite considerable exploratory drilling in the mine area. Reserves were equivalent to about 3 years of production after having decreased by about the equivalent of 6 months' production during 1984. A pillar-mining program began. Technological improvements in beneficiation improved recovery of ore values. Exploration for lead-zinc deposits continued in other areas of Greenland.

A poor market for lead and zinc concentrates and heavy ice conditions caused Greenex A/S to close the concentrator for a major overhaul in December.

Nonmetals.—Kryolitselskabet Oresund A/S reported that cryolite resources in Greenland would be depleted in a few years. An old mine that had been closed in 1982 because of decreasing ore quality had been reopened in 1983 and was expected to again be closed in 1986. The company continued its study of economical methods of separating cryolite from deposited sediments collected during its beneficiation and from pot liners from aluminum reduction cells.

Mineral Fuels.—Bench-scale experiments and engineering-economic feasibility studies beginning in 1978 and concluded in February 1984 by Risö National Laboratory in Roskilde, Denmark, revealed that a uranium deposit in the Kvanefjeld area in southern Greenland is an exploitable reserve. Reserves are sufficient to allow production of approximately 20,000 tons of uranium oxide (yellow cake). Risö developed an improved aqueous carbonate pressure leaching process to extract the uranium from the ore and showed in a pilot plant and engineering-economic study that the process was economically feasible assuming a 15-year open pit mine life. Extraction with acid proved to be uneconomical. The pilot plant demonstrated an 85% uranium recovery from a typical ore. The ore assayed at an average of 365 grams of uranium per ton. The Risö report was presented for consideration to the Danish Government, the Greenland Home Rule Authority, and the joint Committee on Mineral Resources in Greenland on which Denmark and Greenland were equally represented. Environmental problems were not resolved, and the strong environmental concern of the Greenland population presented a potential obstacle.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Danish krone (DKr) to U.S. dollars at the rate of DKr10.36=US$1.00, the average for 1984.

The Mineral Industry of Egypt

By John R. Lewis[1]

The mainstay of the mineral sector of Egypt's economy continued to be petroleum. Other minerals, in far lower proportions, were aluminum metal, iron ore, and some clays and fertilizer components. Egypt was self-sufficient in petroleum. Crude oil reserves were being found at the rate of only 7% per year, while demand was growing at 12% to 15% per year. It was felt that this faster growth in demand would, within just a few more years, swallow up Egypt's exportable surplus petroleum, which in 1984, was bringing in slightly more than 60% of Egypt's total export revenues, or about $2.5 billion.[2]

Exploration for petroleum and a wide variety of nonfuel minerals was very active and appeared on the upswing because of Egypt's recently announced policy of inviting non-Egyptian companies, particularly West European and North American private sector companies, to participate in most facets of Egypt's economy.

The country's gross domestic product, at slightly more than $20 billion, was increasing at about 8% per year, and despite a high rate of inflation, a growing population, and rising unemployment, significant international finance continued to flow toward a number of industrial projects, particularly petroleum. There were also benefits from home remittances by more than 2 million Egyptians working abroad, tourism, and Suez Canal tolls, all of which helped to bring Egypt's balance of payments almost, but not quite, into equality.

Government Policies and Programs.— The Egyptian Government continued to encourage much-needed investment, both domestic and foreign, in productive ventures, including minerals and mineral fuels. Problems within Government circles that tended to discourage investors were slowly disappearing. As an example, the Ministry of Petroleum and Mineral Resources announced, late in 1984, that 10 new oilfields had been put on production during the year. A list of minerals available for exploitation included 95 gold mines, over a billion tons of phosphate, billions of tons of gypsum and silicon for making glass, plus new zinc and copper developments in Sinai.

Work under the joint Egyptian-U.S. Minerals, Petroleum and Groundwater Assessment Program (MPGAP) actively continued throughout the year. Sponsored by the U.S. Agency for International Development, the program's overall administration was under the direction of Bendix Field Engineering Co., Grand Junction, CO.

In addition to assisting in the discovery of apparently commercial deposits of gypsum and potash, remote sensing was being used to train Egyptian specialists in mineral resource exploration and mapping. The Precambrian rocks of the Eastern Desert and the Sinai Peninsula were being evaluated for metals. Two old gold mines, Um Rus and Atud, not far inland from the Red Sea, were being rehabilitated for full evaluation and underground sampling, and two field parties were doing regional geochemical exploration in the southern Sinai, where copper occurrences and other minerals had been found in the previous season.

PRODUCTION AND TRADE

Egypt sold its crude oil to many nations. At mid-1984, Marubeni Corp. of Japan concluded a 9-month contract to purchase 10,000 barrels per day of crude from Amoco International Oil Co. at the official price of $28 per barrel for 33° API Suez blend. Marubeni was the first Japanese trading house to enter into a term contract for Egyptian oil, but several others, all heavy buyers of Persian Gulf crude, were also looking for alternative suppliers outside the gulf. Several Japanese firms bought Egyptian oil on the spot market during the year.

In addition to Japan, Egypt's customers included oil companies or oil traders based in Canada, the Federal Republic of Germany, France, Greece, Israel, Italy, the Netherlands, Romania, Spain, Sudan, Turkey, the United Kingdom, and the United States.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum	120,000	133,812	141,000	140,194	[2]166,000
Copper, refined, secondary	2,000	2,000	2,400	--	--
Iron and steel:					
Iron ore and concentrate thousand tons	1,776	1,943	2,140	2,223	2,500
Pig iron do.	[r] [e]250	[r] [e]220	113	196	225
Steel, crude do.	800	900	480	125	200
Semimanufactures do.	847	850	900	378	500
Ferroalloys: Ferrosilicon[e]	5,000	5,000	6,000	[2]6,000	7,500
NONMETALS					
Asbestos	316	325	424	245	325
Barite	4,532	2,108	3,101	3,185	3,200
Cement: Hydraulic thousand tons	3,028	3,499	4,800	5,500	6,500
Clays:					
Bentonite	5,200	5,200	5,200	2,512	3,000
Fire clay	942,000	995,000	975,263	205,000	250,000
Kaolin	41,227	32,113	49,787	100,176	115,000
Feldspar, crude	3,309	3,480	8,436	5,945	5,500
Fluorspar	1,752	535	90	12	50
Gypsum and anhydrite, crude	940,000	950,000	931,150	721,340	750,000
Lime	87,000	91,294	94,000	93,660	97,500
Nitrogen: N content of ammonia thousand tons	400	518	639	905	[2]686
Phosphate: Phosphate rock do.	658	720	708	623	[2]1,043
Pigments, mineral, natural: Iron oxide	126	130	150	--	--
Salt, marine thousand tons	636	679	829	918	1,000
Sodium compounds:					
Sodium carbonate	18,849	23,364	41,273	43,000	40,000
Sodium sulfate	2,942	3,000	3,000	1,950	2,000
Stone, sand and gravel:					
Basalt thousand cubic meters	96	103	90	NA	100
Dolomite thousand tons	500	500	500	500	500
Granite, dimension cubic meters	6,408	6,400	4,765	NA	4,000
Gravel thousand cubic meters	3,400	3,400	6,480	[e]7,000	7,500
Limestone and other calcareous n.e.s do.	5,196	5,535	7,037	9,276	10,000
Marble blocks (including alabaster) cubic meters	32,000	46,930	19,380	16,400	17,500
Quartz	10,000	10,000	10,000	NA	7,500
Sand including glass sand thousand cubic meters	6,000	6,200	6,874	166	1,500
Sandstone do.	32	32	785	613	710
Sulfur:					
Elemental, byproduct	3,300	2,408	2,281	1,000	1,250
Sulfuric acid	32,000	44,111	45,118	44,899	45,000
Talc, steatite, soapstone, pyrophyllite	4,007	5,723	8,291	4,519	6,000
Vermiculite	730	730	280	300	325
MINERAL FUELS AND RELATED MATERIALS					
Coke: Oven and beehive thousand tons	915	920	974	916	950
Gas, natural:					
Gross production million cubic feet	84,624	108,000	114,074	120,000	140,000
Marketed do.	60,000	70,000	78,000	95,000	110,000
Petroleum:					
Crude thousand 42-gallon barrels	227,395	234,330	245,645	262,486	325,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products:					
Gasoline and naphtha thousand 42-gallon barrels	15,068	16,000	16,200	20,500	25,000
Kerosine and jet fuel do	13,361	13,208	14,100	18,500	20,000
Distillate fuel oil do	18,791	19,000	19,250	25,000	25,000
Residual fuel oil do	47,841	49,004	52,650	70,000	75,000
Lubricants do	539	600	650	1,000	1,000
Liquefied petroleum gas do	1,612	1,800	1,900	2,000	2,500
Asphalt do	1,654	1,800	1,900	2,200	2,500
Unspecified do	292	400	450	800	1,000
Refinery fuel and losses do	4,500	4,600	4,650	6,000	6,500
Total do	103,658	106,412	111,750	146,000	158,500

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 19, 1985.
[2]Reported figure.

COMMODITY REVIEW

METALS

Aluminum.—Total installed capacity in Egypt's only aluminum smelter, at Nag Hammadi, remained 166,000 tons per year. Installation, with Soviet aid, of a fifth potline was completed during the summer of 1983, and it appeared that the Egyptian Electric Authority had been able to allocate sufficient electrical power to permit full output during 1984.

The plant's product mix was 41,000 tons of ingots, 40,000 tons of billets, 30,000 tons of slabs, 20,000 tons of wire, 25,000 tons of T-bars, and 4,000 tons of foundry alloys. The local market consumed about 65,000 tons, fabricated into electrical cables, household utensils, sheets, disks, extruded sections, and aluminum alloy castings for the automotive industry.

The balance of the year's output from the Nag Hammadi plant was to be exported. Value of these shipments was pegged by the Aluminum Co. of Egypt (Egyptal) at $130 million. A vigorous worldwide advertising sales campaign was mounted by the company in early September.

Egypt had no bauxite and bought alumina from Australia. This intermediate product entered the country at the Red Sea port of Safaga and then moved by truck 220 kilometers to the smelter. A railroad was under construction which was expected to reduce Egyptal's costs significantly. Also, Egyptal indicated that it was interested in buying up to 100,000 tons per year of surplus alumina from the plant of India's National Aluminium Co. Ltd., in the eastern Indian State of Orissa.

Iron and Steel.—Work on Alexandria National Steel Co's. El Dikheila direct-reduction steelworks progressed about on schedule during the year. Japan's Nippon Kokan K.K. emerged as the most likely company to supply a 430,000-ton-per-year bar mill to the El Dikheila plant. Kobe Steel Co. was chosen in late March to be the equipment and services supply contractor on the project and was to install Midrex equipment. The contract price was $53.3 million. A process license agreement was signed at the same time with Midrex International BV for a 716,000-ton-per-year direct-reduction plant producing sponge iron. Kobe contracted with the Federal Republic of Germany's Lurgi GmbH to perform the basic engineering for the plant. The direct-reduction plant will be designed to use 70% pellets and 30% lump iron ore, both of which will be imported. Fuel for heat will be natural gas from the offshore Egypt Abu Quir Field of the Egyptian General Petroleum Corp. (EGPC) in the Mediterranean. The International Finance Corporation holds a 3% equity in the company, while Kobe and Toyo Menka also have minority stakes, bringing the total of Japanese participation to 10%. The plant was scheduled for completion by mid-1987.

NONMETALS

Cement.—The vigorous campaign to build cement plants and utilize the output in the very active construction program of the Egyptian Government's Ministry of Housing and Reconstruction resulted in a healthy increase in the production of cement as well as another leap in cement imports. Expansion of plants was proceeding in a number of locations and included new production lines at old plants, new clinker grinding capacity, and at least one totally new plant, by the Helwan Portland Cement Co. at El Minya.

Six cement plants were operating in Egypt in 1984, and production amounted to about 6.5 million tons. Egypt produced roughly one-half the cement it consumed. Most of the imported material was clinker, which was processed into cement within the country. Heating energy for kilns was either fuel oil or natural gas. In one plant, blast furnace slag from the steelworks was used with other raw materials to make slag cement.

Rock Products magazine reported[3] that in an effort to improve cement distribution and production throughout the country, the Egyptian Cement Office, an association of public sector cement manufacturers, and the newly formed Organization for Building Materials asked the Arab Swiss Engineering Co. to make two feasibility studies. The first was to be a study evaluating the distribution of cement throughout the country, using the Nile River. Cement was distributed primarily by road. The second study was to examine the establishment of a maintenance company to serve the cement producers. Such a company would employ highly specialized personnel able to perform maintenance work and repairs in a timely and efficient manner.

Gypsum.—A bed of high-purity gypsum more than 40 meters thick was discovered in early 1984 in the Gemsa area near the Red Sea and the mouth of the Gulf of Suez. It was found during exploratory drilling by the Egyptian Geological Survey and Mining Authority (EGSMA). Geological and structural conditions indicate a deposit that is laterally extensive and not complicated by dislocations.

Phosphate Rock.—The greatly expanded West Sebaeya phosphate mine of Abu-Zaabal Fertilizer & Chemical Co. (AZFC), located 31 kilometers north of Idfu near the Nile River, was expected to be operational in mid-1986. Already producing 600,000 tons of ore per year, the expanded operation will produce an additional 1.2 million tons per year. Ultimately, an annual output of 4.3 million tons per year is planned. The ore will be graded, washed, and dried and then barged down the Nile to the AZFC fertilizer plant located 30 kilometers north of Cairo.

General project management, including purchasing, continued in the hands of Seltrust Engineering Ltd. of London. A $5.7 million bid for a dewatering and drying plant, storage facilities near the Nile, and a large loading dock was analyzed and submitted to AZFC for consideration. Draglines worth $7.1 million were to be supplied by Ruston-Bucyrus, and reduction works valued at $9.25 million were proposed by GEC Mechanical Handling Co. of the United Kingdom. The processing plant will have a capacity of 3,500 tons of fine-grain phosphate rock per day. Concentrates will be produced by washing and/or flotation, depending upon the type of ore. The concentrates will be transported about 4.5 kilometers in a pipeline to a location on the banks of the Nile where they will be dried and stored. Barges will haul the dried product to the AZFC fertilizer factory in lower Egypt. Waste products will be pumped about 10 kilometers away into the Western Desert. GEC will be responsible for the design, equipment, construction supervision, testing, and personnel training for the processing plant and associated installations.

Potash.—In the vicinity of Gemsa, near the mouth of the Gulf of Suez on the Red Sea, exploration for potash was underway during the first half of 1984. Work was being undertaken by EGSMA under the MPGAP project sponsored by the U.S. Agency for International Development. A test well in Miocene evaporites had reached a depth of over 400 meters by May, and continuous coring was being carried out. The immediate target was a potash zone averaging 8 meters in thickness in the Zeit Formation. This zone had been found in wells drilled for oil over a 250-square-kilometer area on the western shore of the Gulf of Suez. Indications were that the zone was mainly the potassium chloride mineral, sylvite. There was optimism that should high-grade composition and stratigraphic continuity be confirmed through additional coring, such a large deposit ideally situated at tidewater would prove readily feasible for development.

MINERAL FUELS

Coal.—The coal reserves of Egypt were increased in 1984 from 50 to 65 million tons. The increase in reserves was established as the result of an extensive core drilling program conducted during the year in Sinai by the EGSMA. The Egyptian Government was planning its first thermal powerplant at Ain Musa.

In addition to a partially developed coal mine at Maghara, in Sinai, there were known probable commercial coal deposits in at least two other locations in Egypt. Both were under investigation during the year. Meanwhile, much of Egypt's coking coal needs were supplied by Australia, the Soviet Union, and the United States.

Natural Gas.—Egypt's gas reserves had been determined to be 8.5 trillion cubic feet. This volume had been previously expected to last for 25 years, but by 1984, in the face of burgeoning demand, was expected to last only 10 to 12 years, assuming there were no further discoveries. Therefore, the Egyptian Government was seeking ways to stimulate exploration for and production of additional gas. The objective in finding more gas was to contain rapid growth in demand for petroleum products, which was threatening to consume much oil that might otherwise be available for export to earn foreign exchange.

Some years earlier, when the Egyptian Government determined that it would be desirable to develop the country's crude oil potential rather rapidly, it attracted oil operators by offering them favorable incentives to explore and develop oil reserves. Late in 1984, to encourage this same type of accelerated development of the country's natural gas potential, a similar policy was adopted. The new policy sought to encourage foreign companies to find and develop gas reserves and make greater volumes available to the rapidly growing domestic market. Two companies, Azienda Generali Italiana Petroli S.p.A. (AGIP) of Italy and Amoco International Oil Co. of the United States, were pioneering in negotiations with the Government, mostly over a price for gas. Both the Nile Delta and parts of the Mediterranean Sea were known to be gas prone, and more gas than oil was showing up in wells drilled in Egypt's Western Desert. Amoco tested its Abu Gharadiq WD-9-15-1 well at 13.2 million cubic feet of gas and 312 barrels per day of condensate, for example, during the year.

The main plant of the Sinai Associated Gas project, located at Abu Rudais on the eastern side of the Gulf of Suez, went into operation during 1984. The plant was to remove 70,000 barrels per year of liquefied petroleum gas and 1,250 million cubic feet of natural gas per year from associated gas produced from the Belayim Marine Field of the Belayim Petroleum Co. Belayim Marine was Egypt's oldest offshore oilfield, having begun production in 1953. In 1984, output was still rising above the 120,000 to 140,000-barrel-per-day range of 1983.

Petroleum.—*Exploration.*—Egypt was very actively engaged in granting multiyear production-sharing concessions, under which many exploratory wells were to be drilled during 1984. By May, six agreements had been signed, all with Western European companies or consortia. They were for periods of 4 to 8 years and were for various sized tracts located both onshore in the Gulf of Suez Basin and offshore in the Gulf of Suez. Later, three other agreements were made with Shell Winning NV of the Netherlands and Shell Qarun of the Federal Republic of Germany for tracts in the Western Desert, in the East Gemsa area of the Gulf of Suez, and in several other areas in the Gulf of Suez. In all, in 1984, Egypt planned to make 13 exploration concession agreements having a combined exploration obligation in excess of $500 million. Several oil companies were to become signators, including Trend Exploration Ltd. (Canada), Exxon Corp., Getty Oil Co., Marathon Petroleum Co., British Petroleum Ltd., and Continental Oil Co.

In another sector, an unrelated concession was negotiated with Total Orient for 2,400 square kilometers in the North Sinai Basin. The company would spend $49 million in 6-1/2 years to drill seven wells.

Meanwhile, extensive exploratory drilling on some of these tracts, plus many that were won earlier, was progressing rapidly both in the Eastern areas and in the Western Desert. A unit of the Gulf Oil Corp. spudded a wildcat in late 1984 in 275 feet of water in the southern end of the Gulf of Suez. The well was to go to 12,000 feet into Miocene and Nubia sands. Estimated cost was $5 million. Other companies were drilling exploration wells in numerous places.

Production.—Crude oil production continued the rapid growth of recent years and generally ran between 870,000 and 890,000 barrels per day. This was an increase of 20% to 24% above 1983 production levels and brought the country ever closer to its target of 1 million barrels per day. Observers expected the target to be reached in 1986 or 1987. In a move designed to lend support to the efforts of the Organization of Petroleum Exporting Countries, of which it is not a member, the EGPC cut Egypt's November-December output from a scheduled 900,000 barrels to 870,000 barrels per day. It also maintained its crude oil prices for the eighth straight month. Prices for various crudes ranged from $28.00 per barrel for 33° API Suez blend to $25.60 for 24° API Ras Gharib crude.

Front-runner among oil producers in Egypt was the Gulf of Suez Petroleum Co. (GUPCO), owned by the Government-owned EGPC and Amoco Egypt Oil Co., a subsidiary of Standard Oil Co. (Indiana). Production, at 548,900 barrels per day, was up 6%, and the annual increase was for the tenth consecutive year. Accounting for GUPCO's increase were five recent discoveries, which were put on production in 1984, plus field extensions, infill drilling, and expanded secondary recovery in producing fields. The operator completed 43 development wells in the Gulf of Suez and was drilling 12 others at yearend. GUPCO produced 60% of Egypt's crude.

Activity continued strong among other crude-producing units. In May, start of production was inaugurated at two new fields. The onshore Ras al-Bihar Field, located south of Ras Gharib on the west shore of the Gulf of Suez, was operated by the state-owned EGPC. It produced about 12,000 barrels per day at the outset and was connected directly to the Ras Gharib Marine Terminal via an 80-kilometer pipeline. East of Ras Gharib in the Gulf of Suez, the second field, Ras Fanar, was brought into production by its owners (EGPC 50%, and 50% in equal shares by Deminex, Shell, and British Petroleum). In mid-1984 the field was producing 9,000 barrels per day, and later in the year it went to 15,000 barrels per day.

From the new Zeit Bay Field offshore in the Gulf of Suez, Egypt was producing directly into the export marine terminal at Ras Gharib at 23,000 barrels per day. Production was to be 45,000 barrels per day by yearend 1984, and was to peak at 80,000 barrels per day at some later date. Zeit Bay will eventually export through its own marine terminal. Crude output sold for the top Suez area price, $28.00 per barrel.

Perhaps indicative of the rapid pace of offshore oil activities in Egypt, a Cairo air service bought seven Bell helicopters, using financial assistance worth $12.1 million from the Export-Import Bank of the United States, for delivery in May. The machines were to be used to service drilling rigs working primarily in the Gulf of Suez, where about 90% of Egypt's drilling, production, and reserves were located.

Transportation.—Egypt's Suez-Mediterranean (Sumed) crude oil pipeline system was constructed to bypass the Suez Canal's restrictions on fully loaded supertankers. The twin 42-inch pipelines ran for 320 kilometers from a bay on the Gulf of Suez located about 30 miles south of Suez to a point on the Mediterranean seacoast just north of El Amiriya and just west of Alexandria. Work on a $400 million project to increase throughput from 1.6 to 2.5 million barrels per day was begun during the first half of the year. Plans to increase capacity had earlier been shelved because of cutbacks in production of Middle East oil and slackness in oil transit operations. Sumed was owned by the Arab Petroleum Pipelines Co., which was owned 50% by Egypt and 50% by Saudi Arabia, Abu Dhabi, Kuwait, and Qatar. Plans to expand the competing Suez Canal were, in effect, shelved early in 1984 for reasons similar to those under which Sumed was delayed for about 6 months.

During midsummer 1984, the Gulf of Suez and the Red Sea were the scenes of mysterious explosions directed against water-borne shipping. Eventually a few explosive devices were found and rendered harmless, but not before a number of ships, including tankers, were damaged.

Uranium.—At midyear, it was announced in Cairo that the United States had granted Egypt $37 million to assist in financing a project to evaluate its mineral resources, especially uranium. Egypt was required to contribute $41.4 million toward the project. Egypt's goal had been to generate 40% of its electricity by the year 2000 from eight 1,000-megawatt nuclear powerplants, costing a total of $34 billion. At the outset, nuclear fuel was to come from the United States. A 5-year delay in attaining the goal, created by problems in financing, was announced by the Egyptian Electricity Ministry.

Late in 1983, five groups submitted bids for construction of the first two 1,000-megawatt reactors at El Dabaa, 94 miles west of Alexandria. During 1984, the Electricity Ministry decided not to award any contract during the year while it studied the proposals in detail.

An undisclosed amount of uranium will be supplied to Egypt by Niger, which also supplied Pakistan and was seeking sales agreements with other developing countries, including the Arab nations.

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[1]Supervisory physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Egyptian pounds (£E) to U.S. dollars at the rate of £E0.70=US$1.00.

[3]Rock Products (Chicago, IL.) Annual International Cement Review. V. 88, No. 4, Apr. 1985, pp. 50-51.

The Mineral Industry of Finland

By Richard H. Singleton[1]

Finland continued to be a significant producer of mineral products including chromium ore, ferrochrome, and stainless steel; copper, nickel, and cobalt; vanadium pentoxide (V_2O_5); zinc concentrates and metal; cadmium; mercury; titanium slag; and feldspar, granite blocks, and wollastonite. Finland's proven reserves of many of these commodities are very limited, and new commercial deposits have not been discovered despite significant exploration activity. In 1984, foreign sources of ore were being sought or considered.

A second arc furnace for producing ferrochrome was under construction by Outokumpu Oy, the sole producer. It was anticipated that Finland's ferrochrome production would double after startup of this furnace in 1985. Stainless steel production continued to increase, and in less than one decade, Outokumpu Oy, Finland's sole producer, had become a significant world supplier.

Finland's largest steel producer, Rautaruukki Oy, continued extensive modernization of its steel plant including construction of a coking plant that would supply one-half of its requirement for coke, all of which had been imported. The company announced the expected closure in 1985 of two of its iron ore mines because of ore depletion. The V_2O_5 byproduct of these operations was the only Finnish source of vanadium.

A new nickel mine under construction was expected to more than double Finland's output of nickel ore after its scheduled startup in 1986. This would significantly reduce Finland's dependence on foreign concentrates for its nickel smelter.

Finland has no reserves of mineral fuels, excluding peat. Nevertheless, oil imports continued to be replaced by imported coal and gas and domestic peat and wood.

Finland's gross domestic product (GDP) increased 3% in constant finnmarks because of increased consumer spending and exports. The 1984 GDP was equivalent to approximately $51 billion.[2] Exports increased 16% to $13.5 billion, and the balance of trade became positive for the first time in 6 years. Forest products accounted for 38% of export value. Both the wholesale and consumer price indexes increased by 6%.

PRODUCTION AND TRADE

Cement production decreased 14% because of decreased domestic construction activity. Production of phosphate rock, a new industry that began in 1979, more than doubled to 477,000 tons over the 2-year period ending in 1984. This augmented considerable imports from the U.S.S.R., the United States, and Morocco, in order of volume.

Imports of copper concentrate, which accounted for most of domestic demand, increased by 40% in 1983. Imports of gypsum, primarily from Spain, increased by 31%. Exports of rough dimension stone decreased 62% to about 215,000 tons.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum, secondary	[r]9,000	[r]9,300	[r]9,400	13,200	3,200
Cadmium, refined	581	621	566	616	614
Chromium: Chromite:					
Gross weight:					
Lump ore thousand tons	176	210	160	85	[e]530
Concentrate do.	165	181	160	141	119
Foundry sand do.	21	21	25	19	15
Total do.	362	412	345	245	664
Cr_2O_3 content:					
Lump ore do.	NA	53	46	24	[e]150
Concentrate do.	NA	72	64	58	47
Foundry sand do.	NA	10	12	9	7
Cobalt:					
Mine output, metal content	[r]1,093	1,034	[r]1,036	1,035	950
Metal, refined	1,151	1,229	1,455	1,550	1,453
Copper:					
Mine output, metal content	36,918	38,539	[r]37,800	39,300	[e]31,000
Metal:					
Smelter:					
Primary	[r]47,900	54,747	66,333	70,100	74,300
Secondary	[r]12,000	12,950	19,051	12,597	12,000
Total	[r]59,900	67,697	85,384	82,697	86,300
Refined:					
Primary	30,542	23,796	37,969	45,376	47,318
Secondary[e]	10,000	10,000	10,000	10,000	10,000
Total	40,542	33,796	47,969	55,376	57,318
Gold troy ounces	41,828	31,893	36,780	25,206	28,067
Iron and steel:					
Iron ore, marketable, all types:					
Gross weight thousand tons	1,172	1,230	[r]1,238	1,277	1,231
Fe content do.	755	789	[r]786	822	788
Metal:					
Pig iron do.	2,019	1,978	1,957	1,898	2,044
Ferroalloys: Ferrochromium do.	53	52	55	59	59
Steel, crude do.	2,509	2,428	2,414	2,416	2,630
Semimanufactures, rolled do.	[r]1,890	1,848	1,848	1,964	1,985
Lead:					
Mine output, metal content	1,134	[r]1,580	1,883	2,125	2,478
Refined, secondary	3,200	4,500	4,400	6,000	[e]4,500
Mercury 76-pound flasks	2,170	1,949	[r]2,068	1,857	2,292
Molybdenum	114	165	216	218	265
Nickel:					
Mine output, metal content	6,531	6,864	[r]6,332	5,314	6,929
Metal, electrolytic	12,807	13,310	12,615	14,837	15,282
Platinum-group metals:					
Palladium troy ounces	675	1,993	4,662	2,283	1,093
Platinum do.	225	1,608	4,147	2,186	1,061
Selenium kilograms	17,250	[r]19,422	10,020	11,172	16,975
Silver thousand troy ounces	1,430	1,215	1,188	980	1,123
Titanium concentrate: Ilmenite:					
Gross weight	159,000	161,500	167,800	163,900	167,000
Ti content	72,026	[r]72,840	75,846	74,083	[e]75,500
Vanadium (V_2O_5):					
Gross weight	5,076	5,557	5,619	5,694	5,469
V content	2,844	3,112	[r]3,147	3,189	3,063
Zinc:					
Mine output, metal content	58,433	53,480	54,568	55,913	60,200
Metal	[r]146,719	[r]139,835	[r]143,885	155,336	158,700
NONMETALS					
Barite	--	--	--	3,400	8,700
Cement thousand tons	[r]1,815	[r]1,862	[r]1,907	1,969	[e]1,700
Feldspar	74,089	63,066	69,600	52,066	56,265
Lime thousand tons	[r]270	[r]263	263	231	241
Nitrogen: N content of ammonia	70,100	68,800	64,800	67,700	68,700
Phosphate rock, apatite concentrate:					
Gross weight thousand tons	138	201	233	381	477
P_2O_5 content do.	50	72	83	141	176
Pyrite, gross weight do.	322	403	385	499	477
Sodium sulfate[e] do.	45	[r]40	[r]40	[r]35	35

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Stone, crushed:					
Limestone and dolomite:					
For cement manufacture thousand tons	2,534	[r]2,416	2,446	2,609	[e]2,300
For agriculture do	1,036	631	864	1,370	[e]1,200
For lime manufacture do	392	383	[r]359	344	[e]350
Fine powders do	262	315	258	287	[e]300
Metallurgical do	82	75	52	52	[e]50
Total do	4,306	3,820	3,979	4,662	[e]4,200
Quartz silica sand do	237	255	249	213	262
Sulfur:					
S content of pyrite do	144	184	177	224	211
Byproduct:					
Of metallurgy do	247	[r]268	270	264	265
Of petroleum do	[r]40	[r]45	[r]40	48	45
Total do	[r]431	[r]497	[r]487	536	521
Sulfuric acid do	1,039	[r]1,058	[r]1,032	1,315	1,418
Talc do	318	308	325	318	327
Wollastonite	8,782	13,690	[r]14,962	15,402	14,669
MINERAL FUELS AND RELATED MATERIALS					
Peat:					
For fuel use thousand tons	[r]3,068	1,303	5,500	3,355	2,713
For agriculture and other uses do	[r]518	204	[r]578	275	[e]225
Petroleum refinery products thousand 42-gallon barrels	[r]75,478	66,003	70,000	78,788	[e]80,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 28, 1985.

Table 2.—Finland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	(2)	17	--	Sweden 13.
Metal including alloys:				
Scrap	62	45	--	All to Sweden.
Unwrought	6,305	10,679	431	Japan 6,118; Sweden 1,486.
Semimanufactures	19,055	20,724	26	United Kingdom 4,271; West Germany 3,585.
Arsenic: Oxides and acids	4	--		
Cadmium: Metal including alloys, all forms	658	536	87	Sweden 161; United Kingdom 160.
Chromium:				
Ore and concentrate	199,806	133,952	--	U.S.S.R. 112,128; Greece 10,001.
Oxides and hydroxides	(2)	11	--	All to Sweden.
Cobalt:				
Oxides and hydroxides	--	159	1	Netherlands 110.
Metal including alloys, all forms	1,297	1,325	446	United Kingdom 191; Japan 169; Netherlands 127.
Copper:				
Ore and concentrate	12,175	14,096	--	Sweden 12,032.
Matte and speiss including cement copper	79	--		
Oxides and hydroxides	292	43	--	Sweden 23; France 18.
Sulfate	--	1	--	NA.
Ash and residue containing copper	61	65	--	Spain 60.
Metal including alloys:				
Scrap	197	1,337	--	Sweden 944; Denmark 169.
Unwrought	19,402	28,541	1,065	Sweden 12,058; Belgium-Luxembourg 8,086.
Semimanufactures	30,603	34,972	1,498	United Kingdom 6,923; Sweden 4,711.
Gold:				
Waste and sweepings value, thousands	$429	$454	--	Sweden $325; Italy $74.
Metal including alloys, unwrought and partly wrought troy ounces	13,471	21,186	--	United Kingdom 16,108.

See footnotes at end of table.

Table 2.—Finland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap and pig iron	247	170	--	U.S.S.R. 55; Netherlands 35; Norway 27.
Ferroalloys:				
Ferrochromium	22,705	NA		
Ferromanganese	--	30	--	All to Sweden.
Ferrosilicomanganese	2	9	--	Sweden 7.
Unspecified	--	18,485	--	Netherlands 9,203; Sweden 6,641.
Steel, primary forms	140,441	118,776	--	Saudi Arabia 36,058; United Kingdom 21,399.
Semimanufactures	719,055	917,156	139,549	West Germany 163,688; U.S.S.R. 104,505; Sweden 72,601.
Lead:				
Ore and concentrate	17	42,708	--	All to U.S.S.R.
Oxides	23	31	--	Sweden 30.
Metals including alloys:				
Scrap	86	372	--	Sweden 269.
Unwrought	1,088	1,345	--	Sweden 1,323.
Semimanufactures	27	22	--	U.S.S.R. 11; Libya 10.
Mercury 76-pound flasks	1,799	1,914	--	Belgium-Luxembourg 1,711.
Molybdenum:				
Ore and concentrate	425	310	--	All to East Germany.
Metal including alloys, all forms	5	([2])	--	All to Sweden.
Nickel:				
Matte and speiss	2,051	955	--	All to Norway.
Metal including alloys:				
Scrap	392	4,268	--	Do.
Unwrought	11,807	11,322	2,710	United Kingdom 1,841; West Germany 1,282.
Semimanufactures	7	53	35	Republic of South Africa 10.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	836	2,540	--	United Kingdom 2,058.
Silver:				
Ore and concentrate[3] value, thousands	$2,437	--		
Waste and sweepings[3] do	$4,744	$5,890	$1,321	United Kingdom $2,136; Sweden $1,835.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,733	1,093	--	United Kingdom 515; West Germany 418.
Titanium:				
Ore and concentrate	--	43	--	All to Sweden.
Oxides value, thousands	$3,639	$2,945	NA	NA.
Vanadium:				
Ore and concentrate	40	40	--	All to Spain.
Oxides and hydroxides value, thousands	$18,252	$22,656	$176	Canada $4,996; France $4,670; United Kingdom $4,363.
Zinc:				
Ore and concentrate	--	14,913	--	U.S.S.R. 8,986; Algeria 5,927.
Blue powder	--	29	--	Sweden 26.
Ash and residue containing zinc	798	1,359	--	United Kingdom 516; West Germany 302.
Metal including alloys:				
Scrap	1,498	636	--	United Kingdom 318; Norway 147.
Unwrought	118,809	131,559	26,053	United Kingdom 32,371; Netherlands 19,733.
Semimanufactures	32	121	--	Sweden 114.
NONMETALS				
Barite and witherite	--	2,305	--	West Germany 2,302.
Cement	81,886	54,741	--	U.S.S.R. 47,442; Sweden 5,632.
Feldspar, fluorspar, related materials	42,041	35,498	--	United Kingdom 20,739; West Germany 7,546.
Fertilizer materials:				
Crude, n.e.s	119	112	--	United Arab Emirates 60.
Manufactured:				
Ammonia	1	--		
Nitrogenous	25,975	74,688	--	United Kingdom 50,415; Nepal 8,439.
Phosphatic	--	1	--	All to Indonesia.
Potassic	17,092	31,002	--	East Germany 19,023; West Germany 11,955.
Unspecified and mixed	235,798	450,983	--	U.S.S.R. 255,404; China 66,326.
Graphite, natural	--	5	--	Sweden 4.

See footnotes at end of table.

Table 2.—Finland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Lime	758	1,562	--	Sweden 920; U.S.S.R. 471.
Magnesium compounds	954	278	--	Netherlands 277.
Mica:				
Crude including splittings and waste	132	814	--	Japan 705; United Kingdom 109.
Worked including agglomerated splittings value, thousands	$2	$3	--	All to U.S.S.R.
Phosphates, crude	28	--		
Phosphorus, elemental	--	(2)	--	NA.
Precious and semiprecious stones other than diamond:				
Natural kilograms	384	539	475	West Germany 51.
Synthetic do.	--	68	64	Sweden 4.
Pyrite, unroasted	69,387	157,180	--	Italy 70,183; Netherlands 65,707.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	218	(2)	--	NA.
Sulfate, manufactured	3,762	15,053	NA	Sweden 8,216; United Kingdom 3,087.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	565,264	214,920	148	Italy 100,339; France 39,346.
Worked	1,979	2,936	24	Sweden 1,374; West Germany 772.
Dolomite, chiefly refractory-grade	20	--		
Gravel and crushed rock	236,807	150,211	--	Netherlands 136,492.
Limestone other than dimension	12,288	8,780	--	Sweden 8,065.
Quartz and quartzite	2,217	16,408	--	Sweden 12,301; Netherlands 1,382.
Sand other than metal-bearing	3,751	3,876	--	Sweden 3,510.
Sulfur:				
Elemental: Crude including native and byproduct value, thousands	$1	--		
Sulfuric acid	5	659	--	Netherlands 645.
Talc, steatite, soapstone, pyrophyllite	53,099	42,911	--	West Germany 10,208; Sweden 7,738.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,361	1,610	--	U.S.S.R. 1,498.
Carbon: Carbon black	1,204	46	--	Sweden 20; Denmark 19.
Coal: Briquets of anthracite and bituminous coal	9	19	--	All to Denmark.
Coke and semicoke	2,552	17,692	--	Norway 17,608.
Peat including briquets and litter	91,393	40,441	3	Netherlands 14,392; Sweden 8,741.
Petroleum refinery products thousand 42-gallon barrels	13,827	18,282	--	Sweden 5,886; Netherlands 2,904; West Germany 2,269.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Finland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	5,588	4,152	--	West Germany 3,714.
Oxides and hydroxides	27,724	20,615	10	United Kingdom 6,315; Hungary 6,286.
Metal including alloys:				
Scrap	8,668	22,608	55	U.S.S.R. 7,432; Norway 6,499.
Unwrought	27,216	26,270	309	U.S.S.R. 13,115; Norway 4,685.
Semimanufactures	28,190	30,168	38	Sweden 7,635; Norway 5,195.
Antimony: Metal including alloys, all forms	16	2	--	All from West Germany.
Arsenic: Oxides and acids	1,555	1,165	NA	Sweden 1,145.
Beryllium: Metal including alloys, all forms value, thousands	$16	$39	$27	West Germany $11.
Chromium:				
Ore and concentrate	131	527	--	Brazil 508.
Oxides and hydroxides	778	847	(2)	West Germany 342; China 257.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$27	$16	--	Norway $6.
Copper:				
Ore and concentrate	74,305	103,800	--	Chile 42,089; Sweden 29,999; Norway 25,371.
Matte and speiss including cement copper	--	2	--	All from West Germany.
Oxides and hydroxides	308	397	(2)	Australia 216; West Germany 108.
Sulfate	3,101	3,324	NA	U.S.S.R. 3,101.
Metal including alloys:				
Scrap	2,318	702	32	U.S.S.R. 598.
Unwrought	18,827	19,017	(2)	Zaire 7,041; U.S.S.R. 6,000; Zambia 5,024.
Semimanufactures	13,140	12,855	50	Sweden 5,170; West Germany 4,182.
Gold:				
Waste and sweepings value, thousands	$54	$16	NA	Sweden $13.
Metal including alloys, unwrought and partly wrought troy ounces	33,694	32,762	NA	United Kingdom 11,478; Sweden 9,453.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	1,493	1,299	--	Sweden 950; U.S.S.R. 203.
Pyrite, roasted	--	2,301	--	All from Sweden.
Metal:				
Scrap	50,594	37,293	--	U.S.S.R. 23,894.
Pig iron, cast iron, related materials	23,116	14,429	(2)	Sweden 6,250; United Kingdom 2,291.
Ferroalloys:				
Ferrochromium	1,233	NA		
Ferromanganese	5,465	3,779	--	Norway 3,587.
Ferromolybdenum	186	163	--	United Kingdom 51; Sweden 35.
Ferrosilicomanganese	17,999	15,776	--	Norway 8,806; U.S.S.R. 6,758.
Ferrosilicon	8,838	7,442	--	Norway 3,601; U.S.S.R. 2,530.
Silicon metal	690	1,070	NA	Norway 990.
Unspecified	9,253	13,870	10	Dominican Republic 2,544.
Steel, primary forms	4,987	7,206	--	Netherlands 5,792.
Semimanufactures	653,615	614,580	321	Sweden 126,346; West Germany 88,901; Czechoslovakia 25,216.
Lead:				
Ore and concentrate	1,993	--		
Oxides	126	171	--	West Germany 76; U.S.S.R. 50.
Metal including alloys:				
Scrap	34	--		
Unwrought	20,282	12,318	9	U.S.S.R. 7,003; Sweden 4,339.
Semimanufactures	781	701	(2)	West Germany 387; Belgium-Luxembourg 287.
Magnesium: Metal including alloys:				
Unwrought	50	74	--	Norway 70.
Semimanufactures	762	347	3	Norway 302.
Manganese:				
Ore and concentrate, metallurgical-grade	1,733	10,154	--	Ghana 5,671; France 2,000.
Oxides	742	462	--	Netherlands 215; Belgium-Luxembourg 204.
Mercury 76-pound flasks	1,102	NA		
Molybdenum:				
Ore and concentrate	488	558	49	United Kingdom 166; Canada 145.
Metal including alloys, all forms	6	2	1	Austria 1.

See footnotes at end of table.

Table 3.—Finland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Nickel:				
Ore and concentrate	11,579	12,188	--	All from Norway.
Matte and speiss	7,583	9,901	--	Canada 4,939; Australia 4,595.
Metal including alloys:				
Scrap	1,959	1,987	58	Netherlands 869; Australia 577.
Unwrought	2,869	4,973	266	Canada 1,655; U.S.S.R. 1,439.
Semimanufactures	157	69	19	West Germany 16.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	2,829	2,348	--	United Kingdom 901; West Germany 547.
Silver:				
Waste and sweepings[3] value, thousands	$4	$100	--	West Germany $61; Sweden $36.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,154	2,154	NA	West Germany 1,029; United Kingdom 739.
Tin: Metal including alloys:				
Scrap	1	--		
Unwrought	193	133	3	West Germany 44; Netherlands 35.
Semimanufactures	140	141	([4])	United Kingdom 88; West Germany 34.
Titanium:				
Ore and concentrate	20,961	31,435	--	Norway 25,575; Australia 5,579.
Oxides	287	481	1	West Germany 225; Belgium-Luxembourg 135.
Tungsten: Metal including alloys, all forms	18	20	12	United Kingdom 6.
Uranium and/or thorium: Metal including alloys, all forms	--	10	--	France 9.
Zinc:				
Ore and concentrate	207,835	205,579	--	Sweden 71,651; Canada 61,070; Greenland 41,755.
Oxides	400	386	--	West Germany 309.
Blue powder	1,085	583	--	Norway 537.
Ash and residue containing zinc	7,355	1,511	--	West Germany 1,409.
Metal including alloys:				
Scrap	10	27	--	All from Denmark.
Unwrought	462	1,188	--	Yugoslavia 1,001.
Semimanufactures	196	114	--	West Germany 57.
Zirconium: Ore and concentrate	86	946	21	Australia 842.
NONMETALS				
Abrasives, n.e.s.:				
Artificial:				
Corundum	855	1,236	--	Austria 756; United Kingdom 281.
Silicon carbide	742	1,179	--	Norway 658; West Germany 445.
Dust and powder of precious and semiprecious stones including diamond kilograms	23	9	--	U.S.S.R. 3.
Grinding and polishing wheels and stones	148	2,092	26	West Germany 517; Austria 472.
Asbestos, crude	4,291	2,561	10	Canada 834; Republic of South Africa 820; U.S.S.R. 720.
Barite and witherite	2,664	1,613	--	West Germany 917.
Boron materials:				
Crude natural borates	13,781	13,806	4,663	Turkey 9,100.
Oxides and acids	296	303	11	Turkey 196; France 64.
Cement	12,814	25,622	14	Denmark 12,287; U.S.S.R. 8,012.
Chalk	24,050	56,712	1	Denmark 36,675; West Germany 16,057.
Clays, crude:				
Fire clay	15,290	NA		
Kaolin	370,054	429,672	13,064	United Kingdom 403,253.
Unspecified	13,673	36,710	84	West Germany 19,951.
Cryolite and chiolite	36	49	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$7,375	$5,916	$15	Belgium-Luxembourg $2,422; Israel $2,411.
Industrial stones do	$479	$52	$4	Belgium-Luxembourg $43.
Diatomite and other infusorial earth	3,925	4,312	1,047	Norway 1,221; United Kingdom 667.
Feldspar, fluorspar, related materials	5,830	4,438	--	Mexico 3,870.
Fertilizer materials:				
Crude, n.e.s	53	23	--	All from United Kingdom.

See footnotes at end of table.

Table 3.—Finland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured:				
Ammonia	248,959	307,074	--	U.S.S.R. 266,021; Brazil 9,276.
Nitrogenous	31,207	54,706	1	Norway 12,183; U.S.S.R. 10,535.
Phosphatic	38	21	--	Denmark 13.
Potassic	309,004	374,898	--	U.S.S.R. 150,356; East Germany 124,211.
Unspecified and mixed	54,913	97,337	17	United Kingdom 20,585; Hungary 20,013.
Graphite, natural	480	263	--	West Germany 181.
Gypsum and plaster	134,190	176,263	99	Spain 107,624; Poland 38,447.
Lime	325	7,887	(2)	Denmark 5,699; Sweden 2,166.
Magnesium compounds	19,973	21,336	15	China 7,954; U.S.S.R. 6,278.
Mica:				
Crude including splittings and waste	187	239	--	United Kingdom 206.
Worked including agglomerated splittings	23	28	1	Austria 14; Switzerland 6.
Nitrates, crude	1,544	2,495	--	All from Sweden.
Phosphates, crude	495,417	443,613	105,722	U.S.S.R. 176,666; Morocco 100,384.
Phosphorus, elemental	4	3	--	All from West Germany.
Pigments, mineral: Iron oxides and hydroxides, processed	3,460	3,941	23	West Germany 3,714.
Precious and semiprecious stones other than diamond:				
Natural kilograms	1,967	926	--	West Germany 377; Republic of South Africa 244; Brazil 199.
Synthetic do	58	262	15	Sweden 169; Austria 23.
Pyrite, unroasted	6	13	--	West Germany 12.
Salt and brine	639,386	495,618	3	Netherlands 196,360; Poland 96,620; U.S.S.R. 61,553.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	76,307	79,393	822	U.S.S.R. 18,208; West Germany 17,431.
Sulfate, manufactured	9,604	6,211	--	East Germany 4,860; Sweden 1,228.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,028	3,947	19	Italy 2,756; Norway 815.
Worked	718	1,201	--	Italy 719; Sweden 304.
Dolomite, chiefly refractory-grade	21,612	19,833	--	Belgium-Luxembourg 14,582.
Limestone other than dimension	722,921	759,546	10	Sweden 743,631.
Quartz and quartzite	83	856	34	Sweden 742.
Sand other than metal-bearing	45,427	47,049	19	Belgium-Luxembourg 29,052.
Sulfur:				
Elemental:				
Crude including native and byproduct	68,825	54,460	1	Poland 40,350; West Germany 9,814.
Colloidal, precipitated, sublimed	12	19	--	Belgium-Luxembourg 15.
Dioxide	18,118	19,377	9	Sweden 19,368.
Sulfuric acid	5,113	371	--	U.S.S.R. 271; Netherlands 63.
Talc, steatite, soapstone, pyrophyllite	682	671	(2)	Belgium-Luxembourg 414.
Other:				
Crude	71,348	67,333	80	Norway 64,644.
Slag and dross, not metal-bearing	74,988	60,926	8	East Germany 29,086; Sweden 20,058.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	344	173	103	Trinidad and Tobago 40.
Carbon:				
Carbon black	8,690	9,105	147	Netherlands 3,248; Sweden 2,865.
Gas carbon	567	--		
Coal:				
Anthracite thousand tons	90	70	--	U.S.S.R. 69.
Bituminous do	4,594	4,320	663	Poland 2,090; United Kingdom 780; U.S.S.R. 777.
Lignite including briquets do	(2)	13	--	All from East Germany.
Coke and semicoke do	1,139	1,128	--	U.S.S.R. 671; West Germany 144.
Gas, natural: Gaseous million cubic feet	23,885	23,367	--	All from U.S.S.R.
Peat including briquets and litter	7,434	605	--	U.S.S.R. 604.
Petroleum:				
Crude thousand 42-gallon barrels	71,332	75,733	--	U.S.S.R. 65,211; Saudi Arabia 4,949; Iran 4,132.
Refinery products do	18,523	21,013	173	U.S.S.R. 19,383.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Most smelters, including those for steel, zinc, copper, ferrochromium, nickel, and cobalt, in order of tonnage output, operated near capacity in 1984. However, domestic ore reserves of many of these commodities were depleting rapidly. Prospecting had not revealed significant new deposits, and this was causing industry to seek reliable foreign sources of ore or concentrate and to develop improved prospecting technology as well as improved methods for processing lean ores.

Copper.—Outokumpu Oy's new dry method for preconcentrating ore went on-stream commercially for the first time in March 1984 in Outokumpu's Hammaslahti copper-zinc mine. Known as Precon, the system analyzes on-stream ore by X-ray fluorescence, and low-metal-content lumps are rejected by a controlled air jet. Approximately one-quarter of the crushed raw ore at Hammaslahti, about 100,000 tons per year, was being subjected to the dry-sorting process, which was rejecting on average about one-quarter of the ore fed into it.

Chromium.—Construction of Outokumpu Oy's second ferrochromium submerged arc furnace continued at its smelter at Tornio, and startup was scheduled for 1985. Finland's annual production capacity for ferrochromium was expected to approximately double thereby to 120,000 tons. About two-thirds of the production from the first arc furnace was being consumed by Outokumpu Oy in its stainless steel facility, and the remainder was exported. Feed material for the ferrochromium furnaces was to be chromium lump ore upgraded in the heavy-medium ore separation plant that went on-stream in the concentrator at Kemi during December 1983.

Chromium ore production, all from Outokumpu Oy's Kemi Mine, approximately doubled after having about halved during the previous 2 years. Exports, mostly to the U.S.S.R., also decreased significantly during the 1981-83 period and accounted for nearly one-half of the market. Proven reserves in the Kemi deposit were approximately 50 million tons of chromium ore with an average chromium oxide (Cr_2O_3) content of 26%.

Iron Ore.—Rautaruukki Oy announced that iron ore mining would not continue after 1985 at its Otanmaki Mine. This mine produced 324,000 tons of iron concentrate in 1984, 36% of Rautaruukki's output. Rautaruukki was responsible for approximately 70% of Finland's output of iron ore. Finland was already dependent on imports for about one-half of its iron ore supply.

Rautaruukki agreed in January to import 500,000 tons of iron concentrate from the U.S.S.R. during the year.

Nickel.—Work was begun by Outokumpu Oy, Finland's mining and metals group, on the development of a new nickel mine and concentrator at Enonkoski in eastern Finland. Total planned investment was approximately $30 million. Production was expected to begin in 1986 and to maximize during the third year at 500,000 tons of ore containing 1.2% nickel and 0.3% copper. Annual nickel concentrate production was expected to be equivalent to 6,000 tons of contained nickel, more than that of the three nickel mines operated in 1984 by Outokumpu. Copper concentrate was to be produced as a byproduct. The nickel concentrate was to be sent to the company's Harjavalta smelter for conversion to nickel matte using Outokumpu's flash smelting process. The company had imported approximately two-thirds of the nickel concentrate required for its smelter, and this fraction was expected to be significantly reduced. Nickel reserves of the Enonkoski deposit were proven to be 3.8 million tons of ore. Equipment for this mine was being moved from other mines where operations were scheduled to cease because of ore depletion. However, the Hitura Mine, which had remained closed during 1983, was reopened at midyear. Production from this mine, expected to be 2,000 tons per year of nickel metal in concentrate form, was to further augment the supply of nickel to the smelter.

Steel.—Production of crude steel increased by 10% to about 2.6 million tons in 1984. Nearly one-half of Finland's steel production was exported, mostly as rolled products. Approximately 600,000 tons of sheet was imported. Domestic consumption of steel increased by 8% to approximately 2 million tons.

Government-owned Rautaruukki Oy, Finland's largest steel producer, continued its program of modernization of its blast furnaces and renovation of its oxygen steelmaking converters as a major project scheduled for completion by the late 1980's. The intention was to improve its competitive position. Rautaruukki produced approximately 1.5 million tons in 1984, mainly as ordinary rolled products.

Rautaruukki's coking plant, scheduled for completion in 1987, was expected to supply about one-half of the coke needs of its Raahe steelworks, which was entirely dependent on coke imports, mostly from the U.S.S.R.

State-owned Outokumpu Oy, the smallest of Finland's three steel producers, had built its cold-rolled stainless steel annual production capacity to more than 100,000 tons in less than one decade and had established a position in the European stainless steel market. All operations, starting with arc melting, were conducted at Tornio except that the billets were hot rolled on a toll basis and returned to Tornio for cold rolling. All raw material sources were supplied domestically except silicon, manganese, and titanium, which were imported. Output of flat stainless steel products increased by 30% in 1984 to a record high of 131,000 tons.

The third Finnish steel producer, privately owned Ovako Oy AB, produced about 500,000 tons of rolled products. Much of this was in special shapes.

Vanadium.—Rautaruukki Oy announced the prospective closing of its Otanmaki iron mine and its Mustavaara vanadium mine in early 1985 because of ore depletion. V_2O_5 was obtained from the Otanmaki Mine product. These mines were the only source of Finnish V_2O_5.

Zinc.—Development of two small zinc sulfide deposits in central Finland began in late 1984 by Outokumpu Oy to supplement its ore supply. The ore, from Kangasjarvi at Keitele and Kallioykyla near Kiuruvesi, was to be mined by open pit methods and transported to the company's Phyasalmi Mine for concentrating. Total zinc reserves of the two deposits was equivalent to approximately 12,000 tons of zinc.

NONMETALS

Barite.—Outokumpu Oy began production of barite concentrate in 1983 at its Phyasalmi copper-zinc-pyrite mine. The ore contained an average of 4% barite. This barite, about 30,000 tons per year, had been previously discarded with the tailings. The preliminary recovery operation was expected to yield at least 5,000 tons of barite in 1984.

Gypsum.—A 50,000-ton-per-year plant was built by Kemira Oy at Siilinjarvi to convert the gypsum byproduct of its conversion of apatite concentrate into phosphoric acid into a gypsum pigment suitable for coating paper in Finland. It reportedly imparts a high degree of brightness to paper.

Mica.—Kemira Oy began construction of a plant to recover phlogopite from discarded tailings from the concentration of apatite at its Siilinjarvi Mine. Plant completion was scheduled for late 1985, and planned annual production was 10,000 tons of raw mica and 6,000 tons of finely ground mica. Most of the products were to be exported for use in oil well drilling and the construction industry.

Stone.—Outokumpu Oy announced its decision to begin manufacturing dimension granite. A newly created division, Granite Products Ltd., was to open a quarry in Taivassalo in southwestern Finland and build a finishing plant at a site not yet specified, which would be the first of its kind in Finland. Red, brown, and grey granites were expected to be marketed in both the rough and finished forms including facing slabs for buildings.

Although Finland ranked among the leading world exporters of rough granite blocks, domestic finishing had been only on a modest scale. The main market areas had been central and southern Europe. The leading granite producer in Finland had been Finska Steinindustri AB.

MINERAL FUELS

Finland has no mineral fuel deposits of commercial significance, excluding peat. Nevertheless, indigenous energy sources accounted for approximately 31% of total energy production in 1983; of this, 50% was obtained from wood, 42% from hydroelectric power, and 8% from peat. Total domestic energy consumption in 1983 was 25 million tons of oil equivalent, or about 34 million tons of coal equivalent. Imported mineral fuels and electricity supplied 69% of this energy, and of this, oil accounted for 53%; nuclear fuel, 24%; coal, 13%; electricity, 7%; and gas, 3%.

Domestic hydropower had become fully developed within the restraints of construction costs and environmental factors. Wood and, particularly, peat were being promoted as energy sources. However, despite this, Finland was expected to remain dependent on imports for about two-thirds of its energy supply in the foreseeable future. Dependence on oil imports, most of which came from the U.S.S.R., continued being reduced in favor of coal and gas. Neste Oy reached an agreement with Soyuzgasexport of the U.S.S.R. to triple imports of Soviet natural gas by 1986 to approximately 100,000 million cubic feet per year subject to completion of additional pipelines from Kourola, Finland, to Helsinki and Tampere.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from finnmarks (Fimr) to U.S. dollars at the rate of Fimr6.01 = US$1.00, the average rate in 1984.

The Mineral Industry of France

By Roman V. Sondermayer[1]

In 1984, the mineral industry of France, including the processing sector, had a year of mixed results and unresolved reorganizational problems. Although the industry was modest by world standards, France remained an important processor of crude minerals and fuels. Imports supplemented domestic production significantly. As in the past, a number of uneconomical mines and other mineral-related facilities were maintained in operation for social reasons, since closure would create economic difficulties in the regions of the country where they are located.

The most prominent minerals and metals produced in France during 1984, with production expressed in approximate ranges of world production, were as follows: arsenic, 19% to 20%; diatomite, 14% to 15%; gypsum, 8% to 9%; potash, 6% to 7%; fluorspar, feldspar, and ferroalloys, 5% to 6% each; bromine, cadmium, talc, and zinc metal, 4% to 5% each; and magnesium metal and alumina, 3% to 4% each. Results of performance of the industry in 1984 were not available. The estimated value of mineral production was about 9% to 11% of the gross domestic product. The Bureau de Recherches Géologiques et Minières (BRGM), the principal Government organization for mineral-related activities, continued its work on the inventory of mineral resources in France, as well as its efforts to assure the supply of minerals and fuels from abroad. Although BRGM was active throughout the world, the majority of its most important projects were in Africa and Saudi Arabia.

The principal events in the mineral industry included, among others, the following: closure of the Salindres alumina plant, exploration of a polymetallic deposit at Chessy, reorganization of the steel industry, exploration of the deposit at Echassière, discovery of an attapulgite deposit in the Armorican Massif, a new discovery of petroleum in the Paris Basin, and reduction of a petroleum refinery capacity by 400,000 barrels per day.

PRODUCTION

The most prominent French mineral producing and processing companies were Government owned or controlled. In this category, among others, were Pechiney Imetal, Compagnie Générale des Matières Nucléaires, Compagnie Française des Pétroles S.A., Charbonnages de France, and Union Sidérurgique du Nord et de l'Est de la France S.A. (Usinor). Production results were mixed during 1984.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Bauxite, gross weight ______ thousand tons__	1,921	1,827	1,662	1,663	1,607
Alumina:					
Crude ______ do____	1,339	1,236	1,087	1,009	1,034
Calcined ______ do____	1,173	1,095	960	853	898
Metal:					
Primary ______ do____	432	436	390	361	342
Secondary ______ do____	170	156	154	170	174
Antimony:					
Mine output, metal content ______	--	312	308	111	--
Metal, including regulus ______	3,885	5,223	5,867	6,442	7,036
Arsenic, white ______	[e]5,300	[e]5,200	[e]6,000	[3]4,727	3,828
Cadmium metal ______	789	663	793	513	568
Cobalt metal including powder ______	676	447	568	131	116
Copper:					
Mine output, metal content ______	116	98	199	114	79
Metal:					
Blister, secondary ______	7,300	6,500	8,100	7,210	6,796
Refined:					
Primary[e] ______	23,000	23,000	24,000	[r]23,000	20,931
Secondary[e] ______	23,500	23,000	23,060	[r]22,063	20,000
Total ______	46,500	46,000	47,060	45,063	40,931
Gold, mine output, metal content__troy ounces__	37,391	36,362	[r] [e]40,000	71,659	70,279
Iron and steel:					
Iron ore and concentrate:					
Gross weight ______ thousand tons__	28,981	21,598	19,391	15,930	14,839
Metal content ______ do____	9,100	6,800	6,186	5,061	4,680
Metal:					
Pig iron ______ do____	19,159	17,268	15,031	13,856	15,039
Ferroalloys:					
Blast furnace: Spiegeleisen and ferromanganese ______ do____	480	313	333	276	329
Electric-furnace:					
Ferrochrome ______ do____	45	27	12	[e]10	26
Ferromanganese ______ do____	21	10	[e]11	[e]10	30
Ferrosilicon ______ do____	246	189	169	[e]160	206
Silicon metal ______ do____	60	60	[e]55	[e]50	50
Other ______ do____	123	115	101	[e]100	130
Total ______ do____	975	714	681	[e]606	771
Steel ingots and castings ______ do____	23,176	21,258	18,416	17,623	19,000
Semimanufactures ______ do____	20,998	18,780	16,431	15,348	16,543
Lead:					
Mine output, metal content ______	28,360	17,200	5,859	1,512	2,263
Smelter, primary only ______	126,800	128,600	122,700	114,948	117,900
Refined:					
Primary: Soft lead ______	126,800	128,600	122,700	114,948	117,900
Secondary:					
Soft lead ______	30,912	35,319	22,400	37,464	24,900
Lead content of antimonial lead ______	61,089	64,119	63,500	62,000	63,900
Total ______	218,801	228,038	208,600	214,412	206,700
Magnesium metal including secondary ______	9,328	7,263	9,610	[e]10,000	12,972
Nickel:					
Cathodes ______	7,974	10,051	[4]7,361	[4]7,300	[4]5,217
Ni content of ferronickel ______	NA	NA	NA	21,717	29,158
Silver: Mine output, metal content:					
Lead and zinc concentrates thousand troy ounces__	NA	NA	NA	417	464
Mixed copper, gold, silver concentrates do____	NA	NA	NA	101	109
Total ______ do____	[r]2,427	[r]1,707	983	518	573
Metal, Ag content of final smelter products do____	7,974	9,729	30,955	[e]30,000	30,000
Tin, smelter output of solder and other alloys, secondary ______	8,900	7,438	6,141	6,708	6,700
Tungsten concentrate, metal content ______	577	591	727	832	796

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS —Continued					
Uranium:					
Mine output, metal content	3,172	2,550	3,020	3,890	3,722
Chemical concentrate, U_3O_8 equivalent	2,845	2,554	2,872	3,299	[e]3,100
Zinc:					
Mine output, metal content	35,810	37,429	37,021	34,272	36,231
Metal including secondary:					
Slab	252,800	257,130	243,800	249,500	258,800
Dust	8,390	9,250	[e]9,000	9,300	7,400
NONMETALS					
Barite	236,560	190,150	143,324	152,600	148,200
Bromine, elemental	[3]16,480	[e]16,500	[e]29,000	[e]30,000	[e]30,000
Cement, hydraulic thousand tons	29,104	28,229	26,150	24,504	22,724
Clays:					
Bentonite[5]	[e]3,100	[e]3,000	3,290	3,091	3,475
Kaolin and kaolinitic clay (marketable) thousand tons	338	331	[e]300	289	307
Refractory clay, unspecified do	1,601	1,457	[e]1,300	413	458
Diatomite do	220	210	244	221	247
Feldspar, crude do	210	191	173	[e]175	209
Fluorspar:					
Crude do	529	524	451	396	504
Marketable, all grades do	259	256	244	184	246
Gypsum and anhydrite, crude do	6,491	6,204	6,039	5,557	5,401
Kyanite, andalusite, related materials[e]	30,000	30,000	30,000	30,000	30,000
Lime: Quicklime, hydrated lime, dead-burned dolomite thousand tons	3,610	3,366	[r] [e]3,000	2,946	3,130
Mica	8,838	9,059	7,950	9,286	10,854
Nitrogen: N content of ammonia thousand tons	[e]2,085	2,250	[e]2,000	[e]1,900	2,000
Pigments, mineral, natural: Iron oxides[e]	6,000	15,000	16,000	16,000	15,000
Phosphates:					
Phosphate rock (phosphatic chalk)	14,460	12,340	([6])	([6])	--
Thomas slag thousand tons	1,865	1,800	1,700	1,124	1,194
Potash:					
Gross weight (run-of-mine) do	12,117	11,344	10,904	10,874	12,480
K_2O equivalent (run-of-mine) do	2,039	1,969	1,824	1,651	1,852
K_2O equivalent (marketable) do	1,894	1,831	1,704	1,537	[e]1,700
Pozzolan and lapilli do	465	450	NA	607	500
Salt:					
Rock salt do	301	298	382	282	226
Brine salt (refined) do	1,113	1,092	1,071	1,074	[e]1,100
Marine salt do	1,275	[e]1,300	1,539	1,354	1,381
Salt in solution do	4,415	3,870	3,711	4,239	[e]4,300
Total do	7,104	6,560	6,703	6,949	7,007
Sodium compounds:					
Sodium sulfate do	[3]150	[e]150	[e]150	[e]150	[e]120
Sodium carbonate do	[3]1,560	[e]1,600	[e]1,000	[e]1,000	[e]900
Stone, sand and gravel:					
Limestone, agricultural and industrial do	6,603	5,407	5,854	6,625	6,700
Roadbuilding, foundation, and ballast material excluding alluvial sand and gravel:					
Ballast and road surfacing do	24,600	NA	NA	NA	NA
Other do	69,150	NA	NA	NA	NA
Slate, roof do	95	88	NA	52	59
Sand and gravel:					
Industrial sands do	6,604	6,046	5,486	5,558	5,395
Other sand and gravel, alluvial do	215,280	218,300	210,000	199,000	181,000
Sulfur, byproduct:					
Of natural gas do	1,838	1,701	1,690	1,653	1,589
Of petroleum do	226	221	235	157	163
Of unspecified sources[e] do	150	120	110	100	110
Total do	2,214	2,042	2,035	1,910	1,862
Talc:					
Crude	320,790	313,140	312,920	315,800	320,000
Powder	301,580	309,270	276,440	286,500	292,400
MINERAL FUELS AND RELATED MATERIALS					
Asphaltic material	50,460	54,020	50,230	NA	NA
Carbon black	[e]170,000	[e]170,000	205,730	218,600	165,900

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Coal including briquets:					
Anthracite and bituminous coal thousand tons	18,136	18,588	16,896	17,021	16,594
Lignite do	2,558	2,945	3,060	2,591	2,426
Total do	20,694	21,533	19,956	19,612	19,020
Briquets do	1,757	1,596	1,320	1,512	1,450
Coke, metallurgical do	11,118	10,723	9,935	8,458	8,999
Gas, natural:					
Gross million cubic feet	382,820	358,936	369,054	r e340,000	320,000
Marketed do	265,922	249,900	258,321	233,100	22,900
Natural gas liquids thousand 42-gallon barrels	7,394	7,446	8,027	7,480	7,424
Peat[e] thousand tons	140	130	120	110	228
Petroleum:					
Crude thousand 42-gallon barrels	10,375	12,288	12,011	12,093	19,117
Refinery products:					
Liquefied petroleum gas do	36,048	31,320	29,626	28,037	27,863
Gasoline, unspecified do	157,485	r151,880	143,266	136,777	138,782
Jet fuel do	36,667	35,152	32,392	35,797	35,488
Kerosine do	1,054	1,449	938	1,434	388
Distillate fuel oil do	267,655	242,293	212,580	181,802	218,302
Heavy fuel oil do	215,723	176,244	128,771	115,983	103,889
Unspecified do	109,827	r46,740	28,949	23,804	5,119
Refinery fuel and losses do	56,832	45,312	40,064	40,020	39,744
Total do	881,291	r730,390	616,586	563,654	569,575

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Oct. 5, 1985.
[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 1980-84.
[3]Reported figure.
[4]From 1982, nickel metal in cathodes only.
[5]Includes smectic clay.
[6]Revised to zero.

TRADE

According to preliminary reports, the overall trade balance of France was positive. Imports of all commodities totaled about $76.1 billion[2] and exports totaled $93.2 billion. Trade in minerals and fuels showed a negative balance. Imports totaled $38.8 billion or about 51% of total imports, and exports totaled $13.3 billion or about 14% of total exports. Fuels accounted for 73% of mineral imports and about 32% of total country imports.

Table 2.—France: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Alkaline-earth metals	322	405	22	West Germany 134; Yugoslavia 100; Belgium-Luxembourg 71.
Aluminum:				
Ore and concentrate	92,369	68,651	NA	Yugoslavia 39,819; Sweden 13,278; Italy 10,626.
Oxides and hydroxides	281,032	269,731	5,184	Netherlands 150,825; Italy 35,936; Norway 13,472.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Aluminum —Continued				
Metal including alloys:				
Scrap	60,757	90,365	NA	Italy 27,436; West Germany 24,706; Belgium-Luxembourg 21,632.
Unwrought	182,683	160,718	5,465	West Germany 42,569; Belgium-Luxembourg 27,818; Italy 26,257.
Semimanufactures	265,319	294,744	17,723	West Germany 79,761; United Kingdom 32,438; Italy 26,558.
Antimony:				
Ore and concentrate	177	26	NA	NA.
Metal including alloys, all forms	77	66	NA	Belgium-Luxembourg 13.
Arsenic: Metal including alloys, all forms	90	27	NA	NA.
Beryllium:				
Oxides and hydroxides	5	--		
Metal including alloys, all forms value, thousands	$121	$17	NA	NA.
Bismuth: Metal including alloys, all forms	3	13	NA	NA.
Cadmium: Metal including alloys, all forms	361	344	31	West Germany 108; Belgium-Luxembourg 67; Netherlands 47.
Chromium:				
Ore and concentrate	1,554	1,316	NA	Spain 807; Italy 437.
Metal including alloys, all forms	590	740	263	West Germany 117; United Kingdom 72; Sweden 61.
Cobalt: Metal including alloys, all forms	780	1,133	85	West Germany 373; Belgium-Luxembourg 270; Italy 133.
Columbium and tantalum: Metal including alloys, all forms, tantalum	23	12	1	United Kingdom 5; Netherlands 3; West Germany 2.
Copper:				
Ore and concentrate	648	448	--	All to West Germany.
Matte and speiss including cement copper	3,146	2,603	--	Spain 1,466; Belgium-Luxembourg 1,137.
Metal including alloys:				
Scrap	112,338	126,003	97	West Germany 46,945; Belgium-Luxembourg 41,019; Italy 23,989.
Unwrought	11,789	26,229	NA	Belgium-Luxembourg 15,728; East Germany 5,096; West Germany 1,175.
Semimanufactures	243,413	251,196	14,837	West Germany 66,188; Italy 42,673; Spain 14,637.
Germanium: Metal including alloys, all forms value, thousands	$2,209	$2,454	$979	United Kingdom $1,306; Czechoslovakia $73.
Gold: Metal including alloys, unwrought and partly wrought do.	$245,458	$121,669	$5,843	United Kingdom $63,722; Switzerland $26,270; Netherlands $11,756.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	5,836	5,031	NA	Belgium-Luxembourg 4,995; West Germany 33.
Metal:				
Scrap do.	3,082	3,227	(2)	Italy 1,805; Spain 885; Belgium-Luxembourg 313.
Pig iron, cast iron, related materials	223,816	191,077	4,501	Italy 55,951; West Germany 44,865; Belgium-Luxembourg 24,439.
Ferroalloys:				
Ferrochromium	605	516	NA	West Germany 176; Belgium-Luxembourg 70; Italy 61.
Ferromanganese	177,151	282,508	133,255	West Germany 34,076; Italy 32,342; Belgium-Luxembourg 31,964.
Ferromolybdenum	829	1,022	NA	Netherlands 845; Belgium-Luxembourg 71; Italy 61.
Ferronickel	45,034	48,464	NA	West Germany 26,823; Italy 6,977; Spain 4,554.
Ferrosilicochromium	1,884	898	NA	Italy 800.
Ferrosilicomanganese	5,657	6,530	54	Belgium-Luxembourg 3,526; West Germany 2,135; Italy 260.
Ferrosilicon	68,003	86,022	3,007	West Germany 26,872; Japan 20,122; Italy 14,070.
Unspecified	30,464	36,319	4,786	West Germany 7,105; Italy 3,613; Japan 3,200.
Steel, primary forms thousand tons	2,305	2,419	333	Italy 790; Spain 206.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	2,354	2,385	181	West Germany 411; Belgium-Luxembourg 323.
Universals, plates, sheets do	2,625	2,838	229	West Germany 562; Italy 341.
Hoop and strip do	431	453	8	West Germany 141; Italy 84; Belgium-Luxembourg 55.
Rails and accessories do	241	164	14	Tunisia 37; Italy 27; Netherlands 16.
Wire do	191	216	44	West Germany 42; United Kingdom 12.
Tubes, pipes, fittings do	1,718	1,376	85	U.S.S.R. 190; West Germany 129.
Castings and forgings, rough do	63	65	1	West Germany 18; Belgium-Luxembourg 12; Morocco 9.
Lead:				
Ore and concentrate	44	3,096	NA	Belgium-Luxembourg 2,998.
Metal including alloys:				
Scrap	8,928	10,674	NA	Italy 5,703; West Germany 2,734; Belgium-Luxembourg 1,735.
Unwrought	55,817	49,649	NA	West Germany 15,559; Belgium-Luxembourg 15,530; Italy 4,245.
Semimanufactures	2,081	2,205	NA	West Germany 717; Syria 174; Morocco 143.
Magnesium: Metal including alloys:				
Scrap	812	666	NA	Italy 535.
Unwrought	4,256	5,735	405	West Germany 2,001; Netherlands 628; Japan 619.
Semimanufactures	382	3,112	NA	U.S.S.R. 1,886; West Germany 647; Italy 510.
Manganese:				
Ore and concentrate, metallurgical-grade	11,136	20,907	6,000	Norway 6,250; Italy 5,326.
Oxides	1,175	996	NA	Italy 440; Morocco 269.
Metal including alloys, all forms	4,188	4,949	293	Italy 1,061; Netherlands 685; Poland 610.
Mercury 76-pound flasks	232	3,104	290	West Germany 174.
Molybdenum:				
Ore and concentrate	502	364	--	Italy 144; Netherlands 85; Belgium-Luxembourg 61.
Metal including alloys:				
Scrap	47	87	21	West Germany 20; United Kingdom 14; Belgium-Luxembourg 8.
Unwrought	48	156	11	Austria 83; India 26; Sweden 12.
Semimanufactures	70	41	NA	West Germany 9; Netherlands 6; United Kingdom 6.
Nickel:				
Ore and concentrate	--	2	NA	NA.
Matte and speiss	12	4	NA	NA.
Metal including alloys:				
Scrap	2,064	2,070	306	West Germany 837; Netherlands 321; United Kingdom 253.
Unwrought	4,359	5,416	1,242	West Germany 1,274; Romania 350; Italy 344.
Semimanufactures	5,244	4,940	376	West Germany 2,903; Republic of South Africa 395; United Kingdom 292.
Platinum-group metals:				
Waste and sweepings value, thousands	$11,134	$8,067	--	United Kingdom $3,692; Spain $3,432; Belgium-Luxembourg $761.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	r44,238	43,666	--	United Kingdom 10,506; Switzerland 7,090; Italy 4,670.
Platinum do	r267,695	109,546	1,000	United Kingdom 50,136; Switzerland 24,504; Belgium-Luxembourg 12,617.
Unspecified do	15,274	20,761	750	Bulgaria 8,375; West Germany 4,564; Netherlands 3,506.
Rare-earth metals including alloys, all forms	18	59	NA	Switzerland 24; West Germany 21.
Silicon, high-purity	14	1	1	

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	[r]10,776	15,995	831	United Kingdom 6,386; Switzerland 4,549; West Germany 1,614.
Tin:				
Ore and concentrate	19	27	--	All to Spain.
Metal including alloys:				
Scrap	472	328	NA	United Kingdom 133; West Germany 115; Belgium-Luxembourg 53.
Unwrought	435	343	NA	Netherlands 146; United Kingdom 70; Italy 39.
Semimanufactures	265	255	8	Italy 33; Switzerland 33; Belgium-Luxembourg 25.
Titanium:				
Ore and concentrate	105	235	NA	NA.
Metal including alloys:				
Scrap	484	810	58	United Kingdom 630; Spain 52; West Germany 29.
Unwrought	3	14	NA	NA.
Semimanufactures	213	145	6	West Germany 37; United Kingdom 31; Italy 20.
Tungsten:				
Ore and concentrate	930	818	146	West Germany 303; Austria 213; Japan 91.
Metal including alloys:				
Scrap	199	266	13	West Germany 111; Belgium-Luxembourg 56; United Kingdom 39.
Unwrought	69	80	--	West Germany 46; Switzerland 10; Italy 8.
Semimanufactures	23	52	NA	United Kingdom 19; Spain 5; Canada 2.
Uranium and/or thorium: Metal including alloys:				
Uranium	5,017	4,231	672	U.S.S.R. 1,692; Japan 787; Belgium-Luxembourg 521.
Thorium	1	--		
Vanadium: Metal including alloys:				
Scrap	23	98	NA	NA.
Semimanufactures value, thousands	$15	$34	NA	NA.
Zinc:				
Ore and concentrate	58,633	98,338	--	Belgium-Luxembourg 85,370; Italy 7,480; West Germany 2,001.
Blue powder	2,945	3,835	NA	West Germany 1,787; Italy 696; Switzerland 552.
Matte	2,978	3,767	NA	West Germany 1,548; Belgium-Luxembourg 1,219; Italy 591.
Metal including alloys:				
Scrap	11,407	11,908	NA	Italy 6,608; Belgium-Luxembourg 2,660; West Germany 1,210.
Unwrought	51,363	52,641	9,128	West Germany 17,037; Belgium-Luxembourg 11,082.
Semimanufactures	38,522	41,021	NA	Belgium-Luxembourg 17,772; West Germany 15,594; Denmark 2,959.
Zirconium: Ore and concentrate	18	188	NA	West Germany 146.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,525	1,808	NA	Tunisia 395; Spain 56; Belgium-Luxembourg 22.
Artificial: Corundum	19,827	19,740	2,028	Italy 2,744; Austria 2,626; Belgium-Luxembourg 2,257.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	1	1	NA	NA.
Grinding and polishing wheels and stones	4,729	5,740	388	West Germany 984; United Kingdom 937; Netherlands 310.
Asbestos, crude	1,586	3,195	NA	Belgium-Luxembourg 2,121; Tunisia 478; Senegal 270.
Barite and witherite	94,558	109,752	NA	West Germany 102,678; Italy 1,552.
Boron materials:				
Crude natural borates	4,315	3,689	NA	Spain 3,527.
Elemental value, thousands	$71	$1	NA	NA.
Oxides and acids	18,691	23,584	127	West Germany 7,674; East Germany 4,331; Belgium-Luxembourg 1,511.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS —Continued				
Cement thousand tons	3,032	2,867	170	Cameroon 465; Nigeria 451; West Germany 322.
Chalk	524,563	550,087	1,355	West Germany 226,592; Belgium-Luxembourg 106,622; Switzerland 38,411.
Clays, crude:				
Bentonite	15,304	10,404	--	West Germany 1,263; Angola 1,101; Congo 1,098.
Chamotte earth	164,686	141,508	--	Italy 43,836; United Kingdom 23,613; West Germany 18,239.
Kaolin	139,029	143,859	--	West Germany 54,786; Italy 37,739; Belgium-Luxembourg 21,239.
Unspecified	309,942	297,169	--	Italy 43,876; West Germany 61,477; United Kingdom 41,104.
Cryolite and chiolite	10	19	NA	NA.
Diamond:				
Gem, not set or strung carats	93,426	98,298	13,270	Belgium-Luxembourg 73,163; Switzerland 6,248.
Industrial stones do	205,303	148,930	NA	Ireland 110,603; Belgium-Luxembourg 20,931.
Dust and powder kilograms	44	61	--	Italy 28; United Kingdom 7; Switzerland 6.
Diatomite and other infusorial earth	26,999	26,984	--	West Germany 8,310; Belgium-Luxembourg 4,576; Italy 3,282.
Feldspar, fluorspar, related materials:				
Feldspar	54,613	54,445	NA	Belgium-Luxembourg 19,538; Spain 14,281; West Germany 7,625.
Fluorspar	71,096	47,356	267	West Germany 17,356; Italy 14,022; Belgium-Luxembourg 2,611.
Unspecified	56	13	NA	NA.
Fertilizer materials:				
Crude, n.e.s	27,898	24,599	NA	Switzerland 15,147; Belgium-Luxembourg 3,029; West Germany 1,473.
Manufactured:				
Ammonia	103,808	182,965	NA	West Germany 88,259; Belgium-Luxembourg 32,664; Spain 27,996.
Nitrogenous	539,995	714,061	NA	Netherlands 190,179; Belgium-Luxembourg 124,597; West Germany 57,097.
Phosphatic	175,118	216,287	254	Switzerland 75,863; Austria 43,899; Italy 42,420.
Potassic	465,563	456,507	NA	Belgium-Luxembourg 97,801; West Germany 79,547; Italy 78,408.
Unspecified and mixed	405,324	432,043	NA	West Germany 130,963; Belgium-Luxembourg 101,824; Switzerland 56,745.
Graphite, natural	791	891	NA	West Germany 376; Morocco 178; Algeria 100.
Gypsum and plaster thousand tons	1,146	1,048	NA	West Germany 495; Belgium-Luxembourg 248; Netherlands 145.
Iodine	72	48	--	Romania 14; Netherlands 10; Belgium-Luxembourg 6.
Kyanite and related materials	78	166	--	Italy 51.
Lime	259,426	300,755	NA	West Germany 180,255; Belgium-Luxembourg 72,598; Guinea 23,506.
Magnesium compounds:				
Magnesite	1,989	1,532	NA	Martinique 657; Yugoslavia 40.
Oxides and hydroxides	10,814	10,890	NA	West Germany 1,993; Italy 1,925; U.S.S.R. 1,925.
Mica:				
Crude including splittings and waste	5,081	5,801	NA	United Kingdom 1,917; West Germany 1,245; Belgium-Luxembourg 447.
Worked including agglomerated splittings	887	848	NA	West Germany 283; Switzerland 171; Austria 85.
Nitrates, crude	31	3	NA	NA.
Phosphates, crude	3,804	4,953	NA	Belgium-Luxembourg 3,943; Algeria 242; West Germany 24.
Pigments, mineral:				
Natural, crude	r1,266	3,146	NA	NA.
Iron oxides and hydroxides, processed	7,057	4,421	NA	Austria 851; United Kingdom 654; Italy 640.
Potassium salts, crude	11,892	11,088	NA	Belgium-Luxembourg 6,681; Switzerland 4,394.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ..... value, thousands..	$40,890	$31,222	$2,036	Switzerland $23,242; United Kingdom $1,552; Belgium-Luxembourg $1,071.
Synthetic ..... do....	$10,536	$6,161	$640	Switzerland $3,899; West Germany $400.
Pyrite, unroasted	110	105	NA	NA.
Quartz crystal, piezoelectric kilograms..	([2])	7	NA	NA.
Salt and brine	493,741	448,765	87,383	Italy 235,819: West Germany 75,986.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	261,032	219,925	NA	Belgium-Luxembourg 45,123; Argentina 25,918; China 21,212.
Sulfate, manufactured	33,568	30,670	NA	Italy 13,153; West Germany 7,500; Belgium-Luxembourg 3,018.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	146,406	118,684	267	Belgium-Luxembourg 34,420; Switzerland 31,493; West Germany 20,436.
Worked	44,861	56,015	1,162	Belgium-Luxembourg 22,813; West Germany 13,201; Saudi Arabia 6,563.
Dolomite, chiefly refractory-grade	33,751	35,027	NA	Belgium-Luxembourg 11,399; West Germany 4,775; Spain 2,921.
Gravel and crushed rock thousand tons..	10,269	9,643	4	West Germany 5,368; Netherlands 1,102; Belgium-Luxembourg 626.
Limestone other than dimension	338,516	316,708	NA	West Germany 277,649; Belgium-Luxembourg 30,460.
Quartz and quartzite	2,603	3,447	201	United Kingdom 450; Algeria 159.
Sand other than metal-bearing thousand tons..	3,514	3,878	NA	West Germany 2,018; Switzerland 883; Italy 668.
Sulfur:				
Elemental:				
Crude including native and byproduct	687,774	678,920	NA	United Kingdom 241,597; Netherlands 118,674; Italy 64,811.
Colloidal, precipitated, sublimed	2,270	2,603	NA	Belgium-Luxembourg 584; West Germany 546; United Kingdom 378.
Dioxide	488	5,446	NA	Netherlands 4,783; Belgium-Luxembourg 445.
Sulfuric acid	156,351	239,675	NA	Belgium-Luxembourg 182,467; United Kingdom 47,821.
Talc, steatite, soapstone, pyrophyllite	75,785	82,480	699	West Germany 32,002; Belgium-Luxembourg 13,547; United Kingdom 10,296.
Vermiculite	557	2,512	NA	Belgium-Luxembourg 2,064; Egypt 95.
Other:				
Crude ..... thousand tons..	836	1,024	NA	Belgium-Luxembourg 660; Switzerland 350; West Germany 9.
Slag and dross, not metal-bearing do....	1,820	1,704	([2])	West Germany 650; Belgium-Luxembourg 608; Greece 112.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	7,238	30,776	NA	Belgium-Luxembourg 26,410; United Kingdom 3,423.
Carbon:				
Carbon black	71,081	79,382	NA	West Germany 17,861; Italy 17,003; Spain 12,591.
Gas carbon	41	1	NA	NA.
Coal:				
Anthracite	86,606	120,732	--	Belgium-Luxembourg 41,279; United Kingdom 26,199; Tunisia 21,775.
Bituminous	717,082	601,240	NA	West Germany 381,180; Norway 75,515; Greece 62,280.
Briquets of anthracite and bituminous coal	17,097	25,704	NA	Belgium-Luxembourg 12,565; United Kingdom 6,047; West Germany 4,115.
Lignite including briquets	4,630	3,397	NA	Spain 3,394.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	822,774	963,756	36,141	West Germany 244,308; Belgium-Luxembourg 131,220; Spain 92,254.
Gas, natural: Gaseous million cubic feet	9,455	27,634	NA	Belgium-Luxembourg 25,038; Austria 2,046.
Peat including briquets and litter	891	831	NA	Saudi Arabia 74.
Petroleum:				
Crude thousand 42-gallon barrels	4,264	3,179	NA	Greece 2,421; Italy 538; West Germany 219.
Refinery products:				
Liquefied petroleum gas do	8,009	7,897	750	Spain 3,376; West Germany 740.
Gasoline do	15,430	13,658	--	West Germany 3,342; Netherlands 3,059; Switzerland 2,143.
Mineral jelly and wax do	309	413	4	West Germany 162; Netherlands 99; Belgium-Luxembourg 35.
Kerosine and jet fuel do	8,592	8,888	(2)	Switzerland 2,361; West Germany 1,521; Egypt 802.
Distillate fuel oil do	23,152	20,112	224	West Germany 7,650; Switzerland 7,146; Italy 1,510.
Lubricants do	5,403	5,502	105	Belgium-Luxembourg 883; West Germany 571; United Kingdom 412.
Residual fuel oil do	26,977	24,956	--	Italy 9,901; West Germany 3,128; United Kingdom 3,041.
Bitumen and other residues do	1,480	1,175	--	West Germany 430; Switzerland 381; United Kingdom 105.
Bituminous mixtures do	211	337	(2)	United Kingdom 128; Belgium-Luxembourg 35; Italy 26.
Petroleum coke do	121	49	--	Italy 43; United Kingdom 5.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.

Table 3.—France: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	131	63	NA	NA.
Alkaline-earth metals	37	64	--	Canada 40; Austria 7.
Aluminum:				
Ore and concentrate thousand tons	1,253	1,079	NA	Guinea 750; Australia 150.
Oxides and hydroxides	80,206	91,116	2,598	Guinea 59,650; West Germany 20,179; Netherlands 5,391.
Metal including alloys:				
Scrap	59,550	60,016	394	Belgium-Luxembourg 16,863; Netherlands 13,594; West Germany 12,481.
Unwrought	351,990	394,641	1,425	Netherlands 66,298; U.S.S.R. 64,200; Norway 48,882.
Semimanufactures	215,738	217,089	1,608	West Germany 84,872; Belgium-Luxembourg 53,533; Italy 14,474.
Antimony:				
Ore and concentrate	8,844	10,273	--	Bolivia 5,228; Republic of South Africa 2,463; Morocco 971.
Metal including alloys, all forms	1,143	593	NA	China 163; Peru 110; Spain 93.
Arsenic: Metal including alloys, all forms	117	99	NA	Sweden 89.
Beryllium: Metal including alloys, all forms	29	6	5	West Germany 1.
Bismuth: Metal including alloys, all forms	197	274	NA	Belgium-Luxembourg 167; United Kingdom 51; West Germany 12.
Cadmium: Metal including alloys, all forms	618	744	NA	Belgium-Luxembourg 254; Netherlands 218; Australia 119.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	111,459	54,509	NA	Republic of South Africa 41,039; Albania 5,425; Finland 3,615.
Metal including alloys, all forms	90	276	1	United Kingdom 131; Japan 91; China 11.
Cobalt:				
Ore and concentrate	5,767	--		
Metal including alloys, all forms	1,721	1,397	162	Zaire 527; Zambia 143; Belgium-Luxembourg 134.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	20	26	10	West Germany 15.
Tantalum	55	31	17	West Germany 12; Austria 2.
Copper:				
Ore and concentrate	298	46	NA	Australia 41.
Matte and speiss including cement copper	70	64	--	All from West Germany.
Metal including alloys:				
Scrap	28,745	32,714	225	West Germany 6,338; Belgium-Luxembourg 5,739; Algeria 3,975.
Unwrought	395,175	357,266	3,730	Zambia 92,250; Chile 84,909; Belgium-Luxembourg 69,148.
Semimanufactures	182,719	164,597	1,570	Belgium-Luxembourg 55,747; West Germany 51,596; Italy 28,353.
Germanium: Metal including alloys, all forms value, thousands	$4,750	$842	$361	Belgium-Luxembourg $450.
Gold:				
Waste and sweepings do	$7,163	$5,843	$196	Switzerland $3,859; Spain $623; Netherlands $325.
Metal including alloys, unwrought and partly wrought do	$164,499	$147,459	$76,667	Netherlands $20,000; Chile $10,703.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	14,943	12,553	14	Brazil 3,280; Sweden 2,353; Australia 1,777.
Pyrite, roasted do	52	83	NA	Spain 28; Italy 24; Belgium-Luxembourg 18.
Metal:				
Scrap	273,020	306,757	354	Belgium-Luxembourg 107,288; West Germany 94,018; United Kingdom 68,734.
Pig iron, cast iron, related materials	398,673	447,270	10	West Germany 321,222; Venezuela 60,031; Canada 19,892.
Ferroalloys:				
Ferrochromium	119,203	113,135	NA	Republic of South Africa 56,158; Sweden 18,004; Finland 8,133.
Ferromanganese	29,374	22,722	--	Norway 14,102; Belgium-Luxembourg 4,694; West Germany 1,605.
Ferromolybdenum	1,269	1,445	NA	Belgium-Luxembourg 754; Austria 287; United Kingdom 127.
Ferronickel	73,555	76,983	--	New Caledonia 63,655; Dominican Republic 4,664; Greece 2,461.
Ferrosilicochromium	1,635	1,030	NA	Zimbabwe 611; U.S.S.R. 326.
Ferrosilicomanganese	30,942	27,144	--	Norway 19,134; Belgium-Luxembourg 3,744; Italy 3,454.
Ferrosilicon	29,075	26,420	--	Norway 13,790; West Germany 5,111; Italy 3,274.
Silicon metal	4,522	3,960	2	Norway 1,798; Brazil 962; Sweden 930.
Unspecified	3,246	3,045	NA	West Germany 658; United Kingdom 545; Italy 434.
Steel, primary forms thousand tons	2,098	1,979	([2])	Belgium-Luxembourg 1,102; West Germany 463; Italy 136.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	2,177	2,080	(2)	Italy 654; West Germany 544; Belgium-Luxembourg 486.
Universals, plates, sheets do	2,940	2,484	(2)	Belgium-Luxembourg 1,066; West Germany 531; Italy 369.
Hoop and strip do	375	351	(2)	West Germany 170; Belgium-Luxembourg 103; Italy 36.
Rails and accessories do	39	45	(2)	Belgium-Luxembourg 32; United Kingdom 11.
Wire do	194	189	(2)	Belgium-Luxembourg 63; West Germany 51; Italy 42.
Tubes, pipes, fittings do	583	472	2	Italy 148; West Germany 127; Belgium-Luxembourg 43.
Castings and forgings, rough do	51	45	(2)	West Germany 26; Italy 8; Belgium-Luxembourg 4.
Lead:				
Ore and concentrate	167,556	144,346	NA	Republic of South Africa 48,497; Sweden 18,889; Greenland 17,559.
Metal including alloys:				
Scrap	19,836	13,246	NA	Netherlands 5,293; Belgium-Luxembourg 3,896; Switzerland 1,030.
Unwrought	43,421	49,132	NA	Belgium-Luxembourg 17,189; West Germany 15,443; United Kingdom 11,608.
Semimanufactures	2,632	5,211	68	Belgium-Luxembourg 3,450; West Germany 1,217; United Kingdom 393.
Lithium:				
Oxides and hydroxides	520	602	145	West Germany 282; China 145.
Metal including alloys, all forms	8	8	NA	West Germany 5.
Magnesium: Metal including alloys:				
Scrap	353	176	--	West Germany 87; Italy 61.
Unwrought	4,237	5,018	1,418	Norway 3,339; United Kingdom 112.
Semimanufactures	313	236	11	Italy 141; Switzerland 24; Norway 19.
Manganese:				
Ore and concentrate, metallurgical-grade	921,816	745,625	--	Gabon 484,488; Republic of South Africa 173,484; Brazil 42,699.
Metal including alloys, all forms	1,173	1,461	--	Republic of South Africa 774; Portugal 500; Netherlands 94.
Mercury 76-pound flasks	3,046	4,960	NA	Spain 3,220; China 551; Mexico 406.
Molybdenum:				
Ore and concentrate	7,713	5,650	1,083	Canada 1,528; Chile 1,055; Mexico 900.
Metal including alloys:				
Scrap	47	49	--	Austria 16; United Kingdom 16; West Germany 13.
Unwrought	47	82	29	Austria 33; Belgium-Luxembourg 6.
Semimanufactures	72	94	9	Austria 41; United Kingdom 19; Netherlands 10.
Nickel:				
Matte and speiss	10,756	7,092	NA	New Caledonia 5,712; Australia 666; Canada 653.
Metal including alloys:				
Scrap	466	529	22	United Kingdom 319; West Germany 61; Belgium-Luxembourg 51.
Unwrought	19,498	20,552	2,393	U.S.S.R. 3,350; West Germany 3,104; Australia 2,865.
Semimanufactures	4,577	3,640	597	United Kingdom 1,352; West Germany 976; Switzerland 159.
Platinum-group metals:				
Waste and sweepings value, thousands	$15,167	$11,374	$107	West Germany $3,133; Netherlands $2,741; Algeria $1,603.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	83,678	85,830	1,049	U.S.S.R. 24,981; United Kingdom 8,408; Switzerland 6,446.
Platinum do	199,036	95,935	2,591	United Kingdom 19,019; Netherlands 13,854; Republic of South Africa 12,405.
Unspecified do	34,443	28,223	NA	Republic of South Africa 10,829; United Kingdom 8,730; Belgium-Luxembourg 4,439.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Rare-earth metals including alloys, all forms	76	75	NA	Austria 51; West Germany 15; United Kingdom 6.
Rhenium: Metal including alloys, all forms value, thousands	$37	$89	$55	NA.
Selenium, elemental	46	42	NA	Canada 18; United Kingdom 14.
Silicon, high-purity	26	153	(2)	Norway 135; West Germany 17.
Silver:				
Ore and concentrate	--	3,649	NA	Greece 3,000; Peru 297; Australia 229.
Metal including alloys, unwrought and partly wrought thousand troy ounces	18,446	15,502	821	Mexico 2,061; United Kingdom 1,821; Switzerland 1,662.
Tellurium, elemental	10	9	NA	Belgium-Luxembourg 4; United Kingdom 3.
Tin: Metal including alloys:				
Scrap	29	75	--	Switzerland 44; Italy 22.
Unwrought	8,557	8,044	30	Malaysia 2,152; Indonesia 1,777; Thailand 1,215.
Semimanufactures	177	148	NA	West Germany 65; Italy 30; Netherlands 13.
Titanium:				
Ore and concentrate	153,859	178,321	NA	Canada 61,049; Australia 43,610; Republic of South Africa 24,098.
Oxides	13,920	14,182	4,856	Netherlands 3,268; West Germany 2,846; Belgium-Luxembourg 1,782.
Metal including alloys:				
Scrap	87	208	36	Japan 95; West Germany 25; United Kingdom 21.
Unwrought	1,374	192	15	Japan 135; West Germany 27.
Semimanufactures	1,435	1,374	292	Japan 571; West Germany 285; United Kingdom 144.
Tungsten:				
Ore and concentrate	818	277	--	Canada 102; China 75; Portugal 60.
Metal including alloys:				
Scrap	122	116	--	Sweden 43; Israel 36; United Kingdom 22.
Unwrought	177	119	3	West Germany 79; Belgium-Luxembourg 14; Austria 10.
Semimanufactures	66	86	3	Austria 33; Belgium-Luxembourg 17; West Germany 12.
Uranium and/or thorium:				
Ore and concentrate	7,254	13,639	398	Australia 11,998; China 717; Malaysia 496.
Metal including alloys, all forms:				
Uranium	11,917	10,044	--	Niger 4,646; Republic of South Africa 1,872; Gabon 1,295.
Thorium -- value, thousands	$17	$5	--	NA.
Vanadium:				
Ore and concentrate	117	--		
Metal including alloys:				
Scrap	3	--		
Unwrought	82	29	--	All from West Germany.
Semimanufactures value, thousands	$19	$42	NA	NA.
Zinc:				
Ore and concentrate	476,239	583,938	--	Canada 159,415; Peru 116,297; Ireland 63,003.
Blue powder	1,033	4,653	NA	Belgium-Luxembourg 3,737; Netherlands 707; West Germany 169.
Matte	2,894	4,399	NA	Belgium-Luxembourg 2,020; United Kingdom 1,035; West Germany 946.
Metal including alloys:				
Scrap	5,433	7,154	NA	Belgium-Luxembourg 4,879; Netherlands 1,061; West Germany 312.
Unwrought	78,804	79,344	NA	Belgium-Luxembourg 33,640; Netherlands 23,062; West Germany 8,765.
Semimanufactures	8,650	8,516	NA	West Germany 4,394; Italy 1,824; Belgium-Luxembourg 1,127.
Zirconium:				
Ore and concentrate	32,115	34,935	214	Australia 23,914; Republic of South Africa 10,246; West Germany 346.
Metal including alloys:				
Scrap	37	92	67	West Germany 24.
Unwrought	11	1	NA	NA.
Semimanufactures	18	16	5	West Germany 6.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	26,822	15,375	692	Turkey 6,650; West Germany 3,131; Italy 3,019.
Artificial:				
Corundum	6,163	6,107	236	West Germany 3,749; Austria 1,411.
Silicon carbide	17,540	13,922	63	Norway 4,967; Italy 1,488; Spain 1,440.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	45	26	NA	Ireland 8; Republic of South Africa 5; Belgium-Luxembourg 4.
Grinding and polishing wheels and stones	9,942	9,584	280	Italy 2,749; West Germany 1,749; Belgium-Luxembourg 1,355.
Asbestos, crude	83,639	76,265	58	Canada 39,957; U.S.S.R. 18,937; Italy 9,699.
Barite and witherite	18,884	18,543	NA	West Germany 11,854; Morocco 4,297; Netherlands 1,027.
Boron materials:				
Crude natural borates	123,847	115,571	73,693	Turkey 41,334; Netherlands 484.
Elemental	3	2	(2)	Mainly from West Germany.
Oxides and acids	1,257	1,530	--	Italy 1,110; Turkey 254; United Kingdom 93.
Bromine	4,209	4,479	NA	Israel 3,203; United Kingdom 763; East Germany 330.
Cement	391,742	395,415	NA	Belgium-Luxembourg 359,715; West Germany 23,819.
Chalk	45,118	48,466	--	West Germany 33,719; Belgium-Luxembourg 12,676.
Clays, crude:				
Bentonite	99,081	89,298	16,496	Italy 34,414; Greece 25,352; West Germany 7,173.
Chamotte earth	6,573	6,000	352	West Germany 4,490; Belgium-Luxembourg 899.
Kaolin	303,345	325,242	44,495	United Kingdom 229,831; West Germany 21,259; Czechoslovakia 16,261.
Unspecified	235,748	223,039	2,726	West Germany 167,284; Senegal 32,222; United Kingdom 14,669.
Cryolite and chiolite	675	724	NA	Denmark 723.
Diamond:				
Gem, not set or strung thousand carats	1,109	559	4	Belgium-Luxembourg 238; India 118; Switzerland 55.
Industrial stones do	695	489	13	Ireland 162; Belgium-Luxembourg 156; Republic of South Africa 76.
Dust and powder kilograms	11,577	957	569	Republic of South Africa 249; Switzerland 69.
Diatomite and other infusorial earth	8,709	9,816	3,658	West Germany 2,664; Spain 2,412.
Feldspar, fluorspar, related materials:				
Feldspar	18,844	19,353	NA	West Germany 14,715; Portugal 2,240; Spain 1,020.
Fluorspar	1,571	1,535	NA	West Germany 442; United Kingdom 376; Italy 365.
Unspecified	45,282	49,841	NA	Norway 47,987; Canada 1,829.
Fertilizer materials:				
Crude, n.e.s	31,338	26,715	NA	Belgium-Luxembourg 17,711; Italy 3,890; West Germany 1,639.
Manufactured:				
Ammonia thousand tons	186	212	--	United Kingdom 55; U.S.S.R. 43; Trinidad and Tobago 36.
Nitrogenous do	2,168	2,295	54	Netherlands 1,100; Belgium-Luxembourg 778; Romania 88.
Phosphatic do	538	578	46	Netherlands 144; Belgium-Luxembourg 140; Tunisia 139.
Potassic do	356	852	NA	Israel 170; Spain 132; Belgium-Luxembourg 129.
Unspecified and mixed do	1,748	1,711	98	Belgium-Luxembourg 840; Netherlands 309; West Germany 220.
Graphite, natural	4,677	3,662	NA	China 1,455; Madagascar 583; Italy 484.
Gypsum and plaster	33,298	33,346	88	Switzerland 12,138; Spain 9,694; West Germany 5,520.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Iodine	1,032	1,122	23	Japan 600; Chile 320; Czechoslovakia 170.
Kyanite and related materials	3,187	3,741	1,787	West Germany 654; Republic of South Africa 412; United Kingdom 292.
Lime	102,194	104,449	NA	West Germany 72,281; Belgium-Luxembourg 11,063; United Kingdom 7,639.
Magnesium compounds:				
Magnesite	79,567	95,970	3,610	Spain 36,148; Greece 24,778; Austria 7,540.
Kieserite	89,813	76,152	NA	West Germany 43,461; East Germany 28,128; Netherlands 4,012.
Mica:				
Crude including splittings and waste	5,464	2,253	619	India 1,056; Canada 155.
Worked including agglomerated splittings	184	197	NA	Belgium-Luxembourg 62; Switzerland 47; China 24.
Nitrates, crude	9,486	6,032	NA	Chile 5,999.
Phosphates, crude ___ thousand tons	4,455	4,516	806	Morocco 1,691; Israel 612; Togo 380.
Phosphorus, elemental	697	701	NA	Italy 456; West Germany 176.
Pigments, mineral:				
Natural, crude	611	595	NA	Spain 230; Austria 145.
Iron oxides and hydroxides, processed	33,132	30,288	417	West Germany 24,531; Belgium-Luxembourg 1,941; Italy 1,211.
Precious and semiprecious stones other than diamond:				
Natural _____ value, thousands	$101,898	$73,989	$3,570	Switzerland $39,491; Thailand $10,607; India $4,709.
Synthetic ____do	$3,014	$1,902	$346	Switzerland $603; West Germany $211; Mauritius $196.
Pyrite, unroasted	1,429	1,028	NA	Italy 890.
Quartz crystal, piezoelectric kilograms	6	1	NA	NA.
Salt and brine	169,353	162,837	NA	Belgium-Luxembourg 63,620; Netherlands 38,331; West Germany 25,131.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	58,821	54,549	NA	Poland 25,776; West Germany 20,511; Bulgaria 3,379.
Sulfate, manufactured	37,605	59,118	--	Belgium-Luxembourg 43,650; Spain 8,639; West Germany 2,510.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	276,196	282,623	--	West Germany 68,340; Republic of South Africa 63,133; Italy 40,481.
Worked	251,072	244,045	12	Spain 140,488; Italy 68,742; West Germany 21,475.
Dolomite, chiefly refractory-grade	331,597	331,324	NA	Belgium-Luxembourg 254,590; West Germany 53,007; Italy 17,971.
Gravel and crushed rock thousand tons	4,201	3,589	NA	Belgium-Luxembourg 3,143; United Kingdom 214; Spain 74.
Limestone other than dimension	201,057	162,292	NA	Belgium-Luxembourg 162,008.
Quartz and quartzite	50,532	157,499	548	Belgium-Luxembourg 102,260; Spain 44,238; Italy 6,887.
Sand other than metal-bearing thousand tons	2,041	2,053	([2])	Belgium-Luxembourg 1,037; United Kingdom 802; Netherlands 158.
Sulfur:				
Elemental:				
Crude including native and byproduct	459,342	537,987	15,143	Poland 302,748; Canada 154,211; West Germany 31,730.
Colloidal, precipitated, sublimed	111	68	NA	NA.
Sulfuric acid	152,905	135,805	NA	West Germany 105,225; Belgium-Luxembourg 28,654.
Talc, steatite, soapstone, pyrophyllite	18,908	23,217	612	Italy 12,317; Belgium-Luxembourg 2,735; Spain 2,659.
Vermiculite, perlite, chlorite	70,255	71,219	NA	U.S.S.R, 26,505; Greece 17,687; Republic of South Africa 15,779.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	15,180	1,755	699	NA.
Carbon: Carbon black	72,066	72,901	1,823	Netherlands 34,984; West Germany 25,765; Italy 4,166.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite thousand tons	1,054	1,177	69	West Germany 416; Republic of South Africa 363; United Kingdom 167.
Bituminous do	20,802	18,592	4,336	Republic of South Africa 4,248; West Germany 3,414; Poland 2,481.
Briquets of anthracite and bituminous coal do	168	152	--	West Germany 92; Republic of South Africa 49.
Lignite including briquets do	146	129	--	West Germany 127; East Germany 2.
Coke and semicoke do	1,697	1,408	NA	West Germany 1,081; Netherlands 213; Belgium-Luxembourg 114.
Gas, natural:				
Gaseous million cubic feet	497,595	518,939	NA	Netherlands 278,218; U.S.S.R. 117,344; Norway 84,437.
Liquefied thousand tons	6,171	5,998	NA	Algeria 5,997.
Peat including briquets and litter	158,162	149,979	NA	West Germany 83,457; U.S.S.R. 26,616; Netherlands 23,251.
Petroleum:				
Crude thousand 42-gallon barrels	563,149	508,401	--	Saudi Arabia 107,186; Nigeria 62,894; United Kingdom 62,752.
Refinery products:				
Liquefied petroleum gas do	83,734	10,104	764	United Kingdom 3,009; Saudi Arabia 1,742; Algeria 1,236.
Gasoline do	48,306	45,479	182	Italy 8,285; Netherlands 6,660; U.S.S.R. 6,454.
Mineral jelly and wax do	159	163	16	West Germany 58; Netherlands 36.
Kerosine and jet fuel do	933	486	75	Spain 250; Netherlands 83.
Distillate fuel oil do	40,865	44,709	463	U.S.S.R. 10,099; United Kingdom 10,089; Algeria 7,910.
Lubricants do	1,191	854	47	Italy 166; Belgium-Luxembourg 161; Netherlands 149.
Residual fuel oil do	56,012	50,438	1,295	U.S.S.R. 6,638; Kuwait 5,571; Netherlands 3,553.
Bitumen and other residues do	316	903	121	Belgium-Luxembourg 537; West Germany 117.
Bituminous mixtures do	64	59	1	Belgium-Luxembourg 30; Netherlands 8; West Germany 6.
Petroleum coke do	8,017	13,151	11,970	United Kingdom 429; West Germany 370.

NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Bauxite production, mostly from mines operated by Aluminium Pechiney S.A., remained at about the same level as in the past. However, results of exploration in the Var District, the major bauxite producing area in France, were disappointing. Available reserves in Var may sustain present production for only another 5 years.

The alumina plant at Salindres, in Gard Province, owned by Pechiney, was closed. At yearend, France had two alumina plants left in operation: one at Gardanne with a capacity of 680,000 tons of alumina per year and the other at La Barasse with a capacity of 360,000 tons per year. Both are in Bouches-du-Rhône Province and both were operated by Pechiney.

Copper.—Exploration of copper continued at a polymetallic deposit at Chessy in Rhône Province and at a sulfide deposit at Rouez, Sarthe Province. At Chessy, detailed exploration by Compagnie Française des Mines S.A. (Coframines) tended to confirm results obtained by drilling. Apparently the deposit contains 3 to 4 million tons of ore averaging 3%. In addition, the deposit at Chessy contained 7% zinc. Exploration continued on the Rouez deposit by the BRGM and the Société Nationale Elf Aquitaine.

Gold.—At the Salsigne Mine at Aude, in Aude Province, operated by the Société des Mines et Produits Chimiques de Salsigne, implementation of a program of modernization of the flotation plant, metallurgical installations, and the sulfuric acid plant continued.

Iron and Steel.—The reorganization of the steel industry continued. Progress was slow and a variety of divergent interests had to be reconciled. The plan envisaged merger of the two largest nationalized companies, Usinor and Société Aciéries et Laminoirs de Lorraine (Sacilor). The first steps were taken during 1984 by the formation of two companies, Unimetal for long steel and Ascometal for special steel.

At Usinor's plant near Dunkerque, automation of the sinter plant was introduced, and measurements and on-line control were computerized. At the same plant, injection of powdered coal into the blast furnace was introduced. Capacity of the equipment for crushing, screening, drying, and injection was for a maximum of 120 kilograms of coal per ton of hot metal; at blast furnace No. 4, a radial turbine with an alternator was installed for recovery of the counter pressure energy of the top gas. About 9,000 to 10,000 kilowatts were recovered for a 560,000-cubic-meter flow at differential pressure of two bars; an installation for recovery of converter gas went on-stream at Dunkerque's plant No. 2. A machine for continuous casting was installed at the Les Dunes works of Usinor using a 75-ton steel ladle furnace. The casting machine has four strands for rounds 160 to 325 millimeters. Installation for automatic width control on the hot-strip mill at Dunkerque went onstream. A Steelmor system for slow cooling started operation in the mill at the Neuve Maisons works. At Sacilor, consumption of fuel for hot metal production went down from 548 kilograms per ton of hot metal in 1983 to 511 kilograms. Sollac's Saint Agathe plant, a new electrolytic zinc line, went onstream. The fully automated line was 210 meters long and was based on the Carodell process of the United States Steel Corp. The line produced a cold-rolled sheet continuously electrogalvanized on one side.

Magnesium.—Production continued to increase. The only producer of magnesium was a plant at Marignac, Province of Haute Garonne, operated by the Société Française d'Electrometallurgie (SOFREM), which produces magnesium from dolomite by the electrothermal process. Magnesium powder was produced at a plant at Liancourt, Province of Oise, by Société des Poudres Metalliques de Senecourt. A plant operated by Compagnie Européenne du Zirconium at Montreuil-Juigne, Province Maine-et-Loire, produced magnesium wire.

Tungsten.—Tungsten ore in France was produced by two mines; the Salau, in Ariège, operated by the Société Minière d'Anglade, and the Favière in Var, operated by the Société de Travaux Public Gagneraud. The Salau Mine was the principal producer of tungsten in France and one of the largest in Europe. Tungsten metal and powder were produced in the following plants: Veurey in Isère Province by Alliages Frittes, a wholly owned subsidiary of Pechiney; Grenoble, in Isère Province; Bourg en Bresse in Ain Province; Epinhouse in Drôme Province, operated by Eurotungsten-Poudres, which was owned by the Société Minière d'Anglade (50%), Sandvik (35%), and Pechiney (15%), and in a plant at Saint Pierre en Faucigny in Haute-Savoie Province. Ferrotungsten was also produced in plants at Saint Beron in Savoie Province, with a capacity of 900 tons of ferrotungsten per year, owned by SOFREM; and at Saint Chely d'Apacher, Lozère Province, capacity 300 tons per year, operated by Creusot Loire S.A. The ferrotungsten producing sector remained depressed, and demand in 1984 was 27% lower than that of 1980.

Other Metals.—Reportedly the Echassieres deposit at Allier contained significant quantities of tin, oxides of tantalum, lithium, and columbium. The Echassière deposit might be developed and an opencast mine would then produce complex ores from which, in an appropriate installation, tin, tantalum, and lithium could be recovered. BRGM, Coframines, and the Société Minière et Métallurgique de Penarroya have jointly conducted a feasibility study on development and future production from Echassière.

NONMETALS

Barite.—Four companies, Société Barytine de Chaillac S.A., Mines Haut du Them, Société Industrielle du Centre S.A., and the Société des Produits Chimiques de Viviez S.A., produced barite during 1984. The largest producer was Chaillac, with mine and plant at Chaillac, which accounted for about 72% of the total barite output of France. During 1984, improvements in the flotation plant at Chaillac resulted in better recovery. In addition, the company reclaimed 4 hectares of mined areas, reportedly increasing the value of the land.

The other important producer was Viviez, which produced about 45,000 tons of barite from its mine and plant at Lacan at Bertholene, Aveyron Province. Underground output was 86% of the total company production. The other two producers recovered barite as a byproduct and output was small.

Clays.—Exploration under the French program "Inventory of Metropolitan Mineral Resources" resulted in the discovery of the Puceul attapulgite deposit, about 30 kilometers north of Nantes. The attapulgite beds are found in late Bartonian-early Stampian clays, at the contact between the green sandy clays and the upper light-green clays, in small fault bounded depressions. The fiber content of the clays was about 60% to 70%. Preliminary results indicated that this material may be used in the manufacture of absorbent granules.

Fluorspar.—As in the past, France produced various grades of fluorspar from a number of mines and plants. At the Fosante Mine, Province of Var, preparation was underway for mine closure in 1986. Société d'Entreprises Carrières et Mines d'Esterel announced that the reserves at the mine were nearly exhausted and that exploration in the vicinity of the mine was negative.

The Société Général de Recherches et d'Exploitations Minières reported output from its mines at Montroc and Tarn to be 170,000 tons of ore, approximately 50,000 tons more than the production in 1983, but with a lower grade than in 1983.

The mine at Burg, Tarn Province, operated by Pechiney, increased its production from 30,900 tons in 1983 to 38,600 in 1984. Most of the increase resulted from production from the new level 200.

After a strike that lasted about 1 year, production restarted in April 1984 at the Rossignol Mine in Indre Province.

Sulfur.—France was still a significant producer of sulfur during 1984, but production continued to decline. The largest producer was at Lacq, where sulfur was recovered from natural gas. At Lacq, production continued to decline as a result of depletion of the gasfield. In addition, lesser quantities of sulfur were recovered from petroleum refining as less crude oil was refined.

The Lacq natural gas installation, with facilities for recovery of sulfur, had a capacity to treat 33 million cubic meters per day of natural gas and recover about 1.95 million tons of sulfur per year. Lacq had storage area for about 12,000 tons of liquid sulfur and 2 million tons of solid sulfur. During 1984, France sold more sulfur than it produced; the difference came from stocks at Lacq. Although sulfur production should decline, stocks at Lacq were adequate to sustain sales at present levels for another 5 to 6 years.

Talc.—Despite difficulties on the talc market, results achieved by the sole French talc producer, Talcs de Luzenac S.A., with a mine at Trumouns, Province of Ariège, were considered satisfactory. Sales increased 2.1%. Sales on the French market were lower than in 1983 while exports increased 11%. Most of the export increase resulted from activities of American French Talc, the representative in the United States. At the mine in Trumouns, ore for a full year of operation of the mill was produced, despite a long winter shutdown. At the mill, capacity for the production of fines was increased, and automation of the production line continued.

MINERAL FUELS

The French Government continued to pursue its energy policy of reducing dependence on imported fuels and to improve the reliability of supplies by diversifying imports by source and by type. The French domestic energy sector was small, and production of energy was well below the needs of the country. Large-scale developments of nuclear energy and strong emphasis on conservation remained the two major elements of the Government's energy policy. Results have been substantial, and during the past 10 years, while the gross national product grew about 25%, primary energy consumption increased by under 5%. Rapid growth of domestic energy production, which almost doubled, was due largely to rapid growth of nuclear generation of electricity. During 1984, France consumed about 192 million tons of oil equivalent, but domestic production was only 81 million tons, or 42% of consumption. The largest energy source in France was oil, about 87 million tons of oil equivalent, followed by nuclear power with 43 million tons and coal with 25 million tons.

Coal.—The production of coal, again lower than in previous years, had decreased by about 500,000 tons compared with output in 1983.

The French national company, Charbonnages de France, was preparing for a large reduction in employment and closing the less efficient mine and plants. A plan was approved for the coming 5 years that may involve elimination of some 5,000 to 6,000 jobs per year, or a total of between 25,000 and 30,000 jobs, compared with present employment of about 57,000 persons. Production of coal should decline from the present 19 million tons between 10 and 13 million tons by 1988. In the Nord-Pas-de-Calais area, only two mines would remain in operation after 1988. In Lorraine, the most profitable coal-producing areas, three installations were reported to be in danger of closure. In the Centre-Midi region one mine and two plants were slated for ending production.

Petroleum.—The petroleum industry, both exploration and production, had a relatively good year in 1984, although domestic production was only slightly over 40,000 barrels per day. In active fields, 88 wells were drilled.

The Paris Basin was the principal region where new discoveries were made. In the area of Melun, wells at Blandy and Sivry extended discoveries that were made recently. A positive well at Saint Germain, located in the western part of the permit area, was 2,250 meters deep. In the Brie permit area, the Charmotte well made a discovery in Triassic formations; depth of the pay zone was reported at 2,590 meters.

Discoveries in the Paris Basin led to domestic production increasing above 15 million barrels per year. The decline in gas production continued. Significant new discoveries of gas were not made during the year, and the downward trend in gas production could thus continue. French consumption of petroleum products declined by 4% when compared with that of 1983. At the beginning of 1984, the total capacity of all petroleum refineries was 2,426,000 barrels per day, a drop of about 400,000 barrels per day when compared with that of 1983. At La Mede refinery, capacity declined from 188,000 barrels to 134,000 barrels per day; at the Berre refinery, capacity declined from 270,000 barrels to 130,000 barrels per day; at the Petit-Couronne refinery, capacity declined from 280,000 barrels to 214,000 barrels per day; and the refinery at Gargenville, with a capacity of 122,000 barrels per day, was closed. Construction continued on an installation for catalytic cracking with a capacity of 20,000 barrels per day at the Lavera refinery, and on two visobreak units at the Gonfreville and Donges refineries with a capacity of 20,000 barrels per day each.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary values have been converted from French francs (F) to U.S. dollars at the rate of F8.7=US$1.00, the average for 1984.

The Mineral Industry of Gabon

By Ben A. Kornhauser[1]

In sub-Saharan Africa, Gabon was the third largest oil producer after Nigeria and Angola, the second largest source of manganese, and fourth most important uranium exporter. Oil continued to fuel the country's economy, providing about $833 million, which amounted to 50% of the gross domestic product.[2] Oil financed the development budget of $659 million and represented about 65% of Government revenues. About $259 million was allocated to the Trans-Gabon Railroad, and $10 million was projected for mining development. Purchasers of Gabon's manganese ore included China, Japan, and the U.S.S.R.

The Tenneco Oil Co. of Gabon Inc. struck oil 20 miles offshore in its first test on the 250,000-acre block that it acquired in 1981. The Tenneco Group made a second discovery later, 15 miles from the earlier strike. Private investment in 1984 was estimated to be $625 million, reflecting a significant increase in investment by oil companies Tenneco and Amoco Gabon Exploration Co., which were new to Gabon.

PRODUCTION AND TRADE

With the decrease in the price of oil, growth in most sectors was minimal because oil accounted for about 85% of the value of Gabon's exports. Manganese and uranium production generated $93 million and $56 million, respectively. Although prices of manganese and uranium fell during 1984, the drop was offset by the 11% increase in the value of the dollar to the Communauté Financière Africaine francs. Petroleum, manganese, and uranium were traded in dollars. The country had the highest per capita income in sub-Saharan Africa, about $3,000.

Oil production rose about 4% over Gabon's quota for the Organization of Petroleum Exporting Countries (OPEC) and was expected to rise more sharply in the near future because of reported oil strikes. Manganese production also was expected to rise somewhat owing to the U.S.S.R. and China purchases. Uranium production was expected to remain at current levels. The Trans-Gabon Railroad upon its completion to Franceville in 1986 was expected to transport manganese and uranium ore to Gabon ports for export. Since the aerial tramway and the Congo State Railroad to Pointe Noire, Congo, were used now and had been amortized, shifting to the Trans-Gabon Railroad would be more costly, at least initially.

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

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic metric tons	109,430	149,913	175,103	120,000	207,916
Diamond, gem and industrial carats	557	550	[e]550	[e]550	550
Gas, natural:					
Gross million cubic feet	[e]58,000	66,073	66,275	[e]66,300	74,484
Marketed do	2,538	2,684	2,304	[e]4,800	4,800
Gold, mine output, metal content troy ounces	553	[e]550	[e]550	[e]550	1,325
Manganese:					
Ore, gross weight (50% to 53% Mn) metric tons	2,044,049	1,359,954	1,406,000	1,761,752	2,011,585
Pellets, battery- and chemical-grade, gross weight (82% to 85% MnO_2) do	102,703	127,584	105,000	94,834	91,283
Total do	2,146,752	1,487,538	1,511,000	1,856,586	2,102,868
Petroleum:					
Crude thousand 42-gallon barrels	64,444	[r]55,439	56,453	56,815	61,582
Refinery products:					
Gasoline do	886	648	502	613	490
Jet fuel and kerosine do	1,391	728	721	721	703
Distillate fuel oil do	2,545	4,117	[e]2,246	1,566	1,465
Residual fuel oil do	4,140	2,182	[e]3,583	[e]2,705	1,285
Other do	142	752	[e]717	66	129
Refinery fuel and losses do	14	20	[e]282	[e]193	148
Total do	9,118	8,447	8,051	5,864	4,220
Uranium oxide (U_3O_8), content of concentrate metric tons	1,218	[r]1,604	976	1,006	1,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 20, 1985.
[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 of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982: United States	Destinations, 1982: Other (principal)
Barite and witherite	--	53	--	All to Angola.
Clays, crude	202	--		
Copper: Metal including alloys, scrap	215	108	--	Belgium-Luxembourg 51; France 39; Ivory Coast 18.
Iron and steel: Metal: Semimanufactures, tubes, pipes, fittings	188	3	--	Mainly to France.
Lead: Metal including alloys, unwrought	55	39	--	Belgium-Luxembourg 19; France 19.
Manganese: Ore and concentrate:				
Metallurgical-grade:				
Quantity thousand tons	1,548	[2]1,419	28	France 320; Norway 208; Italy 194.
Value thousands	$89,790	$79,949	$1,440	France $18,018; Italy $8,259; Norway $7,913.

[1]Table prepared by Virginia A. Woodson.
[2]Data presented under "Destinations" are imports reported by that country.

Table 3.—Gabon: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	178	--		
Semimanufactures	696	674	198	France 456; West Germany 15.
Copper: Metal including alloys, semimanufactures	53	75	1	France 73.
Iron and steel: Metal:				
Scrap	57	--		
Ferroalloys	385	235	--	West Germany 210; France 25.
Semimanufactures:				
Bars, rods, angles, shapes, sections	15,120	14,169	256	France 10,058; West Germany 953; Spain 628.
Universals, plates, sheets	5,117	5,859	7	France 3,019; Belgium-Luxembourg 1,632.
Hoop and strip	138	158	--	France 79; West Germany 43; United Kingdom 35.
Rails and accessories	149	880	--	France 862.
Wire	337	795	--	Belgium-Luxembourg 610; France 177.
Tubes, pipes, fittings	37,704	42,487	816	France 15,928; Japan 13,419; West Germany 10,803.
Lead: Oxides	15	21	--	All from France.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$18	$12	--	France $11; Switzerland $1.
Titanium: Oxides	99	103	--	France 101.
Zinc: Metal including alloys, semimanufactures	49	89	--	France 77; Netherlands 12.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	40	58	--	France 36; Italy 9.
Cement	22,891	23,104	766	Belgium-Luxembourg 11,682; France 8,021.
Chalk	699	386	--	All from France.
Clays, crude	2,437	7,125	744	Spain 2,312; Italy 1,364; Senegal 1,228.
Diatomite and other infusorial earth	132	354	192	France 129; West Germany 17.
Fertilizer materials:				
Crude, n.e.s	651	595	--	West Germany 412; Netherlands 133.
Manufactured:				
Ammonia	32	17	--	France 12; West Germany 2.
Nitrogenous	1,714	1,782	272	Netherlands 646; Belgium-Luxembourg 631.
Phosphatic	569	444	374	Belgium-Luxembourg 69.
Potassic	1,254	1,098	3	Netherlands 569; West Germany 520.
Unspecified and mixed	187	655	--	Netherlands 564; France 91.
Lime	978	2,640	5	France 1,035; Belgium-Luxembourg 722; Netherlands 463.
Magnesite	394	197	--	All from United Kingdom.
Mica: Crude including splittings and waste	64	38	--	France 24; United Kingdom 14.
Phosphates, crude	10	3	--	All from Senegal.
Pigments, mineral: Iron oxides and hydroxides, processed	15	8	--	France 6; West Germany 2.
Salt and brine	7,876	9,051	5	Netherlands 4,683; Senegal 2,557; West Germany 1,269.
Sodium compounds, n.e.s.: Sulfate, manufactured	803	983	1	Netherlands 535; France 406.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	132	20	--	France 17; Portugal 3.
Worked	364	108	--	Italy 82; France 25.
Dolomite, chiefly refractory-grade	313	442	--	France 422.
Gravel and crushed rock	40	290	--	France 274; Spain 16.
Quartz and quartzite	22	11	--	All from France.
Sand other than metal-bearing	1,904	228	14	France 213.
Sulfur:				
Elemental: Crude including native and byproduct	4,936	7,849	--	France 5,176; Italy 2,672.
Sulfuric acid	98	--		
Talc, steatite, soapstone, pyrophyllite	95	56	--	All from France.

See footnotes at end of table.

Table 3.—Gabon: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	22	42	--	All from France.
Carbon: Carbon black	27	1	--	Do.
Coal: Briquets of anthracite and bituminous coal	232	38	--	Do.
Petroleum:				
Crude .... 42-gallon barrels	7,236	5,760	--	Do.
Refinery products:				
Liquefied petroleum gas .... do	441	1,693	--	France 1,357; Italy 290.
Gasoline, motor .... do	35,675	14,884	--	Argentina 7,803; Netherlands Antilles 7,064.
Mineral jelly and wax .... do	--	8	--	All from France.
Kerosine and jet fuel .... do	45,648	(2)	NA	NA.
Distillate fuel oil .... do	13,540	--		
Lubricants .... do	32,186	34,643	476	France 32,697.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $400,000.

COMMODITY REVIEW

METALS

Gold.—Prospecting for gold continued in the Ovala and Domdo Mobi sectors of the Eteke region. Gold-bearing quartz also had been found by the Compagnie Minière de l'Ogooue S.A. (COMILOG) in the Sud-Moanda region for which it had prospecting rights.

Manganese.—The Government of Gabon increased its holdings in COMILOG by acquiring 10% of Imetal S.A.'s share in the company. After the transaction, the shareholdings were as follows: United States Steel Corp., 36%; the Gabon Government, 29%; Compagnie Française des Mines, 17.5%; Société Auxiliare du Manganese de Franceville, 7.5%; Elkem A/S, 6%; Imetal, 3%; and private Gabonese interests, 1%. Sales of manganese ore included 59,175 tons to Japan, 119,453 tons to the U.S.S.R., and 183,074 tons to China. This was China's first known direct purchase from Gabon. COMILOG decided not to appeal a French tribunal award of the ownership of Bozel Electrometallurgie S.A. of Nobel Bozel S.A. to Pechiney. In return, COMILOG received a commitment from Pechiney for increased purchases of manganese ore beyond the current 100,000 tons per year.[3]

MINERAL FUELS

Petroleum.—In 1984, oil production averaged 157,000 barrels per day (bbl/d). This production level exceeded the OPEC quota of 150,000 bbl/d. The Government encouraged exploration by a large number of private companies and planned to award future exploration rights through a competitive bidding procedure instead of negotiating individual contracts. A standardized production-sharing agreement that would be used as the basis for accepting bids was expected to increase Gabon's total receipts from oil revenues to 80% to 85% of profits, depending on oil production so that they would be close to OPEC's norm.

Tenneco discovered oil at the Obando Marin 1 well, 20 miles offshore in 160 feet of water. The wildcat well was located 30 miles seaward of Port Gentil and flowed 2,400 bbl/d of 36° gravity oil through a one-half-inch choke with 1,131 pounds tubing pressure from Upper Cretacous sands at 8,632 to 8,678 feet. The test was the first on the 250,000-acre block that was acquired in 1981. The acreage concession was close to that of the Essence et Lubrificants de France (ELF)-Gabon Oil Co.'s Torpille Field, which had pipeline connections to the main export system in the area. Tenneco, the operator, held a 50% interest in the Obando Marin 1 block with Conoco Petroleum Ltd., a unit of the E. I. du Pont de Nemours & Co. Inc., and the London & Scottish Marine Oil PLC., each holding a 25% interest.[4] The Tenneco Group made a second discovery, Tenneco Octopus Marin 1, which was 15 miles north of the earlier Obando Marin 1.

[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Communauté Financière Africaine francs (CFAF) to U.S. dollars at the rate of CFAF425=US$1.00. The official CFAF exchange rate was maintained at 50CFAF per French franc and was freely convertible.

[3]Metal Bulletin (London). No. 6933, Oct. 30, 1984, p. 21.

[4]Oil & Gas Journal. V. 82, No. 15, Apr. 19, 1984, p. 64.

The Mineral Industry of the German Democratic Republic

By George A. Rabchevsky[1]

The year 1984 marked 35 years of the establishment of the German Democratic Republic (GDR), and the Government claimed that economically it was also the most successful.

The mineral industry was an important contributor to this growth, as it was in all previous years. The potash, coal, and mining machinery industries were the most active of all, with industrial minerals, steel, and a few nonferrous metals producers also contributing to the economy. Much of the GDR's mineral industry continued to rely on mineral processing, based for the most part on raw materials stocks imported from other Council for Mutual Economic Assistance (CMEA) member countries, especially the U.S.S.R. Nevertheless, the GDR's press ran articles claiming that the GDR could meet 90% by volume of its needs for raw materials from its own production. However, because the country's primary raw material base was by nature rather one sided, the GDR had to meet about 60% by value of its need for primary mineral raw materials and fuels from imports.[2]

The GDR in 1984 reportedly returned to a 5.5% growth rate in the national income; the standard of living, however, apparently stagnated or worsened. Consumption of goods, including industrial products, also slowed down considerably.

Despite the official claims that 1984 was the most successful year in the history of the GDR, the mineral industry apparently did not fare well. By some estimates, metal production, mostly steel, increased by 9.5%.[3] Industry, including the minerals processing, claimed to have contributed 70% of the increase in the national income, thus the largest such contributor of all other industries. The pressure on GDR's industry to perform was intensified; for instance, about 30% of all industrial combines (enterprises) were reportedly working on three shifts, but productivity continued to remain low.[4]

About $20 billion[5] was invested in the national economy according to official statements. The mineral industry's share of investments in rationalization increased to 57%. Expenditures by the Government in the exploration for new indigenous resources, especially energy, was also being increased. At least 250,000 meters are drilled annually, for example, for the exploration of lignite deposits alone. As a result, even the areas of Potsdam, Neubrandenburg, and Schwerin, which lie outside the traditional mining regions, have been investigated. Natural gas production, which began to expand in the GDR in the mid-1970's, was also investigated in 1984, with the assistance of Soviet geologists.

PRODUCTION

Despite the official claims of industrial production increases of 4.3% to 5.3% and of labor productivity increases of 5% to 7.6%, at least in the mineral industry, the output was erratic. Approximately 90% of the increase in national income resulted reportedly from increased industrial productivity. The overall labor productivity increased 7.7%, in part owing to the claimed introduction of modern technology and new products. The extractive raw materials sector either stagnated at the 1980 levels or declined. This pertained even to potash and coal output, traditionally the stalwarts of the

GDR's mining industry.

Increases in the national economy and on production lines were claimed to have been achieved despite a reduction of approximately 5% in the consumption of energy and raw materials. The 1984 national economic plan fulfillment report also stated that the utilization of production equipment improved and that equipment was modernized on a large scale. More than one-third of industrial equipment was less than 5 years old. In the mineral industries, this seemed unlikely, however, even though some steel plants were upgraded. According to the same report, 3,270 new products were introduced by the metals industry. A total of 43,000 robots were in use in the GDR's mining and metals manufacturing industry in 1984, which seems to be in-line with the 1981-85 plan period.

Lacking significant indigenous raw materials, the utilization of secondary raw or scrap materials expanded. Almost 12% of the required industrial raw materials was provided by secondary materials. In the metals production sector, that rate may have been twice as high.

The extraction of raw materials was carried out by surface mining and underground mining, including block caving. In the GDR, about 90% of all mineral raw materials was extracted by surface mining. Using high-output, heavy equipment, and highly mechanized conveyors in coal mining, production capacities of up to 100,000 tons of coal per day were at times achieved. Well over 1,000 deposits were claimed to exist in the GDR; primarily, these were of industrial minerals such as gravel, sand, and clays. More than 13% of the total demand for sand and gravel was reclaimed from the overburden stripped off workable coal deposits. Secondary metals were obtained also from copper-bearing schists and tin ores, and bromine was extracted during the processing of potash salts.[6]

Table 1.—German Democratic Republic: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Alumina:					
For metallurgical use	43,025	45,164	46,085	42,156	43,000
For other use[e]	20,000	20,000	20,000	20,000	20,000
Metal:[e]					
Primary	60,000	60,000	[3]58,000	[r]57,000	58,000
Secondary	52,500	52,000	50,000	52,000	52,000
Total	112,500	112,000	108,000	[r]109,000	110,000
Cadmium metal, primary[e]	16	16	16	16	16
Copper:					
Mine output, metal content	11,800	12,000	[e]13,000	[e]12,000	12,000
Metal:					
Smelter, primary	16,000	16,000	17,000	17,000	17,000
Refined:[e]					
Primary	32,000	34,000	32,000	[r]31,000	31,000
Secondary	19,000	20,000	19,000	19,000	19,000
Total	51,000	54,000	51,000	[r]50,000	50,000
Iron and steel:					
Iron ore and concentrate thousand tons	40	40	40	40	40
Metal content do	20	20	20	20	20
Metal:					
Pig iron do	2,458	2,441	2,149	2,207	2,250
Ferroalloys, electric furnace do	[r]137	[r]135	125	128	130
Steel, crude do	7,308	7,467	7,169	7,219	7,250
Semimanufactures (hot-rolled only) do	5,128	5,061	4,959	5,084	5,285
Lead:[e]					
Smelter, primary	22,000	22,000	20,000	20,000	22,000
Refined, all sources	42,000	48,000	50,000	[r]40,000	45,000
Nickel:					
Mine output, metal content, recoverable	2,700	2,700	2,500	[e]2,200	2,000
Metal, refined[e]	3,000	2,800	3,000	[r]3,000	3,000
Silver, mine output, metal content, recoverable thousand troy ounces	1,510	1,450	1,450	1,380	1,360
Tin:[e]					
Mine output, metal content, recoverable	1,800	1,600	1,700	[r]1,800	1,800
Metal, smelter output including secondary	1,800	1,500	2,000	2,000	2,000
Zinc metal including secondary	16,000	16,000	17,000	16,500	17,000

See footnotes at end of table.

Table 1.—German Democratic Republic: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS					
Barite[e]	35,000	35,000	35,000	35,000	35,000
Boron materials: Processed borax, $Na_2B_4O_7 \cdot 10H_2O$ content	3,400	4,300	[e]4,200	[e]4,000	4,000
Cement, hydraulic thousand tons	12,440	12,204	11,721	11,782	11,800
Chalk[e] do.	50	50	50	40	40
Clays, kaolin:[e]					
Crude do.	400	400	420	400	350
Marketable do.	200	200	210	200	175
Fluorspar[e] do.	100	100	100	100	100
Gypsum and anhydrite:					
Crude[e] do.	360	360	360	360	360
Calcined do.	313	303	310	297	300
Lime and dead-burned dolomite do.	3,401	3,441	3,510	3,458	3,500
Nitrogen: N content of ammonia do.	1,182	1,205	1,170	1,211	1,200
Potash, marketable, K_2O equivalent do.	3,422	3,460	3,434	3,431	3,465
Pyrite, gross weight[e] do.	25	25	20	20	19
Salt:					
Marine do.	52	56	55	56	55
Rock do.	3,076	3,056	3,060	3,070	3,075
Total do.	3,128	3,112	3,115	3,126	3,130
Sodium compounds, n.e.s.:					
Caustic soda do.	626	631	695	687	690
Sodium carbonate do.	866	878	882	887	890
Sodium sulfate do.	124	128	142	152	155
Stone, sand and gravel:					
Crushed stone[e] do.	15,000	15,500	15,000	16,000	14,500
Sand and gravel do.	10,353	9,803	8,566	[e]9,000	8,500
Sulfur:					
Byproduct:[e]					
Elemental do.	80	80	90	90	80
Other forms do.	270	270	270	[r]270	270
From pyrite[e] do.	10	10	--	--	--
Sulfuric acid do.	958	948	920	926	920
MINERAL FUELS AND RELATED MATERIALS					
Coal, brown coal (lignite) do.	258,097	266,734	276,038	277,968	296,000
Coke:					
From anthracite and bituminous coal[e] do.	1,500	1,391	1,226	1,200	1,150
From brown coal:					
High-temperature do.	2,608	2,612	2,592	2,510	2,500
Low-temperature do.	2,727	2,747	2,919	3,210	3,300
Total do.	6,835	6,750	6,737	6,920	6,950
Fuel briquets (from lignite) do.	49,693	49,803	50,005	50,047	52,850
Gas:					
Manufactured million cubic feet	219,057	209,483	224,173	255,320	255,500
Natural, marketed production[e] do.	302,450	301,000	286,000	353,000	424,000
Petroleum:					
Crude thousand 42-gallon barrels	400	400	422	383	380
Refinery products:					
Gasoline do.	28,333	29,257	33,071	33,618	33,700
Kerosine, jet fuel, distillate fuel oil do.	46,503	42,665	46,679	46,915	47,000
Residual fuel oil do.	59,300	56,610	56,610	56,610	57,000
Lubricants do.	2,894	3,012	3,058	3,238	3,300
Total[4] do.	137,030	131,544	139,418	140,381	141,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Sept. 30, 1985.
[2]In addition to the commodities listed, magnesium, peat, and a variety of construction materials are produced, but output was not reported, and available information is inadequate to make estimates of output levels.
[3]Reported figure.
[4]Total of listed products only; no estimates have been made for unreported products or refinery fuels and losses.

TRADE

The GDR's foreign trade position continued to improve with a yearend increase of total foreign trade turnover of 8%, compared with that of 1983.

Trade within the CMEA block accounted for about two-thirds of the GDR's total trade turnover. In 1984, the GDR's trade with CMEA countries rose 9% compared with that of 1983. The U.S.S.R. remained the GDR's single largest trading partner both within and outside the CMEA organization, accounting for 40% of the country's imports and exports. Over 50% of Soviet exports to the GDR consisted of raw materials and energy.

In 1984, Soviet deliveries of petroleum and natural gas to the GDR showed increases compared with those for 1983. Pig iron, ferroalloys, iron and steel scrap, and rolled steel deliveries to the GDR also showed modest increases during the year. However, deliveries of manganese, chromium ores, and iron declined by 25%, 24%, and 12%, respectively.[7]

Trade with market economy countries rose 6% compared with that of 1983. The Federal Republic of Germany (FRG) was the GDR's largest trading partner, accounting for 8.5% of total trade. Other impor[illegible] trading partners of the GDR were Austria, Finland, France, and Italy. The main exports to these countries were petroleum refinery products, iron and steel products, and chemicals. The GDR's imports consisted largely of producer durables, which were generally not available on the CMEA market as well as some chemical products and textiles.

The GDR's commercial relations with the United States were marked by a sharp export increase to the U.S. market. The GDR's exports to the United States reached $167.4 million in 1984 from $62.6 million in 1983. This increase was largely due to large U.S. purchases of steel.

Table 2.—German Democratic Republic: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	44	479	--	All to Madagascar.
Ash and residue containing aluminum	279	501	--	All to Netherlands.
Metal including alloys:				
Scrap	11,545	9,780	--	Netherlands 2,974; United Kingdom 2,859; France 2,127.
Unwrought	26,180	25,704	--	West Germany 21,231; Poland 2,093.
Semimanufactures	16,724	21,621	3	West Germany 14,364; Hungary 3,259.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	--	100	--	All to Austria.
Copper: Metal including alloys:				
Scrap	560	355	--	Austria 270; United Kingdom 85.
Unwrought	5,003	12,261	--	West Germany 6,269; Netherlands 4,670.
Semimanufactures	29,360	35,616	28	West Germany 34,543.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	141,609	NA		
Metal:				
Scrap	20,050	20,654	--	West Germany 17,674; Thailand 1,052.
Pig iron, cast iron, related materials	17,319	8,841	--	Sweden 4,200; West Germany 1,957.
Ferroalloys:				
Ferrochromium	2,114	1,575	--	All to West Germany.
Ferromanganese	9,000	450	--	Belgium-Luxembourg 300.
Ferromolybdenum	151	9	--	All to Sweden.
Ferrosilicon	7,281	9,207	--	West Germany 7,111; Netherlands 1,394.
Unspecified	1,689	654	--	Belgium-Luxembourg 517; Switzerland 126.
Steel, primary forms thousand tons	324	402	--	West Germany 183; Italy 140; Turkey 30.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	1,105	220	1	West Germany 86; France 25; Jordan 17.
Universals, plates, sheets do	434	429	10	West Germany 102; Denmark 49; Portugal 38.
Hoop and strip do	392	75	--	West Germany 71; France 2.
Rails and accessories do	14	3	--	Mainly to West Germany.

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Wire thousand tons	47	10	--	West Germany 7; Netherlands 1.
Tubes, pipes, fittings do	172	[2]168	--	West Germany 28; Poland 22; Hungary 21.
Castings and forgings, rough do	73	46	--	West Germany 44; France 1.
Lead:				
Oxides	1,524	1,493	--	West Germany 832; Sweden 637.
Metal including alloys:				
Scrap	--	523	--	All to Austria.
Unwrought	1,950	500	--	All to West Germany.
Semimanufactures	75	38	--	Do.
Nickel: Metal including alloys:				
Unwrought	66	536	--	Sweden 415; Italy 72.
Semimanufactures	3	5	--	Yugoslavia 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$109	$53	--	Japan $52.
Silver:				
Waste and sweepings do	$305	$225	--	All to West Germany.
Metal including alloys, unwrought and partly wrought do	$83,664	$75,805	--	United Kingdom $75,601.
Zinc:				
Oxides	1	785	--	West Germany 450; Norway 335.
Metal including alloys:				
Scrap	--	202	--	All to France.
Unwrought	1,885	309	--	West Germany 200; Sweden 109.
Other:				
Oxides and hydroxides	2,032	81	--	All to Belgium-Luxembourg.
Ashes and residues	34,520	27,963	--	Austria 20,454; West Germany 7,509.
Base metals including alloys, all forms	6,201	5,013	3	West Germany 5,010.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	307	283	NA	Yugoslavia 162; Pakistan 48; Italy 28.
Barite and witherite	40	8,551	--	Poland 7,990; West Germany 537.
Bromine	430	587	--	France 330; West Germany 156.
Cement[2] thousand tons	1,291	1,222	--	West Germany 492; Sweden 142; Hungary 126.
Chalk[3]	45,571	21,856	--	West Germany 8,293.
Clays, crude:				
Kaolin[3]	146,062	111,417	--	West Germany 92,509; Poland 7,463.
Unspecified	45,684	16,921	--	Yugoslavia 10,941; Hungary 4,170.
Diamond:				
Gem, not set or strung value, thousands	$2	$2,850	--	All to Portugal.
Industrial stones do	$185	$21	--	All to Belgium-Luxembourg.
Feldspar, fluorspar, related materials	43,748	39,100	--	West Germany 15,501; Norway 8,071; Austria 7,786.
Fertilizer materials: Manufactured:				
Ammonia	8,329	85,119	--	West Germany 58,280; Norway 10,000; Sweden 6,663.
Nitrogenous	974,226	1,308,669	--	West Germany 1,260,220; United Kingdom 34,917.
Phosphatic	33,149	4,052	--	Netherlands 2,702; Austria 1,132.
Potassic, K_2O content[3] thousand tons	2,834	2,905	49	Czechoslovakia 455; Brazil 443; Romania 189.
Graphite, natural	103	1,382	--	West Germany 1,282.
Gypsum and plaster[3]	101,758	84,863	--	Mainly to Sweden.
Magnesium compounds	76	28,180	--	France 28,128.
Phosphates, crude	22,000	22,635	--	Bulgaria 22,000; Ireland 593.
Pigments, mineral: Iron oxides and hydroxides, processed	399	432	--	Yugoslavia 424.
Potassium salts, crude	97,203	18,849	--	West Germany 12,370; Austria 3,634.
Pyrite, unroasted	--	2,999	--	All to Italy.
Salt and brine[3] thousand tons	1,387	1,390	--	West Germany 127; Sweden 97; undetermined 1,037.
Sodium compounds, n.e.s.:				
Carbonate, manufactured[3]	394,300	365,900	--	Czechoslovakia 65,000; West Germany 43,480; Finland 16,049.
Sulfate, manufactured	2,406	19,606	--	West Germany 11,725; Sweden 5,350.

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone, crude and partly worked ______ thousand tons__	439	364	--	West Germany 362.
Dolomite, chiefly refractory-grade do____	--	([4])	--	All to Denmark.
Sand and gravel[3] ________do____	2,114	2,550	--	All to West Germany.
Sulfur:				
Elemental:				
Crude including native and by-product_______________	748	2,103	--	All to Yugoslavia.
Colloidal, precipitated, sublimed_	45	118	--	West Germany 108.
Sulfuric acid[3] _______________	30,345	37,300	--	Yugoslavia 21,604; West Germany 11,939.
Talc, steatite, soapstone, pyrophyllite __	--	32	--	All to Jordan.
Vermiculite, perlite, chlorite________	--	170	--	All to Austria.
Other:				
Crude___________________	86,491	81,136	--	Denmark 57,024; Netherlands 11,798.
Slag and dross, not metal-bearing___	35,652	30,748	--	Finland 29,086; West Germany 1,009.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black _____________	4,823	3,961	11	Czechoslovakia 1,000; Poland 591; United Kingdom 547.
Coal:				
Anthracite and bituminous thousand tons__	305	325	--	Poland 283; United Kingdom 41.
Briquets of anthracite and bituminous coal_______________do____	490	515	--	All to Hungary.
Lignite including briquets[3]__do____	3,947	3,285	--	West Germany 1,418; Czechoslovakia 676; Austria 300.
Coke and semicoke__________do____	215	32	--	Austria 20; Belgium-Luxembourg 5.
Gas, manufactured[3] million cubic feet__	653	399	--	NA.
Peat including briquets and litter_____	1,467	1,189	--	West Germany 1,142.
Petroleum:				
Crude_ thousand 42-gallon barrels__	--	1,132	--	All to United Kingdom.
Refinery products:				
Liquefied petroleum gas _do____	997	1,557	--	West Germany 1,239; Netherlands 158.
Gasoline[3]__________do____	6,243	10,893	--	West Germany 2,776; undetermined 7,269.
Mineral jelly and wax __do____	105	63	13	Netherlands 17; Austria 7; Yugoslavia 5.
Kerosine and jet fuel ___do____	84	94	--	Hungary 83; Sweden 11.
Distillate fuel oil[3]_____do____	6,088	18,038	--	West Germany 9,587; Sweden 5,780; Norway 2,221.
Lubricants[2] ________do____	69	170	--	Mainly to Austria.
Residual fuel oil[3] _____do____	14,399	13,686	--	Norway 4,151; Denmark 3,420; West Germany 3,166.
Bitumen and other residues do____	564	583	--	West Germany 582.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by the German Democratic Republic, 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.
[3]Official Trade Statistics of the German Democratic Republic.
[4]Less than 1/2 unit.

Table 3.—German Democratic Republic: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate[2]	109,900	103,700	--	Mainly from Hungary.
Oxides and hydroxides	100,171	89,178	--	West Germany 61,857; Hungary 27,259.
Metal including alloys:				
Unwrought	44,426	51,105	--	Yugoslavia 35,094; Hungary 9,891.
Semimanufactures	25,112	26,384	1	West Germany 12,540; Hungary 8,612; Yugoslavia 4,983.
Antimony: Oxides	253	220	--	All from France.
Cadmium: Metal including alloys, all forms	252	220	--	Japan 205.
Chromium: Ore and concentrate, Cr_2O_3 content[2]	46,800	51,900	--	NA.
Cobalt: Metal including alloys, all forms	181	132	--	Finland 107; Netherlands 25.
Copper:				
Matte and speiss including cement copper	--	360	--	All from Ireland.
Metal including alloys:				
Scrap	1,626	2,337	--	Netherlands 691; Belgium-Luxembourg 658; Switzerland 473.
Unwrought	36,649	42,635	--	West Germany 23,169; Chile 7,200; Finland 4,923.
Semimanufactures	5,220	8,704	--	France 3,561; West Germany 3,479.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	579	207	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite, Fe content[2] thousand tons	1,932	1,842	--	U.S.S.R. 1,369; India 449.
Metal:				
Scrap do.	455	595	--	U.S.S.R. 224; West Germany 195; Belgium-Luxembourg 93.
Pig iron, cast iron, related materials[3] do.	871	855	--	West Germany 31; undetermined 824.
Ferroalloys:				
Ferrochromium	--	1,990	--	All from West Germany.
Ferromanganese	--	935	--	Do.
Ferromolybdenum	--	2	--	Do.
Silicon metal	102	221	--	Do.
Unspecified	78,000	NA	--	
Steel, primary forms thousand tons	2,320	[2]729	--	U.S.S.R. 249; West Germany 196; Czechoslovakia 86.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	771	738	--	West Germany 402; U.S.S.R. 227; Austria 76.
Universals, plates, sheets do.	816	1,063	--	U.S.S.R. 479; West Germany 350; Austria 126.
Hoop and strip do.	129	95	--	West Germany 77; Austria 17.
Rails and accessories do.	189	4	--	All from West Germany.
Wire do.	26	9	--	West Germany 6; Belgium-Luxembourg 2.
Tubes, pipes, fittings[3] do.	298	295	--	Czechoslovakia 127; West Germany 46; Poland 20.
Castings and forgings, rough do.	37	3	--	West Germany 2.
Lead:				
Oxides	8	691	--	West Germany 660.
Metal including alloys:				
Scrap	1,702	3,764	--	United Kingdom 1,822; Denmark 1,382.
Unwrought	3,929	3,047	--	Sweden 1,997; France 703.
Manganese: Ore and concentrate, metallurgical-grade, Mn content[2]	39,800	27,400	--	Mainly from U.S.S.R.
Mercury 76-pound flasks	1,363	6,380	--	West Germany 5,597.
Molybdenum: Ore and concentrate	425	310	--	All from Finland.
Nickel:				
Matte and speiss	821	781	--	All from Cuba.
Oxides and hydroxides	615	589	--	Do.
Metal including alloys:				
Unwrought	198	536	--	France 310; Finland 216.
Semimanufactures	134	90	9	West Germany 80.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$905	$5,163	--	West Germany $5,049.
Silver:				
Waste and sweepings do.	--	$46	--	All from West Germany.
Metal including alloys, unwrought and partly wrought do.	$111,905	$120,241	--	West Germany $113,329; United Kingdom $5,132.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Tin:				
Oxides	72	61	--	All from West Germany.
Metal including alloys:				
Scrap	27	NA		
Unwrought	312	30	--	Do.
Titanium:				
Ore and concentrate	1,297	1,752	--	All from Netherlands.
Oxides	18,856	17,002	--	Yugoslavia 11,173; Finland 3,602.
Tungsten: Ore and concentrate	130	45	--	All from Netherlands.
Zinc:				
Ore and concentrate	63,648	65,338	--	West Germany 61,492.
Oxides	109	160	--	West Germany 117; France 43.
Metal including alloys:				
Scrap	504	41	--	Denmark 21; Sweden 20.
Unwrought	28,011	16,545	--	Yugoslavia 10,487; West Germany 2,833; Finland 2,825.
Semimanufactures	1,559	2,145	--	West Germany 1,945; Norway 190.
Other:				
Ores and concentrates	5,144	5,060	--	Norway 5,028.
Oxides and hydroxides	6,983	NA	--	
Ashes and residues	6,470	11,200	--	West Germany 9,195; Belgium-Luxembourg 974; Italy 941.
Base metals including alloys, all forms	25,090	49,176	--	West Germany 25,877; Singapore 23,000.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	140	24	--	All from Italy.
Artificial: Corundum	3,934	3,754	--	All from West Germany.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$69	NA		
Grinding and polishing wheels and stones	113	127	--	Austria 113.
Asbestos, crude[2]	61,200	47,000	--	NA.
Barite and witherite	667	1,472	--	All from West Germany.
Boron materials:				
Crude natural borates	15,408	9,472	--	Do.
Oxides and acids	4,965	4,431	--	All from France.
Cement[3]	7,300	6,200	--	West Germany 1,778; Belgium-Luxembourg 543.
Clays, crude:				
Bentonite	10,539	10,499	--	All from Hungary.
Unspecified	7,066	2,484	88	West Germany 2,304.
Diamond:				
Gem, not set or strung value, thousands	$200	$29	--	West Germany $20.
Industrial stones do.	$709	$447	--	Belgium-Luxembourg $437.
Diatomite and other infusorial earth	857	1,633	--	France 864; West Germany 559.
Feldspar, fluorspar, related materials	14,748	16,815	--	Norway 7,308; Sweden 6,953.
Fertilizer materials: Manufactured:				
Ammonia	1	2,403	--	All from West Germany.
Nitrogenous, N_2 content[3]	69,400	110,000	--	West Germany 71,081.
Phosphatic, P_2O_5 content[2]	21,200	15,129	--	All from West Germany.
Potassic	--	19,023	--	All from Finland.
Unspecified and mixed	105,500	203,340	--	Austria 203,338.
Graphite, natural[2]	7,945	6,359	--	West Germany 1,544; undetermined 4,596.
Gypsum and plaster	174	170	--	Belgium-Luxembourg 124.
Magnesium compounds:				
Magnesite	48,884	[2]10,972	--	All from Czechoslovakia.
Other	1,271	NA		
Phosphates, crude, P_2O_5 content[2] thousand tons	420	419	--	All from U.S.S.R.
Pigments, mineral: Natural, crude	46	47	--	All from Austria.
Precious and semiprecious stones other than diamond: Natural value, thousands	$148	$43	--	All from West Germany.
Salt and brine	29	16	--	All from Sweden.
Sodium compounds, n.e.s.: Carbonate, manufactured	5	4,999	--	All from France.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,188	5,605	--	Hungary 1,788; Norway 1,761; West Germany 1,227.
Worked	1,208	15,120	--	West Germany 14,388.
Gravel and crushed rock	326	263	--	Yugoslavia 195.
Quartz and quartzite	11,952	153	--	Brazil 150.
Sand other than metal-bearing	499	10,058	--	West Germany 10,007.
Sand and gravel	--	5,051	--	All from West Germany.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental, crude including native and byproduct	337,900	157,000	--	All from Poland.
Dioxide	9,412	1,373	--	All from West Germany.
Sulfuric acid	808	[3]1,800	--	NA.
Talc, steatite, soapstone, pyrophyllite	5,222	1,546	--	Austria 617; West Germany 580; Finland 326.
Other:				
Crude	27,206	21,494	--	Hungary 21,492.
Slag and dross, not metal-bearing	1,632	700	--	All from Denmark.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	39	4,162	--	West Germany 4,158.
Carbon: Carbon black	37,738	41,926	--	U.S.S.R. 22,628; West Germany 18,918.
Coal:				
Anthracite and bituminous[2] thousand tons	4,739	4,198	--	U.S.S.R. 2,958; Poland 622; Czechoslovakia 596.
Lignite including briquets do	3,600	200	--	All from Poland.
Coke and semicoke[2] do	2,022	1,820	--	U.S.S.R. 1,025; Czechoslovakia 533; Poland 142.
Gas, natural: Gaseous[2] million cubic feet	225,731	226,543	--	U.S.S.R. 226,437.
Petroleum:				
Crude[2] thousand 42-gallon barrels	158,739	166,183	--	U.S.S.R. 125,325.
Refinery products:				
Liquefied petroleum gas do	1	433	--	All from West Germany.
Gasoline do	6	5	--	West Germany 4.
Mineral jelly and wax do	(4)	(4)	--	All from France.
Kerosine and jet fuel do	58	8	--	All from Yugoslavia.
Distillate fuel oil do	2	32	--	Sweden 30.
Lubricants[3] do	117	159	(4)	NA.
Residual fuel oil[3] do	141	679	--	NA.
Bitumen and other residues do	1	2	--	West Germany 1.
Bituminous mixtures do	2	(4)	--	Mainly from France.
Petroleum coke do	116	120	--	All from West Germany.
Unspecified[3] do	582	8	--	NA.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by the German Democratic Republic, 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 German Democratic Republic.
[3]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[4]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Iron and Steel.—The GDR's iron and steel industry continued its second year of growth, after a drop in production in 1982. By some estimates, the GDR in 1984 was in 19th place in world output of raw steel, just slightly overtaking Mexico and slightly below the Republic of South Africa. The chief aim of the GDR's iron and steel industry has been to improve production efficiency and to expand the range of marketable goods, rather than to increase raw steel output. The use of oxygen converter technology late in 1984 showed a potential for significant energy savings as well as for a reduction of losses.[8] At enterprises such as the VEB Qualität und Edelstahl, production was enhanced by a direct billet feed system from large-scale electric furnaces to continuous rolling mills. To expand product range, another enterprise, the VEB Bandstahlkombinat "Hermann Matern" of Eisenhüttenkombinat Ost (EKO), at Eisenhüttenstadt planned to replace its conventional cold-rolled sheet and strip product line with a wide-range, thin cold-rolled strip (minimum thickness 0.3 millimeter) produced by a high-output roll stand.[9] EKO put on-stream the GDR's first oxygen converter shop, consisting of two 210- to 235-ton oxygen converters with a 2.1-million-ton-per-year raw steel capacity, as well as an argon stirring station with a steel desulfurization and a degassing unit, and two-strand continuous slab and six-strand continuous bloom casters. The project cost was about $597 million, with technology provided by Voest-Alpine AG (VA) of Austria. During the year, EKO also began the reconstruction and expansion of its sixth blast furnace to 1,100 cubic meters for pig iron production; completion was scheduled for mid-1985.

Other developments in 1984 included the startup of a new 770,000-ton-per-year continuous wire rod mill at the Brandenburg steel works near Potsdam, and a new 12,600-ton-per-year steel foundry at Boesdorf near Leipzig. The Boesdorf foundry was built by a Japanese, Hungarian, Polish, and GDR consortium of companies.

At yearend, the U. S. International Trade Commission issued a determination that the GDR's exports of carbon steel wire rod to the United States had materially injured U.S. domestic producers owing to allegedly unfair low prices of the GDR products.[10]

Precious Metals.—Except for a small production of mined silver, the GDR recovered its precious metals from scrap. In September, a plant for the recovery of precious metals from electronic scrap reportedly began operation at Dahlwitz-Hoppegarten near Berlin. Previously, this was done by students of the Technological University Merseburg, mostly during their summer vacation. Twenty workers formerly processed 5 tons in an entire shift, while the new automatic facility reportedly accomplished this in 1 hour.

The scrap, consisting of electronic switches, relays, and scientific apparatus and household articles, was transported on a conveyor belt to a hammer mill and a rotor, shredding the material to 10-centimeter size fraction. It then was sorted in a magnetic separator, a drum, an air separator, and a flotation tank, yielding 50% to 60% steel scrap, 10% copper, and 15% aluminum. It was estimated that 1 ton of processed scrap contained 450 grams of silver and 14 grams of gold.[11]

NONMETALS

Graphite.—The GDR imported virtually all its requirements of natural graphite. Except for a slight drop in 1980, imports had continued to grow in the last decade, being on the average 8,000 to 9,000 tons per year. In 1984, VEB Elektrokohle, the sole GDR graphite electrode producer, at Lichtenberg near Berlin, modernized its works and reportedly ordered a new plant from Austria's VA. The order covered mixers and kneaders for petroleum coke and hard pitch, and a hydraulic extrusion press for producing green electrodes. The new equipment was to be fitted with measuring and control facilities aimed at making the operation virtually automatic and continuous. VA was to begin deliveries in 1987, and the plant was expected on-stream in mid-1988.

The Lichtenberg electrode plant, which after modernization was to produce some 20,000 tons per year of graphite electrodes, dates from the beginning of the century. It was built originally for arc lamp production, and graphite electrodes were made after 1916. In the late 1970's, VA also supplied an electrode press to the Novy Sacz electrode plant at Ratibor in Poland, the largest such press in the world.[12]

Potash.—Mining and production of potash in the GDR contributed significantly to the economy of the country, and, after coal, was the only mineral mined on a large scale. The GDR was the third largest producer in the world, after the U.S.S.R. and Canada. Production has hovered just over 3.40 million tons for several years. Exports and domestic consumption also showed little change over the 1983 levels of 2.86 million tons of product containing 570,000 tons of K_2O equivalent.

All potash in the GDR was mined by underground operations; to expand production, a tentative agreement was reached in December 1984 with the FRG to extract potash in the Werra River area in the border region between Hesse in the FRG and Thuringia in the GDR. To maximize product extraction further, VEB Kombinat Kali, the only producer, set up a new evaporation plant for the manufacture of highly concentrated magnesium chloride-potassic brine from potash containing magnesium chloride and bromine. The plant is at Sondershausen, one of the largest potash producing areas in the GDR, managed by Kalibetrieb Sud-Harz. A new magnesium oxide plant at Teuschenthal was also separating potassic brine thermally in a reactor into hydrochloric acid and magnesium oxide-sinter magnesite.

Potash exports from the GDR have changed very little in the last several years. Eastern Europe, including the non-CMEA member Yugoslavia, remained the largest importer, with Czechoslovakia being the largest customer. Western Europe was GDR's second most important region for potash exports.

The capacity of the Port of Wismar, the main port for potash loading on the Baltic Sea, underwent 4 years of modernization and reconstruction. The GDR was previously able to barge materials, but not from Wismar. The port is between 250 and 450 kilometers from potash plants in the northwest, and until now, the product was moved in 22-ton tipper wagons. Robot unloading equipment for up to 190 to 220 rail wagons per day was also installed.[13]

MINERAL FUELS

Lignite, often referred to as brown coal, continued to provide a large share of the total energy consumed in the GDR. In 1984, this was estimated at 72%, compared with 71% in 1983. There was considerable increase in primary energy consumption, perhaps 4% to 5%, the highest since 1976. A large part of the consumption increase was brought about by the increased availability of lignite, production of which reached 296 million tons. The minor GDR natural gas production also increased, to about 424 billion cubic feet, but, in view of limited gas reserves, the increase could not be considered to indicate a trend. The trend upward in consumption, however, evidently resulted from a very cold winter, the difficulty of substituting lignite for coal on a one-for-one basis, greater transport demands, even for lignite itself, and diminishing opportunities for conservation.

Coal.—Efforts to increase production of lignite, the major fuel mineral produced in the GDR, which provided over 70% of primary energy supply, continued during the year. Three large new mines in the Cottbus areas made substantial progress toward coming into production: at the North Kettwitz open pit, which is to supply the Lauchhammer processing plant, overburden removal began; at Dreiwebern, in the same area, production for the Boxberg power stations began at the rate of 3,000,000 to 4,000,000 tons per year; and the first shipment from the Grabendorf Mine nearby, ultimately to produce 4 million tons per year, was sent to the Luebbenau-Veitschau power station. Mines in this area were operated by the Senfenberg Combine, which produced in all, from 14 mines, about 185 million tons of lignite, out of a national goal of 295 million tons in 1984, and over 300 million tons in 1985. Expansion, in all regions, was under way at eight other lignite mining combines. Figures for lignite capacity and production included those for what GDR authorities sometimes call brown coal.

Increasing production came against a background of two problems: increasing cost and increasing salt content of remaining reserves. Large amounts of saliniferous lignite occur in the Halle District, but are otherwise of good quality and of high calorific value. The Vockerode powerplant was switched to the use of this coal on an experimental basis, although the sodium oxide content of 0.5% or more can be highly damaging to the boilers. Initial shipments of lignite were from the Geiseltal Mine.

In the period 1970 to 1980, the cost of lignite extraction rose 85%, largely because of growing unfavorable mining conditions. The conditions can only deteriorate if production goals of 300 million tons by 1985 and 315 million tons by the year 2000 are met. Operators feel that there is little room for further technological improvements.

Natural Gas and Petroleum.—Production of oil and gas in the GDR continued to be negligible, and efforts were devoted to ensuring supplies from external sources, particularly the Soviet Union. In September, two contracts were signed between the Government of the GDR and the U.S.S.R, one for 220 billion cubic feet of natural gas and one for 125 million barrels of petroleum in 1985. These represented no increase over supplies from the U.S.S.R. in previous years, but rising costs of these imports (from about $1.7 billion in 1980 to $3.8 billion in 1984) has made conservation imperative. The GDR is the Soviet Union's largest customer for oil and gas. The reported continuing rise in lignite production and consumption in powerplants has been another response, but the increasing level of atmospheric pollution this caused has aroused serious concern. The GDR was reported to have the most heavily polluted atmosphere in Europe.

The remainder of the GDR's petroleum

supply came from hard currency areas. An agreement was signed in December to purchase 20,000 barrels per day from Iran during 1985, with a possibility of increasing this by 50%. This was apparently the first major GDR purchase of Iranian oil.

Nuclear Energy.—Attention continued to be focused on expanding nuclear energy production, the chief alternative to lignite. A new "Law on the Use of Atomic Energy and Protection Against its Dangers" was enacted December 8, 1983, and took effect on February 1, 1984, replacing legislation dated March 28, 1962. The law covers use of nuclear energy in plants, the handling of radioactive substances, and ionizing radiation of all kinds; penalties are included for careless or criminal acts in connection therewith. Much stress is laid on peaceful uses of the atom and social responsibility of the various levels of government and private individuals. Liability for damage includes required compensation. Fines and imprisonment are provided for violations.

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[1]Physical scientist, Division of International Minerals.

[2]Bachmann, H. Indigenous Raw Materials and Economic Strategy. Urania (Leipzig), Aug. 1984, pp. 12-16.

[3]Hauk, P. German Democratic Republic. Min. Ann. Rev. (London), 1985, pp. 521-522.

[4]Frankfurter Allgemeine Zeiting (Frankfurt). Feb. 13, 1985, p. 14.

[5]The German Democratic Republic's mark (M) is not convertible, and the official exchange rate cannot be used as a measure of relative values. Foreign trade figures, however, are denoted in valuta marks (VM), which are convertible; the rate of valuta marks converted to U.S. dollars in 1984 was taken as VM2.80=US$1.00.

[6]Work cited in footnote 2.

[7]Vneshnyaya Torgovlya S.S.S.R. v. 1984. (The Foreign Trade of the U.S.S.R. in 1984), (Moscow). P. 127.

[8]Metal Bulletin Monthly (London). Jan. 1985, p. 31.

[9]Die Wirtshaft (East Berlin). Fall 1984, p. 37.

[10]U. S. International Trade Commission. Carbon Steel Wire Rod From the German Democratic Republic. USITC Pub. 1607, Nov. 1984, p. 2.

[11]Berliner Zeitung (East Berlin). Sept. 26, 1984, p. 3.

[12]Metal Bulletin Monthly (London). Dec. 1984, p. 39.

[13]Phosphorus & Potassium (London). No. 135, Jan.-Feb. 1985, p. 13.

The Mineral Industry of the Federal Republic of Germany

By George A. Rabchevsky[1]

The economic performance of mineral production in the Federal Republic of Germany (FRG) was uncharacteristically erratic during 1984, although the economy was in the third year of its upswing. Some mineral industries were adversely affected by overcapacity and labor unrest with layoffs and shorter workweeks being considered. Unemployment, almost 9%, was becoming a serious problem, climbing to over 2.2 million workers, the highest since the currency reform of 1948. Despite a damaging metalworkers strike, the gross national product expanded by 2.6% in 1984, the highest rate of growth since 1979. As a consequence of the strike settlement, the average workweek in the metal processing industries was reduced from 40 hours to 38.5 hours effective April 1985. IG Metall, the 2.5 million-member metalworkers' union, claimed that this would save as many as 70,000 to 80,000 jobs in the metal industry.[2]

In a generally positive economic picture, some soft spots in major industries and regions stood out. As in most European Economic Community (EEC) countries, traditional "smokestack" industries were in trouble, particularly coal mining, coke production, petroleum refining, shipbuilding, and steel. These industries were centered in the Hamburg, Bremen, and Ruhr areas of North Rhine-Westphalia, the Saarland, and Schleswig Holstein. These areas had in the past enjoyed generally higher average incomes than in the FRG's southern Laender. A major reduction of capacity in the competitive steel industry had been under way since the mid-1970's. Other industries, such as petroleum refining, were also in a period of major downsizing. Petroleum refining capacity had peaked in 1978, and current capacity utilization rate was only 76%.

In the fall of 1984, the West German Government was considering selling many of its plants in mineral and metal-related businesses to private industry; the Government held talks with a number of concerned companies and prospective buyers, including major banks. Most metals and minerals plants in the FRG had been traditionally private. The Government-owned industrial holding company Vereinigte Industrieunternehmungen AG, which had interests in aluminum, electricity, and gas, was one of the prime contenders for full or partial privatization. The Government also considered selling shares of the steel company, Salzgitter AG, and the coal mining concern, Saarbergwerke AG, because of their poor economic performances.

PRODUCTION

Despite the temporary interruption by a strike in the metals processing industry, industrial minerals and metals production rose by 3.3%. Reportedly, the 1984 profits of most minerals producing and processing companies were up, some by 2.5% or more, an increase last achieved in 1979.

Except for a small gain in silver output, all nonferrous metal mines in the FRG registered a decline in production. The companies were seeking ways to either restructure or diversify, to ensure continued employment of their workers. However, most nonferrous metals industries, except copper, performed well. Most producers of nonmetals increased their output, although minor fluctuations occurred in certain industrial minerals production. Overall, mineral fuels production declined, except fuel briquets and peat.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite, gross weight	264	79	494	359	300
Alumina thousand tons	1,608	1,651	1,510	1,580	1,701
Metal:					
Primary do.	731	729	723	743	777
Secondary:					
Alloyed do.	368	360	364	387	401
Unalloyed do.	40	41	45	41	41
Cadmium metal, smelter	1,194	1,192	1,030	1,094	1,111
Cobalt metal, smelter[e]	300	[r]150	150	100	100
Copper:					
Mine output, metal content	1,274	1,429	1,303	1,209	1,046
Metal:					
Smelter:					
Primary	153,900	163,100	161,800	159,100	158,000
Secondary	103,900	88,300	78,200	94,500	87,000
Total	257,800	251,400	240,000	253,600	245,000
Refined including secondary:					
Electrolytic	302,516	304,068	313,664	332,397	297,773
Fire-refined	71,483	83,370	80,408	87,928	81,143
Total	373,999	387,438	394,072	420,325	378,916
Gold:					
Mine output, metal content troy ounces	2,964	3,051	1,813	[e]1,900	1,500
Metal including secondary do.	298,873	298,873	[e]299,000	[e]300,000	310,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	[r]1,945	[r]1,572	1,319	976	977
Iron content do.	[r]596	[r]476	386	279	293
Metal:					
Pig iron do.	33,873	31,876	27,621	26,598	30,203
Blast furnace ferromanganese, spiegeleisen, ferrosilicon do.	264	264	242	174	309
Ferroalloys, electric-furnace do.	182	154	131	119	156
Steel, crude do.	43,838	41,610	35,880	35,729	39,389
Semimanufactures do.	31,661	30,850	25,782	26,061	27,957
Lead:					
Mine output, metal content	23,063	21,605	23,455	23,523	20,998
Metal:					
Smelter:					
Primary	111,891	107,493	110,749	116,216	102,289
Secondary	189,458	254,824	239,746	236,259	254,944
Total	301,349	362,317	350,495	352,475	357,233
Refined:					
Primary	191,100	189,500	201,600	212,500	216,200
Secondary	159,200	158,800	148,900	135,500	141,000
Total	350,300	348,300	350,500	348,000	357,200
Mercury (secondary only) 76-pound flasks	1,624	2,205	1,537	2,005	--
Nickel metal including secondary[e 2]	[3]1,235	1,200	1,200	1,200	1,000
Platinum[e] troy ounces	2,411	2,411	2,420	2,450	2,000
Silver:					
Mine output, metal content thousand troy ounces	1,058	1,126	1,279	1,167	1,225
Metal including secondary do.	24,371	21,126	[e]21,000	[r e]20,000	21,500
Tin metal including secondary	2,262	1,815	608	417	400
Zinc:					
Mine output:					
Metal content	120,800	110,700	105,800	113,900	92,500
Metal content, recoverable	99,720	91,779	86,920	92,562	92,467
Metal, unwrought, unalloyed:					
Primary	342,797	331,471	303,373	328,689	325,567
Secondary	27,849	35,085	31,578	27,848	30,824
Total	370,646	366,556	334,951	356,537	356,391

See footnotes at end of table.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS					
Abrasives: Artificial: Corundum	102,222	97,026	80,385	74,201	88,962
Barite	175,380	165,189	165,661	163,965	166,568
Bromine	4,006	3,567	3,073	3,136	3,306
Cement and clinker:					
Cement (excluding clinker) thousand tons	34,186	31,498	30,078	30,466	28,909
Clinker do	1,360	1,364	959	702	742
Clays:					
Fire clay excluding klebsand do	5,791	5,478	5,594	5,792	5,800
Kaolin, marketable do	502	475	454	407	410
Bleaching do	638	625	700	601	650
Other (schieferton) do	152	131	86	75	100
Diatomite and similar earth, marketable	52,824	42,373	42,695	44,195	44,500
Feldspar, marketable	380,880	342,148	331,430	330,000	260,000
Fluorspar, marketable:					
Acid-grade[e]	70,337	64,627	[r]70,779	[r]72,607	73,000
Metallurgical-grade[e]	7,815	7,181	[r]7,860	[r]8,100	8,100
Total	78,152	71,808	78,639	80,707	81,100
Graphite:					
Crude	11,375	16,372	23,305	[e]23,500	24,000
Marketable[e]	5,688	8,186	11,653	10,000	12,000
Gypsum and anhydrite, marketable thousand tons	2,250	1,952	1,721	1,720	2,200
Lime (hydrated), quicklime, dead-burned dolomite do	8,576	7,916	6,898	6,871	6,941
Nitrogen: N content of ammonia do	2,044	1,962	1,570	1,703	1,963
Phosphates: Thomas slag-based fertilizer, P_2O_5 content do	161	138	130	93	62
Pigments, mineral, natural	24,669	22,524	18,589	19,886	20,000
Potash, K_2O equivalent:					
Crude, marketable thousand tons	76	72	75	87	92
Chemically processed do	2,661	2,519	1,981	2,332	2,552
Total do	2,737	2,591	2,056	2,419	2,644
Pumice:					
Crude and washed do	2,102	1,253	745	645	1,013
Marketable do	807	399	220	200	355
Pyrites, marketable concentrate, gross weight do	502	483	508	554	500
Quartz, quartzite, glass sand:					
Quartzite do	454	395	326	331	362
Quartz sand, ground do	453	422	378	337	316
Quartz sand, unground and glass sand do	7,475	7,018	7,320	7,391	7,195
Salt, marketable:					
Rock do	6,759	8,367	7,034	6,265	7,000
Marine and other do	4,637	4,174	3,944	4,137	4,200
Sodium compounds:					
Sodium carbonate do	1,411	1,189	1,105	1,218	1,364
Sodium sulfate do	225	255	214	125	128
Stone, sand and gravel, n.e.s.:					
Dimension stone[4] thousand cubic meters	264	324	254	237	300
Limestone, industrial thousand tons	53,477	49,243	42,935	44,371	43,505
Crushed and broken stone do	117,616	99,149	93,286	91,445	97,439
Slate do	50	52	53	62	23
Basalt lava and lava sand do	8,153	7,784	7,010	6,350	7,482
Calcite do	5	3	3	4	3
Grinding stone[e] cubic meters	[3]43	42	40	40	42
Sand and gravel thousand tons	188,155	164,437	150,016	146,414	143,278

See footnotes at end of table.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS—Continued					
Sulfur:					
S content of pyrites ______ thousand tons__	222	213	229	([5])	--
Byproduct:					
Of metallurgy[e] ____do____	450	400	400	400	350
Of natural gas____do____	814	834	872	632	860
Of petroleum[e]____do____	[3]220	190	220	195	190
Unspecified[e]____do____	[3]93	95	100	95	90
Total ____do____	1,799	1,732	1,821	1,322	1,490
Talc including talc schist____do____	15	15	15	14	14
MINERAL FUELS AND RELATED MATERIALS					
Carbon: Carbon black ________	353,568	354,191	348,037	362,125	382,420
Coal:					
Anthracite and bituminous _ thousand tons__	87,146	88,460	89,014	82,202	79,426
Lignite____do____	129,833	130,619	127,307	124,281	126,739
Total ____do____	216,979	219,079	216,321	206,483	206,165
Coke, metallurgical ____do____	28,494	27,914	26,275	22,427	20,586
Fuel briquets:					
Of anthracite and bituminous coal ___do____	1,455	1,332	1,285	1,244	1,437
Of lignite ____do____	4,446	4,169	3,951	3,568	3,818
Gas:					
Manufactured (excluding that from petroleum refineries):[6]					
Blast furnace _____ million cubic feet__	199,456	185,752	153,545	147,683	174,345
Coke oven ____do____	226,336	227,246	214,144	185,858	174,345
Natural, gross ____do____	658,430	673,014	568,909	622,339	563,258
Peat:					
Agricultural use ________ thousand tons__	1,555	1,742	1,842	1,868	1,429
Fuel use ____do____	279	246	253	259	277
Petroleum:					
Crude ______ thousand 42-gallon barrels__	33,450	32,207	30,734	29,730	29,289
Refinery products:					
Gasoline, motor____do____	182,296	167,731	171,599	170,885	170,801
Jet fuel (including aviation gasoline) do____	10,506	11,802	11,099	11,231	13,318
Kerosine ____do____	315	349	388	356	295
Distillate fuel oil ____do____	311,192	270,977	264,823	252,029	260,018
Residual fuel oil ____do____	128,509	143,037	127,852	104,649	92,701
Lubricants____do____	9,922	9,874	9,229	8,687	11,205
Liquefied petroleum gas____do____	30,938	26,425	26,262	23,942	23,548
Bitumen ____do____	20,406	18,470	17,676	19,460	18,514
Unspecified ____do____	122,646	47,304	38,205	45,809	42,665
Refinery fuel and losses ____do____	57,827	55,762	52,255	50,169	48,769
Total ____do____	874,557	751,731	719,388	687,217	681,834

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 1985.
[2]Primary nickel and nickel contained in ferronickel, Monel metal, and nickel oxide directly used by the steel industry.
[3]Reported figure.
[4]Partial figures.
[5]Revised to zero.
[6]Other types of manufactured gas may be produced but production data are not reported, and available information is inadequate to make reliable estimates. Estimates presented in previous editions of this Yearbook are considered unreliable.

TRADE

The FRG was actively negotiating trade with the U.S.S.R. Mannesmann AG, for example, was reportedly holding talks on the sale of surface mining and coal processing equipment to develop Siberian lignite reserves. The project would be the largest East-West Siberian transaction since the agreement to build the trans-Siberian gas pipeline. Ruhrgas AG signed an agreement with the U.S.S.R. to supply West Berlin with natural gas from the trans-Siberian export pipeline. Deliveries were scheduled to begin in 1985 and were to increase over a period of several years to 650 to 700 million cubic meters per year. FRG's Thyssen Rheinstahl Technik GmbH received an order for a steel-rolling mill for the Krivoy Rog Works in the Ukraine. Mannesmann Demag signed a contract to construct two steel pipe plants in the U.S.S.R., one in Baku on the Caspian Sea and the other in Taganrog on the Sea of Azov.

Since the signing of an economic cooperation agreement in 1979 with China, the FRG had established technical working groups on agriculture, coal, and nonferrous metals. Since that time, over 40 representative offices have been set up in Beijing, Shanghai, and Guangzhou by West German industries. The FRG was China's largest trading partner in Western Europe in 1983, trade having increased sevenfold over that of 1972. One major current cooperation project under negotiation was the construction by the FRG of the Shanghai Bao steelworks.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Alkaline-earth metals	16	27	3	Italy 14.
Aluminum:				
Ore and concentrate	33,742	43,934	1,662	Belgium-Luxembourg 20,378; France 4,262.
Oxides and hydroxides	438,067	467,939	11,849	Canada 108,377; East Germany 73,894.
Ash and residue containing aluminum	10,210	10,055	NA	France 4,952; Netherlands 3,237.
Metal including alloys:				
Scrap	67,719	77,722	14	Italy 24,108; Netherlands 20,659.
Unwrought	267,403	321,146	11,758	Italy 80,562; France 59,140; Netherlands 40,762.
Semimanufactures	434,174	506,659	18,788	France 86,811; United Kingdom 74,134; Italy 45,021.
Antimony:				
Oxides	422	571	93	Switzerland 107; Spain 57.
Metal including alloys, all forms	9	17	NA	NA.
Arsenic: Oxides and acids	827	471	NA	United Kingdom 304; Italy 125.
Bismuth: Metal including alloys, all forms	251	82	17	United Kingdom 35.
Cadmium: Metal including alloys, all forms	617	633	NA	NA.
Cesium and rubidium: Metal including alloys, all forms value, thousands	$21	$47	NA	NA.
Chromium:				
Ore and concentrate	12,959	8,694	--	Netherlands 4,205; Denmark 2,082.
Oxides and hydroxides	11,622	12,643	NA	NA.
Metal including alloys, all forms	101	106	1	Belgium-Luxembourg 31; Netherlands 30.
Cobalt:				
Oxides and hydroxides	25	86	--	Netherlands 33; Italy 18.
Metal including alloys, all forms	816	885	6	Italy 72; undetermined 664.
Columbium and tantalum:				
Ore and concentrate	1,424	1,328	859	Netherlands 452.
Metal including alloys, all forms:				
Columbium (niobium)	45	97	NA	NA.
Tantalum	75	86	3	NA.
Copper:				
Ore and concentrate	2	2,662	--	All to Sweden.
Matte and speiss including cement copper	41	2,569	--	Netherlands 2,132.
Oxides and hydroxides	2,562	2,546	112	Denmark 560; United Kingdom 402.
Sulfate	1,680	2,212	NA	NA.
Ash and residue containing copper	15,513	18,986	NA	Austria 8,297; Belgium-Luxembourg 3,410.
Metal including alloys:				
Scrap	61,514	67,128	726	Italy 22,623; Belgium-Luxembourg 13,296.
Unwrought	104,114	122,905	474	United Kingdom 32,418; East Germany 23,169.
Semimanufactures	391,080	413,782	45,289	France 53,564; Netherlands 40,752; Italy 38,927.
Gallium: Metal including alloys, all forms	6	14	2	Japan 5; Netherlands 4.
Germanium: Metal including alloys, all forms value, thousands	$388	$879	$105	United Kingdom $690.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Gold:				
Ash and residue containing gold value, thousands	$222	$672	NA	Belgium-Luxembourg $372; Netherlands $270.
Waste and sweepings do	$1,545	$2,977	$1,293	Switzerland $756; Netherlands $436.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,111	1,211	15	United Kingdom 274; Belgium-Luxembourg 242.
Hafnium: Metal including alloys, all forms value, thousands	$5	$11	--	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	5,763	9,944	37	Belgium-Luxembourg 6,165; East Germany 1,508.
Pyrite, roasted	51,264	38,932	--	Belgium-Luxembourg 13,427; France 11,084.
Metal:				
Scrap thousand tons	3,048	3,172	([2])	Italy 1,673; Belgium-Luxembourg 423.
Pig iron, cast iron, related materials do	825	541	1	France 322; Italy 49; Spain 35.
Ferroalloys:				
Ferrochromium	53,988	55,901	5,966	France 16,605; India 7,592.
Ferromanganese	32,975	48,198	9,445	Italy 6,113; Belgium-Luxembourg 5,512.
Ferromolybdenum	1,010	1,025	NA	Netherlands 314; Poland 174.
Ferronickel	50	274	NA	Netherlands 112; France 99.
Ferrosilicochromium	2,920	3,179	NA	Belgium-Luxembourg 1,798; France 591.
Ferrosilicomanganese	5,729	5,134	NA	Switzerland 3,270; Belgium-Luxembourg 1,274.
Ferrosilicon	59,191	59,052	588	Italy 13,124; Belgium-Luxembourg 8,609.
Silicon metal	5,036	6,378	449	Netherlands 2,289; France 1,013.
Unspecified	9,257	11,754	1,513	Japan 1,489; Austria 1,032.
Steel, primary forms thousand tons	3,185	2,985	417	Belgium-Luxembourg 428; France 396; United Kingdom 389.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	2,722	2,866	144	France 540; East Germany 402; Netherlands 361.
Universals, plates, sheets do	5,817	5,719	608	U.S.S.R. 777; France 504; East Germany 350.
Hoop and strip do	1,264	1,253	42	France 158; U.S.S.R. 146; Netherlands 125.
Rails and accessories do	235	219	30	Italy 81; Netherlands 33.
Wire do	310	305	23	Netherlands 53; France 52; Belgium-Luxembourg 38.
Tubes, pipes, fittings do	4,111	3,628	140	U.S.S.R. 1,404; China 374; Netherlands 262.
Castings and forgings, rough do	115	118	5	France 18; Belgium-Luxembourg 15.
Lead:				
Ore and concentrate	55	741	--	All to Belgium-Luxembourg.
Oxides	11,728	13,238	186	Netherlands 3,503; U.S.S.R. 2,001.
Ash and residue containing lead	14,774	18,190	2	Belgium-Luxembourg 12,568.
Metal including alloys:				
Scrap	13,588	17,194	--	Italy 6,600; Netherlands 6,569.
Unwrought	100,622	120,330	1,589	Italy 32,378; France 15,252; Egypt 12,826.
Semimanufactures	14,176	16,905	137	Denmark 3,591; Saudi Arabia 2,018.
Lithium:				
Oxides and hydroxides	510	610	NA	France 198; Belgium-Luxembourg 126.
Metal including alloys, all forms	40	60	NA	Switzerland 46; Japan 6.
Magnesium: Metal including alloys:				
Scrap	1,686	1,563	202	Italy 822; Netherlands 150.
Unwrought	323	92	--	Belgium-Luxembourg 34; France 17.
Semimanufactures	934	883	10	India 199; Netherlands 144.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade	1,497	4,020	101	United Kingdom 2,989.
Oxides	716	476	NA	France 131; Italy 101.
Metal including alloys, all forms	98	143	NA	Spain 40; United Kingdom 4.
Mercury 76-pound flasks	8,077	16,675	464	Netherlands 5,974; East Germany 5,597.
Molybdenum:				
Ore and concentrate	7,442	6,898	149	Netherlands 3,120; Belgium-Luxembourg 1,681.
Metal including alloys:				
Unwrought and scrap	391	591	NA	NA.
Semimanufactures	39	30	NA	Japan 9; Brazil 5.
Nickel:				
Matte and speiss	136	5,553	--	Netherlands 1,803; Canada 1,318.
Oxides and hydroxides	135	2,437	1,764	Sweden 235; Netherlands 183.
Ash and residue containing nickel	1,582	1,583	NA	Austria 922; Netherlands 305.
Metal including alloys:				
Scrap	7,700	7,637	316	Sweden 6,492; Netherlands 454.
Unwrought	9,461	14,358	336	Netherlands 7,558; France 3,175.
Semimanufactures	9,575	8,766	2,398	United Kingdom 930; France 924.
Platinum-group metals:				
Ash and residue containing platinum value, thousands	$3	$5	NA	NA.
Waste and sweepings do	$1,347	$1,185	NA	Spain $774; Netherlands $335.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	143,437	115,223	38,643	Switzerland 16,291; Netherlands 12,859.
Platinum do	238,142	225,203	12,334	Switzerland 66,982; France 33,950.
Unspecified do	90,732	102,236	17,848	Japan 14,779; Austria 7,894; Switzerland 7,691.
Rare-earth metals including alloys, all forms	253	170	NA	NA.
Rhenium: Metal including alloys, all forms value, thousands	$24	$19	NA	NA.
Selenium, elemental and phosphorus	8,414	9,651	NA	NA.
Silver:				
Ash and residue containing silver value, thousands	$1,732	$2,904	NA	United Kingdom $1,500; Belgium-Luxembourg $836.
Waste and sweepings do	$1,266	$3,515	NA	Spain $1,532; United Kingdom $964.
Metal including alloys, unwrought and partly wrought thousand troy ounces	43,886	47,814	209	United Kingdom 10,413; East Germany 9,137.
Tellurium, elemental and arsenic	9	14	2	Belgium-Luxembourg 2; Canada 2; Sweden 2.
Tin:				
Oxides	72	61	--	All to East Germany.
Ash and residue containing tin	3,025	3,652	34	United Kingdom 3,401.
Metal including alloys:				
Scrap	133	230	--	Netherlands 134; Denmark 77.
Unwrought	4,025	4,356	1,831	Netherlands 1,328; United Kingdom 517.
Semimanufactures	857	1,114	101	Austria 198; undetermined 309.
Titanium:				
Ore and concentrate	5,377	6,652	--	Bulgaria 2,600; France 866.
Oxides	56,028	58,956	12,903	Italy 5,820; Netherlands 2,820.
Metal including alloys:				
Scrap	1,043	1,169	125	United Kingdom 774; Spain 90.
Unwrought	106	100	NA	United Kingdom 45; Austria 20.
Semimanufactures	622	1,029	NA	France 329; Spain 187; Netherlands 135.
Tungsten:				
Ore and concentrate	--	76	--	Albania 41; Spain 20.
Ash and residue containing tungsten	126	312	NA	Austria 289.
Metal including alloys:				
Scrap	304	470	--	NA.
Unwrought	335	298	--	NA.
Semimanufactures	72	92	5	Romania 15; Sweden 9; Brazil 8.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Uranium and thorium:				
Ore and concentrate value, thousands	(2)	$10	--	Czechoslovakia $9.
Oxides and other compounds	326	647	NA	France 509.
Metal including alloys, all forms	7	4	--	Italy 3; United Kingdom 1.
Vanadium:				
Ash and residue containing vanadium	889	1,486	NA	Belgium-Luxembourg 1,031.
Metal including alloys:				
Scrap value, thousands	$4	--		
Unwrought	135	192	--	United Kingdom 150; France 40.
Semimanufactures value, thousands	$9	$7	--	NA.
Zinc:				
Ore and concentrate	144,537	158,868	--	East Germany 61,492; Belgium-Luxembourg 36,961; Netherlands 34,286.
Oxides	19,202	19,379	NA	NA.
Blue powder	4,151	5,755	68	Hungary 1,101; Netherlands 915.
Matte	7,470	9,826	NA	Belgium-Luxembourg 4,727; Italy 2,614.
Ash and residue containing zinc	98,173	85,405	4,200	Sweden 30,622; France 13,694.
Metal including alloys:				
Scrap	8,623	14,889	--	Belgium-Luxembourg 4,683; Netherlands 4,256.
Unwrought	113,602	133,180	22,788	Italy 34,924; Netherlands 13,670.
Semimanufactures	18,620	21,192	36	NA.
Zirconium:				
Ore and concentrate	16,379	14,461	--	Netherlands 2,179; Czechoslovakia 2,145; Yugoslavia 1,819.
Metal including alloys:				
Scrap	38	40	15	France 23.
Unwrought	37	25	2	France 6; United Kingdom 5.
Semimanufactures	26	21	1	Canada 19.
Other:				
Ores and concentrates	--	18	--	East Germany 12.
Oxides and hydroxides	11,057	11,885	NA	NA.
Ashes and residues	76,210	59,274	878	Belgium-Luxembourg 34,823; Netherlands 11,940.
Base metals including alloys, all forms	25,066	26,020	5	East Germany 25,877; United Kingdom 72.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	266,971	269,338	33	Netherlands 249,444.
Artificial:				
Corundum	45,755	45,760	2,667	Italy 4,903; Austria 4,557.
Silicon carbide	22,971	26,164	NA	NA.
Dust and powder of precious and semiprecious stones including diamond kilograms	743	1,389	148	Greece 372; Austria 215; Italy 211.
Grinding and polishing wheels and stones	13,632	14,202	652	France 1,728; Iran 1,478; Netherlands 1,020.
Asbestos, crude	47,239	34,261	NA	NA.
Barite and witherite	39,886	37,839	162	France 11,969; Belgium-Luxembourg 5,613.
Boron materials:				
Crude natural borates	15,717	13,743	--	East Germany 9,472; Sweden 3,607.
Elemental	5	15	1	France 3.
Oxides and acids	976	665	--	Yugoslavia 365; Switzerland 73.
Bromine	11	13	NA	NA.
Cement thousand tons	2,673	2,312	--	Netherlands 1,538; Iraq 126; Libya 109.
Chalk	48,053	54,979	81	Netherlands 16,975; Sweden 13,561; Finland 13,496.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS —Continued				
Clays, crude:				
Bentonite	21,122	31,488	NA	Belgium-Luxembourg 12,210; France 8,224.
Ceramic	825,625	839,641	NA	Italy 399,214; Netherlands 167,556; France 126,696.
Chamotte earth	37,277	29,950	NA	Netherlands 13,086; France 4,177.
Fire clay	360,038	355,235	NA	Italy 139,949; Belgium-Luxembourg 79,229; Netherlands 72,472.
Fuller's earth	3,865	6,361	NA	Netherlands 2,067; France 2,064.
Kaolin	91,488	96,395	NA	Italy 26,395; Netherlands 14,408.
Unspecified	266,417	219,085	NA	Netherlands 149,907; Italy 21,447.
Cryolite and chiolite	5	40	1	Italy 31.
Diamond:				
Gem, not set or strung carats	134,503	120,733	8,527	Belgium-Luxembourg 55,598; Switzerland 21,643.
Industrial stones do	249,798	321,615	53,306	Belgium-Luxembourg 79,481; Ireland 52,600.
Diatomite and other infusorial earth	2,344	2,660	12	Netherlands 611; East Germany 559.
Feldspar, fluorspar, related materials:				
Feldspar	15,176	17,465	NA	France 8,602; Belgium-Luxembourg 2,673.
Fluorspar	13,219	12,921	NA	Netherlands 4,684; Austria 3,281.
Unspecified	1,128	1,235	NA	Belgium-Luxembourg 1,098.
Fertilizer materials:				
Crude, n.e.s	58,589	74,683	--	Netherlands 63,837.
Manufactured:				
Ammonia thousand tons	223	176	--	Denmark 131; France 12.
Nitrogenous do	959	1,252	10	Belgium-Luxembourg 361; Netherlands 172; Austria 91.
Phosphatic do	45	70	--	East Germany 33; Austria 15.
Potassic do	1,997	2,193	50	Belgium-Luxembourg 668; India 212; Japan 148.
Unspecified and mixed do	957	1,106	([2])	Belgium-Luxembourg 342; France 152; Austria 140.
Graphite, natural	10,029	9,978	763	East Germany 1,544; Italy 698.
Gypsum and plaster	327,411	309,826	27	Netherlands 146,592; Belgium-Luxembourg 56,438.
Iodine	45	50	NA	Mexico 19; Italy 6.
Kyanite and related materials	8,790	5,556	--	Italy 1,347; France 1,343; Austria 1,283.
Lime	381,361	397,465	19	Netherlands 255,755; France 65,829.
Magnesium compounds:				
Magnesite	8,917	9,842	NA	France 7,159; Sweden 815.
Oxides and hydroxides	7,849	7,265	257	Italy 1,467; Netherlands 657.
Other	8,196	9,216	NA	Netherlands 3,103; Italy 1,989.
Mica:				
Crude including splittings and waste	879	919	--	Netherlands 335; Spain 153.
Worked including agglomerated splittings	274	220	([2])	Italy 63; United Kingdom 44.
Phosphates, crude	1,602	1,925	--	Switzerland 1,563.
Pigments, mineral:				
Natural, crude	1,094	1,659	714	Switzerland 499.
Iron oxides and hydroxides, processed	135,935	144,553	9,549	France 21,969; United Kingdom 16,746.
Potassium salts, crude	38,562	38,253	--	United Kingdom 18,276; Belgium-Luxembourg 16,653.
Precious and semiprecious stones other than diamond:				
Natural kilograms	273,194	325,875	14,854	Japan 99,547; China 78,609; Hong Kong 31,489.
Synthetic do	26,883	22,760	2,039	Japan 12,108; Switzerland 3,210.
Pyrite, unroasted	2,031	1,041	NA	NA.
Quartz crystal, piezoelectric kilograms	96	71	NA	Iran 52.
Salt and brine thousand tons	1,942	1,793	([2])	Belgium-Luxembourg 1,231; Sweden 224.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	160,188	281,745	20	Belgium-Luxembourg 98,095; China 30,000.
Sulfate, manufactured	87,719	53,706	NA	Italy 13,260; Belgium-Luxembourg 7,756.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	1,373	1,119	(²)	Netherlands 997; Switzerland 70.
Worked do	31	50	(²)	East Germany 14; Austria 8.
Dolomite, chiefly refractory-grade do	215	211	(²)	Netherlands 11; France 57.
Gravel and crushed rock do	9,756	9,907	(²)	Netherlands 7,779; Switzerland 1,126.
Limestone other than dimension do	44	37	--	Netherlands 22; Belgium-Luxembourg 12.
Quartz and quartzite do	132	124	(²)	Belgium-Luxembourg 52; Netherlands 33.
Sand other than metal-bearing do	6,437	7,352	(²)	Netherlands 5,783; Belgium-Luxembourg 1,153.
Sulfur:				
Elemental:				
Crude including native and byproduct	602,558	461,821	1	Netherlands 195,192; Denmark 61,513.
Colloidal, precipitated, sublimed	280	314	70	Netherlands 84; Belgium-Luxembourg 28.
Dioxide	24,427	18,033	NA	Netherlands 5,356; Austria 5,277.
Sulfuric acid	766,913	648,629	7,665	Netherlands 223,141; Belgium-Luxembourg 159,088.
Talc, steatite, soapstone, pyrophyllite	4,159	4,663	--	Yugoslavia 1,315; East Germany 580.
Vermiculite, perlite, chlorite	4,686	4,841	--	Belgium-Luxembourg 2,770; Netherlands 1,041.
Other:				
Crude thousand tons	2,381	3,090	25	Netherlands 1,989; Belgium-Luxembourg 495.
Slag and dross, not metal-bearing do	2,979	3,261	5	Netherlands 2,197; France 712.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	971	5,562	--	East Germany 4,158; Sweden 491.
Carbon:				
Carbon black	19,029	24,530	241	East Germany 18,918.
Gas carbon	109,799	110,906	529	France 23,073; Belgium-Luxembourg 13,845; Austria 13,316.
Coal:				
Anthracite and bituminous thousand tons	9,828	10,582	(²)	France 3,711; Belgium-Luxembourg 2,246; Italy 1,883.
Briquets of anthracite and bituminous coal do	349	409	--	United Kingdom 167; France 97.
Lignite including briquets do	741	661	--	Belgium-Luxembourg 203; Austria 143.
Coke and semicoke do	3,959	4,129	--	Belgium-Luxembourg 1,502; France 1,060.
Gas:				
Manufactured million cubic feet	39	72	--	All to Switzerland.
Gaseous do	392,176	336,530	NA	NA.
Peat including briquets and litter	542,127	528,189	57	Netherlands 328,007; Switzerland 57,093.
Petroleum:				
Crude thousand 42-gallon barrels	8,335	8,137	--	East Germany 8,094.
Refinery products:				
Liquefied petroleum gas do	6,710	8,309	8	Netherlands 3,646; Italy 1,430.
Gasoline do	15,863	13,762	80	Switzerland 4,462; France 2,975; Austria 2,235.
Mineral jelly and wax do	1,337	1,256	(²)	Netherlands 121; Belgium-Luxembourg 79.
Kerosine and jet fuel do	9,504	8,583	(²)	Switzerland 459; bunkers 7,531.
Distillate fuel oil do	7,485	7,263	1	France 1,529; Switzerland 1,100.
Lubricants do	3,258	3,234	10	Belgium-Luxembourg 498; United Kingdom 349.
Nonlubricating oils do	320	NA	--	
Residual fuel oil do	24,543	23,393	166	United Kingdom 5,029; bunkers 5,670.
Bitumen and other residues do	2,136	2,262	--	Austria 599; Switzerland 486.
Bituminous mixtures do	131	111	(²)	Netherlands 32; Switzerland 24.
Petroleum coke do	1,566	1,864	--	Netherlands 573; France 400.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	3	23	NA	France 20.
Alkaline-earth metals	236	270	2	France 165; Canada 48.
Aluminum:				
Ore and concentrate thousand tons	3,533	3,156	--	Australia 1,107; Guinea 863; Sierra Leone 579.
Oxides and hydroxides	492,196	488,477	2,308	Australia 201,696; Italy 134,852; Suriname 99,289.
Ash and residue containing aluminum	46,260	40,063	--	Austria 12,629; Netherlands 5,934.
Metal including alloys:				
Scrap	196,801	192,452	2,298	Netherlands 45,324; United Kingdom 32,843.
Unwrought	552,928	592,141	1,974	Norway 217,635; United Kingdom 53,358.
Semimanufactures	253,163	299,920	2,937	France 81,535; Netherlands 42,942; Belgium-Luxembourg 42,419.
Antimony:				
Ore and concentrate	1,640	1,706	--	Bolivia 921; China 700.
Oxides	3,899	5,167	100	France 1,614; United Kingdom 1,143.
Metal including alloys, all forms	440	371	NA	China 173; Belgium-Luxembourg 159.
Arsenic: Oxides and acids	501	369	NA	Belgium-Luxembourg 190; France 69.
Beryllium:				
Oxides and hydroxides value, thousands	$39	$44	--	All from United Kingdom.
Metal including alloys, all forms kilograms	354	338	208	NA.
Bismuth: Metal including alloys, all forms	332	418	NA	United Kingdom 119; Peru 117.
Cadmium:				
Oxides and hydroxides	487	635	NA	Belgium-Luxembourg 524.
Metal including alloys, all forms	784	829	NA	Belgium-Luxembourg 137.
Cesium and rubidium: Metal including alloys, all forms value, thousands	$10	$7	NA	NA.
Chromium:				
Ore and concentrate	244,279	247,187	--	Republic of South Africa 135,094; Albania 77,850.
Oxides and hydroxides	2,676	1,918	129	U.S.S.R. 621; China 430; Poland 378.
Metal including alloys, all forms	600	921	69	United Kingdom 314; Japan 196.
Cobalt:				
Ore and concentrate	(2)	5	--	NA.
Oxides and hydroxides	308	409	6	Belgium-Luxembourg 203; Canada 56.
Metal including alloys, all forms	1,450	2,009	78	Zaire 718; Belgium-Luxembourg 210.
Columbium and tantalum:				
Ore and concentrate	185	370	--	Canada 208; Sweden 110.
Ash and residue containing columbium and/or tantalum	1,383	866	--	Zimbabwe 210; Zaire 199.
Metal including alloys, all forms:				
Columbium (niobium)	24	41	34	France 5.
Tantalum	102	126	85	Belgium-Luxembourg 17.
Copper:				
Ore and concentrate	553,963	496,262	27,929	Papua New Guinea 205,039; Mexico 105,023; Poland 90,090.
Matte and speiss including cement copper	6,309	11,358	--	Poland 5,164; Australia 3,990.
Oxides and hydroxides	750	979	NA	Belgium-Luxembourg 606; Italy 350.
Sulfate	9,305	10,756	NA	Belgium-Luxembourg 2,362; Czechoslovakia 1,775.
Ash and residue containing copper	20,638	17,921	189	Italy 4,091; France 3,135; Netherlands 1,961.
Metal including alloys:				
Scrap	177,122	205,405	5,284	United Kingdom 44,984; France 42,916.
Unwrought	544,079	518,073	4,348	Chile 126,899; Poland 75,972; Republic of South Africa 66,941.
Semimanufactures	243,796	253,562	2,937	France 81,535; Netherlands 42,942; Belgium-Luxembourg 42,419.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS—Continued				
Gallium: Metal including alloys, all forms	7	14	2	Belgium-Luxembourg 4; Netherlands 2.
Germanium: Metal including alloys, all forms ... kilograms	1,800	3,700	NA	Belgium-Luxembourg 3,100.
Gold:				
Ash and residue containing gold ... value, thousands	$17,867	$26,394	$9,643	Canada $8,111; Bulgaria $6,561.
Waste and sweepings ... do	$25,069	$22,660	$681	Sweden $5,703; Netherlands $3,167.
Metal including alloys, unwrought and partly wrought ... thousand troy ounces	3,879	1,965	42	Switzerland 405; U.S.S.R. 395.
Hafnium: Metal including alloys, all forms ... kilograms	700	500	450	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite ... thousand tons	38,910	35,497	--	Brazil 13,220; Liberia 6,530; Australia 4,207.
Pyrite, roasted ... do	430	88	--	Belgium-Luxembourg 40; Sweden 24.
Metal:				
Scrap ... do	1,289	1,300	7	Netherlands 325; United Kingdom 218; Belgium-Luxembourg 207.
Pig iron, cast iron, related materials	269,217	227,815	189	Canada 57,827; Brazil 46,811.
Ferroalloys:				
Ferroaluminum	268	148	64	United Kingdom 65.
Ferrochromium	219,884	297,662	482	Republic of South Africa 178,457; Zimbabwe 48,237.
Ferromanganese	96,538	98,243	--	Norway 41,327; France 34,453.
Ferromolybdenum	4,207	4,583	85	Belgium-Luxembourg 2,758; United Kingdom 805.
Ferronickel	33,358	73,107	NA	Greece 23,733; New Caledonia 18,118.
Ferrosilicochromium	7,570	5,753	NA	Zimbabwe 4,363.
Ferrosilicomanganese	110,704	115,360	NA	Norway 58,697; Portugal 26,654.
Ferrosilicon	193,258	195,001	782	Norway 94,955; France 30,785.
Silicon metal	51,703	65,637	NA	Norway 25,128; France 12,649.
Unspecified	12,201	13,075	175	France 5,130; Belgium-Luxembourg 2,026.
Steel, primary forms ... thousand tons	1,501	1,904	(2)	Belgium-Luxembourg 531; Netherlands 299.
Semimanufactures:				
Bars, rods, angles, shapes, sections ... do	3,663	4,517	1	Italy 981; Belgium-Luxembourg 925; France 434.
Universals, plates, sheets ... do	3,539	3,834	2	Belgium-Luxembourg 982; France 647; Netherlands 352.
Hoop and strip ... do	502	623	1	Belgium-Luxembourg 199; France 147; East Germany 71.
Rails and accessories ... do	23	17	(2)	Netherlands 5; East Germany 3.
Wire ... do	244	272	(2)	Belgium-Luxembourg 92; France 41; Austria 30.
Tubes, pipes, fittings ... do	767	832	2	Italy 168; France 127; Netherlands 100.
Castings and forgings, rough ... do	39	81	(2)	East Germany 44; France 5.
Lead:				
Ore and concentrate	192,371	217,753	1,081	Canada 56,443; Republic of South Africa 34,177; Sweden 29,463.
Oxides	8,329	9,924	57	Belgium-Luxembourg 3,551; Netherlands 2,013.
Ash and residue containing lead	19,244	16,091	4,193	France 3,526; United Kingdom 2,615.
Metal including alloys:				
Scrap	35,606	30,886	671	Netherlands 12,100; Denmark 5,366.
Unwrought	153,977	118,670	38	United Kingdom 30,094; Sweden 19,727.
Semimanufactures	3,151	3,803	6	Belgium-Luxembourg 2,530; France 724.
Lithium:				
Oxides and hydroxides	1,684	641	295	China 63; France 60.
Metal including alloys, all forms	14	13	1	United Kingdom 11.
Magnesium: Metal including alloys:				
Scrap	2,135	2,086	59	Italy 685; Netherlands 416.
Unwrought	26,886	28,274	6,138	Norway 12,085; Italy 4,856.
Semimanufactures	858	1,362	17	Austria 624; France 512.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade	393,546	434,261	--	Republic of South Africa 291,747; Australia 99,197.
Oxides	4,198	2,974	21	Belgium-Luxembourg 2,354.
Metal including alloys, all forms	5,989	5,468	504	Republic of South Africa 2,532; Belgium-Luxembourg 761.
Mercury 76-pound flasks	7,038	16,249	2,871	Netherlands 4,060; Spain 3,393.
Molybdenum:				
Ore and concentrate	21,524	19,061	3,935	Canada 3,208; Chile 2,757; Belgium-Luxembourg 2,237.
Oxides and hydroxides	265	274	24	Netherlands 191.
Metal including alloys:				
Scrap	381	433	12	Austria 305; France 29.
Unwrought	51	34	7	United Kingdom 14; France 7.
Semimanufactures	333	282	47	Austria 194; United Kingdom 20.
Nickel:				
Ore and concentrate	571	115	--	Albania 93.
Matte and speiss	13,847	11,999	--	Australia 4,580; Canada 2,737.
Oxides and hydroxides	193	186	NA	Canada 84; Netherlands 54.
Ash and residue containing nickel	2,244	2,037	48	Netherlands 405; Belgium-Luxembourg 378.
Metal including alloys:				
Scrap	6,419	4,902	410	France 1,309; Netherlands 927.
Unwrought	41,322	44,831	5,579	U.S.S.R. 12,300; Australia 6,514; Norway 6,081.
Semimanufactures	8,818	6,654	385	France 2,621; United Kingdom 1,091.
Platinum-group metals:				
Ash and residue containing platinum value, thousands	$4,588	$1,627	$699	United Kingdom $274; Bulgaria $248.
Waste and sweepings do	$31,174	$38,200	$6,943	Netherlands $5,478; Hungary $4,064.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	853,706	357,613	25,747	U.S.S.R. 166,632; United Kingdom 69,159.
Platinum do	777,382	491,913	85,148	Switzerland 131,080; United Kingdom 95,482.
Unspecified do	96,854	170,538	47,383	Republic of South Africa 87,620; United Kingdom 20,787.
Rare-earth metals including alloys, all forms	74	129	NA	NA.
Rhenium: Metal including alloys, all forms value, thousands	$320	$367	NA	Italy $225; U.S.S.R. $122.
Selenium, elemental and phosphorus	26,213	26,844	NA	NA.
Silicon, high-purity	92	54	(2)	Italy 29; United Kingdom 10.
Silver:				
Ash and residue containing silver value, thousands	$23,584	$34,794	$22,087	Switzerland $2,691; Canada $1,951.
Waste and sweepings do	$13,861	$19,469	$4,712	Netherlands $4,054; Sweden $1,582.
Metal including alloys, unwrought and partly wrought thousand troy ounces	40,847	35,679	5,360	Sweden 5,754; North Korea 2,347; Poland 2,137.
Tellurium, elemental and arsenic	77	74	NA	Sweden 25; Netherlands 19.
Tin:				
Ore and concentrate	1,766	2,166	--	Bolivia 1,461; Brazil 467.
Oxides	51	82	NA	United Kingdom 28; Italy 17.
Ash and residue containing tin	4,335	2,068	738	Netherlands 346; Belgium-Luxembourg 257.
Metal including alloys:				
Scrap	448	282	22	United Kingdom 85; Switzerland 50.
Unwrought	16,342	16,662	41	Malaysia 3,406; Indonesia 3,240.
Semimanufactures	1,233	156	1	United Kingdom 65; Netherlands 38.
Titanium:				
Ore and concentrate	409,412	403,732	1,009	Norway 256,729; Canada 86,267.
Oxides	20,824	23,487	2,897	Belgium-Luxembourg 9,492; France 5,289.
Metal including alloys:				
Scrap	177	128	14	United Kingdom 43; France 29.
Unwrought	1,778	891	33	U.S.S.R. 660; Japan 140.
Semimanufactures	1,280	1,027	65	Japan 700; United Kingdom 186.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Tungsten:				
Ore and concentrate	2,855	3,841	3	China 2,042; Australia 340; Brazil 308.
Oxides and hydroxides	8	11	NA	U.S.S.R. 5.
Ash and residues containing tungsten	300	287	53	France 103; Sweden 32.
Metal including alloys:				
Scrap	380	422	30	United Kingdom 115; France 78; Netherlands 78.
Unwrought	394	444	5	Austria 302; France 66.
Semimanufactures	67	80	17	Austria 36; Belgium-Luxembourg 6.
Uranium and/or thorium:				
Ore and concentrate value, thousands	$5	$4	--	NA.
Oxides and other compounds	146	25	--	NA.
Metal including alloys, all forms:				
Uranium value, thousands	$111	$114	$114	
Thorium do	--	$5	--	United Kingdom $3.
Vanadium:				
Ore and concentrate	--	5	--	All from United Kingdom.
Oxides and hydroxides	2,360	1,455	208	Finland 902; China 306.
Ash and residue containing vanadium	29,878	27,826	1,367	China 5,104; Italy 1,982.
Zinc:				
Ore and concentrate	556,903	542,406	--	Canada 196,859; Greenland 63,962 Ireland 61,434.
Oxides	9,447	11,887	12	Netherlands 3,786; France 2,807.
Blue powder	12,678	11,302	NA	Belgium-Luxembourg 7,116; France 1,773.
Matte	5,765	9,712	219	Netherlands 2,596; United Kingdom 1,834.
Ash and residue containing zinc	93,312	60,582	3,404	Belgium-Luxembourg 15,206; United Kingdom 8,196.
Metal including alloys:				
Scrap	16,552	17,565	--	Netherlands 4,537; United Kingdom 2,831.
Unwrought	156,376	161,964	52	Belgium-Luxembourg 60,925; Netherlands 33,019.
Semimanufactures	29,295	30,504	3	France 23,825; Netherlands 4,156.
Zirconium:				
Ore and concentrate	67,648	68,622	2,191	Australia 30,768; Republic of South Africa 26,683.
Metal including alloys:				
Scrap	4	11	NA	France 8.
Unwrought	13	16	10	France 3; Sweden 3.
Semimanufactures	386	339	127	France 197.
Other:				
Ores and concentrates	11,511	16,242	74	Chile 14,668; Peru 1,353.
Oxides and hydroxides	3,711	2,436	990	France 420; Belgium-Luxembourg 398.
Ashes and residues	236,377	207,920	696	Canada 117,754; East Germany 7,509.
Base metals including alloys, all forms	1,129	5,581	235	East Germany 5,010; Sweden 83.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	64,620	87,026	1,201	Greece 71,519; Iceland 8,268.
Artificial:				
Corundum	39,328	22,966	508	Austria 4,726; Yugoslavia 4,053.
Silicon carbide	66,540	59,475	21	Norway 12,330; U.S.S.R. 3,151; Italy 2,901.
Dust and powder of precious and semiprecious stones including diamond	219	178	176	Ireland 1.
Grinding and polishing wheels and stones	6,955	8,040	85	Austria 1,835; Italy 1,678; France 1,045.
Asbestos, crude	151,555	188,857	443	Canada 141,148; U.S.S.R. 18,606.
Barite and witherite	174,976	141,023	--	France 101,602; China 11,699; Spain 11,169.
Boron materials:				
Crude natural borates	105,759	109,401	56,864	Turkey 47,627.
Oxides and acids	17,418	18,505	7	France 8,237; Turkey 5,646.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Bromine	3,361	4,152	NA	Israel 3,160; United Kingdom 739.
Cement thousand tons	1,728	1,927	(2)	Belgium-Luxembourg 523; East Germany 492; France 427.
Chalk	120,428	180,102	1	France 150,976; Belgium-Luxembourg 17,730.
Clays, crude:				
Bentonite	70,476	82,442	16,538	Greece 45,792; Spain 7,386.
Ceramic	84,053	103,207	--	Netherlands 32,352; France 21,885; East Germany 19,416.
Chamotte earth	81,774	56,879	--	Czechoslovakia 36,095; France 13,421.
Fire clay	77,659	64,442	1,935	France 22,939; Czechoslovakia 21,497.
Fuller's earth	5,369	5,649	3,310	United Kingdom 1,115; Spain 869.
Kaolin	851,426	863,566	133,666	United Kingdom 379,486; Czechoslovakia 140,222.
Unspecified	124,745	155,619	11,736	Netherlands 57,103; Czechoslovakia 38,195.
Cryolite and chiolite	1,705	1,730	--	Greenland 1,706.
Diamond:				
Gem, not set or strung carats	493,004	534,446	8,990	Belgium-Luxembourg 243,905; India 76,177.
Industrial stones do	864,233	939,371	21,151	Belgium-Luxembourg 312,470; Republic of South Africa 265,090.
Diatomite and other infusorial earth	37,780	36,791	5,236	Denmark 21,782; France 6,282.
Feldspar, fluorspar, related materials:				
Feldspar	54,006	54,356	--	Norway 23,612; Italy 14,168.
Fluorspar	205,698	176,124	--	China 45,424; Republic of South Africa 38,570.
Unspecified	59,646	50,597	9	Norway 37,324; Netherlands 11,613.
Fertilizer materials:				
Crude, n.e.s	30,494	30,232	1,448	Netherlands 22,027.
Manufactured:				
Ammonia thousand tons	141	198	(2)	France 90; East Germany 58.
Nitrogenous do	3,135	2,447	3	Netherlands 876; Belgium-Luxembourg 539; East Germany 258.
Phosphatic do	860	796	--	Belgium-Luxembourg 585; France 113.
Potassic do	87	83	--	France 76.
Unspecified and mixed do	1,308	1,655	86	Belgium-Luxembourg 325; Netherlands 221; Austria 215.
Graphite, natural	32,433	28,869	24	China 6,700; Austria 3,293; Norway 2,237.
Gypsum and plaster	712,889	758,492	74	France 476,964; Austria 187,503.
Iodine	1,134	1,190	108	Japan 697; Chile 312.
Kyanite and related materials	82,053	72,289	51,244	Republic of South Africa 18,407.
Lime	262,057	285,015	--	France 181,526; Belgium-Luxembourg 48,388.
Magnesium compounds:				
Magnesite	230,732	262,239	--	Greece 49,169; Czechoslovakia 37,987; North Korea 33,094.
Oxides and hydroxides	3,577	4,923	900	France 1,812; Japan 659.
Other	89,525	99,085	31	Austria 21,830; North Korea 21,769; Greece 19,626.
Mica:				
Crude including splittings and waste	11,345	10,515	291	India 4,169; China 1,595.
Worked including agglomerated splittings	559	544	9	France 185; Belgium-Luxembourg 173.
Nitrates, crude	3,555	1,468	--	Chile 1,416.
Phosphates, crude thousand tons	1,931	2,031	939	Israel 167; undetermined 813.
Pigments, mineral:				
Natural, crude	453	164	NA	Cyprus 118.
Iron oxides and hydroxides, processed	10,085	15,867	6,539	Belgium-Luxembourg 3,117; Netherlands 2,586.
Potassium salts, crude	86,753	12,393	--	East Germany 12,370.
Precious and semiprecious stones other than diamond:				
Natural	838	900	27	Brazil 573; Republic of South Africa 94.
Synthetic	37	23	4	Switzerland 12; Bulgaria 3.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	71,472	80,190	--	Finland 33,356; Yugoslavia 16,762; Hungary 9,989.
Quartz crystal, piezoelectric -- kilograms	39	371	NA	Malaysia 285.
Salt and brine	801,054	749,323	31	Netherlands 500,093; East Germany 127,205.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	181,748	168,851	59	Netherlands 66,671; East Germany 43,480.
Sulfate, manufactured	42,905	80,873	NA	Austria 30,537; Spain 14,179.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	906	875	(2)	East Germany 362; Sweden 93; Austria 84.
Worked do	653	732	(2)	Italy 437; Portugal 138.
Dolomite, chiefly refractory-grade do	545	457	(2)	Belgium-Luxembourg 401.
Gravel and crushed rock do	10,097	9,792	(2)	France 5,808; Denmark 1,412.
Limestone other than dimension do	1,116	1,291	--	Austria 604; France 299; Belgium-Luxembourg 271.
Quartz and quartzite do	87	63	1	Netherlands 22; Belgium-Luxembourg 12.
Sand other than metal-bearing do	r3,143	3,332	1	France 2,134; Netherlands 727.
Sand and gravel do	2,667	2,771	--	All from East Germany.
Sulfur:				
Elemental:				
Crude including native and byproduct	287,861	339,288	40,648	Canada 176,634; Poland 87,126.
Colloidal, precipitated, sublimed	635	783	1	France 552; Netherlands 136.
Dioxide	5,303	3,331	NA	Sweden 2,485.
Sulfuric acid	44,574	88,277	--	Netherlands 42,876; East Germany 15,506.
Talc, steatite, soapstone, pyrophyllite	121,699	141,788	585	Austria 58,330; France 32,303.
Vermiculite, perlite, chlorite	101,781	96,954	--	Greece 70,962; Hungary 11,609.
Other:				
Crude thousand tons	1,266	1,108	15	Norway 363; Austria 185; United Kingdom 131.
Slag and dross, not metal-bearing do	1,774	1,709	8	France 749; Belgium-Luxembourg 609.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	13,716	17,986	5,094	Trinidad and Tobago 11,971.
Carbon:				
Carbon black	5,259	3,564	22	Netherlands 2,261; United Kingdom 529.
Gas carbon	40,448	42,030	1,564	France 18,883; Netherlands 10,538.
Coal:				
Anthracite thousand tons	68	71	--	United Kingdom 61; U.S.S.R. 5.
Bituminous do	10,567	9,051	1,608	Republic of South Africa 2,360; Poland 2,040.
Lignite including briquets do	2,681	4,621	3	Czechoslovakia 2,641; East Germany 1,969.
Coke and semicoke do	910	684	65	France 254; Belgium-Luxembourg 103.
Gas, natural: Gaseous million cubic feet	1,835,438	1,844,581	NA	NA.
Peat including briquets and litter	37,093	46,244	--	U.S.S.R. 39,440; Poland 2,442.
Petroleum:				
Crude thousand 42-gallon barrels	536,436	481,347	--	United Kingdom 104,097; Libya 79,310; Nigeria 55,331.
Refinery products:				
Liquefied petroleum gas do	8,584	8,427	36	Netherlands 2,116; United Kingdom 1,272; East Germany 1,239.
Gasoline do	82,234	98,175	162	Netherlands 33,744; U.S.S.R. 20,973.
Mineral jelly and wax do	1,560	1,335	3	Netherlands 184; undetermined 672.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Kerosine and jet fuel thousand 42-gallon barrels	18,888	16,701	91	Netherlands 10,903; Belgium-Luxembourg 3,080.
Distillate fuel oil do	96,876	127,955	1,153	Netherlands 50,156; Belgium-Luxembourg 18,152.
Lubricants do	1,672	2,511	222	France 592; United Kingdom 354; Netherlands 353.
Nonlubricating oils do	55	NA	--	
Residual fuel oil do	45,938	60,006	83	Netherlands 19,050; U.S.S.R. 9,747.
Bitumen and other residues do	1,276	2,026	(2)	Netherlands 877; East Germany 583.
Bituminous mixtures do	110	132	4	Netherlands 75; France 17.
Petroleum coke do	6,331	5,930	5,050	Argentina 380; Netherlands 207.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Cobalt.—Approximately 500 tons of cobalt, as metal powder, oxide, and chemicals, was recovered by the sole producer, Hermann C. Starck Berlin, from scrap and residues, mostly imported. Starck remained a major world producer of metal powder, which comprised about two-thirds of its total production and was used in the manufacture of cemented carbides, magnetic alloys, nickel-base superalloys, and steel. The remainder of the recovered materials was cobalt oxide and salts for use in pigments, ceramics, frits, catalysts, and drying compounds. Total imports, including primary metals, were about 2,000 tons, mostly from Finland and Zaire. As a major world consumer of cobalt, the FRG used 1,500 tons of cobalt materials. Significant quantities were exported. A history of cobalt production and uses in Germany was published.[3]

Gallium.—According to Preussag AG Metall, a new plant for the extraction of gallium from gallium arsenide scrap, supplied by the domestic consuming industry, was in full operation at Langelsheim near Goslar. The plant could refine gallium to a very high purity, at least 99.99%, and increased the company's capacity for extracting gallium to 8 tons per year from the previous level of between 2 and 3 tons per year. The quantity of gallium arsenide scrap needed to produce 8 tons of pure gallium would equal about 30% of currently available world scrap stocks.

Vereinigte Aluminium-Werke AG also planned to double its high-purity electrolytic gallium production capacity to 5 tons per year at its Lunen plant. The expanded production was in response to increasing demands by the electronics industry for solid-state devices.

Iron and Steel.—After its general decline since 1979 to a low in 1982-83, the mostly privately owned steel industry began to show signs of recovery in 1984 as output increased significantly to 39 million tons of crude steel, 35 million tons of hot-rolled product, and 28 million tons of semimanufactures. This occurred despite a decrease in domestic demand during the first half of the year caused by a strike in the metalworking industries. Most of the demand increase occurred in the foreign market, particularly in the United States, as total steel exports increased by 16% to 18.4 million tons. Imports decreased slightly to 11.2 million tons. Despite the production increase, most of the steel industry did not begin to profit until the last quarter after unit steel prices were increased effective October 1 by about $10 per ton.[4]

Programs of modernization, company mergers and geographic centralization, plant closings, and layoffs continued to improve efficiency and profitability. Employment in the steel industry decreased by

5%, and productivity increased.

The lean and strengthened West German steel industry, believing that the continuing excessive subsidization of steel industries in other EEC countries was preventing fair competition, urged its Government to insist that EEC steel industries receiving large subsidies, especially those in Belgium, France, and Italy, be required to reduce capacity accordingly. In addition to competition from heavily subsidized EEC steel industries, the weakly subsidized West German industry faced inroads from developing countries. The EEC Government-subsidy program had begun in 1980 and was scheduled to cease at yearend 1985.

ARBED Saarstahl Group remained in financial difficulty and was still receiving heavy Government aid, as it had been for many years, much of it from the Saar regional government. The latter indicated that ARBED would require an additional $20 million in 1985 to avoid bankruptcy. This support, for reasons of regional rather than industrial policy, would require the approval of the EEC, which requested assurances that the company would return to viability within a reasonable time. The Saar government loaned ARBED about $40 million in 1984 but attached a condition that the company work closely with Dillinger Hüttenwerke AG, the other Saar producer, particularly in production of coke and pig iron, which was to be concentrated at Dillinger where construction of a new blast furnace began.

Total FRG pig iron and crude steel production capacity was decreased in compliance with EEC requirements. Steel industry capacity utilization rose to about 60% in 1984. Continuous casting continued to increase, accounting for about 80% of steel billet production, and this alone accounted for a significant part of the efficiency and productivity increases effected over the previous few years. Production of stainless steel increased 15% to about 880,000 tons. A planned significant increase in electrolytic galvanizing capacity, particularly by Thyssen Stahl AG, the FRG's largest steel producer and 1 of the world's 10 largest, was put on hold because of world overcapacity.

Lead and Zinc.—Traditionally, lead and zinc mining had been, and continued to be, the backbone of the FRG's mining industry. No new deposits had, however, been discovered in recent years, and the grade and metal content of the ores was decreasing. Preussag and Metallgesellschaft AG were virtually the only companies engaged in the lead-zinc industry.

In addition to the lead and zinc mines and smelters described in previous "Minerals Yearbooks," there were also the 145,000-ton-per-year electrolytic zinc smelter of Ruhr-Zink GmbH at Datteln (50% Metallgesellschaft and 50% Mount Isa Mines Ltd., Australia); the Imperial smelting furnace of "Berzelius" Metallhütten AG at Duisburg, with 80,000 tons of zinc and 30,000 tons of lead bullion capacity; the secondary lead smelter of Preussag at Harlingerode near Goslar, with a 70,000-ton capacity; and the electrolytic zinc plant of Weser-Zink GmbH at Nordenham, with a 120,000-ton capacity (75% Preussag and 25% Société Minière et Métallurgique de Penarroya, France), on the same site as the Preussag-Boliden-Blei GmbH smelter.

Preussag, headquartered in Hanover, operated its nonferrous metals division, principally lead and zinc, from Goslar. The total work force of the division was about 4,600 people, and sales in 1983 amounted to $415 million. Preussag accounted for about 45% of the FRG's lead production and 50% of its zinc production. The annual production of the Rammelsberg Mine in 1984 was about 280,000 tons of crude ore containing approximately 13% zinc, 5% lead, 1% copper, 3 ounces of silver per ton, and traces of gold. The flotation plant produced about 60,000 tons of zinc in concentrate, 20,000 tons of lead, 4,000 tons of copper, and 32,000 tons of barite. After the smelter at Goslar, Harz, was converted to the processing of secondary raw materials, the concentrates from the Rammelsberg Mine were sold to other smelters in Europe. Reserves were expected to be depleted in about 4 years, and the mine was to be shut down in 1988.

Annual production at Preussag's Bad Grund Mine in 1984 averaged about 420,000 tons of crude ore, containing approximately 6.5% zinc, 3.5% lead, and 2 ounces of silver per ton. The ore, treated at the mine, yielded 40,000 tons of zinc concentrate containing almost 62% zinc, and about 18,000 tons of lead concentrate containing 74% lead and 400 ounces of silver per ton. Reserves were estimated to be sufficient to last beyond the year 2000.

Preussag operated a lead-zinc smelter at Nordenham, at the mouth of the Weser River, in addition to the one at Goslar. Also, a plant at Langelsheim, near Goslar, produced high-purity antimony, arsenic, bismuth, cadmium, copper, gallium, germanium, gold, indium, lead, mercury, phosphorus, selenium, tellurium, thallium, tin, and zinc under the trade mark of PPM-Preussag Pure Metals.

Tantalum.—Tantalum mineral concentrates and tin slags had been the predominant feed materials for production of tantalum metal and compounds. A new electron-beam furnace was commissioned in 1984 by WC Heraeus GmbH, a major producer of tantalum mill products, thus increasing its ingot capacity tenfold, and the furnace broadened the company's raw materials base to include some materials not previously usable.

NONMETALS

The nonmetallic minerals industry in the FRG made slight advances in 1984. The potash industry, after decreasing in output since 1980, bounced back in 1983 and 1984 to the pre-1980 production level and became the most profitable nonmetallics industry. Most of the sales, by the only producer, Kali und Salz AG, were to domestic users. Western Europe accounted for about 19% of total world production of potash, nearly 50% of which was produced by Kali und Salz.[5]

Pumice.—After declining for several years, pumice production increased in 1984. Pumice from the FRG had an established foothold in the pumice market, particularly in the supply of raw pumice to neighboring countries.[6]

Pumice continued to be produced by a large number of small companies, about 122. More than 75% of these companies employed less than 20 people each. All production was concentrated in an area of about 30 square miles and was derived from one extinct volcano a few miles west of the small town of Neuwied, north of Coblenz. The pumice was mined in shallow pits with depths varying from 3 to 15 meters. Most of the better deposits, with almost no overburden, had been exhausted, and the industry was forced to rely on lean ores containing gross impurities, including silt. This led to the increased use of beneficiation methods, such as screening, washing, and heavy-medium separation.

Although the Neuwied area still contained about 35 to 45 million tons of pumice, the rapid depletion of higher purity reserves gave rise to research into the replacement of pumice by plentiful reserves of scoria in the same region. Initial tests indicated that this substitution in block manufacture was promising.

MINERAL FUELS

Total energy consumption, nearly one-half from domestic sources, increased 4% to 378 million tons of coal equivalent. Nuclear power, which increased 39% to about 30 million tons of coal equivalent, accounted for much of this increase, followed by small increases in gas and hard-coal consumption. Oil consumption, about 95% imported, was unchanged and accounted for about 42% of total energy consumption compared with 56% in 1979, an oil crisis year. The North Sea became the largest supplier of oil to the FRG, accounting for 28% of consumption. Coal and lignite, about 95% of which was produced domestically, continued to account for nearly one-third of energy consumption. Gas, approximately two-thirds imported, continued to account for about one-sixth of energy consumption. Gas consumption had decreased for several years and the increased consumption in 1984 was caused by industrial plants and households converting to gas. Gas imports from Denmark began in October. The Netherlands was the major supplier in 1983 followed by the U.S.S.R. and Norway.

More than 60% of the baseload electrical power in 1984 was generated with coal. Nearly 30% was produced by 17 nuclear power stations; 11 more nuclear plants were under construction, and another 9 were planned.

Veba AG was FRG's biggest energy and chemicals firm, and Ruhrkohle AG was the country's dominant coal producer.

Coal.—Coal remained the FRG's only abundant indigenous source of energy. During the previous few years, however, it had been severely affected by the sharp drop in demand from the steel industry, which had been the largest user of coal. In 1984, the utilities became the largest purchaser of Ruhrkohle coal. Ruhrkohle produced almost 75% of the FRG's coal, 58 million tons in 1983 and about 52 million tons in 1984.

Hard-coal production in the FRG continued to decline, by about 3 million tons to a total of 79 million tons in 1984; this was produced in four mining districts, of which the Ruhr area was by far the most important, producing about 80% of the total. All areas practiced longwall mining, and both shearing (rotating drum) methods and plowing methods were used.

Ownership of Ruhrkohle was radically altered during the year when the owner steel companies sold most of the firm to the two largest FRG energy producers. As a result, Veba increased its holdings from 27.2% to just under 40%, while Vereinigte Elektrizitaetswerke Westfalen AG increased its share to 21.9%. The remaining shareholders were Thyssen AG, 12.7%; Hoesch AG, 7.6%; and the French company Société Nouvelle Sidechar, 8.3%.

Ruhrkohle continued to operate at a loss. The Government lowered its subsidy on coking coal at yearend 1984 from $20 to $16 per ton. Although the steel industry increased output significantly and used only domestic coking coal, Ruhrkohle was nevertheless in the process of reducing its coal production capacity from 57.9 million tons in 1984 to 55 million tons in 1987.

Ruhrkohle, as reserves in its present areas became exhausted, had started to mine in newer areas north and northwest of the Ruhr Basin.[7] Since this is the area of the scenic Lippe Valley, access to the new areas was limited to ventilation and personnel shafts, and the coal is being moved southwards by high-speed underground rail systems to the existing shafts in the Ruhr, which were near powerplants and coking plants and had a supply of skilled labor as well.

Extraordinary precautions had been taken to protect the environment in surface lignite mining in the densely populated Cologne Aachen area.[8] Entire villages, roads, rivers, and factories were relocated. The overburden was being carefully removed and stored to be replaced after completion of mining.

Natural Gas.—Domestic sources supplied 32% of the country's needs in 1983. Most of this production, 57%, came from the Weser-Ems River estuaries in the northwest, 15% from the Hanover region, and the remainder from the upper Rhine Valley and the Alpine foothills. Shipments of natural gas from the Soviet Union accounted for almost 25% of total requirements in 1983 and were growing. On October 1, 1984, the Soviet Union began delivery of Siberian natural gas to the FRG via the new trans-Siberian gas export line, construction of which had begun in November 1981. The pipeline started in the Urengoi Gasfield of Western Siberia and terminated at the Czechoslovak border. The gas was then transmitted to Western Europe via the existing pipelines. By 1990, the Soviet pipeline was expected to deliver to the FRG some 30% of its natural gas requirements. At a September meeting in Munich, the Energy Fuels Committee of the West German-Soviet Economic Commission resolved to promote closer cooperation between the two countries in the energy field, notably in extracting Siberian coal reserves and in the utilization of solar as well as wind energy. Other foreign suppliers of natural gas to the FRG were the Netherlands (43%), Norway, and, as of the first week of October 1984, Denmark, in decreasing order.

Domestic consumption of natural gas rose. The use of natural gas in powerplants continued to decline.

Petroleum.—Petroleum remained the main energy source in the FRG, but its share had fallen by 25% between 1979 and 1984, contributing only 41% of the total in the latter year. The refining industry continued to suffer from changing markets, foreign competition, declining consumption and high crude prices, which were in high-valued dollars.[9] The dollar rose sharply again in 1984, and the industry was hit with a 10% increase in crude oil costs, as imports increased by only 2.3%. Oil refining had been profitable in the FRG in only 1 year between 1974 and 1984. In 1984, 14 refineries continued to operate in competition with more than 100 refinery product importers.

A general decline in crude oil prices had continued after the price rise in 1973, and especially the second round of increases in 1980. This had caused a concurrent decrease in prices of refinery products, notably light and heavy fuel oils that were amenable to substitution by other energy sources such as coal. At the same time, a large increase, about 27%, occurred in consumption of gasoline. The oil companies, however, found it uneconomic to continue converting heavy products to the lighter ones because of the price squeeze, and a large number of conversion facilities, led by those operated by British Petroleum Co., were in the process of closing down.

The FRG's small domestic petroleum production came from onshore wells in northwest areas of the country. In 1984, it was announced that a second offshore well would be developed by Deutsche Texaco AG and Wintershall AG. The well was to be a pilot operation, starting in 1986, to test feasibility of commercial production. An artificial island, Mittelplate, was to be constructed in the North Sea about 5 miles offshore from Schleswig Holstein, from which ultimately five wells would be drilled. The pilot production was to be barged to Brunsbuttel and moved by pipeline to Texaco's refinery at Heide.

[1]Physical scientist, Division of International Minerals.
[2]Financial Times (London). West German Industry. Sec. 3, Apr. 3, 1985, p. 3.
[3]Borchers, B. Cobalt in Germany-History, Production and Uses. Cobalt News, Dec. 1984, pp. 7-9.
[4]Where necessary, values have been converted from the Deutsche mark (DM) to U.S. dollars at the rate of DM2.81=US$1.00 for 1984.
[5]Phosphorus & Potassium (London). World Potash Markets. No. 135, Jan.-Feb. 1985, pp. 20-21.
[6]Industrial Minerals (London). Prince, West Germany. May, 1984, pp. 46-47.
[7]Pearse, G. Ruhr Coal Mining-Moving Northwards. Min. Mag. (London), June 1985, pp. 493-494.
[8]Schultz, H. J. Braunkohlenbergbau und Umwelt im Rheinland. Erzmetall, No. 2, 1985, pp. 65-72.
[9]Schurmann, H. Performance of the West German Oil Industry. Pet. Times (London), June 1985, pp. 13-15.

The Mineral Industry of Ghana

By Ben A. Kornhauser[1]

The mineral industry primarily was composed of the production of aluminum, bauxite, cement, diamonds, gold, and manganese. Bauxite and manganese production and shipments were hampered by the closing of the Western Rail line of the Ghana Railway Corp. for repairs; the Western Rail line was the means by which these ores were transported to Takoradi Harbor for export. Increasing gold production, which increased by 4% in 1984, looked promising because of the greater funding to improve mining operations. Cement production decreased owing to the lack of clinker, power supply, and paper bags, while diamond production increased slightly.

The water shortage in the Akosombo Dam that lasted into the fall continued to severely affect mining and manufacturing industries because of electrical power shortages. In this period, the Ghanaian Government and the Volta Aluminum Co. (VALCO) negotiated a new operating agreement. The agreement greatly improved Ghana's financial return resulting from more equitable rates for the electrical power generated at the dam and from VALCO's increased taxes and reduced list of duty-free import items. Conversely, VALCO was permitted to operate at an 80% production capacity with increased operating cost.

After Ghana introduced economic austerity measures, the International Bank for Reconstruction and Development (World Bank) and the International Monetary Fund (IMF) loaned about $159 million to the Ashanti Goldfields Corp. (Ghana) Ltd. (AGC) to increase productivity at its mines in order to improve the country's economy and foreign exchange reserves.[2] To this end, Ghana Consolidated Diamonds Ltd. (GCD) was granted credits by various consortia from India, Switzerland, and the United Kingdom to modernize placer diamond mining at Akwatia and Birim Rivers. The World Bank was also loaning $23.7 million to the Government-owned State Gold Mining Corp. (SGMC) to develop and rehabilitate its gold mines at Dunkwa, Prestea, and Tarkwa.

Promising oil and gas finds in the Belier Field offshore the Ivory Coast revived interest in petroleum explorations near the Ghana-Ivory Coast border. Discovery of commercial-sized oil pools would benefit Ghana's balance of payments because oil purchases were a severe drain on the economy.

PRODUCTION AND TRADE

Ghana's economy grew significantly in 1984 after declining since 1978. Although Government revenues increased by 121% over that of 1983, Government expenditures of $714 million exceeded 1984 revenues by 21%. However, the increased revenues enabled Ghana to decrease its 1984 deficit by 13% to $126 million.

The economic recovery was due largely to the IMF funding, which was preceded by currency devaluation. IMF then assisted in restructuring various problems including deteriorated infrastructure and balance of payments. Mining and manufacturing suffered from severe shortages of raw materials and spare parts.

From December 1983 until May 1984, Ghana was supplied with electricity only on alternate days because of the water shortage in the Akosombo hydroelectric dam.

This power shortage severely hampered the mining and manufacturing industries. By November, increased rainfall refilled the reservoir at Lake Volta behind the Akosombo Dam, permitting the 768-megawatt hydroelectric powerplant of the Volta River Authority (VRA) to operate again at full capacity. The 160-megawatt Kpong powerplant, downstream from the Akosombo Dam, also was producing electricity again.

Under VRA's new agreement with VALCO, important benefits included a reduction in power supply from 370 megawatts to 315 megawatts, payment of $41 million annually instead of $19 million based on a conservative projection of aluminum prices, and the sale of the available 55 megawatts at 40 mills per kilowatt hour. VRA would have a stronger foreign exchange base against which to borrow because it had been a self-financing utility since the initial investment in the Akosombo Dam. The $250 million for the Kpong Dam, which was commissioned in July 1982, was financed entirely by VRA funds and loans. The Government spent about 50% of its foreign exchange earnings to import crude oil.

In July, the Western Rail line of Ghana Railway resumed shipment of bauxite and manganese to Takoradi.

As a result of the devaluation of the cedi's official exchange rate to 38.5 cedi to the U.S. dollar in March 1984 in accord with the IMF request, Ghana was to receive $600 million in IMF and World Bank loans and standby credits. However, the unofficial market rate was 140 cedis to 1 U.S. dollar.

In 1984, the Ghana National Manganese Corp. (GNMC) shipped 250,000 tons of manganese ore compared with 140,000 tons in 1983.

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

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Aluminum:					
Bauxite, gross weight metric tons	225,100	181,257	63,500	[r]70,200	115,000
Metal, smelter, primary do	187,667	190,496	174,246	42,453	NA
Cement, hydraulic thousand metric tons	294	396	292	290	250
Diamond:					
Gem[e] thousand carats	126	86	68	[r]34	35
Industrial[e] do	1,023	750	616	[r]306	311
Total do	1,149	[e]836	684	[r]340	346
Gold thousand troy ounces	353	341	331	276	287
Iron and steel: Steel, crude[e] metric tons	5,000	5,400	5,400	5,400	5,400
Manganese:					
Ore and concentrate, gross weight do	249,900	233,100	159,900	[r]173,000	268,700
Mn content do	99,960	89,240	63,960	69,216	48,000
Petroleum:					
Crude thousand 42-gallon barrels	650	NA	730	730	730
Refinery products:					
Gasoline do	[e]1,830				
Jet fuel do	[e]260				
Kerosine do	926				
Distillate fuel oil do	2,115	NA	NA	NA	NA
Residual fuel oil do	NA				
Other do	NA				
Refinery fuel and losses do	NA				
Total do	[e]8,500	NA	NA	NA	NA
Salt[e] metric tons	50,000	50,000	50,000	50,000	50,000
Silver, mine output, metal content thousand troy ounces	[e]18	17	17	14	14

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

[1]Table includes data available through July 28, 1985.

[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.

Table 2.—Ghana: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1979	1980	Destinations, 1980: United States	Destinations, 1980: Other (principal)
Aluminum:				
Ore and concentrate	205,795	194,642	--	United Kingdom 144,119; Netherlands 20,706.
Metal including alloys:				
Unwrought	107,194	114,484	42,559	Japan 38,524; Netherlands 26,262.
Semimanufactures	--	52	--	All to West Germany.
Diamond: Industrial stones value, thousands	$11,438	$10,016	--	United Kingdom $5,608; China $1,287.
Manganese: Ore and concentrate, metallurgical-grade	222,733	162,845	--	Spain 50,437; Ireland 36,273; Norway 31,489.
Petroleum refinery products:				
Liquefied petroleum gas value, thousands	$238	$320	--	Togo $154; Benin $150.
Distillate fuel oil thousand 42-gallon barrels	--	(2)	--	Mainly to bunkers.
Lubricants value, thousands	--	$5	--	United Kingdom $4.
Residual fuel oil thousand 42-gallon barrels	1,094	133	--	All to West Germany.
Salt and brine	4,129	5,452	--	Niger 3,625; Upper Volta (Burkina) 1,726.

[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

Table 3.—Ghana: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980: United States	Sources, 1980: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	247,931	334,172	149,404	Jamaica 176,937.
Metal including alloys:				
Unwrought	69	52	23	Switzerland 20; United Kingdom 9.
Semimanufactures	1,545	1,282	87	United Kingdom 1,000; U.S.S.R. 84.
Copper: Metal including alloys, semimanufactures	429	520	198	West Germany 253; Yugoslavia 31.
Iron and steel: Metal:				
Scrap	14,581	1,492	--	West Germany 1,490.
Pig iron, cast iron, related materials	2,628	1,524	680	United Kingdom 836.
Ferroalloys: Ferromanganese	508	1,591	1,486	West Germany 54; Belgium-Luxembourg 51.
Steel, primary forms	113	1,080	22	West Germany 991; United Kingdom 66.
Semimanufactures:				
Bars, rods, angles, shapes, sections	63,763	7,466	1,048	Italy 2,806; United Kingdom 2,356.
Universals, plates, sheets	11,452	8,424	705	Japan 2,629; United Kingdom 1,282; Netherlands 1,136.
Hoop and strip	1,095	1,161	82	United Kingdom 1,017.
Rails and accessories	324	689	23	United Kingdom 637.
Wire	3,317	3,841	--	West Germany 1,730; Czechoslovakia 776; Belgium-Luxembourg 606.
Tubes, pipes, fittings	2,789	5,013	111	France 1,775; United Kingdom 1,010; Japan 984.
Castings and forgings, rough	506	232	21	Czechoslovakia 188.
Lead: Metal including alloys:				
Unwrought	113	8	--	All from United Kingdom.
Semimanufactures	240	189	--	United Kingdom 81; France 61.
Magnesium: Metal including alloys, all forms[2]	2,001	1,193	1,193	
Silver: Metal including alloys, unwrought and partly wrought[3] value, thousands	$4	$21	--	Netherlands $11; United Kingdom $10.
Tin: Metal including alloys, semimanufactures	183	349	--	Netherlands 292; United Kingdom 56.

See footnotes at end of table.

Table 3.—Ghana: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980: United States	Sources, 1980: Other (principal)
METALS —Continued				
Zinc: Metal including alloys, semimanufactures	316	239	--	West Germany 60; Belgium-Luxembourg 54; Peru 50.
Other: Base metals including alloys, all forms	86	90	55	United Kingdom 33.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc ____ value, thousands	$2	$1	--	All from Italy.
Dust and powder of precious and semiprecious stones including diamond ____ do	--	$10	--	All from United Kingdom.
Grinding and polishing wheels and stones	61	214	6	United Kingdom 182; India 7.
Asbestos, crude	3,556	1,114	--	Republic of South Africa 757; West Germany 350.
Barite and witherite	--	37	--	All from Italy.
Cement	288,902	67,787	3,508	Norway 27,543; Togo 23,023.
Chalk	19	3	--	All from United Kingdom.
Clays, crude	278	495	20	Hong Kong 252; United Kingdom 116.
Diamond: Industrial stones ____ value, thousands	--	$12	--	All from Belgium-Luxembourg.
Diatomite and other infusorial earth ____ do	$138	$191	--	United Kingdom $171; Ivory Coast $10.
Fertilizer materials:				
Crude, n.e.s	148	220	5	Nigeria 93; France 36; Austria 5.
Manufactured:				
Ammonia	151	211	22	United Kingdom 89; Netherlands 44.
Nitrogenous	30,159	3,096	42	Netherlands 3,000.
Potassic	--	208	--	All from Upper Volta (Burkina).
Unspecified and mixed	3,256	8,976	--	Netherlands 7,984; West Germany 982.
Graphite, natural	1,544	--		
Gypsum and plaster	3,003	466	--	West Germany 434; Italy 28.
Lime	5,121	1,222	--	United Kingdom 1,207.
Mica:				
Crude including splittings and waste[4]	45	--		
Worked including agglomerated splittings	166	1	--	Mainly from United Kingdom.
Nitrates, crude	1,212	--		
Phosphates, crude	140	65	--	West Germany 60; United Kingdom 5.
Pyrite, unroasted	435	--		
Salt and brine	17	27	11	United Kingdom 10; Italy 6.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	308	133	24	United Kingdom 49; China 40.
Sulfate, manufactured	4,574	8,678	24	Australia 5,139; United Kingdom 1,026.
Stone, sand and gravel:				
Dimension stone, worked	7	79	--	Canada 65; United Kingdom 12.
Dolomite, chiefly refractory-grade	835	72	--	All from United Kingdom.
Gravel and crushed rock	66	--		
Sand other than metal-bearing	328	1,652	--	West Germany 1,402; United Kingdom 250.
Sulfur: Sulfuric acid	33	208	2	West Germany 84; Netherlands 41; United Kingdom 28.
Talc, steatite, soapstone, pyrophyllite	141	399	--	India 275; France 56; United Kingdom 28.
Other: Crude	388	--		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	826	15	15	
Coal:				
Anthracite and bituminous	--	772	--	Nigeria 768.
Briquets of anthracite and bituminous coal	31	--		
Coke and semicoke	--	436	--	United Kingdom 412.

See footnotes at end of table.

Table 3.—Ghana: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1979	1980	Sources, 1980	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	3,758	8,237	--	Nigeria 7,055; Libya 1,009.
Refinery products:				
Liquefied petroleum gas value, thousands	--	$10,323	$4,712	West Germany $1,583; Ivory Coast $1,049.
Gasoline, motor thousand 42-gallon barrels	22	([5])	--	Mainly from Nigeria.
Mineral jelly and wax do	28	--		
Distillate fuel oil do	61	1	1	
Lubricants do	131	107	27	Ivory Coast 27; United Kingdom 27.
Bitumen and other residues do	359	2	([5])	Mainly from United Kingdom.
Petroleum coke do	676	810	753	Netherlands Antilles 50.

[1]Table prepared by Virginia A. Woodson.
[2]May include beryllium.
[3]May include platinum-group metals.
[4]May include meerschaum, amber, and jet.
[5]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The Ghanaian Government and VALCO, owned 90% by Kaiser Aluminum & Chemical Corp. and 10% by Reynolds Metals Co., reached an agreement on concessions under which VALCO would operate. These concessions included an increase in the base electric power charge to 17 mills per kilowatt hour from 5.6 mills per kilowatt hour (one mill=0.1 U.S. cent); a 15% reduction in power available to 315 megawatts, which permitted the regular operation of only four potlines to produce 160,000 tons of aluminum annually; an increase in the tolling fee paid to VALCO by its stockholders to 68% of the London Metal Exchange price; a rise in income tax to 46% from 40%; placement of two directors selected by the Government on VALCO's board of directors; a Government option to take a 20% share in the smelter; and a reduction in the list of items that VALCO could import duty free. The agreement was subject to review in 1988 and at 5-year intervals thereafter. VALCO's imports of alumina would remain duty free until locally mined bauxite was available in commercial quantities and at competitive prices. Any available excess power would be offered to VALCO first.[3] The startup of VALCO would be of social and economic significance since its 1,900 employees were on leave because of the power shortage that had closed the smelter operations.

The state-owned Ghana Bauxite Co. had closed until the Western Rail line was repaired. Approximately 75,000 tons of bauxite was held at the Awaso Mine, until shipments could be made to the Port of Takoradi.

A $46.8 million rolling mill was being installed at Tema to roll aluminum sheets for roofing, household utensils, and other aluminum products. The mill would have the capacity to produce 10,000 tons of coil and sheets per year, sufficient to meet the requirements for the domestic factories manufacturing aluminum products. Machinery and equipment for the project were supplied by FATA Industriale S.p.A. of Italy. The plant was scheduled to be completed in the spring of 1985.[4]

Gold.—The Konongo gold mine of SGMC at Ashanti was being phased out because it was no longer viable. Only one shaft out of four was functioning since the other three had been flooded. SGMC expected to increase its output to 150,000 troy ounces of gold by mid-1987 by undertaking a $53 million capital investment program. The gold mines of Dunkwa, Prestea, and Tarkwa were to be developed and rehabilitated with the help of a $23.7 million loan from the International Development Association of the World Bank.

A consortium led by the International Finance Corp., a World Bank affiliate, agreed to loan $159 million to the AGC, owned 55% by the Government and 45% by Lonhro Ltd. (United Kingdom), for the rehabilitation of the Ashanti Mine at Obuasi. Under the agreement, Lonhro would be compensated for the Government's appropriation of its 55% share in 1972. To qualify for the loan, which was part of approximately $600 million promised by the World Bank and the IMF for improving the country's economy, Ghana introduced austerity measures including devaluing its currency. The devaluation made the Government more creditworthy to the international lenders and helped make it more economic to mine Ashanti's secondary ores. A new shaft had been sunk at Obuasi in 1984. Gold production of 276,000 troy ounces in fiscal year 1983-84 was expected to increase to 400,000 troy ounces by fiscal year 1989-90. The project had two main components: a 5-1/2-year program to sink two new ore access shafts and a new hoisting shaft, and a 3-year reequipment program to increase mine mechanization as well as replace wornout equipment, machinery, and facilities.

Manganese.—Because the high-grade manganese dioxide ores at Nsuta had been substantially depleted over the years, current operations mined pockets of lower grade oxide and carbonate ore. The oxide and carbonate ores were treated separately to conform to various sales specifications. Five oxide and carbonate products were made, necessitating running the plants on a batch basis depending on the needed product type. Fine, clean carbonate ore was to be fed into a calcining kiln and nodulizing plant at the rate of 1,500 tons per day for conversion to higher priced, battery-grade manganese dioxide. However, the nodulizing plant built 2 years ago for the GNMC by the Fuller Co. of Bethlehem, Pennsylvania, had not been commissioned yet owing to insufficient power availability, power problems, and lack of oil supplies.[5]

NONMETALS

Cement.—The Ghana cement plant in Takoradi expected to produce only 100,000 tons because of the lack of clinker, power supply, and paper bags.

Diamond.—A consortium of diamond dealers, led by Enadeo A.G. of Switzerland, representing Belgian diamond marketing interests, granted the GCD a credit of $5.5 million to modernize its mine at Akwatia, the only mine operating on an industrial basis. The $12.6 million Birim River project, which was financed by $5.5 million from the Indian firms Bahrat Earth Movers Ltd. and Tata Export Ltd. and $1.6 million from Aveling-Barford Ltd., the British truck company, was expected to begin production in early 1985. The two Indian companies would supply dozers, scrapers, draglines, and dump trucks. GCD expected output of 1 million carats per year over a 15-year period based on proven reserves of about 20 million carats.[6]

Salt.—The Government acquired at least 51% of the shares of each of the two salt-producing companies in the Ada area near Accra, the Vacuum Salt Products Ltd. and the Star Chemical Industries Ltd. The companies were to be compensated for their shares by a special development fund.[7]

MINERAL FUELS

On finding oil and gas at two wildcat wells, the Petro-Canada International Assistance Corp. was considering appraisal drilling offshore from Half Assini, near the Ghana-Ivory Coast border, in conjunction with Ghana's Fuel and Power Ministry. The particular area of interest was near the Belier Field off the Ivory Coast. The 5 South Tano, 20.5 miles offshore, flowed 36 million cubic feet per day of gas and some condensate from Lower Cretaceous formations at 5,997 to 6,037 feet and gas at a similar rate from perforations at 5,932 to 5,971 feet. The 6 South Tano found gas from the same zone tapped by the 5 South Tano at 6,017 to 6,047 feet and flowed 800 barrels per day of oil from separate reservoirs at 6,148 to 6,168 feet.[8]

Loans of $18.3 million were made to the Ghana Italian Petroleum Co. to finance repair of its 28,000-barrel-per-day refinery at Tema. The loans comprised $5.1 million from the Ghanaian Government, $6.9 million from the International Development Association of the World Bank, and $6.3 million from the European Investment Bank. Among the work funded by the loans were reworking furnaces and heat exchangers, instrumentation of the refinery and electrical systems, and the crude oil handling system of the oil jetty. Completion of the work was expected in late 1985.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Ghanaian cedi (C) to U.S. dollars at the rate of C1=US$0.026. Since the official exchange rate did not reflect the true value of the Ghanaian currency, the current value must be viewed cautiously.
[3]Metal Bulletin (London). No. 6905, July 20, 1984, pp. 12-13.
[4]London West Africa. No. 3506, Oct. 29, 1984, p. 2189.
[5]Mining Journal (London). V. 304, No. 7794, Jan. 4, 1985, p. 4.
[6]———. V. 303, No. 7778, Sept. 14, 1984, p. 186.
[7]Accra Ghanaian Times. June 2, 1984, p. 52.
[8]Oil & Gas Journal. V. 82, No. 29, July 16, 1984, p. 52.

The Mineral Industry of Greece

By Walter Steblez[1]

Greece remained a significant European producer of bauxite and magnesite, and an important producer of a variety of other nonmetallic and metallic minerals and mineral commodities. In 1984, the country's economy continued to stagnate; national income and industrial production each remained at about the same level as in 1983. Inflation abated somewhat from the high 22% to 24% levels of the 1982 and 1983 periods, but was still rated at about 19% by yearend. Yearend statistical reports showed a decline in the production of petroleum and coal products and an increase in nonmetallic mineral production.

The agreement with the U.S.S.R. for the construction of a 600,000-ton-per-year alumina plant at Itea remained the major mineral project. In mid-1984, both sides approved startup of this project. Other developments included the nationalization of the Esso Pappas Petroleum Group (Exxon), and continued Government feasibility studies for the construction of a 100,000-ton-per-year stainless steel plant that would use domestically produced ferronickel and ferrochromium. Reportedly, exploration and survey work for new chromite deposits was successful, assuring a sufficient reserve base for planned increases of ferrochromium production.

Government Policies and Programs.— The Government, controlled by the Pan-Hellenic Socialist Movement, maintained the policy of nationalization and/or socialization of the Greek mineral industry by all statutory and administrative means available. As in previous years, a sector of the mineral industry was targeted for takeover, and actions were taken that made normal operations problematic. In mid-1984, two large steel producers, Halyvourgiki Inc. and the Hellenic Steel Co., were reportedly charged with foreign currency transfer violations. Similar criticism was also directed against Aluminium de Grèce S.A. (AG), a subsidiary of the French aluminum company Pechiney. Although state actions against these companies remained in abeyance pending governmental decision and court resolution, in the case of Halyvourgiki, a fine of about five times the company's capital assets was levied, a sum the company would have been unable to pay. Changes in the mining code also placed deposits of minerals, such as mixed sulfides and chromite, under tight state regulations. These actions, and similar ones in the past, have reportedly caused concern in the Greek business community that the Government's nationalization program was aimed at confiscating a company's assets without compensation.

Late in the year, a conflict reportedly arose between Greece and the European Economic Community (EEC) over allegedly discriminatory provisions in the Greek mining code. According to EEC regulations in article 52 of the Treaty of Rome, discrimination against foreigners on the basis of nationality or domicile was forbidden; mining activity conducted by EEC member states' citizens in other member states was to be guaranteed by the same laws that regulated domestic mining and quarrying operations in those countries. It appeared that provisions in article 8 of the Greek Mining Law constrained the free transfer of mining rights to EEC foreign nationals by requiring prior permission by the Greek Cabinet. The EEC Commission brought charges against the Greek Government to the Euro-tribunal to force Greece's compliance with the EEC's mining regulations and practices. A decision by the Euro-tribunal against Greece would most likely force the Greek Government to comply with the EEC's mining regulations because the EEC had been funding extensive mineral exploration programs in Greece as well as the development of chromite mining and processing and electric power industries since Greece's entry into the EEC in 1981.

These policies served to further dampen an already uncertain investment climate in the country's economy and mineral industry, and conflicted with the Government's often stated aim to encourage private and foreign sources of investment in the economy, including the mineral sector.

Government plans in the field of geological and mineral research included the completion of a geological map of Greece at a 1:50,000 scale and the compilation of a geochemical map of the country. Studies would also be conducted for more accurate measurement of the country's large-scale deposits such as bauxite, nickeliferous iron ore, magnesite, and marble. Reserves would be classified by grade and economic potential. Feasibility studies would be made for possible production increases in minerals that have a more limited reserve base such as chromite, kaolin, copper, mixed sulfide ores, and other minerals. Research in the field of metallurgy and ore beneficiation would be accelerated by providing greater scope to laboratories and facilities at the National Technical University, the Institute of Geological and Mining Research (IGME), and the Project Studies and Mining Development Corp. (GEMEE). Other governmental plans included the creation of a national statistical data bank for mineral resources, reserves, and production. This agency would correlate domestic mineral data with international data. Plans were studied also to establish vocational programs in mining and metallurgy in cities near major mining and processing operations, as well as to expand and renovate existing mining facilities.

PRODUCTION

According to official statistics, the Greek mineral industry registered an overall production increase of about 20% by yearend compared with the roughly 8% decline in 1983. The production increase was largely due to increases in nickeliferous iron, magnesite, and chromium and manganese ores. On the other hand, the production of bauxite during January to November 1984 declined by over 5.5% compared with that of the same period in 1983. The production of electricity and gas rose 3.8% during this period.

The Greek mineral industry continued to come increasingly under state ownership and/or supervision. The Ministry of Energy and Natural Resources was the chief Government agency for mining and metallurgy, and energy. The subordinate National Committee of Geological, Metallurgical and Mining Policy directed lower Government bodies dealing with exploration, research, finances, and operation. IGME was mandated to do work in geological mapping, geophysical research, mineral exploration, and research on the ore beneficiation. Dealing more in the area of applied science, GEMEE conducted work in the areas of mineral exploration and exploitation, and ore beneficiation. The Hellenic Industrial Development Bank (ETVA) financed industrial infrastructure, private ventures, and carried out or commissioned feasibility studies. ETVA also formed and operated subsidiary companies such as Asbestos Mines of Northern Greece Mining S.A. (91% ownership), the Aegean Metallurgical Industries S.A. (lead-zinc and refractories), and the Hellenic Industrial & Mining Co. of Laurium (lead). The Hellenic Industrial Mining & Investment Co. (HIMIC) was largely involved in commissioning and conducting feasibility studies as well as setting up subsidiary companies. HIMIC-owned companies included the Hellenic Ferroalloys S.A. (ferrochromium). The Public Power Corp. (PPC) had the sole responsibility of conducting exploration and exploitation of energy resources, primarily lignite, used in electric power generation. Petroleum and natural gas exploration and production were conducted by the Public Petroleum Corp.

The major privately owned companies included the Bodossakis Group (mixed sulfides and lead and zinc concentrates), the Eliopoulos Kyriacopoulos Group (bauxite, perlite, barite, and bentonite), AG (bauxite, alumina, and aluminum), the Magnomin General Mining Co. S.A. (magnesite and dead-burned magnesite) and the Titan Cement Co. S.A., Halkis Cement Co., and Halyps Cement S.A.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[e]	1984[e]
METALS					
Aluminum:					
Bauxite, gross weight ----- thousand tons--	3,286	3,216	2,853	2,455	2,400
Alumina, gross weight ----------do----	494	490	420	410	410
Metal:					
Primary	146,500	[e]147,000	135,000	136,181	[3]136,244
Secondary	7,116	[e]7,000	[e]7,000	1,029	2,000
Chromium: Chromite:					
Run-of-mine ore	77,611	[e]80,000	[e]80,000	83,202	230,000
Marketable products:					
Direct-shipping ore[e]	8,000	8,000	8,000	7,000	15,000
Concentrate	33,614	20,856	23,238	20,517	60,000
Copper, mine output, metal content	[e]100	100	--	--	--
Iron and steel:					
Iron ore and concentrate, nickeliferous:[4]					
Gross weight ------- thousand tons--	1,451	1,272	516	1,331	1,400
Iron content --------------do----	624	547	221	572	600
Metal:					
Pig iron ----------------do----	303	350	[e]300	300	300
Ferrochromium	--	--	--	18,000	40,000
Ferronickel[e]	[3]51,407	51,000	51,000	50,000	55,000
Steel, crude -------- thousand tons--	935	909	910	920	920
Lead:					
Mine output, metal content[e]	[3]20,504	21,000	[r]19,000	[r]20,000	20,000
Metal, refined:[e 5]					
Primary	[3]15,626	21,000	[r]3,200	([6])	15,000
Secondary	4,000	4,000	1,000	([6])	--
Manganese:					
Ore, crude:					
Gross weight	60,050	64,517	63,700	40,140	42,000
Metal content	18,015	19,355	19,110	12,042	12,600
Concentrate:					
Gross weight	5,555	5,800	5,500	4,636	5,000
Metal content	2,722	2,842	2,695	2,272	2,450
Nickel:					
Ni content of nickeliferous iron ore[7]	15,237	15,600	[r e]5,000	[r]13,000	16,700
Ni content of alloys	13,880	12,700	[r e]4,500	[r]11,700	15,000
Silver: Mine output, metal content thousand troy ounces--	1,672	1,945	1,582	1,797	1,800
Tin metal, secondary[e]	45	45	40	40	40
Zinc:					
Mine output, metal content	27,100	27,000	[r e]20,400	[r]21,300	21,500
Metal including secondary	[r]142	416	NA	NA	NA
NONMETALS					
Abrasives, natural: Emery[e]	[3]9,582	[r]9,000	([6])	[r]8,000	9,000
Asbestos:					
Ore	44,355	[r]599,126	1,562,260	2,489,950	2,500,000
Processed	--	--	--	[r]100,000	110,000
Barite:					
Crude ore	98,529	115,768	[e]116,000	90,187	95,000
Concentrate	48,200	47,014	[e]47,000	30,262	30,000
Cement, hydraulic --------- thousand tons--	12,680	13,355	6,912	14,196	13,700
Clays:					
Bentonite:					
Crude	501,878	311,947	[e]312,000	688,941	700,000
Processed	362,013	185,627	[e]186,000	214,193	220,000
Kaolin:					
Crude	42,546	[e]42,500	[e]42,500	60,749	61,000
Processed	11,489	[e]11,000	[e]11,000	6,032	6,000
Fluorspar, grade unspecified	400	292	[e]300	300	300
Gypsum and anhydrite	485,053	629,489	[e]500,000	500,000	500,000
Magnesite:					
Crude --------------- thousand tons--	[r]1,247	[r]962	967	891	900
Dead-burned	[r]392,666	[r]273,366	285,572	251,692	260,000
Caustic-calcined	[r]85,898	[r]79,776	86,930	113,026	114,000
Nitrogen: N content of ammonia	226,000	255,000	254,800	255,000	230,000
Perlite:					
Crude	278,912	253,780	[e]245,000	206,882	210,000
Screened	198,150	131,750	[e]135,000	151,601	140,000
Pozzolan (Santorin earth) ---- thousand tons--	1,460	1,482	[e]1,500	911	155,000
Pumice	928,535	620,585	[e]625,000	500,460	600,000
Pyrites, gross weight	147,298	[e]147,000	[e]147,000	143,518	145,000
Salt, all types ------------ thousand tons--	121	131	132	133	133
Silica (probably silica sand)[e]	28,000	28,000	28,000	[3]1,908	2,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[e]	1984[e]
NONMETALS —Continued					
Sodium compounds:[e]					
Carbonate	[3]10,878	11,000	11,500	12,000	12,000
Sulfate	1,000	1,000	1,000	1,000	1,000
Stone: Marble ---- cubic meters	211,729	[r]216,412	[e]250,000	260,000	270,000
Sulfur:					
S content of pyrites ---- thousand tons	[r]67	[r]74	52	65	60
Byproduct of petroleum ---- do	4	7	8	5	5
Talc and steatite	1,460	[e]1,400	[e]1,500	1,666	1,600
MINERAL FUELS AND RELATED MATERIALS					
Coal including briquets:					
Lignite ---- thousand tons	23,207	27,107	26,843	30,580	[3]31,576
Lignite briquets ---- do	97	[r]69	108	120	120
Coke:					
Coke oven ---- do	267	[r]47	306	300	300
Gashouse ---- do	15	15	16	15	15
Gas:					
Manufactured, gasworks[e] million cubic feet	12	12	12	15	15
Natural ---- do	NA	1,351	4,416	5,000	[3]6,756
Petroleum:					
Crude ---- thousand 42-gallon barrels	--	1,538	7,618	10,000	[3]9,668
Refinery products:					
Gasoline ---- do	9,690	13,277	14,952	14,500	[3]14,136
Jet fuel ---- do	10,632	12,976	13,504	13,000	[3]11,696
Kerosine ---- do	333	357	332	300	[3]217
Distillate fuel oil ---- do	27,505	29,407	29,479	29,000	[3]28,378
Residual fuel oil ---- do	41,772	45,841	41,878	35,000	[3]29,417
Lubricants ---- do	535	618	687	650	630
Other ---- do	10,240	3,400	3,349	3,400	[3]3,852
Refinery fuel and losses ---- do	4,060	3,465	4,969	4,500	[3]3,521
Total ---- do	104,767	109,341	109,150	100,350	91,847

[e]Estimated. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 1985.
[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]Includes antimonial lead and hard lead.
[6]Revised to zero.
[7]Includes Co content.

TRADE

Greece's overall trade balance improved somewhat compared with that of 1983. The trade deficit for the first quarter of 1984 declined by approximately 5%. However, an uncertain investment climate, owing to policies of nationalization and capital repatriation restrictions continued to adversely affect foreign investment.

Since 1981, there has been an apparent increase in commercial activity in the minerals field with the member states of the Council for Mutual Economic Assistance (CMEA). The U.S.S.R. was Greece's largest trade partner within CMEA. In 1984, the trade balance favored the U.S.S.R.; Greek exports to the U.S.S.R., compared with that of 1983, declined by about 30%, while imports from the U.S.S.R. increased about 9%. The U.S.S.R. supplied Greece with petroleum and refinery products, coal, electricity, ammonia, scrap iron, machinery, and other durables in exchange for agricultural products, bauxite, and lead and zinc ores and concentrates. Because of the 1984 trade imbalance, the Greek Government reportedly expected to increase exports to the U.S.S.R. by 70% in 1985. Negotiations were conducted during 1984 on the construction of a pipeline that would supply Soviet natural gas to Greece and would be paid for in part by increases of traditional Greek exports as well as by the construction and repair of ships for the U.S.S.R.

Greece and the German Democratic Republic reached an agreement in 1984 that in principle foresaw a tripling of Greek exports to the German Democratic Republic, with the share of minerals and industrial goods reaching 40% of total exports.

Commercial agreements with countries of the Near East and North Africa remained an important source of crude petroleum and an important market for sales of Greek products such as aluminum, cement, gypsum, and quarry products.

Table 2.—Greece: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	1,441	1,411	--	U.S.S.R. 587; Romania 417; Netherlands 125.
Oxides and hydroxides	130,000	110,500	--	All to Netherlands.
Metal including alloys:				
Scrap	93	884	--	Belgium-Luxembourg 278; France 218.
Unwrought	66,608	50,085	--	Italy 28,645; France 19,428.
Semimanufactures	29,129	40,547	2,267	Saudi Arabia 18,809; West Germany 4,567.
Chromium:				
Ore and concentrate	12,175	12,030	--	West Germany 9,080.
Metal including alloys, all forms	--	185	--	NA.
Copper:				
Ash and residue containing copper	251	696	--	West Germany 556.
Metal including alloys:				
Scrap	430	1,263	--	Belgium-Luxembourg 502.
Unwrought	98	274	--	All to Iran.
Semimanufactures	14,013	15,027	132	West Germany 2,820; Libya 2,500; Italy 2,098.
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	14,300	--		
Metal:				
Scrap	734	1,140	--	Italy 600; West Germany 243.
Pig iron, cast iron, related materials	22	--		
Ferroalloys:				
Ferrochromium	--	11,966	--	West Germany 10,766.
Ferronickel	19,852	33,583	--	West Germany 23,664.
Unspecified	11,535	--		
Steel, primary forms	31,387	99,647	--	Italy 96,336.
Semimanufactures:				
Bars, rods, angles, shapes, sections	111,558	180,001	--	U.S.S.R. 74,272; Algeria 50,773.
Universals, plates, sheets	107,091	89,716	23,015	Yugoslavia 14,181; Belgium-Luxembourg 10,945.
Hoop and strip	15,062	20,206	--	Syria 6,796; Cyprus 6,717.
Rails and accessories	20	--		
Wire	1,084	1,390	--	Libya 824; Saudi Arabia 320.
Tubes, pipes, fittings	94,833	97,495	24,560	U.S.S.R. 38,482; Libya 13,631.
Castings and forgings, rough	648	215	--	West Germany 207.
Lead:				
Ore and concentrate	23,700	36,800	--	Belgium-Luxembourg 15,000; Finland 9,800; Yugoslavia 7,000.
Metal including alloys, scrap	216	--		
Manganese:				
Ore and concentrate, metallurgical-grade	300	1,429	--	Yugoslavia 779; Spain 650.
Oxides	r11,350	3,377	294	Belgium-Luxembourg 1,935.
Mercury 76-pound flasks	116	--		
Nickel:				
Matte and speiss	21	19	--	All to Netherlands.
Ash and residue containing nickel	--	403	--	NA.
Metal including alloys:				
Scrap	43	590	--	All to Netherlands.
Unwrought	403	33	--	Do.
Semimanufactures	356	306	--	Netherlands 287.

See footnotes at end of table.

Table 2.—Greece: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings value, thousands	--	$202	--	All to United Kingdom.
Metal including alloys, unwrought and partly wrought do	$688	$224	--	West Germany $207.
Zinc:				
Ore and concentrate	35,700	57,500	--	France 38,000; Finland 2,500.
Matte	46	128	--	All to West Germany.
Ash and residue containing zinc	1,824	1,421	--	Spain 483; West Germany 425.
Metal including alloys:				
Scrap	1,262	339	--	West Germany 223; Italy 116.
Unwrought	133	26	--	West Germany 24.
Semimanufactures	39	20	--	NA.
Other:				
Ores and concentrates	91,505	100,556	--	Romania 94,555; Italy 3,000.
Oxides and hydroxides	--	99	--	All to Saudi Arabia.
Ashes and residues	50,233	34,342	--	Saudi Arabia 23,796; Egypt 6,821.
Base metals including alloys, all forms	168	38	--	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	279,887	349,400	155,005	United Kingdom 91,265; West Germany 70,579; Algeria 26,260.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$281	$465	$360	West Germany $102.
Grinding and polishing wheels and stones	38	37	--	Egypt 18; France 6.
Asbestos, crude	992	--		
Barite and witherite	36,758	5,400	--	Kuwait 4,500; Malta 900.
Cement thousand tons	6,372	7,886	--	Egypt 3,046; Saudi Arabia 2,735; Algeria 687.
Chalk	796	1,371	--	Saudi Arabia 1,150.
Clays, crude:				
Bentonite	314,533	322,920	--	West Germany 58,920; Canada 52,920.
Kaolin	11,812	13,923	--	Yugoslavia 13,679.
Unspecified	32	18	--	NA.
Fertilizer materials:				
Crude, n.e.s	581	--		
Manufactured:				
Ammonia	50	--		
Potassic	4,500	--		
Unspecified and mixed	20,002	31,281	--	China 16,500; El Salvador 8,600.
Gypsum and plaster	15,150	38,951	--	Saudi Arabia 38,901.
Lime	541	262	--	Cameroon 242.
Magnesium compounds:				
Magnesite	r340,333	362,985	500	West Germany 71,623; Italy 68,918; France 41,681.
Other	10,997	12,276	--	Yugoslavia 10,519.
Pyrite, unroasted	--	100	--	All to Saudi Arabia.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	36,635	45,180	64	Italy 11,698; Libya 7,469.
Worked	83,246	94,911	837	Saudi Arabia 60,083; Kuwait 10,999.
Gravel and crushed rock	68,112	12,016	--	Libya 11,850.
Quartz and quartzite	4,850	17	--	Italy 16.
Sulfur:				
Elemental, crude including native and byproduct	442	4,884	--	Turkey 3,000; Syria 1,187.
Dioxide	145	149	NA	NA.
Sulfuric acid	16,593	1,602	--	Lebanon 743; Syria 280.
Talc, steatite, soapstone, pyrophyllite	105	566	--	Israel 530.
Vermiculite, perlite, chlorite	162,718	163,555	41,093	West Germany 50,990; Italy 15,141.
Other:				
Crude	r3,649	10,666	--	West Germany 2,036.
Slag and dross, not metal-bearing	5,463	28,592	--	France 24,398.
MINERAL FUELS AND RELATED MATERIALS				
Coal: Lignite including briquets	41	5,214	--	Czechoslovakia 5,000.
Coke and semicoke	40	40	--	All to Libya.
Peat including briquets and litter	989	--		

See footnotes at end of table.

Table 2.—Greece: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	583	797	(2)	Egypt 163; Morocco 151.
Gasoline do	2,326	1,980	1,359	France 312.
Mineral jelly and wax do	49	--		
Kerosine and jet fuel do	3,212	2,502	2,055	Switzerland 68.
Distillate fuel oil do	1,988	919	615	Cyprus 60; Panama 51.
Lubricants do	210	253	1	Italy 142; Lebanon 21.
Residual fuel oil do	4,073	3,295	163	Italy 1,598; Bulgaria 243.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Greece: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	30	789	--	All from Italy.
Oxides and hydroxides	404	360	124	West Germany 67; United Kingdom 45.
Metal including alloys:				
Scrap	14	6	NA	NA.
Unwrought	3,970	2,119	--	West Germany 1,315; Italy 478.
Semimanufactures	3,958	5,090	494	United Kingdom 1,463; West Germany 1,206.
Antimony:				
Oxides	19	31	--	United Kingdom 19.
Metal including alloys, all forms	8	30	--	China 20; Turkey 6.
Arsenic: Oxides and acids	98	33	--	France 20.
Chromium:				
Ore and concentrate	20	18,719	--	Republic of South Africa 8,877; Albania 4,837.
Oxides and hydroxides	122	147	--	West Germany 120.
Copper:				
Matte and speiss including cement copper	8,864	15,583	738	Belgium-Luxembourg 6,498; Chile 1,882; Spain 1,871.
Oxides and hydroxides	48	55	--	Norway 42.
Sulfate	275	511	10	Italy 250; Yugoslavia 240.
Metal including alloys:				
Scrap	2,129	23	--	Switzerland 19.
Unwrought	17,742	19,272	(2)	Zambia 7,871; Chile 4,178.
Semimanufactures	1,536	3,132	21	West Germany 844; France 763.
Germanium: Metal including alloys, all forms	--	25	--	All from Poland.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	51	186	--	West Germany 142.
Metal:				
Scrap	433,779	520,380	134,879	U.S.S.R. 334,395; Bulgaria 21,311.
Pig iron, cast iron, related materials	14,425	16,925	--	U.S.S.R. 13,382; France 1,395.
Ferroalloys:				
Ferrochromium	29	38	--	West Germany 30.
Ferromanganese	4,552	1,686	--	Portugal 1,333.
Ferrosilicomanganese	8,173	4,271	--	Portugal 3,765; Norway 451.
Ferrosilicon	2,424	1,737	--	Norway 809; France 565.
Silicon metal	538	429	--	France 419.
Unspecified	r295	395	33	France 350.
Steel, primary forms	321,671	1,097,207	3	United Kingdom 373,415; Netherlands 243,481; France 153,981.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	198,473	156,023	(2)	West Germany 27,535; Italy 25,493.
Universals, plates, sheets	198,767	222,409	209	Japan 45,197; France 34,849.
Hoop and strip	66,594	29,013	--	West Germany 11,039; Bulgaria 5,242.
Rails and accessories	2,883	1,216	(2)	Bulgaria 505.
Wire	9,383	8,570	1	West Germany 2,136.
Tubes, pipes, fittings	33,001	27,356	430	West Germany 9,586; France 3,922.
Castings and forgings, rough	1,649	1,524	99	Belgium-Luxembourg 1,162.
Lead:				
Oxides	87	146	--	France 104; Bulgaria 12.
Metal including alloys:				
Unwrought	18,719	23,921	1,069	Morocco 8,875; Australia 4,468.
Semimanufactures	9	2,759	(2)	Japan 2,732.
Magnesium: Metal including alloys:				
Scrap	--	21	--	All from West Germany.
Unwrought	581	424	--	France 193; Norway 186.
Semimanufactures	10	25	(2)	West Germany 17; Austria 5.
Manganese:				
Ore and concentrate, metallurgical-grade	25,157	--		
Oxides	152	17	--	Belgium-Luxembourg 15.
Metal including alloys, all forms	458	17	16	France 1.
Mercury 76-pound flasks	116	58	--	West Germany 29.
Nickel:				
Matte and speiss	(2)	42	15	Netherlands 25.
Metal including alloys:				
Unwrought	153	100	40	Finland 22; Canada 15.
Semimanufactures	40	36	(2)	West Germany 18.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$464	$889	$59	West Germany $445; Switzerland $362.
Silicon, high-purity	167	80	--	France 59; Italy 21.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$2,334	$3,464	$12	West Germany $2,678.
Tin: Metal including alloys:				
Unwrought	298	377	--	Malaysia 256; Indonesia 73.
Semimanufactures	20	19	2	West Germany 9.
Titanium:				
Ore and concentrate	198	18	--	All from Australia.
Oxides	718	487	--	West Germany 232; France 119.
Zinc:				
Oxides	518	405	--	France 144; Netherlands 125.
Metal including alloys:				
Scrap	37	2	--	All from West Germany.
Unwrought	14,248	12,792	--	Belgium-Luxembourg 4,113; Netherlands 1,797.
Semimanufactures	183	132	--	West Germany 43; Yugoslavia 34.
Zirconium: Ore and concentrate	26	102	--	United Kingdom 61; Italy 36.
Other:				
Ores and concentrates	r3,787	3,162	--	Italy 2,445; Australia 343.
Oxides and hydroxides	r197	59	--	West Germany 27; France 21.
Ashes and residues	20	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	77	12	2	Italy 8.
Artificial:				
Corundum	357	297	(2)	West Germany 170; France 68.
Silicon carbide	681	846	--	West Germany 588; Italy 196.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$2,227	$5,131	$503	West Germany $3,254; Belgium-Luxembourg $909.
Grinding and polishing wheels and stones	416	411	1	Italy 258; West Germany 58.
Asbestos, crude	7,102	7,531	--	Republic of South Africa 4,438.
Barite and witherite	6,039	3,420	--	Ireland 3,250.
Boron materials:				
Crude natural borates	600	341	160	Netherlands 180.
Oxides and acids	94	108	--	Yugoslavia 40; Italy 26.
Cement	338	6,682	32	Denmark 6,380.
Chalk	578	481	--	France 207; Austria 96.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Clays, crude:				
Bentonite	1,250	617	20	West Germany 99.
Chamotte earth	1,436	1,468	--	Czechoslovakia 684.
Kaolin	43,753	37,921	263	United Kingdom 25,278.
Unspecified	r5,174	17,642	248	United Kingdom 14,169.
Cryolite and chiolite	5	5	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$17	$82	--	Belgium-Luxembourg $72.
Industrial stones do	$44	$251	--	West Germany $223.
Diatomite and infusorial earth	553	744	286	United Kingdom 126; Italy 97.
Feldspar	2,427	2,216	--	Italy 1,053; Norway 682.
Feldspar, fluorspar, related materials:				
Feldspar	2,427			
Fluorspar	648			
Unspecified	r5,749	5,682	--	Norway 3,243.
Fertilizer materials: Manufactured:				
Ammonia	145,754	183,170	2	U.S.S.R. 82,515; Trinidad and Tobago 37,792.
Nitrogenous	174,255	95,337	--	Romania 38,719; Italy 27,971.
Phosphatic	20	--		
Potassic	2,317	5,607	--	West Germany 2,701.
Unspecified and mixed	4,274	3,642	167	West Germany 2,536.
Fluorspar	648	6,024	--	Italy 3,131; Spain 2,870.
Graphite, natural	252	332	--	West Germany 116; Austria 59.
Gypsum and plaster	988	812	--	Italy 535; West Germany 261.
Kyanite and related materials	633	171	--	United Kingdom 150.
Lime	2	1	--	All from Netherlands.
Magnesium compounds:				
Magnesite	r120	3,995	--	All from Turkey.
Oxides and hydroxides	135	119	1	West Germany 46.
Other	140	3,025	--	Turkey 2,906.
Mica:				
Crude including splittngs and waste	210	139	6	Austria 92; India 25.
Worked including agglomerated splittings	26	2	--	All from Belgium-Luxembourg.
Nitrates, crude	--	519	--	Bulgaria 514.
Phosphates, crude	359,340	126,193	--	Tunisia 60,005; Morocco 39,664.
Pigments, mineral:				
Natural, crude	93	53	--	Cyprus 18.
Iron oxides and hydroxides, processed	1,490	1,389	([2])	West Germany 1,062.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$57	$94	$2	Thailand $49; West Germany $33.
Synthetic do	$3	$46	--	Thailand $43.
Pyrite, unroasted	112,799	67,452	--	Spain 55,011; U.S.S.R. 12,441.
Salt and brine	23,959	16,635	--	Italy 14,441; France 1,233.
Sodium compounds, n.e.s.: Carbonate, manufactured	23,609	24,021	--	Bulgaria 7,292; Turkey 6,289.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,793	1,014	--	Pakistan 349; Turkey 249.
Worked	341	282	--	Italy 239.
Dolomite, chiefly refractory-grade	4,516	1,088	--	Italy 672; United Kingdom 224.
Gravel and crushed rock	604	631	--	France 322.
Quartz and quartzite	195	32	--	France 22.
Sand other than metal-bearing	84,057	87,705	4	Belgium-Luxembourg 63,985.
Sulfur:				
Elemental:				
Crude including native and byproduct	142,250	43,294	--	France 29,700; Poland 10,822.
Colloidal, precipitated, sublimed	58	59	--	West Germany 49.
Sulfuric acid	34	44	--	West Germany 13; Italy 13.
Talc, steatite, soapstone, pyrophyllite	1,612	1,738	3	Belgium-Luxembourg 358; France 333.
Other:				
Crude	984	645	--	Gabon 162; Italy 112.
Slag and dross, not metal-bearing	692,068	549,421	--	Italy 354,299; West Germany 95,494.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	32	41	--	France 31.
Carbon: Carbon black	6,004	4,991	7	Italy 4,109.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite and bituminous	385,604	527,456	194,852	Republic of South Africa 319,803.
Briquets of anthracite and bituminous coal	80	1,115	1,066	Czechoslovakia 49.
Coke and semicoke	33,549	50,289	--	Poland 26,821; Italy 15,601.
Peat including briquets and litter	5,861	8,857	--	U.S.S.R. 6,792; Netherlands 1,700.
Petroleum:				
Crude thousand 42-gallon barrels	85,340	82,151	--	Saudi Arabia 44,248; Iraq 13,648; Libya 10,715.
Refinery products:				
Liquefied petroleum gas do	13	21	(2)	Italy 14; France 7.
Gasoline do	194	427	298	France 43; Italy 42.
Mineral jelly and wax do	6	9	(2)	West Germany 5.
Kerosine and jet fuel do	119	206	(2)	France 101; Italy 51.
Distillate fuel oil do	259	319	--	Albania 145; U.S.S.R. 59.
Lubricants do	446	544	3	Netherlands 211; Italy 135.
Residual fuel oil do	303	774	--	Libya 347; Bulgaria 176.
Bitumen and other residues do	202	349	--	Albania 348.
Bituminous mixtures do	9	2	(2)	Italy 1.
Petroleum coke do	357	299	223	France 76.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—Although bauxite mining declined again in 1984, owing to unfavorable markets, the Bauxites Parnasse Mining Co. S.A., the largest producer, was able to hold production at about 1,200,000 tons, and continue its program of facility expansion in anticipation of the construction of the new alumina plant at Itea. The Itea project, after 6 years of negotiations, was finalized, and an agreement was officially signed by ETVA, on the Greek side, and Raznoimport, representing the U.S.S.R. Construction startup was scheduled for early 1985. In July, the U.S.S.R. officially signed a commitment to purchase at least 380,000 tons per year of alumina over a 10-year period. During the first 7 years, the U.S.S.R. would reportedly pay 13% of the prevailing Aluminium Co. of Canada Ltd. (ALCAN) market price, and during the remaining period the rate would be 12.6% of the prevailing ALCAN price. The contract with the Soviet foreign trade organization Tsvetmetpromexport called for most if not all equipment to be provided by the Soviet Union, which would, reportedly, constitute about 54% of the total investment. In addition, Greece sought further financial and technical assistance for this project, especially from Japan. When completed, the plant would produce about 600,000 tons of alumina per year and employ 700 persons. Moreover, Greece's 1-billion-ton bauxite resource base and 130-million-ton reserves would be sufficient for sustained long-term operation and future expansion.

The dispute in late 1983 between AG and the PPC over proposed increases in the power rates was brought before the Swiss Federal Court at Lausanne for adjudication, and a decision that reportedly favored AG was rendered. However, more pressure was brought to bear on AG by the Greek Government. AG was accused of charging higher prices for domestic sales than for exports. The Government indicated that it would no longer recognize AG's right to set domestic aluminum prices at rates higher than ones for export, and that it would apply unspecified sanctions against the company. AG was also a target of a lobbying effort by the Greek Union of Public Power Corp. Engineers aimed at implementing the country's nationalization program, which would include AG.

Chromite.—The chief developments in the chromium sector included a sharp increase in chromite production at the Skoumtsa Mines as well as a takeover of the Domokos Mines by Hellenic Ferroalloys, a subsidiary of HIMIC, which runs chromite mining operations in Greece.

Production of chromite at the Skoumtsa Mines reached 190,000 tons, and an additional 40,000 tons was mined at the new operations at Moutsara and Aetoraches. Also, a new concentrator, with a 220,000-ton-per-year capacity was reportedly put into operation during the year. Developmental studies were carried out at the old Domokos Mines for initial open pit operations, followed by renewal of underground mining. Continuing exploration for new chromite reserves met with success in 1984, and resulted in a reserve increase of more than three times the production rate.

During the year, the ferrochromium plant at Volos produced at nearly full capacity of 40,000 tons per year. It was planned to expand this facility by the addition of a new unit that would add 60,000 tons per year of capacity to produce high-carbon ferrochromium. Construction startup was reportedly scheduled for 1985.

Gold.—According to the Ministry of Energy and Natural Resources, prospecting and exploration in northern Greece from 1974 to 1984 yielded about 210,000 troy ounces in alluvial deposits. These deposits were at Aghios Mandilos, near Nigria; in the Khimarvos area of Serres; and at Makropotamos and Rodopi. To test the economic feasibility for developing these deposits, a pilot plant was erected late in the year. Also, a small, uneconomic deposit in the Evros River was studied for possible exploitation in conjunction with the major deposits under exploration.

Iron and Steel.—During the first half of 1984, the Greek Government imposed a reported $82 million[2] administrative fine against Halyvourgiki for alleged tax irregularities and illicit foreign transfers of equity despite the fact that the company was cleared of all charges by routine as well as special tax courts. Company equity transfers were found to have been done properly and only after prior clearance was provided by the state's Currency Committee. Also, a corresponding amount of foreign capital was brought into the country. The fine levied against Halyvourgiki, the largest Greek steel producer, was about five times the company's total assets. Moreover, the company was denied the right to borrow in the public sector in Greece for 5 years, making the company insolvent, a "problem industry," and, therefore, within the legal bounds of nationalization, but without any compensation by the state. Similar actions were reportedly being prepared against Hellenic Steel, the country's largest specialty steel producer and a subsidiary of Nippon Kokan K.K. of Japan, for allegedly offering lower prices to favored private sector buyers rather than to state-owned customers. The Greek Government also issued appeals to foreign and domestic private investors for large-scale investment in the country's industry.

Reportedly, the Greek Government accepted a proposal by HIMIC to plan the construction of stainless steel and cold rolling units that would use domestically produced ferroalloys. Plans for this project were to be completed in 1985, and construction bids would be accepted from foreign investors for the initial stages of the stainless steel plant.

At yearend, about 1,600 tons of Greek cold-reduced coil, labeled as blackplate on U.S. entry documents, was seized by U.S. Customs agents. The U.S. Customs Service indicated that this was in violation of EEC export licensing rules, since the export of blackplate did not require a license from the EEC and had a 1% lower U.S. duty than cold-reduced sheet and coil. The seizure resulted from increased surveillance following a U.S. Government decision to limit steel imports to 18.5% of the domestic market.

Lead and Zinc.—The former Peñarroya subsidiary Compagnie Française des Mines du Laurium S.A.F., renamed the Hellenic Mining and Metallurgical Co. of Laurium S.A. (EMMEL), restarted its lead smelting furnaces at Lavrion after the completion of modernization and expansion in 1984. The new company was largely state owned with ETVA and HIMIC as the participating state bodies; however, one-third of the shares were owned by the workers and the town of Lavrion. Approximately 50% of the feedstock was to be supplied from the Kassandra mixed sulfide mines at Chalkidiki; the balance of the lead concentrates would have to be imported because Kassandra mixed sulfide ores were technologically not wholly suitable for the Laurium beneficiation and smelting operations, which were designed for treating only lead-silver ores. Moreover, there were long-term commitments to other customers by the Kassandra mines. Exploration for new sulfide deposits in the Lavrion region was planned by EMMEL and IGME to make the Lavrion operation self-sufficient.

Planned production at the EMMEL operation included about 20,000 tons per year of lead and lead alloys; 350 tons per year of bismuth and about 35 tons of gold-bearing silver.

During the year, construction work continued on the 400-meter shaft of the Olympias Mine of the Kassandra Group. Operational startup was scheduled for 1985.

Nickel.—Market conditions remained favorable for Larco S.A.'s nickel mining and processing operations. Reportedly, production increased to over 15,000 tons of nickel from about 12,000 tons in 1983, and plans for 1985 aimed to increase production to about 18,000 tons of metal.

NONMETALS

Greece remained a significant European producer and exporter of nonmetallic industrial minerals. The country was the sole EEC producer of magnesite, with production reaching approximately 6% of total world output. Apart from magnesite, Greece was an important producer of barite, bentonite, gypsum, marble, perlite, and pumice. Most nonmetallics, with the exception of barite and perlite, experienced favorable market conditions in 1984. A sharp decline in demand resulted in a temporary suspension of barite mined by Mykobar S.A. at its Mykonos operation.

Asbestos.—Operations continued to improve at the asbestos mines of Northern Greece S.A.'s Zidani mining complex. Difficulties connected with the plant's shakedown period were apparently eliminated, and the mining complex was able to increase production in 1984 by almost 40% compared with that of 1983. Product sales reportedly reached 35,000 tons in 1984, a 30% increase over that of 1983.

Cement.—Reportedly, exports and production each declined by 3.5% compared with those of 1983. Cement, sold almost entirely to Mideast countries, had been one of Greece's most profitable export commodities. The industry's decline was partly due to increased sales by traditional European competitors, as well as from the Jordanian entry into the market as an exporter. Moreover, domestic price controls by the Greek Government, setting prices below production cost, have been subsidized by profits made in this sector. Losses incurred in domestic sales were compensated by profits made abroad. This prevented the Greek cement industry from competing effectively in its usual markets.

The Halkis Cement Co. completed modernization and expansion at the Halkis cement plant, where capacity was increased to 3 million tons per year. A precalcining system was installed, and the three burning units at the plant were converted for coal use. During the year, the Government began litigation procedures against the former management of the Heracles General Cement Co., the largest producer, which was nationalized late in 1983.

Magnesite.—After taking over the Scalistiris Group, Greece's largest magnesite producer, Government spokespersons indicated that the state will have a basic role in the future management of this company. Production results for the first quarter of 1984 indicated a 21.3% increase for raw magnesite, a 30.4% increase in dead-burned magnesite and Magflot, and a 28.7% increase in refractories compared with the same period in 1983.

MINERAL FUELS

Greece's consumption of primary energy was about 26 million tons of standard coal equivalent, an increase of about 4.9% compared with that of 1983. The share of domestic coal was 23.2% of the total; that of imported coal was 6.5%; petroleum and natural gas, 62.2%; domestic hydroelectric power, 4.3%; and imported electricity, 3.8%.

Coal.—Greece's lignite reserves were measured at about 5,140 million tons with the main deposits at Megalopolis in the Peloponnesus, and at Ptolemaïs in northern Greece. During the year, a new lignite deposit was reportedly discovered at Drama in northern Greece. The lignite field was measured at 30 square kilometers and had about 500 million tons of recoverable reserves. Samples indicated a thermal value of 1,000 to 1,100 kilocalories per kilogram. The PPC indicated that the field could potentially support two 300-megawatt electric power stations.

During the year, Greek authorities reported a number of problems with 400,000 tons of steam-raising coal imported from the U.S.S.R. The first consignments contained pieces of concrete reinforcing rods, scrap iron, broken steel springs, hammers, pieces of timber, and stones as large as 20 centimeters. The sixth and seventh consignments reportedly contained broken spades and railway brakeshoes. The coal could not be routinely pulverized for furnace hoppers.

Petroleum and Natural Gas.—The Aspropyrgos state oil refineries planned facility expansion and modernization. This work would include the installation of new units for converting fuel oil to lighter refinery products. The total project was scheduled for completion late in 1987 at a cost of $300 million. Contracts for planning and technology for this project were signed with Exxon Corp. (United States), Union Carbide Corp. (United States), Institute Française du Petrole (France), Lummus Ltd. (United Kingdom), and Foster Wheeler Italiana S.p.A. (Italy). After lengthy negotiations, the Greek Government acquired the Esso Pappas Group, Exxon's Greek subsidiary, in March. This company would have probably ended its operations if the Government had not bought it.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Data were provided in U.S. dollars. The official exchange rate for Greek drachmas (Dr) at the end of Dec. 1984 was Dr128.48=US$1.00.

The Mineral Industry of Guinea

By Ben A. Kornhauser[1]

Bauxite mining remained the principal Guinean mineral industry. However, there was considerable activity in other areas. Diamond mining and exploration were being pursued vigorously. The development of the Mifergui-Nimba iron ore deposit was still under study by the International Bank for Reconstruction and Development (World Bank), and exploration for gold and petroleum continued.

The new Government, which assumed power in April, approached the World Bank regarding measures to stimulate its economic development. Production from the new Aredor diamond mine was expected to generate considerable foreign exchange and to help promote a healthy economy. Hopes were still high for contributions from gold and iron ore developments.

An assessment of the offshore oil potential was funded mainly by the International Development Association (IDA), a World Bank affiliate, and a Canadian oil corporation.

PRODUCTION AND TRADE

The mineral industry accounted for 97% of total export earnings. Of this amount, 96% came from bauxite mining with some alumina production and 1% from industrial and artisanal diamond mining. Outside the minerals sector, industrial production was limited and inhibited in development by an inadequate infrastructure. The country's economy had stagnated for many years owing to factors that included about a 3% population growth, inefficient and poorly managed socialized industry, lack of financial resources and foreign exchange, and poor maintenance and spare parts for existing equipment.

The Government sought World Bank technical and financial assistance in reviewing Guinea's mineral and petroleum resources as a prelude to future development. Although the trade balance has been in surplus since 1977, the balance of payments was negative because of items such as debt burden and repatriation of mining company dividends. In 1983, the severe shortage of foreign exchange and foreign debt amounted to about $200 million and $1.6 billion, respectively. About 50% of Guinea's debt was with the centrally planned economy countries, and 25%, with market economy countries. The bauxite that was exported from the Kindia deposit, which was put in operation by the U.S.S.R. in 1974, was used to repay the Soviet investments of about $450 million. The debt continued to grow because of accumulating arrearages on interest and principal. The Government released its 1984 Investment Code in October based on generally accepted international precepts that included priority investment sectors and guaranteed the expatriation of the earnings and capital of foreign firms.

Bauxite production increased 6% while alumina production decreased 13% compared with those of 1983. About 80% of this production was sold to market economy countries with the United States as the largest purchaser of Guinean bauxite. On the other hand, 90% of the production of the Office des Bauxite de Kindia (OBK) went to the U.S.S.R. and other centrally planned economy countries. OBK was owned by the Government but built and managed by the U.S.S.R. Gem diamond production increased 48% and industrial diamond production decreased 18% compared with the 1983 production figures.

In recent years, France has been Guinea's most important supplier, providing about 30% of all imported materials and equipment, with Eastern Europe and China combined supplying about 25%.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Aluminum:					
Bauxite:					
Mine production:					
Wet basis	13,427	12,833	11,827	12,421	[3]13,160
Dry basis[4]	12,219	11,678	10,446	11,300	12,000
Shipments (dry basis):					
Metallurgical-grade bauxite	10,330	9,792	9,701	10,000	10,000
Calcined bauxite	111	98	98	100	[3]130
Alumina:					
Production	708	679	549	583	[3]508
Shipments	708	608	549	583	[3]508
Diamond:					
Gem[e] thousand carats	12	12	10	23	[3]34
Industrial[e] do.	26	26	23	17	[3]14
Total do.	38	38	33	40	[3]48

[e]Estimated. [p]Preliminary.
[1]Includes data available through July 1984.
[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) 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]Calculated, assuming 9% average moisture.

Table 2.—Guinea: Apparent exports of bauxite and alumina, by country[1]

(Metric tons)

Country	Bauxite		Alumina	
	1982	1983	1982	1983
Austria	16,884	18,872	--	--
Belgium-Luxembourg	--	297	--	--
Canada	762,663	614,095	--	--
Finland	1,000	--	--	--
France	820,548	749,824	47,565	59,650
Germany, Federal Republic of	791,114	863,200	60,027	22,691
Iceland	--	--	58,804	--
Ireland	111,650	509,112	--	--
Italy	191,324	312,055	5,710	128,384
Netherlands	303	--	--	--
Spain	816,439	1,388,761	--	--
Switzerland	--	--	3,747	7,611
U.S.S.R.[2]	2,387,000	[e]2,700,000	--	--
United Kingdom	78,157	--	--	--
United States	4,197,933	3,600,246	--	12,768
Yugoslavia	138,667	115,528	31,624	88,920
Total	[r]10,313,682	10,871,990	207,477	320,024

[e]Estimated. [r]Revised.
[1]Table prepared by Virginia A. Woodson. 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 Aug. 13, 1985.
[2]Metal Statistics 1973-83. Metallgesellschaft Aktiengesellschaft. 1984, Frankfurt am Main, Federal Republic of Germany.

COMMODITY REVIEW

METALS

Bauxite and Alumina.—In 1984, OBK produced a record high output of 3.15 million tons of bauxite. Production of bauxite by Compagnie des Bauxites de Guinée (CBG) remained about the same. Friguia production of alumina, on the other hand, dropped to 508,000 tons, a 13% decrease from that of 1983, owing to continuing quality control problems. The European Investment Bank granted a $6 million loan to Friguia for a new processing plant to improve its alumina quality. This modification of the Bayer process would permit continuous production of a sandy, more marketable alumina. The total investment was expected to be $17 million with the process operable in 1986. Friguia was owned by the Government, 49%, and by Frialco Co., a consortium of Canadian and European countries, 51%. CBG received a $12 million credit from a group of French banks to buy French equipment and services to improve its mining operation. Martin Marietta Aluminum, a subsidiary of the Martin Marietta Corp., agreed to sell its 6% share of the common stock of Halco Mining Inc. to the Reynolds Metals Co. The purchase would permit Reynolds to extract and use 6% of the mine's bauxite production. Halco is an international consortium that owned 51% of CBG and operated the Boke bauxite mine. The Aluminum Co. of America (27%) and Aluminum Co. of Canada Ltd. (27%) were the major shareholders in Halco.

Gold.—The Chevaning Mining and Exploration Co. of the United States, whose exploration concession was in the Siguri-Mandia regions near Mali, invested $3 million to date in its endeavors. The project was a joint venture between Chevaning and the Government.

Iron Ore.—The World Bank's study of options for the development of the Mifergui-Nimba deposit was to be completed in February 1985. Algeria's Société Nationale de Sidérurgie was planning a 3.1-million-ton-per-year pelletizing plant using direct-reduction-based iron for its steel complex at Bellara, Algeria. The proposed mixture for the feed to the direct reduction plant was 70% to 75% Mifergui-Nimba iron ore and 25% to 30% Algerian iron ore. The owners of the Mifergui-Nimba Co. were the Guinean Government, 50%; the Nigerian Government, 13%; the Algerian Government, 5.9%; the United States Steel Corp., 5%; and the Japan Mifergui Corp., 1.78%; with the balance owned by various government agencies of France, Liberia, Libya, Romania, Spain, and Yugoslavia.

NONMETALS

The Aredor diamond project started full-scale production in April. The open pit mine was operated by Aredor Services Pty. Ltd., a wholly owned subsidiary of Bridge Oil Ltd. of Australia. Bridge Oil was the major owner of the consortium and owned Aredor Guinea S.A. equally with the Guinean Government. The first batch of diamonds of between 20,000 and 30,000 carats was marketed in October through the Aredor Sales Pty. Ltd. managed by the Industrial Diamond Co. of the United Kingdom, a 5% owner of the Aredor consortium. About 90% of the diamonds was of gem quality. Of the gem diamonds, 62% was reported to be of first quality with average size between 1.0 and 1.2 carats instead of the 0.57 carat average and an average value of $185 per carat estimated in the original feasibility study. The expected yield was 250,000 carats per year.

A major new diamond area was discovered outside the main project area and contained six known kimberlite pipes and potentially rich alluvial diamonds. The new find covered an area of 300 square kilometers and was less than 2 kilometers away from the existing Aredor washing plant. The 68-square-kilometer section containing the kimberlite pipes was expected to be in production by April 1985.

MINERAL FUELS

A $12 million program was financed early in 1984 to assess Guinea's oil potential and to develop an exploration plan. The program was funded by IDA for $8 million, Petro-Canada International Assistance Corp. for $3.6 million, and the Guinean Government for $400,000. The $3 million contract for the seismic survey of two shallow offshore basins was to be let through international competitive bidding procedures in accordance with IDA guidelines. The surveys would cover 10,000 square kilometers of the shallow water area along the coast in the western part of the country and the continental shelf, and the slope of more than 45,000 square kilometers in deeper waters. The Ministry of Mines and Geology would oversee the project.

[1]Physical scientist, Division of International Minerals.

The Mineral Industry of Hungary

By Walter G. Steblez[1]

Hungary continued to be a significant European producer of bauxite and manganese ore with bauxite production constituting about 4% of total world output. Although Hungary's manganese production is negligible in comparison with total world output, it nevertheless constituted about 48% of European production if Soviet production is not included. Other minerals produced are of only local importance.

In 1984, the overall objectives of Hungary's centrally planned economy were met. National income and industrial production each grew by 3% and exceeded planned targets by about 1%. In comparison with that of 1983, the gross output of the mineral industry increased by about 2%; the mining share registered a slight decrease, whereas the petroleum and natural gas share increased during the year. Industrial profits increased, largely because of improved productivity levels in the metallurgical, chemical and construction sectors of the economy.

There was a slight decline in the number of industrial workers during the year, especially in the mining, metallurgy, and heavy manufacturing sectors. The increase of productivity in the metallurgical sector was mainly due to an increased work load in a declining labor force and not to imported technology. Over a 3-year period, the labor force in metallurgy alone declined by about 14%, and that of the unskilled component by 25%. In mining, the labor force declined from 113,300 persons in 1983 to about 112,500 in 1984. As in previous years, the increasing appearance of more lucrative jobs in the Hungarian economy has led to some worker mobility from the more traditional heavy industry employment. However, within heavy industry, the mining sector maintained the highest average monthly wage, despite a lower than average annual wage increase. The metallurgical and the electric power sectors had the second and third highest wage scales, respectively, within heavy industry.

Major investment projects underway in 1984 included the completion of a new slag processing plant at the Ozd steel complex, as well as of first stage of the Fenyoefoe bauxite mining operation with a capacity of 240,000 tons per year. Also, reportedly, new shafts were completed at the Markus Mine at the Oroszlany coal mining complex, and construction work neared completion of a new catalytic cracking plant at the Danube refinery at Szazhalombatta. At yearend, a second 440-megawatt reactor block was added at the Paks nuclear power station; it was expected to become fully operational in 1986.

Government Policies and Programs.— The basic tasks of Hungary's centrally planned economy for 1985 again called for modest increases of 2.3% to 2.8% and 3.0% in national income and industrial output, respectively. Resources for investment in the mineral industry were to go largely into existing projects. Further facility development was envisaged at the Markushegy and Nagyegyhaza coal mines and at the Fenyoefoe bauxite mine. Reportedly, the construction of a new coal coking plant at the Dunaujvaros steelworks was planned for acceleration. Also, marked development of the petroleum and natural gas industry was planned for 1985.

The chief mineral policy of the Hungarian Government was to maintain modernization of existing industries to assure their competitiveness in the market and to reduce the imports of fuels and raw materials. In part, this would be achieved by using more efficient designs in the steel and construction industries. Savings would result from a sharp reduction of overdimensioned industrial products through the greater use of specialty steels as well as by substitution of newer materials. Greater emphasis was placed on the reduction of import and consumption of raw materials and fossil fuels. Consumption of petroleum was to be reduced by about 900,000 tons by 1985, which would be replaced by natural gas and nuclear energy. Petroleum's share in energy consumption would decline from 35% to about 30%.

In the field of industrial minerals, proposals to mine calcium sulfate at the Rudabanya Mine were discussed at a yearend 1984 meeting of the National Assembly. The benefits cited would be increased employment opportunities and a reduction of imports.

Capital investment in the mining sector grew from 11% of total industrial investment in 1980 to a planned 17% in 1984. However, the number of uncompleted projects rose substantially between 1976 and 1984 for industry as a whole. Although there were no exact figures regarding the mining sector's share of uncompleted projects, it was reportedly one of the chief elements in this problem. Construction delays in the mining and electric power industries were due largely to delays in machinery and equipment deliveries.

PRODUCTION

Hungary's mineral industry had mixed results in 1984. The production of steel and aluminum products increased, whereas coal production declined by about 0.7%. The latter was due to delayed startup of new mining operations and depletion of reserves at old ones. The production of petroleum remained at the 1983 level; output of natural gas rose by about 6%.

Bauxite production, with newly added mining capacities, rose by almost 3% compared with that of 1983. Industrial minerals, used mainly in the construction industry, registered a decline in output owing to a 4% to 5% decrease in construction and installation work during the year.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite, gross weight ----- thousand tons--	2,950	2,914	2,627	2,917	[3]2,994
Alumina, gross weight ----------do----	805	792	710	836	[3]839
Metal, primary	73,498	74,253	74,221	74,039	[3]74,202
Copper:					
Metal:[e]					
Smelter, secondary	100	100	100	100	100
Refined including secondary	12,000	12,000	[r]12,200	12,500	12,800
Gold, mine output, metal content[e] thousand troy ounces--	60	60	50	30	20
Iron and steel:					
Iron ore:					
Gross weight ------- thousand tons--	426	422	467	441	[3]383
Iron content --------------do----	[r]102	[r]101	112	106	92
Metal:					
Pig iron:					
For steel industry --------do----	2,094	2,065	2,065	1,966	[3]2,029
For foundry use ---------do----	120	128	116	81	67
Total -------------do----	2,214	2,193	2,181	2,047	[3]2,096
Ferroalloys:					
Ferrosilicon	10,390	[e]10,500	10,500	[e]10,000	9,000
Silicon metal[e]	2,000	2,000	2,000	2,000	2,000
Other[e]	2,400	2,500	2,500	2,000	2,000
Total	14,790	15,000	15,000	14,000	13,000
Steel, crude -------thousand tons --	3,764	3,642	3,702	3,616	[3]3,750
Semimanufactures, rolled only --do----	3,043	2,816	2,853	2,815	[3]2,955
Lead:[e]					
Mine output, metal content	1,100	[r]500	[r]600	[r]700	700
Metal, refined, secondary	100	100	100	100	100

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Manganese ore:					
Run of mine:[4]					
Gross weight	134,472	121,965	150,035	103,580	105,000
Metal content	25,550	23,173	28,507	19,802	20,000
Concentrate:					
Gross weight	83,000	71,000	83,000	59,000	60,000
Metal content	24,900	21,300	24,900	17,700	18,000
Zinc:[e]					
Mine output, metal content	2,800	[r]1,300	[r]1,500	[r]2,400	2,300
Metal, smelter, secondary	600	600	600	600	600
NONMETALS					
Cement, hydraulic thousand tons	4,660	4,635	4,369	4,243	[3]4,145
Clays:					
Bentonite:					
Raw	77,685	80,531	84,934	79,807	[3]64,158
Processed	51,061	52,515	54,014	56,850	[3]45,759
Kaolin:					
Raw	51,839	52,518	45,131	37,375	[3]38,869
Processed	7,067	7,024	7,109	7,874	[3]8,303
Lime, calcined thousand tons	698	757	845	822	[3]812
Nitrogen: N content of ammonia do	795	818	792	813	825
Perlite	99,270	95,190	89,975	93,503	95,000
Pyrites, gross weight[e]	7,000	7,000	7,000	7,000	7,000
Refractory materials, n.e.s.:					
Chamotte products thousand tons	164	[r]162	158	166	166
Chrome magnesite products do	41	[r]42	40	48	48
Sand and gravel:					
Gravel thousand cubic meters	11,634	12,191	11,219	10,665	11,000
Sand:					
Common do	406	400	400	400	400
Foundry thousand tons	496	692	585	579	[3]591
Sodium sulfate[e]	11,000	11,000	11,000	11,000	10,000
Stone:					
Dimension, all types thousand tons	1	1	1	1	1
Dolomite do	1,220	1,248	1,324	1,167	1,200
Limestone do	8,415	8,565	8,367	8,081	8,100
Quartzite do	43	33	26	14	14
Sulfur:					
From pyrite[e]	3,000	3,000	3,000	3,000	2,000
Byproduct, elemental, all sources	9,293	[e]9,200	9,200	[e]9,200	9,000
Total	12,293	12,200	12,200	12,200	11,000
Sulfuric acid	589,838	[r]572,681	[r]571,339	605,659	[3]549,159
Talc[e]	17,500	17,500	17,000	17,000	17,500
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	5,000	5,000	5,000	5,000	5,000
Coal:					
Bituminous thousand tons	3,056	3,066	3,039	2,827	[3]2,573
Brown do	14,157	14,463	14,754	14,406	[3]14,448
Lignite do	8,479	8,413	8,286	7,980	[3]8,026
Total do	25,692	25,942	26,079	25,213	[3]25,047
Coke:					
Coke oven:					
Metallurgical do	673	645	618	564	[3]546
Other[e] do	170	170	170	170	160
Total do	843	815	788	734	706
Gashouse[e] do	180	180	180	170	160
Total coke do	1,023	995	968	904	866
Fuel briquets do	1,250	1,338	1,472	1,533	[3]1,549
Gas:					
Manufactured million cubic feet	19,317	[e]18,000	17,834	15,362	15,200
Natural, marketed do	216,902	212,276	234,524	229,899	243,601
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	3,791	[e]3,700	[e]3,700	[e]3,800	3,900
Liquefied petroleum gas do	3,600	3,500	3,500	3,500	3,500
Peat, agricultural use[e] thousand tons	70	70	70	70	70

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude:					
As reported thousand tons	2,031	2,024	2,027	2,004	[3]2,007
Converted thousand 42-gallon barrels	15,497	13,723	15,466	15,290	[3]15,313
Refinery products:[5]					
Gasoline including naphtha do	[r]19,873	20,085	20,068	20,153	[3]21,479
Kerosine and other light distillates[6] do	6,960	[e]7,000	[e]7,000	[e]7,000	7,000
Distillate fuel oil do	27,207	26,297	25,185	23,454	[3]25,879
Residual fuel oil do	21,758	20,526	17,329	16,836	[3]16,970
Lubricants do	1,090	1,000	[e]1,000	[e]1,000	1,000
Liquefied petroleum gas[e] do	1,100	1,000	1,000	1,000	1,000
Asphalt and bitumen do	3,927	[e]3,900	[e]3,900	3,800	3,800
Paraffin and petrolatum do	251	[e]250	[e]250	250	250
Total do	[r]82,166	[r]80,058	75,732	73,493	77,378

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 31, 1985.
[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

The overall objectives of Hungary's foreign trade plan were met. A $600 million hard currency surplus was achieved, which was about an 8% increase over that of 1983. Hungary remained a net importer of most raw materials and fuels with the dominant share of fuels and metals imported from the U.S.S.R. As in previous years, over 50% of Hungary's foreign trade was conducted with the centrally planned economy countries belonging to the Council for Mutual Economic Assistance (CMEA). Trade with industrialized market economy countries accounted for about 35% of the total and that with developing countries for about 12%.

A major development in 1984 was a $90 million loan from the International Bank for Reconstruction and Development (World Bank) for exploration and development of gasfields at Ulles in southern Hungary and at Endrod in east-central Hungary. This international financial deal will reportedly also cover the cost of imported equipment for all oil to gas conversion.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate[2]	467,375	431,033	--	Czechoslovakia 270,304; East Germany 140,409.
Oxides and hydroxides[2]	551,953	664,872	--	U.S.S.R. 353,003; Austria 141,194; Poland 119,645.
Ash and residue containing aluminum	504	690	--	All to West Germany.
Metal including alloys:[2]				
Scrap	8,740	6,498	--	Austria 4,776; West Germany 1,314.
Unwrought	49,675	57,882	--	East Germany 9,891; Bulgaria 9,826; Poland 5,254.
Semimanufactures	42,289	49,464	5,976	East Germany 8,612; Iran 5,142; Cuba 4,003.
Chromium:				
Ore and concentrate	1,720	3,275	--	All to Italy.
Oxides and hydroxides	93	67	--	Italy 45; West Germany 20.
Copper:				
Sulfate	1,167	1,192	--	West Germany 964; Belgium-Luxembourg 177.
Ash and residue containing copper	70	19	--	All to West Germany.
Metal including alloys:				
Scrap	4,286	4,613	--	Austria 4,140; West Germany 436.
Unwrought	5,697	3,883	--	All to West Germany.
Semimanufactures	3,715	2,956	--	West Germany 2,093; Austria 663.
Iron and steel: Metal:				
Scrap	53,000	50,000	--	Italy 38,391; West Germany 6,506.
Pig iron, cast iron, related materials[3]	--	4,800	--	NA.
Ferroalloys:				
Ferrochromium	23	NA		
Ferrosilicomanganese	500	NA		
Ferrosilicon	82	NA		
Unspecified	73	24	--	All to Italy.
Steel, primary forms[2]	6,522	5,192	--	All to West Germany.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	569,527	693,529	--	Iran 138,109; West Germany 95,770; U.S.S.R. 86,582.
Universals, plates, sheets[2]	284,337	275,991	3,065	Austria 52,240; Italy 38,960; Iran 29,582.
Hoop and strip[2]	19,181	19,754	--	Yugoslavia 6,135; Czechoslovakia 2,559; Romania 2,471.
Rails and accessories	480	33	--	West Germany 29.
Wire[2]	14,089	16,058	35	Iran 11,449; Cyprus 1,018.
Tubes, pipes, fittings[2]	73,866	66,136	--	Iran 17,528; Austria 11,727; U.S.S.R. 11,518.
Castings and forgings, rough[2]	16,179	11,782	--	Iran 4,181; Poland 1,950; West Germany 1,454.
Lead:				
Oxides	77	NA		
Ash and residue containing lead	1,517	1,124	--	West Germany 1,022; Italy 102.
Metal including alloys:				
Scrap	6,566	2,257	--	West Germany 1,422; Austria 835.
Unwrought	881	284	--	Austria 279.
Semimanufactures	27	NA		
Manganese: Ore and concentrate, metallurgical-grade[2]	15,865	9,608	--	All to Czechoslovakia.
Mercury ... 76-pound flasks	870	NA		
Molybdenum: Ore and concentrate	24	10	--	All to West Germany.
Nickel: Metal including alloys:				
Scrap	361	37	--	Do.
Unwrought	144	NA		
Semimanufactures	120	81	16	Sweden 35; Yugoslavia 29.
Platinum-group metals:				
Waste and sweepings ... value, thousands	$4,833	NA		
Metals including alloys, unwrought and partly wrought ... do	$1,431	NA		
Silver:				
Waste and sweepings ... do	$7	$4,152	--	All to West Germany.
Metal including alloys, unwrought and partly wrought ... do	$341	$863	--	West Germany $547; Austria $316.
Tin:				
Ash and residue containing tin	21	NA		
Metal including alloys, scrap	33	NA		

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
METALS —Continued				
Tungsten: Metal including alloys, all forms	1	12	--	Austria 8; Yugoslavia 4.
Zinc:				
Ore and concentrate	--	27	--	All to Italy.
Matte	540	250	--	All to West Germany.
Ash and residue containing zinc	--	3,420	--	Do.
Metal including alloys:				
Scrap	947	1,079	--	West Germany 1,003; Austria 47.
Unwrought	120	40	--	All to Austria.
Other:				
Ores and concentrates	27	15	--	All to Belgium-Luxembourg.
Oxides and hydroxides	4,652	11	11	
Ashes and residues	12,918	14,531	--	Austria 14,318; Italy 146.
Base metals including alloys, all forms	20	10	5	Japan 2; Sweden 2.
NONMETALS				
Abrasives,n.e.s.:				
Natural: Corundum, emery, pumice, etc	236	478	17	West Germany 441.
Artificial: Corundum	14,732	13,714	--	West Germany 2,718; U.S.S.R. 1,977; Austria 1,743.
Dust and powder of precious and semiprecious stones including diamond kilograms	3	NA		
Grinding and polishing wheels and stones[2] value, thousands	$2,038	$1,663	$118	East Germany $533; Romania $514; Bulgaria $159.
Asbestos, crude	4,859	4,848	--	All to Belgium-Luxembourg.
Boron materials: Oxides and acids	39	20	--	All to West Germany.
Cement[2]	143,713	145,296	--	Yugoslavia 121,434; U.S.S.R. 22,208.
Clays, crude:				
Bentonite[2]	21,527	16,382	--	East Germany 10,499; Poland 5,207.
Kaolin[2]	5,995	6,115	--	Czechoslovakia 4,707; West Germany 1,408.
Cryolite and chiolite	--	50	--	All to Norway.
Diamond:				
Gem, not set or strung value, thousands	$1,701	$5,195	--	Belgium-Luxembourg $5,054; Italy $137.
Industrial stones do	$1,173	$302	--	Belgium-Luxembourg $229; Austria $73.
Diatomite and other infusorial earth	2,028	2,857	--	Austria 2,704; Greece 86.
Feldspar, fluorspar, related materials	1,781	NA		
Fertilizer materials:				
Crude, n.e.s	73	1,152	--	Austria 1,023; West Germany 69.
Manufactured:				
Ammonia[2] thousand tons	57	69	--	Yugoslavia 65; Italy 2.
Nitrogenous[2] do	1,384	1,191	--	Yugoslavia 93; West Germany 88; undetermined 979.
Phosphatic, P_2O_5 content[3] do	55	12	--	NA.
Pyrite, unroasted	20,213	9,989	--	All to West Germany.
Sodium compounds, n.e.s.: Carbonate, manufactured	2,268	[3]7,800	--	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	29,623	14,487	--	U.S.S.R. 8,841; Czechoslovakia 2,684.
Worked	161	126	NA	West Germany 106; Finland 20.
Dolomite, chiefly refractory-grade	15,255	11,745	--	Poland 11,685.
Gravel and crushed rock	9,174	4,150	--	All to Austria.
Quartz and quartzite	20,976	29,158	--	Do.
Sand:				
Construction cubic meters	161,007	63,757	--	Czechoslovakia 58,118; U.S.S.R. 5,535.
Industrial	31,364	43,495	--	Yugoslavia 27,352; Austria 16,103.
Sulfur:				
Elemental, crude including native and byproduct	10,796	13,196	--	Austria 12,336; Yugoslavia 698.
Sulfuric acid[2]	70,858	52,687	--	Yugoslavia 52,671.
Other:				
Crude[2]	100,214	88,757	--	Austria 22,542; East Germany 21,492; West Germany 12,680.
Slag and dross, not metal-bearing	1,736	689	--	All to Austria.

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983 United States	Destinations, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,776	10,989	--	All to Pakistan.
Coal:				
Anthracite and bituminous[3]	598	547	--	NA.
Briquets of anthracite and bituminous coal	1,321	693	--	All to Austria.
Lignite including briquets[2]	35,085	22,712	--	U.S.S.R. 22,662.
Gas, natural: Gaseous million cubic feet	336	383	--	All to U.S.S.R.
Peat including briquets and litter[2]	9,718	2,903	--	Austria 2,345; Yugoslavia 365.
Petroleum refinery products:				
Liquefied petroleum gas[2] thousand 42-gallon barrels	597	618	--	Italy 278; Yugoslavia 223.
Gasoline do.	[2]289	341	--	West Germany 216; Yugoslavia 101.
Mineral jelly and wax[2] do.	266	255	([4])	Italy 70; West Germany 67.
Kerosine and jet fuel do.	[2]373	203	--	All to Austria.
Distillate fuel oil do.	[2]810	2,290	--	Austria 1,491; West Germany 495; Yugoslavia 304.
Lubricants[2]	522	519	--	Austria 261; Yugoslavia 114; Switzerland 55.
Residual fuel oil do.	1,715	525	--	Austria 402; Yugoslavia 80.
Bitumen and other residues[2] do.	518	655	--	Austria 237; Algeria 178; Pakistan 101.
Bituminous mixtures do.	--	([4])	--	All to West Germany.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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. Unless otherwise specified, these data were compiled from United Nations information and data published by the partner trade countries.
[2]Official Trade Statistics of Hungary.
[3]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[4]Less than 1/2 unit.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	1,097	1,092	--	All from West Germany.
Oxides and hydroxides	222	204	--	Do.
Metal including alloys:				
Scrap	11	NA		
Unwrought[2]	137,087	163,000	--	U.S.S.R. 162,864.
Semimanufactures[2]	6,262	4,997	8	East Germany 3,259; Czechoslovakia 577; Romania 392.
Chromium:				
Ore and concentrate	14,440	17,352	--	U.S.S.R. 17,000.
Oxides and hydroxides	1	NA		
Cobalt:				
Oxides and hydroxides	11	NA		
Metal including alloys, all forms	7	3	--	Finland 2; West Germany 1.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium) kilograms	223	NA		
Tantalum do.	450	400	--	All from West Germany.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Copper:				
Sulfate[2]	3,480	3,450	--	All from U.S.S.R.
Metal including alloys:				
Scrap	4,642	2,351	--	West Germany 1,238; Belgium-Luxembourg 868.
Unwrought	[2]33,428	[2]31,785	--	Poland 9,254; Austria 2,079; undetermined 18,007.
Semimanufactures	[2]12,464	[2]12,121	7	West Germany 1,623; undetermined 9,939.
Gold: Metal including alloys, unwrought and partly wrought ___troy ounces	2,991	1,350	NA	All from West Germany.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite[2] __ thousand tons	3,757	3,967	--	U.S.S.R. 3,893; Yugoslavia 45.
Metal:				
Scrap	14,000	28,000	--	NA.
Pig iron, cast iron, related materials[2]	234,024	293,562	--	U.S.S.R. 260,304; Algeria 17,404.
Ferroalloys:				
Ferrochromium[2]	7,450	9,098	--	U.S.S.R. 6,069; West Germany 620; Sweden 470.
Ferromanganese[2]	45,008	39,980	--	U.S.S.R. 24,120; Norway 11,500; Brazil 4,000.
Ferromolybdenum	80	1	--	All from Sweden.
Ferrosilicomanganese	70	NA		
Ferrosilicon[2]	7,783	6,654	--	U.S.S.R. 6,554.
Silicon metal	1,123	NA		
Unspecified	11,074	13,592	--	U.S.S.R. 11,982; Brazil 703.
Steel, primary forms[2]	368,772	425,386	--	U.S.S.R. 403,719; Czechoslovakia 10,863.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	179,445	170,146	4	U.S.S.R. 143,843; Poland 11,377.
Universals, plates, sheets[2]	344,185	369,211	--	U.S.S.R. 171,031; Czechoslovakia 24,479; Spain 14,976.
Hoop and strip	7,684	10,014	--	Czechoslovakia 3,407; West Germany 1,833; Italy 1,720.
Rails and accessories	569	637	--	All from West Germany.
Wire[2]	32,735	34,420	13	Czechoslovakia 14,434; West Germany 4,104; Belgium-Luxembourg 2,965.
Tubes, pipes, fittings[2]	103,055	81,053	([3])	East Germany 21,087; Romania 17,647; West Germany 16,569.
Castings and forgings, rough[2]	14,318	11,353	--	Yugoslavia 6,468; Poland 1,653; West Germany 1,296.
Unspecified[2]	1,384	1,173	--	France 1,146.
Lead:				
Oxides	2,061	425	--	West Germany 405.
Metal including alloys:				
Unwrought	[2]13,647	[2]11,930	--	West Germany 1,173; Yugoslavia 603; undetermined 9,798.
Semimanufactures	21	[2]2,308	--	NA.
Lithium: Oxides and hydroxides	--	18	--	All from West Germany.
Magnesium: Metal including alloys:				
Unwrought	173	53	--	Yugoslavia 49; Italy 4.
Semimanufactures	44	23	--	Italy 18; West Germany 4.
Manganese: Ore and concentrate, metallurgical-grade[2]	404	343	--	France 320.
Mercury ________ 76-pound flasks	174	NA		
Molybdenum: Metal including alloys, all forms	28	23	--	All from Japan.
Nickel:				
Matte and speiss	398	190	--	All from Cuba.
Metal including alloys:				
Unwrought	4	55	--	Finland 50; West Germany 5.
Semimanufactures	78	65	--	West Germany 31; Italy 17; Sweden 10.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$6,664	$4,539	--	West Germany $3,428; Italy $702; Japan $409.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983p	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$2,562	$2,183	--	West Germany $2,161.
Tin: Metal including alloys, unwrought	[2]1,772	NA		
Titanium:				
Ore and concentrate	1,147	679	--	All from West Germany.
Oxides	1,254	1,237	--	Belgium-Luxembourg 635; West Germany 552.
Tungsten: Ore and concentrate	--	139	--	Brazil 100; Austria 39.
Zinc:				
Oxides	2,123	1,254	--	Austria 622; Yugoslavia 440.
Metal including alloys:				
Unwrought[2]	19,291	26,904	--	Poland 7,828; Finland 1,499; Yugoslavia 1,409.
Semimanufactures[2]	7,027	5,892	--	West Germany 1,101; undetermined 4,760.
Zirconium: Ore and concentrate	3,998	4,727	--	All from Italy.
Other:				
Ores and concentrates[2]	21,589	8,252	111	Cuba 5,000; Switzerland 899; Australia 700.
Oxides and hydroxides	3,260	101	--	West Germany 82.
Base metals including alloys, all forms	117	41	--	West Germany 22; Belgium-Luxembourg 19.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	11	82	75	Italy 6.
Artificial:				
Corundum[2]	1,394	1,451	(3)	Italy 1,099; U.S.S.R. 197.
Silicon carbide	874	1,056	--	All from Italy.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$312	$237	$173	Belgium-Luxembourg $64.
Grinding and polishing wheels and stones[2] do	$7,041	$5,604	$14	U.S.S.R. $1,796; Austria $1,384; West Germany $988.
Asbestos, crude[2]	33,688	37,603	--	U.S.S.R. 33,606.
Barite and witherite	21,212	19,037	--	Yugoslavia 17,497.
Boron materials:				
Crude natural borates	1,240	NA		
Oxides and acids	2,982	2,282	--	U.S.S.R. 1,850; Italy 431.
Bromine[2]	579	597	--	Israel 350; U.S.S.R. 146.
Cement[2]	734,313	875,040	--	U.S.S.R. 559,935; East Germany 126,377; Czechoslovakia 113,287.
Chalk	2,685	956	--	All from Austria.
Clays, crude:				
Chamotte earth[2]	73,568	73,219	704	Czechoslovakia 66,641; Israel 4,422.
Fire clay	18,451	14,808	--	All from Poland.
Kaolin[2]	37,772	40,232	--	Austria 15,741; Czechoslovakia 12,683.
Unspecified[2]	55,155	62,948	52	Czechoslovakia 53,202.
Diamond:				
Gem, not set or strung value, thousands	$290	$118	--	Austria $50; West Germany $44.
Industrial stones do	$2,987	$575	--	Belgium-Luxembourg $482.
Diatomite and other infusorial earth	543	2,643	19	Iceland 2,624.
Feldspar, fluorspar, related materials	4,641	3,499	--	West Germany 1,365; Norway 1,165.
Fertilizer materials:				
Crude, n.e.s	1,000	NA		
Manufactured:				
Ammonia	--	2	--	All from West Germany.
Nitrogenous, N_2 content[2]	221,318	257,189	3,027	U.S.S.R. 247,826.
Phosphatic, P_2O_5 content[2]	160,017	145,715	9,474	Yugoslavia 44,613; U.S.S.R. 26,226; Austria 20,706.
Potassic, K_2O content[2]	475,889	566,491	--	U.S.S.R. 404,718; East Germany 156,773.
Unspecified and mixed[2]	126,001	113,687	12	Yugoslavia 67,957; U.S.S.R. 45,730.
Graphite, natural	1,065	1,030	--	Austria 960.
Gypsum and plaster[2]	89,583	79,940	--	East Germany 64,258; Romania 15,100.
Iodine[2] kilograms	888	486	--	U.S.S.R. 291; Japan 155.
Lime[2]	24,367	53,806	--	Yugoslavia 36,510; Czechoslovakia 16,969.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Magnesium compounds:				
Magnesite[2]	101,161	98,312	--	Czechoslovakia 72,766; Austria 11,103.
Oxides and hydroxides	182	57	--	All from West Germany.
Other	2,218	NA		
Mica:				
Crude including splittings and waste	225	12	10	West Germany 2.
Worked including agglomerated splittings	19	20	--	West Germany 15.
Phosphates, crude[2]	567,966	648,880	--	U.S.S.R. 463,704; Algeria 98,299.
Pigments, mineral: Iron oxides and hydroxides, processed	3,150	2,613	--	West Germany 2,501; Italy 95.
Potassium salts, crude[2]	3,131	2,906	--	U.S.S.R. 1,888; East Germany 944.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$109	$12	--	West Germany $10.
Synthetic do.	$115	$30	--	Japan $17; Austria $6.
Pyrite, unroasted[2]	49,575	80,067	--	All from U.S.S.R.
Salt and brine[2]	755,482	572,569	--	Romania 432,982; U.S.S.R. 70,306.
Sodium compounds, n.e.s.:				
Carbonate, manufactured[2]	181,049	182,678	--	Bulgaria 114,832; Romania 51,524.
Sulfate, manufactured	1,675	255	--	All from Austria.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	34,476	57,206	--	Czechoslovakia 41,630; Bulgaria 4,794.
Worked	284	182	--	West Germany 150; Austria 27.
Dolomite, chiefly refractory-grade	95	94	--	West Germany 89.
Gravel and crushed rock	16,856	9,550	--	Austria 6,673; Yugoslavia 2,219.
Quartz and quartzite	1,973	1,723	--	West Germany 1,679.
Sand other than metal-bearing[2]	119,715	135,035	--	Czechoslovakia 101,967; East Germany 26,294.
Sulfur:				
Elemental:				
Crude including native and byproduct[2]	163,701	174,692	--	Poland 140,912; U.S.S.R. 33,616.
Colloidal, precipitated, sublimed	7	1	--	All from West Germany.
Dioxide	466	336	--	Do.
Sulfuric acid[2]	4,357	194	--	Do.
Talc, steatite, soapstone, pyrophyllite	2,953	2,253	--	Austria 1,280; Finland 776.
Other:				
Crude[2]	135,065	65,981	500	Czechoslovakia 23,087; Bulgaria 11,201.
Slag and dross, not metal-bearing	322	335	--	All from Austria.
MINERAL FUELS AND RELATED MATERIALS				
Carbon:[2]				
Carbon black	386	989	--	U.S.S.R. 764.
Gas carbon	22,030	31,304	--	U.S.S.R. 20,924.
Coal:[2]				
Anthracite and bituminous thousand tons	1,997	1,756	--	U.S.S.R. 819; Czechoslovakia 481; Poland 452.
Briquets of anthracite and bituminous coal do.	489	516	--	All from East Germany.
Coke and semicoke[2] do.	717	863	--	Yugoslavia 414; Poland 192; Czechoslovakia 144.
Gas, natural: Gaseous[2] million cubic feet	138,911	143,762	--	U.S.S.R. 136,699.
Petroleum:				
Crude[2] thousand 42-gallon barrels	64,712	65,601	--	U.S.S.R. 45,423; Libya 12,207; Iran 7,473.
Refinery products:				
Liquefied petroleum gas do.	256	330	--	U.S.S.R. 256; Austria 60.
Gasoline[2] do.	681	921	--	Yugoslavia 490; U.S.S.R. 307.
Kerosine and jet fuel[2] do.	1,876	1,267	--	U.S.S.R. 984; East Germany 83.
Distillate fuel oil[2] do.	5,994	4,142	--	U.S.S.R. 4,068.
Lubricants[2] do.	103	127	([3])	U.S.S.R. 88; Belgium-Luxembourg 11.
Residual fuel oil[2] do.	543	1,197	--	U.S.S.R. 1,178.
Petroleum coke do.	4	44	--	Norway 29; West Germany 15.

[p] Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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. Unless otherwise specified, these data were compiled from United Nations information and data published by the partner trade countries.
[2]Official Trade Statistics of Hungary.
[3]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Hungary must rely on imports to meet most requirements for ores, concentrates, and metals. The country produced a modest amount of iron ore in 1984, and imported most of its iron ore, as in previous years, from the U.S.S.R. Hungary also relied largely on the U.S.S.R. for imports of steel and semimanufactures as well as for most ferroalloys. Also, Hungary's reserves of nonferrous metals such as lead and zinc were near depletion. Copper was no longer mined at Resck, although substantial deep-lying resources were surveyed in the vicinity. Bauxite and manganese reserves constituted the basis of Hungary's metallic mining industry. In recent years, gallium and vanadium began to be produced as byproducts of the aluminum industry at the Ajka alumina plant.

Aluminum and Bauxite.—The salient development in Hungary's bauxite mining industry was the completion and startup of the 240,000-ton-per-year first stage of the Fenyoefoe bauxite mine in Fejér County. This new facility was planned to have design capacity of 650,000 tons per year. By yearend, it was expected to produce about 100,000 tons of bauxite. The bauxite mining industry, which employs about 4,000 persons, was planned to reach an annual capacity of over 4.5 million tons per year in the near future.

During the year, output as well as domestic sales and exports of aluminum improved significantly over those of previous years. Exports increased mainly to industrial market economy countries and were an important source of hard currency earnings. By midyear, a new production unit for the manufacture of semimanufactured products and rolled aluminum was commissioned at the Szekesfehervar Light Metal Works, which would increase the capacity of the works by 65%. In the field of foreign technical assistance, Hungary reportedly signed a protocol with the State of Gujurat in India to assist the latter in the construction of an alumina plant at Panandhro.

Iron and Steel.—Domestic production of iron ore at Rudabanya Mine had been declining and constituted only a small portion of Hungary's industrial requirements. Reportedly, one of the major issues in this industry was whether or not this operation should be continued despite sustained financial losses. Reorganization with Government aid, in order to minimize losses, was scheduled for 1986.

The steel industry exceeded its production targets for 1984 and by yearend was operating at a profit, despite setbacks earlier in the year. Exports to centrally planned economy countries increased by about 7% compared with those of 1983, and those to market economy countries by about 2%. The successful upturn of the steel industry in 1984 was attributed to price reforms and a moratorium on debt repayment until the end of 1985 that was initiated by the Government in 1983.

During 1984, a new slag retreatment plant was put on-stream at the Ozd steel complex. The plant was designed to process about 1,600,000 tons per year of slag and would recover approximately 200,000 tons of iron. Following an accident in 1983, an oxygen converter at the Dunaujvaros steel complex was rebuilt and recommissioned in July 1984. The converter shop's electrical fittings were replaced with nonflammable material.

Lead and Zinc.—Hungary produced only small quantities of lead and zinc and had to meet industrial needs through imports. As with iron ore mining, the rationale for continuing lead-zinc mining operations was questioned because of steady financial losses by this sector.

NONMETALS

Hungary produced a variety of industrial minerals at 12 mines in the Tokaj Mountains. Annual production had been over 300,000 tons, and the most important products were perlite, zeolite, kaolin, and bentonite. Moreover, production of nonmetals meets both domestic and export needs.

Cement production continued to decline owing to a further cutback on construction and installation activity. The production of stone, gravel, and limestone remained at about the 1983 levels.

MINERAL FUELS

Hungary's total consumption of energy rose by about 3.9%, which was twice the planned target. Consumption of electricity increased by 5%. Demand on producers was significant, which resulted in increased efforts to supply coal and coal briquetes as well as natural gas. In keeping with the

Government's long-term plan to reduce consumption of energy to 0.5% for each 1% increase on the annual growth of the gross national product, the energy consumption plan for 1985 called for an increase of 1.3% to 1.5%.

Coal.—Coal reserves were estimated at 4,400 million tons out of a total resource base of 7,400 million tons. The breakdown by type was hard coal, 19%; brown coal, 25%; and lignite, 56%. Reportedly, the Kirad Mine, northeast of Ozd, was worked-out. The miners were to be transferred to the nearby Putnok Mine, which was scheduled to produce 1 million tons per year by 1986. At the Many Mine, west of Budapest, construction of two inclined shafts was completed; one would be used for ventilation, and the other for transport of coal. Estimated coal reserves in the Many area were set at around 100 million tons. The first stage of the new mine was designed to provide access to about 21 million tons of coal. Reportedly, the Nagyegyhaza open pit at Tatabaya encountered production problems owing to the presence of very hard underlying rock, which required changes in equipment used in the pit. Equipment downtimes were reportedly high.

Natural Gas and Petroleum.—Petroleum reserves in Hungary were reported to be about 420 million barrels. Extraction was becoming increasingly difficult, and it was estimated that production would decrease from the present rate of 2 million tons per year to 1 million tons in the 1990's. Most of Hungary's petroleum had been imported from the U.S.S.R., although in gradually decreasing amounts. Greater reliance was placed on substituting natural gas, both domestic and that imported from the Soviet Union. During the year, a new catalytic cracking plant was put on-stream at the Szazhalombatta refinery, which would convert 1 million tons per year of residual fuel into lighter fractions.

Nuclear Power.—A second 444-megawatt reactor from the Soviet Union was added to the Paks nuclear power station. The two reactor blocks were expected to provide 12% of Hungary's electric power.

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The Mineral Industry of Iceland

By Richard H. Singleton[1]

Without significant mineral resources, Iceland has an abundance of hydroelectric and geothermal power, supporting energy-intensive industries for the processing of imported raw materials. The mineral industry's chief contribution to the national economy continued to be aluminum, ferroalloys, and some nonmetallic minerals, particularly cement and diatomite.

Iceland's gross national product declined for the second consecutive year, by 1% compared with 6% in 1983; it remained at about $2.2 billion.[2] The cost of living index increased about 15%, compared with 76% in 1983, primarily because wage indexing had been suspended in May 1983; however, the annualized rate of increase rose to 40% during the last quarter because of wage increases and a 12% currency devaluation in November. Unemployment remained at about 1%.

PRODUCTION

Increases occurred in output of aluminum and ferrosilicon. Production of these energy-intensive products, as well as that of diatomite, was at nearly full capacity.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
Aluminum metal, primary[2]	73,111	[r]73,600	[r]75,200	76,077	82,391
Cement, hydraulic[3] ... thousand tons	122	122	[r]124	115	118
Diatomite	18,150	19,840	24,965	25,501	25,000
Iron and steel:					
Ferrosilicon	25,309	33,612	42,200	51,008	55,000
Scrap	3,690	NA	3,922	10,882	10,000
Nitrogen: Fixed	7,000	7,000	8,000	8,000	8,000
Pumice	36,000	33,945	8,700	45,000	50,000
Salt	53	50	100	500	500
Sand					
Calcareous, shell ... thousand cubic meters	109	114	120	125	125
Basaltic ... cubic meters	4,900	5,000	5,300	5,500	5,000
Stone:					
Crushed ... thousand cubic meters	24	21	21	20	20
Silica dust	4,400	4,900	4,200	[e]5,000	5,500

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through May 3, 1985.
[2]Ingot and rolling billet production.
[3]Sales.

TRADE

There was no significant change in Iceland's pattern of minerals traded, aluminum and ferrosilicon, and smaller values of diatomite and pumice, being the main mineral export items. However, exports of aluminum, mostly ingot, increased significantly, 74%, to about 107,000 tons, and exports of pumice more than doubled. Principal mineral imports were petroleum products, coal, and alumina. The United States remained one of the major importers of Icelandic ferrosilicon.

Table 2.—Iceland: Exports of selected mineral commodities[1]

(Metric tons)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	18,733	45,328	202	Norway 21,966; Denmark 11,542; West Germany 10,104.
Aluminum: Metal including alloys, unwrought	61,531	106,904	--	Switzerland 32,783; West Germany 15,410; United Kingdom 11,251.
Diatomite and other infusorial earth	24,966	24,508	--	West Germany 6,511; Hungary 2,624; Denmark 2,520.
Iron and steel: Metal:				
Scrap	3,482	10,268	--	Norway 5,007; Spain 3,486; Japan 1,400.
Ferroalloys: Ferrosilicon	42,174	49,238	4,483	West Germany 25,133; Japan 13,701.
Other: Base metals including alloys, all forms	440	614	(2)	Netherlands 398; Denmark 111; West Germany 42.

[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.

Table 3.—Iceland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	117,331	144,483	NA	Australia 144,470; United Kingdom 12.
Metal including alloys:				
Unwrought	46	33	--	Netherlands 26; United Kingdom 6.
Semimanufactures	1,180	1,021	9	West Germany 244; Norway 239; Sweden 128.
Chromium: Oxides and hydroxides	2	8	--	Denmark 6; West Germany 2.
Copper: Metal including alloys:				
Unwrought	4	4	--	Mainly from Denmark.
Semimanufactures	203	161	12	West Germany 53; United Kingdom 14.
Gold: Metal including alloys, unwrought and partly wrought value, thousands	$138	$106	$37	Republic of South Africa $22; Switzerland $21.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	11,936	12,531	--	All from Norway.
Metal:				
Pig iron, cast iron, related materials	669	537	14	France 396; Sweden 101.
Ferroalloys	10	20	10	Netherlands 10.
Steel, primary forms	1,061	1,230	--	United Kingdom 610; West Germany 274.
Semimanufactures:				
Bars, rods, angles, shapes, sections	20,986	19,147	50	Sweden 6,583; Norway 3,758; Spain 2,996.
Universals, plates, sheets	12,693	11,710	--	Sweden 2,669; West Germany 2,470; Norway 1,943.
Hoop and strip	482	575	2	West Germany 151; Belgium-Luxembourg 96.
Rails and accessories	8	15	--	West Germany 13; Netherlands 2.
Wire	181	286	1	Belgium-Luxembourg 209; Italy 22.

See footnotes at end of table.

Table 3.—Iceland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Tubes, pipes, fittings	7,005	6,904	8	West Germany 1,920; Netherlands 1,367.
Castings and forgings, rough	161	149	--	West Germany 100; Sweden 22.
Lead: Metal including alloys:				
Unwrought	304	155	--	Denmark 144; West Germany 10.
Semimanufactures	17	13	(2)	West Germany 9; Denmark 3.
Magnesium: Metal including alloys, all forms	(2)	41	NA	Netherlands 26.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$169	$152	$11	Switzerland $111; Netherlands $17.
Silver: Metal including alloys, unwrought and partly wrought do	$153	$99	NA	West Germany $57; Sweden $16.
Tin: Metal including alloys, all forms	9	6	NA	Denmark 5.
Titanium: Oxides	434	648	NA	United Kingdom 348; West Germany 260; Norway 35.
Zinc: Metal including alloys:				
Unwrought	89	73	--	Norway 58; Belgium-Luxembourg 15.
Semimanufactures	3	6	NA	Belgium-Luxembourg 3; Norway 1.
Other:				
Ores and concentrates	30	1	NA	NA.
Base metals including alloys, all forms	11	20	(2)	Mainly from Republic of South Africa.
NONMETALS				
Abrasive, n.e.s.:				
Natural: Corundum, emery, pumice, etc	27	3	NA	Italy 2.
Grinding and polishing wheels and stones	23	28	1	West Germany 8; Sweden 5; France 3.
Barite and witherite	68	127	--	West Germany 117; Denmark 10.
Cement	2,958	7,456	5	Denmark 7,230; Belgium-Luxembourg 200.
Chalk	363	321	NA	Norway 106; France 81; United Kingdom 80.
Clays, crude	332	348	18	United Kingdom 156; Netherlands 102.
Cryolite and chiolite	50	2,406	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$41	$32	NA	Belgium-Luxembourg $23; West Germany $5.
Industrial stones do	$2	$8	--	Mainly from Belgium-Luxembourg.
Fertilizer materials: Manufactured:				
Ammonia	2,930	3,168	NA	Norway 3,157; Netherlands 9.
Nitrogenous	1,832	2,691	NA	United Kingdom 2,500; West Germany 100.
Phosphatic	1,692	1,809	--	All from Sweden.
Potassic	9,029	11,033	NA	East Germany 11,032.
Unspecified and mixed	30,333	31,035	2	Norway 18,000; Netherlands 10,344.
Gypsum and plaster	3,747	8,183	NA	Sweden 8,142; Denmark 12.
Lime	781	516	NA	United Kingdom 378; West Germany 114.
Pigments, mineral: Iron oxides and hydroxides, processed	17	29	--	Denmark 15; Spain 8; United Kingdom 3.
Salt and brine	69,699	80,733	NA	Spain 74,030; West Germany 3,492.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	1,463	1,126	NA	East Germany 700; West Germany 242.
Sulfate, manufactured	82	91	--	West Germany 70; Denmark 16.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	116	111	1	China 29; Denmark 29; Italy 25.
Worked	279	172	NA	Italy 122; West Germany 28.
Dolomite, chiefly refractory-grade	179	289	--	Norway 202; Sweden 87.
Quartz and quartzite	80,802	86,207	20	Norway 83,380; Spain 2,731; Denmark 53.
Sand other than metal-bearing	4,618	238	1	United Kingdom 94; Netherlands 65; Belgium-Luxembourg 48.
Sulfur:				
Elemental:				
Crude including native and byproduct	72	50	--	All from Denmark.
Colloidal, precipitated, sublimed	1	(2)	--	Do.
Dioxide	28	--		
Sulfuric acid	353	353	NA	Norway 301; Denmark 32.
Talc, steatite, soapstone, pyrophyllite	111	105	NA	Norway 91; United Kingdom 10.

See footnotes at end of table.

Table 3.—Iceland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3	5	NA	Denmark 2.
Carbon: Carbon black	6	1	NA	Mainly from Denmark.
Coal:				
Anthracite	24,516	32,551	16,338	United Kingdom 10,108; Belgium-Luxembourg 4,306.
Bituminous	111	5,006	--	United Kingdom 5,004; Denmark 2.
Coke and semicoke	23,817	31,686	--	Norway 20,862; United Kingdom 10,795.
Peat including briquets and litter	62	114	--	Sweden 87; Finland 21.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	10,208	12,911	--	Netherlands 12,876.
Gasoline do	896,310	817,258	(2)	U.S.S.R. 576,920; Portugal 219,805.
Mineral jelly and wax do	2,495	3,282	8	United Kingdom 2,152; West Germany 937.
Kerosine and jet fuel do	439,619	375,015	16	Netherlands 312,875; Belgium-Luxembourg 62,062.
Distillate fuel oil do	1,520,423	1,429,515	--	U.S.S.R. 998,096; Netherlands 244,158; Portugal 187,261.
Lubricants do	75,173	44,849	462	Netherlands 13,195; United Kingdom 12,915.
Residual fuel oil do	942,004	920,212	--	All from U.S.S.R.
Bitumen and other residues do	70,514	44,317	3,642	United Kingdom 40,487.
Bituminous mixtures do	2,230	19,053	61	United Kingdom 17,986.

NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Aluminum production at Icelandic Aluminum Co. Ltd.'s (ISAL) Straumsvik reduction plant increased 8% to about 82,000 tons. The plant utilized approximately 37% of Iceland's electrical energy. Negotiations continued without final settlement on the power rates charged to Swiss Aluminium Ltd. by the Icelandic Government for aluminum production. However, both sides had apparently agreed to base the rates on world aluminum prices. A formula for taxes to be paid by ISAL was also apparently agreed upon. The Government continued to encourage foreign investment in further expansion of the plant as well as in establishing a new plant in the north of Iceland.

Ferrosilicon.—The Icelandic Alloys Ltd. plant at Grundartangi operated at full capacity during the entire year and utilized approximately 14% of Iceland's electrical energy. Output was a record high 55,000 tons of material, calculated as containing 75% silicon. The firm experienced its first prosperous year, mainly because of high world market prices for ferrosilicon. Sumitomo Corp. of Tokyo, Japan, bought a 15% share of the firm from Elkem A/S. This reduced Elkem's share to 30% with the Icelandic Government holding the remainder. Sumitomo also agreed to take 20,000 tons per year of the product. Markets were being sought for byproduct silica powder taken from the dust collection system. Sementsverksmidja Rikisins procured 7,000 tons of this material in 1984 and utilized it as an effective inhibitor against alkali reactions in concrete.

The Government was seeking a foreign investor for a 25,000-ton-per-year silicon metal plant to be located in Reydarfjordur in eastern Iceland. Conceptual proposals were approved in June. Talks were being conducted with potential foreign partners.

Iron and Steel.—The project for Iceland's first steel mill, near Reykjavik, was delayed somewhat because of slowness in relocating the bar rolling mill from Sweden. However, installation began and mill operation was expected in 1985 using billets supplied by Sweden's Halmstads Järnverks AB, which had acquired 18% of the operating company, Icelandic Steel Co. Tenders were being accepted to construct a melting and billet plant to supply the mill. The billet plant was scheduled to be operational in 1986 using iron from scrapped ships. The 25,000-ton-per-year plant was to initially manufacture reinforcing bars, about one-half of which was expected to be used in domestic construction.

NONMETALS

Pumice.—Beneficiation of domestic pumice from the Hecla volcano began on a commercial scale in July by Eldberg Ltd., a new company owned jointly by Jardefnaidnadur (51%) and a West German consortium (49%). Use of Icelandic pumice in construction had been limited by its up to 10% content of basalt and soil. After a trial delivery of 8,000 tons to the Federal Republic of Germany, the company decided to produce about 100,000 tons per year of beneficiated pumice for use in building block and wall coatings. In addition to the safe West German market, a significant domestic market was anticipated. Eldberg also hoped to introduce the product into the United Kingdom where pumice had apparently never been used as a construction material.

More than 45,000 tons of as-mined pumice from the Hecla volcano had been exported in 1983.

Salt.—Production of a coarse salt byproduct was demonstrated by evaporating spent brine used to generate geothermal energy at the Svartsengi power station near Reykjavik. R.C. Ltd., mainly Government-owned, planned to begin salt production in 1984 at a rate of 8,000 tons per year. The product had been proven to be suitable for salt-fish production. By continuing the evaporation, other recoverable minerals were, for each 100 tons of salt, 10 tons of potash, 3 tons of bromine, and 25 tons of calcium chloride. A second stage 50,000-ton-per-year plant was envisaged.

MINERAL FUELS

Iceland's installed electrical generating capacity was approximately 900 megawatts; of this, 83% was hydroelectric, 4% was geothermal, and the remainder was oil-fired standby and peaking plants. In 1983, approximately 54% of the electrical power was consumed by power-intensive industries including aluminum, ferrosilicon, and fertilizer, in which hydrogen for ammonia production was made by aqueous electrolysis. About 80% of all space heating was with geothermal steam or hot water. Geothermal steam was also used for drying diatomite. Total energy consumed in 1983 was the equivalent of 1.8 million tons of oil; of this, approximately 45% was hydroelectric, 28% was geothermal, 25% was from imported oil for the fishing fleet and a number of vital industries, and the remaining 2% was from imported coal.

Geothermal Energy.—A 60-megawatt geothermal electrical generation station was reportedly under construction at Krafla in northern Iceland.

Hydroelectric Power.—Estimated potential hydroelectric energy in Iceland was 30,000 gigawatt hours per year, and only about one-tenth of this was harnessed. A new 150-megawatt plant on the river Blanda in the north of Iceland was under construction and expected to come on-line in 1988; it would increase available hydroelectric power by 20%. Foreign investment was being sought for four additional plants.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from new Icelandic krona (IKr) to U.S. dollars at the rate of IKr31.74=US$1.00.

The Mineral Industry of India

By Gordon L. Kinney[1]

India, the second most populous country in the world, was a major producer of a number of minerals and a major consumer of even more. Barite, cement, chromite, coal, iron ore, limestone, manganese, mica, mineral sands, and nitrogen fertilizer were all produced in significant amounts by world standards. A considerable amount of aluminum, copper, lead, and zinc were produced, but sizable imports of these metals were also needed to meet demand.

The industrial index of mineral production climbed in the first quarter of the year, dropped during the monsoon season, and climbed again at the return of good weather. Every month showed an increase over the same month of 1983, which was the same as the monthly relationship of 1983 and 1982. Overall, production rose an average of 10% over that of 1983. Metallic ore production was not as high but still showed an increase over that of 1983 in all but one month.

India's seventh 5-year plan, fiscal year (FY) 1985-89,[2] projected an economic annual growth continuing at 5%. It called for a total capital investment of $270 billion,[3] and emphasized irrigation, power generation, and oil and gas exploration and development.

The Oil and Natural Gas Commission (ONGC) was expected to get an outlay of about $15 billion, 2-1/2 times the amount for the sixth 5-year plan period. The intention was to increase crude oil output to 100 million tons by the year 2000. Three objectives were envisaged for ONGC by the Government: to achieve self-sufficiency in petroleum exploration, in oil technology, and in oil-related services and equipment production. In keeping with the plan, ONGC would permit Indian companies to enter into joint ventures with foreign oil companies and undertake contract drilling both onshore and offshore.

Chronic electric power shortages and stoppages have hindered the overall growth of the economy for a number of years. The mining and mineral processing industry has been particularly hard hit by these shortages by the very nature of their need for continuous operation. Solidification of hot metal because of a power failure causes damage to the furnace or ladle that is far more costly than the immediate metal production loss. Cement, fertilizer, petroleum, and petrochemical industries all suffer unique and expensive damage when the power stops. During 1984, 10 States were hit by major shortages. Bihar was the most affected with a 44% shortage. The normally power-surplus State of Kerala ended the year with a deficiency of 12%. It was difficult to estimate the damage of power disruptions to the economy, and the mineral industry in particular. A report by the Indian Federation of Chambers of Commerce estimated a loss of at least $16 billion in the last 3 years. In addition, a number of mining or mineral processing projects were probably not initiated in the knowledge that adequate electric power would not be available.

Both the central and State governments have been building new capacity at an impressive rate, adding an average of 10,000 megawatts in each of the last two 5-year planning periods. Demand, however, continued to grow at a similar or faster rate. The seventh 5-year plan called for an increase of 30,600 megawatts at a cost of $57 billion. Budgetary restraints, however, already have cut planned expenditures to $38 billion and a capacity increase of only 22,000 megawatts, only marginally more than the sixth plan (FY 1980-84) increase.

In an effort to utilize Indian resources more efficiently and to install additional power capacity quickly, the Government has made an important policy change. Utilization of natural gas for power generation was approved. The policy has been that natural gas could only be used for fertilizers, petrochemicals, and liquefied petroleum gas (LPG). However, offshore natural gas reserves have risen to the point where it was considered that their use for power generation would not deprive other industries of feedstock. The decision was made in part because nearly one-half of the current gas production has been flared for lack of a market. The Department of Power plans to set up gas turbine-powered generators at Kawas in Gujarat (580 megawatts), Sawai Madhopur in Rajasthan (375 megawatts), and Auriya in Uttar Pradesh (580 megawatts).

The Indian Bureau of Mines (IBM) has been preparing a series of comprehensive mineral maps for specific commodities. It planned to complete maps for bauxite, iron, and manganese during FY 1984. In preparation or scheduled were maps for fluorite, limestone, magnesite, and steatite. The IBM also planned to study the geology of small mines, which do not yet have surveys. Almost 80% of the working mines need such studies in order to proceed with exploration and development.[4]

Government organizations have been conducting basic mineral exploration in various parts of the country. The Geological Survey of India (GSI) has been evaluating gold prospects in several States, including Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, and along the Himalayan foothills. The Atomic Mineral Division of the Atomic Energy Department has been surveying for uranium in Nagaland, Meghalaya, and in the West Kameng District of Arunachal Pradesh. Other areas of Arunachal Pradesh will come under a GSI program for basic geological mapping and mineral investigation. Only 33% of Arunachal Pradesh has been geologically mapped where GSI has found clays, coal, dolomite, graphite, limestone, and marble.

The Government awarded a contract to a Canadian firm for airborne natural resource surveys and processing of the resulting data. The main equipment will be a DHC-6 Twin Otter aircraft with a multisensor airborne geophysical system. In addition, Indian technical personnel will be trained to operate and maintain the aircraft and equipment.

PRODUCTION

The mineral industry had a generally good year, increasing production 10% over the 1983 output. Several sectors that did better than average were aluminum, barite, cement, copper, and gypsum. Production of coal, natural gas, and oil continued to increase. The value of hydrocarbon production increased an estimated 11% over that of 1983, and represented over 90% of the total mineral industry value. Metals and nonmetals were about equal in value and accounted for less than 5% each of the mineral value. The increased production of aluminum and copper was a result of improved power supplies, some from newly installed on-site captive powerplants.

Currently, natural gas is underused and mostly flared. However, natural gas utilization was expected to increase dramatically during the seventh plan period as fertilizer, petrochemical, and gas-turbine electric powerplants come on-line.

Coal production reached a record high, which was a 7% increase over the previous record high of 1983. Dispatches, however, were 119 million tons resulting in pithead stocks of more than 30 million tons at the end of FY 1984.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Bauxite, gross weight ____ thousand tons__	1,785	1,923	1,854	1,923	1,994
Alumina, gross weight[e] ____ do____	500	500	500	450	560
Metal, primary	184,838	212,844	216,679	203,559	268,520
Cadmium metal	89	113	131	131	[e]120
Chromium: Chromite, gross weight	319,538	334,681	339,196	422,000	435,000
Copper:					
Mine output, metal content	27,600	25,200	24,000	37,774	44,132
Metal:					
Smelter	28,489	25,743	32,585	[3]35,469	37,001
Refined (cathode, not including secondary)	[r]24,564	[r]24,036	[r]25,632	28,368	32,580
Gold metal, smelter ____ troy ounces__	78,834	79,875	71,935	70,158	65,234
Iron and steel:					
Iron ore and concentrate:					
Gross weight ____ thousand tons__	41,936	41,354	40,902	38,800	41,026
Iron content ____ do____	26,252	25,888	25,605	24,289	25,682
Metal:					
Pig iron ____ do____	8,493	9,474	9,600	9,086	9,382
Ferroalloys:					
Ferrochromium	[r]16,494	[r]31,905	40,244	31,119	[e]40,000
Ferromanganese	[r]158,303	[r]205,571	150,707	125,594	[e]125,000
Ferrosilicochromium	[r]4,050	[r]4,339	[e]4,000	11	[e]100
Ferrosilicon	[r]54,319	[r]60,354	36,060	41,187	[e]40,000
Other	535	9,074	[e]14,000	[e]11,000	[e]10,000
Steel, crude:					
Steel ingots ____ thousand tons__	9,358	10,300	10,628	10,216	[e]10,261
Steel castings ____ do____	[e]65	[e]80	87	89	[e]86
Total ____ do____	[e]9,423	[e]10,380	10,715	10,305	[e]10,347
Semimanufactures[3] ____ do____	[e]6,740	6,600	[4]6,565	[4]6,511	[4]6,967
Lead:					
Mine output, metal content	12,720	15,320	16,640	25,700	24,839
Metal, refined:					
Primary	14,846	14,325	14,413	14,960	15,246
Secondary	10,732	11,081	8,780	6,596	[e]10,000
Total	25,578	25,406	23,193	21,556	[e]25,246
Manganese ore and concentrate, gross weight thousand tons__	1,692	1,526	1,448	1,320	1,081
Rare-earth metals: Monazite concentrate, gross weight[e]	3,395	3,704	4,000	4,000	4,000
Selenium ____ kilograms__	4,148	4,104	5,351	3,684	[e]4,000
Silver, mine and smelter output thousand troy ounces__	366	555	463	469	862
Titanium concentrates, gross weight:					
Ilmenite	[3]167,900	162,514	[r] [3]152,938	[3]134,476	[e]140,000
Rutile	[3]5,360	6,710	[r] [3]5,782	[3]5,500	[e]6,000
Tungsten, mine output, metal content	22	18	25	15	21
Zinc:					
Mine output, concentrate:					
Gross weight	46,489	52,876	52,839	77,594	92,968
Metal content	26,457	29,082	29,060	40,350	48,343
Metal:					
Primary	43,627	57,434	52,571	53,268	55,753
Secondary	234	[e]200	[e]200	[e]200	[e]200
Total	43,861	57,634	52,771	53,468	55,953
Zirconium concentrate: Zircon, gross weight	14,820	12,400	10,483	11,395	[e]12,000
NONMETALS					
Abrasives, natural, n.e.s.:					
Corundum, natural	1,454	1,292	1,355	714	[e]500
Garnet	3,742	3,176	5,429	3,349	[e]3,000
Jasper	4,117	3,356	2,139	5,418	[e]5,000
Asbestos	31,253	24,515	26,761	24,873	25,450
Barite	434,015	353,362	325,368	323,000	446,000
Bromine, elemental	334	350	[e]350	[e]350	[e]350
Cement, hydraulic ____ thousand tons__	17,700	20,760	22,498	25,400	29,030
Chalk	87,142	85,309	87,057	91,146	[e]80,000
Clays:					
Ball clay	125,457	118,635	114,782	137,917	[e]135,000
Diaspore	5,504	6,099	5,802	6,361	[e]6,000
Fire clay	656,279	791,105	769,495	657,000	602,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Clays —Continued					
Kaolin:					
Direct salable, crude thousand tons	355	392	531	553	623
Processed do.	105	114	[e]100	[e]100	[e]100
Total do.	460	506	[e]631	[e]653	723
Other do.	80	80	[e]80	[e]80	[e]80
Diamond:					
Gem[e] thousand carats	12	14	11	12	13
Industrial[e] do.	2	2	2	2	2
Total do.	14	16	13	14	15
Feldspar	58,610	59,395	44,854	41,837	[e]45,000
Fluorspar:					
Concentrates:					
Acid-grade	12,349	13,346	12,407	[e]11,000	[e]12,000
Metallurgical-grade	4,809	5,374	5,710	4,590	[e]5,000
Total	17,158	18,720	18,117	[e]15,590	[e]17,000
Other fluorspar materials, graded	4,049	4,185	6,785	6,993	[e]7,000
Gem stones excluding diamond:					
Agate including chalcedony pebble	1,379	1,476	1,062	502	[e]1,000
Emerald, crude carats	6,600	1,000	--	--	--
Garnet kilograms	3,726	1,539	2,249	735	[e]2,000
Graphite[5]	[r]54,960	[r]72,796	52,376	39,567	[e]40,000
Gypsum	866,228	947,663	970,365	1,039,000	1,378,000
Kyanite and related materials:					
Andalusite	--	146	536	2,573	[e]2,000
Kyanite	46,522	38,283	33,951	38,307	37,024
Sillimanite	12,987	10,254	13,066	7,928	13,377
Lime[e]	400,000	400,000	400,000	400,000	500,000
Magnesite	380,113	453,410	407,071	434,072	403,000
Mica:[6]					
Exports:					
Block	788	1,184	[e]1,100	[r e]1,100	[e]1,100
Film and book for M cuttings	328	348	[e]200	[r e]200	[e]200
Splittings	1,636	3,313	[e]4,000	[r e]3,000	[e]3,000
Scrap	7,077	6,475	[e]8,000	[r e]7,000	[e]7,000
Powder	14,005	11,646	[e]5,000	[r e]4,000	[e]4,000
Manufactured	1,752	420	[e]300	[r e]500	[e]500
Total	25,586	23,386	[e]18,600	[r e]15,800	[e]15,800
Domestic use, all forms[e]	3,000	3,000	3,000	3,000	3,000
Total mica	28,586	26,386	[e]21,600	[r e]18,800	[e]18,800
Nitrogen: N content of ammonia[3] thousand tons	2,221	3,193	3,469	3,560	3,900
Phosphate rock including apatite	540,932	561,944	559,986	687,907	892,000
Pigments, mineral, natural: Ocher	86,198	79,631	84,789	88,633	[e]90,000
Pyrites, gross weight	83,806	57,598	55,853	63,621	44,238
Salt:					
Rock salt thousand tons	5	4	4	4	5
Other do.	8,004	8,928	7,308	7,008	7,725
Total do.	8,009	8,932	7,312	7,012	7,730
Sodium carbonate	524,644	613,000	586,800	744,329	[e]720,000
Stone, sand and gravel:[7]					
Calcite	24,028	21,167	19,101	[e]20,000	[e]20,000
Dolomite thousand tons	1,887	1,955	2,133	2,264	2,277
Limestone do.	28,215	30,873	33,462	36,965	45,483
Quartz and quartzite do.	240	282	332	[e]300	[e]300
Sand:					
Calcareous do.	772	685	669	598	570
Other do.	1,532	[e]1,400	1,254	1,018	[e]1,200
Slate	11,406	9,187	4,770	3,461	[e]5,000
Sulfur:					
Content of pyrites	33,522	23,039	22,341	25,448	17,695
Byproduct:					
From metallurgical plants[e]	115,000	92,000	100,000	110,000	115,000
From oil refineries	5,065	4,170	5,189	3,906	[e]5,000
Total[e]	153,587	119,209	127,530	139,354	137,695

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Talc and related materials:					
Pyrophyllite	34,102	38,420	43,602	59,042	[e]60,000
Steatite (soapstone)	335,455	329,149	300,338	294,000	[e]300,000
Vermiculite	3,428	3,624	2,068	2,411	[e]2,500
Wollastonite	5,788	15,940	20,725	16,557	[e]20,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous thousand tons	114,010	124,900	128,225	136,261	145,800
Lignite do	4,548	5,500	6,675	7,342	7,500
Total do	118,558	130,400	134,900	143,603	153,300
Coke:[e]					
Coke oven and beehive do	12,000	12,000	12,000	12,000	12,000
Gashouse do	100	100	100	100	100
Other, soft do	50	50	50	50	50
Total do	12,150	12,150	12,150	12,150	12,150
Gas, natural:					
Gross million cubic feet	82,530	[3]136,067	140,000	210,550	[e]211,000
Marketable[8] do	50,661	[3]75,820	85,180	100,860	114,420
Petroleum:					
Crude thousand 42-gallon barrels	75,672	116,712	149,811	184,440	204,943
Refinery products:					
Gasoline do	12,393	22,691	NA	27,100	[e]26,000
Kerosine and jet fuel do	18,440	22,529	NA	27,900	[e]27,000
Distillate fuel oil do	60,680	74,555	NA	87,200	[e]84,000
Residual fuel oil do	41,845	46,307	NA	53,600	[e]51,000
Lubricants do		2,849	NA	3,200	[e]3,000
Other do	[e]57,642	42,176	NA	43,600	[e]42,000
Refinery fuel and losses do		13,594	NA	20,200	[e]19,000
Total do	[e]191,000	224,701	[e]240,000	262,800	[e]252,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 10, 1985.
[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 metric tons of uranium ore containing about 3 metric tons of U_3O_8 was reported from two mines, which was only a part of total national production. Reported production of sand and gravel and stone 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]Excludes production from steel miniplants.
[5]India marketable production is 10% to 20% of mine production.
[6]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: 1980—12,355; 1981—12,729; 1982—12,961; 1983—7,364; and 1984—7,171.
[7]Partial figures; for details, see footnote 2.
[8]Includes reinjected gas.

TRADE

The foreign trade deficit dropped from $5.7 billion to $4.3 billion for a 25% improvement over that of 1983. The improvement was due mainly to the 3.5-million-ton increase in crude oil production, which in turn allowed a corresponding decline in net petroleum imports. India's main export commodity by value was cut diamonds, obtained by importing the rough stones. Iron ore continued to be a major export item but has been decreasing because of the world economic situation and because of a controversy over higher ore handling and other charges at the export docks. Both problems were settled or improved by yearend.

The only important proposal in the central Government budget concerning the mineral sector related to the abolition of export duties on chrome, iron and manganese ores, manganese dioxide, sillimanite, kyanite, and some types of mica. The policy was to be effective in March 1985 and was designed to promote exports of these minerals.

Table 2.—India: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981: United States	Destinations, 1981: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	131,587	118,718	--	Saudi Arabia 60,952; United Arab Emirates 50,236; U.S.S.R. 5,555.
Oxides and hydroxides	1,202	428	--	Kenya 336; Republic of Korea 34.
Metal including alloys, all forms	4,962	25,267	56	Sri Lanka 10,246; Malaysia 9,577; U.S.S.R. 1,894.
Antimony: Ore and concentrate	812	--		
Chromium: Ore and concentrate	129,981	75,075	--	Japan 59,500; China 15,575.
Cobalt: Oxides and hydroxides	38	70	--	France 30; Kuwait 11.
Copper:				
Ore and concentrate	11,011	--		
Metal including alloys, all forms	2,205	528	(2)	Bangladesh 339; United Kingdom 46.
Iron and steel:				
Iron ore and concentrate including roasted pyrite -- thousand tons	25,210	19,477	--	Japan 12,619; Romania 3,123; Republic of Korea 2,050.
Metal:				
Scrap	1,675	20,221	--	Japan 17,278; Saudi Arabia 2,037.
Pig iron, cast iron, related materials	1,936	1,818	603	Australia 458; Thailand 276.
Ferroalloys	12,261	4,178	--	Qatar 3,000; Oman 1,107.
Steel, primary forms	7,675	2,091	--	Nepal 1,823; U.S.S.R. 157; Japan 62.
Semimanufactures:				
Bars, rods, angles, shapes, sections	29,267	6,802	938	Egypt 2,444; Bangladesh 686; Iran 678.
Universals, plates, sheets	7,473	436	--	Egypt 167; Nepal 111; Kuwait 56.
Hoop and strip	20	34	--	U.S.S.R. 13; Iran 9; Iraq 6.
Rails and accessories	652	978	17	Iraq 330; Sudan 281; Bangladesh 137.
Wire	16,242	3,884	14	Bahrain 1,009; Iraq 611; Iran 565.
Tubes, pipes, fittings	104,232	103,844	9,802	Saudi Arabia 26,201; Iran 11,471; Iraq 7,008.
Castings and forgings, rough	6,381	8,103	4,856	Canada 836; Saudi Arabia 725; Egypt 393.
Manganese:				
Ore and concentrate	568,424	421,028	--	Japan 322,889; Republic of Korea 41,700; Czechoslovakia 16,500.
Oxides	673	203	--	Sri Lanka 175.
Titanium: Oxides	238	102	54	Kenya 42.
Zinc:				
Oxides	250	143	66	Iraq 50; Sri Lanka 27.
Metal including alloys, all forms	297	387	1	Sri Lanka 364.
Other: Ores and concentrates	1,321	10	10	
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,065	2,641	10	Japan 2,370.
Artificial: Corundum	47	68	--	All to Republic of Korea.
Grinding and polishing wheels and stones	3,462	43,381	19	Saudi Arabia 39,240; China 1,034; Thailand 794.
Barite and witherite	341,348	135,590	29,219	Mexico 41,334; United Arab Emirates 31,070; Iraq 12,000.
Cement	32,413	1,151	--	Nepal 1,076.
Chalk	1,024	153	--	Kuwait 50; Bahrain 25; Oman 21.
Clays, crude	20,547	21,060	9	Kenya 5,669; Saudi Arabia 4,637; United Arab Emirates 3,586.
Diamond: Gem, not set or strung thousand carats	(3)	3,042	896	Belgium-Luxembourg 585; Hong Kong 359; Japan 325.
Feldspar	182,272	17,303	--	Singapore 4,691; Malaysia 4,675; Bangladesh 1,861.
Fertilizer materials: Manufactured, nitrogenous	10,208	--		
Graphite, natural	3,476	3,491	455	Japan 966; China 612; United Kingdom 569.
Gypsum and plaster	9,223	4,583	--	Sri Lanka 2,435; Nepal 1,200.
Kyanite and related materials	NA	645	--	All to Japan.

See footnotes at end of table.

Table 2.—India: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Destinations, 1981: United States	Destinations, 1981: Other (principal)
NONMETALS —Continued				
Magnesium compounds: Magnesite	6,788	2,065	79	United Kingdom 903; Sri Lanka 350; West Germany 200.
Mica:				
Crude including splittings and waste	11,551	11,695	2,806	Japan 3,337; East Germany 1,184; Czechoslovakia 816.
Worked including agglomerated splittings	15,755	12,065	620	West Germany 1,983; Japan 1,713; Poland 1,193.
Pigments, mineral: Natural, crude	371	--		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$38,100	$19,432	$4,394	Hong Kong $2,034; Italy $1,846; West Germany $1,585.
Synthetic do	$457	$719	$205	Italy $115; United Kingdom $84; Thailand $75.
Salt and brine	47,363	61,833	--	Nepal 36,406; Kenya 14,160; Bangladesh 8,807.
Sodium compounds, n.e.s.: Sulfate, manufactured	6,742	50	--	All to Malaysia.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	341,928	365,727	566	Japan 133,571; Bangladesh 69,753; Italy 55,333.
Worked	13,550	4,955	1	United Arab Emirates 3,191; Netherlands 707.
Dolomite, chiefly refractory-grade	8,151	5,503	--	Bangladesh 3,530; Qatar 845; United Arab Emirates 439.
Gravel and crushed rock	30,761	6,218	--	Kuwait 3,690; United Arab Emirates 1,879.
Limestone other than dimension	194,966	205,075	--	Bangladesh 179,968; Malaysia 8,838; Singapore 5,683.
Quartz and quartzite	16,092	38,004	--	Japan 37,249.
Sand other than metal-bearing	4,229	10,363	--	United Kingdom 8,999; Pakistan 784.
Talc, steatite, soapstone, pyrophyllite	11,087	8,150	56	Kenya 2,955; Bangladesh 998; Norway 920.
Vermiculite	3,117	62	--	China 50; Japan 10.
Other: Crude	1,180	1,985	3	Netherlands 500; Republic of Korea 271; West Germany 232.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	122	2	--	All to United Arab Emirates.
Carbon: Carbon black	659	330	--	Sri Lanka 300.
Coal: All grades including briquets	113,877	142,910	--	Bangladesh 104,757; Nepal 38,153.
Coke and semicoke	2,302	--		
Petroleum refinery products:				
Gasoline 42-gallon barrels	NA	486,753	NA	NA.
Kerosine and jet fuel do	NA	540,973	NA	NA.
Distillate fuel oil do	813,998	41,328	NA	NA.
Unspecified do	25,256	--		

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $535,069,000.

Table 3.—India: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981: United States	Sources, 1981: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	NA	22,615	20,757	Singapore 461; Australia 390.
Unwrought	86,535	30,241	15,146	United Arab Emirates 6,316; Netherlands 4,416; Egypt 2,002.
Semimanufactures	22,072	20,395	4,581	Hong Kong 5,671; Venezuela 5,662; Spain 1,309.

See footnotes at end of table.

Table 3.—India: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981: United States	Sources, 1981: Other (principal)
METALS —Continued				
Antimony: Oxides	[2]45	98	1	United Kingdom 69; West Germany 19.
Arsenic: Oxides and acids	[2]171	318	--	France 255; United Kingdom 48.
Cobalt: Oxides and hydroxides	[2]750	1,679	3	Netherlands 1,000; Belgium-Luxembourg 525.
Copper:				
Ore and concentrate	7,364	16,613	9,708	Philippines 6,905.
Metal including alloys:				
Scrap	[2]31,767	39,367	12,433	Singapore 8,941; Kuwait 4,378; United Arab Emirates 3,544.
Unwrought	45,047	48,983	288	Zambia 20,508; Tanzania 18,549; Zaire 2,453.
Semimanufactures	5,659	15,693	1,038	France 3,603; Japan 3,148; United Kingdom 2,230.
Iron and steel: Metal:				
Scrap	112,605	519,918	226,677	United Kingdom 161,997; Netherlands 66,636.
Pig iron, cast iron, related materials	1,817	120,155	10,331	China 43,157; Indonesia 28,270; Pakistan 20,331.
Ferroalloys	7,593	8,160	31	United Kingdom 5,145; Singapore 620; France 404.
Steel, primary forms	170,031	168,612	1,629	West Germany 67,756; China 36,943; United Kingdom 15,126.
Semimanufactures:				
Bars, rods, angles, shapes, sections	346,672	518,323	10,323	Japan 144,103; United Kingdom 84,735; Republic of Korea 82,206.
Universals, plates, sheets	801,189	1,725,743	83,440	West Germany 362,484; Spain 209,765; Japan 204,394.
Hoop and strip	16,936	14,532	463	West Germany 4,641; Japan 2,970; Belgium-Luxembourg 2,352.
Rails and accessories	25,872	19,883	8	Austria 5,442; West Germany 4,199; Belgium-Luxembourg 3,753.
Wire	4,440	9,089	191	Belgium-Luxembourg 2,946; Japan 1,559; Italy 1,091.
Tubes, pipes, fittings	85,681	97,336	1,184	Japan 49,971; West Germany 16,373; France 5,328.
Castings and forgings, rough	1,653	2,450	15	Japan 1,037; West Germany 951; United Kingdom 257.
Lead: Metal including alloys:				
Scrap	[2]2,736	5,806	549	United Arab Emirates 1,972; Kuwait 973; Australia 725.
Unwrought	19,518	18,336	102	Australia 16,180; West Germany 1,248.
Semimanufactures	238	46	NA	Australia 41.
Manganese:				
Ore and concentrate, battery-grade	11,444	3,790	--	Singapore 2,930; Japan 760.
Oxides	[2]482	731	--	Belgium-Luxembourg 389; Japan 203; United Kingdom 80.
Mercury .... 76-pound flasks	[2]8,697	9,552	1,001	Finland 2,901; Netherlands 1,918; China 1,751.
Molybdenum: Ore and concentrate	[2]163	172	28	Japan 43; Netherlands 29; Switzerland 25.
Nickel: Metal including alloys:				
Scrap	[2]1,647	2,870	85	West Germany 619; Netherlands 532; Belgium-Luxembourg 326.
Unwrought	2,225	6,720	175	Canada 1,561; United Kingdom 1,501; Australia 659.
Semimanufactures	1,864	1,411	37	United Kingdom 381; Spain 300; Australia 141.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	[2]12,392	8,406	54	United Kingdom 4,577; U.S.S.R. 3,009.
Rare-earth metals including alloys, all forms .... kilograms	[2]5,080	1,118	368	Japan 750.
Selenium, elemental	[2]15	26	([3])	Japan 19; United Kingdom 2.
Silicon, high-purity	[2]672	1,351	5	France 535; Norway 431; China 160.

See footnotes at end of table.

Table 3.—India: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981: United States	Sources, 1981: Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings[4] value, thousands	NA	$92	$22	Bahrain $70.
Metal including alloys, unwrought and partly wrought troy ounces	(5)	18,494	580	West Germany 8,848; East Germany 8,038; United Kingdom 1,000.
Tin:				
Oxides	[2]13	11	--	Japan 8; West Germany 1; United Kingdom 1.
Metal including alloys:				
Scrap	[2]1,366	2,649	398	United Kingdom 1,046; Belgium-Luxembourg 846.
Unwrought	1,546	2,351	--	Malaysia 2,050; Singapore 300.
Semimanufactures	25	5	--	West Germany 4.
Titanium: Oxides	[2]5,425	9,397	1,576	United Kingdom 4,295; Australia 966; Japan 876.
Tungsten: Ore and concentrate	[2]376	446	--	Switzerland 153; Canada 96; Thailand 85.
Zinc:				
Ore and concentrate	40,845	--		
Metal including alloys:				
Scrap	[2]4,115	3,371	1,936	Australia 572; Singapore 270; Belgium-Luxembourg 263.
Unwrought	51,882	59,806	46	Zaire 9,324; Zambia 8,704; Canada 8,487.
Semimanufactures	1,234	227	35	West Germany 77; Netherlands 49; Japan 34.
Other:				
Ores and concentrates	712	147	--	Belgium-Luxembourg 73; West Germany 15; United Kingdom 14.
Oxides and hydroxides	[2]848	2,338	518	West Germany 603; Belgium-Luxembourg 288; Japan 237.
Ashes and residues	[2]3,938	8,792	3,256	Australia 3,296; Kenya 725.
NONMETALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones including diamond kilograms	[2]191	426	138	U.S.S.R. 94; United Kingdom 76.
Grinding and polishing wheels and stones	439	231	36	West Germany 53; Japan 37.
Asbestos, crude	54,590	42,779	1,381	Canada 21,191; U.S.S.R. 11,541; Republic of South Africa 3,086.
Boron materials:				
Crude natural borates	[2]2,713	3,477	377	Turkey 3,100.
Oxides and acids kilograms	[2]9,560	3,511	406	Japan 3,105.
Bromine	[2]20	466	--	Israel 318; United Kingdom 80.
Cement	1,728,067	880,523	43,735	Republic of Korea 468,859; North Korea 221,967; Indonesia 71,391.
Clays, crude	[2]5,380	824	121	United Kingdom 475; West Germany 174.
Diamond:				
Gem, not set or strung value, thousands	$513,852	$515,812	$5,990	Belgium-Luxembourg $277,922; United Kingdom $182,285; Switzerland $33,663.
Industrial stones do	$969	$834	$108	United Kingdom $355; Belgium-Luxembourg $281.
Feldspar, fluorspar, related materials	[2]5,279	272	--	Thailand 240; United Kingdom 26.
Fertilizer materials: Manufactured:				
Ammonia	[2]111,772	173,298	(3)	Kuwait 98,893; Qatar 66,367.
Nitrogenous	1,959,460	1,494,962	233,262	Netherlands 330,640; Qatar 152,040.
Phosphatic	186,342	201,570	182,791	Jordan 18,779.
Potassic	813,605	792,173	31,315	West Germany 367,497; Canada 302,914; East Germany 57,593.
Unspecified and mixed	492,046	236,378	157,912	Canada 48,234; West Germany 19,636; U.S.S.R. 10,500.
Graphite, natural	[2]132	219	(3)	Japan 172; West Germany 37.
Iodine	[2]159	115	(3)	Japan 88; Belgium-Luxembourg 23.

See footnotes at end of table.

Table 3.—India: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	Sources, 1981 United States	Sources, 1981 Other (principal)
NONMETALS —Continued				
Magnesium compounds: Magnesite	[2]22,752	1,303	3	Austria 515; Republic of Korea 308; Czechoslovakia 200.
Mica: Worked including agglomerated splittings	[2]58	14	(3)	West Germany 5; United Kingdom 5; Switzerland 3.
Phosphates, crude	[2]844,764	975,257	152,729	Jordan 433,252; Morocco 288,711; Senegal 53,027.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$13,113	$16,406	$3,990	United Kingdom $4,044; Switzerland $3,073.
Synthetic do	$605	$352	$86	France $92; Switzerland $76.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	[2]93,477	102,857	42	Bulgaria 61,728; Romania 29,871.
Sulfate, manufactured	[2]141	973	--	China 764; Belgium-Luxembourg 105; Singapore 96.
Sulfur: Elemental, crude including native and byproduct	676,604	592,261	147,441	Canada 134,887; Israel 109,363; Mexico 74,311.
Other:				
Crude	[2]838	8,203	18	Republic of Korea 4,986; Turkey 3,000.
Slag and dross, not metal-bearing	[2]5,353	78,569	17,289	United Kingdom 60,431.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	[2]10,070	5,032	158	Singapore 4,800.
Carbon: Carbon black	[2]5,685	17,559	1,928	Australia 8,911; China 2,468; Thailand 2,517.
Coal: All grades including briquets	391,482	176,252	29,881	Australia 107,104; Canada 38,213.
Petroleum:				
Crude thousand 42-gallon barrels	118,702	114,734	--	Iran 44,993; Saudi Arabia 21,062; United Arab Emirates 13,911.
Refinery products:				
Liquefied petroleum gas value, thousands	$2,637	$2,313	$8	Saudi Arabia $2,305.
Gasoline thousand 42-gallon barrels	2	2,341	NA	NA.
Kerosine and jet fuel do	41	34,223	NA	NA.
Distillate fuel oil do	9	7,656	NA	NA.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Quantity represents 11 months' data.
[3]Less than 1/2 unit.
[4]May include other precious metals.
[5]Unreported quantity valued at $121,000.

COMMODITY REVIEW

METALS

Bauxite, Alumina, and Aluminum.—During the last few years, the Indian aluminum industry has suffered production problems owing basically to the continual shortages and frequently unannounced power outages. During 1984, captive powerplants were being allowed by the Government for major power-intensive industries such as the aluminum industry, whose production suffered because of inadequate power. Hindustan Aluminium Co. Ltd. (HINDALCO) had just completed installation of enough captive capacity to meet 90% of its power requirements. A captive 270-megawatt thermal powerplant was under construction for Bharat Aluminium Co. (BALCO), which was expected to be completed in 3 years. National Aluminium Co. Ltd. (NALCO) was installing total captive power as part of its original design. These measures should go a long way toward ensuring uninterrupted power supplies and thereby improving smelter utilization. During 1984, the power situation improved, allowing a substantial increase in aluminum production over that of 1983.

India's 362,000-ton-per-year smelter capacity will be increased considerably when

NALCO's 218,000-ton-per-year smelter comes on-line. This plant could put India into a position of aluminum self-sufficiency. In view of the present consumption pattern, production could outstrip demand for a few years. There was, however, considerable scope for expanding the use of aluminum in India. The producers were aware of the situation and were making efforts to broaden and diversify the usage of aluminum in the country.

The NALCO project is reportedly going to be the seventh largest aluminum plant in the world when it is completed. Construction advanced well during the year but the generally slower than expected progress since 1980 has led to an increase in overall cost from $1.6 billion in 1980 to an estimated $1.9 billion in 1984 dollars. The increase represents a near doubling in terms of rupee costs. The cost increase was due to a rise in prices, change in scope of work, higher customs duties, and increased interest costs on the outstanding loans. The time delays in the project were caused primarily by problems in translating basic engineering specifications from French into workable detailed specifications for the local contractor. In addition, the project was delayed by problems in land acquisition, labor unrest, and relocation of displaced persons.

Nearest to completion of the NALCO complex was the 2.4-million-ton-per-year Panchpatmalli bauxite mine, which will incorporate several firsts for equipment usage in the Indian mining industry. Among them are vacuum suction drilling for faster penetration, more precise sampling, and lower operating costs; 700-horsepower-class bulldozers for ripping overburden; steel chain beadless tires on front-end loaders to reduce tire costs and increase vehicle capabilities; first use of an ANFO truck for onsite explosives mixing and substantially reduced blasting cost; use of articulated rear-dump trucks on steep grades and slippery ground; a double roll-toothed crusher as primary breaker to save energy; and a cable belt conveyor system to transport bauxite 15 kilometers from the mine to the alumina plant.

The public sector BALCO complex at Korba in Madhya Pradesh operated at nearly rated capacity during the year because full electric power was available from the State Electricity Board for the first time. BALCO produced 167,000 tons of alumina and 87,000 tons of aluminum in FY 1984, both of which were company record highs. Although this generated a cash surplus for the year, prospects of sustaining the profit in FY 1985 were poor. There were cost increases for domestic fuel, electric power, production supplies, and Government taxes, which, when combined with the low Government-set selling price, will make it difficult for the company to continue in the black in FY 1985.

HINDALCO embarked on a $85 million plan for modernization and expansion over the next 3 years. The modernization included updating the power and steam generation efficiency, thereby reducing total energy costs by 15%. The expansion is designed to bring aluminum production up to 150,000 tons per year by 1986. By that time, the ongoing expansion of the alumina plant to 300,000 tons per year should also be completed. The company also planned to increase its captive power by at least 70 megawatts in addition to the units installed in 1983.

HINDALCO's 33,000-ton-per-year caustic soda plant, constructed jointly with Bihar State Industrial Development and Investment Corp. (IDCOL) of Orissa Ltd., commenced production in September. Its 7,000-ton-per-year aluminum fluoride facility, built in collaboration with Tamil Nadu Industrial Development Corp., was scheduled for completion by yearend 1985.

The fate of the proposed Andhra Pradesh alumina complex in Vishakhapatnam continued to be uncertain. The complex originally envisaged to have a capacity of 600,000 tons per year was subsequently revised to 800,000 tons per year. However, major problems for the proposed complex were financing and the prospect of a bleak export market for alumina and bauxite. Based on the status at yearend of the aluminum industry, including the ongoing projects, it appeared that the Soviet-assisted Andhra Pradesh alumina complex was likely to be delayed further.

Chromite.—Orissa Mining Corp. (OMC) was near completion of its 50,000-ton-per-year charge chrome plant at yearend. There was a slight delay in construction when the furnace transformer was damaged and had to be sent back to Stromberg, Finland, for repairs. Commissioning and production startup were rescheduled for March 1985. The plant is in Bamnipol, Keonjhar District of Orissa, and will operate under the name of OMC Alloys Ltd.

Indian Metals and Ferro Alloys Ltd. (IMFA) was building a second export-oriented, 50,000-ton-per-year charge chrome plant that was to be managed as a separate subsidiary, Indian Charge Chrome Ltd. (ICC). The $30 million plant, being put up with assistance from Elkem A/S of Norway, will be at Choudhar, Cuttack District, Orissa. ICC placed a $100 million order with a Swedish firm for a coal-fired thermal power station. Two 54-megawatt turbogenerating units, as well as ancillary equipment, were to be installed and should render the plant independent of Orissa's chronic power problems. Earlier plans called for a 180-megawatt plant. Any surplus power would be fed back to the Orissa power grid.

Ferro Alloys Corp. Ltd. in Balasore District, Orissa, commissioned a new chromium ore concentration plant. The plant was built at its Boula Mine, which adjoins the ferrochromium production plant. The facility was designed to produce 30,000 tons per year of 50% chromium oxide (Cr_2O_3) concentrate from 20% Cr_2O_3 feedstock by gravity separation.

Copper.—The Government-owned Hindustan Copper Ltd. (HCL), the country's only copper producer, currently supplies about one-half of the nation's copper needs—the remainder being imported. This condition was likely to change in future years as continuing exploration added to the copper reserves in the country. The Singhbhum copper belt in southern Bihar currently has five underground mines, but the results of continued exploration beyond the mines indicate a potential for additional commercial deposits in the area. The major hope for significantly increasing copper production, however, came from continued exploration of the Malanjkhand deposit in Madhya Pradesh. Although the surface mine opened in late 1982, exploration drilling has delineated much higher reserves. The most recent estimates put reserves at 790 million tons grading 0.83% copper at a 0.20% copper cutoff. Ore values reportedly were continuing below 580 meters, the depth at which the drilling stopped.

As a result of larger copper reserves, HCL was considering options for its expansion program. Planned increases in the Khetri smelter and refining capacity have been put on hold. Instead, the possibility of adding a smelter and refinery at Malanjkhand was being considered by HCL. A foreign consultant has recommended that HCL consider expansion of the mine production to 14 million tons per year from the present 2 million tons per year and construction of a smelter and refinery to produce 100,000 tons per year of copper. One strong argument for a new smelter was that Malanjkhand's concentrate was being trucked 900 kilometers across India to the Khetri smelter for processing. The high shipping cost would be eliminated if a smelter was built at Malanjkhand. Funding of either project was questionable under present economic conditions.

The Khetri complex has suffered serious production losses over the years because of chronic electric power shortages. In an attempt to solve the problem, HCL has ordered two 10-megawatt gas turbine-powered generator sets from Sweden. The new units would bring captive power at Khetri to 46 megawatts and should meet the full power requirements of the complex. Installation was to be completed by yearend 1985.

HCL installed the world's first electronic ore sorting system for copper at its Khetri complex. The complex was faced with a choice of increasing the concentrator capacity or not using all of the ore the mine could produce. HCL opted for a less expensive shortcut—a highly sophisticated ore sorter supplied by RTZ Ore Sorters Pty. Ltd. of Australia. The sorter takes secondary ore crusher feed of minus 150-millimeter to plus 65-millimeter size. Two streams of ore are deposited on a belt where the conductivity and magnetic properties of the lumps are assessed and relayed to an electronic processor. The lumps pass an optical system that measures their size and position on the belt. The electronic and optical data are then evaluated to determine the grade of each lump. The processor then activates an airblast manifold to deflect the low-grade lumps directly to waste. The system can handle 2,000 tons of ore per day and eliminates an average of 25% of the original feed material.[5]

Ore reserves at the Dariba Mine in Alwar District of Rajasthan were nearing depletion. Dariba has operated at a loss in the past few years. A detailed underground drilling program was begun in 1980 and continued into 1984. By 1983, however, the marginal ore shoots indicated by former surface boreholes had been extended upward from the 320-meter-level drifts. Several sizable ore shoots were mapped, and new reserves of 257,000 tons of 2.2%-grade copper ore were blocked out. Development of the new reserves, referred to as the "Nalla ore block," was expected to extend the life of the mine by 6 to 8 years.[6]

Gold.—Gold was produced in India exclusively in the public sector by the central Government's Bharat Gold Mines Ltd. (BGML) and the Karnataka State government's Hutti Gold Mines Co. Ltd. In addition, a small quantity was recovered as a byproduct in the HCL smelter operations.

India was a major world consumer of gold, used mostly in jewelry. Its production, however, has been small and generally declining since 1971. The problem was one of declining ore grade and increasing costs because of the great depths involved. Since 1880, the ore grade has gone from over 40 grams per ton to an average of 3.4 grams per ton. The output per miner-year has fallen to 80 grams, compared with about 1,150 grams for the average South African miner under similar mining conditions. BGML incurred a loss of $8.5 million in FY 1984, the highest since its nationalization.

In order to increase gold production, BGML was reopening the Yeppamana Mine in the old Ramagiri goldfields in the Anatapur District of Andhra Pradesh. Construction began in November 1981, and trial runs of the mine and mill began in early 1984. The relatively small operation was designed for an ore capacity of 250 tons per day and an annual gold output of just under 300 kilograms.

GSI, Mineral Exploration Corp. (MEC), and BGML have discovered economic gold deposits in the Chigargunta-Mallappakonda area about 30 kilometers south of the Kolar goldfields (KGF). Three blocks have been delineated with an aggregate total of at least 1 million tons of ore grading over 4.3 grams per ton within 200 meters of the surface. Initial mine studies by MEC indicated a startup production of 210 kilograms of gold per year, increasing to 280 kilograms by 1987. Ore would be treated at KGF's mill to utilize spare capacity.

In a further effort to increase overall production, BGML called in a U.S. consultant to develop heap leaching technology for recovering gold from millions of tons of old mill tailings at KGF. It was determined that the yearly treatment of 1 million tons of tailings would yield 500 kilograms of gold. A semicommercial-scale pilot plant was to be set up to determine technical parameters for a large-scale operation. In addition to gold, some of the tailings contain scheelite. The possibility of extracting tungsten from tailings with the highest values was also being studied.

Surveys conducted by the GSI in the Siwalik Belt in Uttar Pradesh and Himachal Pradesh and the States of Punjab, Haryana, and Jammu and Kashmir have indicated some potentially economic placer gold deposits. Terraces along the Markanda and Triokpur Rivers yield spot sampling of up to 1.6 grams of gold per ton. Bulk samples analyzing 0.1 to 0.8 gram per ton were tested in Raigarh District of Madhya Pradesh. Auriferous gravels in the Nilambur Valley of Kerala were being examined for exploitation as well.[7]

Iron and Steel.—The Government-owned Steel Authority of India Ltd. (SAIL) showed a much improved performance during FY 1984. This was achieved mainly through a revival of steel demand, improved inventory management and product mix, and higher capacity utilization owing to fewer electric power outages. SAIL also was able to reduce an unsold inventory of 740,000 tons of steel to a normal average of 100,000 tons by yearend. During the fiscal year, SAIL raised steel prices an average 15% in June 1984 and an additional 15% in February 1985. The first increase helped to drop the huge losses that the public sector steel plants have incurred in recent years to a more manageable level. The second price increase was not in force long enough to affect the industry during the fiscal year. SAIL justified two price increases because of rising raw materials costs. Other problems affecting the industry were the low quality of coking coal and the continuing electric power shortages. SAIL lost 227,000 tons of steel output in April-June 1984 because of power problems. Several steel mills were compensating for the power shortages by installing captive power facilities.

The Indian press made an issue of SAIL's performance during recent years. It was stated that SAIL made a small profit in FY 1984 after a loss of at least $220 million in FY 1983. The press, however, was quick to point out that the central Government had permitted an interest holiday on the steel plant's formidable debts. Also, a favorable rate of depreciation was allowed for Indian steel plants. If the current interest payments had been enforced, the loss reportedly would have been $140 million.

Indian steel development policy called for increasing the present 12.2-million-ton-per-year steel capacity through a combination of modernization of existing and construction of additional plants. Although the sixth 5-year plan (1980-85) envisaged a capacity of 18 million tons in 1985, the actual capacity was unlikely to exceed 14 million tons.

Faced with financial shortages, the Government was according priority for modernization over construction of new plants. In addition, a lower growth in demand for steel than anticipated has lessened the urgency for building additional plants. The expansion and modernization of the Bhilai and Bokaro plants are near completion.

At Bhilai, trial runs of the continuous slab caster began in July 1984 and the oxygen converter shop was beginning to operate smoothly after a several month break-in period. The 3,600 millimeter plate mill, showpiece of the project, was completed in February and was operating satisfactorily. Initial capacity was 950,000 tons per year of high-quality plate, which can be increased to 1.2 million tons when needed.[8] The continuous bloom caster was nearing completion at yearend and scheduled for hot trials in February 1985. In addition, ironmaking and coking facilities were under construction at Bhilai. The overall expansion project was about 2 years behind the original schedule and more than 50% over budget.

Expansion of the Bokaro plant was nearing completion. The fourth blast furnace was completed and operating, and the fifth was scheduled for startup in April 1985, about 9 months behind the current schedule. The second melting shop comprises two 300-ton oxygen converters with a combined capacity of 1.5 million tons per year. The converters were completed in late 1983 and began trial runs early in the year, bringing total raw steel capacity at Bokaro to over 4 million tons per year. In the rolling mill, the new five-stand-tandem, 800,000-ton-per-year, cold-rolling mill was under construction and scheduled for startup in 1986. The sophisticated new mill was designed to roll to a finish thickness of 0.15 millimeter, far thinner than the 0.40-millimeter thickness of the present four-stand mill.[9] In order to mitigate chronic electric power shortages, both Bokara and Bhilai were authorized to install captive power facilities at a cost of $200 million each.

The modernization plan for Durgapur steel mill was cleared by the Public Investment Board during the year. In phase I, updating facilities to be undertaken at the raw material stage included modifications to iron ore beneficiation, improvement in coal washing, augmenting sinter capacity, and updating the blast furnace and steel melting operations. In phase II, an additional blast furnace is to be added. Construction of a captive thermal power station, having two 60-megawatt generators and independent of the mill's modernization plan, was well under way.

The Rourkela steel mill has been the most innovative mill of the Indian steel industry since its construction in 1959. A $140 million silicon steel shop was completed at the plant in 1984. The new facility produced the first domestic cold-rolled grain-oriented and nonoriented specialty steels. The plant will displace about 50,000 tons per year of formerly imported steel. Rourkela also began rolling stainless steel ingots produced at Alloy Steel Plant (ASP) in Durgapur. The unit also began initial Indian production of clad stainless steel sheet and coils. These new products will allow a considerable savings in foreign exchange. Captive power was being installed at Rourkela, which suffered approximately $86 million in lost production from 34 power failures in 1984.

The 3.4-million-ton-per-year Vishakhapatnam steel plant was experiencing both lengthy construction delays and large cost overruns. The plant and infrastructure was originally planned in 1980 to cost $3.3 billion and to begin first-phase operation of 1.2 million tons per year in 1985. Costs have risen steadily on the heavily Soviet-aided project, mainly because the Government did not fund the project at an optimal level. The latest estimates now put the cost at $6.8 billion in 1984 dollars with first-stage completion not before early 1988. Second-stage completion has been put back to 1991. In order to speed up construction, the Indian Planning Commission recommended a 1984 outlay of $680 million, but the Ministry of Finance only allocated $340 million. Continued underfunding of the construction can only lead to additional cost increases. Some steel executives and Government officials reportedly claim that even at 90% utilization capacity the plant could still run large financial losses when or if it is completed. By yearend, the Indian press speculated that the best solution for the Government to minimize its losses would be to abandon the project.

Salem Steel Ltd.'s cold-rolling mill began receiving limited quantities of hot-rolled stainless steel coil from the Rourkela plant. Salem had been completely dependent on high-cost imports, which included an average of 100% ad valorem duty. The 32,000-ton-per-year-capacity plant has been producing only about 7,000 tons per year because of customer resistance to the price. The customs duty was reduced by one-half at midyear to encourage sales. Domestic coil will not be fully available until 1986.

At Durgapur, ASP was in the middle of a second-stage expansion and updating program. The ladle refining units were to have been completed during the year, but labor problems reportedly have delayed completion to late 1985. The delays have increased the program cost from $58 million to $85 million.

Two States joined fifteen other States that have operating steel minimills or electric arc furnace-based steel mills. Assam Ispat Ltd. began trial production of its 18,000-ton-per-year mill in Amingaon, Assam. Because of its remote location, the plant enjoys 3 to 5 years of concessional power rates, sales, income, and other tax reductions.

Orissa's first miniplant is to come on-line early in 1985 at Gundechapada in Dhenkanal District. It too will have a capacity of 18,000 tons of mild steel ingots. The company has been named Ipisteel Ltd. and was a joint promotion of the Industrial Promotion and Investment Corp. of Orissa and Trident Steel and Industries Partnership.

SAIL and the Public Investment Board have given approval for an iron ore washing plant at Gua Mine in Bihar and a sintering plant at Burnpur. The captive mine of the Indian Iron and Steel Co. (IISCO) over the years has accumulated the world's largest pile of iron ore fines—more than 25 million tons. The Government decided that the pollution problem caused by the fines during monsoon rains had to be stopped. About 1 million tons of new fines are added to the pile each year. The $150 million project was awaiting Union Finance Ministry approval.

Construction of an ore fines handling plant began in February at the Bailadila No. 5 Mine. The plant was to have a 2-million-ton-per-year capacity. About one-half of the fines generated in the mine were being dumped as waste. Construction of a new crushing plant at the Bailadila No. 14 Mine was also started at the same time.

India's scarcity of good coking coal has led to extensive research on methods of steelmaking without coke. In addition, the many steel minimills were faced with a shortage of good melting scrap. The ongoing research on direct-reduction technology has led to several small-scale plants using different technologies.

Orissa Sponge Iron Ltd. began commercial operation of its 150,000-ton-per-year plant in April 1984 at Tangareni, Orissa. Completion of the plant was nearly 1 year late because of severe power shortages. The plant uses a mixture of 80% noncoking coal and 20% petroleum fuels in a process developed by Allis-Chalmers Corp.

The expansion project of Sponge Iron India Ltd. (SIIL), which would double the capacity to 60,000 tons per year, was expected to be completed by yearend 1984. The expansion work was being handled by SIIL's engineering staff. The SIIL plant, which was built for the Government of India (GOI) and the Andhra Pradesh government with United Nations Development Program assistance, has been operating at over 90% of design capacity. Combinations of various raw materials and coal have been tested for Indian and foreign clientel. The consumption of coal has been reduced from 1.9 tons to 1.2 tons per ton of sponge iron produced.[10]

A new private-public company called Ipitata Sponge Iron Ltd. was established to build and operate a sponge iron plant in Keonjhar District of Orissa. Tata Iron and Steel Co. Ltd. (TISCO) and Industrial Promotion and Investment of Orissa were promoting the project. The 90,000-ton-per-year plant was based on TISCO's patented noncoking coal rotary kiln process and scheduled for completion in late 1985.

The Kudremukh iron ore project continued to have problems during 1984. The plant ran at a fraction of rated capacity and supplied modest amounts of concentrate to countries on a test basis. Romania received most of the output as part payment for its aid in erecting the Mangalore pellet plant. The Arab Iron and Steel Co.'s pellet plant in Bahrain was completed at yearend, and Kudremukh received a contract to supply 250,000 tons of concentrate. Czechoslovakia and the Netherlands also have received modest amounts of ore. Negotiations were also under way for sales to France, Japan, and the United Kingdom.

The 3-million-ton-per-year Mangalore pellet plant was scheduled for completion this year but fell behind plans. It was rescheduled for commissioning in mid-1985.

Lead and Zinc.—The Indian demand for lead and zinc, which has been rising 5% per year, far exceeds domestic production. In its long-term plan to increase domestic production, the Government has decided to develop a lead-zinc mine and smelter complex based on the Rampura-Agucha deposit in

Bhilwara District of Rajasthan. Although this was in the sixth 5-year plan (1980-85), financial constraints compelled the Government to defer its implementation. In order to curtail imports, the Secretaries Committee recently approved the project in principle based on commercial borrowing of approximately $525 million. Hindustan Zinc Ltd. (HZL), the Government-owned lead and zinc company, was expected to build the 70,000-ton zinc and 35,000-ton lead smelters at Chanderiya, Chittorgarh District, Rajasthan. A captive powerplant with three 30-megawatt generators was to be included because of chronic power shortages. Metallurgical and Engineering Consultants (India) Ltd. has completed a feasibility report for the project. Total resources at the deposit were set at over 60 million tons with average grades of 13.9% zinc and 1.57% lead. The surface mine would produce and concentrate 2,500 tons per day of ore.

HZL signed an agreement with Cominco Binani Zinc Co. (CBZ) at Binanipuram in Kerala for engineering consultancy work for development and modernization of the CBZ smelter. The program was to add a roaster from Lurgi Corp. of the Federal Republic of Germany, upgrade efficiency of the plant, and increase capacity from 17,000 to 20,000 tons per year. The award of the contract to HZL was significant because it was the first time that HZL had entered into outside consultancy for smelting processes although the company had been doing its own engineering designs for some time.

Completion of these two projects would raise Indian smelter capacity from 92,000 to 165,000 tons per year. Notwithstanding these developments, India would still have to rely on imports to meet the anticipated growth in demand.

In another development, expansion of the Debari smelter and lead residue treatment plant was completed. The smelter capacity was increased from 45,000 to 49,000 tons per year.

Efforts by GSI to locate new reserves continued. Deposits at Siddeswar Kalan, Rajasthan, and Gorabuttan in West Bengal were being explored in detail. The old Ambamata mixed sulfide deposit in Banaskantha District of Gujarat was being reexamined for possible development. A mining lease has been acquired by Gujarat Mineral Development Corp. The 8-million-ton deposit contains relatively good values of lead, zinc, copper, and silver, but the minerals are very fine grained, which may make it difficult to separate economically.

Manganese.—Manganese Ore India Ltd. (MOIL) received a favorable feasibility report, commissioned in 1982, for its proposed 400,000-ton-per-year beneficiation-agglomeration plant. This and the planned 60,000-ton-per-year ferromanganese plant would use the stockpiled and newly generated fines to improve product recovery and quality. Present demand, both domestic and export, is for lump ore only.

In view of the sluggish market for ferromanganese, MOIL was not hurrying to start these projects. It was, however, more seriously considering a 2,500-ton-per-year electrolytic manganese dioxide and a 1,000-ton-per-year electrolytic manganese metal plant. MOIL reportedly was seeking assistance from Kerr-McGee Chemical Corp. of the United States to use its chemical process.

MOIL's other programs included deepening of the Holmes shaft of its Balaghat Mine in Madhya Pradesh, redesigning its Ukwa Mine, and replacing and updating worn-out equipment.[11]

Tungsten.—India's production of tungsten has amounted to only a few dozen tons each year from manual mining of a narrow vein deposit at Degana, in the Nagaur District, Rajasthan. Rajasthan Tungsten Ltd., a State-owned enterprise, was reportedly formed to explore and develop the Oegana deposit. The IBM was to assist with resource calculations and the feasibility study. The main problems were believed to be narrow veins and the very fine-grained occurrence of the wolframite.

Recently, new deposits have been located in Rajasthan at Balda and Devaka-Bera in the Sirohi District. GSI and MEC were conducting exploratory mining to assess the grade and extent of the deposits.

Possible economic deposits of tungsten minerals were reported in the Almora, Chamoli, and Kumaon areas of Uttar Pradesh in the Himalayan foothills. The deposits could be the biggest in the country according to an Uttar Pradesh government geologic report.

In the KGF District, Hutti Gold Mines was considering the potential for recovering scheelite contained in its gold mill tailings. The tailings contain between 0.1% and 0.2% WO_3. Test work was being carried out in the Federal Republic of Germany and by the IBM on the recovery of the scheelite by gravity or flotation to yield a marketable product.[12]

Other Metals.—IDCOL reportedly decided to setup India's first ferronickel plant at Jaipur Road in Cuttack District. IDCOL owns a ferrochrome plant at Jaipur Road and proposed using one of its slag furnaces with suitable modification to produce 4,000 tons of ferronickel per year. The location is near the Sukinda nickel deposit, which contains most of India's known nickel resources. The plant would presumably start operations with imported nickel concentrate. The Sukinda's nickel laterite deposit had been studied for years in an effort to develop an economical process for recovering nickel. Tests to develop an economical process in an experimental Indian-designed pilot plant were unsuccessful.

A molybdenum occurrence was found at Yegavakote in Kolar District, Karnataka, in 1984. The State's Mines and Geology Department reported preliminary analysis of samples grading 0.5% molybdenum. The Department was to undertake a drilling operation to determine the extent of the deposit. There were no molybdenum mines in India.

NONMETALS

Cement.—Installed capacity of the cement industry continued to increase at a rapid rate. About 7 million tons of capacity was added in 1984 in the form of new kilns or by updating existing plants. By the end of the sixth plan (March 1985), capacity was to reach 44 million tons per year. Another 18 million tons of capacity was planned for the seventh plan, much of which was already under construction.[13]

The increase in capacity and production was proving to have some negative as well as obvious positive effects. The increased availability lowered the uncontrolled retail price of the nonlevy cement, leading to lower profits, just as costs of coal and electric power have risen steeply. The cement plant owners had counted on generating money for expansions but profits were doubtful for many. Cement industry representatives contended that the controlled selling price of levy cement was well below the cost of production at many plants.

Several other problems hampered further increases in the output of cement: the chronic electric power shortage, the availability and quality of the coal received for firing the kilns, and the transportation of the coal to the plants. Because of the trend toward higher capacity kilns, shortages of coal or of electric power can cause a complete and costly shutdown. In the past, cement plants could operate at part capacity as each had several kilns of relatively small capacity; with giant one-kiln plants, a supply cutoff shuts down the entire plant. Some of the larger plants have dealt with the power situation by installing captive generating capacity.

The first 100-ton-per-day cement miniplant based on vertical shaft kiln technology, developed by the Regional Research Laboratory at Jorhat, began commercial production in June 1984 at Rajkot, Gujarat. The quality of cement produced by these small plants met all the specifications of the Indian Standards Institute. Six of these plants, with an aggregate capacity of 300,000 tons per year had gone into production by yearend. The Government approved the building of 121 of these plants, often in areas remote from the big rotary-kiln plants or where transportation costs make the local plant more economical. Recent changes in Government regulations could affect the operation of these plants and the construction of the remaining ones. Changes in the freight rates for cement favor the more remote plants. However, employees in the cement miniplants were to be covered by the national wageboard pay scale, which reportedly would triple cement plant costs.

Fertilizer Materials.—Consumption of fertilizers in India has increased significantly during the last 10 years from 2.8 million tons in FY 1973 to 7.2 million tons in FY 1983. Indigenous production of fertilizers, however, totaled only 4.7 million tons in FY 1983. India was thus required to import about $1 billion worth of chemical fertilizer during FY 1983. In order to alleviate this large drain on foreign exchange, the Government began a program for increasing fertilizer capacity using indigenous raw materials. A number of fertilizer plants, which were to utilize natural gas from the offshore Bombay High gasfields, were under construction or in the late planning and design stage. Of particular significance were the six gas-based ammonia-urea plants, which were to be linked by a 1,700-kilometer gas pipeline from Hazira, near Surate, north of Bombay, northward to about 200 kilometers east of New Delhi.

The locations of the six plants, selected by the Government were Bijaipur, near Guna in Madhya Pradesh; Sawai Madhopur in Rajasthan; and Jagdispur, Aonia, Shahjahanpur, and Babrala in Uttar Pradesh. All plants were to have the same capacity—1,350 tons per day of ammonia and 2,200 tons per day of urea. Furthest along was the Bijaipur plant, started in May 1984, which was to be run by National Fertilizers Ltd. The project cost was estimated at $540 million, much of which was being financed by the International Development Association of the International Bank for Reconstruction and Development (World Bank). Also helping with financing were a Japanese lending agency and the Indian Government. The Indian Government was to hold 50% equity in the Bijaipur plant. Local importers and private firms were to put up the remainder of the capital. The Jagdishpur project, the second plant to be built, was to be a joint venture between Pradeshik Industrial Investment Corp. of Uttar Pradesh and Gulf Consolidated Co. for Services and Industries (GCCSI) of Bahrain. Its cornerstone was laid in October, but the awarding of some contracts was delayed several months reportedly because of problems in obtaining financing from the Indian Government for its 60% equity in this plant. The Aonia project was owned by the Indian Farmers Fertilizer Cooperative Ltd. Contracts were signed for this plant late in the year and construction was to begin in the spring of 1985. The other three projects appeared to be falling behind schedule, mostly because of paperwork and selection of the builders and operators of the projects. The six new plants were to be in major fertilizer consuming areas because of much easier and cheaper transportation of the finished fertilizer. Putting the plants on the coast near Bombay and the gasfield would have put an unacceptable strain on the already crowded transportation system. At yearend, the pipeline that was to serve the plants had not been started.

One naphtha- and three gas-based ammonia-urea plants, unrelated to the six plants above, were under construction during the year. The first phase of Rashtriya Chemicals and Fertilizers Ltd.'s complex at Thal Vaishet in Maharashtra started trial production in October. Commissioning of the plant, which has a capacity of 2,700 tons per day of ammonia and 3,000 tons per day of urea, was scheduled for early 1985. Krishak Bharati Cooperative's plant at Hazira, near Surat, Gujarat, was to be completed by yearend but was rescheduled for a June 1985 startup. It is comprised of two 1,350-ton-per-day ammonia units and four 1,100-ton-per-day urea plants. The Hindustan Fertilizer Corp. Ltd. in Namrup, Assam, was expected to complete a second expansion project in mid-1985 consisting of a 600-ton-per-day ammonia unit and a 1,200-ton-per-day urea plant. This project was originally scheduled to be completed in late 1984. Transportation bottlenecks were the cause for the delay. The Namrup complex has installed a 15-megawatt captive power station to alleviate serious power shortages that affected production since 1981. The fourth plant was the Nagarjuna plant at Kakinada, Andhra Pradesh. It was designed for a capacity of 900 tons per day of ammonia and 1,500 tons per day of urea. Its status was uncertain at yearend.

The phosphate rock, mobile beneficiation pilot plant installed at Jhamarkotra has operated successfully since a full rubber lining was added to resist the hard silicious rock. Use of this plant was helping to develop a suitable flowsheet for a 5,000-ton-per-day beneficiation plant at Jhamarkotra. The results have shown that further development could take place at the numerous very small deposits of rock phosphate that are scattered around India. These deposits were already being used on a small scale as a local source of direct application fertilizer where acid soils can break down the poorly water-soluble phosphate. A mobile plant could be used to greatly increase the utilization of the local resources in a practical and highly beneficial manner.[14]

Gem Stones.—India's diamond exports hit a record $1 billion in FY 1983. During FY 1984, the rate of exports remained about the same as that of FY 1983. Rough diamonds, generally the smaller sizes, are imported, cut, and polished on a small scale by thousands of artisans. The world supply of rough diamonds has been increasing rapidly, and there was concern in the Indian market of an oversupply.

India's first diamond bourse was scheduled to open in Bombay by yearend. To be known as Bharat Diamond Bourse, it will serve as the main center of trade activity where exporters can display their products to the foreign buyers. Minerals and Metals Trading Corp. was instrumental in organizing and setting up the bourse, which will consolidate the diamond trade in Bombay. In past years, the diamond cutting industry has been centered in Gujarat.

India's only sapphire mine at Paddar in the Doda District of the State of Jammu and Kashmir may be reopened after a 7-year closing. A new company was formed comprising the State-owned Jammu and Kashmir Minerals Ltd. and the Indian Government-owned National Mineral Development Corp. The deposit was discovered in 1881 and has been worked intermittently since then. The deposit is in rugged terrain and is closed in the winter months. The gem stone occurrence is described as "erratic," making exploitation difficult and highly speculative.

Mica.—Mica mining was one of the few major Indian mineral commodities predominantly in the private sector. The Indian mica mining and trade was mainly an export-oriented industry, with less than 25% of production consumed domestically. To protect the interests of the small miner and to extend its control on this important mineral, the GOI regulated mica trade through its Mica Trading Corp. of India Ltd. (MITCO). MITCO shared with the private sector all exports of crude and processed mica on a 50-50 basis. Its main objectives were to promote exports of processed mica, improve export realization, ensure fair returns to the labor force, and to organize and undertake the fabrication and manufacture of mica products. Apart from routing exports through MITCO, the Government has set minimum export prices for various types of mica.

The volume of mica exports declined in FY 1983, but at the same time, the export earnings from mica rose 17% to $24.8 million. The higher export earnings were attributed to increased imports by the U.S.S.R., which purchased mostly high-priced and high-quality mica. The country-wide port strike in March and April 1984 caused the loss of about $2 million in additional mica sales.

In addition to processed mica, India exports considerable quantities of fabricated and manufactured mica. Very successful marketing efforts by MITCO and the private exporters have doubled the earnings between FY 1979 and FY 1983.

In-line with the Government policy and to take advantage of the market for mica products, MITCO set up a facility for the production of 4,000 tons per year of micronized mica powder and another plant for the manufacture of silvered mica and mica capacitors. In addition, it was setting up a plant for the manufacture of mica paper with an annual capacity of 1,200 tons to be produced by three units. Nippon Rika Kogyosho of Japan was assisting in the construction of a 600-ton-per-year and a 300-ton-per-year unit with an agreement for the Japanese side to buy 50% of the production of the two units. The Government's Bharat Heavy Electrical Ltd. (BHEL) was to design and build the other 300-ton units. Although the first two units were to employ the mechanical disintegration process, the latter was to use the thermochemical process for which BHEL has already prepared a detailed project report. Other plants under consideration included a mica-paper-based products plant, a wet ground mica powder unit, and a glass-bonded mica facility, all of which will require imported technology. All of these projects were being built or planned at Abraknagar in Bihar and were scheduled for commissioning in 1985 against the original schedule of 1984.

MITCO has also initiated a research project to assess the suitability of green mica scrap of Andhra Pradesh for the manufacture of mica paper. The preference world-over for the proven ruby mica scrap of Bihar origin has adversely affected the export of Andhra Pradesh's green mica scrap. The success of the project should benefit the Andhra Pradesh mica industry, which produced mainly the green-quality mica.[15]

Mineral Sands.—Two new deposits of titanium-rich beach sands have been identified. The first, in the Thanjavur District of the State of Tamil Nadu, extended more than 12 kilometers along the Cauvery River delta between Sirkali and Kaveripattinam. Indian Rare Earths Ltd.'s (IREL) analysis suggested a higher content of ilmenite, zircon, monazite, and garnet than the deposit being worked by IREL at Manavalakurichi, 400 kilometers to the south. A detailed investigation was to be conducted to determine the reserves and study the deposition rate. The replenishment from wave action at Manavalakurichi is approximately 50,000 tons per year.[16]

The second deposit was found by the National Institute of Oceanography (NIO) during a survey off the Konkan coastal area of Maharashtra. The occurrence of onshore ilmenite placers along 200 kilometers of the coast had been known for many years. In 1983 and 1984 offshore exploration, NIO identified large reserves of ilmenite in 13 to 20 meters of water over a 436-square-kilometer area. Maharashtra mining officials estimated the reserves between Undi and Purnagad, a distance of 48 kilometers, at 4 million tons. The survey showed that the ilmenite placers were on the seafloor for the first 2 to 5 kilometers offshore then continue below a clay layer further offshore.

IREL's Orissa sand complex at Chatarpur made progress toward opening during the year. The long-delayed startup was rescheduled for mid-1985. The 2.8-million-ton-per-year dredge and wet concentrator plant was completed with Australian collaboration. The complex was designed to produce 200,000 tons per year of ilmenite, 10,000 tons of natural rutile, 4,000 tons of monazite, and 3,000 tons of zircon. In addition, 30,000 tons of byproduct sillimanite per year would double the country's production of that mineral.

The dryer section, electromagnetic sand separation plant, and acid regeneration plant were due to be completed in mid-1984. The major sections still to be completed were the rare-earths chemical plant and the 100,000-ton-per-year synthetic rutile plant.

Meanwhile, Kerala Minerals & Metals Ltd.'s 22,000-ton-per-year titanium dioxide pigment plant in Kerala was nearing completion. The $100 million project was set up in three stages: the synthetic rutile plant, the acid recovery plant, and the titanium dioxide pigment plant. Stages one and two were ready for commercial production during 1984, but the third stage was not expected to be completed until 1985.

Renovation began on the rare-earths plant of IREL at Alwaye, Kerala, and completion was scheduled for 1986.[17]

Stone and Clay.—Many of the active marble quarries in Rajasthan and several other States were threatened with closure by recent Government decisions affecting the operations of the industry. Marble mining employed 21,000 workers in more than 1,000 quarries in 1982 and had expected to increase employment to 32,000 by 1985. Output of finished stone more than doubled since 1982. The recent introduction of close-tolerance diamond gang-saws into the Indian marble industry has enabled a better quality stone to be produced at prices competitive with the world famous Italian polished marbles.

Several recent Government actions, however, have combined to jeopardize the profitability of the quarry and marble processing operations. First, late in 1983, the Rajasthan State government increased the royalty on marble mining from $2.67 to $9.70 per ton, cutting heavily into mine profits.

Secondly, the central Government has lifted the ban on imports of Italian marble. The Rajasthan Marble Processors Association (RMPA) wanted it reinstated because sales of its famous Makrana marble declined 40% since the ban was lifted. RMPA claimed that polished Italian marble pasted over with plaster was being brought into the country as raw marble slabs. Lastly, the central Government reportedly imposed an excise duty on processed marble blocks, slabs, and tiles. The rate was set at $4.24 to $5.08 per square meter. Nearly 70% of production was ordinary marble selling at $6.36 to $9.15 per square meter. The All-India Marble Processors Association claimed that the cost of the new tax would price marble beyond the reach of most of their regular customers. The Association claimed that nearly 200 of the marble quarries or processors have already closed.[18]

An export-oriented ceramic tile plant was being set up at Yenam near Kakinada in technical and financial collaboration with an Italian firm. Using a new technology for the first time in India, the clay-drying cycle was reduced to 45 minutes with a fuel savings of 40%. The $10 million plant was to be owned by Regency Ceramics Ltd. and have a capacity of 30,000 tons of finished tile per year.[19]

Sulfur.—India has no commercial native sulfur deposits. Sulfur was produced as a byproduct from sulfide ore, petroleum refining, and a small amount from roasting iron pyrite. A $5 million sulfur recovery plant was nearly completed at Hindustan Petroleum Corp.'s Chembur refinery. The hydrogen-sulfide-rich gases were expected to save about $190,000 per year in imported sulfur. Seven hydrogen sulfide oxidation plants have been ordered for the Hazira area north of Bombay. Each plant will be able to treat 5 million cubic meters per day of sour natural gas and recover 12.5 tons of elemental sulfur daily. The first three plants were to be installed immediately, while the installation of the remainder were to be spread over the next 2 years. The 32,000 tons of combined sulfur output per year would more than double India's current output from iron pyrite.[20]

MINERAL FUELS

Coal.—Coal production reached a record high in FY 1984, and output was 7% over that of FY 1983. Coal India Ltd. (CIL), the main Government-owned coal producer contributed 131 million tons. The remainder came from Singareni Collieries Co. Ltd. (SCCL) and the captive mines of two steel companies.

There was an encouraging increase in productivity as output per worker shift for CIL reached 0.82 ton. SCCL's rate increased also to 0.68 ton. During the year, the Government sanctioned the development of 12 new coal mines with a cumulative capacity of 14.8 million tons per year and a capital outlay of $370 million. In addition, 14 previously approved mines were nearing completion. The intention of the Government was to reach a production of 236 million tons by the end of the seventh plan period. About 100 million tons of this could be from far more efficient surface mines, compared with the present level of 65 million tons from surface mines.

In order to improve the quality of the coal going to the steel mills, a Government working group on coal recommended construction of 15 additional coal washers. This would raise the total number of washers to 39 and increase the raw coal input capacity from 33 million to over 60 million tons by the end of the seventh plan. To finance the production increases and the coal washers, the Department of Coal had proposed an investment of $9 billion during the plan period, several times the investment of the current period.

A change in transportation policy was proposed by the coal department and the railroads. The mines would deliver coal to central storage dumps in State capitals and major industrial centers from where the consumers would take delivery of the coal. It was believed that this proposal would eliminate most of the problem in the coal transport system. Direct linkages from the mines to the electric powerplants was to be retained.

Several projects were completed or begun in 1984. The 1.2-million-ton-per-year Nandan coal washer in Chhindwara District of Madhya Pradesh began trial runs in June. The plant was designed to reduce ash content below 17%, enabling it to supply clean coking coal to the Bhilai steel plant and middlings to the nearby powerplants.

Development of the huge $275 million Amlohri coal mine in the Singrauli Coalfield began in March. The project was receiving technical and financial aid from the United Kingdom. Coal production was to begin after removal of 50 million cubic meters of overburden. Initially, the mine was to supply 4 million tons per year of coal to the Rihand superthermal powerplant. The mine's ultimate capacity was to be 10 million tons per year, the quantity needed to operate the powerplant at its designed capacity of 3,000 megawatts. First-phase startup of both mine and powerplant was scheduled for 1986.[21]

The Soviet Union and India signed a protocol for cooperation in new coal projects in the seventh plan period. The new projects include a surface mine in Jharia Coalfield in Bihar with a capacity of 8.8 million tons of coking coal, the nearby Sitamala Mine with a capacity of 2.2 million tons of coking coal, and the Mohar Mine at the Singrauli Coalfield with an 11-million-ton-per-year capacity of powerplant coal.

Development of the 1.2-million-ton-per-year Satgram underground mine began at yearend. The mine was to be constructed with Polish technical assistance.

Petroleum and Natural Gas.—Oil and Natural Gas Commission (ONGC) and Oil India Ltd. (OIL) are the Government-owned companies responsible for oil exploration and production. Both accelerated their oil search and development efforts during the year. OIL in particular has expanded its once modest role of production of oil from the Assam fields to that of a full-fledged exploration company. The accent on exploration stemmed from the Government's continuing policy of increasing long-term domestic petroleum production and reducing expensive oil imports.

Crude oil production has risen impressively during the sixth 5-year plan period (FY 1980-84). The rate of increase, however, has slowed in the last few years, reflecting that no new large oilfields have been discovered since the Bombay High-area bonanza.

ONGC had three discoveries in 1984: a natural gas strike at the Bhimanpalli One well in the onshore section of the Krishna-Godavari Basin, an oil strike in the Gulf of Kutch near the Pakistan border, and an onshore oil strike near Cambay in Gujarat State. All of these will require additional evaluation to determine if they are commercially exploitable.

OIL had less luck in its exploration activity. Six wells were drilled in the offshore Mahanadi Basin, none of which showed evidence of hydrocarbons. OIL planned to continue its onshore search in Assam and its new concessions in the Thar desert of Rajasthan and onshore Mahanadi. It has also applied for an exploration license for an area north of the Brahmaputra River near Pasighat in Assam and for another near its present block in Arunachal Pradesh. OIL also plans to explore offshore around the Anadaman and Nicobar Islands in a tract previously held by ONGC.

ONGC planned a greatly increased exploration budget for the seventh plan period. It would concentrate on the Krishna-Godavari Basin offshore.

In addition to its own exploration work, the Indian Government was also considering allowing foreign firms to form joint ventures with private Indian companies.

OIL's production sector was planning to rehabilitate the Digboi Oilfield in Assam. The 95-year-old field, one of the oldest continuously producing fields in the world, needed to have most of its old equipment overhauled or replaced in order to continue operating. OIL was likely to seek technical assistance from the French for the project.[22]

India's refining capacity has kept up well with the increases in crude oil production during the last decade. Total refining capacity was 37.8 million tons with the opening of the Mathura Refinery in 1982. Continued expansion was to raise the capacity to 45.5 million tons by yearend 1984.

The Cochin refinery in Kerala was due to complete an expansion project in 1984 but an explosion and fire in March set the project back. The capacity was to be increased from 3.3 million to 4.5 million tons per year. Of more significance than the new capacity was the installation of fluid catalytic cracking (FCC) equipment, which enabled the use of Bombay High crude oil and increased the production of middle distillates.

The Visakhapatnam refinery was being expanded to 4.5 million tons per year in a first-stage expansion scheduled for mid-1985 completion. A second stage of construction was to include an FCC unit and liquefied petroleum gas production facilities. Refineries at Madras and Bombay were also being expanded and were to get FCC units as well. The long-planned Haldia refinery expansion, however, was shelved indefinitely.

GOI, through its newly formed Gas Authority of India Ltd., planned to build the country's largest pipeline, 1,700 kilometers from Hizira through Bejaipur to Jagdishpur. Bids for various sections of the pipeline and for equipment were called for in March. Construction was to start no later than midyear, but delays and changes on bidding, financing, and basic policy decisions have set the entire project back at least 1 year. The plan was to develop the South Bassein offshore gasfield and bring the gas 230 kilometers to shore in a 91-centimeter pipeline. It would then travel 1,700 kilometers to Jagdisphur, servicing six large gas-based nitrogen fertilizer complexes and some proposed thermal or gas turbine powerplants on the way. The delayed start of construction was almost certain to affect the startup of at least the Bijaipur plant, which was scheduled for a December 1986 commissioning. Failure to have the pipeline completed in time could leave several billion dollars worth of fertilizer capacity idle.

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[1]Physical scientist, Division of International Minerals.

[2]The Indian fiscal year runs from Apr. 1 of the year stated.

[3]Where necessary, values have been converted from Indian rupees (Rs) to U.S. dollars at the rate of Rs9.65=US$1.00 in 1982, Rs10.3=US$1.00 in 1983, and Rs11.8=US$1.00 in 1984.

[4]The New Sketch. V. 44, No. 36, June 4, 1984, p. 17.

[5]Engineering and Mining Journal. V. 185, No. 6, June 1985, p. 40.

[6]Indian Mining and Engineering Journal. V. 29, No. 1, Jan. 1985, p. 3.

[7]Indian News. V. 24, No. 5, Apr. 29, 1985, p. 5.

[8]Iron and Steel Review. V. 17, No. 10, Mar. 1984, p. 3.

[9]Metal Bulletin Monthly. No. 167, Nov. 1984, p. 49.

[10]Minerals & Metals Review (Bombay). V. 10, No. 10, Oct. 1984, p. 43.

[11]U.S. Embassy, New Delhi, India. State Dep. Airgram A-16, May 6, 1985, p. 49.

[12]Mining Journal. V. 303, No. 7773, Aug. 10, 1984, p. 89.

[13]Rock Products. V. 88, No. 4, Apr. 1985, p. 52.

[14]Phosphorus and Potassium. No. 132, July-Aug. 1984, p. 22.

[15]Page 52 of work cited in footnote 11.

[16]Journal of Mines, Metals and Fuels. V. 33, No. 2, Feb. 1985, p. 63.

[17]Page 56 of work cited in footnote 11.

[18]Minerals and Metals Review (Bombay). V. 11, No. 5, May 1985, p. 18.

[19]Industrial Times (Bombay). V. 27, No. 15, July 22-Aug. 4, 1985, p. 7.

[20]Oil and Gas Journal. V. 83, No. 1, Jan. 7, 1985, p. 53.

[21]The New Sketch. V. 44, No. 40, July 2, 1984, p. 11.

[22]Chemical Industry News (Bombay). V. 29, No. 12, Apr. 1985, p. 703.

The Mineral Industry of Indonesia

By John C. Wu[1]

Indonesia was the world's second largest producer and exporter of liquefied natural gas (LNG) and the 10th largest producer and exporter of light- and medium-grade crude oil. Indonesia was also the second largest tin producer and exporter and was 1 of the top 10 producers and exporters of nickel in the Western World. Indonesia has emerged as an important producer of aluminum, cement, copper, nitrogen fertilizer, and steam coal in the Far East and Southeast Asia.

The further weakening of the world's oil prices and the imposition of production quotas by the 13-member Organization of Petroleum Exporting Countries (OPEC) limited and slowed down the growth of Indonesia's oil industry. The uncertainty over the new tax law introduced in 1984 and a lack of potentially promising exploration areas reportedly resulted in fewer production-sharing contracts signed, a lesser number of exploratory wells drilled, and less exploration expenditures. There were only two new production-sharing contracts signed in 1984 compared with three new contracts and one renegotiated contract in 1983. The number of exploratory wells drilled was about 240 compared with 264 in 1983, while the total exploration expenditures by foreign companies dropped to about $900 million[2] from $1.1 billion in 1983.

Despite the slowdown in Indonesia's oil exploration, several important oil and gas deposits were discovered in West Java, East Kalimantan, Central Sumatra, and in an offshore area of Madura in East Java. The Madura Oilfield reportedly has exploitable reserves of 22 million barrels of oil and 401 billion cubic feet of natural gas. The Indonesian Government and the Kodele Energy Co. Ltd. (Kodeco) of the Republic of Korea established a joint venture to develop and produce crude oil from the Madura Oilfield in 1985 and produce natural gas in 1987. Part of the crude oil will be exported to the Republic of Korea, and the natural gas will be processed into LNG for export, mainly to the Republic of Korea.

In early 1984, the $800 million expansion project at the Arun LNG plant was completed. By combining the Arun plant in North Sumatra and the Badak plant in East Kalimantan, Indonesia's annual output capacity of LNG rose to 13.9 million tons. A $300 million new contract was awarded to Japan Gasoline Co. of Japan to build the sixth LNG train at the Arun LNG plant with an annual capacity of 1.3 million tons to be completed by 1986.

Expansion projects at the Ombilin coal mine and at the Bukit Asam coal mine continued. Because of the delay in constructing the transport system for the Bukit Asam Mine, Indonesia's coal production was below planned output. Indonesia was expected to import about 1.5 million tons of steam coal from Australia during 1984-85 for the Suralaya powerplant that was scheduled for operation in West Java in early 1985.

Third-phase construction at the smelter of P.T. Indonesia Asahan Aluminum (INALUM) was completed by yearend. The 225,000-ton-per-year smelter reportedly was operating at 85% capacity owing to a lack of demand for primary aluminum by the domestic fabricating industries. The $750 million alumina project on Bintan Island reportedly was reinstated and to be completed by 1987. The first-phase expansion project of Freeport Indonesia Inc. at the Ertsberg copper mine in Irian Jaya was also completed in 1984. The copper mining capacity at the Ertsberg Mine was raised to 13,500 tons of ore per day, and the milling capacity of the concentrator was increased to 13,100 tons per day. At Soroako in South Sulawesi, P.T. International Nickel Indonesia (P.T. Inco) established a new output record to meet growing Japanese demand for its nickel-sulfate matte. The hard hit tin mining industry remained depressed because of weak demand for tin in the world. The country's only tin smelter at Mentok on Bangka Island planned to cut its capacity from 38,000 to 26,000 tons per year in 1985.

Indonesia's cement industry capacity rose to about 12 million tons per year following completion of three new cement plants in South Sulawesi, West Java, and Sumatra. The fertilizer industry's capacity of urea and triple superphosphate was raised to 3.3 million tons per year and 1 million tons per year, respectively, after completion of three urea plants in Kalimantan and North Sumatra, and two compound fertilizer plants in East Java.

The devaluation of the Indonesian rupiah and rephasing of Government multibillion dollar projects helped to improve Indonesia's merchandise trade position substantially in 1984. During the year, the trade surplus rose 67% to $8 billion owing to increased export earnings and decreased imports. Exports of crude petroleum and LNG accounted for 73% of total export earnings. Despite reduced earnings from exports of crude petroleum, the increased exports of LNG to Japan helped Indonesia to sustain the earning power from exports of its energy resources. A 17% increase in exports of nonoil commodities to $5.9 billion was also recorded. Exports of most minerals and metals increased, except tin.

After 3 years of implementing a counterpurchase policy, the number of countries signing agreements with Indonesia rose to 22, and total counter-purchase obligations reached $1.2 billion in 1984. The policy was to promote exports of nonoil commodities. These nonoil commodities included aluminum alloy bar, aluminum ingot, coal, compound chemical fertilizer, copper concentrate, iron ore, latex, nickel matte, plywood, quartz, resin, rubber, sand, timber, tin, urea, and other materials. In terms of contract value, the Federal Republic of Germany ranked first at $369 million followed by Japan, $248 million; Canada, $182 million; and the United States, $93 million.[3]

Indonesia's gross domestic product (GDP) in 1973 constant dollars grew 4.4% in 1984 compared with 4.2% (revised) in 1983. The mining sector, which contributed about 24% to Indonesia's GDP, and the agricultural sector, which contributed about 26%, remained the basic strength of the faster growth rate in Indonesian economy. The increased output of LNG and nonfuel minerals helped Indonesia's mineral sector to sustain its share of sectoral contribution to Indonesia's GDP. Indonesia's GDP in current dollars was estimated at about $90 billion compared with $73 billion in 1983. The inflation rate as measured by the Consumer Price Index dropped to 9% from 12% in 1983.

In July, the 10% value-added tax laws, originally scheduled to become effective on July 1, were postponed until January 1, 1986, owing to a lack of preparation by the Government and taxpayers. Effective June 8, 1984, a 10% tax on tin exports was abolished. In an effort to promote nonfuel commodities exports, the Minister of Finance issued a decree in April to abolish export taxes on bauxite and nickel. In January, a new income tax law became effective lowering the maximum income tax rate from 45% to 35%.

PRODUCTION

The performance of Indonesia's mineral industry was significantly better than that of 1983. However, the production controls imposed by the International Tin Council (ITC) on tin and by OPEC on crude petroleum continued to affect the output level of the two most important mineral commodities produced in Indonesia.

Production of crude petroleum dropped 4.5% to an average of 1.3 million barrels per day, but the output of natural gas rose to a new annual record high of 1.5 trillion cubic feet resulting from increased use of natural gas for the production of LNG at the Arun LNG plant in North Sumatra and at the Badak LNG plant in East Kalimantan. Production of coal from the Ombilin Mine in West Sumatra and from the Bukit Asam Mine in South Sumatra reached new record highs of 583,600 tons and 501,100 tons, respectively, as the two mines continued their expansion programs.

In the metallic mineral sector, production of tin continued to decline because of the ITC export controls resulting from the depressed world tin market. However, production of aluminum, bauxite, copper, and metallic nickel was at a higher level than that of 1983. The growing Japanese demand and higher prices for those metals in the world market were the two major factors for the increased production. However, the high production level of copper concentrate at the Ertsberg Mine in Irian Jaya was sustained by the reduced production costs resulting from increased productivity following the completion of the first-phase mining and milling expansion project by Freeport Indonesia. After completion of third-phase construction, aluminum ingot production from the Asahan smelter at Kuala Tanjung in North Sumatra rose to 200,000 tons per year.

Under Government encouragement and support, Indonesia's cement and fertilizer industries continued to grow. Production of cement by the nine cement companies rose to a new record high when three new cement plants came on-stream. Production of fertilizer materials also reached a new record high as the annual output capacity of urea was expanded to over 3.3 million tons. Production of compound chemical fertilizer also increased substantially when the phase II expansion project was completed and became operational in Gresik, East Java.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Bauxite, dry equivalent, gross weight thousand tons	1,249	1,203	[r]700	778	1,003
Metal, primary	--	--	[r]32,532	114,766	204,200
Copper, mine output, metal content	59,027	62,516	[r]75,116	78,608	82,509
Gold, mine output, metal content[2] troy ounces	[r]58,223	[r]51,218	[r]71,878	76,892	78,684
Iron and steel:					
Iron sand, dry basis	62,914	86,626	144,493	132,887	82,769
Metal:					
Ferroalloys, ferronickel	18,314	19,884	21,501	20,708	[3]22,729
Steel, crude	360,000	500,000	500,000	800,000	[e]1,400,000
Manganese ore	4,299	2,587	17,894	8,318	[e]10,000
Nickel:					
Mine output, metal content[3]	53,287	48,850	45,882	49,378	[e]48,500
Metallurgical products:					
Matte: Nickel content	20,302	19,940	13,748	18,288	22,815
Ferronickel: Nickel content	4,421	4,703	5,010	4,855	5,340
Silver, mine output, metal content thousand troy ounces	701	830	1,134	1,135	1,121
Tin:					
Mine output, metal content	32,527	35,391	33,806	26,553	23,225
Metal	30,465	32,429	29,755	28,390	22,467
NONMETALS					
Asbestos[e]	--	5,000	25,000	25,000	25,000
Cement, hydraulic thousand tons	5,821	6,844	7,501	8,187	[e]10,700
Clays, kaolin powder	75,558	80,904	77,207	59,628	67,795
Diamond:[e]					
Industrial thousand carats	12	12	12	22	22
Gem do.	3	3	3	[r]5	5
Total do.	15	15	15	27	27
Iodine kilograms	[r]29,231	25,360	28,920	25,297	24,970
Nitrogen: N content of ammonia	938,455	920,213	1,027,600	1,150,400	1,658,200
Phosphate rock	11,191	7,846	5,031	5,573	2,547
Salt, all types thousand tons	690	286	799	620	[e]700
Stone:					
Granite do.	926	1,811	2,130	2,405	[e]2,500
Limestone[4] do.	7,605	8,749	11,002	12,073	12,703
Marble square meters	25,380	28,842	28,970	24,374	16,108
Quartz	260,075	155,730	977,289	372,216	543,766
Sulfur, elemental[5]	197	951	1,144	2,769	[e]2,700
MINERAL FUELS AND RELATED MATERIALS					
Asphalt rock, bitumen content	173,018	276,498	330,842	533,188	471,239
Coal thousand tons	338	399	588	648	1,085
Gas, natural:					
Gross million cubic feet	1,045,748	1,123,720	1,111,928	1,186,362	1,527,517
Marketed do.	695,914	720,258	926,150	1,032,321	1,367,473

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Natural gas liquids: Propane and butane[e] thousand 42-gallon barrels	15	15	14	14	14
Petroleum:					
Crude including field condensate ----do----	577,016	584,838	488,167	490,483	468,513
Refinery products:					
Gasoline ----do----	17,475	17,015	13,385	12,980	NA
Jet fuel ----do----	25	--	8	2,760	NA
Kerosine ----do----	25,988	24,052	18,947	31,669	NA
Distillate fuel oil ----do----	19,184	17,850	14,714	37,522	NA
Residual fuel oil ----do----	17,985	14,343	14,131	66,596	NA
Lubricants ----do----	499	--	525	487	NA
Liquefied petroleum gas ----do----	294	448	373	471	NA
Paraffin wax ----do----	253	143	103	76	NA
Naphtha ----do----	(6)	(6)	465	19,074	NA
Unfinished oils requiring further processing ----do----	41,599	39,188	26,355	2,405	NA
Unspecified ----do----	2,418	1,962	5,623	5,657	NA
Refinery fuel and losses ----do----	3,917	3,443	4,654	5,169	NA
Total ----do----	129,637	118,444	99,283	184,866	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 30, 1985.
[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

Despite the continuing decline in exports of crude petroleum, the increased exports of LNG and nonoil commodities helped not only to offset the reduction in oil exports but also boosted the level of overall export earnings by more than 3%. Because of rescheduling several major industrial development projects, Indonesia's import bill was reduced by about 15%. As a result, Indonesia's trade balance improved substantially.

According to the Central Bureau of Statistics, overall export earnings rose 3.5% to $21.9 billion over that of 1983, while imports of goods dropped 15.1% to $13.9 billion. As a result, the merchandise trade surplus increased 67% to $8 billion in 1984.

Exports of mineral products were valued at $16.2 billion, of which $16 billion were from crude petroleum, petroleum products, and LNG; $111 million from copper ore; $14 million each from bauxite ore and nickel ore; and $61 million from coal and other. Exports of base metals were valued at $630 million, of which $269 million were from exports of tin, $205 million from aluminum ingot, and $126 million from nickel matte. Exports of cement and fertilizer were valued at $12.5 million and $37.3 million, respectively.

Capital goods for the country's industrial development projects remained the major import items. Imports of machinery and electrical equipment, vehicles and transport equipment, and base metals were valued at $3.4 billion, $1.6 billion, and $1.5 billion, respectively. Indonesia also imported about $1.3 billion of heavy crude petroleum for consumption by the domestic petroleum refineries.

The European Economic Community (EEC), Japan, Singapore, and the United States remained the major trade partners of Indonesia. Indonesia's exports to and imports from Japan were $10.4 billion and $3.3 billion, respectively. Indonesia's exports to and imports from the United States were $4.5 billion and $2.6 billion, respectively. Most exports of Indonesia's crude petroleum went to Japan and the United States, and all exports of LNG were to Japan. Most exports of minerals and metals were to Japan, while imports of most capital goods were from the EEC, Japan, and the United States.

Table 2.—Indonesia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	746,784	786,311	--	All to Japan.
Metal including alloys:				
Unwrought	16,028	90,712	--	Japan 90,577.
Semimanufactures	192	1,912	--	Japan 1,547; Singapore 171; Hong Kong 158.
Cobalt: Oxides and hydroxides	4	--		
Copper:				
Ore and concentrate	191,749	229,053	--	All to Japan.
Metal including alloys, all forms	1,169	863	--	Japan 605; Singapore 142; Hong Kong 116.
Gold: Waste and sweepings kilograms	--	50	--	All to Switzerland.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	11,000	--		
Metal:				
Scrap	134	1,016	--	All to Japan.
Pig iron, cast iron, related materials	117,080	119,941	--	Japan 62,052; India 57,889.
Semimanufactures:				
Bars, rods, angles, shapes, sections	(2)	--		
Universals, plates, sheets	100	--		
Tubes, pipes, fittings	1,951	70	--	All to Singapore.
Castings and forgings, rough	784	1	--	All to Japan.
Lead: Ore and concentrate	--	700	--	Japan 500; Taiwan 200.
Manganese: Ore and concentrate[3]	8,400	27,670	--	Japan 23,170; Taiwan 4,500.
Nickel:				
Ore and concentrate	721,518	514,972	--	All to Japan.
Matte and speiss	37,951	46,010	--	Japan 33,055; Netherlands 12,807.
Metal including alloys, all forms	30	--		
Tin:				
Ore and concentrate	1,473	1,342	--	Malaysia 905; United Kingdom 437.
Metal including alloys, all forms	28,610	24,968	--	Singapore 15,527; Netherlands 4,125; United Kingdom 1,775.
Zinc:				
Ore and concentrate	--	1,294	--	All to Japan.
Metal including alloys, all forms	679	436	--	Japan 348.
Other: Ashes and residues	1,754	2,389	--	Japan 1,777; Taiwan 507.
NONMETALS				
Barite and witherite	2,829	5,807	--	All to Singapore.
Cement	206,734	198,350	--	Singapore 78,950; Bangladesh 68,000; Malaysia 31,100.
Clays, crude:				
Bentonite	6,909	9,928	--	Singapore 5,837; Philippines 2,380; Malaysia 181.
Kaolin	2,063	3,796	--	Taiwan 2,533; Japan 1,000.
Unspecified	r2,127	100	--	All to Singapore.
Fertilizer materials: Manufactured:				
Ammonia	7,640	25,909	--	Philippines 13,862; Republic of Korea 4,810; India 4,500.
Nitrogenous	45,033	328,547	--	Philippines 196,266; Hong Kong 69,600; Malaysia 32,711.
Phosphatic	--	14,500	--	All to Hong Kong.
Iodine	18	2	--	All to India.
Phosphates, crude	520	1,106	--	All to Taiwan.
Pigments, mineral: Iron oxides and hydroxides, processed	--	21	--	Taiwan 11; West Germany 10.
Salt and brine	--	330	--	All to Singapore.
Sodium compounds, n.e.s.: Sulfate, manufactured	--	2,100	--	Thailand 1,000; Singapore 900; Republic of Korea 200.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	714	1,358	--	All to Singapore.
Worked	4	1	--	All to Japan.
Gravel and crushed rock	--	304	12	Hong Kong 292.
Quartz and quartzite	5,880	28,385	--	All to Japan.
Sand other than metal-bearing thousand tons	17,669	20,596	--	Singapore 20,595.
Sulfur: Elemental, colloidal, precipitated, sublimed kilograms	--	100	--	All to Malaysia.
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite	94,371	251,810	--	Malaysia 189,017; Republic of Korea 36,150; Thailand 11,000.
Bituminous	116,368	172,648	--	Japan 107,199; Malaysia 35,300; Republic of Korea 20,889.

See footnotes at end of table.

Table 2.—Indonesia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Gas, natural, liquefied ______ thousand tons__	9,866	9,919	--	All to Japan.
Petroleum:				
Crude ______ thousand 42-gallon barrels__	426,892	380,166	94,580	Japan 165,687; Singapore 58,779; Trinidad and Tobago 28,774.
Refinery products:				
Liquefied petroleum gas ______do____	4,349	4,095	516	Japan 3,260; Singapore 159.
Mineral jelly and wax _______do____	2	--		
Kerosine and jet fuel ________do____	8	11	NA	NA.
Distillate fuel oil __________do____	24	82	NA	NA.
Lubricants _______________do____	(2)	(2)	--	All to Singapore.
Nonlubricating oils _________do____	125	--		
Residual fuel oil ____________do____	19,547	32,029	7,283	Japan 24,366; Republic of Korea 274.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Includes manganiferous iron ore and concentrate.

Table 3.—Indonesia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate _______________	45	146	1	Japan 120.
Oxides and hydroxides _____________	66,110	182,417	61	Japan 96,887; Australia 78,822; China 2,900.
Metal including alloys:				
Scrap _____________________	42	1	--	All from Singapore.
Unwrought__________________	33,677	20,067	138	Australia 7,701; Canada 3,787; United Kingdom 903.
Semimanufactures _____________	27,621	26,765	733	Japan 6,317; France 4,943; West Germany 2,498.
Arsenic:				
Ore and concentrate _______ kilograms__	--	235	--	All from Japan.
Oxides and acids _________________	66	34	--	Belgium-Luxembourg 17; U.S.S.R. 12; China 5.
Chromium:				
Ore and concentrate _______________	10	21	--	Japan 20.
Oxides and hydroxides _____________	315	562	54	United Kingdom 320; Japan 139.
Cobalt: Oxides and hydroxides ___________	63	95	--	China 60; Japan 21.
Copper:				
Matte and speiss including cement copper__	502	641	475	Singapore 112; Japan 54.
Sulfate _______________________	196	321	(2)	Japan 163; Italy 72; West Germany 32.
Metal including alloys:				
Scrap _____________________	36	475	100	Japan 300; Australia 75.
Unwrought__________________	18,119	16,968	9	Japan 8,994; Zambia 7,627.
Semimanufactures _____________	11,311	7,942	402	Japan 4,870; Singapore 953; Republic of Korea 670.
Gold: Metal including alloys, unwrought and partly wrought___ thousand troy ounces__	1,028	14	--	All from United Kingdom.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite__________	121,039	127,999	--	Sweden 121,022; Brazil 5,975; Malaysia 1,000.
Pyrite, roasted________________	178,786	60,450	--	All from Sweden.
Metal:				
Scrap _____________________	226,894	257,889	80,459	Australia 69,164; Hong Kong 45,496.
Pig iron, cast iron, related materials __	84,022	87,694	54	Algeria 19,651; Netherlands 12,122; U.S.S.R. 10,131.
Ferroalloys:				
Ferrochromium _____________	5	24	--	Japan 13; Philippines 10.
Ferromanganese____________	5,680	7,437	--	Australia 3,124; Mozambique 2,250; Taiwan 750.

See footnotes at end of table.

Table 3.—Indonesia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys —Continued				
Ferrosilicon	7,335	8,444	--	Australia 3,542; Philippines 1,725; China 960.
Unspecified	496	1,447	16	Taiwan 773; Australia 398; Mozambique 150.
Steel, primary forms	222,413	158,471	32	Republic of Korea 49,608; Australia 19,888; Switzerland 19,705.
Semimanufactures:				
Bars, rods, angles, shapes, sections	281,364	241,621	2,855	Japan 197,537; Republic of Korea 12,266; Taiwan 12,141.
Universals, plates, sheets	1,231,953	1,147,563	7,784	Japan 790,453; Republic of Korea 121,853; Mozambique 39,087.
Hoop and strip	35,381	24,362	86	Japan 17,077; Australia 4,311.
Rails and accessories	15,362	27,607	40	Republic of Korea 21,109; Japan 3,580.
Wire	14,290	11,604	98	Japan 5,542; Republic of Korea 1,670; United Kingdom 1,464.
Tubes, pipes, fittings	416,085	266,037	36,381	Japan 161,651; Singapore 39,778.
Castings and forgings, rough	13,815	10,184	1,433	Japan 3,097; Singapore 1,491; Taiwan 1,472.
Lead:				
Oxides	1,238	1,220	106	Australia 590; Mexico 270; West Germany 116.
Metal including alloys:				
Scrap	174	321	--	Taiwan 162; Australia 159.
Unwrought	11,422	12,717	31	Australia 11,045; Taiwan 600; Malaysia 491.
Semimanufactures	223	357	3	China 231; Taiwan 48; Thailand 42.
Magnesium: Metal including alloys:				
Unwrought	28	36	3	West Germany 20; Norway 12.
Semimanufactures	50	29	16	Japan 11.
Manganese:				
Ore and concentrate	4,890	2,889	--	Singapore 2,888.
Oxides	17,284	18,322	--	Singapore 12,929; Japan 4,360; China 671.
Mercury 76-pound flasks	524	642	1	Netherlands 408; West Germany 174.
Molybdenum: Metal including alloys, all forms kilograms	670	363	86	Netherlands 214; Taiwan 61.
Nickel: Metal including alloys:				
Unwrought	48	76	--	Japan 71.
Semimanufactures	1,824	1,778	85	West Germany 1,214; Canada 314.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	482	10,449	7,941	Singapore 2,443.
Rare-earth metals including alloys, all forms	395	12	--	Japan 10.
Silver:				
Waste and sweepings[3] value	$748	--		
Metal including alloys, unwrought and partly wrought troy ounces	1,508	9,726	290	Singapore 7,716; Japan 1,720.
Tin: Metal including alloys:				
Unwrought kilograms	2,271	1,043	43	United Kingdom 1,000.
Semimanufactures	396	84	(2)	Japan 51; Netherlands 16; Singapore 11.
Titanium: Oxides	11,797	14,087	1,400	Japan 4,484; West Germany 2,519; Australia 2,478.
Tungsten: Metal including alloys, all forms	2	82	1	France 71; Japan 7.
Uranium and/or thorium:				
Oxides and other compounds	r260	211	--	France 196.
Metal including alloys, all forms, uranium	139	48	(2)	Australia 18; Taiwan 18; China 10.
Vanadium: Oxides and hydroxides	5	29	12	Japan 17.
Zinc:				
Oxides	795	521	7	China 260; Japan 214.
Metal including alloys:				
Scrap	167	432	--	Australia 300; Singapore 120.
Unwrought	65,626	68,937	50	Australia 54,383; Canada 5,871; Japan 2,932.
Semimanufactures	1,374	1,559	198	Australia 575; Belgium-Luxembourg 248.
Other:				
Ores and concentrates:				
Of base metals	1,155	3,030	--	China 2,000; Australia 727.
Of precious metals	--	802	--	All from Malaysia.
Ashes and residues	9	988	--	Japan 980.
Base metals including alloys, all forms	86	96	(2)	China 46; Australia 19.

See footnotes at end of table.

Table 3.—Indonesia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	327	418	81	Japan 275; India 20.
Artificial: Silicon carbide	170	116	--	France 37; Brazil 34; Switzerland 22.
Grinding and polishing wheels and stones	2,354	2,030	80	China 1,021; Japan 402; Taiwan 242.
Asbestos, crude	18,764	15,095	270	Canada 8,849; China 1,205; Mozambique 746.
Barite and witherite	70,833	74,316	--	Thailand 69,075; Philippines 3,700; Singapore 768.
Boron materials:				
Crude natural borates	185	21	--	West Germany 18.
Oxides and acids	676	698	609	Belgium-Luxembourg 37; France 19.
Bromine kilograms	78	2	2	
Cement	494,888	691,190	20,101	Republic of Korea 200,345; Taiwan 187,789; Japan 129,622.
Clays, crude:				
Bentonite	30,679	24,185	21,189	Italy 1,100; Singapore 570; Japan 558.
Chamotte and dinas earth	90	56	--	All from Japan.
Kaolin	13,218	20,347	8,319	Japan 5,148; Australia 3,248.
Unspecified	4,720	5,820	4,681	Japan 500; Malaysia 356.
Cryolite and chiolite	3,940	6,661	--	All from Japan.
Diatomite and other infusorial earth	179	1,188	213	Thailand 681; Malaysia 207.
Feldspar	10,653	7,230	--	China 4,155; India 1,698; Japan 429.
Fertilizer materials:				
Crude, n.e.s	9,404	2,957	76	Netherlands 2,041; Jordan 824.
Manufactured:				
Ammonia	163	31	4	United Kingdom 15; Japan 7; Singapore 4.
Nitrogenous	376,268	425,077	38,213	Japan 97,336; Romania 73,670; West Germany 45,231.
Phosphatic	259,441	227,321	116,706	Turkey 40,000; Egypt 20,900; Tunisia 20,510.
Potassic	223,767	254,913	--	West Germany 63,320; Spain 61,687; Singapore 29,498.
Unspecified and mixed	10,937	6,288	24	West Germany 2,376; Belgium-Luxembourg 2,250; Netherlands 1,074.
Graphite, natural	231	161	--	Taiwan 50; Japan 37; West Germany 36.
Gypsum and plaster	294,350	356,155	46	Australia 183,295; Thailand 116,862; Japan 26,279.
Iodine	40	54	24	United Kingdom 28.
Lime	567	849	78	Malaysia 530; Singapore 105.
Magnesium compounds: Magnesite	3,613	3,955	--	Japan 1,639; Taiwan 1,205; Republic of Korea 1,000.
Mica:				
Crude including splittings and waste	587	547	32	India 297; Japan 47; Australia 46.
Worked including agglomerated splittings	197	152	9	China 78; Taiwan 27; Japan 19.
Nitrates, crude	901	5,090	--	Japan 4,300; Belgium-Luxembourg 790.
Phosphates, crude	294,730	361,759	85,962	Jordan 177,000; Morocco 61,432; Australia 24,015.
Pigments, mineral:				
Natural, crude	351	538	--	China 520.
Iron oxides and hydroxides, processed	2,410	3,730	272	China 1,397; West Germany 986; Japan 800.
Potassium salts, crude	--	588	--	All from West Germany.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$432	--		
Salt and brine	668	943	28	West Germany 501; United Kingdom 172; Taiwan 60.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	97,600	88,779	43,262	Japan 10,699; Kenya 10,501.
Sulfate, manufactured	13,380	6,723	3,366	Japan 854; Taiwan 800; China 793.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	546	393	--	West Germany 175; Italy 123; China 90.
Worked	2,466	3,273	3	Italy 1,398; Taiwan 925; China 618.
Dolomite, chiefly refractory-grade	4,356	4,072	--	Japan 2,891; Taiwan 1,050.
Gravel and crushed rock	1,716	1,580	368	France 538; Japan 222; Taiwan 200.
Limestone other than dimension	173	160	(2)	Malaysia 150.
Quartz and quartzite	257	130	--	Japan 60; Taiwan 50; United Kingdom 20.
Sand other than metal-bearing	3,286	17,406	560	Malaysia 15,559; Singapore 598.

See footnotes at end of table.

Table 3.—Indonesia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	3,413	3,122	--	Singapore 2,240; Republic of Korea 530.
Colloidal, precipitated, sublimed	82,805	102,564	3,119	Canada 70,543; Singapore 19,880; Saudi Arabia 6,417.
Dioxide	8	12	(2)	Australia 8; Sweden 4.
Sulfuric acid	1,391	1,826	366	Singapore 1,423.
Talc, steatite, soapstone, pyrophyllite	17,338	20,304	508	China 14,019; Taiwan 1,772; Republic of Korea 1,207.
Other:				
Crude	3,705	5,708	158	Japan 2,314; Republic of Korea 1,050; China 985.
Slag and dross, not metal-bearing	14,166	3,109	784	Japan 1,172; Singapore 703; United Kingdom 450.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	16,745	8,143	264	Singapore 7,232; China 218.
Carbon: Carbon black	27,621	27,108	368	Australia 15,862; Japan 3,256; Taiwan 2,478.
Coal: All grades including briquets	2,772	1,587	771	Japan 626; Thailand 144.
Coke and semicoke	28,218	24,199	13	Japan 15,903; Taiwan 6,056.
Petroleum:				
Crude thousand 42-gallon barrels	26,925	22,709	--	All from Saudi Arabia.
Partly refined do	1,053	1,289	--	Singapore 1,148.
Refinery products:				
Gasoline do	8,928	16,039	6	Singapore 15,086; Australia 431.
Mineral jelly and wax do	47	549	1	Singapore 485.
Kerosine and jet fuel do	17,074	22,760	--	Singapore 21,952.
Distillate fuel oil do	4,304	10,199	(2)	Singapore 9,145; Philippines 1,054.
Lubricants do	695	707	229	Singapore 360; Japan 48.
Nonlubricating oils do	617	270	12	Australia 131; Singapore 53; China 35.
Residual fuel oil do	9,959	14,860	178	Singapore 13,499; Philippines 539.

[r]Revised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—Production of bauxite at Kijang on Bintan Island increased to a monthly average rate of 83,000 tons from 65,000 tons in 1983 owing to increased exports to Japan. All bauxite produced by P.T. Aneka Tambang (P.T. Antam) was exported to Japan under a 5-year contract signed in 1983. During 1984, exports of bauxite to Japan totaled 944,300 tons and were valued at $14 million.

In May, the Government of Indonesia reinstated the $750 million project to construct a 600,000-ton-per-year alumina plant on Bintan Island. The project was shelved by the Government in 1983 because of the high capital costs. However, a $60 million loan reportedly was secured for the project from the U.S. Export-Import Bank and the Chase Manhattan Bank of New York. According to press reports, the alumina plant was scheduled for completion in 1987.[4] Indonesia imported all of its alumina, principally from Australia and Japan.

Production of aluminum by IN-ALUM's smelter at Kuala Tanjung increased to over 200,000 tons from 115,000 tons in 1983. Exports of aluminum ingots to Japan also increased to 135,000 tons from 92,600 tons in 1983. Export earnings from aluminum rose to $205 million from $132 million in 1983 resulting from increased export volume as well as in average export prices to $1,516 per ton from $1,425 ton in 1983.

In November, third-phase construction on the Asahan aluminum project was completed at Kuala Tanjung in North Sumatra.

The Asahan project, initiated in 1976, consists of a 225,000-ton-per-year aluminum smelter with three 170-cell reduction plants; two hydroelectric powerplants with a combined installed capacity of 603 megawatts; a new port at Kuala Tanjung; and new roads, telecommunications, and a new town of 10,000 people with shops, community centers, a school, and a hospital. The project, divided into three phases, took 6-1/2 years to complete at a cost of $1.7 billion, which is more than two times the original 1975 estimate.

Production of aluminum ingots by IN-ALUM in 1984 totaled about 350,000 tons since the aluminum smelter commenced first-phase operation in February 1982. During the 3-year period, the company exported 231,000 tons to Japan and distributed 31,000 tons to the domestic market. The remaining 83,000 tons, which was supposed to be sold in the domestic market, reportedly was being stockpiled in company warehouses and at the smelter owing to the availability of cheap imported aluminum and low demand for primary aluminum by the small fabricating industries of Indonesia. The aluminum ingot produced by IN-ALUM contained 99.7% aluminum, and was priced at $1,400 per ton for the domestic market compared with cheaper imported aluminum at $1,300 per ton. Indonesia's domestic consumption of primary aluminum was estimated at about 50,000 tons per year.[5]

Copper.—Despite the lower copper price in the world market, production of copper by Freeport Indonesia from the Gunung Bijih (Ertsberg) Mine in Irian Jaya reached a new record high in 1984. With the completion of the first-phase expansion program at the Ertsberg East underground mine and installation of a second primary crusher, Freeport Indonesia successfully raised its mining capacity to 13,500 tons per day from 12,000 tons per day in 1983. As a result, ore mined from the Ertsberg underground mine and open pit reached a record high of 4,951,000 tons compared with 4,349,000 tons in 1983. In 1984, the company also completed the modifications of its concentrator and raised its mill throughput to 13,100 tons per day.

According to the company's annual report, the output of copper concentrate decreased to 190,000 tons from 205,000 tons in 1983, but the copper content of the concentrate rose to 82,500 tons from 78,600 tons in 1983. Gold and silver content of the concentrate also rose to 71,000 troy ounces and 1,057,000 troy ounces from 66,000 troy ounces and 989,000 troy ounces, respectively, in 1983. Because of a 5.6% reduction in average copper price in 1984, the profits of Freeport Indonesia dropped to $5.4 million from $12.7 million in 1983. However, Freeport Indonesia's Ertsberg operation was one of the few copper operations in the world to remain profitable owing to the company's effective strategy to reduce the cost of production by increasing production efficiency and through stringent cost controls.[6]

The estimated proven and probable ore reserves at the Ertsberg and Ertsberg East ore bodies, as of December 1984, were 44 million tons having an average ore grade of 2.4% copper. At the current rate of production, the ore reserves were expected to last 8 to 9 more years until 1992 or 1993. To increase Ertsberg's ore reserves and maintain its low cost position, Freeport Indonesia continued to explore copper mineralization in the vicinity of the Ertsberg East ore body. In 1984, the company reported the discovery of two mineralized zones beneath the Ertsberg East underground mine. Further drilling and evaluation were scheduled for 1985 to ascertain the potential new ore reserves.

Gold and Silver.—Gold and silver production by P.T. Antam from the Cikotok Mine in South Banten, West Java, decreased while gold and silver recovered by Freeport Indonesia from its copper operation at the Ertsberg Mine increased. (See "Copper" section.)

Under the fourth 5-year plan (1984-88), development of natural resources was given as one of the Government's top priorities with special emphasis on increased exploration for nonoil mineral resources. To meet this end, the Government of Indonesia reportedly awarded contracts to nine foreign mining companies to explore and develop gold mines under modified third generation contracts of work in 1984. The modified terms under the new contracts of work include free foreign exchange movement; a corporation tax of 35% for the first 5 years after the start of mine production, 40% from 6 to 10 years, and 45% after 11 years; and a provision of 51% of the issued shares allowed for Indonesian nationals within 10 years after the start of mine production.[7]

The awarded nine contracts for gold exploration and mine development are shown in table 4.

Table 4.—Indonesia: Gold exploration and mine development contracts

Contractor (Firm established in Indonesia)	Location	Area (square kilometers)
British Petroleum Ltd., United Kingdom:		
P.T. Barito Sakti	Central Kalimantan	2,519
P.T. Putri Tayan Indonesia	West Kalimantan	1,227
Conzinc Rio Tinto of Australia Holding Pty. (CRA):		
P.T. Rio Tinto Indonesia	Sampit, Central Kalimantan	10,693
CRA, Kelian Pty., Australia:		
P.T. Buana Jaya Raya; P.T. Kelian Equator Mining	Kutai, East Kalimantan	2,862
Duval Corp., United States:		
P.T. Gunung Muro	Central Kalimantan	1,036
Jimberlana Minerals Ltd., Hong Kong, and Duval Alluvial Corp., United States:		
P.T. Sungai Mas; P.T. Amysa Mining	West Kalimantan	5,535
J. V. Bengkulu Minerals Ltd., Australia:		
P.T. Ketaun Mining; P.T. Lebong Tandi	North Bengkulu	1,603
P.T. Lusang Mining Indonesia	do	75
Petson Mangani Minerals Ltd., Australia:		
P.T. Bulangsi Andala Mining	West Sumatra	1,899

In November, a joint venture firm, Bengkulu Minerals Pty. Ltd., was established by CSR Ltd. of Australia and a local Indonesian company to rehabilitate and develop a new mining operation at the old Lebong Tandai gold mine in Bengkulu, southwest Sumatra. The gold project, estimated to cost $30 million, was expected to commence operation at a rate of 35,000 tons of ore per year in late 1986. The proven ore reserves were estimated at 300,000 tons having an average grade of 0.31 troy ounce of gold per ton.[8]

Iron and Steel.—Iron sands production from the Cilacap area along the south coast of central Java dropped significantly to an average monthly rate of 7,000 tons from 11,000 tons in 1983. Most iron sands produced in Indonesia was for domestic consumption principally by the cement industry. In 1983, domestic consumption of iron sands totaled 122,154 tons; 10,251 tons was exported to Japan.

According to local press reports, a small iron mine and smelting project was completed in 1984 at Sindang Sari near Bandar Lampung in south Lampung, South Sumatra. The $2.8 million project included an 8,000-ton-per-year iron smelting plant at Way Rilau, a 16,000-ton-per-year iron ore mine at Pematang Burhan, two charcoal procurement centers in Lampung Selantau and in Lampung Utara, and a Lamturo tree (from which charcoal would be made) plantation in Bergen to produce 8,000 tons per year of charcoal for the smelter as fuel. The project is to serve as a model for the development of the homegrown iron processing technology. The design and manufacturing of the iron ore smelter were furnished by the National Metallurgy Institute of the Indonesian Institute of Sciences in Lampung, and only 10% of the equipment and facilities was imported. The plant was scheduled to commence operation in mid-1984. The pig iron produced by the plant will be marketed to the local foundry industry for production of casting products.[9]

Production of steel increased to about 1.4 million tons but the output in 1984 was still far below the installed capacity of 2.2 million tons per year. According to a Government official, Indonesia's total demand for steel was about 2.8 million tons. The underutilization of the country's steel capacity reportedly, was attributable to the high price and low quality of the domestically produced steel.

P.T. Krakatau Steel began construction of its third-phase steel mill project, which included installation of an 850,000-ton-per-year cold-rolling mill, tinning line, seamless pipe mill, and an iron ore pellet plant. The third-phase steel mill project was scheduled for completion in 1986.

In anticipation of a future increase in steel demand, the Government of Indonesia invited a team of nine Japanese steel experts sponsored by the Japan International Cooperation Agency to Indonesia in July 1984. The Japanese team reportedly was to investigate the prospects for constructing a second integrated steel mill complex with a 3-million-ton-per-year capacity in Indonesia.

Nickel.—Production of nickel ore by P.T. Antam from nickel mines in the Pomalaa area of southeast Sulawesi, and on Gebe

Island, Maluku, of north Molyccas decreased to about 1.1 million tons, but production of ferronickel at P.T. Antam's Pomalaa plant increased 10% to 22,729 tons. Exports of nickel ore and ferronickel to Japan rose substantially owing to continuing improvements in the Japanese nickel market.

In 1983, P.T. Antam produced 1,278,031 tons of wet ore, of which 51% was from the Pomalaa area, and 49% was from Gebe Island. The company exported only 737,024 tons of ore in 1983 compared with 1.1 million tons in 1982. Production of ferronickel was 20,708 tons in 1983 compared with 21,500 tons in 1982. However, exports of ferronickel rose to 24,190 tons (5,721 tons of nickel) in 1983 compared with 18,648 tons (4,336 tons of nickel) in 1982. Export earnings of nickel ore and ferronickel were valued at $12.8 million and $25.4 million, respectively, in 1983.[10]

Production of nickel ore and nickel matte by P.T. Inco from its Soroako nickel complex in South Sulawesi continued to increase in 1984 to meet the growing Japanese demand for nickel-sulfate matte. Both mine output and nickel matte production reached new record highs, and the operating costs reportedly were reduced. However, the production of nickel in matte was about 6,700 tons below the planned level of 29,500 tons because of mechanical difficulties with the top blown rotary converter. To increase productivity and lower operating costs, P.T. Inco was to undertake a major overhaul of the existing converters and to install a Pierce-Smith converter at the smelting plant.[11]

In 1984, P.T. Inco exported 22,987 tons of nickel in matte to Japan compared with 17,149 tons in 1983. However, the value of nickel exports dropped to $106 million from $109 million in 1983 resulting from lower export prices in 1984.

As a result of further detailed sampling within a 10-kilometer radius of the Soroako townsite, proven and probable ore reserves were increased to 69 million tons containing 1.3 million tons of nickel at the end of 1984. The average grade of ore mined from the East and West blocks of the open pit mines was about 2.1% nickel.

Tin.—The output of tin ore and concentrate declined because of the continuing imposition of export controls by the ITC. Under an agreement signed in July 1983, the quarterly permissible tin metal exports by Indonesia during 1984 was 5,506 tons. As a result, Indonesia's production of refined tin reportedly dropped to the 22,500-ton level from the 28,400-ton level in 1983, while exports of tin metal also dropped to 22,000 tons from 25,000 tons in 1983.

Tin production in Indonesia by company and area for 1982-83 was as follows, in metric tons:

Company and area	1982	1983
P.T. Tambang Timah:		
Bangka Island	18,446	13,893
Belitung Island	6,468	4,514
Singkep Island	1,250	1,506
Bangkinang, Sumatra	54	40
P.T. Koba Tin: Koba, Bangka Island	5,471	5,253
P.T. Broken Hill Pty. Indonesia:		
Kelapa Kampit, Belitung Island	648	649
P.T. Riau Tin Mining:		
Tujuh Riau Island	1,469	698
Total	33,806	26,553

Peleburan Timah Indonesia, a tin smelting unit of P.T. Timah at Mentok on the northwest coast of Bangka Island, reportedly was operating at 60% capacity because of export controls. According to a company official, the capacity of the 38,000-ton-per-year smelter would be reduced to 26,000 tons per year in 1985. The smelter produced two brands of tin metal for export. Mentok tin with a minimum of 99.85% tin was exported to Europe, Japan, and the United States, and Bangka tin with a minimum of 99.92% tin is sold directly to Japanese customers and may not be reexported.

NONMETALS

Cement.—Production of cement continued to increase as the industry's production capacity was expanded to 11.7 million tons per year in 1984. According to Government and industry sources, Indonesia's cement production in 1983 and the estimated annual capacity for 1984 by company were as follows, in thousand metric tons:

Company and location	1983 production	1984 estimated capacity
P.T. Indocement (West Java)	[1]2,823	3,200
P.T. Semen Padang (West Sumatra)	1,070	2,130
P.T. Semen Gresik (East Java)	1,413	1,500
P.T. Semen Cibinong (West Java)	1,116	1,250
P.T. Semen Tonasa (South Sulawesi)	409	1,210
P.T. Semen Andalas Indonesia (North Sumatra)	312	1,000
P.T. Semen Nusantara (West Java)	686	750
P.T. Semen Baturaja (South Sumatra)	358	500
P.T. Semen Kupang (Timor Island)	NA	120
Total	8,187	11,660

NA Not available.
[1]Includes 83,042 metric tons of white cement.

In August, an agreement was signed between Karya Merdeka Cooperative and the Jakarta-based P.T. Jacolintech Group to build a portland cement miniplant with an annual capacity of 30,000 tons in South Kalimantan. Construction work was expected to start following feasibility studies on limestone mining in South Kalimantan.

By yearend, P.T. Semen Padang was expected to add 600,000 tons per year to its 1.53-million-ton-per-year capacity under its Indarung III-B expansion programs in West Sumatra. P.T. Semen Tonasa had completed its expansion program to increase its capacity by 590,000 tons per year to 1.2 million tons per year in South Sulawesi. P.T. Indocement Group, the country's largest cement producer, was expected to complete the sixth phase of its rotary kiln in Citeureup, Cibinong, West Java, and increase its capacity to 4.7 million tons per year by 1985. The construction work of a 1.2-million-ton-per-year cement plant on Madura Island off the northeast coast of Java had been discontinued by the Government since October 1983. However, P.T. Indocement reportedly had taken over the project in August 1984.

Diamond.—Mining of diamonds in Indonesia was by primitive panning in the Cempaka area in the southeastern corner of Kalimantan, near Martapura where most of Indonesia's gem finishing and trading activities were concentrated. The diamonds produced from the area are of industrial quality for cutting tools and phonograph needles.

According to local officials, production of high-quality gem stone has been dwindling to about 27,000 carats of raw stones per year. To meet the country's requirements for raw stone by the Martapura finishing industry, Indonesia was importing about 150,000 carats of raw stone per year mainly from Belgium-Luxembourg and the Netherlands. Recently, the Central Bank of Indonesia provided funds to set up a gem finishing center and a training program to increase production and quality of the finished products.[12]

Fertilizer Materials.—In an effort to become self-sufficient in fertilizer, Indonesia's chemical fertilizer industry continued to expand. Production of ammonia, urea, and other chemical fertilizer materials such as ammonium sulfate, phosphoric acid, and sulfuric acid all reached new record highs in 1984.

The four major urea producers shown in table 5 also produced ammonia for further processing into ammonium sulfate by P.T. Petrokimia Gresik, the other important producer of chemical fertilizers in Indonesia.

Production of triple superphosphate, diammonium phosphate, and ammonium sulfate by P.T. Petrokimia Gresik was 783,000 tons, 14,000 tons, and 208,000 tons, respectively, in 1983. P.T. Petrokimia Gresik operated a large fertilizer manufacturing complex in Gresik and in Sarabaja of East Java. The company completed and brought on-stream its phase II expansion project in August and increased its annual capacity of triple superphosphate to about 1 million tons and ammonium sulfate to about 450,000 tons. The phase II expansion project at Gresik included a 317,500-ton-per-year phosphoric acid plant, a 510,000-ton-per-year sulfuric acid plant, a 440,000-ton-per-year gypsum plant, a 250,000-ton-per-year ammonium sulfate plant, and a 12,600-ton-per-year aluminum fluoride plant.[13]

Table 5.—Indonesia: Production and annual capacity of urea

(Thousand metric tons)

Company	Location	Production 1983	Production 1984	Capacity 1984
P.T. Pupuk Sriwijaya	Palembang, South Sumatra	1,621	1,519	1,620
P.T. Pupuk Kujang	Tjikampek, West Java	579	542	570
P.T. Pupuk Kaltim	Bontang, East Kalimantan	--	410	[1]570
P.T. Asean-Aceh Fertilizer	Lhokseumawe, North Sumatra	56	427	570
Total		2,256	2,898	3,330

[1]The annual capacity of P. T. Pupuk Kaltim was expanded to 1,140,000 tons of urea under its Kaltim II project in mid-1984.

Source: Fertilizer International. No. 183. July 19, 1984, pp. 12-13.

According to the Department of Industry, exports of urea dropped to 227,683 tons from 316,225 tons in 1983 because of lower prices in the world market. However, exports of triple superphosphate rose to more than 50,000 tons from 29,200 tons in 1983. Imports of fertilizer were 140,000 tons of ammonium sulfate and 200,000 tons of potassium chloride (sylvite) in 1984.

MINERAL FUELS

Coal.—Production of coal in Indonesia rose sharply as the two coal mines, operated by the state-owned coal company P.N. Tambang Batubara in Sumatra, continued to expand their production capacities. About 492,000 tons of coal produced from the Ombilin Mine in West Sumatra was exported to Bangladesh, Malaysia, and Taiwan at $37 per ton, f.o.b. Pandang, and about 183,000 tons was marketed mainly to the domestic cement plants in 1984. Coal output from the Bukit Asam Mine in South Sumatra reached 500,000 tons. Most steam coal from the Bukit Asam Mine was shipped to Banten, West Java, for power generation at Unit I of the Suralaya powerplant, which was scheduled to start operation in 1985. About 35,000 tons of anthracite was shipped to the domestic tin and nickel mining and smelting companies. Production of coal by four private companies in East Kalimantan reportedly also increased substantially in 1984. Almost all of the coal from East Kalimantan was exported to Japan, the Republic of Korea, and Taiwan.

According to Indonesia's 1983 "Mining Yearbook" published by the Department of Mining and Energy, Indonesia's supply and demand for coal in 1982-83 were as follows, in metric tons:

	1982	1983
Production:		
P.N. Tambang Batubara:		
Ombilin Mine	302,572	325,662
Bukit Asam Mine	178,415	159,668
C.V. Fadjar Bumi	11,824	64,189
C.V. Baiduri Enterprise	95,177	49,669
P.T. Kitadin Corp	--	38,152
P.T. Tanito Harun	--	10,600
Total	587,988	647,940
Demand:		
Cement plants	132,458	160,605
Coal mining	45,518	34,976
Tin mining and smelting	24,700	29,550
Nickel mining and smelting	13,100	23,131
Railroads	15,162	9,883
Other	15,418	8,860
Total	246,356	267,005

In 1983, exports of coal from Sumatra to the Republic of Korea, Japan, Malaysia, and Vietnam totaled 283,773 tons while exports of coal from East Kalimantan to the Republic of Korea, Japan, and the Philippines totaled 149,840 tons.

As a result of a 1-year delay in completion of the Bukit Asam coal expansion project, Indonesia was expected to import about 1.5 million tons of steam coal from Australia during 1984-85 for consumption by the Suralaya powerplant in West Java, which was scheduled to start operation in February 1985.

In early 1984, a 200-ton-per-hour washery was completed and delivered to P.N. Tambang Batubara at the Ombilin Mine by the Noyes Bros. Pty. Ltd. of Australia. The coal washery consists of conveyors, bins, and ancillary equipment, which include coal trucks, 4-wheel-drive vehicles, and front-end loaders.

Coal exploration in Kalimantan by the seven foreign contractors continued to make progress. According to industry sources, two additional discoveries were made by the contractors. P.T. Arutmin Indonesia discovered a 150-million-ton deposit in a coal concession area near Banjarmasin, South Kalimantan, and P.T. Utah Indonesia found a 60-million-ton deposit in the coal concession areas near Tandjung and Tanahgrogot of East Kalimantan. Production of coal from these areas reportedly was planned to begin in 1986.[14]

Petroleum and Natural Gas.—Production of crude petroleum declined to the lowest level since 1972 because of further softening of world oil prices and the continued imposition of production quotas by OPEC. During 1984, the output of crude petroleum dropped to an average of 1.28 million barrels per day from 1.34 million barrels per day (revised) in 1983. However, production of natural gas continued to increase resulting from the increased utilization of natural gas for LNG production. The output of natural gas totaled 1.5 trillion cubic feet.

Under an agreement signed by the 13 members of OPEC in October, the quota for Indonesia's daily output of crude petroleum will be reduced further from 1.3 million barrels per day to 1.19 million barrels per day beginning in January 1985.

The slowdown of Indonesia's oil industry was evidenced by a decline in exploratory wells drilled as well as exploration expenditures in 1984. According to industry sources, the number of exploratory wells dropped to about 240 from 264 in 1983, while foreign oil companies spent only about $900 million for exploration compared with $1.1 billion in 1983. In 1984, PERTAMINA, the state-owned oil company, signed only two production-sharing contracts with foreign companies. The two companies were British Petroleum Development Ltd. and Podena Shell BV. British Petroleum was expected to spend $60 million for exploration in the Merangin block near Jambi in South Sumatra, and Podena Shell plans to spend $110 million for exploration in the Podena block onshore and offshore Irian Jaya.[15]

In March, P.T. Caltex Pacific Indonesia (CPI), the largest foreign contractor in Indonesia, brought on-stream three new oilfields in Central Sumatra. The initial production of Buena, Dusun, and Pusaka Oilfields was 15,000 barrels per day, 7,000 barrels per day, and 20,000 barrels per day, respectively. There are 24 wells in these 3 oilfields. The crude petroleum produced from these wells was connected by a pipeline to the export terminal at Dumai. In July, an offshore oilfield—Lalang, in Bengkalis District of Rian Province—was officially opened. The Lalang Oilfield reportedly was producing 35,000 barrels per day of crude oil.

Several oil and gas deposits were discovered in Indonesia. PERTAMINA reportedly struck an oil and gas reserve at the West Kandanghuar No. 1 exploratory well, about 47 kilometers west of the Jatibarany Oilfield in northwest Java. The exploratory well was flowing at a rate of 1,300 barrels of crude oil and 3 million cubic feet of natural gas per day. PERTAMINA also discovered an important oil and gas deposit in its Nibung Barat No. 2 exploratory well near Bunyu Island in East Kalimantan. CPI, the joint venture of Standard Oil Co. of California and Texaco Inc., discovered four oil wells near its producing Duri Oilfield in Central Sumatra and two wells northwest of the Giant Minas Field in Central Sumatra.

In August, Kodeco of the Republic of Korea reportedly struck a commercially feasible oil and gas reservoir in the offshore area of Madura, about 3 kilometers north of Sepulu Island in East Java after more than 3 years of exploration. According to Kodeco, the Madura Oilfield has an estimated reserve of 120 million barrels of crude oil, of which 22 million barrels are exploitable, and 1.3 trillion cubic feet of gas, of which 401 billion cubic feet are exploitable. Kodeco reportedly has invested over $66 million on the exploration, planned to spend an additional $22 million to start production at a rate of 10,000 to 15,000 barrels per day of crude oil in 1985, and is expected to spend $226 million for production of natural gas at a rate of 100 to 150 million cubic feet per day of gas in 1987.[16]

In February, the expansion program of the Dumai refinery in Central Sumatra was completed. The Dumai hydrocracker has an annual capacity of 198,000 barrels per day of crude oil. The Dumai refinery reportedly was not yet operational because of technical problems, which were expected to be resolved during the test run in 1984.

In January, the fifth train was completed and brought on-line at the Arun LNG plant in Aceh. The annual capacity of the Arun plant was raised to 7.5 million tons of LNG. In August, a $300 million contract was awarded to C. Itoh & Co. Ltd. and Japan Gasoline Co. by PERTAMINA to build the sixth LNG train with an annual capacity of 1.3 million tons of LNG at Arun in Aceh, North Sumatra. The sixth train was scheduled for completion in November 1986. The production of LNG from the sixth train will be exported to the Republic of Korea.

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[1]Economist, Division of International Minerals.
[2]Where necessary, values have been converted from Indonesian rupiahs (Rp) to U.S. dollars at the rate of Rp1,000=US$1.00.
[3]Business News (Jakarta). Mar. 8, 1985, p. 6.
[4]Metal Bulletin (London). No. 6886, May 11, 1984, p. 13.
[5]U.S. Embassy, Jakarta, Indonesia. State Dep. Telegram 19886, Nov. 16. 1984.
[6]Freeport-McMoRan Inc. 1984 Annual Report. Pp. 17, 49.
[7]U.S. Embassy, Jakarta, Indonesia. State Dep. Telegram 01420, Jan. 24, 1985.
[8]Mining Journal (London). Nov. 9, 1984, p. 320.
[9]Business News (Jakarta). June 20, 1984, p. 4; July 18, 1984, p. 4.
[10]Indonesia's Ministry of Mining and Energy. Indonesia Mining Yearbook, 1983. Pp. 103, 104, 160.
[11]Inco. Annual Report 1984. P. 33.
[12]The Asian Wall Street Journal. V. 8, No. 142, Mar. 23, 1984, p. 1.
[13]Kompas (Jakarta). Aug. 27, 1984, p. 12.
[14]International Mining. June 1984, p. 50.
[15]Oil and Gas Journal. V. 82, No. 18, Apr. 30, 1984, p. 27.
[16]ANTAR News Bulletin (Jakarta). Aug. 24, 1984.

The Mineral Industry of Iran

By Peter J. Clarke[1]

Iran's mineral industry continued to suffer the debilitating effects of its 4-year-old war with Iraq. Mineral ventures in southwest Iran, which included its main refineries, sulfur plants, and gas facilities, operated far below capacity if at all. Crude oil production, which had been on a substantial rebound since 1980, fell for the first time in 5 years to just over 2.1 million barrels per day. Mineral projects that were isolated from the hostilities continued to expand, however, despite a chronic lack of financing and shortages of equipment and spare parts. The primary development in the mineral sector was clearly the commencement of refinery operation at the Sar Cheshmeh copper complex. Production of copper concentrates and blister copper was nearing capacity in 1984, while the refinery managed to produce near 60% of capacity for the overall year.

The Iranian Government was also rehabilitating its steel industry. Iron ore production from the Gol-e-Gohar iron ore deposit was scheduled to begin in 1986, and construction continued on the Mubarakeh direct-reduction (DR) iron plant as well. Expansion and rehabilitation projects were also underway at the steel mills at Ahwaz and Isfahan.

Iran's economy was also experiencing considerable problems in 1984. Oil revenue, the mainstay of the economy and the engine of economic growth, was down to $14 billion,[2] a substantial drop from the 1983 level and considerably less than the budget estimate of $19 billion. Iran spent $8.45 billion on the war with Iraq, which included direct costs as well as veterans, victims, and refugee aid, leaving little available for economic development purposes.

PRODUCTION AND TRADE

The most substantial changes in Iran's mineral production were the large falloff in crude oil production, partially offset by a significant increase in refined product output, and by the more than tripling of copper production from Sar Cheshmeh. Production of other minerals remained fairly stable, with the exception of slight increases in lead and zinc output, and a drop in nitrogenous fertilizer production.

Iranian trade remained dominated by crude oil exports, which were directed mainly to Japan, and by imports of manufactured products. Japan was by far Iran's largest trading partner, although trade with Western Europe and Turkey continued to gain in importance. West German exports, which account for about one-half of the European Community's exports to Iran, were suffering from the Iranian Government's policy of reducing imports to conserve much needed foreign exchange. Iranian trade with the United States had been negligible since the revolution in 1979.

Table 1.—Iran: Estimated production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984
METALS					
Aluminum metal, primary ingot	[3]15,900	[3]12,500	[3]45,000	[3]45,600	46,000
Chromium: Chromite, gross weight	80,000	[r]30,000	[r]40,000	50,000	50,000
Copper:					
Mine output, metal content	1,000	2,000	[3]43,500	[3]48,500	150,000
Metal:					
Smelter	800	800	13,500	[3]23,500	143,000
Refined	[r]800	[r]800	[3]1,000	[3]10,000	90,000
Iron and steel:					
Iron ore, gross weight ..... thousand tons	600	600	750	850	850
Metal:					
Pig iron ..... do.	800	500	600	700	700
Steel, crude ..... do.	[r]1,200	[r]1,200	[r]1,200	[r]1,400	1,200
Lead, mine output, metal content	12,000	20,000	25,000	[3]26,000	28,000
Zinc, mine output, metal content	30,000	35,000	[3]40,000	[3]39,900	50,400
NONMETALS					
Barite	150,000	75,000	80,000	85,000	90,000
Cement, hydraulic ..... thousand tons	8,000	8,000	9,500	[r]10,000	10,500
Clays:					
Bentonite	20,000	10,000	11,000	10,000	10,000
Fire clay	50,000	40,000	50,000	45,000	45,000
Kaolin	150,000	100,000	110,000	100,000	100,000
Feldspar	2,500	2,000	2,500	2,600	2,500
Gypsum ..... thousand tons	[3]6,985	[3]5,987	5,000	[r]5,500	5,000
Lime ..... do.	500	500	550	[r]650	650
Magnesite	4,000	4,000	[r]5,000	[r]5,000	5,000
Nitrogen: N content of ammonia	[3]217,800	200,000	[r]26,000	[r]28,800	21,400
Pigments, mineral, natural	500	500	[r]500	[r]600	600
Salt, rock ..... thousand tons	600	600	700	750	750
Sodium compounds: Caustic soda	NA	10,000	12,000	12,500	12,000
Stone, sand and gravel:					
Limestone ..... thousand tons	11,000	11,000	14,000	12,000	12,000
Marble ..... do.	NA	200	200	225	200
Silica ..... do.	NA	200	200	220	200
Travertine ..... do.	NA	100	100	150	150
Strontium minerals: Celestite	5,500	5,000	4,500	4,600	4,600
Sulfates, natural:					
Aluminum-potassium sulfate (alum)	NA	3,000	3,000	2,500	12,000
Sodium sulfate (mineral not specified)	9,000	[r]10,000	[r]10,000	[r]12,000	12,000
Sulfur:					
Native ..... thousand tons	70	50	10	20	30
Byproduct of petroleum and natural gas ..... do.	150	6	10	25	30
Total ..... do.	220	56	20	45	60
Sulfuric acid ..... do.	100	70	100	150	200
Talc	300	200	250	225	200
MINERAL FUELS AND RELATED MATERIALS					
Coal ..... thousand tons	700	600	700	[3]980	1,000
Coke ..... do.	400	350	350	400	400
Gas, natural:					
Gross ..... million cubic feet	NA	200,000	381,500	NA	NA
Marketed ..... do.	NA	100,000	150,000	NA	NA
Natural gas liquids, unspecified ..... thousand 42-gallon barrels	2,000	2,000	3,000	3,200	3,400
Petroleum:					
Crude[4] ..... do.	550,000	692,000	873,000	892,200	790,590
Refinery products:					
Gasoline:					
Aviation ..... do.	[3]1,335	[3]530	620	530	
Motor ..... do.	[3]30,830	[3]26,050	[3]28,630	28,900	
Jet fuel ..... do.	[3]4,940	[3]3,040	[3]3,200	3,920	
Kerosine ..... do.	[3]34,360	[3]27,400	[3]31,870	31,900	
Distillate fuel oil ..... do.	[3]58,500	[3]47,800	[3]52,050	53,000	
Residual fuel oil ..... do.	[3]99,330	[3]58,980	[3]59,430	60,100	NA
Lubricants ..... do.	[3]1,240	[3]910	[3]910	980	
Liquefied petroleum gas ..... do.	[3]12,876	[3]12,168	[3]12,447	12,500	
Naphtha and solvents ..... do.	7,610	1,400	1,650	4,250	
Asphalt and bitumen ..... do.	[3]6,470	[3]6,290	[3]6,880	6,900	
Refinery fuel and losses ..... do.	NA	1,000	NA	NA	
Total ..... do.	257,491	[r]185,568	197,687	[r]202,980	231,800

[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 June 20, 1985.

[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]Excludes petroleum reinjected into fields.

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

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982: United States	Destinations, 1982: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	9,257	--	All to Yugoslavia.
Oxides and hydroxides	NA	330	--	All to Netherlands.
Metal including alloys, scrap	2	--		
Chromium: Ore and concentrate	5,133	--		
Copper:				
Ore and concentrate	--	7,500	--	All to Japan.
Metal including alloys, scrap	44	--		
Iron and steel: Metal:				
Scrap	12,220	433	--	All to Pakistan.
Semimanufactures:				
Bars, rods, angles, shapes, sections	153	--		
Universals, plates, sheets	1	--		
Lead:				
Ore and concentrate	5,000	--		
Oxides	--	18	--	All to Netherlands.
Platinum-group metals: Waste and sweepings ... value thousands	$418	--		
Silver:				
Ore and concentrate[2] ... do	--	$331	--	All to United Kingdom.
Waste and sweepings[2] ... do	$2	$167	--	All to West Germany.
Metal including alloys, unwrought and partly wrought ... do	$4	--		
Zinc: Ore and concentrate	--	3,090	--	All to Japan.
Other: Ashes and residues	--	60	--	All to Denmark.
NONMETALS				
Diamond:				
Gem, not set or strung ... value thousands	$83	--		
Industrial stones ... do	$56	$8	--	All to Finland.
Fertilizer materials: Crude, n.e.s	323	--		
Magnesite	--	1,735	--	All to United Kingdom.
Precious and semiprecious stones other than diamond:				
Natural ... value, thousands	$442	$95	--	Switzerland $65; West Germany $30.
Synthetic ... do	--	$8	--	All to Finland.
Salt and brine	154	303	--	Kuwait 238; Oman 65.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	76	1,642	--	Italy 1,602; Greece 40.
Worked	--	424	--	All to Kuwait.
Gravel and crushed rock	--	20,538	--	Do.
Sand other than metal-bearing	200	--		
Sulfur: Elemental:				
Crude including native and byproduct	18	--		
Colloidal, precipitated, sublimed	6	--		
MINERALS FUELS AND RELATED MATERIALS				
Peat including briquets and litter	--	19	--	All to United Kingdom.
Petroleum:				
Crude ... thousand 42-gallon barrels	169,336	855,755	540,507	Italy 84,146; Japan 78,889; Singapore 28,050.
Refinery products:				
Gasoline ... do	1,105	414	--	Netherlands 212; France 202.
Distillate fuel oil ... do	([3])	530	--	Italy 292; Switzerland 238.
Lubricants ... value, thousands	--	$193	--	All to United Arab Emirates.
Residual fuel oil ... thousand 42-gallon barrels	2,912	1,150	--	France 662; Thailand 182; Netherlands 144.
Bitumen and other residues ... do	2,052	--		
Bituminous mixtures ... value, thousands	$148	--		

NA Not available.

[1]Table prepared by Virginia Woodson. 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]May include platinum-group metals.

[3]Less than 1/2 unit.

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

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS				
Alkali and alkaline-earth metals value, thousands	$24	--		
Aluminum:				
Ore and concentrate	500	3,834	--	All from West Germany.
Oxides and hydroxides	515	904	(2)	West Germany 586; Japan 300.
Metal including alloys:				
Scrap	--	47	--	Finland 28; United Kingdom 19.
Unwrought	14,311	21,381	--	Norway 9,999; West Germany 5,894; Yugoslavia 2,772.
Semimanufactures	11,161	39,939	7	United Arab Emirates 25,806; Hungary 5,379; Switzerland 1,857.
Antimony: Metal including alloys, all forms	--	2	--	All from Italy.
Arsenic: Oxides and acids	16	--		
Chromium: Oxides and hydroxides	19	--		
Cobalt:				
Oxides and hydroxides value, thousands	$28	--		
Metal including alloys, all forms kilograms	4,300	--		
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$2	--		
Copper:				
Sulfate	40	--		
Metal including alloys:				
Scrap	--	75	--	United Kingdom 50; Italy 25.
Unwrought	1,921	2,706	--	Italy 1,590; United Kingdom 604.
Semimanufactures	33,275	15,120	--	West Germany 3,622; Japan 3,264; Sweden 1,833.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	129	--		
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	24	8	--	All from Netherlands.
Metal:				
Scrap	--	310	--	Italy 300; United Kingdom 10.
Pig iron, cast iron, related materials	585	754	--	West Germany 310; Sweden 200; Italy 126.
Ferroalloys:				
Ferromanganese	--	415	--	All from West Germany.
Silicon metal	--	36	--	Do.
Unspecified	4,131	858	--	Norway 652; West Germany 177.
Steel, primary forms	437,418	298,327	--	Japan 215,971; West Germany 34,998; France 20,264.
Semimanufactures:				
Bars, rods, angles, shapes, sections	491,341	282,109	12	Hungary 162,092; Japan 64,973; France 17,309.
Universals, plates, sheets	521,871	600,983	(2)	Japan 294,253; West Germany 215,092; Hungary 52,879.
Hoop and strip	65,005	23,120	--	West Germany 8,514; Japan 8,262; Hungary 3,326.
Rails and accessories	7,216	22,846	--	Austria 12,547; Japan 9,796.
Wire	18,479	28,218	--	Hungary 9,813; West Germany 6,388; Japan 4,691.
Tubes, pipes, fittings	155,219	106,577	21	Japan 36,009; Hungary 28,587; West Germany 16,532.
Castings and forgings, rough	644	5,939	--	Hungary 5,174; West Germany 355.
Unspecified	950	--		
Lead:				
Oxides and hydroxides	(2)	145	--	United Kingdom 120; Austria 25.
Metal including alloys:				
Scrap	--	2	--	All from United Kingdom.
Unwrought	828	1,774	--	United Kingdom 1,114; West Germany 499.
Semimanufactures	145	202	--	United Kingdom 151; Sweden 37.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Unwrought	--	1	--	All from West Germany.
Semimanufactures	--	36	--	All from United Kingdom.
Manganese:				
Ore and concentrate, metallurgical-grade	--	2,698	--	All from Netherlands.
Oxides	50	--		
Mercury 76-pound flasks	116	2	--	All from West Germany.
Molybdenum: Metal including alloys, all forms	5	2	--	Japan 1; United Kingdom 1.
Nickel: Metal including alloys:				
Unwrought	141	62	--	All from United Kingdom.
Semimanufactures	126	38	([2])	United Kingdom 37.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,308	$353	--	West Germany $278; Switzerland $75.
Silver: Metal including alloys, unwrought and partly wrought do	$1,207	$508	--	West Germany $304; United Kingdom $153.
Tin: Metal including alloys:				
Unwrought	654	8	--	All from United Kingdom.
Semimanufactures	22	10	--	Japan 5; United Kingdom 3.
Titanium:				
Ore and concentrate	2,000	1,000	--	All from Netherlands.
Oxides	396	187	--	West Germany 186.
Tungsten: Metal including alloys, all forms	15	4	--	United Kingdom 2; Belgium-Luxembourg 1; Japan 1.
Zinc:				
Oxides	462	317	--	United Kingdom 275; Switzerland 18.
Metal including alloys:				
Unwrought	2,287	--		
Semimanufactures	[3]259	--		
Zirconium: Metal including alloys:				
Unwrought	--	5,803	--	Belgium-Luxembourg 1,859; Finland 1,853.
Semimanufactures	--	1,548	--	United Kingdom 1,510.
Other:				
Ores and concentrates	2	1,015	--	Netherlands 1,000.
Oxides and hydroxides	34	465	--	Austria 403; West Germany 37.
Ashes and residues	--	6	--	All from West Germany.
Base metals including alloys, all forms	87	156	--	All from United Kingdom.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	204	121	--	Netherlands 120.
Artificial: Corundum	232	18	--	Japan 15; West Germany 2.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$3	$200	--	Belgium-Luxembourg $191; United Kingdom $8.
Grinding and polishing wheels and stones	2,461	424	--	West Germany 228; Italy 110; Denmark 40.
Asbestos, crude	1,131	8	--	All from United Kingdom.
Boron materials: Oxides and acids	3	10	--	All from West Germany.
Cement	2,636	96,388	--	Italy 59,751; Japan 18,149.
Chalk	276	208	--	Belgium-Luxembourg 108; United Kingdom 100.
Clays, crude	1,642	5,985	--	United Kingdom 5,689; West Germany 265.
Cryolite and chiolite	21	1	--	All from Switzerland.
Diamond:				
Gem, not set or strung value, thousands	$13	$186	--	All from United Kingdom.
Industrial stones do	$1,956	$2,055	--	Switzerland $1,550; United Kingdom $366.
Diatomite and other infusorial earth	325	199	54	Japan 140.
Feldspar, fluorspar, related materials	150	80	--	West Germany 70; Switzerland 10.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	286	6,571	--	All from Pakistan.
Manufactured:				
Ammonia	426	14	--	West Germany 9; United Kingdom 3.
Nitrogenous	260,127	397,779	--	U.S.S.R. 346,758; Kuwait 39,764.
Phosphatic	15,286	--		
Potassic	17	66	--	United Kingdom 29; Italy 19.
Unspecified and mixed	30,515	20,210	--	Austria 19,994; Switzerland 181.
Graphite, natural	936	1,068	--	West Germany 827; Austria 191.
Gypsum and plaster	1,297	315	--	West Germany 314.
Iodine	--	3	--	All from Netherlands.
Lime	4,575	6	--	All from Switzerland.
Magnesium compounds: Magnesite	2,454	3,177	--	Austria 2,000; Japan 1,165.
Mica: Worked including agglomerated splittings	2	6	--	Mainly from West Germany.
Phosphates, crude	1	20	--	All from United Kingdom.
Pigments, mineral: Iron oxides and hydroxides, processed	1,194	176	--	West Germany 156; United Kingdom 11.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$40	[4]$142	--	West Germany $136; United Kingdom $6.
Synthetic do	$31	$5	--	All from West Germany.
Quartz crystal, piezoelectric kilograms	--	13	--	Do.
Salt and brine	75	35	--	All from United Arab Emirates.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	743	1,073	--	United Kingdom 1,043; France 30.
Sulfate, manufactured	28,174	81	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone, worked	218	455	--	All from Italy.
Gravel and crushed rock	119	107	--	United Kingdom 100; West Germany 7.
Quartz and quartzite	395	33	--	Belgium-Luxembourg 32.
Sand other than metal-bearing	6	39	--	Belgium-Luxembourg 27; United Kingdom 9.
Sulfur:				
Elemental:				
Crude including native and byproduct	215	115	--	West Germany 63; United Kingdom 26.
Colloidal, precipitated, sublimed	33	19	--	Japan 17; West Germany 2.
Dioxide	48	--		
Sulfuric acid	15,453	790	10	Netherlands 443; Belgium-Luxembourg 253.
Talc, steatite, soapstone, pyrophyllite	1,515	148	--	Italy 76; West Germany 52.
Other:				
Crude	639	330	--	United Kingdom 234; West Germany 60.
Slag and dross, not metal-bearing	36	--		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	70	27	--	West Germany 20; Italy 7.
Carbon: Carbon black	3,997	4,311	--	West Germany 2,500; Italy 800; United Kingdom 600.
Coal:				
Anthracite and bituminous	54,058	335,673	--	West Germany 331,372.
Briquets of anthracite and bituminous coal	--	18	--	All from United Kingdom.
Coke and semicoke	1,462	--		
Peat including briquets and litter	1,281	66	--	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	1981	1982	Sources, 1982	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	25	2	--	Mainly from Italy.
Gasoline do	1	--		
Mineral jelly and wax do	39	7	--	West Germany 3; Japan 2; Netherlands 1.
Kerosine and jet fuel do	1,253	2,811	--	Italy 1,994; Netherlands 282; Singapore 246.
Distillate fuel oil do	3,227	7,487	--	Italy 4,158; Singapore 3,327.
Lubricants do	487	[5]74	--	Netherlands 9; Thailand 8; United Kingdom 7.
Nonlubricating oils do	--	1,724	2	West Germany 1,722.
Residual fuel oil do	11	73	--	All from United Kingdom.
Bitumen and other residues do	4	([2])	--	Mainly from West Germany.
Bituminous mixtures do	2	18	--	United Kingdom 17.
Petroleum coke do	62	13	--	West Germany 12.
Unspecified do	3	145	--	All from Japan.

[1]Table prepared by Virginia A. Woodson. 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]Less than 1/2 unit.
[3]Excludes unreported quantity valued at $737,000 exported by the United Kingdom.
[4]Excludes unreported value of 15,010 carats exported by Thailand.
[5]Excludes unreported quantity valued at $52,000 exported by the United Arab Emirates.

COMMODITY REVIEW

METALS

Aluminum.—Output from Iran's only aluminum smelter, at Arak, remained stable at 46,000 tons of primary aluminum. The Iranian Aluminium Co. also produced roughly 85,000 tons of aluminum alloys, a 20% increase over the 1983 level. Aluminum demand in Iran was running at 160,000 tons per year, and the shortfall was made up for by imports from Europe and the Dubai Aluminium Co. smelter in the United Arab Emirates.

Capacity at the Arak plant was to be expanded to 120,000 tons per year of aluminum bars in the late 1980's. The expansion project was underway in 1984. A tentative plan was also announced to construct a second aluminum plant near Bandar Abbas in southern Iran at a cost of $250 million.

Copper.—The National Copper Industries of Iran's Sar Cheshmeh copper mine, smelter, and refinery continued to expand output. Capacity of the operation was 145,000 tons per year of anode copper. Production amounted to over 140,000 of 98.65%-pure blister copper. The Sar Cheshmeh deposit has proven reserves of 450 million tons containing 1.12% copper and another 400 million tons of probable reserves at a similar grade. The deposit also contains 3.9 grams of silver per ton, 0.27 gram of gold per ton, and a relatively high molybdenum content.

Actual mine production at Sar Cheshmeh began in December 1981, and the smelter began operating shortly afterwards. Problems were encountered in bringing the refinery on-stream, however, and the electrolytic plant did not actually start production until February 1984. The refinery managed to produce at close to 60% capacity for the year overall. All production of blister and refined copper was consumed in the domestic market. Iran did export some copper concentrate to Japan. Concentrates had been stockpiled following the breakdown of one of Iran's sulfuric acid manufacturing plants in 1982.

The Sar Cheshmeh operation also began exporting molybdenum sulfide beginning with a 1,000-ton tender in October 1984. The molybdenum unit has an annual capacity of 4,000 tons of concentrates, containing 50% molybdenum and close to 2% copper. The concentrates also contain 1,400 parts per million of rhenium, which only a few facilities in the world have the capacity to recover.

Iron and Steel.—Engineering and design work at the National Iranian Steel Industries Corp. Gol-e-Gohar iron ore deposit continued throughout 1984, under the supervision of Gränges AB of Sweden. Gränges had done the initial site survey, core drilling, and laboratory tests on the 650-million-ton magnetite deposit between 1974 and 1978. Work was halted in 1979 during the revolution, but was restarted in July 1983. In the meantime, ownership of Gränges was assumed by Boliden AB in 1983. The Gol-e-Gohar deposit was 220 kilometers southwest of Kerman, and was expected to produce 5 million tons of ore per year, which was to be used in a DR process for steelmaking. The open pit operation was to commence in 1988 and coincide with the opening of the Mubarakeh DR plant.

Meanwhile, controversy continued over Kobe Steel Ltd.'s (Japan) contract to supply the National Iranian Steel's Mubarakeh plant with five Midrex DR plants, each with the capacity of 1.5 million tons of ore per year. Total steelmaking capacity at Mubarakeh was planned at 2.46 million tons per year from eight 180-ton electric arc furnaces. By mid-1984, Kobe Steel was cleared to supply the Midrex units following an extended legal battle with Korf Engineering of the Federal Republic of Germany. Iran had set up a special account into which payments for Iranian oil lifted by the Showa Oil Co. of Japan will be transferred to pay Kobe Steel for work on Mubarakeh. Showa had contracted to lift 25,000 barrels per day of Iranian oil in 1984, roughly equal to the value of Kobe Steel's contract during that period.

Expansion continued at Iran's two major existing steel plants, at Isfahan and Ahwaz. Addition of a second coke oven battery and a second 2,000-cubic-meter blast furnace was to raise steelmaking capacity from 600,000 to 1.9 million tons per year at Isfahan. At Ahwaz, three 150-ton electric arc furnaces were under construction, due to start up in 1986. The three 400,000-ton-per-year Midrex DR units, four 250,000-ton-per-year HYL units, and the pelletizing plant at Ahwaz were also nearing completion. Iran was scheduled to begin importing ore from the Kudremukh iron ore project in India, which had been partially funded by Iran prior to the revolution, in order to establish a supply for the units at Ahwaz. However, indications were that no ore shipments were made in 1984 to the Ahwaz plant. Iran also imported considerable quantities of steel from Turkey.

Lead and Zinc.—Production of lead and zinc in Iran remained largely unaffected by hostilities with Iraq, with lead output actually reaching its highest level in several years. The largest lead-zinc mine in the country was the Angouran Mine, in Zanjan Province in northern Iran. The operation had a daily milling capacity of 900 tons of ore. Annual production had averaged 11,000 tons of contained lead and 35,000 tons of contained zinc over the previous 5 years. Other large lead-zinc mines in the country were the Kovshke Mine, near Yazd, and the Iran Kuh Mine, near Isfahan. Production from these mines combined totaled 10,000 tons of lead metal and nearly 20,000 tons of zinc metal.

The National Iranian Lead and Zinc Co. continued planning a lead-zinc smelter at Zanjan to serve the Angouran Mine and other smaller mines. The plant was to be capable of producing between 40,000 and 60,000 tons of both lead and zinc metal. Meanwhile, a smaller facility at Sorb Abad, near Tehran, was nearing completion. This plant was to produce 15,000 tons of lead metal per year.

NONMETALS

Cement.—Production of cement managed to climb slowly, despite the adverse effects of the war and the resulting lack of spare parts. Production capacity, at between 14 and 16 million tons per year, remained well above the output level of about 10.5 million tons per year. A single new cement plant was reportedly under construction at Ourmia by the Ourmia Cement Co. The plant, scheduled for completion in 1987, was to have a capacity of 840,000 tons per year. Parts for the mill were being supplied by F. L. Smidth Group of Denmark. Despite a slight increase in production, Iran continued to import between 250,000 and 300,000 tons of cement per year to satisfy domestic requirements.

Fertilizer Materials.—The Shiraz Fertilizer Complex was completed and was being prepared for startup early in 1985. The plant was to be capable of producing 326,000 tons per year of nitrogen in ammonia, 228,000 tons per year of nitrogen in urea, 198,000 tons per year of nitric acid, and 74,000 tons per year of ammonium nitrate. Construction of the plant began in 1977 but was halted in 1979 for over a year. A second ammonia and urea facility, under construction by the National Petroleum Co., was to begin operating in 1985 also. This plant was to have an annual capacity of 366,000 tons per year of nitrogen in ammonia, and 262,000 tons of nitrogen in urea.

Sulfur.—Sulfur production had been adversely affected by hostilities with Iraq, mainly because the primary sulfur and sulfuric acid production facilities are around Kharg Island and other refining facilities, which have been considered military targets. Sulfur production capacity was 1.6 million tons per year in 1984, while sulfuric acid capacity was slightly less, at 1.24 million tons per year. Completion of a gas-processing plant at the Khangiran Gasfield in northeast Iran added capacity of 495,000 tons per year of sulfur to the country's system, which was to be consumed in a fertilizer plant at the same location which had yet to be completed. A 25,000-ton-per-year sulfuric acid plant, under construction by Nobel Chematur SA of Belgium was scheduled to begin operating in 1985, while an additional 260,000 tons per year of sulfuric acid should be made available from the Sar Cheshmeh project by 1986.

MINERAL FUELS

Petroleum.—*Production.*—Crude oil production in Iran fell over 11% in 1984 to 2.2 million barrels per day from the previous year's level of 2.6 million barrels per day, even though output remarkably remained above 2 million barrels per day, despite the upsetting effects of the Iran-Iraq conflict on petroleum facilities. Total production capacity was estimated at 3.5 million barrels per day, 3.2 million barrels per day of which was from onshore fields. Iranian production remained well below capacity, and about 200,000 to 500,000 barrels per day below its official ceiling maintained in accordance with the policies of the Organization of Petroleum Exporting Countries. Iranian crude production fluctuated during the year from about 1.0 to 2.5 million barrels per day. Actual production was restricted mainly by the reduced export capacity of Kharg Island. Crude oil production had to be reduced owing to the upsetting influence of the conflict on tanker traffic and crude oil shipments from the northern Persian Gulf.

In order to reduce the pressure on tankers traveling to Kharg, Iran introduced a tanker shuttle service from Kharg Island to its Surri Island export terminal near the mouth of the Persian Gulf, out of range of Iraqi jets. The Surri shuttle service consisted of two ultralarge crude carriers (ULCC) moored at Surri for storage, and five very large crude carriers carrying oil from Kharg to the ULCC. Export capacity at Surri, which began operating late in 1984, was 500,000 barrels per day, but was to be increased to handle up to 1 million barrels per day by mid-1985. More adventurous tankers continued to call at Kharg Island as well, despite the continuation of sporadic air attacks by Iraq.

Refining.—The war with Iraq has had its most devastating impact on Iran's refining industry. Total refining capacity in the country was estimated at 750,000 barrels per day at yearend 1984, although only slightly over 630,000 barrels per day was considered to be fully operational. Capacity was expanded late in the year by the return to production of the Kopal oil-processing plant in Khuzestan Province following a 5-year shutdown. Capacity of this plant was 35,000 barrels per day of crude oil, capable of being raised to 75,000 barrels per day within 2 years. The Tehran refinery, with design capacity of only 200,000 barrels per day, produced nearly 260,000 barrels per day of refined products in 1984 in order to supply fuel to the capital. Besides the Tehran refinery, the other primary suppliers of petroleum were the Isfahan, Lavan, Shiraz, and Tabriz refineries. Iran was in the process of beginning construction of its seventh major petroleum refinery, at Arak, which was to have a capacity of 250,000 barrels per day. At yearend 1984, basic design work and equipment purchases were being conducted. The refinery was scheduled to come into production in 1988 or 1989.

Petrochemicals.—The controversy continued over construction of the Iran-Japan Petrochemical Complex at Bandar Khomeini. The project, being built for the Iranian National Petrochemical Co. (NPC), was originally conceived in 1971 and was 85% complete when construction halted in 1979 during the Iranian revolution. Construction was resumed in 1981, but the complex came under repeated air attack, and the Iran Chemical Development Co., the Mitsui & Co.-led Japanese consortium responsible for construction of the complex, had been reluctant to continue work. In October 1983, the Japanese withdrew from the site, and negotiations proceeded on making NPC the majority owner and having it pay all construction costs. This agreement was rejected by the Iranian Parliament, and the final project resolution remains in doubt.

Uranium.—Uranium deposits, containing more than 5,000 tons of uranium were discovered in the Saghand area of Yazd. The discovery was made by the Atomic Energy Organization of Iran after several years of exploration for nuclear materials. The vein-type deposit was also found to contain iron, lead, and zinc.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Iranian rials (Rls) to U.S. dollars at the rate of Rls90.03=US$1.00.

The Mineral Industry of Iraq

By George A. Morgan[1]

Petroleum exports accounted for 99% of the foreign exchange generated in 1984. Crude petroleum output improved slightly, as did production of some nonmetallic products. Cement output in particular increased because of the addition of new capacity.

Economic activity was marked by conflicting events. The country remained engaged in war with Iran, with heavy demands placed on skilled labor and financial resources. Resource allocation and distribution were also strained owing to regional disturbances created by the war. However, exports of crude petroleum improved owing to action of the Government to expedite shipment of the country's main source of wealth. Import restrictions, imposed in 1983 to prevent draining of foreign exchange, were partially relaxed. Loan and aid agreements with foreign contractors and governments were rescheduled, while new credit extensions were obtained. The construction trades were more active, with increased brick and clay product production. Petroleum pipelines were under construction or in the planning stage.

PRODUCTION AND TRADE

Official production data for mineral commodities were unavailable, and detailed foreign trade was not reported. Output was estimated on the basis of best available information. Total exports in 1983, the latest year available, were valued at $9.8 billion, of which $9.7 billion was petroleum.[2] The United States was a net exporter to Iraq, mainly of food products shipped on credit.

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

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Iron and steel:					
Sponge iron metric tons	210,000	40,000	[e]40,000	--	--
Steel, crude do.	260,000	45,000	[e]45,000	--	--
NONMETALS					
Cement, hydraulic thousand metric tons	5,500	5,600	[e]5,600	[e]5,600	8,000
Gypsum[e] do.	170	170	170	170	300
Nitrogen:					
N content of ammonia do.	500	80	[e]80	[e]80	100
N content of urea do.	300	50	[e]50	[e]50	60
Phosphate rock do.	--	[e]50	363	[e]1,199	1,500
Salt do.	90	80	[e]80	[e]80	80
Sulfur, elemental:					
Native, Frasch do.	700	[r]200	[r e]300	[e]300	500
Byproduct[e] do.	40	40	40	40	70
Total do.	740	[r]240	[r e]340	[e]340	570

See footnotes at end of table.

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

Commodity[2]	1980	1981	1982	1983 p	1984e
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	430,000	401,173	e400,000	e400,000	400,000
Marketed[3] do	79,000	62,154	e60,000	e60,000	60,000
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	e250	400	e400	e400	e400
Propane and butane do	e3,000	990	e1,000	e1,000	e1,000
Petroleum:					
Crude do	968,582	326,000	e310,000	400,000	410,000
Refinery products:					
Gasoline do	10,000	NA	NA	NA	NA
Jet fuel do	3,000	NA	NA	NA	NA
Kerosine do	NA	NA	NA	NA	NA
Distillate fuel oil do	17,000	NA	NA	NA	NA
Residual fuel oil do	18,500	NA	NA	NA	NA
Lubricants do	400	NA	NA	NA	NA
Other do	10,000	NA	NA	NA	NA
Refinery fuel and losses do	8,100	NA	NA	NA	NA
Total do	67,000	75,000	e75,000	100,000	110,000

eEstimated. pPreliminary. rRevised. NA Not available.
[1]Includes data available through Apr. 16, 1985.
[2]In addition to the commodities listed, lime and a variety of crude construction materials (clays, sand and gravel, and stone) are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Includes reinjected, if any.

COMMODITY REVIEW

METALS

Startup of a plant to produce sponge iron from iron ore fines and thus avoid briquetting at Khor al Zubair was delayed owing to the war. Capacity information for the plant was unavailable.

NONMETALS

Cement.—Cement exports were about 2.5 million tons, mainly as a result of new capacity. Five new plants were being readied for full production, which should add an additional 9 million tons of capacity. By yearend 1985, total capacity may reach 20 million tons.

Sulfur.—Sulfur mining continued at Mishraq, 1 of 15 dome-shaped deposits in the vicinity of Mosul. Output was shipped to the Al-Qaim fertilizer complex for production of sulfuric acid and was also exported via Shuaiba in Kuwait and Ceyhan in Turkey. Exports in 1983 were about 515,000 tons. A new plant of the Iraqi National Oil Co. to recover sulfur from petroleum and natural gas was operational in 1984 at Kirkuk. Output was well below design capacity of 528,000 tons per year. Other sulfur recovery plants at Baiji were due for startup shortly. Total domestic demand is estimated at 150,000 tons per year.

MINERAL FUELS

Exploration for petroleum continued in Iraq, although at a reduced pace. Eight seismic crews and about 30 drilling rigs were active, with a discovery rate reported at over 70%.

A pilot petroleum production project, with output of about 25,000 barrels per day, was underway at the East Baghdad Field, where gas lift may be employed. High metal content, particularly vanadium, was reported for the oil.

Overall oil well production capacity was 4 million barrels per day, and additional oilfields awaited development. The U.S.S.R. was to supply technical personnel and equipment for an unspecified oilfield. A contract was also signed with Jordan for shipment to that country of about 10,000 barrels per day of crude oil by truck for refining at Zarqa. Iraqi refining capacity was to be increased with a new 150,000-barrel-per-day refinery, and output was to be for domestic consumption.

Expansion of the existing crude oil pipeline to Turkey was completed in July, and contracts were let for new pipelines to Turkey and Saudi Arabia. Negotiations continued on the financing of a $1 billion pipeline to Jordan. Tank truck transport of crude oil to Aqaba in Jordan amounted to 20,000 barrels per day over about a 10-month period as payment to Brazil for $140 million worth of Volkswagens. Also, 58,000 barrels per month of liquefied petroleum gas and 30,000 barrels per day of fuel oil are trucked to Aqaba. About 30,000 barrels per day of fuel oil is trucked through Turkey, as well as 3,500 barrels per day of gas liquids and 15,000 barrels per day of diesel fuel.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Iraqi dinars (ID) to U.S. dollars at the rate of ID0.309=US$1.00.

The Mineral Industry of Ireland

By Richard H. Singleton[1]

Ireland continued to be a significant producer of barite, lead, and zinc, each of which showed a production increase of about 10%. The new alumina plant operated successfully during its second year of production. Nitrogen and peat production each increased significantly as Ireland continued to be a significant producer of these commodities.

The Government-owned steel industry continued to operate at a loss despite improvements in efficiency. Exports of semifinished steel increased significantly while that of scrap iron decreased. Output of cement and gypsum decreased in response to decreased construction activity despite increased gypsum exports that reflected improvement in the British economy.

A 900-megawatt, coal-fired powerplant was under construction in accordance with Government policy of replacing, for economic reasons, natural gas and oil with imported coal for electrical power generation. The United Kingdom abandoned, for economic reasons, its contingent agreement to purchase Irish natural gas for Northern Ireland. The search for offshore oil continued.

Ireland's economy continued to be characterized by slow growth, a 2% increase in real gross national product; high unemployment, 16%; and governmental budgetary restraints including frozen pay for Government workers. The Consumer Price Index increased by 12%. The budget deficit, $1.1 billion,[2] was aided by a significant increase in exports. However, the positive trade balance was partially counteracted by transfer of private company profits to owners of foreign companies operating in Ireland.

PRODUCTION

Noteworthy changes in output from the modest Irish mining industry were small increases in production of barite and lead and zinc concentrates; significant increases in output of alumina, ammonia, lime, and peat; and small decreases in the production of cement, gypsum, and silver concentrate. Mine output during the preceding decade had decreased overall. Production of silver concentrate decreased by 86% during this period. Production of copper concentrate ceased in 1983. Lead concentrate production reached a record high 75,000 tons of lead equivalent in 1979 but then declined by 1984 to near the 1974 level and about one-half that of 1979. Production of zinc concentrate more than tripled during the decade. Output of most of the industrial minerals decreased somewhat during the decade, and pyrites output ceased in 1983. Ammonia production had begun in 1979 and increased through 1982. Production of natural gas increased throughout the decade, as did peat in most years.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Alumina thousand tons	--	--	--	66	653
Copper, mine output, metal content	4,200	3,500	1,600	--	--
Iron and steel: Steel, crude thousand tons	2	32	55	r e136	e136
Lead, mine output, metal content	r57,900	r28,800	r36,200	33,600	37,100
Silver, mine output, metal content thousand troy ounces	771	596	352	309	279
Zinc, mine output, metal content	228,700	120,300	167,200	186,000	206,100
NONMETALS[2]					
Barite thousand tons	260	274	266	199	220
Cement, hydraulic do.	r1,888	1,938	1,530	1,486	1,377
Gypsum do.	382	359	371	352	325
Lime	31,700	46,100	46,500	r e50,000	67,900
Magnesia[3] thousand tons	73	77	71	65	e75
Nitrogen: N content of ammonia do.	254	291	r371	294	371
Pyrites	25,000	25,600	13,800	--	--
Sand and gravel[4] thousand tons	5,376	5,400	6,497	e6,500	6,714
Stone and other quarry products:					
Limestone[4] do.	11,945	9,721	11,831	e11,000	10,598
Other[4 5] do.	3,694	3,040	3,126	e3,000	2,665
Sulfur: S content of pyrites[e]	e11,250	11,250	r6,200	--	--
MINERAL FUELS AND RELATED MATERIALS					
Coal: Anthracite and bituminous thousand tons	63	70	63	75	70
Gas, natural: Marketed million cubic feet	32,205	49,087	r71,800	77,500	82,200
Peat:					
For agricultural use thousand tons	88	81	95	e95	96
For fuel use:					
Sod peat[7] do.	1,688	1,584	1,680	e1,650	1,643
Milled peat[8] do.	2,738	3,774	3,599	e5,000	6,291
Total do.	4,426	5,358	5,279	e6,650	7,934
Peat briquets do.	338	340	406	e400	410
Petroleum refinery products thousand 42-gallon barrels	r15,600	r5,300	3,510	8,500	9,200

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Aug. 15, 1984.
[2]Ireland also produces significant quantities of synthetic diamond and is the major overseas supplier of this material to the United States. However, output is not quantitatively reported, and available general information is inadequate to make reliable estimates of output levels.
[3]Based on exports.
[4]Excludes output by local authorities and road contractors.
[5]Includes clays for cement production, fire clay, granite, marble, rock sand, silica rock, and slate.
[6]Reported figure.
[7]Includes production by farmers and by Bord Na Mona.
[8]Includes milled peat used for briquet production.

TRADE

Exports of steel semimanufactures nearly doubled in 1983, while that of lead concentrate increased. Exports of steel scrap and cement decreased significantly. Significant increases occurred in the imports of aluminum, cement, chromium concentrate, manganese concentrate, mercury, platinum, steel scrap, and sulfuric acid. Significant decreases occurred in the imports of gem diamond, silver, and steel semimanufactures.

Table 2.—Ireland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals, unspecified	24	5	NA	NA.
Aluminum:				
Ore and concentrate	--	4,553	4,553	
Oxides and hydroxides	2,309	31,667	3	United Kingdom 25,199; West Germany 5,328.
Metal including alloys:				
Scrap	3,479	4,246	--	United Kingdom 2,823; West Germany 629.
Unwrought	1,876	2,537	--	United Kingdom 2,072; Japan 465.
Semimanufactures	1,783	1,724	(2)	United Kingdom 850; West Germany 293.
Cadmium: Metal including alloys, all forms	46	20	--	All to Belgium-Luxembourg.
Chromium:				
Oxides and hydroxides	5	1	--	All to United Kingdom.
Metal including alloys, all forms	16	--		
Cobalt: Metal including alloys, all forms	22	41	38	West Germany 2.
Copper:				
Ore and concentrate	7,430	360	--	All to East Germany.
Metal including alloys:				
Scrap	8,260	8,051	20	Netherlands 2,292; United Kingdom 1,623; Belgium-Luxembourg 1,474.
Unwrought	481	530	--	West Germany 193; Belgium-Luxembourg 148.
Semimanufactures	1,567	803	100	United Kingdom 271; West Germany 207.
Gold: Waste and sweepings value, thousands	$885	$440	--	United Kingdom $310; West Germany $70.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	47	23	--	All to United Kingdom.
Metal:				
Scrap	58,753	21,264	--	United Kingdom 15,083; Spain 4,637.
Pig iron, cast iron, related materials	1,790	49	--	United Kingdom 33; Switzerland 5.
Ferroalloys:				
Ferromanganese	17	184	--	Belgium-Luxembourg 170; West Germany 14.
Ferrosilicon	--	20	--	All to United Kingdom.
Unspecified	50	25	--	Belgium-Luxembourg 15; United Kingdom 10.
Steel, primary forms	1,094	241	4	United Kingdom 158; Malta 40.
Semimanufactures:				
Bars, rods, angles, shapes, sections	42,133	100,442	(2)	United Kingdom 37,885; France 17,158; West Germany 13,431.
Universals, plates, sheets	5,491	5,796	--	United Kingdom 4,716; West Germany 646.
Hoop and strip	690	1,050	18	Italy 560; United Kingdom 341.
Rails and accessories	709	2,178	(2)	Italy 1,519; United Kingdom 567.
Wire	539	969	33	United Kingdom 861; France 41.
Tubes, pipes, fittings	5,010	4,232	(2)	United Kingdom 3,445; West Germany 236.
Castings and forgings, rough	385	59	1	United Kingdom 49; Tanzania 9.
Lead:				
Ore and concentrate	49,383	59,606	--	West Germany 14,107; Spain 13,675; France 10,669.
Oxides	--	41	--	All to United Kingdom.
Ash and residue containing lead	407	267	--	Do.
Metal including alloys:				
Scrap	3,858	2,995	--	Belgium-Luxembourg 1,685; Netherlands 825.
Unwrought	1,715	177	(2)	United Kingdom 160; Netherlands 15.
Semimanufactures	4,258	2,542	--	United Kingdom 2,352; Singapore 82.
Lithium: Oxides and hydroxides	3	36	--	All to Netherlands.
Magnesium: Metal including alloys:				
Scrap	--	8	--	Do.
Unwrought	1	3	--	All to United Kingdom.
Semimanufactures	1	10	--	Do.
Manganese: Oxides	9,164	8,286	308	Belgium-Luxembourg 3,438; Singapore 1,512.
Nickel:				
Matte and speiss	47	20	--	All to Belgium-Luxembourg.
Ash and residue containing nickel	NA	4	--	All to United Kingdom.

See footnotes at end of table.

Table 2.—Ireland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS —Continued				
Nickel —Continued				
Metal including alloys:				
Scrap	47	51	--	United Kingdom 33; Netherlands 13.
Unwrought	19	108	19	Netherlands 88.
Semimanufactures	206	181	--	West Germany 76; Switzerland 42.
Platinum-group metals:				
Waste and sweepings value, thousands	$64	$18	--	West Germany $16.
Metals including alloys, unwrought and partly wrought troy ounces	44,625	29,900	(2)	Mainly to United Kingdom.
Silver:				
Waste and sweepings[3] value, thousands	r$825	$1,310	--	West Germany $750; United Kingdom $540.
Metal including alloys, unwrought and partly wrought troy ounces	180,944	94,073	--	United Kingdom 78,512; Switzerland 15,561.
Tin: Metal including alloys:				
Scrap	192	765	--	United Kingdom 691; Netherlands 39.
Unwrought	119	161	--	Belgium-Luxembourg 78; United Kingdom 58.
Semimanufactures	31	15	--	Mainly to United Kingdom.
Titanium:				
Oxides	25	15	--	All to Italy.
Metal including alloys, all forms	6	3	--	All to United Kingdom.
Tungsten: Metal including alloys, all forms	6	15	(2)	United Kingdom 12; Belgium-Luxembourg 1.
Zinc:				
Ore and concentrate	343,770	356,219	--	Belgium-Luxembourg 126,533; West Germany 51,756; France 47,200.
Oxides	31	29	3	United Kingdom 26.
Ash and residue containing zinc	376	263	--	All to Belgium-Luxembourg.
Metal including alloys:				
Scrap	332	95	--	United Kingdom 55; Belgium-Luxembourg 40.
Unwrought	230	228	--	All to United Kingdom.
Semimanufactures	29	56	--	United Kingdom 54; Switzerland 2.
Other:				
Ores and concentrates	20	--		
Ashes and residues	84	67	NA	Mainly to United Kingdom.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	38	2	--	All to United Kingdom.
Dust and powder of precious and semiprecious stones including diamond kilograms	97	2,491	506	Japan 837; West Germany 509.
Grinding and polishing wheels and stones	33	41	12	United Kingdom 8; Singapore 3.
Asbestos, crude	109	176	--	All to United Kingdom.
Barite and witherite	267,501	227,148	7,000	United Kingdom 81,446; Canada 33,100; Saudi Arabia 32,000.
Cement	168,872	90,669	NA	United Kingdom 88,714.
Chalk	5	12	NA	United Kingdom 10.
Clays, crude	9	789	NA	United Kingdom 207.
Diamond:				
Gem, not set or strung value, thousands	--	$21	--	Belgium-Luxembourg $11; United Kingdom $10.
Industrial stones carats	10,000	--		
Diatomite and other infusorial earth	(2)	10	--	All to United Kingdom.
Fertilizer materials:				
Crude, n.e.s	4,745	7,094	--	Do.
Manufactured:				
Ammonia	118,372	96,736	--	Spain 62,881; France 19,548; United Kingdom 14,306.
Nitrogenous	217,580	215,770	--	United Kingdom 77,510; India 30,650.
Potassic	2	2,413	NA	United Kingdom 1,281; France 1,076.
Unspecified and mixed	51,534	48,363	--	United Kingdom 47,223; France 1,111.
Graphite, natural	5	(2)	--	All to West Germany.
Gypsum and plaster	54,244	41,175	NA	United Kingdom 27,126.
Lime	3,063	2,227	--	All to United Kingdom.

See footnotes at end of table.

Table 2.—Ireland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Magnesium compounds	r70,861	65,176	17,834	Belgium-Luxembourg 12,937; United Kingdom 11,259.
Mica:				
Crude including splittings and waste	--	14	NA	United Kingdom 5.
Worked including agglomerated splittings	--	2	1	United Kingdom 1.
Phosphates, crude	42	465	--	All to United Kingdom.
Pigments, mineral: Iron oxides and hydroxides, processed	6	21	--	Do.
Precious and semiprecious stones other than diamond: Natural value, thousands	$218	$55	--	Switzerland $36; United Kingdom $10.
Salt and brine	800	685	NA	United Kingdom 598; Norway 25.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	39	140	--	All to United Kingdom.
Sulfate, manufactured	37	108	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,000	908	1	United Kingdom 592; Belgium-Luxembourg 313.
Worked	2,451	3,629	2,751	United Kingdom 862.
Dolomite, chiefly refractory-grade	--	20	--	All to United Kingdom.
Gravel and crushed rock	314,873	334,204	--	United Kingdom 274,529; West Germany 48,980.
Limestone other than dimension	573	1,063	--	United Kingdom 1,062.
Quartz and quartzite	324	368	--	United Kingdom 254; Switzerland 77.
Sand other than metal-bearing	7,436	6,662	NA	United Kingdom 6,591.
Sulfur:				
Elemental: Crude including native and byproduct	36	68	--	All to United Kingdom.
Sulfuric acid	2,067	77	--	Do.
Talc, steatite, soapstone, pyrophyllite	248	297	--	United Kingdom 268; Netherlands 28.
Other:				
Crude	152	203	66	United Kingdom 134.
Slag and dross, not metal-bearing	67	341	2	United Kingdom 339.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	77	125	--	All to United Kingdom.
Carbon black	116	204	NA	United Kingdom 167; Netherlands 20.
Coal:				
Anthracite	9	1,605	--	All to United Kingdom.
Bituminous	3,421	3,261	--	Do.
Lignite including briquets	--	179	--	Do.
Gas, manufactured	91	50	--	United Kingdom 49; Nigeria 1.
Peat including briquets and litter	157,342	168,163	256	United Kingdom 148,674; Egypt 6,742.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	42,827	53,604	--	United Kingdom 53,592.
Gasoline do.	7,787	12,486	--	Netherlands 10,718.
Mineral jelly and wax do.	1,322	1,251	(2)	United Kingdom 701; Netherlands 527.
Kerosine and jet fuel do.	16	23	--	United Kingdom 16.
Distillate fuel oil do.	3,320	18,493	134	United Kingdom 18,359.
Lubricants do.	14,868	18,046	7	United Kingdom 15,176; West Germany 1,358.
Residual fuel oil do.	1,009,170	2,772,178	--	United Kingdom 2,684,719; Spain 87,459.
Bitumen and other residues do.	182	6,151	--	All to United Kingdom.
Bituminous mixtures do.	1,248	430	--	Do.

rRevised. NA Not available.
[1]Table prepared by Margaret M. Chauncey.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Ireland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals, unspecified	16	15	(2)	United Kingdom 14.
Aluminum:				
Ore and concentrate	111,673	562,997	--	Guinea 561,956; China 1,000.
Oxides and hydroxides	4,042	13,026	132	France 8,974; United Kingdom 3,674; Netherlands 222.
Metal including alloys:				
Scrap	202	339	--	United Kingdom 287; West Germany 31.
Unwrought	2,757	2,002	--	United Kingdom 1,207; Norway 764.
Semimanufactures	21,230	27,380	3,917	United Kingdom 11,962; West Germany 3,501; France 3,177.
Chromium:				
Ore and concentrate	--	3,275	--	China 3,273; United Kingdom 2.
Oxides and hydroxides	147	128	(2)	Netherlands 64; United Kingdom 38.
Cobalt: Oxides and hydroxides	6	4	3	United Kingdom 1.
Copper: Metal including alloys:				
Scrap	530	286	--	United Kingdom 281; Italy 3.
Unwrought	330	131	--	West Germany 104; United Kingdom 27.
Semimanufactures	17,855	18,149	125	United Kingdom 10,220; Belgium-Luxembourg 2,165.
Gold: Metal including alloys, unwrought and partly wrought value, thousands	$4,190	$5,502	NA	NA.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	20	479	--	United Kingdom 418; Brazil 61.
Metal:				
Scrap	2,424	70,294	1	United Kingdom 70,138.
Pig iron, cast iron, related materials	1,594	751	(2)	United Kingdom 616; Sweden 72.
Ferroalloys:				
Ferromanganese	558	1,348	--	France 1,216; West Germany 98.
Ferrosilicon	146	508	--	United Kingdom 283; Norway 225.
Unspecified	123	330	(2)	West Germany 180; Norway 96.
Steel, primary forms	9,924	4,206	25	United Kingdom 3,521; West Germany 345.
Semimanufactures:				
Bars, rods, angles, shapes, sections	143,743	118,602	59	United Kingdom 82,556; Belgium-Luxembourg 7,264.
Universals, plates, sheets	143,094	122,008	52	United Kingdom 66,317; France 15,151.
Hoop and strip	19,982	12,872	74	United Kingdom 9,573; West Germany 2,422.
Rails and accessories	8,755	8,188	10	United Kingdom 3,854; West Germany 3,851.
Wire	17,730	20,038	28	United Kingdom 8,862; France 4,783.
Tubes, pipes, fittings	82,774	51,782	122	United Kingdom 21,376; Italy 5,684.
Castings and forgings, rough	4,515	2,931	24	United Kingdom 1,662; West Germany 504.
Lead:				
Oxides	2,272	2,061	--	United Kingdom 1,999; West Germany 40.
Metal including alloys:				
Scrap	7,689	3,918	--	All from United Kingdom.
Unwrought	1,478	973	--	United Kingdom 967.
Semimanufactures	1,326	514	3	United Kingdom 274; Belgium-Luxembourg 220.
Magnesium: Metal including alloys:				
Scrap	(2)	5	--	All from United Kingdom.
Unwrought	147	80	--	Norway 74; United Kingdom 5.
Semimanufactures	93	155	15	United Kingdom 118; Norway 15.
Manganese:				
Ore and concentrate, metallurgical-grade	10,815	21,152	--	Ghana 20,781; Brazil 194.
Oxides	301	324	2	United Kingdom 156; Belgium-Luxembourg 122.
Mercury 76-pound flasks	447	12,474	--	United Kingdom 12,445.
Molybdenum: Metal including alloys, all forms	1	4	3	West Germany 1.
Nickel:				
Matte and speiss	5	5	--	All from United Kingdom.
Oxides and hydroxides	2	2	--	United Kingdom 1.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Nickel —Continued				
Metal including alloys:				
Scrap	23	4	(2)	United Kingdom 2.
Unwrought	187	142	--	France 100; United Kingdom 31.
Semimanufactures	256	293	64	United Kingdom 119; West Germany 58.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	11,799	27,842	4,694	United Kingdom 23,148.
Silver:				
Waste and sweepings[3] value, thousands	$213	$1	--	All from United Kingdom.
Metal including alloys, unwrought and partly wrought troy ounces	282,219	182,970	NA	United Kingdom 171,428.
Tin:				
Oxides	2	25	--	United Kingdom 24; West Germany 1.
Metal including alloys:				
Scrap	8	(2)	NA	NA.
Unwrought	9	38	(2)	United Kingdom 33; West Germany 4.
Semimanufactures	137	146	7	United Kingdom 138.
Titanium:				
Ore and concentrate	26	136	118	United Kingdom 18.
Oxides	3,017	2,290	1	Norway 610; West Germany 521; United Kingdom 519.
Metal including alloys, semimanufactures	20	68	26	Japan 33; United Kingdom 3.
Tungsten: Metal including alloys, all forms	26	7	5	United Kingdom 2.
Zinc:				
Oxides	1,045	939	(2)	United Kingdom 785; Belgium-Luxembourg 68.
Blue powder	135	130	NA	NA.
Metal including alloys:				
Scrap	251	184	--	All from United Kingdom.
Unwrought	1,814	1,939	--	Canada 773; Belgium-Luxembourg 430; Netherlands 357.
Semimanufactures	527	120	1	NA.
Zirconium: Ore and concentrate	--	21	--	All from United Kingdom.
Other:				
Ores and concentrates	92	161	136	United Kingdom 25.
Ashes and residues	2,484	1,131	--	Belgium-Luxembourg 1,058.
Base metals including alloys, all forms	150	264	124	United Kingdom 89; Japan 33.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	165	240	(2)	United Kingdom 206; Italy 16.
Artificial: Corundum	48	76	--	Denmark 42; United Kingdom 22.
Dust and powder of precious and semiprecious stones including diamond kilograms	286	2,172	2,156	West Germany 14.
Grinding and polishing wheels and stones	499	407	23	West Germany 150; United Kingdom 108.
Asbestos, crude	5,777	4,729	--	Republic of South Africa 2,586; Canada 1,472; Cyprus 632.
Barite and witherite	300	366	--	United Kingdom 306; West Germany 60.
Boron materials:				
Crude natural borates	1,225	1,363	802	Belgium-Luxembourg 351.
Oxides and acids	111	144	--	France 116; United Kingdom 26.
Cement	100,702	111,969	1	Spain 31,423; West Germany 30,298; United Kingdom 26,696.
Chalk	1,907	2,950	--	United Kingdom 2,461; France 180.
Clays, crude	27,924	21,932	175	United Kingdom 13,727; France 4,620.
Diamond:				
Gem, not set or strung value, thousands	$245	$835	--	United Kingdom $633; Belgium-Luxembourg $197.
Industrial stones thousand carats	3,380	1,015	980	United Kingdom 20.
Diatomite and other infusorial earth	469	453	NA	NA.
Feldspar, fluorspar, related materials	7,586	6,333	--	Norway 5,723; United Kingdom 546.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	3,864	2,493	--	All from United Kingdom.
Manufactured:				
Ammonia	1,365	17,110	--	United Kingdom 13,506; France 2,140.
Nitrogenous	201,178	222,279	--	Belgium-Luxembourg 70,392; Netherlands 37,916; Sweden 33,643.
Phosphatic	98,418	133,482	23,105	Netherlands 39,013; Sweden 25,219.
Potassic	258,020	303,191	--	West Germany 140,743; France 46,011.
Unspecified and mixed	353,612	476,514	46,888	United Kingdom 159,633; Netherlands 85,094; Belgium-Luxembourg 70,764.
Graphite, natural	22	19	16	West Germany 3.
Gypsum and plaster	5,474	4,912	322	United Kingdom 4,106.
Lime	626	1,236	--	United Kingdom 1,229; West Germany 5.
Magnesium compounds	37,410	40,042	--	United Kingdom 20,592; Greece 6,602.
Mica:				
Crude including splittings and waste	375	168	14	United Kingdom 144.
Worked including agglomerated splittings	43	81	60	United Kingdom 21.
Nitrates, crude	([2])	16	--	All from United Kingdom.
Phosphates, crude	9,669	3,405	--	Morocco 2,750; East Germany 593.
Pigments, mineral: Iron oxides and hydroxides, processed	1,921	1,966	33	West Germany 1,665; United Kingdom 160.
Potassium salts, crude	38	([2])	NA	NA.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$91	$240	$23	United Kingdom $161; Switzerland $19.
Synthetic ----- do	$6	$14	$5	Switzerland $5; United Kingdom $4.
Salt and brine	88,964	79,218	3	United Kingdom 47,013; West Germany 16,754.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	15,220	17,659	22	United Kingdom 11,230; Netherlands 4,817.
Sulfate, manufactured	694	582	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	6,825	2,863	([2])	Republic of South Africa 1,338; United Kingdom 789.
Worked	3,788	6,048	223	Canada 2,213; Italy 2,199.
Dolomite, chiefly refractory-grade	809	2,512	--	United Kingdom 1,925; Netherlands 556.
Gravel and crushed rock	336,979	247,357	--	United Kingdom 246,395.
Limestone other than dimension	5,364	16,537	40	United Kingdom 16,457.
Quartz and quartzite	879	368	3	Portugal 202; United Kingdom 102.
Sand other than metal-bearing	126,963	100,329	86	United Kingdom 76,032; Belgium-Luxembourg 20,838.
Sulfur:				
Elemental:				
Crude including native and byproduct	443	493	55	United Kingdom 283; West Germany 104.
Colloidal, precipitated, sublimed	178	90	14	United Kingdom 76.
Sulfuric acid	45,828	64,319	21	United Kingdom 35,233; Norway 14,062.
Talc, steatite, soapstone, pyrophyllite	2,538	2,725	24	United Kingdom 974; China 933.
Other:				
Crude	5,655	6,743	25	Republic of South Africa 1,708; Italy 1,600.
Slag and dross, not metal-bearing	2,584	2,795	--	Belgium-Luxembourg 2,369; United Kingdom 212.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,693	2,534	72	United Kingdom 1,976; Trinidad and Tobago 360.
Carbon black	9,866	6,228	89	United Kingdom 3,322; Netherlands 1,532; France 730.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite thousand tons	41	58	--	Republic of South Africa 22; United Kingdom 14.
Bituminous do.	1,196	1,368	155	Poland 726; United Kingdom 438.
Briquets of anthracite and bituminous coal	1,680	7	--	All from United Kingdom.
Lignite including briquets	15,453	15,132	--	West Germany 7,682; East Germany 7,322.
Coke and semicoke	9,430	6,548	--	West Germany 4,190; United Kingdom 1,880.
Gas, manufactured	10	11	--	Switzerland 5; United Kingdom 4.
Peat including briquets and litter	626	707	NA	NA.
Petroleum:				
Crude thousand 42-gallon barrels	3,625	7,797	--	United Kingdom 6,554; Libya 984; Saudi Arabia 259.
Refinery products:				
Liquefied petroleum gas do.	1,779	1,713	(2)	United Kingdom 1,509.
Gasoline do.	7,951	6,140	(2)	United Kingdom 5,836; Spain 186.
Mineral jelly and wax do.	26	28	(2)	United Kingdom 23; West Germany 4.
Kerosine and jet fuel do.	2,636	2,512	--	United Kingdom 2,062; U.S.S.R. 419.
Distillate fuel oil do.	8,725	6,820	(2)	United Kingdom 6,181; U.S.S.R. 637.
Lubricants do.	301	331	7	United Kingdom 305.
Residual fuel oil do.	9,083	7,641	--	United Kingdom 4,445; France 1,072.
Bitumen and other residues do.	544	572	--	United Kingdom 544; France 26.
Bituminous mixtures do.	43	44	(2)	United Kingdom 40; Italy 2.
Petroleum coke do.	(2)	98	98	

NA Not available.
[1]Table prepared by Margaret M. Chauncey.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—The new Aughinish alumina plant operated at nearly 80% of designed capacity in 1984 producing 653,000 tons of alumina. Most of the product was exported, in decreasing order of volume, to the United Kingdom, the Netherlands, and Norway. Alcan Aluminum Ltd. assumed 65% ownership of the plant by purchasing the 25% owned by ARCO Metals Ltd. The remaining 35% was retained by Billiton Aluminium Ireland Ltd.

Lead-Zinc.—Bula Ltd. decided at yearend to sell its property within the Navan lead-zinc deposit in County Meath to Tara Mines Ltd., largely because of a lack of capital. The property was near the Tara lead-zinc mine, which was also within the Navan deposit. Tara was 48% owned by Noranda Mines Ltd., a Canadian company, whereas Bula was wholly Irish owned, 49% by the Government.

Steel.—Government-owned Irish Steel Ltd. continued to operate at a loss, $21 million in 1984, despite technological improvements and a sharp reduction in staff. This caused the Government to examine the plant's viability. The renovated and expanded plant, which began operation in 1981 using steel scrap as feedstock, had reached approximately one-half production capacity by 1983, in accordance with a quota prescribed by the European Economic Community. About two-thirds of the product was exported, mostly as semimanufactured products. Irish Steel began to replace its line of galvanized sheet with a corrugated zinc-aluminum coated sheet product.

NONMETALS

Magnesia.—Sales, all exports, increased as Premier Periclase Ltd. (PPL), the sole producer, had its most successful year. Production of high-grade magnesia from seawater had begun by PPL in 1980 near Drogheda in County Meath just north of Dublin. Indicated plant capacity was 100,000 tons per year. High-purity lime needed for the process was produced from a high-purity limestone taken from a nearby deposit. The magnesia was suitable for manufacture of refractory brick used to line steel furnaces. A world steel industry depression had forced the plant to close for a period in late 1982 and early 1983. The other manufacturer, the Quigley Magnesite Div. of Pfizer Chemical Corp., had permanently ceased production of a lower grade magnesia in 1982 because of high energy costs and a falling market. Energy costs remained high in PPL's oil-fired plant although the company showed a profit in 1984. The fraction of magnesia exports shipped to the United States decreased steadily after 1979 although the United States remained the largest recipient, taking 25% of total exports in 1984.

Nitrogen.—The ammonia plant, operated by Government-owned Nitrigin Eireann Teoranta (NET) in its ammonia-urea complex at Marino Point on Grant Island in Cork Harbor since it went on-stream in 1979, resumed full-capacity production in 1984 after operating at 80% of capacity in 1983. It had reached full capacity for the first time in 1982. Feedstock was natural gas from Ireland's offshore Kinsale Field. The ammonia was distributed to the urea plant, to NET's Arklow plant in County Wicklow for manufacture of calcium ammonium nitrate and other nitrogenous compounds, and to an export market. Approximately one-half of the total fertilizer output, on a nitrogen-content basis, was used in the domestic fertilizer market, and the remainder was exported, mostly to Western Europe, about one-half in the form of ammonia and the balance in nitrogen compounds, primarily urea. Imports of nitrogen fertilizers were insignificant.

MINERAL FUELS

Fuels demand, 8.24 million tons of oil equivalent, was supplied 49% by imported oil, 22% by domestic offshore natural gas, 16% by domestic peat, and 13% by mostly imported coal. Fuel-end-use categories were electrical power generation, 31%; residential and commercial space heating, 27%; industry, 22%; and transportation, all oil, 20%. Fuels used for electrical power generation were natural gas, 54%; peat, 24%; and oil, 22%. A surplus existed in electrical power generation capacity. No electrical power was exported to Northern Ireland.

Coal.—Approximately 95% of the coal supply was imported. Exports were negligible. Coal was used primarily in space heating, 78%; and the balance was used by industry. Although no coal was used for electrical power generation, a 900-megawatt, coal-fired powerplant was under construction at Moneypoint, County Clare. The Government announced its intention to replace natural gas and oil with imported coal for electrical power generation to reduce electrical power unit cost.

Production of anthracite from the Flair Resources Ltd. mine at Lickfinn, County Tipperary, in the Slieve Ardagh Coalfield, ceased at midyear. The firm had planned on renovating and enlarging the mine to significantly increase Ireland's coal output.

Natural Gas.—In September, the British Government abandoned, for economic reasons, the contingent agreement to purchase natural gas from Ireland as envisaged in a Memorandum of Understanding signed by the Irish and British authorities in October 1983. The gas was to have been pipelined from Dublin to Belfast and would have required an extension of the Kinsale-Dublin pipeline. The United Kingdom's position was that the offered unit price was too high, particularly in view of the questionable market in Northern Ireland where most of the energy had been traditionally supplied by coal. This market loss, together with the Irish domestic gas surplus, was expected to restrict further development of the Kinsale Gasfield off the city of Cork.

Natural gas was used primarily in electrical power generation, 75%; and industry, 23%. Specialty premium end uses were being sought.

Petroleum.—Exploration drilling continued in the Celtic Sea in an attempt to discover oil. An appraisal in April of the well in which oil had been discovered in 1983 by Gulf Oil Ltd. in block 49/9 flowed only water. A second test well drilled subsequently by Gulf in block 49/10 yielded only water. No major oil reserve had yet been found in offshore Ireland. Interest was being diverted to the shallower waters of the Celtic Sea in which awards had been made in 1982 for exploration in 24 blocks.

In order to attract more applicants for offshore exploration awards, incentives were being offered by the Government including exemption from royalty payments on the first 25 million barrels of production from marginal oilfields and deduction of development costs from profits in certain cases in exchange for a Government option to participate. Also, the awarding date was postponed from February 1985 to June 1985.

Very heavy dependence on oil imports, about 75% in 1973, had been lowered by development of offshore natural gas and increased coal imports. Oil was used in 1984 for transportation, 41%; industry, 29%; space heating, 16%; and electrical power generation, 14%.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Irish pounds (£) to U.S. dollars at the rate of £1=US$1.08, the average for 1984.

The Mineral Industry of Israel

By Ben A. Kornhauser[1]

The U.S. International Trade Commission was investigating the economic effect of permitting duty-free imports from Israel, especially on U.S. industries producing like articles or those that would be directly competitive. Effects of such duty-free imports on consumers were also under study.

Israel remained in an economic crisis during 1984 with a $4.8 billion current account deficit and a 445% inflation at yearend.[2] To continue trading with countries with foreign debt problems, Israel increased its reliance on countertrading, an adaptation of barter trading.

Negev Phosphates Ltd. (NPL), a subsidiary of the Israel Chemicals Ltd. (ICL), completed its new $2 million facility at Zin and had its capacity increased to 2.5 million tons of finished fertilizer products. The Maklef project for producing potash was completed at a total cost of $180 million and had the capacity to produce 2.1 million tons of potash per year.

The United States and Israel signed a cooperative agreement for research in various aspects of energy. Exploration for petroleum continued. A pilot plant for producing a stable emulsion of powdered coal, fuel oil, and water was built using U.S. technology and a commercial-scale plant was planned.

PRODUCTION AND TRADE

The U.S. International Trade Commission was investigating the economic effect of permitting entry of duty-free Israeli exports on U.S. industries producing like or directly competitive articles and the effect on the consumers. The agreement would phase out tariffs on all trade between the countries and would eliminate non-tariff barriers that would inhibit trade between them.

Israel was in an economic crisis with a $23.8 billion foreign debt, a $4.8 billion current account deficit, and a 445% inflation at yearend, more than double the 190% figure of 1983.[3] Israel's current budget deficit equaled 17% of its gross national product (GNP) and was a major source of inflation because the Bank of Israel was required by law to cover deficits by printing money. Unemployment reached 6% to 7%. Although economic growth had stagnated for the last several years causing GNP to decline to $24 billion from $24.3 billion in 1983, it was only the second such decline in Israel's history. The balance-of-payments was of great concern because of the GNP; imports constituted $8.4 billion, 35%; and exports were $5.8 billion, 24%. The trade deficit in 1984 declined $1 billion to $2.5 billion because of the growth in exports, which was led by the chemical sector, and recovery in the metals, machinery, and electronics sectors. Although chemical sales amounted to 34% of sales of all industrial companies, income from chemical exports equaled 59% of income from all industrial companies. Israel's largest single trading partner continued to be the United States although its trade was greater with the European Communities (EC) as a whole. In trade with Israel, the United States imported $1.6 billion or 28% of total imports, and exported $1.8 billion or 21% of total exports; the EC imported $1.9 billion, 33%, and exported $3.5 billion, 42%.

Countertrading grew in importance because of Israel's need to maintain a market share in countries with foreign debt problems. A buy-back clause was required in every contract for the purchase of more than $50,000 worth of goods or services abroad by the Government or Government-affiliated organizations. The supplier, in turn, was required to buy Israeli goods or services valued at 35% of the amount of the sale. Such reciprocal purchases reached $500 million in 1984.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Copper, oxide (80%-90% Cu):[e]					
Gross weight	[3]800	NA	4,200	4,200	3,500
Metal content	600	NA	3,500	3,500	2,900
Iron and steel: Steel, crude[e]	115,000	120,000	120,000	150,000	200,000
NONMETALS					
Barite (60% $BaSO_4$)	750	NA	NA	NA	NA
Bromine:					
Elemental	44,059	44,019	70,000	70,000	90,700
Compounds	31,792	32,248	50,500	50,500	65,300
Cement, hydraulic (from domestic clinker) thousand tons	1,842	2,361	2,189	2,058	[4]1,889
Clays:					
Bentonite	18,321	12,581	12,000	[4]6,838	12,000
Flint clay	14,351	9,133	25,000	9,108	9,000
Kaolin	9,495	37,299	12,000	26,844	27,000
Other	32,073	2,926	35,000	18,274	19,000
Gypsum	[e]80,000	42,700	42,000	[4]42,000	42,000
Lime	[e]124,000	80,000	50,000	[4]41,000	50,000
Nitrogen: N content of ammonia	54,800	42,700	49,300	53,400	57,500
Phosphate rock, beneficiated thousand tons	2,307	2,372	2,171	2,969	3,312
Potash, K_2O equivalent do	797	839	1,004	1,000	1,100
Salt, marketed (mainly marine)	18,010	132,250	148,200	98,200	130,000
Sand:					
Glass sand	71,465	62,700	65,000	[4]61,000	61,000
Other (for building industry) thousand tons	3,900	4,100	4,000	4,300	4,300
Sodium and potassium compounds: Caustic soda	35,268	34,553	29,346	30,974	28,501
Stone:					
Crushed thousand cubic meters	4,696	5,000	6,000	4,500	5,000
Dimension, marble	14,000	14,000	[e]15,000	12,000	13,000
Sulfur:					
Byproduct from petroleum thousand tons	10	10	10	10	10
Sulfuric acid do	209	182	154	171	[4]189
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural, marketed million cubic feet	7,769	13,420	7,000	6,300	5,000
Peat[e] thousand tons	20	20	20	20	20
Petroleum:					
Crude:					
From Israel proper thousand 42-gallon barrels	142	116	100	92	[4]132
From occupied Sinai Peninsula[e] do	12,500	NA	--	--	--
Refinery products:					
Gasoline do	8,640	NA	NA	NA	NA
Kerosine and jet fuel do	6,120	NA	NA	NA	NA
Distillate fuel oil do	11,160	NA	NA	NA	NA
Residual fuel oil do	19,080	NA	NA	NA	NA
Lubricants do	360	NA	NA	NA	NA
Other do	5,760	NA	NA	NA	NA
Refinery fuel and losses do	3,960	NA	NA	NA	NA
Total do	55,080	NA	NA	NA	NA

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

[1]Table includes data available from the Mar. 1985 monthly Bulletin of Statistics, Israel Central Bureau of Statistics, v. 35, Jerusalem; and the Israel Geological Survey.

[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% to 80% Cu metal.

[4]Reported figure.

COMMODITY REVIEW

METALS

Production at the Tinna copper mine, a subsidiary of ICL located near Eilat, closed in October because it was uneconomical to operate at prevailing copper prices.

NONMETALS

Fertilizer Materials.—*Phosphorus.*—NPL became profitable after several years of losses. About 90% of its phosphate rock production was exported, and the balance was used in local phosphoric acid production, of which much was exported.[4] Expansion programs called for substantial investments in new equipment, detailed study of the Zohar Field in the Negev Desert, and extensive prospecting. Financing needs were to come from the company's resources. NPL completed a new $2 million facility at Zin to refine ore and dispose of waste gas. The facility was expected to reach production of 3.5 million tons of finished products in 1985. ICL increased its exports by 17% in the calendar year 1984, generating an export income of $373 million from total sales of $800 million. Israel's share of the world phosphate market was 4%.

Potash.—In February, Dead Sea Works Ltd. (DSW) near the Dead Sea completed the Maklef project, a cold crystallization process, which expanded potash production capacity by 260,000 tons per year of K_2O to 1.26 million tons of K_2O, at an investment of $97 million. The total investment for the project was $180 million. The plant may exceed its annual rated capacity, as did the original plant, once the facility is operating smoothly. About 90% of the production was aimed for export under long-term contracts. Israel was the world's fifth largest exporter of potash, accounting for about 6% of the world's trade.

A $20 million contract for an 11-mile overland conveyor to transport potash from Sdom on the Dead Sea to the railhead at Dimona across the Negev Desert was awarded to Cable Belt, a British company, by the DSW. The conveyor will transport 2 million tons of potash per year, replacing a fleet of trucks.[5]

Magnesia.—Dead Sea Periclase Ltd. committed $10 million to erect a plant for operation by 1986 to produce specialty magnesia-based chemicals for the chemical, pharmaceutical, rubber, and plastic industries, and in the production of transformer steel. The 8,000-ton-per-year facility would use the conventional method of preparing magnesia from caustic soda and the new Aman process, which relied on the thermal decomposition of natural magnesium chloride brines. The magnesia, produced by the Aman process, was purer than magnesia obtained by conventional precipitation and commanded a higher price. It was used in relining steel plant equipment, and in the pharmaceutical, rubber, and plastic industries.

MINERAL FUELS

Coal and Energy.—When the fourth and last of the 350-megawatt stations of the coal-fed Hadera powerplant came on-stream in the summer, 56% of Israel's electricity was generated from coal. At 1984 prices, it was 30% cheaper to produce electricity from coal than from heavy fuel oil, saving about $150 million in 1984.

A pilot plant for the production of liquid coal was built on the premises of the Paz Oil Co. in Haifa at a cost of $200,000. The installation could produce about 10,000 tons annually of the economical liquid fuel, which was based on U.S. technology. The liquid coal was an emulsion of powdered coal, heavy fuel oil, and water, and was treated by ultrasonic waves. The emulsion remained stable even after prolonged storage and could be transported, stored like heavy fuel oil, and required relatively minor adaptations on most combustion systems.[6] The pilot plant was built by the United Coal Co., which was owned by Israel's three major petroleum fuel distributors. A $4 million commercial installation was planned for a capacity of 100,000 tons per year.

In June 1984, the U.S. Department of Energy and the Israeli Ministry of Energy signed a 5-year energy agreement for cooperative energy research and development. In addition exchanging scientists and engineers who would participate in joint projects and share scientific and technical research, the fields of cooperative research in energy would include solar including photovoltaic, biomass, oil shale, coal, and conservation. The funding for the first year was to be over $700,000. In addition, the U.S. Department of Energy arranged a special grant of $500,000 to the Israel-U.S. Binational Science Foundation to promote additional energy research through the foundation.

Petroleum.—Jerusalem Oil Exploration Ltd. and its U.S. partner, Isramco Inc., discovered oil at a depth of 1,000 meters at its Gurim IV well, about 8 kilometers south of Arad in the Negev Desert area. The well was pumping about 100 barrels of oil daily. The oil-producing formation was about 22 meters thick, believed to be part of a 4-million-barrel reservoir, and was the first discovery of oil in commercial quantity in many years. Five development wells were planned at $400,000 each. In midyear, Isramco was set to drill its second well, a $3 million wildcat designated as the Julie I, near the Gaza Strip. Several small U.S. oil companies were planning to drill wells in Israel.

Israel's demand for oil was 150,000 barrels per day, of which 250 barrels were supplied from domestic sources. Israel spent $2 billion in oil imports in 1984, about one-tenth of the national budget.[7]

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Israeli shekels (I) to U.S. dollars at the average rate of I56.23=US$1.00 for 1983 and I293.28=US$1.00 for 1984.

[3]Financial Times (London). No. 29525, Jan. 16, 1985, p. 4.

[4]Engineering and Mining Journal. V. 185, No. 11, Nov. 1984, p. 13.

[5]Phosphorus and Potassium. No. 131, May-June 1984, p. 15.

[6]Innovation (Haifa). No. 108, Nov. 1984, pp. 3-4.

[7]The Israeli Economist. May 1984, pp. 26-27.

The Mineral Industry of Italy

By Roman V. Sondermayer[1]

As in the past, Italy was an important processor of imported raw minerals and mineral fuels in Europe during 1984, but domestic production of a large number of commodities remained modest by world standards. The most prominent minerals and related products, expressed in approximate percentages of world production, were pumice 50% to 51%; feldspar 23% to 24%; cement and bentonite 4%; and fluorspar, asbestos, and magnesite, 3% to 4%, each.

The mineral industry of Italy in general showed a positive trend during 1984. The overall mineral industry production index was 2.3% higher than in 1983, with the largest increases shown by the nonmetallic sector, 3.7%, and by natural gas, 6.1%. This was offset by a drop in metallic mining of 5.1%. Recovery of the country's economy, with a growth in the overall industrial index of 3.1%, had a positive impact on the mineral industry.

The mineral industry faced increased costs resulting from higher energy prices, increases of wages and fringe benefits, and operation of nonprofitable facilities by state entities. Consequently, the mineral industry made all possible efforts to lower production costs by increasing productivity, lowering consumption of energy, and cutting exploration expenses. The cuts in exploration costs were deep and resulted in exploration that was below sufficient levels for maintaining present production of nonfuel minerals. Only producers of crude petroleum and natural gas managed to finance properly their exploration with their own funds. Because exploration for nonfuel minerals was declining, the Italian state, based on Public Law 752 of 1982 and on Public Law 246 of 1984, renewed support for exploration with a budget of about $444 million.[2]

The major events related to the mineral industry included closure of the small Fenice Capanne copper mine, closure of the Niccioleta pyrite mine, discovery of new barite reserves at Felice, and streamlining of the petroleum refining sector.

PRODUCTION

The mineral industry of Italy, including processing of minerals and mineral fuels, showed mixed results. The mining and processing sectors were owned by the Government and by private companies. The Government with Ente Nazionale Idrocarburi (ENI) and its affiliates Società per Azioni Minero-Metallurgiche (SAMIM) and Azienda Generali Italiana Petroli S.p.A. (AGIP); Finanziaria Siderurgica S.p.A. (Finsider) with its subsidiaries Nuovo Italsider S.p.A., Dalmine S.p.A., Acciaieria Piombino, and Nuova Sias; and the Government-owned potash companies controlled most of the minerals. The principal privately owned companies of the mineral industry were Società Mineraria e Metallurgica di Pertusola S.A. (Pertusola) in lead and zinc, Acciaierie Ferriere Lombarde Falck (Falck) in steel, and major foreign oil and gas companies.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Bauxite	23,260	19,000	23,010	23,000	--
Alumina	900,373	786,357	698,329	465,671	607,274
Metal:					
Primary	271,211	273,845	232,861	195,694	230,207
Secondary[e]	266,000	250,000	242,000	240,000	250,000
Antimony:					
Mine output, metal content	713	696	339	--	508
Metal, total	732	792	1,047	720	1,121
Bismuth metal	43	15	28	23	26
Cadmium metal, smelter	568	489	475	385	452
Copper:					
Mine output, metal content	604	748	138	1,538	875
Metal, refined, all kinds	12,200	23,700	19,600	31,200	40,000
Iron and steel:					
Iron ore and concentrate:[2]					
Gross weight thousand tons	185	123	3	([3])	--
Iron content do	73	50	1	([3])	--
Metal:					
Pig iron do	12,149	12,260	11,537	10,341	11,628
Ferroalloys:					
Blast furnace, spiegeleisen	4,990	832	957	494	935
Electric furnace:					
Ferromanganese[4]	[e]83,092	71,770	73,353	61,847	50,476
Silicomanganese	44,914	54,563	58,118	37,244	72,779
Ferrosilicon	71,857	55,144	63,947	51,913	71,157
Silicon metal[e]	15,000	15,000	15,000	[r]14,000	14,000
Ferrochromium	41,150	10,333	36,541	11,429	12,265
Other	14,679	12,252	11,552	42,219	50,755
Total	275,682	219,894	259,468	219,146	272,367
Steel, crude thousand tons	26,501	24,777	23,981	21,674	24,061
Semimanufactures:					
Wire rod do	1,933	1,935	2,098	2,027	NA
Sections do	8,782	7,812	6,909	6,874	NA
Plates and sheets do	5,895	6,453	5,021	8,409	NA
Hoop and strip do	871	781	593	461	NA
Railway track material do	217	216	240	234	NA
Ingots, semimanufactures, solids for tubes do	1,089	1,276	903	957	NA
Other do	859	1,276	1,784	1,515	NA
Total do	19,646	19,749	17,548	20,477	NA
Castings and forgings do	747	783	614	453	NA
Cold rolled sheet do	2,690	2,646	2,595	3,892	NA
Seamless tubes do	880	1,094	1,010	753	NA
Lead:					
Mine output, metal content	22,879	21,300	16,187	23,561	20,883
Metal, refined:					
Primary	42,057	35,556	36,360	36,955	37,558
Secondary	91,600	97,400	97,300	90,000	90,000
Magnesium metal, primary	9,676	10,800	9,943	7,687	7,491
Manganese, mine output:					
Gross weight	9,165	8,756	8,727	7,205	9,582
Metal content	2,763	2,614	2,618	2,215	2,875
Mercury metal 76-pound flasks	96	7,527	4,612	--	--
Silver metal thousand troy ounces	1,366	1,768	1,791	2,361	2,858
Zinc:					
Mine output, metal content	58,417	43,906	39,601	42,944	42,288
Metal, primary	206,430	180,903	158,560	155,893	169,672
NONMETALS					
Asbestos	157,794	137,086	116,410	139,054	147,272
Barite	203,038	177,005	180,022	139,090	107,128
Bromine[e]	590	600	600	500	500
Cement, hydraulic thousand tons	41,772	41,553	39,728	39,216	[e]40,000
Clays, crude:					
Bentonite do	332	277	237	297	311
Refractory excluding kaolinitic earth do	226	270	[e]250	[e]220	230
Fuller's earth do	4	5	[e]6	[e]5	[e]6
Kaolin do	89	74	53	50	53
Kaolinitic earth do	27	31	30	25	25
Diatomite[e]	30,000	25,000	20,000	25,000	28,000
Feldspar	344,301	428,485	783,411	826,856	985,573

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Fluorspar:					
Acid-grade	124,774	128,838	134,127	102,910	110,330
Metallurgical-grade	26,229	35,397	32,822	74,760	77,931
Total	[r]151,003	164,235	166,949	177,670	188,261
Graphite, all grades	3,957	3,535	3,210	2,299	--
Gypsum[e] thousand tons	4,200	[5]4,820	1,600	[5]1,388	1,300
Lime, hydrated and quicklime do	2,365	2,307	[e]2,300	[e]2,200	[e]2,100
Nitrogen: N content of ammonia do	1,397	1,207	1,406	1,060	1,100
Perlite[e]	90,000	85,000	80,000	75,000	80,000
Pigments, mineral: Iron oxides, natural[e]	1,000	900	800	900	800
Potash, crude salts:					
Gross weight thousand tons	1,302	1,418	1,460	1,674	1,481
K_2O equivalent do	156	142	146	184	162
Pumice and related materials:					
Pumice and pumiceous lapilli[e] do	571	600	750	700	650
Pozzolan[e] do	5,156	[r]5,509	5,500	5,000	5,500
Pyrite, all types, gross weight do	859	681	667	646	443
Salt:					
Marine, crude[e] do	1,300	[5]964	1,000	1,100	1,000
Rock and brine do	3,997	3,610	3,605	3,454	3,255
Sodium and potassium compounds:					
Caustic soda	9,531	8,484	[e]9,000	[e]9,000	[e]8,000
Sodium carbonate[e] thousand tons	95	95	90	85	90
Sodium sulfate[e] do	100	90	85	90	80
Stone, marble in blocks, all kinds[e 6] do	[5]2,200	2,100	2,000	1,900	2,000
Strontium minerals: Celestite	1,053	6,697	3,272	[e]3,300	[e]3,400
Sulfur:					
Gross weight of ore thousand tons	101	96	88	41	20
Recovered as elemental and in compounds:					
Elemental from ore do	23	20	10	9	8
S content of pyrites do	331	261	269	271	282
Byproduct, oil refining do	30	25	10	10	10
Byproduct, other sources[e] do	220	205	200	200	190
Total do	604	511	489	490	490
Talc and related materials	165,905	163,390	163,970	158,974	142,727
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bituminous rock, natural[e]	[5]117,893	100,000	105,000	100,000	110,000
Carbon black[e]	170,000	170,000	160,000	150,000	160,000
Coal: Lignite thousand tons	1,933	1,958	1,913	1,737	1,806
Coke, metallurgical do	8,266	8,071	7,335	6,419	[e]6,500
Gas, natural: Marketed million cubic feet	442,543	495,944	512,377	458,930	[e]485,000
Natural gas liquids: thousand 42-gallon barrels	150	140	140	130	150
Petroleum:					
Crude do	12,264	10,532	11,881	14,961	15,635
Refinery products:					
Liquefied petroleum gases do	(7)	22,132	21,518	22,132	21,286
Gasoline, all kinds do	124,550	129,116	132,693	125,732	123,522
Naphtha do	(7)	28,490	24,738	24,269	22,876
Jet fuel do	14,720	9,208	8,312	7,880	8,664
Kerosine do	18,747	21,901	23,405	18,933	18,514
Distillate fuel oil do	190,603	189,230	181,822	172,288	171,557
Residual fuel oil do	244,935	249,017	212,793	190,322	173,466
Lubricants do	7,196	6,356	(7)	(7)	(7)
Other do	76,105	39,781	39,326	41,300	40,957
Refinery fuel and losses do	42,231	45,806	48,151	46,167	48,631
Total do	719,087	741,037	692,758	649,023	629,473

[e] Estimated. [p] Preliminary. [r] Revised. NA Not available.
[1]Table includes data available through Aug. 28, 1984.
[2]Excludes pelletized iron oxide derived from pyrite.
[3]Revised to zero.
[4]Includes blast furnace ferromanganese.
[5]Reported figure.
[6]In addition to marble, Italy produced a large variety of stone. Production was not reported.
[7]Included with other refinery products.

TRADE

Based on preliminary results, Italy's trade balance in minerals, fuels, and related commodities remained negative. Approximately 30% of the total value of the country's imports were minerals and fuels. The value of the mineral exports, mostly in processed form, was about 20% of the value of the total country exports. Trade with the United States remained insignificant for the economies of both countries.

Table 2.—Italy: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	8,240	5,053	--	Greece 3,307; Turkey 1,000.
Oxides and hydroxides	269,988	174,335	63	Netherlands 93,766; Norway 45,349.
Metal including alloys:				
Scrap	3,380	5,721	36	France 2,791; West Germany 1,540.
Unwrought	54,115	41,282	2,418	West Germany 10,241; Japan 9,467.
Semimanufactures	105,904	117,525	7,712	West Germany 28,162; France 17,293.
Antimony: Metal including alloys, all forms	4	51	NA	NA.
Beryllium: Metal including alloys, all forms	(2)	15	--	All to Finland.
Bismuth: Metal including alloys, all forms	17	6	NA	NA.
Cadmium: Metal including alloys, all forms	79	504	NA	Belgium-Luxembourg 399.
Cesium and rubidium: Metal including alloys, all forms	3	12	NA	Portugal 6.
Chromium:				
Ore and concentrate	436	680	--	France 194; Switzerland 130.
Metal including alloys, all forms	3	30	NA	NA.
Cobalt:				
Ore and concentrate	28	--		
Oxides and hydroxides	29	8	--	Belgium-Luxembourg 4.
Metal including alloys, all forms	63	35	NA	United Kingdom 8.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	1	(2)	NA	NA.
Tantalum	54	14	--	West Germany 8.
Copper:				
Ore and concentrate	657	1,970	--	Spain 1,969.
Matte and speiss including cement copper	344	2,890	--	Belgium-Luxembourg 1,620; Spain 1,238.
Metal including alloys:				
Scrap	19,042	20,305	517	West Germany 12,522; France 2,712.
Unwrought	8,564	13,282	1,018	United Kingdom 4,006; Iran 3,160.
Semimanufactures	96,365	109,279	3,076	France 26,373; West Germany 18,748.
Gallium: Metal including alloys, all forms	5	14	8	NA.
Germanium: Metal including alloys, all forms	1	5	NA	NA.
Gold: Metal including alloys, unwrought and partly wrought ___ troy ounces	49,995	87,290	13,182	Switzerland 19,195; France 7,106.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	160	87	--	Venezuela 60.
Pyrite, roasted	39,218	28,679	--	France 22,479.
Metal:				
Scrap	17,149	17,560	44	West Germany 8,154; France 7,613.
Pig iron, cast iron, related materials	9,556	33,165	511	Turkey 7,521; Egypt 5,568.
Ferroalloys:				
Ferrochromium	9,109	23,101	227	West Germany 11,585.
Ferromanganese	2,805	1,392	--	Switzerland 1,001.
Ferromolydenum	221	4	NA	NA.
Ferronickel	119	1	NA	NA.
Ferrosilicochromium	86	395	NA	France 326.
Ferrosilicomanganese	3,027	5,360	NA	France 3,465; Switzerland 1,095.
Ferrosilicon	4,361	6,966	379	West Germany 2,771; France 2,318.
Silicon metal	r5,949	6,108	NA	West Germany 2,681; Hungary 1,107.
Unspecified	r4,677	5,231	303	West Germany 780; France 699.
Steel, primary forms ___ thousand tons	906	982	79	France 138; Argentina 133.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes sections ___ thousand tons__	2,173	2,527	17	West Germany 965; France 662.
Universals, plates, sheets do____	1,574	1,501	128	France 321; U.S.S.R. 298; West Germany 167.
Hoop and strip ____do____	102	111	1	France 30; U.S.S.R. 18.
Rails and accessories do____	12	39	(2)	Egypt 30; Switzerland 3.
Wire __________do____	104	104	6	France 30; West Germany 19.
Tubes, pipes, fittings do____	2,072	1,899	182	U.S.S.R. 820; West Germany 167; France 144.
Castings and forgings, rough do____	51	49	(2)	Yugoslavia 11; West Germany 7.
Lead:				
Ore and concentrate ___________	21,549	21,023	--	Spain 7,500; Austria 4,045.
Oxides ___________________	1,348	1,660	--	U.S.S.R. 646; Romania 550.
Metal including alloys:				
Scrap ________________	496	1,168	--	Belgium-Luxembourg 640; Spain 300.
Unwrought_______________	4,472	5,896	359	Libya 3,103; Turkey 1,767.
Semimanufactures __________	429	718	1	Libya 208; Saudi Arabia 169.
Magnesium: Metal including alloys:				
Scrap ___________________	1,059	1,463	612	West Germany 662.
Unwrought ________________	6,308	7,378	382	West Germany 4,339; Austria 1,015.
Semimanufactures______________	385	528	111	France 172; West Germany 64.
Manganese:				
Ore and concentrate, metallurgical-grade__________________	1,345	1,009	--	France 984.
Oxides ___________________	21	206	--	Belgium-Luxembourg 106.
Metal including alloys, all forms ___	13	18	NA	NA.
Mercury ________ 76-pound flasks__	2,862	11,020	NA	Netherlands 8,346.
Molybdenum:				
Ore and concentrate ___________	348	298	--	Austria 167; Netherlands 131.
Metal including alloys, all forms ___	20	150	NA	France 121; West Germany 23.
Nickel:				
Matte and speiss _____________	440	294	--	West Germany 264.
Ash and residue containing nickel __	162	386	--	Austria 230.
Metal including alloys:				
Scrap _________________	290	165	18	West Germany 74.
Unwrought______________	210	713	--	West Germany 380; Netherlands 199.
Semimanufactures _________	618	776	7	Switzerland 202; West Germany 114.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces__	60,026	164,646	68,707	West Germany 32,216; United Kingdom 24,146.
Selenium, elemental_____________	3	6	NA	NA.
Silicon, high-purity ____________	175	220	95	West Germany 58; Japan 51.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces__	1,833	4,270	NA	Switzerland 3,585.
Tin:				
Ore and concentrate ___________	28	26	--	All to Austria.
Metal including alloys:				
Scrap _________________	51	57	--	Netherlands 28; Denmark 12.
Unwrought______________	345	460	--	United Kingdom 147; undetermined 209.
Semimanufactures _________	125	165	--	U.S.S.R. 101; Greece 20.
Titanium:				
Ore and concentrate ___________	1,174	536	--	Romania 298.
Oxides ___________________	1,597	2,273	568	Republic of Korea 1,008.
Metal including alloys:				
Scrap _________________	9	23	NA	NA.
Unwrought______________	9	67	NA	West Germany 46.
Semimanufactures _________	115	94	4	India 66.
Tungsten: Metal including alloys:				
Scrap ___________________	32	27	NA	France 8; Belgium-Luxembourg 7.
Unwrought ________________	9	24	NA	Bulgaria 12.
Semimanufactures_____________	24	34	(2)	Mainly to West Germany.
Vanadium:				
Oxides and hydroxides _________	26	96	--	West Germany 67.
Ash and residue containing vanadium	1,484	1,956	--	West Germany 1,720.
Metal including alloys, all forms ___	4	13	NA	West Germany 8.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	7,866	4,320	--	Austria 3,302; France 1,000.
Blue powder	1,086	620	--	France 211; Belgium-Luxembourg 185.
Matte	4,470	68	NA	NA.
Metal including alloys:				
Scrap	2,927	3,278	--	West Germany 3,018.
Unwrought	25,455	35,796	8,596	Netherlands 11,326; Turkey 3,193.
Semimanufactures	2,577	2,093	1	France 1,146.
Zirconium:				
Ore and concentrate	5,305	5,062	NA	Hungary 4,727.
Metal including alloys, all forms	11	61	1	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	169,494	129,330	174	United Kingdom 66,753; Algeria 40,101.
Artificial:				
Corundum	1,505	2,623	1	Bulgaria 1,259; Austria 562.
Silicon carbide	10,412	8,240	NA	West Germany 2,788; France 1,322.
Dust and powder of precious and semiprecious stones including diamond kilograms	132	483	5	U.S.S.R. 153; Switzerland 12.
Grinding and polishing wheels andd stones	21,491	23,116	721	France 2,888; Saudi Arabia 2,296.
Asbestos, crude	48,647	61,164	(2)	West Germany 15,221; France 12,268.
Barite and witherite	71,914	46,831	14	Egypt 17,111; Netherlands 9,330.
Boron materials: Crude natural borates	2,665	1,281	--	Belgium-Luxembourg 692; Yugoslavia 569.
Bromine	25	10	NA	NA.
Cement	552,275	589,351	93	Libya 246,225; Switzerland 104,406.
Chalk	581	4,997	20	West Germany 4,639.
Clays, crude:				
Bentonite	21,261	40,798	NA	France 11,085; Norway 8,388.
Chamotte earth	2,707	2,572	NA	Tunisia 1,500.
Kaolin	23,859	19,981	NA	France 16,681.
Unspecified	2,479	2,713	64	Greece 272; Libya 265.
Cryolite and chiolite	3	56	--	China 25; West Germany 22.
Diamond:				
Gem, not set or strung carats	4,294,952	2,054	NA	Switzerland 900.
Industrial stones do	28,740	9,300	--	Yugoslavia 6,836.
Diatomite and other infusorial earth	2,586	3,231	--	Austria 922; Yugoslavia 595.
Feldspar, fluorspar, related materials	98,260	98,037	36,505	West Germany 26,439; Switzerland 13,111.
Fertilizer materials:				
Crude, n.e.s	17,444	22,586	--	France 10,087; Egypt 3,219.
Manufactured:				
Ammonia	34,597	46,775	--	Israel 31,987; Turkey 14,299.
Nitrogenous	383,218	901,631	--	Turkey 197,945; Greece 174,635.
Phosphatic	2,191	710	--	Switzerland 475.
Potassic	39,895	87,324	--	Japan 22,600; Algeria 20,500.
Unspecified and mixed	338,914	581,426	--	West Germany 113,484; France 75,466.
Graphite, natural	1,823	2,743	--	Austria 1,211; France 1,173.
Gypsum and plaster	11,268	12,167	2	Switzerland 9,086.
Kyanite and related materials	64	46	NA	NA.
Lime	50,834	35,936	--	Switzerland 33,790.
Magnesium compounds:				
Magnesite	37,504	27,004	63	Austria 14,500; Netherlands 7,043.
Oxides and hydroxides	1,059	37,959	NA	West Germany 17,649; Spain 9,136.
Other	--	2,800	NA	Saudi Arabia 1,500.
Mica:				
Crude including splittings and waste	1,223	498	--	France 155; Libya 107.
Worked including agglomerated splittings	13	23	--	Spain 4; Yugoslavia 4.
Phosphates, crude	5,273	398	17	Yugoslavia 141; Switzerland 101.
Pigments, mineral:				
Natural, crude	232	285	NA	Egypt 66.
Iron oxides and hydroxides, processed	4,202	5,502	8	France 2,539; Yugoslavia 444.
Potassium salts, crude	51	4	(2)	Malta 3.
Precious and semiprecious stones other than diamond:				
Natural kilograms	4,024	2,521	217	West Germany 117; Singapore 110.
Synthetic do	333	401	NA	Saudi Arabia 228.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Pyrite, unroasted	3,733	3,626	--	West Germany 2,119; France 775.
Quartz crystal, piezoelectric kilograms	8	60	NA	NA.
Salt and brine	474,284	262,584	12,620	Sweden 50,319; United Kingdom 47,950; Greece 45,743.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	21,146	17,165	--	Israel 5,230; Greece 5,088.
Sulfate, manufactured	2,129	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	474	485	17	West Germany 65; Saudi Arabia 59; France 42.
Worked do	1,264	1,504	120	West Germany 446; Saudi Arabia 353.
Dolomite, chiefly refractory-grade do	32	37	(2)	Switzerland 16; France 9.
Gravel and crushed rock do	608	745	1	Kuwait 101; Switzerland 89; Libya 83.
Quartz and quartzite do	33	28	(2)	Switzerland 15; France 6.
Sand other than metal-bearing do	14	15	(2)	Sweden 6; Nigeria 2.
Sulfur:				
Elemental:				
Crude including native and byproduct	4,912	7,298	--	Yugoslavia 4,613; France 1,371.
Colloidal, precipitated, sublimed	150	65	--	West Germany 21; Malta 20.
Dioxide	1,160	430	NA	NA.
Sulfuric acid	39,336	20,785	--	Greece 9,780; Spain 7,165.
Talc, steatite, soapstone, pyrophyllite	46,082	49,546	10,143	France 12,060; West Germany 11,057.
Vermiculite, perlite, chlorite	56,466	57,226	NA	United Kingdom 47,619.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	991	6,498	62	Nigeria 2,994; Libya 2,347.
Carbon: Carbon black	45,214	55,796	2	Yugoslavia 19,058; Austria 9,604.
Coal:				
Anthracite	3,608	3,867	--	France 3,243.
Bituminous	882	1,367	--	Switzerland 1,032.
Briquets of anthracite and bituminous coal	91	11	--	Switzerland 6.
Lignite including briquets	--	29	--	United Kingdom 22.
Coke and semicoke	377,662	347,867	--	Romania 185,298; Austria 55,577.
Gas, natural: Gaseous million cubic feet	1	2	--	Mainly to Greece.
Peat including briquets and litter	376	214	--	Algeria 54; Saudi Arabia 43.
Petroleum:				
Crude thousand 42-gallon barrels	255	1,641	--	West Germany 1,334.
Refinery products:				
Liquefied petroleum gas do	2,572	3,193	736	Greece 854; France 488.
Gasoline do	35,518	34,500	2,615	France 13,115; Libya 4,957.
Mineral jelly and wax do	48	454	2	Netherlands 399.
Kerosine and jet fuel do	24,373	9,685	56	Iran 2,741; Greece 1,712.
Distillate fuel oil do	34,438	24,542	38	Libya 6,011; Saudi Arabia 4,425.
Lubricants do	4,024	4,099	281	Belgium-Luxembourg 363; Netherlands 339; Iran 287.
Residual fuel oil do	32,800	16,213	717	Libya 4,997; Netherlands 2,781.
Bitumen and other residues do	1,066	991	(2)	Austria 279; Switzerland 195.
Bituminous mixtures do	29	49	--	Libya 28.
Petroleum coke do	62	234	--	Austria 115; Switzerland 99.

[r] Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Italy: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	1,578	1,182	(2)	Australia 747; Guinea 312.
Oxides and hydroxides	69,545	305,591	384	Guinea 128,391; Australia 79,334.
Ash and residue containing aluminum	98,170	88,641	NA	Austria 72,520; France 6,985.
Metal including alloys:				
Scrap	94,224	108,485	399	Austria 28,890; France 25,141.
Unwrought	211,153	254,498	21	West Germany 79,988; Netherlands 49,226.
Semimanufactures	85,324	112,435	4,501	West Germany 46,764; France 26,698.
Antimony: Metal including alloys, all forms	252	177	NA	West Germany 110.
Arsenic: Metal including alloys, all forms	654	539	NA	Belgium-Luxembourg 303; West Germany 167.
Bismuth: Metal including alloys, all forms	39	39	NA	United Kingdom 33.
Cadmium: Metal including alloys, all forms	38	135	NA	NA.
Chromium:				
Ore and concentrate	159,431	192,211	--	Albania 120,233; Turkey 37,620.
Oxides and hydroxides	1,675	1,669	--	West Germany 1,284.
Metal including alloys, all forms	124	122	(2)	United Kingdom 83; France 22.
Cobalt: Metal including alloys, all forms	252	327	12	France 115; West Germany 61.
Copper:				
Ore and concentrate	491	2,214	--	Zaire 1,670.
Matte and speiss including cement copper	194	20	--	All from Belgium-Luxembourg.
Oxides and hydroxides	396	386	9	Norway 166; West Germany 91.
Sulfate	5,647	4,900	NA	Yugoslavia 4,071.
Ash and residue containing copper	3,887	4,482	NA	Austria 3,800.
Metal including alloys:				
Scrap	71,728	82,442	98	France 22,444; West Germany 22,244.
Unwrought	326,139	306,726	208	Chile 93,837; Zambia 47,461.
Semimanufactures	103,453	119,583	217	France 41,190; West Germany 40,159.
Germanium: Metal including alloys, all forms value, thousands	$86	$89	NA	NA.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	6,497	4,858	2	Switzerland 2,239; Republic of South Africa 2,136.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	16,066	13,799	--	Brazil 3,542; Liberia 3,305; Mauritania 2,038.
Metal:				
Scrap do.	5,571	4,446	24	France 1,698; West Germany 1,624.
Pig iron, cast iron, related materials	425,148	333,071	69	U.S.S.R. 80,732; Algeria 56,612; France 53,076.
Ferroalloys:				
Ferrochromium	85,215	66,973	NA	Zimbabwe 28,344; Republic of South Africa 14,230.
Ferromanganese	114,113	64,719	--	France 22,773; Republic of South Africa 14,417.
Ferromolybdenum	1,355	1,066	NA	Belgium-Luxembourg 572.
Ferronickel	15,331	13,375	NA	France 6,158; Dominican Republic 2,560.
Ferrosilicochromium	2,497	1,273	NA	France 600; West Germany 366.
Ferrosilicomanganese	34,701	24,914	NA	Norway 15,062; Portugal 2,166.
Ferrosilicon	54,864	46,080	NA	France 13,527; West Germany 13,178.
Silicon metal	r5,392	13,724	NA	Norway 6,387; France 2,939; Brazil 822.
Unspecified	8,593	6,475	51	France 2,087; Sweden 2,033.
Steel, primary forms thousand tons	2,450	2,288	29	France 758; Belgium-Luxembourg 433.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	792	748	(2)	France 202; West Germany 149.
Universals, plates, sheets do.	1,283	1,318	28	France 372; Belgium-Luxembourg 244; West Germany 222.
Hoop and strip do.	178	195	(2)	France 78; West Germany 58.
Rails and accessories do.	106	128	4	West Germany 45; Canada 27.
Wire do.	52	63	(2)	Belgium-Luxembourg 19; Czechoslovakia 11.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Tubes, pipes, fittings thousand tons	206	198	1	France 69; West Germany 61.
Castings and forgings, rough do	7	8	(2)	France 2; West Germany 2.
Lead:				
Ore and concentrate	275	5,589	--	Turkey 3,404; Algeria 2,185.
Metal including alloys:				
Scrap	24,626	21,642	87	West Germany 6,714; Switzerland 4,829.
Unwrought	128,363	133,499	--	West Germany 31,814; Morocco 24,051.
Semimanufactures	2,152	2,863	11	Yugoslavia 2,519; France 132.
Lithium: Oxides and hydroxides	120	215	31	West Germany 96; Bulgaria 38.
Magnesium: Metal including alloys:				
Scrap	1,589	2,217	--	West Germany 785; France 481.
Unwrought	843	988	20	Norway 498; France 197.
Semimanufactures	644	1,188	98	France 438; Belgium-Luxembourg 397.
Manganese:				
Ore and concentrate, metallurgical-grade	333,063	385,550	--	Republic of South Africa 218,521; Gabon 129,355.
Metal including alloys, all forms	1,713	1,974	NA	France 731; Republic of South Africa 567.
Mercury 76-pound flasks	1,073	804	29	Netherlands 444.
Molybdenum:				
Ore and concentrate	2,768	2,360	431	Netherlands 932; Chile 577.
Metal including alloys:				
Scrap	18	19	NA	NA.
Unwrought	10	45	NA	Netherlands 35.
Semimanufactures	83	111	35	Netherlands 31; Austria 26.
Nickel:				
Matte and speiss	2,045	2,676	28	Cuba 1,400; Austria 390.
Oxides and hydroxides	2,430	2,300	NA	Cuba 1,710; Australia 370.
Metal including alloys:				
Scrap	320	143	--	Austria 84.
Unwrought	17,735	14,257	3,780	Netherlands 2,557; Australia 2,145.
Semimanufactures	2,472	7,536	5,489	West Germany 799; United Kingdom 638.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	177	169	3	United Kingdom 54; Switzerland 49.
Rare-earth metals	136	63	NA	Austria 25; West Germany 12.
Selenium, elemental	14	29	NA	United Kingdom 19.
Silicon, high-purity	74	102	(2)	Norway 46; West Germany 14.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	18,979	10,227	1,051	West Germany 2,157; Belgium-Luxembourg 1,546.
Tellurium and arsenic, elemental	65	32	NA	Sweden 29.
Tin: Metal including alloys:				
Scrap	34	1	--	All from West Germany.
Unwrought	5,067	5,765	(2)	Indonesia 2,338; Malaysia 985.
Semimanufactures	209	233	1	West Germany 121; United Kingdom 62.
Titanium:				
Ore and concentrate	6,045	6,314	NA	Republic of South Africa 3,803; Australia 2,100.
Oxides	43,216	45,332	361	West Germany 18,279; France 8,922.
Metal including alloys:				
Scrap	1,336	1,740	NA	Austria 1,518.
Unwrought	48	43	NA	U.S.S.R. 35.
Semimanufactures	457	208	67	United Kingdom 63; West Germany 58.
Tungsten:				
Ore and concentrate	36	54	--	All from Canada.
Metal including alloys:				
Scrap	(2)	1	NA	NA.
Unwrought	47	23	NA	West Germany 9; France 8.
Semimanufactures	53	60	2	West Germany 19; United Kingdom 10.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Vanadium:				
Oxides and hydroxides	123	106	NA	China 53; West Germany 23.
Ash and residue containing vanadium	2,646	1,923	NA	West Germany 657.
Metal including alloys, all forms	26	23	--	All from West Germany.
Zinc:				
Ore and concentrate	231,872	201,564	--	Canada 81,621; Peru 55,126.
Blue powder	777	1,626	--	West Germany 642; France 596.
Matte	5,487	5,763	NA	West Germany 2,481; Switzerland 1,315.
Metal including alloys:				
Scrap	6,883	11,001	--	France 5,613; West Germany 2,642.
Unwrought	79,343	95,715	--	West Germany 35,900; Belgium-Luxembourg 16,097.
Semimanufactures	2,585	4,704	(2)	West Germany 3,472; France 689.
Zirconium:				
Ore and concentrate	66,919	75,035	NA	Australia 44,722; Republic of South Africa 28,487.
Metal including alloys, all forms	52	29	17	France 4.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,463	2,938	145	Greece 2,626.
Artificial:				
Corundum	23,601	21,448	379	Austria 6,104; West Germany 4,669.
Silicon carbide	7,739	9,477	NA	Switzerland 2,406; France 1,840; Norway 1,800.
Dust and powder of precious and semiprecious stones including diamond kilograms	1,730	2,219	568	Switzerland 843; Ireland 478.
Grinding and polishing wheels and stones	3,556	2,798	37	Austria 938; West Germany 496.
Asbestos, crude	56,884	41,620	306	Canada 13,590; Republic of South Africa 11,178.
Barite and witherite	10,328	14,424	--	Spain 8,750; Jordan 3,500.
Boron materials: Crude natural borates	103,795	153,527	9,104	Turkey 112,887; Netherlands 31,047.
Bromine	2,485	1,273	NA	Israel 1,202.
Cement	173,231	235,958	84	Yugoslavia 158,957; France 69,037.
Chalk	18,407	21,443	--	France 21,281.
Clays, crude:				
Bentonite	42,504	39,530	411	Greece 35,859.
Chamotte earth	94,894	69,614	NA	France 47,851; West Germany 11,589.
Kaolin	599,598	596,700	144,876	United Kingdom 256,110; West Germany 53,769.
Unspecified	715,642	728,689	1,493	West Germany 524,059; France 121,133.
Cryolite and chiolite	514	830	--	France 463; Denmark 336.
Diamond:				
Gem, not set or strung carats	196,650	171,443	NA	Belgium-Luxembourg 89,069; India 26,046.
Industrial stones do	169,727	114,613	--	Belgium-Luxembourg 78,823.
Diatomite and other infusorial earth	4,743	5,347	180	France 3,289; Spain 558.
Feldspar, fluorspar, related materials	82,877	124,098	213	Spain 47,283; Republic of South Africa 26,388; Canada 11,371.
Fertilizer materials:				
Crude, n.e.s	2,290	2,803	147	France 1,050; West Germany 844.
Manufactured:				
Ammonia	259,580	468,929	--	U.S.S.R. 323,362.
Nitrogenous	181,095	235,249	13,826	West Germany 62,101; Austria 61,831.
Phosphatic	123,531	114,063	10,649	France 42,762; Tunisia 32,099.
Potassic	510,906	615,142	67	Israel 186,886; U.S.S.R. 109,797.
Unspecified and mixed	627,620	818,837	262,217	Morocco 153,715; Tunisia 148,465.
Graphite, natural	5,117	4,064	20	West Germany 1,767; China 731.
Gypsum and plaster	14,923	11,619	801	West Germany 7,600; Austria 1,955.
Iodine	315	213	NA	Japan 130; Belgium-Luxembourg 38.
Kyanite and related materials	36,215	23,713	1,248	Republic of South Africa 11,373; West Germany 7,669.
Lime	336	631	--	Yugoslavia 319; West Germany 230.
Magnesium compounds: Magnesite	61,187	58,127	NA	Greece 4,227.
Mica:				
Crude including splittings and waste	981	896	179	France 301; Austria 102.
Worked including agglomerated splittings	346	345	19	France 89; Belgium-Luxembourg 82.
Nitrates, crude	671	1,911	--	Chile 1,500; West Germany 325.
Phosphates, crude thousand tons	1,162	1,554	246	Morocco 683; Israel 294; Togo 150.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Phosphorus, elemental	107	22	NA	NA.
Pigments, mineral:				
Natural, crude	404	565	--	Cyprus 177.
Iron oxides and hydroxides, processed	17,645	16,428	240	West Germany 12,543.
Potassium salts, crude	11,341	11,687	--	France 10,766.
Precious and semiprecious stones other than diamond:				
Natural kilograms	r65,617	57,125	2,511	Brazil 15,512; U.S.S.R. 8,408.
Synthetic do	3,304	5,835	NA	West Germany 2,020; France 1,494.
Pyrite, unroasted	109,155	262,813	4	Norway 93,252; Finland 89,528.
Quartz crystal, piezoelectric kilograms	3,658	3,286	NA	NA.
Salt and brine	313,432	378,105	--	France 219,787; Tunisia 112,141.
Sodium compounds, n.e.s.: Carbonate, manufactured	92,088	39,931	--	Romania 13,315; Switzerland 9,939.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	611,967	661,368	4,314	Spain 160,103; Finland 99,518; Brazil 67,944.
Worked	4,634	5,301	113	Spain 1,484; Greece 968.
Dolomite, chiefly refractory-grade	1,658	1,699	--	West Germany 958; Netherlands 381.
Gravel and crushed rock	19,009	14,277	212	France 8,337; Yugoslavia 2,408.
Limestone other than dimension	150	75	--	All from West Germany.
Quartz and quartzite	48,489	43,196	91	Switzerland 33,268.
Sand other than metal-bearing	1,027,000	989,902	507	France 541,208; Belgium-Luxembourg 227,170.
Sulfur: Elemental:				
Crude including native and byproduct	375,588	464,907	54,404	Saudi Arabia 155,977; Canada 64,499; France 60,911.
Colloidal, precipitated, sublimed	1,238	961	--	West Germany 758; France 99.
Talc, steatite, soapstone, pyrophyllite	20,479	22,944	2	Austria 13,736; France 4,300.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	780	963	877	France 41.
Carbon: Carbon black	24,758	28,703	880	France 16,585; West Germany 6,654.
Coal:				
Anthracite thousand tons	295	110	--	Republic of South Africa 50; U.S.S.R. 38.
Bituminous do	17,579	15,666	7,075	Republic of South Africa 3,034; Poland 2,209.
Lignite including briquets do	79	76	([2])	Yugoslavia 43; West Germany 28.
Coke and semicoke do	203	98	--	France 64; West Germany 32.
Gas, natural million cubic feet	518,850	602,106	--	U.S.S.R. 308,260; Netherlands 206,217.
Petroleum:				
Crude thousand 42-gallon barrels	570,908	537,536	--	Saudi Arabia 93,083; Iran 88,983; Libya 82,275.
Refinery products:				
Liquefied petroleum gas do	9,675	10,423	1,255	Algeria 2,362; West Germany 1,583; Libya 836.
Gasoline do	16,545	24,004	28	Kuwait 5,470; Algeria 3,196; U.S.S.R. 2,747.
Mineral jelly and wax do	207	252	3	Hungary 72; West Germany 58.
Kerosine and jet fuel do	242	649	75	Brazil 534.
Distillate fuel oil do	30,712	32,300	645	Algeria 8,900; Romania 7,832; Kuwait 5,830.
Lubricants do	793	906	36	Greece 159; West Germany 137.
Residual fuel oil do	96,290	114,140	3,339	Kuwait 23,873; Venezuela 14,887; France 8,151.
Bitumen and other residues do	1,364	1,209	1,058	Netherlands 94.
Bituminous mixtures do	8	30	1	France 25.
Petroleum coke do	5,401	10,379	8,996	U.S.S.R. 670; United Kingdom 301.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper.—The Fenice Capanne Mine, Province of Tuscany, operated by Solmine S.p.A., ended its production toward the end of 1984 because of low prices for copper and difficult mining conditions.

Iron and Steel.— The Government-owned steel companies posted losses, although smaller than those of 1983. On the other hand, the privately owned Falck reported a sales increase of 28%. Steel output of Falck was 1,006,661 tons or 11.5% higher than that of 1983.

At the iron and steel works at Taranto, a new control system was introduced that totally automated converter production. The new method cuts production time and reduces consumption of ferroalloys, refractories, and oxygen. At Taranto, a new installation for controlling the speed of large electric motors went on-stream. This is the first time that an installation of this kind was used in Italy.

Lead and Zinc.—Lead-zinc mines operated by SAMIM, Pertusola, and Mineraria Silius S.p.A. produced about 57% of the primary lead metal consumed and about 25% of primary zinc metal. The rest was imported.

At the Masua Mine, located about 9 kilometers west-northwest of Iglesia in Sardinia and operated by SAMIM, production reached about 667,000 tons of lead-zinc ores. The Marx and Alice deposits were in production. At the modernized flotation plant, which started production at the beginning of 1984, 31,688 tons of zinc concentrates, 10,366 tons of lead concentrates, and 4,462 tons of mixed-lead-zinc concentrates were produced. During the year, work on developing a third mining field of the Marx deposit was under way. It included work on service and transportation ramps with a conveyor belt and storage bins on level 130. In addition, radio-operated underground loading equipment was introduced. Ornella gallery remained the main haulageway of the operation. Exploration has confirmed sulfide ores in deeper zones, below level 30, in the Marx and Alice deposits.

At the Raible underground and opencast mine, located about 5 kilometers south of Tarvisio in the Province of Friuli, operated by SAMIM, about 342,000 tons of lead-zinc ores were produced and a flotation plant recovered 21,550 tons of zinc concentrates and 2,780 tons of lead concentrates. The Raible Mine started to use the power produced in its own hydropower plants, which covered about 50% of the mine's power consumption.

In the so-called Monteponi project, the administrative functions were centralized for three mines, Monteponi, San Giovanni, and San Benedetto, located in the general area of Iglesia in the Province of Sardinia, and operated by SAMIM. In addition, work on constructing centralized auxiliary facilities for all three mines continued. The flotation plant at Campo Pisano, with various workshops, was the focal point. Approximately 50% of the construction was completed. From the Monteponi project mine, output included sulfide and semioxidized ores. Production of sulfide ores reached 135,683 tons, along with 2,489 tons of semioxidized ores. From these quantities, the flotation plant recovered 7,580 tons of zinc concentrates and 999 tons of lead concentrates. The aim of the Monteponi project was to increase the total production of all three operations to 1 million tons of ore from which concentrates with 65,000 tons of zinc and lead metal will be recovered.

Magnesium.—Production of 84,500 tons of dolomite, from which 7,491 tons of magnesium metal were produced, came from the Dosseni Mine, Province of Trento, operated by the Società Italiana per il Magnesio e Leghe di Magnesio S.p.A. Mining was carried out in the upper part of the opencast mine and was hampered by large intercalations of sterile materials.

Pyrite.—The Niccioleta Mine in the Province of Tuscany, operated by Solmine, stopped production during the fall.

NONMETALS

Asbestos.—The only producer of asbestos in Italy was the opencast mine Balangero, also known as the San Vittore Mine, owned and operated by the Amiantifera di Balangero S.p.A. The Balangero Mine was located near the small village of Balangero near Lonzo, about 50 kilometers north of Turin in the foothills of the Alps at about 1,200 meters altitude. The Balangero Mine produced 147,272 tons of asbestos fiber from about 2.1 million tons of ores. For protection of the environment by lowering the amount of dust, an automatic system for watering the dump site went into operation at Balangero Mine. In the asbestos plant, an installation for dedusting the air was brought on-stream.

Barite.—At the beginning of 1984, barite was produced by six companies; Bariosarda Co., Edem Co., Società Edem Sarda, Baroyd S.A., Mineraria Baritina S.p.A., and Mineraria Silius. However, activities of Baroyd were taken over by Società Edem Sarda and Bariosarda, which left five companies producing barite in Italy at yearend.

At Barega and Mont'Ega Mines, both in the Province of Cagliari, exploration resulted in discoveries of minor barite reserves. Output was 243,900 tons of crude barite, from which was recovered 37,500 tons of coarse barite and 21,200 tons of floated barite. In addition, in the Barega Mine about 107 meters of a ramp with a cross section of 16 square meters was built. At Mont'Ega, 308 meters of a ramp were constructed also with a cross section of 16 square meters. Mining was by sublevel caving and stoping.

In the Val di Castelo Mine owned by Edem, located near Pietrasanta in the Province of Lucca, 24,560 tons of raw minerals were mined and 11,700 tons of barite for drilling needs were recovered. Exploration resulted in discoveries of new mineralized zones.

Exploration in the Felice zone of the Marigole Mine, owned by Mineraria Baritina, uncovered new mineralized areas of excellent quality, and during 1984, Marigole recorded an increase of reserves. Output at Marigole was 12,000 tons of barite.

Fluorspar.—Almost all acid-grade fluorspar was produced in mines operated by Mineraria Silius. The metallurgical-grade was produced in mines located in the Provinces of Lazio, Bergamo, and Trentino.

At the Gennas Tres Montes e Muscadraxiu Mine in Sardinia operated by Mineraria Silius about 110,300 tons of acid-grade fluorspar was produced. Large-scale exploration was under way in the area of the mine. Production of metallurgical-grade fluorspar totaled 77,331 tons. Upgrading of ores from the mines in Lazio was difficult because of the fine dispersion of fluorspar in the ore.

Potash.—In Italy, potash was produced by two companies, Italkali S.p.A. and Ispea S.p.A. All active mines were located in Sicily. Lower potash production in 1984 resulted from gradual decline of production at the San Cataldo Mine where reserves are being exhausted. As part of a reorganization of the potash sector, management of the plant at Pasquasia was assigned to Italkali. At Pasquasia, a new conveyer belt entered into service. The conveyer belt for transporting ores out of the mine has been installed in a ramp and has replaced a skip in shaft No. 1.

At the Realmonte Mine, Sicily, a new conveyer belt in the entry ramp entered into service. The construction of a gallery under the village of Realmonte continued to open up the main deposit of kainite.

Salt.—Salt was produced by solution mining and as a byproduct of potash mining from facilities operated by Società Solvay S.p.A., Italkali, and Montedipe S.p.A.

At the solution mines of Ponte Ginori, Buriano, and Quercianella, located in Valdi Cecina, Province of Pisa, production reached 1,780,000 tons of salt. The salt solution was piped to Solvay's plant at Rosignano where it was used for production of chemicals.

At the Timpa di Salto solution mine in the Province of Calabria, operated by Montedipe, output reached 413,000 tons of salt in solution. The salt solution was pumped through a pipeline to a chemical plant located at Ciro Marina. During the year, production was stopped at state request because the subsidence of the ground caused leakage of saline solution on the surface.

The byproduct salt was mostly produced in Italkali's underground potash mines at Petralia, Racalmuto, and Realmonte, located in Sicily. Production was about 1,061,700 tons of salt. Higher output from that of 1983 resulted from better demand for salt.

Talc.—About 43% of total talc production was from mines located in Piedmont and Sardinia and operated by the Talco Graphite Valchisone S.p.A. The rest of the production came from mines in the region of Sondrio operated by the Mineraria Valle Spluga S.p.A. and from mines in the Province of Bolzano. The largest talc mine owned and operated by Talco Graphite Valchisone, was the Fontana underground mine, which produced 41,235 tons of talc during 1984. The Fontana Mine was located in the Alps, 35 kilometers northwest of the mill, and the talc mill was built on the Chisone River about 30 kilometers north of Pinerolo, the rail terminus in Piedmont. Talc occurred in veins ranging from a few centimeters to several meters thick. Stoping with cement filling was replacing the old mining method, and a new production field between levels 1,300 and 1,320 was prepared for production.

MINERAL FUELS

Italy remained a large importer of coal, crude oil, and natural gas. As in the past, domestic production was far below the country's demand.

Coal.—Two lignite mines, Santa Barbara in Tuscany and Pietrafitta in Umbria were the only producers of lignite. Overburden landslides caused problems in the Santa Barbara Mines. However, production showed a slight increase. Work on reopening the Sulcis Mines in Sardinia was still in the phase of studies at yearend.

Petroleum and Natural Gas.—Domestic production of crude oil and natural gas was below demand. About 1.2% of crude oil and 9% to 10% of natural gas demand were met by domestic output. Exploration for crude oil and natural gas continued. A total of 188,949 meters in 84 exploration wells and 102,434 meters in 31 development wells were drilled onshore and offshore throughout Italy. Major oil and gas fields brought into production were Canaldente, Province of Matera; Melanico, Province of Foggia; and Crude del Vento, Province of Ancona. Most of the development drilling was in the field at Porto Corsini, Cervia-Arianna, in the Adriatic, and at Vega and Mila near Sicily.

The downward trend in petroleum refinery output continued. A committee, formed of representatives of the private and public sector, suggested streamlining the country's petroleum refining sector. The Italian petroleum refining sector was being forced to adjust its production to meet a declining domestic demand that at the same time favored light products. To balance capacities with the future demand for refinery products, the committee suggested three courses of action: (1) Forbid building new primary refinery capabilities, (2) void all permits given to closed refineries, and (3) grant fiscal and other relief to companies that reduce their primary capacities and conduct research on more effective refining methods.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Italian lire (Lit) to U.S. dollars at the rate for 1984 of Lit1,757=US$1.00.

The Mineral Industry of Japan

By John C. Wu[1]

In 1984, Japan was the world's largest metal producer of gallium, indium, and selenium; the second largest metal producer of bismuth, cadmium, steel, and zinc; the third largest metal producer of copper, nickel, and titanium; and the sixth largest mine producer of zinc. Japan remained one of the major producers of cement and limestone. Japan was also the world's largest importer of coal, copper concentrate, iron ore, nickel ore, liquefied natural gas (LNG), crude petroleum, phosphate rock, and industrial salt.

Japan's mining industry continued to suffer from the industry's chronic recession. The total output of the mining industry declined 0.8% from that of 1983 resulting from a reduction in the number of operating mines, low metal prices, and fast-depleting ore reserves. A significant decline in mine production was reported in chromium, copper, manganese, and tin. However, the output of the mineral processing industry rose moderately over that of 1983 owing to a stronger domestic demand. Production of steel rebounded to over 100 million tons. A strong recovery was reported in the metal production of lead, titanium, and zinc. However, because of the shortage of copper concentrates in the world market and reduced supplies of nickel matte and other raw materials from overseas suppliers, the metal production of cobalt, copper, and nickel was down considerably. As a result, a record-high amount of refined cobalt, copper, and nickel was imported. Japan also imported a record-high amount of gold, lead, and tin to meet the strong domestic demand in 1984.

The primary aluminum industry was forced to close down four more plants and reduced the production capacities of three plants because of the continued financial difficulties resulting from high electric power cost and the low price of imported primary aluminum. According to industry sources, Japan's primary aluminum production capacity will be reduced to only 354,318 tons per year in 1986 from 712,000 tons per year in 1984. The cement industry continued to suffer from structural recession. To cope with the problems of reduced exports and excessive competition in the domestic markets, the industry's production capacity was to be reduced to 100 million tons per year by early 1985 from 129 million tons per year in 1984. Beginning in September, the cement output of 22 companies was distributed by the 5 newly formed cement marketing companies.

During 1984, Japan's iron and steel industry made significant progress in expanding its international-scale operations. Several important capital investments in U.S. steel companies reportedly were made by Nisshin Steel Co. Ltd., Nippon Kokan K.K., Kawasaki Steel Corp., and Sumitomo Metal Industries Ltd. Other capital investments by Japan's major steel companies overseas included Nisshin Steel in China and the Republic of Korea for production of stainless steel, and Kobe Steel Ltd. in China for production of aluminum.

As a result of continued advances in the high-technology industry, Japan's metal production of gallium, germanium, rare earths, silicon, tantalum, and zirconium had been expanded substantially in the past 2 years. In September, a mining industry advisory council of the Ministry of International Trade and Industry (MITI) identified 31 types of rare (minor) metals that are important in meeting the growing need of the fine ceramics, computer, electronics, laser, and nuclear power industries. In its recommendations, the council urged the necessity of establishing a stable supply system of such metals as columbium, gallium, and rare earths. Top priority reportedly was given to domestic exploration and development of gallium, indium, molybdenum, and tungsten. The council also urged the industry to increase its efforts in research and development, exploration, mining, smelting, and refining and encouraged new industrial applications of rare metals.[2]

To secure a short-term raw material supply vital to the Japanese iron and steel, machinery, and electronic industries, the Government continued to build its rare metal stockpile of chromium, cobalt, manganese, molybdenum, nickel, tungsten, and vanadium. By the end of fiscal year 1984, the amount of the seven metals stockpiled by the Government and by joint Government and private programs was increased to a 7-day supply each, while the private program was increased to a 2.8-day supply. However, the total stockpile of the three programs was 7.2 days below the target of a 24-day supply.

In the mineral fuels sector, Japan's coal mining industry suffered another setback because of a coal mine fire at the Ariake Mine in Kyushu in January. As a result, the output of coal dropped to under 17 million tons for the first time in Japan's modern coal mining history. The financially troubled petroleum refining industry was still undergoing reorganization. After a 16% reduction of refining capacity in 1983, the industry was regrouping the 13 existing oil companies into 7 larger companies through voluntary mergers or other business relationships in 1984. As a result of increased demand for refined petroleum products, the refining industry operated at a higher capacity than that of 1983.

According to the Economic Planning Agency, Japan's economy as measured by real gross national product (GNP) grew 5.8% in 1984 compared with 3.4% (revised) in 1983. The higher growth in the Japanese economy was again mostly attributed to a sharp increase in exports and a moderate expansion of domestic demand and fixed capital formation. In 1984, Japan's industrial output rose 11%, the largest increase in 8 years, owing to an unprecedented growth in the output of the electric machinery industry. The rapid expansion in the production of semiconductor elements and integrated circuits reportedly contributed the most to the overall growth of the electric machinery industry.

Despite the continued decline in the activity of the mining industry, most economic indicators for the overall activity of the Japanese economy were the best in more than 10 years. In 1984, Japan's GNP in 1975 constant dollars was estimated at $939 billion,[3] and in current dollars was estimated at $1,233 billion. Inflation rate, as measured by change in the Consumer Price Index, was 2.7% compared with 2% in 1983. The unemployment rate rose slightly to 2.7% from 2.6% in 1983, however, the labor force rose to 59.2 million from 58.9 million in 1983. According to the Ministry of Labor and Japan Productivity Center, the real wage in the manufacturing sector rose 2.5% while labor productivity increased 10%. Japan's export earnings rose 16% to $170 billion while imports rose 8% to $136 billion. As a result, a record-high trade surplus of $34 billion was recorded. Machinery and equipment remained the major export earners while fuels continued to be Japan's major import commodity.

PRODUCTION

Despite an upswing in domestic demand for minerals and metals, Japan's mining industry continued its downward trend. Production of nonferrous minerals continued to decline because of low metal prices and high production costs while the output of nonmetallic minerals remained stagnant owing to sluggish domestic demand and increased overseas competition. Mine production of all nonferrous minerals was down except for gold, iron ore, lead, molybdenum, and silver while production of most nonmetallic minerals remained unchanged or suffered cutbacks except for feldspar and pyrophyllite.

According to MITI's survey, the number of operating metallic and nonmetallic mines declined to 67 and 679, respectively, in 1984 from 78 and 691, respectively, in 1983. The number of employees in metal mining decreased to 9,242 in 1984 from 9,943 in 1983, and in nonmetal mining, declined to 16,108 in 1984 from 17,048 in 1983.

In the metallic and nonmetallic mineral processing sectors, metal production of cobalt, copper, and nickel was down because of a shortage of copper ore and concentrate in the world market and because of cutbacks in supplies of nickel matte and mixed cobalt-nickel sulfate from Australia and the Philippines. Production of lead and zinc continued its upward trend and production of aluminum and titanium was up slightly. Production of iron and steel recovered to the 1981 level for the first time in 3 years. Production of ferroalloys also recovered slightly from the 1983 slump. Japan became the world's largest producer of gallium metal when production of gallium, including scrap recycling, reached 17 tons. Production of cement declined because of reduced exports to the Middle East, whereas the output of chemical fertilizers rose slightly as domestic market conditions improved.

In the mineral fuels sector, production of coal dropped below 17 million tons as a result of a coal mine fire in Kyushu. Japan's production of crude petroleum and natural gas remained small compared with its requirements. Because of increased domestic demand for refined petroleum products, Japan's petroleum refining industry operated at a higher rate than that of 1983. The petroleum refining industry was undergoing a major change in structure as well as in product mix under a guideline recommended by the Petroleum Deliberation Council of MITI.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Alumina, gross weight ---- thousand tons--	1,936	1,344	959	1,065	1,172
Metal:					
Primary:					
Regular grades ---------do----	[r]1,091	[r]771	[r]351	256	287
High-purity -----------do----	4	6	4	3	5
Secondary ---------------do----	800	840	761	802	819
Antimony:					
Oxide	6,482	6,238	6,446	7,596	9,698
Metal	356	390	260	273	253
Arsenic, white (equivalent of arsenic acid)	284	95	[e]100	[r] [e]300	[e]500
Bismuth	338	478	486	573	563
Cadmium	2,173	1,977	2,034	2,214	2,423
Chromium:					
Chromite, gross weight	13,610	10,959	11,129	8,396	6,001
Metal	3,621	3,625	3,785	2,786	3,452
Cobalt metal	2,867	2,421	1,942	1,371	905
Columbium and tantalum: Tantalum metal	58	53	44	40	[e]45
Copper:					
Mine output, metal content	52,553	51,513	50,658	46,045	43,309
Metal:					
Blister and anode:					
Primary	889,500	930,000	948,200	944,600	821,100
Secondary	39,800	50,100	98,100	117,300	107,900
Total	929,300	980,100	1,046,300	1,061,900	929,000
Refined:					
Primary	889,497	929,967	948,158	944,551	821,064
Secondary	124,795	120,153	126,816	147,378	114,092
Total	1,014,292	1,050,120	1,074,974	1,091,929	935,156
Gallium metal[2]	[r]6	[r]8	[r]7	8	17
Germanium:					
Oxide	16	12	10	11	11
Metal	13	11	7	7	8
Gold:					
Mine output, metal content thousand troy ounces--	102	99	104	101	104
Metal ---------------------do----	1,217	1,214	1,271	1,296	1,342
Indium metal ------------------do----	482	482	482	449	[e]482
Iron and steel:					
Iron ore and iron sand concentrate:					
Gross weight ------- thousand tons--	477	442	362	298	325
Iron content --------------do----	294	[r]275	[r]227	185	202
Roasted pyrite concentrate (50% or more Fe) do----	318	308	327	329	225
Metal:					
Pig iron and blast furnace ferroalloys do----	87,041	80,048	77,658	72,936	80,402

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS —Continued					
Iron and steel —Continued					
Metal —Continued					
Electric-furnace ferroalloys:					
Ferrochrome	402,997	306,104	328,480	304,053	323,930
Ferromanganese	569,147	567,746	538,355	389,381	485,008
Ferronickel	276,829	244,135	214,523	180,826	217,053
Ferrosilicon	303,754	234,524	192,372	157,939	153,386
Silicomanganese	310,714	282,852	269,379	222,204	233,061
Ferrochromium-silicon[3]	20,531	10,469	9,845	7,152	6,451
Other:					
Calcium silicon	3,859	2,590	3,834	2,357	1,724
Ferrocolumbium	1,159	825	1,039	530	1,031
Ferromolybdenum	4,367	3,056	3,413	3,104	3,299
Ferrotungsten	242	362	329	200	144
Ferrovanadium	3,526	4,063	4,465	2,821	3,733
Unspecified	10,360	3,167	2,309	2,159	2,727
Total[4]	1,907,485	1,659,893	1,568,343	1,272,726	1,431,547
Steel, crude thousand tons	111,395	101,675	99,548	97,179	105,581
Semimanufactures, hot-rolled:					
Of ordinary steels do	88,888	79,797	78,206	77,552	82,765
Of special steels do	12,872	13,281	13,660	13,286	16,070
Lead:					
Mine output, metal content	44,746	46,922	45,873	46,888	48,735
Metal, refined:					
Primary	175,172	175,371	183,132	203,325	233,796
Secondary	129,769	141,646	119,068	118,317	131,900
Magnesium metal:					
Primary	9,252	5,667	5,555	6,026	7,103
Secondary	23,872	[r]28,437	21,670	13,012	15,656
Manganese:					
Ore and concentrate:					
Gross weight	79,579	86,696	78,045	75,199	61,635
Manganese content	19,065	20,953	19,928	19,860	16,679
Oxide	39,487	44,296	45,990	47,182	47,807
Metal	4,431	4,232	3,873	3,939	4,323
Molybdenum:					
Metal content of concentrate[e]	56	74	97	97	147
Metal	388	388	392	438	493
Nickel metal:					
Refined	24,798	23,791	[r]23,327	23,812	23,356
Ni content of ferronickel	73,566	63,008	60,030	45,739	50,842
Total	98,364	86,799	[r]83,357	69,551	74,198
Platinum-group metals:					
Palladium metal troy ounces	28,968	25,748	27,862	37,122	33,802
Platinum metal do	12,366	10,521	15,411	21,460	19,523
Rare-earth metals:					
Lanthanum oxide	188	227	118	160	235
Cerium metal	670	852	628	[e]600	[e]630
Selenium, elemental	471	428	410	433	465
Silicon:					
Metal	15,751	11,906	8,124	--	--
High-purity	476	594	605	652	908
Silver:					
Mine output, metal content thousand troy ounces	8,603	9,010	9,843	9,877	10,403
Metal, primary do	37,828	40,252	41,573	48,794	47,020
Tellurium, elemental	69	62	63	55	[e]63
Tin:					
Mine output, metal content	549	561	529	599	485
Metal, smelter	1,319	[r]1,314	1,296	1,260	1,354
Titanium:					
Metal	13,961	24,938	[r]16,850	10,590	15,368
Oxide	171,000	177,600	185,648	198,010	206,342
Tungsten:					
Mine output, metal content	668	[r]631	[r]604	475	477
Metal	2,055	1,820	1,775	1,842	2,386
Uranium metal kilograms	5,218	2,619	NA	NA	NA
Zinc:					
Mine output, metal content	238,108	242,042	251,356	255,712	252,702
Oxide	63,497	64,735	60,924	64,796	71,850
Metal:					
Primary	629,681	575,645	549,010	579,021	644,360
Secondary	155,423	144,789	159,407	171,016	[e]160,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS —Continued					
Zirconium:					
Metal	84	47	45	NA	NA
Oxide	3,750	4,020	4,320	4,900	6,020
NONMETALS					
Asbestos	3,897	3,950	4,135	[e]4,000	[e]4,000
Barite	55,916	56,369	59,492	69,699	66,018
Bromine, elemental[e]	12,000	12,000	12,000	12,000	12,000
Cement, hydraulic thousand tons	87,958	84,827	[r]79,212	80,892	78,851
Clays:					
Bentonite	548,328	511,781	484,431	440,923	415,974
Fire clay	1,547,085	1,455,619	1,321,002	1,260,678	1,287,484
Kaolin	228,255	210,858	197,346	230,720	224,614
Feldspar and related materials:					
Feldspar	29,782	25,620	30,160	30,996	35,184
Aplite	302,749	350,123	349,355	412,454	441,005
Gypsum thousand tons	6,105	6,137	6,363	5,845	[e]6,050
Iodine, elemental	6,525	6,862	7,180	7,273	7,302
Lime: Quicklime thousand tons	9,350	8,026	7,777	7,436	7,753
Nitrogen: N content of ammonia do	2,149	1,850	1,652	1,546	1,668
Perlite[e]	77,000	75,000	75,000	75,000	75,000
Salt, all types thousand tons	1,112	[r]1,002	[r]966	1,200	1,200
Sodium compounds, n.e.s.:					
Carbonate	1,355,433	1,177,695	1,162,398	1,103,378	1,036,133
Sulfate	310,743	284,677	255,969	260,661	278,941
Stone, crushed and broken:					
Dolomite thousand tons	6,206	5,787	4,996	4,386	4,268
Limestone do	184,780	176,702	168,259	169,780	169,821
Sulfur:					
S content of pyrite do	311	293	276	272	259
Byproduct:					
Of metallurgy do	1,300	1,236	1,268	1,239	[e]1,170
Of petroleum do	1,173	1,080	1,051	1,102	[e]1,060
Talc and related materials:					
Talc	121,670	114,466	99,886	87,124	85,798
Pyrophyllite	1,627,128	1,430,585	1,392,418	1,378,699	1,414,593
Vermiculite[e]	17,000	17,000	17,000	17,000	17,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black thousand tons	575	557	504	568	602
Coal:					
Anthracite do	10	34	32	17	23
Bituminous[5] do	18,017	17,653	[r]17,574	17,045	16,622
Lignite do	27	--	--	--	--
Total do	18,054	17,687	17,606	17,062	16,645
Coke including breeze:					
Metallurgical do	45,146	44,864	46,520	43,600	48,145
Metallurgical breeze do	2,318	2,378			
Gashouse including breeze do	3,494	3,448	3,261	3,073	3,130
Fuel briquets, all grades do	453	376	334	282	306
Gas, natural:					
Gross[6] million cubic feet	77,593	74,245	72,305	73,645	75,293
Marketed do	75,545	71,594	70,440	72,432	75,329
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:					
Crude thousand 42-gallon barrels	3,169	2,868	2,937	3,095	2,962
Refinery products:					
Gasoline:					
Aviation do	88	101	101	82	88
Other do	214,614	219,168	222,489	223,590	227,678
Jet fuel do	28,839	28,273	27,109	27,933	23,499
Kerosine do	178,718	174,548	169,825	168,982	168,774
Distillate fuel oil do	135,633	134,476	113,581	144,936	155,817
Residual fuel oil do	697,507	601,412	528,299	485,258	479,836
Lubricants do	12,636	11,806	10,774	11,517	12,032
Asphalt and bitumen do	28,411	27,078	27,078	29,682	30,719
Liquefied petroleum gas do	47,067	47,475	45,890	48,733	47,029
Naphtha do	110,512	92,403	71,804	72,509	73,175

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products —Continued					
Paraffin thousand 42-gallon barrels	1,101	1,101	1,025	981	1,050
Petroleum coke do	692	717	761	717	881
Unfinished oils do	44,557	12,076	NA	4,478	48,243
Refinery fuel and losses do	[7]110,411	113,002	118,708	88,591	[7]130,666
Total do	1,610,786	1,463,636	1,337,444	1,307,989	1,399,487

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 27, 1985.
[2]Includes scrap recovery.
[3]For reasons not evident in sources, these figures are reported as negative numbers. (See also footnote 4.)
[4]Sum of listed detail as reported, but adding quantity bearing footnote 3 as positive numbers. Japanese sources provide the following totals for ferroalloy output in the years indicated, in metric tons: 1980—1,866,423; 1981—1,638,955; 1982—1,548,653, 1983—1,258,422, and 1984—1,418,645. These totals represent the sum of listed detail using the quantities bearing footnote 3 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.
[5]Includes coking coal and steam coal.
[6]Includes output from gas wells and coal mines.
[7]May include some additional unfinished oils.

TRADE

Japan scored another record-high merchandise trade surplus in 1984 when the trade balance rose 64% to $34 billion. Despite an 8% increase in imports to $136 billion, exports rose 16% to $170 billion. Foodstuffs, mineral fuels, metallic minerals, and chemical raw materials remained the major imported commodities while machinery, transport equipment, electrical appliances, and iron and steel products were the major export earning commodities.

In the mineral commodity trade, Japan imported a record-high amount of refined cobalt, copper, lead, nickel, tin, and zinc as a result of strong domestic demand for these metals by the manufacturing sector. Imports of primary aluminum were down slightly but remained over 1.2 million tons. Imports of iron and steel products reached a new high but were small when compared with domestic production. Imports of iron ore and other nonferrous metal ore remained at the same level as that of 1983 while imports of petroleum and coal were at a slightly higher level than that of 1983. Exports of iron and steel, nonferrous metal products, and nonmetallic mineral products were at a slightly higher level than that of 1983.

Based on the total value of two-way merchandise trade, the United States remained the single most important trade partner of Japan, accounting for 28.3% of the total value, followed by Saudi Arabia, 6.6%; China, 4.3%; Australia, 4.1%; and the Republic of Korea, 3.7%. In the mineral commodity trade, the important suppliers of metallic and industrial minerals and metals were Australia, Brazil, Canada, Chile, India, Indonesia, Malaysia, Mexico, New Caledonia, Peru, the Philippines, the Republic of South Africa, the U.S.S.R., and the United States. The major suppliers of mineral fuels were Saudi Arabia, the United Arab Emirates, and Indonesia for crude petroleum, and Australia, Canada, China, the Republic of South Africa, and the United States for coal.

Table 2.—Japan: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	17	260	--	All to Republic of Korea.
Oxides and hydroxides	339,719	569,199	1,332	Canada 285,831; Indonesia 84,514; China 73,580.
Metal including alloys:				
Scrap	630	637	--	Republic of Korea 509; Taiwan 118.
Unwrought	6,681	1,679	12	Republic of Korea 529; Thailand 343; Indonesia 329.
Semimanufactures	155,714	197,996	122,018	Taiwan 13,278; Republic of Korea 11,497; Indonesia 9,215.
Bismuth: Metal including alloys, all forms	242	250	45	Netherlands 124; West Germany 36; India 26.
Cadmium: Metal including alloys, all forms	1,145	910	--	U.S.S.R. 230; East Germany 205; Austria 109.
Chromium:				
Ore and concentrate	744	852	--	Republic of Korea 765; Singapore 56.
Oxides and hydroxides	2,427	3,175	465	Taiwan 1,225; Republic of Korea 728; China 180.
Cobalt: Oxides and hydroxides	10	66	45	Vietnam 11; North Korea 3.
Columbium and tantalum	9	9	6	Austria 1; West Germany 1.
Copper:				
Sulfate	379	834	17	Philippines 458; Taiwan 301.
Metal including alloys:				
Scrap	45,037	177,919	10,194	China 84,775; Taiwan 51,071; Republic of Korea 19,250.
Unwrought	3,793	5,315	1,031	Republic of Korea 2,723; Taiwan 1,199.
Semimanufactures	203,252	207,614	38,831	Taiwan 36,353; Hong Kong 23,797; Singapore 18,372.
Gold: Metal including alloys, unwrought and partly wrought ___troy ounces	468,079	261,303	36,643	Singapore 91,870; United Kingdom 88,613; Republic of Korea 12,675.
Iron and steel: Metal:				
Scrap	174,787	115,822	6,522	Taiwan 48,646; Republic of Korea 43,674.
Pig iron, cast iron, related materials	60,785	345,033	3,499	China 293,144; Thailand 9,694; Singapore 7,414.
Ferroalloys:				
Ferromanganese	26,683	22,202	1,000	North Korea 10,821; Republic of Korea 7,890; Australia 708.
Unspecified	27,274	21,687	6,620	Netherlands 8,195; China 2,000; North Korea 1,683.
Steel, primary forms thousand tons	2,547	3,301	262	Republic of Korea 835; China 549; Iran 258.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	7,892	8,239	907	China 1,742; Singapore 728; Republic of Korea 435.
Universals, plates, sheets do	9,775	14,089	2,243	China 3,647; Iran 801; Republic of Korea 667.
Hoop and strip do	578	602	107	China 138; Taiwan 46; Hong Kong 38.
Rails and accessories do	166	193	98	China 20; Brazil 16; Indonesia 11.
Wire do	254	314	127	Iran 16; Hong Kong 15; Taiwan 13.
Tubes, pipes, fittings do	7,233	5,519	739	U.S.S.R. 1,250; China 872; Saudi Arabia 489.
Castings and forgings, rough do	30	16	6	Singapore 4; Republic of Korea 2.
Lead:				
Ore and concentrate	4,807	3,001	--	North Korea 3,000.
Oxides	79	120	--	Vietnam 50; Hong Kong 30; Republic of Korea 25.
Metal including alloys, all forms	8,022	16,037	8	Taiwan 4,014; Hong Kong 3,921; Republic of Korea 3,462.
Magnesium: Metal including alloys, all forms	67	79	--	Saudi Arabia 18; Republic of Korea 16; Indonesia 8.
Manganese:				
Ore and concentrate	1,557	1,973	--	Republic of Korea 556; Cuba 375; Bangladesh 340.
Oxides	31,489	35,547	16,546	Indonesia 3,843; Republic of Korea 1,976; Philippines 1,286.

See footnotes at end of table.

Table 2.—Japan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Mercury 76-pound flasks	7,296	738	--	Republic of Korea 441; Taiwan 96; Burma 60.
Molybdenum: Metal including alloys, all forms	54	51	1	Hungary 23; West Germany 5; Republic of Korea 5.
Nickel: Metal including alloys, all forms	1,438	1,144	29	Republic of Korea 327; Taiwan 183; Indonesia 117.
Platinum-group metals:				
Waste and sweepings value	$13,965	--		
Metal including alloys, unwrought and partly wrought troy ounces	186,072	158,631	75,546	Taiwan 61,082; Republic of Korea 6,177; Switzerland 5,543.
Selenium, elemental	204	234	60	Netherlands 71; United Kingdom 29; India 19.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	4,441	7,074	1,505	United Kingdom 3,230; Taiwan 999; Republic of Korea 355.
Tin:				
Oxides	25	37	--	China 26; Republic of Korea 7.
Metal including alloys, all forms	1,812	870	1	Nigeria 217; Jordan 147; Republic of Korea 139.
Titanium:				
Oxides	16,544	19,055	1,372	Taiwan 5,422; China 4,378; Republic of Korea 2,241.
Metal including alloys, all forms	3,711	2,664	1,955	France 180; United Kingdom 165; West Germany 136.
Tungsten:				
Ore and concentrate	9	90	--	All to West Germany.
Metal including alloys, all forms	286	146	32	U.S.S.R. 32; Taiwan 28; Republic of Korea 19.
Zinc:				
Oxides	913	1,344	23	Vietnam 535; Thailand 270; Indonesia 156.
Metal including alloys, all forms	45,699	57,576	59	Taiwan 16,486; China 11,674; Philippines 9,536.
NONMETALS				
Asbestos, crude	723	677	--	Republic of Korea 268; Vietnam 237; China 86.
Barite and witherite	4	30	30	
Boron materials:				
Crude natural borates	1,230	1,345	--	Republic of Korea 876; Taiwan 469.
Oxides and acids	106	232	(2)	Taiwan 124; Republic of Korea 67; Vietnam 27.
Cement thousand tons	11,348	14,317	(2)	Saudi Arabia 5,470; Kuwait 2,204; Singapore 2,063.
Clays, crude	r52,985	59,588	75	Taiwan 32,710; Republic of Korea 10,402; Indonesia 5,453.
Diamond:				
Gem, not set or strung carats	1,038	583	65	Belgium-Luxembourg 241; United Kingdom 112; Hong Kong 103.
Industrial stones do	6,123	22,639	4,068	Taiwan 15,550; Hong Kong 1,600.
Diatomite and other infusorial earth	2,165	1,322	20	Taiwan 470; Iran 230; Vietnam 200.
Feldspar	24,246	28,886	--	Taiwan 26,762; Indonesia 1,573.
Fertilizer materials: Manufactured:				
Ammonia	23,102	1,472	--	Thailand 1,120; North Korea 89; Vietnam 75.
Nitrogenous thousand tons	1,080	659	(2)	Thailand 160; China 105; Indonesia 86.
Phosphatic	9,205	17,601	--	Bangladesh 8,805; Fiji 5,000; Taiwan 2,020.
Potassic	1,092	58	2	Philippines 44.
Unspecified and mixed	149,622	107,615	734	Thailand 50,000; Indonesia 5,003; Vietnam 5,000.
Fluorspar	486	458	1	North Korea 130; Vietnam 110; New Zealand 100.
Graphite, natural	2,084	2,515	60	Taiwan 995; Republic of Korea 321; Czechoslovakia 288.
Gypsum and plaster	9,173	10,039	59	Republic of Korea 4,943; Taiwan 1,802; Indonesia 1,465.
Kyanite and related materials	12,400	8,439	10	Taiwan 4,621; Republic of Korea 2,088; Thailand 1,029.
Iodine including bromine and fluorine	5,199	6,282	2,248	United Kingdom 1,023; West Germany 785; France 542.
Lime	20,193	25,937	--	Papua New Guinea 23,812; Australia 1,589.

See footnotes at end of table.

Table 2.—Japan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Magnesium compounds:				
Magnesite	95,325	71,507	569	Republic of Korea 25,542; Poland 10,413; Australia 8,731.
Oxides and hydroxides	6,103	7,792	1,955	West Germany 1,515; Taiwan 996; Republic of Korea 778.
Mica, all forms	840	1,098	57	Hong Kong 564; Taiwan 193; Republic of Korea 115.
Pigments, mineral:				
Natural, crude	66	67	--	Republic of Korea 29; Indonesia 20; Taiwan 11.
Iron oxides and hydroxides, processed	13,066	18,452	3,426	Taiwan 7,336; U.S.S.R. 1,628; Republic of Korea 1,555.
Precious and semiprecious stones other than diamond:				
Natural kilograms	20,150	239,974	323	Taiwan 131,120; Singapore 78,822; Republic of Korea 26,956.
Synthetic do	37,391	52,109	2,988	Malaysia 16,274; Republic of Korea 13,804; Taiwan 7,776.
Salt and brine	1,609	1,292	482	North Korea 404; Republic of Korea 75.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	40,854	21,889	8	Indonesia 9,522; Philippines 5,925; China 2,191.
Sulfate, manufactured	9,413	8,897	1	Mozambique 2,000; Philippines 1,967; Thailand 1,610.
Stone, sand and gravel:				
Dimension stone	6,612	3,583	77	Singapore 1,857; Republic of Korea 939; Taiwan 274.
Dolomite, chiefly refractory-grade	5,093	5,375	--	Indonesia 3,530; Taiwan 920; Republic of Korea 460.
Gravel and crushed rock	95,102	159,698	61	Australia 135,150; Taiwan 294; Singapore 280.
Limestone other than dimension	991,670	1,659,307	34	Australia 838,350; Hong Kong 800,369.
Quartz and quartzite	3,824	5,362	40	Hong Kong 5,005.
Sand other than metal-bearing	3,703	3,100	--	Republic of Korea 934; Taiwan 906; Philippines 252.
Sulfur:				
Elemental:				
Crude including native and byproduct	299,451	239,025	(2)	Republic of Korea 191,850; Taiwan 44,521; China 2,018.
Colloidal, precipitated, sublimed	200	371	(2)	Republic of Korea 202; Thailand 53; Philippines 32.
Sulfuric acid	788,953	723,322	21,965	Republic of Korea 237,850; China 213,780; Belgium-Luxembourg 58,412.
Talc, steatite, soapstone, pyrophyllite	2,032	4,058	2	Republic of Korea 2,379; Taiwan 833; Vietnam 265.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	10,865	13,864	106	Indonesia 3,321; Republic of Korea 2,007; Vietnam 1,244.
Coal, all grades including briquets	25,376	15,274	--	Republic of Korea 11,085; Philippines 2,800; Australia 520.
Coke and semicoke thousand tons	1,745	2,029	44	United Kingdom 703; Romania 347; Philippines 212.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	3	13	10	Hong Kong 2.
Gasoline do	52	28	(2)	Taiwan 23.
Mineral jelly and wax do	563	453	61	Republic of South Africa 136; Republic of Korea 58; Taiwan 52.
Kerosine and jet fuel do	48	30	--	Republic of Korea 23; Australia 5.
Lubricants do	1,221	1,288	63	Republic of Korea 365; Taiwan 201; Pakistan 177; U.S.S.R. 124.
Residual fuel oil do	16	203	(2)	Republic of Korea 161; Guam 42.
Bituminous mixtures do	42	11	--	Philippines 4; Taiwan 1.
Petroleum coke do	225	199	18	Netherlands 84; North Korea 33; U.S.S.R. 30.

[r]Revised.
[1]Excludes exports under Japanese-United States Mutual Defense Agreement or for account of U.S. military forces. Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 3.—Japan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	3,439	3,580	--	Australia 2,118; Indonesia 821; Malaysia 552.
Oxides and hydroxides	r155,806	35,209	985	Australia 32,419; West Germany 951; France 623.
Metal including alloys:				
Scrap	181,667	302,025	181,553	Australia 20,499; United Kingdom 18,336; Hong Kong 17,761.
Unwrought thousand tons	1,447	1,604	259	Venezuela 207; New Zealand 176; Canada 142.
Semimanufactures	30,196	36,792	4,094	Romania 7,661; France 4,684; Austria 3,193.
Antimony:				
Ore and concentrate	3,993	6,272	--	Bolivia 4,201; China 1,356; Republic of South Africa 507.
Oxides	1,150	1,796	8	China 1,014; United Kingdom 518; U.S.S.R. 200.
Metal including alloys, all forms	2,493	3,487	--	China 3,469.
Arsenic: Oxides and acids	599	272	--	France 175; China 67.
Beryllium:				
Oxides and hydroxides	116	80	50	China 30.
Metal including alloys, all forms kilograms	3,037	4,445	4,445	
Chromium:				
Ore and concentrate	694,521	644,895	--	Republic of South Africa 301,715; India 77,656; Albania 76,563.
Oxides and hydroxides	2,418	2,556	907	West Germany 952; U.S.S.R. 615.
Cobalt:				
Oxides and hydroxides	306	517	43	Belgium-Luxembourg 448.
Metal including alloys, all forms	2,015	2,071	279	Zaire 805; Belgium-Luxembourg 524.
Columbium and tantalum:				
Ore and concentrate	2,070	861	--	Canada 740; Malaysia 109.
Metal including alloys, all forms, tantalum	25	42	23	West Germany 14.
Copper:				
Ore and concentrate thousand tons	3,628	3,135	162	Canada 788; Philippines 646; Papua New Guinea 348.
Matte and speiss including cement copper	478	4,394	4,367	Taiwan 27.
Sulfate	420	252	--	China 220.
Metal including alloys:				
Scrap	56,418	57,486	17,181	Hong Kong 14,194; Taiwan 7,593; Singapore 5,157.
Unwrought	374,198	246,449	4,984	Zambia 101,068; Peru 53,440; Chile 29,633.
Semimanufactures	2,956	4,619	554	Republic of Korea 2,606; Indonesia 450; West Germany 177.
Germanium: Metal including alloys, all forms kilograms	874	811	([2])	Mainly from China.
Gold:				
Ore and concentrate value	$1,710	--		
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,624	3,532	6	Switzerland 1,703; United Kingdom 1,118.
Indium: Metal including alloys, all forms kilograms	4,040	4,308	1,243	Belgium-Luxembourg 1,595; West Germany 828.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	121,808	109,153	--	Australia 49,773; Brazil 23,509; India 14,653.
Metal:				
Scrap do.	2,025	3,906	2,310	U.S.S.R. 440; Netherlands 336; Australia 302.
Pig iron, cast iron, related materials do.	1,381	1,001	18	Australia 275; Brazil 226; U.S.S.R. 162.
Ferroalloys:				
Ferrochromium	214,313	297,533	--	Republic of South Africa 193,956; Brazil 36,686; Zimbabwe 29,802.
Ferromanganese	11,965	15,832	--	Brazil 6,819; Mexico 4,103; India 2,381.
Ferromolybdenum	374	460	1	Austria 163; West Germany 84; Chile 83.
Ferronickel	29,758	36,750	--	New Caledonia 16,809; Indonesia 10,648; Dominica 6,996.
Ferrosilicochromium	6,662	5,379	--	Zimbabwe 3,078; Republic of South Africa 2,301.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys —Continued				
Ferrosilicomanganese	75,627	115,533	2,318	Brazil 56,793; Republic of South Africa 24,103; Mexico 11,397.
Ferrosilicon	237,541	273,907	430	Norway 65,598; Brazil 62,737; Venezuela 28,409.
Silicon metal	61,473	80,435	734	China 17,883; Norway 16,271; Republic of South Africa 12,115.
Unspecified	7,781	7,998	36	France 2,769; Brazil 1,953; West Germany 1,446.
Steel, primary forms	934,058	1,288,971	462	Republic of Korea 726,122; Brazil 125,618; Spain 39,913.
Semimanufactures	r1,080,607	1,457,972	5,709	Republic of Korea 831,581; Taiwan 243,737; Brazil 142,529.
Lead:				
Ore and concentrate	225,654	237,807	--	Peru 77,822; Canada 66,975; Australia 35,488.
Oxides	1,506	2,736	1	Mexico 1,540; Singapore 853; China 334.
Metal including alloys:				
Scrap	2,762	1,012	708	Papua New Guinea 120; Canada 101.
Unwrought	61,778	61,209	1	Australia 32,721; Mexico 12,172; North Korea 3,924.
Semimanufactures	32	35	30	Belgium-Luxembourg 2; Italy 2.
Lithium:				
Oxides and hydroxides	670	766	636	U.S.S.R. 85; China 40.
Metal including alloys, all forms	35	30	24	West Germany 6.
Magnesium: Metal including alloys, all forms	14,369	15,716	11,229	Norway 2,429; Canada 901; France 617.
Manganese:				
Ore and concentrate thousand tons	2,164	1,651	--	Republic of South Africa 874; Australia 404.
Oxides	682	787	13	Belgium-Luxembourg 774.
Mercury 76-pound flasks	2,359	3,583	--	Algeria 1,151; China 1,071; Mexico 1,061.
Molybdenum:				
Ore and concentrate	17,245	18,737	5,383	Chile 6,650; Canada 3,078; Netherlands 1,270.
Oxides and hydroxides	635	549	519	Netherlands 17.
Metal including alloys, all forms	209	226	43	West Germany 144.
Nickel:				
Ore and concentrate thousand tons	2,997	2,297	--	New Caledonia 1,136; Indonesia 709; Philippines 452.
Matte and speiss	40,374	37,982	--	Indonesia 21,656; Australia 16,326.
Metal including alloys:				
Scrap	2,938	3,668	2,070	Taiwan 823; United Kingdom 301.
Unwrought	21,345	27,400	1,973	Canada 7,427; U.S.S.R. 5,410; Australia 3,953.
Semimanufactures	2,191	3,931	561	Philippines 1,539; United Kingdom 1,405.
Platinum-group metals: Metals including alloys, unwrought and partly wrought:				
Palladium thousand troy ounces	1,048	1,024	73	U.S.S.R. 732; Republic of South Africa 143.
Platinum do	1,099	942	57	Republic of South Africa 572; U.S.S.R. 117.
Rhodium do	32	75	6	Republic of South Africa 32; U.S.S.R. 27; United Kingdom 8.
Iridium, osmium, ruthenium do	55	105	6	Republic of South Africa 86; United Kingdom 11.
Unspecified do	20	33	3	Taiwan 15; West Germany 7.
Rare-earth metals including alloys, all forms	9	26	9	Brazil 7; Chile 6; France 4.
Selenium, elemental	3	23	--	Chile 7; Peru 5; Australia 3; United Kingdom 3.
Silicon, high-purity	50	60	11	Italy 19; West Germany 13; France 6.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	16,642	13,646	1,029	Mexico 7,932; Peru 3,201.
Tellurium, elemental kilograms	6,815	9,800	910	Peru 3,832; Belgium-Luxembourg 2,998; U.S.S.R. 2,000.
Tin: Metal including alloys, all forms	26,252	29,832	5	Malaysia 18,369; Indonesia 6,158; Thailand 4,276.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	367,500	411,047	(2)	Malaysia 173,920; Australia 100,637; India 80,645.
Oxides	5,127	6,625	425	Republic of Korea 2,500; Belgium-Luxembourg 998; United Kingdom 886.
Slag	91,625	63,118	--	Republic of South Africa 47,576; Canada 15,532.
Tungsten:				
Ore and concentrate	2,297	3,214	--	China 1,006; Republic of Korea 537; Portugal 463.
Metal including alloys, all forms	118	157	19	Republic of Korea 87; West Germany 45.
Uranium and/or thorium:				
Ore and concentrate	57	182	--	Niger 96; Australia 58; China 28.
Oxides and other compounds kilograms	1,399	13,094	11,095	West Germany 1,999.
Vanadium: Oxides and hydroxides	4,846	2,957	318	Republic of South Africa 1,771; China 768.
Zinc:				
Ore and concentrate	813,408	759,924	--	Australia 407,173; Peru 214,153; Canada 76,693.
Oxides	4,232	6,227	39	Republic of Korea 2,375; Taiwan 2,210; Singapore 805.
Metal including alloys, all forms	46,583	45,620	584	North Korea 20,124; Peru 11,365; Mexico 4,377.
Zirconium:				
Ore and concentrate	196,453	198,224	14	Australia 160,417; Republic of South Africa 31,031.
Metal including alloys, all forms	11	75	40	France 29.
NONMETALS				
Asbestos, crude	229,125	237,413	11,332	Canada 89,740; Republic of South Africa 56,698; U.S.S.R. 42,804.
Barite and witherite	40,187	46,568	--	China 44,652; Thailand 1,896.
Boron materials:				
Crude natural borates	28,779	49,850	--	Turkey 49,180; U.S.S.R. 618.
Oxides and acids	18,480	21,125	15,198	Italy 1,951; U.S.S.R. 1,720; China 1,548.
Bromine and iodine	3,210	3,212	506	Israel 2,705.
Clays, crude: Kaolin	560,071	549,763	427,129	Republic of Korea 46,870; Brazil 33,817; China 11,672.
Diamond:				
Gem, not set or strung thousand carats	848	1,051	39	India 457; Israel 242; Belgium-Luxembourg 125.
Industrial stones do	757	794	134	Zaire 244; Republic of South Africa 165; Belgium-Luxembourg 75.
Dust and powder do	23,279	30,026	12,464	Ireland 16,222; Zaire 742; Switzerland 242.
Diatomite and other infusorial earth	8,984	10,281	10,270	Mexico 10.
Feldspar	6,114	7,915	--	China 4,414; India 1,379; Canada 1,214.
Fertilizer materials: Manufactured:				
Nitrogenous	39,777	64,959	2,482	North Korea 19,165; Chile 17,498; Republic of Korea 10,803.
Phosphatic	67,070	72,018	34,442	Republic of Korea 21,655; China 15,820.
Potassic thousand tons	1,300	1,339	166	Canada 578; U.S.S.R. 242; West Germany 151.
Unspecified and mixed	312,988	397,091	361,873	Republic of Korea 20,923; Taiwan 7,850.
Fluorspar	413,535	435,383	--	China 260,693; Thailand 93,121; Republic of South Africa 72,086.
Graphite, natural	53,138	54,195	116	China 27,769; Republic of Korea 20,717.
Gypsum and plaster	222,810	202,151	421	Mexico 112,734; Australia 80,426.
Kyanite and related materials	26,627	17,675	4,821	Republic of South Africa 12,150; India 654.
Magnesium compounds:				
Magnesite	249,948	283,736	3	China 178,963; North Korea 102,992.
Oxides and hydroxides	2,175	6,835	7	China 6,376; Netherlands 200; West Germany 113.
Mica, all forms	14,651	9,852	680	India 4,828; Canada 1,358; Sri Lanka 958.
Nitrates, crude	4,000	--		
Phosphates, crude thousand tons	2,216	2,438	1,462	Morocco 602; Jordan 218.
Phosphorus, elemental	21,830	23,733	8,846	Canada 9,908; U.S.S.R. 1,652; China 1,531.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Pigments, mineral:				
Natural, crude	1,161	1,005	--	China 907; Australia 68.
Iron oxides and hydroxides, processed	6,793	6,194	1,564	West Germany 4,462.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material kilograms	345,604	537,974	56,322	Brazil 189,949; Angola 151,680; Pakistan 45,327.
Industrial stones do.	32	110	2	China 104.
Synthetic do.	49,395	76,855	48,799	West Germany 14,179; U.S.S.R. 5,867; Switzerland 2,559.
Salt and brine thousand tons	6,269	6,381	(2)	Australia 3,057; Mexico 2,716; China 608.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	315	186	--	Kenya 110; China 31; Romania 20.
Sulfate, manufactured	47,837	46,642	102	China 29,615; Mexico 15,346; Taiwan 1,399.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	538,029	629,366	34,432	Republic of Korea 168,221; India 146,198; China 73,589.
Worked	73,163	83,244	55	Republic of Korea 48,456; Italy 16,644; China 4,979.
Dolomite, chiefly refractory-grade	417,782	370,562	4,924	Philippines 299,080; Republic of Korea 59,435.
Gravel and crushed rock	408,930	377,807	4	Taiwan 361,318.
Limestone other than dimension	472	687	30	France 506; Pakistan 150.
Quartz and quartzite	85,663	75,732	609	India 32,292; Republic of Korea 16,223; China 11,347.
Sand and gravel	747,063	865,210	1,821	Australia 493,187; Taiwan 273,900; Malaysia 65,608.
Sulfur and sulfuric acid kilograms	4,128	2,077	2,077	
Talc, steatite, soapstone, pyrophyllite	584,281	615,182	13,936	China 469,810; Australia 88,599; North Korea 23,617.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,949	5,116	2,962	China 1,302; Australia 789.
Carbon: Carbon black	8,620	8,726	4,903	Canada 991; West Germany 748; Republic of Korea 547.
Coal:				
Anthracite	630,197	913,389	12	Republic of South Africa 340,874; China 195,914; Australia 187,749.
Bituminous thousand tons	78,461	73,753	15,647	Australia 35,822; Canada 10,816; Republic of South Africa 5,604.
Peat including briquets and litter	11,912	17,769	10	Canada 17,232.
Petroleum:				
Crude thousand 42-gallon barrels	1,310,191	1,288,306	(2)	Saudi Arabia 428,274; United Arab Emirates 198,723; Indonesia 183,234.
Partly refined do.	14,499	8,497	--	Kuwait 3,450; Indonesia 1,867; Saudi Arabia 1,042.
Refinery products:				
Liquefied petroleum gas do.	338,694	344,286	15,801	Indonesia 114,217; Brunei 60,910; Saudi Arabia 60,736.
Gasoline do.	71,704	98,659	499	Saudi Arabia 24,041; Singapore 21,880; Kuwait 12,575.
Mineral jelly and wax do.	57	79	36	China 20; Saudi Arabia 17.
Kerosine and jet fuel do.	9,940	6,109	659	Singapore 2,297; China 1,064; Republic of Korea 909.
Distillate fuel oil do.	14,769	8,360	1,957	Saudi Arabia 3,900; China 850; Republic of Korea 745.
Lubricants do.	407	319	160	Netherlands Antilles 97; Singapore 39.
Residual fuel oil do.	50,176	62,412	12,376	Indonesia 21,164; Singapore 10,279; U.S.S.R. 3,914.
Petroleum coke do.	14,025	20,394	18,498	China 758; U.S.S.R. 587.

[r]Revised.

[1]Excludes imports under Japanese-United States Mutual Defense Agreement or for account of U.S. military forces. Table prepared by Audrey D. Wilkes.

[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The ailing primary aluminum industry continued to suffer from the high cost of electric power and the lower price of imported aluminum. Despite the 3-year (1982-84) import tariff exemption granted by the Government to assist the primary aluminum industry for scrapping its high cost and excess capacity plants, and the Government-sponsored stockpiling program for stabilizing the domestic price of primary aluminum, the cumulative loss of the five primary smelters remained substantial at $331 million for the fiscal year ending March 1984. By yearend, the Industrial Structure Council (ISC) of MITI recommended that a further contraction of the 712,000-ton-per-year capacity to 350,000 tons per year was necessary for the primary aluminum industry to cope with its financial difficulties.

In December, Nippon Light Metal Co. Ltd. decided to close down its 72,000-ton-per-year Tomakomai smelter in Hokkaido, and Sumitomo Aluminium Smelting Co. Ltd. decided to shut down its 99,000-ton-per-year Toyo smelter in Ehime by March 1985, as recommended by ISC. These two smelters used oil for their electric powerplants. The 99,000-ton-per-year Sakata smelter of Sumikei Aluminium Industries Ltd. in Yamagata and the 17,000-ton-per-year Kitakata smelter of Showa Aluminium Industries K.K. in Fukushima, which have not been in operation since 1983 but were included in the 1984 industry's 712,000-ton-per-year capacity, reportedly will also be shut down under the ISC's recommendation.

Table 4.—Japan: Primary aluminum production and capacity, by company

(Metric tons)

Company and plant location	1984 Production	1984 Capacity	1986 Planned capacity
Mitsubishi Light Metal Industries Co. Ltd.,[1] Sakaide, Kawaga	41,607	76,427	50,951
Mitsui Aluminium Co. Ltd., Miike, Fukuoka	97,365	144,366	124,906
Nippon Light Metal Co. Ltd:			
Kambara, Shizuoka	72,997	63,854	63,854
Tomakomai, Hokkaido		72,365	--
Showa Light Metal Co. Ltd.:[2]			
Kitakata, Fukushima[3]	28,972	16,922	--
Chiba, Chiba		57,945	31,690
Sumikei Aluminium Industries Ltd.,[3] Sakata, Yamagata	--	98,712	--
Sumitomo Aluminium Smelting Co. Ltd.:			
Toyama, Toyama	45,787	82,917	82,917
Toyo, Ehime		98,712	--
Total	286,728	712,220	354,318

[1]Company's name changed to Ryoka Light Metal Industries Ltd.
[2]Company's name changed to Showa Aluminium Industries K.K.
[3]Operations suspended since 1983.

Source: Japan Metal Journal (Tokyo). V. 15, No. 19, May 13, 1985, p. 8.

As the Japanese aluminum industry shrank from 6 companies having 14 plants with a 1.6-million-ton-per-year capacity in 1979 to 5 companies having 7 plants with only a 712,000-ton-per-year capacity in 1984, Japanese overseas aluminum smelting projects became the most important long-term and steady supply source of primary aluminum to meet the Japanese demand for primary aluminum.

Table 5.—Japan: Overseas aluminum smelting operations in 1984

Company and country	Annual capacity (metric tons)	Japanese share (metric tons)	Japanese equity participation (percent)
Industria Venezolana de Aluminio C.A. (VENALUM), Venezuela.	280,000	170,000	20.0
New Zealand Aluminium Smelters Ltd., New Zealand.	244,000	100,000	41.3
P.T. Indonesia Asahan Aluminum (IN-ALUM), Indonesia.	225,000	150,000	75.0
Boyne Smelter Ltd., Australia	206,000	90,000	50.0
Alumax Inc., United States	180,000	45,000	25.0
Alcan Smelters and Chemicals Ltd., Canada	90,000	45,000	50.0
Alumínio Brasileiro Ltda. (ALBRÁS),[1] Brazil	--	--	49.0
Total	1,225,000	600,000	XX

XX Not applicable.
[1]Under construction and scheduled to come on-stream in 1986. Upon completion, annual capacity will be 320,000 tons, of which the Japanese share will be 160,000 tons.

Sources: Sumitomo Corp. (Tokyo); Non-Ferrous Metals in Japan, 1984 Review. Apr. 1985, p. 60; Metals Week. Jan. 14, 1984, pp. 2-3.

Japan's imports of primary aluminum dropped 12.7% to 1,235,842 tons owing mainly to excess imports in 1983. Of the total imports of primary aluminum, 1,043,290 tons was regular grade, 13,851 tons was high grade, and 178,701 tons was aluminum alloy ingot. Imports of primary aluminum by the five primary smelters in Japan under overseas captive-import development projects in Australia, Canada, Indonesia, New Zealand, the United States, and Venezuela totaled 615,370 tons, of which about 400,000 tons was duty free. The remaining imports, based on long-term contracts and spot purchases by trading companies and consumers, were subjected to a 9% tariff. Australia became the largest supplier of regular-grade aluminum, followed by the United States, New Zealand, Venezuela, Indonesia, Canada, and Bahrain. The average unit value of imported regular grade aluminum was $1,441 per ton in 1984 compared with a domestic average price of $1,502 per ton.

In August, the Ministry of Finance (MOF) disapproved a petition by the five primary smelters to extend the 3-year import tariff exemption for 3 more years. However, in December, MOF reversed its earlier decision and announced that a 1% tariff will be imposed on 350,000 tons per year of primary aluminum imported by the five smelters beginning from fiscal year 1985 to fiscal year 1987. The 8% cut in tariff reportedly was equivalent to about a $40 million financial relief grant to the five smelters for their continuing effort in reducing production costs by closing down additional high-cost production facilities and reducing excess capacity.

Domestic demand for primary aluminum decreased 3.1% to 1,743,876 tons owing to a slight decline in consumption by the aluminum rolling sector, which accounted for 80% of the total demand. Consumption of primary aluminum by the wire and cable sector dropped 22% to 71,013 tons resulting from increased substitution of refined copper. However, consumption of primary aluminum by the aluminum casting and die-casting sector rose 6.3% to 124,073 tons. During 1984, Japan exported only 646 tons of primary aluminum, mainly to the Republic of Korea.

As a result of the decrease in imports, by yearend, the overall stocks of primary aluminum dropped 8.3% to 549,642 tons, of which 124,868 tons was held by producers, 70,432 tons by dealers, 230,678 tons by consumers, and 123,664 tons by the Government-sponsored Light Metal Stockpiling Association.

Japan imported 3,861,875 tons of bauxite, principally from Australia (57%), Indonesia (25%), and Malaysia (15%). Production of alumina by the Shimizu and Tomakomai plants of Nippon Light Metal, the Yokohama plant of Showa Aluminium Industries, the Kikumoto plant of Sumitomo Aluminium, and the Wakamasu plant of Mitsui Aluminium Co. Ltd. totaled 1,172,482 tons. Because of the growing demand for alumina from Canada, China, Indonesia, and the Republic of Korea, exports of alumina remained at a high level of 573,072 tons compared with 569,199 tons in 1983.

Chromium.—Production of chromium ore and concentrate was by Hirose Mining Co. Ltd. at the Takase Mine in Okayama and at the Hirose Mine in Tottori and by

Nippon Chrome Industries Ltd. at the Wakamatsu Mine in Tuttori. The output of chromium ore and concentrate continued its downward trend. Japan's imports of chromium ore and concentrate rose 28% to 823,394 tons owing to increased demand for metallurgical-grade chromite by the ferroalloy industry and chromium metal manufacturers. Imports of ferrochromium reached a new record high of 395,381 tons. The major overseas suppliers of chromium ore and concentrate were the Republic of South Africa, 51%, and India, 17%. The Republic of South Africa remained the single most important supplier of ferrochromium, accounting for 64%, followed by Zimbabwe, 12%; the Philippines, 8%; and Brazil, 7%.

According to MITI's latest report, consumption of chromium ore and concentrate for fiscal year ending March 1984 totaled 715,000 tons. Consumption by the steel industry was 610,000 tons; chemical industry, 49,000 tons; refractory industry, 40,000 tons; and the metal industry, 16,000 tons.

For the fiscal year ending March 1984, stocks of chromium ore and concentrate were 279,000 tons and ferrochromium, 128,000 tons. According to the Metal Mining Agency of Japan, the stockpile of ferrochromium by the three rare metal stockpile programs will be increased to a 16.8-day supply. Japan's import reliance on chromium was 99% in 1984.

Cobalt.—Production of cobalt metal dropped to the lowest level since 1976 while consumption according to MITI surged 24% to 1,816 tons. To meet increased demand, imports of cobalt increased 30% to 2,477 tons. The continued decline in cobalt metal production was caused mainly by a substantial reduction in nickel-cobalt mixed sulfide supplied by the financially troubled Marinduque Mining and Industrial Corp. of the Philippines (now Nonoc Mining and Industrial Corp.) to the nickel-cobalt refinery of Sumitomo Metal Mining Co. Ltd. at Besshi in Ehime. The Nikko nickel-cobalt refinery of Nippon Mining Co. Ltd. at Hitachi in Ibaraki reportedly also received less raw materials from the Greenvale Mine in northeastern Australia. The major overseas suppliers of cobalt metal, including powder and flakes, in 1984 were Zaire, 1,408 tons; Belgium, 498 tons; the United States, 249 tons; and Finland, 145 tons.

According to MITI's official statistics, consumption by the manufacturers of magnetic materials rose 26% to 511 tons; by the manufacturers of specialty steels, 39% to 404 tons; by the manufacturers of carbide tools (ultrahard alloy), 46% to 263 tons; by the manufacturers of catalysts, 4% to 146 tons; and by the manufacturers of extruded products and other producers, 10% to 492 tons. The statistics on cobalt consumption published by MITI reportedly was based on data provided by consumers. However, a much higher estimate of 2,400 tons in 1983 and 3,500 tons in 1984 by an industry source based on data provided by distributors reportedly was closer to the actual annual consumption of cobalt in Japan.[4]

Stocks of cobalt metal at yearend were 804 tons. In addition, the stockpile of cobalt metal by the three rare metal stockpile programs is to be increased to a 16.8-day supply by the end of fiscal year 1984. Japan's import reliance on cobalt was 100%.

Copper, Lead, and Zinc.—Most major nonferrous mining companies in Japan produced coproducts of copper, lead, and zinc. The typical mining operations of copper, lead, and zinc was that of Dowa Mining Co. Ltd. at the Kosaka and Hanaoka Mines in Akita.

Table 6.—Japan: Mine production of copper, lead, and zinc, in 1983

(Metric tons, metal content)

Company and location	Copper	Lead	Zinc
Akenobe Mining Co. Ltd., Akenobe, Hyogo	4,181	--	10,941
Chuugai Mining Co. Ltd., Jokoku, Hokkaido	--	517	1,217
Dowa Mining Co. Ltd.:			
Kosaka, Akita	4,724	6,065	22,619
Hanaoka, Akita	14,223	10,697	49,286
Furutobe Mining Co. Ltd., Minami-Furutobe, Akita	2,564	843	3,774
Hanawa Mining Co. Ltd., Hanawa, Akita	1,470	453	3,314
Hokushin Mining Co. Ltd., Ooe, Hokkaido	--	1,074	3,474
Hosokura Mining Co. Ltd., Hosokura, Miyagi	--	5,177	15,179
Mitsui Mining & Smelting Co. Ltd., Kamioka, Gufu	--	4,419	64,022
Nippon Zinc Mining Co. Ltd., Nakatatsu, Fukui	--	1,493	21,106
Nittetsu Mining Co. Ltd., Kamaishi, Iwate	4,123	--	--
Syakanai Mining Co. Ltd., Syakanai, Akita	7,856	3,843	19,518
Toyoha Mining Co. Ltd., Toyoha, Hokkaido	--	8,359	34,066
Yatani Mining Co. Ltd., Yatani, Yamagata	--	2,963	4,972
Other	6,904	985	2,224
Total	46,045	46,888	255,712

Mine production of copper declined further owing mainly to the shutdown of two small copper mines in Akita and Shimane. Mine production of zinc also declined slightly, while production of lead increased. Domestic mine production of copper, lead, and zinc was equivalent to 3%, 17%, and 34%, respectively, of Japan's total demand in 1984.

To meet the strong demand for copper, lead, and zinc, Japan imported 2.93 million tons of copper ore and concentrate (787,303 tons of copper metal), 65,377 tons of blister, and 470,202 tons of refined copper, of which about 300,000 tons was imported under a long-term contract. The further cutback in operating capacity of the copper refining industry and increased domestic demand resulted in record-high imports of refined copper. Imports of lead and zinc ore and concentrates were 249,226 tons (186,394 tons of lead metal) and 954,676 tons (413,701 tons of zinc metal), respectively. Japan also imported 63,507 tons of refined lead and 56,568 tons of refined zinc.

The major overseas suppliers of copper, in order of volume, were Canada, the Philippines, Chile, Papua New Guinea, Australia, Indonesia, the United States, Malaysia, and Peru for ore and concentrate; and Zambia, Chile, Peru, the United States, and the Philippines for refined and blister copper. The major overseas suppliers of lead were Canada, Peru, Australia, the Republic of South Africa, and Thailand for lead ore and concentrate; and Australia and North Korea for refined lead. The major overseas suppliers of zinc were Australia, Peru, and Canada for zinc ore and concentrate; and North Korea and Peru for refined zinc.

Japan's production of refined copper was at a lower level than that of 1983 because of the worldwide shortage of copper concentrate. The copper refining industry was operating at about 75% of its 1.2 million-ton-per-year capacity. Nippon Mining reduced its Hitachi refining capacity to 120,000 tons per year from 156,000 tons per year, while Furukawa Electric Co. Ltd. expanded its Nikko refining capacity to 57,600 tons per year from 48,000 tons per year. Production of refined lead and zinc was at a higher level than that of 1983 because of the strong demand for lead for storage batteries and inorganic chemicals as well as a higher demand for zinc for galvanized steel sheet and diecasting. The lead refinery industry was operating at about 93% of its 300,600-ton-per-year capacity, while the zinc refining industry was operating at about 74% of its 1.0-million-ton-per-year capacity.

Domestic demand for refined copper rose 8% to 1,477,523 tons, of which 973,515 tons was for electric wire and cable, 482,742 tons was for brass mill products, and 20,871 tons, for copper alloy casting and other. Exports of refined copper dropped sharply to only 18,366 tons owing to reduced exports to China. By yearend, the overall stocks of refined copper rose 13% to 157,180 tons, of which 63,398 tons was held by producers, 15,854 tons by distributors, and 77,928 tons by fabricators.

Domestic consumption for refined lead also increased 8% to 280,971 tons, of which 142,570 tons was for storage batteries, 75,107 tons for inorganic chemicals, 17,181 tons for cable sheathing, 14,018 tons for lead pipe and sheet, 15,213 tons for solder and bearing metals, and 16,882 tons for other. Exports of refined lead rose 14% to 16,424 tons. By yearend, overall stocks of refined lead increased 47% to 33,023 tons, of which 12,848 tons was held by producers, 2,704 tons by distributors, and 17,471 tons by consumers.

Domestic consumption of refined zinc increased 3.2% to 742,104 tons, of which 341,750 tons was for sheet galvanizing, 110,789 tons for other galvanizing, 106,384 tons for diecasting, 102,084 tons by brass mills, and 81,097 tons by other. By yearend, the overall stocks of refined zinc decreased 9.8% to 84,594 tons, of which 55,107 tons was held by producers, 1,536 tons by distributors, and 27,911 tons by consumers.

The average domestic price of refined copper was 71.23 cents per pound compared with 68.16 cents per pound in the United States. The average prices of refined lead and zinc were 27.50 and 51.18 cents per pound, respectively, compared with 25.55 and 49.22 cents per pound, respectively, in the United States.

In November, Dowa Mining reportedly discovered a high-grade lead and zinc ore deposit at Nurukawa-Machi, about 2 miles west of Lake Towada between Hiraga in Aomori Prefecture and Kosaka in Akita Prefecture. The Kuroko (black ore) discovered in the area is similar to that of the nearby Kosaka and Hanaoka Mines in Akita, but is of higher quality. Based on the five drillings, the estimated probable reserves at the Nurukawa deposit were 1 million tons of ore averaging 0.75% copper, 11% combined lead and zinc, 6 grams of gold, and 145 grams of silver per ton of ore.[5]

According to MITI's survey, as of April 1984, Japan's copper ore reserves were estimated at 41.0 million tons averaging 1.63% copper with a recoverable rate of 71.7%. The combined ore reserves of lead and zinc were estimated at 63.2 million tons averaging 1.3% lead and 5.8% zinc with a recoverable rate of 69.7%.

Gallium.—Japan became the world's leading producer and the largest consumer of gallium metal when domestic production, including recycled metal, reached 17 tons and the total demand surged to over 30 tons.

Table 7.—Japan: Estimated supply of gallium

(Kilograms)

	1981	1982	1983	1984
Domestic production[1]	3,000	3,000	3,000	10,000
Imports:				
High-purity:[2]				
Germany, Federal Republic of	1,800	2,100	3,720	5,450
Switzerland	300	120	100	85
Intermediate-purity:[3]				
China	2,400	2,600	4,600	2,800
Czechoslovakia	500	1,260	480	900
France	2,000	1,400	2,800	3,000
Hungary	600	1,600	2,300	1,500
U.S.S.R	--	--	200	--
Recycled scrap	5,000	4,000	5,000	7,000
Total	15,600	16,080	22,200	30,735

[1]99.9999% pure.
[2]With purity of 6N to 7N from the Federal Republic of Germany and 6N to 8N from Switzerland.
[3]With purity of 3N to 4N. Part of the imports from France included certain amounts of 6N to 7N.

Source: The Rare Metal News (Tokyo). No. 1272, Sept. 1, 1984, p. 1; No. 1297, Mar. 8, 1985, p. 3.

Domestic production of crude and refined gallium was by Dowa Mining and Sumitomo Chemical Co. Ltd. Dowa Mining extracted crude gallium from black ore, which contains minor amounts of gallium and indium, at the Kosaka Mine in Akita and refined gallium at its Kosaka refinery, which has a capacity of 5 tons per year. Sumitomo Chemical, which had been a major producer of recycled gallium before 1983, produced gallium from Bayer liquor, supplied by domestic alumina smelters, at the newly completed Niihama plant, which has a capacity of 10 tons per year. A substantial amount of gallium was recovered from scrap by Dowa Mining, Sumitomo Chemical, Sumitomo Metal Mining, Rasa Industries Co. Ltd., and Nia Chemical Co. Ltd.

In 1984, Dowa Mining reportedly produced 6 tons of gallium metal including 1 ton from recycled scrap while Sumitomo Chemical produced 9 tons of gallium metal including that from recycled scrap. Because of the difficulty in obtaining an adequate supply of Bayer liquor from domestic alumina smelters, Sumitomo Chemical reportedly was not able to operate at full capacity at its Naihama refinery in Ehime.

Consumption of gallium metal and metallic compounds has been growing at an annual rate of 36% during the past 2 years. Japan's 1984 consumption was estimated at 30.7 tons or 70% of the world's total. The major consumers of high-purity gallium were the manufacturers of gallium arsenide (GaAs) and gallium phosphide (GaP) for production of infrared light-emitting diodes (LED), integrated circuits (IC), microwave field effect transistors (FET), and laser diodes; and the manufacturers of gadolinium gallium garnet (GGG), for production of bubble memories.

Gold and Silver.—Mine production of both gold and silver increased. About 51% of gold and 11% of silver was produced by primary gold and silver producers. The remaining gold and silver was produced by the copper, lead, and zinc producers as coproducts or byproducts. The total mine production of gold and silver was equivalent to only 1% and 13%, respectively, of Japan's consumption.

Japan's gold and silver mining industry consists of 18 small companies. According to the 1984 MITI survey, the top 10 producers and their mine locations were as follows:

Company	Location
Chitose Mining Co. Ltd	Chitose, Hokkaido.
Chuugin Mining Co. Ltd	Mochikoshi, Shizuoka.
Godo Shigen Sangyo Co	Ashahi, Hyogo; Kouryuu, and Sanru, Hokkaido.
Kasuga Mining Co. Ltd	Kasuga, Kagoshima.
Mitsui Kushikino Mining Co. Ltd.	Kushikino and Iwato, Kagoshima.
Miyauchi Akeshi Mining Co. Ltd.	Akeshi, Kagoshima.
Omidani Mining Co. Ltd.[1]	Omidani, Hyogo.
Sado Gold Mining Co. Ltd	Sado, Niigata.
Sakoshioodomari Mining Co. Ltd.	Sakoshioodomari, Hyogo.
Shimokawa Mining Co. Ltd	Nebazawa, Gunma.

[1]The mine, owned by Dowa Mining Co. Ltd., was closed at the end of 1984.

Domestic metal production of gold and silver continued its upward trend. Gold metal production by source of raw materials was 17% from domestic ore, 70% from imported ore, 6% from scrap, and 7% from other sources. Silver metal production by source of raw materials was 20% from domestic ore, 50% from imported ore, 12% from scrap, and 18% from other sources. Domestic metal production of gold and silver accounted for 16% and 65%, respectively, of Japan's total consumption.

Japan's production of gold and silver metal by company in fiscal year 1984 was as follows, in thousand troy ounces:

Company	Gold	Silver
Dowa Mining Co. Ltd	120.2	9,915.3
Furukawa Mining Co. Ltd	69.2	2,084.8
Mitsubishi Metal Corp	436.1	8,545.8
Mitsui Mining & Smelting Co. Ltd	225.0	10,585.8
Nippon Mining Co. Ltd	312.5	7,266.1
Nittetsu Mining Co. Ltd	16.7	408.4
Sumitomo Metal Mining Co. Ltd	244.0	3,439.2
Toho Zinc Co. Ltd	4.3	3,842.5
Total	1,428.0	46,087.9

Because of a sharp increase in demand by private hoarding resulting from a lower price of gold, a slowdown in the prices of lucrative real estate investments, a possible revision of tax-free savings deposits in the Japanese tax system, and a substantial increase in consumption of gold by the electrical, electronic, and telecommunication industries, Japan's total demand for gold jumped 37% to a new record high of 8,392,233 troy ounces. As a result, imports of gold surged 84% to a new high of 6,172,291 troy ounces in 1984. The major consumers of gold were private hoarding, up 64% to 3,847,828 troy ounces; jewelry, up 16% to 1,597,504 troy ounces; electrical, electronic, and communication, up 43% to 1,073,866 troy ounces; gold plating, up 18% to 794,412 troy ounces; and dental and medical, up 34% to 368,865 troy ounces. Switzerland and the United Kingdom remained the two dominant suppliers of imported gold, accounting for 53% and 33%, respectively, of total imports. The other important suppliers included Canada, 5%; the U.S.S.R., 3%; and the Republic of South Africa, 2%.

Demand for silver rose 9.4% to 78.7 million troy ounces, of which 52% was for photographic materials, 10% for electrical contact points, 10% for industrial silver nitrate, 5% for brazing alloys, 5% for plating, 5% for fabricated products, and 13% for other uses. To meet increased demand, imports of silver increased 18% to 15.3 million troy ounces. Mexico and Peru remained the dominant suppliers, accounting for 61% and 24%, respectively, of total imports. Other major suppliers included the United States, 6%; Australia, 5%; and the Republic of Korea, 4%.

The Hishikari gold project of Sumitomo

Metal Mining in Kagoshima, which was originally scheduled to come on-stream in October, was delayed until July 1985 because of water intrusion problems caused by a large hot spring seeping through the gold vein system. Sumitomo Metal Mining reportedly was using pumps to evacuate the high-temperature thermal water and planned to extract the ore through a series of parallel headings. The direct-shipping ore to be produced at a rate of 200 tons per day will be trucked to a port and then transported by ship to the Niihama refinery of Sumitomo's Besshi Div. in Ehime on Shikoku Island for smelting and refining. Furukawa Mining Co. Ltd. reportedly was to redevelop an old Innai silver mine at Ogachi in Akita. Beginning in 1984, Furukawa was to spend $550,000 over a 3-year period to explore new deposits in the area. Preliminary investigation indicated the ore contains 500 grams of silver and 3 grams of gold per ton.

Iron and Steel.—Mine production of iron ore increased slightly but production of pyrite declined. The total output of iron ore was equivalent to only 0.3% of iron ore requirements for Japan's iron and steel industry. Of the total output, about 60% was from the copper-iron operations at the Kamaishi Mine of Kamaishi Mining Co. Ltd. in Iwate. The remainder was from the iron-limestone operations at the Akatani Mine of Akatani Mining Co. Ltd. in Niigata and from the Daichi-aso iron mine of Nippon Rimonaito Mining Co. in Kumamoto on Kyushu Island. The average iron content of domestic iron ore concentrate was 62%, and the average iron content of pyrite was about 60%.

To meet the increased demand for iron ore by the iron and steel industry, Japan imported 125.4 million tons of iron ore (includes sinters, pellets, and briquets), of which 58.4 million tons was from Australia, 29.0 million tons from Brazil, 15.8 million tons from India, 5.5 million tons from the Republic of South Africa, 4.0 million tons from the Philippines, 3.3 million tons from Chile, 3.1 million tons from Canada, and 6.3 million tons from other countries. Japan also imported 826,605 tons of ferruginous manganese ore and concentrates principally from the Republic of South Africa and India.

For production of pig iron, the iron and steel industry consumed 130.5 million tons of iron ore, of which 96.1 million tons was sintered ore, 20.5 million tons was unprocessed imported ore, 13.1 million tons pellets, 474,000 tons other ferrous materials, and 265,000 tons ferruginous manganese ore. The output of pig iron represented 59% of the 137-million-ton-per-year installed capacity. About 99.9% of pig iron was produced by 39 blast furnaces (out of 65 installed) and the remainder was by electric and other furnaces. Japan's pig iron production accounted for 16% of total world output.

Japan's crude steel production recovered to over 100 million tons owing to increased domestic demand and exports. However, the total output of crude steel represented only 68% of the 156-million-ton-per-year capacity. The basic oxygen furnace sector, which consumed 77.3 million tons of pig iron and 6.1 million tons of iron and steel scrap, produced 76.4 million tons of crude steel. The electric-furnace sector, which consumed 1.2 million tons of pig iron and 30 million tons of iron and steel scrap, produced 29.2 million tons of crude steel.

Japan remained the world's second largest crude steel producer, and its crude steel output accounted for 15% of total world production in 1984. By yearend, Japan had 157 continuous-casting machines with an 85-million-ton-per-year capacity for crude steel processing. According to Japan's Iron and Steel Federation, the percentage of continuous casting of ingot for rolling reached 90% in 1984. The percentage for rolled ordinary steel and specialty steel was 93% and 76%, respectively.[6] Production of ordinary steel was higher than that of 1983. Production of specialty steel broke the 1982 record and reached a new high of 16.1 million tons. Japan was the single largest producer of specialty steel in the world.

As a result of increased sales both in domestic and overseas markets, the lower costs of raw materials, and the depreciation of the Japanese yen, the financial performance of the five major steel companies improved substantially in fiscal year 1984. Nippon Steel posted a $175 million profit after tax compared with $13 million in fiscal year 1983. Nippon Kokan reported an $82 million profit compared with a loss of $47 million in the previous year. Kawasaki Steel made an $86 million profit compared with a profit of $3 million in fiscal year 1983. Sumitomo Metal Industries, which suffered the heaviest loss of $50 million in fiscal year 1983, returned to a profit of $93 million. Kobe Steel also reported a profit of $51 million against a loss of $25 million in fiscal year 1983.

Domestic apparent consumption of steel increased 13% to 74 million tons while exports of steel rose 4% to 36 million tons of crude steel equivalent in 1984. The increased domestic demand for steel was boosted mainly by the manufacturing industries of automobiles, shipbuilding, industrial machinery, electrical machinery, and containers. Increased exports of steel was mainly owing to a 26% increase in exports to China and a 20% increase in exports to the United States.

Japan's steel exports by major countries of destination were China, 8.6 million tons; the United States, 6.4 million tons; the Republic of Korea, 2.3 million tons; the U.S.S.R., 2.1 million tons; Saudi Arabia and Taiwan, 1.2 million tons each; and Indonesia and Singapore, about 1 million tons each. Export earnings of steel rose 8% to $14 billion resulting from an increase in both quantity and prices of exported steel. The average export unit value of all iron and steel products was $439 per ton.

The growing imports of iron and steel products remained a major concern of Japan's iron and steel industry. Despite the relatively small share of imported steel in the Japanese domestic market, the low priced imports of rolled steel products such as plate and wide strip from Brazil, the Republic of Korea, Taiwan, and Venezuela reportedly were causing disruption in the Japanese market. Imports of iron and steel products totaled 5,761,298 tons compared with 4,499,434 tons in 1983. Of the total imports, 823,026 tons was pig iron, 927,975 tons was ferroalloys, 3,723,428 tons was ordinary steel products, 23,811 tons was specialty steel products, and 263,058 tons was ingot, semifinished, and secondary steel products.

To streamline operations, Japan's iron and steel industry not only began to diversify into development of new materials, such as carbon fiber, ceramics, amorphous alloys, aluminum, and titanium alloys, but also into development of international-scale operations. Several capital investment programs were launched by Japan's major steel companies. In the United States, an agreement was reached between Nisshin Steel and Wheeling-Pittsburgh Steel Corp. of the United States in February to establish a $9.6 million joint venture plating plant in Ohio. Nisshin Steel was to invest $17.5 million or about 10% in Wheeling-Pittsburgh's common stock while Wheeling-Pittsburgh was to acquire $5.25 million or about 40% of Nisshin Steel's equity.

In August, Nippon Kokan reached an agreement with National Intergroup Inc. (NII) of the United States for a 50% equity participation by Nippon Kokan in the management of the National Steel Corp. of NII in Pittsburgh. Nippon Kokan was to pay NII $272 million in cash and $19 million in notes. The investment reportedly was the largest by a Japanese steel company in the United States. In addition, an agreement to establish a joint venture for production and worldwide sales of aluminum and titanium mill products in Oklahoma was reached between Nippon Kokan and Martin Marietta Corp. of the United States. Nippon Kokan was to invest about $45 million for a 40% equity participation in the joint venture company.

Other capital investments by Japanese steel companies in the United States included acquisition of a 25% voting stock of California Steel Industries Inc., formerly Kaiser Steel Corp.'s Fontana steel plant, by Kawasaki Steel; and an agreement between Sumitomo Metal Industries and The LTV Corp. of the United States to establish a joint venture company for production of electrogalvanized steel sheets in Ohio.[7]

Manganese.—Mine production of metallurgical-grade manganese ore continued to decline. Hokushin Mining Co. Ltd., the largest producer in Japan, closed its manganese operation at the Ooe Mine in Hokkaido when the ore reserves at the mine were depleted in October. About 90 workers lost their jobs. The other producers were Chugai Mining Co. Ltd. at the Jokoku Mine in Hokkaido, Nodatamagawa Mining Co. Ltd. at the Nodatamagawa Mine in Iwate, and two other small mines in Kochi and in Hokkaido. The average grade of domestically produced manganese ore and concentrate was 27% manganese, and the total mine production was equivalent to about 5% of Japanese requirements for manganese excluding ferruginous manganese ore.

To meet domestic demand, Japan imported 18,982 tons of manganese dioxide ore and concentrate and 1,366,656 tons of metallurgical-grade manganese ore and concentrate. Mexico and Gabon were the major suppliers of manganese dioxide ore. The Republic of South Africa and Australia were the two dominant suppliers of metallurgical-grade manganese ore.

Consumption of manganese ore and concentrate by the iron and steel industry was about 1.2 million tons and by other industries, 58,108 tons for production of manganese metal, ceramics, and chemicals. By yearend, the stocks of manganese ore and concentrate held mainly by the iron and steel industry were 500,880 tons. The stockpile of manganese in the form of ferromanganese held by the three rare metal stockpile programs was to increase to a 16.8-day supply by the end of fiscal year 1984.

Nickel.—Japan was the world's third largest producer and consumer of refined nickel. Japan imported 100% of the raw materials requirements for its nickel smelting and refining industries. Japan also imported a substantial quantity of refined nickel and a considerable amount of ferronickel to meet increased demand for nickel by the electronics and the specialty steel industries.

Imports of nickel ore for production of ferronickel rose 23% to 2,834,813 tons, of which 45% was from New Caledonia, 29% was from Indonesia, and 26% was from the Philippines. Imports of ferronickel rose 22% to 44,754 tons, of which 36% was from New Caledonia, 30% from Indonesia, 21% from the Dominican Republic, and the remainder from other countries.

In 1984, consumption of nickel ore by the ferroalloy industry was up 14% to 2.1 million tons. Consumption of ferronickel by the specialty steel industry also rose 11% to 52,890 tons of content nickel. Exports of ferronickel including returning shipments of toll smelting was 1,947 tons of content nickel, principally to the Netherlands.

Imports of nickel matte for production of refined nickel rose 30% to 49,219 tons containing 37,330 tons of nickel. However, imports of nickel-cobalt mixed sulfide for production of refined nickel and cobalt declined 53% to 5,670 tons containing 1,760 tons of nickel and 1,020 tons of cobalt. This drastic drop in imports of nickel-cobalt mixed sulfide was caused mainly by an 11-month suspension of shipments by the Philippines Nonoc Mining and Industrial Corp. (formerly Marinduque Mining and Industrial Corp.) from its Surigao nickel refinery on Nonoc Island. To cope with the increased demand for refined nickel and a slight reduction in domestic production of refined nickel, imports of refined nickel including foil, powder, and flakes rose 13% to 34,016 tons. Indonesia and Australia remained the major suppliers of nickel matte. Australia was the dominant supplier of nickel-cobalt mixed sulfide. Australia, Canada, Norway, the U.S.S.R., the United Kingdom, the United States, and Zimbabwe were the major suppliers of refined nickel to Japan in 1984.

Domestic consumption of refined nickel rose 25% to 49,570 tons. Consumption by the specialty steel industry continued its upward trend and reached 29,606 tons, accounting for 60% of the total consumption in 1984. Other major consumers of refined nickel included plating, 5,548 tons; nonferrous alloys, 4,908 tons; magnetic materials, 3,294 tons; and storage batteries, fabricated product, coinage, and other, 6,214 tons. Japan exported 348 tons of refined nickel mainly to Taiwan and the Republic of Korea.

By yearend, the stocks of ferronickel held by the ferroalloy producers and specialty steel producers dropped to 57,028 tons from 80,135 tons in 1983. The stocks of refined nickel also dropped 14% to 14,256 tons, of which 3,198 tons was held by nickel producers; 648 tons, by distributors; and 10,410 tons, by nickel consumers. The stockpile of nickel in the form of nickel metal, ferronickel, and nickel oxide sinter by the three rare metal stockpile programs was to increase to a 16.8-day supply by the end of fiscal year 1984.

Titanium.—Production of titanium sponge metal recovered to the 15,400-ton level owing to increased exports and a substantial improvement in domestic demand for titanium. However, the total output of titanium sponge represented only 45% of the industry's installed capacity in 1984. During the last quarter of 1984, both Osaka Titanium Co. Ltd. and Toho Titanium Co. Ltd. were operating at 50% capacity, while Nippon Soda Co. Ltd. was at 60% capacity. Showa Titanium Co. Ltd., which began its first commercial operation in October 1983, reportedly was operating at about 75% of its 2,000-ton-per-year capacity. Japan imported 100% of its raw materials for production of titanium sponge principally from Australia.

According to the Japan Titanium Society, total shipments of sponge metal surged 85% to 18,268 tons resulting from a 236% increase in exports to 6,495 tons. Exports to the United States rose 100% to 3,991 tons, of which about 2,700 tons was purchased by the U.S. Government's General Services Administration (GSA). Domestic shipments including internal plant consumption recovered to 12,000 tons from 7,626 tons in 1983, owing to increased consumption by ingot producers.

In early 1984, a U.S. titanium sponge

producer filed dumping complaints with the U.S. Department of Commerce and the U.S. Government's International Trade Commission (ITC) against the three Japanese major producers. In October, the ITC concluded, by a three-to-two decision, that the sponge imported from Japan had been sold at less than fair value; therefore, an antidumping duty should be imposed retroactive to May 1984. The antidumping duties were set at 15.09% for Osaka Titanium, 34.25% for Toho Titanium, and 56.37% for Nippon Soda. The GSA purchase reportedly was exempted from the dumping duties.

In 1984, Nippon Steel, Sumitomo Metal Industries, and Nippon Kokan formally entered the titanium fabricating industry. Nippon Steel has established a titanium division to begin production of titanium rolling products such as sheets, strips, and tubes at its Hikari works with an initial capacity of 1,000 tons per year. Sumitomo Metal Industries was to begin production of titanium alloy bar at an annual rate of 600 tons. Toho Titanium was to supply the ingot to Nippon Steel and Osaka Titanium was to provide the feedstock to Sumitomo Metal Industries. Nippon Kokan has established a joint venture firm with Martin Marietta of the United States in Torrence, California, for production and marketing of aluminum and titanium alloys.

Production of titanium dioxide pigment in Japan was by seven companies that operated eight plants. The annual capacity of titanium dioxide by plant and company were as follows, in metric tons:

Company and plant location	Capacity
Ishihara Sangyo Co. Ltd.:	
Yokkaichi, Mie	92,400
Do	[1]24,000
Teikoku Kako Co. Ltd., Saidaij, Okayama	30,000
Sakai Chemical Industry Co. Ltd., Onahama, Fukushima.	26,400
Furukawa Mining Co. Ltd., Osaka, Osaka	15,600
Tohoku Chemical Co. Ltd., Akita, Akita	14,400
Titan Kogyo Co. Ltd., Ube, Yamaguchi	13,200
Fuji Titanium Industry Co. Ltd., Kobe, Hiratsuka.	7,200
Total	223,200

[1]Chloride processing plant; capacity to be expanded to 36,000 tons per year. All other plants are sulfate process.

The raw materials requirements for production of titanium dioxide was 100% met by imports of rutile and ilmenite as well as titanium slag from Australia, Canada, India, Malaysia, the Republic of South Africa, and Sri Lanka.

Ishihara Sangyo Co. Ltd. signed a joint venture agreement with Westralian Sands Ltd. of Australia and Tioxide International Ltd. of the United Kingdom to construct a 100,000-ton-per-year ilmenite beneficiation plant at a cost of $53 million in North Capel, Western Australia. The plant was scheduled for operation in 1987. Ishihara Sangyo with 15% equity in the project was expected to take 40,000 tons of synthetic rutile to feed its plants at Yokkaichi in Mie. Ishihara Sangyo also operated a synthetic rutile plant with a capacity of 44,000 tons per year at Yokkaichi using ilmenite produced in Quilon, India.[8]

Consumption of titanium dioxide grew at about 6% per year during 1982-84. A higher growth rate was reported in the paint, rubber, printing ink, and condenser industries. In 1984, the total domestic demand was 157,356 tons, of which 54% was for the manufacture of paint, 16% for printing ink, 8% for synthetic resin, 7% for paper, 3% for synthetic fibers, 3% for rubber, 2% for condensers, and 7% for other uses. Japan exported 50,000 tons and imported 37,140 tons of titanium dioxide.

NONMETALS

Cement.—Japan's cement production dropped to under 80 million tons for the first time since 1982. A sharp drop in exports of portland cement and further weakening of domestic demand were the major factors for the decline. Exports of cement to Saudi Arabia and Kuwait, accounting for over 50% of total exports, dropped 22% to 6 million tons because of a reduction in the Middle East's public works projects. Exports to Singapore and Hong Kong, accounting for about 30% of total exports, also declined substantially to 3.2 million tons owing to increased competition with the Republic of Korea and Taiwan. In the domestic market, demand for cement by the public and private sectors, which accounted for 65% and 35%, respectively, dropped to under 70 million tons as a result of reduced spending on public works projects and sluggish private investment in housing.

To cope with the industry's structural recession, several rationalization programs reportedly were being implemented. The industry was to scrap 23% of the industry's 129-million-ton-per-year capacity by the end of fiscal year 1984. Installation of new production facilities will be banned until the end of June 1988. A distribution rationalization program to reduce transportation costs, which accounted for about 23.5% of the cement price in 1983, reportedly was being finalized and implemented in 1984. According to a Japanese source,[9] five joint distribution networks were established in September to distribute cement in the domestic and export markets. These five distribution companies are Dainihon Cement Co. Ltd., Andes Cement Co. Ltd., Union Cement Co. Ltd., Central Cement Co. Ltd., and Fuji Cement Co. Ltd. Because of decreasing profitability from cement operation, several major cement producers reportedly have diversified into production of ceramics, information processing equipment, and electronic parts and components.

According to the latest information in the Japan Economic Journal, to produce a ton of cement in Japan, the industry consumed 1,144 kilograms of limestone, 228 kilograms of clay, 45 kilograms of silica, 32 kilograms of iron materials, 32 kilograms of gypsum, and 7 kilograms of other raw materials. It used 116 kilowatt hours of electricity, 118 kilograms of coal, and 6 liters of fuel oil to produce a ton of cement.

Fertilizer Materials.—Japan's production of nitrogen fertilizers increased slightly over that of 1983 owing to improvement in domestic demand for ammonium sulfate by the producers of blended fertilizer and a significantly higher price of urea in the world market. Under the Basic Plan for Structural Reform, the installed capacities of ammonia and urea were cut to 3,288,000 and 2,219,100 tons per year, respectively, from 3,370,500 and 2,318,100 tons per year in 1983. The 1984 output of ammonia and urea represented about 66% and 60%, respectively, of the industry's operating capacity. To improve its overall operation, the industry reportedly was centralizing its production capacities and reducing its energy costs.[10]

As a result of increased demand for granular mixed fertilizers in Japan, domestic demand for phosphate fertilizer continued a downward trend. However, exports of phosphate fertilizers to Nepal, Pakistan, the Philippines, amd Sri Lanka remained upward. For production of compound fertilizers, Japan imported 2.3 million tons of phosphate rock principally from the United States, 1,325,271 tons; Morocco, 586,180 tons; and Jordan, 274,300 tons. Imports of potassium chloride were mainly from Canada, 589,503 tons, and the U.S.S.R., 223,052 tons. Imports of potassium sulfate were 238,242 tons, of which 77,995 tons was from the Federal Republic of Germany, 66,287 tons from France, 27,239 tons from Belgium, 20,485 tons from Italy, and 46,236 tons from other countries. As part of the Basic Plan for Structural Reform, the compound fertilizer industry was to cut 13% of its installed capacity of 6.2 million tons per year by June 1987. According to an industry source, the old and inefficient high-analysis compound fertilizer plants and equipment were to be scrapped first.

Salt.—Japan's domestic production of salt remained between 1 and 1.2 million tons in 1983-84. Domestic consumption of salt for general use was estimated at 1.5 million tons and for production of soda was estimated at 6.3 million tons in 1984. Japan relied 100% on imported industrial salt for its soda industry.

As a result of the continuing recovery in Japan's caustic soda industry, imports of industrial salt rose to 6.5 million tons from 6.3 million tons in 1983. Australia, Mexico, and China remained the three major suppliers of industrial salt, accounting for 47%, 43%, and 10%, respectively. The average import price in 1984 from Mexico was $24 per ton; Australia, $26 per ton; and China, $22 per ton.

Production of caustic soda recovered to 3 million tons owing to increased consumption by manufacturers of chemical-fiber, paper and pulp, and inorganic chemicals, as well as increased demand by alumina smelters. According to MITI, domestic demand for caustic soda was about 2.9 million tons while exports of caustic soda rose to 148,992 tons from 63,286 tons in 1983.

MINERAL FUELS

Japan's primary energy supply, as estimated by the Natural Resources and Energy Agency of MITI, rose 4% for the first time in 4 years to 3,807 trillion kilocalories or 6,961,000 barrels per day of crude oil equivalent in fiscal year 1983 ending March 31, 1984. However, the relative importance of imported crude petroleum and petroleum products in Japan's primary energy supply continued its downward trend and dropped to 60.8% in fiscal year 1983 from 61.5% in the previous fiscal year. The percentage share of imported coal in Japan's primary energy supply also dropped to 15.3% in fiscal year 1983 from 15.5% in the previous fiscal year, but the percentage share of imported liquefied natural gas rose to 7.2% in fiscal year 1983 from 6.5% in the previous year. Japan's dependency on imported energy dropped slightly but remained high at 83.3% compared with 83.5% in the previous year.

Table 8.—Japan: Primary energy supply

(Thousand 42-gallon barrels per day, crude oil equivalent)

Energy source	Fiscal year[1] 1982	1983
Charcoal and firewood, domestic	3	3
Coal:		
Domestic	213	204
Imported	1,038	1,064
Gas, natural:		
Domestic, gaseous	41	39
Imported liquefied	435	502
Hydropower	377	394
Nuclear power	460	512
Petroleum:		
Domestic crude	8	8
Imported crude	3,507	3,589
Imported products	347	411
Imported liquefied petroleum gas	255	235
Total	6,684	6,961

[1]Beginning Apr. 1 and ending Mar. 31 of that stated.

Coal.—Japan's coal production dropped to below 17 million tons owing primarily to the January coal mine fire at the Ariake Mine in Kyushu where about 1.4 million tons of coal was produced in 1983. The Ariake coal mine accident reportedly claimed 83 lives and was the fourth worst coal mine disaster in Japan's history. Domestic demand for coal rose 11% to 103.4 million tons. As a result, Japan's imports of coal surged by 14% to 85.8 million tons in 1984.

Coal output from the Hokkaido area accounted for 50% of Japan's coking coal production of 4.7 million tons and 66% of steam coal production of 11.9 million tons. Coal output from the Kyushu area accounted for 50% of Japan's coking coal production and 33% of steam coal production. A small quantity of coal output from the Honshu area was mostly anthracite and steam coal. The average heating value of domestic coal was 6,276 kilocalories per kilogram. By the end of 1984, the number of coal miners decreased by 484 to 15,087. However, labor productivity increased to 90.5 tons of coal per month per miner from 88.8 tons of coal per month per miner in 1983. The total number of working days was 301.5 in 1984 compared with 299.9 in 1983. The coal output represented only 16% of the total domestic consumption of coal.

Japan's demand for coal increased to 103.5 million resulting mainly from a 13% increase in demand for coking coal by the iron and steel industry and a 9% increase in demand for steam coal by the electric power industry. To meet the strong domestic demand for coal, imports of coking coal rose 13% to 67.3 million tons, of which 29.6 million tons was from Australia, 15.1 million tons from Canada, 14.9 million tons from the United States, and the remainder from the Republic of South Africa, China, and other countries. Imports of steam coal also rose 18% to 17.2 million tons, of which 10.1 million tons was from Australia, 2.5 million tons from the Republic of South Africa, 2.4 million tons from China, and the remainder from the U.S.S.R., Canada, and other countries. Imports of anthracite jumped 48% to 1.2 million tons mainly from the Republic of South Africa, China, and Australia.

Table 9.—Japan: Coal consumption in 1984, by consuming sector and type

(Thousand metric tons)

Consuming sector	Anthracite	Coking	Steam	Total
Manufacturing:				
Cement, ceramics, and chemicals:				
Domestic	--	2	1,692	1,694
Imported	832	7	7,587	8,426
Coke:				
Domestic	--	914	--	914
Imported	37	4,024	9	4,070
Iron and steel:				
Domestic	--	2,686	8	2,694
Imported	91	62,492	150	62,733
Paper and pulp:				
Domestic	--	--	347	347
Imported	--	--	635	635
Utilities:				
City Gas:				
Domestic	--	412	--	412
Imported	18	779	--	797
Electric power:				
Domestic	--	--	10,156	10,156
Imported	--	--	8,285	8,285
Other including briquets:				
Domestic	24	24	1,436	1,484
Imported	209	41	577	827
Total demand	1,211	71,381	30,882	103,474
Of which:				
Domestic	24	4,038	13,639	17,701
Imported	1,187	67,343	17,243	85,773

Source: Japan Coal Association.

To explore the possibilities of converting additional oil-fired into coal-fired powerplants and to increase imports of U.S. steam coal, two separate studies were conducted by the Japanese Federation of Electric Power Companies (FEPC) and the Agency of Natural Resources and Energy (ANRE). In July, the study conducted by ANRE concluded that almost all of the existing possible oil-fired powerplants had been converted to coal and it was impossible for the Japanese electric power industry to convert any additional existing oil-fired powerplants to coal because of ash disposal and other environmental problems. Unless additional new coal-fired powerplants are to be built, it would be very difficult to increase imports of U.S. steam coal. The conclusions of the FEPC's study was not published by yearend.

In October, Japan's first and the world's largest mixed coal-and-oil-fired powerplant began commercial operation by Tokyo Electric Power Co. in Yokosuka, about 25 miles south of Tokyo. The mixed coal-oil fuel is a mixture of fine coal particles of less than 0.1 millimeter in diameter and heavy oil at a 1:1 ratio in weight. The new fuel was produced by a plant at Iwaki on the Pacific coast, about 125 miles north of Tokyo, with a capacity of 900,000 tons per year. The new fuel was transported by pipeline to the powerplant. The annual coal requirements of the mixed coal-oil fuel plant was about 350,000 tons.

Petroleum and Natural Gas.—Japan was the world's largest importer of crude oil and LNG in 1984. Despite the continued decline in the percentage share of imported crude petroleum in Japan's primary energy supply, imports of crude oil reversed the 4-year downward trend and rose by 3% to 3,694,000 barrels per day, as a result of increased domestic demand for refined oil products, especially gasoline, kerosine, and type "A" fuel oil consumed by the manufacturing, water transport, and fisheries industries. Imports of LNG rose 37% to a new high of 25.7 million tons, because of increased consumption by electric power and city gas industries.

During 1984, imports of crude petroleum totaled 1,348 million barrels, of which 70% was from the Middle East, 18% from Southeast Asia, 6% from China, 5% from Latin America, and 1% from Africa and other countries. Saudi Arabia, the United Arab Emirates, and Indonesia remained the three dominant suppliers of crude petroleum, accounting for 27%, 15%, and 13% of total imports, respectively. Imported crude petroleum from Iran dropped 35% to 94.2 million barrels while imported crude petroleum from China, Mexico, and Malaysia rose 18%, 15%, and 73% to 80.8 million barrels, 57.5 million barrels, and 40.1 million barrels, respectively.

Imports of LNG surged to a new record high of 25.7 million tons, of which about 14 million tons was imported from Indonesia, 5.3 million tons from Brunei, 3.5 million tons from Malaysia, 2 million tons from the United Arab Emirates, and 1 million tons from the United States. Consumption of LNG rose 38% to 19.5 million tons by the electric power industry, 36% to 5.7 million tons by the city gas industry, and 11% to 571,000 tons by other industries.

Domestic production of crude petroleum remained insignificant in Japan's crude petroleum requirements. It provided less than 0.2% of input to the refining industry. The total consumption of crude petroleum by the petroleum refining industry was 1.2 billion barrels, of which over 99% was imported crude. The refinery industry was operating at 3.3 million barrels per day, which was about 67% of the industry's installed capacity. Domestic production of natural gas increased slightly. Most of the domestically produced natural gas was consumed by the city gas, electric power, chemical, and crude oil and natural gas industries.

In October, Idemitsu Oil Development Co., a subsidiary of Idemitsu Kosan Co., began commercial production of oil and gas from the North Aga Field, offshore Niigata Prefecture, at the rate of 1,000 barrels per day of oil. According to Idemitsu, nine additional wells will be developed in 1985 with an $83 million development program. By 1986, the company is expected to raise its oil output to 10,000 barrels per day. The estimated oil reserves in the North Aga Field were 69 million barrels, of which about 14 million barrels is exploitable.[11]

Japex Offshore Ltd. completed drilling three additional exploratory wells after the discovery of oil from the No. 1 exploratory well at the Iwafune block, 4.6 kilometers offshore Nakajo, Niigata Prefecture, in June 1983. The combined flow rate of the four exploratory wells was 23,600 barrels per day of oil plus 63,743 cubic feet per day of natural gas. The No. 3 exploratory well, the largest, reportedly flowed at 9,300 barrels per day of oil and 26,133 cubic feet per day of natural gas. A feasibility study of commercial production was expected to be complete in 1987. However, the domestic market conditions for natural gas at the local electric powerplants in Niigata Prefecture remained the key factor for decision by Japex Offshore to begin commercial production.[12]

As part of reorganizing and restructuring Japan's ailing petroleum industry to streamline overall operation and eliminate excessive competition, an interim report was completed by the Petroleum Deliberation Council of MITI in February 1984. In the report, the Council recommended regrouping 13 existing oil companies into 7 groups through voluntary mergers, joint marketing, or other business cooperation arrangements, with incentive measures to be provided by the Government. By yearend, Japan's Fair Trade Commission, an antitrust law enforcing agency, reportedly had approved four merger plans or operational tieup plans that included joint refining, joint imports of crude oil, mutual sharing of domestic oil transport and storage facilities, and joint marketing of refined products in the domestic market.[13]

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[1]Economist, Division of International Minerals.
[2]Japan Metal Journal (Tokyo). V. 14, No. 36, Sept. 3, 1984, p. 1.
[3]Where appropriate, values have been converted from Japanese yen (Y) to U.S. dollars at the rate of Y237.52=US$1.00 for 1984.
[4]The Rare Metal News (Tokyo). No. 1304, May 1, 1985, p. 7.
Japan Metal Journal (Tokyo). V. 15, No. 16, Apr. 22, 1985, p. 8.
[5]———. V. 14, No. 48, Nov. 26, 1984, p. 3.
[6]Japan Steel Bulletin (Tokyo). V. 9, No. 1, Mar. 1985, p. 2.
[7]U.S. Embassy, Tokyo, Japan. State Dep. Telegram 17875, Aug. 29, 1984.
Metal Bulletin (London). No. 6915, Aug. 24, 1984, pp. 13, 23.
[8]European Chemical News. V. 43, No. 1154, Nov. 26, 1984, p. 31.
[9]Nihon Keizai Shimbun Inc. (Tokyo). Japan Economic Almanac 1985. P. 160.
[10]Japan Chemical Daily Co. Ltd. (Tokyo). Japan Chemical Annual 1984. Pp. 64-66.
[11]U.S. Embassy, Tokyo, Japan. State Dep. Telegram 21612, Oct. 18, 1984.
[12]———. State Dep. Telegram 20701, Oct. 4, 1984.
[13]———. State Dep. Telegram 23175, Nov. 8, 1984.
Oil and Gas Journal. V. 82, No. 25, Dec. 24, 1984, p. 25.

The Mineral Industry of Jordan

By Peter J. Clarke[1]

Jordan's mineral sector maintained its momentum from 1983, following record-high production levels in that year, with additional production gains in 1984 for its primary commodities. The most significant addition to Jordan's proven exploitable resources, however, was crude oil. Test wells in the Al-Azraq region confirmed the existence of an oil structure with undetermined reserves, although test wells indicated commercial production was feasible. Output from Jordan's existing mineral industries, which includes phosphate rock mining and fertilizer manufacturing, potash recovery from the Dead Sea, production of cement, and petroleum refining, all increased. The Jordanian Government, which holds majority or minority shares in most of the major industries, continued to move ahead on development of new mineral deposits and expansion of existing works.

Jordan's economy was also dependent on these mineral resources, with exports for phosphate rock accounting for almost 35% of total exports. Other important mineral exports were diammonium phosphate (DAP) fertilizer and potash, most of which were shipped to the Far East and Africa. Jordan's economy managed to maintain economic growth at about 3.5%, down slightly from that of 1983 and considerably less than the robust 9% to 10% growth rates experienced during the 1975-80 oil boom, which strongly affected Jordan's economy despite its non-oil-producing status. Part of the reason behind the slower economic growth in the early 1980's was the reduced level of trade with Iraq, once Jordan's primary trading partner, but now preoccupied with a 4-year-old war with Iran. Jordanian exports to Iraq had fallen more than 60% since the outbreak of the war. Jordan had also lost a considerable volume of transit trade through Jordan's only seaport at Aqaba. Despite these setbacks, Jordan planned to significantly expand production and exports of phosphate, potash, and other mineral-related commodities to make up for its declining revenues elsewhere.

PRODUCTION AND TRADE

Production of phosphate rock made the most spectacular gain, increasing 32% from the 1983 level, representing a 1.5-million-ton increase for the world's third largest producer of phosphate rock. Production of potash from the Arab Potash Co.'s (APC) Dead Sea works continued to scale up toward full capacity in its second full year of operation. Production was up almost 75% from that of 1983, but remained below the company's target of 500,000 tons of potassium chloride (KCl). Jordan Fertilizer Industries Co.'s phosphate fertilizer plant was also nearing full capacity of DAP and phosphoric acid. Cement production was also boosted considerably, owing to the completion of Jordan's second cement plant at Rashadiyah. Other commodities produced in Jordan include crude construction materials, such as clays, gypsum, lime, and stone, along with small quantities of crude steel produced from imported iron and steel scrap. Jordan also produced refined petroleum products from imported crude oil at its only refinery at Zarqa.

Exports of Jordanian phosphate reached 5.7 million tons in 1984, up 54% from those of 1983. Exports were directed mainly to

Asia and Eastern Europe, with the primary recipients being Romania, India, Malaysia, Indonesia, and Poland. Exports of DAP were also directed primarily eastward, with the major purchasers, in descending order of volume, being China, India, Pakistan, and Ethiopia. Jordanian potash was being exported under semiannual contracts to India and Eastern Europe, mostly on a trial basis. Jordan remained dependent on Saudi Arabia for supplies of crude oil for its refinery. Approximately 19.2 million barrels of Saudi crude were delivered to Zarqa, making up the largest share of imports into Jordan. Overall, Jordan's trade deficit remained large, at about $2.4 billion,[2] although the overall balance of payments continued to show a slight surplus, mainly as a result of aid payments from some of its neighbors. Total U.S. exports to Jordan declined to about $300 million, from $436 million in 1983, mainly as a result of the strong dollar.

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

Commodity	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic metric tons	912,700	964,700	795,000	1,271,332	[2]1,988,424
Clays do.	30,000	20,000	14,335	7,817	[2]26,035
Gypsum do.	45,000	53,054	39,959	41,187	[2]109,863
Iron and steel: Steel, crude do.	86,173	134,900	[e]140,000	[e]140,000	140,000
Lime do.	3,500	20,000	59,839	267,093	[2]224,318
Petroleum: Crude thousand 42-gallon barrels	--	--	--	NA	150
Refinery products:					
Gasoline do.	2,263	[e]2,550	[e]2,925	2,695	2,700
Jet fuel do.	1,759	[e]1,800	[e]2,000	2,146	1,150
Kerosine do.	1,314	1,327	[e]1,600	1,734	1,750
Distillate fuel oil do.	3,509	[e]3,550	[e]3,800	5,132	5,200
Residual fuel oil do.	3,312	[e]3,350	[e]3,600	5,300	5,350
Liquefied petroleum gas do.	475	[e]500	[e]650	875	900
Asphalt do.	581	[e]600	[e]700	1,026	1,100
Unspecified including lubricants do.	[e]50	[e]60	[e]65	53	155
Refinery fuel and losses[e] do.	[e]637	[e]700	[e]750	750	1,695
Total do.	[e]13,900	[e]14,437	[e]16,090	19,711	20,000
Phosphate:					
Mine output thousand metric tons	3,911	4,244	4,390	4,748	[2]6,263
P_2O_5 content[e] do.	1,271	1,379	1,427	1,544	1,899
Phosphatic fertilizer metric tons	--	NA	117,000	365,122	[2]568,968
Potash:					
Crude salts do.	--	--	[e]15,000	280,000	[2]486,868
K_2O equivalent do.	--	--	[e]9,100	170,000	295,000
Salt[e] thousand metric tons	30	30	50	80	80
Stone:					
Limestone metric tons	4,182	[e]7,000	[e]7,000	[e]7,000	7,000
Marble do.	[e]5,000	[e]5,000	[e]5,100	[2]102	[2]4,625

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through June 1, 1984.
[2]Reported figure.

Table 2.—Jordan: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	896	1,852	--	Kuwait 1,173; Italy 179.
Copper: Metal including alloys, all forms	541	1,528	--	Chile 670; West Germany 287.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	36,395	42,857	--	All to Switzerland.
Iron and steel: Metal:				
Scrap	63	1,125	--	Syria 473; Italy 400; Saudi Arabia 178.
Semimanufactures	7,955	2,984	--	Iraq 2,269; Syria 254.
Lead: Metal including alloys, unwrought	386	154	--	Saudi Arabia 132.
Titanium: Oxides	41	81	--	All to Saudi Arabia.

See footnote at end of table.

Table 2.—Jordan: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Tungsten: Metal including alloys, all forms	16	--		
Zinc: Metal including alloys, scrap	429	588	--	Netherlands 350; Syria 136.
NONMETALS				
Asbestos, crude	95	--		
Cement	2,716	288	--	Syria 273.
Clays, crude: Kaolin	7,756	--		
Fertilizer materials: Manufactured:				
Ammonia	29	--		
Nitrogenous	39,700	292,864	--	India 81,422; Italy 51,192; Taiwan 44,758.
Phosphatic	30,250	422	--	All to Saudi Arabia.
Potassic	5,329	2,555	--	Iraq 2,521.
Unspecified and mixed	--	16	--	All to Saudi Arabia.
Gypsum and plaster	520	151	--	Iraq 145; Saudi Arabia 6.
Lime	5,109	3,667	--	Iraq 3,144; Kuwait 300.
Magnesite	520	--		
Mica: Crude including splittings and waste	6,214	--		
Phosphates, crude thousand tons	3,570	3,701		Romania 740; India 431; Pakistan 283.
Salt and brine	1,674	306	--	Qatar 256; Syria 40.
Sodium compounds, n.e.s.: Sulfate, manufactured	--	1,024	--	Iraq 1,013.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	113,855	24,293	--	Lebanon 8,850; Iraq 8,587; Kuwait 5,677.
Worked	99,762	81,272	--	Kuwait 70,182; Abu Dhabi 6,374.
Gravel and crushed rock	--	800	--	Kuwait 350; Lebanon 234.
Sand other than metal-bearing	12,515	1,027	--	Kuwait 616; Lebanon 130.
Sulfur: Sulfuric acid	678	80	--	All to Saudi Arabia.
Talc, steatite, soapstone, pyrophyllite	5,347	2,889	--	Saudi Arabia 1,551; Kuwait 1,338.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	143	--		
Coal: All grades including briquets	--	53	--	All to Saudi Arabia.
Coke and semicoke	--	50	--	Do.
Petroleum refinery products:				
Lubricants 42-gallon barrels	455	1,064	--	Iraq 497; West Germany 231.
Bitumen and other residues do	--	436	--	All to Iraq.
Bituminous mixtures do	1,150	854	--	Iraq 848.

[1]Table prepared by Virginia A. Woodson.

Table 3.—Jordan: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Alkali and alkaline-earth metals	--	13	--	Kuwait 9; Spain 4.
Aluminum: Metal including alloys:				
Scrap	239	106	2	Saudi Arabia 81; Italy 8.
Unwrought	518	2,385	--	Spain 1,049; United Kingdom 497.
Semimanufactures	5,943	6,806	73	Greece 3,352; Italy 724; Turkey 704.
Chromium: Oxides and hydroxides	140	--		
Cobalt: Oxides and hydroxides	1	--		
Copper: Metal including alloys:				
Scrap	133	130	--	All from Saudi Arabia.
Unwrought	60	--		
Semimanufactures	520	719	44	Hungary 98; Japan 97; Italy 94.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	75,779	3,274	--	Switzerland 3,233.

See footnotes at end of table.

Table 3.—Jordan: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	2,468	4,978	--	Kuwait 2,970; Saudi Arabia 1,071.
Pig iron, cast iron, related materials	63,164	13,036	--	West Germany 9,900; U.S.S.R. 2,919.
Ferroalloys:				
Ferromanganese	--	151	--	Belgium-Luxembourg 150.
Ferrosilicon	18	98	(2)	Belgium-Luxembourg 75; Poland 18.
Steel, primary forms	15,095	184,410	--	Brazil 54,704; Cuba 24,949; U.S.S.R. 21,548.
Semimanufactures	213,039	149,400	873	Zimbabwe 26,294; Japan 22,527; East Germany 17,010.
Lead:				
Oxides	16	95	--	United Kingdom 76; Netherlands 19.
Metal including alloys, unwrought	1,078	772	13	Saudi Arabia 584; Kuwait 160.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, platinum troy ounces	--	98,060	--	All from Switzerland.
Silver: Metal including alloys, unwrought and partly wrought do	39,995	1,833	--	India 1,061; Italy 739.
Titanium: Oxides	1,135	1,593	599	United Kingdom 734; Belgium-Luxembourg 109.
Zinc: Metal including alloys:				
Scrap	161	219	--	All from Belgium-Luxembourg.
Unwrought	320	421	--	Belgium-Luxembourg 400; West Germany 21.
Semimanufactures	242	132	--	Japan 70; Belgium-Luxembourg 37.
Other: Base metals including alloys, all forms	1	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2	27	--	Switzerland 20; Italy 7.
Grinding and polishing wheels and stones	546	466	(2)	Italy 264; West Germany 75; Czechoslovakia 34.
Cement	1,088	611,438	(2)	Greece 260,359; U.S.S.R. 161,043; Spain 52,498.
Chalk	359	769	1	United Kingdom 280; France 196.
Clays, crude:				
Kaolin	--	280	--	Turkey 119; United Kingdom 115.
Unspecified	1,444	1,484	124	United Kingdom 318; Turkey 272; Cyprus 270.
Diamond: Gem, not set or strung carats	--	10,000	--	Belgium-Luxembourg 5,000; India 5,000.
Diatomite and other infusorial earth	122	--		
Feldspar, fluorspar, related materials	405	903	--	Finland 425; Turkey 379.
Fertilizer materials:				
Crude, n.e.s	--	2,938	(2)	Netherlands 2,262; Belgium-Luxembourg 200.
Manufactured:				
Ammonia	22,082	11,599	--	Algeria 9,523; Libya 790.
Nitrogenous	24,767	28,966	4	Libya 9,526; Syria 5,520; Italy 5,000.
Phosphatic	14,765	10,138	--	Iraq 9,596.
Potassic	1,117	348	--	Greece 200; Belgium-Luxembourg 75.
Unspecified and mixed	6,078	2,812	--	Netherlands 957; Italy 500; Austria 317.
Gypsum and plaster	2,178	3,182	788	Iraq 1,003; Syria 642; Lebanon 485.
Lime	1,008	22,908	--	U.S.S.R. 22,071.
Magnesite	82	--		
Pigments, mineral:				
Natural, crude	55	136	--	West Germany 91; Belgium-Luxembourg 40.
Iron oxides and hydroxides, processed	184	165	--	West Germany 126; Spain 39.
Precious and semiprecious stones other than diamond:				
Natural kilograms	--	6	2	India 2; Belgium-Luxembourg 1; Thailand 1.
Synthetic do	5	22	--	Thailand 11; Belgium-Luxembourg 7.
Salt and brine	528	1,314	172	Saudi Arabia 720; Kuwait 158.
Sodium compounds, n.e.s:				
Carbonate, manufactured	786	1,412	--	Belgium-Luxembourg 750; Turkey 250.
Sulfate, manufactured	947	1,293	(2)	Saudi Arabia 802; West Germany 310.

See footnotes at end of table.

Table 3.—Jordan: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	15,727	18,412	--	Italy 11,941; Turkey 1,719; U.S.S.R. 1,604.
Worked	1,087	645	--	Italy 499; Greece 61.
Gravel and crushed rock	3,688	5,403	--	Italy 4,632; Turkey 529.
Sand other than metal-bearing	696	451	--	Greece 200; Syria 94; Finland 84.
Sulfur:				
Elemental:				
Crude including native and by-product	31,595	113,148	--	Saudi Arabia 112,891.
Colloidal, precipitated, sublimed	27,409	42,494	--	Iraq 41,642.
Sulfuric acid	2,440	315	--	Greece 100; Netherlands 100; Belgium-Luxembourg 50.
Talc, steatite, soapstone, pyrophyllite	640	427	--	Austria 148; Norway 148; Denmark 35.
Other: Crude	--	167	--	Netherlands 147; Belgium-Luxembourg 20.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	38	--		
Coal: All grades including briquets	207	499	11	France 298; West Germany 165.
Coke and semicoke	360	311	--	Syria 186; West Germany 125.
Peat including briquets and litter	455	456	--	West Germany 185; Finland 136.
Petroleum:				
Crude thousand 42-gallon barrels	18,522	18,326	--	Saudi Arabia 18,289.
Refinery products:				
Gasoline 42-gallon barrels	2,079	--		
Mineral jelly and wax do	1,629	--		
Kerosine and jet fuel do	--	1,364	--	Mainly from Saudi Arabia.
Lubricants do	191,926	114,177	9,401	Belgium-Luxembourg 29,400; Hungary 17,157; West Germany 14,644.
Residual fuel oil do	3,757	3,550	1,025	Belgium-Luxembourg 1,345; United Kingdom 612.
Bituminous mixtures do	3,312	2,545	79	Italy 812; United Kingdom 654; Austria 485.

[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper.—Feasibility studies were being conducted on a copper deposit in west-central Jordan discovered more than 10 years previously. Recent prospecting operations by the Jordanian Natural Resources Authority (NRA) confirmed the existence of approximately 65 million tons of copper ore grading 1.2% copper. A 700-ton ore sample was being analyzed in Chile under the auspices of an undisclosed international company retained by the NRA in 1983. The copper deposit is located at Wadi Araba, an extensive area of rugged terrain stretching from the Dead Sea to the Gulf of Aqaba. Copper concentrations were found specifically at Abu Khushaybah and Finan within Wadi Araba.

Iron and Steel.—Iron ore was reportedly discovered late in 1984 in northern Jordan within the Amman Governorate. Geologists from the University of Jordan discovered the small deposit, estimated at 6 million tons containing an average of 40% iron, in a strata approximately 1.5 meters thick and close to the surface. Further tests were being conducted to determine the extent of the reserves.

Jordan does have a small domestic steel industry, which consists of the Jordan Iron and Steel Co.'s electric arc furnace at Zarqa. The plant has a capacity of 150,000 tons of raw steel, which is produced from imported iron and steel scrap. In 1984, the Arab Engineering Industries Co. (AEIC) was established to plan and build an iron foundry at Irbid to annually produce 10,000 tons of engineering parts, tubes, and fittings. The Arab Mining Co., based in Amman, holds 25% of the equity of AEIC with the remainder being small local shareholders.

NONMETALS

Cement.—The Southern Cement Co. Ltd. completed construction of its 2-million-ton-per-year cement plant at Rashadiyah early in 1984, augmenting output of the Jordan Cement Factories Co. plant at Fuheis, where capacity was recently expanded from 700,000 to 1.3 million tons per year. Consumption of cement in Jordan averaged about 2 million tons per year, still slightly above the domestic production level in 1984. With Rashadiyah producing at or near capacity, Jordan was expected to have an annual exportable surplus of cement of about 1 million tons.

Fertilizer Materials.—Production from the Jordan Fertilizer Industry Co.'s (JFI) phosphate fertilizer plant increased again in 1984, edging closer to full production capacity. The facility was capable of producing 1,100 tons per day of granular DAP or monoammonium phosphate (MAP) from each of two units, along with 1,800 tons per day of sulfuric acid and 1,250 tons per day of phosphoric acid. The plant was inaugurated in November 1982 and produced 596,000 tons of DAP, 294,000 tons of phosphoric acid, and 819,000 tons of sulfuric acid in 1984. Phosphate rock for the plant was purchased from the Jordan Phosphate Mines Co. (JPMC); the sulfur and ammonia were imported. DAP exports, in descending order of volume, went mainly to China, India, Pakistan, Saudi Arabia, Italy, Ethiopia, and Kenya. Worldwide DAP marketing was divided between Mitsubishi Corp. of Japan for Asia, Woodward and Dickerson Inc. of the United States for North and South America, and JFI for direct sales and government-to-government contracts.

JFI, on behalf of a consortium composed of APC and JPMC, awarded a feasibility study contract to Krebs & Cie. S.A. of France for possible construction of a nitrogen-phosphorus-potassium fertilizer and explosives-grade ammonium nitrate plant, construction of which could begin by late 1985. The study was to cover technical processes, marketing, and a profitability analysis for the plant. Jordan in 1984 imported 20,000 tons per year of explosives-grade ammonium nitrate for phosphate rock mining.

Phosphate Rock.—JPMC was undertaking a major production expansion program and cost-cutting drive to increase exports and profitability over the next several years. Between 1980 and 1983, Jordan's exports of phosphate rock rose less than 5%, to approximately 4.2 million tons. The export promotion program centered around barter and countertrade deals, with Jordan paying for imports from Japan, the United States, and Europe in the form of phosphate rock. Bulgaria and Turkey signed such contracts with JPMC, agreeing to take 600,000 tons of phosphate in exchange for participating in joint projects involving production of sugar, cement, iron and steel, and potash. Countertrade deals were also proposed with Japan and the U.S.S.R. in exchange for assistance in energy development and marketing of Jordanian exports. In 1984, Jordan's phosphate exports reached 5.7 million tons, about a 54% increase from those in 1983, indicating that its export drive was highly successful.

In the meantime, JPMC was in the process of reducing its work force by 20% to approximately 3,300 people, while attempting to reduce fuel consumption and increase its savings on spare parts and operating contracts. JPMC was working three major mining areas: at Ruseifa, the smallest and oldest operation, north of Amman; El Hasa, the largest mine, 140 kilometers south of Amman; and Wadi-El-Abyad, an extension of the El Hasa deposit, 20 kilometers north of El Hasa. Total reserves at the three locations were approximately 200 million tons, averaging 65% bone phosphate of lime (BPL). Annual phosphate rock production capacities at the three areas, Ruseifa, El Hasa, and Wadi-El-Abyad, were 1 million tons, 3.5 million tons, and 2 million tons, respectively. Output from these three areas was to be expanded to 7 million tons per year by 1987.

The major long-term increase in Jordan's phosphate rock production was expected to come from the Shidiya deposit in southeastern Jordan. JPMC awarded a second detailed feasibility study contract to a group of companies led by Société Française d'Études Minières (Soframines) to evaluate the technical and economic feasibility of developing the Shidiya deposit. The study was to be based on an initial production level of 3 million tons per year and up to a maximum of 9 million tons per year. Proven reserves at Shidiya are approximately 1 billion tons of phosphate rock.

Jordan was already in the process of expanding its export loading facilities at Aqaba, where all phosphate rock exports originate. PHB Weserhutte AG of the Federal Republic of Germany was awarded a contract for construction of a new wharf and loading facilities for ships under 10,000 deadweight tons, raising total phosphate export capacity to 6 million tons per year.

Potash.—Potash production from APC's Dead Sea potash works nearly doubled in 1984, but it did not reach the year's 500,000-ton target. The full capacity target was delayed from 1985 to 1987. Modifications of the original design of the facility, the only plant to rely strictly on solar evaporation for production of carnallite, were being considered because the solar system was not yielding the expected quantities. The plant, located at Ghor-al-Safi near the southern end of the Dead Sea, consisted of three stages of solar evaporation. The first two sets of pans were for removing sodium chloride, and the final stage was for crystallizing carnallite, the potassium salt from which potassium chloride is derived. The carnallite was harvested by semisubmerged laser-guided machines, which pumped the brine to shore for pipelining to a refinery. All of the ponds and harvesters were operating in 1984, but at lower than expected capacity. Production in 1985 was planned for 800,000 tons. Production was reduced in 1984 by a shutdown in June for annual maintenance and expansion of the pipeline network. APC lost approximately $50 million in 1983, and expected to report a loss again in 1984, APC borrowed $32 million in 1984 to maintain liquidity until production could be increased suffficiently to meet costs.

MINERAL FUELS

Petroleum exploration activity and testing continued at a rapid rate in northeast Jordan after oil was first discovered in the Al-Azraq region in 1983. Two wells, Qurma 1 and 2, struck oil in late 1983, and each flowed at 600 barrels per day during testing. A third well, drilled in 1984, Hamzah No. 3, also found oil and flowed at 2,000 barrels per day in tests. Hamzah 4 and 5 were in the process of being drilled in 1984, and the Ministry of Energy and Natural Resources leased two additional drilling rigs from Romania for drilling at Wadi Sarhan, about 12 kilometers from the previous strikes. The Jordanian Government planned to allocate an additional $36 million for petroleum exploration in 1985 and hoped to begin commercial production by 1987. Jordan's oil strike, completed with technical assistance from the Yugoslav firm NAFTAGAS and the Iraq National Oil Co., came after 29 years of unsuccessful exploration throughout the country.

With commercial oil production only a possibility and at best several years away, Jordan remained dependent mainly on Saudi Arabian crude oil imports for feedstock for the Jordan Petroleum Refinery Co.'s 60,000-barrel-per-day oil refinery at Zarqa. Jordan purchased over 50,000 barrels per day from Saudi Arabia via the Trans-Arabian Pipeline (TAPline) and another 9,500 barrels per day of Iraqi crude brought in by truck. TAPline's decision to shut down the pipeline and phase out all operations in Syria and Lebanon meant that Jordan would be increasingly reliant on Iraqi oil for its domestic refining needs. Jordan's need for crude oil and Iraq's for additional export terminal facilities far from its border with Iran led to plans for construction of a $1 billion pipeline from the oilfields in northern Iraq through the Jordan panhandle to the southern seaport of Aqaba. The 1,650-kilometer line was to be financed mainly by the Iraqi Government but with substantial assistance from the construction contractor, and possibly from Western European nations, the United States and the Export-Import Bank of the United States. The Bechtel Group Inc. of the United States was involved in preliminary negotiations for construction and financing the project, but no firm contracts had yet been established for the line.

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[1]Physical scientist. Division of International Minerals.

[2]Where necessary, values have been converted from Jordanian dinars (JD) to U.S. dollars at the rate of JD0.384=US$1.00

The Mineral Industry of the Republic of Korea

By E. Chin[1]

The Republic of Korea was a significant mine producer of graphite, kaolin, pyrophyllite, talc, and tungsten. With the exception of limestone and aggregates, it was deficient in almost all mineral raw materials required by the country's manufacturing industries. The Republic of Korea's largest metallurgical sector was iron and steel, which must import almost all of its needs for iron ore, manganese, and coking coal, and about 35% of its scrap needs. Aluminum and copper were also produced from imported raw materials, while lead and zinc were produced from domestic and imported ore. The largest nonmetals processing sector was cement.

The gross national product (GNP) in 1984 was estimated at $80 billion[2] in current prices. GNP in constant 1980 prices was $71 billion in 1984 compared with $75 billion in 1983, representing a real growth of almost 5.6%. The input of the mining and quarrying sector to GNP compared with that for manufacturing was as follows, in million dollars:

	1981	1982	1983	1984
Mining and quarrying	965	964	1,012	1,100
Manufacturing	17,469	18,212	19,746	22,300

Total labor force was estimated at 14.4 million persons. Employment in the mining sector was 142,000 compared with 7.0 million for services; 3.9 million for agriculture, forestry, and fishing; and 3.4 million for manufacturing. Monthly earnings for all industries averaged $337 based on 25 worker-days. Monthly earnings per person for various sectors of the economy were as follows: utilities, $537; services, $442; construction, $429; mining, $346; and manufacturing, $280. The breakdown of monthly earnings in the mining sector was coal mining, $360 (25 worker-days); metals mining, $358 (26 worker-days); and other mining, $260 (24 worker-days).[3]

The wholesale price index (1980 = 100) for all commodities was 127. Indices for select products were electricity, 143; petroleum, 135; ceramic and glass products, 129; chemicals, 123; iron and steel products, 118; and nonferrous metal products, 109. Wholesale prices for select commodities were aluminum sash bar, $3 per kilogram; anthracite coal, $38 per ton; cement, $0.05 per kilogram; compound fertilizers, $0.22 per kilogram; electrolytic copper, $1,679 per ton; fuel oil, $0.18 per liter; galvanized sheet, $436 per ton; gasoline, $0.91 per liter; gold, $13 per gram; hot-rolled steel coil, $279 per ton; reinforced steel bar, $260 per ton; and wire rod, $298 per ton.

The value of construction orders received totaled $6.27 billion: $3.77 billion for building construction and $2.50 billion for civil engineering works. Construction orders for road and bridges were valued at $623 million; harbors and airports, $178 million; powerplants, $158 million; railroads, $153 million; and dams, $12 million.

Orders for machinery and equipment by the mining sector were valued at $32 million compared with $55 million by the chemicals sector; $73 million, basic metals; and $247 million, construction.

Marine freight unloaded for select items was as follows, in thousand tons (loaded data are given in parentheses): oil, 43,873 (16,422); mineral ores, 18,013 (2,222); cement, 5,172 (8,350); anthracite coal, 3,181 (2,195); salt, 793; and fertilizers, 264 (1,270). Freight transport by rail included 21.1 million tons for anthracite coal, 5.7 million tons for cement, 4.1 million tons for mineral ores, 2.9 million tons for oil, and 1.6 million tons for fertilizers.

Government approvals for foreign investments in the first half of 1984 alone were $315 million, 18% higher than the $268 million for all of 1983. The largest single approval was for a $100 million equity investment by a U.S. company in a $400 million joint venture with Daewoo Motor Co. Ltd. to produce cars and automotive parts. To encourage additional investment inflows, revisions to the Foreign Capital Inducement Law (FCIL) took effect on July 1, 1984. The revised FCIL eases approval procedures and lifts virtually all restrictions on remittances and reinvestment. To enhance the country's investment climate further, the Government approved a draft revision of its 1958 copyright law, designed to protect the copyrights of foreigners.[4]

The Federation of Korean Industries (FKI) sought Government assistance to support technology research and development. FKI attributed the inferior technological status of the country to the longstanding export drive policy, which was based on a low-wage work force and the simple imitation of imported technologies.[5] The Government-financed Korea Advanced Institute of Science and Technology (KAIST) was to expand research to include development of industrial materials, such as new metallic compounds, alloys, ceramics, plastics, and polymers. Ssangyong Cement Industrial Co. Ltd., Poongsan Metal Manufacturing Co. Ltd., and four other companies were to assist in financing the research to be conducted by KAIST.[6]

PRODUCTION

Anthracite coal was the country's most important mine product by volume and value with production averaging close to 20 million tons per year since 1980. Domestic coal is doubly important to the economy inasmuch as there are no indigenous resources of oil and natural gas. Mine production of metallic ores included substantial quantities of iron, lead and zinc, and tungsten, with only the latter significant in terms of world output. Domestic iron ore accounted for about 4% of the ore requirement by the iron and steel industry, close to 50% of the domestic smelter demand, and 100% of lead demand. For nonmetallic minerals, the country was a significant producer of graphite, kaolin, pyrophyllite, and talc.

The largest metals sector was iron and steel with an aggregate output capacity of 12 million tons of raw steel. Pohang Iron and Steel Co. Ltd. (Posco), operating the only integrated steel complex in the country, accounted for 75% of the total raw steel capacity. Annual production of copper and zinc each exceeded 100,000 tons. Small quantities of aluminum and lead were also produced. The large, nonmetallic processing sectors were cement and fertilizer.

Many of the country's larger companies are state-run enterprises. Those under the control of the Ministry of Trade and Industry include Chinhae Chemical Co. Ltd., Korea Fertilizer Co. Ltd., Korea General Chemical Corp., Namhae Chemical Corp., Posco, and Yong-Nam Chemical Co. Ltd. Companies under the administration of the Ministry of Energy and Resources include Dai Han Coal Corp., Korea Mining Promotion Corp., Korea Petroleum Development Corp., and Korea Tungsten Mining Co. Ltd.

Table 1.—Republic of Korea: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984^{p}
METALS					
Aluminum, primary	17,643	17,506	15,226	12,629	18,252
Arsenic, mine output, white arsenic equivalent	NA	169	306	560	NA
Bismuth metal	123	100	95	100	126
Cadmium, smelter	365	300	320	320	230
Copper:					
Mine output, metal content	372	501	320	389	279
Metal:					
Smelter	64,100	^{r}108,200	119,400	124,000	103,000
Refined, primary	72,931	107,984	110,818	123,289	129,078
Gold metal troy ounces	41,218	43,147	55,750	72,083	79,156
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	619	594	620	655	625
Iron content do.	347	333	347	367	350
Metal:					
Pig iron do.	5,577	7,928	8,445	8,024	8,763
Ferroalloys:					
Ferromanganese	54,279	68,300	60,306	52,896	58,600
Ferromolybdenum	--	--	--	230	260
Ferrosilicon	29,712	32,000	32,478	32,489	35,300
Other	24,994	27,185	33,240	43,594	49,955
Total	108,985	127,485	126,024	129,209	144,115
Steel, crude thousand tons	8,558	10,753	11,753	11,916	13,034
Lead:					
Mine output, metal content	^{r}11,407	13,635	12,167	12,226	10,837
Metal, smelter	8,600	7,200	9,500	10,500	12,000
Manganese ore and concentrate:					
Gross weight	81	--	--	--	74
Manganese content	32	--	--	--	30
Molybdenum, mine output, metal content	300	464	361	142	158
Silver metal thousand troy ounces	2,292	3,061	3,237	3,366	3,759
Tin, mine output, metal content	7	--	--	--	17
Tungsten, mine output, metal content	2,737	2,739	2,420	2,480	2,703
Zinc:					
Mine output, metal content	56,787	56,198	58,175	55,980	49,232
Metal, primary	79,150	83,915	99,211	107,860	108,460
NONMETALS					
Asbestos	9,854	14,084	15,933	12,506	8,062
Barite	410	--	--	552	2,729
Cement, hydraulic thousand tons	15,612	15,617	17,887	21,282	20,413
Clays: Kaolin	577,761	694,584	625,824	684,447	721,220
Diatomaceous earth	25,101	42,176	55,249	55,968	48,496
Feldspar	71,972	103,263	85,040	109,896	127,057
Fluorspar, metallurgical-grade	6,912	6,464	3,667	6,361	4,672
Graphite:					
Crystalline	1,429	842	627	695	2,305
Amorphous	59,157	34,049	26,338	32,571	56,258
Total	60,586	34,891	26,965	33,266	58,563
Kyanite and related materials: Andalusite	82	90	33	289	209
Lime, slaked thousand tons	210	NA	NA	NA	NA
Mica: All grades	10,330	NA	20,355	14,402	24,436
Nitrogen: N content of ammonia	847,871	746,723	543,302	430,169	464,194
Pyrites, gross weight	460	--	--	529	--
Salt	455,000	602,000	864,000	481,000	518,000
Sodium carbonate, manufactured	221,920	202,063	185,670	230,600	247,927
Stone, sand and gravel:					
Agalmatolite	371,932	302,975	315,800	NA	--
Limestone thousand tons	28,024	27,931	^{r}30,736	32,992	33,456
Quartzite do.	291	545	490	842	868
Sand including glass sand do.	510	585	657	1,223	858
Sulfur: S content of pyrites	138	--	--	127	--
Talc and related materials:					
Pyrophyllite	514,511	395,216	466,324	460,922	656,442
Talc	204,662	169,401	124,793	171,214	192,208
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	67,122	60,943	58,047	75,424	82,369
Coal: Anthracite thousand tons	18,624	19,865	20,116	19,861	21,373
Coke do.	2,965	4,401	4,539	4,682	5,199
Fuel briquets: Anthracite briquets	17,000	18,543	20,865	18,932	21,316

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum refinery products:					
Gasoline _____ thousand 42-gallon barrels__	6,759	6,184	5,182	4,902	5,519
Jet fuel ____do____	4,920	5,409	6,521	9,074	10,469
Kerosine____do____	8,884	8,124	8,368	9,199	9,109
Distillate fuel oil____do____	38,527	39,167	41,701	48,560	54,156
Residual fuel oil ____do____	91,412	86,613	81,679	87,140	84,907
Lubricants ____do____	1,403	1,507	2,081	1,733	1,962
Other ____do____	29,709	30,744	26,577	30,860	43,288
Refinery fuel and losses[e] ____do____	1,247	5,068	6,260	6,700	6,400
Total ____do____	182,861	182,816	178,369	198,168	215,810

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through July 15, 1985.

TRADE

During the past decade, total trade expanded almost fivefold, reaching approximately $60 billion in 1984. The Government continued to support vigorously its export policy to limit the country's annual trade deficit. The value of trade for the past 10 years was as follows, in billion dollars:

	Exports	Imports
1975	5.1	7.3
1976	7.7	8.8
1977	10.0	10.8
1978	12.7	14.9
1979	15.7	20.3
1980	17.5	22.3
1981	21.3	26.1
1982	21.9	24.3
1983	24.4	26.2
1984	29.2	30.6

Major exports destinations in 1984 were the United States, $10.5 billion; Japan, $4.6 billion; Hong Kong, $1.3 billion; Saudi Arabia, $991 million; the United Kingdom, $955 million; and the Federal Republic of Germany, $924 million. The major export classes, which collectively accounted for almost 93% of the total value of shipments, were machinery and transportation equipment, $10.5 billion; miscellaneous manufactured articles, $8.1 billion; manufactured goods, $7.4 billion; and food products, $1.1 billion.

Major supplying countries were Japan, $7.6 billion; the United States, $6.9 billion; Saudi Arabia, $1.4 billion; Australia, $1.1 billion; and Malaysia, $1.0 billion. Receipts of machinery and transportation equipment were the largest class, valued at $9.8 billion, followed by fuels and related materials, $7.3 billion; crude raw materials, $3.9 billion; manufactured goods, $3.8 billion; and chemicals and related products, $2.7 billion.

To promote trade, Korea Trade Promotion Corp., a state-run enterprise, has offices in major cities throughout the world. In addition, there are nine large general trading companies, each with numerous overseas branches. In 1984, 7 trading houses were among the 12 top performing South Korean companies. Collectively, business turnover for the seven totaled $13.8 billion, distributed as follows, in billion dollars:

Company	Turnover
Daewoo Corp	3.9
Samsung Co. Ltd	3.1
Hyundai Corp	1.9
Lucky-Goldstar International Corp	1.9
Kukje-ICC Corp	1.2
Ssangyong Corp	1.0
Hyosung Corp	.8
Total	13.8

The other large trading companies are Korea Trading International Inc. and Sunkyong Ltd.

Table 2.—Republic of Korea: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	13,283	13,015	88	Saudi Arabia 4,152; Kuwait 1,164; United Arab Emirates 638.
Arsenic:				
Ore and concentrate	--	2,850	--	All to Japan.
Oxides and acids	643	114	--	Taiwan 112.
Bismuth: Metal including alloys, all forms	83	92	30	Netherlands 50.
Cadmium: Metal including alloys, all forms	152	397	48	Netherlands 342.
Cobalt: Metal including alloys, all forms	--	8	--	All to Japan.
Copper: Metal including alloys:				
Scrap	836	2,716	190	Japan 2,526.
Unwrought	10,710	25,251	8,000	Japan 16,501; Thailand 750.
Semimanufactures	24,387	26,714	1,424	Taiwan 4,044; Japan 2,589; Hong Kong 2,495.
Gold:				
Ore and concentrate value, thousands	$1,056	--		
Metal including alloys, unwrought and partly wrought troy ounces	6,688	19,263	19,257	Japan 6.
Iron and steel: Metal:				
Scrap	140,608	284,597	--	Thailand 168,000; Japan 91,597; Indonesia 20,000.
Pig iron, cast iron, related materials	42,571	18,062	50	Japan 18,000.
Ferroalloys:				
Ferrochromium	6	--		
Ferromanganese	--	701	--	Pakistan 301; Japan 300; Hong Kong 100.
Ferromolybdenum	3	--		
Ferronickel	--	31	--	All to Japan.
Ferrosilicomanganese	--	1,241	--	Japan 1,000; Pakistan 241.
Ferrosilicon	335	180	--	All to Japan.
Unspecified	--	3,001	(2)	Mainly to Japan.
Steel, primary forms thousand tons	2,015	1,824	175	Japan 835; Philippines 213; Kuwait 130.
Semimanufactures do	4,356	4,375	1,714	Saudi Arabia 844; Japan 720; India 114.
Lead: Metal including alloys, all forms	316	58	3	Saudi Arabia 38; Libya 10.
Magnesium: Metal including alloys, all forms	51	52	(2)	Mainly to Japan.
Molybdenum: Ore and concentrate	360	--		
Nickel: Metal including alloys, all forms	25	42	--	Mainly to Japan.
Silver:				
Ore and concentrate value, thousands	$5,557	$1,937	$1,937	
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,586	1,911	1,557	Japan 334; Taiwan 17.
Titanium: Oxides	1,990	2,395	10	Japan 2,350.
Tungsten:				
Ore and concentrate	1,005	1,061	175	Japan 589; Netherlands 155; West Germany 125.
Metal including alloys, all forms	385	277	33	Japan 92; West Germany 81; United Kingdom 60.
Zinc:				
Oxides	1,676	2,790	--	Japan 2,570.
Blue powder	485	165	--	New Zealand 86; Australia 68.
Ash and residue containing zinc	2,082	2,393	1	Mainly to Japan.
Metal including alloys, all forms	6,681	337	231	Austria 34; Saudi Arabia 28.
NONMETALS				
Cement thousand tons	r6,474	5,042	102	India 1,157; Saudi Arabia 1,034; Singapore 625.
Clays, crude	r74,625	62,537	--	Japan 58,118.
Diamond: Gem, not set or strung:				
Natural value, thousands	$237	$462	$111	Japan $180; Belgium-Luxembourg $123.
Synthetic or reconstructed do	$3	$6,257	$5,009	Switzerland $320; West Germany $292.
Feldspar, fluorspar, related materials	23,551	31,679	--	Taiwan 27,478; Thailand 3,500; Japan 701.
Fertilizer materials: Manufactured:				
Nitrogenous	301,019	239,451	--	Thailand 81,546; Philippines 67,175; Fiji 28,300.

See footnotes at end of table.

Table 2.—Republic of Korea: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials: Manufactured —Continued				
Phosphatic	51,490	37,565	--	Japan 13,596; Kenya 5,300; Australia 4,500.
Potassic	2,000	10,389	--	Japan 6,700; Fiji 1,950; Bangladesh 1,000.
Unspecified and mixed	812,166	910,881	(2)	Thailand 338,787; Philippines 140,850; Pakistan 89,364.
Graphite, natural	21,757	32,694	32	Japan 21,986; Taiwan 9,190; Indonesia 548.
Gypsum and plaster	355,296	59,159	(2)	Japan 39,318; Taiwan 14,326; Philippines 5,500.
Kyanite and related materials	1,200	--		
Precious and semiprecious stones other than diamond:				
Natural[3] kilograms	r22,169	13,932	445	Japan 12,571; Sri Lanka 600; West Germany 116.
Synthetic value, thousands	r$11,416	$3,748	$2,591	Japan $299; West Germany $268; Switzerland $253.
Salt and brine	172	3,193	80	Nigeria 3,000.
Sodium compounds, n.e.s.: Carbonate, manufactured	318	392	--	Japan 357.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	161,865	168,269	--	Japan 163,923; Taiwan 3,755; Thailand 507.
Worked	53,812	39,384	4	Japan 39,118; Singapore 91; Saudi Arabia 67.
Dolomite, chiefly refractory-grade	83,500	59,565	--	Japan 59,300.
Quartz and quartzite	18,233	16,041	--	Japan 16,025.
Sulfur:				
Elemental: Crude including native and byproduct	2,028	2,238	--	Indonesia 889; Burma 623; Sri Lanka 338.
Sulfuric acid	2,010	22	NA	NA.
Talc, steatite, soapstone, pyrophyllite	41,836	45,898	1,257	Japan 19,211; Thailand 11,440; Taiwan 2,743.
Vermiculite	8	115	--	Saudi Arabia 112.
Other:				
Crude	207,929	213,228	--	Japan 112,049; Taiwan 99,111; Indonesia 1,050.
Slag and dross, not metal-bearing	61,163	81,786	--	All to Japan.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	1,316	3,533	--	Sudan 1,479; Japan 573; Indonesia 477.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	17	88	--	Japan 49; Thailand 28.
Naphtha do	2,983	4,263	170	Japan 4,093.
Gasoline:				
Aviation do	178	1,217	--	Japan 1,017.
Motor do	718	149	--	Japan 126.
Kerosine and jet fuel do	705	1,266	95	Japan 324; Thailand 170.
Distillate fuel oil do	1,433	4,549	53	Japan 3,838.
Lubricants do	104	114	(2)	Taiwan 46; Bangladesh 13.
Residual fuel oil do	1,597	4,895	336	Japan 4,520.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Excludes unreported quantities valued at $39,495 (revised) in 1982 and $313,177 in 1983; mainly to the United States.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	5,334	6,095	--	Hong Kong 4,486; Japan 875; Guyana 734.
Oxides and hydroxides	56,951	69,681	632	Japan 57,193; Taiwan 7,136; Australia 2,400.
Metal including alloys:				
Scrap	7,299	6,089	4,422	Australia 285; Canada 163; United Kingdom 109.
Unwrought	302,267	333,797	4,868	Bahrain 213,268; United Arab Emirates 22,042; Australia 21,137.
Semimanufactures	23,000	24,848	1,174	Japan 11,462; Australia 5,860.
Antimony:				
Ore and concentrate	391	956	--	Thailand 741; Taiwan 164.
Oxides	126	311	--	United Kingdom 146; West Germany 76; Japan 63.
Metal including alloys, all forms	82	139	(2)	Hong Kong 105; Taiwan 17.
Chromium:				
Ore and concentrate	4,846	3,853	--	Philippines 3,505; Japan 348.
Oxides and hydroxides	1,127	2,311	455	Japan 1,747; Italy 51.
Cobalt:				
Oxides and hydroxides	8	12	2	Canada 4; Japan 4.
Metal including alloys, all forms	88	182	6	Zaire 73; Netherlands 45; Zambia 10.
Copper:				
Ore and concentrate	394,250	371,278	--	Philippines 137,218; Canada 82,544; Mexico 56,848.
Matte and speiss including cement copper	8,495	--		
Oxides and hydroxides	155	257	14	Norway 115; Japan 56; West Germany 54.
Metal including alloys:				
Scrap	94,433	42,787	26,235	Hong Kong 4,045; Singapore 3,794; Pakistan 1,665.
Unwrought	30,112	53,540	6,886	Japan 24,657; Chile 14,755; Peru 3,092.
Semimanufactures	10,109	10,445	322	Japan 7,902; Greece 1,125; United Kingdom 269.
Gold: Metal including alloys, unwrought and partly wrought ... troy ounces	39,255	57,394	39,316	Japan 17,215; Taiwan 403; Philippines 170.
Indium: Metal including alloys, all forms ... kilograms	157	263	--	West Germany 200; Japan 63.
Iron and steel:				
Iron ore and concentrate including roasted pyrite ... thousand tons	11,510	10,170	--	Australia 3,949; India 2,513; Brazil 2,195.
Metal:				
Scrap ... do	1,809	1,896	1,401	Netherlands 142; Australia 99; Canada 83.
Pig iron, cast iron, related materials	74,915	104,976	--	Brazil 66,293; Algeria 21,044; Turkey 9,999.
Ferroalloys:				
Ferrochromium	3,821	4,390	33	Philippines 1,557; Zimbabwe 105; Japan 47.
Ferromanganese	5,812	9,004	--	Japan 6,466; France 116; West Germany 48.
Ferromolybdenum	132	168	18	West Germany 47; United Kingdom 38; Netherlands 36.
Ferronickel	121	120	--	All from Japan.
Ferrosilicomanganese	--	115	--	NA.
Ferrosilicon	3,868	4,745	--	Norway 1,632; France 1,413; Canada 648.
Ferrovanadium	--	105	16	Belgium-Luxembourg 40; Netherlands 21; Canada 15.
Unspecified	984	1,974	66	Japan 885; France 566; West Germany 162.
Steel, primary forms ... thousand tons	396	1,002	(2)	Japan 791; Brazil 57; Australia 52.
Semimanufactures ... do	1,263	1,240	18	Japan 1,094.
Lead:				
Oxides	91	62	2	Japan 29; Mexico 22; West Germany 9.
Metal including alloys:				
Scrap	5,704	6,661	4,615	Canada 933; Australia 688; Jordan 201.
Unwrought	227,136	38,394	366	Taiwan 9,598; Peru 9,579; Australia 8,861.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lithium:				
Oxides and hydroxides	18	33	33	
Metal including alloys, all forms kilograms	113	35	35	
Magnesium: Metal including alloys, unwrought	407	585	331	Norway 131; France 123.
Manganese:				
Ore and concentrate:				
Battery-grade	3,907	6,310	--	Singapore 5,292; Japan 675.
Metallurgical-grade	232,678	190,147	--	Australia 74,583; India 64,019; Gabon 35,867.
Oxides	1,536	2,054	--	Japan 2,036.
Mercury 76-pound flasks	554	557	--	Japan 507; Spain 36.
Molybdenum: Ore and concentrate	--	151	69	Canada 36; Peru 28.
Nickel:				
Oxides and hydroxides	23	2	--	All from Japan.
Metal including alloys:				
Scrap	318	167	--	Canada 132; Finland 16.
Unwrought	2,451	2,001	247	Canada 833; Australia 307; Netherlands 296.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	26,659	20,402	6,988	Japan 11,850; United Kingdom 794; West Germany 566.
Silicon, high-purity	652	866	([2])	Canada 264; France 212; Norway 155.
Silver:				
Waste and sweepings[3] troy ounces	29,042	74,397	58,321	Japan 16,075.
Metal including alloys, unwrought and partly wrought do	164,997	181,941	9,677	Japan 155,159; Singapore 14,468.
Tellurium, elemental kilograms	79	69	--	All from Japan.
Tin:				
Ore and concentrate	17	574	--	Singapore 434; Burma 140.
Oxides kilograms	1,498	2,000	--	All from Japan.
Metal including alloys, all forms	2,123	2,303	12	Malaysia 954; Indonesia 764; Thailand 257.
Titanium:				
Ore and concentrate	33,455	37,698	--	Malaysia 32,104; Australia 5,355; Austria 239.
Oxides	2,950	2,974	35	Japan 2,212; West Germany 626; Spain 36.
Metal including alloys, all forms	391	360	252	Japan 82; Greece 25.
Tungsten: Metal including alloys, all forms	31	150	15	Japan 70; West Germany 64.
Uranium and/or thorium:				
Ore and concentrate kilograms	--	12	12	
Oxides and other compounds	--	12	8	France 2; West Germany 1.
Metal including alloys, all forms, uranium	37	7	([2])	Japan 4.
Vanadium: Oxides and hydroxides kilograms	685	2,000	--	Mainly from Italy.
Zinc:				
Ore and concentrate	79,176	114,399	--	Australia 104,082; Peru 10,317.
Oxides and peroxide	146	183	81	Japan 66; West Germany 21; Norway 14.
Blue powder	15	84	5	Norway 59; Japan 20.
Ash and residue containing zinc	153	843	95	Saudi Arabia 731.
Metal including alloys:				
Scrap	9,252	8,577	314	Japan 4,946; Australia 1,986; Saudi Arabia 510.
Unwrought	1,568	5,417	--	Australia 1,875; Canada 1,850; Zaire 546.
Zirconium: Ore and concentrate	2,370	2,514	--	Australia 1,615; Malaysia 768.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,237	3,711	507	Japan 2,896; India 307.
Artificial:				
Corundum	11,211	13,680	48	Japan 10,278; Hong Kong 869; Taiwan 422.
Silicon carbide	3,918	4,739	8	Japan 3,819; West Germany 222; Netherlands 200.
Dust and powder of precious and semiprecious stones including diamond kilograms	957	1,984	1,520	Japan 461.
Asbestos, crude	44,038	113,305	1,815	Canada 17,228; Greece 630; Italy 516.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Barite and witherite	350	469	--	Thailand 400; Japan 50.
Boron materials:				
Crude natural borates	570	967	--	Japan 949.
Oxides and acids	2,024	1,684	509	Italy 504; Japan 101; Argentina 90.
Bromine	154	162	--	Italy 28; Japan 4.
Cement	3,605	4,149	118	Japan 3,624; France 331; Netherlands 76.
Chalk	19	290	--	France 273.
Clays, crude:				
Bentonite	1,549	2,860	2,033	West Germany 509; Japan 173; France 145.
Chamotte and dinas earths	8,431	6,943	743	Hong Kong 4,586; Japan 622.
Kaolin	129,624	36,258	29,270	Japan 3,884; Hong Kong 2,539; New Zealand 425.
Unspecified	25,505	29,174	5,167	Japan 15,110; Hong Kong 5,164.
Cryolite and chiolite	100	200	--	All from Japan.
Diamond:				
Natural:				
Gem, not set or strung value, thousands	$1,016	$431	$27	Belgium-Luxembourg $188; Japan $178.
Industrial stones do	$690	$808	$598	United Kingdom $59; Ireland $44; Belgium-Luxembourg $41.
Unsorted do	$20	--		
Synthetic stones do	$4,436	$3,029	$2,560	Taiwan $171; Switzerland $107; West Germany $86.
Diatomite and other infusorial earth	82	15	15	
Feldspar, fluorspar, related materials	18,391	19,213	--	Thailand 18,251.
Fertilizer materials: Manufactured:				
Ammonia	224,597	313,804	244,976	Australia 44,044; Qatar 20,010.
Nitrogenous	582	20,747	15,749	Chile 4,863.
Potassic	390,167	310,603	--	Canada 252,252; Jordan 4,499; Italy 1,999.
Unspecified and mixed	83,879	8,952	8,539	West Germany 412.
Graphite, natural	453	443	3	Japan 331; Taiwan 56; India 51.
Gypsum and plaster	17,337	218,722	74	Australia 151,560; Austria 22,377; Morocco 4,543.
Iodine	7	11	(2)	Japan 11.
Kyanite and related materials	1,007	1,307	588	NA.
Magnesium compounds:				
Magnesite	7,575	7,232	--	Japan 7,197; United Kingdom 18; France 17.
Oxides and hydroxides	18,400	16,891	--	Japan 16,860.
Mica:				
Crude including splittings and waste	185	434	159	Malaysia 180; India 52; Japan 35.
Worked including agglomerated splittings	150	50	1	Japan 44.
Nitrates, crude	1,260	127	--	Japan 102.
Phosphates, crude thousand tons	1,505	1,592	1,469	Australia 52; Nauru 45; Jordan 21.
Phosphorus, elemental	1,309	1,578	571	Netherlands 76.
Potassium salts, crude	--	22,920	--	All from Canada.
Precious and semiprecious stones other than diamond:				
Natural[4] kilograms	54,418	77,621	7,425	Japan 45,051; Brazil 22,400.
Synthetic do	22,923	34,987	14,702	Japan 10,927; Belgium-Luxembourg 9,229.
Salt and brine	662,062	757,371	4	Australia 649,244; Yemen (Sanaa) 107,996.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	12,973	3,475	3,474	Japan 1.
Sulfate, manufactured	3,928	10,592	--	West Germany 2,350; Taiwan 1,910; Japan 1,419.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	825	3,141	3	India 1,622; Japan 1,161; Pakistan 149.
Worked	5,495	12,354	2	Italy 10,719.
Dolomite, chiefly refractory-grade	209	653	--	Japan 550; Norway 103.
Limestone other than dimension	4,601	5,000	--	All from Japan.
Quartz and quartzite	74	307	7	Sweden 206; Belgium-Luxembourg 72; Japan 22.
Sand other than metal-bearing	102,613	142,632	55	Australia 134,258; Indonesia 4,942; Malaysia 3,000.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	440,660	448,076	5,156	Canada 254,213; Japan 188,707.
Colloidal, precipitated, sublimed	368	706	476	Japan 219.
Sulfuric acid	133,890	229,867	98	Japan 229,769.
Talc, steatite, soapstone, pyrophyllite	12,486	5,225	124	Japan 2,206; Hong Kong 1,800.
Other:				
Crude	11,431	25,618	509	Japan 10,985; Singapore 5,292; Australia 2,737.
Slag and dross, not metal-bearing	2,078	37,234	--	Japan 37,232.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	47	89	77	Japan 12.
Carbon black	4,134	3,743	655	Japan 2,045; Australia 771; Canada 97.
Coal:				
Anthracite thousand tons	2,449	805	360	Japan 116.
Bituminous do.	9,039	10,151	1,526	Australia 4,625; Canada 2,022.
Briquets of anthracite and bituminous coal	23,578	28	--	All from Japan.
Coke and semicoke	152,461	159,509	829	Japan 156,403.
Petroleum:				
Crude thousand 42-gallon barrels	179,286	184,646	923	Saudi Arabia 60,284; Kuwait 20,648; Oman 15,653.
Refinery products:				
Liquefied petroleum gas do.	2,650	3,859	9	Saudi Arabia 3,203; United Kingdom 268.
Gasoline do.	271	138	5	Netherlands 63; Australia 31; Panama 30.
Naphtha do.	1,448	5,297	([2])	Singapore 2,983; India 568; United Arab Emirates 501.
Mineral jelly and wax do.	83	90	5	Japan 53.
Kerosine and jet fuel do.	198	303	264	Japan 29.
Distillate fuel oil do.	1,206	1,104	811	Taiwan 163; Singapore 120.
Lubricants do.	394	542	37	Japan 368.
Residual fuel oil do.	18,810	13,241	4,191	Singapore 4,784; Japan 2,079; Saudi Arabia 1,124.
Petroleum coke do.	497	492	399	Canada 88.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include other precious metals.
[4]Excludes unreported quantities valued at $183,200 in 1982 and $416,884 in 1983.

COMMODITY REVIEW

METALS

Aside from wolframite and scheelite, metal mining in the Republic of Korea was insignificant by world standards. The largest metals mining sector was iron ore, followed by zinc, lead, and copper, in order of tonnage produced. The metals processing sector was dominated by iron and steel, and to a much lesser extent, zinc refining. Small quantities of byproduct bismuth and molybdenum were recovered from tungsten processing as well as minor amounts of arsenic from copper and cadmium from zinc operations.

Aluminum.—Consumption was estimated at 325,000 tons. The bulk of the aluminum supply is imported unwrought metal, primarily from Australia. Aluminium of Korea Ltd. (Koralu) operates the sole refinery in the country, a 17,500-ton-per-year plant at Ulsan. All of the refinery's requirements for alumina are imported from Japan. Under an agreement, which is due to expire in 1985, power cost to the refinery is one-half the commercial rate. Moreover, import licenses for aluminum ingot are limited to domestic fabricators and Koralu.

Under the import-liberalization program, domestic trading companies will be allowed to import aluminum, effective July 1, 1985. Kukje-ICC Corp. was negotiating a joint venture with United States and Australian interests for the construction of a refinery and two coal-fired powerplants in Western Australia. Under the proposal, one powerplant would be owned and used by the refinery and the ownership of the other by the local power company. Negotiations were protracted because of the lack of agreement on the long-term cost of coal for the joint venture. According to initial plans, the refinery would be in operation in 1988 with one-half of the aluminum output allotted to Kukje.

On September 13, 1984, Hyundai Corp. signed an interim agreement to join a $1.15 billion aluminum joint venture in Australia. Hyundai was to have a 10% equity share of the Portland Aluminium Smelter Co. in Victoria State. At present, Hyundai's participation was the only foreign would-be investor in the project, which consists of a refinery operation with two 150,000-ton-per-year potlines.

Copper.—Copper consumption was estimated at 400,000 tons. About 30% of the consumption was supplied by two refineries run by Korea Mining & Smelting Co. Ltd.: the 40,000-ton-per-year refinery at Changhang and the 80,000-ton-per-year refinery at Onsan. Korea Mining & Smelting imports virtually all of its copper concentrate inasmuch as domestic copper mine output is less than 1,000 tons of contained metal. Korea Mining & Smelting was planning to increase the annual capacity of the Onsan refinery to 100,000 tons, to be completed by 1985. There is no duty on imports of copper ore and concentrates. The ad valorem duty on copper materials ranges from 5% for cement copper to 20% for bars.

Iron and Steel.—The industry was composed of Posco (the only integrated iron and steel facility), 16 steelmaking enterprises using electric furnaces, and 61 rolling enterprises. Annual steel rolling capacity is 14.5 million tons; steelmaking, 13.1 million tons; and ironmaking, 8.8 million tons. Posco dominated the industry, accounting for all of the ironmaking capacity, 9.0 million tons of the steelmaking capacity, and 7.5 million tons of the steel rolling capacity.

Other large steel producers, in order of descending size, included Union Steel Manufacturing Co. Ltd., Dong Jin Steel Co. Ltd., Pusan Steel Pipe Industrial Co. Ltd., Korea Steel Pipe Co. Ltd., Korea Iron and Steel Works Co. Ltd., Sam Chok Industrial Co. Ltd., Boo-Kook Steel & Wire Co. Ltd., Dong Yang Iron Pipe Industrial Co. Ltd., and Korea Cast Iron Pipe Industrial Co. Ltd. Total sales of Posco was over 7 times that of Union Steel and 53 times that of Korea Cast Iron.

Dong Jin, the former bankrupted Ilshin Steel Co., became a wholly owned subsidiary of Posco in October 1982. In July, Posco announced its intention to sell Dong Jin.

Posco's pig iron capacity consisted of one 3,000-ton-per-day, one 4,650-ton-per-day, and two 8,000-ton-per-day furnaces. The pig iron foundry has a capacity of 440 tons per day. Posco has six LD converters: three have capacities of 300 tons each, and the other three have capacities of 100 tons each.

Iron ore resources in the Republic of Korea are estimated at 127 million tons, of which 35 million tons is ore containing 40% iron. Up to 1972, the country had a self-sufficiency rate of 96% for iron ore. However, in the following year when Posco began operation of its first blast furnace, the dependence on foreign ore grew rapidly. At present, almost 100% of the industry demand is imported from Australia, Brazil, India, New Zealand, and Peru, mostly under long-term contracts.

The country produces no coking coal and must import over 6 million tons per year. Receipts are from Australia, Canada, and the United States, again under long-term contracts. To secure supply, Posco developed three overseas mines, which collectively furnish the company with 1.6 million tons per year: Mount Thorley Mine in Australia, the Greenhills Mine in Canada, and the Tanoma Mine in the United States.

Because of the increased use of converters, scrap iron consumption in steelmaking has declined from 90% in 1973 to about 55% in the 1980's. Because generation of domestic scrap has increased, dependence on imports has declined to about 40% of the total annual demand of 5.7 million tons.[7]

Construction continued on Posco's Gwangyang facility, at the southern edge of the country in Cholla-Namdo. This 2.7-million-ton-per-year integrated facility was designed to use no oil and have all-coke blast furnaces. Gwangyang will have 22 plants including those for coke, ironmaking, steel, continuous casting, and hot-strip rolling. Infrastructure will include bridges, new industrial highways, and a port with three berths to accommodate 250,000-ton ships.

Gwangyang will feature 100% continuous casting and concentrate on hot-roll milling. To avoid competition with the Pohang facility, Gwangyang was to produce high-quality specialty steel and specific demand products. Construction was expected to be completed in early 1988. The start of the second phase of construction at Gwangyang to double capacity to 5.4 million tons per year will depend on demand.

Lead and Zinc.—Lead consumption was estimated at 50,000 tons. The country's sole smelter (10,000 tons per year capacity) is operated by Korea Mining & Smelting at Changhang. The disparity between domestic mine production and demand is met by imports and the refining of lead scrap. Lead consumed was mainly in the production of lead storage batteries and inorganic chemicals.

There are two zinc refineries in the country: the 34,000-ton-per-year refinery at Sukpo, built by Young Poong Corp. in 1970, and the 70,000-ton-per-year refinery at Onsan, built by Korea Zinc Co. in 1978. Domestic mine production supplied about one-half of the refinery feed of concentrates. Beginning in 1983, annual consumption of zinc exceeded refinery output, with consumption reaching 124,000 tons in 1984; of this, 71% was consumed by the steel industry for galvanizing pipe, plate, and other forms. Other uses included brass, 18%; die casting, 6%; and miscellaneous applications, 5%. Korea Zinc was planning a 50,000-ton-per-year expansion of its Onsan refinery.

Tungsten.—The Republic of Korea was a significant mine producer of tungsten, accounting for about 5% of the world's production. The bulk of the production was by Korea Tungsten from its mine at Sang Dong, which accounted for nearly 98% of the country's mine output. The remainder was from small operations at Okbeng, Wol-Ak, Ssangjan, and other places.

NONMETALS

Although the Republic of Korea produces both amorphous and crystalline graphite, 98% of the production was the amorphous type from operations in Chungju, Sangju, and Daejeon. Other nonmetallic minerals produced at quantities over 500,000 tons per year included kaolin, silica, and talc and pyrophyllite. Other minerals produced, but at much lower tonnages, included andalusite, asbestos, diatomite, feldspar, fluorspar, and occasional quantities of barite.

The fertilizer industry is weak because there are no indigenous resources of phosphate, potash, sulfur, and fuels except for anthracite coal. Furthermore, the industry's competitive position is challenged by falling export markets and less expensive production from other producers in the region. However, annual fertilizer production has remained at 2.5 million tons per year.

Cement was by far the largest nonmetallic sector with annual production increasing twofold during the last decade. Output was used for domestic consumption as well as for export. Total cement capacity exceeds 23 million tons per year.

Cement.—Ssangyong Cement was the largest cement producer and accounted for 59% of the total production capacity in the country. Annual output capacity for each of Ssangyong Cement's plants is Donghae (the largest single cement plant in the world), 8.7 million tons; Yongwol, 2.2 million tons; and Moonkyong, 600,000 tons. Ssangyong Cement exports cement to countries in the Middle East and Southeast Asia, and in 1984, began shipping to the United States. Ssangyong Cement also has a clinker grinding plant in Singapore.

The remaining eight cement producers were, in order of decreasing capacity, Tong Yang Cement Manufacturing Co. Ltd., Sung Shin Cement Industrial Co. Ltd., Hanil Cement Manufacturing Co. Ltd., Asia Cement Manufacturing Co. Ltd., Hyundai Cement Co. Ltd., Korea Cement Manufacturing Co. Ltd., Hankook Slag Co. Ltd., and Union Corp.

The cement production operating rate in 1984 was at 89% of total capacity compared with 93% in 1983. Domestic consumption accounted for 78% of the shipments, and exports accounted for the remainder. The principal export destinations were Saudi Arabia, India, and Hong Kong, in order of quantity.

The cement industry continued its effort to lower the energy costs in production, which accounts for 48% of the manufacturing cost. Producers were in the process of converting operations to use bituminous coal and low-quality coal for bunker C oil and decreasing electric power consumption. Other problems for the industry included diminishing export markets, transportation, and environmental pollution concerns.[8]

MINERAL FUELS

The only energy sources indigenous to the country are anthracite coal and electricity from hydropower and nuclear generation. During the past decade, mine output of anthracite coal has stabilized at about 19 million tons per year. Annual coal production was expected to remain at this level. Total electric power generation in 1984 was 53.6 billion kilowatt hours. Nuclear power accounted for 11.8 billion kilowatt hours, hydropower for only 2.4 billion kilowatt hours, and thermal power for the remainder. Four hydropower stations were under construction, one each at Chunju and Hapchon and two at Samryangjin.

Three nuclear powerplants are in operation. Kori No. 1 started operations in April 1978 with a capacity of 578,000 kilowatts. Wolsong No. 1 was dedicated in April 1983 with a capacity of 678,000 kilowatts, and Kori No. 2 was dedicated in September 1983 with a capacity of 664,000 kilowatts. Kori Nos. 1 and 2 are pressurized water reactors, while the Wolsong unit is a pressurized heavy water reactor. Six additional nuclear units were planned for construction with startup slated initially for units Nos. 3 and 4 at the Kori compound.

In its overall energy program, the Government sought to continue offshore drilling, develop overseas sources of oil and coal, and diversify energy use to include liquefied natural gas (LNG) and petroleum gas. In May, drilling for oil resumed on the Continental Shelf between the Republic of Korea and Japan. Eight test wells were to be drilled in the seventh mining block by 1987. Drilling was also to continue in the fourth mining block, and seismic surveys in the fifth and sixth blocks. South Korean companies were participating in overseas oil development projects. These include exploration at Adang, Madura, and Nanka in Indonesia; Marib in Yemen (Sanaa); and Oklahoma in the United States. The first shipment of overseas oil involving South Korean participation was to begin in October 1985 from the Madura Field in Indonesia. Malaysia invited South Korean participation for exploration in Sarawak. Seismic surveys and test drillings were also planned in Mauritania.

South Korean enterprises were also active in overseas coal development. In addition to coking coal at the Tanoma Mine in Pennsylvania, United States, there were two ventures to develop anthracite and bituminous coal mines in Alaska. Aside from the coal mine at Mount Thorley, there were two additional coal mine development projects in Australia, one in New South Wales and the other in Queensland. Coal exploration was also conducted in Pasir, Kalimantan Island, Indonesia.

Construction began in 1982 on the LNG import terminal port on the western coast in Asan Bay. This terminal, to be able to accommodate a 125,000-kiloliter LNG transport ship, was scheduled for dedication in 1986. An LNG import terminal was being planned for construction at Pyongtaek, Kyonggi.[9]

In October 1983, the nation's first two thermal powerplants, equipped to burn natural gas from imported LNG, went into commercial operation in Pyongtaek. Each plant has a generating capacity of 350,000 kilowatts. The powerplants will burn heavy oil until the end of 1986 and then switch to LNG when Indonesia begins shipping 2 million tons per year of LNG to the Republic of Korea under a 20-year supply contract.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W795.5=US$1.00 for 1983 and W827.4=US$1.00 for 1984.

[3]Economic Planning Board (Seoul). Monthly Statistics of Korea. V. 2, 1985, 175 pp.

[4]U.S. Embassy, Seoul, Republic of Korea. Foreign Economic Trends for Korea (FET 84-116). Commerce Dep., Nov. 1984, p. 12.

[5]Yonhap broadcast in English. Seoul 0019 GMT. Sept. 12, 1984.

[6]———. Seoul 0537 GMT. Jan. 23, 1984.

[7]Korean Business Review (Seoul). Iron and Steel Industry in Korea. No. 71, Aug. 1984, pp. 52-62.

[8]———. The Cement Industry in Korea. No. 76, Mar. 1985, pp. 61-66.

[9]Economy (Seoul). Korea Annual 1984. 21st ed., 1984, p. 167.

The Mineral Industry of Kuwait

By Peter J. Clarke[1]

Kuwait's mineral industry remained dominated by crude oil and associated gas production, which provided fuel and feedstock for most of the country's other mineral-related ventures. Kuwait's nonfuel mineral-producing sector consisted of cement, clays, lime, salt, chlorine, and caustic soda. Production of most of these minerals increased gradually over the past 5 years, while the hydrocarbon sector has been subject to considerable fluctuations in annual output. Production of crude oil from Kuwait and Kuwait's share of the Kuwait-Saudi Arabia Divided Zone remained below its official ceiling maintained in accordance with the Organization of Petroleum Exporting Countries (OPEC) policy of restricting output in order to maintain the existing price structure. Kuwait's oil production in 1984 actually fell nearly 5% from the 1983 level, averaging just over 1 million barrels per day even though this was still 22% greater than the 1982 level, which was the lowest production level in more than 15 years. Production remained at less than one-third of capacity.

Reduced oil production was not a major problem of Kuwait, which has a small enough population to maintain a relatively high level of domestic spending without creating a serious budget deficit. The low production level was, however, causing problems for some of Kuwait's domestic industries, which rely for raw material or fuel on gas produced in association with crude oil. Among the industries substantially affected by these shortages were the massive liquefied petroleum gas (LPG) plant at Shuaiba and the large ammonia-urea fertilizer manufacturing plant also at Shuaiba. As part of the solution to this shortage, Kuwait continued to press ahead with the Southern Gas project, designed to collect an additional 100 million cubic feet per day of associated gas from the Kuwait Oil Co.'s (KOC) wells in the Divided Zone. This was to be supplemented by imports of liquefied natural gas (LNG) from either Abu Dhabi, Algeria, or Libya. Exploration for domestic reserves of nonassociated gas, which is abundant in some of Kuwait's Persian Gulf neighbors, has continued to prove unsuccessful.

Despite these shortages, the energy and reserve picture for the country was sound in 1984. Kuwait possessed proven reserves of crude oil in excess of 70 billion barrels, the third largest in the world behind Saudi Arabia and the U.S.S.R., despite being a land mass just slightly larger than the State of Connecticut. Financially, Kuwait is among the top three countries in the world in terms of per capita income. Kuwait is also the home of one of the most rapidly expanding integrated energy companies in the world, the Government-owned Kuwait Petroleum Corp. (KPC). KPC acts as an umbrella corporation for subsidiary companies that control every aspect of Kuwait's oil and gas industry.

KOC, the crude oil-producing subsidiary, owns and operates all oilfield assets and equipment, and also operates a small domestic refinery at Ahmadi, the center of KOC's operations. The Kuwait National Petroleum Co. (KNPC), the refining and domestic distribution subsidiary, operates the country's two other refineries at Mina Abdullah Shuaiba plus the LNG plant. The Kuwait Oil Tankers Co. owns and operates a fleet of crude oil and LPG tankers, which numbered 29 in 1984. Largely because it owned its own tanker fleet and did not have to rely on contracting foreign tankers, Kuwait was able to maintain its exports of crude oil, refined products, and LPG in 1984, despite hazards posed by the Iran-Iraq war less than 200 kilometers to the north. The other major domestic KPC subsidiary was the Petrochemical Industries Co. (PIC), which operated the nitrogen fertilizer plant at Shuaiba along with a salt and chlorine plant nearby. PIC was also considering constructing a major primary petrochemical plant at Shuaiba, although marketing considerations and competition with Saudi Arabia have delayed construction for several years.

KPC has also continued to expand its international operations. KPC's foreign holdings include Santa Fe International Corp. and its C. F. Braun and Co. engineering subsidiary of the United States; Andover Oil Co. of the United States; 29% of International Energy Development Corp. (IEDC) of Switzerland; and 25% of Hoechst AG and 22% of Metallgesellschaft AG, both of the Federal Republic of Germany. Also in Europe, KPC purchased from Gulf Oil Co. 2 petroleum refineries, 1 at Rotterdam and 1 in Gulfhavn, Denmark, plus 825 gas stations in Denmark and Sweden, and an 80,000-barrel-per-day refinery in Milan, Italy, along with 1,500 gas stations in that country. KPC controlled an average of 6.5% of the domestic fuel distribution systems of Belgium, Denmark, Italy, Luxembourg, the Netherlands, and Sweden.

The Kuwait Foreign Petroleum Exploration Co. (KUFPEC), also a KPC subsidiary, was increasing overseas activities. KUFPEC and IEDC hold 70% of an oil concession in Tanzania, while Santa Fe acquired 30% of a gas development company in China. Santa Fe acquired 20% of the equity of an exploration concession onshore in Ireland, and it also purchased Occidental Petroleum Corp.'s geothermal energy company in northern California. Overall, KPC's foreign investments generated revenue in excess of $1.4 billion[2] in 1984 alone.

In a reversal of a previous decision, Kuwait was granted reciprocal nation status under the United States Mineral Lands Leasing Act of 1920, which effectively allows Santa Fe to develop the more than $10 million worth of energy exploration concessions in the Midwestern United States held prior to its purchase by KPC. Kuwait can apply for and obtain additional mineral leases in the United States as well.

Kuwait's total Government revenues in 1984 were about the same as in previous years, approximately $10.5 billion. Government expenditures exceed that figure slightly, resulting in a deficit of under $1 billion. Investment income, not included in the budget, but of considerable importance for Kuwait's balance of payments, exceeded $6 billion, up from $5.1 billion in 1983. Revenues from crude oil exports were down slightly, while revenues from petroleum products sales from the expanding domestic refining operations increased to maintain total petroleum revenues of $11.2 billion. Kuwait maintained its fiscal austerity program in response to the ceiling on oil output, although use of its extensive financial reserves was not required to maintain the planned level of domestic spending.

PRODUCTION AND TRADE

Crude oil production averaged 1.0 million barrels per day in 1984, 4.8% less than in 1982. Production of refined products rose, however, to an alltime record high of 365,000 barrels per day, nearly 100% of Kuwait's refining capacity. Production of natural gas was down, because all gas output is a coproduct of the production of crude oil. The low level of gas production also caused substantial declines in output of propane, butane, and nitrogen fertilizer. Output from the nonfuel mineral sector, which consisted of cement, clays, lime, salt, caustic soda, and sulfur, generally showed increases in production.

Kuwait's foreign trade sector has been adversely affected by the Iran-Iraq war. The once profitable reexport market has been drastically reduced by the danger to shipping in the Persian Gulf. Also, direct trade with Iran, and to a lesser extent with Iraq, has virtually ceased. The U.S. share of the Kuwait trading market has averaged 13% since 1980, consistently behind the Japanese, who supplied 26% of Kuwait's imports. The high value of the U.S. dollar also adversely affected the U.S. market position in Kuwait.

Kuwait's crude oil exports went primarily to Japan, China, the Philippines, the Republic of Korea, Turkey, Australia, and Yemen (Aden). Significant quantities of Kuwaiti crude, averaging between 50,000 and 70,000 barrels per day, were also sold on the spot market. Approximately 100,000 barrels of crude per day was transferred to Kuwait's European refineries in Denmark, Italy, and Sweden. Total contract and spot market sales, plus transfers of Kuwaiti crude, averaged 330,000 barrels per day. Exports of LPG averaged 34,080 barrels per day, almost entirely to Japan.

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

Commodity	1980	1981	1982	1983[p]	1984[e]
Cement ---- thousand metric tons	1,307	1,549	1,553	1,560	1,575
Clay products, nonrefractory: Sand-lime bricks cubic meters	338,128	293,682	419,000	[e]450,000	450,000
Gas, natural:[2]					
Gross ---- million cubic feet	310,066	223,525	162,728	182,000	167,000
Marketed ---- do	260,039	196,352	145,853	153,665	152,000
Lime: Hydrated and quicklime ---- metric tons	17,738	21,598	10,200	[e]14,000	15,000
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	7,462	5,463	3,914	[e]4,400	4,200
Butane ---- do	10,904	6,976	5,060	[e]6,800	6,271
Propane ---- do	17,381	9,564	4,938	[e]9,000	8,395
Total ---- do	35,747	22,003	13,912	[e]20,200	18,866
Nitrogen: N content of ammonia ---- metric tons	214,456	213,330	183,000	234,000	300,000
Petroleum:					
Crude[2] ---- thousand 42-gallon barrels	607,268	411,174	300,220	384,888	366,098
Refinery products:					
Gasoline, motor ---- do	7,947	8,255	10,196	[e]11,000	13,000
Jet fuel ---- do	4,175	5,788	6,346	[e]7,000	8,000
Kerosine ---- do	11,110	7,451	7,694	[e]8,100	9,525
Distillate fuel oil[3] ---- do	27,516	23,822	63,200	[e]64,500	66,000
Gas oil ---- do	53,109	41,749	40,044	[e]41,600	43,000
Naphtha ---- do	17,045	13,116	22,137	[e]22,800	26,000
Asphalt ---- do	1,181	1,526	1,237	[e]1,300	1,500
Unspecified ---- do	1,075	749	2,600	[e]2,700	2,700
Total ---- do	123,158	102,456	153,454	[e]159,000	169,725
Salt ---- metric tons	20,498	18,663	19,300	[e]20,000	20,000
Sodium and potassium compounds: Caustic soda do	9,111	8,900	8,700	[e]9,000	9,000
Sulfur:					
Elemental, petroleum byproduct ---- do	120,000	97,000	140,644	[e]145,000	220,000
Sulfuric acid ---- do	NA	4,759	8,900	[e]15,000	20,000

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through May 1, 1985.
[2]Includes Kuwait's share of production in the Kuwait-Saudi Arabia Divided Zone.
[3]Includes diesel oil.

Table 2.—Kuwait: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	486	615	--	Iraq 247; Saudi Arabia 140; West Germany 66.
Copper: Metal including alloys, unwrought	178	1,273	--	Iran 863; India 150; Iraq 116.
Iron and steel: Metal:				
Scrap	24,691	18,394	--	Syria 8,327; Pakistan 2,549; Qatar 1,600.
Pig iron, cast iron, related materials	131	7	--	Mainly to Saudi Arabia.
Semimanufactures:				
Bars, rods, angles, shapes, sections	151,796	274,655	--	Iraq 265,300; Saudi Arabia 7,409.
Universals, plates, sheets	12,185	13,869	--	Iraq 10,348; Saudi Arabia 2,808.
Wire	1,952	2,000	--	Iraq 1,918.
Tubes, pipes, fittings	43,890	14,875	22	Iraq 8,447; Saudi Arabia 3,455.
Lead: Metal including alloys, unwrought	91	442	--	Saudi Arabia 428.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	--	140	--	France 77; United Kingdom 63.
Uranium and thorium: Metal including alloys, all forms ---- value, thousands	$2	$7	$4	United Kingdom $2.
Zinc: Metal including alloys, semimanufactures	56	--		

See footnotes at end of table.

Table 2.—Kuwait: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982: United States	Destinations, 1982: Other (principal)
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	34	94	--	Saudi Arabia 64; Iraq 28.
Asbestos, crude	1,315	(2)	--	All to Iraq.
Cement	928,512	970,878	--	Iraq 964,768.
Clays, crude:				
Bentonite	--	18,118	--	Iraq 16,965; Syria 823.
Unspecified	34,486	--		
Diamond: Gem, not set or strung value, thousands	$133	$56	--	All to United Kingdom.
Fertilizer materials:				
Crude, n.e.s	69	345	--	Iraq 299; Saudi Arabia 37.
Manufactured:				
Ammonia	70,884	495	--	Iraq 279; Saudi Arabia 173.
Nitrogenous	170,880	129	--	Iraq 49; Saudi Arabia 30; Somalia 30.
Phosphatic	--	1,240	--	United Arab Emirates 640; Jordan 500.
Unspecified and mixed	--	89	--	Yemen (Aden) 50; Qatar 37.
Gypsum and plaster	161	146	--	Iraq 104; Saudi Arabia 41.
Lime	2,684	2,976	--	Iraq 2,833; Saudi Arabia 140.
Precious and semiprecious stones other than diamond: Natural kilograms	--	350	--	All to Sri Lanka.
Salt and brine	2,064	2,364	--	Saudi Arabia 2,076; United Arab Emirates 135.
Sodium compounds, n.e.s.: Sulfate, manufactured	7,024	1,209	--	Iraq 981; Saudi Arabia 122.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	65	209	--	Iraq 161; Saudi Arabia 35.
Worked	1,095	1,782	--	Iraq 895; Saudi Arabia 450; Jordan 185.
Gravel and crushed rock	2,861	3,715	--	Iraq 2,473; Saudi Arabia 1,161.
Sulfur:				
Elemental, colloidal, precipitated, sublimed	127,285	90,335	--	India 68,636; Pakistan 19,595.
Sulfuric acid	167	83	--	Saudi Arabia 72; United Arab Emirates 10.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets and coke	98	226	--	Saudi Arabia 199; Iraq 27.
Petroleum:				
Crude thousand 42-gallon barrels	314,222	134,064	7	Taiwan 36,922; Japan 30,456; Republic of South Korea 18,360.
Refinery products:				
Liquefied petroleum gas do.	18,538	11,670	--	Japan 7,702; Turkey 2,923.
Gasoline, motor do.	279	1,113	--	Pakistan 825; United Arab Emirates 153; Sudan 94.
Kerosine and jet fuel do.	23,739	43,314	--	Japan 16,042; Netherlands 13,524.
Distillate fuel oil do.	20,791	27,139	--	Pakistan 9,124; United Arab Emirates 3,499; India 2,977.
Residual fuel oil do.	41,231	64,242	--	Italy 13,700; Singapore 10,589; Australia 8,851.

[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

Table 3.—Kuwait: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	15,547	13,960	661	Norway 2,321; Turkey 2,319; Bahrain 2,006.
Copper: Metal including alloys, all forms	3,546	7,192	386	West Germany 3,222; Japan 1,959; United Kingdom 1,165.
Iron and steel: Metal:				
Scrap	1,595	384	--	Saudi Arabia 294; West Germany 57.
Pig iron, cast iron, related materials	900	120	--	United Kingdom 70; Netherlands 50.
Semimanufactures:				
Bars, rods, angles, shapes, sections	498,287	591,092	182	Japan 487,394; China 33,261; West Germany 17,632.
Universals, plates, sheets	138,327	159,840	771	Japan 121,470; Republic of Korea 18,727; West Germany 5,439.
Wire	17,558	25,493	155	Japan 8,816; West Germany 4,853; United Kingdom 3,364.
Tubes, pipes, fittings	149,246	155,974	3,133	United Kingdom 38,055; West Germany 19,818; France 19,696.
Lead: Metal including alloys, all forms	546	732	--	United Kingdom 590; Lebanon 65; Jordan 45.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	--	5,466	--	All from United Kingdom.
Silver: Metal including alloys, unwrought and partly wrought do	1,093	3,249	--	All from West Germany.
Uranium and thorium: Metal including alloys, all forms value, thousands	$182	$125	$18	United Kingdom $75; West Germany $16.
Zinc:				
Blue powder	--	350	(2)	Japan 294; West Germany 31.
Metal including alloys, semimanufactures	576	--		
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	855	907	2	Italy 689; West Germany 37; Czechoslovakia 34.
Asbestos, crude	2,018	10,145	500	Switzerland 3,299; Namibia 1,751; Canada 1,103.
Cement thousand tons	2,303	4,336	(2)	Japan 2,865; Spain 714; Republic of Korea 445.
Clays, crude:				
Bentonite	--	10,640	467	Ireland 8,750; Saudi Arabia 1,016.
Unspecified	39,722	--		
Diamond: Gem, not set or strung thousand carats	(3)	37,975	6,000	Belgium-Luxembourg 31,255.
Fertilizer materials:				
Crude, n.e.s	849	318	--	Pakistan 300; Netherlands 18.
Manufactured:				
Ammonia	140	101	--	Norway 50; Netherlands 40.
Unspecified and mixed	285	332	25	West Germany 65; Netherlands 54; France 53.
Graphite, natural	263	460	--	United Kingdom 245; Italy 215.
Gypsum and plaster	25,127	85,634	164	Saudi Arabia 49,931; Spain 33,461.
Lime	1,279	1,682	--	Lebanon 650; United Arab Emirates 640; Belgium-Luxembourg 158.
Pigments, mineral: Iron oxides and hydroxides, processed	846	418	--	China 214; West Germany 77; United Kingdom 54.
Precious and semiprecious stones other than diamond: Natural kilograms	(4)	14,676	1,200	India 6,002; Italy 2,317; Taiwan 2,000.
Salt and brine	13,606	12,005	297	Saudi Arabia 6,594; Netherlands 4,701.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	99	315	--	Republic of Korea 300.
Sulfate, manufactured	26	93	(2)	West Germany 70; Italy 22.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	117,083	2,629	--	Italy 1,060; Iran 602; Iraq 544.
Worked	118,917	172,489	206	Jordan 82,776; Italy 66,507; Greece 10,620.
Gravel and crushed rock	172,416	235,924	69	Italy 125,395; Syria 58,611; Iran 27,041.
Sand other than metal-bearing	9,821	4,391	33	Jordan 2,559; Norway 720; Netherlands 601.
Sulfur: Elemental, colloidal, precipitated, sublimed	186	95	--	Mainly from Sweden.
Other: Crude	22,982	68,228	449	India 65,923.

See footnotes at end of table.

Table 3.—Kuwait: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	302	183	21	United Kingdom 133; West Germany 14.
Petroleum refinery products:				
Kerosine and jet fuel 42-gallon barrels	72,114	--		
Lubricants do	208,971	220,941	27,972	Singapore 44,016; Belgium-Luxembourg 33,803; United Kingdom 30,072.
Bitumen and other residues do	2,098	3,394	--	China 1,430; West Germany 885; Saudi Arabia 691.
Bituminous mixtures do	75,873	82,119	57,818	United Kingdom 8,757; Japan 5,793.

[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $1,731,000.
[4]Unreported quantity valued at $469,000.

COMMODITY REVIEW

METALS

There were no known metallic mineral deposits in Kuwait. The primary metal fabricating plants were the Arab Light Metal Industries Co., which produced aluminum manufactured goods from imported aluminum, and the Kuwait Metal Pipe Industry Co., which produced spiral welded pipe from imported iron and steel scrap. Kuwait Metal Pipe, which has a capacity of 100,000 tons per year, was awarded an $87 million contract to supply polyvinyl chloride-covered and cement-lined metal pipe for water transportation in Saudi Arabia. Kuwait's foreign metal holdings include 22% of Metallgesellschaft, and 30% of Korf Stahl AG, both of the Federal Republic of Germany; 28% of Prereducidos del Suroeste de España S.A. of Spain; 20% of the Gulf Aluminum Rolling Mill Co. in Bahrain; and an equity share of the Arab Iron and Steel Co.'s pelletizing plant, also in Bahrain.

NONMETALS

Cement.—Cement production in Kuwait edged closer to 2 million tons per year in 1984, still short of the domestic consumption level of about 2.5 million tons. This shortfall was to be more than made up for by Kuwait's share of the output from the Saudi-Kuwait Cement Manufacturing Co., in Saudi Arabia but owned 45% by Kuwait. Domestic cement production increased as a result of installation of two new grinding mills at Kuwait's only cement plant, the Kuwait Cement Co. Cement was produced from imported gypsum and domestically produced and imported limestone.

Fertilizer Materials.—PIC's ammonia-urea fertilizer plant at Shuaiba produced at only 40% of capacity again in 1984, owing to shortages of natural gas feedstock. Capacity of the plant was 547,000 tons per year of nitrogen in ammonia from three parallel production trains, 702,000 tons per year of urea, 165,000 tons per year of ammonium sulfate, and 132,000 tons per year of sulfuric acid. All ammonia production was consumed in the urea plant, all of which was exported as prilled urea. Ammonia capacity was being raised to 708,000 tons per year of contained nitrogen in 1984, through replacement of one of the units with a new 272,000-ton-per-year nitrogen facility under contract to C. F. Braun and Technipetrol of France, to be completed in 1985.

In addition to this domestic expansion, KPC entered into a joint venture with the Tunisian Government-owned Société Industrielle d'Acide Phosphorique et d'Engrais (SIAPE) and the Government of China to construct a phosphate fertilizer plant in Kin Huang Tao in China. The plant was to have a capacity of 450,000 tons per year of diammonium phosphate (DAP) and 600,000 tons per year of nitrogen potassium phosphate (NPK). SIAPE of Tunisia was owned 51% by the Tunisian Government and 49% by KPC. The new plant was to be owned 40% by China and 30% each by Kuwait and Tunisia. Tunisia was to supply the phosphate for the plant, and PIC was to provide the ammonia. Kuwait and the Tunisian Industries Chimiques Maghrebines were also involved in a joint venture to produce DAP and NPK fertilizer at Shuaiba, under the jointly owned Arab Co. for Compound Fertilizers. Construction of the facility had yet to begin in 1984. Talks were also underway among Kuwait, Tunisia, and Turkey on the possibility of constructing an ammonium nitrate fertilizer plant at Iskenderun in Turkey.

Sulfur.—Santa Fe's C. F. Braun subsidiary was in the process of constructing oil and gas desulfurization units that would yield up to 1,320 tons of sulfur per day. Byproduct sulfur was consumed in the fertilizer plant at Shuaiba and was also exported to neighboring countries. With completion of these desulfurization units, sulfur production capacity in Kuwait will reach approximately 500,000 tons per year.

MINERAL FUELS

Natural Gas.—Natural gas production averaged 460 million cubic feet per day, down slightly as a result of reduced crude oil output. Gas utilization continued to increase, however, as the low production level forced maximum collection and use of associated gas. The Southern Gas project, designed to collect up to 100 million cubic feet of gas per day from the Divided Zone oilfields, Kafji and Hont-Ratawi, was to be completed in mid-1985, at which time the gas was to begin flowing from the offshore areas to the LPG plant at Shuaiba. Technip Geoproduction of France was the contractor for the project. The LPG plant, designed to produce 65,000 barrels per day of propane and 45,000 barrels per day of butane, continued to operate at 35% of capacity, with only one of the three parallel production trains operating continuously during the year. Completion of the Southern Gas project was to provide enough gas to double the current output of the LPG plant.

Kuwait's domestic gas exploration program was more successful at locating additional oil reserves than gas. Several deep exploration wells have been drilled since 1981 searching for the Khuff Formation, the Permian Age strata that contain most of the nonassociated gas in the Middle East. Although plentiful reserves of Khuff gas have been located in Qatar, the United Arab Emirates, and other Persian Gulf countries, Kuwait has yet to locate commercial reserves of nonassociated gas. The immediate shortage was to be made up for by imports of LNG, and construction of a berth and regasification equipment at Shuaiba was continuing during 1984.

Petroleum.—*Production.*—Crude oil output remained below the official OPEC ceiling of 1.05 million barrels per day, although monthly production fluctuated between 1.115 million and 880,000 barrels per day. Approximately 90% of Kuwait's crude oil is produced onshore in Kuwait by KOC. Kuwait also derives approximately 65,000 to 70,000 barrels per day from the Kuwait-Saudi Arabia Divided Zone. The Arabian Oil Co. (AOC), owned 60% by Saudi Arabia and 40% by Kuwait, was responsible for most of the Divided Zone production from both onshore and offshore oilfields. Most of AOC's output is derived from the Kafji Oilfield. KOC also operated wells in the Divided Zone, sharing output from the Wafra Field with Getty Oil Co., which operated a concession in the Divided Zone granted by Saudi Arabia. KOC's production from Kuwait proper was from eight major fields, all of which produced oil under natural pressure, requiring no pumping.

The most important development during the year was KOC's announcement that it would begin selling higher quality light 38° API gravity, 1% sulfur crude oil by 1985. Output of light oil from the Magua and several ancillary fields, discovered during the search for nonassociated gas, was expected to rise to 200,000 barrels per day by yearend 1985. Kuwait's current market blend is a relatively heavy 31° API, 2.5%-sulfur grade, which has been difficult to market. The new discoveries were also expected to add substantially to Kuwait's 70 billion barrels of proven reserves. Light crude production was also to increase nonassociated gas output, because the new fields had a gas-to-oil ratio three times that of Kuwait's existing fields.

Refining.—Expansion of Kuwait's domestic refineries was underway in 1984. KNPC was in the process of raising capacity of the Mina Abdullah refinery from 75,000 to 200,000 barrels per day and the Ahmadi refinery from 110,000 to 270,000 barrels per day. These expansion projects were estimated to cost $4.4 billion. The Mina Abdullah project was to include new units for the production of petroleum coke and additional facilities for increasing output of naphtha and kerosene. With these projects completed as planned in 1986, Kuwait's domestic refining capacity will reach 670,000 barrels per day, which includes 200,000 barrels per day from the Shuaiba refinery. Kuwait's domestic refineries produced a record high 465,000 barrels per day in 1984. The Ahmadi refinery produced the bulk of this, averaging 234,000 barrels per day, followed by Shuaiba, which produced 151,200 barrels per day, and Mina Abdullah, which produced 73,000 barrels per day. KPC also processed an estimated 110,000 barrels per day of its domestically produced oil in its European refineries in Denmark, Italy, and Sweden. KPC controls substantial retail product distribution networks in these countries as well. Kuwait's domestic consumption of petroleum products was estimated at 85,000 barrels per day, leaving a substantial 380,000 barrels per day available for export.

Petrochemicals.—PIC of Kuwait, in addition to operating the nitrogen fertilizer plant at Shuaiba, also operated a salt and chlorine plant, which produced caustic soda in addition to small quantities of salt and chlorine. PIC was in the process of constructing a second salt and chlorine plant in order to more than double the current output of these products. PIC also continued to plan for construction of a primary petrochemical plant at Shuaiba. The plant was being designed to produce 350,000 tons per year of ethylene, 130,000 tons per year of low-density polyethylene, 130,000 tons per year of monoethylene, and 330,000 tons per year of styrene monomer. A second associated facility was to produce 284,000 tons per year of benezene, 90,000 tons per year of paraxylene, and 60,000 tons per year of orthoxylene. All the units were under engineering and construction contracts to KPC's Santa Fe subsidiary, C. F. Braun.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Kuwaiti dinars (KD) to U.S. dollars at the rate of KD0.376=US$1.00.

The Mineral Industry of Liberia

By Ben A. Kornhauser[1]

Liberia's balance of payments remained in deficit owing to various factors including heavy debt service requirements and liquidity crises. Interest in gold mining increased, although the quantity of gold produced in 1984 was considerably less than that in 1983. The Bentley International Trading Co. continued its exploration for gold and its plans to mine concessions near its present operations. Although Liberia's position as a major iron ore exporter was not promising because of exhaustion of its present iron ore workings and abundant supplies of iron ore in Australia and Brazil, iron ore production and shipments increased 1% and 9%, respectively, over those of 1983. The Amoco Liberian Exploration Co., a unit of Amoco International Oil Co., was granted licenses for two more offshore blocks, increasing its licenses to six.

PRODUCTION AND TRADE

The United States continued as Liberia's preeminent trading partner and as a leading source of capital and technical assistance. The bulk of Liberia's trading was with the European Communities and the United States. While the European countries absorbed most of Liberia's exports, with the Federal Republic of Germany accounting for about a quarter of this total, principally in iron ore, the United States supplied between 25% to 33% of the imports. Liberia's balance of payments remained in deficit despite a traditional surplus on the balance of trading because of rising and heavy debt service requirements, negative service balances and remittances, and liquidity crises. Liberia's inability to print its own money, the U.S. dollar that was its medium of exchange, caused the liquidity crises. The high value of the U.S. dollar hurt Liberia's exports to non-dollar markets, although the volume of imports from such countries probably rose.

Although interest in gold mining increased during the year, the quantity of gold produced decreased about one-third from that of 1983.

Iron ore production was 15.1 million tons in 1984, 1% greater than that in 1983. However, shipments were 17 million tons, 9% greater than that in 1983. LAMCO Joint Venture Operating Co. (LJV) exports were about 33% greater than those of 1983, while Bong Mining Co. (BMC) exports were about 9% less.

The Liberian National Investment Council revamped the investment code to strengthen assurances offered to foreign investors, thus providing incentives for investment in its industry. Among the salient points of the new code were assurances against nationalization or any form of government interference in business operations, complete freedom in foreign exchange transactions, and 100% repatriation of profits.[2]

Table 1.—Liberia: Production of mineral commodities

Commodity[1]	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic ---- thousand metric tons--	106	86	80	60	60
Diamond:[e]					
Gem -------------- thousand carats--	123	132	170	160	[2]108
Industrial ------------------do----	175	204	263	240	[2]132
Total ------------------do----	298	336	433	400	[2]240
Gold[e] -------------------troy ounces--	7,243	16,720	[3]12,656	[r] [3]15,379	[2] [3]10,538
Iron ore ---------- thousand metric tons--	17,900	19,704	18,165	14,937	[2]15,100
Petroleum refinery products:					
Gasoline ----- thousand 42-gallon barrels--	500	500	NA	NA	NA
Jet fuel -------------------do----	250	250			
Kerosine -------------------do----	60	60			
Distillate fuel oil ---------------do----	1,000	1,000			
Residual fuel oil ---------------do----	1,800	1,800			
Other -------------------do----	40	40			
Refinery fuel and losses-----------do----	250	250			
Total ------------------do----	3,900	3,900	NA	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. 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.
[2]Reported figure.
[3]Gold figures are based on gold taxed for export and include gold smuggled from adjacent countries. Source: Annual Report of the Republic of Liberia, Ministry of Lands, Mines and Energy, Dec. 31, 1984.

COMMODITY REVIEW

METALS

Gold.—In February, the Government granted the Republic Engineering and Mining Co. a 1-year extension of its right to explore for gold. In September, Bentley entered into an agreement with the Liberian Exploration and Mining Co. to work and to conduct operations in Block No. II of its concession, located about 20 miles east of Zwedru, Grand Geteh County. Operations had been closed there in June 1983 owing to a lack of operating funds and spare parts. Bentley proposed a plan to mine the Dubo River placer in Maryland County, which was in Block No. III of its concession. Mining and exploration were expected to start in December.

Iron Ore.—In view of the abundant supplies of iron ore in Australia and Brazil and of declining steel capacity in the industrialized countries, continued operations of LJV and BMC at their present locations were not promising. Long-term prospects for Liberian ore depended upon development of new LJV ore bodies and the mining of the Mifergui-Nimba Co. high-grade iron ore in southeastern Guinea, the plan for which included use of LJV's facilities to process and to transport the ore to the Liberian port of Buchanan. In October, the International Bank for Reconstruction and Development agreed to study the options for developing the Mifergui-Nimba iron ore deposit in Guinea based on a production of 5 million tons per year. The study was to consider the possibilities for the deposits development in conjunction with LJV.

The Bethlehem Steel Corp. of the United States sold its 25% interest in LJV to a new corporation, the Liberian Mining Co., which was owned equally by the Liberian Government and Gränges Engineering AB of Stockholm, Sweden, which operated the mine. Bethlehem's interest had been acquired in 1960.

BMC shipped 6.9 million tons of iron ore; of this amount, about 2.8 million tons of concentrate and 1.8 million tons of pellets were shipped to Rohstoffhandel GmbH, the purchasing agent for its West German owners, while 1.2 million tons of concentrate and 1.1 million tons of pellets were shipped to Finanziaria Siderurgica S.p.A. (Finsider) BMC's Italian owners.

The 90% Government-owned National Iron Ore Co. Ltd. (NIOC) laid off two-thirds of its work force, about 12,000 employees, from October 1, 1984, to January 1985. The layoff was expected to save about one-third of its $350,000 gross monthly payroll after payment of unemployment compensation. NIOC had difficulty in marketing its ore and was presumed to have a stockpile of 300,000 tons of ore, about 60% of its annual production. The curtailment reduced its level of production to 890,000 tons in 1984, averaging 54% iron, and shipments to

778,000 tons per year.[3]

Finsider expected to build a steel rolling mill for $15.9 million, based on a public stock offering.[4]

MINERAL FUELS

Amoco Liberian was granted exclusive rights to two more offshore blocks in addition to the four licenses awarded in 1983. These awards covered 2.6 million acres and required a minimum of 932 miles of seismic surveys with one exploratory well to be drilled in each block. Altogether, the six blocks extended seaward to 40 to 50 miles from the shoreline and along the shore from the Sierra Leone border to the Sangwin River between the Cess River and Greenville. The annual rent on the two blocks would be $20 per square kilometer versus $10 on the first four blocks. In the event of an oil strike and its exploitation, Amoco Liberian would be allowed to recover its costs out of production while the Government would receive rentals and royalties. After production costs were recovered, the Government's share would increase from the company's rising pretax rate of return and from the income tax on net profits from petroleum operations. In November, the Nedrill 1 drillship of Amoco Liberian spudded the S1-1 wildcat in 1,000 feet of water, 15 miles off Liberia. The target depth was 12,300 feet.

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[1]Physical scientist, Division of International Minerals.
[2]Africa NOW (London). Jan. 1984, pp. 31-32.
[3]New Liberian (Monrovia, Liberia). Nov. 15, 1984, pp. 1-6.
[4]Work cited in footnote 3.

The Mineral Industry of Libya

By Thomas Glover[1]

Petroleum, Libya's most important mineral resource, remained the mainstay of the Libyan economy in 1984, providing one-half of the gross national product. Petroleum also provided 99.9% of the export earnings and about 10% of the country's employment. Libya's economic and social policies have been severely undermined by the fall in oil revenues. The reduced income created a balance-of-payment deficit of over $1 billion per year for the years 1982-84. Libyan oil output fell in 1984 to approximately 1 million barrels per day (bbl/d), which was 50% of the output earlier in the decade. Foreign exchange from oil exports fell from $22 billion in 1980 to an estimated $10 billion in 1984. Libya's foreign exchange reserves dropped from $14 billion in 1981 to $3.5 billion in 1984. Per capita income in 1984 was $8,000 compared with $11,000 in 1981.

Most U.S. oil companies had removed their American employees from Libya. Between 1,000 and 1,500 U.S. citizens remained in the country in the construction and oil industries. No current U.S. passports are issued for Libya. Five major oil producers were formerly active in Libya; Occidental Petroleum Corp., Oasis Oil Co. of Libya Inc., Marathon Oil Co., Exxon Corp., and Mobil Oil Corp. Only two, Occidental and Oasis, were still operating there in 1984. Occidental, the largest U.S. producer at 150,000 bbl/d, hired British professionals to oversee their Libyan operations. Marathon hired Europeans for its operations.

Libya, as a producer of light low-sulfur crude, continued to be severely hit by rising North Sea production and the growth of catalytic cracking. A recent report puts proven oil reserves at 23 billion barrels, with a number of promising additional areas that could add to existing oil reserves. Occidental's Fidda Field was estimated to contain 50 to 100 million barrels in recoverable reserves, with a peak flow of 15,000 to 18,000 bbl/d in 1984.

The $15 to $18 billion Ras Lanuf petrochemical plant, slated to come on-stream in late 1984, was delayed until a later date. Libya also firmed up construction of petrochemical complexes at Marsa Brega and Abu Kamash, not far from the Zawia refinery. A problem for the new petrochemical plants was the lack of markets for the products produced.

PRODUCTION AND TRADE

The production and export of crude oil and petrochemical products continues to be Libya's major source of foreign exchange. Production of crude oil, slightly less than that of 1983, averaged 1.071 million bbl/d. Monthly fluctuations in oil production ranged from 0.98 million to 1.2 million bbl/d. Libya's exploration and production infrastructure continued to depend heavily on the efforts of foreign countries. Crude oil production quotas were reduced by the Organization of Petroleum Exporting Countries (OPEC) to 0.99 million bbl/d in late 1984. Production quotas applicable to the various producing companies were approximately as follows, in barrels per day:[2]

Oasis Oil Co. of Libya Inc. (Continental Oil Co., Marathon Oil Co., and Amerada-Hess Corp.) in partnership with the Libya National Oil Co. (LNOC)	420,000
Azienda Generali Italiana Petroli S.p.A. (AGIP) with LNOC	155,000
Arabian Gulf Exploration Co. (AGECO) Umm al-Jawabi (LNOC for crudes from the Akmna and Sarir Fields)	135,000
Occidental Petroleum Corp. with LNOC	125,000
Sirte Oil Co. (LNOC, formerly Esso Sirte Oil Co.)	110,000
LNOC (formerly Mobil Oil Libya Ltd.)	60,000
Others	14,000

Turkey agreed in May to accept $40 million[3] in Libyan crude oil as partial payment on a backlog of debts to Turkish contracting firms that approached $700 million.

Libya and Greece entered into a $1 billion economic agreement that provided greater Greek participation in Libyan development projects in return for Libyan crude oil. The 3-year agreement includes construction and infrastructure projects as well as projects in the aluminum and petrochemical industries.

Charter International Oil Co., reported to have ended its supply contract with Libya early in 1984, had earlier been procuring between 60,000 and 100,000 bbl/d of crude oil. Coastal States Petroleum Co. was understood to still be procuring 150,000 bbl/d. The United States prohibits the import of Libyan crude oil, which reduced Libya's crude oil markets by up to 300,000 bbl/d.

In March 1984, the U.S. Government forbid the sale of any materials to Libya's new Ras Lanuf refinery and petrochemical plant. The $15 to $18 billion plant that was to start up in 1984 was delayed by 1 year. Crude oil purchases by the United States from Libya, prior to March 1982, accounted for $5 billion per year.

Libya's foreign exchange reserves fell from $14 billion in 1981 to $3.5 billion in 1984. Oil accounted for 99.93% of Libya's total exports. The price of oil dropped by almost 40% in the past 4 years. This drop resulted in a 75% reduction in Libya's foreign exchange reserves. Yet, the country remained totally absent from the Eurocredit market, where it has been involved in only one transaction in 5 years, and its external debt was one of the most "manageable" of the developing countries.

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

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic[e] thousand metric tons	3,200	3,200	4,000	5,000	6,000
Gas, natural:					
Gross million cubic feet	719,414	432,000	425,000	258,000	295,000
Marketed[3] do	182,501	108,000	115,000	150,000	150,000
Gypsum thousand metric tons	180	180	175	180	180
Iron and steel: Steel, crude[e] metric tons	10,000	10,000	10,000	10,000	10,000
Lime thousand metric tons	230	235	225	260	260
Nitrogen: N content of ammonia metric tons	[e]150,000	[e]150,000	[4]244,100	250,000	250,000
Petroleum:					
Crude thousand 42-gallon barrels	669,780	407,705	418,000	401,500	390,915
Refinery products:					
Naphtha do	3,905	3,833	4,000	4,000	4,000
Gasoline do	4,450	3,250	4,000	5,000	5,000
Kerosine and jet fuel do	3,835	4,100	5,000	7,000	7,000
Distillate fuel oil do	9,415	7,350	8,000	10,000	10,000
Residual fuel oil do	15,805	13,475	12,500	10,000	10,000
Other do	300	475	500	600	600
Refinery fuel and losses do	800	750	1,000	900	900
Total do	38,510	33,233	35,000	37,500	37,500
Salt[e] thousand metric tons	10	10	10	12	12
Sulfur, byproduct of petroleum and natural gas[e] metric tons	12,000	11,000	12,000	14,000	14,000

[e]Estimated. [p]Preliminary.
[1]Table includes data available through June 10, 1985.
[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.

COMMODITY REVIEW

METALS

Aluminum.—Indications late in 1984 were that the development of the city of Zuwarah and its aluminum smelter had been postponed. Apparently, no funds were allocated to the project owing to the falling foreign exchange reserves. The aluminum plant was expected to cost $1 billion when completed by National Southwire Aluminum Co. of the United States. Startup of the plant will depend on the Libyan economy. When the plant commences, the first stage will be the operation of one potline that would produce 60,000 tons of aluminum metal per year.

Iron and Steel.—Construction continued on the integrated iron and steel complex at Misratah on the Mediterranean coast about 225 kilometers east of Tripoli. Bar and structural shapes mills were installed in early 1984. The direct-reduction-based works was scheduled to start up in 1985 with a raw steel capacity of about 1.3 million tons per year. Most of the mill equipment was supplied by Kobe Steel Ltd. of Japan.

Roads and other infrastructures at the Misratah steelworks constructed by Doprastav from Czechoslovakia will cost approximately $57 million. A 50-kilometer, heavy-duty road from the steelworks to limestone and dolomite quarries at Sadidah was also being built by Doprastav.

Libya's dwindling foreign exchange reserves continued to be a stumbling block in the construction of a 900-kilometer railroad for carrying iron ore from the mines at Wadi Shatti to the mills at Misratah.

NONMETALS

Prior to 1984, seven cement plants existed in Libya with a total designed yearly capacity of 7 million tons. Two additional cement plants were scheduled to go on-stream in 1984, each with capacities of 1 million tons per year. The status of the two new cement plants at Derna and Zliten could not be determined. The Zliten project was handled by Kawasaki Heavy Industries Ltd. of Japan. Libya could be nearing self-sufficiency in cement, even with its great demand for construction materials throughout the country.

MINERAL FUELS

Natural Gas.—Libya had an abundance of natural gas, which was put to useful purposes instead of being flared to the atmosphere. The gas was used in Libya's petrochemical plants, for power generation, desalinization of seawater, and for liquified natural gas (LNG). LNG was exported mostly to southern European customers. In 1980, deliveries of LNG from the plant at Marsa Brega to Italy's Ente Nazionale Idrocarburi (ENI) were suspended over a price dispute. In the early months of 1984, Libya and ENI agreed to reactivate the LNG contract. The agreement provided for the resumption of deliveries of Libyan LNG to Italy. The reported new agreement provided for deliveries to ENI of 78.8 billion British thermal units (Btu) per day at an f.o.b. price of $3.35 to $3.40 per million Btu. This price was substantially lower than Algerian pipeline gas to Italy, which amounted to $3.56 per million Btu. The delivered price of Libyan LNG to northern Italy was close to $4.15 to $4.20 per million Btu, which was higher than the average cost of Italian gas imports from other sources. Spain was Libya's other customer for LNG from the Marsa Brega plant, taking 115.5 billion Btu per day. Total sales to both Italy and Spain amounted to 193.3 billion Btu per day. The designed capacity of the Marsa Brega plant was 345 million cubic feet (362.3 billion Btu) per day. ENI has reactivated the Panigaglia regasification plant near La Spezia, Italy, and bought two tankers in preparation for deliveries.

Petroleum.—*Exploration.*—The Italian state oil company, ENI, signed an agreement with Libya on a joint development of the Bouri Oilfield. The Bouri Field, 120 kilometers offshore near the demarcation line with Tunisian waters, was the largest known petroleum reserve in the Mediterranean Sea. It will have a productive capacity of 61.9 million barrels per year. Development of the field will include two fixed drilling platforms from which wells will be drilled into the reservoir. Total investment was estimated to be $2 billion. A 1974 agreement covering the Bouri area provides for a production split of 81% to Libya and 19% for Azienda Generali Italiana Petroli

S.p.A. (AGIP). AGIP's 19% share of the crude oil production will be free of tax and royalty, according to the agreement.

Libya plans more exploration in Zone 98 after its Al-Waha Oil Co. found a new field. A wildcat well drilled northwest of the Abul-Tifel Oilfield flowed 4,500 bbl/d of oil and 18 million cubic feet of gas per day on a test.

An Italian-South Korean consortium won a $155 million contract to set up the infrastructure of Libya's new offshore Bouri Field. The consortium will oversee the fabrication and installation of process and utilities modules as well as the hookup and commissioning of the drilling and accommodation units together with the flare system.

Libya discovered new oil reserves at existing small oilfields and at the Sarir and Masalah Oilfields that could increase crude reserves, currently estimated at 21.3 billion barrels, by 13%. The discovery was made by the Arabian Gulf Oil Co., a subsidiary of the Libya National Oil Co. (LNOC). The additional 2.85 billion barrels would add an additional 5 years to the lifespan of Libya's reserves at present production rates.

Italy's AGIP discovered Libya's first major offshore oilfield in the eastern Continental Shelf off Benghazi. This find was located northwest of the town of Al Bayan Awal in Benghazi Province. The depth of the first well was approximately 2,400 meters and produced 5,263 bbl/d of 36° gravity crude oil. AGIP continued to explore the area. Estimated reserves for the first well were 765 million barrels of crude oil.

Société Nationale Elf Aquitaine of France obtained four onshore production-sharing concessions in Libya covering 14,854 square kilometers in December 1980. Seismic surveys were conducted in the area, but results were negative; no exploratory wells were drilled in any of the areas, and the company relinquished the concessions during 1984.

Production.—Crude oil production from Libya's 900 plus oil wells averaged 1.1 million bbl/d in 1984, off about 19,000 bbl/d from daily average production in 1983. In late 1984, OPEC set a new production quota for Libya of 990,000 bbl/d, a 7.6% reduction from 1983 production rates. During the first calendar quarter of the year, production averaged 1,100,000 bbl/d; in the second quarter, the average rose to 1,166,000 bbl/d, then fell to 1,027,000 bbl/d in the third quarter, and finally to 1,000,000 bbl/d in the fourth quarter. Libya remained the seventh largest producer in OPEC for the second successive year.

Occidental of the United States produced oil of its own in Libya as well as under a production-sharing contract with LNOC. In 1984, LNOC and Occidental together produced approximately 125,000 bbl/d. In 1970, Occidental alone produced 800,000 bbl/d. Oasis is the only other U.S. producer in Libya. Occidental tried to interest three European state-owned oil companies, Österreichische Mineralölverwaltungs AG of Austria, Svenska Petroleum AB of Sweden, and Neste Oy of Finland, in a 50% interest in its Libyan oil production.

Refining.—Commercial startup of the 220,000-bbl/d Ras Lanuf Oil and Gas Processing Co.'s facility at the coastal town of Ras Lanuf was expected to begin in early 1985. Earlier plans called for the refinery to start operational tests in January 1984. The Oasis crude sea lines at El Sider marine terminal were under construction during the year.

Transportation.—The Libyan tanker fleet was greatly expanded in 1981 by the delivery of three 155,000-deadweight-ton tankers from Sweden. With the reduction of Libyan crude oil deliveries since 1982, the national tanker company ended up with a surplus of tanker capacity. Therefore, Libya's National Corp. for Marine Transport sold two of its 47,000-deadweight-ton tankers to Greek interests for a total price of $8 million. The two vessels, *Marasa el-Hariga* and *Serir*, were built in 1984 by Astilleros Españoles S.A. of Cadiz, Spain.

Petrochemicals.—Methanol production from the Marsa Brega plant of LNOC was being expanded by 1,000 tons per day during the year. Production of methanol was 353,000 tons in 1983 according to the plant's owners. LNOC was also constructing an additional 1,750-ton-per-day urea unit during 1984 at Marsa Brega.

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[1]Physical scientist, Division of International Minerals.

[2]Middle East Economic Survey (Nicosia, Cyprus). V. 28, No. 15, Jan. 21, 1985, p. A10.

[3]Where necessary, values have been converted from Libyan dinars (LD) to U.S. dollars at the rate of LD0.30=US$1.00.

The Mineral Industry of Madagascar

By Kevin Connor[1]

Commercial mineral production on the island nation remained, in order of importance, graphite, chromite, semiprecious stones, and mica. Other major mineral commodities produced, for local consumption, were cement and refined petroleum products. Mineral exploration and production operations in Madagascar changed little in 1984, except for petroleum exploration activities by four United States based international companies, Amoco International, Mobil Exploration Co., and Occidental Petroleum Corp. in a joint venture operation with Union Oil Co. of California. Amoco began drilling operations late in the year after 2 years of geologic and seismic investigations. The Italian firm Azienda Generali Italiana Petroli S.p.A. conducted exploration activities during 1984 within its concession northeast of Morondava in the Majunja Basin. Kraomita Malagasy, a Government parastatal, remained the only chromite producer on the island in 1984, with its sole operation at Andriamena. The state agency continued to suffer from severe technical and financial problems. Another feasibility study of a ferrochrome production plant for Madagascar was completed by Outokumpu Oy of Finland during the year.

In December, an agreement was reached between the European Development Fund and the Government of Madagascar for a 6-month study of the economic mineral potential of the island's known deposits. The $324,000 study was to be conducted by France's Bureau de Recherches Géologiques et Minières (BRGM) in 1985, with joint assistance from the technical departments of the Madagascar Ministry of Industry, Energy, and Mines. The principal goal of the study was to gather, classify, and categorically evaluate existing data from the many previous geotechnical and mining-economic analyses that have been conducted on the island's mineral deposits. The inventory will identify deposits that warrant proposals aimed at immediate to near-future development, identify and prioritize deposits that warrant additional survey work, and finally update the available information on these deposits.

PRODUCTION AND TRADE

Madagascar's chromite production improved by almost 31% over 1983 levels; however, it was still only approximately one-third of the chromite ore produced annually by Kraomita Malagasy in the 1970's. Exports of chromite ore improved markedly, back to the level of foreign sales in 1979, and more than 2-1/2 times the low 1983 sales total of 41,700 tons. The improvements in chromite ore production and trade represented only a small upswing and possibly short-lived reversal for an industry that has experienced several years of decline on the island. Graphite production increased slightly and exports improved some during the year. Mica production also increased slightly, while exports decreased 15% in 1984.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984
METALS					
Beryllium: Beryl concentrate, industrial-grade, gross weight[e]	10	10	10	[r]([3])	46
Chromium: Chromite concentrate, gross weight	180,000	99,689	44,223	45,729	59,765
Gold, mine output, metal content troy ounces	114	[e]110	[e]110	[e]110	[e]130
Nickel, mine output, metal content	100	NA	NA	--	--
NONMETALS					
Abrasives, natural: Garnet (industrial only)[e] kilograms	5,000	5,000	5,000	[r]7,000	10,000
Cement, hydraulic	60,050	35,796	35,921	[e]35,000	[e]35,000
Clays: Kaolin	2,858	1,746	2,511	[e]2,500	2,500
Feldspar[e] kilograms	1,800	1,800	1,800	1,800	--
Gem and ornamental stones:					
Agate do	14,381	45,822	[e]20,000	8,450	9,300
Amazonite do	1,300	711	700	8,910	6,162
Amethyst:					
Gem do	10	24	12	15	10
Geodes do	3,400	350	4,300	[e]4,300	4,300
Apatite (ornamental only) do	200	29	[e]30	[e]30	3,500
Aragonite	969	1,166	1,101	1,226	809
Beryl kilograms	6,115	NA	68,400	170	45,723
Calcite (ornamental only)	--	NA	NA	600,000	1,584,000
Celestine kilograms	22,758	24,882	27,000	29,644	[e]30,000
Citrine, gem do	8	33	[e]30	12	46
Cordierite do	154	348	[e]350	27	10
Garnet: Gem do	1,666	NA	60	1,196	2,603
Jasper do	2,305	2,850	17,100	[e]17,000	--
Labradorite do	24,806	3,084	9,200	7,847	2,740
Quartz:					
Crystal do	NA	NA	NA	5,283	32,467
Rose quartz do	84,460	58,842	[e]58,850	247,943	139,645
Hematoid do	NA	NA	NA	1,885	14,964
Geodes do	57	60	NA	NA	2,970
Other ornamental do	21,649	3,527	[e]3,500	1,200	6,397
Smelting do	NA	NA	NA	771,000	1,058,000
Rhodonite do	350	NA	NA	NA	NA
Tourmaline:					
Gem do	1,745	[e]1,750	[r] [e]750	7	2
Other ornamental do	NA	NA	NA	5,231	26,558
Graphite, all grades	12,252	13,334	15,354	13,557	13,973
Mica, phlogopite:					
Block	84	334	NA	28	26
Splittings and sheet	1,647	NA	NA	72	71
Scrap	NA	49	NA	619	623
Total	1,731	383	1,300	719	720
Quartz, piezoelectric kilograms	167	73	55	51	145
Salt, marine[e]	30,000	30,000	30,000	30,000	30,000
Stone:					
Calcite, industrial[e]	2,000	2,000	2,000	2,000	2,000
Marble, cipoline	470	NA	13	3,511	113
Other: Bastnasite[e] kilograms	23,000	23,000	23,000	[r]25,000	25,000
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	[e]500	544	630	242	87
Kerosine and jet fuel do	[e]300	335	360	175	49
Distillate fuel oil do	[e]500	747	876	734	129
Residual fuel oil do	[e]1,200	935	1,093	1,026	142
Other do	[e]50	37	51	13	2
Refinery fuel and losses do	[e]350	NA	NA	NA	NA
Total do	[e]2,900	2,598	3,010	2,190	409

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

[1]Table includes data available through May 23, 1985.

[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Less than 1/2 unit.

Table 2.—Madagascar: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982	
			United States	Other (principal)
METALS				
Chromium: Ore and concentrate	80,831	83,274	15,151	France 36,944; East Germany 19,514.
Copper: Metal including alloys, semimanufactures	10	3	--	All for ship stores.
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	3	3	--	Do.
Universals, plates, sheets	1,402	202	6	West Germany 72; Switzerland 28.
Wire	--	2	1	NA.
Tubes, pipes, fittings	NA	2	NA	France 1.
Lead: Oxides	--	3	--	All for ship stores.
Other: Ashes and residues value, thousands	$54	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc do	$165	--		
Grinding and polishing wheels and stones	NA	8	--	All to Reunion.
Cement	NA	19	--	All to United Kingdom.
Graphite, natural	16,353	13,590	3,598	Netherlands 5,850; West Germany 2,862.
Lime	--	49	--	United Kingdom 19; France 11.
Mica:				
Crude including splittings and waste	887	873	114	France 407; Belgium-Luxembourg 350.
Worked including agglomerated splittings	1	1	--	Mainly to West Germany.
Pigments, mineral: Iron oxides and hydroxides, processed	3	--		
Precious and semiprecious stones other than diamond: Natural value, thousands	$548	$488	$1	West Germany $275; Japan $117.
Salt and brine	2,241	834	--	Comoros 441; Reunion 392.
Sodium compounds, n.e.s.: Carbonate, manufactured	47	180	--	United Kingdom 121; France 22; Mauritius 11.
Sulfur: Sulfuric acid	11	15	--	France 5; Algeria 3; Italy 3.
Other:				
Crude	114	535	--	All to Japan.
Slag and dross, not metal-bearing	1	--		
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	25	--		
Petroleum:				
Crude 42-gallon barrels	374	--		
Refinery products:				
Nonbunker:				
Gasoline, motor do	37,086	(2)		
Kerosine and jet fuel do	5,697	10,036	--	U.S.S.R. 2,852; France 2,038; Tanzania 1,984.
Lubricants do	3,594	217	--	United Kingdom 98; France 56.
Residual fuel oil do	871,488	(3)		
Bunkers:				
Liquefied petroleum gas do	--	23		
Gasoline, motor do	51	NA		
Kerosine and jet fuel do	19,863	9,409		
Distillate fuel oil do	128,282	265,770		
Residual fuel oil do	114,432	(4)		
Lubricants do	46	5,894		

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $1,068,000; $1,066,000 was exported to Japan.
[3]Unreported quantity valued at $11,520,000; $4,537,000 was exported to Spain and $3,994,000 to Singapore.
[4]Unreported quantity valued at $3,378,000.

Table 3.—Madagascar: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS				
Alkali and alkaline-earth metals value, thousands	$8	--		
Aluminum:				
Ore and concentrate	523	--		
Oxides and hydroxides	9	7	--	All from France.
Metal including alloys:				
Scrap	5	116	--	Do.
Semimanufactures	319	231	--	France 208.
Copper: Metal including alloys:				
Scrap	--	21	--	All from Japan.
Unwrought	2	--		
Semimanufactures	37	15	NA	France 13.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	76	70	--	All from France.
Ferroalloys: Ferromanganese	--	34	--	West Germany 30; France 4.
Semimanufactures:				
Bars, rods, angles, shapes, sections	10,804	7,199	--	France 5,089; Italy 909.
Universals, plates, sheets	7,466	5,938	--	France 5,399.
Hoop and strip	179	222	--	France 179; West Germany 33.
Rails and accessories	6,373	2,004	--	France 1,981.
Wire	1,592	1,607	NA	France 1,224; Japan 205.
Tubes, pipes, fittings	4,837	(2)		
Lead:				
Oxides	--	1	--	All from Japan.
Metal including alloys:				
Scrap	1	--		
Unwrought	56	181	--	France 179.
Semimanufactures	8	13	--	All from France.
Magnesium: Metal including alloys, semimanufactures -- value, thousands	$1	--		
Manganese:				
Ore and concentrate, metallurgical-grade	--	244	--	Do.
Oxides	--	61	--	Do.
Mercury value, thousands	--	$2	--	All from Switzerland.
Nickel: Metal including alloys, semimanufactures do.	$9	$4	$3	NA.
Silver: Metal including alloys, unwrought and partly wrought[3] do.	--	$4	--	All from France.
Tin:				
Ore and concentrate	86	--		
Metal including alloys:				
Scrap	--	9	--	All from Italy.
Semimanufactures	1	13	--	Mainly from China.
Titanium: Oxides	--	3	--	All from France.
Tungsten: Metal including alloys, all forms value, thousands	--	$9	--	Do.
Zinc:				
Oxides do.	$5	$16	--	All from Japan.
Metal including alloys, semimanufactures	133	2	--	All from France.
Other:				
Oxides and hydroxides value, thousands	$2	--		
Base metals including alloys, all forms	3	4	--	France 3.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$1	$10	--	All from France.
Artificial: Corundum	--	1	--	Do.
Grinding and polishing wheels and stones	19	--		
Asbestos, crude	--	1,803	--	All from North Korea.
Boron materials:				
Crude natural borates	--	123	86	Belgium-Luxembourg 37.
Oxides and acids	3	--		
Cement	146,957	45,829	--	U.S.S.R. 13,946; Mozambique 13,537; Cuba 6,099.
Clays, crude	65	81	--	West Germany 65; France 15.
Diamond: Gem, not set or strung value, thousands	--	$1	$1	
Diatomite and other infusorial earth	NA	20	--	All from France.

See footnotes at end of table.

Table 3.—Madagascar: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982 United States	Sources, 1982 Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	13	--		
Manufactured:				
Ammonia	13	5	--	West Germany 3; France 1.
Nitrogenous	738	1,368	--	All from West Germany.
Phosphatic	3,224	7,159	--	France 6,386; Belgium-Luxembourg 745.
Potassic	1,163	5,661	--	Belgium-Luxembourg 3,757; France 1,831.
Unspecified and mixed	5,402	--		
Graphite, natural	8	2	--	All from France.
Gypsum and plaster	18	--		
Lime	451	595	--	France 593.
Magnesium compounds: Magnesite	10	1	--	All from France.
Mica: Worked including agglomerated splittings value, thousands	$1	--		
Phosphates, crude	13	--		
Pigments, mineral: Iron oxides and hydroxides, processed	13	10	--	France 5; West Germany 5.
Salt and brine	8	10	--	France 9.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	743	1,447	--	Kenya 1,289; France 110.
Sulfate, natural and manufactured	2,485	2,571	--	France 1,611; East Germany 479; West Germany 463.
Sulfur:				
Elemental:				
Crude including native and byproduct	8	54	--	All from West Germany.
Colloidal, precipitated, sublimed	--	4	--	All from France.
Sulfuric acid	78	159	--	France 94; Netherlands 62.
Talc, steatite, soapstone, pyrophyllite	1,201	245	--	All from China.
Other: Crude	199	10	NA	
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	NA	10	--	All from France.
Coal: Lignite including briquets	--	19,062	NA	NA.
Coke and semicoke	12,570	27	--	France 20; Belgium-Luxembourg 7.
Petroleum:				
Crude thousand 42-gallon barrels	1,173	2,181	--	Mainly from Saudi Arabia.
Refinery products:				
Liquefied petroleum gas do	383	14	--	All from Japan.
Gasoline, motor do	426	455	--	Qatar 445.
Mineral jelly and wax do	19	30	--	France 17; West Germany 12.
Kerosine and jet fuel do	2	--		
Distillate fuel oil do	225	125	--	France 107; Netherlands 18.
Lubricants do	14	([4])		
Residual fuel oil do	([5])	71	--	All from Singapore.
Bitumen and other residues do	([5])	30	--	France 17; West Germany 12.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $1,860,000; $1,255,000 imported from France, $255,000 from China, and $64,000 from the United States.
[3]May include platinum-group metals.
[4]Unreported quantity valued at $3,457,000; $2,161,000 imported from Saudi Arabia and $1,020,000 from France.
[5]Less than 1/2 unit.

COMMODITY REVIEW

METALS

In November, the French Aid and Cooperation Fund signed a two-part agreement on financial aid providing approximately $300,000[2] to the Government of Madagascar for mineral prospecting. Just over one-half of the funding was to be used specifically for gold prospecting, with intensive exploration expected in the known Andrianena, Mananjara, Miandrivazo, Tsaratanana, and Vohilva, gold-bearing zones. The subsidy was expected to be used for purchasing field transport vehicles and dredging equipment. The second part of the agreement was for the modernization of core analysis laboratories in Ampandrianomby. Both new equipment acquisitions and rehabilitation of existing facilities were expected. A small portion of the funding was expected to be spent on foreign technical expert assistance. The agreement was considered a resumption of French-Malagasy cooperation in the mineral exploration sphere. The exploration work was to be carried out with the assistance of BRGM.

MINERAL FUELS

Coal.—British Petroleum Ltd. (BP) negotiated during the latter part of 1984 with Madagascar's Office Militaire National pour les Industries Strategiques (OMNIS) for exploration and development rights to the Sakoa coal deposits of southwest Madagascar. BP proposed to cover 3,700 square kilometers, with the first phase of the joint venture encompassing a three-part feasibility study program. The first part of the program would evaluate the quantity and quality of the Sakoa Coalfield reserves near Betoiky, based on existing information and a comprehensive drilling, coring, and core analysis program. Reserves in the area were thought to be as high as 500 million tons of high-quality coal. The other two portions of the first-phase feasibility study would include developing mining and coal preparation plans, and a coal marketing analysis. The mining plans would include an assessment of needed infrastructure including rail and road transportation to the coast, and repair of existing harbor facilities at Tulear. The estimated costs of constructing and developing a large open pit mine in the Sakoa Coalfield, along with the necessary support transportation and power infrastructure, and port loadout capability of 5 million tons per year at Tulear, was conservatively put at $550 million. A finalized agreement for the first phase was expected early in 1985. Total cost of the first phase was estimated at $50 million.

Petroleum.—Late in July, Occidental and Union Oil signed an exploration agreement with OMNIS for continuing their exploration activities with a new drilling program to begin in the first half of 1985. Occidental, in partnership with OMNIS, had been conducting geophysical exploration activities since April 1983. A second phase of seismic studies was almost completed at yearend within the concession in southwest Madagascar, onshore in the Sakaraha area north of Tulear. Occidental postponed making a decision to drill in late 1983 owing to financial constraints, a situation that was remedied by the exploration merger with Union Oil, which as a 50-50 partner was to pay Occidental for its assumed share of past exploration expenditures, as well as any future exploration or exploitation costs.

In other activity, drilling equipment arrived in Madagascar in October, and Amoco Madagascar Petroleum Co. began exploration drilling operations early in November at Mahabo in the southwestern part of the country, above the Occidental-Union Oil concession. Owing to technical problems at Madagascar's sole petroleum refinery at Tamatave, the refinery did not operate at all during the first half of 1984. In the second half of the year, the plant operated but only produced slightly over 400,000 barrels of product, which was a small fraction of the plant's throughput capacity.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Madagascar francs (FMG) to U.S. dollars at the rate of FMG670=US$1.00.

The Mineral Industry of Malaysia

By John C. Wu[1]

The mineral fuels sector not only played the leading role in overall growth of the mineral industry of Malaysia but also contributed substantially to the Malaysian economy. The growth of the mineral fuels sector was attributable to the increased output of crude oil from offshore Terengganu and the increased production of natural gas from offshore Sabah, Sarawak, and Terengganu. The tin mining industry, which faced problems of decreased demand, continued high level of tin smuggling, and increased tin production by non-International Tin Council (ITC) members continued to contract with a reduced number of operating mines and a smaller number of mine workers. However, Malaysia's tin industry remained the world's largest supplier of tin and was able to operate more efficiently at lower production costs than before.

To utilize the country's vast resources of offshore natural gas, Malaysia brought onstream a 650,000-ton-per-year, hot-briquetted-iron (HBI) plant, and a 660,000-ton-per-year methanol plant on Labuan Island in Sabah. The direct-reduction iron (DRI) plant and the methanol plant, both of which used natural gas from offshore Sabah, were to produce HBI and methanol for export to Southeast Asian countries. The second-stage production facilities of liquefied natural gas (LNG) in Bintulu, Sarawak, was completed and started commercial operation to boost the exports of LNG to Japan. A nitrogen fertilizer plant, a joint venture project of the Association of South East Asian Nations (ASEAN) with capacity to produce 1,000 tons per day of ammonia and 1,500 tons per day of urea, was near completion in Bintulu. The first-phase gas utilization project for transporting natural gas to Kerteh, Terengganu, from offshore gasfields was also completed. The high-pressure associated and nonassociated gas was gathered from offshore oilfields and gasfields and piped to Kerteh processing and distribution centers for consumption by a new powerplant at Paka in Terengganu and a new DRI plant at Telok Kalong in Terengganu.

During 1984, the production of metallic mining improved slightly except for tin mining. However, the total output value of bauxite, copper, iron ore, and minor metallic minerals such as ilmenite, monazite, and zircon remained small.

For the past 3 years, the Government of Malaysia has been actively conducting exploration to increase mineral resources of bauxite, copper, gold, and silver through the Geological Survey of Malaysia with technical assistance from Canada, Japan, and the Federal Republic of Germany. As a result of the undertakings, two significant copper and gold deposits were discovered in Kelantan and Pahang of Peninsular Malaysia, and another porphyry copper deposit was discovered in the Gunong Ropih area of Sarawak.

Exploration for offshore oil by foreign companies was slower owing to the continued softening of oil prices. The number of exploratory wells drilled dropped to 16 in 1984 from 21 in 1983. There was only one production-sharing contract signed between Petroleum National Bhd. (Petronas), the state-owned oil company, and Overseas Petroleum Investment Corp. (OPIC), a subsidiary of Taiwan's China Petroleum Corp. During 1984, Malaysia discovered two significant oil and gas deposits: the Malung Oilfield, about 140 kilometers off the Terengganu coast in the South China Sea; and a new natural gas deposit in the Sunda area, offshore of Kalantan State.

In the nonmetallic sector, the cement industry continued to grow. However, in the second half of 1984, a shortage of cement occurred in many parts of the country resulting from a strong growth in demand for cement and reduced imports caused by a 50% increase in the cement import tax. The 1.2-million-ton-per-year cement plant on Langkawi Island was brought on-stream by Kedah Cement Sdn. Bhd. in mid-1984. During 1984, two agreements were signed between Malaysia and foreign contractors to build a 500,000-ton-per-year cement plant at Sepang Bay in Sabah and a 600,000-ton-per-year cement plant at Kangar in Perlis. Both plants were scheduled for completion in 1986.

According to Malaysia's Ministry of Finance, Malaysia's gross domestic product (GDP) in 1970 constant dollars was estimated to have grown 7.3% to $13.5 billion[2] in 1984 compared with a growth of 5.9% (revised) in 1983. The increased output and exports of crude oil and LNG remained the dominant driving force of Malaysia's economic growth in 1984. The sectoral contributions by industry in 1984 were as follows: agriculture, 21%; manufacturing, 18%; wholesale and retail commerce, 14%; Government services, 13%; mining, 5%; and other including transport, finance, utilities, and construction, 29%. Malaysia's gross national product in current dollars was estimated at $28.6 billion in 1984.

In 1984, Malaysia's export earnings were estimated at $15.2 billion while import bills were estimated at $13.2 billion. The inflation rate, as measured by changes in the Consumer Price Index, rose slightly to 3.9% in 1984 from 3.7% in 1983 while unemployment rates also rose slightly to 6.2% from 6% in 1983. Malaysia's labor force rose to 5.7 million from 5.6 million in 1983.

In an effort to attract greater foreign investment, the Government of Malaysia announced new rules in May. Under the new rules, a large foreign manufacturing company will be allowed to hold the majority equity up to 70% in a joint venture project in capital-intensive and resource-based industries that gear their products for export.[3]

PRODUCTION

The total output of the mining industry in 1984 increased compared with that of 1983. As a result, the industry's contribution to Malaysia's GDP rose to 5% from 4.2% in 1983. The fuels sector remained the dominant driving force of the mineral industry's growth and an important contributor to the Malaysian economy. The output of crude oil was raised to an average of 440,000 barrels per day to offset the further drop of oil prices in the world market and to increase export earnings. The output of natural gas was also raised to 283 million cubic meters per day for production of LNG and methanol as well as for industrial uses by the metal and electric power generating industries. Production of LNG rose to 3.7 million tons in 1984.

Because of the continued ITC export controls, the high level of surplus tin, and the falling demand in the world market, Malaysia's tin industry remained depressed. The output of tin decreased slightly, but the tin industry's employment was reduced further by 2,000 workers, and more gravel-pump mines and dredging mines were closed in 1984. However, the mining activities of bauxite, ilmenite, iron ore, rare-earth minerals, and zircon as well as nonmetallic minerals were generally at a higher level than that of 1983. The increased production of these minerals reflected improvements in export markets especially in Japan.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS					
Aluminum: Bauxite, gross weight thousand tons	920	701	589	502	680
Antimony, mine output, metal content (Sarawak)	131	191	139	136	130
Columbium and tantalum concentrate, gross weight	33	23	8	67	27
Copper, mine output, metal content (Sabah)	27,013	28,642	30,086	29,048	28,852
Gold, mine output, metal content:					
Malaya troy ounces	4,621	5,691	5,814	5,792	7,041
Sabah do.	60,905	r69,563	80,945	82,616	82,012
Sarawak do.	379	r67	26	162	474
Total do.	65,905	r75,321	86,785	88,570	89,527
Iron and steel:					
Iron ore and concentrate thousand tons	371	532	340	114	194
Steel, crude do.	210	210	210	350	350
Manganese ore and concentrate, gross weight	4,003	--	--	--	--
Rare-earth metals: Monazite, gross weight[3]	347	320	582	1,051	4,451
Silver, mine output, metal content (Sabah) thousand troy ounces	437	472	502	481	470
Tin:					
Mine output, metal content	61,404	59,938	52,342	41,367	41,307
Metal, smelter	71,318	r70,326	62,836	53,338	46,300
Titanium: Ilmenite concentrate, gross weight[3]	189,121	172,757	101,202	222,722	234,984
Tungsten, mine output, metal content	14	35	43	25	3
Zirconium: Zircon concentrate, gross weight[3]	470	r1,307	2,147	2,548	7,614
NONMETALS					
Barite	--	19,365	25,272	21,434	23,421
Cement, hydraulic thousand tons	2,349	2,833	3,123	3,231	3,469
Clays: Kaolin	46,324	44,084	44,363	57,432	72,472
Nitrogen: N content of ammonia	41,100	37,000	27,800	28,800	38,900
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural (Sarawak):					
Gross million cubic feet	94,510	85,816	NA	150,161	NA
Marketed do.	29,249	23,124	NA	NA	NA
Petroleum:[4]					
Crude thousand 42-gallon barrels	100,916	94,210	120,450	139,800	139,800
Refinery products:					
Gasoline do.	4,038	NA	NA	NA	NA
Jet fuel do.	1,157	NA	NA	NA	NA
Kerosine do.	1,434	NA	NA	NA	NA
Distillate fuel oil do.	13,801	NA	NA	NA	NA
Residual fuel oil do.	15,152	NA	NA	NA	NA
Other do.	NA	NA	NA	NA	NA
Refinery fuel and losses do.	NA	NA	NA	NA	NA
Total do.	35,582	NA	NA	NA	NA

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

[1]All production is from peninsular Malaysia (Malaya) unless otherwise specified. Table includes data available through July 24, 1985.

[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, Sabah, and Sarawak.

TRADE

Malaysia's balance of trade continued to improve as exports of crude oil and LNG rose in 1984. According to the Ministry of Finance, export earnings rose 16% to an estimated value of $15.2 billion while imports rose 8% to about $13.2 billion in 1984. As a result, Malaysia recorded another trade surplus estimated at $2.0 billion.

During 1984, Malaysia exported an average of 349,000 barrels per day of crude oil principally to Japan, the Republic of Korea, the Philippines, and Singapore. Export earnings of crude oil and LNG were estimated at $3.5 billion and $696 million, respectively. Export earnings of tin dropped 35% to $449 million resulting from a decline in both export volume and average export price. Export earnings of copper concentrate from Sabah to Japan also decreased 8% to about $66 million resulting mainly from a 12% drop in average export prices. Other major export commodities including rubber, palm oil, and electronic components also contributed substantially to the overall increase in Malaysian export earnings.

As Malaysia continued to expand its downstream manufacturing industry, imports of capital goods including machinery, transport equipment, electrical components, and other manufactured goods remained the major factor in Malaysia's import bills in 1984.

Malaysia's major trade partners were Japan, Singapore, the European Economic Community, and the United States. In 1984, the United States accounted for 16% of Malaysia's imports and about 19% of Malaysia's exports.

Malaysia began implementing a countertrade policy in 1983. By October 1984, an estimated total value of $27 million of countertrade agreements were successfully arranged by Malaysia with Brazil, the Republic of Korea, and Yugoslavia.

COMMODITY REVIEW

METALS

Aluminum.—Production of bauxite increased substantially owing to increased exports to Japan in 1984. Malaysia exported about 600,000 tons of bauxite to Japan, which accounted for about 15% of Japan's annual consumption in 1984.

According to an industry source, production of bauxite was by Promet Berhad Group (Promet) (which acquired Ramunia Bauxite Mining Co. in 1982) at Telok Ramunia near Pengerang in southern Johore and by Johore Mining and Stevedoring Co. Sdn. Bhd. (which was owned 75% by Aluminium Ltd. of Canada) at Sungei Rengit adjacent to Promet's operations in Johore. The monthly output of the two operations averaged about 53,000 tons in 1984.

Most bauxite produced at Telok Ramunia contains 58% to 61% Al_2O_3, 3% Fe_2O_3, and 7% to 9% SiO_2. However, a small quantity of refractory-grade (low-iron) bauxite was also produced from the open pit mine. Promet planned to build a calcining plant to process the low-iron bauxite and distribute the calcined white bauxite to Far East and European markets by 1986. Johore Mining and Stevedoring produced metallurgical-, refractory-, and chemical-grade bauxite.[4]

Copper.—The production of copper concentrate from the Mamut Mine in Sabah was about 120,000 tons with 24% copper content. However, according to Japanese trade statistics, Japan's imports of copper concentrate from Usukan Bay, Sabah, was over 141,000 tons or equivalent to 5% of Japan's imports of copper concentrate in 1984. The remaining ore reserves at the Mamut Mine reportedly could support only 6 more years of operation at the current production rate.

To augment Malaysia's copper reserves, several exploration programs have been undertaken by the Malaysian Geological Survey with technical assistance provided by Canada, the Federal Republic of Germany, and Japan. According to the Ministry of Primary Industry, exploratory drilling indicated that the deposit at Sok (Sokor) of Kelantan in northeast Peninsular Malaysia, which was discovered in 1982, has copper values ranging from 0.05% to 1%, plus gold value of 0.05 to 0.2 gram per ton of ore, and molybdenum value of up to 107 parts per million. The deposit at Mengapur of Pahang in Central Peninsular Malaysia, discovered in 1981, has an average copper value of 0.25%, gold value of 0.22 gram per ton, and silver value of 5.8 grams per ton of ore plus significant contents of molybdenum and tungsten. The Malaysia Mining Corp. (MMC) reportedly was evaluating these two prospects for commercial production.[5]

In Sarawak, a joint exploration project between the Governments of Japan and Malaysia began in 1982. The Metal Mining Agency of Japan was assisting the Malaysian Geological Survey to conduct geological and geochemical surveys as well as a geophysical survey using the Spectral Induced Pularization method. According to exploratory drilling in the Gunong Ropih area of Sarawak, a porphyry copper deposit was discovered. The preliminary data indicated a copper value of 0.2%.

Gold and Silver.—Gold and silver were mainly recovered as byproducts of the copper operation at the Mamut Mine near Ranau in Sabah. According to a Japanese source, the gold and silver content of the copper concentrate produced at the Mamut Mine averaged 0.6 and 3.9 troy ounces per ton of concentrate, respectively, for the past 5 years.[6] During 1984, about 10 small-scale gold mines operated in the States of Pahang and Sarawak. The combined gold production of these two States contributed about 7% of Malaysia's gold production.

An alluvial gold deposit discovered at Sungai Galas near Pulai, Ulu Kelantan, in 1980, reportedly has sufficient gold reserves to support a small-scale mining operation for at least 5 years. MMC, which signed a joint venture agreement with the State government of Kelantan in 1980, completed the second-phase drilling and feasibility studies in early 1984. Kampong Lanjut Tin Dredging Bhd., a subsidiary of MMC, reportedly has committed $542,000 for the overall preliminary investigations and planned to begin commercial production in early 1985.

Iron and Steel.—Demand for domestically produced iron ore remained weak. An iron reduction plant, operated by Malayawata Steel Bhd. in Prai, consumed most of the iron ore output produced from the Johore and Kedah areas, where about five small-scale mines operated in 1984. Four other small-scale mining operations in the Perak and Pahang areas produced about 25% of the output. Malaysia exported about 20,000 tons of iron ore principally to Singapore in 1984.

In July, the 650,000-ton-per-year, HBI (direct reduced) plant on Labuan Island, Sabah, was completed by Voest-Alpine AG of Austria and Midrex Corp. of the United States for Sabah Gas Industries Malaysia Sdn. Bhd. (SGIM), the owner and operator of the plant. The plant reportedly was forced to shut down during the initial trial run in August because of mechanical problems related to the briquet breaker. The plant started production in early December after new equipment was installed. The company planned to operate at 75% of the plant's capacity in 1985. The HBI produced by the plant has 93% iron content with 1.5% carbon. SAMA Industrial Products Sdn. Bhd. was to market the HBI primarily in Southeast Asia, India, Japan, and possibly in Australia and China.

In October, a long-term contract was signed between SGIM and Mount Newman Iron Ore Pty. Ltd. of Australia. The contract called for Mount Newman Iron to supply SGIM with 150,000 tons per year of iron ore for a mininum of 5 years with an option for an additional 150,000 tons per year. The HBI plant required about 1.1 million tons of lump ore and pellets. The plant reportedly has obtained parts of its iron ore requirements from Brazil, India, and Sweden.

Malaysia's second DRI plant with an annual capacity of 600,000 tons of billets, under construction at Telok Kalong industrial estate in Terengganu by Nippon Steel Corp., was near completion by yearend. The Terengganu plant is to use Nippon Steel's process with a capacity of 1,900 tons per day of direct-reduced iron. Perwaja Terengganu Sdn. Bhd., a joint venture firm of Heavy Industries Corp. of Malaysia (70%) and a Japanese consortium (30%) led by Nippon Steel, will operate the plant when it comes on-stream in March 1985.

Tin.—Malaysia's tin production remained at the same level as that of 1983 because of the continued export controls imposed by the ITC. However, the average market price, in Malaysian ringgits (M$), of tin in the Kuala Lumpur Tin Market (KLTM) (formerly the Penang physical tin market) fell close to the floor price of M$29.15 ($11.66) per kilogram in 1984 from M$30.19 ($12.08) per kilogram in 1983. The lower tin price reportedly was caused by the continuing high level of stock held by the ITC's Buffer Stock Department and the weak world demand for tin.

Malaysia's tin mining industry continued to suffer from the ITC's export controls. The impacts included the further closing of small and inefficient mines and further reduction in the number of workers employed by the tin industry. However, the tin mining industry reportedly was operated more productively and efficiently in 1984.

According to the statistics of Malaysia's Department of Mines, the number of operating tin mines decreased to 449 at the end of 1984 from 547 at the end of 1983 while the number of workers employed by the tin industry also decreased to 23,623 at the end of 1984 from 25,641 at the end of 1983. During the period, 77 gravel-pump mines, 8 dredging mines, and 16 opencast mines were closed, but 3 underground mines were added. Of the tin produced in 1984, 52% was mined by gravel pumping, 31% by dredging, 6% by opencasting, 2% by underground operation, and 9% by other methods of mining.

The gravel-pump sector of the tin industry, which accounted for more than 50% of tin production, was facing problems of a shortage of mining land. In early 1984, the president of the Mine, Quarry, and Foundry Manager Society urged the gravel-pump tin miners to form a consortium to undertake lode mining in the highland areas. In the past, not much effort was made to revitalize the old workings or to search for new deposits owing to lack of substantial financial and professional resources of the gravel-pump tin miners. According to the Geological Survey of Malaysia, the most prominent lode deposits are in the Sungai Lembing area of Pahang and in the Bundi area of Terengganu.

In January, the Association of Tin Producing Countries (ATPC) issued a joint statement after a 3-day ministerial meeting in Kuala Lumpur. In the statement, the ATPC urged non-ATPC tin producers to reduce production for the collective interest of all producers, and asked the tin consuming countries to help find a solution to the depressed world tin market. Without their cooperation, the long-term availability of tin could not be ensured. The ATPC also asked the Singapore Government to cooperate in checking the smuggling of tin ore into Singapore. In addition to that of Malaysia, delegations from Australia, Bolivia, Indonesia, Nigeria, Thailand, and Zaire attended the meeting.

To help stabilize tin prices in the world market, the final version of an accord, reached between Malaysia and the United States in 1983 to limit the U.S. General Services Administration's disposal of its tin to no more than 6,000 tons in the 1983-84 period, was ratified by Indonesia, Malaysia, and Thailand in January.

In March, stiffer antismuggling legislation, the Tin Control (Amendment) Act of 1984, was approved by the Government of Malaysia. The act gives the Ministry of Primary Industry power to implement the new law. The penalty for illegal possession of tin was raised to M$50,000 from M$5,000 in fines, and the jail term was increased to 2 years from 6 months.

On October 1, the KLTM began operations. The Penang physical tin market, which had been run by the tin smelters, ceased operations on September 28, 1984. The KLTM is in the Dayabumi Complex next to the Kuala Lumpur Commodity Exchange. According to Malaysian press reports, the KLTM is incorporated as a company limited. It is managed by a seven-member board of directors including six elected from six members—Malaysia Smelting Corp. Sdn. Bhd., Datuk Keramat Smelting Sdn. Bhd., Perangsang International Sdn. Bhd., MMC, Manilal and Sons Sdn. Bhd., and MMC Marketing Sdn. Bhd. (a wholly owned subsidiary of MMC)—and one from the Ministry of Primary Industries. According to a Government official, the KLTM's price setting is more public and reflects the fundamentals of supply and demand, while the Penang physical market was more restrictive of maneuvering by its participants. Initial trading at KLTM was limited to refined tin of Malaysian origin.[7]

Kuala Langat Mining Sdn. Bhd., the joint venture company of Kumpulan Perangsang Selangor and MMC, reportedly started the construction of its first dredge in June 1983, and was expected to complete the dredge by September 1985 at an estimated cost of $45 million. The dredge will be used to mine the Kuala Langat tin deposit in Selangor. The development cost for exploitation of the Kuala Langat tin deposits was estimated at more than $400 million.

Other Metals.—Other important metallic minerals produced in Malaysia included antimony, columbite, ilmenite, monazite, wolframite, xenotime, and zircon. Most of these minerals were recovered as a byproduct of alluvial tin mining operations in the States of Perak and Selangor.

Production of antimony ore and concentrate by Luckyhill Mining Sdn. Bhd. from its small-scale mining operations of the Bau area in Sarawak declined sharply owing to reduced exports to Western Europe. The antimony concentrate, containing 60% to 67% antimony, produced by the processing plant at Bau was exported principally to Belgium and Luxembourg.

Production of ilmenite, monazite, xenotime, and zircon was by MMC Marketing and Beh Minerals Sdn. Bhd. MMC Marketing operated several processing facilities to recover ilmenite, monazite, and zircon from the tailings of alluvial tin mining in the States of Perak and Selangor. MMC Marketing's production capacity of ilmenite, monazite, and zircon was 150,000 tons per year, 1,500 tons per year, and 3,000 tons per year, respectively. Beh Minerals also operated a large processing plant at Lahat in Perak. It produced ilmenite, monazite, struverite, xenotime, and zircon.

In 1976, Beh Minerals and Mitsubishi Chemical Industries Ltd. of Japan formed a joint venture firm, Malaysian Rare Earth Corp. Sdn. Bhd., to produce yttrium concentrate (60% Y_2O_3) from xenotime with a rated capacity of 80 tons per year. In 1982, the two companies formed another joint venture firm, Asian Rare Earth Ltd., to produce rare-earth chlorides (46% REO) from monazite with a rated capacity of 4,000 tons per year. Both rare-earth processing facilities are at Ipoh in Perak.[8]

Most of the ilmenite, rare-earth minerals, and zircon was exported to Europe, Japan, and the United States for production of titanium dioxide, rare earths, and zirconium.

NONMETALS

Despite the continuing expansion of cement production capacity to about 3.9 million tons per year, a shortage of cement was reported in various parts of the country, especially in the southern Johore area where there was no cement plant operating in the State. According to an industry source, Malaysia's total demand had grown to 4.1 million tons, while domestic cement production was estimated at 3.7 million tons in 1984. The shortage of cement reportedly was caused mainly by a 50% tax on imported cement imposed by the Government in July to protect the domestic cement industry.[9]

In July, the 1.2-million-ton-per-year cement plant operated by Kedah Cement on Langkawi Island, offshore of the west coast of the Malaysia Peninsula near southwest Thailand, came on-stream. Construction of the cement plant by Ishikawajima-Harima Heavy Industries Co. Ltd. of Japan took 2-1/2 years to complete and cost $217 million.

In early 1984, an agreement was signed between the Sabah Economic Development Corp. and a consortium of Hitachi Zozen Corp. of Japan and Klöckner Humbolt-Deutz AG of the Federal Republic of Germany to construct a 500,000-ton-per-year cement plant at Sepang Bay in Sabah. The $70 million plant was expected to come on-stream by April 1986.

In late 1984, another agreement was signed between the Cement Industries Malaysia Sdn. Bhd. and a consortium of Kobe Steel Ltd. and Marubeni Corp. of Japan to build a 600,000-ton-per-year cement plant at Kangar in Perlis. The $80 million plant was originally planned in 1982 under an expansion program but was postponed in 1983. After completion of the plant in the second half of 1986, the total cement capacity of the Cement Industries Malaysia at Kangar will be increased to 1.1 million tons per year.[10]

MINERAL FUELS

Natural Gas.—Natural gas production increased substantially as a result of increased gas utilization by major downstream gas processing plants in Bintulu, Sarawak; on Labuan Island, Sabah; and in Kerteh, Terengganu. With the startup of these three major gas projects, the natural gas sector began to play an important role in supplying domestic energy requirements and contributing substantially to Malaysia's economy and export earnings.

Malaysia LNG Sdn. Bhd., the owner and operator of the Bintulu LNG processing plant at Tanjung Kidurong, in Bintulu, Sarawak, completed the second-stage LNG processing facilities while Sarawak Shell Bhd. (SSB) completed the development of the E11 Gasfield in January. The output of natural gas from the first gasfield F23 and the second gasfield E11 in the Central Luconia Province offshore Sarawak was transported by a 109-kilometer submarine pipeline to the LNG processing plant. Natural gas production from these two gasfields reportedly was at a rate of 500 million cubic feet per day. SSB was developing three additional gasfields in the Central Luconia Province. By 1985, the F6A Gasfield is expected to come on-stream and will join gasfields F23 and E11 to feed the Bintulu LNG plant. The total development cost for the five gasfields was estimated at $1.5 billion.[11] As part of utilizing the gas produced from the Luconia gasfields, ASEAN Bintulu Fertilizer Sdn. Bhd. will bring on-stream a nitrogen fertilizer plant with a capacity to produce 1,000 tons per day of ammonia and 1,500 tons per day of urea in 1985.

The Sabah gas project to utilize the dry associated gas from Samarang and Erb West Oilfields, offshore 56 kilometers from the Sabah coast, was completed by a consortium of Marubeni and Nippon Kokan K.K. of Japan, and Brown and Root (Malaysia) Sdn. Bhd. of the United States in June. The natural gas produced from the six floating platforms was transported by a 196-kilometer submarine pipeline to a gas terminal and processing plant, which is capable of processing 2.2 million cubic feet per day of gas at Kiam Sam on west Labuan Island. The main downstream users include a 47-megawatt powerplant, a 650,000-ton-per-year HBI plant, and a 660,000-ton-per-year methanol plant, all at the Rancha-Rancha Industrial Complex about 4 kilometers away from the gas processing plant. SGIM, owned by the Sabah Energy Corp., is the operator of the Sabah gas utilization project, and Sabah Shell Petroleum Co. (SSP) is the gas supplier of Sabah Gas Industries.

Petronas Carigali Sdn. Bhd. completed the first phase of the Peninsular Malaysia gas utilization project in April. The first phase of the project involved construction of a central processing platform offshore near the Sotong and Duyong Gasfields and a 240-kilometer pipeline connecting the two gasfields to a processing platform and to a gas processing plant in Kerteh, Terengganu. The nonassociated gas from the Duyong Gasfield reportedly began to flow successfully through the pipeline to Kerteh in mid-April. According to Petronas Carigali, about 500 million cubic feet per day of gas will be piped to the Kerteh processing plant under the first-phase utilization, which will distribute part of the treated gas to a 450-megawatt powerplant operated by the National Electricity Board at Paka in Terengganu and part to a DRI plant, which is near completion at Telok Kalong industrial estate in Terengganu.[12]

Petroleum.—Despite the continuing decline in oil prices, Malaysia's crude oil production increased to an average of 440,000 barrels per day from an average of 383,000 barrels per day in 1983. Exports of crude oil also rose to an average of 348,000 barrels per day in 1984. The increased production and exports of crude oil reportedly was to help reduce the Government budget and the current-account deficits as well as to help service the mounting external debt.

Crude oil was produced by Esso Production Malaysia Inc. (EPMI), SSB, and SSP. EPMI produced an average of 224,000 barrels per day from 16 production platforms in 5 oilfields in its contract area offshore Terengganu and 1 platform offshore the State of Sabah. EPMI brought on-stream two additional platforms from Irong Barat and Semangkok Oilfields offshore Terengganu. The output of crude oil by SSB averaged 140,000 barrels per day from 15 platforms and 13 jackets in 9 oilfields offshore the State of Sarawak. SSB brought on production its 10th oilfield from Bayan. SSP averaged 76,000 barrels per day and was producing from five platforms and seven jackets in five oilfields offshore Sabah.[13]

According to an industry source, exploration activities in Malaysia have decreased slightly. The exploratory wells dropped to 16 from 21 in 1983. The decline in Malaysia's oil exploration reflected the continuing worldwide oil glut and the tough terms of the current production-sharing contract (PSC) with the Government of Malaysia. According to Petronas, to attract new exploration and encourage development of marginal oil deposits, the Government planned to soften its terms of PSC to the contractors for a fair return on their investment. During 1984, Petronas signed only one PSC with OPIC in September.

OPIC is a wholly-owned subsidiary of China Petroleum, a state-owned company. According to the agreement, OPIC is to start exploration in a 3,760-square-kilometer block jointly operated by Petronas Carigali, British Petroleum Ltd., and Oceanic Exploration and Development Corp. of the United States. According to industry sources, new terms for encouraging the development of small oilfields was not reflected in the agreement with OPIC.[14]

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[1]Economist, Division of International Minerals.

[2]Where necessary, values have been converted from Malaysian ringgits (M$) to U.S. dollars at the rate of M$2.50=US$1.00 in 1984.

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[3]The Borneo Post (Kuching). May 19, 1984, p. 2.

[4]Industrial Minerals (London). Sept. 1984, p. 21.

[5]Business Times (Kuala Lumpur). Nov. 14, 1984, p. 1.

[6]Journal of the Mining and Metallurgical Institute of Japan (Tokyo). V. 100, No. 1160, Oct. 1984, p. 170.

[7]Business Times (Kuala Lumpur). Sept. 5, 1984, p. 1; Sept. 8, 1984, p. 1.

[8]Industrial Minerals (London). Apr. 1984, p. 24.

[9]The Asian Wall Street Journal (Hong Kong). V. 8, No. 240, Aug. 9, 1984, p. 3.

[10]Industrial Minerals (London). No. 204, Sept. 1984, p. 117.

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[12]Business Times (Kuala Lumpur). May 7, 1984, p. 1.

[13]U.S. Embassy, Kuala Lumpur, Malaysia. State Dep. Telegram 02804, Apr. 9, 1984, p. 1.

Oil and Gas Journal. V. 82, No. 35, Aug. 27, 1984, p. 61.

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The Mineral Industry of Malta

By Walter G. Steblez[1]

Malta's economy for the first 9 months of 1984 showed only a modest growth of 2.7%. Lacking most mineral resources, the country depended largely on the economies of Western European countries, with which it has close commercial ties. Limestone and salt production continued to be Malta's major domestic mineral activity; most raw materials and capital goods had to be imported to meet domestic needs. The continued construction of a port at Marsaxlokk, which would expand Malta's transshipment capacity for bulk freight, including minerals and fuels, was again the major development project during the year.

The Government of Malta purchased an $8 million reverse-osmosis desalinization plant from the United States to increase water supplies. The shortage of freshwater has been an acute problem on Malta, and export opportunities should remain good for additional desalinization plants and equipment. The boundary median line dispute with Libya, in connection with offshore petroleum drilling and leasing, was not resolved during the year.

[1]Foreign mineral specialist, Division of International Minerals.

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

Commodity	1980	1981[r]	1982	1983[p]	1984[e]
Lime metric tons	[r]6,000	6,504	7,500	[r] [e]5,080	5,500
Limestone thousand cubic meters	400	465	402	808	800
Salt metric tons	550	109	130	150	150

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 1, 1985.

Table 2.—Malta: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983
METALS			
Aluminum: Metal including alloys:			
Scrap	107	94	Italy 56; Netherlands 25.
Semimanufactures value, thousands	$58	$55	Denmark $27; Saudi Arabia $23.
Copper: Metal including alloys:			
Scrap	267	464	Denmark 126; Spain 119.
Semimanufactures value	[r]$242,600	$90	Libya $79.
Iron and steel: Metal:			
Scrap	6,366	7,252	Italy 5,194; Spain 1,500.
Pig iron, cast iron, related materials	13	--	
Semimanufactures value, thousands	$157	$54	United Kingdom $45; Algeria $5.
Lead: Metal including alloys, scrap	107	185	Belgium-Luxembourg 100; Italy 85.

See footnotes at end of table.

Table 2.—Malta: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983
METALS —Continued			
Nickel: Metal including alloys:			
Scrap	4	2	All to United Kingdom.
Semimanufactures ---- value, thousands	$5	$9	All to West Germany.
Silver: Metal including alloys, unwrought and partly wrought ---- troy ounces	--	1,855	Do.
Tin: Metal including alloys, semimanufactures value	--	$23	All to United Kingdom.
Zinc: Metal including alloys, scrap	59	53	West Germany 35; Spain 14.
Other: Ashes and residues	--	13	All to Netherlands.
NONMETALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones ---- value, thousands	$570	$601	Yugoslavia $247; Australia $154; West Germany $124.
Diamond: Gem, not set or strung ---- do	$3,287	$4,710	All to Belgium-Luxembourg.
Fertilizer materials: Manufactured, unspecified and mixed	155	74	All to Italy.
Stone, sand and gravel: Dimension stone:			
Crude and partly worked ---- value	$748	--	
Worked ---- do	$8,982	$185	All to United Kingdom.
MINERAL FUELS AND RELATED MATERIALS			
Petroleum refinery products: Lubricants 42-gallon barrels	4,235	4,063	Bunkers 4,059.

[r]Revised.
[1]Table prepared by Vanessa Paytes.

Table 3.—Malta: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides value, thousands	$11	$16	$1	West Germany $8; France $4.
Metal including alloys:				
Unwrought ---- do	$50	$2	--	All from United Kingdom.
Semimanufactures ---- do	$3,243	$3,947	$3	Italy $2,747; United Kingdom $611.
Chromium: Oxides and hydroxides do	$6	$1	--	All from West Germany.
Copper:				
Ore and concentrate ---- kilograms	161	--		
Metal including alloys:				
Scrap	--	3	--	Mainly from United Kingdom.
Unwrought	2	5	--	United Kingdom 3; Spain 1.
Semimanufactures value, thousands	$2,559	$1,347	$12	West Germany $567; United Kingdom $451.
Gold:				
Waste and sweepings ---- do	--	$13	--	All from West Germany.
Metal including alloys:				
Unwrought ---- troy ounces	14,098	12,410	--	West Germany 8,906; United Kingdom 3,504.
Partly wrought value, thousands	$135	$91	--	Italy $44; Switzerland $28; West Germany $13.
Iron and steel: Metal:				
Scrap	190	14	--	All from United Kingdom.
Pig iron, cast iron, related materials	3,160	386	--	Czechoslovakia 257; West Germany 60.
Ferroalloys, unspecified	--	28	--	Belgium-Luxembourg 18; Italy 10.
Steel, primary forms[2]	5,857	6,727	--	United Kingdom 2,688; Spain 1,985; East Germany 998.
Semimanufactures value, thousands	$15,018	$13,635	$8	Belgium-Luxembourg $3,631; France $3,266; United Kingdom $2,657.
Lead:				
Oxides ---- do	$79	$80	--	United Kingdom $68.
Metal including alloys:				
Unwrought	63	53	--	United Kingdom 52.
Semimanufactures value, thousands	$115	$34	--	United Kingdom $17; Belgium-Luxembourg $8.
Manganese: Oxides ---- value	$585	$1,418	--	West Germany $944; Netherlands $474.

See footnotes at end of table.

Table 3.—Malta: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Mercury ---- value, thousands--	$1	$4	--	United Kingdom $3; West Germany $1.
Nickel: Metal including alloys, semimanufactures ---- do----	$7,619	$10,187	--	West Germany $7,067; Ireland $2,501.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces--	--	([3])	--	All from United Kingdom.
Silver: Metal including alloys, unwrought and partly wrought ---- do----	11,593	14,492	--	United Kingdom 8,938; West Germany 5,133.
Tin: Metal including alloys, semimanufactures---- value, thousands--	$915	$688	--	Netherlands $229; Italy $228.
Titanium: Oxides ---- do----	$360	$314	$35	United Kingdom $164; Italy $58; West Germany $49.
Uranium and/or thorium: Metal including alloys, all forms ---- value--	$51	$25	--	All from Switzerland.
Zinc:				
Oxides ---- do----	$33,645	$51,800	--	Netherlands $28,900; Norway $11,400.
Metal including alloys:				
Unwrought ----	139	105	--	Belgium-Luxembourg 53; France 50.
Semimanufactures value, thousands--	$145	$55	--	United Kingdom $26; Netherlands $25.
Other:				
Ashes and residues ----	--	1,365	--	All from Spain.
Base metals including alloys, all forms value--	$1,644	$2,582	$104	West Germany $2,452.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc. value, thousands--	$24	$67	--	Italy $24; United Kingdom $22.
Artificial: Corundum---- do----	$55	$37	--	Yugoslavia $28; Italy $8.
Dust and powder of precious and semiprecious stones including diamond do----	$15	$34	--	Ghana $29; Belgium-Luxembourg $5.
Grinding and polishing wheels and stones ---- do----	$400	$313	$2	Italy $124; West Germany $83.
Asbestos, crude ---- value--	$2,941	$2	--	All from Japan.
Barite and witherite ---- do----	$794	$19,792	--	West Germany $17,289.
Boron materials: Oxides and acids do----	$61	$895	--	West Germany $687; Italy $208.
Cement ----	185,947	187,832	--	Bulgaria 50,549; Poland 35,474; Turkey 34,166.
Chalk ---- value, thousands--	$77	$44	--	United Kingdom $19; France $11; Spain $7.
Clays, crude ----	296	1,116	([3])	Spain 571; United Kingdom 163.
Cryolite and chiolite - value, thousands--	$1	$8	--	Italy $4; Yugoslavia $4.
Diamond:				
Gem, not set or strung ---- do----	$5,499	$4,924	--	Ghana $1,692; Belgium-Luxembourg $1,083; Sierra Leone $969.
Industrial stones ---- do----	$501	$522	--	Ghana $273; Belgium-Luxembourg $207.
Diatomite and other infusorial earth do----	$15	$26	--	Spain $10; West Germany $6; Italy $5.
Fertilizer materials: Manufactured:				
Ammonia ---- do----	$35	$23	--	France $8; United Kingdom $8.
Nitrogenous ----	501	1,467	--	North Korea 1,000; West Germany 194.
Phosphatic ----	46	8	--	All from Belgium-Luxembourg.
Potassic ----	18	--		
Unspecified and mixed ----	546	1,294	1	North Korea 1,000; West Germany 194.
Graphite, natural ----	--	20	--	All from Italy.
Gypsum and plaster - value, thousands--	$37	$33	$4	Spain $25; Italy $3.
Lime ----	437	157	--	Italy 156.
Magnesium compounds: Magnesite value--	$355	$2,679	--	All from United Kingdom.
Meerschaum, amber, jet ---- do----	$27	--		
Mica:				
Crude including splittings and waste value, thousands--	$7	$2	--	All from United Kingdom.
Worked including agglomerated splittings ---- do----	$97	$41	--	West Germany $36; Italy $4.
Nitrates, crude ---- do----	--	$6	--	All from Belgium-Luxembourg.
Pigments, mineral:				
Natural, crude ---- do----	$6	$8	--	All from United Kingdom.
Iron oxides and hydroxides, processed do----	$12	$10	--	West Germany $5; United Kingdom $5.

See footnotes at end of table.

Table 3.—Malta: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ______ value, thousands__	$52	$13	--	West Germany $4; Ghana $3; Thailand $2.
Synthetic ______________do____	$1	$1	--	Mainly from Thailand.
Salt and brine[2] ________________	1,776	2,639	--	Italy 1,560; Tunisia 860.
Sodium compounds, n.e.s.: Carbonate, manufactured ________________	321	164	--	West Germany 72; Netherlands 37; Belgium-Luxembourg 36.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked value, thousands__	$1,630	$1,009	--	Italy $988.
Worked ____________do____	$69	$60	--	Italy $59.
Dolomite, chiefly refractory-grade____	--	1	--	All from Belgium-Luxembourg.
Gravel and crushed rock value, thousands__	$617	$503	--	Italy $484.
Limestone other than dimension value__	$124	$49	--	All from Denmark.
Quartz and quartzite value, thousands__	$3	$34	--	Belgium-Luxembourg $14; West Germany $14.
Sand other than metal-bearing[2] _____	1,068	1,167	--	Netherlands 585; United Kingdom 482.
Sulfur:				
Elemental:				
Crude including native and by-product ________________	95	40	--	All from Italy.
Colloidal, precipitated, sublimed __	220	217	--	Italy 215.
Sulfuric acid____ value, thousands__	$112	$43	--	Netherlands $36; United Kingdom $6.
Talc, steatite, soapstone, pyrophyllite do____	$27	$51	$1	Norway $20; Italy $16.
Other: Crude _____________do____	$6	$10	--	All from Austria.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural ________	4	3	[3]	
Carbon:				
Carbon black ___ value, thousands__	$314	$296	$31	Italy $141; West Germany $102.
Gas carbon_____________value__	$413	$2,082	$2,082	
Coal:				
Anthracite and bituminous________	24,343	52,398	--	Poland 52,396.
Briquets of anthracite and bituminous coal ______________________	34	26	--	Austria 15; Mexico 11.
Coke and semicoke ________________	9	20	--	All from Italy.
Peat including briquets and litter ______	359	413	--	United Kingdom 183; Italy 94.
Petroleum:				
Crude ________________value__	$131	--		
Refinery products:				
Mineral jelly and wax[2] 42-gallon barrels__	2,369	441	--	Hungary 275; West Germany 150.
Lubricants[2] _________do____	21,668	20,277	36	Belgium-Luxembourg 6,084; United Kingdom 5,282; Netherlands 4,526.
Bitumen and other residues do____	7	39,741	--	Spain 31,821; Italy 7,872.
Bituminous mixtures value, thousands__	$108	$99	$1	United Kingdom $60; France $22.

[1]Table prepared by Vanessa Paytes.
[2]Totals are incomplete owing to unreported quantities.
[3]Less than 1/2 unit.

The Mineral Industry of Mauritania

By Thomas O. Glover[1]

The bedrock of the Mauritanian economy is the parastatal iron ore mining company, Société Nationale Industrielle et Minière (SNIM). Of projected investment expenditures in the 1981-85 economic plan period, 33% was allocated to the mining sector. Mauritanian iron ore exports accounted for 80% of foreign exchange earnings. For the first time since 1979, the production of iron ore in 1984 exceeded 9 million tons. Exports of iron ore increased to slightly more than 9.5 million tons. The $500 million[2] Guelbs mining project could damage rather than help the Mauritanian economy. The reason was that since petroleum processing costs are much higher than were envisaged before 1979 and iron ore prices much lower, the internal rate of return for the Guelbs project may be negative and the scheduled loan repayments will be higher than the excess of revenues over operating costs during that period.

PRODUCTION AND TRADE

Production of Mauritania's major mineral commodity, iron ore, increased by 29%, owing to the startup of the El Rhein Mine in the Guelbs deposit. Iron ore exports also increased from 7.4 million tons in 1983 to 9.5 million tons. The refurbished oil refinery at Nouadhibou, reported as reactivated in 1983, processed only one small shipment of Algerian crude and then ceased operation. The refinery was not operating at yearend. Prior to the opening of the Guelbs deposit, iron ore exports were shipped, in decreasing order of volume, to Italy, France, Belgium, the United Kingdom, Spain, the Federal Republic of Germany, and Japan, with almost 75% of it going to the first three. The iron ore industry received a 2-million-ton-per-year order from Algeria, to begin at yearend 1984. Source of the ore was to be the new El Rhein Mine at the Guelbs deposit. Even with all the production and sales during the year, profits were minimal because, according to SNIM, production between 8.0 to 8.5 million tons was required to make a profit. Mauritania's SNIM secured contracts to supply four major Japanese steel mills with 380,000 tons of Guelbs ore between December 1984 and June 1985. The contract price per pound of iron content was 21 cents. Nippon Steel Corp. and Nippon Kokan K.K. were expected to take 130,000 tons each, while Kawasaki Steel Corp. planned to import 50,000 tons and Sumitomo Metal Industries Ltd. was to take 70,000 tons.

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

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic metric tons	--	60,000	60,000	60,000	NA
Gypsum do	12,025	[3]1,732	[e]5,000	4,000	[4]800
Iron and steel:					
Iron ore:					
Gross weight thousand metric tons	8,936	8,704	8,255	7,385	[4]9,527
Iron content[e] do	5,332	5,243	4,750	4,250	5,754
Metal:					
Steel, crude metric tons	5,098	--	6,823	[e]7,000	NA
Semimanufactures do	3,995	4,400	10,391	5,454	[4]898

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through May 9, 1985.
[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 Jan.-Mar. 1981.
[4]Reported figure.

COMMODITY REVIEW

METALS

Copper.—The Akjoujt copper deposits, located approximately 280 kilometers northeast of the Mauritanian capital, Nouakchott, were owned by the Government through two state-held companies, Société Cuivre de Mauritanie and Société des Mines du Cuivre de Mauritanie. The deposits contain approximately 25% oxide ore and 75% sulfide ore. The sulfide ore occurs as pyrrhotite, chalcopyrite, and cubanite. The complete mining operation closed in 1978 after having produced over 98,000 tons of copper metal. The mine was closed owing to high fuel prices, low copper prices, and problems with the refractory copper ore process. The Mauritanian Government received $100 million in financing from Arab countries in 1983 to reopen the mine, and modernization work continued in 1984.

Iron Ore.—Mauritania's Guelbs iron ore project, designed to maintain the country's position in the iron ore market after depletion of the Kedia d'Idjill reserves, was inaugurated for SNIM July 12, 1984. Eighty thousand tons of rock was blasted, and the concentrating plant at Guelbs El Rhein was started during the inauguration ceremonies.

SNIM's current capacity of 12 million tons per year of ore from Kedia d'Idjill deposits comes from three surface mines, Tazadit, F'Derik, and Rouessa, and averages 60% iron content. The new El Rhein Mine, located in the Guelbs deposit, contains approximately 35% iron, but was beneficiated to sinter fines of about 66%. The new concentrating plant at El Rhein Mine consists of a primary crusher, two Aerofall mills, and a dry magnetic separation system. The project is designed to produce 6 million tons per year of concentrate, increasing the total capacity of SNIM to 15 million tons per year, while the older mines are still in production. The Guelbs project was funded largely by loans from Iraq, Kuwait, Saudi Arabia, Abu Dhabi, France, Japan, the International Bank for Reconstruction and Development, the African Development Bank, and the Organization of Petroleum Exporting Countries Fund for International Development. Production from the El Rhein Mine commenced in September 1984. France loaned SNIM approximately $1 million in 1984 as part of a $10 million startup cost that was needed for the new Guelbs project. France had previously made two loans to SNIM on the project amounting to approximately $20 million. Ore reserves for the new El Rhein Mine consist of 244 million tons of magnetite and 105 million tons of oxidized ore. Approximately 406 million tons of waste rock must be removed.

NONMETALS

A consortium for phosphate research in Mauritania was created in 1974. It merged the Mauritanian Government, represented by SNIM, with Bureau de Recherches Géologiques et Minières (BRGM), Société Senegalaise des Phosphates de Thies, and the Romanian Geomin Co. The consortium was granted a research permit covering 7,100 square kilometers in southern Mauritania where erosion has revealed phosphate formations. The prospecting operations were conducted by the manager of the consortium, BRGM. The entire area was first explored, and then from 1980 forward, prospecting was focused on the Guellouar Wadi Valley, where two sizable phosphate accumulations were uncovered in the village of Bofal, and in the place called Loubboira on both sides of the valley. BGRM indicated that identified reserves discovered in 1984 totaled approximately 95 million tons. Mining of the Bofal-Loubboira deposit should not pose any major technical problems.

MINERAL FUELS

Mauritania has as yet no domestic production of any mineral fuels. Areas were leased in 1983 by the Government of Mauritania to Mobil Oil Corp. and Oxoco International. Mobil leased Blocks 4 and 5, covering a 28,000-square-kilometer offshore area west of Nouakchott. Seismic surveys were conducted in both blocks, and it was concluded that only Block 5 had sufficient potential for drilling. A 10,000-foot well was drilled in Block 5, but did not strike oil or gas in paying quantities despite promising geologic structures. Mobil concluded all exploration related work in Mauritania during the year.

Although Mobil has withdrawn from Mauritania, Oxoco's exploration activities in the southern part of Mauritania moved into a new phase of operations. Seismic crews from the United Kingdom were based near Mederdra, approximately 50 kilometers north of the Senegal River. The seismic work was to continue until mid-1985 in a 300-square-kilometer area where preliminary magnetometer surveys indicated promising possibilities. Mauritania's only refinery, National Refining Industry of Mauritania, near Nouadhibou, did not operate during 1984 owing to a shortage of available crude oil.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Mauritanian ouguiya (UM) to U.S. dollars at the rate of UM65.213=US$1.00.

The Mineral Industry of Mexico

By Orlando Martino[1]

Mexico's economic performance continued to be conditioned by the austerity program of the new Administration and the international financial crisis caused primarily by the heavy foreign debt, which was approaching $100 billion.[2] To help confront this crisis, Mexico was not able to count on substantial increases in foreign exchange earnings from crude oil exports as had been optimistically projected in the early 1980's. The small increase in earnings compared with that of 1983 resulted from a minor increase in oil prices. Some industry experts see lower oil prices by the end of this decade. From Mexico's viewpoint, however, lower oil prices would be tolerable if accompanied by a fall in interest rates. For each 1% drop in the interest rate, Mexico saves about $1.75 billion per year in interest payments. On the other hand, each dollar drop in the average price per barrel of Mexican crude oil costs the country about $550 million in earnings loss. Fortunately, during 1984, interest rates fell considerably while a substantial drop in oil prices failed to materialize, allowing Mexico's savings on its debt service to outstrip the small rise in earnings from crude oil exports.

Aside from mineral fuels, Mexico had a disappointing year as the world's leading producer and refiner of silver. Although silver output increased to an improved level not achieved since 1944, earnings from silver exports actually declined to one-half of 1980 earnings, because of significantly lower world silver prices.

Despite the discouraging situation of the world oil market in 1984, Mexico's oil industry continued to prosper, making substantial contributions to the national economy while maintaining its position as the fourth most important world oil producer and exporter. Mexico continued to be the primary supplier of foreign oil to the U.S. market. The oil industry accounted for about 11.7% of Mexico's gross domestic product (GDP), which in 1984 surpassed the expected target and grew in real terms by 3.5% over that of 1983 to an estimated $175 billion at current prices. The petroleum GDP share is smaller than might be expected because Mexico has a highly diversified economy with modern, well-developed agricultural, manufacturing, and service sectors. However, the importance of petroleum's role in the economy can be better appreciated by considering the international trade sector where the oil industry's total exports accounted for almost 69% of Mexico's total merchandise exports. The state oil company, Petróleos Mexicanos (PEMEX), provided about 35% of the central Government's fiscal revenue, while PEMEX's investment expenditures accounted for between one-fourth and one-third of total investment by the public sector.

For the first time in recent history, PEMEX announced a small reduction in proven reserves of hydrocarbons from 72.50 billion barrels of oil equivalent at yearend 1983 to 71.75 billion barrels at yearend 1984. The addition to reserves resulting from new oil and gas discoveries during 1984 was not equal to the total amount extracted during the year. This new development appeared to have created within PEMEX greater motivation to devote more funds to exploration and development.

In addition to oil, Mexico is a major world producer and exporter of metallic and industrial minerals supplied by a long-established dynamic mining-metallurgical sector. The 3.5% increase over that of 1983 in Mexico's GDP was reflected in a 3.4%

increase in the value of nonfuel mineral output. Because of the close links between the economies of Mexico and the United States, the robust growth of the U.S. economy in 1984 was an important stimulant to the increase in Mexico's mineral production. The United States is Mexico's main trading partner, and Mexico in turn is the third most important U.S. export market after Canada and Japan. Mexico's strong mineral trade dependency on the United States is shown by the fact that in 1983, Mexico exported 61% of its mining-metallurgical commodities to the United States, while 71% of Mexico's imports in the same category came from the United States. Mexican exports also benefited from the economic recovery of other industrialized countries.

The mining-metallurgical share of Mexico's GDP was about 1.3%, the same as in 1983. Employment in the sector rose by 3%. Figures available for 1983 show that the country's large private mining group, with a 49% share, contributed the major part of the sector's output, followed by a group of companies with Government equity participation, 39%; and the small- and medium-size mining group contributed 12%. The trend since 1975 shows the large private group losing its share with the Government-involved group gaining a greater share of the sector's output.

The differential changes in world mineral commodity prices had a notable impact on Mexico. The price of silver, a very key commodity for Mexico, was lower, but the prices of lead, zinc, and certain industrial commodities were higher in 1984. As a result, there were sharp changes in the relative participation of the four nonfuel mineral groups. Especially notable, the precious metals group share dropped from 44% of the output value of the mining-metallurgical sector in 1983 to 37% in 1984, while the sector share of the nonmetallic mineral group increased from 13% in 1983 to 18% in 1984.

The financial results of the mining companies were negatively impacted by the differential between the controlled-dollar exchange rate and the free-dollar rate. The exports of the companies were credited in controlled dollars, but all imports of equipment, spare parts, etc., had to be paid with dollars at the higher free rate. The industry's financial position was also adversely affected by a 59% inflation rate not matched by the Mexican peso devaluation rate. The favorable effect on the mining industry, whose income is primarily dollar based, of the large peso devaluation of late 1982, was further eroded in 1984. Careful studies made by several institutions showed that price increases of inputs to the mineral industry during 1983 were much higher than the average peso devaluation for that year. A similar situation persisted during 1984.

As expected, those mining companies with low foreign debt, and thus lower debt-servicing costs, were better able to manage the recent financial crisis. Some companies were also able to increase their productivity and diversify their investments, to increase profitability or lessen their losses. The high profitability of some of the mining companies in Mexico was due in part to the revaluation of their assets to adjust for inflation. Among the 70 most outstanding issues traded on the Mexican stock exchange in 1984, 5 are among the important mining enterprises comprising Industrias Peñoles S.A. de C.V. (Peñoles); México, Desarrollo Industrial Minero S.A. (MEDIMSA), 34% owned by ASARCO Incorporated; Empresas Frisco S.A. de C.V. y Subsidiaries (Frisco), formerly Frisco S.A. de C.V.; and Corporación Industrial Sanluis S.A. de C.V. (Sanluis), a holding company recently formed that controls the mining operations of Industrias Luismin S.A. de C.V. Peñoles and MEDIMSA are listed as corporate entities of world rank outside the United States. Peñoles is Mexico's leading miner and refiner of silver and byproduct metals and a range of industrial commodities including barite, fluorspar, magnesia, sodium sulfate, and sulfuric acid. MEDIMSA is the second largest silver producer, Mexico's leading lead-zinc producer and refiner, and operates metallurgical coal mines and coking plants. Frisco is a notable producer of fluorspar, lead, silver, and zinc, and participated in the equity of Minera Real de Ángeles S.A. de C.V.'s silver-lead-zinc operations and Minera Cumobabi S.A. de C.V.'s molybdenum operations. Sanluis is an important producer of fluorspar, gold, and silver as well as ingot aluminum through its equity participation in Aluminio S.A. de C.V. (ALUMSA).

At mid-1984, the capital stock of companies held by commercial banks nationalized in September 1982 were offered for sale to the public. Some companies' shares were purchased, some companies were passed to State governments, and others were closed out. Shares of mining companies in Mexico held by the former commercial banks included Frisco, 70% of total shares; Sanluis, 34%; Cía. Minera Autlán S.A. de C.V., and La Domincia S.A. de C.V., 5.5%. The purchasers of these mining shares were the private companies themselves.

Major mining companies with significant Government equity participation include Mexicana de Cobre S.A.—operator of La Caridad Mine—and Cía. Minera de Cananea S.A., the country's largest copper producers. Mexicana de Cobre was also Mexico's largest molybdenum producer. The Mexican Government's direct role as a mineral producer was carried out by the Comisión de Fomento Minero (CFM) and the Fideicomiso de Minerales No Metálicos Mexicanos (FNMM). Both operated as decentralized agencies within the Federal Government under the policy guidance of the Dirección General Minerometalúrgica within the Secretary of Energy, Mines and Parastate Industries (SEMIP). CFM celebrated its 50th anniversary in 1984 and was involved in a large number of mineral operations to produce coal, copper, fluorspar, gold, iron ore, manganese, phosphate rock, silver, and sulfur. CFM had a majority equity position in 11 mining companies and a minority position in 9 mining companies. FNMM was a producer of industrial minerals, chiefly barite and graphite. CFM functioned through 19 regional offices and operated 21 beneficiation plants in the most important mining districts of Mexico especially to service the needs of the small- and medium-size mining group. The Consejo de Recursos Minerales (CRM), also decentralized under SEMIP, was also set up to assist the small- and medium-size group with a program of geological exploration and mineral resources evaluation.

Cámara Minera de México (CAMIMEX), the trade association for the mining sector, also served as an advisory body and as a channel of communications with the Government. CAMIMEX appointed a special committee to prepare a list of recommendations for Government action to assist the mining sector during the current economic crisis.

Government Policies and Programs.— The National Energy Plan issued by SEMIP accentuated Mexico's growing concerns about energy conservation and environmental damage. This new plan sets out some guidelines on energy savings. PEMEX had its own energy conservation plan. Also, PEMEX produced and marketed in the Federal District regular gas with less lead content and diesel fuel with lower amounts of sulfur to help alleviate the air pollution problem in the capital area.

In May, the President signed a decree granting certain fiscal benefits designed to stimulate the mining industry, especially the small- and medium-size operations.

In August, the President then issued a more comprehensive 5-year national program entitled "Programa Nacional de Minería, 1984-88" within the scope of the National Development Plan approved in May 1983. The program contains a detailed strategy to stimulate the mining sector. The program includes among other measures concentrating exploration efforts on regions offering the highest potential, intensifying the exploitation of minerals required for the growth of Mexico's diversified industrial sector and for the export market to earn foreign exchange, increasing the efficiency and productivity of mining operations, and supporting development of the small- and medium-scale mining group as a priority matter. The program document[3] gives a description of the current situation of Mexico's mining sector, includes statistical and graphical material on mineral production and reserves, as well as a selected list of minerals of critical interest to the country.

The International Bank for Reconstruction and Development (World Bank) was evaluating Mexico's request for a $105 million loan to participate in a $210 million program to specifically stimulate and assist the small- and medium-scale mining group. The program will encompass investments in new mining projects, expansion of current facilities, technical assistance, exploration projects, acquisition of mining and metallurgical equipment, and improvements in the regional laboratories. The different segments of the program will be implemented as relevant by the three main Government entities devoted to the mineral sector, CRM, CFM, and FNMM. The proposed loan, if granted, would be a followup to the first $140 million loan of May 1980 for the same purposes.

PRODUCTION

Output of mineral fuels—crude oil, natural gas, and coal—continued to dominate the results of Mexico's mineral industries. In 1984, Mexico accounted for 45% of total oil production in the region of Latin America and the Caribbean. Although Mexico's production of crude oil rebounded to a level short of the peak level of 1982, there was a record high in the output of petroleum products—giving Mexico near self-sufficiency. Contrary to the output trend for crude oil, output of natural gas, which is mostly associated with crude oil, continued to decrease. Coal production achieved a new historic peak level.

According to preliminary official data on the 32 mineral commodities that accounted for the major part of the value of Mexico's mining-metallurgical output, 22 commodities had higher output and 10 had lower output. Among the metallic minerals, those with the most notable upward changes were primary aluminum, 11%; antimony, 22%; arsenic, 21%; manganese, 36%; mercury, 74% to a recent high; selenium, 83%; and tungsten, 185% from the depressed level of 1983 to the best level in the last decade. Although Mexico maintained its position as the world's leading silver producer, the modest increase was below the change that had been projected on the basis of recently expanded mining capacities and the new Real de Ángeles Mine. Gold output has been trending upward since the low point of 1973. The increase in output of iron ore and ferroalloys reflected the recovery in the steel industry. Relative to 1983, steel output increased 8% while ferroalloys increased 13% to a record high. The metallic commodities registering decreased outputs below those of 1983 included bismuth, 21%; copper, 4%; molybdenum, 31%; and strontium minerals, 28%.

Resumption of growth in Mexico's manufacturing sector was reflected generally in increases in output of the nonmetallic or industrial mineral commodities. Compared with that of 1983, output of barite increased 19%; fluorspar, 16%; magnesia, 60%; and sulfur, 17%. Output was lower for kaolin, nitrogen (ammonia), and salt.

In response to the financial crisis of the country, the mining companies were engaged in programs designed to optimize their productivity in the mines and beneficiation plants by reducing operating costs without significant reductions in employment. Moreover, important investments completed in the last 3 years in the areas of exploration, new projects, and expansions and modernization of equipment continued to be reflected in increased volume of mineral production adequate generally to cover domestic needs with a surplus for export. According to data assembled by CAMIMEX from a group of representative mining companies, investments in the mining-metallurgical sector amounted to $572 million in 1984 directed toward exploration, 4%; new projects, 43%; increased capacity and efficiency of present facilities, 26%; processing plants, 9%; and other purposes, 18%. Investments in the mining-metallurgical sector represented 7.6% of Mexico's gross fixed investment in 1980, the last year for which official data is available.[4] Total employment in this sector increased to 217,000 in 1984 or about 1.1% of the country's total.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[p]
METALS					
Aluminum:					
Primary	42,601	43,237	41,180	39,706	43,988
Secondary	17,111	20,341	25,770	15,722	22,500
Antimony:					
Mine output, metal content[3]	2,176	1,800	1,565	2,519	3,064
Metal (in mixed bars and refined)	422	354	253	1,782	1,907
Arsenic, white[4]	6,932	6,517	4,740	4,557	5,496
Bismuth[5]	770	656	606	545	433
Cadmium:					
Mine output, metal content	1,791	1,433	1,444	1,341	1,135
Metal, refined	778	590	607	642	571

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[p]
METALS —Continued					
Copper:					
Mine output, metal content[6]	184,123	232,902	229,179	195,959	189,111
Metal:					
Blister (primary only)	[r]87,857	[r]65,348	63,761	59,357	70,434
Refined:					
Primary	74,610	61,301	61,424	80,903	69,806
Secondary[e]	11,000	10,000	14,000	15,000	13,844
Total[e]	85,610	71,301	75,424	95,903	83,650
Gold:					
Mine output, metal content[6] troy ounces	176,089	198,594	214,349	198,177	226,920
Metal, refined do.	185,863	176,861	175,189	177,504	177,118
Iron and steel:					
Iron ore, mine output:					
Gross weight[7] thousand tons	7,631	[r]8,711	8,155	8,040	8,317
Metal content do.	5,087	[r]5,749	5,382	5,306	5,489
Metal:					
Pig iron do.	3,639	3,767	3,598	3,538	3,904
Sponge iron do.	1,636	1,686	1,505	1,497	1,448
Total do.	5,275	5,453	5,103	5,035	5,352
Ferroalloys:					
Ferromanganese do.	122	131	140	139	160
Silicomanganese do.	31	26	30	41	42
Ferrosilicon do.	27	23	29	24	23
Ferrochromium	--	3	6	3	7
Other do.	1	2	1	1	2
Total do.	181	185	206	208	234
Steel, crude do.	7,156	7,663	7,056	6,978	7,509
Semimanufactures do.	6,220	6,395	5,652	5,318	5,789
Lead:					
Mine output, metal content[8]	147,176	148,916	170,172	184,261	183,314
Metal:					
Smelter:					
Primary	144,968	156,677	145,382	166,800	160,000
Secondary (refined)[e]	44,000	38,000	34,000	[r]29,000	25,000
Total	188,968	194,677	179,382	195,800	185,000
Refined:					
Primary (including lead content of antimonial lead)	140,294	150,550	137,238	162,461	153,788
Secondary[e]	44,000	38,000	34,000	[r]29,000	25,000
Total	184,294	188,550	171,238	191,461	178,788
Manganese ore:					
Gross weight[9]	447,128	578,314	508,667	350,011	476,158
Metal content	160,966	208,193	183,120	133,004	180,940
Mercury, mine output, metal content 76-pound flasks	4,206	6,962	8,558	6,411	11,140
Molybdenum, mine output, metal content	74	451	5,190	5,866	4,054
Selenium, mine output, metal content	46	12	29	24	44
Silver:					
Mine output, metal content[8] thousand troy ounces	50,052	52,916	59,175	63,607	63,872
Metallurgical products, metal content do.	45,410	50,151	46,784	58,544	53,023
Tin:					
Mine output, metal content	60	28	27	334	416
Metal, smelter, primary	1,322	838	944	1,216	[e]1,200
Tungsten, mine output, metal content	266	263	194	96	274
Zinc:					
Mine output, metal content[8]	235,823	206,569	242,332	266,292	290,236
Metal, smelter, primary	143,868	126,537	126,953	175,655	167,165
Metal, refined, primary	154,053	139,059	123,509	122,744	162,912
NONMETALS					
Barite	269,322	317,738	363,753	357,043	426,095
Cement, hydraulic thousand tons	[r]16,243	[r]17,978	19,298	17,068	18,752

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[p]
NONMETALS —Continued					
Clays:					
Bentonite	176,028	220,454	184,918	171,140	[e]170,000
Common	153,472	277,766	249,069	213,775	[e]200,000
Fuller's earth	56,858	65,378	42,488	41,574	[e]42,000
Kaolin	271,041	207,824	172,390	162,000	[e]150,000
Diatomite	56,352	56,600	56,342	43,967	60,000
Feldspar	117,214	130,826	115,559	117,518	[e]120,000
Fluorspar:[10]					
Acid-grade thousand tons	492	508	409	407	344
Ceramic-grade do	104	108	54	46	37
Metallurgical-grade do	300	307	166	73	213
Submetallurgical-grade do	210	193	106	79	105
Total do	1,106	1,116	735	605	699
Gem stones value, thousands	$2,887	$7,827	$3,984	$520	NA
Graphite, natural:					
Amorphous	44,506	41,142	34,370	42,669	39,829
Crystalline	348	1,152	1,804	1,658	1,700
Gypsum and anhydrite, crude (yeso)	2,170,669	2,390,431	2,042,484	2,958,085	2,300,413
Lime, hydrated and quicklime thousand tons	4,350	4,500	4,000	3,630	[e]4,000
Magnesium compounds:[11]					
Magnesia	[r]86,987	68,578	64,605	66,300	105,701
Magnesite	15,865	12,117	22,492	23,187	[e]23,000
Mica, all grades	3,600	2,077	510	1,560	[e]1,000
Nitrogen: N content of ammonia[12]	1,547,971	1,795,647	2,029,800	1,935,500	1,772,610
Perlite	44,379	56,731	32,425	41,377	NA
Phosphate rock	396,646	503,252	653,050	785,038	793,293
Salt, all types thousand tons	6,575	7,953	5,561	4,998	5,456
Sodium compounds:					
Carbonate, natural and synthetic do	406	401	390	400	NA
Sulfate, natural (bloedite)[13]	372,092	423,410	128,079	150,000	418,000
Stone, sand and gravel:					
Calcite, common	226,882	246,040	234,694	344,793	NA
Dolomite	378,316	371,027	353,265	285,151	329,694
Limestone[14] thousand tons	31,173	39,046	40,880	35,276	NA
Marble	164,392	171,152	119,759	149,086	NA
Quartz, quartzite, glass sand (silica)	892,963	1,009,330	828,187	929,059	937,000
Sand and gravel:					
Sand thousand cubic meters	51,033	56,392	60,339	50,987	NA
Gravel do	33,048	36,518	39,074	33,018	NA
Strontium minerals (celestite)	40,761	41,344	31,676	37,506	27,160
Sulfur, elemental:					
Frasch process thousand tons	1,700	1,652	1,391	1,225	1,364
Byproduct:					
Of metallurgy[e] do	115	100	100	100	160
Of natural gas do	402	426	425	377	461
Total do	2,217	2,178	1,916	1,702	1,985
Talc	10,088	13,733	12,270	15,092	15,000
Vermiculite[15]	545	596	522	399	NA
Wollastonite	14,400	14,602	15,599	10,784	NA
MINERAL FUELS AND RELATED MATERIALS					
Carbon black (negro de humo)	280,039	335,906	328,763	381,425	550,000
Coal, run-of-mine:					
Metallurgical thousand tons	6,602	6,849	6,833	7,181	7,117
Steam do	408	1,237	786	1,818	2,810
Total do	7,010	8,086	7,619	8,999	9,927
Coke:[16]					
Metallurgical do	2,845	[r]2,872	2,969	2,979	NA
Imperial do	16	12	9	9	NA
Breeze do	91	90	8	8	NA
Total do	2,952	[r]2,974	2,986	2,996	2,810
Gas, natural:					
Gross million cubic feet	1,298,581	1,482,196	1,549,921	1,479,560	1,373,457
Marketable do	1,129,288	1,214,240	1,279,398	1,274,465	1,193,929
Natural gas liquids:					
Field condensate thousand 42-gallon barrels	139	309	654	8,300	41,824
Other do	70,791	88,145	NA	NA	NA

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude thousand 42-gallon barrels	708,454	843,933	1,002,430	972,922	982,517
Refinery products:					
Gasoline:					
Aviation do	622	544	653	420	436
Other do	118,855	130,559	126,410	129,230	132,299
Jet fuel do	10,089	10,558	11,177	9,998	12,370
Kerosine do	15,164	15,047	16,541	14,258	11,612
Distillate fuel oil (diesel) do	89,392	98,530	84,254	81,745	85,255
Residual fuel oil do	112,903	126,665	127,621	127,819	137,213
Lubricants do	2,860	3,512	2,854	2,402	2,499
Liquefied petroleum gas do	43,829	49,595	55,042	56,539	57,115
Asphalt do	6,155	6,651	7,288	6,185	8,292
Unspecified do	6,656	7,543	7,541	7,797	2,591
Unfinished crude oil[17] do	--	--	--	1,633	14,577
Refinery fuel and losses do	18,478	21,856	22,478	28,951	22,401
Total do	425,003	471,060	461,859	466,977	486,660

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 30, 1985.
[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 and impure bars plus refined metals.
[4]Calculated white As equivalent of metallic As content of products reported.
[5]Refined metal plus Bi content of impure smelter products.
[6]Mine output series revised beginning with 1979 to show actual mine output. Prior published data for mine output was derived from data on refined products and concentrates.
[7]Calculated from reported Fe content on the basis of concentrate and pellets containing 66% iron. Total run-of-mine output in 1984 was just under 14 million tons.
[8]Production series modified, beginning with 1979, according to available detail data on mine output per municipality and State.
[9]Calculated from reported Mn content of mine production on the basis of ore and nodules averaging 38% manganese.
[10]Beginning with 1979, revised data is obtained from the Instituto Mexicano de la Fluorita A.C.
[11]Reported erroneously as magnesite in previous editions of this chapter covering the years 1977 to 1982.
[12]Beginning in 1981, Petróleos Mexicanos (PEMEX) initiated production of liquid nitrogen, which in that year amounted to 29,540 tons; 1982—39,009 tons; 1983—44,971 tons; and 1984—47,047 tons.
[13]Series reflects output reported by Industrias Peñoles S.A. de C.V., Mexico's principal producer, plus an additional estimated 30,000 tons by a smaller operator.
[14]Excluding that for cement production.
[15]First year of production registered for vermiculite by the Consejo de Recursos Minerales was in 1980.
[16]Includes coke made from imported metallurgical coal.
[17]Specified by PEMEX as "virgin stock-28" and was processed at its refineries primarily for export.

TRADE

Mexico's foreign income from exports of crude oil increased slightly to almost $15 billion, although the quantity exported decreased slightly to 556 million barrels. This increase in value is explained by the small increase in the average composite oil price for Mexico's Maya and Isthmus crude to $26.90 per barrel from $26.42 per barrel in 1983. Crude oil exports were 57% of the total amount produced. Earnings from total exports of hydrocarbons including crude oil, natural gas, petroleum products, and petrochemicals, amounted to $16.5 billion or 68.5% of total exports. With total imports in this category amounting to only $800 million, Mexico had a very favorable balance in its overall petroleum trade. The dominance of crude oil in Mexico's international trade is shown in the following table:

	1980	1981	1982	1983	1984
Total Mexican exports value, millions	$15,308	$19,379	$21,006	$22,312	$24,054
Crude oil exports do	$9,449	$13,305	$15,623	$14,821	$14,968
Crude oil share percent	61.7	68.7	74.4	66.4	62.2
Mining, metallurgical exports value, millions	$1,347	$1,256	$887	$1,018	$1,000
Mining, metallurgical share percent	8.8	6.5	4.2	4.8	4.2

The United States continued as Mexico's most important overseas market, taking 49% of all crude oil exports compared with the 54% share in 1983. Mexico in turn was the leading supplier of crude to the United States. In October, PEMEX reduced exports by 100,000 barrels per day to help stabilize the world oil market, despite the loss of foreign exchange needed to reactivate Mexico's economy.

Natural gas exports to the United States were down again 35% in value from $354 million in 1983 to $232 million in 1984. Restraint in the domestic economy made it possible for Mexico to continue expansion of its exports of petroleum products. The changed mix of products exported in 1984 consisted of virgin stock (unfinished crude oil), 36%; gasoline, 33%; diesel, 11%; and fuel oil, 10%.

Aside from mineral fuels, CAMIMEX estimated[5] that 38% of Mexico's total mining-metallurgical output was for domestic consumption in 1984, while 62% of this output was exported. Mexico's success in its industrialization program is indicated by the fact that in the 1940's only 10% of mineral output was locally consumed. Earnings from silver exports decreased significantly because average world prices decreased from $11.65 per troy ounce in 1983 to $8.34 per ounce in 1984. Silver earnings had been as high as $676 million in 1980 when the price was $20.63 per ounce. Imports of mineral commodities generally rebounded from the depressed level of 1983 to meet the needs of a recovering economy.

In addition to crude oil, the United States was Mexico's chief market for its nonfuel mineral exports that in 1983 amounted to 61% of the total. On the other hand, Mexico relied on the United States for 71% of its imports of nonfuel mineral commodities.

For the second consecutive year, Mexico obtained a high surplus in its merchandise trade balance, as total exports increased by 8% while imports continued depressed. Nonpetroleum exports increased 19% in real terms.

Table 2.—Mexico: Value[1] of foreign trade in major mineral products

(Thousand dollars)

Exports	1983	1984	Imports	1983	1984
Crude oil	14,821	14,968	Steel products	301	474
Petroleum products	866	1,139	Petroleum products	255	348
Silver	398	338	Aluminum	36	83
Steel products	235	281	Copper	34	69
Natural gas	354	232	Nonferrous ores	43	38
Zinc	85	121	Asbestos	22	37
Sulfur	109	93	Phosphate rock	11	33
Ammonia	112	85	Clays, kaolin	12	18
Lead	35	56	Tin	9	17
Salt	42	55	Gem stones, diamond	8	12
Fluorspar	31	44	Nickel	6	10
Gypsum	29	32	Magnesium	5	4
Manganese	6	9	Tungsten	1	3
Barite	3	2	Cobalt	1	2

[1]Values have been converted from Mexican pesos (Mex$) to U.S. dollars at the average rate of Mex$159=US$1.00 in 1983 and Mex$185=US$1.00 in 1984.

Table 3.—Mexico: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	68	5	--	All to Honduras.
Metal including alloys:				
Scrap	14	323	NA	NA.
Unwrought	153	541	541	
Semimanufactures	283	529	NA	NA.
Antimony:				
Ore and concentrate	2,254	2,585	2,547	France 38.
Metal including alloys, all forms	58	182	131	Brazil 51.
Arsenic: Oxides and acids	2,466	2,625	2,535	Brazil 85; Argentina 5.
Bismuth: Metal including alloys, all forms	626	677	385	Belgium-Luxembourg 178; Spain 45.
Cadmium: Metal including alloys, all forms	354	270	146	Brazil 80; Japan 16.
Copper:				
Ore and concentrate	161,461	110,757	5,494	West Germany 37,889; Japan 29,309; Republic of Korea 16,655.
Metal including alloys:				
Scrap	59	471	363	Japan 108.
Unwrought	12,073	4,179	3,165	Belgium-Luxembourg 1,014.
Semimanufactures	972	4,481	2,939	El Salvador 900; Costa Rica 603.
Iron and steel:				
Iron ore and concentrate	161	1,340	1,339	Ecuador 1.
Metal:				
Scrap	19,741	3,197	2,468	Japan 718; France 10.
Pig iron, cast iron, related materials	57	48,142	6,073	Japan 41,108; Colombia 689.
Semimanufactures	241,000	1,023,600	700,000	NA.
Lead:				
Ore and concentrate	(2)	--		
Metal including alloys:				
Unwrought	61,883	78,986	30,043	Italy 14,139; Japan 12,522.
Unspecified	197	127	42	United Kingdom 64; Venezuela 21.
Manganese:				
Ore and concentrate	148,349	102,417	27,131	Venezuela 28,192; Norway 23,100.
Oxides	21,542	40,116	7,309	Spain 14,850; Colombia 4,785; Brazil 3,913.
Mercury 76-pound flasks	5,468	6,260	15	Brazil 3,011; Argentina 1,798; Japan 961.
Molybdenum:				
Ore and concentrate	2,504	7,482	--	West Germany 4,180; Chile 2,404; Belgium-Luxembourg 617.
Oxides and hydroxides	509	1,815	1,400	West Germany 138; Belgium-Luxembourg 120.
Nickel:				
Ore and concentrate	--	1	1	
Metal including alloys, unspecified	--	6,134	6,077	France 57.
Selenium, elemental	3	15	7	Brazil 8.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	38,280	44,571	21,789	Japan 11,038; United Kingdom 4,794.
Tungsten:				
Ore and concentrate	606	545	545	
Metal including alloys, unwrought	--	15	5	United Kingdom 7; Sweden 3.
Zinc:				
Ore and concentrate	157,245	121,586	35,952	Belgium-Luxembourg 83,908; France 1,486.
Blue powder	2,094	2,865	2,686	Dominican Republic 105; Argentina 74.
Metal including alloys:				
Scrap	7	48	48	
Unwrought	14,553	79,268	49,762	China 9,573; Japan 6,043.
Semimanufactures	22,767	11,600	7,380	Brazil 1,665; Dominican Republic 1,297.
NONMETALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	(2)	95	95	
Asbestos, crude kilograms	17	--		
Barite and witherite	123,672	126,208	121,302	Cuba 2,552; Costa Rica 2,354.
Clays, crude:				
Bentonite	820	570	511	El Salvador 43; Guatemala 13.
Fuller's earth	--	1,882	--	All to Venezuela.
Kaolin	29	234	53	Costa Rica 90; Guatemala 90.
Unspecified	139	79	--	Colombia 22; Guatemala 21; Ecuador 20.

See footnotes at end of table.

Table 3.—Mexico: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Diamond: Gem, not set or strung thousand carats	35	--		
Diatomite and other infusorial earth	1,660	3,116	140	Argentina 1,058; United Kingdom 962; Brazil 707.
Feldspar	81	--		
Fluorspar:				
Acid-grade	176,398	223,046	154,449	Canada 68,396; Venezuela 150.
Other grades including ceramic	171,223	110,475	47,066	Netherlands 25,966; Canada 21,453.
Graphite, natural	28,428	19,787	19,331	Spain 308; Guatemala 48.
Gypsum and plaster thousand tons	1,330	1,904	1,724	Canada 83; Republic of Korea 41.
Magnesium compounds: Magnesite kilograms	41	--		
Phosphates, crude	34,428	21,846	21,846	
Precious and semiprecious stones other than diamond: Natural	1	7	4	Japan 3.
Salt and brine thousand tons	4,688	3,942	1,387	Japan 2,233; Canada 260.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	18,852	1,677	516	Italy 435; Guatemala 433.
Dolomite, chiefly refractory-grade	330	6,251	708	El Salvador 2,883; Guatemala 2,660.
Gravel and crushed rock	2,831	516	516	
Limestone other than dimension	1,769	202	202	
Quartz and quartzite	13	--		
Sand other than metal-bearing	16,443	7,030	6,923	El Salvador 88; Nicaragua 6.
Sand and gravel	5,044	23,594	23,594	
Strontium minerals: Celestite	26,161	38,624	38,624	
Sulfur: Elemental:				
Crude including native and byproduct thousand tons	900	997	629	Morocco 136; United Kingdom 121.
Colloidal, precipitated, sublimed	(2)	1	1	
Unspecified	--	24	--	All to Guatemala.
Talc, steatite, soapstone, pyrophyllite kilograms	11	--		
Vermiculite	39	--		
Other: Crude	145	221	--	Nicaragua 160; Brazil 40.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	22,546	82,738	82,364	Guatemala 203; Dominican Republic 138.
Carbon: Carbon black	(2)	3	3	
Coal: All grades including briquets	14	42	--	All to Guatemala.
Coke and semicoke	(2)	90	70	El Salvador 20.
Petroleum:				
Crude thousand 42-gallon barrels	544,614	561,005	300,700	Spain 58,906; Japan 50,280.
Refinery products:				
Liquefied petroleum gas do	431	1,598	NA	NA.
Gasoline, motor do	57	7,906	1,170	NA.
Kerosine and jet fuel do	173	1,151	611	NA.
Distillate fuel oil do	947	8,928	2,237	NA.
Lubricants do	--	75	NA	NA.
Residual fuel oil do	12,981	11,095	7,049	NA.

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

Table 4.—Mexico: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	43,260	26,658	15,656	Guyana 7,931; Suriname 3,000.
Oxides and hydroxides	103,463	92,925	92,509	West Germany 339; France 51.
Metal including alloys:				
Scrap	11,459	6,390	6,302	Canada 70; Japan 18.
Unwrought	28,273	10,804	7,722	Canada 2,334; France 747.
Semimanufactures	49,654	5,877	NA	NA.
Unspecified	25	20	20	

See footnotes at end of table.

Table 4.—Mexico: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Arsenic: Metal including alloys, all forms kilograms	509	1,245	1,245	
Beryllium: Metal including alloys, all forms do	48	--		
Bismuth: Metal including alloys, all forms	81	3	3	
Cadmium: Metal including alloys, all forms kilograms	243	2,036	2,036	
Chromium: Ore and concentrate	43,245	32,868	23,065	Panama 8,000; Cuba 1,010.
Cobalt: Metal including alloys, all forms	90	84	56	Belgium-Luxembourg 22; Canada 5.
Copper: Metal including alloys, all forms	23,691	13,053	13,043	West Germany 6; Italy 3.
Iron and steel:				
Iron ore and concentrate	1,076	157	152	Guatemala 5.
Metal:				
Scrap	420,904	353,790	343,837	West Germany 6,646.
Pig iron, cast iron, related materials	44,434	3,834	2,770	Canada 929; Brazil 124.
Steel, primary forms	89,300	40,376	17,183	Italy 19,516; France 3,484.
Semimanufactures:				
Bars, rods, angles, shapes, sections	13,272	1,596	1,547	West Germany 37; Austria 5.
Rails and accessories	28,930	17,293	17,293	
Lead: Metal including alloys:				
Scrap	902	236	236	
Unwrought	112	6	5	West Germany 1.
Unspecified	78	2	2	
Magnesium: Metal including alloys, all forms	2,686	2,031	1,764	Norway 180; Panama 82.
Manganese: Ore and concentrate	59,320	297	297	
Mercury 76-pound flasks	11	--		
Molybdenum:				
Ore and concentrate	240	(2)	(2)	
Metal including alloys:				
Unwrought	43	(2)	(2)	
Unspecified	9	1	1	
Nickel:				
Matte and speiss	4,312	1,225	872	Cuba 167; Canada 121.
Metal including alloys, semimanufactures	112	70	44	France 19; Norway 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	2,894	1,061	--	All from Switzerland.
Platinum do	96	96	64	Switzerland 32.
Unspecified do	3,890	772	772	
Selenium, elemental	21	10	10	
Tin:				
Ore and concentrate	973	1,937	1,375	Peru 350; Thailand 201.
Metal including alloys:				
Scrap	405	272	272	
Unwrought	454	423	422	Bolivia 1.
Titanium: Ore and concentrate	41,994	45,943	11,946	Australia 33,997.
Tungsten: Metal including alloys, all forms	50	10	9	Brazil 1.
Zinc:				
Blue powder	207	36	30	Japan 6.
Metal including alloys:				
Scrap	14	5	5	
Unwrought	1	--		
Zirconium: Ore and concentrate	4,173	6,114	5,914	Australia 200.
NONMETALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	1,490	1,354	1,266	Spain 63; West Germany 24.
Asbestos, crude	55,732	32,846	10,328	Canada 18,140; United Kingdom 2,010.
Barite and witherite	190,601	90,553	63,492	China 27,060.
Boron materials: Crude natural borates	170	530	502	Argentina 18; West Germany 5.
Clays, crude:				
Bentonite	5,459	481	481	
Kaolin	67,234	60,429	59,577	United Kingdom 753; Spain 58.
Unspecified	131,013	94,707	93,530	France 690; West Germany 268.
Cryolite and chiolite	98	46	(2)	Denmark 43; West Germany 1; Switzerland 1.
Diatomite and other infusorial earth	216	266	265	West Germany 1.

See footnotes at end of table.

Table 4.—Mexico: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Feldspar, fluorspar, related materials	5,517	1,810	1,645	Canada 101; Spain 63.
Graphite, natural	363	194	83	Canada 104; West Germany 5.
Gypsum and plaster	22,403	4,240	4,240	
Magnesium compounds: Magnesite	89	3	3	
Mica:				
Crude including splittings and waste	129	46	40	Belgium-Luxembourg 3; Brazil 3.
Worked including agglomerated splittings	45	40	32	Belgium-Luxembourg 8.
Phosphates, crude ___ thousand tons	1,036	1,115	325	Morocco 790.
Potassium salts, crude	117,981	158,325	59,777	Spain 58,250; West Germany 40,298.
Precious and semiprecious stones other than diamond: Natural	3	--		
Quartz crystal, piezoelectric kilograms	5,119	9	9	
Salt and brine	1,106	448	447	West Germany 1.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	4,923	263	1	Guatemala 260; Brazil 2.
Calcite, common	1,961	1,304	1,286	Italy 18.
Dolomite, chiefly refractory-grade	2,156	97	23	Panama 74.
Quartz and quartzite	4,578	594	279	Sweden 277; Spain 18.
Sand other than metal-bearing	247,940	35,317	35,290	Panama 27.
Sand and gravel	35,163	2,106	2,106	
Sulfur: Elemental:				
Crude including native and byproduct	542	322	322	
Colloidal, precipitated, sublimed	364	178	176	West Germany 2.
Talc, steatite, soapstone, pyrophyllite	93,676	71,937	71,774	Italy 163.
Vermiculite	679	441	441	
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,572	412	412	
Carbon: Carbon black	374	191	191	
Coal:				
Lignite including briquets	6,571	5,372	5,372	
All grades including briquets	644,751	272,869	171,494	Colombia 87,864; Panama 13,461.
Coke and semicoke	89,234	51,490	31,934	Panama 19,516; Canada 40.
Gas, natural: Gaseous million cubic feet	1,934	1,716	1,694	NA.
Peat including briquets and litter	524	257	257	
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1,315	3,793	NA	NA.
Gasoline ___ do	45	46	NA	NA.
Mineral jelly and wax ___ do	19	58	51	NA.
Kerosine and jet fuel ___ do	439	385	NA	NA.
Lubricants ___ do	1,188	2,059	NA	NA.
Petroleum coke ___ do	402	239	179	United Kingdom 50; Switzerland 10.

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—ALUMSA, partly owned by Sanluis, initiated an expansion project at its plant in Veracruz to increase its productive capacity from 44,000 to 94,000 tons per year of ingot aluminum. The $67 million project will require 2 years' construction time. ALUMSA, Mexico's sole producer of ingot aluminum, was negotiating the acquisition of ALCAN Mexicana S.A. de C.V., to be renamed ALMEXA S.A. de C.V. ALCAN was chiefly involved with the milling and extrusion of aluminum. According to El Instituto del Aluminio A.C., consumption of aluminum ingots rose to 117,500 tons in 1984, a 43% increase over that of 1983, while imports of aluminum products rose to 60,500 tons, a 155% increase over those of 1983.

Antimony.—Peñoles decided to increase the capacity of its byproduct plant for producing antimony trioxide in order to meet local and foreign demand. The expanded capacity will be available in mid-1985.

Copper.—The major part, 91%, of the copper produced by Mexico came from six large mining companies, which also produced gold and silver as byproducts. Because of the low world copper price, these associated precious metals economically supported a number of copper operations. However, at the lower 1984 prices of gold and silver, many of the small- and medium-size copper operators reached a marginal level, forcing some to shut down while others compensated by increasing production.

Output from Mexico's largest copper mine, La Caridad in Sonora State, was affected by labor strikes during the year. Pending completion of its new smelter, La Caridad shipped most of its copper concentrate to foreign markets with a small amount delivered to Cananea's smelter. Although Mexico's total mine output decreased, Peñoles' mine output increased by 27% over that of 1983 to 4,390 tons of copper while MEDIMSA'S output increased by 18% over that of 1983 to 16,780 tons. MEDIMSA's completion of expansion of the mine and beneficiation plant of its San Martín unit at Sombrerete, Zacatecas, will increase copper output in 1985 from this unit alone to 14,000 tons, compared with its current level of 5,000 tons per year.

At a reduced level because of lack of financing, Mexico continued its program to gain self-sufficiency in blister copper in the near future. La Caridad's new 180,000-ton-per-year smelter was further delayed in its construction, and it appeared that the plant would not go on-stream before late 1985. The mine, mill, and smelter expansion program of Cananea continued to suffer delays because of financing problems. Work proceeded on its project to increase the ore grinding capacity of its beneficiation plant to 80,000 tons of ore per day. Cananea initiated construction of a second electrowinning plant that will increase its capacity to produce refined copper from 17,500 to 22,000 tons per year by 1987.

Mexico's copper consumption increased 10% above the depressed level of 1983 to an estimated 87,300 tons—reflecting the return to growth of the national economy. Increased domestic output of blister and refined copper made it possible for Mexico to reduce imports in 1984 to 21,100 tons compared with the 77,000 tons imported in 1981 when total consumption surged to 131,000 tons.

Gold.—As the world's largest silver producer, Mexico was a modest producer of gold—about 1% of the Republic of South Africa's output. More intensive exploration for gold was undertaken in 1984 but with little reported success. However, a number of new development projects as well as expansion of established silver-lead-zinc mines created the prospect that gold output would increase in the near future.

Peñoles continued development and underground exploration of its La Cienga project in the State of Durango, confirming substantial reserves of good-grade gold and silver ore. At yearend 1984, an $11.5 million investment was approved to start this new mining operation at an initial rate of 90,000 tons of ore per year. The planned metallurgy will include cyanidation and flotation. Sanluis was planning the construction of a refinery for precious metals at Durango in Durango State to begin in the first half of 1985.

Cía. Fresnillo S.A. de C.V., owned 60% by Peñoles and 40% by AMAX Inc., reinitiated construction of the mill at Sultepec in the State of Mexico. This new mining unit with a capacity of 700 tons per day will produce gold, silver, lead, and zinc and be ready by mid-1985. Its output will improve the supply of concentrate to the Met-Mex Peñoles metallurgical complex. Fresnillo was Mexico's leading gold producer, followed by MEDIMSA and Sanluis.

Gold production accounted for 5% of Mexico's total value of mineral production in 1984. Guanajuato was the leading gold producing State, followed by Durango (San Dimas Municipality), Sonora, Chihuahua, and Zacatecas.

Both established private gold producers, Peñoles and MEDIMSA, reported increases in gold mine output of 11% and 5.4%, respectively, relative to that of 1983. Peñoles' mine output increased to 51,470 troy ounces while refined gold output, including concentrate from other mine producers, increased 19% over that of 1983 to 138,000 troy ounces. This represents 61% of Mexico's total output. On the other hand, MEDIMSA's refined gold output from its metallurgical complex decreased 29% below that of 1983 to 45,800 ounces.

Iron Ore.—Run-of-mine iron ore output of 14 million tons was similar to the 1983 level. Of the six chief producers, the Peña Colorada Mine in Colima State operated by the Benito Juárez Consortium was the main iron ore producer, contributing 32% of

Mexico's gross mine output, followed in importance by the Las Truchas and La Perla operations.

Startup of the new 3-million-ton-per-year pellet plant in Monclova, Coahuila, completed in 1983, brought Mexico's pellet capacity to 11.7 million tons per year. In 1984, 7.1 million tons of iron ore pellets was produced. To rationalize its pellet output, Fundidora de Monterrey S.A. (FMSA) initiated studies on relocating its pellet plant at Monterrey to Monclova. FMSA's new concentrator for its Hércules Mine was practically completed during the year and expected to be ready for startup in the first quarter of 1985.

Iron and Steel.—Steel output increased 8% over that of 1983 in response to the country's economic recovery. Mexico ranked 20th in the world. Production of sponge iron slightly decreased from that of 1983, while that of pig iron increased 10%. Capacity utilization in the steel industry increased to 74% compared with the 65% rate in 1983 as a result of recovery in the automobile industry, export demand, and import substitution.

State-owned steel companies grouped under the holding company Siderúrgica Mexicana (SIDERMEX), accounted for 58% of national output, while private companies produced the balance, of which nonintegrated plants represented 16%. The largest integrated steel producer continued to be Altos Hornos de México S.A. (AHMSA) in Monclova, Coahuila, at a level of 2.5 million tons, ranking it 41st in the world. Of the five most important steel producers, AHMSA and FMSA had output increases of 11% and 53%, respectively, over those of 1983, while Tubos de Acero de México S.A.'s (TAMSA) output of seamless tubes decreased by 12% below that of 1983. Pig iron was produced only by the SIDERMEX companies, while the privately owned plants of Hojalata y Lamina S.A. and TAMSA produced all the sponge iron using natural gas.

Exports of finished steel products by the SIDERMEX companies amounted to 600,000 tons and were shipped to Algeria, Belgium, Canada, Egypt, the Federal Republic of Germany, Iraq, Syria, and the United States. Total exports of steel products decreased to 886,000 tons in 1984 valued at $281 million. During expansion of its steel capacity, Mexico's steel exports have increased from 191,000 tons in 1970 to an historic high of 1,023,600 tons in 1983. During the same period, steel export earnings increased from $30 to $235 million. The major exports were welded and seamless pipes, followed by plate and sheet and corrugated rod. Mexico's exports of welded and seamless pipes to the United States was 231,300 tons or 87% of its total exports of this category.

In December, Mexico entered into an export-restraint accord with the U.S. International Trade Commission. Mexico agreed to limit its finished-steel shipments to 0.3% of the U.S. apparent steel consumption. The expected amount of Mexican steel exports would be 245,000 tons, representing about 28% of its total steel exports in 1984.

As for new investments, the major activity was continued by Siderúrigica Lázaro Cárdenas-Las Truchas S.A. (SICARTSA), the third parastate company within SIDERMEX. At yearend 1984, SICARTSA's phase 1 development program achieved a financial advance of 45% with an investment of $1.22 billion. The financial crisis of Mexico delayed the advance of some project components. As a result, the extent of completion among plants was uneven. For example, the new direct-reduction plant had a physical advance of 96%, while the mine and plate mill projects advanced 47% and 41%, respectively.

Ferroalloys.—Compared with that of 1983, production of ferroalloys increased by 13% to an historic high. Although Mexico had Latin America's largest single producer of ferroalloys, it ranked second in Latin America after Brazil in total output. Considering Mexico's abundance of manganese resources, ferromanganese and silicomanganese accounted for 68% and 18%, respectively, of total ferroalloy output.

Of the total ferroalloys produced in 1984, most was consumed by the domestic steel industry while 26% was exported, principally to the United States. The other markets comprised Japan, Colombia, Guatemala, El Salvador, and Ecuador. Mexico imported 9,000 tons of ferroalloys, especially ferronickel, since Mexico does not mine nickel. Revised projection of domestic demand for ferromanganese give 116,000 tons for 1985 and 130,000 tons for 1987—indicating that Mexico will continue to have a surplus of ferromanganese for export in the near future.

Lead and Zinc.—In Mexico, lead and zinc are often found together with silver in complex ores and generally their output reflects changes in silver output. During 1984, zinc output increased significantly because of greater silver production and in response to improved world zinc prices.

Both Peñoles and MEDIMSA operated lead and zinc refineries at their metallurgical plants, for Peñoles at Torreón, Coahuila, and for MEDIMSA at Monterrey, Nuevo León, and San Luis Potosí, San Luis Potosí. Peñoles' output of refined lead reached a recent high of almost 119,000 tons. The amount of lead concentrates received at Torreón was the greatest in the history of Peñoles. Lead concentrates were supplied by 104 of the 130 mineral concentration plants throughout Mexico. The small- and medium-size mines supplied 20% of the total, and 4,500 tons of concentrates was imported because of prior commitments.

Mexico's consumption of refined lead increased slightly to 86,300 tons or 48% of its total refined output. There has been a gradual decrease in production of refined lead from secondary sources (scrap) as antimonial lead batteries are replaced with lead-calcium batteries using less lead.

Mexico's output of refined zinc reached a record high of almost 163,000 tons, or 56% of mine output, because of the second full year of operations of MEDIMSA's new refinery in San Luis Potosí, which operated at 75% of its capacity. Zinc metal output by MEDIMSA has more than doubled from 40,000 tons in 1980 to 82,000 tons in 1984.

MEDIMSA's new Rosario unit, with a capacity of 600 tons of ore per day, was nearing completion at yearend and expected to start up in October 1985. The mine itself was completed but the beneficiation plant and infrastructure works continued under construction. The Rosario unit in Sinaloa State will produce lead-zinc concentrates with some silver.

Manganese.—Increased steel output in Mexico and the United States stimulated a rebound in Mexico's manganese output relative to the depressed level of 1983. Practically all of the manganese ore was mined in Molango and Pachuca, Hidalgo State, with minor amounts in Durango, Zacatecas, and Chihuahua. Autlán, operating in the Molango District, continued as the leading producer of manganese ore and ferroalloys.

Autlán reported a 13% increase in the output of manganese carbonate ore to 647,400 tons and a 51% increase in manganese oxide nodules to 431,000 tons relative to that of 1983. Approximately three-fourths of output of carbonate ore at the Tetzintla Mine was by underground mining as the surface reserves diminished. Production of battery-grade ore at the Nonoalco Mine, reputed to be the largest of this type in the world, was cut back to 19,000 tons from the 32,000-ton level in 1983 to control inventories. Autlán exported 163,000 tons of oxide nodules and 14,700 tons of battery-grade ore in 1984, both in increased amounts. Of the six types of ferroalloys produced by Autlán, high-carbon ferromanganese increased 14% to 117,000 tons, and ferrochrome increased by 173% to 6,860 tons, both relative to that of 1983.

Autlán continued operation of the pilot plant at its Molango unit to study the production of electrolytic manganese dioxide. The feasibility study on an industrial plant to produce 6,000 tons per year of this material was completed by Bechtel Civil & Minerals Corp.

Proven reserves of manganese carbonate ore were reported by Autlán at the increased level of 3 million tons, sufficient for 29 years at the company's current output level. Autlán estimates that the Molango District has probable ore reserves of 200 million tons capable of being treated economically with present metallurgical methods.

Molybdenum.—After 4 years of remarkable growth, molybdenum output decreased for the first time because of slack demand and low average world prices, which decreased from $4.20 per pound in 1983 to $3.40 per pound in 1984. In addition, byproduct output from La Caridad's copper operations decreased because of labor strikes and problems in the milling facilities. La Caridad's output decreased from 4,600 tons in 1983 to about 3,000 tons, while output from the other major producer, Minera Cumobabi, decreased slightly to 1,182 tons as reported by the controlling company, Frisco.

Frisco reported the completion in the second half of 1984 of all the equipment needed to produce high-purity molybdenum sulfide, the initial output of which was 123,400 pounds. Two grades will be marketed, "technical grade" and "fine grade." Molybdenum sulfide is used primarily in the manufacture of grease and lubricants.

Silver.—Mexico extended its position as the world's leading silver producer. Most of the increased output was due to improved mining operations of Peñoles, Mexico's leading producer, and Real de Ángeles, which had its second full year of operations. Peñoles' mine output, including its share of Fresnillo's operations, expanded by 14% to 19.4 million troy ounces while its output from the Torreón refinery increased to 42 million ounces of refined metal compared with the 33.5 million ounces of 1983. Real de Ángeles mine production increased by 16% to slightly more than 9 million troy ounces, making it Mexico's third most important silver producer after Peñoles and MEDIMSA. At yearend, it was milling 13,000 tons of ore per day.

MEDIMSA's mine output increased by 8% over that of 1983 to 14.2 million troy ounces; however, refined silver output from the Monterrey plant decreased by 6% below that of 1983 to 20.3 million troy ounces. MEDIMSA completed expansion of its highly automated underground mine of the San Martín unit at Sombrerete, Zacatecas, with an increased capacity from 2,400 to 6,800 tons of ore per day. Beginning in 1985, this unit was expected to produce annually concentrates containing 5.6 million ounces of silver, 74,000 tons of zinc, and 14,000 tons of copper. An additional investment to the $63 million already spent would also enable production of 6,000 tons of lead-silver concentrate. This expansion will strengthen MEDIMSA's position in Mexico as the leading lead-zinc producer and rival Peñoles as the leading silver producer.

The result of a drilling program at Mexico's largest open pit silver mine, Real de Ángeles, uncovered ore-grade mineralization at depth. At yearend 1984, Real de Ángeles had ore reserves of 65 million tons grading 80 grams of silver per ton, 1.1% lead, and 0.97% zinc.

Peñoles reported that a new ore body was found at its La Encantada unit in arid northern Coahuila with an attractive grade of silver. Underground work was initiated for its future exploitation.

Minerales Bolanos S.A. discovered a promising silver-lead vein system in Jalisco State. Limited exploration work by yearend indicated that the ore body may be among the largest deposits found in recent years. The ore contains 504 grams of silver per ton and 2.3% lead.

Silver exports represented 88% of Mexico's total silver production. The difference between the country's mine output and refined silver output is explained primarily by the silver content of the exports of blister copper, impure lead, and doré metal. Mexico, in 1984, consumed 7.37 million troy ounces of silver. Mexico continued minting the new 1-ounce, 0.999 fine "Libertad" silver coin for the investor market. The Central Bank first tested this market in 1983.

Tungsten.—Production increased 185% over that of 1983 to a new high within the last decade of 274 tons. Mexico's production of tungsten has been erratic since it was first registered in 1933 at a level of 74 tons. The recent high was in 1971 when 408 tons was produced.

Two Mexican producers, Fresnillo and MEDIMSA, account for more than 81% of total output. Fresnillo's tungsten production came from its Naica unit in Chihuahua. In 1980, Fresnillo initiated recovery of tungsten as a byproduct from its 3,000-ton-per-day flotation plant for lead-silver sulfide ores. The tungsten is recovered by a gravity process. Draco S.A., the Alfa-Inco joint venture, continued with a small output from its San Antonio surface mine in Sonora. The bulk of exported tungsten concentrate went to the United States.

NONMETALS

Barite.—Since initiating barite production in 1951 to meet the growing oil exploration program of PEMEX, Mexico exceeded the 400,000-ton level of barite output for the first time to a record high. However, this output was considerably below Mexico's recently increased capacity that has resulted from the expansion of the mines of Barita de Sonora S.A. de C.V., controlled by FNMM, and the Minera Capela S.A. (La Minita Mine) in the State of Michoacán, operated by Peñoles. Consumption of barite by PEMEX, the only important buyer in Mexico, was at the 1983 level of 390,000 tons. This gave Mexico a surplus of about 35,000 tons available for export.

Peñoles reported that barite output from its new La Minita unit in Coalcomán, Michoacán, increased by 125% over that of 1983 to 119,340 tons. La Minita also operated below its design capacity of 150,000 tons per year as PEMEX reduced its purchases. La Minita also produced silver, lead, and zinc.

Diatomite.—During 1980-83, the United States imported 75% of its imports from Mexico. The two main producers in Mexico continued to be Cía. Almeria S.A. and Diatomita San Nicolás S.A., both in the State of Jalisco.

Fluorspar.—Mexico had a significant increase in sales of fluorspar as a result of increased demand in the United States, Canada, and domestically, and a more competitive pricing policy. The Instituto Mexicano de la Fluorita A.C. reported an increase in sales from 600,000 tons in 1983 to

825,900 tons. Since mine output increased to only 700,000 tons in 1984, inventories were reduced to meet the increase in sales. Of the total sales, 282,300 tons was shipped to domestic users.

The increase in mine output was also moderated by the closing of the El Refugio Mine in Guanajuato operated by Cía. Minera Río Colorado S.A., a subsidiary of Peñoles. This company was owned 60% by Peñoles and 40% by Allied Chemical Corp. Peñoles consequently increased output at its nearby El Realito Mine operated by Fluorita de Rioverde S.A., also a Peñoles subsidiary. Before its closing, El Refugio produced 45,000 tons of acid-grade spar and 7,000 tons of metallurgical grade.

For 1984, Peñoles reported fluorspar output of 127,200 tons, mostly metallurgical grade. The second most important producer, Sanluis, reported an output of 88,550 tons, mostly acid grade, from its associated company La Domincia. MEDIMSA reported 51,900 tons from its Parral unit in Chihuahua and Frisco, 75,000 tons from its Francisco del Oro unit in Chihuahua. These four operations accounted for 80% of the country's output.

More than one-half of fluorspar exports went to the United States in 1984, and the balance was shipped mostly to Canada and European countries.

Graphite (Natural).—Mexico continued as the principal exporter of amorphous natural graphite to the United States, which during 1980-83 represented 61% of U.S. imports. Mexico also exported 75% of its output of crystalline graphite to the United States.

Magnesium Compounds.—Expanded capacity at its two chemical plants in Laguna del Rey, Coahuila, and Ciudad Madero, Tamaulipas, made it possible for Peñoles to increase production of magnesia (magnesium oxide) by 59% over that of 1983 to about 105,700 tons. A modest amount of magnesite (magnesium carbonate) was produced directly from natural sources.

Nitrogen.—PEMEX continued as the only producer of ammonia from Mexico's abundant natural gas resources. Its output of ammonia decreased again as in 1983 by 1.8% to 2.2 million tons after a long period of steady increases. Ammonia output was sufficient to satisfy the demands of Mexico's expanding fertilizer industry with a surplus for exports. PEMEX's ammonia exports, mostly to the United States, decreased substantially from 744,000 tons in 1983 to 440,000 tons in 1984, giving reduced foreign exchange earnings of $85 million. However, ammonia continued as Mexico's most important petrochemical export commodity.

Since 1962, Mexico has been engaged in an ambitious program to develop and expand its ammonia capacity to meet the needs of a more productive agricultural sector under pressure by a rapidly growing population. By yearend 1984, PEMEX had an installed ammonia capacity of 2,891,000 tons comprised of nine plants in three petrochemical centers. A second ammonia plant with a capacity of 445,000 tons per year was under construction at Camargo, Chihuahua, and a similar plant was in the design stage for the new site of Lázaro Cárdenas, Michoacán State, instead of at Salina Cruz.

Phosphate Rock.—State-owned Roca Fosfórica Mexicana S.A. de C.V. (ROFOMEX) improved production at its surface mine operation in Baja California Sur. In October, ROFOMEX completed the expansion of its milling facilities from 800 to 1,400 tons per day. The crude ore is processed by flotation methods to give a concentrate with an average grade of 30.3% P_2O_5. The entire output was shipped to the Pajaritos petrochemical complex near Coatzacoalcos, Veracruz, as the main supplier to Fertilizantes Mexicanos S.A., also State-owned.

For technical and economic reasons, ROFOMEX was considering developing an underground mine (room-and-pillar method) at its San Juan de la Costa location in Baja California Sur in addition to the surface mine. The plans to dredge phosphate-bearing sands in the Santo Domingo area on the Pacific Ocean side of the peninsula were postponed because hard stratigraphic beds were encountered.

Salt.—The downward trend in salt production continued since the peak year of 1981 when about 8 million tons was produced. Mexico was the leading salt producer in Latin America and the world's largest exporter of salt from solar facilities at Guerrero Negro on the west coast of Baja California Sur. Salt exports amounted to 4.6 million tons destined principally to Japan and the United States.

Mexico's largest producer and exporter of salt, Exportadora de Sal S.A. (ESSA), was considering diversification possibilities because of the softness in overseas markets and price stagnation. ESSA was investigating the feasibility of producing chlorine, potassium sulfate, and magnesia and its derivatives, bromine and lithium.

Sodium Compounds.—After the United States, Mexico ranked second worldwide as a producer of natural sodium sulfate. Peñoles by far was the dominant company, operating through its subsidiary, Química del Rey S.A. At its operation at Laguna del Rey in Coahuila, Química del Rey extracts sodium sulfate from subsurface brines. Química del Rey accounts for 92% of Mexico's output and is believed to have the largest plant of its type in the world. Química del Rey's output in 1984 increased to 383,240 tons but was under the record high of 441,000 tons established in 1983 since the first processing plant started up in 1965. In the domestic market, sodium sulfate is used for the manufacture of detergents, paper, and glass. Total sales amounted to 405,000 tons, of which 71% was shipped to domestic users.

Mexico continued as a net importer of sodium carbonate (soda ash). Industria del Alcalí S.A. increased its capacity to produce synthetic soda ash at its Monterrey plant by 10% to 250,000 tons per year. Production of natural soda ash at Lake Texcoco appears to have suffered from operating problems. Mexico imported 117,000 tons of soda ash from the United States compared with 162,000 tons in 1983.

Sulfur.—Sulfur production continued at well below national capacity. Domestic sales amounted to 1.03 million tons, and exports were 841,300 tons valued at $93.4 million, a 14% decrease compared with those of 1983. The major part of exports continued to go to the U.S. market. The U.S. share increased from 63% in 1983 to 81%. Sulfur exports went to four Western countries and the U.S.S.R. in 1984, while in 1983 eight countries received Mexican sulfur. This compares with 17 countries in 1982 that took 953,000 tons. Mexico's domestic consumption was expected to rise to 1.35 million tons when the new phosphate fertilizer complex at Lázaro Cárdenas comes on-stream in 1985.

Although the Frasch process continued as the dominant source of sulfur, increased amounts were contributed by PEMEX from sour gas and by the mining companies from the metallurgical plants—especially MEDIMSA's new zinc refinery at San Luis Potosí where 150,000 tons of sulfuric acid was recovered. Peñoles produced 261,000 tons of sulfuric acid at its plants. When the new La Caridad smelter is in operation, it will produce 270,000 tons of sulfur per year in the form of sulfuric acid.

Mexican Frasch sulfur was obtained from three salt domes, Coachapa, Jáltipan, and Texistepec, in the Isthmus of Tehuantepec south of the Port of Coatzacoalcos in the Gulf of Mexico. The Texistepec Mine, operated by Cía. Exploradora del Istmo S.A., was the largest producer at 1,700 tons per day. Frasch production from Coachapa and Jáltipan was controlled by Azufrera Panamericana S.A. (APSA), headquartered in Veracruz. In September, APSA commissioned the new Petapa dome adjacent to Jáltipan with a capacity of 1,500 tons per day. APSA scheduled a new 1,000-ton-per-day mine, Otapan, for startup in late 1985 or early 1986. Increased production from the Petapa dome is expected to compensate for Jáltipan's diminishing trend and result in a further rise in Mexico's Frasch output.

MINERAL FUELS

Coal.—Run-of-mine production of metallurgical and steam coal totaled almost 10 million tons, a new historic level, while washed coal amounted to 3.3 million tons. Most of the coal was mined by subsidiaries of the steel companies for conversion into coke. The SIDERMEX steel companies accounted for 6.3 million tons of the total and were planning a 20% increase in coal output for 1985. The two major producers of metallurgical coal were Minerales Monclova S.A. and Cía. Minera la Florida de Múzquiz S.A., both subsidiaries of AHMSA, operating in Coahuila. Although steel output increased in 1984, coke output decreased by 6.2% from that of 1983 to 2.8 million tons. This reduction of coke consumption was a direct result of efficiencies in the steel industry, which required 602 kilograms of coke per ton of steel instead of 660 kilograms.

MEDIMSA was the only major private company with coal mine and coking facilities. MEDIMSA's coking coal output decreased again to 755,000 tons, of which 290,000 was sold to SIDERMEX plants, and the balance was consumed at MEDIMSA's coking plant at Nueva Rosita. MEDIMSA completed the first stage of its new underground mine, Pasta de Conchos, in San Juan de Sabinas, Coahuila, to be operated under a subsidiary, Carbonífera de Nueva Rosita S.A. By yearend, the new mine was operating at the level of 100,000 tons of metallurgical coal per year. Full capacity of 480,000 tons per year was expected by the end of 1986.

Minera Carbonífera Río Escondido S.A. (MICARE), a mixed company with the majority of shares held by the Government, continued as the largest and only significant producer of steam coal. MICARE's output from surface and underground mines in Coahuila reached a record high of 2.8 million tons of steam coal for shipment to the Río Escondido complex at Piedras Negras, Coahuila.

Natural Gas.—Most of Mexico's natural gas production is associated with its crude oil output. Of total gas output, 19% was unassociated with crude oil, compared with the 21% share in 1983. Although crude oil output increased modestly, gross natural gas output actually decreased by 7.2%, relative to that of 1983. The area of Huimanguillo in the Southeastern Zone was the major source of associated gas, accounting for 38% of the national total. This area is characterized by producing wells of volatile crude oil with a high component of natural gas or condensate. There was another sharp increase in production of condensate to 41.8 million barrels compared with the 654,000 barrels obtained in 1982, as a result of the startup of separation equipment installed on the marine platforms as well as expanded equipment in the Chiapas-Tabasco area onshore. PEMEX achieved further success in reducing the amount of flared gas to 8% of total output compared with 11% in 1983 and 17% in 1982.

PEMEX's internal gas consumption was down by 5%, and domestic sales were down by 6%, both relative to that of 1983. Reduced domestic demand resulted from the decreased needs of the Comisión Federal de Electricidad because an abundance of rainfall led to greater hydroelectric output.

The United States continued as the only export market for Mexico's surplus of natural gas. Because of a further weakening of demand in the U.S. market in 1984, PEMEX's exports of natural gas decreased again by 32% to 43.1 billion cubic feet valued at $232 million, compared with 79.4 billion cubic feet valued at $354 million in 1983. Natural gas exports to the United States that averaged 148 million cubic feet per day in 1984 was considerably below the delivery rate of 288 million cubic feet per day initiated in January 1980.

PEMEX and Border Gas Inc., a consortium of private U.S. gas companies, announced the suspension of gas exports to the United States effective November 1, 1984. Both companies agreed to meet periodically thereafter to analyze the supply-demand situation in Mexico and the United States and to discuss conditions for the possible resumption of exports.

Petroleum.—PEMEX continued its active program of exploration to uncover new reserves of hydrocarbons and to evaluate areas with potential. During the year, 10 crude oilfields were discovered onshore and 3 offshore. The three offshore oilfields in the Bay of Campeche correspond to the wells Batab 1-A, Chuc 101, and Caan 1. The Batab 1-A well produced a light crude and is particularly significant for future development because of its deep source in the Kimmeridgian Jurassic bed. These three offshore discoveries also importantly increased the extension of the marine area. The new additions to Mexico's reserves partially compensated for the 1.33 billion barrels of liquid hydrocarbons extracted during the year. Reserves are adequate for 54 years at current production levels.

In the established fields, PEMEX drilled 228 development wells, with an 85% success rate. Most of the drilling equipment for field development was concentrated in the Chiapas-Tabasco Mesozoic area because of the high productivity of the wells. In the Bay of Campeche, 23 fixed platforms were in operation at yearend. To maintain its output level of hydrocarbons, PEMEX's drilling program encompassed 53 fields, of which 36 provided crude oil and associated gas and 17, unassociated gas only. A total of 303 exploratory and development wells were drilled in 1984, exceeding the number in 1983 by 56.

Mexico's production of crude oil in 1984 averaged 2.68 million barrels per day, slightly higher than that of 1983 but below the peak of 1982. The share of crude oil contributed by wells in the Bay of Campeche in the Marine Zone increased to 65% of the country's total.

Mexico exported almost 57% of its crude oil output at a rate of 1.52 million barrels per day. Exports were comprised of 41% Isthmus light crude and 59% Maya heavy crude. The Maya crude accounted for 56% of the total in 1983. PEMEX exported crude to 22 countries, the major part of which (49.2%) went to the United States, followed by Spain, Japan, the United Kingdom, and France. In August, Mexico and Venezuela agreed to maintain for the fifth consecutive year the San José Agreement regarding oil exports to Central American and Caribbean countries on a special basis. In May, market changes made it possible for PEMEX to increase the price of Maya heavy crude from $25.00 to $25.50 per barrel, while the light Isthmus crude remained constant at $29.00 per barrel.

PEMEX's total overseas sales were divided as follows: crude oil, 90.9%; petroleum products, 6.9%; natural gas, 1.4%; and petrochemicals, 0.8%. Exports of petroleum products, which increased by 32% over those of 1983 to a rate of 111,900 barrels per day for a value of $1.1 billion, were composed mostly of virgin stock (unfinished crude oil), gasoline, diesel, and fuel oil, while imports were mostly of liquid gas and lubricants, amounting to only $255 million. The figures above indicate a very favorable balance in Mexico's international trade of petroleum products. The steady growth in refinery capacity has made it possible for Mexico to become self-sufficient in a number of products with large surpluses for export. During 1984, PEMEX completed expansion of the capacity to process crude oil at the refinery centers at Poza Rica and Salamanca while expansion works continued at Tula and Salina Cruz. PEMEX operated nine primary refinery centers in Mexico with an installed capacity of 1.35 million barrels per day.

Mexico continued as the leading supplier of foreign oil to the United States, followed by the United Kingdom, Canada, Saudi Arabia, and Indonesia.

In November, PEMEX experienced the worst accident in its history when a propane-butane storage and distribution center in San Juan Ixhuatepec near Mexico City exploded and burned. Over 1,000 people were killed or injured, and millions of dollars in damages were sustained.

Table 5.—Mexico: Petroleum and natural gas production

Zone and district	Natural gas (million cubic feet)		Crude oil[1] (thousand 42-gallon barrels)	
	1983	1984	1983	1984
Marine Zone: Bay of Campeche	328,999	348,383	610,947	636,074
Southeastern Zone:				
Villahermosa[2]	735,279	664,609	268,228	263,878
Comalcalco District	5,217	7,410	5,047	6,047
Ciudad Pemex	120,551	101,033	5	5
Total[3]	861,047	773,052	273,279	269,929
Central Zone:				
Poza Rica	41,289	35,575	32,856	28,267
Cuenca Papaloapan	23,134	21,909	3,688	2,843
Nueva Faja de Oro	15,948	9,870	--	--
Total	80,371	67,354	36,544	31,110
Southern Zone:				
Aqua Dulce District	19,942	16,865	17,782	15,711
El Plan District	19,489	17,476	15,374	12,229
Nanchital District	1,427	1,397	1,578	1,477
Total	40,858	35,738	34,734	29,417
Northern Zone:				
Northern District	15,231	14,020	10,054	9,161
Southern District	9,418	7,589	7,145	6,629
Northeastern Frontier District	143,636	127,321	219	198
Total[3]	168,285	148,930	17,418	15,987
Grand total	1,479,560	1,373,457	972,922	982,517

[1]Does not include condensate.
[2]Referred to as Mesozoic in 1983.
[3]Data may not add to totals shown because of independent rounding.

Source: Petróleos Mexicanos, Memoria de Labores, 1983 and 1984.

Table 6.—Mexico: Salient crude oil statistics[1]

	1980	1981	1982	1983	1984
Production ----- thousand 42-gallon barrels--	708,454	843,933	1,002,430	972,922	982,517
Exports:					
Quantity---------do----	302,129	400,778	544,614	561,005	556,479
Value --------- millions--	$9,449	$13,305	$15,623	$14,821	$14,968
Share of total Mexican exports--percent--	62	69	74	66	62
To the United States:					
Total ---- thousand 42-gallon barrels--	[2]194,172	[2]177,510	[r]266,320	[r]300,700	273,790
Share of total U.S. imports ----percent--	10	10	19	23	19

[r]Revised.
[1]Based on annual reports of Petróleos Mexicanos, Memoria de Labores.
[2]Based on U.S. Department of Commerce import data.

Table 7.—Mexico: Proven hydrocarbon reserves

(Million 42-gallon barrels unless otherwise specified)

Zone	Dry natural gas (billion cubic feet)	Liquid hydrocarbons: Crude oil	Condensate	Dry natural gas liquid equivalent	1984 Total	1983 Total
1983 total ----------	76,998	49,911	7,185	15,404	XX	72,500
1984:						
Marine (Bay of Campeche) ----	12,366	28,506	3,309	2,473	34,288	34,467
Chicontepec ----------	26,705	10,916	1,321	5,341	17,578	17,581
Southeastern ----------	24,513	7,320	2,003	4,903	14,226	14,684
Northern----------	8,390	388	261	1,677	2,326	2,373
Central----------	3,523	1,262	183	705	2,150	2,194
Southern----------	1,206	868	73	241	1,182	1,201
Total----------	[1]76,702	49,260	7,150	15,340	71,750	XX

XX Not applicable.
[1]Data do not add to total shown because of independent rounding.

Source: Petróleos Mexicanos, Memoria de Labores, 1983 and 1984.

Uranium and Nuclear Energy.—Uranio Mexicano S.A., the state entity once responsible for uranium exploration and production, was not active in 1984 and ceased to exist. Reportedly in the near future, CRM will assume responsibility for exploration, while the CFM will continue construction of the metallurgical plant and eventually begin production of yellow cake. By law, uranium-related activities may be undertaken only by the Government.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Mexican pesos (Mex$) to U.S. dollars at the average controlled rate for 1984 of Mex$167.77=US$1.00. The average free rate in 1984 was Mex$185.19=US$1.00.
[3]Poder Ejecutivo Federal. Program Nacional de Mineria 1984-1988. Mexico City, Aug. 1984, 94 pp.
[4]Page 35 of work cited in footnote 3.
[5]Cámara Minera de México. Report to the XLVIII General Assembly. Mexico City, May 1985, p. IV.

The Mineral Industry of Morocco

By Kevin Connor[1]

Morocco continued to strengthen its position in international phosphate rock and derived phosphate fertilizer markets. In 1984, Morocco was the world's leading exporter of both phosphate rock and phosphoric acid. Work continued all year on the new phosphate-based fertilizer complex at Jorf Lasfar, which was to have an annual feed capacity of 4.5 million tons of phosphate rock. The multiproduct complex was expected to begin operations by mid-1985. Production levels of other mineral commodities were stagnant in 1984. Exploration efforts intensified for exploitable sulfur deposits, as Morocco imported all of its sulfur needs, an estimated 1.5 million tons. Continued increases in sulfuric acid manufacture were expected to double sulfur requirements by 1990.

The Government of Morocco had another difficult financial year in 1984, with continued increasing budgetary and account deficits aggravated by a 10% increase in petroleum imports. The total petroleum import bill increased 33% over the previous year's record-high expenditure, to $953 million, representing 24.4% of total import costs for the country.[2] This drain of foreign exchange was approximately $40 million more than all revenues earned from phosphate rock and phosphate derivative exports.

To reduce the need for importing more expensive petroleum products, two new petroleum refineries were under construction during the year at Jorf Lasfar and Nador. Construction of the refinery at Jorf Lasfar was being partly financed by the United Arab Emirates. The other refinery being constructed was a joint development between the Petroleum Maritime Corp. of Bermuda and the Moroccan Government.

Exploration efforts for petroleum in Morocco continued to intensify. Hitherto, drilling programs on Morocco's Continental Shelf as well as onshore regions have failed to identify any major oilfields. Morocco was unable to meet even 1% of its petroleum requirements through domestic production in 1984. Crude oil has been produced on a minor scale in Morocco for more than 50 years, with production peaking in 1963 at approximately 1 million barrels. Production declined steadily thereafter to about 80,000 barrels per year during the early 1980's. Exploration efforts in the early 1980's have, however, identified moderate-size natural gas reserves in the Essaouira Basin, and further exploration and development work was planned for this area in 1985.

PRODUCTION AND TRADE

Except for the phosphate rock and coal sectors, little changed over the course of 1984 in Moroccan mineral production trends. Phosphate rock production increased approximately 5.6%, owing to increased production from the Bou Craa Mine in Western Sahara. Morocco's coal production increased about 11% over 1983's production level and was a record high for coal production in the country.

To maximize export revenues from the phosphate-chemical fertilizer industry, favorably priced phosphoric acid exports were increased 25% in the first half of 1984, while exports of triple superphosphate and monoammonium phosphate decreased 25%

and 60%, respectively, for the same period. Export tonnages for the first half of 1984 of phosphoric acid, triple superphosphate and monoammonium phosphate were 600,000 tons, 212,000 tons, and 43,300 tons, respectively. Morocco was quick to take advantage of the reentry of Brazil into the international market for phosphoric acid, and by midyear, exports of almost 30,000 tons of phosphoric acid had been made to Brazil from Morocco.

The total amount of coal and coke imported during 1984 decreased by almost 23%, approximately 64,000 tons less than the previous year's imports. This decrease in imports was attributed to the increase in production from the country's sole coal mining operation at Jerada, a decrease in electrical generation during the second half of the year at the Roches Noires coal-fired powerplant, and a decrease in demand for coal and coke supplies at the country's sugar refineries. The only category where coal imports increased was the country's cement manufacturing industry, which doubled its coal imports to 107,000 tons for the year.

The Moroccan Government continued with negotiations and planning for three major trade agreements with the Governments of China, India, Saudi Arabia, and the United Arab Emirates. The trade agreements were to be part of joint venture projects for building fertilizer manufacturing plants in Abu Dhabi, China, and Saudi Arabia, based on Moroccan phosphate rock and phosphoric acid feedstock. The fertilizer complex proposed for Saudi Arabia would manufacture phosphoric acid, ammonia, and diammonium phosphate. Morocco would supply 1.4 million tons of phosphate rock annually to the complex, which was estimated would cost $300 million to construct. The major portion of the fertilizer products were to be shipped to India. The feasibility study for the Abu Dhabi plant was under way at yearend. The proposed facility would manufacture diammonium phosphate from imported Moroccan phosphoric acid. Construction costs for this plant were estimated at between $60 and $70 million. The third proposed joint venture project was a two-phase construction project for a diammonium phosphate complex to be built in China. the first phase would build facilities to manufacture diammonium phosphate from imported Moroccan phosphoric acid. The second phase would construct facilities to manfacture phosphoric acid from imported Moroccan phosphate rock. The estimated cost of the first-phase plant was $70 million.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[3]
METALS					
Antimony concentrate:					
Gross weight	1,278	1,140	2,011	1,008	2,209
Metal content	550	513	905	454	972
Cobalt concentrate:					
Gross weight	6,704	6,265	6,338	--	--
Metal content	838	789	792	--	--
Copper concentrate:					
Gross weight	24,067	23,104	63,350	69,213	66,831
Metal content	7,220	6,931	20,905	22,840	22,093
Iron and steel:					
Iron ore:					
Gross weight	78,020	73,112	223,820	252,475	[e]250,000
Iron content	49,933	45,329	138,768	156,535	[e]155,000
Metal:[e]					
Pig iron	12,000	12,000	12,000	15,000	15,000
Steel, crude	6,000	6,000	6,000	6,000	6,000
Lead:					
Concentrate:					
Gross weight	171,377	168,078	147,959	139,996	143,890
Metal content	114,823	115,974	103,571	97,997	100,723
Metal:					
Smelter, primary[e]	40,300	50,100	56,500	[r]57,100	48,500
Refined:					
Primary	40,261	50,149	56,533	54,223	46,054
Secondary[e]	2,100	2,100	2,100	2,000	2,000
Total	42,361	52,249	58,633	56,223	48,054
Manganese ore, largely chemical-grade	131,315	109,647	96,529	73,515	56,786
Nickel, Ni content of cobalt ore[e]	134	130	127	--	--
Silver, mine output, metal content thousand troy ounces	3,154	[e]2,120	[e]2,640	[e]2,850	2,409

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[3]
METALS —Continued					
Tungsten, mine output, metal content kilograms	3,165	--	--	--	--
Zinc concentrate:					
Gross weight	21,443	14,720	22,442	14,048	21,092
Metal content[e]	6,070	7,900	11,200	[r]7,200	11,000
NONMETALS					
Barite	358,311	465,600	515,672	282,544	425,200
Cement, hydraulic thousand tons	3,552	[r]3,606	3,739	3,848	[e]4,000
Clays, crude:					
Bentonite	3,284	2,906	4,457	4,095	1,825
Fuller's earth (smectite)	17,430	19,750	24,604	27,385	33,406
Montmorillonite (ghassoul)	4,271	8,670	4,271	6,037	3,382
Feldspar	1,594	2,156	1,025	[e]1,000	1,000
Fluorspar, acid-grade	64,400	66,700	50,200	60,300	65,900
Mica	331	1,805	512	500	1,200
Mineral water cubic meters	69,424	70,240	70,575	[e]70,000	[e]70,000
Phosphate rock (includes Western Sahara) thousand tons	18,824	18,562	17,754	20,106	21,245
Pigments, mineral: Natural iron oxide (goethite)	121	--	--	--	--
Pyrites and pyrrhotite, gross weight	124,576	78,938	--	--	--
Salt, all types	67,477	55,197	56,556	69,600	62,740
Sulfur, S content of pyrites	36,052	22,105	--	--	--
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand tons	680	703	735	751	834
Gas, natural:					
Gross million cubic feet	[e]3,000	[e]3,000	NA	NA	NA
Marketed do	[e]2,900	[e]2,400	NA	NA	NA
Petroleum:					
Crude thousand 42-gallon barrels	[e]365	[e]300	NA	NA	NA
Refinery products:					
Gasoline do	2,980	[e]3,000	NA	NA	NA
Jet fuel do	NA	[e]2,100	NA	NA	NA
Kerosine do	NA	[e]500	NA	NA	NA
Distillate fuel oil do	8,840	[e]10,200	NA	NA	NA
Residual fuel oil do	12,100	[e]12,400	NA	NA	NA
Other do	1,800	[e]2,000	NA	NA	NA
Refinery fuel and losses do	NA	[e]1,800	NA	NA	NA
Total do	NA	[e]32,000	NA	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through June 26, 1985.
[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. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[3]Reported figures.

Table 2.—Morocco: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	1,016	--		
Metal including alloys:				
Scrap	270	1,002	--	France 579; United Kingdom 325.
Unwrought	3	--		
Semimanufactures	31	--		
Antimony: Ore and concentrate	1,796	1,105	--	United Kingdom 657; Yugoslavia 303.
Cobalt: Ore and concentrate	5,017	1,852	--	All to France.
Copper:				
Ore and concentrate	60,291	69,531	--	Spain 28,848; Turkey 9,673; West Germany 8,122.
Matte and speiss including cement copper	1,815	3,270	--	Belgium-Luxembourg 3,020; West Germany 250.

See footnotes at end of table.

Table 2.—Morocco: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Copper —Continued				
Oxides and hydroxides	--	4	--	France 2; Tunisia 2.
Sulfate	--	2	--	All to France.
Metal including alloys, scrap	2,616	2,539	--	France 1,227; Belgium-Luxembourg 341; United Kingdom 329.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	237,400	139,706	--	Albania 109,144; France 15,707.
Metal:				
Ferroalloys	11,905	68,412	--	Spain 53,843; Netherlands 4,820.
Semimanufactures	27	47	--	Mainly to Tunisia.
Lead:				
Ore and concentrate	61,930	72,119	--	Spain 24,655; France 14,481; West Germany 11,009.
Metal including alloys, unwrought	51,908	55,696	--	Italy 29,001; Greece 10,074; Netherlands 779.
Manganese: Ore and concentrate, metallurgical-grade	97,738	57,860	53	West Germany 17,325; France 17,200; Italy 6,358.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	(2)	2,591	--	France 1,673; Switzerland 546; United Kingdom 370.
Zinc:				
Ore and concentrate	15,862	14,149	--	France 4,880; West Germany 4,847; Belgium-Luxembourg 2,952.
Blue powder	80	7	--	All to France.
Matte	--	169	--	France 121; United Kingdom 21.
Metal including alloys, scrap	828	264	--	France 205; Spain 59.
Other: Ores and concentrates	1,260	1	--	All to Netherlands.
NONMETALS				
Barite and witherite	455,340	372,319	173,517	Netherlands 69,182; Norway 37,830.
Cement	37,266	3,902	NA	The Gambia 3,198; Spain 256.
Clays, crude	25,741	23,520	--	Spain 16,015; Tunisia 1,361.
Feldspar, fluorspar, related materials	62,224	56,452	18,450	Canada 27,000; Norway 10,984.
Fertilizer materials: Manufactured:				
Ammonia	137,037	198,382	--	Italy 125,494; Belgium-Luxembourg 30,240; Spain 29,753.
Phosphatic	295,756	609,035	--	China 219,050; U.S.S.R. 72,095; Egypt 53,225.
Gypsum and plaster	224,724	109,398	--	Ivory Coast 34,678; Senegal 20,370; Japan 14,400.
Lime	237	263	NA	NA.
Mica, crude including splittings and waste	1,570	--		
Phosphates, crude thousand tons	13,976	13,976	--	Spain 2,270; France 1,679; Belgium-Luxembourg 1,530.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,875	5,561	--	Italy 1,074; unspecified 4,267.
Worked	2	--		
Gravel and crushed rock	49,688	41,386	NA	NA.
Quartz and quartzite	--	1	--	All to Hungary.
Sand other than metal-bearing	30,017	31,899	NA	NA.
MINERAL FUELS AND RELATED MATERIALS				
Coal: Anthracite	24,755	40,200	--	United Kingdom 21,080; France 17,620.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	86	92	--	Portugal 77; France 15.
Gasoline:				
Aviation do	2	4	NA	NA.
Motor do	1,742	2,017	--	All to Netherlands.
Kerosine and jet fuel do	357	239	NA	NA.
Distillate fuel oil do	48	30	NA	NA.
Lubricants do	1	--		
Residual fuel oil do	28	23	NA	NA.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $9,144,000.

Table 3.—Morocco: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	8,142	2,000	--	All from Guyana.
Oxides and hydroxides	2,378	2,793	--	France 2,664; Ireland 23.
Metal including alloys:				
Scrap	2	28	--	All from West Germany.
Unwrought	1,276	1,520	--	France 1,131; Spain 171.
Semimanufactures	5,147	5,860	3	France 2,086; Italy 1,166; Spain 1,043.
Chromium:				
Ore and concentrate	40	238	--	Zimbabwe 197; Belgium-Luxembourg 40.
Oxides and hydroxides	18	15	--	West Germany 10; France 3.
Copper:				
Oxides and hydroxides	11	6	--	Norway 4; France 2.
Sulfate	--	3	--	France 1; Spain 1.
Metal including alloys:				
Scrap	55	5	--	All from France.
Unwrought	517	724	--	France 316; Italy 263.
Semimanufactures	9,217	9,038	1	France 3,361; Belgium-Luxembourg 1,785; United Kingdom 1,212.
Gold: Metal including alloys, unwrought and partly wrought value, thousands	--	$277	--	All from Switzerland.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	602	68	--	France 41; West Germany 20.
Ferroalloys:				
Ferrochromium	21	99	--	Italy 40; West Germany 24; Turkey 15.
Ferromanganese	189	206	--	France 94; Spain 62; Portugal 40.
Ferrosilicomanganese	26	30	--	All from France.
Ferrosilicon	116	176	--	France 89; West Germany 54; Portugal 25.
Unspecified	2,683	2,298	--	United Kingdom 2,277.
Steel, primary forms	41,805	53,754	--	France 17,369; West Germany 14,601; Spain 12,277.
Semimanufactures:				
Bars, rods, angles, shapes, sections	304,502	369,289	1	Spain 274,726; France 56,540; Italy 13,107.
Universals, plates, sheets	130,372	116,572	12	France 43,294; West Germany 27,091; Spain 23,606.
Hoop and strip	15,116	10,475	--	France 5,805; Belgium-Luxembourg 2,160; West Germany 982.
Rails and accessories	7,457	3,149	--	France 3,039.
Wire	3,244	3,708	([2])	France 2,120; Belgium-Luxembourg 1,263; Spain 64.
Tubes, pipes, fittings	27,356	26,859	351	France 11,004; Spain 7,129; Belgium-Luxembourg 1,744.
Castings and forgings, rough	2,344	2,505	10	France 1,471; Italy 349; Spain 187.
Lead:				
Oxides	304	314	--	France 290; West Germany 22.
Metal including alloys:				
Unwrought	85	79	([2])	Mainly from Netherlands.
Semimanufactures	249	175	--	France 142; Netherlands 33.
Lithium: Oxides and hydroxides	22	--		
Magnesium: Metal including alloys, semimanufactures	20	([2])	--	Mainly from West Germany.
Manganese:				
Ore and concentrate, metallurgical-grade	138	316	--	Gabon 247; France 69.
Oxides	808	574	--	Belgium-Luxembourg 315; Spain 200.
Mercury 76-pound flasks	290	232	--	Spain 174.
Nickel:				
Matte and speiss	9	9	--	United Kingdom 5; France 4.
Metal including alloys:				
Unwrought	11	16	--	France 8; Canada 4.
Semimanufactures	1,117	735	--	West Germany 438; Italy 140; Switzerland 94.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value	$8,191	$266	--	All from France.
Selenium, elemental	([2])	1	--	Mainly from Netherlands.
Silicon, high-purity	23	5	--	Mainly from France.

See footnotes at end of table.

Table 3.—Morocco: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought ___troy ounces__	(3)	26,042	--	Belgium-Luxembourg 8,681; France 8,681; Italy 7,363.
Tin: Metal including alloys:				
Unwrought	176	114	--	Malaysia 36; Thailand 35; Indonesia 25.
Semimanufactures	16	21	--	France 11; West Germany 4; Netherlands 3.
Titanium:				
Ore and concentrate	2	53	--	Australia 34; Austria 17.
Oxides	2,128	1,940	--	Belgium-Luxembourg 934; Spain 568; West Germany 258.
Zinc:				
Oxides	633	722	--	France 543; Spain 61; Portugal 51.
Blue powder	102	150	--	France 105; Belgium-Luxembourg 42.
Metal including alloys:				
Unwrought	2,648	2,628	--	France 1,231; Belgium-Luxembourg 672; Spain 211.
Semimanufactures	84	118	--	France 47; Italy 42; West Germany 23.
Other:				
Ores and concentrates	227	70	--	Australia 68.
Base metals including alloys, all forms	23	48	(2)	Spain 28; Belgium-Luxembourg 20.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	125	64	1	Italy 60.
Artificial: Corundum	131	285	--	France 113; West Germany 77.
Dust and powder of precious and semiprecious stones including diamond ___value__	--	$1,204	--	All from France.
Grinding and polishing wheels and stones	272	276	(2)	Italy 121; France 62; United Kingdom 38.
Asbestos, crude	8,086	6,590	12	Canada 3,701; Botswana 1,501.
Barite and witherite	5	--		
Boron materials:				
Crude natural borates	(2)	469	468	France 1.
Oxides and acids	17	25	--	Turkey 17; France 7.
Cement	29,216	31,703	--	Spain 15,765; France 14,495.
Chalk	1,937	1,053	--	France 900; Belgium-Luxembourg 150.
Clays, crude:				
Bentonite	358	(2)	--	Mainly from France.
Kaolin	8,133	5,610	(2)	France 5,181.
Unspecified	147	7,228	(2)	United Kingdom 5,268; France 1,177.
Cryolite and chiolite	--	7	--	France 4; Italy 3.
Diamond: Industrial stones ____value__	$1,894	--		
Diatomite and other infusorial earth	36	107	2	Spain 59; France 37.
Feldspar, fluorspar, related materials	565	1,521	--	France 1,147; Sweden 300.
Fertilizer materials:				
Crude, n.e.s	300	--		
Manufactured:				
Ammonia	53,189	83,801	--	U.S.S.R. 24,984; Libya 24,537; Trindad and Tobago 29,128.
Nitrogenous	275,722	207,080	--	Romania 62,473; Belgium-Luxembourg 61,847; France 36,308.
Potassic	72,351	76,336	--	Spain 38,725; Italy 14,979; U.S.S.R. 12,598.
Unspecified and mixed	578	788	--	Belgium-Luxembourg 456; West Germany 157.
Graphite, natural	21	98	--	France 95.
Gypsum and plaster	5	20	--	Mainly from France.
Iodine	1	(2)	--	Do.
Lime	600	2,350	--	All from France.
Magnesium compounds:				
Magnesite	163	42	--	Austria 19; Spain 18.
Oxides and hydroxides	33	43	--	France 26; Ireland 12.

See footnotes at end of table.

Table 3.—Morocco: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Pigments, mineral: Iron oxides and hydroxides, processed	1,116	998	--	West Germany 445; United Kingdom 294; Italy 145.
Potassium salts, crude	(2)	--		
Precious and semiprecious stones other than diamond:				
Natural ... value	--	$515	--	All from France.
Synthetic ... do	--	$1,964	--	Do.
Salt and brine	10	8	--	West Germany 4; United Kingdom 3.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	3,449	8,773	--	France 7,796; United Kingdom 255.
Sulfate, manufactured	5,346	2,596	--	West Germany 2,100; France 225; Belgium-Luxembourg 118.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	11	--	All from France.
Worked	3	64	--	All from Italy.
Dolomite, chiefly refractory-grade	121	149	--	France 106; Spain 43.
Gravel and crushed rock	119	603	--	Belgium-Luxembourg 432; France 166.
Quartz and quartzite	610	919	--	Belgium-Luxembourg 915.
Sand and other than metal-bearing	21,813	23,940	--	Belgium-Luxembourg 18,200; Portugal 3,415.
Sulfur:				
Elemental, crude including native and byproduct ... thousand tons	1,027	1,350	48	Saudi Arabia 467; Poland 348; Canada 331.
Sulfuric acid	(2)	2,015	--	Spain 2,000.
Talc, steatite, soapstone, pyrophyllite	974	1,209	1	France 770; Belgium-Luxembourg 349.
Other: Crude	10,493	18,184	--	France 10,682; West Germany 2,673; Spain 2,464.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	340	4,982	5	Spain 3,490; West Germany 798; France 380.
Coal: Lignite including briquets	--	1	1	
Coke and semicoke	25,385	27,607	--	West Germany 23,629; Italy 2,500.
Peat including briquets and litter	6,694	22	--	All from Netherlands.
Petroleum:				
Crude ... thousand 42-gallon barrels	31,738	29,935	--	Saudi Arabia 15,036; U.S.S.R. 6,660; Iraq 5,251.
Refinery products:				
Liquefied petroleum gas ... do	1,252	1,817	--	Spain 595; France 414; United Kingdom 364.
Gasoline ... do	56	349	--	Mainly from Netherlands.
Mineral jelly and wax ... do	61	1	(2)	Mainly from Belgium-Luxembourg.
Kerosine and jet fuel ... do	1	39	--	Netherlands 31; Belgium-Luxembourg 8.
Lubricants ... do	273	214	(2)	France 212.
Bitumen and other residues ... do	124	55	--	All from Spain.
Petroleum coke ... do	--	193	193	

[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $117,916

COMMODITY REVIEW

METALS

Morocco's fledgling steel industry completed construction of its first manufacturing installation with the commissioning of the $120 million Nador steel rolling mill in March. Completion of the steel rolling mill at Nador was Morocco's first step toward becoming an integrated steel producer. In 1980, the Government agency Société Nationale de Siderurgie (SONASID) awarded the construction contract for the mill to Davy McKee Ltd. of the United Kingdom. The mill had been designed by Morgan Construction of the United States with a capacity of producing 480,000 tons of wire rod and rebar per year. During the early years of the mill's operation, plans called for the plant feedstock of steel billets to be imported.

The Nador rolling mill was part of an integrated steelmaking complex to include a 1-million-ton-per-year blast furnace, Linz-Donawitz steelmaking and billet continuous casting plants, and rolling mills. Civil works completed or under way during 1984 to support the infrastructure for the existing mill and future complex at Nador were an electrical power transmission network, water supply and sewage disposal systems, widening and improvement of roads, enlargement of the Nador seaport to handle 60,000-ton, 13-meter-draft ships, and a railway project linking the port with the Nador steel complex. Nador has proximity to both the Seferif iron ore deposits and the anthracite coal deposits of Jerada.

NONMETALS

Cement.—There were nine cement manufacturing plants in operation in Morocco during 1984, increasing annual production by over 100,000 tons for the third consecutive year. The increase was mainly attributed to the startup of Société Nouvelle de Casablanca's 1.2-million-ton-per-year-capacity plant that began operations late in 1983. Work on converting the Cimenterie de l'Oriental and Ciments d'Agadir plants to coal firing continued throughout the year, with Ciments d'Agadir completing the conversion by yearend. A major expansion program also began during 1984 at the Ciments d'Agadir plant, with an additional 1,200-ton-per-day line slated for startup by the end of 1986. Equipment contracts were awarded to F. L. Smidth of the United Kingdom to supply the kiln and to Polysius S.A. of France to supply the Lepol grate and granulator. Cement produced from the additional line at Agadir was expected to be marketed in the country's southernmost provinces.

Fertilizer Materials.—In the latter half of the year, Morocco's Office Cherifien des Phosphates (OCP) awarded a contract to Technip Cie. Française d'Etudes et de Construction of France for the construction of a phosphate fertilizer complex at Jorf Lasfar. The project was to comprise building units for manufacturing 1 million tons per year of diammonium phosphate, 400,000 tons per year of triple superphosphate, and 200,000 tons per year of ammonium sulfate phosphate. Construction of the first unit was expected to be completed within 22 months, and the unit was to begin operations about mid-1986. Completion of the entire project was expected late in the spring of 1987. The project was being financed by French Government loans and buyers' credits. Approximately 25% of the construction costs were to be spent on supportive infrastructural civil works. The AZF dual pipe reactor process, developed by CdF Chemie AZF of France, was to be incorporated into the Jorf Lasfar plants. As part of its contract, Technip was to supply storage facilities for imported ammonia supplies, a 2.5-kilometer pipeline from the Port of Jorf Lasfar to the complex, and phosphate storage facilities.

The new plant projects mentioned above, plus an additional eight 500-ton-per-day phosphoric acid plants and six 2,300-ton-per-day sulfuric acid units also under construction, would upon completion make Jorf Lasfar the world's largest fertilizer manufacturing complex. With the exception of ammonium sulfate phosphate, all fertilizer products manufactured at Jorf Lasfar were expected to be exported.

Table 4.—Office Cherifien des Phosphates (OCP): Chemical plants, products, and capacities

(Metric tons per day)

Location and plant	Products	Start date	Capacity
Safi:			
Maroc Chimie I	Phosphoric acid	1965	[1]500
	Triple superphosphate	1965	2,000
	Ammonium sulfate phosphate	1973	530
	Nitrogen-phosphorus-potassium	1973	700
Maroc Chimie II	Sulfuric acid	1976	2,000
	Phosphoric acid	1976	[1]400-450
Maroc Phosphore I	Sulfuric acid	1976	4,500
		1981	1,500
	Phosphoric acid	1976	[1]4,500
		1981	[1]500
	Monoammonium phosphate, powder	1976	1,200
Maroc Phospore II	Sulfuric acid	1981	5,250
	Phosphoric acid	1981	[1]1,500
Jorf Lasfar:			
OCP	Sulfuric acid	1985-86	13,800
	Phosphoric acid		[1]4,000
OCP (granulation)	Diammonium phosphate-ammonium sulfate phosphate.	1986-87	2,880
	Diammonium phosphate		2,880
	Triple superphosphate		1,152

[1]In terms of phosphorus pentoxide, P_2O_5.

Source: Phosphorus & Potassium (London). No. 136, Mar.-Apr. 1985, pp. 22-28.

Early in the year, OCP awarded a contract to expand the throughput of the Youssoufia black phosphates purification plant from 500,000 tons per year to 1,700,000 tons per year. Both black and white phosphates have been produced at the Youssoufia mines. The term "black" was used to signify phosphate rock that is unacceptably high in organic matter impurities. The organic matter has been sucessfully removed through calcining. Owing to the expected decline of white phosphate rock reserves at Youssoufia, production and calcining of black phosphate rock were expected to increase because reserves of the organically impure phosphate rock were large in the Youssoufia area. Two new underground mines, Recette 8 and 9, were to start production during 1985-86, each mine with a capacity of 1.5 million tons per year of black phosphate rock. Dorr Oliver Co. of France and the United States was to provide technology and equipment for the expansion project. The plant was to use multistage fluid bed calcifiers to remove the excessive organic carbon and should result in a rock product with 74% to 75% bone phosphate of lime. Construction work for the project was expected to take 25 months to complete.

Table 5.—Office Cherifien des Phosphates (OCP): Phosphate rock production, capacity, and reserves, by area

(Million metric tons, unless otherwise specified)

Area	Actual production 1983	Production capacity		Identified reserves (billion tons)
		1984	1990	
Khouribga	11.9	17.6	19.0	26.80
Youssoufia	5.4	5.6	7.0	8.02
Ben Guerir	3.0	3.0	4.0	([1])
Bou Craa	.7	2.0	4.0	.95
Total	21.0	[2]28.2	34.0	NA

NA Not available.
[1]Undetermined.
[2]Reported production was 21.5 million tons; detail by area was not available.

Source: Phosphorus & Potassium (London). No. 136, Mar.-Apr. 1985, pp. 22-28.

MINERAL FUELS

Coal.—A $74 million expansion and modernization project was begun at the Jerada anthracite coal mine during the year, with expectations of increasing the production from 800,000 to 1 million tons per year by 1988. The project was to simplify the mine's infrastructure, improve upon underground exploration and mine-development work methods, install new underground and surface equipment, and increase technical assistance staff for developing mine plans and plan implementation. Most of the funding for the project had not been secured by yearend, but was expected to be financed via a loan from the International Bank for Reconstruction and Development (World Bank) and other international lending institutions. Negotiations for the World Bank loan, estimated at $34 million, were expected to be finalized early in 1985.

Natural Gas and Petroleum.—*Exploration.*—Morocco's National Agency for Petroleum Research and Production (ONAREP) concentrated its exploration efforts in the Meskala area of the Essaouira Basin, where a natural gas field was discovered at the end of 1981. Early indications in 1982 and 1983 suggested a large reserve of gas with a high proportion of condensates within the Meskala Field. However, the results of four exploratory wells drilled in the field during 1984 were disappointing, and ONAREP had shifted its exploration efforts to another field at Zelten by yearend. No oil discoveries were reported by ONAREP during the year.

In 1984, there were three United States international oil companies with offshore exploration permits and concessions in Morocco's Continental Shelf area. They were Amoco International, with two concession areas along the northern coastline of the Mediterranean Sea and one in the south off the coast of Tan-Tan; Mobil Oil Corp., with two concessions off the coastline of Tarfaya, Western Sahara; and the Atlantic Richfield Co., with a concession area off the coastline of Agadir. Negotiations were also completed with Esso Exploration Inc. to begin an onshore drilling program in the Boudenib area in 1985. Another U.S. exploration firm, Princeton Geophysics Inc., was reported to be negotiating at yearend for an onshore concession area northeast of the Esso concession, near the Algerian border in the high plateau area of Morocco. Amoco International began an exploration drilling operation in 1984 in its Tan-Tan concession and planned to begin drilling a second exploration well early in 1985 off the Al Hoceima coastline of northern Morocco.

Petroleum Refineries.—There were two petroleum refineries operating in Morocco in 1984 at Sidi Kacem and Mohammedia. An expansion project at the Mohammedia plant was completed during the year, increasing the plant's capacity by 40% and raising the combined refining capacity of the two plants to 94,000 barrels per day.

Uranium.—Morocco's Mineral Research Bureau announced in late 1984 that its exploration teams had discovered promising deposits of uranium ore in the area adjoining the Mediterranean Sea between the towns of Cueta and Tetuan. Estimated reserves for the deposits were still unknown at yearend, although total tonnage was suspected to be substantial. Further comprehensive investigations of the deposits were planned for 1985.

Work was completed on installation of a research reactor acquired from the General Atomic Corp. of the United States, at the new Center for Nuclear Sciences and Technology, south of Rabat. Results of pilot-plant-scale tests at the Maroc Chimie and Phosphore I plants in Safi have shown the technical feasibility of byproduct recovery of uranium from Morocco's phosphate rock. Unexpected savings of energy from conservation efforts and the depressed state of the international uranium market have delayed the building of a large-scale extraction plant at Safi, but the Moroccan Government hoped to build a nuclear reactor for generating electricity, fueled by Moroccan uranium, sometime in the 1990's.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Moroccan dirhams (DH) to U.S. dollars at the rate of DH8.81=US$1.00.

The Mineral Industry of Namibia

By George A. Morgan[1]

The mining industry's major mineral production in 1984 was comprised of the base metals copper, lead, and zinc, and the mineral fuel uranium. The mining industry's strength was due to the increased value of mineral exports as a result of depreciation of the rand against the U.S. dollar and English pound, in which most mineral sales were quoted. The industry's contribution to the gross domestic product was about 30%, according to the Sixth Annual Report of the Chamber of Mines. Estimated taxes accrued from mining companies, the export duty on diamonds, and the nonresident shareholders tax were $94 million compared with $89 million in 1983.[2] Production of nearly all mineral products declined, with the exception of increased output of arsenic, lithium minerals, and sulfur in pyrite concentrate.

The base metals sector contracted with the closure of the Matchless and Oamites Mines, while other operations performed at reduced levels. Changes in corporate ownership continued with Metorex Mining Co. of the Republic of South Africa purchasing the Klein Aub copper mine from General Mining Union Corp. Ltd.

Employment in the mining sector declined for the fifth consecutive year from 20,074 people in 1979 to 15,059 people in 1984, mainly owing to lower production levels and higher operating efficiencies. Exploration by new companies declined, although existing mining firms maintained the search for new ore bodies.

The 1984-85 budget included tax increases to cover revenue shortfalls. They included increases in the diamond income tax from 50% to 55%, the general sales tax from 7% to 9%, and the nonresident shareholder's tax from 12.5% to 15%. The general corporate tax rate remained at 42%. The Republic of South Africa provided 48% of the total revenue as budget transfers and substitute customs and export duty payments.

PRODUCTION AND TRADE

The lower value of the rand, while improving export sales, led to higher production costs and increased inflation. Tsumeb Corp. Ltd. (TCL), the largest base metal producer in Namibia, reported a net loss of $5.6 million in 1984. Loss of output from the company's Matchless Mine and toll concentrates from Metorex's Oamites Mine led to operation of a single reverberatory furnace at yearend. An excess of 25,000 tons of concentrate was toll smelted elsewhere.

An agreement was signed to transfer ownership of the South African Transport Services' assets in Namibia, valued at $1.3 billion, to the latter. According to the agreement, the Republic of South Africa, which took over the railroads in 1922, renounced all ownership of fixed property and rolling stock used in the Namibian road and rail transport network, excluding Walvis Bay. The Republic of South Africa was to operate the system on a contractural basis and would continue to cover operational losses for 3 years on a reduced percentage basis. Namibia had financial responsibility for management and operation of transportation in the country, including the Port of Luderitz. No compensation was made to the

Republic of South Africa for the acquisition, which included 148 diesel locomotives. Some lines were to be closed to reduce costs, although those affecting mining areas were to continue operation.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Arsenic, white[3]	1,288	1,370	1,895	1,126	2,504
Cadmium metal, refined	69	--	110	[e]25	40
Copper:					
Mine output, metal content of concentrate	39,200	46,185	49,800	50,447	47,406
Metal, blister	40,004	39,719	49,767	54,238	48,573
Gold, metal content of smelter products	[e]6,000	[e]6,000	7,395	7,459	6,302
Lead:					
Mine output, metal content of concentrate	50,200	46,900	32,900	38,467	33,255
Metal, refined	42,654	41,729	40,590	35,416	28,930
Silver: Mine output, metal content of concentrate thousand troy ounces	3,365	3,456	2,812	3,533	3,255
Tin, mine output, metal content of concentrate	1,070	1,228	1,326	[e]1,400	1,350
Tungsten, mine output, metal content of concentrate[e]	150	--	--	--	--
Uranium, U_3O_8 content of concentrate	4,763	4,681	4,454	[e]4,450	4,400
Zinc, mine output, metal content of concentrate	31,908	29,600	[e]32,200	33,526	32,195
NONMETALS					
Diamond:[4]					
Gem[e] thousand carats	1,482	1,186	963	915	884
Industrial[e] do	78	62	51	48	46
Total do	1,560	1,248	1,014	963	930
Lime	NA	NA	1,150	600	--
Limestone and marble	NA	NA	2,800	2,300	200
Lithium minerals:					
Amblygonite	NA	NA	80	50	60
Lepidolite	NA	NA	60	30	20
Petalite	NA	NA	900	700	800
Total	NA	1,263	1,040	780	880
Mica	NA	NA	--	100	90
Quartz	NA	NA	3,500	150	20
Salt	[e]230,000	193,000	184,000	136,900	84,900
Sulfur: S content of pyritic concentrate	3,692	8,361	58,209	80,719	104,454

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through July 20, 1985.
[2]Data are compiled from the Annual Report of the Chamber of Mines of South West Africa/Namibia and from operating company annual reports as follows: Tsumeb Corp. Ltd., South African Iron and Steel Industrial Corp. Ltd., Falconbridge Nickel Mines Ltd., Rio Tinto Zinc Corp. Ltd., and others as available.
[3]White arsenic equivalent of all arsenic products reported as being produced.
[4]Total figures reported by De Beers Consolidated Mines Ltd. in company annual reports for calendar years. Details on gem and industrial diamonds are estimates, assuming output to be 95% gem quality.

COMMODITY REVIEW

METALS

Copper.—TCL operated the Tsumeb, Kombat, Asis West, and Otjihase Mines. Output from the Matchless Mine ceased in December 1983, and it was placed on care and maintenance. Concentrates from these mines, as well as from Metorex's Klein Aub and Oamites Mines, and South African Iron and Steel Industrial Corp. Ltd.'s (Iscor) Rosh Pinah Mine, were processed at TCL's Tsumeb smelter. TCL closed one of its two reverberatory furnaces because of the Matchless Mine shutdown and shipped almost 10,000 tons of copper concentrate to O'okiep Copper Co. Ltd.'s smelter near Okiep in the Republic of South Africa for toll processing. Copper content of ore feed to TCL's concentrators varied from 1.74% for the Otjihase Mine to 3.85% for the Asis West Mine. Copper content of concentrates produced by TCL varied from 27.3% at the Otjihase mill to 32.7% at the Kombat mill for Asis West Mine ore. An underground crushing and milling plant was commissioned on the eighth level of the Tsumeb Mine, from which ore was pumped directly to a surface plant. Further such advanced techniques were planned to compete with rising transport and water costs. An underground conveyor and crushing station serving the Asis West ore body was due for commissioning in February 1985.

TCL continued to explore for and maintain its ore reserves. At yearend 1984, total reserves in thousand tons and average percent copper content were as follows: Tsumeb Mine, 6,171 at 3.31%; Kombat Mine, 1,568 at 1.54%; Asis West Mine, 1,607 at 4.24%; Otjihase Mine, 8,376 at 2.17%; Asis Ost Mine, 334 at 2.48%; and Matchless Mine, 2,076 at 2.33%.

Germanium.—A study was underway for the recovery of germanium from old slag heaps at Tsumeb, estimated to contain 1,500 tons of equivalent germanium dioxide. The plant last operated from July 1960 to June 1963 and produced 54 tons.

Lead.—Lead was produced from the Asis West, Kombat, and Tsumeb Mines of TCL, and from Iscor's Rosh Pinah Mine near the Orange River in southern Namibia. Tsumeb was the largest lead producer in 1984 at 15,258 tons in lead and copper concentrates, followed by Rosh Pinah with 13,220 tons of lead in concentrate. The lead smelter at Tsumeb produced 14,422 tons of refined lead from TCL operations, and 14,508 tons from purchased materials, mainly from the Rosh Pinah concentrator. Concentrate from Rosh Pinah graded 47% lead. No toll smelting of lead concentrate occurred. Total reserves of lead at the Tsumeb Mine were 6.2 million tons averaging 3.65% lead. Run-of-mine ore at Rosh Pinah Mine averaged 2% lead, with known reserves sufficient for 10 years of production at current output levels.

The Diblin Mining Co. operated the Namibe lead and silver mine and mill. Annual production was 3,500 tons per year of concentrate.

Table 2.—Namibia: Gross weight and elemental content of ore and concentrate produced in 1984, by mine

(Metric tons unless otherwise specified)

Mine	Gross weight	Elemental content: Copper	Lead	Zinc	Sulfur	Silver (troy ounces)
Asis West:						
Ore	133,472	5,139	2,362	--	NA	NA
Concentrate:						
Copper	13,891	4,535	1,018	--	NA	107,185
Lead	1,981	204	965	--	NA	6,496
Klein Aub:						
Ore[e]	210,000	5,000	--	--	NA	NA
Concentrate: Copper	9,000	4,400	--	--	--	225,055
Kombat:						
Ore	185,009	6,845	3,256	--	NA	NA
Concentrate:						
Copper	19,314	6,123	1,402	--	NA	163,933
Lead	2,752	281	1,392	--	NA	9,910
Oamites:						
Ore[e]	93,000	3,500	--	--	NA	NA
Concentrate: Copper	8,700	3,200	--	--	--	128,603
Otjihase:						
Ore	832,446	14,485	--	--	147,426	NA
Concentrate:						
Copper	49,890	13,595	--	--	17,676	109,072
Pyrite	172,315	586	--	--	86,778	--
Rosh Pinah:						
Ore[e]	152,000	--	13,000	35,000	NA	NA
Concentrate:						
Lead	18,200	--	8,900	[e]710	NA	417,959
Zinc	54,000	--	[e]4,320	29,800	NA	[e]500,000
Tsumeb:						
Ore	522,125	16,604	19,266	6,161	NA	NA
Concentrate:						
Copper	36,130	10,687	3,031	--	NA	1,057,060
Lead	43,326	3,795	12,227	1,685	NA	529,325
Total:						
Ore	XX	51,573	37,884	41,161	147,426	NA
Concentrate	XX	47,406	33,255	32,195	104,454	3,254,598

[e]Estimated. NA Not available. XX Not applicable.

Silver.—Output of silver was as a byproduct of copper, lead, and zinc production. About 1.8 million troy ounces was in copper concentrates, 1.0 million in lead concentrates, and 0.5 million in zinc concentrates. Reserves at the Tsumeb Mine were 6.2 million tons grading 3 troy ounces per ton. TCL's remaining reserves averaged 0.82 troy ounce per ton, and the Rosh Pinah Mine of Iscor graded about 1.12 troy ounces per ton.

Tin.—The Uis Mine, near Karibib, employed about 430 people and was operated by Industrial Minerals Mining Corp. (Pty.) Ltd., 100% controlled by Iscor. Reserves were 63 million tons at 0.14% tin, and 24 million tons grading 0.13% tin as cassiterite in pegmatites.

About 64,000 tons of ore was mined monthly, and the stripping ratio was 3.5 tons of waste to 1 ton of ore. Mill output was approximately 100 tons per month yielding 65% tin in concentrate, and small quantities of columbite and tantalite. Output was trucked to Swakopmund for rail shipment to Iscor in the Republic of South Africa, providing 60% of the latter's tin consumption. Output could be doubled to supply all of Iscor's tin requirements.

Zinc.—The Rosh Pinah Mine, owned by Imcor Zinc (Pty.) Ltd., a 100%-owned subsidiary of Iscor, accounted for over 30,500 tons of zinc in concentrates compared with a total Namibian production of 32,195 tons. The Tsumeb Mine of TCL was the only other producer, yielding 1,685 tons of zinc in lead concentrates. Zinc concentrates, averaging 55,000 tons per year, gross weight, normally were shipped to Iscor's plant at Springs, near Johannesburg. Recently, Iscor has substituted other overseas zinc concentrates for Rosh Pinah's, about 20,000 tons of the latter being exported via Walvis Bay.

NONMETALS

Diamond.—Reduced worldwide demand for larger, high-quality gem diamonds produced in Namibia by Consolidated Diamond Mines (Pty.) Ltd. (CDM) resulted in lower output. One of CDM's four conglomerate crushing and treatment plants was closed throughout 1984. One plant also treated only old tailings instead of new ore.

Total tonnage treated was 7.55 million tons compared with 9.59 million tons in 1983. The average recovery was 1.232 carats per ton, up from 1.004 carats per ton. Overburden stripping was 19.33 million tons compared with 17.83 million tons in 1983 and 56.5 million tons in 1980.

Wollastonite.—Plans to exploit wollastonite deposits near Kambib were underway between Futura Explorations and a Dutch firm. Wollastonite is a calcium silicate used in the manufacture of ceramic tiles and as a reinforcing fiber in plastics and cement. The state-owned First National Development Corp. was to finance mine development with an output of 3,000 to 5,000 tons per year.

MINERAL FUELS

All refined petroleum products were imported as there was no domestic production. Coal resources were under evaluation for their commercial viability.

Petroleum and Natural Gas.—The Etosha Petroleum Co., a subsidiary of Brilund Mining Co. of Lichtenstein, extended its exclusive exploration permit over 260,000 square kilometers in the Etosha Basin in northern Namibia. Geophysical studies have been made, but drilling has been minimal.

Southern Oil Exploration Corp. (Pty.) Ltd. sought a partner to complete evaluation of gas potential in the Kudu Field, discovered by Chevron Oil Co. in 1974, offshore from the Orange River. Four wells were required to complete the evaluation at a cost of about $30 million.

Uranium.—Output was by Rio Tinto Zinc Corp. Ltd.'s Rossing Mine, 70 kilometers east of Swakopmund. The uranium-bearing alaskite ore was found intermixed with metamorphosed sediments and was mined as an open pit. An efficient maintenance and repair program to sustain production schedules was necessary owing to the highly abrasive nature of the ore.

Uranium recovery of 85% was by sulfuric acid leaching, followed by ion absorption to produce ammonium diuranate. The latter was calcined to yield 96% uranium trioxide (U_3O_8). Reserves of uranium at the Rossing Mine were estimated at 25 years at current production levels. Total capacity was 5,000 tons per year of U_3O_8. A sulfuric acid plant with a 720-ton-per-day capacity provided most of the 900 tons of acid used daily. The remainder was imported through Walvis Bay. Exports of U_3O_8 were to Belgium, Finland, France, the Federal Republic of Germany, Japan, Sweden, the United Kingdom, and the United States. A contract to supply 7,500 tons of U_3O_8 to the Central Electricity Generating Board of the United Kingdom was not renewed.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from South African rands (R) to U.S. dollars at the rate of R1 = US$0.8991 for 1983 and R1 = US$0.6954 for 1984.

The Mineral Industry of the Netherlands

By George A. Rabchevsky[1]

The Netherlands' sole natural resource of any significance was its massive reserves of natural gas, which continued to be the cornerstone of the Netherlands economy. Because of the economic importance of natural gas, natural resources policies largely concerned those contained in the natural gas pricing act of 1974. Over 50% of the gas was exported to neighboring countries, contributing about 17% to the total gross national product (GNP). The chemical and basic metals processing industries also contributed significantly to the improved economy. In general, the Netherlands economic recovery and growth continued at a moderate pace, with the GNP at $132 billion[2] at current prices, or 20% above that of 1983. The major force driving the economic upswing in the Netherlands was the expanding foreign trade, arising in part from the strong economic recovery of the United States. Unemployment dropped only slightly, however, remaining at a high 17%, still the highest in the European Economic Community (EEC).

The Netherlands minerals processing industry continued to rely on the country's geographical location, its shipping facilities, and truck transportation in northern Europe, which provided an influence over European foreign trade far in excess of its relative GNP. Raw materials and processed minerals were handled 24 hours per day at Rotterdam, the world's largest port, and other seaports, and in barge canals, for reexport around the world. Although total cargo volume declined in 1983, it rose in 1984 by 6%; crude oil volumes rose 8.5% to nearly 61 million tons in the first 9 months of 1984; ores were up 26%; and coal was up 32%. Furthermore, after several years of contraction in the petrochemicals industry, there were also plans for major investments in some of the large refineries that line the banks of the Meuse River Estuary between Rotterdam and the sea. Esso Nederland BV, for example, was expanding its refinery at Pernis, and Shell Nederland BV was planning to do the same at its refinery nearby.

PRODUCTION

Total industrial production rose by 1.5% to 2%, a slight increase over that of previous years. Production in the chemical and some metals industries was, however, better, with financial gains of 9.5% and 24%, respectively. The production of crude steel exceeded that of 1981, when it began a steady decline, as did the production of salt. The production of natural gas and refinery products also continued the steady increase begun in 1981, at which time there had been a slump in the production of all mineral fuels in the Netherlands.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Primary	258,621	261,983	250,925	235,421	248,000
Secondary	47,133	50,217	49,825	58,199	59,000
Cadmium metal	455	518	497	521	525
Iron and steel:					
Ore sintered (from imported ore) thousand tons	2,723	3,042	2,512	2,669	3,500
Metal:					
Pig iron do.	4,328	4,600	3,617	3,748	[3]4,926
Steel, crude do.	5,272	5,472	4,346	4,477	5,700
Semimanufactures do.	4,475	4,732	3,882	4,066	5,000
Lead:					
Smelter[e]	6,000	2,500	2,500	2,500	2,500
Refined:					
Primary	[r]12,400	[r]14,200	5,600	2,300	1,000
Secondary	[r]19,800	[r]19,700	27,300	23,300	[3]34,000
Total	[r]32,200	[r]33,900	32,900	25,600	35,000
Tin, refined:					
Primary	[r]1,100	[r]3,500	2,800	5,400	6,000
Secondary	180	180	180	180	180
Zinc (slab), primary	169,539	177,363	186,022	187,519	185,000
NONMETALS					
Cement, hydraulic thousand tons	3,745	3,316	3,103	3,107	3,250
Nitrogen: N content of ammonia do.	1,874	1,814	1,655	1,747	2,255
Salt, all types do.	3,464	3,578	3,191	3,124	3,650
Sand, industrial do.	24,608	20,000	17,359	[e]18,000	19,000
Sodium compounds, n.e.s.:[e]					
Carbonate do.	420	420	420	420	400
Sulfate, synthetic do.	50	50	50	50	45
Sulfur:					
Elemental byproduct:[e]					
Of metallurgy do.	90	90	100	100	90
Of petroleum do.	52	55	65	[r]105	105
Total do.	142	145	165	[r]205	195
Sulfuric acid, 100% H_2SO_4 do.	1,726	1,726	1,609	1,451	1,600
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	95,300	97,800	82,700	91,200	100,000
Coke thousand tons	2,455	2,242	2,428	2,126	2,715
Gas:					
Manufactured, all types[4] million cubic feet	234,326	220,463	272,739	288,445	290,000
Natural, gross do.	3,219,023	2,988,165	2,543,844	2,702,792	2,800,000
Natural gas liquids thousand 42-gallon barrels	3,341	2,970	2,981	3,608	3,600
Peat[e] thousand tons	400	400	400	400	450
Petroleum:					
Crude thousand 42-gallon barrels	8,724	9,188	11,158	17,647	20,000
Refinery products:					
Gasoline, motor do.	[r]61,821	[r]55,939	62,008	60,597	61,000
Jet fuel do.	[r]27,112	[r]24,064	26,824	28,288	30,000
Kerosine do.	[r]3,658	[r]3,061	3,410	4,487	5,000
Distillate fuel oil do.	[r]130,632	[r]104,149	101,613	107,461	120,000
Residual fuel oil do.	[r]113,533	[r]96,976	89,424	103,743	106,000
Lubricants do.	[r]3,962	[r]3,654	3,297	3,423	3,500
Liquefied petroleum gas do.	[r]17,330	[r]16,646	17,934	21,912	22,000
Naphtha do.	[r]30,991	[r]52,522	56,602	67,737	66,600
Bitumen do.	[r]5,327	[r]3,127	4,200	4,375	4,500
Total[5] do.	[r]394,366	[r]360,138	365,312	402,023	418,600

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 1985.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, gravel, and stone) are 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.
[5]Total of listed products only; refinery fuel and losses included with listed products.

TRADE

The Netherlands steel and nonferrous metal industry and the energy sector totally depended on imports of raw materials from Netherlands' neighbors and other countries for survival. Exports of almost all processed metals expanded, while imports also expanded, but at a lower rate. In-line with the Netherlands centuries-old tradition of trading, total exports still accounted for more than 60% of the GNP, compared with 30% in the United Kingdom. The Netherlands was the third largest market for U.S. exports in Europe and the seventh largest in the world. As in previous years, export commodities again did well in 1984, and the Government ranked the following export sectors, in descending order of growth rates: chemicals and mineral products, machinery and electronics, raw materials, instrumentation, paper products, food, textiles, clothes, and transport equipment. The mineral products and raw materials sectors accounted for the largest export increases.

Table 2.—Netherlands: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	4,268	3,490	--	West Germany 963; Belgium-Luxembourg 583; Algeria 527.
Oxides and hydroxides	47,006	51,883	77	West Germany 16,735; Italy 7,567; United Kingdom 6,983.
Ash and residue containing aluminum	6,335	7,095	--	West Germany 4,887; Spain 1,846.
Metal including alloys:				
Scrap	73,669	80,201	630	West Germany 44,396; France 13,348; Belgium-Luxembourg 11,669.
Unwrought	350,802	433,281	1,073	Belgium-Luxembourg 117,988; West Germany 117,184; France 113,126.
Semimanufactures	89,744	106,810	187	West Germany 43,989; Belgium-Luxembourg 13,612; France 12,936.
Antimony:				
Oxides	331	226	--	West Germany 202; United Kingdom 10; India 7.
Metal including alloys, all forms	22	13	--	Mainly to West Germany.
Arsenic:				
Oxides and acids	12	1	--	All to United Kingdom.
Metal including alloys, all forms	48	39	--	West Germany 28; France 5.
Bismuth: Metal including alloys, all forms	55	74	NA	United Kingdom 55; West Germany 17.
Cadmium: Metal including alloys, all forms	646	782	17	France 385; Belgium-Luxembourg 199; West Germany 106.
Chromium:				
Ore and concentrate	21,130	18,603	--	West Germany 5,293; France 5,080; Belgium-Luxembourg 3,581.
Oxides and hydroxides	439	285	NA	West Germany 95; United Kingdom 83; Ireland 45.
Metal including alloys, all forms	27	58	--	West Germany 30.
Cobalt:				
Oxides and hydroxides	40	38	--	United Kingdom 10; Romania 9; France 8.
Metal including alloys, all forms	117	158	29	West Germany 80; East Germany 25.
Columbium and tantalum:				
Ore and concentrate	243	29	--	All to U.S.S.R.
Ash and residue containing columbium and/or tantalum	158	20	--	NA.
Metal including alloys, all forms, tantalum	4	9	--	Mainly to U.S.S.R.
Copper:				
Ore and concentrate	70	--		
Oxides and hydroxides	157	143	--	United Kingdom 45; Belgium-Luxembourg 39; Bahrain 18.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS —Continued				
Copper —Continued				
Sulfate	1,223	2,749	--	West Germany 1,162; United Kingdom 682; France 467.
Ash and residue containing copper	5,331	4,308	NA	West Germany 1,862; Belgium-Luxembourg 1,765.
Metal including alloys:				
Scrap	53,616	59,055	18	West Germany 28,948; Belgium-Luxembourg 19,987; Italy 5,111.
Unwrought	r5,401	6,573	1,027	West Germany 1,837; Italy 1,735; Turkey 765.
Semimanufactures	r48,787	53,793	14,073	West Germany 10,512; United Kingdom 5,385; Belgium-Luxembourg 4,944.
Germanium: Metal including alloys, all forms value, thousands	$54	$372	--	United Kingdom $347.
Gold:				
Waste and sweepings do	$18,939	$34,743	$20	West Germany $23,886; Spain $6,231; Switzerland $2,389.
Metal including alloys, unwrought and partly wrought troy ounces	894,036	155,556	72	Switzerland 66,606; Belgium-Luxembourg 34,752; France 16,315.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	148,861	13,795	NA	West Germany 8,549; France 2,021.
Metal:				
Scrap thousand tons	1,180	1,522	(2)	India 349; West Germany 340; Belgium-Luxembourg 221.
Pig iron, cast iron, related materials	5,072	13,203	--	West Germany 8,585; Denmark 2,151; Belgium-Luxembourg 943.
Ferroalloys:				
Ferrochromium	13,990	3,308	--	West Germany 2,295; France 611; Italy 391.
Ferromanganese	142	74	--	Thailand 25; Belgium-Luxembourg 5.
Ferromolybdenum	14	145	NA	West Germany 40; Italy 40; China 37.
Ferronickel	(2)	650	--	France 612; Austria 26.
Ferrosilicochromium	8	4	--	United Kingdom 3.
Ferrosilicomanganese	2,064	--		
Ferrosilicon	1,234	5,167	--	West Germany 4,232; Belgium-Luxembourg 840; United Kingdom 60.
Silicon metal	2,464	3,026	--	West Germany 2,972; United Kingdom 54.
Unspecified	216	229	--	France 146; West Germany 50; Japan 10; Sweden 10.
Steel, primary forms thousand tons	1,494	1,686	277	West Germany 299; Greece 180.
Semimanufactures:				
Bars, rods, angles, shapes, sections	457,739	455,869	8,687	West Germany 123,691; Belgium-Luxembourg 119,071.
Universals, plates, sheets	1,476,238	1,549,704	132,776	West Germany 360,445; Belgium-Luxembourg 262,488; United Kingdom 221,973.
Hoop and strip	110,897	100,590	70	West Germany 58,789; Switzerland 10,348; Norway 6,004.
Rails and accessories	30,296	39,570	(2)	Italy 26,991; West Germany 6,117; Turkey 1,998.
Wire	59,040	61,451	735	West Germany 13,105; France 12,874; Belgium-Luxembourg 9,686.
Tubes, pipes, fittings	423,476	387,954	37,500	West Germany 102,751; Belgium-Luxembourg 58,510; United Kingdom 30,890.
Castings and forgings, rough	25,390	22,239	53	Belgium-Luxembourg 15,007; West Germany 3,692; United Kingdom 2,793.
Lead:				
Oxides	7,606	6,524	--	West Germany 4,734; Italy 1,080; United Kingdom 332.
Ash and residue containing lead	3,689	2,023	--	Belgium-Luxembourg 835; Denmark 696; West Germany 232.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys:				
Scrap	26,835	25,946	120	West Germany 12,371; Belgium-Luxembourg 7,335; France 5,713.
Unwrought	14,145	13,197	18	West Germany 10,007; Belgium-Luxembourg 1,466; Portugal 510.
Semimanufactures	1,821	1,784	--	Norway 830; Belgium-Luxembourg 349; West Germany 216.
Lithium: Oxides and hydroxides	188	145	NA	West Germany 61; France 57; Spain 12.
Magnesium: Metal including alloys:				
Scrap	1,018	946	116	West Germany 447; Italy 151; Belgium-Luxembourg 124.
Unwrought	6,957	7,608	32	West Germany 5,050; United Kingdom 2,036; France 245.
Semimanufactures	40	16	NA	NA.
Manganese:				
Ore and concentrate, metallurgical-grade	42,077	43,208	--	West Germany 10,877; Republic of South Africa 5,508; Belgium-Luxembourg 2,906.
Oxides	218	245	4	Finland 100; France 33; Italy 18.
Metal including alloys, all forms	3,845	2,257	2	Norway 549; France 475; West Germany 366.
Mercury 76-pound flasks	3,277	12,125	551	Romania 4,148; West Germany 3,394; Czechoslovakia 986.
Molybdenum:				
Ore and concentrate	14,047	8,905	--	Austria 4,188; West Germany 1,748; U.S.S.R. 831.
Oxides and hydroxides	1,683	1,504	--	Austria 1,041; West Germany 170; Belgium-Luxembourg 116.
Metal including alloys:				
Scrap	30	12	5	Japan 4; West Germany 3.
Unwrought	62	17	--	Chile 10; France 5; West Germany 1.
Semimanufactures	155	155	5	Belgium-Luxembourg 117; France 14; Italy 10.
Nickel:				
Matte and speiss	3,115	2,782	NA	Spain 451; Morocco 24.
Oxides and hydroxides	375	781	116	Italy 110; Finland 59.
Ash and residue containing nickel	1,131	2,317	36	West Germany 1,592; Sweden 156; Taiwan 145.
Metal including alloys:				
Scrap	1,808	2,206	16	Finland 806; West Germany 613; India 192.
Unwrought	2,495	2,013	--	Italy 901; West Germany 311; Romania 199.
Semimanufactures	2,480	1,514	([2])	West Germany 1,326; France 37; Italy 37.
Platinum-group metals:				
Waste and sweepings value, thousands	$25,794	$16,340	--	Belgium-Luxembourg $5,900; France $4,178; West Germany $3,347.
Metals including alloys, unwrought and partly wrought troy ounces	50,566	62,860	671	West Germany 33,835; France 10,177; Belgium-Luxembourg 4,216.
Silver:				
Waste and sweepings[3] value, thousands	$7,999	$20,812	--	Spain $9,768; West Germany $9,233; United Kingdom $858.
Metal including alloys, unwrought and partly wrought thousand troy ounces	5,735	5,120	6	Belgium-Luxembourg 2,016; United Kingdom 838; France 573.
Tin:				
Ore and concentrate	--	344	--	All to Belgium-Luxembourg.
Oxides	23	13	--	Belgium-Luxembourg 8; West Germany 2; Portugal 2.
Ash and residue containing tin	1,143	856	--	Denmark 478; West Germany 212; United Kingdom 119.
Metal including alloys:				
Scrap	440	177	--	West Germany 52; Denmark 49; United Kingdom 47.
Unwrought	1,456	3,411	80	West Germany 1,500; France 543; United Kingdom 357.
Semimanufactures	847	841	--	West Germany 502; Belgium-Luxembourg 149; Sweden 64.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	22,177	41,600	18	West Germany 10,327; U.S.S.R. 10,000; Turkey 3,925.
Oxides	3,842	3,715	5	Italy 2,165; France 277; West Germany 229.
Metal including alloys:				
Scrap	77	3	--	All to West Germany.
Unwrought	3	(2)	--	All to United Kingdom.
Semimanufactures	21	33	--	West Germany 15; Belgium-Luxembourg 8; Turkey 5.
Tungsten:				
Ore and concentrate	793	629	--	U.S.S.R. 421; Poland 68; United Kingdom 61.
Ash and residue containing tungsten	65	29	--	All to West Germany.
Metal including alloys:				
Scrap	158	239	168	West Germany 22; France 19.
Unwrought	--	22	--	Hungary 10; France 3; West Germany 3.
Semimanufactures	101	137	--	Belgium-Luxembourg 82; West Germany 28; France 9.
Uranium and/or thorium:				
Ore and concentrate value, thousands	$1	--		
Metal including alloys, all forms:				
Uranium kilograms	12,956	377	--	All to West Germany.
Thorium value, thousands	--	$1	--	NA.
Vanadium:				
Ash and residue containing vanadium	51	20	--	All to West Germany.
Metal including alloys, all forms	(2)	7	--	NA.
Zinc:				
Blue powder	r3,320	3,891	--	NA.
Matte	2,491	1,951	--	West Germany 1,269; Belgium-Luxembourg 572.
Ash and residue containing zinc	9,357	7,940	--	West Germany 3,867; Belgium-Luxembourg 3,024; France 1,049.
Metal including alloys:				
Scrap	10,603	9,509	--	West Germany 6,009; Belgium-Luxembourg 1,768; France 1,121.
Unwrought	168,202	184,078	21,421	United Kingdom 34,910; West Germany 29,770; Belgium-Luxembourg 28,284.
Semimanufactures	r8,194	5,479	(2)	West Germany 2,811; France 867; Belgium-Luxembourg 487.
Zirconium:				
Ore and concentrate	23,690	22,699	--	West Germany 12,956; France 4,336; Belgium-Luxembourg 2,369.
Metal including alloys, all forms	66	2	--	NA.
Other:				
Ores and concentrates	14,047	76	--	West Germany 26; U.S.S.R. 5.
Ashes and residues	2,628	909	--	West Germany 362; United Kingdom 125; Sweden 83.
Base metals including alloys, all forms	3	4	1	West Germany 2.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5,913	5,827	244	Thailand 1,366; Pakistan 639; United Kingdom 635.
Artificial: Corundum	139	184	--	Argentina 80; Austria 67.
Dust and powder of precious and semiprecious stones including diamond kilograms	109	99	(2)	Belgium-Luxembourg 32; West Germany 16; Sweden 9.
Grinding and polishing wheels and stones	4,291	3,858	8	United Kingdom 820; West Germany 698; France 552.
Asbestos, crude	88	243	NA	Japan 190.
Barite and witherite	80,306	68,162	282	United Kingdom 30,185; Denmark 22,424; West Germany 8,210.
Boron materials:				
Crude natural borates	357,525	356,639	NA	Republic of South Africa 2,609; Belgium-Luxembourg 1,227; undetermined 346,953.
Oxides and acids	975	788	--	West Germany 494; Republic of Korea 61; Costa Rica 24.
Bromine	1,152	1,035	NA	France 743; West Germany 111.
Cement	445,429	474,397	10	West Germany 173,414; United Kingdom 98,947; Belgium-Luxembourg 74,123.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS —Continued				
Chalk	27,499	18,744	--	Belgium-Luxembourg 16,221; West Germany 1,477; Saudi Arabia 676.
Clays, crude:				
Bentonite	22,687	22,238	--	France 5,893; West Germany 3,036; Belgium-Luxembourg 2,758.
Chamotte earth	875	593	--	West Germany 332; Belgium-Luxembourg 109.
Kaolin	94,327	108,861	--	Belgium-Luxembourg 72,876; West Germany 28,587; France 4,231.
Unspecified	r83,087	101,324	4	West Germany 79,433; Belgium-Luxembourg 16,661; Sweden 1,912.
Diamond:				
Gem, not set or strung --- carats	423,506	320,672	109,522	Israel 72,317; Switzerland 41,515; West Germany 21,126.
Industrial stones --- do	632,768	480,787	69,104	Belgium-Luxembourg 206,587; Italy 42,725.
Diatomite and other infusorial earth	756	1,066	--	Nigeria 356; Tanzania 150; Japan 131.
Feldspar, fluorspar, related materials:				
Feldspar	1,251	1,124	--	West Germany 750; France 214.
Fluorspar	1,101	135	--	West Germany 94; Austria 31.
Unspecified	19,029	13,739	NA	West Germany 10,774; Belgium-Luxembourg 2,298; France 441.
Fertilizer materials:				
Crude, n.e.s	77,444	73,894	NA	Belgium-Luxembourg 49,034; West Germany 21,504; Austria 1,781.
Manufactured:				
Ammonia --- thousand tons	407	402	--	Belgium-Luxembourg 333; United Kingdom 23; West Germany 10.
Nitrogenous (N content) do	3,237	1,175	94	France 350; West Germany 243; India 166.
Phosphatic (P_2O_5 content) do	284	153	(2)	France 68; West Germany 28; United Kingdom 18.
Potassic (K_2O content) do	4	3	(2)	Belgium-Luxembourg 1.
Unspecified and mixed do	1,135	1,010	(2)	France 303; West Germany 222; United Kingdom 116.
Graphite, natural	596	152	--	West Germany 83.
Gypsum and plaster	2,756	28,809	--	Belgium-Luxembourg 27,310; West Germany 436; Iraq 242.
Iodine	15	34	NA	France 6; Romania 4; Iran 3.
Kyanite and related materials	941	987	NA	Italy 447; West Germany 217.
Lime	5,470	5,288	--	West Germany 3,784; Belgium-Luxembourg 332; Nigeria 280.
Magnesium compounds:				
Magnesite[4]	r29,303	27,553	75	West Germany 14,333; France 3,965; Belgium-Luxembourg 2,984.
Oxides and hydroxides	713	1,803	NA	Spain 733; Belgium-Luxembourg 406; Canada 263.
Mica:				
Crude including splittings and waste	3,110	2,834	NA	Norway 1,735; West Germany 399.
Worked including agglomerated splittings	3	(2)	--	NA.
Nitrates, crude	226	83	--	NA.
Phosphates, crude	23,926	39,478	--	West Germany 30,572; United Kingdom 4,699; Belgium-Luxembourg 3,303.
Pigments, mineral:				
Natural, crude	270	213	47	Belgium-Luxembourg 46; Spain 30.
Iron oxides and hydroxides, processed	6,713	6,927	1,926	West Germany 2,562; France 1,102; Indonesia 651.
Precious and semiprecious stones other than diamond:				
Natural --- kilograms	2,482	2,422	--	United Kingdom 2,000; Belgium-Luxembourg 17.
Synthetic --- do	166	99	1	Morocco 73; West Germany 20.
Salt and brine --- thousand tons	2,011	2,193	89	Belgium-Luxembourg 737; West Germany 503.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	132,231	159,573	--	West Germany 66,594; Belgium-Luxembourg 16,253; Denmark 9,050.
Sulfate, manufactured[5]	10,611	16,342	--	West Germany 5,972; Belgium-Luxembourg 2,031; France 1,940.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,886	9,454	(2)	West Germany 7,531; Belgium-Luxembourg 1,432; Italy 113.
Worked	28,713	39,273	19	Belgium-Luxembourg 20,879; West Germany 17,620.
Dolomite, chiefly refractory-grade	13,757	18,741	--	West Germany 8,537; Belgium-Luxembourg 6,077; Kuwait 1,203.
Gravel and crushed rock	3,182,051	2,676,030	(2)	Belgium-Luxembourg 2,408,719; West Germany 257,129.
Limestone other than dimension	2,634	468	--	West Germany 128.
Quartz and quartzite	14,788	16,014	38	West Germany 10,799; Austria 1,374; Belgium-Luxembourg 1,203.
Sand other than metal-bearing	7,356,757	7,008,260	10	Belgium-Luxembourg 6,445,056; West Germany 487,247.
Sulfur:				
Elemental:				
Crude including native and byproduct	13,650	15,100	--	Belgium-Luxembourg 14,461; West Germany 271.
Colloidal, precipitated, sublimed	1	20	--	Belgium-Luxembourg 18.
Dioxide	1,187	1,106	--	Belgium-Luxembourg 817; Netherlands Antilles 149.
Sulfuric acid	194,723	170,306	62	Belgium-Luxembourg 103,004; West Germany 42,482.
Talc, steatite, soapstone, pyrophyllite	13,926	17,551	--	West Germany 9,993; Norway 2,200; Belgium-Luxembourg 2,039.
Vermiculite, perlite, chlorite	1,265	489	--	Belgium-Luxembourg 262; West Germany 106.
Other:				
Crude	r247,506	233,194	4	Belgium-Luxembourg 93,219; West Germany 72,652; France 43,455.
Slag and dross, not metal-bearing	587,718	587,940	202	Belgium-Luxembourg 245,972; United Kingdom 161,430; West Germany 84,637.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,103	4,413	NA	West Germany 3,609; Belgium-Luxembourg 750.
Carbon black	75,377	86,533	80	France 35,297; Belgium-Luxembourg 14,866; West Germany 11,528.
Coal:				
Anthracite thousand tons	188	186	--	West Germany 61; France 52; Belgium-Luxembourg 47.
Bituminous do	481	648	--	West Germany 238; Switzerland 127; Belgium-Luxembourg 119.
Coke and semicoke	673,286	686,780	--	Belgium-Luxembourg 288,745; France 220,903; West Germany 107,522.
Gas, natural: Gaseous million cubic feet	1,379,639	1,444,599	--	West Germany 760,076; France 267,240; Belgium-Luxembourg 210,922.
Peat including briquets and litter	139,120	166,096	--	Belgium-Luxembourg 103,079; West Germany 35,300; France 19,866.
Petroleum:				
Crude thousand 42-gallon barrels	694	1,735	--	Belgium-Luxembourg 1,392; West Germany 335.
Refinery products:				
Liquefied petroleum gas do	5,489	6,874	38	Belgium-Luxembourg 2,792; West Germany 1,513; France 650.
Gasoline, motor do	75,531	81,596	5,909	West Germany 43,995; Belgium-Luxembourg 10,876.
Mineral jelly and wax do	503	404	7	West Germany 185; France 40; bunkers 114.
Kerosine and jet fuel do	24,421	25,067	--	West Germany 11,643; Denmark 3,706; United Kingdom 1,751.
Distillate fuel oil do	79,897	84,059	1,487	West Germany 49,299; Belgium-Luxembourg 17,767.
Lubricants do	4,687	4,890	81	Belgium-Luxembourg 1,185; United Kingdom 422; Sweden 374.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Residual fuel oil thousand 42-gallon barrels	90,277	105,634	1,626	Belgium-Luxembourg 20,655; West Germany 19,802; United Kingdom 14,325.
Bitumen and other residues do	2,444	3,407	(2)	West Germany 982; Norway 693; Denmark 449.
Bituminous mixtures do	336	242	(2)	West Germany 166; Belgium-Luxembourg 21; Iraq 6.
Petroleum coke do	1,330	659	8	France 228; West Germany 211; Belgium-Luxembourg 97.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.
[4]Data excludes undetermined secret amounts of sintered magnesite.
[5]Includes cadmium sulfate.

Table 3.—Netherlands: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	126,673	135,623	2,857	Greece 125,066; China 2,069.
Oxides and hydroxides	592,243	531,389	202	Suriname 196,275; Greece 115,536; West Germany 67,239.
Ash and residue containing aluminum	4,624	5,426	NA	West Germany 3,489; France 519; East Germany 501.
Metal including alloys:				
Scrap	41,782	48,280	424	West Germany 20,421; France 7,234; Cuba 4,455.
Unwrought	195,502	284,637	83	Norway 163,628; West Germany 31,516; U.S.S.R. 28,548.
Semimanufactures	107,927	116,970	3,192	West Germany 39,451; Belgium-Luxembourg 28,132; France 9,955.
Antimony:				
Oxides	948	1,053	NA	France 449; Belgium-Luxembourg 180; United Kingdom 178.
Metal including alloys, all forms	85	34	NA	Belgium-Luxembourg 31.
Arsenic:				
Oxides and acids	97	110	NA	United Kingdom 89.
Metal including alloys, all forms	117	63	NA	Sweden 60; Australia 2.
Beryllium: Metal including alloys, all forms value, thousands	$134	$62	$41	West Germany $17; United Kingdom $4.
Bismuth: Metal including alloys, all forms	18	25	NA	Mexico 11; Belgium-Luxembourg 6; West Germany 2.
Cadmium: Metal including alloys, all forms	155	286	NA	West Germany 74; Republic of Korea 52; Canada 40; China 40.
Chromium				
Ore and concentrate	31,335	20,554	--	Republic of South Africa 18,573; Finland 1,458; West Germany 186.
Oxides and hydroxides	1,295	1,292	367	West Germany 561; U.S.S.R. 155; Italy 100.
Metal including alloys, all forms	64	132	NA	West Germany 46; Japan 45; United Kingdom 19.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Cobalt:				
Oxides and hydroxides	192	246	51	Belgium-Luxembourg 185.
Metal including alloys, all forms	140	240	12	West Germany 133; Brazil 65; Italy 14.
Copper:				
Ore and concentrate	59	1,146	--	Malaysia 1,090; West Germany 56.
Matte and speiss including cement copper	19	(2)	--	NA.
Oxides and hydroxides	451	430	NA	West Germany 168; Italy 128; Norway 69.
Sulfate	4,313	5,882	--	U.S.S.R. 2,018; Belgium-Luxembourg 1,283; France 1,020.
Ash and residue containing copper	1,610	744	NA	West Germany 562; Cuba 131; Belgium-Luxembourg 45.
Metal including alloys:				
Scrap	38,211	38,047	386	West Germany 11,703; United Kingdom 6,620; France 6,347.
Unwrought	22,771	26,493	6	Belgium-Luxembourg 10,032; East Germany 4,670; West Germany 2,839.
Semimanufactures	92,522	71,806	281	West Germany 38,330; Belgium-Luxembourg 12,148; France 11,767.
Germanium: Metal including alloys, all forms value, thousands	$202	$350	$256	Belgium-Luxembourg $86.
Gold:				
Waste and sweepings do	$1,657	$2,259	$142	Belgium-Luxembourg $1,044; West Germany $626.
Metal including alloys, unwrought and partly wrought troy ounces	900,805	223,390	94	United Kingdom 90,549; West Germany 40,315; France 32,735.
Hafnium: Metal including alloys, all forms value, thousands	$3	$10	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	6,160	4,980	--	Brazil 1,106; Sweden 890; Spain 726.
Pyrite, roasted	522	14	--	Austria 10.
Metal:				
Scrap	221,641	363,733	1,919	West Germany 203,120; United Kingdom 68,191; Belgium-Luxembourg 63,505.
Pig iron, cast iron, related materials	43,276	37,675	21	West Germany 11,128; France 7,913; Brazil 6,030.
Ferroalloys:				
Ferrochromium	16,206	3,406	--	Republic of South Africa 1,912; Albania 1,000; West Germany 280.
Ferromanganese	18,916	12,065	--	France 5,326; Norway 4,250; West Germany 1,921.
Ferromolybdenum	47	147	--	Sweden 79; West Germany 34; Italy 20.
Ferronickel	103	1,148	20	Colombia 612; Finland 438; Belgium-Luxembourg 34.
Ferrosilicochromium	43	66	--	All from West Germany.
Ferrosilicomanganese	7,463	3,758	--	Norway 2,535; Czechoslovakia 399; Brazil 359.
Ferrosilicon	6,609	8,683	--	Norway 4,552; West Germany 1,873; East Germany 1,394.
Silicon metal	r3,858	4,695	--	Republic of South Africa 2,444; West Germany 1,129; Portugal 554.
Unspecified	1,129	858	--	France 328; West Germany 181; Brazil 167.
Steel, primary forms	474,922	418,264	2	West Germany 151,454; Norway 142,743.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,023,281	1,057,629	1,262	Belgium-Luxembourg 381,397; West Germany 345,917; Sweden 47,099.
Universals, plates, sheets	926,160	903,905	183	Belgium-Luxembourg 372,245; West Germany 298,686; France 42,361.
Hoop and strip	173,083	193,172	112	West Germany 118,945; Belgium-Luxembourg 43,667; France 13,110.
Rails and accessories	58,399	50,954	(2)	West Germany 34,793; France 11,045; Italy 2,019.
Wire	102,267	100,439	27	West Germany 50,874; Belgium-Luxembourg 33,766; Italy 1,953.
Tubes, pipes, fittings	604,142	511,693	5,415	West Germany 269,768; France 67,874; Belgium-Luxembourg 46,988.
Castings and forgings, rough	20,372	17,832	3	West Germany 10,220; Belgium-Luxembourg 5,000.
Lead:				
Ore and concentrate	--	2	--	NA.
Oxides	2,108	4,174	9	West Germany 3,373; Belgium-Luxembourg 571; France 212.
Ash and residue containing lead	2,433	1,442	83	West Germany 1,027; France 113.
Metal including alloys:				
Scrap	11,614	15,220	1,288	West Germany 6,280; United Kingdom 4,659.
Unwrought	47,060	36,739	17	Belgium-Luxembourg 14,368; West Germany 6,608; Morocco 5,401.
Semimanufactures	4,850	5,143	21	Belgium-Luxembourg 3,944; West Germany 720; United Kingdom 368.
Lithium:				
Oxides and hydroxides	278	143	76	China 27; United Kingdom 18.
Metal including alloys, all forms	3	2	--	Mainly from West Germany.
Magnesium: Metal including alloys:				
Scrap	821	502	2	United Kingdom 176; West Germany 152; France 64.
Unwrought	7,933	8,404	7,442	France 476; Norway 403.
Semimanufactures	187	218	(2)	West Germany 130; United Kingdom 54; Switzerland 23.
Manganese:				
Ore and concentrate, metallurgical-grade	67,628	44,389	NA	West Germany 373; Belgium-Luxembourg 347; undetermined 43,555.
Oxides	631	714	81	Belgium-Luxembourg 486; West Germany 49.
Metal including alloys, all forms	4,102	2,170	59	Republic of South Africa 1,033; Mozambique 698; France 57.
Mercury .... 76-pound flasks	3,799	9,979	--	West Germany 6,324; Italy 1,508; United Kingdom 841.
Molybdenum:				
Ore and concentrate	--	13,816	9,990	Canada 2,551; Chile 567.
Oxides and hydroxides	19	29	--	West Germany 23; China 6.
Metal including alloys:				
Scrap	3	3	--	NA.
Unwrought	112	175	8	West Germany 159; United Kingdom 5.
Semimanufactures	57	57	4	Belgium-Luxembourg 37; Austria 10; United Kingdom 4.
Nickel:				
Matte and speiss	3,556	4,279	--	Cuba 4,207.
Oxides and hydroxides	1,245	267	NA	Sweden 90; Italy 23; United Kingdom 20.
Ash and residue containing nickel	754	1,138	NA	West Germany 360; France 330; Albania 195.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Nickel —Continued				
Metal including alloys:				
Scrap	1,527	1,320	20	West Germany 494; United Kingdom 264; France 256.
Unwrought	3,390	3,116	243	United Kingdom 611; U.S.S.R. 395; Zimbabwe 378.
Semimanufactures	3,133	2,013	119	Philippines 1,297; West Germany 279; United Kingdom 180.
Platinum-group metals:				
Waste and sweepings value, thousands	$1,491	$4,182	--	Turkey $2,514; Belgium-Luxembourg $911; Denmark $287.
Metals including alloys, unwrought and partly wrought troy ounces	68,048	69,129	5,172	West Germany 16,626; Switzerland 15,703; Spain 6,665.
Rhenium: Metal including alloys, all forms value, thousands	$255	$71	--	West Germany $46; France $24.
Selenium, elemental	8	15	NA	Canada 5; United Kingdom 4.
Silicon, high-purity	58	6	--	West Germany 3; Italy 3.
Silver:				
Waste and sweepings[3] value, thousands	$900	$2,868	--	Denmark $1,178; Argentina $777; Austria $519.
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,657	4,326	199	France 1,528; Belgium-Luxembourg 843; United Kingdom 752.
Tin:				
Ore and concentrate	4,738	8,910	--	Singapore 3,787; Zaire 1,750; United Kingdom 1,548.
Oxides	99	112	--	United Kingdom 63; West Germany 29; Italy 19.
Ash and residue containing tin	806	609	257	France 130; West Germany 75.
Metal including alloys:				
Scrap	215	186	--	West Germany 106; Italy 30; France 8; Spain 8.
Unwrought	5,022	2,753	43	Thailand 586; West Germany 500; Malaysia 375.
Semimanufactures	127	250	4	United Kingdom 144; West Germany 71; Denmark 20.
Titanium:				
Ore and concentrate	22,248	53,702	NA	Sierra Leone 31,008; Australia 9,256; Sri Lanka 7,648.
Oxides	6,021	5,850	515	West Germany 2,861; United Kingdom 714; France 650.
Ash and residue containing titanium	53,746	41,055	--	All from Canada.
Metal including alloys:				
Scrap	93	20	NA	United Kingdom 17; West Germany 1.
Unwrought	8	18	--	U.S.S.R. 10; West Germany 5.
Semimanufactures	70	206	10	West Germany 99; United Kingdom 84.
Tungsten:				
Ore and concentrate	739	1,317	21	Burma 433; Australia 221; Portugal 181.
Ash and residue containing tungsten	9	17	NA	NA.
Metal including alloys:				
Scrap	58	112	39	Sweden 21; Switzerland 20; Israel 19.
Unwrought	181	312	259	Austria 40; West Germany 12.
Semimanufactures	68	66	([2])	Belgium-Luxembourg 39; United Kingdom 20; West Germany 3.
Uranium: Metal including alloys, all forms	849	1,009	--	United Kingdom 809; France 117; Canada 83.
Vanadium:				
Oxides and hydroxides	321	25	--	Republic of South Africa 17; West Germany 4; Finland 3.
Metal including alloys, all forms value, thousands	$1	$12	NA	NA.
Zinc:				
Ore and concentrate	452,439	381,329	--	Canada 106,906; Ireland 98,960; Australia 63,100.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc —Continued				
Oxides	3,091	3,638	5	West Germany 2,066; France 612; Belgium-Luxembourg 387.
Blue powder	r3,155	2,841	NA	Belgium-Luxembourg 1,884; West Germany 878; United Kingdom 63.
Matte	1,158	2,139	NA	West Germany 1,290; Belgium-Luxembourg 430; France 284.
Ash and residue containing zinc	15,243	7,665	NA	West Germany 5,726; France 637; Belgium-Luxembourg 568.
Metal including alloys:				
Scrap	10,401	13,074	16	Belgium-Luxembourg 7,011; West Germany 4,498; France 428.
Unwrought	19,156	18,526	527	West Germany 8,203; Belgium-Luxembourg 5,031; France 1,652.
Semimanufactures	r4,745	4,525	--	West Germany 3,356; Belgium-Luxembourg 660; France 345.
Zirconium:				
Ore and concentrate	23,149	26,076	NA	Australia 12,276; Republic of South Africa 11,364; Sri Lanka 1,910.
Metal including alloys, all forms	168	31	NA	West Germany 20; France 7.
Other:				
Ores and concentrates	19,677	322	--	Canada 200; West Germany 86.
Ashes and residues	r2,761	2,957	NA	West Germany 1,464; Belgium-Luxembourg 991.
Base metals including alloys, all forms value, thousands	$204	$328	NA	France $149; West Germany $91.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	257,926	259,168	75	West Germany 252,914; Turkey 5,100; Italy 475.
Artificial:				
Corundum	5,611	5,593	6	West Germany 3,930; France 877; Czechoslovakia 425.
Silicon carbide	851	1,906	10	West Germany 1,457; Belgium-Luxembourg 246; Norway 106.
Dust and powder of precious and semiprecious stones including diamond kilograms	205	281	(2)	Belgium-Luxembourg 203; Ireland 40; Switzerland 28.
Grinding and polishing wheels and stones	2,263	2,323	57	West Germany 1,016; Austria 372; France 326.
Asbestos, crude	5,107	5,751	--	Italy 2,054; Canada 1,651; West Germany 1,179.
Barite and witherite	75,748	148,833	--	Belgium-Luxembourg 62,112; Morocco 59,821; China 11,545.
Boron materials:				
Crude natural borates	394,388	326,816	307,424	Turkey 11,000; Belgium-Luxembourg 8,042.
Elemental value, thousands	$2	$6	NA	NA.
Oxides and acids	2,275	2,003	(2)	France 1,106; Turkey 330; Italy 302.
Bromine	3,296	4,053	NA	Israel 3,947; United Kingdom 103.
Cement thousand tons	2,568	2,978	(2)	Belgium-Luxembourg 1,494; West Germany 1,461.
Chalk	80,916	79,436	--	France 38,049; West Germany 28,395; Belgium-Luxembourg 11,948.
Clays, crude:				
Bentonite	84,738	70,786	18,380	Greece 34,443; Spain 8,914.
Chamotte earth	24,036	14,412	--	West Germany 11,014; France 2,583; Czechoslovakia 776.
Kaolin	415,497	460,289	49,695	West Germany 158,394; United Kingdom 145,820; Senegal 40,352.
Unspecified	r432,984	354,369	428	West Germany 336,165; France 5,625; United Kingdom 5,264.
Cryolite and chiolite	37	10	--	Denmark 5; West Germany 5.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung ---- carats--	492,614	503,485	56,865	Switzerland 155,886; United Kingdom 130,754; India 42,690.
Industrial stones --------do----	277,335	237,469	62,192	Belgium-Luxembourg 66,768; Ireland 37,340; Switzerland 23,113.
Diatomite and other infusorial earth ---	15,275	16,150	2,421	Denmark 11,078; West Germany 1,136.
Feldspar, fluorspar, related materials:				
Feldspar	13,038	12,931	--	Norway 8,324; West Germany 1,775; France 1,273.
Fluorspar	24,168	18,684	--	West Germany 4,394; United Kingdom 3,204.
Unspecified	39,128	38,669	--	Norway 19,385; Canada 18,935.
Fertilizer materials:				
Crude, n.e.s	89,466	91,698	NA	West Germany 83,673; Belgium-Luxembourg 6,769; France 882.
Manufactured:				
Ammonia	47,067	134,175	--	United Kingdom 25,124; Belgium-Luxembourg 5,754; France 2,730.
Nitrogenous (N content)	460,168	208,639	--	France 60,880; Belgium-Luxembourg 60,318; West Germany 48,478.
Phosphatic (P_2O_5)	77,014	45,102	--	Israel 25,135; Tunisia 8,511; Belgium-Luxembourg 7,005.
Potassic (K_2O content)	381,114	202,413	14	West Germany 61,302; U.S.S.R. 30,751; East Germany 27,211.
Unspecified and mixed	146,895	199,568	3,762	Belgium-Luxembourg 85,111; West Germany 27,906; Denmark 20,238.
Graphite, natural	863	564	--	West Germany 317; United Kingdom 124; China 100.
Gypsum and plaster	328,377	373,182	43	West Germany 171,326; France 164,444; Belgium-Luxembourg 23,135.
Iodine	206	322	3	France 15; United Kingdom 8.
Kyanite and related materials	4,024	1,677	86	Republic of South Africa 1,281; West Germany 248.
Lime	589,822	690,534	70	Belgium-Luxembourg 436,455; West Germany 252,447.
Magnesium compounds:				
Magnesite	61,666	58,110	265	Greece 20,089; China 12,397; Austria 8,959.
Oxides and hydroxides	r1,025	2,083	59	West Germany 1,672; United Kingdom 81; Japan 80.
Mica:				
Crude including splittings and waste	3,985	4,052	301	India 1,701; Norway 599; Canada 519.
Worked including agglomerated splittings	33	21	([2])	Switzerland 7; Japan 6; Belgium-Luxembourg 3.
Nitrates, crude	20,709	31,857	--	Chile 24,001; Belgium-Luxembourg 7,856.
Phosphates, crude --- thousand tons--	1,949	2,159	780	Israel 541; Morocco 455; Togo 349.
Phosphorus, elemental	95	187	--	West Germany 186.
Pigments, mineral:				
Natural, crude	398	825	--	Austria 777; Switzerland 46.
Iron oxides and hydroxides, processed	12,958	10,608	125	West Germany 9,028; United Kingdom 409; Italy 289.
Potassium salts, crude	2,330	3,134	--	West Germany 3,095.
Precious and semiprecious stones other than diamond:				
Natural ---------- kilograms--	36,396	33,043	6,569	West Germany 12,727; Zaire 2,000.
Synthetic ------------do----	1,911	4,888	NA	Japan 2,683; Belgium-Luxembourg 1,212; West Germany 518.
Pyrite, unroasted	163	223	--	West Germany 160; Austria 40.
Salt and brine	86,813	134,917	78	Belgium-Luxembourg 54,516; West Germany 41,888; East Germany 4,958.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Sodium compounds, n.e.s.:				
Carbonate, manufactured	62,917	55,798	7	West Germany 35,228; France 8,054; Bulgaria 6,040.
Sulfate, manufactured[4]	22,417	29,089	--	Belgium-Luxembourg 18,337; West Germany 8,564; East Germany 1,132.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	2,148	2,202	--	West Germany 1,066; Belgium-Luxembourg 491; Sweden 440.
Worked do	41	44	(2)	Italy 20; Belgium-Luxembourg 7; West Germany 6.
Dolomite, chiefly refractory-grade do	716	980	--	Belgium-Luxembourg 575; West Germany 116; Norway 32.
Gravel and crushed rock do	16,418	17,288	2	West Germany 10,961; Belgium-Luxembourg 4,636; France 1,071.
Limestone other than dimension do	977	973	--	Belgium-Luxembourg 956; West Germany 13.
Quartz and quartzite do	33	36	(2)	West Germany 12; Norway 12; Belgium-Luxembourg 11.
Sand other than metal-bearing do	6,020	6,811	2	West Germany 5,745; Belgium-Luxembourg 895; Norway 157.
Sulfur:				
Elemental:				
Crude including native and byproduct	383,418	299,006	19,107	West Germany 169,337; France 66,882; Poland 38,146.
Colloidal, precipitated, sublimed	328	280	--	West Germany 175; United Kingdom 105.
Dioxide	7,638	10,294	--	West Germany 5,442; France 2,852.
Sulfuric acid	179,448	422,946	5	West Germany 206,868; Norway 81,268; Belgium-Luxembourg 22,396.
Talc, steatite, soapstone, pyrophyllite	39,015	45,455	67	Austria 6,865; France 2,503; Belgium-Luxembourg 2,399.
Vermiculite, perlite, chlorite	5,152	4,983	--	Greece 2,768; Republic of South Africa 1,326; West Germany 729.
Other:				
Crude thousand tons	1,453	967	8	Belgium-Luxembourg 462; West Germany 458.
Slag and dross, not metal-bearing do	1,084	1,377	--	West Germany 721; Belgium-Luxembourg 600.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,916	6,517	855	West Germany 4,537; United Kingdom 1,079.
Carbon black	15,643	14,620	924	West Germany 12,631; France 485.
Coal:				
Anthracite thousand tons	329	225	12	West Germany 97; Republic of South Africa 59; United Kingdom 56.
Bituminous do	8,546	7,512	3,554	Australia 1,482; Poland 1,045.
Briquets of anthracite and bituminous coal do	5	8	--	Belgium-Luxembourg 4; West Germany 4.
Lignite including briquets do	144	112	(2)	West Germany 108; East Germany 4.
Coke and semicoke	420,301	564,411	11	West Germany 334,031; United Kingdom 130,744; Spain 26,924.
Gas, natural million cubic feet	119,445	99,646	--	West Germany 93,356; Norway 6,290.
Peat including briquets and litter	498,796	520,841	--	West Germany 493,518; Finland 15,900; U.S.S.R. 7,198.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	278,571	297,038	--	United Kingdom 53,183; Iran 50,093; Libya 30,070.
Refinery products:				
Liquefied petroleum gas do	16,253	15,416	139	United Kingdom 4,524; France 3,468; Saudi Arabia 2,250.
Gasoline do	45,212	45,829	209	U.S.S.R. 8,641; Belgium-Luxembourg 6,516; United Kingdom 5,918.
Mineral jelly and wax do	416	483	5	Austria 150; West Germany 116; France 103.
Kerosine and jet fuel do	3,620	2,724	(2)	Belgium-Luxembourg 1,450; France 388; Venezuela 246.
Distillate fuel oil do	31,362	46,610	242	U.S.S.R. 35,934; Belgium-Luxembourg 5,578; United Kingdom 1,339.
Lubricants do	2,322	2,315	97	Belgium-Luxembourg 649; Italy 307; United Kingdom 304.
Residual fuel oil do	51,918	44,604	584	U.S.S.R. 17,282; Belgium-Luxembourg 5,354; Kuwait 1,572.
Bitumen and other residues do	1,265	1,188	508	West Germany 264; Belgium-Luxembourg 254.
Bituminous mixtures do	66	177	2	West Germany 131; Belgium-Luxembourg 28.
Petroleum coke do	3,088	2,537	1,150	West Germany 759; Norway 312.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]Includes waste and sweepings of other precious metals.
[4]Includes cadmium sulfate.

COMMODITY REVIEW

METALS

Aluminum.—Netherlands production of aluminum, most of which was exported to neighboring countries, has remained stable, at least for the last decade. In 1984, there were two operating smelters, one at Vlissingen and the other at Delfzijl. The Vlissingen plant used relatively inexpensive electricity from a nuclear powerplant, whereas the Delfzijl power was supplied by gas-fired generating plants. Delfzijl was constructed in 1964 on the basis of a long-term supply of inexpensive gas-based electric power. The contract was to be renegotiated by 1988.

Iron and Steel.—Production of steel in 1984 was the highest in the last decade, while pig iron more than equaled the 1979 record high output. The Netherlands moved up as the 23d steel producer in the world, with production of 5.7 million tons. Implementation of restructuring plans, improved market conditions, and higher output helped Hoogovens IJmuiden BV, the Netherlands' major steel producer, to register a net profit of $64 million, up from a loss of $12 million in 1983. Production of crude steel products increased sharply. Hoogovens' capacity utilization rate rose to 80%. The company announced plans to cut back its raw steel capacity by 1 million tons per year by 1986, in order to comply with EEC Commission requirements. It closed one of its four hot-strip mills at IJmuiden as part of its rationalization program and modernized another mill. Hoogovens also closed the wire rod and products mill at Utrecht. The company, however, converted its No. 3 blast furnace at IJmuiden to a prototype reducer-smelter unit that may have wide-ranging ramifications for other blast-furnace steelmakers. Prior to conversion, the 5.8-meter-hearth-diameter No. 3 furnace produced 1,000 to 1,500 tons per day of hot metal.

Lead and Zinc.—Hollanse Metallurgische Industrie BV (HMI), wholly owned by Billiton International Metals BV (BIM), had a total annual production capacity of about 85,000 tons of lead in all its plants worldwide and was one of the most important producers of secondary lead in Western

Europe. In the Netherlands, HMI operated a lead refinery at Arnhem, employing 237 workers. The plant was recently rebuilt at a cost of $16 million. The new lead plant at Arnhem, which also housed HMI's tin operation, had an annual refining capacity of 37,000 tons of lead. Battery scrap was not part of the plant's feedstock, although there were plans to acquire a battery separation system.

All zinc in the Netherlands was produced by Kempensche Zink-Maatschappij BV, partly owned by BIM. The imported zinc concentrate was processed at the electrolytic smelter at Budel. The smelter had an annual capacity of about 200,000 tons of zinc and employed about 600 workers.

Tin.—HMI also operated the only tin smelter at Arnhem, which in 1983 produced 5,400 tons of tin metal from imported concentrates grading between 20% to 72% tin.

NONMETALS

Fertilizer Materials.—The production of nitrogen, based on the indigenous supply of natural gas, reached an all-time high in 1984, surpassing the previous high output of about 2.1 million tons in 1978. Unie van Kunstmestfabrieken BV (UKF) began operating its new 362,000-ton-per-year (nitrogen content) ammonia plant at Geleen, based on natural gas.

Esso Chemie BV, also a nitrogen producer, sold its fertilizer complex at Rozenburg to Kemira Oy, Finland's largest chemical company. The complex included a 530,000-ton-per-year natural gas-based ammonia plant, a 350,000-ton nitric acid plant, a 230,000-ton urea plant, a 440,000-ton calcium ammonium nitrate plant, and a 250,000-ton ammonium nitrate solutions plant. Esso reportedly decided to dispose of the plant because the European market had an oversupply of ammonia and urea.

Industrial Minerals.—In the northern Netherlands at Veendam, Noordelijke Zoutwinning BV and Magnesia International BV, both wholly owned by Billiton Delfstoffen BV, respectively mined magnesium salt deposits and manufactured refractory-grade magnesia. The Veendam plant came onstream in 1981 with a manufacturing capacity of 100,000 tons of magnesia per year. It uses 600,000 tons of magnesium chloride brine extracted by solution mining in the Groningen Province and 135,000 tons of burned dolomite imported from Belgium. Reserves of magnesium salts are adequate to support the current production rate for at least 40 years, and the Belgian high-purity dolomite will last more than 25 years. The end product, "nedMag" magnesia sinter, is a raw material used in the manufacture of metallurgical refractories, particularly for furnace lining where temperatures exceed 1,600° C. In addition to magnesia, in 1984, the Veendam plant had a capacity of about 25,000 tons of gypsum per year.

Although the Netherlands had no indigenous production of white calcium carbonates, the country produced considerable amounts of off-white ground limestone powders. Chemische Fabrieken Holding BV and CV Nekami Kalk, both in Maastricht in the extreme southeastern corner of the country, were the two major producers. Ankersmit Nederland BV, the owner of both companies, produced limestone and dolomite from Maastricht and Winterswijk and from Uikhoven in Belgium. The total combined annual capacity of the plants was about 2 million tons, although a number of minerals other than carbonates was processed. A wide range of grades of limestone and dolomite were produced, which were used mainly in agriculture (30%), fillers for bitumen (30%), and chemicals (20%).[3]

MINERAL FUELS

All sectors of the Netherlands energy industry have continued to do well in the past few years, including the production of a small but growing crude oil industry. The Netherlands, with 46% of the total, was still the largest natural gas producer in the EEC, followed by the United Kingdom. In 1984, 27 drilling platforms were operating in the Netherlands portion of the North Sea Continental Shelf, and another 20 were planned to be added in the next 3 years.[4] The number of wells drilled during the 1978-82 period, by type, was as follows:[5]

Type of well	1978	1979	1980	1981	1982
Exploration and appraisal	23	21	31	32	46
Development	14	9	7	9	19
Total	37	30	38	41	65

In 1984, all coal requirements were imported from various sources, even though the Geological Survey of the Netherlands was reassessing the coal deposits of the entire country. The two nuclear powerplants in the Netherlands were producing 7% of the country's electric power.

Coal.—There was no coal mining in the Netherlands; all mines were shut down after 1970, and all coal requirements have been met through imports from Australia, the Federal Republic of Germany, and the United Kingdom. There were, however, some indigenous coal deposits in the extreme southeast of the country, at the West German border, in the Aachen coal basin. Underground coal gasification proposals were submitted to the Government, and several studies and reports were prepared on the subject, but no operative or even experimental projects were foreseen in the immediate future.[6] Some coal exploration, however, was undertaken by the Geological Survey for general assessment of the country's coal reserves, especially along its eastern border with the Federal Republic of Germany.[7] The Geological Survey reportedly found a coal seam 4.3 feet thick at a depth of 3,960 feet just outside Ruurlu in Gelderland Province, near the West German border. The Gelderland drillings were part of a countrywide reassessment of deep (5,000 feet) coal deposits.

Natural Gas.—Following almost a decade of banning further export contracts, the Government decided to allow gas exports to resume.[8] On January 2, 1984, Nederlandse Gasunie NV, Netherlands' distributor of natural gas, announced its first new gas export contracts in 10 years. The deals, with three of its West German customers, may be followed by similar arrangements with other European customers.

Because 1984 was the year when regular yearly renegotiations of existing contract prices and terms were scheduled, Gasunie used the occasion to implement its new strategy. To maintain its market share in Europe, which had been steadily eroded by imports of Soviet and Algerian gas during its absence from the market, Gasunie proposed a revision of its price indexing formula. In 1983, about 15% of all Netherlands revenues came from natural gas. When the export ban was enacted, in the mid-1970's, as a reaction to the first oil crisis, the Netherlands accounted for 50% of the gas supply to its European neighbors, exporting 47 billion cubic meters of gas. In 1983, the Netherlands' share to the same customers, Belgium, France, the Federal Republic of Germany, Italy, and Switzerland, amounted to just 35 billion cubic meters and 28% of those countries' gas supplies.

Domestically, there was little room for additional consumption in 1984. The Netherlands already had Europe's highest proportion of domestic gas connections (95%) and the highest share of the heating market (90%). Natural gas supplied close to 50% of the country's energy demand. This share is expected to fall, as gas after 1987 is to be replaced by coal for power generation.

After two decades of production, the giant Groningen Field, which provided 64% of Gasunie's supplies, still had reserves in excess of any other gasfield in Europe (the giant Soviet gasfields are in Asia). With projections of European energy demand well below that of the 1970's and with Groningen's proven reserves calculated at over 1,900 billion cubic meters, the Netherlands will continue to play a central role in Europe's gas economy.[9]

Nuclear Power.—The two operating nuclear powerplants, one at Borssele coast, on the coast, and the other on Dodewaard Island in the Waal River, provided 7% of the country's electrical power. There were plans to add three more plants at a cost of over $14 billion at Amsterdam, The Hague, and Eindhoven.[10]

Petroleum.—The production of crude petroleum in the Netherlands, although it increased significantly in 1984, has remained small, with only minor annual fluctuations, for the last 20 years. In 1984, a group of oil developers, led by Amoco Netherlands Petroleum Co., planned to develop the P/15 Oilfield in the Netherlands North Sea, 25 miles northwest of The Hague, in proximity of the gasfields. The cost of development, scheduled for completion in mid-1986, would be about $270 million. Production was to begin at about 23,000 barrels per day. Amoco planned to drill 12 production wells and 6 water injection wells. The oil, once tapped, will flow through a 10-inch pipeline to the Europort. The discovery well was drilled in 85 feet of water in 1982 and produced 2,500 barrels per day, while the appraisal well flowed at 3,900 barrels. Amoco held a 32.2% interest in the field, and its partners were British Petroleum Exploratie Maatschappij Nederland BV, 11.9%; Oranje Nassau Energi BV, 9.2%; Veba Oil Nederland BV, 8.9%; Ensearch Netherlands Inc., 8.2%; Hudbay Oil (Netherlands) Ltd., 6.9%; Pacific Lighting Exploration Co., 6.9%; Gao North Sea Exploration Ltd., 6.6%; Exploratie-en Productiemaatschappij Dyas BV, 4.1%; Gao North Sea Ltd., 3.3%; and Bricomin Exploration Co. Ltd., 1.8%.[11]

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Netherlands guilders (f.) to U.S. dollars at the rate of f.3.21=US$1.00, the average rate for 1984.
[3]Smith, M. Calcium Carbonate Fillers. Ind. Miner. (London), No. 198, Mar. 11, 1984, p. 28.
[4]Looman, N. J. Buzzing With Action. Elsevier Mag. (Amsterdam), Nov. 17, 1984, pp. 189-191.
[5]Industrial Minerals (London). No. 198, Mar. 11, 1985, p. 55.
[6]NRC Handelsblad (Rotterdam). Report on Feasibility of Underground Coal Gasification. Feb. 20, 1985, p. 11.
[7]Fermont, W. J., and A. van der Menlen. Coal Exploration in the Netherlands, 1981-1985. Energiespectrum (Haarlem), July-Aug. 1984, pp. 146-156.
[8]Financial Times (London). Jan. 21, 1985, sec. 3, p. 2.
[9]Ball, J. Gas: Emphasis on Fresh Export Contracts. Financial Times (London). Jan. 21, 1985, sec. 3, p. 4.
[10]Atomwirtschaft (Dusseldorf). June 1983, p. 332.
[11]Oil & Gas Journal (Tulsa, Oklahoma). July 2, 1984, p. 44.

The Mineral Industry of New Zealand

By Charles L. Kimbell[1]

New Zealand's mineral industry, only a very modest direct contributor to the national economy, showed several upturns in 1984, and had potential for expansion of output of several commodities. Significant increases in iron ore (iron sand) output, cement production, and ammonia-urea output were possible with existing installed or on-site equipment; expansions of facilities at the country's main steel plant and oil refinery were underway, and there were reasonably serious proposals for expansion of coal production. The country's Ministry of Energy published its fifth comprehensive Energy Plan in 1984, reflecting concern for this key element of the economy.

The extractive mineral industry of New Zealand in recent years has contributed slightly under 1% of the country's gross domestic product (GDP). The mineral processing sector, based to a significant extent on imported raw materials (most notably alumina, fertilizer raw materials, and crude oil), provides slightly over 4% of the GDP, raising the mineral industry total to a little over 5%.

PRODUCTION

Official returns on the quantity of production of many commodities showed upturns in 1984, but increases in values among nonfuel mineral output were less common, with an overall increase in total crude mineral production value being attributed to liquid and gaseous fuels. Production of iron ore (iron sand) increased slightly, and significant increases were reported for such diverse items as primary aluminum, crude steel, cement, nitrogenous fertilizers, crude oil, and natural gas. A modest gain was also reported for refined oil, and a marked increase was registered for hard coal, while in contrast output of subbituminous coal turned downward, and that of lignite was virtually unchanged.

The value of New Zealand's crude nonfuel mineral production was approximately $123.1 million,[2] virtually unchanged from the reported 1983 level of $123.2 million. Coal production was valued at $56.8 million, almost 13% below the $65.1 million level of 1983. The combined value of crude liquid and gaseous hydrocarbons production was estimated at $365 million, substantially above the 1983 estimated value of $292 million for these products. Thus, total value of crude mineral production in New Zealand was estimated at nearly $545 million, more than 13% above the partly estimated 1983 level of $480 million.

The principal components of the reported nonfuel mineral value in 1984 (corresponding 1983 values in parentheses) were stone (excluding limestone), sand and gravel for roads, ballast, building aggregate, and reclamation, $69.7 million ($68.3 million); iron sand, $23.9 million ($23.7 million); limestone, $13.0 million ($13.5 million); salt, $5.4 million ($5.4 million); and gold, $7.6 million ($4.3 million). From these figures and those given in the preceeding paragraph above, the dominance of the fuel minerals and of industrial nonmetallics in terms of value should be evident. The total value of production of the nation's principal crude mineral commodity export, iron sand, represented less than 20% of crude nonfuel mineral production value in 1983, and accounted for about the same share of the 1984 total.

Mineral processing operations' output values are not reported on a uniform basis, but may be roughly estimated at about $1.5 billion, raising total 1984 mineral industry output value to about $2 billion.

Table 1.—New Zealand: Production of mineral comodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum metal, smelter:					
Primary	154,740	153,979	166,800	220,000	243,100
Secondary	2,000	3,000	2,700	2,800	[e]3,000
Total	156,740	156,979	169,500	222,800	246,100
Gold, mine output, metal content troy ounces	6,419	[r]6,071	7,775	9,667	21,605
Iron and steel:					
Iron ore, gross weight[2]	72	197	166	156	2,645
Iron sand (titaniferous magnetite):					
Gross weight thousand tons	3,638	3,253	2,791	2,203	2,414
Iron content do.	2,074	1,854	1,591	1,256	1,376
Pig iron (sponge iron) do.	134	150	[e]150	150	148
Steel, crude do.	[r]271	[r]232	252	233	286
Lead, refinery output, secondary[e]	7,000	7,000	[r]6,000	[r]6,000	6,000
Silver, mine output, metal content troy ounces	747	--	--	31	--
Tungsten, mine output (scheelite):					
Gross weight	8	20	14	11	13
Tungsten content	4	10	7	6	6
NONMETALS					
Cement, hydraulic thousand tons	720	759	781	760	823
Clays:					
Bentonite	3,000	1,885	6,220	1,958	5,868
Kaolin (pottery)	46,112	49,307	23,957	23,917	25,098
For brick and tile	130,719	132,226	129,924	97,944	147,390
Lime[e]	170,000	170,000	170,000	165,000	170,000
Magnesite	--	308	--	--	--
Nitrogen: N content of ammonia	--	--	--	43,200	58,000
Perlite	999	999	2,163	1,008	--
Pumice	13,463	33,834	50,183	16,799	15,182
Salt	5,500	55,500	70,000	81,000	57,000
Sand and gravel:					
Silica sand (glass sand)	139,899	129,146	160,009	148,357	133,235
Other industrial sand	115,700	363,446	245,349	234,403	387,209
For roads and ballast thousand tons	13,559	13,548	14,154	15,489	6,260
For building aggregate do.	4,286	4,084	4,169	4,359	4,922
Stone:					
Dolomite	5,726	25,112	14,900	17,033	18,124
Greenstone kilograms	3,095	5,985	8,100	435	3,052
Limestone and marl:					
For agriculture thousand tons	1,581	1,829	1,592	1,460	1,513
For cement do.	1,389	1,458	1,483	1,496	1,621
For other industrial uses do.	172	178	184	207	214
For roads do.	229	312	375	274	351
Serpentine	80,943	65,714	45,644	64,055	76,900
Unspecified:					
Dimension	16,350	30,791	22,493	22,585	36,359
Rock for harbor work thousand tons	2,246	2,891	2,325	2,254	2,520
Sulfur	--	90	156	1,090	862
MINERAL FUELS AND RELATED MATERIALS					
Carbon dioxide, liquefied	NA	6,066	9,797	NA	NA
Coal:					
Anthracite thousand tons	1	1	(3)	2	--
Bituminous do.	487	[r]475	428	494	582
Subbituminous do.	1,467	1,510	1,595	1,752	1,709
Lignite do.	208	212	222	235	235
Total do.	2,163	[r]2,198	2,245	2,483	2,526
Coke:					
Coke oven	30,000	4,004	2,263	2,060	[e]2,100
Gashouse	36,000	20,953	7,037	6,129	[e]6,200
Total	66,000	24,957	9,300	8,189	[e]8,300
Fuel briquets	[e]17,000	6,551	6,144	4,453	[e]4,500
Gas:					
Manufactured (from gasworks) million cubic feet	2,009	1,708	1,168	845	609
Natural:					
Gross production[e] do.	43,900	56,600	[r]100,000	[r]108,000	135,000
Marketed production do.	37,753	48,691	86,272	93,834	120,768

See footnotes at end of table.

Table 1.—New Zealand: Production of mineral comodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
MINERAL FUELS AND RELATED MATERIALS — Continued					
Natural gas liquids:					
Liquefied petroleum gas _ thousand 42-gallon barrels	172	248	[r] [e]315	[r] [e]532	[e]483
Natural gasoline do	45	44	56	[r] [e]94	[e]85
Total do	217	292	371	626	568
Petroleum:					
Crude do	2,635	3,381	5,373	5,268	6,635
Refinery products:					
Gasoline do	10,294	10,736	9,801	10,668	10,965
Distillate fuel oil do	4,879	5,058	4,125	4,551	4,588
Residual fuel oil do	5,235	3,623	2,637	2,331	2,311
Other do	973	630	483	784	931
Refinery fuel and losses do	665	910	735	805	798
Total do	22,046	20,957	17,781	19,139	19,593

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 11, 1985.
[2]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.
[3]Less than 1/2 unit.

TRADE

Complete detailed trade statistics for New Zealand for calendar year 1983, the latest year for which such data were available, show that although the island nation registered a substantial positive trade balance in overall commodity trade, with exports and reexports exceeding imports by 33%, there was a large deficit, proportionally, in terms of mineral commodities value, as shown in the following tabulation, in million dollars:

	1982	1983
Mineral commodities:		
Exports	$301.7	$375.6
Reexports	2.3	2.3
Total	304.0	377.9
Imports	1,722.2	1,629.2
All commodities:		
Exports	5,222.9	5,192.3
Reexports	304.0	378.0
Total	5,526.9	5,570.3
Imports	4,555.8	4,179.4

Mineral commodity imports accounted for almost 39% of total commodity imports in 1983, compared with 37.8% in 1980; in sharp contrast, mineral commodity exports and reexports represented only 6.8% of total commodity exports and reexports in 1983, somewhat up from the 5.5% recorded for 1982.

Among mineral commodity imports, refined oil remained the dominant category, accounting for nearly 36.8% of total mineral commodity imports (32.8% in 1982), with crude oil ranking second, with 22.4% of total mineral commodity imports (23.9% in 1982). Other prominent mineral commodity imports, and their shares of total mineral commodity imports (1982 results in parentheses) were as follows: iron and steel, 15.5% (18.9%); fertilizer materials, 7.6% (7.3%); and alumina, 6.6% (5.0%).

Among mineral commodity exports and reexports, aluminum ingots clearly remained New Zealand's dominant export, accounting for 62.3% of the mineral commodity total in 1983 compared with 60.8% in 1982. Iron and steel ranked second, with 13.9% of the 1983 total and 12.9% of the 1982 total, followed by iron ore (iron sands) with 6.8% of the 1983 total and 7.7% of the 1982 total.

Table 2.—New Zealand: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	1	7	--	All to Australia.
Metal including alloys:				
Scrap	2,598	3,803	--	Japan 3,376.
Unwrought	151,442	182,087	--	Japan 166,469; China 4,999; Hong Kong 3,985.
Semimanufactures	9,175	7,015	102	Australia 1,971; Singapore 1,258; Republic of Korea 961.
Chromium: Oxides and hydroxides value, thousands	--	$6	--	Mainly to Fiji.
Copper: Metal including alloys, all forms	4,103	5,231	941	Australia 1,796; India 436; Singapore 429.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	2,299,056	2,461,805	--	Japan 2,412,555; Republic of Korea 49,237.
Metal:				
Scrap	2,490	2,434	8	Japan 1,824.
Pig iron, cast iron, related materials	--	5	--	Solomon Islands 4.
Ferroalloys	2	NA		
Steel, primary forms	63,243	28,805	--	Philippines 14,258; Malaysia 10,366; Fiji 3,854.
Semimanufactures	42,407	111,893	27,308	China 35,325; Australia 18,444; Papua New Guinea 4,361.
Lead:				
Oxides	--	2	--	All to Australia.
Metal including alloys, all forms	432	1,248	--	Australia 700; Denmark 126; Philippines 88.
Magnesium: Metal including alloys, scrap	--	6	6	
Manganese: Metal including alloys, all forms value, thousands	$1	--		
Mercury do.	$8	--		
Molybdenum: Metal including alloys, all forms do.	$8	--		
Nickel:				
Ore and concentrate	--	2	--	All to Australia.
Metal including alloys, all forms	15	23	--	Australia 20.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$24	$58	--	Australia $38; United Kingdom $18.
Rare-earth metals including alloys, all forms do.	--	$2	--	All to Papua New Guinea.
Silver:				
Waste and sweepings do.	$752	$976	$7	Australia $690; United Kingdom $278.
Metal including alloys, unwrought and partly wrought do.	$139	$1,120	$255	Australia $831.
Tin: Metal including alloys, all forms	8	146	--	French Polynesia 77; Australia 26.
Titanium: Oxides	--	14	--	Australia 12.
Tungsten:				
Ore and concentrate	1	--		
Metal including alloys, all forms value, thousands	$8	$2	--	All to United Kingdom.
Zinc:				
Oxides	--	1	--	All to Fiji.
Metal including alloys, all forms	459	850	--	Japan 321; Australia 246; Republic of Korea 70.
Other:				
Oxides and hydroxides	2	206	--	Papua New Guinea 200.
Ashes and residues	911	1,025	--	Japan 716; India 78; United Kingdom 66.
Base metals including alloys, all forms value, thousands	--	$2	--	Australia $1.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	79	93	--	Australia 70.
Grinding and polishing wheels and stones value, thousands	$95	$97	$1	Fiji $30; Papua New Guinea $30; Australia $18.
Asbestos, crude	2	--		
Barite and witherite	30	16	--	Fiji 14.
Boron materials: Oxides and acids	1	1	--	All to Fiji.

See footnotes at end of table.

Table 2.—New Zealand: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Cement	171,717	226,069	--	Australia 79,948; French Polynesia 58,481; Papua New Guinea 45,675.
Chalk	122	99	--	Fiji 83.
Clays, crude	7,967	11,814	36	Japan 7,943; Republic of Korea 520; United Kingdom 367.
Diamond:				
Gem, not set or strung value, thousands	$109	$65	--	Israel $32; Australia $29.
Industrial stones do	$6	--		
Diatomite and other infusorial earth	4	2	--	Mainly to Fiji.
Fertilizer materials:				
Crude, n.e.s	105	121	--	Malaysia 84; Philippines 17; Singapore 17.
Manufactured:				
Ammonia	1	16	--	Papua New Guinea 13.
Nitrogenous	680	9,010	8,917	Cook Islands 25.
Phosphatic	692	218	--	Fiji 183.
Potassic	405	34	--	Cook Islands 17; Fiji 13.
Unspecified and mixed	402	915	--	Malaysia 396; French Polynesia 93; Cook Islands 56.
Gypsum and plaster	352	180	--	Vanuatu 81; Fiji 44; Papua New Guinea 30.
Lime	714	609	--	Papua New Guina 270; Fiji 207.
Magnesium compounds: Magnesite	--	1	--	All to Fiji.
Mica, crude including splittings and waste	2	3	--	Do.
Phosphates, crude	12	2	--	All to French Polynesia.
Pigments, mineral: Iron oxides and hydroxides, processed	4	4	--	All to Fiji.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$405	$190	$45	Fiji $74; Australia $67.
Synthetic do	--	$7	$1	Canada $5.
Salt and brine	1,517	3,722	1	Australia 2,068; American Samoa 1,262.
Sodium compounds, n.e.s.: Carbonate, manufactured	5	7	--	Fiji 6.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	120	69	--	Norfolk Island 24; Malaysia 18.
Worked value, thousands	$128	$92	--	Cook Islands $21; French Polynesia $19; Western Samoa $17.
Dolomite, chiefly refractory-grade do	$6	$44	--	Papua New Guinea $34.
Gravel and crushed rock	487	430	--	Australia 408.
Limestone other than dimension	352	197	--	New Caledonia 180.
Sand other than metal-bearing	2,358	399	--	Australia 172; Western Samoa 80; Fiji 77.
Sulfur:				
Elemental: Colloidal, precipitated, sublimed	--	8	--	All to Australia.
Sulfuric acid	199	771	--	Australia 613; Fiji 69; Papua New Guinea 51.
Talc, steatite, soapstone, pyrophyllite	33	27	--	Fiji 26.
Other: Crude	1,470	562	--	Austalia 465; Fiji 74.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	408	25	--	Mainly to Papua New Guinea.
Carbon: Carbon black	1	--		
Coal: Anthracite and bituminous	168,703	187,268	--	Japan 177,425; Republic of Korea 9,842.
Coke and semicoke value, thousands	$2,424	--		
Peat including briquets and litter	1,914	2,217	--	Australia 2,015.
Petroleum refinery products:				
Liquefied petroleum gas value, thousands	$10	$5	--	Fiji $2; Cook Islands $1.
Gasoline, motor 42-gallon barrels	978	400	--	Cook Islands 306; Pitcairn Island 68.
Mineral jelly and wax do	488	212	--	Fiji 126.
Kerosine and jet fuel do	3,890	2,054	--	Fiji 1,209; Papua New Guinea 326.
Distillate fuel oil do	440	157	--	Vanuatu 9; Cook Islands 8.
Lubricants value, thousands	$1,260	$1,327	--	Fiji $760; Western Samoa $205.
Bituminous mixtures 42-gallon barrels	1,417	6,878	30	Fiji 2,727; Barbados 1,679; Belgium-Luxembourg 879.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.

Table 3.—New Zealand: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	503	1,000	--	All from Guyana.
Oxides and hydroxides	345,410	448,471	214	Australia 441,157.
Metal including alloys:				
Scrap	47	39	1	French Polynesia 11; Fiji 6; Papua New Guinea 5.
Unwrought	7,468	6,726	2	Australia 6,578.
Semimanufactures	3,901	3,651	129	Australia 2,239; Japan 352; Switzerland 219.
Beryllium: Metal including alloys, all forms ... value, thousands	$6	--		
Chromium:				
Ore and concentrate	574	145	36	Republic of South Africa 104.
Oxides and hydroxides	145	241	16	United Kingdom 123; West Germany 79.
Cobalt: Oxides and hydroxides	7	9	6	Belgium-Luxembourg 3.
Columbium and tantalum: Metal including alloys, all forms, tantalum ... value, thousands	$3	$4	$3	United Kingdom $1.
Copper: Metal including alloys:				
Scrap	48	2	--	Mainly from Cook Islands.
Unwrought	1,996	2,205	7	Australia 1,661; West Germany 510.
Semimanufactures[2]	14,006	12,223	34	Australia 10,835; Republic of Korea 547.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	31	93	(3)	Australia 91.
Pyrite, roasted	--	19	--	All from Australia.
Metal:				
Scrap	5,289	2,507	--	French Polynesia 893; Fiji 841; New Caledonia 748.
Pig iron, cast iron, related materials	1,337	1,174	1	Australia 516; United Kingdom 406; Japan 150.
Ferroalloys:				
Ferromanganese	956	1,045	--	Australia 523; Republic of South Africa 450.
Unspecified	2,940	2,138	37	Australia 1,390; Republic of South Africa 591.
Steel, primary forms	6,381	2,649	9	Australia 2,639.
Semimanufactures:				
Bars, rods, angles, shapes, sections	100,242	72,559	240	Japan 49,357; Australia 19,417; United Kingdom 2,280.
Universals, plates, sheets	373,657	318,687	1,393	Japan 233,254; Australia 65,470; United Kingdom 10,743.
Hoop and strip	18,575	12,457	62	Australia 7,285; Japan 4,129; United Kingdom 372.
Rails and accessories	13,081	14,780	2	United Kingdom 13,083; Japan 1,058; Australia 607.
Wire	16,008	14,586	129	Japan 6,808; Australia 3,288; United Kingdom 3,004.
Tubes, pipes, fittings	49,437	40,793	2,774	Japan 22,693; Australia 6,688; Republic of Korea 4,550.
Castings and forgings, rough	464	128	1	United Kingdom 99; Japan 19.
Lead:				
Ore and concentrate	--	2	--	All from United Kingdom.
Oxides	124	102	1	United Kingdom 55; Australia 46.
Metal including alloys, all forms	6,319	5,474	NA	Mainly from Australia.
Magnesium: Metal including alloys:				
Unwrought ... value, thousands	$636	$298	$122	Norway $173.
Semimanufactures ... do	$80	$46	--	Canada $30.
Manganese:				
Ore and concentrate	234	643	17	Australia 390; Singapore 234.
Oxides	935	882	1	Japan 597; Australia 212.
Mercury ... value, thousands	$11	$15	$1	Spain $4; Japan $3; Netherlands $3.
Molybdenum: Metal including alloys, all forms	$41	$115	$11	United Kingdom $92.
Nickel:				
Ore and concentrate	53	(3)	--	All from Australia.
Metal including alloys:				
Scrap	1	6	--	Australia 5.
Unwrought	130	41	NA	Norway 28; Canada 13.
Semimanufactures	165	132	11	Japan 60; Australia 32.

See footnotes at end of table.

Table 3.—New Zealand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$211	$526	$114	United Kingdom $174; Australia $144.
Rare-earth metals including alloys, all forms value, thousands	$19	$9	$2	United Kingdom $3; Australia $2; Japan $2.
Silver:				
Waste and sweepings do	$248	$249	--	All from Australia.
Metal including alloys, unwrought and partly wrought do	$2,539	$2,831	$61	Australia $2,540.
Tin: Metal including alloys, all forms	209	172	3	Australia 86; Malaysia 71.
Titanium: Oxides	2,179	2,339	743	Australia 1,147; West Germany 257; Finland 108.
Tungsten: Metal including alloys, all forms value, thousands	$418	$464	$10	United Kingdom $345.
Zinc:				
Ore and concentrate	--	10	--	All from United Kingdom.
Oxides	111	27	--	West Germany 18; Australia 6.
Metal including alloys:				
Unwrought	22,850	18,256	18	Australia 12,674; Canada 5,545.
Semimanufactures[4]	257	36	1	West Germany 24; Australia 5.
Other:				
Ores and concentrates	998	864	--	Japan 396; Australia 207; China 200.
Oxides and hydroxides	1,464	1,976	101	Australia 1,508.
Ashes and residues	42	14	--	All from Australia.
Base metals including alloys, all forms value, thousands	$429	$320	$47	China $87; Australia $79.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	268	185	88	France 38; Italy 36.
Artificial: Corundum	106	71	69	United Kingdom 2.
Dust and powder of precious and semi-precious stones, including diamond value, thousands	$262	$253	$187	Ireland $38; United Kingdom $19.
Grinding and polishing wheels and stones do	$1,904	$1,836	$458	Australia $478; Japan $289; United Kingdom $242.
Asbestos, crude	3,699	1,897	([3])	Canada 1,578; Republic of South Africa 315.
Barite and witherite	1,066	4,641	--	China 3,102; Thailand 603; Singapore 499.
Boron materials:				
Crude natural borates value, thousands	$36	$149	$75	Netherlands $45; China $18.
Oxides and acids	804	475	339	China 75; Argentina 36.
Cement	4,191	5,242	13	Australia 2,521; Japan 677; Singapore 655.
Chalk	726	664	1	United Kingdom 592; France 70.
Clays, crude	8,408	11,760	2,199	Australia 4,687; Republic of South Africa 2,782; United Kingdom 1,421.
Cryolite and chiolite	29	966	--	Japan 951.
Diamond:				
Gem, not set or strung value, thousands	$3,482	$3,840	$25	India $2,289; Israel $596; Belgium-Luxembourg $498.
Industrial stones do	$106	$125	$5	Australia $40; United Kingdom $32; Ireland $30.
Diatomite and other infusorial earth	1,282	1,343	834	Japan 473.
Feldspar, fluorspar, related materials	1,342	1,299	--	Canada 525; Norway 437; Australia 168.
Fertilizer materials: Manufactured:				
Ammonia	580	679	NA	Australia 676.
Nitrogenous value, thousands	$15,266	$7,022	$2,201	Japan $1,727; Belgium-Luxembourg $1,632; West Germany $1,131.
Phosphatic	26,883	71,258	53,005	Israel 18,247.
Potassic	182,413	132,450	70,648	Canada 41,017; U.S.S.R. 16,330.
Unspecified and mixed value, thousands	$13,163	$20,466	$17,667	West Germany $1,752; United Kingdom $500.
Graphite, natural	60	116	--	Sri Lanka 53; United Kingdom 37; China 14.

See footnotes at end of table.

Table 3.—New Zealand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Gypsum and plaster	146,212	67,164	29	Australia 66,776.
Lime	18	12	6	West Germany 6.
Magnesium compounds: Magnesite	2,091	3,385	15	China 2,309; Australia 1,014.
Mica:				
Crude including splittings and waste value, thousands	$155	$155	$3	India $46; Republic of South Africa $35; China $29.
Worked including agglomerated splittings do.	$149	$84	$2	United Kingdom $37; Belgium-Luxembourg $35.
Nitrates, crude	--	54	--	All from United Kingdom.
Phosphates, crude	877,334	980,532	89,508	Nauru 494,675; Christmas Island 330,894; Jordan 38,356.
Pigments, mineral: Iron oxides and hydroxides, processed	1,576	1,276	10	West Germany 1,080; Spain 101.
Potassium salts, crude	1,650	3,304	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$2,013	$1,528	$9	Thailand $717; Australia $283; West Germany $142.
Synthetic do.	$89	$85	$8	West Germany $27; Thailand $25; Israel $12.
Pyrite, unroasted	--	2	--	Mainly from Australia.
Salt and brine	65,967	94,891	9	Netherlands Antilles 93,617.
Sodium compounds, n.e.s.: Carbonate, natural and manufactured	25,877	25,487	22,591	United Kingdom 2,605; Australia 143.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	21,229	3,067	30	Republic of South Africa 1,533; China 540; India 381.
Worked value, thousands	$372	$181	$1	Italy $70; United Kingdom $25; Philippines $24.
Dolomite, chiefly refractory-grade	40	9	--	West Germany 5; United Kingdom 4.
Gravel and crushed rock	156	79	--	China 36; France 36.
Quartz and quartzite	334	347	5	Australia 300.
Sand other than metal-bearing	735	445	25	Australia 368.
Sulfur:				
Elemental:				
Crude including native and byproduct	199,415	193,771	62,283	Canada 131,485.
Colloidal, precipitated, sublimed	256	206	2	Australia 168.
Sulfuric acid	34	32	5	United Kingdom 21.
Talc, steatite, soapstone, pyrophyllite	3,774	4,851	2,612	Australia 1,713; China 474.
Other: Slag and dross, not metal-bearing	99	106	--	Australia 99.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6	57	3	Trinidad and Tobago 54.
Carbon: Carbon black	7,895	4,972	79	Australia 4,659.
Coal:				
Anthracite and bituminous	254	210	--	Australia 196.
Briquets of anthracite and bituminous coal	2,516	486	486	
Lignite including briquets	154	9	--	Australia 5; West Germany 4.
Coke and semicoke value, thousands	$442	$339	$14	Australia $325.
Petroleum:				
Crude thousand 42-gallon barrels	10,938	10,659	--	Indonesia 5,856; Saudi Arabia 3,738; Iran 755.
Refinery products:				
Liquefied petroleum gas value, thousands	$99	$16	$5	Netherlands $9.
Gasoline, motor do.	$150,799	$231,980	$25,504	Australia $119,326; Singapore $52,537; Bahrain $13,512.
Mineral jelly and wax do.	$3,195	$2,405	$352	Japan $822; China $464; Australia $404.
Kerosine and jet fuel do.	$110,168	$99,153	$1,828	Singapore $56,187; Australia $40,905.
Distillate fuel oil do.	$144,353	$161,082	$41,351	Singapore $50,998; Australia $47,627; Venezuela $10,231.
Lubricants do.	$34,264	$27,215	$2,861	Australia $15,196; Singapore $5,178.
Residual fuel oil do.	$97,320	$56,928	--	Singapore $29,663; Kuwait $18,368; Saudi Arabia $5,914.

See footnotes at end of table.

Table 3.—New Zealand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Bitumen and other residues 42-gallon barrels	188,824	291	97	Netherlands 188.
Bituminous mixtures do	3,436	3,630	(3)	United Kingdom 2,957; Australia 673.
Petroleum coke do	551,490	469,557	457,336	Australia 12,221.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Excludes unreported quantity valued at $2,743,000 in 1982 and $2,104,000 in 1983.
[3]Less than 1/2 unit.
[4]Excludes unreported quantity valued at $1,016,000 in 1982 and $775,000 in 1983.

COMMODITY REVIEW

METALS

Aluminum.—Output at the Tiwai Point plant of New Zealand Aluminium Smelters Ltd., the country's only such facility, reached 99.2% of rated capacity in 1984. This facility remained the Southern Hemisphere's largest single aluminum smelter.

Gold.—Official annual production results released in late 1984 list Ryan Mining Ltd. as New Zealand's largest gold producer, accounting for almost 17.8% of total national output from its operations in the southern part of South Island, but Ryan ranked only slightly ahead of R. J. and M. W. Herring, the leading operators in the northern half of South Island, who accounted for nearly 16% of the national total. The balance of national output in 1983 came from 144 listed producers and an additional unreported number of firms and individuals, each of whom produced under 1 ounce each in the year. Only six producing entities recorded an annual output exceeding 350 ounces each.

Reserves reported in the 1983 edition of this chapter of North Island were not developed during that year; less than 1% of total 1983 national output was obtained from North Island.

Iron Sands and Iron Ore.—New Zealand Steel Mining Ltd.'s Taharoa Mine produced about 1.5 million dry tons of iron sands in 1984, and exported about 1.7 million tons of material, including 148,296 tons drawn from stocks. This firm's other mine, Waika-to North Head, mined 206,141 tons of product, all of which was shipped to New Zealand's Glenbrook steel plant. Company officials reported that equipment and facilities now installed at Waikato at yearend had the capacity to mine 11 million tons of iron sand and to produce 1.4 million tons of marketable concentrate. The country's other iron sand producer, Waipipi Ironsands Ltd., produces wholly for the export market, and its 1984 output was estimated at about 576,000 tons.

Iron and Steel.—Expansion of New Zealand Steel Ltd.'s Glenbrook plant continued, with annual steel capacity slated to reach 350,000 tons by July or August of 1985, upon completion of the first half of the stage I plant expansion. Total completion of stage I of the expansion was targeted for early 1986, according to company officials. Completion of further expansion, aimed at raising rolling capacity to 750,000 tons, was previously reported as having a target completion date in late 1986.

New Zealand's second steel company, Pacific Steel Ltd., also had a development project underway at Otahuhu, but specifics on the magnitude of the expansion and on the target completion date were not available. The Ministry of Energy, however, reportedly had taken this expansion into account in estimating energy demand in its 1984 Energy Plan. Through 1983, the plant used scrap and billets purchased from New Zealand Steel Ltd. to produce wire rod, bars, angles, and channels.

NONMETALS

Cement.—The 8% increase in cement output registered in 1984 represented a new record high for national production, but output remained considerably below national capacity of well over 1 million tons. New Zealand Cement Holdings Ltd.'s 404,000-ton-per-year-capacity plant at Westport remained the country's largest producer, somewhat ahead of Golden Bay Cement Co. Ltd.'s Tarakohe plant near Nelson (both on South Island).

Fertilizer Materials.—In 1983, there was an upturn in the sales of fertilizer materials in New Zealand for the first year since 1979. The data on sales presented only as totals of manufactured and crude fertilizer materials include all types of soil nutrients and conditioners, not only the standard crude fertilizers such as phosphate rock, potassium chloride, potassium sulfate, ammonium sulfate, and mixtures thereof but also specialized commodities containing boron, cobalt, copper, and molybdenum compounds as well as materials such as lime, serpentine rock, urea, and sulfur.

Throughout the period 1980-83 inclusive, there has been a continual, gradual increase in the area of land under cultivation, and a further modest increase probably occurred in 1984, although final figures are not yet available. Government officials credited the increase in fertilizer sales in 1984 chiefly to (1) a decline in the price of at least some fertilizer raw materials, which in turn was reflected in a decline in the real price for manufactured fertilizers; (2) a modest increase in real gross farm income; and (3) the fact that increased applications were necessary following a drought period.

Production at Petrochem N.Z. Ltd.'s ammonia-urea plant advanced in 1984, but was still at a level of only 37% of the rated capacity of 155,000 tons.

Table 4.—New Zealand: Consumption and sales of fertilizer materials

(Thousand metric tons)

Year[1]	Raw materials consumption at fertilizer works	Sales of fertilizers		
		Manufactured	Crude	Total
1980	1,968	2,376	96	2,472
1981	1,656	1,977	74	2,051
1982	1,550	1,941	86	2,027
1983	1,342	1,652	148	1,800
1984	1,456	1,839	159	1,998

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

Sources: Ministry of Agriculture and Fisheries. New Zealand Fertilizer Statistics 1983. Pp. 15, 30-31; New Zealand Fertilizer Statistics 1984. Pp. 15, 30-31.

MINERAL FUELS

The New Zealand Ministry of Energy's 1984 Energy Plan indicated that petroleum provided 49% of total energy consumed in that year, with hydropower ranking second as an energy source accounting for 24% of the total, coal ranking third with 14% of the total, gas ranking fourth with 12% of the total, and geothermal power accounting for the remaining 1%. Total energy consumption was indicated to be 326 petajoules. The Ministry of Energy's projections call for total demand to rise at an annual growth rate of 2.2% through the forecasting period ending in 1999, reaching a level of 451 petajoules in that year. Relatively little change in the share of total energy provided by each energy source is expected under current planning, except that oil's share is to decline by about 9%, with gas rising by 7%, and hydroelectricity and coal each increasing by about 1%.

New Zealand presently plans to remain wholly nuclear free, with no suggestion to develop any nuclear power generating capacity. Instead, energy development plans include several innovative programs including expanded use of liquefied petroleum gas and compressed natural gas as well as tapping on a larger scale the potential of cogeneration—the coincident production of both heat and power from traditional primary fuel energy sources. Regarding the latter potential, the 1984 Energy Plan indicated that the Energy Advisory Committee noted that there was an estimated potential in New Zealand to economically cogenerate over 1,000 gigawatt hours of electricity annually, but that in 1984, only 247 gigawatt hours was so produced. In addition to these more unusual approaches to meeting increased energy demand, increases in production of hydropower, coal, and geothermal power are expected to carry a part of the burden. Additional significant programs aimed at energy conservation, including both consumer education and technological changes for greater efficiencies, are planned.

Major reserves of fossil fuels were estimated in 1984 on the basis of energy potential measured in petajoules as follows: coal, 86,200; natural gas, 5,750; and condensate and oil, 935. The coal figure, however, was described as "technically recoverable based on geological data," with the note that the coal figure would be "substantially less based on confirmed mineability."

Coal.—A 13% increase in bituminous coal output was more than overbalanced on a gross tonnage basis by a 5.6% drop in subbituminous output and a 9.8% decline in lignite production. The change in terms of energy supply to the domestic economy was small, because of the higher caloric value of the hard coal, but the drop in overall output can only be viewed as a setback to New Zealand's coal industry.

Details on the distribution of actual coal production between state mines and private sector mines was not available for 1984, but on the basis of sales, state mines accounted for 70% of the total, compared with 66% in 1983, reflecting the continued expansion of public sector coal mining in relation to private sector mining.

Development plans call for a fourfold increase in coal production on North Island by 1999, to 3.9 million tons annually. This planned growth, characterized in the 1984 Energy Plan as "challenging," is predicated upon achieving maximum outputs at the existing Huntley East and West underground mines by applying longwall mining techniques and on successful completion of investigations required to achieve approval for three new mines, Maramarua, Ohinewai, and Huntley West No. 2. Reportedly, a limited amount of coal that can be mined by open pit methods is to be held in reserve to meet demand in the event that this ambitious development program meets delays or falls short of expectations. An alternative source of supply could be South Island coal now earmarked for the export market. Export shipments in 1983, the last year for which data are presently available, totaled only about 60% of the level targeted under the development plan.

Gas.—*Manufactured.*—The 1984 Energy Plan notes that there will be a change in coal demand in 1986 in the Southland/Otago area, with the planned closure of the Donedin gasworks in that region at that time. The production of manufactured gas has been consistently declining for a number of years.

Natural.—The 1984 increase in natural gas output reflects the emphasis placed on development and utilization of this energy source in New Zealand. This emphasis through 1984 stressed substitution, to the extent possible, of natural gas and condensate and their derivatives, for imported crude oil and refinery products. During the year, expansion of the gas pipeline system continued, including linkage of the McKee Oilfield to the system so that byproduct gas from that operation can be utilized.

Conversion of motor vehicles on North Island to permit them to use compressed natural gas as a fuel continued. The conversion of just under 19,000 vehicles in the July 1, 1983, through June 30, 1984, year was reported, raising the total number of conversions to over 36,000. The goal is to convert 200,000 automobiless by 1990. At midyear 1984, over 196 compressed natural gas retail stations were operational, 39 were planning expansion of their facilities, and 12 more were under construction. In connection with this program, it was noted that the composition of the compressed natural gas was to be altered, lowering the energy content of each cubic meter of product. It was claimed that with proper tuning, this change would not affect performance of the vehicles, nor should it affect operation costs, since the consumer was not being charged according to volume of material purchased, but rather according to energy content.

On South Island, which lacks access to natural gas, conversion of cars to operate on liquefied petroleum gas (LPG) continued as part of the program to shift demand from imported raw materials to domestic. The 1,000-ton tanker *Tarihiko* went into service in May to transport LPG from North to South Island. Storage depots were reported completed at Oaonui, New Plymouth, and Dunedin, and two more, one at Wellington (the Seaview) and the other at Christchurch (the Wollston), were to become operational at or near yearend. An additional depot at Auckland (the Wiri) was delayed by planning problems but was expected to come on-stream by the end of 1985. Progess on vehicle conversion was not reported for South Island for 1984, but in the first year of the program 6,700 vehicles had been converted.

Gas treatment facilities at Kapuni extracted LPG and natural gasoline from Kapuni gas and condensate and from a part of Maui's gas production, as well as from Kamiro. The Oaonui production facility extracts additional LPG in the process of stabilizing condensate.

In October, it was announced that an ambitious petrochemical project to be based on gas and LPG from the Maui Field that had been proposed for several years has been shelved. Causes of the shelving were reported as uncertain world demand for the product and high capital costs. It was reported that the Japanese had expressed interest in obtaining any surplus production from Maui, but in view of New Zealand's own demands, both present and planned, it was difficult to conceive of any significant surplus being available for export. In fact, in view of plans to substitute domestically produced natural gas and LPG for imported crude oil and products for transport and other fuel use, the concept of the petrochemical plant had previously seemed doubtful in view of limited gas and condensate reserves.

Peat.—Through 1984, peat was not commercially collected nor processed on New Zealand, but the peat deposits of the Chatham Islands were noted as a potential energy source. It was suggested that the peat could be readily extracted by opencast operations and subjected to pyrolysis, with the resulting product used as a feedstock to the Marsden Point oil refinery. The economic and technologic practicability of this scheme was under study during the year. Additional peat deposits overlie coal deposits in the Ohinewai area of the Waikato region, but it was noted that at least some of this peat might be required in this area for land restoration after opencast coal mining.

Petroleum.—New Zealand's small crude oil industry registered a 26% increase in output, but even with the increase, domestic crude output was equal to only slightly over one-third of national refinery output, and the latter figure represented only about 70% of total liquid fuel demand. An increased level of output from the two traditional condensate producing fields, Shell-BP-Todd Oil Service's Kapuni and Maui Development Ltd.'s Maui, was augmented by output from the Government-owned Petroleum Corp. of New Zealand Ltd.'s McKee Oilfield in North Taranaki, which was producing 1,000 barrels of crude oil daily at midyear and reportedly was to increase this figure to 5,000 barrels daily by yearend. This field's area was extended to encompass the single nearby well previously identified as the Pouri Field. The Kaimiro gas condensate field also presumably joined the roster of New Zealand fields in operation about midyear, but its addition, if on-stream, adds only about 150 barrels per day to condensate output.

Early in 1984, it was indicated that three or four offshore rigs were expected to be in operation off New Zealand through 1984, but the semisubmersible Penrod 78 departed New Zealand waters for the Gulf of Mexico in March after drilling what evidently was a second dry hole, this in 900-meter-deep waters of the Great South Basin, an area south and southeast of South Island. Another semisubmersible rig, Benreoch, on-site off North Island's south Taranaki coast on January 1 and engaged in drilling the Moki-1 well at that time, was shifted to Europe's North Sea in August after disappointing results.

In November, the New Zealand Government announced that no new licenses for petroleum exploration would be granted until at least mid-1985, owing to a planned review of national exploration policy. This decision, however, had no effect on licenses already granted, and the Minister of Energy expected no effect on planned exploration work.

Expansion of New Zealand's only oil refinery, the Marsden Point plant of New Zealand Refining Co. Ltd., near Whangarei, continued, but as a result of several problems, completion under revised estimates was not expected until March 1986. The 1984 Energy Plan reported the expansion to be over 40% complete, with completion of about 70% expected by yearend 1984. It was noted, however, that in order to integrate existing refinery facilities with those elements under construction, a shutdown of operations for about 5 months was planned, commencing about June of 1985, and that during this period, all petroleum products will have to be imported.

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[1]Senior foreign mineral specialist, Division of International Minerals.

[2]Where necessary, values have been converted from New Zealand dollars ($NZ) to U.S. dollars at the rate of $NZ1.00=US$0.7519 in 1982, $NZ1.00=US$0.6688 in 1983, and $NZ1.00=US$0.5784 in 1984.

The Mineral Industry of Nigeria

By Ben A. Kornhauser[1]

The mineral industry of Nigeria was based entirely on crude oil and natural gas, supplemented mostly by the production of cement, columbite, lead, steel, and tin. The nationalized steel sector still had major problems related to erratic power supply and transportation of billets and materials, and only produced at about 30% of capacity. The cement companies produced at only 55% of capacity because of factors such as lack of raw materials and spare parts, and erratic electrical supply. Crude oil production increased to 502 million barrels, 11% greater than that of 1983. Columbite production, a byproduct of tin mining, increased to 120 tons, a 38% increase over that of 1983. Tin production, on the other hand, increased to 1,340 tons, 19% greater than that of 1983.

Foreign exchange reserves dropped below $1 billion owing to decreased revenue from oil exports, which provided 90% of foreign exchange earnings. For the next several years, foreign exchange would probably be able to finance only debt servicing and essential imports. Barter deals, involving oil, became more significant.

The Nigerian National Petroleum Corp. (NNPC) was allocated funds for projects that included the production of petrochemicals and the construction of a fourth refinery at Port Harcourt. The Lake Chad Basin area, adjacent to oil finds in Chad and Niger, was being explored by NNPC. The drilling was the first serious exploration outside the southern Delta region. Ashland Exploration Inc. brought its offshore Akan Field on-stream and was doing development drilling in the Ebughu Field, 7 miles southeast of Akan.

PRODUCTION AND TRADE

Despite an 11% increase in oil production to 502 million barrels for the year, the continuing fall in world oil prices kept Nigeria's gross domestic product about $34.6 billion[2] in 1984, down about 5% from that of 1983. Oil provided 90% of foreign exchange earnings and 80% of all Government revenues. Revenues from oil exports were about $10.5 billion, compared with a record high of $25.7 billion in 1980, while Government oil revenues were about $11.5 billion, 13% greater than those of 1983.

Foreign exchange reserves dropped below $1 billion and caused the restriction of available foreign exchange to $400 million per month for imports by the private sector and required all imported goods to enter under specific licenses. For the next several years, foreign exchange would probably only be able to finance debt servicing and essential imports, such as spare parts and industrial raw materials, which were assigned 58% of the monthly allocation. The balance of payments ran at an average deficit of over $5 billion for the past 3 years with foreign exchange reserves barely representing a month's imports. Trade arrears reached $6 billion, and Nigeria's total foreign debt was $17 billion. The lack of an agreement between Nigeria and the International Monetary Fund (IMF) prevented the Government from obtaining an IMF loan of about $3 billion for 3 years.

Nigeria's estimated cash flow problems in

1984 resulted from an estimated $12 billion of exports compared with $8 billion of imports and about $3.5 billion of debt services, which consumed about 44% of foreign exchange earnings. Barter deals were more significant. One such deal was Brazil's agreement to purchase 40,000 barrels per day (bbl/d) of oil for 12 months in exchange for $500 million in raw materials, spare parts and equipment, and for trade financing. The deal between the Nigerian Mining Corp. (NMC) and Petróleo Brasileiro S.A. (PETROBRÁS), the Brazilian state oil company, included PETROBRÁS refining about 50,000 bbl/d of Nigerian crude for reexport to Nigeria as fuel products.

Nigeria increased its imports from France 14% over those of 1983 while its imports from the Federal Republic of Germany fell about 44% and that with the United Kingdom remained the same. Nigeria exported most of its petroleum to the European Economic Community, its closest market. Although the percentage of oil exports to the United States was declining, the United States remained the most important oil customer, receiving about 22% of oil exports in 1983 compared with France's 21%.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Columbium and tantalum concentrates, gross weight:					
Columbite	554	377	180	87	[2]120
Tantalite	1	2	1	1	1
Iron and steel: Steel, crude	15,000	15,000	100,000	140,000	[2]180,000
Lead:					
Mine output, metal content[e]	366	204	260	260	260
Metal, refined, secondary	2,000	2,000	2,000	2,000	2,000
Tin:					
Mine output, cassiterite concentrate:					
Gross weight	3,543	3,172	2,355	1,560	[2]1,844
Sn content	2,569	2,300	1,708	1,130	[2]1,340
Metal, smelter	2,678	2,485	1,800	1,190	1,400
Zinc ore and concentrate, metal content	--	[e]100	100	100	100
NONMETALS					
Cement, hydraulic thousand tons	2,400	2,700	3,600	3,600	3,000
Clays:					
Kaolin	671	635	700	700	[2]286
Unspecified	56,973	39,835	20,900	20,000	20,000
Feldspar[e]	5,000	5,000	5,000	5,000	--
Stone:					
Limestone thousand tons	2,336	1,535	1,400	1,400	[2]1,890
Marble	368	3,735	3,300	3,000	[2]1,200
Shale thousand tons	158	140	140	140	[2]127
MINERAL FUELS AND RELATED MATERIALS					
Coal do	176	116	NA	NA	[2]76
Gas, natural:					
Gross million cubic feet	750,000	700,000	685,000	655,000	174,000
Marketed do	19,000	19,000	19,000	18,000	18,000
Petroleum:					
Crude thousand 42-gallon barrels	753,000	525,000	472,000	452,000	502,000
Refinery products:[3]					
Gasoline do	20,400	21,250	22,100	22,100	NA
Jet fuel do	320	360	400	400	NA
Kerosine do	6,200	6,355	6,432	6,200	NA
Distillate fuel oil do	12,682	13,428	14,174	14,547	NA
Residual fuel oil do	7,992	8,658	9,324	9,990	NA
Other, unspecified do	722	792	920	1,048	NA
Total do	48,316	50,843	53,350	54,285	55,000

[e]Estimated. [p]Preliminary. NA Not available.
[1]Includes data available through July 30, 1985.
[2]Reported figure.
[3]United Nations Energy Statistics Yearbook, New York. 1983, p.288.

COMMODITY REVIEW

METALS

Columbium and Tantalum.—Columbite production, which was a byproduct of tin mining, increased to 120 tons, a 38% increase over that of 1983. Amalgamated Tin Mines of Nigeria (Holdings) Ltd. supplied 90% of the production with the remainder furnished by Bisichi-Jantar Nigeria Ltd.

Gold.—NMC started pilot mining following exploration and development activities in 1983. By September 1984, 47% of NMC's Beni project at the Lake area had been evaluated through extensive drilling. Exploration also was continuing in Kaduna, Kwara, Niger, Oyo, and Sokoto States.

Iron and Steel.—Nigeria increased its participation in the Guinean company, Mifergui-Nimba Co., slightly, to 16.47%. Nigeria planned on using Mifergui iron ore to feed its steel mills. However, development plans on the Guinean project were still pending more favorable world iron ore market conditions and funding.

The wire and rod mill at the Ajaokuta steel project was commissioned in October. Transportation of materials from Lagos and Port Harcourt to the project continued to be a major problem. About twice the tonnage of materials could be brought in by river barges in the rainy season as was possible using 26-ton trucks during the dry season. Retooling the Delta Steel Co. at Aladja to produce billets suitable for rolling at Ajaokuta was dropped until the completion of the Ajaokuta project; the light section and wire rod mills would run on imported billets. Completion of the $6.5 billion project now was planned for 1988.

Delta Steel also had problems with the importing of iron ore and an irregular electrical power supply. Its iron ore was imported from Liberia and Brazil, and transported in ships of 7,000-ton capacity owing to the small size of the port at Warri. The erratic electrical power, delivered to the furnaces and mills, reduced production to about 30% of capacity.

The Pennsylvania Engineering Corp. (PEC) was awarded a contract to build a minimill near Lagos. Lapec, a joint venture of PEC and Nigeria with some private capital, was formed to be the operator. The mill would have a 100,000-ton-per-year capacity and would produce wire rod, initially, and angle iron and sections later. PEC's subsidiary, Lectromelt Corp., would supply an electric arc furnace and its Birdsboro division would supply rolling mills.[3]

Tin.—Although tin production increased 19% over that of 1983, production was on a long-term downtrend because of factors such as lower ore grades, minimal exploration and development, and the need for investment in underground mining and equipment. In the long term, the byproducts, columbite and tantalite, also decreased with decreased tin production particularly since pyrochlore deposits in other areas of the world contained higher percentages of columbium.

NONMETALS

Cement.—Nigeria's seven cement companies, with a capacity of 5.4 million tons per year, only produced 3 million tons in 1984. The West African Portland Cement Co. was the only company to operate near capacity and accounted for about one-half of the national output. The low utilization of capacity was due to factors such as lack of raw materials and spare parts, erratic electrical power supply, and shortage of Kraft paper bags.

Phosphate Rock.—The Federal Superphosphate Fertilizer Co. in Kaduna began drilling at a site near Sokoto State where phosphate deposits had been discovered 50 years ago. Another year of exploratory drilling was deemed necessary to evaluate the quantity and quality of the deposits.[4]

MINERAL FUELS

At the beginning of the year, Nigeria's crude oil production was running fairly close to 1.3 million bbl/d, the levels set by the Organization of Petroleum Exporting Countries (OPEC). Most of the country's exports of petroleum went to Western Europe and the United Kingdom, but encountered increasing competition from rapidly growing output from North Sea fields, much closer to West European markets. To have sufficient money to supply the country's food needs, Nigeria began selling as much as 200,000 bbl/d in excess of its OPEC quota. Shortly thereafter, North Sea countries and Mexico, which were not members of OPEC, lowered their prices for crude to sub-OPEC levels, which, in turn, forced Nigeria to meet these prices in its marketplace. By yearend, however, under a powerful OPEC Ministerial Monitoring Committee, which included Nigeria'a oil minister, appointed to maintain price and production discipline, Nigerian production began to return to the 1.3-million-bbl/d level.

The NNPC was allocated $428 million for activities that included production of petrochemicals, development of a liquefied natural gas project, construction of a fourth oil refinery, and exploration in the Lake Chad Basin of northern Nigeria. The NNPC, which was seeking reservoirs to compensate for the oil being withdrawn from the Delta region, believed the Lake Chad Basin to be an oil-rich region. Oil deposits had been found in the Lake Chad Basin area in the neighboring countries of Chad and Niger. The Gaji-Gana oil well, about 30 miles from Maiduguri, was the first serious drilling and exploration outside the southern Delta region.

Phase 1, involving $550 million of the plan to build petrochemical plants, using oil from the refineries at Warri and Kaduna, was 80% complete but not expected to be completed until 1986. However, phase 2, originally targeted at $2 to $3 billion, probably would be cut back although its 1990 completion date had not been changed. The second phase was to build plants near Port Harcourt making basic products from natural gas, such as ethylene, polyethylene, and polyvinyl chloride. More than one-half of the raw materials, that were used by Nigeria were petrochemicals. Consummation of both phases would permit using large quantities of the natural gas currently being flared and would save an estimated $650 million per year in chemical imports. The volume of gas utilized rose from 4% in 1977 to 20% in 1984.

Plans for a fourth refinery at Port Harcourt using 150,000 bbl/d of Bonny Light crude oil had stalled. Failure to negotiate an agreement with the IMF discouraged financing of the $650 million deal by Western Governments. The gas-gathering system from the Escravos Oilfields at Warri to a power station at Egbin, which was to be built by Mannesmann AG of the Federal Republic of Germany and Saipem S.p.A., also was stalled. The pricing policy of energy products was part of the IMF talks.

Ashland Exploration brought its offshore Akan Field on-stream. Production was expected to reach 15,000 bbl/d from nine wells. Development drilling was proceeding in the Ebughu Field 7 miles southeast of Akan. Ashland's subsidiary had operated in Nigeria since 1973 under a production-sharing agreement with NNPC.[5]

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Nigerian naira (N) to U.S. dollars at the rate of N1.00=US$1.30.
[3]Metal Bulletin Monthly. No. 160, Apr. 1984, p. 95.
[4]Kaduna New Nigerian. Dec. 19, 1984, p. 1.
[5]Wall Street Journal. V. 203, No. 36, Feb. 22, 1984, p. 4.

The Mineral Industry of Norway

By Richard H. Singleton[1]

Norway remained dependent on exports, mostly to Western Europe, for marketing most of its metals production as well as petroleum products. As a result of increased overseas demand, production and export of most metals increased significantly and many new record highs were reached. The two Norwegian steel producers, Government-owned A/S Norsk Jernverk and Elkem A/S, agreed to merge their steel manufacturing capabilities. Norsk Jernverk was constructing an iron ore ocean shipping terminal on the east coast of Norway.

Production of the energy-intensive metals, including aluminum, ferroalloys, magnesium, and titanium slag, each increased significantly. These materials were dependent on hydroelectric power, production of which had become environmentally controversial, to the extent that future production increases might be limited. Nevertheless, a significant increase in primary aluminum capacity by 1990 was announced. Also, Elkem was constructing a 200,000-ton-per-year titanium slag plant that would increase Norwegian capacity by 25%. Elkem purchased 90% of two ferroalloy plants in Canada, thereby enlarging its considerable holdings in ferroalloy production facilities in North America.

Total Norwegian exports increased 17% in value to $18.9 billion,[2] 56% of which was exports of petroleum products, which reached a new record high. North Sea production of crude petroleum and natural gas each reached a new record high. However, output of oil and gas from the Ekofisk Field continued to decrease more rapidly than predicted.

The first platform in the Gullfaks Field was under construction and a second was in the engineering phase. Any decision to develop the Sleipner Field was postponed indefinitely because of a British decision not to purchase Sleipner gas. Chances of finding further large oil and gas deposits in the North Sea were small, and exploratory drilling activity was transferred northward to the Norwegian Sea and the Barents Sea. Construction of the Statpipe system for transferring natural gas from the North Sea proceeded on schedule.

Domestic energy was supplied about equally by oil and hydroelectric power, with 10% supplied by soiid fuels, including coal and wood, even though more than three-quarters of North Sea oil, and all of its gas, was exported. Industry consumed one-half of the energy used domestically, and transportation, all based on oil, consumed about one-fifth. A shift continued from oil to hydroelectric power and solid fuel.

Norway's real gross national product increased 4% while the consumer price index increased 7%. The value of the krone with respect to the U.S. dollar decreased 15% during the year to 8.90 kroner per dollar at yearend.

PRODUCTION

Significant increases occurred in metals output, primarily because of increased overseas demand. Notable was a more than 50% increase in magnesium production, a one-third increase in smelted copper production, an approximately one-quarter increase in the production of lead concentrate, nickel metal, and titanium slag, a 14% increase in ferroalloys production, a 10% increase in the production of crude steel, and smaller percentage increases in the production of primary aluminum and iron ore. Inventory increases of some of these metals suggested a future moderation in the rate of demand increase.

Cement output decreased by 10% because of a significant decrease in domestic housing starts and decreased activity in other types of construction.

Production of crude petroleum and natural gas increased 14% and 7%, respectively, because of the continuing economic recovery in most West European countries.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[e]
METALS					
Aluminum metal:					
Primary ingot	653,337	633,585	636,091	715,374	[2]760,792
Secondary ingot	4,500	4,000	4,000	4,000	4,000
Cadmium metal, smelter	130	117	104	117	110
Cobalt metal	1,275	1,444	992	879	[2]1,191
Copper:					
Mine output, metal content of concentrate	[r]28,891	[r]28,123	[r]27,590	26,191	[2]22,310
Metal:					
Smelter, primary only (includes electrowon)	33,690	31,952	24,388	27,172	[2]36,980
Refined:					
Primary (electrowon)	25,785	26,077	18,041	22,705	[2]30,323
Secondary[e]	6,000	6,000	6,000	6,000	6,000
Total	31,785	32,077	[e]24,041	28,705	[2]36,323
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	3,884	[r]4,138	[r]3,545	3,535	[2]3,723
Iron content do.	2,473	[r]2,690	[r]2,304	2,298	[2]2,420
Metal:					
Pig iron do.	612	568	483	565	550
Ferroalloys:					
Ferrochrome	11,305	11,437	[e]12,000	[e]8,000	10,000
Ferrochromium silicon	424	985	[e]1,000	[e]900	1,000
Ferromanganese	295,706	233,390	203,256	224,032	250,000
Ferrosilicon (75% basis)	319,983	313,763	296,071	345,846	[2]410,405
Silicon metal[e]	85,000	55,000	55,000	[r]67,000	70,000
Ferrosilicomanganese	167,490	214,534	215,732	180,905	200,000
Other	19,795	4,530	12,000	15,317	18,000
Total	899,703	833,639	795,059	842,000	959,405
Steel, crude thousand tons	854	848	768	831	[2]915
Semimanufactures:					
Rolled do.	626	568	[r]496	561	[2]615
Finished castings do.	8	8	[r]5	4	[2]5
Lead:					
Mine output, metal content	[r]2,469	2,973	[e]3,700	[e]4,100	5,300
Smelter, secondary only	[e]400	--	--	--	--
Magnesium metal, primary	44,352	[r]47,455	35,923	29,895	50,000
Nickel:					
Concentrate, metal content	[r]600	[r]500	[r]500	500	300
Metal, primary	37,123	[r]36,954	[r]25,833	28,309	[2]35,548
Platinum-group metals[3] troy ounces	26,782	34,080	33,180	40,832	40,000
Titanium: Ilmenite concentrate	827,814	[r]659,604	551,764	544,238	[2]661,363
Vanadium, mine output, metal content[e]	540	[r]345	[r]110	(4)	--
Zinc:					
Mine output, metal content	[r]27,600	28,500	[r]31,800	32,300	30,000
Metal, primary	79,416	80,279	[r]79,016	90,642	[2]94,190
NONMETALS					
Cement, hydraulic thousand tons	[r]2,206	[r]1,837	[r]1,786	1,618	[2]1,458
Feldspar[5]	67,559	58,311	[r]62,812	[r] [e]65,000	65,000
Graphite	10,406	8,665	7,451	8,060	8,000
Lime, hydrated, and quicklime[e]	130,000	130,000	130,000	130,000	130,000
Nitrogen: N content of ammonia	515,078	544,793	520,411	561,856	[2]631,136
Olivine sand thousand tons	1,103	[r]1,341	1,376	1,186	[2]1,676
Pyrites and pyrrhotite, gross weight do.	421	[r]435	425	415	[2]418
Sodium carbonate[e]	27,000	27,000	27,000	27,000	--

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[e]
NONMETALS —Continued					
Stone, crushed:					
Dolomite thousands tons	559	548	547	[e]550	550
Limestone do.	4,146	3,832	4,515	[e]4,000	3,500
Nepheline syenite do.	231	[r]217	212	227	225
Quartz and quartzite do.	844	633	624	600	600
Other, aggregate[e] do.	10,000	10,000	10,000	10,000	10,000
Sulfur:					
Pyrite, S content do.	[r]160	[r]206	[r]248	220	[2]205
Byproduct of:					
Metallurgy do.	[r]49	[r]52	[r]52	54	[2]62
Petroleum do.	[r]7	[r]8	[r]8	8	[2]8
Total do.	[r]216	[r]266	[r]308	282	[2]275
Talc, soapstone, steatite do.	88	[r]86	[r] [e]100	[r] [e]100	100
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	288,412	[r]409,729	[r]440,000	477,795	[2]470,080
Coke, all grades	[r]347,268	[r]345,223	[r]340,589	[r]305,391	[2]314,444
Gas:					
Manufactured million cubic feet	[r]451	[r]385	[r]385	[e]170	73
Natural:					
Gross do.	[e]960,000	[e]958,000	932,838	931,561	1,000,000
Marketed do.	[r]917,300	[r]923,900	[r]925,000	904,400	[2]970,500
Peat:[e]					
For agricultural use	60,000	60,000	60,000	60,000	100,000
For fuel use	1,200	1,200	1,200	1,200	1,200
Petroleum:					
Crude thousand 42-gallon barrels	181,692	175,361	183,010	228,036	[2]260,861
Refinery products:					
Gasoline, motor do.	9,941	[r]9,608	[r]9,775	10,005	[2]10,820
Jet fuel do.	[r]3,925	4,190	3,613	4,783	[2]4,137
Kerosine do.	3,548	3,670	3,131	3,185	[2]3,650
Distillate fuel oil do.	25,966	26,051	26,026	26,413	[2]27,671
Residual fuel oil do.	11,876	8,689	7,973	7,349	7,235
Lubricants do.	31	NA	NA	NA	NA
Other do.	6,545	1,022	1,479	2,118	2,000
Refinery fuel and losses do.	3,342	[e]2,684	2,623	[e]2,720	2,750
Total do.	[r]65,174	[r]55,914	[r]54,620	56,573	58,263

[e]Estimated. [r]Revised. NA Not available.
[1]Table includes data available through June 8, 1985.
[2]Reported figure.
[3]Data represent exports, a part of which may be derived from imported materials.
[4]Revised to zero.
[5]Excludes nepheline syenite, which is included with "Stone."

TRADE

Total exports increased 17% to $18.9 billion, of which petroleum products, including oil refinery products, and gas, contributed 56%. Total imports increased 15% to $14.9 billion. In addition to relying on overseas markets for its petroleum products, Norway was dependent on export trade for marketing most of its metals production. Exports were shipped primarily to Western Europe. This included energy-intensive metals, including all of Norway's primary aluminum and about 90% of its ferroalloys and magnesium, as well as most of its copper metal, about two-thirds of its iron ore, about three-quarters of its steel, nearly all of its nickel metal, more than 80% of its titanium slag, and about 80% of its zinc metal. Approximately 70% of the zinc concentrate smelted at Odda was imported, mostly from Sweden. Norway also exported much of its production of certain nonmetallic materials including most of its talc and feldspar and nearly all of its graphite.

Table 2.—Norway: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	101	--	All to Sweden.
Oxides and hydroxides	1	7	--	Sweden 6.
Metal including alloys:				
Scrap	21,858	27,517	--	West Germany 9,088; Sweden 7,261.
Unwrought	545,772	637,339	9,878	West Germany 206,601; Netherlands 66,797.
Semimanufactures	69,648	92,596	12,464	United Kingdom 21,891; Sweden 11,867.
Cadmium: Metal including alloys, all forms	139	106	NA	Sweden 54; West Germany 20.
Cobalt: Metal including alloys, all forms	1,007	816	362	Netherlands 252; United Kingdom 55.
Copper:				
Ore and concentrate	92,712	92,465	--	West Germany 36,671; Sweden 27,041; Finland 25,631.
Oxides and hydroxides	2,974	3,857	NA	NA.
Sulfate	115	112	NA	Sweden 107.
Ash and residue containing copper	3,288	2,116	--	Spain 1,860.
Metal including alloys:				
Scrap	4,271	7,730	--	West Germany 4,921; Sweden 1,802.
Unwrought	25,990	26,782	354	West Germany 11,159; Sweden 3,759.
Semimanufactures	2,331	2,544	13	Sweden 1,004; West Germany 926.
Gold:				
Waste and sweepings value, thousands	$1,252	$1,980	NA	United Kingdom $1,213; West Germany $366.
Metal including alloys, unwrought and partly wrought troy ounces	12,603	13,247	NA	West Germany 8,167; Italy 3,119.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	2,166	2,945	--	United Kingdom 1,335; West Germany 996.
Pyrite, roasted do	168	143	--	Denmark 114.
Metal:				
Scrap	32,569	35,212	31	West Germany 20,848; Sweden 7,159.
Pig iron, cast iron, related materials	64,629	43,648	--	United Kingdom 21,096; West Germany 10,552.
Ferroalloys:				
Ferrochromium	9,515	6,632	110	West Germany 1,831; United Kingdom 1,349.
Ferromanganese	196,450	198,288	24,781	West Germany 37,128; United Kingdom 21,412; Sweden 21,005.
Ferrosilicochromium	1,173	732	NA	Belgium-Luxembourg 496.
Ferrosilicomanganese	172,015	172,893	4,819	West Germany 48,182; United Kingdom 20,845; France 18,930.
Ferrosilicon	287,183	347,911	21,213	West Germany 88,609; Japan 74,412; United Kingdom 52,632.
Silicon metal	53,411	74,951	538	West Germany 24,910; United Kingdom 12,177; Japan 11,793
Unspecified	7,190	12,078	4,639	United Kingdom 4,261; Sweden 898.
Steel, primary forms	192,791	233,955	--	Netherlands 147,008; West Germany 77,023.
Semimanufactures	392,654	480,468	4,692	United Kingdom 110,739; West Germany 68,723; Denmark 41,083.
Lead:				
Ore and concentrate	7,449	6,898	--	West Germany 6,877.
Oxides	39	102	--	All to Sweden.
Metal including alloys:				
Scrap	6,507	6,706	--	Denmark 4,211; Sweden 1,537.
Unwrought	29	131	--	West Germany 50; Denmark 41.
Semimanufactures	([2])	34	--	Denmark 26; Sweden 6.
Magnesium: Metal including alloys:				
Scrap	63	38	--	West Germany 18.
Unwrought value, thousands	$74,350	$98,603	NA	NA.
Semimanufactures	74	54	--	West Germany 28; Sweden 21.

See footnotes at end of table.

Table 2.—Norway: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade	5	1,522	--	Sweden 570; Finland 502.
Metal including alloys, all forms	r386	--		
Mercury 76-pound flasks	3,858	1,827	--	Spain 1,566.
Molybdenum: Metal including alloys, all forms	2	(2)	--	All to Sweden.
Nickel:				
Ore and concentrate	10,824	9,952	--	All to Finland.
Metal including alloys:				
Scrap	197	107	41	West Germany 46.
Unwrought	29,270	30,014	13,009	Netherlands 6,490; Hong Kong 1,858.
Semimanufactures	7	5	--	Denmark 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	33,212	40,832	15,915	West Germany 13,182; Netherlands 7,627.
Silver:				
Waste and sweepings[3] value, thousands	$1,150	$3,316	--	West Germany $2,874; United Kingdom $284.
Metal including alloys, unwrought and partly wrought thousand troy ounces	r802	1,010	7	Sweden 426; United Kingdom 246.
Tin: Metal including alloys:				
Scrap	51	52	--	Denmark 25; West Germany 15.
Unwrought	13	8	--	Denmark 5; Sweden 2.
Semimanufactures	14	1	--	Mainly to West Germany.
Titanium:				
Ore and concentrate	470,223	519,611	NA	NA.
Oxides	1,179	2,996	1,400	Sweden 1,219; Denmark 290.
Tungsten: Metal including alloys, all forms value, thousands	$17	$8	--	United Kingdom $5.
Uranium and/or thorium: Metal including alloys, all forms do	$6	$7	--	All to Belgium-Luxembourg.
Zinc:				
Ore and concentrate	23,627	25,658	--	Belgium-Luxembourg 14,585; West Germany 8,803.
Oxides	420	991	--	Sweden 393; Denmark 355.
Ash and residue containing zinc	3,236	3,030	--	West Germany 1,539; United Kingdom 1,468.
Metal including alloys:				
Scrap	410	327	--	West Germany 112; Sweden 108.
Unwrought	63,633	79,981	9,932	West Germany 16,605; Sweden 16,387.
Semimanufactures	25	6,048	30	West Germany 1,361; Denmark 701.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	29	24	--	West Germany 22.
Artificial:				
Corundum	8	5	--	Netherlands 2; Sweden 1.
Silicon carbide	50,546	56,203	NA	NA.
Grinding and polishing wheels and stones	764	913	21	Finland 238; Sweden 177.
Barite and witherite	1,611	166	--	Sweden 120.
Boron materials:				
Elemental	8	1	NA	NA.
Oxides and acids	2	(2)	NA	NA.
Cement	49,189	74,621	NA	NA.
Diamond:				
Gem, not set or strung value, thousands	$783	$736	--	Sweden $483; Belgium-Luxembourg $71.
Industrial stones do	$27	--		
Diatomite and other infusorial earth	1	36	--	France 35.
Feldspar, fluorspar, related materials:				
Feldspar	61,032	71,040	--	West Germany 19,088; United Kingdom 17,135.
Fluorspar	18	5	--	NA.
Unspecified	201,989	217,878	--	Netherlands 79,950; United Kingdom 41,076.

See footnotes at end of table.

Table 2.—Norway: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	--	2	--	All to Faroe Islands.
Manufactured:				
Ammonia value, thousands	$5,014	$3,364	NA	NA.
Nitrogenous do	$88,588	$81,672	--	NA.
Phosphatic do	--	$16	--	All to Egypt.
Unspecified and mixed do	$140,331	$144,442	NA	NA.
Graphite, natural	8,244	7,311	NA	NA.
Gypsum and plaster	2,545	22	--	Sweden 21.
Lime	7,262	10,624	--	Liberia 10,456.
Magnesium compounds: Magnesite	12,865	9,575	NA	NA.
Mica:				
Crude including splittings and waste	1,820	2,009	--	Netherlands 553; Spain 225.
Worked including agglomerated splittings	(2)	2	--	Switzerland 1.
Pigments, mineral: Iron oxides and hydroxides, processed	7	55	20	Singapore 26.
Pyrite, unroasted	171,883	186,867	--	Italy 61,180; Turkey 59,748.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	203	18	--	Sweden 12.
Sulfate, manufactured	1,516	628	NA	United Kingdom 627.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	95,763	93,603	559	Italy 23,548; France 22,785.
Worked	11,427	12,012	(2)	Netherlands 10,544.
Dolomite, chiefly refractory-grade	131,847	136,471	NA	NA.
Gravel and crushed rock	r2,497,210	2,358,593	5,018	West Germany 1,016,382; United Kingdom 265,744.
Limestone other than dimension	9,316	9,177	--	Liberia 5,000; United Kingdom 4,157.
Quartz and quartzite	88,567	87,215	--	Iceland 78,059; Sweden 4,904.
Sand other than metal-bearing	1,090	2,389	--	Sweden 1,098; United Arab Emirates 920.
Sulfur:				
Elemental, crude including native and byproduct	2,753	7,525	--	United Kingdom 6,244.
Dioxide	5,248	5,914	--	Sweden 5,464.
Sulfuric acid value, thousands	$4,716	$3,974	NA	NA.
Talc, steatite, soapstone, pyrophyllite	50,032	50,693	--	Netherlands 12,396; United Kingdom 11,080.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	86	630	12	Sweden 529.
Carbon: Carbon black	41	42	(2)	West Germany 15; Sweden 9.
Coal:				
Anthracite	1,060	3,204	--	United Kingdom 1,841; West Germany 1,000.
Bituminous	95,326	124,288	--	United Kingdom 106,425.
Coke and semicoke	87,908	159,902	--	Romania 40,222; Sweden 34,940.
Gas, natural: Gaseous million cubic feet	863,834	866,178	--	West Germany 456,194; United Kingdom 409,984.
Petroleum:				
Crude thousand 42-gallon barrels	153,837	190,740	4,663	United Kingdom 128,684; Netherlands 24,383.
Refinery products do	20,477	20,605	987	West Germany 2,998; United Kingdom 2,024; Denmark 2,023.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Norway: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	3,297	4,480	--	All from Greece.
Oxides and hydroxides thousand tons	1,137	1,434	(2)	Australia 464; Suriname 274; Jamaica 269.
Metal including alloys:				
Scrap	1,164	1,724	--	Denmark 1,018; Sweden 686.
Unwrought	20,929	11,234	63	Sweden 5,968; West Germany 991.
Semimanufactures	40,307	41,915	93	West Germany 23,478; Sweden 6,428.
Arsenic: Metal including alloys, all forms	30	13	NA	NA.
Beryllium: Metal including alloys, all forms value, thousands	$17	$5	--	West Germany $3.
Cadmium: Metal including alloys, all forms	(2)	2	NA	NA.
Chromium:				
Ore and concentrate	23,311	8,800	--	Albania 8,754.
Oxides and hydroxides	125	76	--	West Germany 54; Austria 20.
Cobalt:				
Oxides and hydroxides	2	129	--	Netherlands 121.
Metal including alloys, all forms	341	166	NA	Netherlands 124.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$7	$14	--	Sweden $9; Switzerland $4.
Copper:				
Matte and speiss including cement copper	437	6,367	--	Finland 5,517; Zimbabwe 850.
Oxides and hydroxides	--	51	NA	West Germany 35.
Sulfate	641	841	--	U.S.S.R. 600; Belgium-Luxembourg 140.
Metal including alloys:				
Scrap	47	71	--	Sweden 48; Finland 15.
Unwrought	2,015	1,630	1	Sweden 674; United Kingdom 472.
Semimanufactures	28,357	28,609	25	West Germany 11,276; Sweden 8,279.
Gold:				
Waste and sweepings value, thousands	$78	--		
Metal including alloys, unwrought and partly wrought troy ounces	26,589	19,966	3,183	West Germany 9,356; United Kingdom 4,534.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	47,292	225,640	--	Sweden 225,579.
Metal:				
Scrap	4,950	15,139	(2)	United Kingdom 7,466; Iceland 4,898.
Pig iron, cast iron, related materials	10,099	9,330	18	Canada 3,283; Sweden 3,241.
Ferroalloys:				
Ferrochromium	24	167	--	Zimbabwe 100.
Ferromanganese	7	19	--	France 10; Sweden 9.
Ferromolybdenum	40	41	--	Sweden 17; United Kingdom 17.
Ferrosilicomanganese	45	25	--	NA.
Ferrosilicon	2,961	5,261	--	West Germany 1,735; Portugal 1,317.
Silicon metal	4	4	NA	Denmark 3.
Unspecified	121	176	(2)	West Germany 108; Austria 31.
Steel, primary forms	146,520	144,293	1	Netherlands 95,570; West Germany 36,850.
Semimanufactures thousand tons	1,115	905	1	Sweden 205; West Germany 82; Japan 69.
Lead:				
Oxides	523	545	6	West Germany 368; United Kingdom 118.
Metal including alloys:				
Scrap	19	61	--	Denmark 34; Netherlands 25.
Unwrought	12,297	12,237	123	United Kingdom 4,912; Sweden 4,287.
Semimanfactures	2,093	1,556	(2)	Netherlands 811; West Germany 464.
Magnesium: Metal including alloys:				
Scrap	18	12	--	Sweden 11.
Unwrought	464	325	317	France 8.
Semimanufactures	31	19	(2)	Sweden 9; Switzerland 8.

See footnotes at end of table.

Table 3.—Norway: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade	764,085	623,305	--	Gabon 304,296; Republic of South Africa 184,352.
Oxides	518	603	--	Netherlands 520.
Mercury 76-pound flasks	464	116	NA	West Germany 87.
Molybdenum: Metal including alloys, all forms	2	7	(2)	United Kingdom 5.
Nickel:				
Ore and concentrate	--	1	--	All from Sweden.
Matte and speiss	62,419	63,140	358	Canada 56,121.
Metal including alloys:				
Scrap	31	8	--	United Kingdom 5.
Unwrought	86	281	39	France 167; U.S.S.R. 64.
Semimanufactures	189	201	20	United Kingdom 84; West Germany 67.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	10,095	14,597	804	West Germany 5,723; U.S.S.R. 3,730.
Silver:				
Waste and sweepings[3] value, thousands	$2,475	$3,344	--	Sweden $2,271; Turkey $408.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,685	1,359	NA	West Germany 741; United Kingdom 375.
Tin: Metal including alloys:				
Scrap	--	4	--	All from Denmark.
Unwrought	460	396	--	United Kingdom 258.
Semimanufactures	225	222	(2)	United Kingdom 81; West Germany 57.
Titanium: Oxides	1,038	935	55	West Germany 703; France 98.
Tungsten: Metal including alloys, all forms	2	2	(2)	Mainly from United Kingdom.
Zinc:				
Ore and concentrate	93,619	87,894	--	Sweden 66,388; Ireland 12,709.
Oxides	2,270	1,787	--	West Germany 979; East Germany 335.
Blue powder	--	1	--	NA.
Ash and residue containing zinc	24,787	29,859	--	Sweden 28,733.
Metal including alloys:				
Scrap	4,540	3,966	--	Denmark 1,834; Sweden 1,541.
Unwrought	1,122	877	--	Poland 370; West Germany 235.
Semimanufactures	695	790	(2)	France 280; Netherlands 186.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	12,206	17,344	26	Iceland 16,925.
Artificial:				
Corundum	1,100	767	--	West Germany 603; Austria 84.
Silicon carbide	1,611	566	NA	Netherlands 363; West Germany 73.
Grinding and polishing wheels and stones	1,046	790	16	West Germany 216; Austria 163.
Asbestos, crude	14	58	--	Canada 57.
Barite and witherite	87,836	90,574	--	Morocco 35,234; Ireland 22,066.
Boron materials:				
Crude natural borates	6,218	6,542	6,542	
Oxides and acids	155	325	5	France 221; Sweden 52.
Cement	6,758	18,788	2	East Germany 6,474; Poland 5,441.
Chalk	8,723	9,441	20	Denmark 5,383; Sweden 3,183.
Clays, crude:				
Bentonite	36,955	31,374	4,350	Italy 12,904; Greece 9,940.
Kaolin	71,914	67,224	113	United Kingdom 62,092.
Unspecified	23,864	17,631	298	United Kingdom 6,443; Sweden 3,398.
Cryolite and chiolite	7,166	7,982	--	Denmark 7,882.
Diamond:				
Gem, not set or strung value, thousands	$3,618	$3,283	$14	Belgium-Luxembourg $1,262; United Kingdom $823.
Industrial stones do	$6	$6	--	Denmark $4.
Diatomite and other infusorial earth	1,609	1,578	195	Iceland 949; Sweden 124.
Feldspar, fluorspar, related materials:				
Fluorspar	35,846	39,084	--	Morocco 12,571; Spain 11,627.
Unspecified	26	133	--	NA.

See footnotes at end of table.

Table 3.—Norway: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	74	85	--	West Germany 59; Sweden 26.
Manufactured:				
Ammonia	22,693	90,848	17,563	U.S.S.R. 27,480; France 23,986.
Nitrogenous	7,817	5,703	--	East Germany 2,404; Belgium-Luxembourg 1,818.
Phosphatic	5,676	4,983	--	Sweden 4,143.
Potassic	284,356	313,718	6,197	West Germany 71,215; Spain 57,555.
Unspecified and mixed	9,275	16,899	30	West Germany 6,088; Belgium-Luxembourg 5,149.
Graphite, natural	693	496	1	Sweden 363; United Kingdom 127.
Gypsum and plaster	145,463	142,710	1	Sweden 78,196; France 58,973.
Kyanite and related materials	526	380	NA	West Germany 198.
Lime	21,521	26,275	--	Denmark 13,434; Sweden 11,921.
Magnesium compounds: Magnesite	5,620	5,142	--	Austria 2,097; China 1,461.
Mica:				
Crude including splittings and waste	2,146	1,953	73	India 1,725.
Worked including agglomerated splittings	32	57	([2])	Switzerland 38.
Nitrates, crude	298	298	--	All from West Germany.
Phosphates, crude	461,447	414,847	30,001	U.S.S.R. 165,909; Sweden 97,417.
Phosphorus, elemental	1	10	NA	NA.
Pigments, mineral: Iron oxides and hydroxides, processed	2,497	2,175	1	West Germany 2,106.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$402	$498	$16	West Germany $128; Belgium-Luxembourg $94.
Synthetic do.	$48	$30	$3	West Germany $18.
Salt and brine	518,176	505,514	4	Netherlands 341,707; Spain 50,310.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	33,542	40,350	--	Netherlands 12,211; West Germany 9,107.
Sulfate, manufactured	3,799	8,431	NA	Sweden 7,471.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	6,769	9,764	3	Sweden 4,787; Italy 1,111.
Worked	4,169	10,054	--	Portugal 4,177; Sweden 3,992.
Dolomite, chiefly refractory-grade	5,541	10,128	8	United Kingdom 7,861; Sweden 1,737.
Gravel and crushed rock	81,783	82,749	([2])	Sweden 80,366.
Limestone other than dimension	168,685	184,975	8	United Kingdom 169,228.
Quartz and quartzite	379,741	491,572	7,086	Sweden 280,322; Spain 176,778.
Sand other than metal-bearing	186,314	198,424	1,713	Belgium-Luxembourg 121,601; Sweden 60,249.
Sulfur:				
Elemental:				
Crude including native and byproduct	2,570	3,886	--	Sweden 3,740.
Colloidal, precipitated, sublimed	12	16	--	West Germany 15.
Dioxide	185	2,369	NA	Sweden 2,366.
Sulfuric acid	209	176	([2])	Denmark 77; Sweden 49.
Talc, steatite, soapstone, pyrophyllite	4,549	5,675	2	Finland 2,686; India 2,200.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	149	54	54	
Carbon: Carbon black	4,583	4,671	46	Sweden 1,982; West Germany 1,325.
Coal:				
Anthracite	63,267	85,685	10,535	United Kingdom 34,997; West Germany 34,668.
Bituminous	741,689	461,980	164,964	France 72,446; Poland 63,652; Belgium-Luxembourg 55,614.
Briquets of anthracite and bituminous coal	9	2	2	
Lignite including briquets	253	4	--	All from United Kingdom.
Coke and semicoke	463,209	521,197	--	United Kingdom 286,060; West Germany 91,887.
Peat including briquets and litter	11,481	15,185	--	Sweden 12,822.
Petroleum:				
Crude thousand 42-gallon barrels	21,357	12,828	--	United Kingdom 8,352; Saudi Arabia 2,181.
Refinery products do.	36,409	31,718	1,857	East Germany 6,372; Sweden 2,849; West Germany 968.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Norwegian primary aluminum production increased significantly for the third successive year, reaching 96% of capacity. The Norwegian industry anticipated capacity increases during the subsequent decade because of expected increases in primary aluminum exports to Western Europe caused by anticipated smelter closures in France, the Federal Republic of Germany, and Italy as a result of high electrical power costs in those countries. However, it was becoming evident to industry and Government that expansion plans in Norway might have to be modified because of hydroelectric power limitations caused by environmental lobbying. This was expected to promote better energy efficiency in the industry, from the current 17 kilowatt hours per kilogram to 14 kilowatt hours per kilogram. Norsk Hydro A/S announced plans to increase annual capacity of its Karmoy smelter by one-third, to 215,000 tons by 1987. However, the plant decreased production late in the year to reduce inventory. The enlarged smelter was expected to become one of the world's largest and most efficient.

Negotiations to merge Government-owned Årdal og Sunndal Verk A/S, the largest aluminum producer, with Norsk Hydro were stalemated at yearend, apparently because of differences of opinion regarding the extent of Government control.

Allegations by the European Commission that Norwegian aluminum ingot was being dumped at prices 6% to 11% below production costs were denied by the producers. No Commission action had been specified by yearend.

Copper.—Outokumpu Oy, the diversified Finnish mining and manufacturing firm, purchased the Bidjovagge Gruber copper mine in Kautokeino in northern Norway. This marginal mine had been closed since 1976. Using modern mining techniques, Outokumpu was refurbishing the mine at a cost of over $4 million and planned to begin operation in mid-1985. The concentrate, to be produced in an amount equivalent to 2,000 tons of copper per year, was to be shipped to Outokumpu's copper smelter at Harjavalta in Finland. Reserves were sufficient for at least 4 years of operation.

Elkem closed its Skorovas Gruber copper-zinc mine after 30 years of operation, because of ore depletion.

Ferroalloys.—Elkem purchased 90% of two ferroalloy plants in Canada's Quebec Province. Total annual capacity of the new firm, Elkem Metal Canada Inc., was at least 150,000 tons. Elkem also increased its ownership in its three U.S. ferroalloy plants, two in Ohio, and one in West Virginia, from 49% to 67%. All original North American purchases had been or were from the Union Carbide Corp. The Jebsen Group of Norway retained a 10% ownership in all of the North American plants; the remaining 23% of the U.S. plants was owned by a group of Norwegian investors. Total annual capacity of the U.S. operations was approximately 600,000 tons.

Norwegian domestic output of ferroalloys increased by about 14% to an estimated 960,000 tons because of demand in foreign steel markets, principally in the European Community. Production of ferrosilicon increased by 19% to 410,000 tons.

Elkem announced plans to increase its medium-carbon ferromanganese capacity in Norway to 115,000 tons at existing plants using new refining equipment.

Magnesium.—Production of primary magnesium was at near capacity because the continuing good export market had allowed high inventories to be reduced to a normal level in 1983. Annual capacity was increased 10% by Norsk Hydro, the sole Norwegian producer, to 55,000 tons during the second half of 1984. The electrolytic cell size had been increased five times in 1983 to 300,000 amperes. These new cells went into operation in early 1984 and significantly improved energy efficiency and productivity. A new alloy foundry and a new plant for manufacturing of magnesium granules for steel desulfurization had gone into production during 1983.

Steel.—Following more than 3 years of negotiation, Norsk Jernverk and Elkem agreed at yearend to merge their steel manufacturing capabilities. Elkem, the private industry partner, was to own 20% of the firm and a continuing negotiation point had been the role that Elkem would play in the organization. The merger placed all steel manufacturing in Norway under one company with an annual capacity of 1.2 million tons of raw steel and 750,000 tons of rolled product. Output of each of these commodities increased by 10% in 1984 to near 900,000 and 600,000 tons, respectively, because of improved foreign markets, mostly in the European Community. Elkem's Christiana Spigerverk produced steel from scrap for the domestic market. Norsk Jernverk had shipped most of its output to foreign markets, and continued to receive Government subsidies, as it had generally since its beginning in 1955. Elkem's U.S. steel plants were not affected by the merger. Elkem indicated its intention to concentrate activities in its energy-intensive ferroalloy and aluminum industries.

Elkem began construction of a titanium slag plant at Tyssedal that was expected to produce 100,000 tons per year of a partially refined pig iron byproduct. The plant was scheduled to go on-stream in late 1986.

Norsk Jernverk was constructing an iron ore ocean shipping terminal, to be completed in late 1986, as the final step in developing its Mo i Rana Mine and beneficiation plant on the west coast of Norway. The 2,000-ton-per-hour-loading-capacity terminal was designed to accommodate 80,000-ton vessels.

Titanium.—The Norwegian Government ratified in December 1983 a decision to allow Elkem to construct a 200,000-ton-per-year, 75%-titanium slag plant at Tyssedal in western Norway using an Elkem process. Approximately 350,000 tons per year of ilmenite concentrate, supplied by local Titania A/S mines at Dalane in Rogaland, would be prereduced with carbon in a rotary kiln built by Allis Chalmers Corp. followed by partial magnetic separation of the reduced pellets and final melting in an Elkem-designed submerged arc furnace to produce the titanium slag and about 100,000 tons per year of a pig iron byproduct. Construction was scheduled for completion in 1985 with plant startup in 1986. The plant would be operated by K/S Ilmenittsmelterverket A/S.

NONMETALS

Cement.—A/S Norcem reported that it would discontinue clinker production at its Slemmestad plant, the second largest of its three plants, in 1985. Clinker was to be supplied by its largest plant, at Dalen. Further modernization of the Dalen plant was scheduled during 1985-87. Clinker production in the cement industry had been completely converted to coal fuel by 1984.

Olivine.—A/S Olivin, the world's largest producer of olivine, was expanding its plant at Aheim in the Sunnmore District of western Norway from an annual capacity of 1.6 to 2.5 million tons. Most of the output was exported, primarily for blast furnace slag conditioning, but also for foundry, refractory, and abrasive applications.

Peat.—LKAB Torv A/B began peat production at Rautavuoma in 1983. Despite a wet summer, 35,000 tons of milled product was produced in 1984.

Stone.—An estimated 3.5 million tons of crushed limestone was produced, mostly by Norcem for its cement industry. Other significant uses for limestone were agricultural, construction aggregate, and fillers for paints, paper, and plastics.

Two companies, A/S Norwegian Talc and Franzefoss Bruk A/S, produced an estimated 550,000 tons of dolomite. Most of the 400,000 tons per year produced by the largest, Norwegian Talc, was shipped from the Hammerfall quarry to Norsk Hydro for production of magnesium metal. About 20% of the Norwegian dolomite was ground, some to submicrometer size, for filler and extender use. The remainder was used in glass manufacture and as a steel flux. The product mined from the Franzefoss Bruk deposit at Ballengen in northern Norway, dolomite marble, was mostly exported to European Economic Community (EEC) countries for glass-mineral insulation and EEC custom grinders. Applications included fillers, down to 40 micrometers; glass manufacture, 0.2 millimeter; granules for agriculture; and lump up to 120 millimeters for chemical and metallurgical applications.

Nepheline syenite was mined at Bondkall near Oslo for use as aggregate in cement and asphalt concretes.

MINERAL FUELS

Norway's production of fuels and harnessing of water power totaled approximately 78 million tons of oil equivalent. The source breakdown was oil, 45%; natural gas, 33%; hydroelectric power, 21%; and solid fuels, 1%. All of the natural gas and most of the oil was exported. No coal was exported, and imports approximated production.

Domestic energy was supplied by oil, 47%; hydroelectric, 43%; and solid fuels including coal and wood, 10%. A broad end-use breakdown was industry, 49%; transportation, all oil, 19%; and other including residential, commercial, public, and agricultural, 32%. Industry energy requirements were supplied by hydroelectric, 49%; oil, 40%; and solid fuels, 11%. The other category was supplied by hydroelectric power, 65%; oil, 26%; and solid fuels, 9%. A shift continued from oil to hydroelectric energy and fuel wood in residential and commercial heating. Nearly all of the coal and coke was used in the iron and steel, chemical, and cement industries.

The Norwegian Government apparently decided to compromise its hydropower expansion program because of increasing resistance from the environmental lobby.

Crude North Sea petroleum production, approximately 60% from the Statfjord Field (Mobil Corp.[3]) and about 30% from the Ekofisk Field (Phillips Petroleum Co. Norway[3]), increased for the third successive year to a record-high 261 million barrels (35.0 million tons). Production of natural gas, mostly from the Frigg (Elf Aquitaine Norge A/S[3]) and Ekofisk Fields, increased 7% to a record high 970,000 million cubic feet. Output of oil and gas from the Statfjord and Frigg Fields each increased by approximately 20%. Output, particularly of oil, from the Ekofisk Field continued to decrease as it had since 1980; this decrease was more rapid than had been predicted.

Gas production began in the Odin Field (Esso Exploration and Development Co.); this field had a capacity of about 250 million cubic feet per day and an estimated life of 9 years.

Construction of a 245,000-barrel-per-day, gravity-based North Sea platform, Gullfaks A, continued, and oil and gas production was scheduled for 1987. Government-owned Den Norske Stats Oljeselskap A/S (Statoil), the operator, held an 85% interest. A second platform, Gullfaks B, of similar capacity, was in the engineering phase, and operation of this unit was scheduled for 1989. Total estimated oil reserves in the Gullfaks Field were 1,230 million barrels. An estimated 250 million cubic feet per year of byproduct natural gas was to be piped from Gullfaks via Statfjord to Emden, the Federal Republic of Germany. The $4 billion project was proceeding with Norwegian designs, 75% Norwegian procurement, and 90% Norwegian contractors.

Other significant wells under development were gas in the Heimdal Field (Elf Aquitaine) scheduled for production in 1986 at a rate of about 80,000 million cubic feet per year, oil in the Ula Field (British Petroleum Co. PLC) scheduled for production in 1987 at a rate of about 70,000 barrels per day, and oil and gas in the Oseberg Field (Norsk Hydro) scheduled for production in 1989.

The chances of finding further large oil and gas deposits in the North Sea were small, and Norway in 1984 was beginning to explore in the Norwegian Sea west of northern Norway and the Barents Sea and associated areas north of Scandinavia. First test drillings were concluded.

The decision to develop the large reserves of gas in the Sleipner Field (Statoil and Esso) was postponed indefinitely because of a near yearend decision by British Gas Corp. not to proceed with the purchase of Sleipner gas.

The very large oil and gas reserves of the Troll Field (Statoil and Shell Oil Co.) had not yet been fully delineated. Troll contains more gas reserves than any other in the North Sea, totaling about 40 trillion cubic feet. The potential operator, Shell, indicated that new technology would have to be developed in order to tap the Troll resources because the water depth, 350 meters, is more than double that of developed wells on the Norwegian shelf.

Construction of Statoil's Statpipe system for gas transportation from North Sea wells to a terminal on the island of Karsto, near Stavanger, was proceeding on schedule with the laying of 880 kilometers of pipe, mostly offshore. Approximately 2,500 people were employed in building the terminal at yearend. Statpipe, scheduled for operation in 1986, represented an investment of approximately $2.5 billion.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values were converted from Norwegian krone (NKr) to U.S. dollars at the rate of NKr8.16=US$1.00 for 1984.
[3]Field operator.

The Mineral Industry of Pakistan

By Kevin Connor[1]

Major successful developments in the petroleum and gas exploration sectors were the most important mineral events during the year for Pakistan. During the first fiscal year of the country's sixth development plan, which began July 1, 1983, and ended June 30, 1984,[2] 86 exploration and development wells were completed. Of this total, 29 wells were drilled by the Government's Oil and Gas Development Corp. (OGDC), and 57 were drilled by the private sector. This exceeded the sixth plan's target of 50 for that year, and as of December 1984 the drilling rate continued to increase and was approaching 4,000 meters per month. Late in 1983 and during 1984, four major oil discoveries and two major natural gas discoveries were made in Pakistan. The petroleum finds were at Leghari in December 1983 by Union Texas Co., at Dhurnal in April by the Occidental Petroleum Corp., at Tando Alam in May by OGDC, and at Tajedi in May by Union Texas. The natural gas finds were at Gularchi in January by Union Texas, and at Nandpur in August by OGDC.[3] The accelerated exploration and development efforts resulted in a major increase in oil production. At the end of 1984, indigenous oil production for the country stood at approximately 25,000 barrels per day, which was double the rate 1 year earlier, and well above the Government's cautiously set target of 21,000 barrels by the end of the sixth plan in 1988.

There were advances in other areas of mineral development and mineral processing, albeit less pronounced than in the oil and gas industry. Gains were noted within the steel, fertilizer, chromite, proposed copper, coal, limestone, and cement industries. All facilities for the Bin Qasim Phase I steel complex were completed by yearend 1984, and commissioning ceremonies for the entire plant were scheduled for January 1985. The complex took over 10 years to complete and cost almost $2 billion. Approximately 25% of the incurred costs were for support infrastructural developments which were nonexistent at the Bin Qasim site prior to the project's conception.

PRODUCTION AND TRADE

Pakistan's estimated real gross national product for 1984 increased 4.6% over that of 1983, a respectable growth rate for this developing nation. Bilateral trade with the United States was $619 million, almost a 50% increase over 1983 figures, and the United States became Pakistan's second largest export market during the year. U.S. investment in Pakistan was concentrated mainly in the fertilizer and petroleum sectors, estimated at $400 million.

Major increases in crude petroleum production took place in Pakistan during the year. The country's overall production rate for crude increased from 12,000 barrels per day to 25,000 barrels per day, with total production for fiscal year 1984 at 4.9 million barrels. Natural gas production also increased, with total production for the fiscal year at 331,108 million cubic feet. Pakistan's three refineries produced almost 35 million barrels of product. Over 30% of Pakistan's energy needs had to be imported in 1984, amounting to 90,000 barrels per day of refined products. The importation of petroleum required almost one-half of Pakistan's export earnings.

Production of other minerals and mineral products also increased, with chromite production up 20%, coal production up 5%, steel production up 20%, cement production up 7%, and fertilizer production up 3%. Mineral exports were approximately the same as in 1983, and represented only a minor fraction of Pakistan's trade.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum: Bauxite, gross weight	1,618	2,087	1,167	3,930	3,000
Antimony ore:					
Gross weight	40	90	51	60	60
Metal content[e]	10	20	20	13	15
Chromium: Chromite, gross weight	3,115	1,427	3,028	4,992	6,000
Iron and steel:					
Pig iron[2] thousand tons	--	383	550	[r] [e]550	825
Mild steel products[e] do.	[r]350	[r]350	[r]350	[r]550	700
Manganese ore, gross weight	186	96	80	[e]100	100
NONMETALS					
Abrasives, natural: Emery	1,395	862	870	900	1,000
Barite	14,054	23,929	26,438	28,240	30,000
Cement, hydraulic thousand tons	3,336	3,538	3,657	4,176	[2]4,687
Chalk	3,426	1,311	1,610	2,228	1,500
Clays:					
Bentonite	1,504	1,130	927	1,069	1,700
Fire clay	55,139	59,633	68,629	86,552	85,000
Fuller's earth	24,463	20,558	14,113	17,483	20,000
Kaolin (china clay)	27,162	38,527	41,279	23,412	20,000
Other	66,000	86,000	105,000	87,000	110,000
Feldspar	10,898	10,494	9,215	5,953	4,000
Fluorspar	592	819	819	394	400
Gypsum, crude	568,000	393,000	309,000	285,000	360,000
Magnesite, crude	1,525	1,551	1,688	1,844	3,500
Nitrogen: N content of ammonia	[r]430,000	[r]593,300	689,778	1,098,400	[2]1,127,000
Pigments, mineral, natural: Ocher	326	[r]445	1,889	769	1,000
Salt:					
Rock thousand tons	506	562	534	570	550
Marine do.	369	495	224	175	3,300
Total do.	875	1,057	758	745	3,850
Sand and gravel:					
Gravel	26,000	12,000	12,000	138,000	150,000
Sand:					
Bajri and common	46,908	60,494	11,220	64,190	280,000
Glass	94,000	82,000	76,000	117,000	130,000
Sodium compounds, n.e.s.:					
Caustic soda	39,181	38,963	40,548	39,989	40,000
Soda ash, manufactured	87,911	101,158	107,190	104,702	125,000
Stone:					
Aragonite and marble	114,000	100,000	96,000	114,000	100,000
Dolomite	21,062	32,284	88,716	79,522	110,000
Limestone thousand tons	2,984	3,192	3,249	4,132	5,000
Strontium minerals: Celestite	250	[r]295	272	135	550
Sulfur:					
Native	800	480	650	704	500
Byproduct, all sources[e]	14,000	14,000	19,000	[r]25,666	26,000
Total	14,800	14,480	19,650	26,370	26,500
Talc and related materials: Soapstone	30,000	24,997	22,568	15,960	14,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades thousand tons	1,695	1,524	1,602	1,815	2,100
Gas, natural (sales) million cubic feet	[r]244,190	285,804	308,198	328,000	[2]331,108
Natural gas liquids[e] thousand 42-gallon barrels	40	40	40	45	45
Petroleum:					
Crude do.	3,566	3,554	3,965	4,738	[2]4,884
Refinery products:					
Gasoline do.	3,650	[r]4,024	3,320	4,608	[2]5,205
Jet fuel do.	4,380	[r]4,323	4,041	3,748	[2]3,796
Kerosine do.	1,460	[r]1,604	1,959	2,076	[2]2,228
Distillate fuel oil do.	8,395	[r]8,321	9,573	10,010	[2]10,001

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products —Continued					
Residual fuel oil thousand 42-gallon barrels	9,490	r9,945	11,117	9,718	210,219
Lubricants do	730	r1,659	1,640	1,660	21,641
Other do	2,555	r1,652	2,067	1,883	21,526
Refinery fuel and losses do	2,555	NA	NA	NA	NA
Total do	33,215	r31,528	33,717	33,703	234,616

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Apr. 2, 1985. Reported data prior to 1983 represent production during the fiscal year, July 1 through June 30. All mineral data for 1983 and 1984, except for petroleum, natural gas, and refinery product figures, are reported on a calendar year basis. Categories excepted have continued to be reported on a Pakistan fiscal year basis.
[2]Reported figure.

Table 2.—Pakistan: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	--	171	--	Japan 73; Belgium-Luxembourg 20; France 20.
Unwrought	--	11	--	Afghanistan 10; Bangladesh 1.
Semimanufactures	--	27	--	Qatar 23; Oman 2.
Chromium: Ore and concentrate	6,000	--		
Copper: Metal including alloys:				
Scrap	--	549	--	Japan 211; Kuwait 178; United Kingdom 100.
Semimanufactures value, thousands	$30	$88	--	Kuwait $86.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	81,875	267,472	--	India 123,456; China 108,155; Bangladesh 28,578.
Steel, primary forms	--	5,951	--	All to Colombia.
Semimanufactures:				
Bars, rods, angles, shapes, sections	275	870	--	United Arab Emirates 820; Oman 21.
Universals, plates, sheets	11	8	--	All to Japan.
Tubes, pipes, fittings	18	108	--	Saudi Arabia 106.
Nickel: Metal including alloys, scrap	--	328	--	Japan 224; Belgium-Luxembourg 40.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$2,729	--	Japan $1,762; West Germany $967.
Silver:				
Ore and concentrate[2] do	$784	--		
Metal including alloys, unwrought and partly wrought do	$7	--		
Uranium and thorium: Ore and concentrate	--	20	--	All to Hong Kong.
Zinc: Oxides	11	2	--	All to United Arab Emirates.
Other: Base metals including alloys, all forms	31	2	1	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	16	--	All to Afghanistan.
Grinding and polishing wheels and stones	6	4	--	Hong Kong 3; Bangladesh 1.
Boron materials: Crude natural borates	144	30	--	All to Bangladesh.
Chalk	--	5	--	All to Afghanistan.
Clays, crude	120	133	--	Bangladesh 111.
Diamond: Gem, not set or strung value, thousands	$1	$13	--	All to Canada.

See footnotes at end of table.

Table 2.—Pakistan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s	157,906	200,657	--	United Arab Emirates 182,421; Qatar 17,349.
Manufactured:				
Nitrogenous	--	95,583	--	Iran 53,583; China 42,000.
Phosphatic	--	320	--	All to Iran.
Unspecified and mixed	--	34	--	All to United Kingdom.
Gypsum and plaster	--	72	--	All to United Arab Emirates.
Mica:				
Crude including splittings and waste	24	10	--	All to Kuwait.
Worked including agglomerated splittings	--	5	--	Do.
Nitrates, crude	6,571	--		
Potassium salts, crude	13	--		
Precious and semiprecious stones other than diamond: Natural value, thousands	$1,710	$1,774	$224	Hong Kong $408; West Germany $370.
Salt and brine	4,629	10,655	--	India 3,078; Kenya 2,900; Afghanistan 2,786.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,550	13,619	75	Italy 4,239; India 4,177; Japan 1,157.
Worked	145	--		
Gravel and crushed rock	345	395	--	United Arab Emirates 248; Bangladesh 89.
Limestone other than dimension	465	--		
Sand other than metal-bearing	1,001	110	--	All to United Arab Emirates.
Sulfur: Sulfuric acid	--	74	--	All to Afghanistan.
Talc, steatite, soapstone, pyrophyllite	--	5	--	All to Bangladesh.
Other: Crude	--	55	--	Italy 39; Afghanistan 16.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	560	789	--	Sri Lanka 230; India 80; Bangladesh 28.
Coke and semicoke	25,658	50	--	Sri Lanka 30; Saudi Arabia 20.
Petroleum:				
Crude value, thousands	--	$17	--	Bangladesh $10; United Arab Emirates $6.
Refinery products:				
Lubricants thousand 42-gallon barrels	--	3	--	Mainly to Iran.
Residual fuel oil do	4,207	1,499	--	United Arab Emirates 889; Yemen (Aden) 240.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]May contain platinum-group metals.

Table 3.—Pakistan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	29,914	1,307	--	Japan 685; China 361; West Germany 135.
Metal including alloys:				
Scrap	12,212	13,948	86	Kuwait 3,154; United Arab Emirates 2,854; West Germany 2,498.
Unwrought	5,781	2,004	165	U.S.S.R. 636; France 270; United Kingdom 215.
Semimanufactures	13,599	13,093	491	Canada 4,134; Hungary 3,538; Switzerland 1,712.
Chromium: Oxides and hydroxides	30	48	--	West Germany 28; China 9.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$3	--		

See footnotes at end of table.

Table 3.—Pakistan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Copper: Metal including alloys:				
Scrap	448	502	--	United Arab Emirates 205; Singapore 135; West Germany 91.
Unwrought	695	287	--	West Germany 103; United Kingdom 67.
Semimanufactures	5,768	7,136	53	Japan 3,676; United Kingdom 835; Belgium-Luxembourg 506.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	524,327	913,621	NA	Brazil 238,204; Australia 198,095.
Pyrite, roasted	17	--		
Metal:				
Scrap	157,363	119,493	73,412	United Kingdom 19,560; United Arab Emirates 9,790.
Pig iron, cast iron, related materials	321	738	--	United Arab Emirates 225; China 158; United Kingdom 117.
Ferroalloys:				
Ferromanganese	3,948	4,733	--	China 1,394; United Kingdom 1,141; France 696.
Unspecified value, thousands	$2,460	$3,755	--	China $1,216; Yugoslavia $538; United Kingdom $399.
Steel, primary forms	219,343	40,780	2,615	Chile 8,649; Japan 6,230; Netherlands 3,506.
Semimanufactures:				
Bars, rods, angles, shapes, sections	39,859	61,281	37	Japan 25,027; West Germany 12,710; Ireland 10,353.
Universals, plates, sheets	421,140	527,282	59,730	Australia 97,339; Japan 86,553; West Germany 64,582.
Hoop and strip	3,971	8,051	18	Japan 5,078; West Germany 2,101.
Rails and accessories	403	194	--	West Germany 119; Netherlands 21.
Wire	10,233	18,931	([2])	Japan 12,093; China 5,164.
Tubes, pipes, fittings	41,297	31,628	475	Japan 11,917; Republic of Korea 8,477; China 2,214.
Castings and forgings, rough	788	691	--	United Kingdom 258; Turkey 148; Belgium-Luxembourg 100.
Lead:				
Ore and concentrate	205	219	--	Morocco 191; United Arab Emirates 28.
Oxides	673	843	--	West Germany 472; China 259.
Metal including alloys:				
Scrap	20	66	--	Canada 36; United Arab Emirates 30.
Unwrought	2,731	1,851	52	Zambia 500; Belgium-Luxembourg 208.
Semimanufactures	76	47	--	United Kingdom 36; West Germany 6.
Manganese:				
Ore and concentrate: Metallurgical-grade	--	5	--	All from China.
Oxides	1,054	548	--	China 232; Singapore 212; Japan 104.
Mercury 76-pound flasks	2,031	2,408	--	China 1,363; Spain 348.
Nickel:				
Ore and concentrate	18	38	--	All from Australia.
Matte and speiss	51	429	--	West Germany 224; Canada 149.
Metal including alloys:				
Scrap	--	10	--	All from Canada.
Unwrought	125	107	--	United Kingdom 46; China 18; Netherlands 13.
Semimanufactures	72	88	--	West Germany 43; United Kingdom 27; Netherlands 11.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2	$64	--	All from West Germany.
Silver:				
Ore and concentrate do.	$12	$8	--	Japan $7.
Waste and sweepings do.	--	$7	--	All from Japan.
Metal including alloys, unwrought and partly wrought do.	--	$4	--	Do.
Tin: Metal including alloys:				
Scrap	--	12	--	All from Afghanistan.
Unwrought	16	5	--	Malaysia 2; Japan 1.
Semimanufactures	2	27	--	United Kingdom 16; Japan 6.
Titanium: Oxides	1,809	2,300	17	United Kingdom 1,117; Australia 504; West Germany 281.

See footnotes at end of table.

Table 3.—Pakistan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Uranium and thorium:				
Ore and concentrate value, thousands	$55	$193	--	Australia $185; China $8.
Metal including alloys, all forms do	$58	--		
Zinc:				
Ore and concentrate	179,259	NA		
Oxides	247	280	4	France 127; China 87; Belgium-Luxembourg 26.
Metal including alloys:				
Scrap	553	152	--	Spain 98; Netherlands 39.
Unwrought	9,920	10,841	47	Spain 5,864; United Kingdom 1,260; Canada 761.
Semimanufactures	147	106	(3)	Australia 97.
Other:				
Ores and concentrates	75	26	--	Australia 22.
Oxides and hydroxides	--	80	21	United Kingdom 19; West Germany 14.
Base metals including alloys, all forms	119	53	(4)	China 22; United Kingdom 10.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	572	781	72	Netherlands 575; China 75.
Artificial: Corundum	20	162	--	West Germany 36; United Kingdom 18.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	--	$4	--	Netherlands $3; West Germany $1.
Grinding and polishing wheels and stones	494	432	2	China 156; West Germany 113; East Germany 48.
Asbestos, crude	3,438	2,987	--	Canada 2,097; Singapore 500.
Barite and witherite	619	613	8	West Germany 598.
Boron materials:				
Crude natural borates	327	1,080	--	West Germany 1,000.
Oxides and acids	173	309	5	China 232; Turkey 70.
Cement thousand tons	846	874	--	Republic of Korea 338; Yugoslavia 115; Japan 92.
Chalk	--	7,231	36	Belgium-Luxembourg 5,377; United Kingdom 1,354.
Clays, crude	7,268	71,866	51,198	United Kingdom 18,763; China 1,034.
Cryolite and chiolite	--	64	--	China 53; Denmark 11.
Diatomite and other infusorial earth	299	282	99	Netherlands 156; Japan 24.
Feldspar, fluorspar, related materials	15,045	106	--	United Kingdom 46; China 25; Canada 20.
Fertilizer materials:				
Crude, n.e.s	9,703	--		
Manufactured:				
Ammonia	--	84	--	Japan 54; Turkey 20.
Nitrogenous	12,254	42,329	NA	United Kingdom 13,322.
Phosphatic	270,754	422,621	243,140	Republic of Korea 89,364; Japan 31,160.
Potassic	329	--		
Unspecified and mixed	271,998	73,267	--	Bulgaria 44,467; Finland 16,800.
Graphite, natural	1,040	1,626	--	China 1,034; Sri Lanka 383.
Gypsum and plaster	344	228	40	United Kingdom 171; West Germany 15.
Lime	9	214	--	Singapore 200.
Magnesite	19,456	2,092	--	China 1,541; Austria 265.
Mica:				
Crude including splittings and waste value, thousands	--	$4	--	All from West Germany.
Worked including agglomerated splittings	3	3	--	Japan 2; United Kingdom 1.
Nitrates, crude	36	--		
Phosphates, crude	213,946	254,184	--	Jordan 253,950.
Pigments, mineral: Iron oxides and hydroxides, processed	1,319	1,484	--	China 695; West Germany 690.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$56	$62	--	Austria $50; West Germany $8.
Synthetic do	$7	$2	--	All from West Germany.
Salt and brine	2,040	60	--	Do.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	641	322	25	U.S.S.R. 250; China 22.
Sulfate, manufactured	22,686	28,518	11,172	France 13,434; West Germany 2,801.

See footnotes at end of table.

Table 3.—Pakistan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	123	1,171	--	Italy 682; Greece 244; Turkey 244.
Worked	141	269	--	West Germany 204; Italy 65.
Dolomite, chiefly refractory-grade	48,165	5,355	--	West Germany 5,000; Italy 298.
Gravel and crushed rock value, thousands	$3	--		
Limestone other than dimension	2	--		
Quartz and quartzite	--	1	--	All from Italy.
Sand other than metal-bearing	45	76	--	Australia 53; United Kingdom 22.
Sulfur:				
Elemental:				
Crude including native and byproduct	24,338	15,551	4	Kuwait 10,596; Saudi Arabia 4,300.
Colloidal, precipitated, sublimed	105	1,159	2	Kuwait 958.
Sulfuric acid	28	30	--	United Kingdom 14; Republic of Korea 10.
Talc, steatite, soapstone, pyrophyllite	1,422	2,401	--	China 2,226; West Germany 101.
Other:				
Crude	80,110	33,620	1	China 31,473; Singapore 1,795.
Slag and dross, not metal-bearing	--	98	--	All from Belgium-Luxembourg.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	12,536	29,082	145	China 11,700; Hungary 10,989.
Carbon: Carbon black	1,308	991	120	China 407; West Germany 197.
Coal:				
Anthracite and bituminous	429,203	519,676	52,283	Australia 324,736; Canada 142,657.
Briquets of anthracite and bituminous coal	4	--		
Lignite including briquets	--	109	--	Sri Lanka 100; United Kingdom 9.
Coke and semicoke	--	5	--	All from United Kingdom.
Petroleum:				
Crude thousand 42-gallon barrels	29,707	31,061	--	Saudi Arabia 17,939; United Arab Emirates 8,624.
Refinery products:				
Liquefied petroleum gas value, thousands	$17	$2	$1	NA.
Gasoline thousand 42-gallon barrels	906	912	--	Kuwait 650; Saudi Arabia 261.
Mineral jelly and wax do.	80	124	(5)	China 89; Iraq 8; West Germany 7.
Kerosine and jet fuel do.	2,548	2,933	(5)	Kuwait 2,195; Saudi Arabia 737.
Distillate fuel oil do.	7,933	9,529	--	Kuwait 7,136; Saudi Arabia 2,213.
Lubricants do.	292	316	35	Japan 205; Spain 40.
Residual fuel oil do.	32	22	--	West Germany 18.
Bitumen and other residues do.	2	25	--	Mainly from China.
Bituminous mixtures do.	164	(5)	(5)	
Petroleum coke do.	22	--		

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $48,000.
[3]Unreported quantity valued at $1,000.
[4]Unreported quantity valued at $2,000.
[5]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Chromite and Magnesite.—In September, Pakistan Chromite Mines Ltd. (PCM), a 51% controlled subsidiary of Cumo Resources Ltd. of Vancouver, Canada, negotiated a trade agreement for the sale of 10,000 tons of chromite ore to the Mitsubishi Trading Co. of Japan. The already stockpiled ore, mined from the Muslim Bagh area deposits, was shipped to Mitsubishi in October. Pakistan's chromite production totaled almost 6,000 tons in 1984. There has been a steady annual increase in production since the low year of 1980-81, when only 1,108 tons was produced. A provincial government agency, the Baluchistan Development Authority (BDA), anticipated a production level of 9,000 tons per year from the newly incorporated PCM operation by the end of 1985. Cumo Resources and PCM were also conducting a study to determine the feasibility of building a 20,000-ton-per-year sodium dichromite facility in Quetta. Also, as a first step in assessing Pakistan's ferrochrome possibilities, the BDA was studying the technical and financial aspects of a chromite beneficiation plant to be located near Muslim Bagh.

A joint venture between BDA and both Canadian and Pakistani private investors was negotiated during the year for the construction of a chromite and magnesite refractory brick plant. Initial product capacity of the plant was to be 15,000 tons per year, increasing to 30,000 tons per year over a 5-year period. A breakdown of the initial proposed production showed an annual output of 1,000 tons burnt magnesite bricks, 9,000 tons burnt magnesite-chrome bricks, 2,000 tons magnesite-chrome bricks, and 3,400 tons of monolithic refractory bricks. Total cost of the project was estimated at $25 million.[4] The operating plant would employ approximately 280 workers.

Copper.—The Resource Development Corp. of Pakistan was negotiating a joint venture agreement late in 1984 with the Saindak International Group (SIG) for the development of Saindak's large porphyry copper deposit. SIG was a consortium of companies formed in 1984 which included Entreprise Minière et Chimique of France, Outokumpu Oy of Finland, and a Yugoslavian copper mining company, Rudarsko Topionicarski Bazen Bor. The SIG consortium is the second industry association set up to develop the Saindak copper deposit; the first was an affiliation of Canadian, Yugoslavian, and French interests which attempted unsuccessfully to launch a mining project in 1977-78. Estimated ore reserves of 89 million tons of 0.385% copper content and 0.3 part per million gold have been identified. Total probable reserves of various minable grades were over 4 million tons. Other major minerals and mineral products of the proposed operation would be silver, sulfuric acid, and iron ore or steel.

The proposed open pit mine would have an initial rate of production of 6 million tons of ore per year, out of which 120,000 tons of copper concentrate and 21,000 tons of blister copper would be produced. Approximately 2 tons of gold and 3 tons of silver would be recovered annually, and there would be the potential for manufacturing over 250,000 tons of sulfuric acid and 100,000 tons of iron or steel per year. Officials involved in the project expected it might take until the end of 1985 or early 1986 to acquire the necessary financial backing, and actual mining and beneficiation operations would take another 3 to 4 years to develop before startup. SIG's consortium companies were expected to provide approximately one-half of the estimated $450 million in capital development costs for the proposed project.

Steel.—A Schlomann rod mill was installed at the M/S Ittefaq Ltd. Lahore works during the year and came on-stream in November. Two new electric arc furnaces and a new two-strand continuous billet caster were also completed to provide feed for the mill, which was to produce wire rod 5 millimeters in diameter and larger, with sufficient capacity to supply all of the country's wire rod requirements. The two new 30-ton arc furnaces were in addition to M/S Ittefaq's previously built facilities, which included five 10-ton arc furnaces, a two-strand billet caster, and a mill to produce beams, angles, flats, and other products. The older caster's capacity was 250 tons per day of billets. In 1984, Pakistan had approximately 60 steel melting shops, containing 80 electric arc furnaces, with a total melting capacity of 650,000 tons per year, but with an estimated production of only 350,000 tons.

A number of section projects were completed during the year to finish the long-awaited Bin Qasim integrated steelworks.

The second blast furnace of the complex, managed and operated by Pakistan Steel Mill Corp., was commissioned on July 15. This furnace, like the first furnace commissioned in 1981, had a capacity of 1,750 tons per day. With both furnaces operating, the plant complex was rated at 1.1 million tons per year of steel. Also completed at the Bin Qasim complex in 1984 was a 200,000-ton-per-year cold-rolling (CR) mill. Half of the yearly CR mill output was slated for galvanizing. Construction of the galvanizing line was also completed by yearend. Steel and associated products that could be produced at the integrated plant by yearend were coke, pig iron, billets, hot-rolled sheets, CR rolled sheets, galvanized sheets, and formed sections. In the latter part of the year plans were underway to install a second CR mill to work in tandem with the first. The second CR mill was to have a capacity of 500,000 to 600,000 tons per year, of which 200,000 tons would be blackplate and 300,000 to 400,000 tons would be CR sheet. The decision to build the second mill was based on the rising domestic demand for steel products, which was expected to exceed the first mill's capacity by the beginning of 1986. The cost of the proposed second CR mill was estimated at $150 million. Since 1981, when the first steel was produced at Bin Qasim, the iron ore feedstock has been imported from Australia, Brazil, Canada, India, and Liberia. However, the Pakistan Council of Scientific and Industrial Research identified promising iron ore deposits near the town of Nokundi in the district of Chagai, which in the next few years were expected to be developed to replace the need for imports.

NONMETALS

Cement.—The Pak Land Cement Co. started up its new 1,100-ton-per-day dry-process plant in Dhabeji and began clinker production during February. The plant was the first private sector manufacturing operation to begin production of cement in Pakistan. The Holderbank Management and Consulting Co. was responsible for the geological investigations and handling of the plant's commissioning and performance testing. Personnel training was done by Lafarge of France; Creusot Loire Entreprises (CLE) Groupe Technip, also a French firm, constructed the plant.[5]

In midyear FECTO Cement Ltd. of Karachi awarded a $16 million construction contract to Fuller International Co. of Bethlehem, PA, (United States) for the construction of a 1,000-ton-per-day cement plant in northern Pakistan. By yearend, however, plans for the plant were in a state of flux, owing to market reports showing unexpected major increases in demand for cement products in the area. FETCO was seriously considering increasing the value and scope of the contract to double the plant's output to 2,000 tons per day. Construction work was to begin in early 1985, with a projected completion date sometime in 1987.

Attock Cement Co. had finished construction on its new 600,000-ton-per-year cement plant at Karachi by yearend, and was expected to begin operating the plant early in 1985. The Cherat Cement Co.'s Lakrai cement plant was almost completed in 1984, and commissioning of the plant was expected in the first quarter of 1985. CLE Groupe Technip had handled the construction of the plant. The development by Snow White Cement Ltd. of a 100,000-ton-per-year white cement plant at Jamshoro was underway throughout 1984, with the first phase of core drilling completed. The coring and analysis were being handled by Lafarge of France. An ongoing study by Dyckerhoff Engineering Co. on behalf of the State Cement Corp. Ltd. of Pakistan was developing and evaluating modernization plans for six of the corporation's cement plants. The investigation was examining conversion of the plants to a dry or semidry process and possible conversion to using coal for energy instead of more costly fuel oil. By yearend, all of the country's 31 cement plants were using fuel oil. Those that had been using natural gas were converted, owing to the difficulty of obtaining gas supplies.

Fertilizer Materials.—In latter 1983, Snamprogetti S.p.A. of Italy was awarded a contract by Pak-Arab Fertilizers Ltd. to expand urea production at the existing urea manufacturing plant at Multan, to install plants for both reducing oxides of nitrogen and recovering purge gas, and to rehabilitate an existing ammonia refrigeration plant. Capacity of the urea output at the facility was to be increased from 180 tons per day to 300 tons per day. Construction work began on the project in December of 1983 and continued throughout 1984. Completion of the project was scheduled for the end of 1985.

The National Fertilizer Corp. (NFC) of Lahore and the Agrico Chemical Co. of the United States announced plans to form a joint venture company to manufacture compound fertilizers at Mathelo Sind. Named B.R.R. Fertilizer Ltd., the proposed facility was to have the capacity to produce 300,000 tons per year of nitrogen-phosphorus and nitrogen-phosphorus-potassium (NPK) fertilizers. It would be the first plant capable of producing NPK fertilizers in Pakistan. Raw material feedstock for the plant, such as monoammonium phosphate and potassium sulfate, was to be imported. Estimated cost of the project was $45 million.

In mid-1984, the Pakistan and Chinese Governments signed a trade agreement under which Pakistan was to export 200,000 tons of urea to China. The exports, worth approximately $40 million, began in November and were to continue into 1985. This was the biggest urea export trade agreement ever signed by Pakistan, and the third such agreement between Pakistan and China. Representatives involved in signing of the agreement were the Fauji Foundation of Pakistan and the Chinese National Chemical Import-Export Corp. office of Karachi.

Work on the new Kakul phosphate mine in the Northwest Frontier Province continued throughout the year. Expansion of mining operations, underway since 1983, continued, and trial quantities of phosphate rock were supplied to the NFC. Initial output design capacity of the mine was 60,000 tons per year, all of which was to be sold to the NFC. The crushing, milling, and bagging equipment from GEC Mechanical Handling Ltd. of the United Kingdom was delivered to the Kakul minesite by yearend 1984, and the rock preparation facility was expected to be operational by mid-1985. The preparation facility was to consist of a two-stage crushing section and a specially designed single-stage ball mill system, all necessary for processing the unusually hard rock. Output from the preparation plant was expected to be shipped to the NFC Haripur superphosphate fertilizer plant. The Kakul project was being financed by the Overseas Development Administration of the United Kingdom. Estimated cost of the United Kingdom aid for the project was $3.5 million. Pakistan was responsible for carrying out all fieldwork and building the necessary infrastructure for the mine and mill operations.

Gypsum.—In December, a new gypsum plant began operations near Taunsa in D.G. Khan District. The plant had a startup output of 800 tons per day of wall plaster, agrogypsum, and plaster of paris products. Gypsum ore feedstock for the plant was being obtained from reserves in the Rodo Hills, 35 kilometers from the plant. Measured ore reserves were sufficient to supply the plant for 70 years at its rated output capacity of 240,000 tons per year. The construction of the plant was handled by the State Gypsum Corp. of Pakistan (GCP), which was also the operator. GCP was considering expanding the plant's product lines to include partition walls, ceiling blocks, and partition board.

Limestone.—Pakistan Steel reported developing limestone quarries during the year at Makli near Karachi. Proven reserves were given at approximately 300 million tons. Production from the quarries in latter 1984 was 1,400 tons per day, all for domestic consumption by Pakistan Steel. The quarries were conveniently located near Port Mohammed Bin Qasim, and export of the limestone was being seriously evaluated. Pakistan Steel has also set up refractories and lime production plants, which include a tar-bonded dolomite refractory and compound plant, a fireclay plant, and a lime calcination plant. All basic raw materials necessary for operating the plants were indigenously available, with the dolomite supplied from the Jhimpir area in Thatta District. Pakistan's refractory industry had 24 plants within the country at the end of 1984. Local demand for firebrick and dolomite brick was expected to remain strong, and with increasing cement production projected for the country, the limestone industry was expected to continue to grow.

Salt.—Late in the year, the Pakistan Mineral Development Corp. (PMDC) announced the discovery of almost 30 million tons of high-quality rock salt at its Khewra minesite. Development of the deposit by the PMDC was in question, however, because the deposit was too deep to surface mine, and underground mining of rock salt at Khewra had become increasingly expensive and non-cost-effective. The Khewra salt mines were the oldest and largest in the country, producing over one-half of the PMDC's annual production of 500,000 tons. It had been proposed by mining officials that improved mechanization at the underground mines might improve the economics, but the provincial government was thought to be more inclined towards the development of surface minesites, which would be cheaper.

MINERAL FUELS

Coal.—During the year, the PMDC and the Pakistani Water and Power Development Authority (WAPDA) continued plans to develop a 1.4-million-ton-per-year coal mine at Lakhra and to construct a 300-megawatt coal-fired powerplant at nearby Jamshoro, 150 kilometers northeast of Karachi. WAPDA invited international proposals for participation in the project and was seeking financial assistance from several international agencies and banking institutions.

Other coal projects ongoing during the year included an expansion and modernization project at the Sharigh collieries, aimed at increasing the annual production to 100,000 tons. The estimated cost of the project was $2.5 million; completion was scheduled by June 1985. The output from the mine was to be shipped to a near new coal washing plant at Sharigh. The clean coal output would then go to the Bin Qasim steel complex for blending with imported coking coal for the manufacture of metallurgical coke.

The PMDC also developed plans during the year for a $2 million project to expand production at the existing Degari coal mines from 60,000 to 90,000 tons per year. Also as part of the project, a new mine would be developed with a production capacity of 90,000 tons per year. Exploratory drilling by PMDC was underway in 1984 to measure the remaining minable reserves in the area. Expected completion date of the proposed project was mid-1988.

Natural Gas.—During January, Union Texas made a gasfield discovery at Gularchi, located about 23 kilometers from the Khaskheli Oilfield. Two wells were completed in this field during the year, and both were briefly tested. The discovery well, Gularchi-1, showed a gas flow of approximately 708,000 cubic meters per day, and Gularchi-2 tested out at 396,440 cubic meters per day. The well depth of Gularchi-2 was given as 1,830 meters.

The Nandpur Gasfield, discovered by OGDC in August, was located about 65 kilometers northeast of Multan in the Punjab plains. This was the first discovery of oil or gas within the plains area. Preliminary tests indicated a flow rate of 707,925 cubic meters per day for the discovery well, Nandpur-1. Two top zones in the field were reported to have a high percentage of inert gases and only a 45% methane content. The pay zones were reported to be between depths of 1,770 and 2,070 meters. Development plans for the field were being prepared at yearend.

The Pirkoh Gasfield integration project, begun in August of 1983, was completed by the beginning of March 1984 at a cost of $36 million. Approximately 65% of the project's cost was met through a loan from the Asian Development Bank. After startup, natural gas supplies of 40 million cubic feet per day were being transported from six gas wells in the Pirkoh Gasfield to the Sui-Karachi gas transmission system, 74 kilometers away. Because of low Pirkoh Gasfield pressures, a booster compressor station was being installed at Sui for continuous injection of the Pirkoh gas into the main Sui transmission system. Planned capacity of the new Pirkoh-Sui line was to increase to 70 million cubic feet per day by the end of 1985. Six more gas wells were to be drilled in the Pirkoh Gasfield, and when fully developed, the additional gas was to supply the Sui-Karachi line with 120 million cubic feet per day.

Petroleum.—Early in 1984 the International Bank for Reconstruction and Development approved two loans for petroleum and gas exploration projects that totaled $81.5 million. Pakistan's OGDC was to handle implementation of both projects. The first project, with an approved loan of $30 million, was for the second-phase development of the Toot Oilfield in northern Pakistan. The project involved drilling four development wells for producing both oil and gas and installing facilities and equipment for gas separation and compressor systems to produce liquefied petroleum gas. Also, a reservoir monitoring study was to be implemented to evaluate methods of improving oilfield production. The second and larger of the two projects was for seismic work and for six exploratory wells to be completed over a 3-year period. The first two exploratory wells were to be drilled at Loti and Afiband. OGDC was to field two seismic crews for the initial survey work.

At yearend 1983, Union Texas discovered the Leghari Oilfield in the Badin concession block. The Leghari-1 well was drilled within the field located 17.5 kilometers east of the Khaskheli Oilfield in southeast Pakistan. By the end of 1984, four wells had been drilled and completed, and the field's reserves were being estimated at 6 million barrels. Production operations from the Leghari-1 discovery well started on

March 9. Using a 1-inch choke, the well flowed at 5,443 barrels per day during a short production test. By yearend, the well was producing at 4,000 barrels per day. The Government's equity interest in the field is 40%, with the remaining 60% shared equally by Union Texas and Cities Services Co. of the United States.

Occidental Petroleum discovered oil and associated gas at Dhurnal in north Potwar during April. The new field was located 63 kilometers southwest of Islamabad. At a depth of approximately 4,000 meters, the discovery well was briefly tested and produced 5,950 barrels per day of oil on a 3/4-inch choke, with 481,390 cubic meters per day of associated gas. By yearend, extended flow testing was being conducted with a rate of 3,000 barrels per day being reported, and the drilling of a second well was well underway.

OGDC'S discovery at Tando Alam, 23 kilometers southeast of Hyderabad, was made during May. The discovery well, Tando Alam-1, produced crude at a test rate of 4,800 barrels per day from a depth of 2,100 meters. OGDC planned to commence production in late September or early October of 1985. Also during 1985, a second Tando Alam well was scheduled to be drilled and tested.

Another oil discovery was made in May 1984 by Union Texas at Tajedi, 32.7 kilometers southwest of the Khaskheli Oilfield. The results of initial testing produced a flow rate of 3,400 barrels per day from a depth of 1,640 meters. Union Texas was preparing an appraisal-development plan for the field at yearend.

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[1]Physical scientist, Division of International Minerals.

[2]Pakistan's fiscal year runs from July 1 through June 30. Textual material based on Government agency reports is reported in fiscal years unless otherwise specified.

[3]Petroleum News (Hong Kong). Pakistan. V. 15, No. 10, Jan. 1985, pp. 75-78.

[4]Where necessary, values have been converted from Pakistani rupees (PRs) to U.S. dollars at a rate of PRs13.80=US$1.00.

[5]Rock Products (Chicago, IL). Pakistan. V. 88, No. 4, Apr. 1985, pp. 68-69.

The Mineral Industry of Peru

By Doris M. Hyde[1]

It was another crisis year for the minerals sector, and a few of the smaller companies dependent primarily on copper production were forced to close down in 1984. Many of the polymetallic medium and small mining companies were in a position to take advantage of any upward metal price fluctuations because of earlier efforts directed toward cost-cutting measures and a diversification of production. Whereas in 1983 it was silver that allowed many producers to be profitable, in 1984, it was fortuitous midyear sales of zinc that assisted. The value of zinc sales surpassed that of silver, and even the lead export value exceeded that of silver.

Not only did the mining industry have to contend with falling metal market prices, but labor strikes were estimated to have caused the loss of 20,000 tons of copper, 8,000 tons of lead, 19,000 tons of zinc, and 2 million troy ounces of silver. The value of lost production was estimated at $63 million, plus $4.5 million in uncollected taxes.[2] Terrorist activity increased and, despite security measures, caused interruptions to energy supplies, transportation routes, and exploration activities.

Peru faced a worsening economy in 1984, caused in great part by a high fiscal deficit and an external debt exceeding $13 billion. The gross domestic product (GDP) reached an estimated $16.9 billion and showed a real growth of 4.5% using 1970 as a base year. Currency devaluation against the U.S. dollar reached almost 151%, and the rate of inflation averaged about 112%. The contribution of the mining sector to the GDP remained at almost 10%, but nonfuel mineral export earnings fell about 12% in value and represented less than 46% of total export earnings. Petroleum accounted for almost 20% of total exports.

Southern Peru Copper Corp. (SPCC), Empresa Minera del Centro del Perú (Centromín Perú), and Empresa Minera del Perú (Minero Perú) dominated copper production with 92% of output. Even though Minero Perú's Cerro Verde I copper mine was rapidly approaching depletion, the new Tintaya sulfide copper mine was scheduled to open early in 1985. Plans were advancing to use Tintaya's copper oxide overburden as feed for the Cerro Verde refinery. Unable to complete financing for mining the copper sulfides underlying the Cerro Verde I copper oxides, Minero Perú began developing plans for a smaller version.

Government Policies and Programs.— Several legislative actions were taken that affected the mineral industries. Effective January 1, 1984, the new 5% to 10% tax on all exports and domestic sales of traditional metals became effective whenever export prices met or exceeded a given referenced value for each metal.

In July, Legislative Decree No. 296 granted tax incentives to the small mining sector, and these incentives were to be in effect until 1990. The decree included small alluvial heavy mineral and gold producers that started operations as of July 26, 1984, or those already operating that increased their production by no less than 50% without exceeding the maximum production limit of 2,500 cubic meters of material per day, regardless of the aerial size of the respective claim or concession. These small miners were exempted from income tax and other taxes on the capitalization and/or reinvestment of distributable profits. If the headquarters and operation centers were located outside the Province of Lima and the Constitutional Province of Callao, the company may multiply the average tax rate times 10% of the total payroll and use that amount as a credit against tax payments due each year. Miners living and working in specified provinces throughout the country were exempted from paying the income tax on wages.

Those companies increasing by 20% or more the number of permanent jobs in their operation may deduct as expenses a percentage of the wages of the new jobs. This expense deduction increases incrementally from 30% to 60% as the percentage of new jobs increases and is allowed for 5 years, counting from the first year of reaching the qualifying percentage of personnel increase. A company with fiscal losses not exceeding 20% of paid capital may obtain a negotiable fiscal certificate that may be used to pay any taxes due the treasury. Small miners may also apply for a discount of up to 50% on import duties for new or used mining equipment.

On August 24, 1984, by Supreme Decree 027-84-EM/VM, Peru issued regulations implementing Articles 133, 140, 155, 157, 158, 159, 160, and 161 of Legislative Decree No. 109, the General Mining Law of June 1981. A part of these regulations concern the distribution of financial benefits and obligations of mining companies and their respective shareholders in regard to tax payments, tax credits, and the investment or reinvestment of capital.

Some provisions of the regulations were designed to promote mining investment by establishing certain guarantees in new mining contracts. The guarantees include tax stability; free disposal of foreign currency; nondiscrimination in foreign currency exchange; free commercialization of production; exemption from income tax and other taxes included in Article 157 of the mining law on the revaluation of fixed assets; a 30% reduction in the payment of the income taxes prevailing at the time the contract is signed; and authorization for accounting procedures to be in U.S. dollars, or in whatever currency the investment was made, when at least 80% of the new or additional production is exported. The foreign currency exchange rate is to be based on that established by the International Accounting Standards Committee. In addition, the mining community contribution provisions of the mining law can be delayed until 7 years after initial production from the new mining project, during which time the miners will collectively receive and share 7% of the company's annual net profit as compensation.

The new regulations also defined which new and existing companies are entitled to enter into new contracts with the Government pursuant to rules set forth in Article 157 of the Mining Law. The provisions also apply to owners and operators of concentrators and refineries, even if they do not have mining properties.

PRODUCTION

Total mineral production increased about 3.4% over that of 1983. Poor weather affected some producers at the beginning of the year. Labor strikes caused disruptions in production schedules, and continued low market prices encouraged some companies to initiate or complete cost-cutting modifications to their operations. Although in 1983 a recovery in silver prices helped many companies survive the generally depressed market for metals, in 1984, it was increased zinc prices, at least through midyear, that provided assistance against financial losses. Polymetallic mining companies were expected to diversify their production as much as possible to take advantage of any metal market gains.

Among Peru's five most important minerals, copper showed the largest increase in volume, primarily because Centromín Perú's Cobriza mining unit reached a record-high output and SPCC lost only 22 days to strike activity at its mines. Low copper prices caused medium and small private producers to direct their investments toward greater efficiency, and some companies delayed expansion plans. A few of the smaller predominantly copper producers, hit by labor strikes as well as low prices, were forced to close. The medium-size producers accounted for 7% of total copper production in 1984, but this percentage could diminish in the future unless market prices improve.

Although only a minor contributor to total copper production, the medium mining sector produced 51% of total lead, 54% of the zinc, and 61% of the silver. Small-size mines were mostly concerned with lead, silver, and placer gold.

A gain in crude oil production represented a recovery from the effects of heavy rains and floods that damaged producing fields and pipeline routes in 1983. No major oil discoveries were made during the year and reserves continued to dwindle. New drilling planned for 1985 was mostly on the part of Petróleos del Perú S.A. (Petroperú) and wildcats by new contractors in untested jungle concessions. Without a sizable increase in investment from the Government as well as foreign companies, Peru faces the prospect of becoming a net importer of crude oil by 1988, or perhaps even sooner if an accelerated economic recovery increases domestic demand at a faster pace than anticipated.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Antimony:					
Mine output, metal content	344	685	738	713	[2]672
Metal	427	448	411	307	[2]372
Arsenic, white[3]	2,475	2,164	1,663	1,110	[2]887
Bismuth:					
Mine output, metal content	497	639	613	535	[2]668
Metal	497	639	604	526	[2]651
Cadmium:					
Mine output, metal content	490	511	600	630	550
Metal	172	307	421	451	[2]390
Copper:					
Mine output, metal content	366,800	342,058	356,632	322,169	[2]375,064
Sulfate (Cu content)	1,857	2,281	2,510	2,494	2,537
Metal:					
Smelter	323,083	279,327	294,412	258,305	[2]298,806
Refined	195,735	175,572	194,416	158,134	[2]188,622
Electrowon	[r]33,751	[r]33,806	33,907	33,008	[2]30,833
Gold:					
Mine output, metal content troy ounces	142,041	[r]161,590	157,667	165,576	[2]198,691
Metal do.	57,196	55,781	69,606	71,053	[2]88,414
Indium kilograms	3,675	3,489	3,673	2,707	[2]2,906
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	5,705	6,069	5,774	4,347	[2]4,076
Iron content do.	3,765	4,007	3,811	2,869	2,715
Metal:					
Pig iron[4] do.	262	[r]187	161	113	--
Ferroalloys	575	30	--	320	300
Steel ingots and castings thousand tons	447	364	273	299	337
Lead:					
Mine output, metal content	[r]189,133	192,667	175,771	212,600	[2]205,333
Metal	79,939	79,236	76,990	67,734	70,260
Molybdenum, mine output, metal content	2,688	2,488	2,893	2,628	[2]3,079
Selenium metal, refined kilograms	22,908	22,478	20,851	19,553	20,800
Silver:					
Mine output, metal content thousand troy ounces	44,419	46,940	53,479	55,878	53,584
Metal do.	23,797	23,853	24,704	21,725	[2]23,676
Tellurium metal kilograms	20,920	21,310	20,726	15,116	[2]14,094
Tin, mine output, metal content	1,077	1,519	1,672	2,391	[2]2,991
Tungsten, mine output, metal content	549	521	688	720	[2]754
Zinc:					
Mine output, metal content	487,596	498,890	507,111	576,400	[2]558,443
Metal	63,829	126,159	160,733	154,030	[2]148,579
NONMETALS					
Barite	[r]414,600	409,100	375,000	[r] [e]163,300	160,000
Boron materials, crude (borates)[e]	21,000	16,644	14,000	[r]10,000	10,000
Cement, hydraulic thousand tons	2,169	3,080	2,590	2,300	2,200
Chalk	485,174	475,000	470,000	[e]470,000	470,000
Clays:					
Bentonite	18,200	30,500	31,000	31,000	32,000
Fire clay	13,325	8,520	8,000	8,000	8,500
Kaolin	5,500	[e]6,000	6,000	6,000	6,000
Common clay	309,800	754,256	750,000	750,000	750,000
Diatomite[e]	7,300	7,300	7,300	7,300	7,300
Feldspar	15,600	21,600	[e]25,000	[e]25,000	25,000
Gypsum, crude	280,000	350,000	[e]350,000	[e]350,000	350,000
Mica	50	574	[e]550	[e]550	550
Nitrogen: N content of ammonia	61,700	97,500	84,700	[e]85,000	85,000
Phosphates, crude	[r]13,980	[r]11,938	2,911	2,510	1,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Salt, all types	456,987	506,000	485,000	[e]490,000	500,000
Stone, sand and gravel:					
Dimension stone:					
Marble	12,050	3,072	[e]3,000	[e]3,000	3,000
Slate	[2]18,800	[e]19,000	[e]18,000	[e]18,000	18,000
Crushed and broken stone:					
Dolomite	[2]4,250	[e]4,300	[e]4,200	[e]4,000	4,000
Limestone thousand tons	3,175	3,800	2,590	2,500	2,500
Quartz and quartzite	[2]1,900	[e]2,000	[e]2,000	[e]2,000	2,000
Silica sand thousand tons	90	18	[e]20	20	20
Sand and gravel do	3,596	2,538	2,850	[e]2,800	2,800
Sulfur:					
Elemental:					
Native	[2]105	[e]100	[e]100	[e]100	100
Byproduct of metallurgy	20,000	20,000	58,000	65,000	70,000
Sulfuric acid, gross weight	51,801	170,801	226,760	200,000	203,777
Talc and related materials:					
Talc	[2]1,095	[e]1,100	[e]1,100	[e]1,100	1,000
Pyrophyllite	[2]7,500	[e]8,000	[e]7,500	[e]7,500	7,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	[r]5,486	4,200	6,200	2,153	[2]5,330
Coal: Anthracite, run-of-mine	89,471	157,000	[e]120,000	120,000	130,000
Coke, all types[e]	10,000	10,000	10,000	10,000	10,000
Gas, natural:[e]					
Gross million cubic feet	[2]71,028	71,600	[r]51,800	[r]42,100	[2]46,705
Marketed[e] do	21,000	21,000	21,000	22,000	22,000
Natural gas liquids:					
Natural gasoline and other[5] thousand 42-gallon barrels	[r]350	344	320	53	[2]190
Propane do	75	86	59	6	[2]49
Butane do	[r]8	9	9	3	[2]5
Total do	[r]433	439	388	62	[2]244
Petroleum:					
Crude do	71,356	70,431	71,197	62,454	[2]67,374
Refinery products:					
Gasoline, motor do	13,028	13,960	13,069	10,835	[2]11,539
Jet fuel do	3,018	3,307	2,891	2,718	[2]2,654
Kerosine do	6,741	7,003	7,111	6,024	[2]6,220
Distillate fuel oil do	12,422	13,071	12,177	9,591	[2]12,020
Residual fuel oil do	16,656	16,907	18,866	21,637	[2]26,617
Lubricants do	85	124	148	57	[2]63
Liquefied petroleum gas do	1,148	1,410	1,525	1,170	[2]1,429
Asphalt do	234	256	313	178	[2]212
Refinery fuel and losses do	259	199	93	596	[2]667
Unspecified do	156	318	1,292	2,090	[2]793
Total do	53,747	56,555	57,485	54,896	[2]62,214

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 19, 1985.
[2]Reported figure.
[3]Output reported by Empresa Minera del Centro del Perú.
[4]Excludes sponge iron production as follows, in tons: 1980—33,826; 1981—53,967 (revised); 1982—42,853 (revised); 1983—27,024 (revised); and 1984—61,080.
[5]Includes hexane.

TRADE

By midyear 1984, slight price gains in some metals began to slide and the total value of mineral exports fell from $1,629 million in 1983 to $1,433 million. Petroleum contributed an additional $618 million, which represented a 13% increase in value over that of 1983. Exported copper volumes increased 15%, but their value was almost equal to that received in 1983. Zinc prices showed a small but stable gain during the first half of the year, but then they began to slide, and all major metals except tin ended the year at a lower per unit value than in January.

Nonfuel minerals contributed about 46% to the total $3,147 million value of exports, whereas in 1983 they made a 54% contribution. Petroleum accounted for an additional 20%, or slightly more than its 18% share of exports in 1983.

Total Peruvian copper exports amounted to 337,000 tons valued at $442 million; zinc reached 512,000 tons valued at $341 million; refined silver was 27 million troy ounces valued at $227 million; lead, including any silver content, was 180,000 tons valued at $233 million; iron ore was about 4.2 million tons valued at $58 million; and gold was 183,000 troy ounces valued at $67 million. In midyear, the Government exempted exporters of manufactured gold products from payment of the sales tax.

The state-owned marketing company, Minero Perú Comercial (Minpeco), was responsible for 63% of the value of nonfuel mineral sales in 1984, down from 78% in 1983. This was mostly because of the SPCC decision not to use Minpeco's services to market its available blister and toll-refined copper. Minpeco marketed 60% of all copper exports, 42% of the lead, 89% of refined silver, 75% of zinc, and 23% of minor metals.

Copper exports by Minpeco were valued at $268 million, of which 39% went to Western Europe, 30% to Asia, and 14% to the United States. Lead exports went about one-third each to Western Europe and Asia, while the United States imported about 20%. All of Minpeco's gold exports, valued at $1 million, went to the United States, as did almost 65% of its silver exports. Minpeco's zinc exports went mainly to Western Europe, followed by Asia, other Latin American countries, the centrally planned economy countries, and the United States, which imported almost 14%. Overall, the United States was Minpeco's largest single purchaser of minerals, and accounted for over $231 million, or more than 25% of total sales. Western European countries purchased over $259 million, or 28% of Minpeco's sales, and Asian nations, almost $238 million, or 26%.

COMMODITY REVIEW

METALS

Copper.—Total copper production failed to meet the Government's programmed goal, but of the top 10 producers, all except Minero Perú, Cía. Minera Los Montes S.A., and Corporación Minera Nor Perú S.A. recorded volume gains over those of 1983. SPCC increased overall production by 16% as the copper content of concentrate reached 119,730 tons from Toquepala and 141,542 tons from Cuajone. Beset by strike activity in 1983, the company almost made it through 1984 strike free. However, on November 21, workers at both mines went on a 22-day strike over increased pay for 1985. The strike action at SPCC slowed delivery of blister copper to Minero Perú's Ilo copper refinery. This caused a reduction from programmed cathode production. Even so, the Ilo refinery output reached 131,586 tons and surpassed that of 1983 by 25%. Because of low copper prices, SPCC continued to postpone any decision regarding investments to expand production at its two mining operations. Feasibility studies on geothermal potential in the Moquegua area were also delayed by SPCC.

Blister copper exported through SPCC's marketing efforts amounted to 110,471 tons, 61% of which went to Europe, 35% to Japan, and 4% to the United States. Toll-refined copper cathode exports by SPCC amounted to 137,980 tons, of which 53% went to Europe, 24% to Japan, and 23% to the United States. SPCC also shipped about 27,000 tons of copper concentrate to China.

The effects of inclement weather in March, a 2-week labor strike during July, and power restrictions caused by a terrorist attack at the Yauli hydroelectric facility, left Centromín Perú's blister and refined copper production from the La Oroya metallurgical complex behind programmed schedules, although volumes were higher than in 1983.

Electrowon copper from Minero Perú's Cerro Verde I operation declined because of the gradual reduction of available oxide ore. Production was projected to be 28,000 tons for 1985, and 16,000 tons in 1986 when the operation expected to be dependent on secondary recovery unless alternate oxide feedstock for the refinery is obtained. The company continued to cperate the experimental pilot plant for treating the sulfide copper ore that underlies the oxide reserves. The pilot plant produced 2,700 tons of copper concentrate from sulfide ore already mined.

Minero Perú discontinued negotiations with the Japanese for $130 million in financing for the development of the sulfide copper ore known as Cerro Verde II. The company announced it would proceed on a much smaller scale, and would seek financing from the U.S. Export-Import Bank and the Export Development Corp. of Canada, both of which had approved loans for the original Cerro Verde II project. The reduced development plan called for an investment of $33 million to treat 5,000 tons per day of 1.7% copper sulfide ore and to produce about 75,000 tons of 30% copper concentrate per year for 7 years. The original plan called for the production of 200,000 tons per year of 30% copper concentrates at an investment cost of $290 million. The smaller project was estimated to have a per pound break-even price that would enable a profitable operation, while the original project break-even price was considerably higher than the expected near-term prices. Minero Perú also expected to proceed with a $25 million project to process treated copper oxide ore from the Empresa Minera Especial Tintaya S.A. mine at the Cerro Verde electrowinning refinery to produce about 16,000 tons of cathodes per year. Perhaps $20 million of this investment cost would be charged to Tintaya for constructing a plant to produce copper sulfate crystals from the oxide ore, and thus provide feed for Cerro Verde's electrowinning plant. The feasibility study was completed and basic engineering work was expected to be finished in mid-1985, after which another 18 months would be required for plant construction.

At yearend, about 24 million tons of overburden and copper oxide ore had been stripped at the new Tintaya Mine, about 250 kilometers from Arequipa in Yauri District, Espinar Province, Cuzco Department. The $329 million project is owned 45% each by Minero Perú and Centromín Perú, with a 10% interest held by Corporación Financiera de Desarrollo (Cofide). The January 1985 inauguration was rescheduled for March to allow time for proper testing of the grinding circuits and concentrators. The expected capacity production from Tintaya was 160,000 tons per year of 33% copper concentrate. Sulfide ore reserves were estimated at 34 million tons of 2.12% copper at a cutoff of 0.65% copper. Byproducts in the concentrate include 4 troy ounces of silver and 0.14 troy ounce of gold per ton. Concentrates are to be shipped by truck for 150 kilometers to Canagua, and thence by railroad to the port city of Matarani in Arequipa Department. Some contracts for future production have been negotiated by Minpeco. Minero Perú estimated that the break-even copper price to recover the operating costs, financing costs, and capital investment would be about $0.75 per pound, an amount higher than yearend world market prices.

Minero Perú's two pending copper projects, La Granja and Tambo Grande, remained static in 1984. The West German firm Kupferexplorationsgesellschaft mbH maintained its option to develop the La Granja copper-molybdenum property in the Department of Cajamarca in northern Peru. The project probably remained dormant because of low copper prices, which may also have been part of the reason that Minero Perú and the French Bureau de Recherches Géolgiques et Minières did not push the Peruvian Congress for approval to develop the Tambo Grande polymetallic project located in Piura near the Ecuadorian border.

Centromín Perú's major copper unit, the Cobriza Mine in Huancavelica Department, operated at nearly full capacity in 1984 and mined ore averaged slightly over 1.2%. Production reached 35,934 tons of contained copper. It was this mine and SPCC that were responsible for overall copper production gains. In December, Los Montes was absorbed into the parent company and became an operating unit of Centromín Perú. Los Montes has had problems with finances, labor, and dwindling ore reserves. Mining was to continue under Centromín Perú. The original ore reserves were expected to become exhausted by mid-1986. Exploration for new reserves continued, especially at the Sol Radiante and Raquel veins where development was underway to exploit over 82,000 tons of ore averaging 2.5% copper.

The largest private copper producer, besides SPCC, remained Cía. Minera Pativilca S.A., operating the Raul deposit about 98 kilometers south of Lima. Production in 1984 was about 5,510 tons of copper contained in 22,365 tons of concentrate. Pativilca and other medium and small companies accounted for about 7% of total copper production.

Gold.—Estimated gold production by source, in troy ounces, is shown in the following table:

	1983	1984
In ores and concentrates	13,278	14,468
Refined	r71,053	88,414
In placer gravels	r81,245	95,809
Total	r165,576	198,691

rRevised.

In 1984, Peru exported a total of 175,833 troy ounces of gold valued at $371.34 per ounce. This represented a 5% increase in volume and a 13% decrease in the average troy ounce value received in 1983. Direct exports by the Banco Minero del Perú amounted to 77,580 troy ounces, slightly less than in 1983. However, total gold exports through the Banco Minero were 175,833 troy ounces, slightly more than in 1983. Refined gold production from the La Oroya metallurgical center increased to 52,828 troy ounces because Centromín Perú purchased concentrates with a higher grade of gold.

Gold was one commodity in the minerals sector that appeared to be particularly favored for new mining ventures. Exploration activities included the Madre de Dios placer areas in the southeastern jungle and vein deposits scattered over central and southern Peru.

Alluvial gold is mainly produced by several companies using artisan methods and by a few thousand individuals panning along rivers in the jungle areas after the rainy season. Perhaps 60% of this gold is purchased by Banco Minero through its branch offices scattered throughout the country. It is acknowledged by officials that significant quantities pass illegally into neighboring countries where payment can be made in U.S. dollars or is sold directly to individuals who pay more than the Banco Minero. Miners also stockpile gold in anticipation of rising prices and as protection against currency devaluation. The most productive area for alluvial gold remained the Madre de Dios in the southeastern jungle where 53% was obtained. The Puno area accounted for 30% of alluvial gold produced, and the Cuzco area 10%.

South American Placers Inc., a multinational consortium, outlined 80 million cubic meters of gold-bearing material in the concession held by its subsidiary, Cía. Aurífera Inambari S.A., in the Madre de Dios area. The material graded just over 0.2 gram of gold per cubic meter. The area was determined to be amenable to dredging techniques but requires a $25 million investment, a part of which may be obtained from the International Finance Corp. (IFC).

Minero Perú continued to operate in a small area of its San Antonio de Poto concession in Puno Department and produced over 3,000 troy ounces of gold in 1984. Approval was given to purchase a $20 million dredge to mechanize the artisan methods employed at the Pampa Blanca zone, but financing was not immediately available. Mine life was estimated at 12 years at a production rate yielding about 35,000 troy ounces of gold per year. The construction phase would take about 2 years.

At Centromín Perú's concession along the Madre de Dios and Inambari Rivers in southeastern Peru, the pilot plant was moved from Bijahual to the Inambari area. A 12-kilometer access trail was under construction to connect this new working camp with the Maldonado-Cuzco road.

Minas Los Rosales S.A. deferred installing a cyanidation plant to treat the oxide ores at its copper-gold deposit about 30 kilometers southeast of the city of Puno. The company continued to operate its 200-ton-per-day flotation plant and in 1984 produced copper concentrates containing 9,645 troy ounces of gold. In 1985, the company expected to sell its concentrate to Minpeco instead of Centromín Perú. Delivery would be made to Arequipa, 300 kilometers distant, instead of to La Oroya, which is 1,500 kilometers distant and adds considerably to freight charges.

Cía. Minera Ana Maria S.A. started mining its gold deposit in Ananea, near Sandia, Puno Department. A 30-ton-per-day concentrator was installed. The mine was expected to produce about 480 troy ounces of gold per month. The $1 million financing cost was 80% provided by Banco Minero.

Los Montes, Centromín Perú's copper producing subsidiary near Ica, was installing a gold cyanidation plant to treat ore from small producers in the Ica area. The plant was scheduled to go on-stream in November. Initial capacity was to be 20 tons of ore per day, with a possible later expansion to 40 tons per day.

Iron Ore.—A slack market demand continued to depress production from Empresa Minera del Hierro del Perú S.A. (Hierro Perú). Production by category for 1983-84 is shown in the following table, in thousand metric tons:

	1983	1984
Pellets	1,063	907
Low-silica pellets	38	87
High-grade sinter feed	2,403	1,849
Pellet feed in slurry form	39	98
Pellet feed in cake form	751	1,089
Oxide ore	53	46
Total	4,347	4,076

The company was unable to take good advantage of a slight world market improvement during 1984 because of high freight costs to distant markets. Hierro Perú continued to improve the San Nicolás port facilities and was engaged in engineering studies for implementing the $17 million water supply project to cleanse the alkali content from iron concentrate.

Beneficiated iron ore exports were valued at $58 million and totaled slightly less than 4.2 million tons. The Republic of Korea (43%), Japan (33%), and the Netherlands (15%), were the major recipients, with the Federal Republic of Germany, Yugoslavia, Argentina, and the United States purchasing the remainder. This represented a 4% decrease in total volume exported and a 23% drop in value from that of 1983.

Empresa Siderúrgica del Perú (Siderperú), with its blast furnace shut down, operated its direct-reduction plant on stockpiled pellets and scrap, making no purchases from Hierro Perú in 1984.

Iron and Steel.—The state-owned steel producer, Siderperú, underwent adjustments in managerial and operating techniques during 1984. The objectives of these changes centered on improved personnel efficiency, a reduction in stock and spare parts inventories, and a lower debt level. The company expected to show a small profit for 1984. Siderperú's blast furnaces were shut down in July 1983, and only the electric furnaces have operated since then. This curtailed iron sales by Hierro Perú in 1983 and stopped them altogether in 1984 because the electric furnaces use scrap as primary feedstock.

Siderperú used spare parts valued at $100,000 to fabricate a corrugator for a new venture to produce corrugated galvanized steel sheets. The plant began production in October at Pucallpa and expected to produce 6,000 tons per year for use as roofing material in the central jungle Departments of Ucayali, San Martín, and Loreto.

Empresa Laminadora del Pacífico S.A. at Pisco was reported as having captured about 50% of the domestic market for nonflat steel products.

Lead and Zinc.—Because of low market value, lead production has almost assumed a byproduct status of silver production. Certainly, without the association of other metals, a lead mine could not exist for long under 1984 market conditions. Any future increase in lead production may be assumed to be the result of polymetallic mine expansion, primarily designed to increase silver and zinc output. Zinc was the one metal that most helped Peruvian companies financially survive generally falling metal markets. It became a counter or refuge against other metal price fluctuations, especially silver.

Minero Perú's Cajamarquilla zinc refinery, 37 kilometers east of the main port city of Callao, produced an estimated 83,663 tons of zinc, down 7% from that of 1983. During the first half of 1984, the refinery endured temporary shutdowns to correct operating problems, flood damage, and curtailments in electrical power. The refinery also produced 242 tons of cadmium, 1,156 tons of copper cement, 11,082 tons of lead-silver residues, and 167,395 tons of sulfuric acid. For 1985, about 50% of the plant's 101,500 tons per year capacity was contracted out to produce refined zinc for Minpeco under a toll agreement. This arrangement was expected to reduce costs at the refinery by lessening Minero Perú's need to purchase zinc in concentrates for refining. The toll refining also offered Minero Perú protection against fluctuations in zinc market prices and the higher utilization rate should allow the plant to operate at a lower cost.

Sulfuric acid produced at the Cajamarquilla refinery has been sent to the Cerro Verde copper mine near Arequipa. In 1985 and 1986, the new Tintaya copper mine was expected to consume acid at the initial rate of 35,000 tons per year. A new superphosphate plant, which Minero Perú planned for construction at Cajamarquilla, was expected to consume 20,000 tons per year of acid by 1986. Exports to Chile were projected to account for any surplus sulfuric acid available after 1986.

The La Oroya metallurgical complex of Centromín Perú increased production of both refined lead and zinc over 1983 volumes. Refined zinc output reached 64,916 tons. Refined lead production increased despite operating problems with the new lead agglomeration plant installed last year and a 14-day labor strike in July. The lead plant had problems with the hardness of the concentrate feedstock, and the altitude of the site also caused processing difficulties.

Total zinc production was only a fraction above that of 1983. However, increased zinc market prices were instrumental in saving many medium- and small-size companies from financial losses. Centromín Perú, with output at almost 220,000 tons of contained zinc from its own mining units, had no close competition for first rank volume-wise. Cía. San Ignacio de Morococha S.A., with zinc production from the San Vincente deposit estimated at 67,000 tons, was the second largest producer, followed by Cía. Minera Milpo S.A. in third place at about 31,000 tons of contained zinc in concentrate. Cía. Minerales Santander Inc. suffered the greatest decrease in zinc production when output fell about 25% below the 1983 level.

Centromín Perú also remained the leading producer of lead, with output estimated at about 81,000 tons contained in concentrate. This 5% decrease from the 1983 level was primarily caused by a midyear labor strike. Milpo, with contained lead production of slightly less than 17,000 tons, was the second ranking lead producer. Cía. Minera Santa Luisa S.A., owned by Mitsui Mining & Smelting Co. Ltd. (70%), and Mitsui & Co. (30%), produced about 13,000 tons of contained lead and ranked third because Cía. Minera Atacocha S.A. suffered a 16% reduction in output caused by labor problems, an expansion program, and power interruptions. In late November, Atacocha completed a $10 million mine and concentrator expansion from 1,500 tons per day to 1,800 tons per day. A further expansion to 2,200 tons per day was scheduled for completion in 1986. Cía. Minera Raura S.A. suffered the greatest decrease in production. Lead was down 23% to about 9,000 tons, zinc production fell 16%, and silver output dropped 35%, primarily because of a 43-day midyear labor strike.

Although not among the top 10 zinc producers, Sociedad Minera Gran Bretaña S.A. suffered a production drop of 33% from its Azulcocha Mine. This was attributed to labor problems and a development slowdown in order to concentrate investment toward the December opening of the Contonga Mine. This new polymetallic mine in the Province of Huari, Department of Ancash, had proven and probable ore reserves estimated at 3.4 million tons, averaging 5.5% zinc, 3.2% lead, 0.4% copper, and 4.3 troy ounces of silver per ton. Other estimates of Contonga's reserves were as high as 8 million tons. After a $16 million initial investment to open the Contonga Mine, in 1985, the company expected to initiate a $6 million expansion of the present 500-ton-per-day concentrator to 1,000 tons per day.

Silver.—Even though zinc became financially important to producers in 1984, silver remained the most influential metal affecting decisions by the medium and small mining sector. The two largest private producers initiated projects designed to significantly increase 1985 silver output. The third ranking private silver producer, Cía. Minera de Caylloma Ltd., reduced its programmed output for 1985 because of the low market price. Other private producers expected to maintain output at more or less the 1984 levels. In general, Peru's silver producers concentrated their efforts on new exploration, the completion of expansion projects, equipment modifications, and improved electrical power systems. Cost reduction efforts were central to most companies as they sought to cope with the opposing forces of falling metal prices and increased labor and security costs.

Centromín Perú produced over 13 million troy ounces of silver contained in concentrates from its six operating units. Refined silver from La Oroya suffered a slight decrease during the first half of the year because of problems caused by the weather, operational difficulties with the new lead agglomeration plant, and a 2-week labor strike. This decrease was overcome by yearend, and total output rose almost 9% over that of 1983.

The new anode slimes plant constructed as an annex to Minero Perú's Ilo copper refinery went on-stream in November. The $500,000 plant was designed to treat 100 tons of residue slimes per year from the refinery that were formerly treated at the metallurgical complex at La Oroya. Minpeco financed 75% of the cost of the plant, with repayment to be made in silver. Annual production at full operation was expected to be about 1.4 million troy ounces of refined silver, 2,700 troy ounces of refined gold, and 20 tons of 92% selenium residue. In 1984, the plant produced 73,432 troy ounces of silver, which was exported to initiate registration on the world stock market of the MP-AG trademark as a high-purity product.

Cía. de Minas Buenaventura S.A., the largest private silver producer, ended the year with about 4.2 million troy ounces of silver produced at its Julcani and Uchucchacua Mines. This 12% decrease from the 1983 production level was primarily caused by 57 days of strike activity at Julcani and 30 days at Uchucchacua. The company continued an aggressive exploration program, as well as expansion work at the Uchucchacua unit and improvement at the Paton hydroelectric facility. The Orcopampa unit was separated and established as a subsidiary company in 1984, with Buenaventura holding just fractionally less than 100% interest. Concentrates from Orcopampa contained 2.3 million troy ounces of silver and 28,261 troy ounces of gold in 1984. Some other companies in which Buenaventura held an interest were Cía. de Minas Recuperada S.A. (over 99%), where operating status may be changed from exploitation to exploration; Cía. de Minas Colquirrumi S.A. (over 52%); Cía. Minera Condesa S.A. (92%); and Sociedad Minera El Brocal S.A. (11%).

Minas de Arcata S.A., a part of the Hochschild Group, remained the second largest private silver producer. Its mine is about 210 kilometers north of Arequipa. Arcata completed a $7 million expansion program from 550 to 800 tons per day. This expansion, and an earlier switch to hydroelectric power from the Misapuquio project, allowed silver operating expenses to drop well below the 1983 level for a production slightly higher than the 3.18 million troy ounces produced in 1983. Landslides caused by severe rain during January disrupted hydroelectric power for 3 months, added to Arcata's per troy ounce production costs, and reduced the projected minerals output. Proven reserves at yearend amounted to 2.2 million tons averaging 15 troy ounces of silver per ton.

Among the larger private producers, Milpo and Raura experienced the greatest silver production declines: Milpo as a result of labor problems and electric power interruptions, while Raura was also faced with declining reserves and ore grades.

Tungsten.—Peru's largest tungsten producer, Fermín Málaga Santolalla e Hijos Negociación Minera S.A., resumed spot sales of concentrate in May. The company had suspended sales in December 1983 because of low prices. Despite some improvement, prices continued to fluctuate, and the expansion to double capacity that had been under consideration for the Pasto Bueno Mine in Ancash was indefinitely postponed. Minera Regina S.A. easily outproduced Centromín Perú for the second consecutive year. The company negotiated a $5 million loan and a $250,000 equity subscription from the IFC toward a two-stage $21 million expansion of infrastructure and the 80-ton-per-day pilot plant at its small Palca XI Mine near Puno. The project included a two-stage increase in tungsten concentrate production, reaching 350 tons per day in 1985 and 750 tons per day in 1986. Besides installing a new ore treatment section and expanding the existing plant capacity, the second stage called for a new processing plant, a hydroelectric system, new exploration, increased mine development work, and additional worker housing.

Tungsten production by company was as follows, in metric tons of WO_3 content:

	1981	1982	1983	1984[e]
Málaga Santolalla	358	397	475	533
Minera Regina	200	187	196	263
Centromín Perú	130	239	158	88
Other[e]	50	[r]50	83	69
Total	738	[r]873	912	953

[e]Estimated. [r]Revised.

NONMETALS

Phosphate Rock.—Unless new budgetary restrictions are imposed on Minero Perú, the construction of a simple superphosphate plant was planned at the Cajamaquilla zinc refinery. The $2 million plant would use 20,000 tons per year of sulfuric acid from the zinc refinery and obtain phosphate rock from the Bayóvar deposit.

Meanwhile, Peru continued to actively negotiate with potential partners in an effort to develop the Bayóvar phosphate deposit. Empresa Promotora Bayóvar S.A. (Probayóvar) is owned by Minero Perú (60%), Cofide (30%), and Empresa Nacional de Comercialización de Insumos (10%).

Probayóvar has envisioned an ambitious $700 million, three-stage project that starts with the production of phosphatic fertilizers using 1.5 million tons per year of 30% phosphate rock and imported sulfur. A second stage would produce sulfuric acid from pyrites supplied by the Tambo Grande polymetallic mining project planned for development in northwestern Peru's Piura Department. A third stage would double phosphate rock production to 3 million tons per year. About 66% of the phosphate rock would be converted to phosphoric rock, triple superphosphate, and diammonium phosphate. The remainder would be sold as phosphate rock.

The list of potential investors was headed by Norway's Norsk Hydro A/S, which signed a memorandum of understanding in June for a 1984 work program. Other possible partners included France's Société Chimique des Charbonnages; a United States-Japanese consortium; and Peru Phosphate Development Ltd., a joint venture organized by two New Zealand companies that want to operate on a smaller scale to produce about 150,000 to 400,000 tons per year of phosphate rock concentrate. The Soviet Union also expressed an interest in cooperating technically, financially, and commercially in the project. China indicated to Probayóvar that the China International Trust Investment Corp. could be interested in participation, although its main interest appeared to be in a contract to purchase between 50,000 and 100,000 tons per year of phosphoric acid.

MINERAL FUELS

Coal.—The Government has given a high priority toward promoting the use of domestic coal as an alternative or substitute for oil. Peruvian coal reserves were estimated at over 1 billion tons, 80% of which is anthracite.

Ladrillera Huachipa S.A., an important brick producer, has taken a coal concession in the Callejón de Huaylas area in order to relieve dependence on small miners in the Alto Chicama and Oyón areas for the 40,000 tons to 50,000 tons of coal it uses each year. Other Peruvian brickmakers also use coal in their operations. Manufacturing industries considering a conversion to coal as a fuel include cement plants, breweries, fertilizer plants, paper plants, fishmeal plants, sugar refineries, textile mills, and glass factories.

Siderperú has been developing its coal concessions in the Pampahuay zone at Oyón, La Libertad Department, and supplies its Chimbote steel plant with about 500 tons per month. Siderperú expected coal production to increase to as much as 3,000 tons per month in 1985. Siderperú also has concessions in the Callejón de Huaylas where it planned to extract anthracite to mix with Oyón's bituminous coal for use in sponge iron production.

A private Peruvian company, Carbonera Santa Rosa S.A., was actively negotiating with foreign groups for a $5 million, three-stage development project at its anthracite deposit in the Santa Basin area of Payasca, Ancash Department. The Santa Rosa coal reserves were estimated to be at least 8 million tons.

The most important coal-related development in 1984 was a project sponsored by the Republic of Korea and Empresa Promotora del Carbón S.A. (Procarbón), the state-owned company created to promote coal development projects. The South Korean Institute of Energy and Resources performed a laboratory level study on the manufacture of coal briquets using low-quality anthracite samples from the Santa and Alto Chicama regions. The study proved the project would be feasible, and two South Korean companies have shown an interest in participating in a coal mining and briquet processing project.

Procarbón has successfully attracted the interest of local miners to provide the feedstock; attracted the interest of Peru's industrial sector to manufacture domestic appliances that operate with the briquets instead of kerosine; and attracted Petroperú's interest to participate in the project. Procarbón was seeking support from the United Nations Development Program to fund a feasibility study at the industrial level. The World Bank may also provide support.

Procarbón may have interested some Peruvian coal mining companies in joining Centromín Perú in developing the Jantunhuasi bituminous coal deposit. The coal would be used to supply fuel to local cement manufacturers, such as Cementos Lima S.A. and Cemento Andino S.A., and eventually to other industrial plants. In addition to owning the rights to the Jantunhuasi coal deposit, Centromín Perú has exploited its Goyllarisquizga metallurgical coal deposit at the rate of about 180 tons per day since 1978.

Petroleum and Natural Gas.—Drilling activity included 17 wildcats and 162 development wells. In 1985, new drilling was expected to include 9 exploration and 147 development wells. Petroperú was to account for 5 of the exploration wells and 91 of the development wells. Officials of Petroperú stressed that production and exports can be expected to decline sharply unless a considerably greater investment commitment is made by the Government itself, as well as by the foreign companies. This prospect did not appear probable, at least for 1985. No significant crude oil discoveries were made, and total crude oil reserves dropped to about 699 million barrels at yearend.

Petroperú sought new exploration contracts for the jungle areas of Huallaga, Madre de Dios, and Río Santiago because these appeared to have good hydrocarbon potential. A group headed by Union Texas Petroleum Corp. (42.5%) and including Texaco Producing (Peru) Inc. (21.25%) acting as operator, Texaco Canada Resources Ltd. (21.25%), and Ensearch Perú Ltd. (15%), signed a 30-year risk contract with Petroperú for the 2.5-million-acre Block 6 in the northern jungle area of Alto Amazonas and Loreto Departments. The contract called for a $20 million, 6-year exploration program, including the drilling of five wildcats. The first wildcat, located within 30 miles of the trans-Andean crude oil pipeline, was scheduled to be spudded in early 1985 and reach a depth of 16,300 feet. The contract called for a 50-50 production split on output up to 145,000 barrels per day, with Petroperú's share incrementally increasing on higher production until it reached 58% of output over 300,000 barrels per day.

Royal Dutch/Shell Group through its subsidiary Shell Exploradora y Productora del Perú BV, which has been exploring Blocks 38 and 42 in the southeastern jungle, signed a second contract for Blocks 49 and 51. These blocks cover 1.6 million acres in southern Madre de Dios Department, the northern tip of Puno Department, and a part of Cuzco Department. Shell's 30-year risk contract called for a $49 million, 6-year exploration period. If geologic and seismic studies prove favorable, after 3 years, Shell would start test drilling.

In Block 42, Shell's early 1984 wildcat flowed encouraging amounts of natural gas and condensate. The company planned to initiate additional drilling by November 1985 in a four-well program. Shell hoped to find enough crude oil reserves under the gas to justify a field development program that would include pipeline construction.

Occidental Petroleum Corp. finally suspended negotiations for Block 29 in the central jungle Huallaga Valley area. Both Occidental and Belco Petroleum Corp. have been involved in a longstanding dispute with the Government over tax problems. Starting in 1980, the contractors had to pay their income tax from their share of production. All payments were to be in oil rather than in currency. This included giving Petroperú 40% of their oil sales, in oil, in advance, for income taxes, and also, the payment of any taxes due at yearend was to be in oil. The 40% advance payment resulted in overpayments after 1981. Any amount overpaid was to be credited to the company after it filed its income tax returns at yearend. However, the credit was to be calculated in Peruvian currency at the average exchange rate for the previous year and the sol was depreciating at more than 120% per year. The year ended without a solution to this dispute. The Government did reduce the tax rate finally to 20% for Occidental and 19% for Belco as of August 1984, but the companies maintained that this was not enough to prevent advance overpayment and later financial losses when reimbursed by deflated soles. Occidental and Belco both reduced their 1985 drilling programs.

Petroperú has been involved in several negotiations for petroleum exploration contracts. Besides Occidental, British Petroleum Corp. and Union Oil Co. of California have also indicated an interest in the Huallaga Valley area. Maritime Petroleum Co. was interested in the Titicaca Basin area where oil seeps have been reported. Spain's Hispanica de Petróleos S. A. withdrew from negotiations for a 25% interest in the Santiago Basin in Block 50 in the northern jungle after failing to find interested partners.

Occidental's northern jungle fields remained the major petroleum producing area and averaged about 84,500 barrels per day, a slight decrease from that of 1983. Petroperú's northern coastal and northern jungle fields both showed significant gains over 1983, and their combined output was estimated at about 60,000 barrels per day. Peru's total crude oil production averaged about 184,000 barrels per day. This increase over that of 1983 does not assure a reversal of the predicted downtrend, because Belco and especially Occidental have curtailed their 1985 investment programs. Belco's 1985 schedule indicated 2 offshore exploration wells, compared with 10 during 1984. Belco's offshore development drilling for 1985 was estimated at 56 wells, which is only slightly less than the 60 drilled in 1984. Occidental, however, did not indicate it would drill any exploration or development wells in its northern jungle concession.

Uranium.—The Instituto Peruano de Energía Nuclear, through the Peruvian Instituto Geológico Minero y Metalúrgico (INGEMMET), continued its investigations of uranium deposits in a 600-square-kilometer area of the Macusani District of Carabaya Province, Puno Department. INGEMMET identified at least 55 uranium occurrences in volcanics of the Quenamari Formation. This rock formation was deposited during the Miocene to Pliocene Epochs in the tectonically formed Macusani Depression. It is underlain by the Paleozoic Era Ambo-Mitu Groups.[3] At first, the Macusani District was estimated to have reserves containing about 400 tons of uranium yellowcake (U_3O_8) in the area of Pinocho and Chilcuno VI, Huiquiza Province. Based on continued exploration, INGEMMET then revised this figure and calculated that the Macusani District contained tens of thousands of tons of U_3O_8 potential.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Peruvian soles (S/) to U.S. dollars at the 1984 average exchange rate of S/3,476=US$1.00.

[3]Instituto Geológico Minero y Metalúrgico, (Lima, Peru). De Re Metallica, No. 3, Sept.-Oct. 1984, pp. 4-5.

The Mineral Industry of the Philippines

By John C. Wu[1]

Despite the financial hardships of low metal prices in the world market and shortage of capital and foreign exchange in the Philippines under the shadow of the country's continuing economic difficulties, most major mining companies survived and continued to operate at a low level of output with losses in 1984. However, the Philippines remained an important world producer of chromium, copper, and gold, and accounted for 4%, 3%, and 2% of the world's mine production, respectively. Inline with the Government policy of expanding the country's manufacturing sector, the Philippines has become an important mineral processor of refined copper, ferrochromium, ferrosilicon, and phosphatic fertilizer in the Southeast Asian region.

Because of the significant decline in mineral output resulting from additional shutdowns of mining operations, the mining and quarrying industry sectoral contribution to the gross domestic product (GDP) declined to 1.7% from 2% in 1983. Export earnings of minerals also dropped substantially from about 10% of the total exports in 1983 to less than 7% in 1984.

During the year, two major mining companies, which have had serious financial problems since 1982, finally collapsed and were foreclosed by their major creditors. Marinduque Mining and Industrial Corp. (MMIC), which operated the Sipalay copper mine on Negros Island, Surigao nickel mine and refinery on Nonoc Island, and the Island cement plant at Antipolo in Rizal, on Luzon Island, was foreclosed by the Development Bank of Philippines (DBP) and the Philippines National Bank (PNB) in July. The two banks established the Nonoc Mining and Industrial Corp. (NMIC) and the Maricalum Mining Corp. (MMC) to take over the operations of MMIC in August. Basay Mining Corp., owned and operated by the state-owned National Development Co. (NDC), was foreclosed by PNB in May. The Sipalay and the Basay copper mines remained shutdown during the year. The foreclosures of these two companies resulted in idling over 7,000 workers.

In an effort to assist the mining industry, the Government of the Philippines granted temporary relief in July to three major copper-gold producers by deferring their tax payments until metal prices recover to an adequate level to sustain mining operations.

To ensure an adequate supply of copper concentrates to the copper smelter at Isabel in Leyte, the Government imposed restrictions on exports of copper concentrates in July. The Ministry of Trade and Industry (MTI) was given authority to issue export clearance if the proposed exports of copper concentrates would not adversely affect the feeding of the domestic copper smelter. Benguet Corp., which did not have a supply contract with the smelter, was denied export clearance in October. However, the cancellation of export clearance was lifted 2 months later, after Benguet agreed to provide copper concentrates for further testing of the mercury content in its concentrates. The shortage in copper concentrates for the copper smelter and the dispute between Benguet and MTI on supply of concentrates to the smelter remained unresolved by year-end.

The development of the Hinobaan copper project on Negros Island, which was undertaken by Lepanto Consolidated Mining Co. Inc. and NDC, was shelved in November 1983 because of the low copper price. However, two new projects were expected to start during 1985-86. Benguet in 1984 signed an operating agreement with La Suerte Gold Mining Corp. to rehabilitate the old gold mine in the Paracale District of Jose Panganiban in south Luzon while the Sabah Government of Malaysia agreed to invest $15 million[2] in St. Ines Mining and Steel Corp. for the iron ore mining and pelletizing project at Antipolo in Rizal.

In January, a new mining law was issued to encourage the development and exploitation of small but relatively high-grade untapped mineral deposits. The Decree No. 1899 defines small-scale mining as any single unit mining operation having an annual production of not more than 50,000 tons of ore; a minimal investment on infrastructure and processing plant; no sophisticated mining equipment but having heavy reliance on manual labor; and ownership, management, or control by an individual or entity qualified under existing mining laws and regulations.[3] Under this small-scale-mining law, various incentives such as tax exemptions (excluding income tax), technical assistance, and simplified processing and granting of permits or licenses would be provided to the holder of mining rights on a small-scale mining property.

In the mineral processing sector, the $340 million fertilizer complex at Isabel, Leyte, owned and operated by Philippines Phosphate Fertilizer Corp. (Philphos), was completed in October. The ferrochromium plant at Tagoloan on Mindanao Island, owned and operated by Ferrochrome Philippines Inc., expanded its capacity to 60,000 tons per year of high-carbon ferrochromium in July. The copper smelter at Isabel, Leyte, owned and operated by the Philippines Associated Smelting and Refining Corp. (PASAR), suffered a setback after an accident caused a 6-week shutdown between May and July. However, the most significant event was the announcement by the Government to scrap the $800 million integrated steel mill project in Iligan City in northern Mindanao owing to the continuing economic difficulties in the Philippines.

In the mineral fuels sector, coal production continued to increase and was expected to reach 1.2 million tons in 1984. The Philippines reportedly was to import about 450,000 tons of high-grade coal from Australia and China to blend with the low-grade coal produced domestically. Crude petroleum output from existing major oilfields dropped sharply because of reduced flow rates from the Nido and Matinloc Oilfields offshore northwest of Palawan Island. The development of the Galoc Oilfield was deferred by the Philippines Cities Service Inc. because of the less than anticipated flow rate from Galoc-2.

According to the National Economic and Development Authority (NEDA), the Philippines' economy as measured by the gross national product dropped 5.4%, which was the worst in 20 years. Natural calamities, the shortage of foreign exchange, the debt crisis, and poor investor confidence in the economy were cited as primary causes for the negative economic growth. The growth rate and the sectoral contribution of major industries to the GDP at 1972 constant prices for the first half of 1984 were as follows, in percent:

Sector	Growth rate	Contribution to GDP
Agriculture, fishery, forestry	2.2	26.1
Industrial:		
Mining and quarrying	-19.7	1.7
Manufacturing	-6.3	24.6
Construction	-16.2	7.5
Electricity, gas, water	4.7	1.2
Service:		
Transport, communication, storage	-5.4	5.2
Trade	2.2	13.9
Finance and housing	-3.3	7.7
Other services	-5.5	12.1
Gross domestic product, total	-3.7	100.0

According to NEDA, the Philippine GDP in 1972 constant prices was estimated at $8.9 billion in 1983 and $3.3 billion for the first half of 1984. The inflation rate in the Philippines, the highest in Southeast Asia, averaged 49% during the first 10 months of 1984. During the first 6 months, the total two-way merchandise trade was estimated at $5 billion compared with $6.2 billion for the same period in 1983. Total exports rose 6% to $2.6 billion while imports dropped 23% to $2.9 billion for the first 6 months in 1984. The increase in exports was due to increased exports of semiconductors, coconut oil, and garments. The decline in imports was caused by a substantial drop in imports of mineral fuels and nonelectrical machinery.[4]

In June, the Central Bank of the Philippines devaluated the Philippine peso against the U.S. dollar from P14 to $1.00 to P18 to $1.00 while adopting a float of the peso as well as eliminating the requirement that commercial banks surrender 80% of their foreign exchange receipts to the Central Bank and the allocation of foreign exchange by the Central Bank.

PRODUCTION

Philippine mineral production continued to decline in 1984. Low metal prices, high production costs, and shortage of capital and foreign exchange for importing mining equipment and spare parts were the major causes for the decline. The significant decline in mine production of copper was attributed to the continued shutdown of the Sipalay Mine and the Basay Mine on Negros Island because of financial difficulties of the producers, and a 5-month suspension of the Lepanto operations in Benguet, Luzon, resulting from a declaration of force majeure by a foreign smelter. The drastic reduction in mine production of cobalt, molybdenum, and nickel was a direct result of restructuring and foreclosing of the financially troubled MMIC. Mine production of other metallic and nonmetallic minerals remained stagnant owing to lack of demand and low prices.

In mineral processing, Ferrochrome Philippines expanded its annual capacity to 60,000 tons of ferrochromium in July while the copper smelting and refining operations of PASAR were not able to reach full capacity because of inadequate ore supply and an accident at the smelter in May.

In the mineral fuel sector, the output of coal continued its upward trend as demand for coal by the cement industry continued to increase. Most increased coal production was from the Semirara Island, Cebu Island, and Batan Island areas. Meanwhile, the output of crude oil dropped significantly because of the reduced flow rate from the three major oilfields of Nio, Cadlao, and Matinloc.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Chromium: Chromite, gross weight:					
Metallurgical-grade	160,961	156,237	142,186	136,347	120,000
Refractory-grade	335,099	283,019	179,680	130,562	130,000
Total	496,060	439,256	321,866	266,909	250,000
Cobalt, mine output, metal content	1,331	997	468	579	90
Copper:					
Mine output, metal content	304,504	302,328	292,086	273,251	226,000
Metal, primary	--	--	--	38,800	77,000
Gold troy ounces	643,806	753,451	834,431	812,333	773,000
Iron and steel:					
Iron ore and concentrate thousand tons	--	6	6	3	2
Ferroalloys:					
Electric-furnace ferrosilicon[e]	20,000	[r]26,000	[r]29,000	20,000	18,400
Electric-furnace ferrochromium[e]	10,000	10,000	12,000	21,500	32,800
Steel, crude thousand tons	330	350	350	200	250
Lead, mine output, metal content	1,812	1,066	--	--	--
Manganese ore and concentrate, gross weight	2,556	3,113	1,556	2,242	2,000
Molybdenum, mine output, metal content	91	94	68	37	--
Nickel:					
Mine output, metal content	[r]47,114	29,247	20,124	15,895	16,600
Metal, smelter	25,881	21,485	11,302	9,729	3,690
Silver, mine output, metal content thousand troy ounces	1,952	2,024	1,984	1,913	1,600
Zinc, mine output, metal content	6,845	5,289	3,003	2,295	2,200
NONMETALS					
Asbestos	6	--	--	--	--
Barite	5,355	2,135	8,697	2,626	581
Cement, hydraulic thousand tons	4,481	4,090	4,350	4,993	5,000
Clays:					
Bentonite	5,053	5,527	4,671	1,340	3,000
Red	31,561	6,613	400	247	300
White	15,232	[r]10,543	6,632	19,990	15,000
Rock	1,039	613	390	[e]500	400
Other	453,494	571,386	579,229	379,903	400,000
Feldspar	15,925	15,999	15,213	6,524	10,000
Gypsum and anhydrite:					
Natural	--	412	202	500	200
Synthetic[e]	110,000	110,000	110,000	110,000	110,000
Lime	87,363	84,837	66,349	50,675	50,000
Nitrogen: N content of ammonia	39,100	32,400	14,800	20,300	[3]16,200
Perlite	7,973	7,530	3,580	2,020	3,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Phosphate:					
Guano	24,836	2,055	15,259	610	1,000
Phosphate rock	17,679	8,413	5,944	4,135	5,000
Pyrite and pyrrhotite (including cuprous), gross weight	115,231	97,872	64,555	62,864	65,000
Salt, marine	346,387	355,289	364,420	381,912	390,000
Sand and gravel:					
Alumina sand	25,979	33,513	65,213	[e]60,000	50,000
Silica sand thousand tons	478	472	480	343	400
Other[4] thousand cubic meters	13,310	13,319	14,902	15,093	15,000
Stone:					
Andesite	231,872	22,484	334,915	[e]200,000	200,000
Basalt cubic meters	--	602,529	737,365	[e]700,000	700,000
Dacite	10,636	30,047	54,555	32,448	35,000
Diorite	86,800	77,782	56,215	47,895	50,000
Dolomite	11,318	90,095	353,342	336,043	340,000
Limestone[5] thousand tons	10,098	10,676	7,208	6,686	7,000
Marble (dimension), unfinished cubic meters	9,288	6,753	6,797	6,117	6,500
Volcanic cinder do	2,651	1,050	1,100	[e]1,000	1,000
Sandstone	57,467	36,593	32,616	47,234	45,000
Serpentine	23,571	9,040	515	[e]600	500
Tuff	132,721	122,788	81,008	117,772	100,000
Quartz	61,533	45,282	84,866	74,515	75,000
Crushed, broken, other[6] thousand cubic meters	1,687	1,489	1,031	1,817	1,500
Sulfur: S content of pyrite	53,583	45,511	30,018	29,232	30,000
Talc	863	446	1,008	878	1,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	325,008	318,170	556,755	1,019,594	1,200,000
Petroleum:					
Crude thousand 42-gallon barrels	3,620	2,500	3,000	4,654	3,740
Refinery products:					
Gasoline do	11,751	9,654	9,242	9,349	[3]8,124
Jet fuel do	2,270	2,184	2,858	3,007	[3]3,322
Kerosine do	3,620	3,152	3,142	3,441	[3]2,382
Distillate fuel oil do	17,204	16,361	16,362	17,540	[3]17,027
Residual fuel oil do	27,333	26,460	24,462	21,670	[3]18,544
Other do	3,421	3,251	8,737	5,097	[3]4,027
Refinery fuel and losses do	3,203	3,114	3,197	14,555	NA
Total do	68,802	64,176	68,000	74,659	[3]53,426

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 18, 1985.
[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]Reported figure.
[4]Includes "pebbles" and "soil" not further described.
[5]Excludes limestone for road construction. Reported figures are as follows, in cubic meters: 1980—9,741; 1981—24,092; 1982—30,697; 1983—39,735; and 1984—not available.
[6]Includes materials described as rock, crushed or broken; stones, cobbles, and boulders; rock aggregates; and broken adobe.

TRADE

According to the Central Bank of the Philippines, the Philippine merchandise trade balance improved significantly owing to a substantial drop in imports attributed to the foreign exchange squeeze during the year. For the first 6 months of 1984, total export earnings were valued at $2.6 billion, and imports were valued at $2.9 billion. Among the top export mineral commodities were copper concentrate, $57 million; and iron ore agglomerates and gold, $47 million each. Among the top import mineral commodities were mineral fuels, $830 million; base metals, $123 million; and chemical elements and compounds, $108 million.

Between 1983 and 1984, three significant changes occurred in the Philippine mineral commodity trade structure as a result of the newly established mineral processing plants for refined copper, ferrochromium, and phosphate fertilizers. Exports of copper, traditionally in the form of copper concentrate, were in the forms of concentrate and metal. The export earnings of copper concentrate and copper metal for the first 7 months of 1984 were estimated at $72 million and $58 million, respectively. Exports of metallurgical-grade chromite ore and concentrates had dropped substantially since 1983 as most output of Acoje was shipped to Ferrochrome Philippines, which in turn produced and exported all of its ferrochromium. Beginning in 1984, the Philippines became an important importer of phosphatic rock as well as an important exporter of phosphoric acid in the Southeast Asian region.

The United States, Japan, and the European Economic Community remained the major trade partners of the Philippines. For the first 6 months, the United States accounted for 27% of Philippine imports and 40% of Philippine exports while Japan accounted for 14% of the total imports and 20% of the total exports. Most Philippine mineral commodities were exported to Japan, the Republic of Korea, the United States, and Taiwan while the Philippines imported most of its required base metals and chemicals from Japan and most of its required mineral fuels from Kuwait and Saudi Arabia.

Table 2.—Philippines: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	4,623	3,121	--	Indonesia 1,862; Japan 756; Hong Kong 220.
Chromium: Ore and concentrate	279,017	146,826	21,512	Japan 59,685; Sweden 23,772.
Copper:				
Ore and concentrate thousand tons	1,060	788	49	Japan 559; Republic of Korea 134.
Matte and speiss including cement copper	20	19	--	West Germany 8; Japan 6; Belgium-Luxembourg 5.
Metal including alloys:				
Scrap	621	2,062	100	Japan 1,111; Republic of Korea 562; Taiwan 289.
Unwrought	--	18,112	--	Italy 6,000; Turkey 6,000; Japan 5,370.
Semimanufactures	6	424	148	Thailand 127; Singapore 97.
Gold:				
Concentrate, gross weight	120	--		
Waste and sweepings kilograms	--	2,296	--	United Kingdom 2,295.
Metal:				
Contained in copper concentrates troy ounces	472,807	366,933	40,461	Japan 265,288; Republic of Korea 33,389; China 16,193.
Unwrought and partly wrought do	--	6,494	--	All to United Kingdom.
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted	18,422	15,408	--	All to Taiwan.
Metal:				
Scrap	1,582	1,014	149	Japan 809; Hong Kong 31.
Ferroalloys:				
Ferromanganese	--	13	--	All to Malaysia.
Ferrosilicon	28,364	22,827	--	Japan 19,308; Indonesia 2,527.
Unspecified	4,219	28,643	--	Japan 25,139.
Semimanufactures:				
Bars, rods, angles, shapes, sections	866	332	--	Singapore 188; Malaysia 96; Australia 48.
Universals, plates, sheets	249	25	--	Brunei 6.
Hoop and strip	--	(2)	--	All to Australia.
Wire	46	4	--	NA.
Tubes, pipes, fittings	151	2,604	23	Hong Kong 2,514.
Castings and forgings, rough	794	570	322	Australia 171; Saudi Arabia 60.
Manganese: Ore and concentrate	--	1,315	--	All to Japan.
Mercury 76-pound flasks	881	--		
Molybdenum: Ore and concentrate	155	122	--	Chile 81; Netherlands 32.
Nickel:				
Ore and concentrate	408,712	346,973	--	Japan 346,968.
Metal including alloys:				
Scrap	61	186	137	Japan 49.
Unwrought	5,869	10,362	5,090	Japan 2,963; Netherlands 2,109.
Semimanufactures	5,032	1,782	650	Japan 1,020.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	121,403	596,211	480,795	United Kingdom 61,210; Hong Kong 54,206.
Tin: Metal including alloys, all forms	66	54	17	Japan 34.

See footnotes at end of table.

Table 2.—Philippines: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	3,989	4,590	--	All to Japan.
Metal including alloys, all forms	149	204	--	Japan 102; Taiwan 69; Hong Kong 26.
Other: Ashes and residues	3,952	5,289	--	Japan 4,353; Taiwan 602.
NONMETALS				
Barite and witherite	5,516	2,432	--	Brunei 2,000; Papua New Guinea 432.
Cement	571,683	154,020	--	Indonesia 81,800; Hong Kong 34,465; India 17,050.
Fertilizer materials: Crude, n.e.s	1,176	2,572	--	Taiwan 1,977; Japan 402.
Phosphates, crude	500	4	--	All to Taiwan.
Salt and brine	(2)	201	--	Guam 200.
Sodium compounds, n.e.s.: Carbonate, manufactured	--	1,000	--	All to Hong Kong.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,518	4,142	--	Japan 2,269; Taiwan 829; Saudi Arabia 540.
Worked	5,196	5,177	775	Japan 1,598; Hong Kong 924; Singapore 731.
Dolomite, chiefly refractory-grade	316,337	293,738	--	All to Japan.
Gravel and crushed rock	r6,424	6,329	--	Japan 5,398; Hong Kong 657.
Limestone other than dimension	21,034	--		
Quartz and quartzite	--	8	--	Malaysia 4; Taiwan 4.
Sand other than metal-bearing	2,139	2,368	420	Japan 667; Hong Kong 639.
Other:				
Crude	3,025	4,293	--	Taiwan 2,451; Mozambique 1,000; India 465.
Slag and dross, not metal-bearing	800	1,732	--	Japan 1,527.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	69	88	--	Hong Kong 40; Thailand 40.
Coal: Anthracite	1,155	--		
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	38,976	39,208	--	All to Hong Kong.
Gasoline do	r11,397	642,372	518,239	Hong Kong 36,320.
Naphtha including white spirit do	274,864	1,674,823	--	Japan 1,623,242.
Kerosine and jet fuel do	4,890	727,504	161,396	Japan 413,420; Hong Kong 152,688.
Distillate fuel oil do	42,067	--		
Lubricants do	r14,348	31,590	--	Singapore 16,067; Republic of Korea 5,241; Saudi Arabia 4,351.
Residual fuel oil do	4	172,708	--	All to Hong Kong.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 3.—Philippines: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals kilograms	17,417	678	492	West Germany 81; Switzerland 55.
Aluminum:				
Ore and concentrate	3,762	3,119	--	Malaysia 2,421; China 696.
Oxides and hydroxides	644	1,998	191	Japan 664; China 650; Taiwan 350.
Metal including alloys:				
Scrap	82	19	6	Japan 8; Taiwan 5.
Unwrought	18,472	14,843	199	Australia 6,296; France 2,320; Iceland 1,608.
Semimanufactures	13,604	8,861	302	Japan 3,633; Singapore 1,148; West Germany 677.
Arsenic: Oxides and acids	218	157	(2)	Malaysia 41; Belgium-Luxembourg 38; United Kingdom 21.

See footnotes at end of table.

Table 3.—Philippines: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Beryllium: Metal including alloys, all forms ____ kilograms	--	211	43	Australia 158.
Chromium:				
Ore and concentrate	(2)	3,859	--	Australia 3,858.
Oxides and hydroxides	51	75	13	West Germany 28; Japan 23.
Cobalt: Oxides and hydroxides	29	2	(2)	Canada 1.
Copper:				
Sulfate	344	263	(2)	Japan 107; Taiwan 51; West Germany 38.
Metal including alloys:				
Scrap	--	104	4	Singapore 100.
Unwrought	5,610	5,713	(2)	Japan 4,498; Republic of Korea 685; Taiwan 478.
Semimanufactures	4,380	4,423	497	Japan 2,953; Australia 247; Republic of Korea 190.
Iron and steel: Metal:				
Scrap	25,031	142	19	Hong Kong 55; Australia 48.
Pig iron, cast iron, related materials	4,097	763	37	Japan 373; Sweden 306.
Ferroalloys:				
Ferromanganese	2,167	3,315	94	Mozambique 1,326; Norway 594; China 324.
Unspecified	1,303	1,235	5	China 331; Taiwan 280; Norway 245.
Steel, primary forms	679,866	778,687	4	Republic of Korea 220,983; Japan 126,600; West Germany 86,779.
Semimanufactures:				
Bars, rods, angles, shapes, sections	114,055	98,401	267	Japan 43,082; Brazil 13,209; West Germany 11,482.
Universals, plates, sheets	342,953	282,542	13,665	Japan 182,238; Taiwan 17,116.
Hoop and strip	7,005	6,557	97	Japan 5,654; Taiwan 326.
Rails and accessories	1,841	3,236	119	Japan 3,000.
Wire	9,551	10,399	89	Japan 5,007; Republic of Korea 3,043.
Tubes, pipes, fittings	37,320	39,867	1,545	Japan 29,367; West Germany 3,343.
Castings and forgings, rough	30	4	(2)	Japan 3.
Lead:				
Oxides	85	85	5	Australia 52; China 20; Japan 8.
Metal including alloys:				
Scrap	--	341	107	Singapore 198; Australia 36.
Unwrought	6,323	9,599	82	Australia 4,982; Japan 2,169; Taiwan 1,717.
Semimanufactures	276	158	18	Belgium-Luxembourg 66; West Germany 20; Netherlands 17.
Magnesium: Metal including alloys, all forms	r48	27	6	Norway 20.
Manganese:				
Ore and concentrate	3,021	3,981	--	Singapore 3,505; Japan 448.
Oxides	1,409	1,653	(2)	Japan 1,452; Australia 123; Belgium-Luxembourg 38.
Mercury ____ 76-pound flasks	101	52	(2)	Japan 36; Netherlands 9.
Molybdenum: Metal including alloys, all forms	r13	30	12	Belgium-Luxembourg 14.
Nickel: Metal including alloys:				
Unwrought	r82	100	7	Japan 41; Hong Kong 36.
Semimanufactures	56	46	1	Australia 13; Japan 9.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	145	231	231	
Silver: Metal including alloys, unwrought and partly wrought ____ do	10,670	27,182	679	Japan 22,435; West Germany 3,408.
Tin:				
Oxides ____ kilograms	1,215	100	--	All from Japan.
Metal including alloys:				
Unwrought	429	682	(2)	Thailand 239; Indonesia 236; Singapore 153.
Semimanufactures	5	6	(2)	Hong Kong 2; France 1; United Kingdom 1.
Titanium:				
Ore and concentrate	1,099	973	--	Australia 939.
Oxides	1,894	2,648	228	Australia 956; Japan 558; United Kingdom 248.
Tungsten: Metal including alloys, all forms	r6	20	(2)	Brazil 16.
Uranium and/or thorium: Metal including alloys, all forms kilograms	183	--		
Zinc:				
Oxides	713	726	82	Taiwan 497; Belgium-Luxembourg 31.

See footnotes at end of table.

Table 3.—Philippines: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc—Continued				
Metal including alloys:				
Scrap	--	50	--	All from Canada.
Unwrought	21,704	24,669	299	Japan 9,859; Canada 6,758; Australia 6,454.
Semimanufactures	392	343	258	Japan 35; China 23.
Zirconium: Ore and concentrate	92	107	--	Australia 72; Japan 35.
Other: Ashes and residues	63,997	54,532	--	Japan 54,432.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	620	771	42	China 212; Japan 149; India 128.
Artificial:				
Corundum	78	25	--	Austria 18; Japan 7.
Silicon carbide	163	176	21	Japan 126; Brazil 17.
Dust and powder of precious and semiprecious stones including diamond kilograms	--	907	907	
Grinding and polishing wheels and stones	808	720	33	Japan 172; West Germany 163; China 88.
Asbestos, crude	2,200	2,385	114	Canada 1,633; Mozambique 317.
Barite and witherite	85	341	32	Thailand 234.
Boron materials:				
Crude natural borates	67	1	1	
Oxides and acids	1,941	991	484	Japan 177; France 81.
Cement	10,814	9,405	250	Japan 8,227; Singapore 554; China 300.
Chalk	18	6	--	Hong Kong 5; New Zealand 1.
Clays, crude	29,170	24,917	13,184	Japan 3,704; Australia 1,872.
Diamond: Industrial stones:				
Natural carats	22,900	33,117	--	Australia 22,300; Belgium-Luxembourg 8,750; United Kingdom 1,000.
Synthetic do	99,000	95,845	--	Belgium-Luxembourg 71,545; Ireland 13,700; Australia 10,600.
Diatomite and other infusorial earth	1,259	1,093	614	Japan 365; Spain 100.
Feldspar, fluorspar, related materials	1,855	2,474	576	Thailand 817; China 300.
Fertilizer materials: Manufactured:				
Ammonia	32,167	31,483	17	Kuwait 16,900; Indonesia 8,256; Australia 4,285.
Nitrogenous	469,990	462,663	44,487	Indonesia 123,951; Qatar 83,666; Republic of Korea 74,726.
Phosphatic	58,228	56,431	29,297	Republic of Korea 25,134; Japan 2,000.
Potassic	100,181	64,215	4,165	Canada 42,595; U.S.S.R. 9,300; West Germany 4,194.
Unspecified and mixed	117,418	122,155	15	Republic of Korea 103,076; Japan 13,963; Romania 5,000.
Graphite, natural	206	141	19	China 52; Norway 34.
Gypsum and plaster	63,965	79,488	94	Japan 33,384; Thailand 31,088; Republic of Korea 10,394.
Lime	448	375	298	United Kingdom 75.
Magnesium compounds: Magnesite	5,404	6,051	72	Japan 4,405; China 1,250.
Mica:				
Crude including splittings and waste	173	84	45	Japan 18; Taiwan 10.
Worked including agglomerated splittings	12	24	3	West Germany 15.
Phosphates, crude	12	10,588	--	All from Japan.
Pigments, mineral:				
Natural, crude	3,405	2,741	152	India 1,785; United Kingdom 691.
Iron oxides and hydroxides, processed	845	1,065	13	West Germany 868; Spain 96.
Precious and semiprecious stones other than diamond: Natural carats	34,120	47	47	
Salt and brine	130,586	109,633	30	Australia 64,258; China 29,955; West Germany 7,254.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	82,551	94,880	51,551	East Germany 13,390; Kenya 9,826.
Sulfate, manufactured	11,187	11,323	([2])	China 5,622; Taiwan 2,127; Japan 1,509.
Stone, sand and gravel	41,542	34,934	5,119	Australia 17,007; Malaysia 4,853; Taiwan 3,252.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,564	1,719	80	Singapore 1,221.
Colloidal, precipitated, sublimed	22,615	17,884	51	Saudi Arabia 17,487.
Dioxide	21	2	2	
Sulfuric acid	79,127	2,057	14	Japan 1,999.
Talc, steatite, soapstone, pyrophyllite	8,669	9,709	914	Republic of Korea 4,641; China 3,206.

See footnotes at end of table.

Table 3.—Philippines: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Other:				
Crude	580	862	71	Australia 352; Japan 194; Finland 118.
Slag and dross, not metal-bearing	231,760	182,792	2	Japan 127,507; India 43,797; Taiwan 11,480.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	605	397	21	Republic of Korea 200; Japan 176.
Carbon black	1,133	1,136	193	Hong Kong 319; Japan 261.
Coal, all grades including briquets	120,439	70,687	226	Australia 65,952; Japan 4,175.
Coke and semicoke	271,664	193,566	--	Japan 193,430.
Petroleum:				
Crude thousand 42-gallon barrels	54,400	59,716	--	Saudi Arabia 27,012; Kuwait 6,853; Indonesia 4,825.
Refinery products:				
Liquefied petroleum gas do	1,882	816	(2)	Saudi Arabia 650; Indonesia 89.
Gasoline do	44	36	35	China 1.
Mineral jelly and wax do	85	109	5	China 73; Hong Kong 12.
Distillate fuel oil do	8,403	12,710	524	Singapore 6,981; Kuwait 3,730.
Lubricants do	104	90	58	Netherlands 8.
Residual fuel oil do	7	15	--	Mainly from Singapore.

[r]Revised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Chromium.—Chromite mining in the Philippines continued to decline owing to the weak demand and the low chromite prices in the world market. Mine production of refractory-grade chromite was at the lowest level in its history, and the output of metallurgical-grade chromite was at the lowest level since 1977. In 1983, three small metallurgical-grade chromite ore producers, Misamis Exploration Corp., San Grace Mining Corp., and San Felipe Mining and Exploration Inc., reportedly stopped operations; Amerasia Mining and Development Corp. also shut down its refractory-grade chromite ore mining operations.

In 1984, Benguet remained the major producer of quality refractory-grade chromite while Acoje Mining Co. Inc. continued to dominate the production of metallurgical-grade chromite concentrates from its operations at Concepcion and Santa Cruz in Zambales, and direct-shipping metallurgical-grade lump ore from Dinagat in Surigao del Norte.

Export earnings of Philippine chromite ore and concentrate declined further to only $13 million in 1983 from $22 million in 1982 resulting from a 46% drop in volume of chromite exports because of the cutback in orders for refractory-grade chromite from Japan, Sweden, and the United States as well as reduced exports of metallurgical-grade chromite concentrate owing to increased domestic purchases by Ferrochrome Philippines, which started its ferrochromium production in April 1983.

The ferrochromium plant operated by Ferrochrome Philippines at Tagoloan on Mindanao Island reportedly underwent a series of furnace modifications to increase productivity during June and July 1984. A water-cooled panel system that was expected to save furnace maintenance costs, and a gas cooling system that will save energy in operating the furnace was added. After the modification of its 30,000-kilovolt-ampere electric furnace into a 35,000-kilovolt-ampere furnace, the annual capacity of the plant was raised to 60,000 tons from 50,000 tons of high-carbon ferrochromium. According to a company official, the ferrochromium production was estimated at 50,000 tons. Ferrochrome Philippines exported most of its output to Japan; however, about 4,000 tons of ferrochromium reportedly was shipped to Europe in November.[5]

Copper.—After a slight improvement in the financial situation in 1983, the Philippine copper industry suffered again in 1984 from a further decline in copper prices on the world market, a continuing high cost of production, and a shortage of capital and foreign exchange for importing supplies, mining equipment, and spare parts. As a result, mine production of copper dropped sharply by 20% with only six major copper producers operating.

According to the Chamber of Mines of the Philippines, production of copper by company, during 1983-84 was as follows, in thousand tons of copper metal:

Company	1983	9 months 1983	9 months 1984
Atlas Consolidated Mining and Development Corp	121.9	93.8	88.8
Marcopper Mining Corp	34.9	25.8	24.4
Marinduque Mining and Industrial Corp.[1]	28.3	28.3	--
Benguet Corp	25.9	18.8	17.5
Philex Mining Corp	21.4	16.2	14.6
North Davao Mining Corp	18.5	12.6	16.3
Lepanto Consolidated Mining Co., Inc	16.8	12.8	9.0
Basay Mining Corp.[1]	5.4	5.4	--
Benguet Exploration Inc.[2]	.1	.1	.1
Total	273.2	213.8	170.7

[1]Shutdown production since Oct. 1983.
[2]Secondary producer.

MMIC, the third largest copper producer in 1983, suspended its Sipalay copper mining operation in Negros Occidental in October 1983 owing to a lack of operating capital and spare parts. Mitsui Mining & Smelting Co. Ltd. of Japan, with a contract to take two-thirds of the mine output from the Sipalay Mine, suspended the purchase agreement with MMIC in August 1984, after the mine was closed for over 10 months. The two state-owned banks, DBP and PNB, took over MMIC in September and established a new firm called MMC to operate the Sipalay copper project. Despite efforts to reopen the Sipalay Mine with financing by Japanese importers through Marubeni Corp. of Japan, the copper mine failed to resume operations by yearend because of the continuing low level of world copper prices.

Basay Mining, a high-cost copper producer, was taken over and operated by NDC at Basay in Negros Oriental in May 1983; operations were shutdown in October 1983 because of financial difficulties. Basay Mining was foreclosed by PNB in April 1984 for nonpayment of $109 million in debts. Public auction of Basay's real estate mortgage reportedly was conducted at the end of May.[6]

During the year, the following copper mining operations remained closed: the Bagacay copper project on Samar Island and the Sipalay project on Negros Island of MMC (formerly MMIC); the Basay project on Negros Island of Basay Mining; the Camanlangan project in Davao, Mindanao, of Sabena Mining Corp.; the Bully Bueno project in Ilocos Norte, Luzon, of Hercules Minerals and Oils Inc.; the Kennon project in Benguet, Luzon, of Benguet Exploration Inc. (formerly Black Mountain Inc.); the Boneng project in Benguet of Western Minolco Corp.; and the Santa Nino project in Benguet of Baguio Gold Mining Co. Inc.

Lepanto suspended its copper mining operations at Lepanto in Benguet for 5 months beginning in September following a declaration of force majeure by ASARCO Incorporated of the United States on the smelting contract with Lepanto. Asarco discontinued its Tacoma smelting operations in the state of Washington in July. However, a 60,000-ton-per-year concentrate roasting plant reportedly was built near PASAR's smelter at Isabel in Leyte to take Lepanto concentrate that has a high arsenic content.

Batong Buhay Gold Mines Inc. finally started its copper-gold operations at Pasil in Mountain Province, Luzon, in November 1983 after a power transmission line was installed. The output of copper ore reportedly was running at 8,000 tons per day against the initial capacity of 9,000 tons per day during early 1984. The ore reserves at the Batong Buhay property, estimated by the Philippine Bureau of Mines and Geo-Sciences, was 100 million tons containing 0.4 gram of gold per ton of ore and averaging 0.6% copper.[7]

In an effort to ensure an adequate supply of copper concentrate to the domestic copper refinery operated by PASAR, the Government of the Philippines imposed restrictions on exports of copper concentrates in February. The Letter of Instruction No. 1388 was issued, which authorized MTI to issue export clearance only when the proposed export shipment of copper concentrate does not adversely affect the supply and delivery to PASAR. The export restrictions became effective on June 1.

Benguet, which operated the Dizon copper-gold project in Zambales, reportedly rejected a Government request to supply some of its copper concentrates to PASAR, claiming that the copper ore from Dizon is not suitable for the PASAR smelter because of its high mercury content and that a partial sale to PASAR would violate its long-term contract (1980-91) to export its entire output to Mitsubishi Metal Mining Co. Ltd. of Japan. However, the PASAR smelter reportedly was equipped with a mercury scrubber to process up to 40,000 tons per year of the Dizon concentrate. In June, Benguet provided about 3,500 tons of the concentrate to PASAR's smelter for testing following MTI's request while proceeding to apply for export clearance for its July shipments to Japan.

According to local press reports, MTI reportedly canceled all export clearances for copper concentrate from Benguet in October and charged Benguet for misrepresenting facts in statements about the nature of its copper concentrate. In November, Benguet denounced the cancellation as unjustifiable and asked the Supreme Court for relief from unwarranted government interference in its business operations. In December, the suspension of Benguet's export clearance was lifted by MTI after Benguet agreed to replace the nonrepresentative samples of Dizon concentrate provided in June for the first testing, and allow PASAR's representative to visit Benguet's mine, mill, and port facilities in Zambales to verify the assay records regarding all metals and impurities, including mercury.[8]

On July 17, Atlas Consolidated Mining and Development Corp., Marcopper Mining Corp., and North Davao Mining Corp. were granted a temporary relief from tax payments including all taxes, duties, fees, and other Government charges at copper mines by the Philippine Government, according to a Letter of Instruction No. 1416 issued. The three major copper producers incurred substantial losses as a result of low copper prices as well as reduced exports of concentrate owing to increased shipment to PASAR. However, the tax exemptions would be suspended when the world's copper price reached a level that is adequate to sustain mining operations, and the three companies were required to pay back the deferred taxes.

Because of the reduced output of copper concentrates in the Philippines, PASAR was unable to secure adequate copper concentrate to feed its smelter in southern Leyte. Furthermore, PASAR was forced to shutdown the smelter following an accident involving spillage of molten blister that caused damage to the casting wheel on May 13. The plant reportedly halted operations for 6 weeks between June and July. In June, PASAR declared force majeure on shipment of refined copper to Japan. However, the smelter resumed operation on July 10, after a safety barrier between the furnace and casting wheel was installed; later, the force majeure was lifted. The smelter reportedly was operating near full capacity starting in August.[9]

The Hinobaan copper project in Negros Occidental reportedly was shelved by NDC in late 1983 because of low copper prices and the unfavorable economic condition. Negros Occidental Copperfield Mines Inc., a joint venture firm of NDC (70%) and Lepanto (30%), was established to operate an open pit mine at a capacity of 22,000 tons of ore per day. About $21 million has been spent on the Hinobaan project on the development work undertaken by Lepanto for NDC.

Gold.—Despite the increased gold production of Benguet and Philex Mining Corp., the overall gold production declined slightly from that of 1983 because of reduced output by copper producers such as Atlas Consolidated Mining, Lepanto, Marcopper Mining, and other small gold producers. According to the Chamber of Mines of the Philippines, gold production of the top 10 companies during 1983-84 was as follows, in thousand troy ounces of gold:

Company	1983	9 months	
		1983	1984
Benguet Corp. (primary and byproduct)	238.6	162.9	192.1
Atlas Consolidated Mining and Development Corp. (primary and byproduct)	178.9	137.5	139.6
Philex Mining Corp. (primary and byproduct)	137.9	102.2	101.5
Lepanto Consolidated Mining Co. Inc. (byproduct)	63.9	48.5	36.9
Apex Mining Corp. (byproduct)	45.0	34.0	27.9
North Davao Mining Corp. (primary and byproduct)	36.8	26.6	23.3
Marcopper Mining Corp. (byproduct)	31.4	24.4	20.3
Surigao Consolidated Mining Co. (primary)	24.5	22.0	11.6
Itogon-Suyoc Mines Inc. (primary)	13.6	10.3	10.1
Benguet Exploration Inc. (primary)	12.6	9.7	9.8
Other (primary and byproduct)	25.8	21.0	8.9
Total	809.0	599.1	582.0

Other gold producers in 1984 included Vulcan Industrial and Mining Corp. (primary), Manila Mining Corp. (primary), and Batong Buhay (byproduct), which began its copper-gold operation in November (see "Copper" section).

Benguet's gold operations continued to improve because of further reductions in production costs and increased gold output resulting from modernization of its Balatoc mill. In early 1984, Benguet signed an operating agreement with La Suerte Gold Mining to rehabilitate the pre-World War II Santa Rosa gold mine in the Paracale Gold District of Jose Panganiban in Camarines Norte, south Luzon. Benguet was to redevelop the mine and construct a mill and other facilities to start gold production by 1987 at an estimated cost of $23 million. The planned milling capacity was 500 tons per day of ore. According to Benguet, the mine was expected to produce 50,000 troy ounces of silver, 35,000 troy ounces of gold, and 280 tons of copper per year. The ore reserves, estimated at 3.7 million tons, are sufficient for 20 years of operations at the planned capacity.[10]

Iron and Steel.—Production of lump iron ore was by Construction Aggregate Producers Co. Inc., Smelters Corp., and San Pio Quinto Mining Corp. The total output of the three companies was only 2,645 tons in 1983. The total output of iron lump ore in 1984 was expected to be at a lower level than that of 1983. Iron ore for domestic consumption was supplied mostly from Japan on a consignment basis. In 1983, imports of sinter from Japan totaled 3.8 million tons, about 5.6% higher than that of 1982.

St. Ines reportedly agreed to a tripartite joint venture with the Sabah State government of Malaysia and Philippine Blooming Mills in early 1984. According to the agreement, the Sabah State government was to invest $15 million for iron ore mining and milling as well as pelletizing at Antipolo, Rizal. St. Ines Mining was to operate the project and produce iron ore pellets for export to the direct iron reduction plant on Labuan Island in Sabah to produce hot briquetted iron. The Philippine Blooming Mills will import from Sabah the hot briquet iron and convert the briquets into billets, steel reinforcing bars, and wire rods, and then reexport them back to Sabah and other markets.[11]

In June, the Government of the Philippines decided to scrap the $800 million integrated steel mill project in Iligan City on Mindanao Island because of its large capital requirements and the financial difficulties in the Philippine economy. The integrated steel mill project was the sixth major industrial project canceled by the Government following the scrapping of the $773 million aluminum smelter in 1982.[12]

Nickel.—The Surigao nickel mine and refinery on Nonoc Island remained shutdown during the first 5 months of 1984 owing to lack of working capital and delay in receiving imported coal and spare parts. MMIC, which incurred an accumulated loss of $877 million in 1983, had a total outstanding debt of $1.3 billion. In early 1984, a major restructuring of the company was undertaken by a new president following resignation of the founder and president of MMIC. The proposed restructuring plan to convert a $929 million debt into equity, bonds, and a noninterest-bearing subordinated loan was approved by the board of directors in April. As a result, the Government of the Philippines, through the state-owned DBP and PNB, increased its ownership of MMIC from 36% to 87%.[13]

In late April, a $9.6 million loan from Philipp Brothers Inc. of the United States was secured and approved by the Philippine Central Bank to be used as the operating capital for reopening the Surigao nickel complex. The nickel operations on Nonoc Island resumed in late June and operated way below capacity at between 600 and 900 tons per month during July and August. In late August, a shipment of 1,000 tons of nickel briquets reportedly was made to Philipp Brothers for sale in the United States and Europe.[14]

In a move to protect their interest in MMIC from claims by minor creditors, DBP and PNB instituted foreclosure proceedings on their mortgages on MMIC assets on July 30. The two banks took over MMIC on August 31 through an auction and bought the company for $822 million by converting large portions of their holdings of MMIC's $1.3 billion debts into equity. A new company, NMIC, was established to operate the Surigao nickel complex on Nonoc Island. Another new president was appointed as chief operating officer of NMIC in September. NMIC is jointly owned by DBP (57%) and PNB (43%).

In early September, the Surigao nickel complex shut down its operations again because of the extensive damage by typhoons to the two coal unloading cranes at the berth of the refinery, the power transmission line, and the housing complex. The repair and rehabilitation work reportedly was completed in November. NMIC resumed nickel operations in late November after a $5 million loan was secured from Marc Rich & Co. A.G., a trading company of Switzerland. According to an agreement, Marc Rich was to be NMIC's sales agent to distribute NMIC's nickel briquets and nickel-cobalt mixed sulfide in the world market. In December, the nickel refinery was operating at 75% of the installed capacity of 31,000 tons per year.[15]

NONMETALS

Construction work on the $340 million fertilizer complex at Isabel in southern Leyte was completed by a consortium led by Coppee-Rust of Belgium for Philphos in October. Philphos, the operator of the complex, was expected to start production by yearend. The complex consists of four production units, storage facilities, a wharf with materials handling equipment, and a new port. The production facilities include a 169,000-ton-per-year ammonium sulfate plant and two 600-ton-per-day phosphoric acid plants, built by Coppee-Rust; a 1,500-ton-per-day sulfuric acid plant, built by Mitsubishi Heavy Industries Ltd. of Japan; and two 1,500-ton-per-day granulation units for production of complex fertilizers, built by Dragados y Construcciones of Spain. The fertilizer complex was designed to produce 350,000 tons per year of phosphate and 153,000 tons per year of ammonium sulfate as finished products as well as other intermediate raw materials such as phosphoric acid and sulfuric acid. Most of the raw materials, especially the phosphatic rock, urea, and potash for fertilizer production, must be imported from Nauru for phosphatic rock, Indonesia for ammonia and urea, and Canada for potash. However, most of the sulfuric acid could be supplied by neighboring copper smelters operated by PASAR and Philphos' own sulfuric acid plant using domestic pyrite from Basay in Negros Oriental.

Philphos is owned 60% by the state-owned NDC and 40% by Nauru Phosphate Corp. (NPC) of Nauru. The equity capital was $100 million, of which $40 million or 40% of the equity owned by NPC was in the form of raw material (phosphatic rock). The fertilizer complex, which took more than 3 years to complete, was mainly financed by suppliers credit provided by the governments of the contractors, and syndicated loans from Bankers Trust Co. of New York ($100 million) and Bank of Tokyo ($74 million).[16]

MINERAL FUELS

Coal.—Production continued its upward trend and was expected to reach 1.2 million tons in 1984. Because of the cement industry's coal conversion programs, Atlas's copper operations, and NMIC's nickel operations, consumption of coal increased significantly from 1982 to 1983, and was expected to reach over 1.5 million tons in 1984.

Despite increased coal production, the Philippines reportedly required an additional 450,000 tons of high-grade imported coal to be blended with the low-grade domestic coal for the boilers of cement plants and nickel refineries. According to the National Coal Authority, most imported coal was purchased from Australia and China. However, about 25,000 tons of coal was imported from the U.S.S.R. on a trial basis at $40 per ton.

According to the Bureau of Energy Development, the Semirara and Cebu areas contributed 32% each to total production in 1983. As a result of further exploration, the Philippine proven coal reserves increased to 306 million tons by the end of 1983. The most promising areas were Semirara Island, 152 million tons; Cagayan Valley (Cagayan), 66 million tons; and Surigao (Mindanao), 37 million tons.[17]

Petroleum.—Production dropped 20% to only 3.7 million barrels in 1984, mainly attributable to the decline of output from the offshore oilfields of Matinloc, Panadan, and Libra northwest of Palawan Island. The combined output from these oilfields averaged about 5,500 barrels per day while Nido Oilfield, also offshore northwest of Palawan Island, averaged about 2,500 barrels per day. According to the Philippine Ministry of Energy, consumption of crude oil also dropped to 140,000 barrels per day from 206,000 barrels per day in 1983 because of converting from oil to coal in the cement, steel, and metal refining industries. As a result, Philippine oil imports reportedly declined to $1.5 billion from $2.6 billion in 1983.

In November 1984, the Philippines Cities Service and five other exploration partners decided to defer the plans to develop Galoc Oilfield, also offshore northwest of Palawan Island, after spending about $9 million on Galoc-2. According to a company official, the flow rate from the Galoc Oilfield never reached the anticipated 10,000-barrel-per-day level to justify the $14 million production plan. Galoc-2, which was sunk to 12,141 feet in August 1981, has a flow rate of 1,800 barrels per day of 34° API gravity oil, and a sidetrack of Galoc-2, sunk to 8,000 feet, has a flow rate of 1,200 barrels per day. By yearend, one of the six participants in the consortium (Philippines Cities Service), Husky Oil Inc. of Canada, reportedly sold its 30% interest in Galoc-1 to Marathon Oil Co., a subsidiary of the Marathon Steel Co. of the United States. The other participants in the exploration and development of the Galoc Oilfield include Oriental Petroleum and Minerals Corp., Basic Petroleum and Minerals Inc., Landoil Resources Corp., and Philippines Overseas Drilling and Oil Development Corp.[18]

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[1]Economist, Division of International Minerals.

[2]Where necessary, values have been converted from the Philippine peso (P) to U.S. dollars at the rate of P11=US$1.00 in 1983, and P14=US$1.00 in 1984.

[3]The Philippine Bureau of Mines and Geo-Sciences (Manila). BMG Newsletter, v. 8, No. 5, Jan.-Feb. 1984, p. 10.

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[5]The Tex Report Ltd. (Tokyo). The Tex Report. V. 16, No. 3810, Oct. 8, 1984, p. 2; v. 16, No. 3856, Dec. 13, 1984, p. 3.

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[7]Engineering and Mining Journal. V. 185, No. 1, Jan. 1984, p. 81.
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[16]FMB Publications Ltd. (Surrey, England). Fertilizer Focus. V. 1, No. 6, July 1984, p. 7.
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[17]Bulletin Today (Manila). Nov. 29, 1984, p. 32.

[18]Business Day (Manila). Dec. 31, 1984, p. 12.
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The Mineral Industry of Poland

By Tatiana Karpinsky[1] and Walter G. Steblez[2]

Poland remained an important world producer of coal, copper, and sulfur, and an important European producer of cadmium, lead, silver, and zinc. The country, however, continued to be deficient in iron ore, petroleum, and natural gas, and met its industrial needs through imports. In 1984, the mining and fossil fuels extracting industries increased production by about 2.8%, compared with that of 1983. Overall industrial production rose 5.3%, and national income increased by 5%. Poland's centrally planned economy, after a 4-year depression, continued to recover, but national income, in constant prices, remained 14% below the level achieved in 1978 and about 12% below that of 1979. By yearend, total employment in industry decreased only slightly in the minerals sector; the greatest decline was in the steel industry with a 3.4% decline in the work force.

Major mineral industry projects completed during the year included the Olendra powerplant at the Siarkopol sulfur mining and processing complex and the new 5.8-million-ton-per-year coal mining facilities at the Belchatow Mine together with the third and fourth 360-megawatt power units at the Belchatow powerplant.

Government Policies and Programs.—Poland's central economic plan for 1985 called for a 4.0% to 4.5% increase in industrial production in comparison with that of 1984. The mining industry was to increase overall production by 4.6%, the fuel and energy output was to rise 2.2%, and the metallurgical sector was to increase output by 4%. The chief Government priorities were to increase production efficiency and to eliminate waste; two-thirds of industry's planned production increase for 1985 was to be achieved by lowering unit consumption of energy and raw materials. Also, greater efforts were aimed at improving quality controls during production. To increase the production of coal in 1985, the Government planned to extend miners' working time to include Saturdays.

Table 1.—Poland: Planned mineral and energy production for 1985

(Thousand metric tons unless otherwise specified)

Commodity	1985	As percentage of 1984 production
NONFUELS		
Cement	17,500	102.9
Copper	385	104.1
Lead	81	100.0
Steel, rolled products	12,100	101.7
Sulfur	5,000	100.3
Zinc	179	101.4
FUELS		
Coal:		
Bituminous	191,500	100.0
Lignite	53,000	110.4
Coke	16,150	98.7
Electric energy billion kilowatt hours	136.5	100.7
Petroleum products	14,220	103.9

Source: Rzeczpospolita (Warsaw). Nov. 1984.

PRODUCTION

Although Poland's mineral industry met most planned production targets for 1984, overall economic recovery continued to proceed slowly. Most output levels for minerals and fuels were below those of 1979, before the onset of political unrest. In the fuels and electric energy sector, only the production of lignite and electricity exceeded the 1979 production levels, by 32% and 16%, respectively. Output of bituminous coal was 4.7% below that of 1979; that of coke, 15%; petroleum refinery products, 8%; and natural gas, 17%. The production of crude steel was 14% below the 1979 output level. The production of refined copper exceeded the output of 1979 by 11%, but primary aluminum, zinc, and lead production remained below the respective 1979 levels by 52%, 16%, and 1%.

Table 2.—Poland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum metal, primary	95,100	66,000	42,700	44,400	[3]45,900
Cadmium metal, primary	698	580	500	600	600
Copper:					
Mine output, metal content, recoverable	346,125	315,250	328,000	349,000	360,000
Metal:					
Smelter, including secondary	363,500	330,770	[e]351,000	[e]362,000	375,000
Refined, including secondary	357,300	327,210	348,000	360,000	[3]372,300
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	104	105	49	10	--
Pig iron do.	11,600	9,350	8,523	9,716	9,700
Ferroalloys:					
Blast furnace do.	126	126	126	126	126
Electric furnace do.	170	170	170	170	170
Steel:					
Crude do.	19,485	15,719	14,795	16,236	[3]16,500
Semimanufactures:					
Rolled excluding pipe do.	13,551	11,064	10,477	11,731	12,000
Pipe do.	1,132	1,043	940	995	1,000
Lead:					
Mine output, metal content, recoverable	60,040	50,434	57,495	[e]59,200	61,000
Metal, smelter	82,000	69,000	78,800	81,000	[3]83,400
Nickel:[e]					
Mine output, metal content, recoverable	2,100	2,100	2,100	2,100	2,100
Metal, smelter	2,000	2,100	2,100	2,100	2,100
Silver, mine output, metal content, recoverable thousand troy ounces	24,665	20,576	21,123	21,798	22,000
Zinc:					
Mine output, metal content	187,800	146,484	[e]145,000	[e]149,000	153,000
Metal, refined, including secondary	215,300	167,100	165,400	170,300	[3]176,000
NONMETALS					
Barite	96,300	85,300	90,600	81,000	81,000
Cement, hydraulic thousand tons	18,443	14,226	16,100	16,200	[3]16,700
Clays and clay products:					
Crude:					
Bentonite[e] do.	50	50	70	70	70
Fire clay do.	1,200	1,200	1,075	1,001	1,000
Kaolin do.	51	43	46	49	50
Products[e] do.	600	600	600	600	600
Feldspar[e] do.	40	82	80	80	80
Gypsum and anhydrite, crude[4] do.	1,290	1,311	1,300	[e]1,300	1,300
Lime, hydrated and quicklime do.	4,830	4,179	4,061	4,209	4,200
Magnesite, crude	19,600	11,300	16,100	15,500	16,000
Nitrogen: N content of ammonia thousand tons	1,543	1,389	1,423	1,425	1,425
Salt:					
Rock do.	1,465	1,313	1,338	1,131	1,130
Other do.	3,069	2,958	2,518	[e]2,500	2,500
Sodium and potassium compounds, n.e.s.:					
Sodium carbonate (soda ash) do.	762	701	746	825	800
Caustic soda (96% NaOH) do.	433	417	378	408	400
Stone:					
Dolomite do.	3,437	3,070	2,804	2,996	3,000
Limestone do.	60,877	50,000	NA	NA	NA
Other do.	16,000	16,000	NA	NA	NA

See footnotes at end of table.

Table 2.—Poland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Sulfur:					
Native:					
Frasch[e] ___ thousand tons	4,667	4,295	4,428	4,460	4,500
Other than Frasch[e] ___ do	518	478	492	500	500
Total ___ do	5,185	4,773	4,920	4,960	5,000
Byproduct:[e]					
From metallurgy ___ do	300	300	300	300	300
From petroleum ___ do	30	30	30	30	30
Total ___ do	330	330	330	330	330
From gypsum[e] ___ do	20	20	20	20	20
Total sulfur ___ do	5,535	5,123	5,270	5,310	5,350
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous ___ do	193,121	163,022	189,300	191,100	[3]191,600
Lignite and brown ___ do	36,866	35,600	37,600	42,500	[3]50,400
Total ___ do	229,987	198,622	226,900	233,600	[3]242,000
Coke:					
Coke oven ___ do	19,244	17,346	17,300	17,100	[3]16,600
Gashouse ___ do	940	573	600	[e]600	600
Total ___ do	20,184	17,919	17,900	[e]17,700	17,200
Fuel briquets, all grades ___ do	1,700	1,511	1,575	[e]1,500	1,500
Gas:					
Manufactured:					
Town gas ___ million cubic feet	14,000	11,763	11,500	[e]11,500	11,000
Coke oven gas ___ do	250,000	229,546	[e]200,000	[e]200,000	200,000
Natural, marketed ___ do	223,501	205,248	195,370	193,230	[3]214,430
Natural gas liquids:					
Natural gasoline[e] thousand 42-gallon barrels	80	80	80	80	80
Propane and butane[e] ___ do	53	53	53	53	53
Peat: Fuel and agricultural ___	202,700	201,645	[e]200,000	[e]200,000	200,000
Petroleum:					
Crude:					
As reported ___ thousand tons	329	315	240	[e]210	210
Converted _ thousand 42-gallon barrels	2,441	2,337	1,780	1,558	1,554
Refinery products[5] ___ do	105,978	101,078	99,288	[e]101,200	101,200

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through Aug. 1985.
[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]Includes virtually all major products, but not some minor products, or refinery fuel or losses.

TRADE

In 1984, Poland's foreign trade structure shifted to increased exports of fuels and raw materials. Fuel and energy as a share of total exports rose from 17.1% to 17.7% compared with that of 1983; coal alone rose by 8.2 million tons, or 23%. At the same time, the country's exports of durable goods declined; electrical machinery exports dropped from 40.6% of total exports in 1983 to 39% in 1984. Also, Poland's cumulative debt to market economy countries reached \$26.6 billion[3] in 1984 from \$26.4 billion in 1983.

Most of Poland's import requirements for chromite, iron ore, magnesite, manganese, and other mineral commodities as well as natural gas and petroleum were met by shipments from the U.S.S.R.

Table 3.–Poland: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	2,129	NA		
Oxides and hydroxides	--	805	--	All to Finland.
Ash and residue containing aluminum	3,296	1,655	--	All to West Germany.
Metal including alloys:				
Scrap	3,469	3,188	--	Finland 1,380; West Germany 1,308.
Unwrought[2]	2,317	2,812	--	Czechoslovakia 2,370; Italy 345.
Semimanufactures	341	535	--	West Germany 383; Austria 70.
Cadmium: Metal including alloys, all forms	43	NA		
Chromium: Oxides and hydroxides[2]	834	1,422	--	Switzerland 502; Sweden 212; West Germany 179.
Copper:				
Ore and concentrate	5,937	96,431	--	West Germany 90,090; Finland 6,341.
Matte and speiss including cement copper	--	5,366	--	West Germany 5,164; Greece 202.
Sulfate	--	636	--	West Germany 618.
Metal including alloys:				
Scrap	1,587	357	--	West Germany 247; United Kingdom 49.
Unwrought[2]	176,447	183,203	--	West Germany 80,597; United Kingdom 43,552; Romania 21,749.
Semimanufactures[2]	47,071	54,085	--	Czechoslovakia 15,299; U.S.S.R. 12,020; Iran 10,185.
Iron and steel: Metal:				
Scrap[2]	257,912	146,138	--	Yugoslavia 74,302; West Germany 38,046; Austria 30,422.
Ferroalloys:				
Ferrochromium	22	452	--	All to Belgium-Luxembourg.
Ferrosilicon	4,653	1,536	--	Austria 1,088; West Germany 430.
Unspecified	--	239	--	Italy 200; West Germany 34.
Steel, primary forms ... thousand tons	108	161	--	Yugoslavia 83; Belgium-Luxembourg 28.
Semimanufactures:				
Bars, rods, angles, shapes, sections, do	873	1,385	33	West Germany 92; Yugoslavia 24; undetermined 1,171.
Universals, plates, sheets ... do	355	450	8	West Germany 57; China 42; undetermined 163.
Hoop and strip ... do	139	156	--	Yugoslavia 40; Sweden 27.
Rails and accessories ... do	156	111	--	NA.
Wire ... do	41	34	([3])	Hungary 2; Greece 1; undetermined 29.
Tubes, pipes, fittings ... do	72	77	5	East Germany 20; West Germany 5; China 4.
Castings and forgings, rough ... do	8	11	([3])	West Germany 4; Sweden 2; United Kingdom 2.
Lead:				
Ash and residue containing lead	--	540	--	All to United Kingdom.
Metal including alloys, unwrought	374	NA		
Molybdenum: Metal including alloys, all forms	2	NA		
Nickel: Metal including alloys:				
Unwrought	10	65	--	Do.
Semimanufactures	4	NA		
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$176	$58	--	West Germany $41; United Kingdom $17.
Silicon, high-purity ... kilograms	--	60	60	
Silver:				
Ore and concentrate[4] value, thousands	$128	$41	--	All to Switzerland.
Waste and sweepings[4] ... do	--	$128	--	West Germany $123.
Metal including alloys, unwrought and partly wrought[2] thousand troy ounces	11,896	13,021	2,251	United Kingdom 6,302; West Germany 2,701; Switzerland 1,608.
Tin:				
Ash and residue containing tin	--	36	--	All to United Kingdom.
Metal including alloys:				
Scrap	233	NA		
Unwrought	900	NA		
Zinc: Metal including alloys:[2]				
Unwrought	22,519	27,774	917	United Kingdom 17,132; Hungary 7,828.
Semimanufactures	4,514	4,607	34	U.S.S.R. 1,612; Czechoslovakia 1,429; West Germany 900.
Other: Base metals including alloys, all forms	1,372	1,188	2	Czechoslovakia 1,161; Greece 25.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	35	72	--	All to West Germany.
Artificial:				
Corundum	940	3,482	--	West Germany 1,214; Austria 1,032; Yugoslavia 847.
Silicon carbide	2,196	509	--	Italy 240; West Germany 213.
Grinding and polishing wheels and stones[5]	237	281	([5])	Yugoslavia 255; Thailand 10.
Asbestos, crude	--	60	--	All to Turkey.
Cement[2]	557,094	615,851	--	West Germany 156,065; Sweden 127,838; United Kingdom 102,088.

See footnotes at end of table.

Table 3.—Poland: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Clays, crude:[2]				
Chamotte earth	--	8,078	--	Yugoslavia 3,570; Switzerland 1,495.
Fire clay	19,988	15,641	--	Hungary 14,808.
Diamond: Industrial stones value, thousands	--	$358	--	All to Belgium-Luxembourg.
Diatomite and other infusorial earth	--	22	--	All to Greece.
Fertilizer materials: Manufactured:				
Nitrogenous[2]	32,219	100,942	--	West Germany 65,040; United Kingdom 16,303.
Phosphatic	7,625	2,182	--	All to Hungary.
Unspecified and mixed	--	4,245	--	Denmark 2,795; West Germany 1,450.
Gypsum and plaster	134	38,472	--	Finland 38,447.
Lime	110	[2]16,192	--	West Germany 16,133.
Nitrates, crude	18	36	36	
Precious and semiprecious stones other than diamond:				
Natural value, thousands	--	$2	--	All to West Germany.
Synthetic do	$7	$68	--	All to Japan.
Salt and brine[2]	337,396	376,675	--	Sweden 174,905; Finland 96,831; Hungary 50,212.
Sodium compounds, n.e.s.: Carbonate, manufactured[2]	127,700	167,614	--	China 71,644; U.S.S.R. 49,018; Czechoslovakia 28,018.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	13,725	13,253	--	West Germany 5,841; Belgium-Luxembourg 3,224.
Worked	14,286	13,769	NA	West Germany 9,905; Belgium-Luxembourg 2,513.
Dolomite, chiefly refractory-grade[2]	8,913	16,333	--	West Germany 14,331; Czechoslovakia 1,837.
Gravel and crushed rock[2]	251,967	254,758	--	All to West Germany.
Limestone other than dimension	8,321	9,237	--	Do.
Sand other than metal-bearing	125,813	99,046	--	Do.
Sulfur:				
Elemental:				
Crude including native and byproduct[2] thousand tons	3,973	4,034	--	U.S.S.R. 914; Czechoslovakia 476; Brazil 364; France 351.
Colloidal, precipitated, sublimed	431	6,808	--	Sweden 5,285; Yugoslavia 1,438.
Sulfuric acid[2]	93,462	105,915	--	U.S.S.R. 105,134.
Other:				
Crude	3,271	3,947	--	All to West Germany.
Slag and dross, not metal-bearing	1,084	386	--	West Germany 336; Sweden 50.
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite and bituminous[2] thousand tons	28,462	35,148	--	U.S.S.R. 11,564; Romania 2,490; France 2,242; Italy 2,160.
Briquets of anthracite and bituminous coal do	9	16	--	All to United Kingdom.
Lignite including briquets[2] do	941	200	--	All to East Germany.
Coke and semicoke[2] do	1,720	1,630	--	U.S.S.R. 722; Hungary 214; Austria 169; East Germany 140.
Peat including briquets and litter	5,880	13,471	--	Austria 6,556; Italy 2,953; West Germany 2,442.
Petroleum:				
Crude thousand 42-gallon barrels	3	1,386	--	Sweden 592; United Kingdom 532.
Refinery products:				
Liquefied petroleum gas do	38	31	--	West Germany 21; Austria 6.
Gasoline do	145	105	--	Sweden 57; West Germany 37.
Mineral jelly and wax do	10	21	--	Austria 12; United Kingdom 9.
Kerosine and jet fuel do	6	11	--	All to Hungary.
Distillate fuel oil do	2,029	1,164	--	West Germany 902; Denmark 174.
Lubricants do	76	136	--	Austria 86; West Germany 16.
Residual fuel oil do	579	597	--	Austria 245; Sweden 177; West Germany 137.
Bitumen and other residues do	--	10	--	All to United Kingdom.
Petroleum coke do	--	27	--	United Kingdom 24.
Unspecified[2] do	1,656	8,175	--	United Kingdom 4,271; West Germany 1,546; Netherlands 1,335.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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 and data published by the partner trade countries.
[2]Official Trade Statistics of Poland.
[3]Less than 1/2 unit.
[4]May include other precious metals.
[5]Totals exclude unreported quantities valued at $186,000 in 1982 and $91,000 in 1983, of which $32,000 was imported in 1983 by the United States.

Table 4.—Poland: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:[2]				
Ore and concentrate	41,015	34,400	--	Hungary 20,319; Australia 13,931.
Oxides and hydroxides	206,716	210,434	145	Hungary 114,419; West Germany 75,385.
Metal including alloys:				
Unwrought	83,826	83,465	--	Romania 37,495; U.S.S.R. 35,471.
Semimanufactures	20,188	18,030	33	U.S.S.R. 8,088; Romania 3,413; Austria 2,259.
Cadmium: Metal including alloys, all forms	--	10	--	All from Finland.
Chromium: Ore and concentrate[2]	203,835	169,249	--	U.S.S.R. 135,451; Turkey 14,294; Albania 10,543.
Cobalt:				
Oxides and hydroxides	3	24	--	All from United Kingdom.
Metal including alloys, all forms	10	14	([3])	West Germany 11; United Kingdom 2.
Columbium and tantalum: Metal including alloys, all forms, columbium (niobium) kilograms	344	195	--	All from West Germany.
Copper:				
Oxides and hydroxides	--	60	--	West Germany 30; United Kingdom 30.
Metal including alloys:				
Unwrought	[2]1,295	[4]1,000	--	NA.
Semimanufactures[2]	816	968	15	West Germany 454; U.S.S.R. 228.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	322	320	--	West Germany 289.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	13,493	13,787	--	U.S.S.R. 11,346; Brazil 1,951; Sweden 391.
Metal:				
Scrap do.	4	4	--	All from U.S.S.R.
Pig iron, cast iron, related materials do.	1,273	1,133	--	NA.
Ferroalloys:				
Ferromanganese	35,000	9,000	--	Norway 1,600; undetermined 7,176.
Ferromolybdenum	5	198	--	West Germany 174.
Silicon metal	2,911	34	--	All from West Germany.
Unspecified	34,084	31,802	--	Norway 3,541; undetermined 26,641.
Steel, primary forms thousand tons	185	166	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	324	317	--	Yugoslavia 27; Hungary 18; undetermined 256.
Universals, plates, sheets do.	592	506	([3])	Czechoslovakia 110; U.S.S.R. 39; undetermined 256.
Hoop and strip do.	12	14	--	West Germany 6; Yugoslavia 2.
Rails and accessories do.	9	9	--	NA.
Wire do.	42	44	([3])	West Germany 4; Yugoslavia 2; undetermined 32.
Tubes, pipes, fittings do.	175	188	--	Romania 41; East Germany 22; Czechoslovakia 21.
Castings and forgings, rough do.	36	12	--	NA.
Lead:				
Ore and concentrate	--	643	--	West Germany 608.
Oxides	726	35	--	All from West Germany.
Metal including alloys, unwrought[2]	6,358	1,621	2	West Germany 1,429; North Korea 119.
Magnesium: Metal including alloys, unwrought[2]	2,027	1,513	--	United Kingdom 984; Belgium-Luxembourg 309.
Manganese:				
Ore and concentrate, metallurgical-grade[2]	689,370	574,194	--	U.S.S.R. 544,208; France 29,986.
Oxides	48	180	--	All from Ireland.
Metal including alloys, all forms	281	NA		
Mercury 76-pound flasks	145	145	--	All from West Germany.
Molybdenum: Metal including alloys, all forms	--	20	--	Do.
Nickel:				
Matte and speiss	303	294	--	All from Cuba.
Metal including alloys:				
Unwrought	24	23	--	Belgium-Luxembourg 19.
Semimanufactures	44	44	1	West Germany 28; Sweden 10.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$3,096	$1,814	$16	United Kingdom $1,361; West Germany $437.
Silver: Metal including alloys unwrought, and partly wrought do.	$729	$735	--	West Germany $700.

See footnotes at end of table.

Table 4.—Poland: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Tin:				
Oxides	--	6	--	All from Austria.
Metal including alloys:				
Unwrought[2]	4,601	4,352	--	United Kingdom 3,388; Indonesia 900.
Semimanufactures	1	1	--	All from West Germany.
Titanium:				
Ore and concentrate	[2]57,426	NA		
Oxides	844	696	--	West Germany 385; United Kingdom 300.
Metal including alloys, all forms	1	1	--	All from West Germany.
Tungsten:				
Ore and concentrate	2,461	30	--	All from U.S.S.R.
Metal including alloys, all forms	1	3	2	West Germany 1.
Zinc:				
Oxides	132	45	--	All from Austria.
Metal including alloys, unwrought[2]	5,417	5,787	--	U.S.S.R. 3,767; North Korea 2,020.
Zirconium: Ore and concentrate	900	330	--	All from West Germany.
Other:				
Ores and concentrates	24	24,515	--	Norway 24,492.
Oxides and hydroxides	2,967	243	--	West Germany 217.
Base metals including alloys, all forms[2]	3,134	2,497	--	Sweden 1,581; West Germany 500.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	388	757	93	Italy 634; Greece 20.
Artificial: Corundum	3,781	4,028	--	Japan 1,550; Hungary 1,377; Yugoslavia 973.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$55	$47	--	Austria $45.
Grinding and polishing wheels and stones	[5]1,048	1,436	--	Austria 570; Yugoslavia 293; Hungary 156.
Asbestos, crude[2]	72,705	71,260	1	U.S.S.R. 69,077; West Germany 783.
Barite and witherite	5,000	[2]22,814	--	Turkey 14,815; East Germany 7,999.
Boron materials:				
Crude natural borates	27,247	23,282	--	All from Turkey.
Oxides and acids	55	73	--	All from Italy.
Cement[2]	26,220	17,977	--	U.S.S.R. 17,975.
Chalk	12	25	--	All from West Germany.
Clays, crude:				
Bentonite	4,605	5,207	--	All from Hungary.
Chamotte earth[2]	17,905	13,120	--	France 10,837; West Germany 2,237.
Fire clay	5,140	5,017	--	U.S.S.R. 4,794.
Kaolin[2]	137,028	137,918	--	Czechoslovakia 84,382; U.S.S.R. 32,762.
Diamond:				
Gem, not set or strung value, thousands	$7	$19	--	Belgium-Luxembourg $9; West Germany $9.
Industrial stones do	$1,982	$4,047	--	Belgium-Luxembourg $3,335; Switzerland $458.
Diatomite and other infusorial earth	833	1,331	1,111	Denmark 220.
Feldspar, fluorspar, related materials	[2]35,756	12,952	--	Norway 9,916; Finland 3,036.
Fertilizer materials: Manufactured:				
Ammonia[2] thousand tons	118	88	--	All from U.S.S.R.
Nitrogenous[2] do	150	166	--	Romania 160.
Phosphatic do	106	NA		
Potassic[2] do	2,377	1,685	--	U.S.S.R. 1,160; East Germany 497.
Unspecified and mixed	9,063	93	--	All from Sweden.
Graphite, natural[2]	6,775	6,688	31	Austria 4,941; Czechoslovakia 1,405.
Gypsum and plaster	4,873	4,973	69	West Germany 4,903.
Magnesium compounds:				
Magnesite[2]	223,455	243,021	--	North Korea 105,595; Czechoslovakia 60,271.
Oxides and hydroxides	451	46	--	All from West Germany.
Mica:				
Crude including splittings and waste[2]	1,066	779	--	India 769.
Worked including agglomerated splittings	14	21	--	Switzerland 18.
Phosphates, crude[2] thousand tons	3,280	3,176	769	Morocco 1,195; U.S.S.R. 591; West Germany 544.
Phosphorus, elemental	11,659	13,319	--	All from U.S.S.R.
Pigments, mineral: Iron oxides and hydroxides, processed	483	1,057	4	West Germany 1,053.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$7	$97	$87	West Germany $8.
Synthetic do	$17	$32	--	West Germany $19; Austria $7.
Salt and brine	15	6	--	All from Sweden.

See footnotes at end of table.

Table 4.—Poland: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	378	2,245	--	Bulgaria 1,038; Hungary 930.
Worked	110	105	--	Italy 74; Belgium-Luxembourg 30.
Dolomite, chiefly refractory-grade[2]	15,090	11,723	--	Hungary 11,685.
Gravel and crushed rock[2]	7,928	13,465	--	Norway 10,435; Finland 3,030.
Limestone other than dimension	--	71	--	All from West Germany.
Quartz and quartzite	1,666	2,827	--	West Germany 2,324; Sweden 255.
Sand other than metal-bearing	6	50	--	West Germany 25; Italy 22.
Talc, steatite, soapstone, pyrophyllite[2]	15,226	16,662	--	Czechoslovakia 7,659; Austria 3,170; North Korea 1,724.
Other: Crude	16,085	12,823	--	Hungary 11,582; West Germany 924.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	165	70	--	All from West Germany.
Carbon: Carbon black[2]	15,601	19,699	--	Romania 10,530; U.S.S.R. 3,754.
Coal:[2]				
Anthracite thousand tons	30	21	--	All from U.S.S.R.
Bituminous do	972	1,042	--	U.S.S.R. 759; East Germany 283.
Gas, natural: Gaseous[2] million cubic feet	198,503	212,134	--	All from U.S.S.R.
Petroleum:[2]				
Crude thousand 42-gallon barrels	97,196	103,711	--	U.S.S.R. 92,279; Libya 7,394.
Refinery products do	23,608	25,685	--	U.S.S.R. 17,432; Romania 911; Albania 264.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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 and data published by the partner trade countries.
[2]Official Trade Statistics of Poland.
[3]Less than 1/2 unit.
[4]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.
[5]Excludes quantities valued at $117,000.

COMMODITY REVIEW

METALS

Copper.—Poland's copper reserves of 50 million tons of contained metal were reportedly the fourth largest in the world.[4] The copper-bearing minerals, bornite, chalcocite, chalcopyrite, and covellite, were mined in strata-bound deposits in sedimentary rocks, mainly dolomite, limestone, sandstone, and Tertiary and Quaternary gravels, occurring over an area of about 240 square kilometers, and at depths ranging from 390 to 1,350 meters in the Legnica-Lubin-Glogow area in southwestern Poland. The chief mining method was room-and-pillar with roof caving used in conjunction with hydraulic fill. Stoping was reportedly fully mechanized, and productivity was rated at about 30 to 50 tons per worker shift.

The chief metal associated with copper was silver as native silver and silver-bearing minerals. The silver content of the ore ranged from 30 to 80 grams per ton. Other valuable minerals associated with the copper were cobalt, gold, lead, molybdenum, rhenium, vanadium, and zinc. The gold content of the copper concentrates was 1 gram per ton, with a recovery rate for both gold and silver at about 80% to 90%. Ore was treated at four concentrators with a combined annual capacity of 30 million tons using conventional crushing, grinding, and flotation. Copper concentrates contained between 18% and 30% copper and from 300 to 750 grams of silver per ton. Approximately 75% of the concentrate was smelted in shaft furnaces; the balance was treated by flash smelting at a facility using a modified Outokumpu process. Ore refining and electrorefining were used to produce refined metal.

The Polish copper industry was managed by the Kombinat Gorniczo-Hutniczy Miedzi (KGHM), or the Copper Mining and Smelting Industrial Group. The industry reportedly employed approximately 43,000 workers in 1984. In 1983, labor and energy costs totaled $380 million, but the combined transactional value of copper and silver output in the same year amounted to $576 million.

Although, owing to a depressed economy, the country had few financial resources in recent years to expand mining capacity, the KGHM planned some expansion at the Sieroszowice Mine, the newest and largest mine in the Lubin-Glogow-Legnica area. Capital investment was to be concentrated on shaft construction with main emphasis on shaft SW-2, which was already sunk and was in the process of being equipped. With a rated annual output of 2.7 million tons, the Sieroszowice project was scheduled for startup during the first half of 1986.

In March, severe earth tremors caused the collapse of a 200- to 300-meter section of the Rudna Mine at a depth of 950 meters. There was reportedly one fatality and one serious injury. No estimates as to the extent of the damage were provided.

At yearend, Poland made Japan an offering of between 20,000 and 40,000 tons of copper concentrates for shipment in 1985.

Gold.—Poland's industrial consumption of gold has been reportedly in excess of 85,000 ounces per year, produced largely as a byproduct of copper mining and smelting operations. Some gold-bearing residues may also have been available from lead-zinc mining and processing. The assayed gold content of copper concentrates was about 1 gram per ton with a recovery rate of 80% to 90%. Although gold production may have been 70,000 ounces or more per year, reportedly, the potential to produce as much as 1.4 million ounces per year could be achieved with a corresponding high investment in new technology and equipment. Apart from associated gold, there are about 20 known areas of disseminated gold deposits and occurrences in Lower Silesia.

Iron and Steel.—Poland continued to mine small amounts of iron ore in 1984, but domestic supplies were not sufficient to meet the needs of its 17-million-ton-per-year steel industry. Most of the country's supplies of chromite, iron ore, and manganese were provided by the Soviet Union. An agreement signed at yearend between the Polish foreign trade organization Stalexport and Sojuzpromexport of the U.S.S.R. called for Soviet exports to Poland in 1985 of 13.0 million tons of iron ore with an average iron content of about 60%. Poland's steel industry would receive 6.3 million tons of concentrates, 2.5 million tons of pellets, and about 4.2 million tons of other types of ore designated for large blast furnaces. Essentially, this agreement would provide Poland with 80% of its needs for iron ore as well as 90% of the steel industry's requirements for chromium and manganese.

Poland announced plans to restart the modernization of its steel industry after a 4-year delay that was caused by a lack of available capital. Work on three projects was begun with loans provided by the U.S.S.R. on a partial buy-back basis. New facilities under construction included a 3-million-ton-per-year coke oven battery and a 250,000-ton-per-year rail mill at the Katowice steelworks, and a 100,000-ton-per-year section mill supplied by Voest-Alpine AG of Austria at the Pokoj steelworks. The latter was expected to go on-stream in 1985.

Lead and Zinc.—Four mines in Upper Silesia were the chief producers of lead-zinc ore. The country's recoverable reserves were measured at 350 million tons with a 4.2% zinc content and a lead content of 1.7%.[5] Other elements associated with the ore were cadmium, iron, silver, and sulfur. Some lead was also produced in association with Poland's copper industry.

Smaller in size compared with the copper deposits, Poland's lead-zinc deposits have been mined to an increasing extent in a difficult geological environment. The ore was mined using the room-and-pillar method with drilling and loading operations 85% and 100% mechanized, respectively. The metal content of the ore had been gradually declining, and production was hardly able to meet domestic needs. To maintain or increase present production levels, a substantially greater amount of ore would have to be mined, which would require large capital investments. Unlike the copper industry, Poland's lead-zinc operations required large state subsidies. According to official sources, the industry employed approximately 20,000 workers and had a combined labor and energy cost in 1983 of $243 million. The combined transactional value for lead and zinc was $157 million, which resulted in a deficit of about $86 million.

Silver.—Over 22 million troy ounces of silver was produced in 1984, largely as a byproduct of copper. Silver was also produced, to a lesser extent, from lead-zinc ores. An important source of foreign exchange, about one-half of Poland's silver was sold to market economy countries in Europe.

NONMETALS

Poland produced a variety of nonmetallic industrial minerals such as barite, dolomite, gypsum, kaolin, salt, and sulfur, and in most cases, domestic and export needs were met.

Clays (Kaolin).—Poland produced approximately 45,000 tons of processed kaolin, which partially satisfied industrial requirements; the balance had to be imported primarily from Czechoslovakia and the U.S.S.R. Reportedly, the Turow lignite mine was to have changed over to kaolin production during the year. The share of production contributed by kaolin at the Turow Mine had been steadily increasing. The deposit contained kaolin reserves amounting to about 300 million tons.

Sulfur.—Poland remained a major world producer of sulfur, with about 10% of the world's output. The country's proven reserves were about 900 million tons, or about 26% of the world's reserves. The mineral was mined in the Tarnobrzeg area from one opencast mine and three mines using the Frasch process. During the year, plans were announced to develop a new 1.3-million-ton-per-year opencast mine at the Oslek deposit. Mine development reportedly was already started, and operational startup was scheduled for 1990. Plans to expand carbon disulfide production facilities at the Siarkopol sulfur mine were also announced at yearend.

MINERAL FUELS

Poland continued to produce relatively negligible amounts of petroleum and had to import about 96,000,000 barrels from the U.S.S.R. Domestic production of natural gas was slightly less than 50% of consumption. The balance was imported from the U.S.S.R. as well. Coal remained Poland's most significant mineral fuel from the standpoint of both availability and export value.

In 1984, both production and exports of coal increased. Exports, compared with those of 1983, rose by over 22%, and coal revenues constituted 20% of the country's total foreign revenues, with approximately 70% of the hard-coal shipments going to Brazil and market economy countries of Western Europe.

Poland's hard-coal reserves were measured at 120 billion tons. The coal contained only 0.7% to 1.0% sulfur, and the calorific value exceeded 6,000 kilocalories per kilogram.

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[1]Foreign mineral specialist, Division of International Minerals (deceased).

[2]Foreign mineral specialist, Division of International Minerals.

[3]The Polish zloty (Z) is not convertible, and the official exchange rate cannot be used as a measure of relative value. Prices were provided in U.S. dollars in Przeglad Techniczny (Warsaw), No. 38, Sept. 16, 1984.

[4]Mining Magazine (London). Aug. 1985, pp. 92-111.

[5]Work cited in footnote 4.

The Mineral Industry of Portugal

By Roman V. Sondermayer[1]

As in the past, the mineral industry of Portugal remained modest by world standards during 1984. Only tungsten, among mined products, and ferroalloys, among processed mineral commodities, were of even modest significance to the world economy. The general economic slowdown in the country, and in Europe, affected the activities of the mineral industry. The value of production of minerals was relatively small when compared with the value of the gross national product. The approximate figure for employment in the mineral industry, including processing, was between 40,000 and 50,000 persons.

The development of mineral resources was among the major concerns of the Government. Emphasis remained on total utilization of pyrite, development of copper production, and expansion of the iron and steel industry. The difficulties included lack of capital and general lack of demand for mineral products which resulted from the economic slowdown.

Development of the Neves-Corvo copper mine, modernization of the iron and steel plant near Seixal, expansion of the Aljustrel pyrite mine, and updating of the National Energy Plan (NEP) were the principal events relating to the mineral industry during 1984.

PRODUCTION

The mineral industry was both privately and Government-owned. Cimentos de Portugal E.P. remained the largest producer of cement. Empresa Carbonifera do Douro S.A.R.L. produced coal; Sociedade Mineira de Neves-Corvo S.A.R.L. (Somincor) was developing a copper mine; Sociedade Anglo-Portuguesa de Diatomita Lda. produced diatomite; Piritas Alentejanas S.A.R.L. was the largest producer of pyrite; Siderurgia Nacional S.A.R.L. produced iron and steel; Beralt Tin & Wolfram Ltd. remained the largest tungsten producer; and Quimica de Portugal E.P. (Quimigal) produced zinc metal.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Arsenic, white[e]	200	257	200	180	180
Beryl concentrate, gross weight	19	17	12	[e]11	--
Columbite and tantalite concentrates, gross weight	4	12	6	[e]3	3
Copper:					
Mine output, metal content	5,200	4,800	500	400	400
Metal:					
Smelter, primary and secondary[e]	3,200	3,200	1,500	[r]6,000	6,000
Refined, primary and secondary	4,480	4,800	4,600	[e]4,600	4,600
Gold, mine output, metal content troy ounces	8,855	10,931	6,783	9,603	9,100
Iron and steel:					
Iron ore and concentrate:					
Gross weight:					
Hematite and magnetite	14,773	--	--	--	--
Manganiferous	41,850	37,050	27,100	[e]25,000	36,000
Total	56,623	37,050	27,100	[e]25,000	[e]36,000
Iron content:					
Hematite and magnetite	10,046	--	--	--	--
Manganiferous	15,359	13,000	9,214	[r] [e]11,000	13,000
Total	25,405	13,000	9,214	11,000	13,000
Metal:					
Pig iron thousand tons	349	410	215	355	[2]373
Ferroalloys:					
Ferromanganese[e]	74,000	65,000	27,100	[r]33,800	30,000
Silicomanganese[e]	17,000	18,000	16,000	16,000	15,000
Ferrosilicon[e]	25,000	24,000	21,000	22,000	20,000
Silicon metal[e]	33,000	32,000	32,000	32,000	30,000
Ferrotungsten	[e]200	[e]200	212	177	200
Total[e]	149,200	139,200	96,312	[r]103,977	95,200
Steel, crude thousand tons	653	551	504	[e]500	500
Semimanufactures do	650	NA	NA	NA	NA
Lead: Refined, secondary	5,600	5,300	4,000	[r] [e]6,000	5,000
Silver, mine output, metal content troy ounces	28,935	38,580	23,532	32,400	[2]28,722
Tin:					
Mine output, metal content	274	[r]506	410	347	350
Metal, primary and secondary	938	900	400	200	180
Titanium: Ilmenite concentrate, gross weight	234	334	292	247	250
Tungsten, mine output, metal content	[r]1,568	1,395	1,358	1,185	1,200
Uranium concentrate: U content	95	120	130	[e]120	110
Zinc: Smelter, primary	[e]2,000	4,600	4,200	3,800	5,800
NONMETALS					
Barite	1,200	1,350	1,300	944	350
Cement, hydraulic thousand tons	5,748	5,697	5,800	6,062	6,000
Clays:					
Kaolin	83,145	[r]52,846	50,716	57,275	50,000
Refractory	202,899	259,852	[e]250,000	[e]200,000	150,000
Diatomite	2,710	2,690	[e]2,600	1,870	1,500
Feldspar	40,802	44,007	[e]43,000	[e]42,000	40,000
Gypsum and anhydrite	205,378	243,537	[e]250,000	[e]240,000	240,000
Lime, hydrated and quicklime thousand tons	270	260	[e]250	[r] [e]230	200
Lithium minerals: Lepidolite	1,000	[e]900	[e]800	[e]700	600
Nitrogen: N content of ammonia thousand tons	200	133	[e]132	[e]135	140
Pyrites and pyrrhotite (including cuprous), gross weight do	350	287	[e]290	[e]280	150
Salt:					
Rock do	401	408	406	423	450
Marine do	130	120	[e]100	[e]110	110
Total do	531	528	[e]506	[e]533	560
Sand and gravel: Sand do	5,046	5,430	NA	NA	NA
Sodium compounds, n.e.s.:					
Sodium carbonate[e]	175,000	170,000	170,000	160,000	150,000
Sodium sulfate	52,200	[r]57,759	[r] [e]57,000	[r] [e]56,000	50,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone:					
Basalt thousand tons	56	124	NA	NA	NA
Calcareous:					
Dolomite do.	97	98	NA	NA	NA
Limestone, marl, calcite do.	9,738	12,598	NA	NA	NA
Marble do.	370	383	NA	NA	NA
Diorite do.	1,246	53	NA	NA	NA
Gabbro do.	108	73	NA	NA	NA
Granite do.	5,535	5,966	NA	NA	NA
Graywacke do.	13	12	NA	NA	NA
Ophite do.	44	35	NA	NA	NA
Quartz do.	125	116	NA	NA	NA
Quartzite do.	480	587	NA	NA	NA
Schist do.	214	131	NA	NA	NA
Serpentine do.	1	NA	NA	NA	NA
Slate do.	45	NA	NA	NA	NA
Syenite do.	8	4	NA	NA	NA
Sulfur:					
Content of pyrites do.	155	[e]135	116	124	106
Byproduct, all sources do.	2	2	2	5	4
Total do.	157	137	118	129	110
Talc	2,598	6,363	4,940	5,459	4,800
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand tons	177	184	179	[e]180	190
Coke, metallurgical do.	140	173	159	[e]160	170
Fuel briquets, all grades do.	200	NA	NA	NA	NA
Gas, manufactured million cubic feet	5,000	NA	NA	NA	NA
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	7,140	9,656	7,965	7,360	7,300
Jet fuel do.	3,000	4,424	3,408	3,688	3,700
Kerosine do.	900	534	395	271	270
Distillate fuel oil do.	18,500	15,285	13,800	16,113	16,000
Residual fuel oil do.	32,581	22,910	23,596	22,837	23,000
Lubricants do.	500	574	567	600	600
Liquefied petroleum gas do.	2,000	3,132	2,830	3,016	3,000
Naphtha do.	([3])	1,300	2,490	2,346	2,400
Unspecified do.	6,000	1,981	3,738	3,215	3,200
Refinery fuel and losses do.	5,000	759	410	413	420
Total do.	75,621	60,555	59,199	59,859	59,890

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 12, 1985.
[2]Reported figure.
[3]Included with "Unspecified."

TRADE

Preliminary data for 1984 showed that imports of minerals, related products, and mineral fuels accounted for about one-third of the country's total imports. Exports of the same commodities were approximately one-seventh of total exports. Trade with the United States remained insignificant for both partners.

Table 2.—Portugal: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	4,187	6,920	--	Spain 3,827; Netherlands 2,162.
Unwrought	455	338	--	France 250; Netherlands 63.
Semimanufactures	3,677	5,692	4	Japan 2,961; Saudi Arabia 1,006.
Cobalt: Oxides and hydroxides value, thousands	$2	$2	--	All to Mozambique.
Copper:				
Ore and concentrate	--	2,990	--	All to Sweden.
Matte and speiss including cement copper	--	399	--	All to West Germany.
Metal including alloys:				
Scrap	83	1,001	--	West Germany 854.
Unwrought	3,637	1,171	--	Belgium-Luxembourg 1,020.
Semimanufactures	1,165	1,744	563	Belgium-Luxembourg 480; India 180.
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted	12,040	--		
Metal:				
Scrap	9,149	9,710	--	Spain 5,882; Netherlands 2,455.
Pig iron, cast iron, related materials	800	1,229	--	Morocco 1,000.
Ferroalloys:				
Ferromanganese	13,890	9,793	1,250	Italy 4,633; Greece 2,020.
Unspecified	35,396	79,159	13,935	West Germany 25,123; Japan 19,013.
Steel, primary forms	1	11,399	--	Turkey 9,729.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,607	91,312	--	West Germany 30,319; Belgium-Luxembourg 26,687.
Universals, plates, sheets	20,229	54,739	4,100	United Kingdom 14,016; Romania 9,342.
Hoop and strip	2,379	823	6	Angola 598; France 109.
Rails and accessories	524	82	--	Cape Verde 55; Cuba 26.
Wire	2,283	852	--	United Kingdom 294; Cape Verde 124.
Tubes, pipes, fittings	4,380	5,976	--	Spain 2,017; France 854.
Castings and forgings, rough	6,485	3,642	447	United Kingdom 875; Angola 654.
Lead:				
Ore and concentrate	1,193	1,049	--	All to Belgium-Luxembourg.
Metal including alloys:				
Scrap	6	9	--	All to United Kingdom.
Unwrought	23	44	--	France 21; Angola 20.
Semimanufactures	--	5	--	Cape Verde 3; Angola 2.
Manganese: Ore and concentrate, metallurgical-grade	450	4,625	1,375	Spain 2,000; United Kingdom 1,250.
Nickel: Metal including alloys:				
Scrap	--	13	--	All to United Kingdom.
Unwrought	--	2	--	All to Mozambique.
Semimanufactures	18	7	--	United Kingdom 6.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,089	$71	--	France $35; United Kingdom $26.
Silver: Metal including alloys, unwrought and partly wrought do.	$807	$591	--	United Kingdom $328; West Germany $126.
Tin: Metal including alloys:				
Scrap	22	43	--	All to United Kingdom.
Unwrought	10	--		
Semimanufactures	6	1	--	Mainly to Cape Verde.
Tungsten:				
Ore and concentrate	1,727	1,669	604	Japan 520; West Germany 165; Netherlands 150.
Metal including alloys, all forms	23	3	--	All to West Germany.
Zinc:				
Oxides	1,427	1,449	--	Italy 805; Netherlands 260.
Metal including alloys:				
Scrap	98	--		
Semimanufactures	214	14	--	Cape Verde 7; Panama 2.
Other:				
Ores and concentrates	25	8	--	All to Netherlands.
Oxides and hydroxides	208	--		
Ashes and residues	3,982	997	--	Netherlands 600; Spain 149.
Base metals including alloys, all forms	79	57	--	West Germany 29; United Kingdom 17.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	7,072	1	--	All to Angola.
Artificial: Corundum	112	24	--	All to Spain.
Dust and powder of precious and semiprecious stones including diamond value, thousands	--	$1	--	All to Angola.
Grinding and polishing wheels and stones	38	91	7	Angola 48; West Germany 23.

See footnotes at end of table.

Table 2.—Portugal: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Asbestos, crude	2	14	--	All to Angola.
Barite and witherite	588	NA		
Boron materials:				
Crude natural borates	22	65	--	Spain 48; France 8.
Oxides and acids	2	1	--	All to Mozambique.
Cement	13,892	2,640	--	Angola 1,290; Guinea Bissau 746.
Chalk	132	64	--	São Tomé and Principe 30; Cape Verde 18.
Clays, crude	1,052	593	--	Spain 581.
Diamond:				
Gem, not set or strung value, thousands	$60,985	$43,538	$830	Switzerland $42,556.
Industrial stones do	$311	--		
Diatomite and other infusorial earth	29	25	--	All to Venezuela.
Feldspar, fluorspar, related materials	4,398	4,522	--	France 3,365; West Germany 1,100.
Fertilizer materials:				
Crude n.e.s.	300	--		
Manufactured:				
Ammonia	1	50	--	Spain 45.
Nitrogenous	84,226	88,520	--	West Germany 72,770.
Phosphatic	54,786	25,998	--	Nigeria 11,000; Ireland 7,478.
Potassic	392	--		
Unspecified and mixed	52,579	67,518	--	Sri Lanka 22,804; Angola 11,992.
Graphite, natural	145	140	--	All to Spain.
Gypsum and plaster	45	142	--	Mozambique 118.
Lime	5	61	--	Cape Verde 42.
Mica:				
Crude including splittings and waste	145	208	--	United Kingdom 206.
Worked including agglomerated splittings	40	186	--	All to United Kingdom.
Nitrates, crude	--	2	--	All to West Germany.
Phosphates, crude	188	--		
Pigments, mineral: Iron oxides and hydroxides, processed	24	40	--	Mozambique 24; Cape Verde 12.
Salt and brine	724	5,510	24	Nigeria 2,510; São Tomé and Principe 800.
Sodium compounds, n.e.s.: Carbonate, manufactured	4,012	4,879	--	Spain 3,512; Mozambique 1,350.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	115,901	133,509	266	Italy 36,132; Spain 30,834.
Worked	193,422	223,612	4,942	West Germany 140,614; United Kingdom 18,036.
Gravel and crushed rock	2,284	4,943	--	Guinea Bissau 4,500.
Limestone other than dimension	311	93	--	Mozambique 60.
Quartz and quartzite	1,050	560	--	United Kingdom 439.
Sand other than metal-bearing	8,954	17,741	--	Gibraltar 11,400; Morocco 3,834.
Sulfur:				
Elemental:				
Crude including native and byproduct	61	47	--	All to Mozambique.
Colloidal, precipitated, sublimed	--	2	--	Do.
Sulfuric acid	454	15,089	--	Belgium-Luxembourg 11,306.
Talc, steatite, soapstone, pyrophyllite	27	32	--	Angola 24.
Other:				
Crude	151	430	--	Spain 308; France 114.
Slag and dross, not metal-bearing	1,018	900	--	All to France.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	725	664	--	São Tomé and Principe 656.
Carbon: Carbon black	1	1	--	NA.
Coal: Anthracite and bituminous	22	13	--	France 11.
Coke and semicoke	20	--		
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	13	1	--	Mainly to Gibraltar.
Gasoline do	1,300	1,688	--	Canada 458; Spain 385; Netherlands 327.
Mineral jelly and wax do	21	14	--	Netherlands 13.
Kerosine and jet fuel do	1,413	2,072	--	Nigeria 273; bunkers 1,281.
Distillate fuel oil do	743	1,350	--	France 509; bunkers 410.
Lubricants do	214	160	--	Belgium-Luxembourg 34; Greece 28.
Residual fuel oil do	270	2,296	--	Belgium-Luxembourg 635; France 630.
Bitumen and other residues do	7	1	--	Mainly to Angola.
Bituminous mixtures do	(2)	1	--	Do.

NA Not available.
[1]Prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Portugal: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	1,640	3,410	--	France 2,032; West Germany 502.
Oxides and hydroxides	7,626	6,506	21	United Kingdom 3,791; France 2,019.
Metal including alloys:				
Scrap	77	35	--	France 10; West Germany 10.
Unwrought	49,440	42,975	--	Spain 15,536; France 10,585.
Semimanufactures	13,310	14,259	24	Spain 2,967; Belgium-Luxembourg 2,492.
Chromium:				
Ore and concentrate	577	753	--	Republic of South Africa 408; Netherlands 279.
Oxides and hydroxides	161	152	(2)	West Germany 130; U.S.S.R. 10.
Copper:				
Ore and concentrate	7,521	1,030	--	Canada 980.
Matte and speiss including cement copper	463	20	--	All from the Netherlands.
Metal including alloys:				
Scrap	222	188	2	Netherlands 71; West Germany 25.
Unwrought	13,879	13,947	(2)	Zaire 5,000; Peru 2,410; France 1,932.
Semimanufactures	16,732	12,753	58	France 4,055; Italy 1,857; Sweden 1,558.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	262,664	470,413	--	Mauritania 187,778; Venezuela 172,537; Canada 110,037.
Metal:				
Scrap	124,717	108,294	217	United Kingdom 88,596; U.S.S.R. 15,352.
Pig iron, cast iron, related materials	48,535	55,179	(2)	Spain 45,359; West Germany 3,562.
Ferroalloys:				
Ferromanganese	160	104	--	West Germany 44; Switzerland 20.
Unspecified	1,358	470	(2)	United Kingdom 221; West Germany 150.
Steel, primary forms	465,982	229,313	--	West Germany 106,378; Netherlands 28,705.
Semimanufactures:				
Bars, rods, angles, shapes, sections	148,961	115,078	19	Spain 31,084; West Germany 27,901.
Universals, plates, sheets	262,503	232,268	3	West Germany 66,682; East Germany 37,874.
Hoop and strip	41,653	32,610	(2)	West Germany 14,856; Belgium-Luxembourg 9,303.
Rails and accessories	4,400	4,107	--	West Germany 2,617; Sweden 553.
Wire	23,968	21,774	2	Spain 9,293; Belgium-Luxembourg 4,615.
Tubes, pipes, fittings	32,007	18,047	72	West Germany 7,454; France 3,746.
Castings and forgings, rough	857	502	(2)	West Germany 416.
Lead:				
Ore and concentrate	240	--		
Metal including alloys:				
Scrap	222	5	5	
Unwrought	20,082	21,321	1,335	Peru 10,693; United Kingdom 2,769.
Semimanufactures	51	5	1	West Germany 2.
Magnesium: Metal including alloys, unwrought	36	11	--	France 9.
Manganese:				
Ore and concentrate, metallurgical-grade	122,071	68,587	--	Republic of South Africa 29,637; Gabon 17,850; Brazil 15,799.
Oxides	1,227	1,595	--	Greece 477; Belgium-Luxembourg 420.
Mercury 76-pound flasks	2,030	232	--	Netherlands 145.
Nickel:				
Matte and speiss	29	30	--	Zimbabwe 11.
Metal including alloys:				
Scrap	26	16	--	West Germany 6; Norway 5.
Unwrought	297	275	--	Canada 67; Republic of South Africa 59.
Semimanufactures	629	617	(2)	United Kingdom 314; Finland 115.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,416	$801	--	United Kingdom $407; France $280.
Silver: Metal including alloys, unwrought and partly wrought do	$4,775	$10,626	--	West Germany $7,277; Republic of Korea $2,936.

See footnotes at end of table.

Table 3.—Portugal: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	37	81	--	Burma 40; Zaire 21.
Metal including alloys:				
Unwrought	408	408	(2)	Bolivia 140; Malaysia 140.
Semimanufactures	43	55	(2)	United Kingdom 33; West Germany 10.
Titanium: Oxides	9,331	8,485	558	United Kingdom 2,273; France 1,977.
Tungsten: Metal including alloys, all forms	5	6	(2)	West Germany 4.
Zinc:				
Oxides	135	64	6	West Germany 43.
Metal including alloys:				
Scrap	174	397	--	Saudi Arabia 143; Yugoslavia 103.
Unwrought	10,685	10,682	--	Canada 3,136; Belgium-Luxembourg 2,461.
Semimanufactures	2,229	1,713	(2)	West Germany 726; United Kingdom 332.
Other:				
Ores and concentrates	1,991	22,111	20	Brazil 20,008; Spain 861.
Oxides and hydroxides	1,070	1,248	3	United Kingdom 929.
Ashes and residues	--	754	--	West Germany 749.
Base metals including alloys, all forms	140	132	3	Japan 42; Belgium-Luxembourg 34.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	631	655	21	Italy 264; Spain 177.
Artificial: Corundum	1,652	1,396	2	West Germany 1,209.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1,050	$1,250	$32	Ireland $594; West Germany $490.
Grinding and polishing wheels and stones	500	398	13	Italy 202; Spain 47.
Asbestos, crude	14,396	14,047	48	Canada 6,011; Zimbabwe 3,736.
Barite and witherite	703	1,335	--	Morocco 750; West Germany 438.
Boron materials:				
Crude natural borates	5,410	11,361	1,940	Turkey 7,000; Peru 1,974.
Oxides and acids	377	929	--	France 633; Italy 267.
Cement	684,823	299,560	3	Spain 294,740.
Chalk	13,703	10,565	--	France 7,374; United Kingdom 2,145.
Clays, crude	45,415	37,763	406	Spain 23,736; United Kingdom 8,858.
Cryolite and chiolite	20	60	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$42,579	$38,542	--	East Germany $2,850; undetermined $35,292.
Industrial stones	$60	$1,548	--	Switzerland $381; undetermined $1,116.
Diatomite and other infusorial earth	3,608	3,762	319	Spain 1,460; France 1,087.
Feldspar, fluorspar, related materials	2,621	2,544	--	France 2,206.
Fertilizer materials:				
Crude, n.e.s	37	55	--	All from France.
Manufactured:				
Ammonia	102,150	57,861	5,023	Libya 41,695; Algeria 6,436.
Nitrogenous	13,729	16,827	--	United Kingdom 8,040; France 4,387.
Phosphatic	15,266	720	--	All from France.
Potassic	61,891	74,686	--	Israel 24,435; France 24,132.
Unspecified and mixed	32,225	14,216	6,712	Morocco 6,090.
Graphite, natural	248	146	16	Norway 42; United Kingdom 38.
Gypsum and plaster	39,844	34,050	3	Spain 30,783; Morocco 2,250.
Lime	1,074	1,055	--	Sweden 984.
Magnesium compounds	5,048	4,529	2	United Kingdom 2,715; Austria 899.
Mica:				
Crude including splittings and waste	375	320	--	Norway 205; France 94.
Worked including agglomerated splittings	22	12	2	Belgium-Luxembourg 5.
Nitrates, crude	1,076	1,018	--	Chile 1,000.
Phosphates, crude	396,953	301,863	--	Morocco 295,817; Israel 5,846.
Pigments, mineral: Iron oxides and hydroxides, processed	1,324	1,144	--	West Germany 911.
Potassium salts, crude	--	3,300	--	All from Spain.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$254	$250	$1	Belgium-Luxembourg $169.
Synthetic do	$20	$15	--	Switzerland $8; Austria $6.
Pyrite, unroasted	3	3	--	All from West Germany.

See footnotes at end of table.

Table 3.—Portugal: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Salt and brine	43,018	20,817	--	Italy 20,635.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,145	283	--	Spain 140; France 49.
Worked	204	242	--	France 86; Belgium-Luxembourg 54.
Dolomite, chiefly refractory-grade	6,598	7,249	--	Italy 3,046; Norway 1,578.
Gravel and crushed rock	251	325	74	France 128; Spain 99.
Limestone other than dimension	3,000	3,500	--	All from France.
Quartz and quartzite	353	238	--	Belgium-Luxembourg 96; Finland 54.
Sand other than metal-bearing	6,451	5,324	37	Spain 3,033; Belgium-Luxembourg 2,098.
Sulfur:				
Elemental:				
Crude including native and byproduct	113,481	28,693	--	All from France.
Colloidal, precipitated, sublimed	44	2	--	West Germany 1.
Sulfuric acid	5,121	1,521	--	Netherlands 1,507.
Talc, steatite, soapstone, pyrophyllite	13,485	4,773	181	France 2,364; Belgium-Luxembourg 1,114.
Other:				
Crude	527	426	7	Spain 111; United Kingdom 102.
Slag and dross, not metal-bearing	223,003	160,733	--	Spain 132,376; France 28,355.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,314	901	52	France 551; Spain 274.
Carbon: Carbon black	10,999	11,509	65	France 6,183; Spain 2,574.
Coal: Anthracite and bituminous	362,716	425,823	255,755	United Kingdom 130,197.
Coke and semicoke	78,378	55,205	1	United Kingdom 25,815; Netherlands 14,035.
Peat including briquets and litter	2,114	1,937	--	West Germany 766; U.S.S.R. 443.
Petroleum:				
Crude -- thousand 42-gallon barrels	55,998	53,063	--	Saudi Arabia 13,233; Iran 10,032; Nigeria 6,541.
Refinery products:				
Liquefied petroleum gas do.	3,500	3,603	151	United Kingdom 1,845; France 636.
Gasoline do.	4,411	3,708	(2)	Spain 809; Algeria 755; Turkey 428.
Mineral jelly and wax do.	9	10	(2)	West Germany 2.
Kerosine and jet fuel do.	174	101	(2)	Netherlands 58; France 12.
Distillate fuel oil do.	2,373	646	143	United Kingdom 209; France 137.
Lubricants do.	318	221	2	Italy 40; France 35; undetermined 61.
Residual fuel oil do.	5,102	8,136	84	Netherlands 4,519; France 1,359.
Bitumen and other residues do.	230	177	(2)	Spain 137; France 26.
Bituminous mixtures do.	91	112	--	Spain 96.
Petroleum coke do.	49	112	111	West Germany 1.

[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper.—The Neves-Corvo copper mine, under development near Castro Verde in the pyritic belt of southern Portugal, was in the process of changing ownership during 1984. The French companies Penarroya S.A. and Compagnie Française des Mines relinquished their 49% share in the Neves-Corvo operating company, Somincor, which is owned by the Government of Portugal. Rio Tinto Zinc Corp. Ltd. has offered to purchase the French interest in Somincor. However, before any purchase could be concluded, the Government of Portugal had the right to exercise a preemptive option to acquire the 49% relinquished by the French.

Development of the mine at Neves-Corvo continued. Production was planned for 1987 at an annual rate of 1 million tons of ore per year. In addition, the Government assigned Quimigal to plan and, eventually, to build a new copper smelter and refinery at Sines, on the Atlantic coast in southern Portugal. According to preliminary reports, the Sines facility should tentatively be able to process annually about 400,000 tons of sulfuric acid and anode slime containing 30,000 kilograms of silver and about 150 kilograms of gold. At yearend 1984, the plan called for building a flash smelting furnace; a refining furnace; installations for slag treatment for copper recovery, storage, and materials handling facilities; and an electrolytic plant. The sulfuric acid would be used by the fertilizer industry. At yearend, Quimigal was developing contacts with potential investors, domestic and foreign, for participation in the project. Reportedly, total investments should reach $300 million at 1983 prices.

Gold.—Exploration near the Jalles gold mine was completed, and results were being evaluated at yearend. If results warrant an expansion of the mine, a new plant for gold recovery may be built.

Iron and Steel.—The Moncorvo project for iron ore exploration and mine development in northern Portugal was inactive during the year, mostly owing to lack of funds.

The country's only integrated steel plant, owned by Siderurgia Nacional, underwent some modernization. A process computer was installed for blast furnace operation and control. In addition, a Paul Wurth mouth was installed in the blast furnace loading system. In the steel shop, a computer was put into operation to control the oxygen converter, and the steel shop weighing system was adapted for use of process computers. To protect the environment, dust cleaning systems were introduced in the blast furnace casthouse and in the sinter screening plant. In the light section mill, the billet reheating furnace refractory lining was replaced by a ceramic fiber lining. In the annealing department, capacity was increased by installing four new furnaces and nine bases. Furthermore, alteration of the control and regulation system resulted in improvement of the annealing quality. In the galvanizing shop, furnace capacity was increased from 1 ton per hour to 15 tons per hour. In addition, the recovery of furnace heat has reduced energy consumption by about one-fifth.

Pyrite.—Portugal continued to implement its integrated pyrite processing program, with the Aljustrel Mine as the focal point. Preparatory work was under way to increase current production to 1 million tons per year at Moinho, by introduction of sublevel stoping; the main hoisting shaft was also slated for deepening, and the access ramp should reach the 330 level. In connection with the mining expansion, surface grinding and flotation installations were considered, depending on results of the tests being conducted in the pilot plant operating at Aljustrel since 1982. Reportedly, the results were promising during 1984.

Other Metals.—Prospecting work for tungsten and tin was conducted in the Massueime, Fundao, Pena Macor, Almendra Mine, and Gois areas.

NONMETALS

Stone (Dimension).—Production of various kinds of dimension stone remained the most important sector of the nonmetallics branch of the industry. About 1,000 companies of various sizes produced dimension stone. The value of dimension stone production topped the list of values of the mineral industry of the country. Dimension stone of marble, granite, and slate was the principal product.

Granite.—Most of the production was concentrated in the districts of Braga, Viana do Costelo, Porto, and Vila Real. In addition, some deposits were in production in Evora and Portalegre in the south. Granite accounted for about 90% of the igneous dimension stone produced.

Marble.—Marble remained the most valuable stone produced in the country. The bulk of the marble was produced in the district of Evora with production concentrated around the localities of Vila Vicosa, Borba, and Estremas. Marble was also produced in areas of Trigexa, in Beja, Vienna do Alentego, and Escoural. Principal producers and exporters of marble were Marmores e Materias de Construçao Lda., Lusco-Belga de Marmores, S.A.R.L., and Companhia Industrial de Marmores de Estremor Lda.

Slate.—Production of slate was concentrated in the area around Valongo, in the district of Porto in northern Portugal. Three companies, Fonesca Costa and Ca. Lda., Pereira Gomez & Carvalho, both of Valongo, and Companhia Portuguesa de Ardoisias Lda., of Porto, produced slate.

MINERAL FUELS

Portugal was almost completely dependent on imported fuels to meet its energy demand. During 1984, Portugal did not produce crude oil, natural gas, or coking coal. Consequently, imports burdened the trade balance of the country, and the Government was undertaking measures to alleviate the adverse impact of the difficult energy situation. The Ministry of Energy and Industry revised the NEP issued in 1982. The new version projected a growth of energy use far below the previous version of the plan. According to the new forecasts, the energy used in 1990 is expected to be about 15.5 million tons of petroleum equivalent, and about 21 million tons of petroleum equivalent in 2000. The plan also calls for diversification of energy supplies away from imported oil by development of domestic nuclear and hydroenergy sources.

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The Mineral Industry of Romania

By Walter G. Steblez[1]

Romania's centrally planned mineral industry continued to produce modest amounts of metallic and nonmetallic ores and concentrates. However, the country's per capita crude steel production was sufficiently large to rank it among the top five producers in the world in that category. In 1984, Romania's national income rose 7.7%, and industrial production, 8.4%, compared with their respective levels in 1983. Mineral industry investment projects to come onstream during the year included two coking batteries at the Galati steel complex, a 4,000-ton-per-year welded tube mill at Zimnicea, and the connection of the oil-shale-fired Anina thermal power station to the national grid.

Investment policy continued to emphasize completion of ongoing projects rather than to accelerate the development of new ones.

Government Policies and Programs.— Increased vertical integration of the country's mineral industry and increased value added in heavy industry were among the main objectives of Government planners. Other priorities included maximizing the development of domestic fuel, energy, and raw material resources, and the reduction of import dependency, especially with regard to hard-currency transactions. These aims, coupled with aggressive exports to market economy countries, allowed Romania to accumulate sufficient hard-currency surpluses in 1984 to pay off 11% of its debt to Western lenders.

PRODUCTION

Romania's centrally planned production targets for coal and petroleum were not met and were below actual 1983 output levels. Steel and primary aluminum production showed gains in 1984; however, the country's copper, lead, and zinc production results were not published.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite, gross weight[e]	710,000	[3]712,000	680,000	650,000	620,000
Alumina, calcined, gross weight	534,000	540,000	514,000	[e]500,000	500,000
Ingot including alloys:					
Primary	241,000	242,000	208,000	[e]210,000	223,000
Secondary	18,000	18,000	18,000	[e]23,000	22,000
Total	259,000	260,000	226,000	[e]233,000	245,000
Bismuth, mine output, metal content[e]	80	80	80	80	80
Cadmium, smelter[e]	85	85	80	80	75
Copper:					
Mine output, metal content[e]	28,000	27,000	26,000	27,000	25,000
Smelter:[e]					
Primary	[3]40,675	39,450	35,000	34,000	32,000
Secondary	4,000	4,000	4,000	6,000	6,000
Total	44,675	43,450	39,000	40,000	38,000
Refined, primary and secondary[e]	[r]65,000	[r]60,000	[r]50,000	[r]47,000	45,000
Gold, mine output, metal content[e] troy ounces	65,000	65,000	65,000	65,000	65,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	2,333	2,304	2,146	1,987	2,000
Metal content (26% Fe) do.	607	600	560	517	520
Metal:					
Pig iron do.	9,012	8,857	8,637	8,190	8,100
Steel, crude do.	13,175	13,025	13,055	12,593	[3]14,437
Ferroalloys:[e]					
Ferrochromium	34,000	36,000	39,000	42,000	45,000
Ferrosilicon	39,000	42,000	45,000	48,000	52,000
Ferromanganese	65,000	70,000	75,000	80,000	87,000
Silicomanganese	31,000	33,000	35,000	38,000	41,000
Silicon metal	3,000	3,300	3,600	3,800	4,100
Semimanufactures:					
Castings and forgings, finished thousand tons	1,220	1,200	1,200	[e]1,100	1,200
Pipes and tubes do.	1,464	[e]1,500	[e]1,500	[e]1,400	1,500
Rolled products do.	9,319	9,600	[e]9,600	[e]9,400	10,000
Lead:					
Mine output, metal content[e]	[r]25,000	[r]25,000	[r]27,000	30,000	30,000
Metal, smelter:					
Primary	[r]40,991	[r]40,665	[r] [e]40,500	[r] [e]40,000	39,000
Secondary[e]	4,000	5,000	5,175	9,298	10,000
Total	[r]44,991	[r]45,665	45,675	49,298	49,000
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	900	[e]850	[e]850	820	810
Zinc:					
Mine output, metal content	[r]50,000	[r] [e]50,000	[r] [e]45,000	45,000	44,000
Metal, smelter, primary and secondary	45,906	45,217	[r] [e]39,800	42,000	41,000
NONMETALS					
Barite	[3]80,000	79,000	78,000	78,000	75,000
Cement, hydraulic thousand tons	15,611	14,746	14,995	13,968	14,200
Clays:[e]					
Bentonite	176,500	176,000	175,000	177,000	180,000
Kaolin	[3]402,400	[r]410,000	[r]410,000	[r]410,000	410,000
Diatomite[e]	[r]287,000	[r]290,000	[r]290,000	[r]290,000	300,000
Feldspar[e]	[r]83,600	[r]84,000	[r]84,000	[r]85,000	85,000
Fluorspar[e]	20,000	20,000	20,000	20,000	20,000
Graphite[e]	12,500	12,500	12,500	12,500	12,500
Gypsum[e]	[3]1,611	1,630	1,630	1,630	1,650
Lime thousand tons	3,813	3,742	3,792	3,623	3,700
Nitrogen: N content of ammonia do.	2,248	2,381	2,217	[e]2,200	2,200
Pyrites, gross weight[e] do.	930	930	930	930	930
Salt:					
Rock salt do.	1,770	2,013	1,902	1,838	1,800
Other do.	3,286	3,020	2,854	2,758	2,800
Total do.	5,056	5,033	4,756	4,596	4,600

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Sand[e] thousand tons	[3]2,716	2,800	2,900	2,500	2,500
Sodium compounds, n.e.s.:					
Caustic soda do	723	725	[e]720	[e]710	710
Sodium carbonate, manufactured, 100% Na_2CO_3 basis do	937	926	870	850	850
Sulfur:[e]					
S content of pyrites do	350	300	200	200	200
Byproduct, all sources do	140	150	150	150	150
Total do	490	450	350	350	350
Sulfuric acid do	1,850	1,950	2,000	[e]2,000	2,000
Talc[e]	[3]65,400	[r]65,000	[r]65,000	[r]66,000	65,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	101,849	104,358	102,000	101,166	100,000
Coal:					
Run-of-mine:					
Anthracite and bituminous thousand tons	9,686	9,826	9,658	10,629	[3]8,458
Brown do	680	724	714	773	850
Lignite do	27,448	29,014	31,061	37,357	[3]34,971
Total do	37,814	39,564	41,433	48,759	[3]44,279
Washed (produced from above):					
Anthracite and bituminous:					
For coke and semicoke production do	2,337	2,391	2,244	2,618	2,600
For other uses do	5,723	5,895	4,944	5,175	5,000
Brown do	648	686	674	731	800
Lignite do	26,456	27,955	29,996	35,998	30,000
Total do	35,164	36,927	37,858	44,522	38,400
Coke:					
Metallurgical do	3,033	2,933	3,513	4,268	[3]4,848
Other[e] do	[3]470	450	450	450	450
Total do	3,503	3,383	3,963	[3]4,718	[3]5,298
Fuel briquets (from brown coal) do	730	730	730	750	750
Gas, natural:					
Gross:					
Associated million cubic feet	247,732	274,042	310,663	366,813	370,000
Nonassociated do	[r]994,320	1,033,379	1,010,706	978,888	1,000,000
Total do	[r]1,242,052	1,307,421	1,321,369	1,345,701	1,370,000
Marketed[e] do	[3]1,198,683	1,200,000	1,100,000	1,100,000	1,120,000
Petroleum:					
Crude:					
As reported thousand tons	11,511	11,644	11,742	11,593	[3]11,453
Converted thousand 42-gallon barrels	[r]87,023	88,028	88,769	87,643	86,585
Refinery products:[4]					
Liquefied petroleum gas do	2,575	2,807	[e]2,800	[e]2,900	2,900
Gasoline do	40,502	42,381	[e]42,500	43,367	35,000
Jet fuel and kerosine do	6,727	7,200	[e]7,300	[e]7,300	7,300
Distillate fuel oil do	55,764	50,265	[e]49,000	48,042	48,000
Residual fuel oil do	68,138	56,244	[e]55,000	53,167	53,000
Asphalt do	4,066	[e]4,000	[e]3,500	[e]3,000	3,000
Lubricants do	4,648	4,207	[e]4,000	3,927	3,950
Total do	182,420	167,104	[e]164,100	161,703	153,150

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

[1]Includes data available through Sept. 14, 1985.

[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

Romania's cutback of hard-currency imports resulted in increased purchases from soft-currency centrally planned economy countries, as well as stepped-up barter arrangements with potentially mineral-rich developing states.

Romania's trade with the United States in 1984 significantly grew in value. Romania's exports to the United States rose 74%, and imports from the United States rose 33%, compared with those of 1983. Minerals and fuels accounted for the largest share of Romania's minerals exports to the United States; the highest of these in value were naphtha, steel plate and sheet, aluminum sheet and strip, chemicals, and oil well casings. U.S. exports to Romania included bituminous coal and chemical products.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	1,120	NA		
Unwrought	[2]79,900	[2]121,600	5,006	Poland 37,495; France 14,532; Japan 10,246.
Semimanufactures	8,873	12,683	30	Japan 7,661; Poland 3,413.
Chromium: Oxides and hydroxides	239	251	211	West Germany 20; Netherlands 20.
Copper: Metal including alloys:				
Scrap	704	NA		
Unwrought	3,885	4,279	--	All to West Germany.
Semimanufactures	24	125	--	West Germany 98; Pakistan 27.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	869	611	--	All to West Germany.
Iron and steel: Metal:				
Scrap	155	254	--	All to Yugoslavia.
Pig iron, cast iron, related materials	424	617	--	Sweden 450; Finland 165.
Ferroalloys:				
Ferrochromium	70	NA		
Ferrosilicon	2,308	126	--	All to Japan.
Unspecified	50	2,175	--	Turkey 2,150.
Steel, primary forms	65,966	165,000	--	Yugoslavia 23,298; undetermined 101,797.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	653	781	([3])	Yugoslavia 45; West Germany 31; undetermined 674.
Universals, plates, sheets do	744	776	--	Japan 143; West Germany 52; undetermined 522.
Hoop and strip do	3	([3])	--	Mainly to Greece.
Wire do	108	103	--	West Germany 8; undetermined 94.
Tubes, pipes, fittings do	[2]430	[2]374	4	Poland 42; West Germany 18; undetermined 275.
Castings and forgings, rough do	6	4	--	West Germany 3.
Platinum-group metals:				
Waste and sweepings value, thousands	$54	$59	--	All to United Kingdom.
Metals including alloys, unwrought and partly wrought do	$39	$32	--	All to West Germany.
Silver: Metal including alloys, unwrought and partly wrought do	$51	$2,340	--	Do.
Tin: Metal including alloys, scrap	--	20	--	All to United Kingdom.
Other:				
Oxides and hydroxides	4,231	NA		
Base metals including alloys, all forms[2]	26,098	19,037	--	NA.
NONMETALS				
Abrasives, n.e.s.: Dust and powder of precious and semiprecious stones including diamond value, thousands	$81	$1,225	$256	Belgium-Luxembourg $778.
Barite and witherite	365	202	--	All to France.
Boron: Oxides and acids	291	107	--	All to Yugoslavia.

See footnotes at end of table.

Table 2.—Romania: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Cement thousand tons	[2]3,083	[2]2,490	--	Algeria 449; Hungary 69; undetermined 1,944.
Clays, crude	621	NA		
Diamond: Industrial stones value, thousands	$59	$107	$3	Belgium-Luxembourg $104.
Fertilizer materials: Manufactured:				
Ammonia thousand tons	35	11	--	Greece 7; Yugoslavia 4.
Nitrogenous do.	[2]1,291	[2]1,353	202	Turkey 545; Poland 160; France 88.
Phosphatic do.	59	21	--	Yugoslavia 14; Hungary 7.
Potassic do.	([3])	20	--	All to Indonesia.
Unspecified and mixed do.	[2]1,428	[2]2,011	--	Yugoslavia 26; West Germany 23; undetermined 1,918.
Gypsum and plaster	19,905	15,100	--	All to Hungary.
Phosphorus, elemental	231	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	25	30	--	All to Greece.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	--	$58	--	All to Belgium-Luxembourg.
Salt and brine	652,000	565,593	--	Hungary 432,982; Yugoslavia 132,611.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	[2]443,400	[2]377,700	--	Hungary 51,524; Czechoslovakia 47,000; Thailand 30,023.
Sulfate, manufactured	15,433	NA		
Stone, sand and gravel: Dimension stone:				
Crude and partly worked	2,535	752	--	Hungary 645; Jordan 107.
Worked	11,228	9,248	--	West Germany 7,927; Austria 1,015.
Sulfur: Sulfuric acid	97	NA		
Other:				
Crude	983	NA		
Slag and dross, not metal-bearing	2	NA		
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	[2]21,500	[2]24,900	--	Poland 10,530; Czechoslovakia 3,299.
Coal: Anthracite and bituminous	--	2,900	--	All to Yugoslavia.
Gas, natural: Gaseous million cubic feet	7,063	[2]7,063	--	All to Hungary.
Peat including briquets and litter	643	637	--	Austria 386; Italy 251.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	66	50	--	Netherlands 46; Italy 3.
Gasoline do.	[2]23,588	[2]28,674	6,385	West Germany 1,719; France 524; undetermined 19,299.
Mineral jelly and wax do.	44	[2]28	--	Italy 8; undetermined 20.
Kerosine and jet fuel do.	27	615	--	Canada 300; Cyprus 162; West Germany 130.
Distillate fuel oil do.	[2]10,562	[2]17,106	1,086	Italy 7,832; Turkey 1,102; France 542.
Lubricants do.	[2]1,816	[2]1,487	--	Austria 509; Canada 252; Brazil 192.
Residual fuel oil do.	[2]12,707	[2]20,396	437	Italy 7,153; Singapore 2,299; France 545.
Bitumen and other residues do.	20	7	--	All to Austria.
Petroleum coke do.	[2]583	[2]636	--	France 107; Italy 76; undetermined 434.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a 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]Less than 1/2 unit.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	580,502	534,609	--	Greece 416,757; Yugoslavia 117,848.
Oxides and hydroxides	11,675	14,445	--	Yugoslavia 4,507; Netherlands 4,428; Hungary 3,127.
Metal including alloys:				
Unwrought	1,902	2,205	--	All from Hungary.
Semimanufactures	2,100	745	--	Hungary 340; West Germany 325.
Cadmium: Metal including alloys, all forms	30	32	--	All from Japan.
Chromium: Ore and concentrate	26,802	62,414	--	Turkey 62,134; Finland 230.
Cobalt:				
Oxides and hydroxides	38	9	--	All from Netherlands.
Metal including alloys, all forms	28	28	(2)	Belgium-Luxembourg 15; West Germany 9.
Copper:				
Ore and concentrate	--	[3]750	--	All from Zaire.
Oxides and hydroxides	5	25	--	All from West Germany.
Metal including alloys:				
Unwrought	20,790	23,748	--	Poland 21,749; Zambia 1,979.
Semimanufactures	9,381	7,942	--	Poland 6,523; West Germany 633.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	451	96	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	[4]14,398	[4]14,477	--	U.S.S.R. 7,645; Brazil 3,910.
Metal:				
Scrap	--	30	--	All from Jordan.
Pig iron, cast iron, related materials[4]	285,400	212,800	--	NA.
Ferroalloys:				
Ferroaluminum	915	1,200	--	All from West Germany.
Ferroboron	63,000	54,000	--	NA.
Ferrochromium	--	73	--	All from West Germany.
Ferrosilicon	29	21,405	--	All from U.S.S.R.
Unspecified[4]	99,756	72,022	--	NA.
Steel, primary forms	171,000	445,000	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	304	190	--	Hungary 24; undetermined 148.
Universals, plates, sheets do	233	156	--	Czechoslovakia 19; Hungary 10; undetermined 95.
Hoop and strip do	18	11	--	West Germany 9; Hungary 2.
Rails and accesories do	105	108	--	NA.
Wire do	20	7	--	West Germany 2; undetermined 4.
Tubes, pipes, fittings do	[4]60	[4]48	1	Japan 10; Czechoslovakia 4; undetermined 28.
Lead:				
Ore and concentrate	--	3,400	--	All from Italy.
Oxides	1,495	550	--	Do.
Metal including alloys, unwrought[3]	4,900	1,200	--	NA.
Manganese: Ore and concentrate, metallurgical-grade	174,000	220,000	--	Brazil 86,613; undetermined 133,387.
Mercury 76-pound flasks	58	4,148	--	All from Netherlands.
Nickel:				
Matte and speiss	470	955	--	All from Cuba.
Oxides and hydroxides	39	23	--	All from Netherlands.
Metal including alloys:				
Unwrought	345	700	--	France 350; Netherlands 199.
Semimanufactures	191	203	--	West Germany 113; Sweden 28; Italy 22.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,493	$698	$40	West Germany $641.
Titanium:				
Ore and concentrate	2,240	2,659	--	Netherlands 2,361; Italy 298.
Oxides	1,284	2,311	--	Yugoslavia 1,713; West Germany 598.
Tungsten:				
Oxides and hydroxides	--	10	--	All from France.
Metal including alloys, all forms	(2)	15	--	All from West Germany.
Vanadium: Oxides and hydroxides	283	NA		
Zinc:				
Ore and concentrate	9,134	2,500	--	All from Greece.
Oxides	3,843	3,135	--	France 2,219; Yugoslavia 900.
Blue powder	--	240	--	All from France.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc —Continued				
Metal including alloys:				
Unwrought	[3]6,900	[3]1,000	--	Netherlands 500.
Semimanufactures	1,967	1,050	--	West Germany 750; Belgium-Luxembourg 300.
Zirconium:				
Ore and concentrate	40	53	--	All from West Germany.
Metal including alloys, all forms kilograms	--	289	289	
Other:				
Ores and concentrates	--	95,555	--	All from Greece.
Oxides and hydroxides	13,803	199	--	West Germany 156.
Base metals including alloys, all forms	31	26	14	Sweden 10; West Germany 2.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	110	93	--	Japan 90; Italy 3.
Artificial: Corundum	5,202	6,414	--	Yugoslavia 3,755; Hungary 1,697; Japan 960.
Dust and powder of precious and semi-precious stones including diamond value, thousands	$254	$763	$681	Belgium-Luxembourg $82.
Grinding and polishing wheels and stones	1,251	935	--	West Germany 237; Yugoslavia 157; Belgium-Luxembourg 152.
Asbestos, crude	10	1,412	--	Canada 1,406.
Barite and witherite	3,800	1,000	--	All from Turkey.
Boron materials:				
Crude natural borates	25,300	24,397	--	Do.
Oxides and acids	271	1,057	--	Turkey 1,000; Yugoslavia 56.
Cement	30	49	--	All from Belgium-Luxembourg.
Clays, crude:				
Kaolin	4,729	6,375	--	United Kingdom 4,063; West Germany 1,508.
Unspecified	52,758	50,040	--	Turkey 48,988; West Germany 1,032.
Diamond:				
Gem, not set or strung value, thousands	$109	$118	--	All from Belgium-Luxembourg.
Industrial stones do	$5,529	$5,442	--	United Kingdom $3,380; Belgium-Luxembourg $2,062.
Diatomite and other infusorial earth	520	992	--	France 776; Iceland 139.
Feldspar, fluorspar, related materials	2,640	NA		
Fertilizer materials: Manufactured:				
Nitrogenous	105	461	--	Jordan 350; West Germany 111.
Phosphatic	33	NA		
Potassic	[4]754,808	[4]811,538	--	East Germany 188,800; undetermined 609,863.
Unspecified and mixed	9,006	401	--	All from Belgium-Luxembourg.
Graphite, natural	47	129	--	West Germany 79; Austria 50.
Lime	25,891	29,696	--	Czechoslovakia 20,000; Greece 8,950.
Mica:				
Crude including splittings and waste	298	NA		
Worked including agglomerated splittings	9	17	--	Austria 14; France 3.
Phosphates, crude thousand tons	[4]2,083	[4]2,510	317	Jordan 740; Morocco 590.
Phosphorus, elemental	--	190	--	All from U.S.S.R.
Pigments, mineral: Iron oxides and hydroxides, processed	597	412	--	West Germany 276; Japan 136.
Stone, sand and gravel:				
Gravel and crushed rock	183	NA		
Quartz and quartzite	110	200	--	All from West Germany.
Sand other than metal-bearing	4,880	NA		
Sand and gravel	--	400	--	Do.
Sulfur:				
Elemental:				
Crude including native and byproduct	270,967	191,317	31,492	Poland 145,000; Canada 14,250.
Colloidal, precipitated, sublimed	--	100	--	All from France.
Sulfuric acid	1,659	16	--	All from West Germany.
Talc, steatite, soapstone, pyrophyllite	114	NA		
Other:				
Crude	2,217	3,841	--	Italy 1,526; Greece 1,000; Yugoslavia 470.
Slag and dross, not metal-bearing	--	67	--	All from West Germany.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	27	25	--	All from Italy.
Carbon: Carbon black	42	25	--	West Germany 18; Netherlands 7.
Coal: Anthracite and bituminous thousand tons	[4]3,631	[4]5,313	314	Poland 2,490; Czechoslovakia 352.
Coke and semicoke do.	[4]2,614	[4]1,715	--	Japan 347; Czechoslovakia 188; Italy 185.
Petroleum:				
Crude thousand 42-gallon barrels	[4]80,838	[4]90,484	--	Mainly from U.S.S.R.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	82	NA		
Gasoline do.	8,755	3,621	--	West Germany 1,794; Netherlands 926.
Mineral jelly and wax do.	4,337	126	--	United Kingdom 47; Switzerland 39.
Kerosine and jet fuel do.	4,278	4,689	--	West Germany 2,751; Greece 1,349.
Distillate fuel oil do.	2,515	NA		
Lubricants do.	37,492	40,110	NA	West Germany 32,662; Netherlands 2,086.
Nonlubricating oils do.	4,823	1,798	--	Ivory Coast 1,665.
Residual fuel oil do.	--	164	--	All from Italy.
Asphalt do.	261	18	--	All from France.
Bitumen and other residues do.	--	3,375	--	All from Netherlands.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a 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.

COMMODITY REVIEW

METALS

Copper.—Romania announced plans to start construction of the Rosia Poieni copper mining and beneficiation complex. The complex, in the Apuseni Mountains, would reportedly be the largest project of its kind in the country, covering 200 square kilometers. A crusher and concentrator there were put on-stream in 1983. The low-grade ore apparently contained sufficient amounts of valuable associated constituents, such as molybdenum, to warrant extraction and processing. Approximately 15 million tons per year of ore would be processed when the complex became fully operational.

Ferroalloys.—Since 1976, a variety of ferroalloys have been produced at the Tulcea metallurgical complex. Located on the Danube-Black Sea Delta region in the eastern part of the country, the Tulcea complex's ferroalloy facilities consisted of two shops with a combined capacity of 280,000 tons per year, and a third facility that had a 4,750-ton-per-year silicon metal production capacity.

The first ferroalloy shop had an 80,000-ton-per-year capacity in five 16.5-megawatt, three-phase electric open arc furnaces equipped with 1,200-millimeter (diameter) self-coking continuous electrodes. Three furnaces were designated for the production of ferrosilicon alloys with annual capacities of 11,000 tons per furnace; two furnaces, each with a 23,500-ton capacity, produced ferromanganese alloys. The second ferroalloy shop, with about a 200,000-ton-per-year capacity, was equipped with four operational three-phase continuous process DEMAG electric arc furnaces; a fifth furnace apparently was under construction in 1984. Ferromanganese was produced in two 33-megawatt furnaces, each with a 50,000-ton-per-year capacity. Ferrochromium was produced in a 43-megawatt, 52,000-ton-per-year furnace, and ferrosilicon, in a 55-megawatt, 27,000-ton-per-year unit. The pouring cycle for ferrochromium and ferromanganese was every 2.5 to 3 hours; that of silicon ferroalloys, every 2 hours. Metallic silicon was produced at two 6.3-megawatt, continuous process, open-phase electric arc furnaces.

The first unit was domestically manufactured with a 2,500-ton-per-year capacity; the second unit with a 2,250-ton-per-year capacity was imported from China. Domestic raw materials used in Romania's ferroalloy industry included chips, metallurgical coke, and quartzite. Manganese and chromium ores and concentrates as well as additional metallurgical coke was imported.

In recent years, the country had also been importing over 150,000 tons of assorted ferroalloys per year including an estimated 15,000 tons of ferrochromium from the U.S.S.R. Planned facility expansion at the Tulcea metallurgical complex included new silicon metal ferrotitanium units, an oxygen-vacuum refinery for low carbon ferrochrome, and installations for slag and dust recovery from ferroalloy manufacturing operations.

Iron and Steel.—Since 1965, Romania has been implementing an ambitious industrialization program based on a large domestic steel industry. The country's steelmaking capacity rose from 3.4 million tons in 1965 to about 15 million tons in 1984. Romania was among the top five per capita crude steel producers in the world in 1984, with a per capita crude steel output equivalent to that of Belgium. Steel production by process was as follows: oxygen converter, 50%; open hearth, 33.7%; and electric steelmaking, 16.3%. Over 20% of Romania's steel output was continuously cast.

The Galati steelworks was the largest integrated steel complex in Romania, producing about 8 million tons of steel per year, or about 50% of the country's total output. Planned facility expansion was to be completed by yearend and would raise capacity to 10 million tons per year. Older steelworks such as Calan, Hunedoara, and Resista were undergoing modernization that was scheduled for completion by 1986. Also, three 150-ton oxygen converters were to be added at the Calarasi steel plant that would add about 3.6 million tons of crude steel capacity by yearend 1985. Three 250-ton units were also planned for Calarasi after 1985, which would eventually add 6 million tons per year of additional capacity.

Other events in the industry included the startup of production at the cold strip mill at the Otelu Rosu steel plant, the commissioning of Nos. 7 and 8 coking batteries at the Galati complex, and a 4,000-ton-per-year welded tube mill at the Zimnicea steel plant.

Romania continued to mine small amounts of iron ore but had to meet most of its needs through imports. Iron ore was imported from Brazil, India, Liberia, and the U.S.S.R.; scrap was imported from the U.S.S.R. and the United States, as well as from several African and Asian countries. In 1984, Romania indicated an interest in participating in the development of the Marandoo iron ore deposit in the Pilbara region of Australia. Romania reportedly proposed a barter deal that would exchange Romanian mining equipment for ore. In West Africa, Romania expressed similar interest in the development of the Faleme River iron ore deposits in Senegal, 760 kilometers east of Dakar.

Despite the rapid development of the iron and steel industry, Romania continued to import substantial amounts of high-value special steels and semimanufactures to meet the requirements of its manufacturing sector.

U.S. imports of low-priced Romanian plate increased significantly in 1984, amounting to roughly 10% of U.S. total plate imports. Romania's mineral imports from the United States consisted largely of bituminous coal.

Lead and Zinc.—Romania continued to mine and process its low-grade lead-zinc ores, but apparently began to rely increasingly on imports of concentrates and metals.

NONMETALS

Romania continued to mine and process a wide variety of nonmetallic industrial minerals for domestic use, including barite, bentonite, diatomite, feldspar, graphite, kaolin, limestone, mica, quartz, and quartz sands as well as other useful nonmetallic minerals. The country also produced some synthetic diamonds for domestic use in building materials, ceramics, paint, and sprays.

As with ferroalloys, the Tulcea metallurgical complex was also the center of the country's refractory industry. The Tulcea plant had two tunnel furnaces of 25,000 and 35,000 tons per year, respectively, and a 1,700-ton press. The plant produced both magnesite and chrome-magnesite refractory bricks. The development of a second stage of the plant was reportedly under consideration during the year.

MINERAL FUELS

Coal.—Romania's coal production in 1984 declined slightly in comparison with that of 1983, owing mainly to production shortfalls of lignite. Reportedly, the shortfall was blamed on poor management in the Ministry of Mines, which allegedly failed to maintain worker discipline. During the year, a new lignite mine was under development at Borsec in the central part of the country that would exploit a relatively high-calorie lignite. The first two shafts were reportedly sunk to a depth of 76 meters. Transformer and compressor stations were also installed and put into operation by yearend.

Nuclear Energy.—The Government announced that Babcock and Wilcox (Canada) Ltd. would supply the Romanian foreign trade organization Romenergo with heat exchangers and steam generators for the Cernavoda nuclear powerplant that was under construction. The powerplant, east of Bucharest, would be supplied by Canadian-built Candu reactor blocks.

Petroleum and Natural Gas.—Petroleum production, like that of coal, declined during 1984 owing to an alleged lack of discipline among the work force and poor management. To meet the needs of its refineries, Romania's petroleum imports in recent years equaled and, in some cases, exceeded domestic output. Although both Romania and the U.S.S.R. were fellow members of the Council for Mutual Economic Assistance, Romania's 8 to 11 million barrels per year of petroleum imports from the U.S.S.R. was paid for in hard currency. In February, the U.S.S.R. reportedly turned down a Romanian request for additional petroleum deliveries, indicating that preferential treatment would only be granted to Romania in exchange for direct Romanian participation in Soviet industrial energy projects or by payment in agricultural products. During the winter of 1983-84, Romania experienced shortages of both energy and food. Unlike petroleum, the production of natural gas showed some gains in 1984 compared with that of 1983.

Shale (Bituminous).—Late in the year, it was announced that the first 330-megawatt power generating units at the Anina Thermal Power Station were connected with the national electric power grid. The power station was fired by oil shale from the nearby open pit mines at the Anina deposits (Caras-Severin County); the Anina mining operation reportedly produced more than 500,000 tons of shale per year with calorific content ranging from 980 to 1,200 kilocalories per kilogram.

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[1]Foreign mineral specialist, Division of International Minerals.

The Mineral Industry of Saudi Arabia

By John R. Lewis[1]

Over one-fourth of the world's known reserves of crude oil are in the geologic structures beneath Saudi Arabia and its adjacent offshore waters. Saudi reserves are about one-third larger than those of the entire Western Hemisphere. Petroleum, thus, continued in 1984 to be the dominant force in Saudi Arabia's mineral economy as well as of its overall economy. Export revenues from crude and refined petroleum products and, increasingly, from petrochemicals comprised a large percentage of the national income. Because of its position as swing producer among its fellow members in the Organization of Petroleum Exporting Countries (OPEC) and because of continued reduced world demand for petroleum energy, exports of Saudi Arabia's crude and refined products for 1983 and 1984 combined were off 62% from the level of exports of crude and products in 1982.

Other minerals or mineral products that were important, but to a lesser degree than oil, included cement, iron and steel, and sulfur. Exploration for nonferrous minerals and startups of several modest mining operations in copper, gold, lead, and zinc were under way.

The gross domestic product stood at $108 billion[2] and was growing at an annual rate of about 7%. Total revenues to the Government were $53 billion while expenditures were $62 billion, resulting in a shortfall to be recovered by drawing on Saudi Arabia's estimated $155 billion overseas financial reserve; a course it was reluctant to allow to continue. The drive toward diversification of the economy continued and gains were made in the industrial and agricultural sectors. In this period of recession, the Government moved to minimize or eliminate wasteful and unproductive spending while allowing productive spending to continue.

Government Policies and Programs.—Having spent more than a decade in building a modern and highly efficient infrastructure that was in top condition and virtually completed by 1984, the Government began a campaign to spur the private sector into investing more in the economy, particularly in industry. Saudi Arabia's fourth 5-year plan called for privatization of several large state agencies including the General Petroleum and Mineral Organization (Petromin). One of the more important objectives of the plan was diversification of the national income and a reduction in dependence on oil for foreign exchange.

PRODUCTION AND TRADE

Crude petroleum production remained at drastically depressed levels as Saudi Arabia sought, within the framework of OPEC, to maintain production ceilings and agreed-upon prices. Accurate information on Saudi Arabia's daily crude output was not issued by the Government in 1984. Outside estimates ranged from 5.5 million barrels per day (bbl/d) to 4.2 million bbl/d, but an official statement, limited to the output for July and August only, stated that for those 2 months, output was much less.

Production of both iron and steel and cement rose in 1984 as the Saudi Iron and Steel Co. (Hadeed) plant went on full production and a ninth large cement plant went on-stream. Saudi Arabia was still reliant for about 40% of its cement upon foreign sources, mostly neighboring countries.

Exports of petroleum and petroleum products comprised 99% of Saudi Arabia's exports and were valued at $38.9 billion, down from $105.8 billion in 1981. Imports of all commodities also were down to $36.8 billion, and created a closer trade balance than had existed in many years.

Generally, Saudi Arabia was against any barter or countertrading transactions involving oil. During 1984, in what was described as an exceptional case, Saudi Arabia's national airline, Saudi, arranged to purchase 10 Boeing stretched 747 transport aircraft from the Boeing Co. of the United States. Price per plane was estimated to be $100 million, with one spare Rolls Royce jet engine per plane for $7 million additional. The $1.07 billion purchase was to be financed by the Saudi Government through sale of between 34 and 35 million barrels of Saudi crude oil, valued at official prices. Sale of the oil was to be handled by the Saudi national oil company, Petromin. It appeared that crude sales would be made only in sufficient quantity to pay for each plane as it was delivered.

The six-nation Gulf Cooperation Council (GCC), composed of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, protested tariffs imposed by the European Economic Community on imports of Saudi Arabian methanol coming from new petrochemical facilities beginning to produce that product in Saudi Arabia.

Table 1.—Saudi Arabia: Production of mineral commodities[1]

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Iron and steel: Steel, crude thousand metric tons	50	72	70	275	[2]842
NONMETALS					
Cement, hydraulic[3] do.	2,911	4,735	7,153	8,126	[2]9,000
Gypsum do.	[r]300	[r]350	363	500	[2]300
Lime[e] do.	150	175	170	9	[2]12
Nitrogen: N content of ammonia do.	167	170	207	225	410
Sulfur:					
Native metric tons	1,000	NA	NA	NA	NA
Byproduct, all sources do.	460,000	600,000	900,000	695,000	[2]833,000
Total do.	461,000	600,000	900,000	695,000	833,000
MINERAL FUELS AND RELATED MATERIALS[4]					
Gas, natural:					
Gross million cubic feet	1,935,407	1,880,071	1,200,000	[e]1,000,000	1,700,000
Marketed[e] do.	450,000	500,000	400,000	383,500	1,100,000
Natural gas liquids: All forms thousand 42-gallon barrels	135,139	163,582	159,769	[e]125,000	[2]130,000
Petroleum:					
Crude do.	3,613,683	3,579,920	2,309,428	1,834,100	1,606,000
Refinery products:					
Gasoline do.	26,043	29,000	39,000	[e]50,000	36,000
Jet fuel do.	11,800	13,500	16,700	[e]17,000	15,000
Kerosine do.	12,526	[r]10,000	9,000	[r e]9,000	10,000
Distillate fuel oil do.	47,700	[e]46,000	66,975	84,900	99,000
Residual fuel oil do.	89,048	[e]90,000	93,748	[e]90,000	80,000
Liquefied petroleum gas do.	97,339	[e]100,000	57,243	[e]50,000	60,000
Naphtha do.	45,560	[e]47,000	36,850	[e]32,000	35,000
Asphalt do.	8,268	[e]8,300	14,125	[e]16,000	5,000
Unspecified do.	1,600	[e]1,700	2,000	[e]3,000	3,500
Refinery fuel and losses[e] do.	10,200	10,500	10,000	9,000	10,000
Total do.	350,084	[r e]356,000	[r e]345,641	[r e]360,900	353,500

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Oct. 15, 1985.
[2]Reported figure.
[3]Data are for the Hejira calendar year, which corresponds closely to the Gregorian calendar year.
[4]Includes Saudi one-half share of production in the Kuwait-Saudi Arabia Partitioned Zone.

Table 2.—Saudi Arabia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983
METALS		
Aluminum: Metal including alloys:		
Scrap	6,946	NA
Unwrought	62	NA
Semimanufactures	244	NA
Copper:		
Matte and speiss including cement copper	110	NA
Metal including alloys:		
Scrap	8,013	NA
Semimanufactures	152	NA
Iron and steel:		
Iron ore and concentrate, pyrite, roasted	2,000	NA
Metal:		
Scrap	28,680	NA
Pig iron, cast iron, related materials	269	NA
Steel, primary forms	98	NA
Semimanufactures:		
Bars, rods, angles, shapes, sections	2,561	NA
Universals, plates, sheets	2,452	NA
Rails and accessories	455	NA
Tubes, pipes, fittings	4,498	NA
Lead: Metal including alloys, all forms	r1,094	NA
Zinc:		
Ore and concentrate	107	NA
Metal including alloys:		
Scrap	240	NA
Unwrought	193	NA
Semimanufactures	467	NA
NONMETALS		
Abrasives, n.e.s.: Grinding and polishing wheels and stones	23	NA
Asbestos, crude	798	NA
Cement	527,301	NA
Clays, crude: Unspecified	88	NA
Diatomite and other infusorial earth	81	NA
Fertilizer materials:		
Crude, n.e.s	542	NA
Manufactured:		
Nitrogenous	340,764	NA
Phosphatic	4,473	NA
Unspecified and mixed	38	NA
Graphite, natural	25	NA
Gypsum and plaster	38,361	NA
Lime	3,991	NA
Pigments, mineral: Iron oxides and hydroxides, processed	31	NA
Salt and brine	2,000	NA
Sodium compounds, n.e.s.: Carbonate, manufactured	8	NA
Stone, sand and gravel:		
Dimension stone:		
Crude and partly worked	1,116	NA
Worked	3,161	NA
Gravel and crushed rock	182,651	NA
Sand other than metal-bearing	364	NA
Sulfur:		
Elemental:		
Crude including native and byproduct	131	NA
Colloidal, precipitated, sublimed	415,946	NA
Sulfuric acid	234	NA
Other: Crude	3,660	NA
MINERAL FUELS AND RELATED MATERIALS		
Asphalt and bitumen, natural	14,760	NA
Carbon black	13	NA
Coal:		
Anthracite	7	NA
Briquets of anthracite and bituminous coal	219	NA
Lignite including briquets	33	NA
Gas, natural: Gaseous million cubic feet	578,688	NA
Petroleum:		
Crude thousand 42-gallon barrels	2,024,172	[2]1,658,925
Refinery products:		
Liquefied petroleum gas do	127,286	117,530
Gasoline, motor do	34,902	37,230
Kerosine and jet fuel do	33	12,045
Distillate fuel oil do	16,637	70,810
Lubricants do	506	1,825
Residual fuel oil do	18,876	93,075

rRevised. NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Includes partly refined.

Table 3.—Saudi Arabia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkaline- and rare-earth metals	1,500	2,770	45	United Kingdom 1,033; Sweden 800; Kenya 299.
Aluminum:				
Ore and concentrate	114,856	142,686	--	India 97,226; Romania 22,781; Australia 22,675.
Oxides and hydroxides	541	393	69	France 101; West Germany 37; unspecified 184.
Ash and residue containing aluminum	--	436	NA	Netherlands 280; United Kingdom 69.
Metal including alloys:				
Scrap and unwrought	r6,381	14,629	NA	Bahrain 7,151; Spain 3,392; Canada 1,445.
Semimanufactures	44,446	60,642	3,809	Greece 16,342; France 5,746; Italy 4,449.
Arsenic: Metal including alloys, all forms	98	129	--	West Germany 103; France 16.
Cobalt:				
Oxides and hydroxides	74	154	--	United Kingdom 146.
Metal including alloys, all forms	--	196	42	Italy 89; Taiwan 21; Spain 12.
Copper: Metal including alloys:				
Scrap	215	77	43	Japan 16; unspecified 18.
Unwrought	39	58	20	Italy 22; France 16.
Semimanufactures	26,459	28,678	4,407	Australia 11,045; Japan 5,641; United Kingdom 1,937.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	638,995	738,180	--	Switzerland 498,271; West Germany 112,849; United Kingdom 115,871.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	95,695	294,656	--	Brazil 181,098; Sweden 68,085; India 44,470.
Metal:				
Scrap	1,278	--		
Pig iron, cast iron, related materials	196,940	377,853	846	Brazil 201,810; Sweden 78,652; India 26,179.
Ferroalloys	356	140	7	West Germany 64; Taiwan 33; France 16.
Steel, primary forms	229,385	214,296	991	Japan 94,891; Finland 34,592; Republic of Korea 18,575.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	3,362	2,972	3	Japan 1,369; Republic of Korea 564; Brazil 256.
Universals, plates, sheets do	736	559	10	Japan 416; West Germany 49; Republic of Korea 32.
Rails and accessories do	73	23	2	United Kingdom 11; West Germany 5; Japan 2.
Wire do	55	90	(2)	West Germany 31; Japan 15; Republic of Korea 11.
Tubes, pipes, fittings do	1,032	1,028	68	Japan 501; Italy 95; West Germany 73.
Castings and forgings, rough do	48	93	16	United Kingdom 18; India 10; West Germany 8.
Lead:				
Ore and concentrate	313	158	--	Mainly from Morocco.
Oxides	247	214	NA	West Germany 87; unspecified 127.
Metal including alloys:				
Scrap	1,044	844	--	United Kingdom 473; Lebanon 106; Kuwait 97.
Unwrought	892	731	--	Jordan 386; Kuwait 265.
Semimanufactures	2,538	9,719	296	United Kingdom 6,497; West Germany 2,001.
Magnesium: Metal including alloys, semimanufactures	155	--		
Manganese:				
Ore and concentrate, metallurgical-grade	2,605	7,424	--	Norway 5,880; France 1,444.
Oxides	31	159	110	NA.
Mercury 76-pound flasks	348	638	87	Turkey 116; United Kingdom 29; unspecified 377.
Molybdenum: Ore and concentrate[3]	789	1,001	230	France 183; Belgium-Luxembourg 171.
Nickel: Metal including alloys, semimanufactures	288	360	18	Italy 177; Taiwan 72; West Germany 44.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified value, thousands	$19	--		
Silver: Metal including alloys, unwrought and partly wrought[4] troy ounces	104,683	24,370	3,651	Switzerland 10,579; West Germany 7,942.
Tin: Metal including alloys:				
Scrap	55	34	--	Singapore 25; Malaysia 9.
Semimanufactures	1,328	3,263	609	Japan 1,317; West Germany 1,125.
Titanium: Oxides	3,184	4,277	2,003	United Kingdom 974; Belgium-Luxembourg 440.
Uranium and thorium: Metal including alloys, all forms value, thousands	$84	--		
Zinc:				
Ore and concentrate	242	514	--	Czechoslovakia 317; West Germany 171.
Oxides	686	898	24	West Germany 372; Czechoslovakia 225; United Kingdom 144.
Metal including alloys:				
Scrap	--	1,153	--	Japan 466; United Kingdom 199; Czechoslovakia 180.
Unwrought	1,861	--		
Semimanufactures	16,715	15,646	89	Japan 6,721; Belgium-Luxembourg 2,571; West Germany 2,536.
Other:				
Ores and concentrates	198	207	15	Netherlands 77; unspecified 104.
Oxides and hydroxides	--	215	19	West Germany 156.
Ashes and residues	--	436	--	Netherlands 280; United Kingdom 69.
Base metals including alloys, all forms	229	--		
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	17	306	31	NA.
Grinding and polishing wheels and stones	3,352	3,208	179	Italy 1,571; West Germany 276; Japan 273.
Asbestos, crude	15,882	8,801	465	Canada 4,028; Botswana 2,361; Cyprus 832.
Barite and witherite	46,699	73,459	551	Thailand 51,536; Ireland 9,500; Greece 6,180.
Boron materials:				
Crude natural borates	27	387	123	West Germany 255.
Elemental	360	339	71	Japan 177; Italy 65.
Bromine	1,965	2,729	211	United Arab Emirates 1,537; West Germany 456.
Cement thousand tons	10,612	15,543	3	Spain 6,028; Japan 5,166; Greece 2,744.
Chalk	3,445	3,995	NA	Belgium-Luxembourg 1,256; France 647; Italy 584.
Clays, crude: Fire clay	30,171	23,189	11,888	India 4,169; Bulgaria 4,000; West Germany 1,258.
Cryolite and chiolite	38	111	111	
Diamond:				
Gem, not set or strung value, thousands	$1,914	$2,001	--	India $900; Belgium-Luxembourg $384; Italy $321.
Industrial stones do	$145	$471	--	India $193; Belgium-Luxembourg $114; Singapore $100.
Diatomite and other infusorial earth	49,756	10,518	1,488	Spain 3,693; Senegal 2,000; Italy 1,137.
Feldspar, fluorspar, related materials	965	1,136	NA	West Germany 831; France 300.
Fertilizer materials:				
Crude, n.e.s	28,666	89,594	5,248	West Germany 33,690; Netherlands 20,004; Italy 17,553.
Manufactured:				
Ammonia	727	588	83	Kuwait 283; Netherlands 89; United Kingdom 69.
Nitrogenous	44,905	73,497	1,522	France 19,177; Netherlands 18,404; Denmark 9,033.
Phosphatic	47,575	97,254	17,112	Belgium-Luxembourg 33,010; Finland 12,908; West Germany 6,140.
Potassic	7,936	29,119	260	Italy 18,500; Netherlands 4,976; United Kingdom 2,340.
Unspecified and mixed	18,948	21,793	1,276	Italy 5,500; Netherlands 3,144; Jordan 2,189.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Gypsum and plaster	59,140	96,788	3,780	West Germany 18,455; France 29,360; Yemen (Sanaa) 4,109.
Kyanite and related materials	3,582	3,937	125	West Germany 1,449; United Kingdom 1,354; India 512.
Lime	30,658	9,937	486	Lebanon 2,913; United Arab Emirates 1,620; France 684.
Magnesite	164	869	NA	Japan 632; Norway 90; West Germany 42.
Mica:				
Crude including splittings and waste	1,584	1,032	NA	India 922.
Worked including agglomerated splittings	203	109	80	West Germany 28.
Nitrates, crude	5,923	7,666	3,008	Italy 4,000; Finland 250.
Phosphates, crude	314	345	NA	United Kingdom 191; Netherlands 111.
Pigments, mineral:				
Natural, crude	2,756	5,667	2,536	India 682; West Germany 512; Turkey 472.
Iron oxides and hydroxides, processed	56,530	15,949	--	Qatar 15,019; West Germany 461.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$571	$766	--	West Germany $293; India $270; Taiwan $75.
Synthetic do	$1,121	$1,109	--	India $459; West Germany $341; Taiwan $176.
Pyrite, unroasted	97	190	38	West Germany 69; United Kingdom 30.
Salt and brine	18,049	20,665	12,156	United Kingdom 4,119; Netherlands 2,353.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	42,460	60,226	13,350	Jordan 15,415; Belgium-Luxembourg 11,524.
Sulfate, manufactured	r8,569	10,164	317	West Germany 3,985; United Kingdom 3,008; Spain 700.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	46,315	64,578	293	Italy 50,880; Spain 1,688; Syria 974.
Worked	492,177	614,408	6,469	Italy 403,032; Greece 54,562; Spain 39,117.
Dolomite, chiefly refractory-grade	2,512	1,917	NA	France 815; Italy 275.
Gravel and crushed rock	336,972	284,497	4,650	United Arab Emirates 191,021; Italy 66,879.
Limestone other than dimension	31,789	798	NA	Netherlands 376; Turkey 300.
Quartz and quartzite	1,060	891	NA	Belgium-Luxembourg 402; West Germany 367.
Sand other than metal-bearing	6,787	7,846	965	Netherlands 3,623; Greece 1,174; Italy 429.
Sulfur:				
Elemental:				
Crude including native and byproduct	900	287	NA	Iraq 272.
Colloidal, precipitated, sublimed	819	591	--	Kuwait 500; United Kingdom 60.
Sulfuric acid	2,424	1,191	64	Belgium-Luxembourg 436; Netherlands 322.
Talc, steatite, soapstone, pyrophyllite	927	1,876	90	India 466; Netherlands 267; Austria 243.
Other:				
Crude	6,025	--		
Slag and dross, not metal-bearing	541	--		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,606	2,764	1,835	United Kingdom 297; West Germany 140.
Carbon black	103	178	34	West Germany 22; Denmark 14; unspecified 94.
Coal: All grades including briquets	1,543	4,457	1,288	West Germany 2,284; Bangladesh 278.
Coke and semicoke	457	941	573	Malaysia 260.
Peat including briquets and litter	929	669	NA	Ireland 271; West Germany 197; United Kingdom 16.
Petroleum:				
Crude thousand 42-gallon barrels	5,774	1,627	770	NA.
Refinery products, lubricants do	r1,000	1,099	212	Netherlands 331; Singapore 217.

rRevised. NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]May contain vanadium and tantalum ores.
[4]May include platinum-group metals.

COMMODITY REVIEW

METALS

In 1984, Saudi Arabia was engaged in active exploration for copper, gold, silver, and zinc, mostly in the Arabian Shield sector of the country. Some promise emerged also for tin and tungsten. Most of the work was done by the Deputy Ministry for Mineral Resources (DMMR) through its contractors, but there was also activity in and progress by the private sector. DMMR operated several exploration support facilities both in-house and under contract including three geochemical laboratories, a Remote Sensing Center, and computer services and drilling facilities.

Aluminum.—Following consultations with other members of the GCC, Saudi Arabia decided in May to temporarily shelve plans to build a 200,000-ton-per-year aluminum plant, presumably at or near other industrial development at Jubail in the Eastern Province. Saudi Arabia's Petromin said that the decision had been taken to head off "harmful competition" among GCC members. The opportunity for a viable aluminum industry in Saudi Arabia still exists, according to the Ministry. Bahrain and the United Arab Emirate, Dubai, already had aluminum smelters in operation with total aluminum metal capacity of 319,000 tons per year.

The Gulf Organization for Industrial Consulting was laboratory testing bauxite from the Az Zabirah deposit to determine its usability for making alumina; some of it proved convertible into alumina using the Bayer process. Based on close-spaced drilling of the deposit during the year, inferred reserves of 94,000 tons of 50% alumina were found. The reserves lie beneath 30 meters of overburden and were considered easily mined by open pit methods.

Copper.—Further exploration work was going forward during the year at the Jabal Sayid copper prospect. Spurred by sufficiently promising finds in underground drilling completed in July 1983, the DMMR authorized further tunneling and underground drilling into four ore bodies that were found. A 100-ton representative ore sample had been sent to Western Europe for pilot plant studies.

Gold.—The Government-owned Mahd adh Dhahab gold complex continued to take shape at a slow but steady pace. The 400-ton-per-day mine, first exploited about 900 B.C., is about 170 miles northeast of Jidda, and was under the overall design and development responsibilities of Gold Fields Mahd adh Dhahab Ltd. Saudi Arabia's DMMR awarded a contract to Alimah, a Swedish company, for seven assorted pieces of heavy mine development machinery for Mahd adh Dhahab during the year. It appeared likely that Marubeni Saudi Arabia Co. of Japan would furnish crushing and grinding plants valued at $15.2 million for the ore processing section of the complex.

Meanwhile, development of the Al-Masane gold-silver-copper-zinc mine, jointly owned by the Arabian Shield Development Co. of Dallas, Texas, and the National Mining Co. of Saudi Arabia, was proceeding well at the site in far southwest Saudi Arabia. A 60-ton ore sample was metallurgically tested to try to obtain maximum gold recovery. Beneficiation equipment was to be designed to yield a copper and a zinc concentrate while gold and silver will be recovered by carbon-in-pulp adsorption. Approval by the Saudi Arabian Government permitted a long-term, interest-free loan to the two companies for commercial-scale development of the Al-Masane property as well as a 30-year mining lease. The next phase was to be construction of the plant and commencement of full-scale mining, eventually at a rate of 500,000 tons per year. Arabian Shield Development and National Mining are joint owners-managers of the operation. Petromin had an option to acquire 25% of the ownership at an unspecified future date.

There were a number of other gold exploration operations in progress at various places in the Arabian Shield. An area known as Nugrah as Safra was licensed by Petromin to Boliden Mineral AB of Sweden, and exploration by Boliden continued in the areas around the Nugrah ancient minesite, about 75 miles northeast of Medina in the Arabian Shield.

In the summer of 1984, there were reports that the British firm International Exploration was mounting a search for gold in a 7,500-square-kilometer area in the Al Wajh quadrangle. Data gathered on earlier exploratory efforts using conventional methods were consulted, but the work was also benefiting from the use of new techniques for investigating the mineral potential of an area using infrared and other images gathered by the landsat satellite of the

U.S. National Aeronautics and Space Administration.

Iron and Steel.—Progress in mining various low-grade iron ore bodies at the Wadi Sawawin minesite in the far northwest sector of Saudi Arabia continued. The objective was to have a variety of ore body samples to run through the nearby pilot crushing facility and beneficiation plant. The mining phase was almost completed by yearend. The project was being conducted by the British Steel Corp. for the Saudi DMMR.

The pilot beneficiation plant, capable of treating 5 tons of raw ore per hour, was at Al Muhwaylih on the Red Sea coast, and was operating according to plan and making concentrates containing 62% iron and 68% iron in the feed. The goal was 65% iron with an accompanying 70% iron recovery. The flotation process in use at this plant had been devised by the U.S. Bureau of Mines Research Center at Minneapolis, Minnesota.

Primary market for the output of a full-scale beneficiation plant, should it be built, was the new Hadeed plant at Jubail on the Persian Gulf coast. Other potential markets under study were those in Egypt and Pakistan.

After having begun steel production early in 1983, the Hadeed plant reached its rated capacity of 850,000 tons per year during March 1984, about 15 months after startup. In that month, 72,000 tons of direct-reduced iron, 77,000 tons of billets, and 70,000 tons of bars and rods were produced. By yearend, the plant had produced a total of 842,000 tons of steel; 820,000 tons was sold to Saudi Arabian buyers. A goal of 1 million tons of finished steel had been set for 1985. The availability of inexpensive natural gas was expected to make Saudi Arabian steel production competitive in international markets, according to the Arab Iron & Steel Union.

Magnesium.—The Refractory Industry of Saudi Arabia, a trade association, was studying development of ways to obtain magnesium and magnesium compounds from 45% magnesium oxide ore and/or the seawater desalinization plants' salt wastes from the waters of the Red Sea and of the Arabian Gulf. The U.S. Bureau of Mines was assisting through provision of technical information.

Zinc.—The presence of zinc has been noted in a number of deposits in the country. Usually the ores are associated with other nonferrous metal ores as at Al-Masane, where copper, gold, silver, and zinc were found in the ore body. In July 1983, joint venture partners surrendered their gold-copper-zinc exploration license in the Umm Al Shalahib area because of the absence of gold in the deposits. This shortcoming made development uneconomical, the partners announced. However, in late 1984, Petromin confirmed the presence of zinc deposits at Umm Al Shalahib grading 15% to 18%. The site is about 150 miles southwest of Riyadh.

NONMETALS

Cement.—Production capacity in Saudi Arabia rose 20% by yearend, owing to the completion of additional facilities at the Yanbu plant of the Yanbu Cement Co. plus completion of an entirely new plant by the Arabian Cement Co. at Rabigh. The new 4,000-ton-per-day plant had four 1,000-ton-per-day capacity furnaces and a special filtering system to eliminate air pollution. This new project gave Saudi Arabia eight operating plants. Total capacity by yearend was 10,305,000 tons per year, still far short of a demand approximating 22 million tons per year. Under construction was an additional capacity of slightly more than 2 million additional tons, and still more was under study by consultants for the Saudi Cement Corp. plant at Hufuf.

Yamama Saudi Cement Co. Ltd. had a sixth line under construction at its Riyadh plant, which would virtually double that facility's capacity when completed in 1986. Among other features, the entire plant will then be a completely computer controlled system, which will include automation of the laboratory and of the cement dispatch system.

Oasim Cement Industries Co. contracted at midyear with Ishikawajima-Harima Heavy Industries Co. Ltd. of Japan to build a 730,000-ton-per-year cement plant at Burayadah, about 400 kilometers northwest of Riyadh. The plant cost was set at $110 million.

Sulfur.—The Red Sea Sulphur Corp. was formed in 1984 for Petromin by a subsidiary of Boliden AB of Sweden and unidentified Arabian partners. The firm completed a sulfur pelletizing plant in April at Uthmaniyah, west of Dhahran, which was working up to a planned feed rate of about 1,000 tons per day of liquid sulfur fed to the plant from the desulfurizing of crude oil at the Arabian-American Oil Co. (Aramco) Ras

Tanura refinery. Red Sea bought, pelletized, transported, and marketed the sulfur thus produced. The Boliden subsidiary, CONTECH, also supervised installations in the Jubail Harbor for storing and shiploading the sulfur and was to manage the entire operation for a minimum of 2 years.

Two sulfur recovery plants had been scheduled for completion and operation in 1984. The Petromin-Mobil Oil Corp. plant at Yanbu was completed in September. The plant had capability to produce up to 300 tons of sulfur per day from refinery effluent gas. The Petromin-Shell Saudi Arabia Refining Ltd. plant at Al Jubail, however, was not completed, but was expected to be operational early in 1985.

MINERAL FUELS

Coal.—At midyear, geologists working for the DMMR found Saudi Arabia's first outcropping of coal in a limestone quarry where weathering had previously made several seams undiscernible. Near Burayadah, northwest of Riyadh, the discovery rekindled interest in coal as a future fuel and for chemicals. Because chips of coal turn up in many water well bores stretching from the Empty Quarter on the south to the Jordanian border on the north, geologists feel that the possibilities of commercial coal deposits are very promising. In the summer of 1984, for example, chips of coal from 12 separate layers at deep levels showed up in water well drilling at Wasia near Riyadh. The coal source was Cretaceous rocks correlating with borehole findings in the Empty Quarter. Coal found in the Burayadah stone quarry tested at 13,500 British thermal units per pound. DMMR geologists felt that it will take 15 years to explore, map, and exploratory drill this huge coal prospect, which, if commercial, would match the English-French-Belgian-German coal region.

Natural Gas.—Proved recoverable reserves of natural gas continued a slow, steady increase, growing from 118 trillion cubic feet in early 1983 to 123 trillion cubic feet at yearend 1984.

Meanwhile, Saudi Arabia was proceeding rapidly throughout 1984 toward its goal of 1 billion cubic feet of nonassociated gas to be available for its domestic industrial and power requirements, including the burgeoning petrochemical industry.

On behalf of the Saudi Government, Aramco was drilling 27 wells through the oil and gas producing horizons in the Ghawar Field, Saudi Arabia's oldest and largest, to a depth of about 11,000 feet into the prolific Permian-age Khuff Formation, which lies beneath the Ghawar oil horizons. The Khuff gas was high-pressure, high-sulfur material requiring treatment. Gas was to be collected from these wells through a 137-kilometer gas gathering system and fed into existing gas treatment plants at Shedgum and Uthmaniyah, near the Ghawar Field. The sweetened and cleaned-up gas was then to be fed into the Master Gas System, allowing the system much greater flexibility in its deliveries to all its customers, some of whom had been on a very precarious edge for gas when Saudi Arabia's oil production was reduced so drastically in 1983-84.

Petroleum.—At mid-1984, the 4-year-old Iraq-Iran war appeared to have entered a serious new phase. Iran's military aircraft attacked, among many others by Iraq and Iran, a Saudi oil tanker, the Yanbu Pride, just 35 miles off the Saudi coast not far from Saudi Arabia's major oil export Port of Ras Tanura. This gave cause for concern that major Arab oil facilities at any random place along the Persian Gulf's west side might be next. Saudi Arabia accepted outside assistance in stepping up air defenses. Standard Oil Co. of California and Mobil were sufficiently alarmed that their tankers were told to stay out of the Persian Gulf. The gulf was not as important a source of oil as it was in the 1970's but still provided 20% of the market economy countries' oil supplies in 1984. Europe and Japan were still the largest users of oil originating at gulf ports.

Exploration.—Aramco sharply curtailed all drilling for exploratory purposes as well as development work on established productive structures. Except for active drilling of the deep Khuff gas formation, which was going forward rapidly, drilling was limited to about 110 wells, down markedly from the approximately 184 wells drilled in 1983. Emphasis remained on offshore fields that produced heavy and medium crudes. With tremendous reserves and a productive capacity about 2-1/2 times the daily production, there was little incentive to seek new reserves.

Production.—Petromin made a policy decision to restrict dissemination of petroleum statistics. Therefore, information from indirect sources is at best only educated estimates. The self-imposed curtailment of Saudi Arabia's crude oil production, which began in 1981, continued in 1984. From a daily average production of about 9.6 million barrels in 1981, the 1984 daily production was 4.0 to 4.4 million barrels, which was off 9% from that of 1983 and was creating serious problems for Saudi Arabia's growth plans and programs because of sharply reduced oil sales income. Aramco, for the Saudi Government, continued producing about 90% of the country's crude, and the company was reporting production at its lowest level since 1970. This was beginning to affect the crude supplies of Aramco's four U.S. participants: Exxon Corp., Mobil, Standard Oil of California, and Texaco Inc., which were lifting about 1 million bbl/d, down from 7 million bbl/d in 1981, while Petromin was exporting about 2.2 million bbl/d, and placing additional crude in floating storage aboard huge tankers.

Activities in the Persian Gulf offshore Saudi Arabia continued fairly brisk. The huge, 31-year-old Safaniya Field, which produced from two sandstone reservoirs, was the site of construction of a 600,000-bbl/d desalting project costing $100 million and due on-stream by 1986. At a shipyard in neighboring Sharjah, Entrepose G.T.M. Pour Les Travaux Petroliers Maritimes (ETPM) was building 26 drilling platforms for Aramco, costing $20 million, for delivery early in 1985 to well sites in the Safaniya Field. Aramco was planning to proceed with a once-inactivated project for a sizable offshore oil and gas processing plant at Safaniya. Aramco reactivated a contract with Lummus Crest Inc. of Houston, Texas, for a preliminary design and bid package preparation for the 250,000-bbl/d offshore oil and gas production platform complex. The plant would also be handling 100 million cubic feet of gas per day. The complex was to include a main processing plant, an accommodation platform, and a platform containing manifolding and pipeline tie-in equipment. Plans called for oil and gas separation and gas compression and conditioning facilities and appropriate oil and gas pipelines to shore. Meanwhile, ETPM was also to build five tie-in platforms for Aramco in the Marjan offshore field. At Aramco's Qatif Field in the gulf, development of a waterflood project was under way. An underwater trencher was digging trench and laying a 6- to 8-inch pipe system, about 11 miles in all, including a shore approach and landing of the lines. Other wellhead platforms were being built for Aramco in Dubai and Abu Dhabi shipyards for use in Aramco's Marjan and Zuluf Fields.

During the year, Aramco discovered two new onshore oilfields at Farhah and Sahba while new deeper oil horizons were discovered offshore at the existing Marjan, Safaniya, and Zuluf Oilfields.

Refining.—At midyear, Aramco began awarding contracts on behalf of Petromin for various components of the new 150,000-bbl/d refinery to be built about 34 kilometers north of Burayadah in Saudi Arabia's Qasim region about 400 kilometers northwest of Riyadh. Designed to operate on heavy Saudi crude, the facility would make petroleum products for the domestic market. Saudi Arabian Bechtel Co. completed a feasibility study for the refinery late in 1982 and was to prepare detailed plans for the entire project. Saudi Arabia Toyo Engineering Co., the local affiliate of Japan's Toyo Engineering Co., was awarded an $8 million contract to build a 300-ton-per-day sulfur recovery plant at the refinery.

Work continued on the modernization work undertaken by Aramco on its Ras Tanura refinery, even as it continued in operation. Crude throughput averaged 400,000 bbl/d, and when the work is completed, the facility was to have a new 260,000-bbl/d crude unit and a 300-ton-per-day sulfur unit. Also, during the year, a dehydrator, a new asphalt tank farm, and loading docks for local use were put into service.

During the summer of 1984, Petromin announced that it planned to establish an international marketing network to promote spot and short-term sales of petroleum products from its new export refineries. The export services division was to be headquartered in London with branch sales offices in Houston, Texas; Geneva, Switzerland; and Tokyo, Japan. As Petromin's new export refineries increased their output, it was expected that about 20% of the petroleum products would be disposed of through spot and short-term deals.

One new export refinery, the PEM-REF facility at Yanbu, owned 50-50 by Petromin and Mobil, was started up in late July and loaded out its first shipment of products on behalf of Mobil on August 22, 1984. At the outset, the 250,000-bbl/d refinery ran at about 60% of capacity; crude was supplied from Saudi Arabia's Eastern Province fields through the Petroline crude pipeline. A huge power and desalination complex and the King Fahd Industrial Port and terminal on the Red Sea completed the gigantic new installation at Yanbu, which was inaugurated officially by Saudi Arabia's King on

October 2. The powerplants produce 250 megawatts of electricity per day, and the water plant will furnish 28.5 million gallons of freshwater per day to the new city of Yanbu.

Petrochemicals.—The world's petrochemical producers were carefully observing developments as Saudi Arabia's tremendous new producing capability began to move toward all-out production. Saudi Arabia's natural gas, previously flared as a waste product, was the primary feedstock to plants that soon would be producing 5% to 7% of the world's demand for petrochemicals. In 1984, world markets for these items were weak, and the world petrochemical industry registered deep concern.

There were 10 primary industry complexes either operating or under construction at Jubail during the year, and nearly all had something to do with petrochemicals. Most were joint ventures between the Saudi Basic Industries Corp. (SABIC) and a variety of international partners. At Yanbu, on the western side of Saudi Arabia, the huge ethylene plant of the Saudi Yanbu Petrochemical Co., a project of SABIC and Mobil, was completed ahead of schedule and under budget. The plant's output was to exceed a billion pounds per year, and employed state-of-the-art technology. Two principal products were to be polyethylene, which is used to make plastic bags and molded plastic products such as bottles, and ethylene glycol, a raw material used in the manufacture of certain fibers and automotive coolants. Mobil opened offices in 28 countries and an international marketing headquarters and technical services center in Brussels, Belgium, to handle the output from the Yanbu plant.

In addition to various basic plastic products from the group, at least one plant, Al Jubail Fertilizer Co., a joint venture of SABIC and Taiwan Fertilizer Co., was producing urea fertilizer for use in Saudi Arabia and in Bangladesh, China, India, Iran, Sudan, and Taiwan. SABIC also had established a worlwide marketing affiliate to handle sales, marketing, and technical services.

The new plant of the Saudi Petrochemical Co. (SADAF) at Jubail started test production of ethylene in the fourth quarter of 1984. Total cost of the SADAF project was estimated[3] to be $2.81 billion. Upon completion, the plant will have the capacity to produce annually 656,000 tons of ethylene, 456,000 tons of ethylene dichloride, 281,000 tons of crude industrial ethanol, 295,000 tons of styrene, and 377,000 tons of caustic soda. The Jubail plant was a 50-50 joint venture between SABIC and Pecten Arabia, an affiliate of U.S. Shell. U.S. Shell announced, late in the year, that it would take the plant's entire annual output of crude industrial ethanol, about 100 million gallons. This is about one-half the estimated U.S. annual demand for ethanol, which is used in solvents and coatings. Saudi Arabia has repeatedly stated that it hopes to capture 5% of the world's petrochemical market when all of its petrochemical plants are on-stream within a few years.

In December 1984, the Saudi-European Petrochemical Co. was established under an agreement signed by SABIC, the Arab Petroleum Investments Corp., Enichem of Italy, and Neste Oy of Finland. SABIC was to own 70% of the consortium's new plant, and each of the other three partners, 10%. The plant was to cost $600 million, and be constructed at Jubail. Using 700,000 tons per year of butane from Petromin and 170,000 tons per year of chemical-grade methanol from SABIC, the plant was to annually produce 500,000 tons of methyl tertiary butyl ether, 125,000 tons of butadiene, and 80,000 tons of butene-1.

Still another petrochemical complex was under way at Jubail. At the end of 1983, the National Plastic Co. (Ibm Hayyan) was established by SABIC, 70%; the Lucky Group of the Republic of Korea, 15%; and unidentified private sector investors, 15%. Construction began late in 1984 on the plant that will produce 300,000 tons of vinyl chloride monomer and 200,000 tons of polyvinyl chloride annually. Cost was expected to be about $400 million.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Saudi riyals (SRls) to U.S. dollars at the rate of SRls3.58=US$1.00.

[3]Middle East Economic Survey (Nicosia, Cyprus). V. 28, No. 7, Nov. 26, 1984, p. A3.

The Mineral Industry of Sierra Leone

By Ben A. Kornhauser[1]

The mineral industry of Sierra Leone was based on the production of bauxite, diamond, gold, and rutile. However, Sierra Leone's persistent shortage of foreign exchange and arrearage in debt repayment continued to disrupt trade necessary for a healthy economy.

Exploration for chromite was continuing, and the United Nations Development Program agreed to finance an initial mineral exploration program in central Sierra Leone. A U.S. oil consortium signed an agreement with the Government to explore for oil offshore.

The Government was trying to increase its income from diamonds by reducing smuggling, and by establishing procedures for selling diamonds at market rates and permitting their export.

PRODUCTION AND TRADE

Trade was disrupted and the country's ability to import was reduced by consistent balance of payment deficits that contributed to persistent shortages of foreign exchange and to debt payment arrears. The balance of payment deficits resulted from the falling prices for commodity exports, the rising cost of imports, and a great dependence on imported energy. To reduce the foreign exchange shortage, the Government formed the Precious Minerals Marketing Co. (PMMC), which had the status of a dealer and exporter of alluvial gold and diamonds and was designed to reduce smuggling in the commodities that were the major earners of foreign exchange. The change apparently succeeded as gold exports in 1984 increased by 50% and foreign exchange revenue from exported alluvial diamonds increased about 125% to $36 million[2] compared with that of 1983.

Sierra Leone's fiscal year ran from July 1 to June 30. The 1984-85 budget projected a total revenue of $126 million against expenditures of $202 million. The resulting deficit of $76 million was $8 million above the limit set by the International Monetary Fund in their February standby agreement.

Rutile production reached a record high, an increase of about 20,000 tons over that of 1983, and was valued at $25 million compared with $17 million in 1983. Rutile shipments amounted to 111,300 tons compared with shipments of only 39,000 tons in 1983. Bauxite production was valued at $20 million. The major trading partners were the countries of the European Economic Community. The United States and Japan were also active but to a lesser degree.

Table 1.—Sierra Leone: Production of mineral commodities[1]

Commodity[2]		1980	1981	1982	1983[p]	1984[e]
Aluminum: Bauxite, gross weight	thousand metric tons	766	610	[r]631	785	1,000
Diamond:						
Gem	thousand carats	317	208	203	242	240
Industrial	do	275	97	87	103	105
Total	do	592	305	290	345	345
Gold	troy ounces	407	3,435	8,729	[3]12,000	[3]18,223
Iron ore	metric tons	--	--	66,000	420,000	355,000
Petroleum refinery products:						
Gasoline	thousand 42-gallon barrels	375	343	228	NA	NA
Jet fuel	do	306	131	84	NA	NA
Kerosine	do	99	213	151	NA	NA
Distillate fuel oil	do	533	548	414	NA	NA
Residual fuel oil	do	420	383	295	NA	NA
Liquefied petroleum gas	do	7	9	9	NA	NA
Other	do	2	NA	1	NA	NA
Refinery fuel and losses	do	173	88	25	NA	NA
Total	do	1,915	1,715	1,207	NA	NA
Salt[e]	thousand metric tons	200	200	200	200	200
Titanium: Rutile ore and concentrate, 96% TiO_2 gross weight	metric tons	47,497	50,795	47,709	71,800	[4]91,300

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 30, 1985.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) was produced, but output was not reported, and available general information was inadequate to make reliable estimates of output levels. Sierra Leone annually refined 4,000 to 10,000 metric tons of salt from imported crude marine salt, but this was 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.
[3]Based on export figures reported in the Mining Journal, v. 304, No. 7804, Mar. 15, 1985, p. 180.
[4]Reported figure.

COMMODITY REVIEW

METALS

Bauxite.—Revised bauxite production figures for 1982 and 1983 showed that production increased about 3% and 24%, respectively, with an increase of 27% in 1984.

Chromium.—Richelson Oil and Gas Co. of Tulsa, Oklahoma, reported that its area of chromite occurrences, which contained all known chromium resources, had been reduced to 1,900 square miles. Samples had assayed 44.5% to 46.7% chromium oxide with the chromium-to-iron ratio ranging from 4.21:1 up to 11.6:1. However, exploration was discontinued. Chromite previously had been found along a 70-mile belt centered at Hanga near Kenema on the railway, extending northeast to the Gori Hills and southwest to Pujehun.

Gold.—The Government of Sierra Leone and the United Nations signed an agreement whereby the United Nations would provide $970,000 for the initial exploration of the central area of the country. The exploration would be for gold and other minerals in the Sula Mountains and the Kangar Hills.

Iron Ore.—The Marampa iron ore mines produced and shipped about 355,000 tons of ore in 1984. The mines had been reactivated and operated by Austromineral GmbH, a subsidiary of the Austrian state-owned firm of Voest-Alpine AG. The predicted annual production of 1 million tons never was reached. Accordingly, Austrominerals was unable to meet its operating costs plus its debt repayments to modernize its equipment on a $15 million loan from the Austrian Kontral Bank. The worsening inflation also caused the price of diesel fuel for its electrical generators to increase from $1.00 to $2.40 a gallon.

NONMETALS

The Government attempted to stimulate official diamond exports by paying for diamonds at market rates and permitted licensed dealers to export diamonds. This method was in effect from March to August, during which period $24 million passed through the banking system compared with $17 million in all of 1983. In addition, diamond exports increased to $36 million in 1984. In August, PMMC formed by the Government, 25%, and local diamond dealers and private individuals, 75%, replaced that marketing method. PMMC's earnings for the balance of 1984 were projected to be $15 million. In October, Sierra Leone bought the 49% share in the National Diamond Mining Co. (DIMINCO) from BP Minerals International Ltd., a subsidiary of the British Petroleum Co. Ltd., for $8.5 million. BP received $4 million on the sale and expected to be paid the remainder within 6 months. BP's 49% interest in DIMINCO was acquired in 1980 when the company purchased the Sierra Leone Selection Trust. The remaining 51% of DIMINCO was owned by the Government, making the company entirely state-owned.

MINERAL FUELS

The Amoco Sierra Leone Exploration Co. signed an agreement with the Government of Sierra Leone for a consortium to explore an offshore area of 11,200 square miles. The consortium was composed of Amoco, the operator with an 80% interest, and Aracca Petroleum Co. and Oxoco Petroleum Co., each with a 10% interest. Seismic surveys were to start in midyear.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Leones (Le) to U.S. dollars at the rate of Le1=US$0.40. However, this rate must be viewed cautiously because it did not reflect the true value of the currency.

The Mineral Industry of the Republic of South Africa

By George A. Morgan[1]

The Republic of South Africa was among the top world suppliers of andalusite, antimony, asbestos, chromite, coal, diamond, ferroalloys, gold, manganese ore and metal, platinum-group metals (PGM), titanium slag, uranium, vanadium, vermiculite, and zirconium in 1984. It was also a leading exporter of coal and lead concentrates, and was exceeded only by the U.S.S.R. in production of chromite, ferroalloys, manganese ore, and PGM.

The domestic processing industries, particularly the chemicals and iron and steel sectors, continued to expand consumption of locally produced mineral products and to export them in finished or semifinished forms. The mining and quarrying industry contributed 15% to the gross domestic product (GDP). About 85% by value of all mineral products sold was exported, mainly to Western industrialized countries, and mineral exports were about 67% of total exports by value. The value of major mineral commodities exported was $11.2 billion[2] and local sales were $2.44 billion, both representing declines from that of 1983. However, in terms of local currency, exports of all minerals rose by 17% and resulted in record sales by the industry, as well as a real growth in the GDP of over 4%. Gold was the single most important product on a value basis, making up 61% of total mineral earnings and 72% of total mineral export revenues. Expenditures in 1984 for capital projects and equipment for the mining industry were about $4.2 billion.

The private sector accounted for most of the mining activity in the country and consisted primarily of six multinational mining corporations: Anglovaal Ltd. (AVL), Anglo American Corp. of South Africa Ltd. (AAC), Barlow Rand Ltd. (BRL), General Mining Union Corp. Ltd. (Gencor), Gold Fields of South Africa Ltd. (GFSA), and Johannesburg Consolidated Investment Co. Ltd. (JCI). The Chamber of Mines (CM) of the Republic of South Africa acted as coordinating body for its members, of whom the multinational corporations were the most important. The CM also had responsibility for basic and applied research, for the hiring and training of mine labor, workers' compensation and wage and labor code negotiations, processing and marketing of uranium concentrate, gold and silver refining, and the marketing of Krugerands. The Council for Mineral Technology (Mintek) was responsible for metallurgical research, and the Minerals Bureau, within the Department of Mineral and Energy Affairs, collected, interpreted, and disseminated data on the mining industry for Government and public use.

Nearly 734,000 people were employed in all mines in 1984 compared with 715,000 in 1983. Gold mines accounted for 510,000 employees, and coal mines, 117,000, while the remainder were employed at all other mines. The foreign worker labor force component of total gold mine employment was over 183,000, with Lesotho, Mozambique, Botswana, and Malawi being the principal countries of origin. Approximately 12,000 coal miners were foreign nationals; the majority were from Lesotho.

PRODUCTION AND TRADE

The index of physical volume of all mining production increased to 102.9 in 1984 from 99.5 in 1983 (1980=100). For the same time periods, the index for gold was 101.2 and 100.3; iron ore, 92.4 and 62.3; copper, 100.6 and 102.5; manganese, 55.8 and 52.9; other metallic minerals, 95.4 and 88.7; diamond, 98.5 and 99.3; coal, 136.7 and 118.5; asbestos 57.6 and 78.0; and other nonmetallic minerals, 80.7 and 82.9.

Improved worldwide demand for iron and steel products accounted for production increases of major ferrous metals ores and concentrates. Most output was exported, but local sales to domestic users were also up. Ferrochromium production was near full capacity of 900,000 tons. The Republic of South Africa was the leading producer of manganese metal, which may be substituted for ferromanganese in the production of special nonferrous alloys, and stainless and carbon steels.

Increases in production capacity were under way for coal, platinum-group metals, titanium, and vanadium. Feasibility studies continued for exploitation of natural gas discovered 100 kilometers offshore Mossel Bay. Expansion of coal production facilities was expected to lead to exports of about 42 million tons of primarily steam coal, mainly through the port of Richards Bay, in 1985 and 1986.

Mineral trade data, as published by the Minerals Bureau, report local sales and exports in terms of quantity and value for most mineral commodities. Official trade data published by the Commissioner for Customs and Excise includes trade data published for the common customs area, which consists of Botswana, Lesotho, the Republic of South Africa, and Swaziland. Import data from the latter include quantity, value, and source country, but export data are not available, and are compiled by the Bureau of Mines and reported as apparent exports.

Of total mineral exports by the Republic of South Africa, valued at $13.2 billion in 1984, the United States was the recipient of $2.1 billion, which was 80% of all imports from the Republic of South Africa. These consisted primarily of chromite, diamond, ferroalloys, gold, manganese, PGM, and uranium.

The Government-owned South African Transport Services (SATS) employed 241,000 people and was responsible for airline, harbor, railroad, and road traffic in the Republic of South Africa. In 1984, total rail traffic for all commodities was 157.2 million tons compared with 158.3 million tons in 1983. Major mineral products moved by rail were base metals and iron and steel, 9.2 million tons; cement, 5.2 million tons; coal and coke, 56.6 million tons; iron ore, 18 million tons; and other mineral products, 21.4 million tons. Total cargo shipped and transshipped from seven major ports was 62.9 million tons, and total cargo landed was 14.3 million tons. Cargo cleared for shipment to Malawi, Zaire, Zambia, and Zimbabwe was 1.6 million tons, and cargo from those countries was 1.5 million tons. SATS percentage of total exports by those countries was Malawi, 50%; Zaire, 45%; Zambia, 40%; and Zimbabwe, 65%. An even larger percentage as imports to those countries passed through the Republic of South Africa. About 6,000 railroad freight cars belonging to SATS were in service in neighboring countries.

Table 1.—Republic of South Africa: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum metal	[r]85,700	[r]83,700	105,500	161,300	167,357
Antimony concentrate:					
Gross weight	22,372	16,599	15,314	10,670	12,924
Metal content	13,067	9,810	9,127	6,310	7,440
Beryl concentrate (11% to 12% BeO)	([2])	122	58	21	1
Chromite, gross weight:					
More than 48% Cr_2O_3 thousand tons	20	36	33	25	53
44% to 48% Cr_2O_3 do.	1,989	1,561	1,193	1,070	1,242
Less than 44% Cr_2O_3 do.	1,405	1,273	939	1,129	1,711
Total[3] do.	3,414	2,870	2,164	2,224	3,006

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Columbium-tantalum concentrate ___ kilograms___	1,912	3,615	9,960	406	317
Copper:					
Mine output, metal content	200,683	[r]199,424	188,709	204,984	198,179
Metal:					
Smelter	[r]185,800	[r]185,400	191,800	192,300	167,100
Refined	140,887	144,100	142,800	157,700	155,722
Gold, primary ______ thousand troy ounces___	21,669	21,121	21,355	21,847	21,907
Iron and steel:					
Ore and concentrate:					
Gross weight ______ thousand tons___	26,312	28,319	24,554	16,605	24,496
Iron content ______do____	16,840	18,124	15,714	10,627	15,677
Metal:					
Pig iron ______do____	7,515	7,365	6,762	4,998	5,255
Ferroalloys, blast furnace and electric furnace:[e]					
Ferrochromium ______do____	[r]680	[r]560	[r]438	[r]720	886
Ferromanganese ______do____	520	450	440	[r]143	196
Ferrosilicochrome ______do____	38	20	20	18	27
Ferrosilicomanganese ______do____	70	50	40	[r]143	196
Ferrosilicon ______do____	162	110	100	100	110
Ferrovanadium ______do____	([2])	([2])	([2])	([2])	([2])
Silicon metal ______do____	30	30	30	22	25
Total ______do____	[r]1,500	[r]1,220	[r]1,068	[r]1,146	1,440
Steel, crude ______do____	9,068	9,004	8,271	7,190	7,827
Semimanufactures:					
For immediate sale ______do____	207	93	NA	NA	NA
Hot-rolled products ______do____	6,568	6,707	NA	NA	NA
Iron castings ______do____	2,236	2,092	NA	286	322
Steel castings and forgings ___do____	72	76	NA	112	111
Total ______do____	9,083	8,968	NA	NA	NA
Lead:					
Mine output, metal content	86,059	98,901	90,288	87,533	94,764
Smelter, secondary	35,400	26,900	30,400	23,600	21,900
Manganese ore and concentrate, gross weight:					
Metallurgical:					
Over 48% Mn ______ thousand tons___	290	368	442	674	753
45% to 48% Mn ______do____	942	1,226	1,423	268	448
40% to 45% Mn ______do____	997	676	713	415	432
30% to 40% Mn ______do____	3,099	2,429	2,301	1,270	1,225
Total ______do____	5,328	4,699	4,879	2,627	2,858
Chemical:					
Over 65% MnO_2 ______do____	([2])	([2])	([2])	([2])	([2])
35% to 65% MnO_2 ______do____	166	45	39	98	123
Less than 35% MnO_2 ______do____	201	296	295	161	69
Total ______do____	367	341	334	259	192
Total manganese[3] ______do____	5,695	5,040	5,213	2,886	3,049
Metal[e]	30,000	28,000	28,000	23,400	25,000
Nickel:					
Mine output, metal content	25,700	26,400	[r] [e]22,000	20,500	25,000
Metal, electrolytic	[r]18,098	17,960	14,425	17,000	18,000
Platinum-group metals, metal content of concentrate, matte, refinery products[e] [4] thousand troy ounces___	3,100	3,110	2,600	2,600	3,500
Silver:					
Mine output, metal content ______do____	7,144	7,568	6,943	6,513	6,997
Primary ______do____	3,125	3,050	3,080	[r] [e]1,950	2,000
Tin:					
Concentrate:					
Gross weight[e]	6,160	6,950	7,500	6,700	5,900
Metal content	2,913	2,811	3,035	2,668	2,301
Metal, primary[5]	1,100	2,602	2,884	2,685	1,592
Titanium:					
Rutile concentrate[e]	48,000	49,900	47,000	[r]56,000	56,000
Slag	344,000	370,000	381,000	420,000	420,000
Uranium oxide (U_3O_8)	7,295	7,235	6,833	7,128	6,762

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Vanadium:					
Vanadiferous slag, gross weight	59,435	59,459	57,395	35,825	45,911
V content:					
Of vanadiferous slag[e]	r8,400	r8,400	r8,100	r5,100	6,500
Of V_2O_3 and vanadate products[e]	r6,503	r4,217	r3,613	r3,733	6,017
Total	r14,903	r12,617	r11,713	r8,833	12,517
Zinc:					
Concentrate:					
Gross weight	158,137	174,377	e183,000	e200,000	200,000
Metal content	79,068	87,172	91,516	109,981	106,107
Metal, smelter	81,400	r80,900	79,700	84,384	88,406
Zirconium concentrate (baddeleyite and zircon)	e80,000	e100,000	e125,000	162,281	153,123
NONMETALS					
Asbestos:					
Amosite	51,646	56,834	43,457	40,656	33,237
Chrysotile	106,940	76,772	81,140	93,061	75,414
Crocidolite	118,148	102,337	87,263	87,439	58,738
Total	276,734	235,943	211,860	221,156	167,389
Barite	2,635	2,247	3,177	6,683	4,467
Cement, hydraulic thousand tons	7,200	8,095	8,010	7,899	8,188
Clays:					
Attapulgite	3,684	5,221	4,398	4,425	4,843
Bentonite	49,815	44,372	30,827	39,529	41,849
Fire clay	154,967	282,645	259,767	117,807	162,665
Flint clay	190,488	171,500	163,075	69,984	93,755
Fuller's earth	720	434	311	312	--
Kaolin	107,500	155,003	127,891	129,605	135,281
Montmorillonite	1,115	354	--	--	--
Corundum, natural	141	91	62	49	21
Diamond:					
Gem[e] thousand carats	r2,812	3,429	3,342	r4,554	4,516
Industrial[e] do.	r5,708	6,097	5,812	r5,757	5,603
Total do.	8,520	9,526	9,154	10,311	10,119
Diatomite	584	615	596	1,088	258
Feldspar	52,247	57,052	47,854	45,114	39,018
Fluorspar:					
Acid-grade	e448,783	451,614	293,821	232,750	289,294
Ceramic-grade	e9,823	6,118	9,628	6,406	4,502
Metallurgical-grade	e64,112	38,789	27,386	28,446	25,410
Total	522,718	496,521	330,835	267,602	319,206
Gem stones, semiprecious:					
Emerald crystals kilograms	432	502	e547	575	440
Tiger's-eye do.	163,157	220,034	e112,000	120,000	89,030
Gypsum, crude	452,490	554,827	534,991	518,353	535,286
Kyanite-related materials:					
Andalusite	196,516	181,272	155,723	116,576	143,305
Sillimanite	16,194	15,504	10,060	815	1,311
Lime[5] thousand tons	2,184	2,251	2,150	1,892	2,110
Magnesite, crude	59,975	56,557	31,927	22,560	33,059
Mica:					
Sheet kilograms	252	--	NA	NA	--
Waste	5,046	2,395	1,762	2,672	4,478
Nitrogen: N content of ammonia thousand tons	549	552	571	575	580
Phosphate rock, gross weight do.	3,185	2,617	2,815	2,887	2,496
Pigments, mineral, natural:					
Ochers	710	742	1,812	1,319	746
Oxides	660	555	324	369	245
Total	1,370	1,297	2,136	1,688	991
Pyrites, gross weight	1,450,000	1,475,000	e1,500,000	e1,500,000	464,878
Quartz, quartzite, glass sand (silica) thousand tons	1,629	1,387	1,260	1,184	1,471
Salt	567,270	539,801	586,210	744,295	604,785
Silcrete	5,430	9,243	5,582	1,839	1,153

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone, n.e.s.:					
Dimension:					
Granite:[5]					
Sawn slabs	28,910	23,535	12,595	11,000	13,345
Rough blocks	181,250	182,770	160,000	150,000	196,237
Marble	5,965	6,327	6,725	4,936	NA
Crushed and broken:					
Limestone thousand tons	19,869	21,107	22,379	19,874	21,084
Shale do	604	600	482	454	533
Sulfur:					
S content of pyrites do	493	[r]502	465	474	
Byproduct:					634
Of metallurgy[e] do	100	100	[r]135	125	
Of petroleum[e] do	25	27	[r]25	32	30
Total do	618	[r]629	625	631	664
Sulfuric acid, gross weight[6] do	3,616	3,677	3,195	3,201	NA
Talc and related materials:					
Talc	9,466	9,464	9,743	7,617	9,793
Pyrophyllite (wonderstone)	4,900	5,662	4,070	3,575	3,851
Vermiculite	185,699	190,601	182,641	153,034	173,759
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	45,000	45,000	NA	NA	NA
Coal:					
Anthracite thousand tons	3,895	4,017	3,526	2,227	3,864
Bituminous do	111,225	[r]126,361	140,650	142,896	158,170
Total[3] do	115,120	[r]130,379	144,176	145,123	162,034
Coke, all types do	5,680	5,685	NA	NA	NA
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	31,390	33,215	35,770		
Jet fuel do	2,920	2,920	3,285		
Kerosine do	3,285	3,650	3,650		
Distillate fuel oil do	34,310	35,405	37,230		
				NA	NA
Residual fuel oil do	23,360	24,090	28,470		
Lubricants do	2,555	2,555	2,555		
Other do	6,205	8,395	11,315		
Refinery fuel and losses do	4,015	5,475	6,205		
Total do	108,040	115,705	128,480	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 31, 1985.
[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. Sulfur imports to the Republic of South Africa, in thousand metric tons, were as follows: 1980—936; 1981—552; 1982—590; 1983—600; and 1984—not available.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	--	66,861	66,787	Sweden 74.
Ash and residue containing aluminum	--	213	--	All to West Germany.
Metal including alloys:				
Scrap	354	3,085	--	Japan 2,816; Taiwan 178.
Unwrought	11,221	89,251	10,597	Japan 38,540; Taiwan 36,641; Hong Kong 2,924.
Semimanufactures	3	2,020	--	Japan 1,738; United Kingdom 181; Hong Kong 47.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Antimony:				
Ore and concentrate	1,135	3,767	767	France 2,463; Japan 507.
Oxides	2,903	3,461	3,461	
Metal including alloys, all forms	--	218	--	All to Belgium-Luxembourg.
Arsenic: Oxides and acids	--	17	17	
Beryllium: Ore and concentrate	205	116	116	
Chromium:				
Ore and concentrate thousand tons	852	[2]803	131	Japan 302; Netherlands 135; Austria 31.
Oxides and hydroxides	--	911	911	
Cobalt: Metal including alloys, all forms	741	31	--	United Kingdom 17; West Germany 14.
Columbium and tantalum: Ore and concentrate kilograms	[2]1,204	4	4	
Copper:				
Ore and concentrate	73,115	41,733	33	Japan 28,930; West Germany 11,867.
Matte and speiss including cement copper	222	553	--	Greece 431; West Germany 122.
Ash and residue containing copper	539	167	--	All to West Germany.
Metal including alloys:				
Scrap	9,720	10,228	233	West Germany 4,650; Belgium-Luxembourg 2,572; United Kingdom 2,106.
Unwrought	139,588	175,394	13,726	West Germany 66,941; Belgium-Luxembourg 42,873; Japan 18,599.
Semimanufactures	2,064	2,987	1,404	United Kingdom 432; Taiwan 400; Hong Kong 311.
Gold:				
Waste and sweepings troy ounces	744	7,201	6,204	West Germany 997.
Metal including alloys, unwrought and partly wrought thousand troy ounces	630	[3]2,405	28	Italy 2,137; West Germany 136; Japan 67.
Iron and steel:				
Iron ore and concentrate:				
Including roasted pyrite	5,917	--		
Excluding roasted pyrite thousand tons	11,316	8,380	--	Japan 5,143; West Germany 2,329; United Kingdom 105.
Metal:				
Scrap	3,549	46,326	--	Japan 38,463; West Germany 4,543; Taiwan 2,741.
Pig iron, cast iron, related materials	70,386	56,725	8,754	Japan 17,801; West Germany 11,731; Austria 3,390.
Ferroalloys:				
Ferrochromium	340,516	[2]741,824	129,319	Japan 193,956; West Germany 178,457; France 56,158.
Ferromanganese	298,993	[2]304,100	79,527	United Kingdom 67,119; Italy 14,417; West Germany 4,085.
Ferrosilicomanganese	72,360		47,351	Japan 24,103; West Germany 6,661; Italy 3,064.
Ferronickel	16	20	6	West Germany 14.
Ferrosilicochromium	1,668	2,434	--	Japan 2,301; West Germany 112.
Ferrosilicon	17,480	[2]22,000	--	Japan 10,399; Hong Kong 191.
Silicon metal	17,756	[2]27,000	1	Japan 12,115; United Kingdom 6,135; West Germany 4,903.
Unspecified	78,967	211,970	--	West Germany 185,244; Sweden 16,435; Italy 2,027.
Steel, primary forms	197,787	234,734	--	Turkey 72,087; Taiwan 46,414; Japan 30,934.
Semimanufactures:				
Bars, rods, angles, shapes, sections	327,227	400,547	229,359	Hong Kong 61,288; West Germany 27,861; Sri Lanka 25,509.
Universals, plates, sheets	421,780	523,720	342,676	Taiwan 55,474; West Germany 45,772; Hong Kong 20,987.
Hoop and strip	1,923	4,918	--	West Germany 4,399; Taiwan 342; Greece 99.
Rails and accessories	205	10,141	--	Turkey 9,931; Taiwan 200.
Wire	7,281	14,707	8,073	Sri Lanka 3,185; Honduras 1,334; Portugal 751.
Tubes, pipes, fittings	75,157	52,441	31,574	Hong Kong 13,530; United Kingdom 4,884.
Castings and forgings, rough	57	30	--	Japan 21; Hong Kong 5.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	47,574	110,565	--	France 48,497; West Germany 34,177; Japan 27,891.
Oxides	9	20	--	Italy 14; West Germany 4; Belgium-Luxembourg 2.
Metal including alloys:				
Scrap	151	685	--	Denmark 563; Italy 53; Japan 51.
Unwrought	10,840	13,259	--	Italy 11,469; France 993; Taiwan 507.
Semimanufactures	56	114	--	All to Hong Kong.
Magnesium: Metal including alloys:				
Scrap	30	80	9	Brazil 71.
Unwrought	57	52	--	All to Japan.
Semimanufactures	4	--		
Unspecified	--	14	--	All to Taiwan.
Manganese:				
Ore and concentrate:				
Battery-grade	18	--		
Metallurgical-grade thousand tons	2,170	[2]1,996	23	Japan 874; Netherlands 291; Italy 218.
Oxides	531	303	18	Hong Kong 105; Portugal 87; Finland 36.
Metal including alloys, all forms	9,582	14,107	4,705	West Germany 2,532; United Kingdom 2,152; Canada 2,051.
Nickel:				
Matte and speiss	10,065	74,321	--	Belgium-Luxembourg 69,820; Norway 4,424.
Ash and residue containing nickel	5,608	--		
Metal including alloys:				
Scrap	151	99	--	West Germany 49; Austria 26; Switzerland 24.
Unwrought	12,031	15,287	4,481	West Germany 2,800; United Kingdom 1,805; France 1,762.
Semimanufactures	638	150	--	France 114; Brazil 20; Italy 13.
Platinum-group metals:				
Ore and concentrate value, thousands	$22	--		
Waste and sweepings do	$3,158	$1,726	$1,568	West Germany $158.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	675,425	415,671	404,391	West Germany 6,366.
Platinum do	1,177,386	1,500,061	617,000	Japan 833,040; West Germany 38.
Rhodium do	51,190	84,010	84,010	
Iridium, osmium, ruthenium do	34,586	97,739	97,739	
Unspecified value, thousands	$159,845	$81,614	$3,313	Switzerland $40,472; West Germany $23,572; France $8,294.
Silver:				
Ore and concentrate[4] do	$111	$1,645	$1,630	Switzerland $14.
Waste and sweepings do	$317	$664	--	West Germany $628; United Kingdom $36.
Metal including alloys, unwrought and partly wrought do	$21,710	$2,659	--	West Germany $2,349; United Kingdom $310.
Tin:				
Ore and concentrate	1,747	212	--	All to Netherlands.
Oxides	144	270	270	
Ash and residue containing tin	244	197	--	All to West Germany.
Metal including alloys:				
Scrap	NA	4,787	--	All to United Kingdom.
Unwrought	1,136	1,333	18	United Kingdom 719; Italy 469; France 74.
Semimanufactures	1	1	1	
Titanium:				
Ore and concentrate	42,642	44,008	9,813	France 24,098; Netherlands 5,420.
Metal including alloys, semimanufactures	--	26	--	All to United Kingdom.
Uranium and thorium:				
Oxides and other compounds	3,451	3,685	3,685	
Metal including alloys, all forms, uranium	--	1,872	--	All to France.
Vanadium:				
Oxides and hydroxides	4,469	2,090	136	Japan 1,771; France 161.
Ash and residue containing vanadium	--	2,156	--	All to Belgium-Luxembourg.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	69,567	33,687	--	West Germany 19,571; Japan 12,701.
Oxides	--	41	--	Portugal 36; Sri Lanka 5.
Matte	101	--		
Ash and residue containing zinc	126	--		
Metal including alloys:				
Scrap	17	175	--	All to Taiwan.
Unwrought	648	2,231	1,000	Taiwan 699; Japan 351; Hong Kong 150.
Semimanufactures	24	44	44	
Zirconium: Ore and concentrate	72,934	[2]132,765	6,399	West Germany 26,683; United Kingdom 14,434; Netherlands 11,364.
Other:				
Ores and concentrates	73,761	78,145	--	Italy 32,289; West Germany 30,980; Belgium-Luxembourg 6,588.
Oxides and hydroxides	701	50	--	Belgium-Luxembourg 34; West Germany 16.
Ashes and residues	120,835	125,865	105	Italy 63,006; Japan 47,576; Austria 10,616.
Base metals including alloys, all forms	46,709	9,270	683	West Germany 2,546; Japan 2,528; Brazil 879.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	86	18	1	Sweden 17.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$549	$51	$3	France $47.
Grinding and polishing wheels and stones	627	1	--	All to West Germany.
Asbestos, crude	120,934	[2]183,946	11,754	Japan 56,598; Thailand 14,706; Taiwan 9,850.
Cement	87,564	47	47	
Clays, crude:				
Bentonite[2]	995	380	--	Taiwan 125.
Chamotte earth	11,428	6,014	--	West Germany 3,914; United Kingdom 2,004.
Fire clay	5,848	4,353	--	All to West Germany.
Kaolin	[2]1,387	1,493	--	All to United Kingdom.
Unspecified	31,376	57,711	--	West Germany 26,685; Italy 11,388; Japan 8,203.
Diamond:				
Gem, not set or strung value, thousands	$392,203	$405,726	$316,973	Belgium-Luxembourg $42,958; Hong Kong $24,679; Japan $7,286.
Industrial stones do.	$45,649	$52,594	$39,000	Japan $6,670; West Germany $4,945.
Dust and powder do.	--	$3,393	--	France $3,383; Japan $10.
Diatomite and other infusorial earth do.	$33	--		
Feldspar, fluorspar, related materials:				
Feldspar	[2]1,389	--		
Fluorspar	279,758	[2]246,462	--	Japan 72,086.
Unspecified	1,036	168,900	102,744	West Germany 38,750; Italy 26,388.
Fertilizer materials:				
Crude, n.e.s	--	2,902	--	West Germany 2,096; France 522.
Manufactured:				
Ammonia	2	--		
Nitrogenous	366	140	--	All to Sri Lanka.
Phosphatic	10,263	11,389	--	West Germany 9,320; Belgium-Luxembourg 2,069.
Unspecified and mixed	55	24	--	Netherlands 15; United Kingdom 5; West Germany 4.
Graphite, natural	437	380	380	
Gypsum and plaster[2]	2,769	3,003	--	NA.
Kyanite and related materials:				
Andulusite[2]	76,714	69,264	--	NA.
Sillimanite[2]	6,309	2,560	--	NA.
Lime	[2]59,840	--		
Magnesite	201	1,108	1,108	
Mica: Crude including splittings and waste	1,212	[5]392	--	Japan 221; West Germany 128; Italy 43.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS —Continued				
Phosphates, crude	124,734	258,909	60	Denmark 95,796; West Germany 61,267; Norway 35,965.
Phosphorus, elemental	276	712	106	Taiwan 606.
Pigments, mineral:				
Natural, crude[2]	363	200	--	NA.
Iron oxides and hydroxides, processed	56	2	--	All to Netherlands.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$6,061	$961,056	$1,224	Hong Kong $957,550; Switzerland $827; West Germany $788.
Synthetic do	$3	$6,204	--	Turkey $6,172; Sweden $24.
Pyrite, unroasted	--	[2]103,662	--	NA.
Salt and brine	[2]67,197	--		
Sodium compounds, n.e.s.: Sulfate, manufactured	--	348	--	Hong Kong 288; Taiwan 60.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	155	244	2	France 63; Italy 58; Japan 48.
Worked do	1,763	[5]1,597	NA	United Kingdom 927; Netherlands 458; Portugal 80.
Gravel and crushed rock	12,227	--		
Limestone other than dimension[2]	54,940	61,381	--	NA.
Quartz and quartzite	29,287	779	20	Netherlands 423; West Germany 227.
Sand other than metal-bearing	7,548	4,558	--	Belgium-Luxembourg 3,842; Ireland 370; Hong Kong 38.
Sand and gravel	--	2	2	
Sulfur:				
Elemental[2]	31,867	11,338	--	NA.
Sulfuric acid	90	--		
Talc, steatite, soapstone, pyrophyllite	44	94	NA	West Germany 78; Sweden 9.
Vermiculite[2]	146,094	113,154	--	United Kingdom 26,968; France 15,779; West Germany 7,956.
Other:				
Crude	64,859	69,070	--	Japan 32,779; Italy 9,900; West Germany 8,366.
Slag and dross, not metal-bearing	--	58,253	--	United Kingdom 32,035; Brazil 26,218.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	4,532	2	--	All to Netherlands.
Coal:				
Anthracite and bituminous[2] thousand tons	27,695	30,131	675	Japan 5,604; France 4,248; Italy 3,084.
Briquets of anthracite and bituminous coal	10,651	71,831	--	France 48,267; Sri Lanka 23,564.
Lignite including briquets	72	11,831	--	All to Turkey.
Coke and semicoke	--	15,815	--	Netherlands 10,606; Sweden 3,919; Belgium-Luxembourg 1,000.
Petroleum:				
Crude thousand 42-gallon barrels	--	5,429	--	Greece 3,504; Taiwan 1,023.
Refinery products:				
Gasoline do	1,632	950	242	Japan 448; Sweden 260.
Mineral jelly and wax do	109	183	83	West Germany 39; United Kingdom 18; Japan 17.
Distillate fuel oil do	--	169	--	All to Sri Lanka.
Lubricants do	9	2	([6])	Mainly to West Germany.
Residual fuel oil do	8	([6])	--	All to Japan.
Bitumen and other residues do	55	--		
Bituminous mixtures do	--	6	--	All to United Kingdom.

NA Not available.

[1]Table prepared by Virginia A. Woodson. 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 data issued by the Republic of South Africa Department of Mines and Department of Mineral and Energy Affairs as well as official trade returns of trading partner countries. Data issued by the Government of the Republic of South Africa are 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 area of Botswana, Lesotho, the Republic of South Africa, and Swaziland.

[2]Data issued by the Government of the Republic of South Africa.

[3]Excludes imports of unreported quantity valued at $3,909,000 by France and $22,000 by Iceland.

[4]May include platinum-group metals.

[5]Incomplete total. Excludes imports expressed in value only.

[6]Less than 1/2 unit.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	26,966	17,196	--	Australia 14,918; Netherlands 55.
Oxides and hydroxides	277,232	357,892	124	Australia 345,679; United Kingdom 4,236.
Metal including alloys:				
Scrap	2,678	6,070	2,747	United Kingdom 1,539; West Germany 1,190.
Unwrought	633	433	--	Switzerland 180; United Kingdom 150; Norway 50.
Semimanufactures	12,620	12,592	783	West Germany 4,654; United Kingdom 1,960; Australia 1,561.
Arsenic:				
Oxides and acids	1	90	--	All from France.
Metal including alloys, all forms	14	9	--	Sweden 7; United Kingdom 2.
Chromium: Oxides and hydroxides	485	774	33	West Germany 341; Spain 135; Belgium-Luxembourg 100.
Cobalt:				
Oxides and hydroxides	9	16	1	Belgium-Luxembourg 3; Australia 2; Canada 2.
Metal including alloys, all forms	77	91	7	Sweden 17; Belgium-Luxembourg 14; Canada 12.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	100	1,300	1,300	
Copper: Metal including alloys:				
Scrap	107	166	NA	United Kingdom 99; unspecified 67.
Unwrought	3,044	978	2	West Germany 255; United Kingdom 87; Belgium-Luxembourg 50.
Semimanufactures	8,398	4,695	227	West Germany 1,784; United Kingdom 633; Japan 475.
Gold: Metal including alloys, unwrought and partly wrought[2] troy ounces	3,196	8,545	NA	France 914; Switzerland 443; unspecified 6,368.
Iron and steel: Metal:				
Scrap	27,462	7,274	NA	Taiwan 17; unspecified 7,257.
Pig iron, cast iron, related materials	9,943	3,782	3	Sweden 1,933; United Kingdom 556; West Germany 121; unspecified 1,048.
Ferroalloys:				
Ferrochromium	7,626	8,088	NA	Sweden 41; unspecified 8,047.
Ferromanganese	91	55	--	West Germany 38; United Kingdom 17.
Ferromolybdenum	--	120	4	West Germany 55; Belgium-Luxembourg 32; United Kingdom 16.
Ferrosilicomanganese	--	7	NA	NA.
Ferrosilicon	1,955	932	--	France 736; West Germany 133.
Silicon metal	46	133	--	France 126.
Unspecified	840	1,069	--	United Kingdom 413; France 308; Brazil 125.
Steel, primary forms	42,787	50,769	NA	West Germany 300; Japan 267; unspecified 49,795.
Semimanufactures:				
Bars, rods, angles, shapes, sections	32,071	48,592	75	West Germany 4,188; United Kingdom 2,474; Japan 1,512.
Universals, plates, sheets	55,900	30,685	268	Japan 19,131; West Germany 7,207; France 1,175.
Hoop and strip	14,716	10,903	106	Japan 3,594; West Germany 1,797; United Kingdom 1,210.
Rails and accessories	1,036	635	1	West Germany 197; Switzerland 111; Netherlands 18.
Wire	22,810	20,432	171	Belgium-Luxembourg 2,825; United Kingdom 1,614; West Germany 1,376.
Tubes, pipes, fittings	60,631	61,895	1,538	Japan 28,790; West Germany 13,426; United Kingdom 4,852.
Castings and forgings, rough	509	735	--	West Germany 149; Taiwan 89; United Kingdom 52.
Unspecified	3,298	2,573	265	West Germany 511; United Kingdom 435; Taiwan 251.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead:				
Oxides	18	67	--	Mexico 54; West Germany 5.
Metal including alloys:				
Scrap	12,734	216	NA	NA.
Unwrought	3,976	5,438	199	Mexico 1,801; unspecified 3,438.
Semimanufactures	64	90	4	United Kingdom 45; West Germany 17; unspecified 24.
Lithium:				
Ore and concentrate	1,163	1,228	NA	NA.
Oxides and hydroxides	33	102	44	NA.
Magnesium: Metal including alloys:				
Unwrought	408	536	488	Canada 25; Italy 22.
Semimanufactures	97	61	52	Norway 4; Austria 3.
Manganese: Oxides	10,039	4,037	4	Belgium-Luxembourg 3,807; Netherlands 158.
Mercury 76-pound flasks	1,828	1,218	--	Spain 667; United Kingdom 348; West Germany 116.
Molybdenum:				
Oxides and hydroxides	138	10	--	All from West Germany.
Metal including alloys, all forms	11	26	4	United Kingdom 18; Austria 3.
Nickel:				
Matte and speiss	560	455	--	All from Canada.
Metal including alloys:				
Unwrought	103	40	NA	Finland 5; unspecified 35.
Semimanufactures	534	670	20	West Germany 190; United Kingdom 119; France 34.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	61,098	46,669	10,462	United Kingdom 32,462; West Germany 1,169.
Selenium, elemental	13	9	--	United Kingdom 6; Canada 1.
Silver:				
Ore and concentrate[3] value, thousands	$44,308	$67,339	NA	Norway $67,334.
Metal including alloys, unwrought and partly wrought troy ounces	892,601	776,402	--	West Germany 703,587; United Kingdom 54,002; Australia 9,903.
Tin: Metal including alloys:				
Unwrought	41	18	NA	NA.
Semimanufactures	29	30	NA	West Germany 8; United Kingdom 4; unspecified 18.
Titanium:				
Ore and concentrate	54	3	--	All from West Germany.
Oxides	1,032	2,207	405	West Germany 639; United Kingdom 549; Netherlands 285.
Tungsten:				
Ore and concentrate	388	507	54	Canada 162; Sweden 90; West Germany 35.
Metal including alloys, all forms	13	34	11	Sweden 12; United Kingdom 5.
Zinc:				
Oxides	771	180	--	United Kingdom 74; Portugal 36; West Germany 34.
Blue powder	451	730	--	West Germany 416; United Kingdom 260.
Metal including alloys:				
Scrap	520	242	NA	United Kingdom 79; Netherlands 20.
Unwrought	3,851	3,149	NA	NA.
Semimanufactures	106	190	NA	United Kingdom 144; West Germany 37.
Other:				
Ores and concentrates	105	69	64	Chile 5.
Oxides and hydroxides	510	281	71	United Kingdom 61; West Germany 40; Belgium-Luxembourg 36.
Ashes and residues	2,216	1,436	5	West Germany 907; United Kingdom 50.
Base metals including alloys, all forms	321	1,579	29	United Kingdom 93; West Germany 15; unspecified 1,417.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,777	484	133	Italy 65; Japan 17; unspecified 221.
Artificial:				
Corundum	4,290	2,597	761	West Germany 804; United Kingdom 445.
Silicon carbide	2,257	1,766	14	Norway 1,319; Argentina 221; Switzerland 115.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$167	$95	--	Belgium-Luxembourg $60; Japan $20; Belgium-Luxembourg $12.
Grinding and polishing wheels and stones	705	532	51	West Germany 140; Italy 124; United Kingdom 86.
Asbestos, crude	12,878	12,781	13	West Germany 7; unspecified 12,761.
Barite and witherite	1,789	2,384	NA	United Kingdom 504; Australia 162; unspecified 1,521.
Boron materials:				
Crude natural borates	5,498	3,952	315	Netherlands 2,632; United Kingdom 997.
Elemental value	$2,533	$336	NA	NA.
Oxides and acids	920	832	38	France 482; Argentina 197; Italy 70.
Bromine	55	31	1	Israel 16; Japan 9.
Cement	194,239	108,658	NA	West Germany 1,474; France 8,134; unspecified 96,530.
Chalk	7,988	5,753	--	France 3,561; Sweden 1,276; Spain 139.
Clays, crude	r31,249	31,002	18,485	United Kingdom 11,899.
Cryolite and chiolite	115	115	NA	Denmark 73; West Germany 38.
Diamond:				
Gem, not set or strung value, thousands	$80,935	$25,125	$61	Belgium-Luxembourg $1,778; Netherlands $1,649; unspecified $21,621.
Industrial stones do	$3,475	$7,133	$11	Belgium-Luxembourg $2,346; United Kingdom $1,896; Australia $140.
Diatomite and other infusorial earth	7,172	5,849	5,387	West Germany 46; Japan 34.
Feldspar, fluorspar, related materials	33	33	NA	NA.
Fertilizer materials: Manufactured:				
Ammonia	79,524	21,278	21,277	NA.
Nitrogenous	314,097	40,016	10,464	Belgium-Luxembourg 5,373; West Germany 2,006; Ireland 300.
Phosphatic	141	3,249	3,009	Israel 121.
Potassic	144,835	173,541	3	Israel 87,367; Canada 53,657; West Germany 17,391.
Unspecified and mixed	83,883	58,202	57,545	United Kingdom 352.
Graphite, natural	1,630	2,129	211	Norway 603; Brazil 367; Republic of Korea 342.
Gypsum and plaster	7,026	9,523	53	West Germany 6,026; United Kingdom 1,826.
Kyanite and related materials	308	NA		
Lime	9,225	14,361	NA	France 5,648; unspecified 8,713.
Magnesium compounds:				
Magnesite	69,693	32,420	NA	Greece 9,128; Japan 1,215; unspecified 20,999.
Oxides and hydroxides	36,223	26,793	78	Switzerland 8,332; Italy 7,780; Netherlands 3,459.
Mica:				
Crude including splittings and waste	545	486	28	Australia 125; unspecified 333.
Worked including agglomerated splittings	65	80	3	Austria 14; United Kingdom 14; Switzerland 13.
Phosphates, crude	16	2	NA	NA.
Phosphorus, elemental	69	73	--	United Kingdom 59; Canada 14.
Pigments, mineral:				
Natural, crude	372	50	NA	Austria 17; unspecified 33.
Iron oxides and hydroxides, processed	6,857	10,897	12	West Germany 9,639; United Kingdom 1,132.
Potassium salts, crude	64,844	56,813	--	West Germany 18,971; Belgium-Luxembourg 17,516; Israel 11,837.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ..... value, thousands..	$1,071	$1,382	$130	Switzerland $387; Hong Kong $145; Brazil $93.
Synthetic .... do....	$6,896	$8,384	$254	United Kingdom $7,107; West Germany $97.
Pyrite, unroasted	170	108	20	West Germany 83.
Salt and brine	1,153	43,550	16,243	Australia 24,291.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	254,214	214,041	142,084	United Kingdom 33,474; West Germany 2,694; France 2,061.
Sulfate, natural and manufactured	27,276	40,567	20,199	Spain 6,228; Netherlands 6,112.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,666	2,301	NA	Italy 1,582; West Germany 120; Portugal 120.
Worked	1,411	1,230	--	Italy 1,026; Portugal 67; Taiwan 33.
Dolomite, chiefly refractory-grade	42	102	NA	NA.
Gravel and crushed rock	183	804	67	Australia 112; unspecified 623.
Limestone other than dimension	15	75	NA	NA.
Quartz and quartzite	4,450	92	NA	NA.
Sand other than metal-bearing	376	347	20	West Germany 182; Israel 20.
Sulfur:				
Elemental:				
Crude including native and byproduct	590,201	383,414	383,125	West Germany 156.
Colloidal, precipitated, sublimed	136	111	1	West Germany 85; United Kingdom 25.
Dioxide	--	19	NA	NA.
Sulfuric acid	130,574	54,470	--	Belgium-Luxembourg 23,765; West Germany 19,280.
Talc, steatite, soapstone, pyrophyllite	2,503	2,555	238	Republic of Korea 1,140; Italy 339; Belgium-Luxembourg 301.
Other:				
Crude	9,397	7,535	--	Greece 5,377; Australia 1,055.
Slag and dross, not metal-bearing	2,124	3,166	489	United Kingdom 1,437; Taiwan 854.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	302	254	218	United Kingdom 36.
Carbon black and gas carbon	3,416	3,927	2,015	West Germany 711; Canada 473; United Kingdom 426.
Coke and semicoke	6	7	NA	NA.
Peat including briquets and litter	665	651	--	Canada 272; Finland 197; West Germany 105.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels..	186	974	([4])	Italy 371; France 278; West Germany 116.
Mineral jelly and wax ..... do....	444,143	520,388	47,771	Japan 140,094; West Germany 126,219; Brazil 8,460.
Lubricants .... do....	13,958	12,572	2,051	West Germany 5,789; United Kingdom 3,171; Belgium-Luxembourg 469.
Bitumen and other residues .do....	1,394	721	394	Belgium-Luxembourg 182.
Bituminous mixtures ..... do....	4,326	3,079	571	United Kingdom 788; Netherlands 772; West Germany 490.
Petroleum coke .... do....	505,318	488,802	438,279	United Kingdom 27,550; Netherlands 22,836.

[r]Revised. NA Not available.

[1]Table prepared by Virginia A. Woodson. Data presented are imports by the common customs area 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]May include platinum-plated gold.

[3]May include platinum-group metals.

[4]Less than 1/2 unit.

Table 4.—Republic of South Africa: Value of domestic sales and exports of major mineral commodities

(Thousand U.S. dollars)

Commodity	Domestic sales			Exports		
	1982	1983	1984[p]	1982	1983	1984[p]
METALS						
Antimony	10,978	16,381	16,166	870	1,137	10,008
Chromite	26,209	44,315	43,221	42,466	35,544	43,972
Copper	126,449	122,374	118,765	151,700	194,265	127,695
Gold	(1)	(1)	(1)	8,101,564	9,153,026	8,038,559
Iron ore	122,040	119,788	91,003	216,648	158,860	168,132
Lead concentrate	--	--	--	35,116	22,424	22,050
Manganese	52,471	22,139	22,252	124,442	77,017	119,271
Nickel	9,079	11,061	16,854	36,911	36,848	33,702
Silver	1,226	3,119	561	47,841	60,696	45,462
Tin	14,989	9,435	9,552	20,122	21,778	16,769
Titanium	4,493	5,337	4,377	11,966	9,646	14,289
Uranium[e]	NA	NA	NA	300,000	250,000	200,000
Vanadium	2,061	3,548	3,235	60,446	34,851	58,624
Zinc	23,027	26,588	42,143	12,892	5,171	21,801
Zirconium	445	676	342	18,141	22,551	25,575
NONMETALS						
Asbestos	8,759	5,924	3,680	90,654	92,914	66,519
Cement[e]	300,000	300,000	380,000	35,000	35,000	40,000
Clays, flint	2,968	2,746	2,558	3,550	2,393	1,708
Clays, other	6,415	7,027	3,799	60	26	27
Diamond	(1)	(1)	(1)	315,237	483,328	360,214
Feldspar	3,056	3,116	2,763	144	54	61
Fluorspar	2,762	2,642	2,219	24,431	25,000	32,001
Granite	1,763	1,847	1,452	17,023	21,723	19,071
Gypsum	4,944	5,410	4,669	33	40	23
Kyanite-related materials:						
Andalusite	5,850	5,391	6,239	8,311	7,081	8,519
Sillimanite	570	289	112	1,295	430	178
Lime products	83,512	87,000	77,413	1,974	2,722	2,569
Limestone	56,875	55,336	52,212	178	107	87
Magnesite	2,479	1,765	1,247	--	31	--
Mica	298	319	322	356	406	338
Phosphate rock	63,797	55,581	52,338	5,887	11,196	17,355
Pyrite-sulfur	37,588	42,633	31,512	1,131	569	396
Salt	17,450	19,103	21,896	1,720	3,606	2,491
Silica, sand	14,621	16,670	16,494	283	116	189
Slate	1,959	2,155	1,853	2,097	2,133	2,553
Stone, other	1,532	1,502	1,821	330	277	237
Vermiculite	346	387	374	11,662	9,336	13,315
Wonderstone	254	238	272	467	333	47
Miscellaneous	201,889	253,323	217,586	378,013	557,654	480,807
MINERAL FUELS						
Coal:						
Anthracite	15,559	13,263	30,377	77,602	55,480	100,780
Bituminous	1,289,066	1,300,020	1,161,486	1,034,257	986,572	1,089,769
Total	[r]2,517,779	2,568,448	2,443,165	[r]11,192,820	12,382,341	11,185,163

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Value, if any, is included under exports.

Sources: Republic of South Africa Department of Mines. Quarterly Information Circular, Minerals, Oct.-Dec. 1982; Republic of South Africa Department of Mineral and Energy Affairs. South Africa's Mineral Industry 1984.

COMMODITY REVIEW

METALS

Aluminum.—A single smelter with a capacity of about 170,000 tons per year, owned and operated by Alusaf (Pty.) Ltd., was near Richards Bay. Feed material was imported alumina, mainly from Australia; there was no domestic production of bauxite or alumina. Output, near full production capacity in 1984, was about equally divided between exports and domestic use. About 35% of local sales was in the form of molten metal, the remainder was ingot. Local users included Alustang (Pty.) Ltd., an associated company of Alusaf, for production of conductor rod, and the Aluminum Extrusion Co. Ltd. (Almax), for aluminum extrusions and paint.

Antimony.—Reserves of antimony were 254,000 tons of contained metal, second only to China. Consolidated Murchison Ltd. (CML) was the only producer and was owned 75% by AVL and 25% by JCI. Output from deposits near Gravelotte in northeastern Transvaal graded 2.9% antimony in ore. Local sales of antimony concentrate grading 60% antimony trioxide continued to increase with expanded production of antimony trioxide for flame retardants by Antimony Products (Pty.) Ltd. Most of the trioxide was also exported. A proposal was made by CML for Japanese technical assistance for construction of a smelter. No information on capacity or timeframe for the project was reported.

Chromite.—Gencor purchased the remaining 44% of African Metals Ltd. (AML) from the South African Iron and Steel Industrial Corp. Ltd. (Iscor), and thus gained control of South African Manganese Amcor Ltd. (Samancor), with the latter's manganese and chromite mines. Transvaal Mining and Finance Co. Ltd., a Gencor subsidiary, transferred its three chromite mines, Groothoek, Montrose, and Tweenfontein, with a combined export capacity of 1 million tons per year, to Samancor. The Grasvally, Mooinooi, and Waterkloof Mines were also in operation, but the Ruighoek Mine closed in the rationalization program.

The Grasvally Mine had a chromium-to-iron ratio of 2.5:1 and an average chromium oxide content of 46%, mainly as lumpy ore. Lumpy ore was shipped to Samancor's ferrometals plant at Witbank for production of high-carbon ferrochromium. Fines, with grades of 48% to 54% chromium oxide, were shipped via company-owned rail line to Drummondlea and exported through Richards Bay. Slimes containing 7% chromium were being processed in trial runs, and waste rock was sold for construction purposes.

Cobalt.—Cobalt was a byproduct of PGM production by three companies. Rustenburg Platinum Mines Ltd. (RPM), through its affiliate Rustenburg Refineries (Pty.) Ltd., extracted cobalt sulfate from converter matte and had a capacity of 525 tons per year of contained metal. Impala Platinum Holding (Pty.) Ltd. produced 99.8%-pure cobalt powder at its refinery at Springs, and Western Platinum Ltd. (Wesplat) obtained 99%-pure cobalt cathode from an overseas refiner of its matte. Wesplat was constructing a new base metals refinery near Rustenburg, at a cost of about $12 million, to process its own matte and produce cobalt-nickel sulfate.

Copper.—Output, either as a byproduct or as a primary product, was by nine companies. Palabora Mining Co. Ltd. (PMC), a subsidiary of Rio Tinto Zinc Corp. Ltd. and Newmont Mining Corp., was the largest producer with a total of almost 102 million tons of ore and waste moved in 1984. Over 29.2 million tons of ore grading 0.50% copper was treated and yielded 322,261 tons of 38.4% copper concentrate. The company's smelter produced 117,196 tons of anode copper from PMC's concentrates and 20,648 tons from tolled or purchased material. Total cathode production at PMC's refinery was 136,495 tons consisting of 116,448 tons from PMC sources and 20,047 tons from all other sources. Byproducts included baddeleyite, gold, magnetite, palladium, platinum, silver, uranium, and vermiculite. The cost of production increased 4.4%. Net profit amounted to $39.1 million, the highest since operations commenced in 1966. PMC's labor force was 3,922.

Messina Ltd. continued to experience financial difficulties and sold its mining interests in Zimbabwe to the Zimbabwe Mining Development Corp. Smelter operations ceased in January, and in October, the company was purchased by South African Life and Assurance Co. Ltd. The African Finance Corp. Ltd. and AAC continued to hold 13.6% and 10%, respectively, of Messina. Messina Mine produced 17,976 tons of concentrate containing 7,711 tons of copper, which was sold to PMC where they were smelted. Proven ore reserves were 2.89 million tons grading 1.39% copper. The cost per ton milled was $13.00.

GFSA acquired 41.2% of O'okiep Copper Co. Ltd., which was also 40.2% owned by Newmont. Ore mined and milled was 1.46 million tons grading 1.5% copper. Blister output from O'okiep concentrates was 20,730 tons, and O'okiep also toll smelted concentrates. The Carolusberg, Hoits, and Spiktakel Mines employed 2,000 workers, but Spiktakel was to cease operations in 1985. Carolusberg Mine was to provide 83% of total output.

Gold.—Gold production was up for the fourth consecutive year, and sales were $8.04 billion. A total of 152 million tons of ore and tailings was worked in 1984, a third of which consisted of slimes, sand, and other tailings that were retreated and yielded almost 550,000 troy ounces of gold. East Rand Gold and Uranium Co. Ltd. treated 19 million tons of slimes. About 99% of all gold output was from the Witwatersrand. Over

101 million tons of ore was milled by the main producers at an average grade of 0.207 troy ounce of gold per ton. Total working revenue was $7.6 billion or about $78 per ton of ore milled. Larger tonnages of lower grade ore continued to be mined.

The CM operated the Rand Refinery, gold for which was purchased from the producers at prices based on London gold fixings. The South African Reserve Bank purchased production from the Rand Refinery on behalf of the Government. A portion of these purchases was diverted to the South African Mint for striking both proof and nonproof Kruggerands in 1-ounce, 1/2-ounce, 1/4-ounce, and 1/10-ounce weights. Proof coins were sold by the mint; nonproof coins were handled by the International Gold Corp., the marketing arm of the CM. Over 2.1 million troy ounces in Kruggerands were sold in 1984 out of a total gold production of 21,907 million troy ounces.

The average production cost per ton of gold milled was $40.99, equal to about $199 per troy ounce of gold produced. Mine working revenue averaged $78 per ton of ore milled, equivalent to $363 per troy ounce of gold recovered, leaving an average working profit of $37 per ton of ore milled or $172 per troy ounce of gold recovered. The Kloof Mine of GFSA again had the highest working profit of $129 per ton of ore milled, or $267 per troy ounce of gold produced, and GFSA's Driefontein West and Driefontein East Mines were the next most profitable, respectively.

Table 5.—Republic of South Africa: Gold production and ore reserves, by producer

Producer	Production (troy ounces)				Developed ore	
	1981	1982	1983	1984[p]	Thousand metric tons	Troy ounces per ton
AAC Joint Metallurgical Scheme	112,405	[r]114,492	115,981	129,066	NA	NA
Barberton	38,098	38,160	45,252	56,521	NA	NA
Blyvooruitzicht	604,254	643,372	593,708	501,381	5,187	0.608
Bracken	112,064	106,544	115,103	110,042	1,300	.212
Buffelsfontein	904,506	883,827	966,204	1,011,519	9,800	.308
Consolidated Murchison Ltd	17,580	16,551	18,683	25,302	NA	NA
Deelkraal	171,530	217,574	204,746	234,642	2,991	.212
Doornfontein	382,256	348,440	319,533	314,906	4,100	.311
Driefontein Consolidated Ltd.:						
East Driefontein	1,168,557	1,134,433	1,092,511	1,110,646	15,624	.501
West Driefontein	1,275,333	1,333,809	1,270,662	1,238,930		
Durban Deep	265,173	269,195	251,863	244,734	2,895	.154
East Rand Gold and Uranium Co. Ltd	202,453	187,567	197,341	207,694	NA	NA
East Rand Proprietary Mine	373,984	343,814	357,037	335,017	5,189	.244
Elandsrand	167,322	261,652	316,955	343,813	4,138	.279
Free State Geduld	883,833	816,671	873,803	860,009	8,142	.408
Grootvlei	210,372	229,367	227,505	247,445	5,650	.167
Harmony	1,027,087	1,021,333	1,042,295	1,037,310	24,611	.202
Hartebeestfontein	981,661	959,876	968,663	996,778	20,740	.369
Kinross	310,399	322,141	392,866	432,748	8,600	.305
Kloof	957,034	893,742	978,852	1,048,190	5,323	.675
Leslie	128,429	125,729	125,308	148,170	1,900	.212
Libanon	325,597	343,129	328,423	285,440	7,541	.241
Loraine	211,445	260,749	270,960	278,271	5,995	.260
Marievale	39,124	35,848	39,381	38,790	570	.167
President Brand	859,379	807,418	771,165	726,580	8,304	.366
President Steyn	787,747	801,611	834,292	783,615	13,902	.305
Randfontein	761,297	869,838	952,903	998,781	9,283	.302
St. Helena	500,555	469,828	444,204	396,843	9,850	.340
St. Helena-Beisa	--	20,708	44,918	40,526		
Stilfontein	478,766	401,100	396,354	346,623	4,488	.308
Unisel	235,681	277,782	296,494	291,385	4,800	.266
Vaal Reefs	2,363,314	2,531,865	2,572,281	2,659,969	20,587	.353
Venterspost	181,291	208,353	195,785	203,315	5,682	.221
Western Areas	569,261	544,087	582,732	567,878	5,407	.237
Western Deep Levels	1,254,293	1,269,179	1,268,501	1,158,907	6,239	.572
Western Holdings	1,339,969	1,290,955	1,287,296	1,252,472	14,449	.308
West Rand Consolidated	90,957	122,478	127,960	140,142	6,268	.202
Winkelhaak	447,933	422,313	467,842	471,709	9,900	.282
Witwatersrand Nigel	36,156	30,498	27,653	25,984	NA	NA
Other producers	344,042	378,594	463,684	604,526	NA	NA
Total or average	21,121,137	[r]21,354,622	21,847,699	21,906,619	259,455	.322

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

Sources: Chamber of Mines of South Africa. Quarterly Analysis of Working Results, Oct.-Dec. 1980-84; supplements to the Mining Journal (London), 1980-85.

Despite several mine fires at Kloof Mine, mill throughput at 2.075 million tons was only 10,000 tons less than planned. Average ore grades were high, particularly in the Ventersdorp Contact Reef, which sampled 0.565 troy ounce per ton. Average mill grade increased to 0.495 troy ounce per ton, and was expected to rise further. Total ore reserves were 5.3 million tons averaging 0.675 troy ounce per ton.

Driefontein Consolidated Ltd.'s combined milling rate was 475,000 tons per month with a yield of 0.414 troy ounce per ton. Reserves at the East Driefontein Mine were 9.2 million tons grading 0.466 troy ounce per ton. West Driefontein Mine had 6.5 million tons of reserves at 0.549 troy ounce per ton. Shaft development in anticipation of future production continued; about 15 years was required from the start of physical work on a shaft to actual winning of gold.

Gencor, which administered 13 gold mines and accounted for 17% of total South African gold output, indicated the viability of the Poplar gold deposit in the Transvaal. Estimated mill capacity was to be 90,000 tons per month yielding 0.178 troy ounce per ton, and capital costs would be about $350 million.

AAC sought to merge its six mining companies and eight contiguous mining operations in the Orange Free State. The merger would make the complex one of the top gold mining complexes in the world, having milled 20.8 million tons of ore at an average grade of 0.176 troy ounce per ton in 1984. Included was the President Brand Mine where construction of a new plant to treat 390,000 tons of ore per month was under way. Gold recovery would be 96% using AAC's intensive cyanidation process. The merger would allow a higher portion of the nearly 11 million troy ounces of gold in pillars to be recovered, reduce costs, increase profitability, and extend mine life by several years.

Iron Ore and Concentrate.—Iscor produced 18.1 million tons of hematite from the Sishen Mine and 2.3 million tons from the Thabazimbi Mine. Over 10.7 million tons of Iscor's production was shipped from Saldanha Bay for export. Low iron ore exports led to losses at the Sishen Mine estimated at $105 million in 1984, and underutilization of the 861-kilometer Sishen-Saldanha Bay railroad, which can carry 20 million tons of ore per year.

Iron and Steel.—Iscor, which was Government-owned, and its subsidiaries accounted for about 90% of the country's steel production capacity of 8.65 million tons. Highveld Steel and Vanadium Corp. Ltd., the second largest producer, had a production capacity of 0.84 million tons. Iscor continued to modernize its three plants, and reduced the number of blast furnaces from 12 to 7. At its Pretoria Works, it replaced blast furnaces, coke ovens, and open-hearth furnaces with two electric furnaces with continuous casting, maintaining steel capacity at 0.9 million tons per year. A $56 million, two-strand continuous caster was planned for installation at Vanderbijlpark Works. Iron production capacity would increase to 10,000 tons per day from 7,800 tons per day with further upgrading of blast furnaces. Four new rotary kilns were commissioned in June, and sponge iron production commenced in November. The coal-based Lurgi process was used to produce 93% iron in sponge iron for electric-furnace feed. Iscor's raw feed materials were from captive iron, coal, and dolomite mines, supplemented by other producers. Other Iscor subsidiaries included Dunswart Iron and Steel Works, an integrated steel plant with a combined sponge iron and electric-furnace production capacity of 32,000 tons per month, and Cape Iron and Steel Co. (CISCO). CISCO's production for the year ending June 30 was 110,000 tons.

Union Steel Corp. (USC) planned construction of a 300,000-ton-per-year plasma direct-reduction plant at its Vaal Works. A 600,000-ton-per-year pelletizing plant was under construction at USC's Klip Works, and would use magnetite from PMC.

Highveld Steel, owned 50% by AAC, commenced restart of idle capacity and planned to add three additional prereduction kilns and a submerged arc furnace at Witbank. About 30% of production was exported, mainly structural steel and hot-rolled products.

Scaw Metals Ltd., owned 100% by AAC and the largest steel foundry in Africa, in July commissioned a $23 million sponge iron plant with capacity of 75,000 tons per year to supplement scrap utilization. Direct-reduced iron makes up about 40% of electric-furnace feed, and could be increased to 70% in the event of a scrap shortage.

Middelburg Steel & Alloys Holdings (Pty.) Ltd. (MSA), owned 75% by BRL, was the Republic of South Africa's only producer of stainless steel, including the new corrosion resistant 3CR12 variety. Production capacity was 100,000 tons per year as hot-rolled plate, cold-rolled sheet, coil, and strip.

Lead.—There was no smelting of primary lead in the Republic of South Africa. Lead concentrate amounting to 86,000 tons of contained lead was exported for processing. Secondary smelters had a combined capacity of 39,000 tons per year. Consumption was about 50,000 tons per year, 20,000 tons of which was imported.

Shell South Africa (Pty.) Ltd. was to develop an opencast zinc-lead mine near Pering at an initial cost of $43 million. Output would be 90,000 tons per year of lead concentrate grading 65% lead. In 1983, the Republic of South Africa was the second largest exporter of lead in concentrates after Peru.

Manganese.—Production and exports of manganese ore and ferroalloys improved in 1984. Mines that were closed in 1983 were reopened. About 85% of metallurgical-grade ore production was by 11 mines in the Kalahari Field. Total ore shipments by the Associated Manganese Mines of South Africa Ltd. (AMMOSAL) were 1.2 million tons compared with 0.8 million tons in 1983. Ferroalloys Ltd., a subsidiary of AMMOSAL, produced high-carbon ferromanganese and ferrosilicomanganese at its Cato Ridge, Natal, plant.

Delta Manganese (Pty.) Ltd. and Electrolytic Metal Corp. produced manganese metal, and output was consumed mainly in the aluminum industry. Delta Manganese used manganese oxide from the Hotazel Mine in a process that required fine grinding, reduction, sulfuric acid leaching, precipitation, filtering, and electrolytic deposition onto stainless steel cathodes. The final product was shipped as cathode flake and powder, or degassed in a vacuum furnace at 600° C. The Republic of South Africa's manganese metal production capacity was about 40,000 tons per year; ferromanganese production capacity was 710,000 tons per year.

Nickel.—Output of nickel was as a byproduct of PGM and copper production. Products produced, 80% of which were exported, included nickel cathode at 99.8% nickel, nickel sulfate, and nickel powder and briquets at 99.8% nickel. Completion of construction of a base metals refinery by Wesplat would lead to further output of nickel sulfate.

Platinum-Group Metals.—Rustenburg Platinum Holdings Ltd. (RPH) (owned 32.6% by JCI, 23.8% by AAC, and 8.3% by Lydenburg Platinum Ltd.) was the holding company of the Rustenburg group of mines. RPH's principal holding was RPM, the largest PGM producer in the Republic of South Africa. Since 1977, RPH has also controlled Atok Platinum Mines (Pty.) Ltd., a small PGM producer. RPM owned a base metals refinery at Rustenburg in the Bushveld Igneous Complex, the latter the source of nearly all PGM in the Republic of South Africa. It also owned the Wadesville precious metals refinery, operated by Matthey Rustenburg Refiners (Pty.) Ltd. (MRR), which owned and operated the Royston precious metals refinery. Johnson Matthey PLC was the sole marketing agent for MRR, although some output was purchased directly under long-term contracts.

RPM's major production was from the Merensky Reef, which has a PGM content of 0.17 troy ounce per ton, but the company has also experimented with the UG2 chromitite seam, which grades 0.191 troy ounce per ton. Flotation and gravity concentration were employed to produce a concentrate that was pelletized and smelted in an electric furnace to produce a matte. The matte assayed about 50% nickel, 28% copper, 1% to 2% iron, 21% sulfur, and 48 to 64 troy ounces of PGM per ton. The matte is cooled at a controlled rate to produce a magnetic PGM-rich phase, which is treated for separation of individual metals.

Wesplat, (owned 50.4% by Lonrho Ltd., 25% by Falconbridge Ltd., and 24% by Superior Oil Co.) milled 2 million tons of ore averaging 0.156 troy ounce of PGM per ton, both increases over those of 1983. Of this amount, 1.39 million tons grading 0.153 troy ounce per ton was from the Merensky Reef and 609,000 tons grading 0.194 troy ounce per ton was from the UG2 chromitite seam. Matte output was 4,074 tons and contained 203,182 troy ounces of PGM. Byproduct output included 1,962 tons of nickel, 1,198 tons of copper, and 22 tons of cobalt. Sales included 4,208 troy ounces of rhodium, 11,981 troy ounces of ruthenium, and 1,540 troy ounces of iridium. Wesplat was increasing output from the UG2 seam by 240,000 tons over a 2-year period, primarily because of its higher rhodium content. A base metals refinery was under construction as well as a precious metals plant to improve recovery of iridium, rhodium, and ruthenium. Matte has been sent to Falconbridge's plant in Norway for cobalt, copper, and nickel recovery. Precious metals values were returned to Wesplat for recovery at the Brakpan precious metals refinery. Process time for the matte would then be reduced from over 3 months to less than 1 week. Chromite from the UG2 seam, grading 30% to 32% chromium oxide, was stockpiled at the rate of 55,000 to 60,000 tons per month.

GFSA was drilling in the UG2 seam and expected to commence output within 2 years at about 300,000 troy ounces of PGM per year.

Silicon.—Silicon metal was produced by Silicon Smelters Ltd., a subsidiary of Samancor, at Pietersburg using high-purity quartz from the Witkop deposit. Three submerged arc furnaces totaling 98 megawatt-amps had a capacity of 42,000 tons of metal per year.

Tin.—Rooiberg Tin Ltd., a subsidiary of GFSA, produced 2,380 tons of gravity concentrates grading 58.7% tin from new ore and 2,200 tons of flotation concentrates grading 17.4% tin from reclaimed material. A small tonnage was also obtained from retreated slag. Total ore mined was 698,000 tons grading 0.42% tin, compared with 0.49% in 1983. Overall recovery fell to 75.7% from 77.8%, mainly owing to declining ore grade. Tin contained in concentrates and metal sold was 1,738 tons. Smelter throughput was 2,363 tons of concentrate grading 59% tin, producing 1,346 tons of metal with a recovery of 97%. Low-grade concentrates were no longer smelted. The recovery rate of tin from the slag retreatment circuit was 48%.

Union Tin Mines Ltd., also a subsidiary of GFSA, mined 170,000 tons of ore grading about 0.47% tin, down slightly from that of 1983. Overall recovery was 61.6%, and continued to decline. Reclamation of old sand dump material, grading 0.61% tin, was discontinued owing to low recovery. Although ongoing exploration revealed several small extensions to existing lodes, a large number of support pillars were being withdrawn, and underground operations were expected to decline and possibly cease in 2 years.

Zaaiplaats Tin Mining Co. Ltd. milled 106,000 tons of ore with an overall recovery grade of 0.187% tin, compared with 94,000 tons and 0.185% tin in 1983. Smelter output was 198 tons compared with 173 tons in 1983. A new mill was operational with throughput of 7,000 tons per month. Accumulated smelter slag was sold to the United Kingdom. Currently, produced slags were uneconomic owing to their low grade. A new ore handling system was being instituted, and the company may switch to oil firing of its furnaces from gas firing.

Iscor smelted tin at the Vanderbijlpark Complex from concentrates imported from Namibia. A single 350-kilovolt-amp submerged arc furnace produced 862 tons from 1,389 tons of concentrate grading 62.5% tin.

Titanium.—Titanium production was by Richards Bay Minerals (RBM), which consisted of Tisand (Pty.) Ltd., responsible for mining operations, and Richards Bay Iron and Titanium (Pty.) Ltd., responsible for processing and smelting. Output of concentrates of ilmenite and rutile by RBM was over 1.2 million tons compared with 1.0 million tons in 1983. Mining was by floating dredges in artificial ponds, which supplied a floating concentrator for heavy metal separation. Standard gravity, magnetic, and electrostatic techniques were employed for individual mineral separation. The ilmenite was smelted to produce pig iron and a titanium slag grading 85% titanium dioxide, which can be used as a substitute from rutile. S.A. Tioxide (Pty.) Ltd. marketed 10 grades of pigment produced from the slag. RBM continued to implement expansion plans for concentrates and slag production.

Vanadium.—The Republic of South Africa was the world's leading producer of vanadium. Highveld Steel, owned 50.1% by AAC, operated the Mapochs Mine at Roossenekal in eastern Transvaal, exploiting vanadiferous, titaniferous magnetite grading 1.6% vanadium pentoxide (V_2O_5). Prereduced ore was smelted in electric furnaces at Witbank, yielding a vanadium-rich slag from oxygen blowing of the molten metal. The company's Vantra division produced V_2O_5 from salt roasting and leaching of ore fines, as did Transvaal Alloys Co. Ltd.

Vametco Minerals Co., formerly Ucar Minerals Corp. Ltd., produced V_2O_5 at Brits. Local sales of V_2O_5 were for production of ferrovanadium.

Zirconium.—Zirconium was produced by RBM as zircon and by PMC as baddeleyite, the latter making up about 14% of total concentrate output. Premium-grade zircon, grading 66% zirconium dioxide (ZrO_2), was used in ceramics and standard zircon, 65% ZrO_2, was used in refractory brick and foundry sand. Both were produced by RBM.

Baddeleyite was produced independently by PMC and the Phosphate Development Corp. Ltd. (Foskor) from PMC's open pit at Phalaborwa. PMC commissioned two new plants to produce baddeleyite. PMC produced 9,158 tons of zirconium chemicals, compared with 5,531 tons in 1983. N-grade and special-grade baddeleyite concentrates were produced by gravity concentration and chemical treatment, respectively. Foskor produced four grades of baddeleyite concentrate, all exceeding 96% combined zirconium and hafnium oxide. The main contaminants in the four grades were generally oxides of titanium, iron, and silicon.

NONMETALS

Andalusite and Related Minerals.—The Republic of South Africa led the world in production of andalusite. Reserves were primarily in shales of the Pretoria Group, metamorphosed rock adjacent to the Bushveld Igneous Complex. Six mines were in production in 1984, and concentrates produced ranged from 52% to 60% alumina. About 64% was exported. Sillimanite production, which had declined from 1980 to 1983, increased in 1984 and was produced at the Niemoller and Pella Mines in northwestern Cape Province.

Asbestos.—Three varieties of asbestos—amosite, chrysotile, and crocidolite—were produced at 10 mines employing over 10,000 people. The Penge Mine in northern Transvaal was the only amosite producer. Amosite was used in saltwater applications owing to its chemical resistance.

Msauli Asbestos Ltd. owned the Msauli Mine, which was operated by African Chrysotile Asbestos Ltd., and accounted for about 90% of total chrysotile output. Management was by Griqualand Exploration and Finance Co. Ltd. (Gefco), a subsidiary of Gencor. Gencor held 39.4% of Msauli Asbestos Ltd. Mine flooding owing to a typhoon in February caused nearly a 15% drop in output. About 850,000 tons of ore was mined in 1984 using sublevel caving methods. Ore was shipped 2 kilometers by ropeway to a mill where three grades of fiber were produced.

Abandoned mines and areas in eastern Transvaal, which were worked since about 1900 for asbestos production, were under study for possible cleanup owing to their health-related hazards.

Cement.—Blue Circle Cement Co. Ltd. completed a new bulk handling system at its Lichtenburg plant, valued at about $17 million. Bulk loading capacity was 1,800 tons per hour. Two silos with a capacity of 17,500 tons each were also constructed.

Pretoria Portland Cement Ltd. (PPC) continued construction of a $210 million cement works at Dwaalboom, due for completion in 1986. A 24-kilometer-long railroad from Middelwit was included in the project.

A $172 million clinker plant was completed near Port Shepstone, about 100 kilometers south of Durban, by a consortium of cement producers. Capacity was 500,000 tons per year, using Natal limestone. A $21 million railroad was built to the coast for raw materials and shipment of clinker on to Durban for processing to cement. Cement for the area was formerly shipped for Lichtenburg.

O'okiep was to construct a cement plant near its Carolusburg Mine. Slag from the company's copper smelter was to be used as feed material; the cement produced would be used for backfill operations and was expected to save $1.6 million per year.

Diamond.—De Beers Consolidated Mines Ltd.'s diamond mines accounted for about 94% of the Republic of South Africa's total diamond output. There were 51 operating mines employing nearly 18,600 people. Three operations produced diamonds exclusively from tailings, and another 12 mines processed both ore and tailings.

A 6-meter-diameter ventilation shaft was being excavated by raise-boring at the Premier Mine. Allocation of 54 concession areas off the west coast was completed in 1984. Ocean Diamond Mines (ODM) commenced exploration offshore in the Orange River Delta area. A ship-based dredging operation with a heavy-medium-separation plant was to be the method of exploitation. ODM expected the operation to produce 2,000 to 3,000 carats per month.

The Golden Dumps Pty. Ltd. continued to make acquisitions, buying up the Star Mine, a kimberlite deposit in the Orange Free State near Theunisen. Underground mining was to resume following deepening of the vertical shaft. The company also purchased the Dawn Diamond Co., which held a sea concession off the west coast.

Table 6.—Republic of South Africa: Marketed diamond output, by Province

Province	1982		1983		1984[p]	
	Output (carats)	Price per carat	Output (carats)	Price per carat	Output (carats)	Price per carat
Mine diamond:						
Transvaal	2,251,169	$18.54	2,673,249	$22.37	2,538,954	$23.62
Cape Province	4,756,484	21.98	6,184,238	27.54	5,715,141	23.56
Orange Free State	219,098	92.37	99,188	74.21	113,678	38.87
Total or average	7,226,751	23.04	8,956,675	26.51	[1]8,367,774	23.79
Alluvial diamond:						
Transvaal	26,690	187.62	36,353	200.79	42,224	162.01
Cape Province	1,225,356	117.25	1,316,729	156.55	1,208,433	93.74
Orange Free State	321	372.37	602	48.66	344	494.10
Total or average	1,252,367	118.75	1,353,684	157.69	1,251,001	96.16
Grand total or average	8,479,118	37.18	10,310,359	43.74	9,618,775	37.44

[p]Preliminary.
[1]Data do not add to total shown because of independent rounding.

Sources: Republic of South Africa Department of Mineral and Energy Affairs, Quarterly Information Circular, Minerals, Oct.-Dec. 1981-82, p. 6, and Monthly Commodity Summaries for 1983 and 1984. R1=US$0.9228 for 1982, R1=US$0.8991 for 1983, and R1=US$0.6954 for 1984.

Emerald.—Golden Dumps took over Gravelotte Emerald Mines Ltd., which was the only emerald producer in the Republic of South Africa with two mines, the Cobra and the Discovery. Output was about 50 kilograms per month from two ore bodies in schist host rock. The opencast mining operation had a waste-to-ore stripping ratio of 7:1, with an average yield of 38 carats per ton. Processing was by a series of crushers and hand sorting. Less than 10% of production was considered gem quality, and rough emerald output was exported mainly to Canada, Switzerland, the United Kingdom, and India. Sales were about $3,000 per kilogram, and the company may seek to cut emeralds prior to export for increased return.

Fluorspar.—Four mines were operational in 1984. Acid-grade fluorspar was the most important grade on both a tonnage and value basis, and production capacity was in excess for several years owing to depressed export markets. Output was mainly from the Bushveld Igneous Complex, where Gencor's Buffalo Mine operated with a capacity of 240,000 tons per year.

Gypsum.—There were 13 gypsum operations in 1984 with a production of over 535,000 tons. Gypsum beds were found mainly in the Ecca Group, Karoo sequence, and were formed mainly in a terrestrial environment from the interaction of sulfuric acid and calcareous material. Open pit mines used conveyors or trucks for transport to washing plants where concentrates grading about 85% gypsum were produced, compared with run-of-mine material grading 20% to 35% gypsum. Synthetic gypsum was also produced from the manufacture of phosphoric acid; over 82,000 tons was consumed in the agricultural sector in 1983.

Gypsum Industries Ltd. was the largest producer of gypsum. The company commenced development of a high grade gypsum deposit near Granaatsboskolk in northwestern Cape Province in October at a development cost of about $1.4 million. Run-of-mine ore was 84% gypsum and would not require beneficiating. Truck transport would connect with the underutilized Sishen-Saldanha Bay railroad line about 36 kilometers south of Granaatsboskolk for shipments to Pretoria. Output would replace declining production from the Kimberley deposit, and would commence at 50,000 tons per year with full capacity planned at 250,000 tons per year.

Phosphate Rock.—The Phalaborwa Igneous Complex was the main source of phosphate contained in foskorite, a serpentine, magnetite, apatite rock. Reserves in foskorite were 20 million tons for every 30 meters of depth at a cutoff grade of 6% phosphorus pentoxide (P_2O_5) and an average grade of 8.6% P_2O_5. Additional reserves existed in the adjacent pyroxenite zone, and total reserves to a depth of 600 meters and at a cutoff grade of 5% P_2O_5 were 2.3 billion tons. Foskor accounted for over 99% of total output, both from primary foskorite and pyroxenite ore and from phosphate tailings from PMC's copper mine. Concentrate graded up to 39.5% P_2O_5. A dry extraction process employing high intensity magnetic separators was successfully tested. Modifications of the process were under way for further improvement in concentrate grade. Foskor exported over 219,000 tons of phosphoric acid and 500,000 tons of phosphate rock in 1984, as well as granulated fertilizer mixtures.

Output by two small producers near Saldanha Bay, Langeboam Phosphate Works and Saldanha Bay Aluminum Co. Pty. Ltd., was from sedimentary-type deposits grading 6% to 15% P_2O_5. Reserves of phosphate nodules between Lamberts Bay and Port Elizabeth on the Continental Shelf were estimated at 8 billion tons grading 10% to 20% P_2O_5.

There were five producers of mixed fertilizer products with a total capacity of 5.2 million tons and about 60% capacity utilization. Domestic consumption was about 3.6 million tons per year.

Soda Ash.—About 250,000 tons of soda ash was imported in 1984, and soda ash was considered a strategic material. A venture for production of synthetic soda ash by AVL, African Explosives and Chemicals Industries, and the Industrial Development Corp. of South Africa Ltd. was postponed pending possible startup of a 300,000-ton-per-year year natural soda ash plant near Sua Pan in Botswana by British Petroleum of South Africa Ltd.

Vermiculite.—Output was by the Vermiculite Operations Department of PMC from the northern portion of the pyroxenite unit of the Phalaborwa Igneous Complex. Total reserves were 73 million tons. Ore beneficiation included crushing, drying, screening, cleaning, and grading. Unexfoliated vermiculite was shipped to a processing plant where exfoliation would take place in vertical furnaces at 1,100° C. About 9% of output was used locally, the rest was exported, accounting for about 90% of total world trade in vermiculite.

MINERAL FUELS

Coal.—Production and exports of coal again increased. Future domestic demand was to be from new thermal powerplants, which in 1984 accounted for about 50% of local sales totaling 122 million tons. Local sales to other sectors included industry and synthetic fuels, 36%; metallurgy, 7%; merchants and home use, 5%; and transport and mining, 1% each. Increased use of diesel and diesel-electric locomotives led to further declines in coal consumption by the transport sector. Of total coal production, 30% was from open pit mines and 70% from underground mines. The Transvaal and Natal were the two main coal producing regions. Working cost of production of marketable steam coal from the Transvaal was about \$7 to \$10.40 per ton, and for Natal, \$11 to \$17.40 per ton. Beneficiating processes to improve the generally high ash coal resulted in coal discards of 35 million tons.

Of 38 million tons of coal exported, 86% was steam coal, and the remainder was blend coal for coking. The Government prohibited the export of pure coking coal owing to limited resources. Exports through Richards Bay were 35.2 million tons; Durban, 1.9 million tons; and Maputo, Mozambique, 331,000 tons. About 635,000 tons was shipped to other countries in Africa. Europe was the destination for 60% of all exports, led by France, the Federal Republic of Germany, and Italy. Most of the remainder went to Asia, led by Japan, 7 million tons, and Taiwan, 2.5 million tons. The average free-on-board cost at Richards Bay ranged from \$16.27 per ton for Transvaal coal to \$27.91 per ton for anthracite from Natal. Included were port handling charges of \$2.61 per ton and rail costs of \$2.01 to \$6.40 per ton. Local coal sales prices were fixed by the Government, but exports were based on free market prices. Both current and future export quotas were allocated by the Government.

AAC was the largest producer, with 12 collieries. The Goedehoop underground mine was commissioned in February and will have a production capacity of 4 million tons for export. The New Denmark Colliery began deliveries to the 3,600-megawatt Tutuka powerplant, which was to be formally commissioned in 1985. The New Vaal Colliery, with a capacity of 6 million tons per year, was to supply the Lethabo powerplant.

Gencor produced about 27 million tons of coal in 1984. Nearly \$600 million has been targeted to raise coal sales by about 7.5 million tons. Another \$117 million was budgeted for a project to extract oil from Torbanite shale. Output from the Kwa Ngoma anthracite mine was to commence by yearend 1985 with 1.5 million tons of coal for export. Capital cost of the mine was about \$60 million.

The South African Coal, Oil and Gas Corp. Ltd. (Sasol) accounted for 20% of total coal output, mainly by its Sigma and Secunda Collieries for its oil-from-coal industry.

The Bosjesspruit Mine, one of four mines in the Secunda Group, was to have a delivery capacity of 27 million tons per year. Sasol's group turnover was $1,541 billion; profit before taxes, $300 million; and net profit, $287 million.

Government assistance to the coal industry included that by the Electricity Supply Commission (Escom) and SATS. Escom provided lower cost loans to new mines that met coal reserve requirements. SATS was to spend $830 million over 3 years to upgrade railroad transport from Witbank to Richards Bay, with unit trains of 200 cars to be used.

Petroleum.—Sasol reportedly saved the equivalent of $1.4 billion in foreign exchange through its oil-from-coal technology in lieu of importing crude or refined products.

The Southern Oil Exploration Corp. (Pty.) Ltd. (Soekor) reported a flow of 2,600 barrels per day of crude oil from a test well in the Mossel Bay area about 50 miles from shore in 100 feet of water. Soekor has drilled 11 potentially economic wells with gas reserves estimated at about 450 billion cubic feet. An estimated $300 million has been spent in oil and gas exploration since 1965. Development of the Mossel Bay gas resources was under consideration, with both Government and private company participation.

Uranium.—Gencor's Beisa Mine, a primary uranium producer, closed owing to the poor market for uranium. About 5,000 workers were adversely affected. Uranium recovery from the Western Deep Levels gold mines also ceased in late 1984. Several uranium recovery plants elsewhere also ceased production, including the Merriespruit plant of Harmony Gold Mining Co.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from South African rands (R) to U.S. dollars at the rate of R1=US$0.8991 for 1983 and R1=US$0.6954 for 1984.

Table 7.—Republic of South Africa: Production of U_3O_8, by producer

(Kilograms)

Producer	1980	1981	1982	1983	1984[p]
AAC Joint Metallurgical Scheme[1]	977,116	1,093,416	863,361	718,928	596,787
Blyvooruitzicht	324,482	315,502	252,270	289,156	233,092
Buffelsfontein	603,800	631,750	580,500	611,000	613,500
East Rand Gold and Uranium Co. Ltd	295,314	302,194	264,814	229,885	164,000
Harmony	490,822	580,428	591,090	623,600	496,680
Hartebeestfontein	435,242	478,663	429,103	441,446	436,283
Palabora Copper	140,000	234,206	257,879	218,635	159,769
Randfontein	646,452	591,774	462,837	491,067	592,776
St. Helena-Beisa	--	--	253,612	454,792	353,294
Vaal Reefs	1,758,386	1,693,569	1,721,782	1,877,421	1,962,977
West Driefontein	251,656	242,327	224,601	174,566	159,638
West Rand Consolidated	385,924	190,258	--	--	--
Western Areas	--	--	170,638	282,465	305,403
Western Deep Levels	212,562	212,484	183,394	173,841	145,632
Miscellaneous	773,619	668,320	577,176	541,190	542,395
Total	7,295,375	7,234,891	6,833,057	7,127,992	6,762,226

[p]Preliminary.
[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. Ltd. in the Orange Free State Province.

Sources: Chamber of Mines of South Africa. Quarterly Analysis of Working Results, Oct.-Dec. 1980-84; Republic of South Africa, Department of Mineral and Energy Affairs. Quarterly Statistical and Other Data on Minerals, Oct.-Dec. 1979-82; Republic of South Africa, Department of Mineral and Energy Affairs. Annual Reports 1980-83; Palabora Mining Co. Ltd. Annual Reports 1980-84; and East Rand Gold and Uranium Co. Ltd. Annual and Quarterly Reports, 1979-83.

The Mineral Industry of Spain

By Roman V. Sondermayer[1]

Although 1984 was a mediocre year for the mineral industry, Spain remained an important producer of minerals and a significant processor of imported crude minerals and related commodities. Production of prominent minerals produced in the country, expressed as approximate percentages of world production, was as follows: strontium, 25.1%; mercury, 22.9%; pyrite, 11.5%; gypsum, 6.9%; magnesite, 5.5%; mine zinc, 3.5%; smelter zinc, 3.3%; potash, 2.3%; and refined copper, 1.6%. As in the past, production of other minerals and fuels was of only domestic significance. Value of output of the nonfuels extractive industry was only 1% of the country's gross national product. The industry employed about 2% of the industrial workers in Spain.

The major events in the mineral industry were as follows: start of regular production at the Sotiel polymetallic mine; start of production in an iron ore concentrator at the Marquesado iron ore mine; start of development of the Navalmedio lead-zinc mine; planning to close the 2,000-year-old Almadén mercury mine; decision to close the potash mine and plant at Esparza; startup of a sulfuric acid plant at Sotiel; and administrative decentralization of the Government's institutions involved with the mineral industry.

Government Policies and Programs.—The Government of Spain has transferred responsibilities for mining, reporting on mining, and mining health and safety from the central administration in Madrid to 17 autonomous authorities in the Provinces. In addition, to speed up development, those owners of concessions that delay development will be heavily taxed. On the other hand, those that do develop their properties will pay nominal taxes.

PRODUCTION

The mineral industry of Spain was made up of a variety of organizations with ownership by both Government and private capital. Table 1 shows the principal industrial organizations operating in Spain, and table 2 shows the latest trends in production of minerals.

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	Rio Tinto Minero S.A	Mines at Rio Tinto.
Copper, refined	do	Refinery at Huelva.
Ferroalloys	Sociedad 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	Minas de Almadén y Arrayanes S.A	Mines and smelter at Almadén.
Petroleum, refined	Empresa Nacional del Petróleo S.A	Refineries at Valle de Escombreras, Puertollano, Tarragona.
Do	Cía. Española 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 Rio 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.

Table 2.—Spain: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite	7,899	8,930	7,361	5,200	6,000
Alumina	58,000	695,000	672,000	[e]650,000	660,000
Metal:					
Primary	386,492	396,600	366,500	357,614	380,830
Secondary	43,000	40,000	[e]35,000	[e]30,000	33,000
Antimony, mine output, metal content	625	646	459	489	500
Cadmium metal	309	[r]303	286	278	250
Copper:					
Mine output, metal content	42,483	50,923	47,614	49,964	50,000
Metal:					
Blister:					
Primary	85,100	87,900	105,000	100,000	105,000
Secondary	18,000	20,000	30,000	18,000	15,000
Total	103,100	107,900	135,000	118,000	120,000
Refined:					
Primary	138,700	137,100	[e]151,300	[e]143,600	135,000
Secondary	15,000	15,000	[e]20,600	[e]15,000	15,000
Total	153,700	152,100	[2]171,900	158,600	150,000
Gold, mine output, metal content troy ounces	108,154	98,381	109,858	162,296	168,000
Iron and steel:					
Iron ore and concentrate (including byproduct concentrate):					
Gross weight thousand tons	9,227	8,565	8,370	7,449	7,260
Iron content do	4,372	4,218	4,130	3,512	3,613

See footnotes at end of table.

Table 2.—Spain: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Iron and steel —Continued					
Metal:					
Pig iron thousand tons	6,720	6,423	5,991	5,398	5,338
Ferroalloys, electric-furnace do	383	293	259	253	276
Steel:					
Crude do	12,333	12,662	13,160	12,731	13,484
Castings and forgings do	253	250	209	156	156
Total do	12,586	12,912	13,369	12,887	NA
Semimanufactures do	[r]10,137	10,244	9,970	10,787	NA
Lead:					
Mine output, metal content	87,105	80,200	73,271	82,453	85,000
Metal:					
Primary	84,300	83,000	99,500	107,800	110,000
Secondary	39,700	34,100	32,100	36,000	38,000
Mercury:					
Mine output, metal content 76-pound flasks	49,198	49,545	50,832	43,250	42,000
Metal do	43,038	46,008	48,808	41,075	40,000
Silver, mine output, metal content thousand troy ounces	4,526	5,347	3,787	1,496	3,000
Tantalum minerals (tin byproduct):					
Gross weight kilograms	50,730	58,390	53,630	47,000	48,000
Tantalum content do	13,445	16,463	14,142	15,066	16,000
Tin:					
Mine output, metal content	437	[r]564	518	444	450
Metal, primary	4,100	[r]4,400	3,700	[e]2,200	2,000
Titanium dioxide[e]	40,000	40,000	40,000	35,000	34,000
Tungsten, mine output, metal content	446	437	545	517	500
Uranium, mine output, U_3O_8 content	394	290	280	283	[3]175
Zinc:					
Mine output, metal content	183,120	182,045	167,000	167,715	225,600
Metal, primary and secondary	151,800	179,500	181,800	189,900	20,406
NONMETALS					
Barite	59,827	52,695	50,031	52,410	50,000
Bromine[e]	400	400	350	330	300
Cement, hydraulic, other than natural thousand tons	28,010	28,751	29,569	30,632	30,000
Clays:					
Attapulgite	48,020	42,227	42,296	44,654	40,000
Bentonite	97,705	110,000	112,326	82,530	80,000
Kaolin, marketable:					
Crude	46,066	71,665	72,956	[e]73,000	74,000
Washed	181,116	189,990	165,936	[e]160,000	150,000
Refractory, not further described	416,114	529,416	453,425	[e]450,000	500,000
Other thousand cubic meters	7,838	10,994	11,318	[e]11,000	12,000
Diatomite and tripoli	23,460	38,111	63,365	55,638	55,000
Feldspar	103,365	129,593	131,071	116,137	115,000
Fluorspar:					
Gross weight:					
Acid-grade	204,596	213,616	157,205	190,749	195,000
Metallurgical-grade	40,153	43,511	37,075	41,585	45,000
Total	244,749	257,127	194,280	232,334	240,000
CaF_2 content:					
Acid-grade	198,152	259,500	197,550	190,749	195,000
Metallurgical-grade	29,631	31,500	29,247	41,585	40,000
Total	227,783	291,000	226,797	232,334	235,000
Gypsum and anhydrite, crude thousand tons	5,223	5,288	5,048	5,620	5,000
Kyanite, andalusite, and related materials	6,471	6,151	5,105	4,486	4,500
Lime, hydrated and quicklime thousand tons	950	1,051	1,100	1,000	1,000
Magnesite:					
Calcined	153,933	135,023	154,421	173,876	175,000
Crude	505,532	476,392	533,595	597,137	600,000
Mica	4,831	3,524	3,428	1,300	1,200
Nitrogen: N content of ammonia thousand tons	742	743	538	615	620
Pigments, mineral:					
Ocher	13,696	15,522	11,709	9,879	10,000
Red iron oxide[e]	25,000	25,000	23,000	20,000	20,000
Potash salts, K_2O equivalent	658,230	731,642	691,931	656,726	677,000
Pumice	1,086,417	937,851	970,480	1,002,301	1,100,000
Pyrite including cuprous, gross weight thousand tons	2,394	2,400	[e]2,200	2,306	2,400

See footnotes at end of table.

Table 2.—Spain: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Salt:					
Rock including byproduct from potash works thousand tons	2,379	2,300	2,213	2,008	2,000
Marine and other do	1,129	1,393	1,077	1,149	1,100
Sand and gravel: Silica sand[4] do	2,425	1,832	1,611	2,100	2,200
Sepiolite	286,232	288,499	329,243	345,932	330,000
Sodium compounds, n.e.s.:					
Sodium carbonate, manufactured[e] thousand tons	505	500	500	500	550
Sodium sulfate:					
Natural:					
Glauberite, Na_2SO_4 content	37,735	55,097	92,737	130,566	135,000
Thenardite, Na_2SO_4 content	118,324	132,340	117,776	132,513	135,000
Manufactured[e]	175,000	175,000	170,000	170,000	170,000
Stone:					
Calcareous:					
Chalk thousand tons	278	277	397	377	NA
Dolomite do	2,043	1,999	1,967	2,020	NA
Limestone do	81,239	78,673	83,831	84,080	NA
Marble do	753	694	665	685	NA
Marl do	7,150	6,210	6,380	6,346	NA
Basalt do	920	1,138	1,269	1,064	NA
Granite do	7,224	7,514	7,671	7,527	NA
Ofite do	458	659	846	1,044	NA
Phonolite do	396	568	680	449	NA
Porphyry do	396	341	309	461	NA
Quartz do	708	627	455	502	NA
Quartzite do	401	347	432	602	NA
Sandstone do	1,633	1,791	1,807	1,365	NA
Serpentine do	302	342	303	360	NA
Other do	29,890	26,819	25,308	23,659	NA
Strontium minerals:					
Gross weight	19,000	36,000	34,900	34,500	35,000
Sr_2O_4 content	17,480	33,120	32,108	31,740	32,000
Sulfur:					
S content of pyrites thousand tons	1,096	1,118	1,029	1,073	1,100
Byproduct:					
Of metallurgy do	125	135	130	r e120	125
Of petroleum do	12	12	10	r e8	9
Of coal (lignite) gasification do	3	3	3	r e3	3
Total do	1,236	1,268	1,172	1,204	1,237
Talc and steatite	73,949	69,068	69,686	69,467	64,000
MINERAL FUELS AND RELATED MATERIALS					
Coal (marketable):					
Anthracite thousand tons	4,077	4,863	5,205	5,370	[2]5,574
Bituminous do	9,070	9,080	10,217	10,049	[2]10,240
Lignite do	15,390	20,986	23,882	24,524	[2]24,088
Total do	28,537	34,929	39,304	39,943	[2]39,902
Coke, metallurgical do	4,000	NA	NA	3,422	3,500
Gas, natural: Marketed million cubic feet	300	NA	NA	182,000	NA
Peat	44,367	39,012	60,092	39,622	40,000
Petroleum:					
Crude thousand 42-gallon barrels	11,732	8,955	11,170	21,693	21,000
Refinery products:					
Liquefied petroleum gases do	([5])	11,228	10,834	12,597	[2]14,964
Naphtha do	([5])	9,891	12,138	18,606	[2]23,709
Gasoline, motor do	45,452	44,871	38,505	47,787	[2]52,350
Jet fuel do	17,091	15,720	15,816	16,968	[2]18,160
Kerosine do	1,061	581	3,231	1,418	[2]1,860
Distillate fuel oil do	80,219	78,270	75,055	74,771	[2]78,067
Residual fuel oil do	151,365	148,371	123,762	108,391	[2]108,238
Lubricants including grease do	2,386	([5])	([5])	([5])	([5])
Other do	47,346	41,552	49,896	45,927	[2]28,420
Refinery fuel and losses do	21,700	6,391	8,108	10,405	[2]1,112
Total do	366,620	356,875	337,345	336,870	[2]326,880

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 10, 1984.
[2]Reported figure.
[3]Content of uranium.
[4]Includes sand obtained as a byproduct of feldspar and kaolin production.
[5]Included in other refinery products.

TRADE

Based on preliminary statistics, trade in mineral fuels-related products had a negative balance of $6 billion[2] during 1984. Value of imported hydrocarbons was $8.7 billion.

COMMODITY REVIEW

METALS

Gold.—Charter Exploration S.A., together with Anglo-American S.A., explored for gold. A low-grade disseminated deposit, near Salave in northern Spain, reportedly may be economic providing further exploration shows more easily minable reserves near the surface.

British Petroleum S.A. (BP), a subsidiary of Minera España S.A., explored for gold in the eastern Pyrenees, western Astúrias, and northern Palencia. BP's explorations were reconnaissance work. After assessment of results, a decision will be made on future operations in promising areas already examined.

Iron and Steel.—A new sink-float plant for upgrading iron ore went on-stream at the Santander Mine, operated by Altos Hornos de Vizcaya S.A. Capacity of the new installation was estimated at 200,000 tons of ore per year.

Cía. Andalusa de Minas S.A., at its Marquesado Mine near Alquife, Granada Province, started operating an iron ore concentrator using high-intensity wet magnetic separators. Plant capacity was reported at 200 tons per hour. The 4.6-millimeter fraction of the ore will be crushed to less than 1 millimeter and then concentrated. The new plant was built to meet the need for sintered feed with high iron content and reduced alkali content.

The state steel sector was planning the restructuring of its facilities to prepare the industry for the entry into the European Economic Community. Progress was slow, and various conflicting interests had to be adjusted so that they could be accepted by all concerned.

Plans for modernization of the Avilés and Verina works, operated by Empresa Nacional Siderúrgica S.A. (Ensidesa), were approved. Orders for an electrogalvanizing line of 150,000 tons per year capacity were placed for the Sagunto works operated by the Altos Hornos del Mediterraneo S.A. The Government's Instituto Nacional de Industria (INI), which controls Ensidesa, considered building a smaller steel smelting shop in Astúrias with a capacity of 1.5 million tons, instead of the 2.7-million-ton-per-year shop that was previously planned. Disputes with the unions delayed the decision during the year.

Lead and Zinc.—Exploratory drilling on the La Infanta massif complex sulfide ore deposit was completed. Getty Oil Co. and Phelps Dodge Corp. of the United States were partners in the venture. Results of a feasibility study based on exploratory drilling should be known during 1985.

Exploration continued on the lead-zinc deposit at Toral de los Vades, near Ponferrada, Province of León. In addition to drilling, some underground exploration was underway at yearend. According to reports, the Toral de los Vades deposit contains about 5 million tons of ore with an average total lead-zinc content of 13%. At the Troya deposit near Bilbao in northern Spain, exploration and subsequent studies have indicated a possibility of opening a new mine, based on reserves of about 4 million tons of ore.

At the Navalmedio lead-zinc deposit, owned by Minas de Almadén y Arrayanes S.A., development of an underground mine has started. The new mine should become a producer by 1989. Furthermore, Asturiana de Zinc S.A. was restructuring and modernizing its mine at Reocin.

Mercury.—During 1984, the Almadén management examined the possibility of closing the present underground mercury mine and the existing smelter at Almadén after almost 2,000 years of operation. A new flotation plant and a new smelter were planned, to be built near the existing El Entredicho open pit mine. The Almadén Mine may be transformed into a museum of mining technology.

A final decision on the future of the Almadén Mine was expected in 1985. During 1984, El Entredicho produced about 80% of the total mercury output of the Almadén company. The old Almadén Mine produced only 20% of the total.

Polymetallic Sulfide Ores.—The Sotiel complex, made up of an underground mine producing sulfide ores of lead, zinc, copper, and pyrite, with a corresponding flotation plant and a sulfuric acid plant, went onstream in 1984; trial production started in 1983. Sotiel is about 90 kilometers northwest of Seville in southern Spain. An asphalt road and a railroad spur connect Sotiel with the port at Huelva and with other parts of Spain. The complex is owned by Minas de Almagrera S.A., a fully owned subsidiary of INI.

The Sotiel Mine and flotation plant were rated at 600,000 tons per year of run-of-mine ore. Reserves were reported at 59 million tons of ore with an average metal content of 0.61% copper, 1.6% lead, and 3.82% zinc. During 1984, the flotation plant processed 298,671 tons of run-of-mine ore and produced 3,310 tons of copper concentrate with an average copper content of 19.23%; 1,605 tons of lead concentrate with an average lead content of 43.43%; 12,952 tons of zinc concentrate with an average lead content of 46.17%; and 79,526 tons of pyrite with an average sulfur content of 44.7%. (See the "Sulfur" section for details on this sulfuric acid plant.)

NONMETALS

Cement.—The cement producing industry had a slow year, reflecting a leveling of building activities. During 1984, 51 cement plants, with a capacity of 32.1 million tons of cement per year, were in operation. Approximate coefficient of plant utilization was 77%. With an output of about 8.7 million tons, the region of Catalonia remained the largest cement producer. Cementos del Mar S.A., with a plant at Alcanar (Tarragona); Asland S.A., with a plant at Moncada (Barcelona); and Cementos Uniland S.A., with plants at Vallcarca and Monjos y Villafranca, both near Barcelona, were the principal producers of cement in the country.

Clays.—*Kaolin.*—Completion of a new kaolin washery and expansion of a kaolin mine near Poveda de la Sierra, Province of Guadalajara, owned by the Cía. Española de Caolines S.A., raised the company's capacity to 70,000 tons of washed kaolin, of which one-half was of ceramic quality and the other one-half was of stucco grade. Neither was previously produced in Spain.

Potash.—A decision to close the potash mine and plant at Esparza, near Pamplona, was made public by Potasas de Navarra S.A., which operated these facilities and employed 1,800 persons. Furthermore, Potasas de Navarra made plans to start production from unexploited deposits at Subiza, which is near the existing beneficiation plant at Esparza. At the Cardona Mine, owned by Unión Explosivos Rio Tinto S.A., expansion of capacities and the mechanization program have been completed. The new capacity of the Cardona Mine was reported at 360,000 tons of K_2O per year.

Pyrite.—Work was completed on restarting pyrite and complex sulfide ores production at the Santa Barbara Mine. When in full operation, probably by 1985, this mine should produce 190,000 tons of pyrite. Pyrite from Santa Barbara will be used by the sulfuric acid plant at Rontealde in Vizcaya. Plans call for pyrite cinder to be delivered to the Axpe-Erandio plant near Bilbao, operated by Metal Química del Nervión S.A., where iron, copper, zinc, gold, and silver will be recovered.

Sepiolite.—The capacity for production of sepiolite by Sociedad Tolsa S.A., near Vallecas, near Madrid, was increased to 350,000 tons of sepiolite per year.

Sodium Sulfate.—Development was completed and startup of production was announced at a glauberite deposit at Colmenar de Oreja, Madrid, operated by Solquisa S.A., with a capacity of 75,000 tons per year. Sociedad Unión Salinera de España completed expansion of its facilities for production of sodium sulfate from a deposit near Villarrubia de Santiago to 140,000 tons per year.

Sulfur.—The sulfuric acid plant of the Sotiel mining complex in southern Spain, operated by the Minas de Almagrera, went on-stream in September 1984. The plant was designed and built by Lurgi Chemie und Hüttentechnik GmbH of Frankfurt, Federal Republic of Germany. Plant capacity was rated at 300,000 tons of sulfuric acid per year. Pyrite mined in the nearby Sotiel Mine was used for feed.

MINERAL FUELS

During 1984, Spain remained short of mineral fuels and energy resources. Imports of petroleum, natural gas, and high-rank coals were necessary to meet the country's demands. Based on preliminary data, the share of various sources in the energy balance of Spain for 1984 was as follows: oil, 50%; coal, 27%; hydropower, 12%; nuclear power, 8%; and natural gas, 3%. A new scaled-down National Energy Plan projected an increase of energy consumption from 105 million tons of coal equivalent in 1983 to 116 million tons of coal equivalent in 1986 and 136 million tons in 1992. The share of liquid hydrocarbons in the total was planned to decline from about 60% in 1983 to 47% in 1992.

Coal.—Cía. Española de Petróleos S.A. and Hydroelectrica Española S.A. plan to conduct joint research on coal gasification. In the "Rio" anthracite mine near Bierzon, Province of León, a methane explosion killed five miners and injured seven.

The Instituto Geológico y Minero de España awarded to the Cía. Iberica de Especialidades Geotecnicas and the Compañia General de Sondeos a contract for exploration of lignite deposits in the Provinces of Alicante, Almeria, Granada, Murcia, and Valencia.

Petroleum and Natural Gas.—Although there were more wells drilled offshore in Spain than onshore, emphasis in exploratory drilling for oil and natural gas may be slowly turning toward promising onshore areas. Activities were concentrated in the north, in Burgos, Rioja, and Huesca Provinces and in the south, in Andalucia.

Development of the El Serrable onshore gasfield in the southern Pyrenees was completed and production of about 400,000 cubic feet per day started.

Construction of a natural gas pipeline for distribution of mostly imported natural gas continued in northern and southeastern Spain. Completion was expected in 1986. Difficult negotiations with Algeria for a new natural gas purchase contract continued the whole year, without results. However, both negotiating parties expressed hopes that a contract might be concluded in 1985. The new completed cracking units in the Algerias, Castellon, Puertollano, and Somorrostro refineries were in operation for the full year. Construction of a new cracking unit at Huelva continued and completion was expected in 1985.

At the beginning of 1984, Spain had in operation 10 petroleum refineries with a throughput capacity of 1,520,000 barrels per day of crude oil. The largest refineries were Tarragona with a capacity of 260,000 barrels per day, Somorrostro with 240,000 barrels per day, and Escombreras with 200,000 barrels per day.

Uranium.—The principal uranium producing areas of Spain, all controlled by the Spanish Government, were Ciudad Rodrigo, in the Province of Salamanca, and Don Benito, in the Province of Badajoz. Of the country's total reserves of 24,390 tons of U_3O_8, about 19,306 tons were located in Salamanca. Two plants, one in Sealices el Chico in the Province of Salamanca, and one at General Hernadez Vidal in the Province of Andujar, produced uranium concentrate at the same rate as in the past. In addition, uranium exploration continued near the operational mines in Salamanca in Min fe Alameda de Gardon, and in the Province of Badajoz in the areas of Don Benito, El Pedregal, Intermedia, and Zarcinas. Furthermore, exploratory activities of various kinds were carried out in Molina de Aragon in the Province of Segovia and near Viar in the Province of Seville.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Spanish pesetas (Ptas) to U.S. dollars at the rate of Ptas173=US$1.00, the average rate in 1984.

The Mineral Industry of Sudan

By Kevin Connor[1]

Operations within the mineral sector showed mixed results in 1984. Gold exploration and development, mainly in the northern part of the country, showed excellent results and was expected to increase Sudan's gold production over tenfold by 1987. The chromite industry remained stagnant at best, with antiquated equipment and poor finances plaguing the industry. The fledging crude petroleum industry continued to be stalemated throughout the entire year by the insurgence problems in the southern part of the country, where existing commercial size fields were discovered by Chevron Oil Co. of Sudan in 1980. Other minerals produced showed little or no change from their 1983 levels of production.

On balance, 1984 was a poor year economically for Sudan, with the largest drain on the economy continuing to be petroleum imports at a cost of $373 million.[2] Because of the country's increasing inability to pay on outstanding loans, Sudan was unable to secure normal commercial financing for its oil imports, and as a result much of the oil imported was secured only through special negotiations and agreement to prices well above world market rates. The overall balance of payments for the country actually improved some, owing to a bumper crop of cotton and a decline in imports because of the constrained domestic credit situation.

PRODUCTION AND TRADE

Sudan's mineral industry continued to be an insignificant contributor to the country's economy. Mineral commodities produced were chromite ore, gold, cement, gypsum, mica, and salt. Gold production rose sharply during the year, and exports increased as Greenwich Resources Inc. of Vancouver, Canada, exported approximately 1,000 troy ounces of gold from their new Gebeit mining operation. The total value of mineral exports represented less than 1% of the country's total export revenues for the year. Major import items were crude petroleum, refined petroleum products, and iron and steel materials. Except for cement manufacture and a petroleum refinery plant located at Port Sudan, the country had no mineral processing industries.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
Cement, hydraulic thousand tons	185	150	183	200	[2]176
Chromium: Chromite concentrate, gross weight	25,400	25,515	[e]19,000	[e]20,000	20,000
Gold, mine output, metal content[e] troy ounces	300	300	400	500	1,500
Gypsum and anhydrite, crude[e]	10,000	15,000	15,000	8,000	[2]8,000
Manganese ore	363	[e]400	[e]400	[e]400	400
Mica, all grades	1,500	2,000	165	10	[2]10
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	1,118	1,099	1,000	[e]1,000	1,000
Jet fuel do	428	308	300	[e]300	300
Distillate fuel oil do	2,366	2,198	2,000	[e]2,000	2,000
Residual fuel oil do	--	2,419	2,000	[e]2,000	2,000
Other do	55	--	--	--	--
Refinery fuel and losses do	299	296	300	[e]300	300
Total do	4,266	6,320	5,600	[e]5,600	5,600
Salt	80,000	64,253	27,927	[e]75,000	75,000

[e]Estimated. [p]Preliminary.

[1]In addition to the commodities listed, modest quantities of a variety of crude construction materials (including clays, sand and gravel, and stone) 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 1984. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels. Table includes data available through June 28, 1985.

[2]Reported figure.

COMMODITY REVIEW

METALS

Chromite.—The main chromite producer in Sudan, the state-owned Ingessana Hills Mining Corp., continued to experience severe financial and technical problems throughout the year. All of the corporation's mining operations were located in the Ingessana Hills near the Ethiopian border. The company's existing mining equipment and facilities needed replacement, renovation, and modernization, particularly the main operation at Jebel Gam. Negotiations with the Romanian Government were underway for securing financial and technical aid for renovating the mines.

Gold.—Greenwich Resources produced approximately 1,000 troy ounces of gold from its vat leaching operation of old tailings at the Gebeit Mine in the Red Sea Hills. In conjunction with the leaching operation, Greenwich had also conducted an extensive evaluation of the underground potential of the property during 1983 and 1984. Reported proven reserves were 207,000 tons of ore at an average grade of 1.09 troy ounces of gold per ton. Although a decision on whether to mine underground or not at Gebeit was still pending at yearend, indications were favorable for development.

The economic feasibility study for the Gebeit Mine was conducted by Robertson Research International Ltd. of the United Kingdom, which owned 15.7% of Greenwich Resources. The feasibility final report targeted a full-scale production rate for Gebeit of 50,000 tons per year of ore, giving the operation a lifespan of 4 years based on proven reserves. However, further exploration of the four identified lode zones was expected to increase the reserves figure and extend the mine's life.[3]

Processing of the underground ore would involve crushing, milling, and vat leaching, followed by precipitation of the gold from solution using a zinc catalyst. The gold would then be smelted on-site into a crude bullion and finally air freighted to London for refining. Approximately 60 local employees and 12 expatriates were estimated for the mining and processing operations. Greenwich Resources had a 21-year mining lease on 6 square kilometers of property at Gebeit, as a joint venture operation with the Government of Sudan. The terms of the agreement allowed Greenwich Resources to recover exploration and development costs from mining revenues first, and thereafter, the profits would be shared 49% by Greenwich Resources, and 51% by the Sudanese Government.

At yearend, negotiations between the Bahamas-based Dar Tadine Al Umma Co. (DTU) and the Sudanese Government were still ongoing for development of a gold exploration agreement covering two areas in southern and eastern Sudan. One of the locations was the Kurmuk Fazughli area where gold has been traditionally panned by local prospectors. DTU personnel envisioned a multimillion-dollar exploration program. DTU was expected to receive a maximum percentage split of any contract stipulated revenues.

France's Bureau de Recherches Geologiques et Minières (BRGM) continued a modest scale exploration program in the Red Sea Hills area, which owing to favorable results has been ongoing since 1976. Within its concession areas, BRGM has identified three promising gold deposits at Kamoeb, Ganaet, and Hassai. Kamoeb and Ganaet were estimated to contain a total of 250,000 troy ounces of gold at grades of 0.06 to 0.32 troy ounce per ton of ore. The Kamoeb site was also estimated to contain 0.48 troy ounce of silver per ton of ore. The Hassai deposit was estimated to contain at least 800,000 tons of ore graded at 0.22 troy ounce of gold per ton. In 1980, a tri-party technical organization based on BRGM's field studies was formed between BRGM and the Governments of Saudi Arabia and Sudan. Under the terms of the organizational agreement, still in effect in 1984, any development of mineral deposits defined through BRGM's work would be by a Sudanese-French company, of which a 60% share was acquired for Sudan by the Saudi Arabian Government.

Other Metals.—The BRGM concessions in the Red Sea Hills comprised three separate areas covering a total of 70,000 square kilometers. These areas were almost completely surveyed by yearend. Numerous gossans have been identified through the 8 years of exploration efforts by the BRGM geologists and scientists, assisted by equal numbers of personnel from the Geological and Mineral Resources Department of the Sudanese Ministry of Energy and Mining. Within the Atiab-Arbaat region, which also contained BRGM's major gold prospects, massive sulfide mineralizations containing copper, lead, zinc, and silver have been identified. Three extensive gossans near Wadi Ariab were estimated to have at least 10 million tons of base metals in sulfide mineralizations.

MINERAL FUELS

Sun Sudan Oil Co. began seismic activities in late 1984 on its exploration and production-sharing concession in north-central Sudan. The concession holder was a group of petroleum concerns comprised of Sun Oil Co., 42.5% ownership; Marathon Oil Co., 29.75%; Ocelot Exploration, 12.5%; and the Sudanese state-owned General Petroleum Corp. (GPC), 15%. During October, 508 line kilometers of seismic survey work were conducted within the 175,000-square-kilometer concession area. Based on preliminary analysis of the seismic work, another 120 line kilometers of seismic activities were planned for early 1985. The company expected to begin drilling operations by yearend 1985.

In December 1984, the Government of Sudan and Sigma International signed an agreement in Khartoum setting up a 50-50 petroleum joint venture firm, the National Oil Co. of Sudan (NOCS). Sigma International, a wholly owned subsidiary of the Saudi Triad Group, planned to invest $400 million in petroleum-related projects over the next 8 to 10 years, according to the agreement. In return for this investment, Sigma was to control 50% interest in NOCS. All the rights, titles, concessions, leases, and royalties of Sudan regarding petroleum and related hydrocarbon activities were to become property of NOCS. NOCS was to be granted a wide range of exemptions from taxation and import regulations. Existing oil-related assets of third parties, such as those of the Chevron-Shell-Total Group, were also subject to the accord, if their existing contracts with the Government should become nullified owing to nonfulfillment of obligations.

Civil disturbances continued to hamper petroleum exploration and development efforts in south-central Sudan throughout 1984. Little progress if any was made during the year regarding construction of either the production facilities for the Benitu oilfields, or the Benitu end of the dual pipeline system to carry the crude oil production to the Red Sea at Port Sudan. On the exploration side, however, Chevron Sudan completed a development well, the Sharaf-2, near Mughlad during November and, on November 1, spudded a wildcat well at Nugara. Throughout most of the year Chevron had two seismic crews operating in the Lugud area, and a third seismic crew began work in the Malut concession block during December.

During the year, the International Development Authority agreed in principle to a $12 million grant for establishing a petroleum facility in Sudan for purchasing petroleum products through price competitive channels. The Government agency GPC has been the country's sole agent for purchasing, pricing, and allocating fuel supplies, with existing petroleum companies in the country allowed only to distribute the supplies. This system of government control has been plagued by economic inefficiencies that have resulted in annual fuel costs much higher than world prices. In 1982 and 1983, the Sudanese were obligated to pay $60 million in administrative and interest fees above competitive market prices for the country's fuel supplies. The petroleum facility calls for all fuel to be purchased under open bidding, with private oil companies importing supplies and having a voice in making regional and institutional allocations. At yearend 1984, initiation of the facility was still pending agreement by the International Monetary Fund and the Sudanese Government on general economic policies for the country.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Sudanese pounds (£S) to U.S. dollars at a rate of £S1.3=US$1.00

[3]Mining Journal (London). Red Sea Hills Turning Gold. Mar. 22, 1985, pp. 190-191.

The Mineral Industry of Sweden

By Richard H. Singleton[1]

Sweden remained a significant world producer of iron ore, steel and ferroalloys; copper, lead, and zinc; arsenic; silver; and feldspar. Iron ore output increased significantly after a 3-year slump. Production of pig iron and crude steel increased, as did export of steel manufactures. Iron ore mining and beneficiation methods were improved, particularly in lowering the phosphorus and alkali contents. Ferrochromium and ferrosilicon production capacities were each being increased significantly and production of ferronickel began. Exports of ferrochromium and ferrosilicon increased, as did exports of high-purity silicon metal.

Copper refining capacity was being increased, as was, concurrently, gold and silver refining capacity. Increases continued in the production of copper ore and smelted copper, and in copper exports. A new gold mine was opened as Sweden's gold production increased. Silver exports increased, as did imports of silver concentrate. Primary aluminum production capacity was being increased. Output of refined lead increased, and hydrometallurgical leaching of lead from copper concentrates was being studied in an experimental plant. Operation of a new arc-plasma reduction plant for recovery of zinc, iron, and ferroalloy values from bag dust began.

Industry sources stated that Sweden's reserves of metallic ores are complex and limited in quantity. Foreign ore sources were being sought, and exploration continued for additional indigenous ore deposits. Boliden AB alone was investing at an annual rate of approximately $8 million[2] in exploration, and promising discoveries of complex zinc-copper-silver ores had been made. Development of these deposits was being hampered by continuing delays in obtaining licensing from the Government.

Cement production increased because of increased demand in the foreign market. A new plant was installed for the manufacture of dolomite granules for removal of sulfur oxides from stack gases from coal-burning powerplants. Also, exploratory drilling was conducted in dolomite deposits. Fluorspar production had begun in 1983.

Exports of fertilizer materials, industrial diamond, sodium sulfate, dimension stone, carbon black, and sulfur dioxide increased in 1983 while exports of gem diamond and coke decreased. Imports of ammonia, sodium carbonate, and kaolin increased while imports of gypsum decreased.

The Government approved in 1984 the startup of the last 2 of 10 nuclear reactors in Sweden. New legislation was enacted for the regulation of this industry as well as the hydrolectric and coal-fueled electrical power industries.

Sweden's economic upturn continued throughout 1984 primarily as a result of the favorable export market. Real gross national product increased 3% to $91 billion. At yearend, industrial activity was at a record high, up 7% in 1984, and industrial investment increased by 20% during the year. A positive trade balance was led by exports of automobiles and machinery. The United States became Sweden's second largest export market, accounting for 11% of foreign shipments. The United States supplied 8% of Swedish imports, the largest item being coal and coke valued at $106 million in 1983.

PRODUCTION AND TRADE

Output increases occurred in 1984 in the mining of copper, 8%; gold, 19%; and iron, 37%. Production of crude steel increased 13% to 4.8 million tons. In 1983, exports of steel semimanufactures increased 10% to 2.1 million tons. Production of pig and sponge iron combined increased 10% to 2.3 million tons. Production of refined lead increased significantly.

Increases occurred in 1983 in exports of copper metal, ferrochromium, ferrosilicon, and silver metal. The value of exported high-purity silicon increased 60% to $22.8 million. Decreased exports occurred in copper concentrates and silver wastes.

Significant increases occurred in 1983 in the importation of silver concentrate and wastes. Imports of chromium ore and concentrate increased 12% to about 342,000 tons.

The value of exported synthetic diamond increased 24% to $19.3 million in 1983 while that of gem diamond decreased 46% to $5.1 million. Exports of fertilizer materials increased 84% to 374,000 tons while imports of ammonia increased 36% to about 213,000 tons. Exports of sodium sulfate increased 38% to about 92,000 tons while net imports of sodium carbonate decreased 11% to about 119,000 tons.

Significant increases occurred in 1983 in the exportation of dimension stone, 26% to about 216,000 tons; carbon black, nearly fourfold to about 40,000 tons; and sulfur dioxide, fourteenfold to about 52,000 tons. Coke exports decreased 41% to about 130,000 tons. Kaolin imports increased while gypsum imports decreased.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Primary	81,641	82,717	78,898	82,156	[2]82,903
Secondary	23,239	[r]24,724	26,903	[e]27,000	27,000
Arsenic: Trioxide, refined[e]	[r]6,500	[r]6,900	[r]7,200	[r]5,300	5,900
Copper:					
Mine output, metal content	42,785	50,700	55,400	64,000	[2]69,100
Metal:					
Smelter:					
Primary	45,749	60,576	72,504	78,756	[2]79,775
Secondary	10,692	13,259	17,397	23,076	[2]22,895
Total	56,441	73,835	89,901	101,832	[2]102,670
Refined:					
Primary	43,164	50,142	[e]50,304	51,357	51,904
Secondary	12,549	11,750	[e]12,000	[e]12,000	12,000
Total	55,713	61,892	62,304	63,357	[2]63,904
Gold:					
Mine output, metal content troy ounces	[e]70,000	[e]70,000	77,160	102,880	[2]122,000
Metal including alloys do	143,424	[r]148,000	148,000	205,766	[2]244,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	27,184	23,225	16,143	13,212	[2]18,123
Iron content do	17,643	15,073	10,490	8,588	[2]11,180
Metal:					
Pig iron and sponge iron do	[r]2,563	[r]1,933	1,883	2,109	2,315
Ferroalloys:					
Ferrochromium	144,089	145,716	116,634	119,491	125,000
Ferrochromium-silicon	[r]26,329	[r]22,516	19,954	18,377	20,000
Ferromolybdenum	805	726	552	641	600
Ferrosilicon	[r]7,741	[r]18,619	14,177	19,406	20,000
Ferrotungsten	423	377	365	121	--
Ferrovanadium	348	129	8	10	10
Silicon metal	18,457	14,340	[e]16,000	[e]16,000	16,000
Total	[r]198,192	[r]202,423	167,690	174,046	181,610
Steel, crude thousand tons	4,232	[r]3,781	3,936	4,210	[2]4,766
Semimanufactures, rolled do	3,569	[r]3,272	4,435	3,598	4,100

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Lead:					
Mine output, metal content	72,200	84,100	86,767	78,200	[2]80,200
Metal:					
Smelter, primary	[r]47,123	[r]21,795	63,690	62,800	66,000
Refined:					
Primary	20,300	7,000	29,600	34,800	[2]49,800
Secondary	22,000	22,000	19,900	18,800	[2]30,100
Total	42,300	29,000	49,500	53,600	[2]79,900
Selenium, elemental, refined	51	44	[e]44	[e]44	45
Silver:					
Mine output, metal content thousand troy ounces	[r]5,337	[r]5,170	5,395	5,491	[2]5,793
Metal including alloys[3] do	[r]7,767	6,825	8,018	10,218	[2]9,809
Tungsten, mine output, metal content	[r]289	[r]312	268	365	[2]385
Zinc, mine output, metal content	167,400	180,900	185,000	202,900	[2]205,900
NONMETALS					
Cement, hydraulic thousand tons	2,445	2,318	2,304	2,240	2,350
Clays: Kaolin	357	289	305	305	300
Feldspar, salable, crude and ground	57,999	40,341	54,669	52,913	50,000
Fluorspar concentrate	--	--	--	3,454	[2]3,685
Lime: Quicklime, hydrated lime, dead-burned dolomite thousand tons	744	642	581	610	600
Nitrogen: N content of ammonia do	86	79	77	49	[2]49
Phosphate rock (byproduct):					
Gross weight do	88	124	131	107	128
P_2O_5 content do	34	48	50	41	49
Pyrite, gross weight do	396	419	426	430	[2]418
Sodium compounds:					
Sodium carbonate	(4)	(4)	(4)	(4)	--
Sodium sulfate[e] thousand tons	[r]100	[r]100	[r]100	[r]100	100
Stone:					
Dimension, mostly unfinished:					
Granite do	[r]105	[r]126	115	120	120
Limestone do	[r]23	27	27	11	10
Slate do	65	66	59	28	30
Crushed:					
Dolomite do	371	426	469	487	500
Granite do	9,827	10,210	10,715	9,892	10,000
Limestone:					
For cement manufacture do	1,840	1,352	1,181	918	1,000
For lime manufacture do	910	841	611	759	800
For other construction and industrial uses do	2,352	2,183	2,125	2,117	2,100
Chalk (ground) do	34	34	34	38	[2]37
Marl do	1,977	2,259	2,431	2,717	2,700
For agricultural uses (ground) do	125	143	151	184	200
For other uses (ground) do	131	74	71	67	70
Total do	7,369	6,886	6,604	6,800	6,907
Quartz and quartzite do	[r]1,457	[r]1,338	1,275	1,410	1,400
Sandstone do	227	164	141	140	140
Other do	[r] [e]550	[r]515	571	610	600
Sulfur:					
S content of pyrite do	[r]178	[r]189	214	220	[2]180
Byproduct:					
From metallurgy do	62	85	--	--	[2]114
From petroleum do	48	37	22	20	25
Total do	[r]288	[r]311	236	240	319
Sulfuric acid do	[r]648	[r]832	856	928	[2]930
Talc and steatite	15,856	15,581	17,753	21,056	20,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black thousand tons	27	26	23	NA	NA
Coal, all grades[e] do	9	--	--	--	--
Coke, metallurgical do	1,186	1,101	1,148	1,159	1,150
Peat, for agricultural use do	134	131	126	125	125
Petroleum refinery products thousand 42-gallon barrels	[r]127,000	[r]101,000	92,000	104,000	110,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 19, 1985.
[2]Reported figure.
[3]Includes silver values in blister copper.
[4]Revised to zero.

Table 2.—Sweden: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals, unspecified	2	15	NA	Netherlands 14.
Aluminum:				
Ore and concentrate	673	5	--	West Germany 4.
Oxides and hydroxides	740	632	1	West Germany 500; Denmark 47.
Metal including alloys:				
Scrap	2,446	5,053	--	Finland 2,065; Norway 778.
Unwrought	35,221	39,164	36	Netherlands 12,420; West Germany 8,366.
Semimanufactures	49,920	55,766	1,462	Denmark 9,931; United Kingdom 9,770.
Cadmium: Metal including alloys, all forms	--	58	30	Finland 21.
Chromium:				
Ore and concentrate	43	12	--	All to Norway.
Oxides and hydroxides	8	19	NA	Norway 14.
Metal including alloys, all forms	41	1	NA	NA.
Cobalt:				
Oxides and hydroxides	1	(2)	NA	NA.
Metal including alloys, all forms	65	67	6	Republic of South Africa 23; United Kingdom 10.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	--	$35	$35	
Copper:				
Ore and concentrate	45,193	33,829	--	Finland 33,744.
Oxides and hydroxides	--	1	--	All to Norway.
Sulfate	33	23	--	All to West Germany.
Ash and residue containing copper	10,555	8,498	NA	Belgium-Luxembourg 7,671.
Metal including alloys:				
Scrap	2,222	1,963	--	Denmark 1,042; West Germany 813.
Unwrought	56,984	67,123	37	Belgium-Luxembourg 31,382; United Kingdom 13,194.
Semimanufactures	70,822	76,468	12,253	West Germany 9,903; Norway 9,180.
Gold:				
Waste and sweepings value, thousands	$7,030	$6,410	NA	West Germany $4,834.
Metal including alloys, unwrought and partly wrought do	$38,448	$39,755	$48	West Germany $28,186.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	12,597	14,193	64	Belgium-Luxembourg 3,148; France 2,430; West Germany 2,046.
Pyrite, roasted	56,543	5	--	All to United Kingdom.
Metal:				
Scrap	18,315	20,585	--	West Germany 6,621; Spain 3,156.
Pig iron, cast iron, related materials	126,839	130,684	--	West Germany 16,564; Italy 16,480; United Kingdom 15,662.
Ferroalloys:				
Ferrochromium	80,351	108,726	NA	NA.
Ferromanganese	674	663	NA	Netherlands 269; Turkey 221.
Ferromolybdenum	413	737	NA	West Germany 271; Netherlands 269.
Ferrosilicochromium	1,037	362	--	West Germany 314.
Ferrosilicomanganese	16	1	NA	NA.
Ferrosilicon	6,533	18,990	NA	NA.
Unspecified	639	507	NA	NA.
Steel, primary forms	354,098	326,289	74,581	West Germany 45,202; Greece 42,802.
Semimanufactures:				
Bars, rods, angles, shapes, sections	712,575	815,154	49,706	West Germany 493,450; Denmark 85,205.
Universals, plates, sheets	746,234	824,989	74,443	West Germany 165,012; Denmark 133,115.
Hoop and strip	100,432	118,868	5,726	West Germany 28,942; Finland 12,183.
Rails and accessories	41,471	35,663	21	Norway 13,889; Italy 11,890.
Wire	62,197	69,439	7,374	West Germany 11,565; Finland 8,324.
Tubes, pipes, fittings	222,921	210,188	17,819	West Germany 34,789; Denmark 22,173.
Castings and forgings, rough	2,105	2,224	46	Denmark 612; Norway 486.

See footnotes at end of table.

Table 2.—Sweden: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	49,246	51,317	--	West Germany 28,306; Belgium-Luxembourg 14,180.
Oxides	152	55	NA	NA.
Metal including alloys:				
Scrap	69	513	--	Denmark 494.
Unwrought	54,413	55,411	--	West Germany 21,534; U.S.S.R. 13,039.
Semimanufactures	870	604	1	Yemen (Sanaa) 189; Norway 119.
Magnesium: Metal including alloys:				
Scrap	373	338	12	West Germany 235; Denmark 74.
Semimanufactures	26	10	--	Denmark 7.
Manganese:				
Ore and concentrate, metallurgical-grade	182	509	--	Cameroon 409.
Oxides	81	4	NA	NA.
Metal including alloys, all forms	68	111	NA	Norway 57; Finland 50.
Mercury 76-pound flasks	290	3,306	NA	Netherlands 3,074.
Molybdenum:				
Ore and concentrate	1,970	1,458	21	West Germany 780; Netherlands 433.
Oxides and hydroxides	49	28	--	West Germany 24.
Metal including alloys, all forms	7	5	(2)	West Germany 1.
Nickel:				
Matte and speiss	--	117	--	Netherlands 112.
Metal including alloys:				
Scrap	573	1,620	19	United Kingdom 1,064.
Unwrought	823	482	--	Netherlands 342.
Semimanufactures	1,195	1,295	359	France 175; United Kingdom 167.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2,313	$4,112	$52	Iran $1,805; Finland $638.
Silicon, high-purity do	$14,259	$22,793	NA	NA.
Silver:				
Waste and sweepings[3] do	$38,783	$29,520	$525	United Kingdom $13,281; West Germany $11,148.
Metal including alloys, unwrought and partly wrought thousand troy ounces	5,819	6,752	NA	West Germany 5,401.
Tin: Metal including alloys:				
Scrap	7	(2)	--	Mainly to West Germany.
Unwrought	60	56	--	Finland 29; United Kingdom 21.
Semimanufactures	34	27	--	Norway 22.
Titanium:				
Ore and concentrate	9	34	NA	NA.
Oxides	20	68	NA	Denmark 20; Turkey 20.
Metal including alloys, all forms	210	211	102	United Kingdom 93.
Tungsten:				
Ore and concentrate	404	752	--	Netherlands 162; West Germany 115; India 108.
Metal including alloys, all forms	99	44	6	Republic of South Africa 25; France 7.
Zinc:				
Ore and concentrate	362,276	369,570	--	Finland 84,187; Norway 72,632; France 62,074.
Oxides	382	274	NA	Norway 126; West Germany 81.
Blue powder	3	1	NA	NA.
Ash and residue containing zinc	30,007	28,790	NA	Norway 22,638; Japan 3,000.
Metal including alloys:				
Scrap	3,543	3,619	--	Norway 1,679; West Germany 1,346.
Unwrought	900	1,098	361	Netherlands 350; Norway 210.
Semimanufactures	27	8	--	Finland 5.
Zirconium:				
Ore and concentrate	--	109	NA	Denmark 55.
Metal including alloys, all forms	32	21	NA	United Kingdom 15.
Other:				
Oxides and hydroxides	58	11	NA	NA.
Ashes and residues	955	6,688	550	Belgium-Luxembourg 4,249; Switzerland 580.
Base metals including alloys, all forms	612	542	12	United Kingdom 101; Finland 89; Norway 77.

See footnotes at end of table.

Table 2.—Sweden: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5	2	--	Denmark 1; Finland 1.
Artificial:				
Corundum	50	23	NA	Finland 9.
Silicon carbide	671	388	NA	Finland 253; United Kingdom 121.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$13	$47	$13	Finland $29.
Grinding and polishing wheels and stones	1,970	1,941	5	West Germany 361; Finland 305; U.S.S.R. 197.
Asbestos, crude	--	135	--	West Germany 114.
Boron materials:				
Crude natural borates	13	--		
Oxides and acids	9	58	NA	Norway 55.
Cement	537,515	554,533	NA	Saudi Arabia 196,400; Nigeria 195,734; Egypt 159,580.
Chalk	8,830	10,246	--	Finland 3,808; Norway 3,350.
Clays, crude:				
Kaolin	403	160	--	Denmark 60; Turkey 52.
Unspecified	768	1,527	--	Norway 1,308.
Diamond:				
Gem, not set or strung value, thousands	$9,362	$5,061	$758	Finland $2,790; Belgium-Luxembourg $835.
Industrial stones do	$115	$302	$98	Netherlands $140; United Kingdom $42.
Diatomite and other infusorial earth	690	694	--	Iceland 479; Norway 172.
Feldspar, fluorspar, related materials	25,529	29,484	4,490	United Kingdom 9,818; East Germany 6,953.
Fertilizer materials:				
Crude, n.e.s	5,094	5,431	--	Saudi Arabia 3,377; Norway 1,819.
Manufactured:				
Ammonia	337	111	NA	Norway 107.
Nitrogenous	77,733	172,973	--	NA.
Phosphatic	64,260	79,306	--	NA.
Potassic	56	179	--	United Kingdom 60; Netherlands 57.
Unspecified and mixed	60,539	120,976	--	Denmark 19,865; undetermined 68,405.
Graphite, natural	135	13	12	Norway 1.
Gypsum and plaster	809	789	--	Finland 592; Denmark 122.
Lime	10,752	15,081	NA	Norway 11,625.
Magnesium compounds	266	240	--	Norway 138; Denmark 50.
Mica:				
Crude including splittings and waste	1	58	--	United Kingdom 54.
Worked including agglomerated splittings	1	3	--	Finland 1; Iraq 1.
Nitrates, crude	1,003	2,495	--	All to Finland.
Phosphates, crude	81,414	77,198	--	Norway 77,174.
Phosphorus, elemental	19	([2])	--	NA.
Pigments, mineral: Iron oxides and hydroxides, processed	22	140	16	Norway 8; undetermined 114.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$663	$1,553	$1	Belgium-Luxembourg $1,364.
Synthetic do	$15,607	$19,291	--	Ireland $19,025.
Pyrite, unroasted	31,177	97	--	Denmark 95.
Salt and brine	3,798	6,646	--	Norway 2,893; Denmark 1,730.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	8,859	16,388	NA	United Kingdom 7,784; Iran 7,173.
Sulfate, manufactured	66,715	92,110	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	158,422	200,512	48	West Germany 66,773; Italy 46,717.
Worked	13,265	15,821	313	Denmark 7,549; Norway 3,637.
Dolomite, chiefly refractory-grade	35,656	41,340	--	Netherlands 9,251; Saudi Arabia 9,028.
Gravel and crushed rock	[r]1,386,144	1,940,792	--	Denmark 841,529; West Germany 577,453; Netherlands 399,596.
Limestone other than dimension	882,817	834,495	--	Finland 740,612; Denmark 79,179.
Quartz and quartzite	169,764	272,753	12	Norway 262,667.
Sand other than metal-bearing	124,949	143,552	--	Norway 59,552; Denmark 45,773.

See footnotes at end of table.

Table 2.—Sweden: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and by-product	1,310	1,641	--	Finland 1,638.
Colloidal, precipitated, sublimed	22	12	NA	NA.
Dioxide	31,879	26,263	NA	Finland 19,582; Norway 2,564.
Sulfuric acid	3,360	51,852	8,341	Netherlands 27,847; Brazil 11,587.
Talc, steatite, soapstone, pyrophyllite	8,378	13,768	--	Netherlands 5,861; Norway 3,995.
Other:				
Crude	10,576	9,933	--	Norway 5,075; Denmark 2,217.
Slag and dross, not metal-bearing	104,748	122,046	(2)	United Kingdom 31,912; West Germany 28,796.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	321	11	--	NA.
Carbon: Carbon black	10,722	39,729	NA	Finland 2,925; Poland 2,437; Denmark 2,136.
Coal: Bituminous	868	1,051	--	Norway 697; Finland 321.
Coke and semicoke	220,310	129,522	--	Finland 112,692; Bulgaria 13,490.
Peat including briquets and litter	20,114	23,190	--	Denmark 11,868; Norway 6,141.
Petroleum:				
Crude thousand 42-gallon barrels	579	--		
Refinery products:				
Liquefied petroleum gas value, thousands	$22,697	$25,366	$4,127	United Kingdom $16,518; France $2,411.
Gasoline thousand 42-gallon barrels	3,932	7,071	--	Denmark 3,070; Norway 1,332.
Mineral jelly and wax do	19	8	(2)	Norway 7.
Kerosine and jet fuel do	95	531	--	Denmark 382; Norway 103.
Distillate fuel oil do	12,993	19,010	219	Denmark 10,527; West Germany 4,154.
Lubricants do	1,010	848	(2)	Norway 161; Finland 155.
Residual fuel oil do	16,359	20,330	1,190	United Kingdom 7,119; Denmark 4,256.
Bitumen and other residues do	528	589	--	Denmark 279; Norway 202.
Bituminous mixtures do	50	60	6	Norway 9; Finland 8.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Sweden: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals, unspecified	68	83	(2)	Netherlands 42; Brazil 14.
Aluminum:				
Ore and concentrate	49,838	45,459	511	Australia 29,226; China 5,360.
Oxides and hydroxides	204,581	202,775	110	Panama 97,852; West Germany 47,242; Suriname 42,159.
Metal including alloys:				
Scrap	2,674	2,816	--	Norway 1,687; Poland 500.
Unwrought	45,479	49,662	4	Norway 36,732; Egypt 4,992.
Semimanufactures	69,987	80,669	7,092	West Germany 21,336; Norway 7,826.
Antimony: Metal including alloys, all forms	12	15	--	All from China.
Arsenic: Metal including alloys, all forms	604	730	--	All from Chile.
Beryllium: Metal including alloys, all forms value, thousands	$3	$4	$2	West Germany $2.
Cadmium: Metal including alloys, all forms	224	218	NA	Finland 157; Norway 56.
Chromium:				
Ore and concentrate	305,447	341,947	--	Finland 134,487; Albania 110,293.
Oxides and hydroxides	542	776	--	West Germany 501; Poland 222.
Metal including alloys, all forms	155	187	--	United Kingdom 125; France 56.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Cobalt:				
Oxides and hydroxides	3	6	--	France 4.
Metal including alloys, all forms	273	233	12	Belgium-Luxembourg 60; United Kingdom 29.
Columbium and tantalum:				
Ore and concentrate	6	--		
Metal including alloys, all forms, tantalum --- value, thousands	$15	$74	$14	East Germany $29; West Germany $21.
Copper:				
Ore and concentrate	96,844	89,331	--	Norway 27,707; Chile 27,089; Finland 13,027.
Matte and speiss including cement copper	8,516	8,053	--	All from France.
Oxides and hydroxides	547	697	--	Yugoslavia 263; Australia 157; Norway 115.
Sulfate	1,188	853	--	U.S.S.R. 420; Czechoslovakia 160.
Ash and residue containing copper	12,173	29,532	NA	West Germany 17,384; Italy 5,400.
Metal including alloys:				
Scrap	10,403	22,368	11,934	France 3,709; United Kingdom 1,442.
Unwrought	77,471	75,891	132	Zambia 19,398; Belgium-Luxembourg 11,796.
Semimanufactures	28,483	29,885	122	West Germany 9,635; Finland 4,618.
Gold:				
Waste and sweepings value, thousands	$333	$428	--	Finland $304; Denmark $89.
Metal including alloys, unwrought and partly wrought do	$8,009	$8,164	$127	United Kingdom $4,773; West Germany $2,670.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	--	19,194	--	Norway 18,930.
Pyrite, roasted	34,774	7	--	All from Denmark.
Metal:				
Scrap	529,074	450,890	1,811	U.S.S.R. 189,185; United Kingdom 143,281.
Pig iron, cast iron, related materials	67,615	48,084	474	U.S.S.R. 20,223; Canada 8,761.
Ferroalloys:				
Ferrochromium	39,820	36,878	20	Republic of South Africa 15,393; Albania 7,569.
Ferromanganese	29,139	28,743	--	Norway 20,680; France 5,581.
Ferromolybdenum	1,243	1,091	34	Austria 311; Belgium-Luxembourg 279.
Ferronickel	9,619	12,875	--	New Caledonia 4,052; Brazil 2,466.
Ferrosilicochromium	2,396	1,215	--	U.S.S.R. 1,003.
Ferrosilicomanganese	11,086	12,083	NA	Norway 11,053.
Ferrosilicon	21,782	23,905	4	Norway 21,610; U.S.S.R. 1,374.
Unspecified	3,668	2,899	82	U.S.S.R. 935; Belgium-Luxembourg 487.
Steel, primary forms	166,919	131,581	([2])	West Germany 79,944; United Kingdom 14,786.
Semimanufactures:				
Bars, rods, angles, shapes, sections	416,737	422,959	591	West Germany 93,930; France 50,988; United Kingdom 50,366.
Universals, plates, sheets	890,550	817,859	369	West Germany 210,996; Belgium-Luxembourg 154,487.
Hoop and strip	135,838	136,315	13	West Germany 50,882; Poland 26,970.
Rails and accessories	3,705	3,748	11	United Kingdom 1,471.
Wire	25,517	25,216	126	Belgium-Luxembourg 7,596; West Germany 5,313.
Tubes, pipes, fittings	284,146	287,460	634	West Germany 61,318; Finland 49,059.
Castings and forgings, rough	8,862	9,615	3	Poland 2,371; West Germany 1,865.
Lead:				
Ore and concentrate	--	12,539	--	Canada 5,378; Australia 4,136.
Oxides	2,563	2,682	8	West Germany 1,295; East Germany 637.
Metal including alloys:				
Scrap	5,040	2,984	--	Norway 1,522; Nigeria 645.
Unwrought	4,161	3,900	--	Finland 1,034; United Kingdom 1,052.
Semimanufactures	1,144	1,026	1	West Germany 830; Netherlands 161.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Scrap	1	2	--	All from Denmark.
Unwrought	1,382	1,198	99	Norway 1,080.
Semimanufactures	149	96	18	Norway 31; West Germany 28.
Manganese:				
Ore and concentrate:				
Battery-grade	35,835	2,964	--	All from Republic of South Africa.
Metallurgical-grade	234	21,593	--	Republic of South Africa 21,374.
Oxides	326	240	117	West Germany 108.
Metal including alloys, all forms	1,295	1,442	247	Republic of South Africa 720; France 431.
Mercury 76-pound flasks	348	928	29	Spain 290; Turkey 290.
Molybdenum:				
Ore and concentrate	6,397	5,238	2,047	Belgium-Luxembourg 884; Netherlands 686.
Oxides and hydroxides	483	232	25	China 86; West Germany 57; Chile 53.
Metal including alloys, all forms	58	50	6	Belgium-Luxembourg 16; France 16.
Nickel:				
Matte and speiss	2,603	4,059	116	Australia 3,209.
Metal including alloys:				
Scrap	2,903	3,365	780	United Kingdom 1,982.
Unwrought	10,862	9,562	1,185	Canada 2,434; U.S.S.R. 1,328.
Semimanufactures	1,289	997	166	United Kingdom 598; West Germany 79.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$36,002	$37,586	$7,473	Switzerland $13,570; United Kingdom $6,856.
Selenium, elemental	23	37	17	United Kingdom 14.
Silicon, high-purity	411	324	--	France 237; Norway 69.
Silver:				
Ore and concentrate[3] value, thousands	$13,916	$35,004	--	Peru $28,823; Canada $1,979.
Waste and sweepings[3] do	$7,632	$11,118	$3,203	Finland $3,326; France $3,052.
Metal including alloys, unwrought and partly wrought thousand troy ounces	8,938	5,401	64	West Germany 3,022; United Kingdom 1,125.
Tin: Metal including alloys:				
Unwrought	323	365	6	Malaysia 140; Denmark 67.
Semimanufactures	211	141	--	Netherlands 69; West Germany 38.
Titanium:				
Ore and concentrate	3,730	2,233	--	Sri Lanka 1,290; Australia 813.
Oxides	2,979	3,749	200	Norway 1,684; Finland 621.
Metal including alloys, all forms	363	536	4	U.S.S.R. 298; Japan 113.
Tungsten:				
Ore and concentrate	1,700	681	--	China 293; Australia 224.
Oxides and hydroxides	153	--		
Metal including alloys, all forms	84	163	1	United Kingdom 68; West Germany 49.
Vanadium: Oxides and hydroxides	16	--		
Zinc:				
Ore and concentrate	--	45	--	Iran 30.
Oxides	1,134	1,308	--	Norway 391; France 275; Netherlands 273.
Blue powder	638	662	NA	Norway 607.
Ash and residue containing zinc	12,815	22,132	NA	West Germany 15,645; Italy 5,255.
Metal including alloys:				
Scrap	44	([2])	--	All from Finland.
Unwrought	35,792	36,034	229	Norway 17,253; Finland 11,967.
Semimanufactures	829	206	([2])	West Germany 108; Norway 41.
Zirconium:				
Ore and concentrate	888	3,984	--	Republic of South Africa 3,817.
Metal including alloys, all forms	176	186	20	France 153.
Other:				
Ores and concentrates	6	--		
Oxides and hydroxides	958	944	230	United Kingdom 408; West Germany 148.
Ashes and residues	27,380	25,179	18	Norway 12,740; Spain 5,325.
Base metals including alloys, all forms	1,393	1,036	157	Japan 530; Republic of South Africa 101.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,575	1,221	9	Iceland 729; Italy 209.
Artificial:				
Corundum	4,959	5,593	312	West Germany 3,196; Netherlands 626.
Silicon carbide	4,252	5,262	4	Norway 4,643; West Germany 430.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1,836	$2,349	$77	Switzerland $1,902.
Grinding and polishing wheels and stones	2,821	2,525	46	Austria 862; West Germany 378; France 271.
Asbestos, crude	1,039	1,000	--	All from Canada.
Barite and witherite	5,440	4,986	71	West Germany 4,382; China 375.
Boron materials:				
Crude natural borates	17,375	14,355	8,000	Turkey 4,423; Netherlands 1,927.
Oxides and acids	548	458	55	France 243; Netherlands 60.
Cement	225,996	268,048	20	East Germany 142,682; Poland 93,992.
Chalk	32,726	29,719	13	West Germany 13,920; Norway 7,806.
Clays, crude:				
Bentonite	5,546	2,903	1,002	West Germany 905; United Kingdom 825.
Kaolin	297,476	336,310	25,770	United Kingdom 283,863.
Unspecified	34,451	32,435	7,427	United Kingdom 15,066; West Germany 4,397.
Cryolite and chiolite	488	433	--	Denmark 429.
Diamond:				
Gem, not set or strung value, thousands	$21,176	$14,895	$121	Belgium-Luxembourg $10,171.
Industrial stones do	$635	$646	$20	Netherlands $288; Republic of South Africa $147.
Diatomite and other infusorial earth	3,039	3,149	663	Denmark 1,391; Spain 678.
Feldspar, fluorspar, related materials:				
Fluorspar	12,837	6,476	--	Mexico 4,224; East Germany 1,593.
Unspecified	9,791	12,465	--	Norway 11,279.
Fertilizer materials:				
Crude	540	532	--	West Germany 492.
Manufactured:				
Ammonia	156,133	213,005	([2])	U.S.S.R. 134,120; Trinidad and Tobago 32,753.
Nitrogenous	481,612	504,849	6,892	Mainly from Norway.
Phosphatic	24	60	--	France 51.
Potassic value, thousands	$21,737	$18,911	$669	West Germany $6,763; East Germany $4,802.
Unspecified and mixed	213,186	275,626	373	Norway 186,107; Netherlands 38,870.
Graphite, natural	534	396	17	West Germany 229; Norway 67.
Gypsum and plaster	304,057	257,108	138	Spain 139,275; East Germany 111,686.
Lime	4,461	4,772	--	Norway 2,292; Belgium-Luxembourg 866.
Magnesium compounds	22,213	20,752	107	China 4,445; Spain 2,795; Czechoslovakia 2,505.
Mica:				
Crude including splittings and waste	422	438	5	India 172; Norway 141.
Worked including agglomerated splittings	60	78	1	Switzerland 49; Belgium-Luxembourg 20.
Nitrates, crude	12,200	7,400	--	All from Chile.
Phosphates, crude	678,932	724,394	139,806	U.S.S.R. 295,769; Morocco 286,527.
Phosphorus, elemental	45	--		
Pigments, mineral: Iron oxides and hydroxides, processed	6,210	6,100	11	West Germany 5,353.
Potassium salts, crude	1,323	1,701	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,077	$2,517	$397	Thailand $800; Belgium-Luxembourg $429.
Synthetic do	$2,318	$2,703	$1,989	Ireland $352; West Germany $125.
Pyrite, unroasted	85	168	40	West Germany 121.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Salt and brine thousand tons	947	1,103	(2)	Netherlands 283; West Germany 237; Poland 180.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	134,272	119,072	--	East Germany 54,977; West Germany 18,455.
Sulfate, manufactured	21,968	18,318	15	East Germany 5,350; United Kingdom 4,008.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	6,636	5,257	--	Finland 2,043; Norway 1,506.
Worked	6,009	7,026	(2)	Italy 2,341; Poland 1,960.
Dolomite, chiefly refractory-grade	125,900	127,304	526	United Kingdom 47,044; Norway 42,146.
Gravel and crushed rock	105,780	50,862	259	Denmark 17,096; Norway 12,767.
Limestone other than dimension	28,796	40,508	20	Denmark 28,093; Norway 5,765.
Quartz and quartzite	45,231	56,457	12	Spain 44,030; Finland 12,286.
Sand other than metal-bearing	337,213	300,941	132	Belgium-Luxembourg 146,989; Denmark 131,447.
Sulfur:				
Elemental:				
Crude including native and byproduct	8,645	4,919	--	Poland 4,558.
Colloidal, precipitated, sublimed	2,012	5,962	--	Poland 5,285; Norway 640.
Dioxide	5,211	5,444	(2)	Norway 5,443.
Sulfuric acid	6,643	1,834	--	Netherlands 1,144; West Germany 327.
Talc, steatite, soapstone, pyrophyllite	26,133	22,315	59	Finland 7,527; Norway 6,921.
Other:				
Crude	150,609	239,821	75	Norway 218,250; West Germany 19,532.
Slag and dross, not metal-bearing	26,514	40,062	10	Finland 15,624; West Germany 8,327.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,036	661	156	Trinidad and Tobago 454.
Carbon: Carbon black	7,372	9,472	215	West Germany 5,986; Netherlands 2,158.
Coal:				
Anthracite	26,140	31,910	--	United Kingdom 29,878.
Bituminous thousand tons	2,856	3,054	1,687	Poland 577; United Kingdom 171; Canada 168.
Briquets of anthracite and bituminous coal	86	54	--	All from West Germany.
Lignite including briquets	2,879	6,229	--	All from East Germany.
Coke and semicoke	196,256	237,042	12,081	United Kingdom 90,979; Norway 36,028.
Peat including briquets and litter	75,681	10,971	--	Denmark 7,857; U.S.S.R. 1,992.
Petroleum:				
Crude thousand 42-gallon barrels	93,206	102,678	--	United Kingdom 43,274; Norway 23,263; U.S.S.R. 11,121.
Refinery products:				
Liquefied petroleum gas do	1,423	2,458	47	United Kingdom 1,524; Saudi Arabia 518.
Gasoline do	21,303	22,218	227	Netherlands 4,121; United Kingdom 3,929; Denmark 3,487.
Mineral jelly and wax do	156	125	1	West Germany 68; China 18.
Kerosine and jet fuel do	4,025	3,657	(2)	Algeria 1,609; Netherlands 1,160.
Distillate fuel oil do	30,917	26,547	668	United Kingdom 5,782; East Germany 5,780; U.S.S.R. 5,660.
Lubricants do	1,682	2,533	29	U.S.S.R. 988; Netherlands 342.
Residual fuel oil do	27,763	21,829	2,429	U.S.S.R. 8,229; United Kingdom 4,021.
Bitumen and other residues value, thousands	$18,458	$12,862	$26	Finland $5,658; Netherlands $3,138.
Bituminous mixtures thousand 42-gallon barrels	24	45	3	Finland 25; France 7.
Petroleum coke do	274	276	124	United Kingdom 109.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Gränges AB began modernization and expansion of its Sundsvall aluminum smelter, Sweden's only such unit. The oldest potline, 13,000 tons annual capacity, was being replaced with a 22,000-ton-per-year modern potline scheduled for operation in 1987. This was expected to increase primary aluminum capacity by 11% to 92,000 tons per year.

Copper.—Boliden Metall AB, Sweden's principal copper producer, announced its decision to expand its copper refining capacity at its Ronnskar works in northern Sweden by nearly 50% to 94,000 tons per year. This was to enable the refinery to process all of the blister copper produced at its Ronnskar smelter. Boliden was concurrently expanding its capacity for producing silver and gold from the copper refinery slimes by about 50%. Also, a new process was being added to recover platinum-group metals.

In its second year of operation, the new Viscaria Mine more than doubled production of copper concentrate to about 93,000 tons, which was near capacity. It was owned and operated by the Government-owned Luossavaara Kiirunavaara AB (LKAB).

Copper mine output in Sweden rose 8% to about 69,000 tons of copper content. Production increased for the fourth consecutive year, up 62% since 1980. Similarly, smelter production of copper metal increased 82% to about 103,000 tons during 1980-84. Exports of copper metal increased 12% in 1983 to about 146,000 tons. Exports of copper concentrate dropped 25% in 1983 to about 34,000 tons in response to increased domestic smelting.

Ferroalloys.—Construction of a 78,000-ton-per-year arc-plasma ferrochromium reduction plant at Malmo in southern Sweden was begun by SKF Steel Engineering AB for Swedechrome, a consortium of Swedish companies. The 6-megawatt furnace, designed by SKF as the world's most powerful arc-plasma unit, was projected to cost about $60 million and was expected to increase Sweden's output of ferrochromium by approximately 50%. Although overcapacity of ferrochromium production existed both in Europe and worldwide, Swedechrome claimed that significant economies would be realized by the use of chrome ore fines instead of the more expensive lump ore and by using surplus heat from the unit to provide district heating. The largest ferrochromium producer in Sweden was Vargon Alloys AB, a division of Switzerland's Vargon AG. Exports of ferrochromium increased 35% in 1983 to about 109,000 tons.

Ferrolegeringar Trollhätteverken AB began production in 1984 of ferrosilicon in a converted ferrochromium furnace. Annual furnace capacity was 18,500 tons. The output was being sold in the strong export market by Norway's Fesil Group. Exports of ferrosilicon nearly tripled in 1983 to about 19,000 tons.

Gullspangs Elekrokemiska AB also began producing a ferronickel, containing about 35% nickel and 15% chromium, at a rate of approximately 3,500 tons per year. The firm indicated that it could readily expand to several times this capacity.

Gullspangs converted its three ferrotungsten furnaces into units for the production of high-speed steel ingots using, as feed, secondary materials such as flue dusts and sludges. The company determined that it could not compete with ferrotungsten imported from China, especially because it had been using imported Chinese ore as feed material.

Gold and Silver.—Swedish gold production increased 19% in 1984 to 244,000 troy ounces. Boliden AB began operation of its new open pit mine and concentrator in Hälsingland within the Enasen gold deposit and shipped the first concentrates to its Ronnskar smelter in May. The designed annual capacity of the mine was 11,000 troy ounces of gold with 18,000 troy ounces of silver and 400 tons of copper as byproducts. The reserves were small, and the expected mine life was only 7 years. However, Boliden AB had geological evidence indicating that discovery of more gold resources in the immediate area was likely.

Silver exports increased 16% in 1983 to 6.8 million troy ounces while imports decreased 40% to 5.4 million troy ounces. Imports of silver ore and silver wastes more than doubled to about $46 million while exports of silver wastes decreased 24% to about $30 million.

Iron Ore.—Most Swedish iron ore continued to be produced in northern Sweden in the Government-owned Kiruna and Malmberget Mines, which together produced 82%

of Sweden's iron ore in 1984. Total Swedish production increased 37% to 18.1 million tons. Total deliveries continued to exceed production as producers' stocks were drawn to 4.6 million tons by yearend 1984 from about 11 million tons at yearend 1982. Approximately 15% of the 21.0 million tons of total 1984 deliveries was for domestic consumption, and the remainder was exported. Total production and deliveries increased by 37% and 21%, respectively, as the market continued to improve after its considerable slump during the 3-year period ending in 1982. Production had peaked in 1980 at 27.2 million tons.

Development of advanced mining methods continued at the Luossavaara Mine, near the Kiruna Mine, with a relatively small production of about 400,000 tons in 1984. The concentrator and pellets plant at Svappavaara were reactivated in November to produce pellets for the blast furnace market. Modification of the beneficiation plant at the Kiruna Mine to increase production of low-phosphorus fines by 45% was begun with startup scheduled for March 1985. An increased market for these fines had been realized after reduction of the alkali content to 0.1%. The Kiruna pelletizing plant capacity was being enlarged to 4 million tons per year. The Malmberget concentrator was rebuilt and, as a result, only low alkali-content (0.05%) concentrate was produced after September 1984.

Lead.—Boliden AB began operation of an experimental plant to study hydrometallurgical leaching of lead from copper concentrates. Total output of refined lead increased 49% to about 80,000 tons; of this, output of primary lead increased 43% to about 50,000 tons.

Zinc.—Scan Dust AB began operation in September of its new continuous arc-plasma reduction plant at Landskrona on the southwest coast of Sweden. The furnace, capable of handling approximately 70,000 tons per year of steel mill bag dust, was designed and built by SKF at a cost of about $28 million. The plant was expected to recover from the 70,000 tons of oxide dust, approximately 15,000 tons of zinc metal, 10,000 to 15,000 tons of iron, and 3,000 to 4,000 tons of ferroalloys.

NONMETALS

Cement.—Cement production increased by about 5% because of a 13% increase in exports, primarily to Egypt, Nigeria, and Saudi Arabia. Nearly two-thirds of the total shipments continued to be to the domestic market which remained weak, about the same as in 1983, because of low activity, particularly in housing. Imports increased 19% in 1983 to about 268,000 tons while exports increased by only 3% that year.

In an attempt to further improve the export market, Industri AB Euroc, parent of Cementa AB, Sweden's sole producer, signed an agreement with Norway's sole producer, A/S Norcem, whereby marketing and shipping resources would be shared to improve the international marketing of cement including that used in the construction of oil and gas wells. The agreement included the intercompany exchange of approximately 15% of the stock ownership of each company.

At the Skovde plant, fly ash, a byproduct of coal burning, was being added to cement in amounts up to 25% to make a new product with properties competitive with those of portland cement.

Dolomite.—Enstrom Mineral AB constructed a plant at Bjorkaverken, Glanshammar, for production of dolomite granules for desulfurization of flue gases from coal burning. An extensive geomapping and core drilling program was underway in order to define limestone and dolomite reserves in the deposit at Larsboro.

Fluorspar.—LKAB began production of fluorspar concentrate in 1983 at its Yxjoberg Mine and produced about 7,000 tons by yearend 1984.

Kyanite.—LKAB formed a new company within its Svenska Forshammar AB Div. for the purpose of mining and beneficiating kyanite. LKAB indicated that the division's profits would be lowered in 1985 by costs incurred in this development.

Mica.—After a few years development of a process for recovering mica from tailings at its Aitik copper mine, Boliden AB was seeking markets for its product as a filler in plastics, paper, and construction materials.

MINERAL FUELS

The lowering of dependence on oil, all of which was imported, continued. Nevertheless, Sweden was still dependent on oil for about 52% of its final domestic energy consumption, or about 30.7 million tons of oil equivalent. The remainder was supplied primarily by electricity, 28%; and solid fuels, 19%. No known reserves of natural gas existed in Sweden, and the scheduled imports from Denmark had not yet begun in 1984. Of the electrical power, about 57%

was hydropower, and most of the balance, 36%, was nuclear. Of the solid fuels, approximately 30% was imported coal and coke, and the remainder was domestic wood and imported and domestic peat. Further development of the large peat reserves was being constrained by high capital costs.

Final domestic energy consumption had decreased by 14% during the previous decade as a result of conservation and improved efficiency of use. Sweden had a surplus capacity for electrical energy generation. This, augmented by an increase in nuclear power generation and, to some extent, solid fuels use, allowed net imports of oil to decrease during the period by 38% to 18 million tons in 1983. Sweden's known oil resources were negligible. Coal, mostly imported, was being promoted as a long-range replacement for oil in space heating and electrical energy generation within limitations imposed by environmental restraints and high taxes. Parliament approved a bill in June establishing new guidelines for the introduction of coal into the Swedish energy system.

Controversy continued between private energy producers and environmentalists concerning future energy requirements, electrical power generation methods, and environmental restrictions. The Royal Academy of Engineering Sciences joined the side of the private energy producers in questioning the Government's policy of limiting most forms of electrical power, including nuclear, hydropower, and oil-produced power, arguing that abundant and inexpensive electrical energy was required for Sweden's future economic success.

The Government approved startup of two nuclear reactors scheduled to become operational in 1985. Nuclear power was expected to increase during the remainder of the decade. However, for environmental reasons, these reactors were to be the last to be built in Sweden even though the nuclear power industry was highly developed and successful and had an excellent economic and safety record. Also, Sweden has significant reserves of uranium. New legislation regulating the industry became effective in February. All spent nuclear fuel was to be stored permanently in a granite natural formation after 40 years of interim storage.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Swedish krona (SKr) to U.S. dollars at the rate of SKr8.26=US$1.00, the average for 1984.

The Mineral Industry of Switzerland

By Roman V. Sondermayer[1]

The economic significance of the mineral industry of Switzerland remained modest during 1984. There were a considerable number of small mineral deposits but few were in production. Domestic mineral production was limited to cement, gypsum, lime, salt, and sand and gravel. In addition, aluminum, iron and steel, and petroleum refinery products were produced from imported raw materials. According to preliminary reports, the gross national product of Switzerland grew to about $94,000 million[2] in 1984, an increase of between 2% and 3% when compared with that of 1983. The value of mineral industry production was between 1% and 2% of this. Employment in the mineral industry was close to 2% of the total employment in the country.

Completion of modernization of an aluminum plant and startup of expansion of an iron and steel plant were the major events related to the mineral industry.

PRODUCTION

The mineral industry was privately owned except for salt, which was produced by a Government-owned monopoly. The following were the major private mineral-producing companies operating in Switzerland during 1984: Schweizerisches Aluminium A.G. produced aluminum; Vigier Cement Ltd. produced cement; La Raffinerie du Sud S.A. and La Raffinerie de Cressier S.A. produced petroleum products; and Monteforno Acciaierie Laminatoi S.A. and Von Roll Ltd. produced steel.

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

(Thousand metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum, smelter, primary metric tons	86,302	82,202	75,256	75,974	[3]79,161
Iron and steel:					
Pig iron and blast furnace ferroalloys	[e]29	30	[e]35	[e]30	25
Electric-furnace ferroalloys[e]	5	5	5	4	5
Steel, crude	[e]900	966	950	[e]900	900
Semimanufactures[e]	750	700	720	700	700
NONMETALS					
Cement, hydraulic	4,252	4,348	4,099	4,140	4,000
Gypsum[e]	64	85	75	75	75
Lime	64	57	46	42	40
Nitrogen: N content of ammonia	[e]45	33	33	33	30
Salt	378	431	362	306	300
Sodium compounds: Sodium carbonate[e]	45	46	45	45	44
Sulfur, byproduct, all sources metric tons	3,262	3,364	2,965	2,711	3,000

See footnotes at end of table.

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

(Thousand metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
MINERAL FUELS AND RELATED MATERIALS					
Gas, manufactured ______ million cubic feet__	1,789	1,379	1,864	1,850	1,900
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels__	1,199	1,092	1,297	1,180	1,200
Gasoline, all kinds ______ do____	9,527	10,371	9,041	9,624	9,700
Jet fuel ______ do____	1,793	1,851	1,814	2,030	2,100
Kerosine ______ do____	44	46	41	37	40
Distillate fuel oil ______ do____	15,527	13,201	12,800	13,479	13,500
Residual fuel oil ______ do____	4,431	3,615	3,315	4,547	4,600
Other refinery products ______ do____	798	768	756	702	700
Refinery fuel and losses ______ do____	1,896	1,766	1,692	1,265	1,300
Total ______ do____	35,215	32,710	30,756	32,864	33,140

[e]Estimated. [p]Preliminary.
[1]Table includes data available through June 5, 1985.
[2]In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) is undoubtedly produced, but output is not reported, and available general information is inadequate to make reliable estimates of output levels.
[3]Reported figure.

TRADE

Switzerland remained a net importer of mineral products. Fuels topped the list of imports, accounting for about 38% of the total value. Imports of alumina, iron and steel, and nonferrous metals followed. Exports of mineral products, excluding reexports, were small. Most of the minerals imported were processed in the country and exported in the form of finished products.

Table 2.—Switzerland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides ______	320	239	5	West Germany 101; Austria 13; Iran 13.
Metal including alloys:				
Unwrought including scrap ______	52,981	56,825	740	West Germany 26,543; Italy 20,069; Japan 1,716.
Semimanufactures ______	75,388	84,512	2,793	West Germany 15,880; France 13,969; United Kingdom 7,325.
Antimony: Metal including alloys, all forms ______	11	5	NA	NA.
Beryllium: Metal including alloys, all forms kilograms__	170	416	78	West Germany 160.
Chromium: Oxides and hydroxides ______	9	12	(2)	West Germany 3; France 2.
Cobalt: Oxides and hydroxides ______	(2)	3	--	Mainly to Italy.
Columbium and tantalum: Metal including alloys, all forms, tantalum___ kilograms__	568	292	15	West Germany 66; France 55; Bulgaria 36.
Copper:				
Sulfate ______	22	24	NA	United Kingdom 10; West Germany 2.
Metal including alloys:				
Scrap ______	13,259	18,887	2,369	West Germany 6,564; Hungary 2,949.
Unwrought ______	5,723	7,078	18	West Germany 5,297; Italy 959; Netherlands 602.
Semimanufactures ______	22,336	22,670	2,764	West Germany 7,020; France 3,198.
Gold: Metal including alloys, unwrought and partly wrought__ thousand troy ounces__	25,717	17,934	1	West Germany 42; unspecified 17,787.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate including roasted pyrite	2,772	41	--	Peru 28; Colombia 6.
Metal:				
Scrap	105,415	149,485	--	Italy 131,382; West Germany 11,776.
Pig iron, cast iron, related materials	1,262	1,006	1	West Germany 872; Austria 26.
Ferroalloys:				
Silicon metal	4,903	4,963	107	West Germany 4,714; Italy 124.
Unspecified	831	795	26	Turkey 495; West Germany 87; Italy 51.
Steel, primary forms	12,718	14,467	--	West Germany 12,037; Italy 2,404.
Semimanufactures:				
Bars, rods, angles, shapes, sections	319,284	472,090	93	West Germany 327,337; Italy 79,404; France 32,199.
Universals, plates, sheets	56,095	194,555	135	West Germany 171,316; Austria 11,861; Italy 3,722.
Hoop and strip	23,266	35,579	23	West Germany 14,721; Austria 13,760; France 3,709.
Rails and accessories	1,786	1,376	4	Italy 362; Austria 322; West Germany 282.
Wire	15,624	17,231	44	West Germany 7,842; France 4,973; Austria 1,107.
Tubes, pipes, fittings	164,934	155,049	1,101	West Germany 63,929; Netherlands 12,421; France 11,736.
Castings and forgings, rough	13,355	10,649	179	West Germany 5,273; France 2,009; Netherlands 785.
Lead:				
Oxides	1	6	--	Ivory Coast 4; Austria 1.
Metal including alloys:				
Scrap	6,725	5,980	--	Italy 4,238; France 775; Austria 479.
Unwrought	5,101	7,694	(2)	Italy 4,740; West Germany 2,177.
Semimanufactures	62	51	(2)	Italy 21; Austria 18.
Magnesium: Metal including alloys:				
Unwrought including scrap	198	259	--	West Germany 183; Italy 28; Saudi Arabia 18.
Semimanufactures	316	404	126	Italy 83; France 46.
Manganese: Oxides	6	1	--	Mainly to West Germany.
Mercury 76-pound flasks	93	28	--	France 6.
Molybdenum: Metal including alloys:				
Unwrought	1	3	--	Brazil 1; West Germany 1.
Semimanufactures	3	3	(2)	Hungary 2.
Nickel: Metal including alloys:				
Scrap	241	318	--	West Germany 285; United Kingdom 28.
Unwrought	23	27	(2)	West Germany 26.
Semimanufactures	578	351	1	West Germany 83; France 69; United Kingdom 30.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	797,852	773,321	58,546	Japan 247,850; West Germany 156,735.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	r23,278	11,814	2	Italy 404; France 326; unspecified 9,872.
Tin: Metal including alloys:				
Scrap	110	76	--	West Germany 39; France 33; Netherlands 3.
Unwrought	218	196	--	West Germany 92; Italy 66; France 19.
Semimanufactures	33	12	(2)	France 2; Austria 1; Italy 1.
Titanium: Oxides	76	86	(2)	Austria 45; Ivory Coast 14; Yugoslavia 10.
Tungsten: Metal including alloys:				
Unwrought	42	43	(2)	Netherlands 21; West Germany 20.
Semimanufactures	26	2	(2)	West Germany 1.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Uranium and thorium: Oxides and other compounds	2	3	(2)	West Germany 1.
Zinc:				
Oxides	24	19	--	Yugoslavia 12; Italy 1.
Metal including alloys:				
Scrap	983	1,618	NA	Italy 887; West Germany 437; Taiwan 123.
Unwrought	12	249	--	Italy 170; Belgium-Luxembourg 52; West Germany 22.
Semimanufactures	8	28	--	Austria 14; Norway 8.
Zirconium: Ore and concentrate	25	1	NA	NA.
Other:				
Ores and concentrates	309	105	--	Portugal 72; Italy 15; France 9.
Ashes and residues	15,353	14,044	--	Belgium-Luxembourg 3,677; West Germany 3,478; Italy 3,463.
Wastes and sweepings of precious metals value, thousands	$249,996	$288,500	$4	Spain $241,340; West Germany $35,010; France $5,360.
Base metals including alloys, all forms	182	360	33	Brazil 142; West Germany 107.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	108	28	NA	NA.
Artificial:				
Corundum	194	220	1	West Germany 160; France 16; Algeria 11.
Silicon carbide	6,189	5,573	NA	NA.
Dust and powder of precious and semiprecious stones including diamond kilograms	2,981	4,273	177	Italy 1,215; India 1,066; France 374.
Grinding and polishing wheels and stones	1,396	1,512	6	United Kingdom 447; West Germany 378; France 102.
Asbestos, crude	348	389	--	Turkey 372; Austria 7.
Barite and witherite	12	16	--	Ivory Coast 10; Philippines 4.
Boron materials:				
Crude natural borates	11	3	--	All to West Germany.
Oxides and acids	13	13	--	Yugoslavia 7; Austria 5.
Cement	18,161	21,341	8	West Germany 21,139; France 63.
Chalk	2,634	2,851	26	France 2,633; West Germany 149.
Clays, crude	3,640	5,752	(2)	West Germany 5,301; Bulgaria 165.
Cryolite and chiolite	9	(2)	NA	NA.
Diamond:				
Gem, not set or strung value, thousands	$689,258	$675,005	$70,918	United Kingdom $196,138; Israel $119,796.
Industrial stones do	$42,113	$47,136	$966	Italy $20,055; Belgium-Luxembourg $5,015; France $4,733.
Diatomite and other infusorial earth	42	86	(2)	France 39; Yugoslavia 21.
Feldspar, fluorspar, related materials	129	97	--	Portugal 50; Peru 20; Republic of South Africa 20.
Fertilizer materials:				
Crude, n.e.s	2,032	1,570	--	Austria 1,131; France 385.
Manufactured:				
Ammonia	85	3	--	West Germany 1.
Nitrogenous	870	1,434	(2)	West Germany 865; East Germany 317.
Phosphatic	24	120	--	Saudi Arabia 50; Oman 48.
Potassic	47	36	--	West Germany 19; Italy 10.
Unspecified and mixed	2,867	5,238	(2)	Saudi Arabia 1,949; West Germany 1,045; Egypt 464.
Graphite, natural	9	10	--	West Germany 7; Austria 1.
Gypsum and plaster	13,992	14,027	--	France 13,871; Austria 109.
Lime	4,206	3,452	--	West Germany 3,088.
Magnesium compounds	28	35	13	West Germany 8; Iran 6.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Mica:				
Crude including splittings and waste	115	75	--	West Germany 38; Yugoslavia 20.
Worked including agglomerated splittings	466	445	(2)	Sweden 54; Italy 52; India 50.
Nitrates, crude	--	2	--	All to Morocco.
Phosphorus, elemental	31	71	--	West Germany 45; France 26.
Pigments, mineral:				
Natural, crude	18	20	NA	Austria 6.
Iron oxides and hydroxides, processed	31	24	(2)	Austria 11; Philippines 4; Yugoslavia 3.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$248,219	$214,582	$27,004	France $37,863; United Kingdom $34,748.
Synthetic do	$15,469	$16,473	$3,669	West Germany $2,370; France $1,657.
Salt and brine	698	548	(2)	France 516; West Germany 16.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	26,321	21,304	--	West Germany 11,257; Italy 9,956.
Sulfate, manufactured	1,024	584	NA	Italy 345; West Germany 142.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	30,455	30,598	--	West Germany 15,062; Italy 9,988; France 4,403.
Worked	10,115	8,529	(2)	West Germany 7,649; Austria 430.
Dolomite, chiefly refractory-grade	47	10	NA	NA.
Gravel and crushed rock	16,365	34,537	2	France 19,758; West Germany 12,960.
Limestone other than dimension	(2)	38	--	West Germany 25.
Quartz and quartzite	32,107	35,195	--	Italy 33,648; West Germany 1,230.
Sand other than metal-bearing	14,111	13,958	--	Italy 7,552; France 5,321.
Sulfur:				
Elemental:				
Crude including native and byproduct	8,249	6,260	--	Italy 6,161; West Germany 73.
Colloidal, precipitated, sublimed	5	3	--	Yugoslavia 1.
Dioxide	r2	(2)	--	NA.
Sulfuric acid	17,628	11,069	--	West Germany 9,308; France 1,248.
Talc, steatite, soapstone, pyrophyllite	113	137	--	Austria 45; West Germany 26; France 20.
Other:				
Crude	r3,425	1,433	(2)	West Germany 1,224; France 44; Republic of South Africa 34.
Slag and dross, not metal-bearing	30,575	36,083	--	West Germany 20,708; Italy 10,828.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	7	255	--	West Germany 254.
Carbon: Carbon black	134	172	2	Czechoslovakia 75; U.S.S.R. 31; France 14.
Coal: Anthracite and bituminous	20	138	--	Austria 126; West Germany 12.
Coke and semicoke	56	(2)	--	Mainly to Austria.
Peat including briquets and litter	1,395	1,522	--	Austria 1,146; France 194.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	172,399	478,129	23	Italy 442,575; Yugoslavia 13,885; France 12,656.
Gasoline do	1,768	1,513	--	Austria 1,122; West Germany 119.
Mineral jelly and wax do	590	2,542	39	Kuwait 1,283; Tanzania 732.
Kerosine and jet fuel do	178	736	8	West Germany 295; Austria 279.
Distillate fuel oil do	35,316	96,458	--	Austria 85,268; France 11,190.
Lubricants do	74,018	93,506	3,640	West Germany 20,657; Albania 10,150; Iraq 8,610.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Residual fuel oil ---- 42-gallon barrels--	272,267	1,357,894	--	West Germany 1,149,576; Austria 143,310.
Bitumen and other residues ---- do----	13,423	182	--	France 170; Spain 6.
Bituminous mixtures -------- do----	4,472	5,805	--	West Germany 2,400; Sweden 788; France 764.
Petroleum coke------------ do----	352	198	22	West Germany 55; Italy 16.

[r]Revised. NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

Table 3.—Switzerland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS				
Aluminum:				
Ore and concentrate---------------	379	1,254	NA	France 1,186.
Oxides and hydroxides ------------	135,364	149,241	209	Australia 125,032; West Germany 8,435; Guinea 7,611.
Metal including alloys:				
Unwrought including scrap-------	48,076	57,751	10	Iceland 32,258; Norway 11,559; France 4,653.
Semimanufactures ------------	47,723	53,318	183	West Germany 24,103; France 8,525; Austria 6,045.
Antimony: Metal including alloys, all forms --------------- kilograms--	45	60	NA	Mainly from China.
Arsenic: Oxides and acids-------------	3	22	--	Mainly from France.
Beryllium: Metal including alloys, all forms -------------- kilograms--	423	756	580	West Germany 24.
Chromium: Oxides and hydroxides -------	439	449	28	West Germany 305; Italy 61; Poland 50.
Cobalt: Oxides and hydroxides----------	2	2	([2])	Mainly from United Kingdom.
Columbium and tantalum: Metal including alloys, all forms, tantalum--- kilograms--	1,236	974	532	Austria 324.
Copper:				
Sulfate ----------------------	[r]583	697	--	Czechoslovakia 190; France 124; Belgium-Luxembourg 97.
Metal including alloys:				
Scrap --------------------	3,695	2,201	18	West Germany 850; Austria 274; Bulgaria 272.
Unwrought ---------------	9,363	9,044	75	West Germany 3,151; Belgium-Luxembourg 2,368; Chile 1,501.
Semimanufactures ------------	76,332	70,997	389	West Germany 31,489; France 11,996; United Kingdom 7,768.
Gold: Metal including alloys, unwrought and partly wrought-- thousand troy ounces--	32,715	24,229	NA	NA.
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted --------------------	21,050	8,016	--	West Germany 6,776; Italy 1,218.
Metal:				
Scrap --------------------	106,433	146,802	--	West Germany 112,538; Netherlands 28,081.
Pig iron, cast iron, related materials -	81,041	79,383	1	West Germany 28,858; France 19,283; Canada 14,755.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys:				
Ferroaluminum	206	338	40	United Kingdom 155; France 128.
Ferrosilicon	4,726	5,954	NA	France 2,670; West Germany 1,131; Yugoslavia 619.
Silicon metal	273	263	1	West Germany 132; Norway 100; France 12.
Unspecified	r11,744	12,854	8	France 4,342; Norway 4,239; West Germany 2,398.
Steel, primary forms	113,453	148,192	19	West Germany 46,194; United Kingdom 42,371; France 25,204.
Semimanufactures:				
Bars, rods, angles, shapes, sections	481,493	569,465	284	Italy 182,544; West Germany 145,440; France 100,876.
Universals, plates, sheets	573,570	690,768	59	West Germany 203,972; Belgium-Luxembourg 114,413; France 110,528.
Hoop and strip	190,614	207,867	500	West Germany 108,383; France 43,250; Austria 16,806.
Rails and accessories	41,288	42,788	64	Austria 20,034; West Germany 16,816; Italy 2,968.
Wire	35,152	34,150	79	West Germany 11,426; Austria 5,486; Italy 4,480.
Tubes, pipes, fittings	128,582	120,678	105	West Germany 54,976; Italy 14,342; France 13,998.
Castings and forgings, rough	9,576	7,855	(2)	West Germany 3,671; France 1,261; Italy 754.
Lead:				
Ore and concentrate	5	2	--	All from France.
Oxides	155	210	--	West Germany 103; France 54; Mexico 36.
Metal including alloys:				
Scrap	33	63	--	France 62; West Germany 1.
Unwrought	12,867	10,429	--	Canada 3,551; United Kingdom 3,309; West Germany 1,785.
Semimanufactures	1,688	1,769	1	West Germany 1,582; Belgium-Luxembourg 151.
Magnesium: Metal including alloys:				
Unwrought including scrap	1,620	2,162	80	Norway 1,177; Italy 678.
Semimanufactures	44	32	(2)	West Germany 15; Austria 10; Italy 3.
Manganese: Oxides	783	998	--	Greece 668; Belgium-Luxembourg 123; Netherlands 111.
Mercury ... 76-pound flasks	879	1,163	(2)	West Germany 936; Spain 75; France 73.
Molybdenum: Metal including alloys:				
Unwrought	18	2	NA	Mainly from West Germany.
Semimanufactures	11	7	(2)	Austria 6.
Nickel: Metal including alloys:				
Scrap	242	94	--	Republic of South Africa 24; West Germany 22; France 15.
Unwrought	1,034	895	30	Finland 243; Norway 127; United Kingdom 110.
Semimanufactures	940	928	59	West Germany 544; United Kingdom 159; France 75.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ... thousand troy ounces	980	1,220	158	United Kingdom 435; Netherlands 177; U.S.S.R. 147.
Silver: Metal including alloys, unwrought and partly wrought ... do	r36,640	37,708	9	West Germany 866; United Kingdom 705; unspecified 35,645.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Tin: Metal including alloys:				
Scrap	(2)	1	--	Mainly from France.
Unwrought	866	890	(2)	Malaysia 310; Indonesia 205; Thailand 65.
Semimanufactures	278	263	2	West Germany 126; France 77; Italy 16.
Titanium: Oxides	2,020	2,134	147	West Germany 857; United Kingdom 399.
Tungsten: Metal including alloys:				
Unwrought	28	31	1	West Germany 13; France 10; Ireland 3.
Semimanufactures	12	12	1	West Germany 4; Austria 3.
Uranium and thorium: Oxides and other compounds	18	16	4	France 7; West Germany 3.
Zinc:				
Oxides	1,606	1,815	12	France 1,009; West Germany 344; United Kingdom 236.
Metal including alloys:				
Scrap	41	342	--	Italy 204; Hungary 137.
Unwrought	18,243	20,330	2	Netherlands 4,942; West Germany 4,390; Norway 3,645.
Semimanufactures	r4,143	4,088	68	Belgium-Luxembourg 1,310; West Germany 866; Netherlands 745.
Other:				
Ores and concentrates	4,417	3,262	--	Republic of South Africa 1,786; Australia 464; West Germany 437.
Waste and sweepings of precious metals value, thousands	$69,601	$184,400	$790	Spain $103,100; Panama $9,900; Netherlands Antilles $9,500.
Ashes and residues	348	392	2	France 115; United Kingdom 102; West Germany 89.
Base metals including alloys, all forms	r939	1,121	99	Netherlands 278; Republic of South Africa 207.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,130	3,870	102	West Germany 3,292; Italy 439.
Artificial:				
Corundum	5,902	5,862	66	West Germany 2,999; Austria 1,845; France 508.
Silicon carbide	1,100	1,923	NA	West Germany 1,360; France 286; Norway 209.
Dust and powder of precious and semiprecious stones including diamond kilograms	5,363	4,623	1,030	Ireland 3,325; West Germany 108.
Grinding and polishing wheels and stones	1,848	1,602	28	West Germany 844; Italy 200; Austria 165.
Asbestos, crude	5,455	12,211	41	Canada 4,504; U.S.S.R. 3,205; Republic of South Africa 2,376.
Barite and witherite	1,795	1,393	--	West Germany 964; France 294.
Boron materials:				
Crude natural borates	10,757	10,089	9,220	Netherlands 747; West Germany 72.
Oxides and acids	410	632	3	France 312; Turkey 135; West Germany 92.
Cement	r179,550	265,092	28	Italy 127,167; West Germany 69,326; France 34,763.
Chalk	24,078	23,961	7	France 20,264; Austria 1,500; West Germany 1,203.
Clays, crude	178,324	177,438	1,527	West Germany 75,347; United Kingdom 59,893; France 26,825.
Cryolite and chiolite	180	58	--	Denmark 56; West Germany 2.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung value, thousands	$721,537	$748,931	$110,290	United Kingdom $353,299; Belgium-Luxembourg $111,688.
Industrial stones do	$39,999	$51,802	$4,123	Ireland $33,621; United Kingdom $9,424.
Diatomite and other infusorial earth	12,067	10,209	315	Denmark 6,394; Spain 1,972; France 934.
Feldspar, fluorspar, related materials	7,883	7,571	--	Italy 2,556; West Germany 2,290; Hungary 1,285.
Fertilizer materials:				
Crude, n.e.s	17,124	19,962	18	France 12,644; West Germany 4,325; Italy 2,696.
Manufactured:				
Ammonia	15,315	17,815	(2)	France 9,293; Austria 8,053.
Nitrogenous	77,646	88,537	27	Austria 33,955; West Germany 14,480; Italy 13,900.
Phosphatic	115,418	107,070	--	France 69,727; Belgium-Luxembourg 31,995.
Potassic	86,356	96,524	--	France 65,689; West Germany 27,816; East Germany 3,016.
Unspecified and mixed	134,669	160,316	18,083	France 57,462; West Germany 22,419.
Graphite, natural	167	112	--	West Germany 66.
Gypsum and plaster	66,242	67,524	--	West Germany 41,385; France 13,368; Italy 12,696.
Lime	61,147	69,865	--	West Germany 38,157; Italy 31,527.
Magnesium compounds	4,472	4,445	4	Austria 2,710; Spain 1,148; West Germany 210.
Meershaum, amber, jet kilograms	(2)	502	NA	NA.
Mica:				
Crude including splittings and waste	682	480	--	France 228; West Germany 105; United Kingdom 43.
Worked including agglomerated splittings	392	341	1	France 170; Belgium-Luxembourg 122; India 29.
Phosphates, crude	7,344	5,873	500	Morocco 3,329; Israel 989; Republic of South Africa 823.
Phosphorus, elemental	r2,870	4,032	122	Italy 1,308; U.S.S.R. 932; West Germany 830.
Pigments, mineral:				
Natural, crude	436	278	NA	West Germany 130; Austria 110.
Iron oxides and hydroxides, processed	2,548	2,143	6	West Germany 2,089; United Kingdom 30.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$271,494	$258,599	$31,353	Thailand $27,221; United Kingdom $25,351.
Synthetic do	$8,173	$7,051	$787	France $3,012; West Germany $906.
Pyrite, unroasted	118	156	--	West Germany 132; France 24.
Salt and brine	1,775	2,004	1	France 1,665; West Germany 185.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	6,508	5,009	7	East Germany 2,417; West Germany 757; Bulgaria 540.
Sulfate, manufactured	15,515	17,598	--	Austria 7,936; West Germany 7,607; France 2,006.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	135	125	--	West Germany 46; France 38; Italy 25.
Worked do	93	102	(2)	Italy 77; Austria 6; West Germany 6.
Dolomite, chiefly refractory-grade do	20	21	--	Italy 16; France 2.
Gravel and crushed rock do	5,372	5,444	(2)	France 3,224; West Germany 1,230; Italy 675.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Stone, sand and gravel —Continued				
Limestone other than dimension thousand tons	20	18	--	Italy 9; France 7; West Germany 2.
Quartz and quartzite do	27	23	(2)	Italy 16; West Germany 6.
Sand other than metal-bearing do	1,209	1,192	(2)	Italy 516; France 307; West Germany 246.
Sulfur:				
Elemental:				
Crude including native and byproduct	36,390	39,336	27	West Germany 39,252; Italy 20.
Colloidal, precipitated, sublimed	127	198	(2)	France 95; West Germany 79.
Dioxide	r35	39	--	Italy 35.
Sulfuric acid	3,624	3,236	1	West Germany 2,827; Austria 243.
Talc, steatite, soapstone, pyrophyllite	12,684	11,991	(2)	Austria 7,690; Italy 1,813; France 1,376.
Other:				
Crude	89,089	89,734	785	West Germany 47,473; France 10,367; Netherlands 9,826.
Slag and dross, not metal-bearing	32,700	32,553	--	West Germany 21,130; France 9,569; Austria 735.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,074	1,879	125	Trinidad and Tobago 1,558.
Carbon:				
Carbon black	3,881	4,629	98	West Germany 2,759; France 1,050; Italy 383.
Gas carbon	57	98	--	All from West Germany.
Coal:				
Anthracite and bituminous	471,399	344,274	67,969	Australia 122,707; West Germany 97,125.
Briquets of anthracite and bituminous coal	11,558	11,083	--	West Germany 9,524; Belgium-Luxembourg 1,118.
Lignite including briquets	33,743	29,866	--	West Germany 28,455; East Germany 1,258.
Coke and semicoke	r78,179	74,883	--	West Germany 46,096; France 24,359; Netherlands 2,842.
Peat including briquets and litter	r73,816	75,697	(2)	West Germany 60,414; U.S.S.R. 13,602.
Petroleum:				
Crude thousand 42-gallon barrels	27,219	30,645	--	Libya 13,418; Algeria 7,130; Saudi Arabia 3,543.
Refinery products:				
Liquefied petroleum gas do	9,918	12,139	(2)	West Germany 6,669; Netherlands 5,446.
Gasoline do	17,378	16,818	(2)	Belgium-Luxembourg 5,593; West Germany 3,897; Italy 2,810.
Mineral jelly and wax do	94	106	1	West Germany 64; France 14; Netherlands 5.
Kerosine and jet fuel do	397	601	(2)	Belgium-Luxembourg 227; Italy 149; France 107.
Distillate fuel oil do	31,549	38,031	1,298	U.S.S.R. 16,686; Netherlands 6,871; France 4,319.
Lubricants do	537	574	10	West Germany 146; Italy 112; Netherlands 81.
Residual fuel oil do	2,109	1,717	--	West Germany 1,079; France 310; Belgium-Luxembourg 131.
Bitumen and other residues do	1,223	1,061	(2)	West Germany 460; France 388; Italy 196.
Bituminous mixtures do	58	59	(2)	West Germany 39; France 12.
Petroleum coke do	743	995	843	West Germany 152.

rRevised. NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The two aluminum smelters, at Steg and Chippis, in Valais Canton, with their ancillary facilities, which were operated by Alusuisse S.A., completed a program of modernization in recent years; in 1984, details were made available. About $119 million was spent on modernization, improvements, and expansion of the Valais installations. To compensate for the high costs of transport of raw materials, operations in the Valais works had to be made more efficient, and at the same time, fluoride emissions had to be reduced. Power and anode consumption had to remain unchanged. To accomplish these goals, Alusuisse developed a system in which alumina and electrolytes are computer fed in a closed system. The closed system and dry scrubbers allow better handling of fluoride-enriched alumina and electrolytes with no problem in disposing of fluoride-containing water. The recovered fluoride is used again in the process. Rolling capacity was also increased 40%, to about 95,000 tons per year, by adding a new cold-rolling mill and a continuous-heat treatment furnace, at a cost of about $62 million.

After 3 years of losses, Alusuisse reported profits of about $78 million. Restructuring in the light metals division and good demand for aluminum metal were the reasons for this good showing.

Iron and Steel.—At the Gerlafingen plant, operated by Von Roll, new investment has improved productivity. In the rolling mill, in the heavy train, a new roll stand with a cooling section makes it possible to produce wide flats up to 250 millimeters wide. One of the electric furnaces in the steel shop was equipped with a new 48-megavolt-ampere (MV•A) transformer. Noise and dust controls included enclosure of the furnace and the new filter installation. In addition, a new 125-MV•A step-down transformer, which permits a change-over to single furnace operation, should be in operation in the near future. Furthermore, the management of Von Roll awarded the contract for the turnkey supply of a vacuum oxygen decarburization and degassing unit for melt weights ranging between 50 and 60 tons to Leybold-Heraeus GmbH of Hanau, Federal Republic of Germany. The vacuum unit is to operate in-line with a 60-ton ladle furnace for production of high-grade forging products. The new installation will be built at Gerlafingen.

NONMETALS

Cement.—During 1984, 12 cement plants were in production in Switzerland. The industry employed about 1,413 persons, and plants were operating at about 76% of installed capacity.

Salt.—Salt was produced by the state monopoly at Ridburg, near Basel. During 1984, production was at the same rate as in the past. There were some small improvements in the salinas.

MINERAL FUELS

As in the past, Switzerland remained a net importer of fuels. All requirements had to be met by imports except for hydroelectric power and fuel wood. Domestic electric power output was almost pollution free since about 70% of electric energy was generated in hydroelectric plants and about 29% in nuclear plants.

Development of the small Finsterwald Gasfield, the first in Switzerland, continued. Liquid fuels were imported mostly by pipelines. In 1983, the latest year for which information was available, about 5.1 million tons of liquid fuels entered Switzerland.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Swiss francs (SwF) to U.S. dollars at the 1984 average rate of SwF2.1 = US$1.00.

The Mineral Industry of Taiwan

By E. Chin[1]

The value of Taiwan's mine output has decreased annually since 1981 primarily owing to decreased output of oil and natural gas. The domestic manufacturing sector continued to overshadow the mining sector. In 1984, the value of mining output was only 0.6% of the manufacturing output, down from 2.4% in 1974. Taiwan has few mineral resources, and aside from construction raw materials, domestic mine output is insignificant in terms of the world market. The value of oil and natural gas production in 1984 was $236 million; coal, $126 million; and miscellaneous mining and quarrying, $67 million.[2] The mining sector accounted for only 1.5% of the industrial gross domestic product.[3]

Taiwan's economic growth rate of 11% was one of the highest rates in the world. In current market prices, the gross national product (GNP) was estimated at $56 billion compared with $50 billion in 1983. GNP in 1976 prices was $33 billion in 1984 compared with $29 billion in 1983. Per capita GNP was nearly $3,000. Input by sector to the GNP was as follows: agriculture and livestock, $4.9 billion; mining, $0.4 billion; manufacturing, $18.9 billion; commerce, $8.2 billion; government services, $7.3 billion; construction, $3.3 billion; transportation and communications, $3.2 billion; real estate, $3.1 billion; utilities, $2.1 billion; banking, $1.9 billion; and other, $2.9 billion.

Taiwan is heavily dependent on foreign raw materials. The value of total imports in 1984 was nearly $22 billion, compared with $20 billion in 1983. The value of industrial output grew from $67 billion in 1983 to $76 billion. Taiwan's economy is based on value-added manufacturing with emphasis on exporting much of its production. Exports in 1984 were valued at $30 billion. Taiwan's trade balance was $8 billion and the current account, $7.8 billion. Prime interest rate during the year averaged 8.3%. Indices for the year (1981=100) included industrial production, 129.9; agriculture, 108.8; industrial wages, 135.7; and labor productivity, 117.5.

Selected wholesale prices for 1984 included iron ore, $28 per metric ton; compound fertilizer, $213 per ton; steel plate, $390 per ton; electrolytic copper, $193 per ton; aluminum ingot, $165 per ton; and steel scrap, $136 per ton. The wholesale price for coal was $77 per ton; fuel oil, $174 per kiloliter; and gasoline, $0.64 per liter.

Employment in the mining and quarrying sector averaged 40,500 persons compared with 1,970,000 for manufacturing; 33,500 for the utilities sector; and 361,000 for construction. Monthly working hours in the mining sector averaged 179 hours, compared with 211 hours for manufacturing, 206 hours for utilities, and 198 hours for construction. Average monthly earnings of employees were $470 for mining, $438 for manufacturing, $669 for utilities, and $419 for construction.

In June, explosions in two coal mines in northern Taiwan resulted in the death of 177 persons. The disaster occurred in Taiwan's 2d and 16th largest coal mines, which were also considered the best and safest in the country. Subsequently, Government authorities ordered all pits to be inspected and substandard operations to be closed. Moreover, the country's coal mining policies and safety standards were to be reevaluated. The Government's 10-year mining development plan was canceled, and no coal production targets were to be issued in the near future. For the past several years, the domestic coal output target had been set at

2.5 to 3 million tons per year.

Domestic coal supplies less than 5% of Taiwan's total energy needs but accounts for about 25% of the total annual coal consumption. Many of Taiwan's coal mines are marginal operations and require subsidy. The cost of domestic coal exceeds the cost of imported coal by as much as 25% to 50%. If mines were to remain closed, there would be serious social and employment dislocations for the coal sector; any drop in domestic production must be replaced through increased imports.

PRODUCTION

Production of crude oil and natural gas is of little consequence by world standards. However, the output of this sector was valued at $236 million in 1984, or 55% of the total value of domestic mineral output. Coal was the second most important mineral sector; the value of coal production was $126 million. Output of bituminous coal has decreased annually since 1977. The value of miscellaneous mining and quarrying during the year was $67 million.

Metallic minerals mined included small quantities of gold and sporadic output of copper and iron sands. In terms of output quantity, carbonate minerals, limestone, marble, and dolomite, in that order, dominate the nonfuel mining sector. The remainder of the output, aside from the carbonates and aggregates, are industrial minerals: asbestos, chiolite, clays, feldspar, gem stone, gypsum, mica, salt, serpentine, sulfur, and talc. None of Taiwan's output of mineral commodities is significant in the world market.

Although output value of the mining sector in 1984 was only $429 million, the value of manufacturing was $19 billion. Manufactures of nonmetallic mineral products were valued at $2 billion; primary metals, $4 billion; metal products, $3 billion; and petroleum refinery products, $5 billion.

Taiwan's annual steel capacity, close to 5 million tons, is dominated by the Government-run 3.2-million-ton integrated complex at Kao-Hsiung. The only other metal output is electrolytic copper, the annual output of which has averaged less than 50,000 tons during 1982-84, and some gold and silver. Taiwan's aluminum smelter was closed down in 1983.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Alumina, gross weight	(2)	(2)	(2)	--	--
Metal, primary	63,549	30,532	10,120	--	--
Copper:					
Mine output, metal content[e]	1,900	500	--	--	--
Metal, refined	19,495	53,230	47,377	37,960	48,436
Gold, primary troy ounces	13,278	56,695	71,770	52,361	37,794
Iron and steel: Metal:					
Pig iron thousand tons	[r]1,724	1,610	2,695	3,415	3,360
Ferroalloys:					
Ferromanganese	21,010	[r]19,175	[r]18,665	2,763	19,803
Ferrosilicomanganese	22,607	14,376	21,311	18,509	23,082
Ferrosilicon	28,390	[r]17,523	[r]16,930	18,304	23,714
Steel, crude thousand tons	3,417	3,143	4,078	5,017	5,000
Lead, refinery, secondary[e]	16,800	30,000	35,000	[r]38,000	38,000
Silver, primary troy ounces	95,073	214,879	504,088	345,270	364,274
NONMETALS					
Asbestos	683	2,317	2,392	2,819	1,355
Cement, hydraulic thousand tons	14,062	14,342	13,432	14,810	14,234
Clays:					
Fire clay	48,048	34,879	35,577	36,926	52,479
Kaolin	79,802	90,836	87,532	102,895	79,411
Feldspar	25,149	17,215	10,305	11,866	15,452
Gypsum:					
Precipitated	3,364	1,985	1,320	1,522	1,882
Other	4,706	4,054	725	1,500	--

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Lime	199,305	142,615	109,458	104,494	117,496
Mica	338	85	44	311	304
Nitrogen: N content of ammonia	414,350	406,097	317,647	310,594	268,427
Pyrite, gross weight	150	40	--	--	--
Salt, marine	722,425	351,330	262,103	79,188	218,491
Sodium compounds, n.e.s.:					
Caustic soda	410,800	372,996	358,736	295,349	350,527
Sodium carbonate (soda ash)	92,540	72,064	59,220	93,820	107,210
Stone:					
Dolomite thousand tons	489	359	261	228	258
Limestone do	12,822	13,221	11,378	13,183	12,936
Marble do	2,839	3,269	3,155	9,281	9,542
Serpentine do	103	118	119	116	123
Sulfur:					
S content of pyrite	80	21	--	--	--
Byproduct, all sources	8,099	9,849	20,080	26,936	28,705
Total	8,179	9,870	20,080	26,936	28,705
Talc	9,911	24,774	30,661	27,053	18,680
MINERAL FUELS AND RELATED MATERIALS					
Carbon: Carbon black	15,070	23,406	21,313	32,968	39,842
Coal, bituminous thousand tons	2,574	2,446	2,384	2,236	2,011
Coke do	227	219	159	150	141
Gas, natural:					
Gross[e] million cubic feet	69,000	59,000	48,000	48,000	49,000
Marketed do	60,329	53,042	43,526	43,689	44,698
Petroleum:					
Crude thousand 42-gallon barrels	1,330	1,150	874	847	855
Refinery products:					
Gasoline do	13,086	13,008	14,154	17,422	17,518
Kerosine do	--	--	98	86	61
Distillate fuel oil do	22,418	20,769	19,792	21,898	21,972
Residual fuel oil do	63,988	60,286	57,133	58,019	56,426
Lubricants do	857	802	702	835	951
Asphalt do	1,749	1,813	2,271	2,406	2,311
Other[3] do	2,595	1,562	1,442	3,449	8,517
Refinery fuel, losses and not reported[e 4] do	8,225	24,201	25,000	27,000	27,000
Total do	112,918	122,441	120,592	131,115	134,756

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through June 10, 1985.
[2]Revised to zero.
[3]Naphtha, solvent oil, and base oil.
[4]Includes liquefied petroleum gas and jet fuel.

TRADE

Taiwan's major trading partners were, in descending order, the United States, Japan, and Hong Kong, which collectively accounted for 59% of Taiwan's total imports and 72% of total exports. Other major trading partners included Australia, Canada, the Federal Republic of Germany, Kuwait, Saudi Arabia, and the United Kingdom.

The value of total imports was close to $22 billion. Receipts from Japan were $5.7 billion, the United States, $4.5 billion; Saudi Arabia, $1.7 billion; and Australia and Kuwait, each with $0.7 billion. The value of crude petroleum imports was $3.8 billion; coal, $0.4 billion; metallic ore, $0.2 billion; nonmetallic ore, $0.1 billion; basic metals, $2.0 billion; metal products, $0.2 billion; nonmetallic mineral products, $0.1 billion; and chemicals, $3.2 billion.

Total exports were valued at $30.2 billion. Shipments to the United States were $15.0 billion; Japan, $3.2 billion; Hong Kong, $2.0 billion; Canada, $0.9 billion; and to Australia, the Federal Republic of Germany, and Saudi Arabia, each about $0.8 billion. Manufactures continued to dominate exports.

The largest class was electrical machinery and appliances, accounting for 21% of the total value of exports, followed by clothing and footwear, 18%; metal products, 6%; wood products, plastic products, transportation equipment, machinery, and chemicals, each with 4%.

The Government was preparing new tariff rates on import goods for 1,161 items: the tariff on 1,058 items was to be reduced, 35 items were to be exempt, 67 were to be given new classifications; and the tariff on 1 item was to be higher. The new tariff schedule was expected to lower the Government's annual tariff revenue by $100 million.

Table 2.—Taiwan: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	4,498	3,426	--	Republic of Korea 3,150; Philippines 200.
Metal including alloys, all forms	8,004	13,503	122	Japan 5,319; Hong Kong 4,653; Singapore 2,019.
Columbium and tantalum: Metal including alloys, all forms, tantalum	11	83	73	Denmark 7.
Copper:				
Matte and speiss including cement copper	135	30	2	Japan 28.
Sulfate	98	315	18	Singapore 154; Philippines 51; Canada 36.
Metal including alloys:				
Scrap	8,911	8,095	234	Japan 7,530.
Unwrought	184	227	51	Japan 154.
Semimanufactures	4,689	8,387	636	Hong Kong 2,936; Singapore 2,823; Thailand 593.
Iron and steel: Metal:				
Scrap	402,215	279,854	20	Thailand 172,191; Japan 52,867; Republic of Korea 29,039.
Pig iron, cast iron, related materials	438	3,363	673	Singapore 1,250; Indonesia 1,000.
Ferroalloys	6,771	6,322	11	Indonesia 2,192; Japan 2,011; Thailand 850.
Steel, primary forms	294,275	250,617	348	Malaysia 114,694; Philippines 81,558; Japan 36,903.
Semimanufactures thousand tons	1,560	1,846	165	Japan 420; Saudi Arabia 282; Hong Kong 160.
Lead: Metal including alloys, all forms	14,891	16,241	46	Republic of Korea 9,829; Japan 1,686; Philippines 1,557.
Magnesium: Metal including alloys, all forms	220	361	230	Japan 113.
Nickel: Metal including alloys:				
Scrap	1,198	1,423	--	Japan 1,330; India 81.
Unwrought and semimanufactures	56	116	1	Japan 111.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	96	6,012	6,012	
Rare-earth metals including alloys, all forms kilograms	1,000	851	--	Indonesia 601; Hong Kong 250.
Silver:				
Waste and sweepings[2]	93	34	1	Hong Kong 16; Japan 16.
Metal including alloys, unwrought and partly wrought troy ounces	4,855	22,506	--	Switzerland 17,683; United Kingdom 4,823.
Tin:				
Oxides kilograms	483	--		
Metal including alloys, all forms	209	198	6	Hong Kong 161.
Titanium: Oxides	234	7,971	7,914	Philippines 35.
Tungsten: Metal including alloys, all forms	11	9	1	Japan 6.
Uranium and/or thorium: Metal including alloys, all forms	17	66	26	Nigeria 18; Netherlands 5.
Zinc:				
Oxides	1,809	2,932	1	Japan 2,318; Philippines 497.
Blue powder	579	733	--	Japan 731.
Metal including alloys, all forms	1,021	1,363	78	Japan 1,077.

See footnotes at end of table.

Table 2.—Taiwan: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	13	5	1	Indonesia 2.
Artificial: Corundum	383	329	--	Japan 283; Indonesia 29.
Dust and powder of precious and semiprecious stones including diamond kilograms	900	1,462	220	Thailand 723; Republic of Korea 304.
Asbestos, crude	3	31	--	Thailand 20; Indonesia 6.
Barite and witherite	--	50	--	All to Indonesia.
Cement thousand tons	2,764	4,056	2	Singapore 1,317; India 968; Hong Kong 787.
Clays, crude	494	805	--	Philippines 624; Japan 72.
Diamond:				
Natural:				
Gem, not set or strung thousand carats	11,075	8,380	6,740	Japan 1,160; France 435.
Industrial stones do	310	1,615	865	France 455; West Germany 265.
Synthetic: Gem, not set or strung do	46,170	5,500	1,270	Republic of Korea 1,170; Thailand 1,065; Saudi Arabia 755.
Diatomite and other infusorial earth	49	95	--	Japan 72; Singapore 18.
Fertilizer materials: Manufactured:				
Ammonia	339	415	--	Thailand 400.
Nitrogenous	12,000	3,213	--	Malawi 2,000; Japan 1,120.
Potassic	13,037	10,250	--	All to Japan.
Unspecified and mixed	175	168	--	Hong Kong 146.
Graphite, natural	352	100	--	Indonesia 41; Japan 36.
Gypsum and plaster	350	734	2	Indonesia 701.
Magnesium compounds:				
Oxides and hydroxides	150	460	--	All to Indonesia.
Other	50	132	--	All to Japan.
Meerschaum, amber, jet	45	10	(3)	Malaysia 3; Philippines 3; Hong Kong 2.
Mica, all forms	51	416	--	Japan 158; Australia 69; United Kingdom 69.
Pigments, mineral:				
Natural, crude	26	1	--	All to Japan.
Iron oxides and hydroxides, processed	203	195	--	Pakistan 64; Malaysia 53; Thailand 43.
Precious and semiprecious stones other than diamond:				
Natural kilograms	36,385	52,990	25,657	Italy 9,007; Hong Kong 5,951; Japan 2,661.
Synthetic do	28,237	31,366	19,170	Italy 7,785; New Zealand 1,180.
Salt and brine	1,000	672	36	Brunei 600.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	71	--		
Sulfate, manufactured	25,273	13,657	--	Malaysia 3,980; Singapore 3,100; Philippines 1,600.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,400	7,192	11	Japan 5,136; Saudi Arabia 851.
Worked	40,715	34,510	749	Saudi Arabia 28,433; Japan 1,846; Republic of Korea 840.
Dolomite, chiefly refractory-grade	14,835	8,495	--	Japan 6,200; Indonesia 850; Philippines 648.
Gravel and crushed rock	406,784	369,081	--	Thailand 361,031.
Limestone other than dimension	664	718	--	Hong Kong 700.
Quartz and quartzite	239	112	--	Japan 100.
Sand other than metal-bearing	288,708	290,232	1	Japan 283,919.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,553	1,728	--	Indonesia 1,062; Philippines 376.
Colloidal, precipitated, sublimed	430	105	--	Malaysia 102.
Sulfuric acid	269	635	--	Saudi Arabia 354; Australia 115; Indonesia 70.
Talc, steatite, soapstone, pyrophyllite	1,114	1,823	--	Indonesia 1,496; Philippines 165.
Other:				
Crude	2,211	2,798	80	Japan 1,570; Indonesia 281; Philippines 246.
Slag and dross, not metal-bearing	16,891	78,339	--	Japan 65,995; Philippines 11,892.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	2,487	4,170	--	Indonesia 3,132; Thailand 610.

See footnotes at end of table.

Table 2.—Taiwan: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal: Anthracite	40	30	--	All to Philippines.
Coke and semicoke	10,435	10,374	--	Indonesia 7,140; Thailand 1,250; Malaysia 822.
Petroleum, refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	--	15	--	All to Hong Kong.
Mineral jelly wax do	([3])	1	NA	NA.
Kerosine and jet fuel do	2,978	6,105	210	Japan 1,142; Singapore 952; Iran 878.
Distillate fuel oil do	7,129	6,308	--	NA.
Lubricants do	274	841	420	Thailand 103; Republic of Korea 90; Kenya 54.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Taiwan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	30,373	36,805	--	All from Malaysia.
Oxides and hydroxides	18,593	5,052	202	Japan 4,370.
Metal including alloys:				
Scrap	15,775	25,766	19,622	Japan 1,541; Australia 1,241.
Unwrought	88,569	139,145	16,629	Republic of South Africa 36,641; Australia 23,581; Bahrain 18,376.
Semimanufactures	14,955	23,187	948	Japan 13,305; Australia 4,930.
Arsenic: Oxides and acids	192	311	--	France 182; Republic of Korea 69.
Chromium:				
Ore and concentrate	1,856	1,751	--	Republic of South Africa 900; Philippines 833.
Oxides and hydroxides	1,654	2,181	492	Japan 1,194.
Cobalt: Oxides and hydroxides	23	56	([3])	Belgium-Luxembourg 49.
Copper:				
Ore and concentrate	85,427	134,083	22,067	Canada 80,208; Philippines 21,088.
Matte and speiss including cement copper	6	6	--	Hong Kong 2.
Sulfate	287	299	28	Japan 235.
Metal including alloys:				
Scrap	23,367	30,441	21,168	Japan 3,330; Hong Kong 1,234; Singapore 1,034.
Unwrought	27,401	64,006	1,857	Japan 51,654; Zaire 6,569.
Semimanufactures	32,043	44,523	1,808	Japan 36,541; Republic of Korea 2,826.
Gold:				
Bullion troy ounces	337,692	112,515	--	All from Switzerland.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,179	1,088	920	Japan 166.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	4,049	4,957	([3])	Australia 3,016; Brazil 1,582.
Pyrite, roasted	21,014	13,757	--	All from Philippines.
Metal:				
Scrap	650,988	735,515	403,698	Hong Kong 180,828; Netherlands 51,373; Japan 40,351.
Pig iron, cast iron, related materials	148,325	223,693	683	Brazil 197,043.
Ferroalloys	5,466	10,641	47	India 3,504; Republic of South Africa 2,785; Norway 1,178.
Steel, primary forms	163,796	132,701	2,758	Republic of South Africa 46,414; Republic of Korea 17,067; Italy 15,611.
Semimanufactures thousand tons	1,481	1,139	37	Japan 978.

See footnotes at end of table.

Table 3.—Taiwan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	--	228	--	All from Indonesia.
Oxides	1,847	3,235	8	Australia 2,577; Mexico 628.
Metal including alloys:				
Scrap	35,142	48,215	28,275	Jordan 5,039; Kuwait 3,949; Saudi Arabia 3,778.
Unwrought	8,806	17,540	386	Australia 5,409; Japan 3,319; Peru 2,664.
Semimanufactures	41	43	8	Japan 30.
Magnesium: Metal including alloys, all forms	501	843	62	Norway 404; France 318.
Manganese:				
Ore and concentrate	135,556	106,195	--	Republic of South Africa 58,237; Gabon 23,185; Australia 19,556.
Oxides	1,504	1,369	([2])	Japan 907; Singapore 108; Spain 105.
Metal including alloys, all forms	16	16	8	Republic of South Africa 5.
Mercury 76-pound flasks	452	254	([2])	Japan 97; Belgium-Luxembourg 58; West Germany 49.
Molybdenum: Metal including alloys, all forms	45	71	63	Japan 4.
Nickel:				
Matte and speiss	486	429	--	All from Canada.
Metal including alloys:				
Scrap	155	133	100	Singapore 18.
Unwrought	2,822	4,060	11	Canada 2,199; Norway 923; Australia 370.
Semimanufactures	154	268	38	Australia 64; Japan 51; United Kingdom 21.
Platinum-group metals:				
Ore and concentrate[3] value	$13,463	$5,184	--	All from Japan.
Metals including alloys, unwrought and partly wrought thousand troy ounces	96	57	1	Japan 54.
Rare-earth metals including alloys, all forms	128	100	--	France 48; Japan 44.
Selenium, elemental	6	48	--	Portugal 36; Japan 12.
Silicon, high-purity	926	1,271	13	Norway 757; Canada 141; France 126.
Silver:				
Waste and sweepings[3] value	$64,064	$337,227	$329,936	United Kingdom $7,291.
Metal including alloys, unwrought and partly wrought thousand troy ounces	850	1,264	144	Japan 929.
Tin: Metal including alloys, all forms	1,346	1,899	10	Malaysia 1,145; Hong Kong 362; Singapore 227.
Titanium: Oxides	16,434	9,436	265	Japan 4,919; West Germany 2,287.
Tungsten:				
Ore and concentrate	--	34	--	All from Australia.
Metal including alloys, all forms	30	35	2	Japan 27.
Uranium and/or thorium: Oxides and other compounds	181	99	.92	France 4.
Zinc:				
Oxides	248	201	41	West Germany 81; Japan 73.
Blue powder	114	585	52	Norway 230; Greece 196; Netherlands 69.
Metal including alloys:				
Scrap	29,654	43,701	32,148	Japan 2,724; Canada 1,833; West Germany 1,339.
Unwrought	45,424	65,158	56	Australia 28,014; Japan 13,605; Canada 12,253.
Semimanufactures	731	792	4	Japan 678; West Germany 104.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,640	2,635	582	Japan 1,806.
Artificial: Corundum	6,957	8,360	22	Japan 5,100; Brazil 1,406.
Asbestos, crude	30,020	37,939	--	Canada 22,517; Republic of South Africa 9,850; Greece 2,884.
Barite and witherite	600	2,867	--	Thailand 2,862.
Boron materials:				
Crude natural borates	1,026	1,569	--	Netherlands 1,092; Japan 477.
Oxides and acids	1,148	1,491	1,027	Italy 180.
Bromine	([2])	45	32	Israel 13.
Cement	2,561	1,362	6	Thailand 1,000.

See footnotes at end of table.

Table 3.—Taiwan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Clays, crude:				
Bentonite	6,174	9,396	8,585	Japan 390.
Fire clay	541	830	197	Japan 546.
Kaolin	52,357	58,509	34,381	Malaysia 8,494; Hong Kong 5,957.
Unspecified	101,639	124,044	1,677	Hong Kong 60,492; Japan 41,284; India 12,730.
Cryolite and chiolite	72	85	--	Denmark 84.
Diamond:				
Natural:				
Gem, not set or strung thousand carats	285	1,515	5	Republic of South Africa 1,480.
Industrial stones do	1,990	8,380	5	Republic of Korea 7,510.
Synthetic:				
Gem, not set or strung do	10	200	200	
Industrial stones do	800	700	145	Japan 525.
Diatomite and other infusorial earth	2,743	3,143	1,673	Japan 1,318.
Feldspar, fluorspar, related materials	69,312	99,169	558	Republic of Korea 29,828; Thailand 28,115; Japan 25,862.
Fertilizer materials: Manufactured:				
Nitrogenous	38,160	135,942	60,707	Saudi Arabia 52,870.
Potassic	138,206	152,833	15,000	Canada 71,266; Jordan 24,200; Israel 24,121.
Unspecified and mixed	1,153	11,438	10,557	Japan 455.
Graphite, natural	7,942	10,957	--	Republic of Korea 9,190; Japan 1,033.
Gypsum and plaster	312,893	349,224	391	Japan 145,213; Thailand 84,829; Australia 77,653.
Iodine	5	12	([2])	Mainly from Japan.
Magnesium compounds:				
Oxides and hydroxides	5,598	7,327	37	Japan 6,920.
Other	11,918	17,736	--	India 11,800; Malaysia 4,750.
Mica:				
Crude including splittings and waste	257	224	--	Singapore 158; India 47.
Worked including agglomerated splittings	127	204	8	Japan 186.
Phosphates, crude	288,081	228,636	38,205	Jordan 150,800; Morocco 32,000.
Phosphorus, elemental	521	885	208	Republic of South Africa 606.
Pigments, mineral:				
Natural, crude	16	42	--	Japan 41.
Iron oxides and hydroxides, processed	9,773	15,314	41	Japan 11,672; Republic of Korea 1,550.
Precious and semiprecious stones other than diamond:				
Natural	1,203	2,158	55	Republic of South Africa 716; Brazil 656; Canada 329.
Synthetic kilograms	15,642	30,393	2,235	Italy 20,027; Japan 3,718.
Salt and brine	382,147	584,903	--	Australia 573,607.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	33,879	14,098	14,098	
Sulfate, manufactured	106	18	--	Mainly from Japan.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	23,639	34,078	3	India 11,408; Italy 8,842; Republic of Korea 2,783.
Dolomite, chiefly refractory-grade	1,050	1,283	--	Japan 957; United Kingdom 326.
Limestone other than dimension	3,543	5,425	--	All from Japan.
Quartz and quartzite	635	824	NA	Belgium-Luxembourg 296; Netherlands 220.
Sand other than metal-bearing	5,070	3,087	202	Japan 1,130; Australia 770; Singapore 500.
Sulfur:				
Elemental:				
Crude including native and byproduct	25,358	48,380	--	Canada 48,308.
Colloidal, precipitated, sublimed	156,287	205,885	60,011	Canada 86,001; Japan 46,581; Singapore 13,259.
Sulfuric acid	27,286	80,271	123	Japan 53,853; Philippines 26,289.
Talc, steatite, soapstone, pyrophyllite	6,356	6,662	760	Republic of Korea 2,674; Hong Kong 936; Japan 867.
Vermiculite	594	589	--	Republic of South Africa 397; United Kingdom 105.
Other:				
Crude	112,651	116,912	443	Republic of Korea 101,277.
Slag and dross, not metal-bearing	16,088	23,710	127	Japan 18,605; Australia 2,504.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	37	105	88	Republic of Korea 14.

See footnotes at end of table.

Table 3.—Taiwan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Carbon: Carbon black	5,074	3,382	858	Australia 1,370; Japan 589.
Coal: All grades including briquets thousand tons	5,589	6,510	1,765	Australia 3,323; Republic of South Africa 901.
Coke and semicoke	46,325	99,465	--	All from Japan.
Peat including briquets and litter	31	86	--	Finland 38; Canada 32.
Petroleum:				
Crude thousand 42-gallon barrels	116,580	137,487	--	Saudi Arabia 62,746; Kuwait 37,906; United Arab Emirates 9,454.
Refinery products:				
Liquefied petroleum gas do	3,018	3,338	245	Saudi Arabia 2,185; Australia 487.
Mineral jelly and wax do	75	90	2	Japan 53; Indonesia 16.
Distillate fuel oil do	4,733	5,276	4,554	Kuwait 583.
Lubricants do	441	450	150	Japan 225.
Nonlubricating oils do	88	90	24	Japan 48.
Petroleum coke do	154	322	315	Japan 5.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Metal mining in Taiwan is sporadic and output is very limited in light of domestic requirements. There are mining and prospecting registrations for copper, gold, iron, manganese, mercury, and silver. However, only insignificant amounts of copper, gold, and iron sand are occasionally produced. Taiwan's primary metals industry is limited to copper and iron and steel, both of which require imported raw materials.

All of Taiwan's large industrial enterprises are Government operated. These include Taiwan Aluminium Corp. (Talco), Taiwan Metal Mining Corp. (TMMCO), China Steel Corp. (CSC), Taipei Iron Works, and Tang Eng Iron Works Co. Ltd. (Tang Eng). Other metal users and fabricators, also Government enterprises, include China Shipbuilding Corp. and Taiwan Machinery Manufacturing Corp.

Aluminum.—In June 1980, Talco inaugurated its new 50,000-ton-per-year smelter, Kao-Hsiung II. In early 1981, the old 38,000-ton-per-year smelter, Kao-Hsiung I, was shut down. By 1981, output by Kao-Hsiung II was about 61% of rated capacity. By 1982, output by Kao-Hsiung II was reduced, operating at 20% of its capacity. Because of its weakened financial position (debts were estimated to exceed $225 million), the smelter was closed in 1983. On March 25, 1983, an initial memorandum of understanding was signed between Talco and the Aluminum Co. of America (Alcoa) to operate the facility as a joint venture. On March 29, the Council of Economic Planning and Development approved the joint venture proposal.

On October 12, 1983, the two parties signed a second memorandum on the joint venture proposal. Kao-Hsiung II remained closed while negotiations were being conducted. Talco and Alcoa were each to own 49% of the venture, with 2% held by local firms. Ownership of the two smelters would remain with Talco while two rolling mills, a casting plant, and a warehouse would be under the new ownership. The joint venture was to have the option of renting Kao-Hsiung II; Kao-Hsiung I would remain shut. Alcoa was to invest $6 to $10 million initially, increasing its investment to over $25 million when operations began.[4]

By midyear 1984, Talco and Alcoa remained deadlocked in making concessions on technology transfer, import tariffs and restraints, product processing, stock ownership, and development targets. By the end of July, the Government withdrew approval of the project. Government agencies then were reviewing means to revive Talco, and it was proposed that CSC operate Talco with the Government assuming the latter's debt.

Talco's output of aluminum sheet in 1984 was 14,300 tons, down 20% from that of 1983. Foil production remained at the 1,600-ton level.

Copper.—TMMCO continued to operate a 50,000-ton-per-year smelter at Juifang near Keelung in northern Taiwan despite financial losses from high interest rates and low copper prices. The Li-Yueh smelter was run at 97% of rated capacity throughout 1984 compared with 76% in 1983.

TMMCO offered its smelter for sale in 1983, and Nippon Mining Co. of Japan reportedly offered $130 million for the plant despite estimates of worth of $125 million.[5] Other interested parties were The Anaconda Company and Southwire Co. of the United States. The smelter uses imported concentrate primarily from Canada and the Philippines. Depending on world prices for copper, the smelter was losing $750 to $950 per ton of metal sold. Financial liabilities of the smelter were estimated at about $250 million. The state-run Taiwan Power Co. purportedly was to assume operation of TMMCO's smelter.

Iron and Steel.—CSC operated the country's only integrated iron and steel facility at Kao-Hsiung. Total annual steel capacity in Taiwan was distributed as follows: CSC, 3.2 million tons and about 100 small operations, 2.8 million tons. About one-third of the mills have arc furnaces and rolling facilities to produce reinforcing bars for the construction industry. However, most of the smaller operations simply melt scrap and produce small steel sections. The smaller mills were running at about two-thirds capacity in 1984 because of the slump in Taiwan's construction industry and partly because of the shortage of scrap. The Government continued to encourage the small mills to consolidate and modernize to achieve economy of scale.

Second-stage expansion of CSC's complex at Kao-Hsiung was completed in early 1982, raising annual crude steel output capacity from 1.5 million tons to 3.2 million tons. A third-stage expansion, also to have begun in 1982, was postponed because of a downturn in demand. Despite retrenchment by foreign steel producers, CSC launched a $1.4 billion expansion of its Kao-Hsiung complex in July 1984 to boost annual crude steel capacity to 5.7 million tons. Rather than buy a turnkey package, CSC was to deal with individual vendors for major pieces of equipment, the same as CSC had done for its original plant construction and previous expansion. Bids for equipment included a blast furnace, two steel refining units, two slab casters, and additional equipment for the existing hot-strip rolling mill. The third-stage expansion program was scheduled for completion in the late 1980's to be followed by a fourth expansion to raise output to 8 million tons.

CSC, the 32d largest steel maker in the world, is ranked as the third most efficient steel producer, with per capita worker output of 452 tons. In comparison, Pohang Iron and Steel Co. Ltd. of the Republic of Korea produces 689 tons per employee and Kobe Steel Ltd. of Japan, 463 tons per employee.

Tang Eng's $191 million stainless steel plant in Kao-Hsiung started production in early 1984. The plant, consisting of smelting facilities and a cold rolling mill, has an annual capacity to produce 130,000 tons of stainless steel billets. All of the production will be domestically consumed by Tang Eng and other local fabricators of stainless steel manufactures.

NONMETALS

The sizable mining operations of nonmetallic minerals center around the carbonate compounds. Most of the limestone output was from captive mines of cement producers. Local limestone was also used for sugar refining. The largest dolomite operation is at Ch'ing-Ch'ang Shan, which CSC works for flux material for its Kao-Hsiung complex. Output of decorative marble has increased from 34 million tons in 1976 to nearly 10 million tons in 1984. Salt production averaged only 228,000 tons annually during 1981-84 because of the typhoons that flooded the salt evaporation ponds in the coastal region of southern Taiwan. In addition to semiprecious gem stones, minor quantities of asbestos, chiolite, clays, feldspar, gypsum, mica, pyrite, and serpentine are produced and consumed locally.

Cement.—Taiwan's annual cement output capacity is around 15 million tons. Eleven companies, operating seventeen plants, produced about 14 million tons in 1984. About 11 million tons was domestically consumed with the remainder exported. Taiwan Cement Corp. was the largest producer and accounts for 34% of the nation's total annual capacity, followed by Asia Cement Corp. with 18%, and Chia Hsin Cement Corp. with 8%. Most of the cement plants have their own limestone quarries, with only the small plants purchasing limestone from quarries operated by others. The industry was to continue efforts to raise energy efficiency of its operation and to replace oil use with coal.

Fertilizer Materials.—Taiwan's fertilizer industry is dominated by the large Goverment-run companies—Kao Hsiung Ammonium Sulfate Corp. and Taiwan Fertilizer Co. Ltd. In 1984, the output value of fertilizer was estimated at $275 million. Most of the fertilizer production is domestically consumed with only small amounts exported. Taiwan's output of chemical fertilizer is not cost competitive with other producers in the Far East. In addition, the country lacks resources of potash and phosphate, further increasing the cost of compound fertilizers. To balance nitrogenous fertilizer supply-demand, production of ammonia and urea was to increase to meet the needs of other user industries for nitrogen compounds.

MINERAL FUELS

Taiwan has little resources of mineral fuels and produces only small quantities of coal, petroleum, and natural gas. The bulk of the nation's energy source in 1984 was from imports of oil (61%) and coal (13%). In comparison, domestic production of oil and natural gas accounts for 4.5% of the country's energy; coal, 4.3%; hydroelectric power, 3.6%; and nuclear power, 13.5%.

Total energy consumption by industry was estimated at 31 million kiloliters of oil equivalent. Consumption, by sector, included mining, 185,000 kiloliters of oil equivalent; chemical, 2.9 million kiloliters; metallic and nonmetallic mineral products, 3.1 million kiloliters each; other manufactures, 1.5 million kiloliters; energy, 2.2 million kiloliters; and transportation, 3.8 million kiloliters.

Electric power consumption in 1984, by selected industrial sector, was as follows, in million kilowatt hours: Mining and quarrying, 737; cement, 1,776; steel, 2,644; and aluminum, 58. During 1982-84, total industrial power consumption increased by 2.6 billion kilowatt hours annually.

Coal production has steadily decreased from 3.2 million tons in 1976 to 2.0 million tons in 1984. Two explosions in 1984, resulting in the loss of 177 lives, caused the Government to invoke strict mine safety inspections for all active mining pits. Substandard operations were to be closed. The Government estimated that about one-half of the 124 mines in operation were to be closed. At the minimum, the Government planned to maintain monthly coal production capacity of at least 1,000 tons.

The larger suppliers of coal were, in descending order, Australia, the United States, the Republic of South Africa, and Canada, which collectively totaled about 6.5 million tons. Large users such as Taiwan Power and CSC have secured coal supply with long-term contracts.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from New Taiwan dollars (NT$) to U.S. dollars at the rate of NT$40.10=US$1.00 in 1983 and NT$40.32=US$1.00 in 1984.

[3]American Institute in Taiwan. U.S. State Dep. Aitgram A-019, Dec. 31, 1984.

[4]Far Eastern Economic Review (Hong Kong). Alloyed Prospects for Taiwan Industry. V. 124, No. 22, May 21, 1984, pp. 67-69.

[5]Metal Bulletin (London). Taiwan Smelter Attracts Bids. No. 6767, Mar. 1, 1983, p. 9.

The Mineral Industry of Thailand

By Gordon L. Kinney[1]

Thailand produced 22 nonmetallic, 14 metallic, and 3 fossil fuel minerals or mineral-based products during 1984. Four of these were of consequence on the world mineral market. Thailand was still the major producer of tantalum in the form of tin smelter slags. Its tin production ranked third in the world, and its barite and fluorite production was among the top 10 producers. Domestically important amounts of antimony, cement, gypsum, kaolin, lead, limestone, manganese, salt, sand, talc, and tungsten were also produced. The fossil fuels were becoming economically more important. Valued at only a few million dollars 6 years ago, domestic production substituted for over $400 million[2] worth of imported energy in 1984.

The Thai mineral industry experienced a modest recovery in 1984, based mainly on increased production of fluorite, gypsum, lignite, and zinc. The value of the annual mineral production (excluding natural gas and petroleum) was estimated to have risen 15% to $409 million, after declining the previous 3 years. The performance of the industry continued to be affected by depressed world demand for minerals, particularly for tin, which accounts for 65% of total mineral production value (excluding natural gas and petroleum).

The Department of Mineral Resources (DMR) authorized two U.S.-Thai joint-venture enterprises to explore and develop potash deposits in separate areas of the northeast. Completion of a tantalum processing plant in Phuket was delayed again because of unfavorable world prices and problems in attracting foreign investors. The long-planned soda ash plant was still being debated at yearend. The November 1984 opening of the zinc smelter at Tak, in Tak Province, promises to give a boost to the economy of the whole Province.[3]

The comprehensive mineral resources development project was to have been started during 1984. Kenting Earth Sciences Ltd. of Canada was selected out of the three short-listed bidders for the airborne geophysical survey of the entire country. The 514,000-square-kilometer survey reportedly will be the biggest geophysical survey of its type ever attempted. The project was being funded in part with a $39 million Asian Development Bank loan. Data collection will require about 2 years, followed by another 2 years of interpretation and map compilation and production.

The gross domestic product (GDP) recorded an increase of 6%, the same as in 1983. The mining and construction sectors each contributed more than their proportional share of the GDP increase—the mining sector considerably more at 10.2%. Private investment increased only 4.3% compared with 20.0% in 1983. The inflation rate based on the Consumer Price Index rose only 0.9%, sustaining its low level for the third consecutive year. The Wholesale Price Index declined by 30% as a result of a decline in agricultural product prices while other product prices either remained unchanged or increased only marginally. Overall real income rose by 2.5%. Income earned from the mining sector rose by 4.1% after declining for 3 consecutive years.

PRODUCTION

Mining output increased by 10.2%, a revival from the decline of the last 3 years.[4] This was attributed to the rise in the production of natural gas, condensate, and the first full year of commercial crude oil production.[5] Other traditional mineral outputs, namely, antimony, fluorite, gypsum, lignite, limestone, and tungsten, recovered owing to the increase in both domestic and foreign demand. Tin production, Thailand's most important mineral export, rose marginally after a substantial 4-year decline. Zinc metal production was inaugurated in November at the Tak electrolytic refinery in northern Thailand.

Natural gas production increased dramatically as new wells were brought on-line in the Gulf of Thailand. The politically sensitive shortfall of gas in 1983 was eliminated, and 350 million cubic feet per day was to be available by mid-January 1985. A production capacity of 450 million cubic feet per day was scheduled to be available shortly thereafter, which is more than the existing industries and utilities can presently utilize. Union Oil Co. of Thailand, the operator of the gasfields, was thus being put in a position of possibly having to restrict its output until new consumers can be brought on-line.

Production of indigenous liquefied petroleum gas (LPG) and petrochemical feedstock was begun with the November completion of the gas separation plant in Rayong Province.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Antimony:					
Ore and concentrate:					
Gross weight	6,862	2,820	1,567	2,808	4,636
Metal content[e]	2,916	1,199	666	1,193	1,970
Metal, smelter	22	36	28	13	--
Columbium and tantalum ores and concentrates, gross weight:[2]					
Columbite	213	49	39	549	477
Tantalite	143				
Total	356	49	39	549	477
Struverite (mixed columbite-tantalite)	301	44	10	275	30
Iron and steel:					
Iron ore:					
Gross weight	84,966	62,472	26,750	40,304	60,670
Iron content	46,731	34,360	14,713	22,167	33,369
Metal:					
Pig iron	17,738	10,310	6,338	159	--
Ferroalloys:					
Ferromanganese	112	369	--	--	--
Ferrosilicon	60	280	--	--	--
Steel:					
Crude	450,000	300,000	312,158	243,900	380,971
Semimanufactures (selected):					
Bars	321,517	109,711	229,203	385,000	281,934
Galvanized iron sheets	129,342	151,620	126,890	123,679	132,455
Tinned plates	70,183	78,834	62,227	73,119	91,974
Lead:					
Mine output, metal content of 42.5% Pb concentrate	10,560	17,283	18,580	21,015	16,662
Metal: Ingot, secondary	1,667	548	929	3,174	6,198
Manganese ore:					
Chemical-grade, over 75% MnO_2	11	5	12	--	8
Battery- and chemical-grade, 75% MnO_2	3,996	5,205	3,398	4,804	6,110
Metallurgical-grade, 46% to 50% MnO_2	50,303	5,707	4,348	1,906	2,577
Total	54,310	10,917	7,758	6,710	8,695
Rare-earth metals:					
Monazite concentrate, gross weight	152	107	162	277	298
Xenotime	52	45	46	38	28

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS —Continued					
Tin:					
Mine output, metal content	33,685	31,474	26,109	19,943	21,960
Metal, smelter, primary	34,689	32,636	25,479	18,467	19,729
Titanium: Ilmenite concentrate, gross weight	--	37	18	205	148
Tungsten concentrate:					
Gross weight	3,134	2,348	1,661	1,092	1,439
Metal content	1,615	1,209	855	562	741
Zinc:					
Mine output, gross weight	--	--	--	--	147,993
Mine output, metal content	--	--	--	--	41,438
Metal, smelter, primary	--	--	--	--	[e]3,000
Zirconium ore and concentrate, gross weight	61	104	196	199	290
NONMETALS					
Barite	305,057	307,046	330,948	187,437	174,918
Cement, hydraulic thousand tons	5,337	6,263	6,609	7,263	8,240
Clays:					
Ball clay	1,557	1,856	2,200	4,960	2,520
Kaolin	19,934	14,086	17,846	36,350	58,616
Kaolinite (dickite)	5,020	7,450	--	--	--
Diatomite	1,982	128	80	425	471
Feldspar	24,158	24,243	19,326	47,908	74,404
Fluorspar:					
Crude mine output:					
High-grade	172,784	157,311	176,084	159,959	230,228
Low-grade	133,547	113,667	106,609	77,716	64,940
Total	306,331	270,978	282,693	237,675	295,168
Salable product:					
Acid-grade (beneficiated low-grade)	60,108	55,181	81,024	46,689	57,151
Metallurgical-grade	172,784	157,311	176,084	159,959	230,228
Total	232,892	212,492	257,108	206,648	287,379
Graphite	2,074	1,800	630	86	--
Gypsum	411,977	540,383	753,433	760,361	1,110,660
Phosphate rock, crude	5,570	2,610	4,265	5,158	3,075
Salt:					
Rock	16,744	11,000	11,100	5,679	9,850
Other[e]	165,000	165,000	165,000	165,000	165,000
Sand, silica	171,000	76,330	82,820	116,094	166,787
Stone:					
Calcite	360	2,325	1,020	1,871	1,272
Dolomite	8,130	7,510	9,662	7,927	10,364
Limestone for cement manufacture only thousand tons	3,958	5,486	6,371	8,936	9,223
Marble	5,649	8,016	9,311	26,428	37,927
Marl for cement manufacture only thousand tons	1,939	1,787	458	--	--
Quartz, not further described	7,828	20	7,531	15,159	20,687
Shale for cement manufacture only thousand tons	801	1,124	1,248	1,200	1,564
Talc and related materials:					
Pyrophyllite	10,350	10,370	19,989	18,875	26,851
Talc	1,376	1,665	2,009	1,273	1,628
MINERAL FUELS AND RELATED MATERIALS					
Coal: Lignite thousand tons	1,427	1,686	1,964	1,866	2,337
Natural gas (gross production) million standard cubic feet	--	--	47,036	56,762	85,506
Petroleum:					
Crude thousand 42-gallon barrels	[e]110	[e]100	[3]3,832	2,401	5,387
Natural gas condensate do	--	--	NA	2,379	3,008
Refinery products:					
Gasoline do	11,511	11,558	12,366	13,365	12,620
Jet fuel do	4,948	5,941	5,648	6,275	6,432
Kerosine do	1,794	2,293	2,277	2,725	1,539
Distillate fuel oil do	17,551	17,331	17,879	19,198	17,409
Residual fuel oil do	16,180	17,018	15,201	13,591	15,494
Liquefied petroleum gas do	1,536	1,730	1,255	1,434	1,541
Naphtha do	1,530	1,275	[e]1,300	[e]1,300	--
Asphalt do	727	854	[e]900	[e]900	--
Refinery fuel and losses and unspecified do	[e]1,670	[e]1,740	[e]1,710	[e]1,700	2,671
Total do	57,447	59,740	58,536	60,488	57,706

[e]Estimated. [p]Preliminary. NA Not available.
[1]Includes data available through July 23, 1985.
[2]Excludes columbium- and tantalum-bearing tin slags, which make Thailand the world's largest source of newly mined tantalum.
[3]Includes natural gas condensate.

TRADE

After 3 consecutive years of decline, Thai exports of minerals and metals (i.e. tin) increased slightly in 1984. Once Thailand's leading foreign exchange earner, tin now ranks ninth among exports. The value of tin exports declined 3% from that of 1983 to $233 million, mainly because of the fall in world tin prices. Significant increases in export volumes, however, were registered in unground barite, fluorite, and gypsum. Although the Government prohibits the export of tin concentrate, DMR estimated that up to 5,000 tons per year was smuggled out of the country, mainly to Singapore. This figure was not reflected in official trade statistics.[6]

Table 2.—Thailand: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	1,337	908	--	Japan 195; Malaysia 191; Nepal 185.
Antimony: Ore and concentrate	2,796	3,037	1,088	Republic of Korea 806; Brazil 439; Belgium-Luxembourg 294.
Columbium and tantalum: Ore and concentrate	93	125	28	West Germany 90.
Iron and steel: Metal:				
Scrap	r7,850	1,712	121	Japan 1,480.
Semimanufactures:				
Tubes, pipes, fittings	51,110	52,502	798	Singapore 14,399; Hong Kong 9,897; Saudi Arabia 6,911.
Unspecified	2,682	756	--	Italy 271; Laos 182; India 48.
Lead: Ore and concentrate	37,636	42,737	--	Japan 16,200; Netherlands 11,500; Belgium-Luxembourg 6,500.
Manganese: Ore and concentrate, metallurgical-grade	2,000	(2)	--	All to Belgium-Luxembourg.
Silver:				
Waste and sweepings troy ounces	--	8,038	--	All to Japan.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,007	3,304	2,307	West Germany 549.
Tin:				
Ore and concentrate	697	--		
Metal including alloys:				
Unwrought	25,542	18,876	7,303	Taiwan 5,951; Japan 3,981.
Semimanufactures kilograms	50	1,500	--	All to West Germany.
Tungsten: Ore and concentrate	1,462	1,207	433	Netherlands 308; West Germany 214; Japan 101.
Zinc: Metal including alloys, all forms	r972	153	(2)	Laos 133.
Other: Ashes and residues	2,525	2,819	1,492	United Kingdom 997; Mexico 200.
NONMETALS				
Barite and witherite	287,888	205,443	43,586	Indonesia 65,625; Saudi Arabia 51,750.
Cement	254,357	172,786	--	Malaysia 96,830; Bangladesh 27,933; Indonesia 19,006.
Diamond:				
Gem, not set or strung carats	61,554	49,115	1,130	Belgium-Luxembourg 17,942; Hong Kong 14,202.
Industrial stones do	1,130	--		
Unsorted do	2,879	373	--	All to Israel.
Diatomite and other infusorial earth	--	153	--	All to Singapore.
Feldspar	3,707	12,621	(2)	Taiwan 8,000; Malaysia 1,944; Singapore 1,776.
Fertilizer materials: Manufactured:				
Ammonia	1	4	--	All to Laos.
Nitrogenous	875	--		
Phosphatic	120	--		
Potassic	62	--		
Unspecified and mixed	469	431	--	Saudi Arabia 358; Brunei 55.
Fluorspar	182,388	183,002	4,400	Japan 89,744; U.S.S.R. 32,000; Taiwan 17,896.
Gypsum and plaster	377,148	491,127	--	Indonesia 143,950; Malaysia 140,219; Taiwan 94,550.
Precious and semiprecious stones other than diamond:				
Natural kilograms	144,298	103,502	2,024	Hong Kong 89,779; Japan 3,034.
Synthetic do	54	180	9	Republic of Korea 66; Kuwait 43; Switzerland 36.
Salt and brine	65,109	47,482	1	Malaysia 32,674; Singapore 14,471.

See footnotes at end of table.

Table 2.—Thailand: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	110	408	--	Bangladesh 300; Bahrain 69.
Worked	475	1,542	(2)	Bangladesh 1,301.
Dolomite, chiefly refractory-grade	5,160	6,993	--	Singapore 6,060.
Limestone other than dimension	2,713	3,471	--	Malaysia 2,251; Singapore 1,177.
Quartz and quartzite	12,759	13,604	--	Japan 11,000; Singapore 1,667.
Sand other than metal-bearing	623	1,721	--	Mainly to Malaysia.
Talc, steatite, soapstone, pyrophyllite	3,511	5,153	--	Sri Lanka 3,770; Philippines 1,200.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	480	--		
Carbon: Carbon black	4,973	2,251	--	Indonesia 750; Sri Lanka 664; India 387.
Petroleum refinery products:				
Kerosine and jet fuel 42-gallon barrels	428,541	88,443	--	NA.
Lubricants do	140,790	462,136	--	NA.
Unspecified do	10,747	3,141	--	Singapore 2,563.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 3.—Thailand: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals kilograms	16,950	12	4	West Germany 6.
Aluminum:				
Ore and concentrate	r285	3,557	--	Malaysia 2,750; China 807.
Oxides and hydroxides	11,851	11,409	46	Japan 7,116; China 3,877.
Metal including alloys, all forms	62,340	69,618	3,015	Canada 24,160; Australia 16,949; Bahrain 7,466.
Antimony:				
Ore and concentrate	--	776	--	All from Burma.
Metal including alloys, all forms	25	157	--	China 117.
Arsenic: Oxides and acids	289	139	--	China 69; West Germany 36.
Chromium:				
Ore and concentrate	47	108	--	Finland 72; Belgium-Luxembourg 36.
Oxides and hydroxides	334	339	37	West Germany 232.
Metal including alloys, all forms kilograms	455	13	--	Republic of Korea 12.
Cobalt:				
Oxides and hydroxides	5	8	(2)	Belgium-Luxembourg 4; Canada 3.
Metal including alloys, all forms kilograms	333	169	16	Japan 75; West Germany 50.
Copper:				
Sulfate	100	57	--	France 23; Taiwan 20.
Metal including alloys, all forms	24,722	28,802	72	Japan 14,607; Zambia 6,396; Taiwan 2,416.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	425,293	145,799	43,950	Singapore 92,388.
Iron and steel: Metal:				
Scrap	389,928	641,288	65,284	Taiwan 163,667; Republic of Korea 121,632; Canada 46,455.
Pig iron, cast iron, related materials	14,734	17,094	3	Japan 16,966.
Ferroalloys:				
Ferrochromium	34	240	--	U.S.S.R. 190.
Ferromanganese	2,973	4,017	--	Australia 1,843; Belgium-Luxembourg 1,047; Norway 496.
Ferrosilicomanganese	397	731	--	Taiwan 490; Austria 200.
Ferrosilicon	3,003	3,538	12	Norway 1,458; Yugoslavia 988; France 332.

See footnotes at end of table.

Table 3.—Thailand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Ferroalloys —Continued				
Unspecified	r202	2,143	7	Taiwan 1,233; Belgium-Luxembourg 458.
Steel, primary forms	457,537	521,217	(2)	Japan 123,864; Republic of Korea 84,356; Australia 47,646.
Semimanufactures thousand tons	1,185	1,495	18	Japan 1,138.
Lead:				
Oxides	483	436	--	Australia 372.
Metal including alloys, all forms	11,348	20,538	1,347	Australia 9,706; Burma 2,019; China 1,827.
Manganese:				
Ore and concentrate, chemical-grade	2,932	--		
Oxides	163	309	(2)	Japan 247; China 45.
Mercury 76-pound flasks	315	246	1	Netherlands 109; West Germany 74; Japan 34.
Nickel: Metal including alloys, all forms	2,444	949	13	Canada 398; West Germany 258; Norway 119.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	31,286	1,511	64	Japan 1,157.
Silver:				
Ore and concentrate[4]	54	1,133	--	Philippines 805; China 260.
Metal including alloys, unwrought and partly wrought troy ounces	417,991	384,169	17,522	Japan 157,185; West Germany 114,135; France 55,942.
Tin: Oxides kilograms	34,000	300	(2)	Mainly from Japan.
Titanium:				
Ore and concentrate	1,225	1,235	--	Australia 1,230.
Oxides	757	846	2	Japan 343; Belgium-Luxembourg 255.
Tungsten: Metal including alloys, all forms	2	5	(2)	Japan 3.
Zinc:				
Oxides	581	548	(2)	Japan 249; China 185; Taiwan 75.
Blue powder	50	52	--	Norway 28; Singapore 14.
Metal including alloys:				
Unwrought	33,857	36,258	151	Australia 23,809; Canada 5,548; Japan 2,266.
Semimanufactures	247	556	(2)	Japan 313; West Germany 111.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,345	2,492	37	Netherlands 1,573; India 683.
Artificial:				
Corundum	277	579	(2)	Japan 561.
Silicon carbide	611	331	(2)	China 131; West Germany 62; Switzerland 50.
Dust and powder of precious and semiprecious stones, including diamond kilograms	1,948	29	7	United Kingdom 10; Belgium-Luxembourg 7.
Grinding and polishing wheels and stones	1,697	2,512	22	Japan 986; Taiwan 518; China 182.
Asbestos, crude	54,332	55,967	7,844	Canada 22,436; Botswana 14,386; Zimbabwe 5,449.
Barite and witherite	5,000	1	--	All from West Germany.
Cement	883	11,065	NA	Japan 10,680.
Clays, crude	r9,394	15,253	3,717	Australia 3,598; China 3,511; United Kingdom 1,567.
Cryolite and chiolite kilograms	28,000	400	--	All from United Kingdom.
Diamond:				
Gem, not set or strung carats	r141,161	279,956	5,445	India 185,894; Belgium-Luxembourg 49,309; Hong Kong 22,527.
Industrial stones do	3,485	1,400	--	Belgium-Luxembourg 1,000; Zaire 400.
Unsorted do	818,056	250,769	30,394	India 98,076; Ghana 75,799; Belgium-Luxembourg 36,864.
Feldspar and nepheline syenite	2,252	1,512	--	Ghana 1,000; Finland 322; Japan 176.
Fertilizer materials: Manufactured:				
Ammonia	1,546	2,307	(2)	Japan 1,133; Taiwan 429; Indonesia 295.
Nitrogenous	311,643	506,493	56,280	Japan 161,042; West Germany 118,006; Republic of Korea 73,271.
Phosphatic	6,228	5,407	3,900	Netherlands 1,506.
Potassic	50,964	72,719	6,000	U.S.S.R. 30,405; West Germany 16,952; East Germany 9,971.
Unspecified and mixed	550,821	880,057	62,532	Republic of Korea 304,970; Romania 196,452; West Germany 97,139.

See footnotes at end of table.

Table 3.—Thailand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Fluorspar	681	1,783	22	India 998; Finland 611.
Graphite, natural	369	733	--	China 513; Republic of Korea 110; Taiwan 44.
Gypsum and plaster	581	661	81	Japan 283; West Germany 189; China 108.
Iodine kilograms	1,824	1,569	--	West Germany 516; Netherlands 400; Japan 350.
Magnesium compounds: Magnesite	2,880	6,470	--	China 3,542; Japan 2,409.
Mica, all forms	127	212	3	Japan 82; Taiwan 59; India 49.
Pigments, mineral: Iron oxides and hydroxides, processed	1,694	2,607	17	West Germany 1,710; Japan 403; United Kingdom 129.
Precious and semiprecious stones other than diamond:				
Natural kilograms	279,073	166,418	8,840	Burma 110,749; Australia 23,836; Sri Lanka 3,772.
Synthetic do	14,081	16,097	6,213	Switzerland 3,561; Taiwan 1,822; France 1,777.
Salt and brine	45,168	21,149	11	Australia 20,718.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	58,079	81,985	30,936	Romania 30,023; Kenya 12,200; East Germany 3,293.
Sulfate, manufactured	14,736	20,023	3,987	China 6,709; West Germany 4,519; Finland 2,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	66,171	6,880	--	Italy 6,204.
Worked	1,060	1,048	(2)	Italy 949.
Sand other than metal-bearing	71	310	54	Norway 144; Hong Kong 100.
Sulfur:				
Elemental, crude including native and byproduct	31,742	30,991	6,126	Canada 14,839; Singapore 9,574.
Sulfuric acid	6,053	16,895	1	Philippines 8,990; Japan 7,839.
Talc, steatite, soapstone, pyrophyllite	13,931	19,159	62	Republic of Korea 10,389; China 8,624.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	4,308	4,531	42	China 2,867; Taiwan 613; Japan 316.
Coal: All grades including briquets	107,436	117,581	NA	Australia 95,673; Indonesia 17,903.
Coke and semicoke	52,315	51,573	15	China 24,999; Japan 23,912.
Petroleum:				
Crude thousand 42-gallon barrels	46,789	48,901	--	Saudi Arabia 25,041; Malaysia 12,296; Brunei 3,913.
Partly refined do	7,277	6,112	--	Mainly from Saudi Arabia.
Refinery products do	16,196	13,922	237	Singapore 8,477; Saudi Arabia 2,202.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Excludes unreported quantity valued at $9,600.
[4]May include other precious metals.

COMMODITY REVIEW

METALS

Copper.—Exploration by DMR in the Khao Loan hills, Nong Khai Province, has revealed ancient copper workings with former mine workings up to 20 meters deep. Twelve sites were sampled and reportedly indicated a large deposit of potentially commercial grade.[7] Thailand has not been a commercial producer of copper ore.

Gold.—Thailand's first commercial gold mining since 1941 has been authorized by the Government. Two gold exploration and mining concessions were awarded to Aokham Thai Ltd., a company engaged in offshore tin dredging. The concession areas include an abandoned underground working at Toh Moh in Narathiwat Province near the Malaysian border and the old Kabinburi underground mine in Prachin Buri Province 140 kilometers east of Bangkok.

It was planned to form a new company

called Masphum Co. Ltd., which will be composed of mainly Thai private and Government holdings plus a 30% interest by the Malaysian company Aokham Tin Bhd. The company proposes a $3 million exploration and development program at the sites. Planned output would be about 900 kilograms of gold per year.[8]

Tantalum and Columbium.—Construction of the Thailand Tantalum Industry Co. Ltd.'s (TTIC) tin slag processing plant, begun in June 1982, has yet to be completed. TTIC reportedly stopped construction late in 1984, because world prices and demand for tantalum oxide were not adequate to ensure a profitable return. Another complicating factor was that, at the current level of tin metal production in Thailand, the amount of domestic tin slag available would have been insufficient to run the plant at full capacity. TTIC and the Government were considering the possibility of importing tin slag if supplies in Thailand are inadequate. Under the present circumstances, the tantalum plant was not expected to be operational before 1986.

Tin.—Foreign and domestic politics and economic policies appeared to be more influential to the tin sector this year than any tangible developments in tin mining or processing. The overriding problem was a world surplus of tin metal and how best to equitably resolve it. A world decline in tin consumption, which began in the early 1980's and continued through 1984, has complicated an already delicate situation. The International Tin Council (ITC) adopted production controls in 1982 for each of its members, with Thailand's production cutback on the order of 40%. The burden of this reduced production quota fell most heavily on the small-scale legitimate mine operators.

The Thai miners' feelings about the situation have been strong and vocal during the year. The tin mining industry council, or council of mines, an organization of private mining companies, has urged the Government to withdraw from the International Tin Agreement and remove the tin export controls. Also under fire by the miners was the Government's high tin royalty or taxing system, reported to be five times the Malaysian rate.[9] The high tax and export quotas have led to an exacerbation of the chronically serious smuggling problem. Government sources estimate 5,000 tons of tin concentrate was smuggled out of the country in 1984. Other sources state the amount was much higher. Thai and other Governments started countermeasures with some success. The Government's position remained firm in staying with the ITC agreement. It felt that the long-term benefits of the stable market outweigh any short term benefits of dropping from the agreement. It felt that uncontrolled Thai production would so increase the world tin glut that prices could fall as much as 50%. This would in turn close more than 300 Thai mining operations, employing about 10,000 miners. The considerable amounts of smuggled tin entering the market also add to the world surplus, estimated to be about 70,000 tons out of a total world market of 180,000 tons. One of the Thai Government's efforts to help the beleaguered miners has been to suspend the issuance of any new tin mining licenses or concessions. The Ministry of Industry has also reduced some fees and operational charges to aid the miners.

Billiton Thailand Ltd., which operates an offshore dredge under contract to the Government's Offshore Mining Organization, suspended its operation for several weeks in October and November because of continuing financial losses owing to the quota restrictions. The company stated it could not operate profitably at less than 700 tons per year. Its tin quota was then reviewed by the DMR, under pressure from the miners' union, and raised to 230 tons for the first quarter of 1985 in order to keep the operation going a few months longer.

Billiton's Thailand Smelting and Refining Co. Ltd. (Thaisarco) tin smelter was also losing heavily and in danger of closing if the tin situation didn't change soon. Thaisarco must purchase tin concentrate at the prevailing Kuala Lumpur Tin Market price while 80% of its tin was sold at the effectively lower London Metal Exchange price. In effect, Thaisarco subsidized the tin miners to the amount of $6 million during 1984. The issue of changes in the tin sector is very sensitive politically, and there was no clear cut solution in sight at yearend.

The results of the offshore tin surveys conducted in deep water during the past 2 years were reported to be "very satisfying." A large potentially economic tin deposit was reported 35 kilometers off the Phangnga-Phuket coast in 61 meters of water. Recovery of alluvial tin at that depth and distance from the shore would require entirely new equipment and some very sophisticated technology.[10]

Zinc.—Production began at the Mae Sot

Mine early in the year in order to stockpile ore for the opening of the Tak refinery in November. The mine was designed to produce 350,000 wet tons of high-grade silicate-oxide ore during an 8- to 9-month mining season. The surface mine will not be operated during the June to September rainy season.

Construction of the 60,000-ton-per-year refinery was completed in November and trial runs began at that time. A ruling by environmental authorities caused concern but no delay in startup trials. Possible cadmium contamination of the plant effluent will require construction of an additional waste water treatment circuit at a cost of about $900,000. During the first year of operation, Padaeng Industry Co. planned to operate the plant at 80% of rated capacity. The refinery used a sophisticated hot acid leach system to produce a zinc sulfate solution, which is filtered to remove the main insoluble impurities. Small amounts of dissolved arsenic, cadmium, copper, nickel, and tin are then removed from solution by cementation. The zinc sulfate solution then goes to a highly automated electrolytic cell house where the zinc metal is deposited on aluminum cathodes. Zinc is stripped, melted, and cast into ingots for shipping. Most of the production will be used domestically.[11]

Other Metals.—The DMR's canvass of the old tin mine tailings and waste piles continued in 1984. Another 343 mines in 20 Provinces were canvassed but the results were not published. The 1983 survey recorded about 35,000 tons of monazite at 222 tin mine waste dumps and in the remaining tin reserves. Monazite contains thorium and rare-earth elements.

NONMETALS

Cement.—Overall capacity remained at about 9 million tons per year after a precipitous rise from 5.7 million tons in 1980. Three new plants, however, were apparently under construction. A new company in cement production, Union Thai Cement Industry Ltd., plans to complete a 3,000-ton-per-day plant in Kok Samrong District in Lop Buri in mid-1986. Output will be primarily for export. Siam Cement Co. Ltd. was working on a new 4,000-ton-per-day kiln at its plant in Kaeng Khoi District in Saraburi. Startup was scheduled for late 1986. Siam City Cement Co. Ltd. was also to build a 4,000-ton-per-day plant in Kaeng Khoi District for operation in 1987. Construction was believed to have started in 1984. Completion of these three projects would raise capacity to 13.6 million tons per year. Consumption increased rapidly in 1983 and 1984 as a result of a recovery in construction. Even so, a significant amount of cement should be available for export during the next few years. Fierce price competition is expected to be encountered, however, from Japan, the Republic of Korea, and Taiwan.

Fertilizer Materials.—*Nitrogenous.*—In March, National Fertilizer Corp. Ltd. (NFC) eliminated 24 of the 37 international construction companies that were interested in bidding on the fertilizer complex. Bids from the remaining 13 were submitted in early July for the long-proposed nitrogen-phosphorus-potassium fertilizer complex in Mab Ta Pud in Rayong Province. Surprisingly low bids were received for the complex, and it appeared that all was going smoothly for a mid-1985 start of construction. Late in the year, however, problems relating to the financing and ownership of the project were encountered. Government loan guarantees were not available to NFC under its 55% Thai private and 45% Thai Government ownership. As a result, the already negotiated loans from overseas lenders were jeopardized. It was then reported that a meeting of Thai Economic Ministers decided to change NFC to 100% Government ownership. Restructuring of the company would extend well into 1985. It was unclear if a new board of directors would proceed with the submitted bids or call for new submissions.[12] In either case, construction of what was to be the largest single industrial project in Thailand was not likely to be started in 1985. Thailand will therefore continue to be wholly dependent on expensive imports for all of its fertilizer needs for at least several more years.

Potash.—The DMR'S flooded carnallite mine at Bamnet Narong in Chaiyaphum Province may get a new start in 1985. A new feasibility study showed that the underground flooding could be circumvented by starting at another site and sinking a concrete-lined vertical shaft. Final approval by the Government depends heavily on the financing arrangements and whether another International Bank for Reconstruction and Development loan would be approved for the new shaft.

If the carnallite can be economically mined and processed into potassium fertilizer, it will open up large deposits on the

Khorat Plateau to commercial exploitation. The Bamnet Narong Mine could also supply salt as a byproduct to the proposed Association of South East Asian Nations (ASEAN) soda ash project.

After years of planning and negotiating, there has been some progress toward mining the higher grade but less extensive deposits of sylvite on the Khorat Plateau. The Thai Government signed its first concession for the detailed exploration and development of the sylvite deposits in September with Thai Potash Co. Ltd. The company consists of Duval Corp. (United States, 35%), CRA Exploration Pty. Ltd. (Australia, 35%), Siam Cement (Thailand, 20%), and the Thai Government (10%). Thai Potash is committed to spend $3 million for exploration over the next 5 years in a 3,500-square-kilometer area in Khon Kaen and Maha Sarakham Provinces.

The Government approved the granting of concession rights to Agrico Potash Co. Ltd. in September, but it was not known if a contract was signed at that time. The company consists of Agrico Chemical Co. (United States, 50%), Thai Central Chemical Co. Ltd. (Thailand, 40%), and the Ministry of Finance (Thai Government, 10%). Agrico Potash's concession is a 2,333-square-kilometer area of Udon Thani Province. If the detailed exploration program shows that the deposits can be developed economically, then the companies have production rights for 25 years, subject to a complicated set of regulations and conditions.

A third consortium, Khorat Potash Co. Ltd., led by AMAX Exploration Inc. of the United States, was supposed to sign a contract in December, but the arrangement fell through at the last minute, and AMAX was reportedly banned from further consideration. The Government then called for new bids on the 144-square-kilometer area in Sakon Makhon Province.[13]

Salt.—The on again, off again ASEAN salt mine and soda ash project was considered again during the year. First proposed in 1976, the project has been a continuing problem, both economically and politically since its inception. In 1983, the project was shelved by the Minister of Industry, ostensibly because of lack of support from the other ASEAN countries. The newly revised plan called for a scaled down output of 300,000 tons per year of soda ash rather than the 400,000 tons or more originally proposed. The reduced size of the project would also lower the construction cost by $100 million to about $267 million. The plant would be built near the deepwater Port of Sattahip.

Thick salt beds underlie vast areas of the Khorat Plateau, but the site of the salt mine has not been finalized. One possibility was to mine the salt at DMR's experimental carnallite mine at Bamnet Narong. (See "Fertilizer Materials—Potash.") The final decision on the soda ash project was pending at yearend.

Other Nonmetals.—A Thai- and Philippine-owned company, Swan Marble Co. Ltd., has applied for permission to set up a marble quarry and marble tile finishing plant. The mine would be in Amphoe Prankrathai, which is probably in Kamphaeng Phet Province. The company planned to produce annually 30,000 square meters of marble and 18,000 square meters of marble tiles.

The ASEAN council has approved plans for a joint Thai-Indonesian (60%-40%) feldspar mining project in Tak Province. The $2 million project would be operated by the Pacific Impex Co. Ltd. of Thailand and P.T. Ansardaya Co. of Indonesia. Plans call for a flotation plant that would produce 27,000 tons of potassium feldspar and 10,000 tons of quartz from a mine output of 60,000 tons per year. The output would be mainly for the Thai glass and ceramics industry but about 25% would be exported to Indonesia and Malaysia, both ASEAN members.

MINERAL FUELS

Coal and Lignite.—The Government continued to encourage the use of lignite as a substitute for expensive imported fuel oil. The electric powerplants at Krabi, Lampang, and Mae Moh, are by far the major consumers. Private industrial plants, however, were reporting favorable results from switching to lignite. Locally produced lignite costs about one quarter that of fuel oil per British thermal unit of energy. Even after the cost of switching boilers to handle the solid fuel, local food processing and textile plants reported energy savings of 30% to 60%. Four private companies produced lignite in addition to the big Government electric power complexes.

Lignite consumption by private industry was expected to increase steadily in the next few years. Exploratory drilling by DMR during 1984 delineated an additional 16 million tons of probable reserves in the Krabi area. More drilling was planned in other areas.

The first lignite production line for Electricity Generating Authority of Thailand's new powerplant at Mae Moh was put into operation after midyear. A performance test of the semimobile crushing plant reportedly handled well over the guaranteed throughput of 1,200 cubic meters per hour. Output from the mine and crusher will be moved by conveyor belt to the new powerplant. The second lignite production line was under construction.[14]

Petroleum and Natural Gas.—The natural gas situation has gone from a controversy involving insufficient supply in 1983 to the potential problem of oversupply by mid-1985. Major developments during 1984 were the trial startup of two new offshore gasfields, the continuing exploration and development of onshore oil and gas reserves, and the completion of a $200 million gas separation plant at Mab Ta Pud in Rayong Province. The plant is designed to produce 450,000 tons of LPG, 350,000 tons of ethane, and 64,000 tons of natural gasoline per year.

Offshore, platform construction and both developmental and exploration drilling continued at a brisk pace, with 17 wells being sunk and 13 of them hitting natural gas. No crude oil was struck in commercial quantities. By yearend, Union Oil Co. of Thailand, currently the only offshore producer, had 31 platforms, 300 kilometers of pipeline, and a floating-storage tanker operating in the Gulf of Thailand. At yearend, Union Oil began production testing from two new gasfields—Platong and Satun. Satun Gasfield was to go on-line in January 1985, and Platong Gasfield, a few weeks later. The overall capacity of Union Oil's offshore fields will be about 450 million cubic feet per day when the new fields reach design capacity. Union Oil has spent about $2 billion on exploration and development of its Gulf of Thailand concessions.

Development of Texas Pacific (Thailand) Inc.'s (TP) B-structure Gasfield farther south in the Gulf of Thailand was still stymied after 7 years of discussion, because of the inability of TP and the Petroleum Authority of Thailand (PTT) to agree on a pricing structure for the huge gas reserves. Needing to recover some of its large exploration investment, TP offered to sell its concessions back to PTT if the price was fair. PTT has been looking into the possibility of developing the field with the idea of liquefying and exporting the natural gas. Several Japanese companies were interested in setting up a joint venture with the Thai interests. The first order of business would be a detailed feasibility study on this extremely expensive proposal.

Exploration continued both onshore and offshore as more than a dozen foreign firms or partnerships were operating in the country. New blocks were opened for bidding and at least a dozen operators participated during the year. Awards of three blocks were to be announced early in 1985. Production sharing contracts were offered for the onshore tracts, while concessions were offered for the offshore acreage.

Onshore, Thai Shell Exploration and Production Co. Ltd. drilled 23 holes during the year. Some were developmental wells at the Sirikit Oilfield and others were exploration wells in other geologic structures.

A small discovery about 3 kilometers west of the Sirikit Field was being developed as the Sirikit West Oilfield. Planned output would only be 1,200 to 1,500 barrels per day, not an economically justifiable flow if it was not in close proximity to the main oilfield. Thai Shell wells drilled in the Mae Nam Nan area of Uttaradit Province were promising for oil. Additional work would be needed in 1985 to determine the area's production feasibility.

In addition to the Thai Shell wells, North Central International Inc., Esso Udon Inc., Esso Exploration and Production Khorat Inc., and Esso Sakon Inc. in conjunction with Phillips Petroleum Co. Thailand all drilled one or more wells during 1984. North Central's first well was an oil discovery about 9 kilometers northwest of Thai Shell's Sirikit Oilfield. A development well was planned for 1985. Esso Khorat's gas discovery in Khon Kaen Province has the potential to supply gas to the northeast region. Exploration costs in this remote area were more than double the offshore drilling costs. Development of the field, therefore, would depend on the pricing structure negotiated with PTT.

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[1]Physical scientist, Division of International Minerals.
[2]During 1984, the Thai baht (B) was devalued against the dollar. Values ranged from B23.0=US$1.00 to B27.15=US$1.00. B23.639=US$1.00 was the yearly average.
[3]U.S. Embassy, Bangkok, Thailand. State Dep. Telegram 25142, May 1985.
[4]Bank of Thailand, Department of Economic Research. Thailand: Economic Conditions in 1984 and the Outlook for 1985. P. 23.
[5]The less than 500-barrel-per-day Fang Oilfield has been operated by the Thai military for many years.
[6]Work cited in footnote 3.
[7]Mining Journal (London). V. 304, No. 7805, Mar. 22, 1985, p. 198.
[8]Engineering and Mining Journal. V. 185, No. 12, pp. 11, 75.
[9]The Nation Review (Bangkok). Nov. 2, 1984, p. 19.
[10]Bangkok NAEO NA in Thai. June 8, 1984, p. 9.
[11]Business in Thailand. V. 16, No. 1, p. 24.
[12]Fertilizer International. No. 194/5, Jan. 31, 1985, p. 7.
[13]Mining Journal (London). V. 304, No. 7796, Jan. 18, 1985, p. 37.
[14]International Mining. V. 1, No. 11, p. 8.

The Mineral Industry of Tunisia

By Kevin Connor[1]

Performance within the minerals sector was mixed during 1984. Crude petroleum, Tunisia's most valuable mineral commodity, was down slightly from the production levels of 1983, but was above the Government's expectations. Production of steel and cement construction products was up for the year, while mining output for all minerals except fluorspar was down. The phosphate-based fertilizer industry showed an overall downturn in production. However, owing to increases in fertilizer prices and to the strength of the dollar in which phosphates were internationally traded, there was a healthy surge in export receipts. Antiquated equipment and exhaustion of deposits continued to plague the iron ore and lead-zinc mining operations within the country. The country's growth in overall gross national product was estimated at 5.0% for the year.

Negotiations were completed by yearend for a tri-party Tunisio-Sino-Kuwait agreement for the construction of a chemical fertilizer plant in China. The facility would use technology developed by Société Industrielle d'Acide Phosphorique et d'Engrais (SIAPE) of Tunisia to produce diammonium phosphate (DAP) from Chinese ammonia and Tunisian phosphoric acid. All three countries would contribute financially to the proposed project. SIAPE was to construct the plant complex, which upon completion would have a manufacturing capacity of 480,000 tons per year of DAP. Estimated cost of the project was $50 million. China would be the second foreign country to utilize Tunisian DAP manufacturing technology, which was already being applied in Turkey. In trade-exchange for supplying the phosphoric acid feedstock, Tunisia was to receive wheat and cotton from China.

PRODUCTION AND TRADE

Output of all minerals except fluorspar was down slightly to moderately for 1984. Phosphate rock production was below the record-high production of 1983 by 10%, although the 1984 total was still well above that of 1982. The fertilizer sector had mixed results. Production of monoammonium phosphate and triple superphosphate (TSP) were up moderately, while declines were recorded for production of phosphoric acid, DAP, and dicalcium phosphate (DCP). Export prices and the strength of the dollar internationally resulted in a brighter trade picture as receipts for fertilizers exported increased almost 7% over 1983 levels. Overall output of petroleum was down a slight 1.2% from that of 1983, with decreases of 7% and 14% registered for the offshore Ashtart and Tazerka Fields, respectively. The El Borma onshore field continued to surprise the experts with an increase in production of approximately 1% for 1984. Crude oil exports were down 2%, but again the strength of the dollar resulted in a 9.2% increase in equivalent Tunisian dinars over petroleum trade receipts in 1983. Natural gas production was down slightly from 1983, but the total gas available for consumption was more than double the production level, as Tunisia began receiving Algerian royalty gas from the Transmed pipeline in August. Owing to antiquated equipment and exhaustion of economic deposits, output of iron ore, lead and zinc concentrates and barite were down between 6% to 16%. Drawn steel products were down 7%, but the remaining steel subsectors—castings, rolled products, and steel structures—all showed moderate growth. Along with the increased demand for industrial steel goods, a strong demand for cement surged domestic sales up 11% over 1983 levels. Chalk and plaster production was at the same level as in 1983.[2]

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	389	396	275	316	300
Metal:					
Pig iron do.	151	160	[e]100	[e]150	150
Steel, crude do.	178	178	[e]110	[e]165	165
Lead:					
Mine output, metal content	8,310	5,661	4,988	4,570	4,500
Metal:					
Primary[3]	19,195	17,530	15,320	10,398	10,000
Secondary[e]	600	500	500	500	500
Total	19,795	18,030	15,820	10,898	10,500
Silver metal, primary thousand troy ounces	235	84	115	90	85
Zinc, mine output, metal content	7,579	7,458	7,088	7,700	7,500
NONMETALS					
Barite	26,949	24,671	30,654	20,250	20,000
Cement, hydraulic thousand tons	[r]1,755	2,020	1,783	2,519	2,500
Clays, construction do.	300	352	[e]350	[e]350	350
Fluorspar, chemical- and metallurgical-grade	39,451	34,844	33,209	34,013	40,000
Gypsum[e]	75,000	75,000	75,000	85,000	80,000
Lime thousand tons	529	466	[r] [e]500	580	550
Phosphate rock, gross weight do.	4,582	[r]4,596	4,196	5,924	[4]5,346
Salt, marine do.	437	467	421	375	350
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross[e] million cubic feet	28,000	28,000	28,000	[r]28,000	28,000
Marketed do.	12,700	13,703	14,883	14,503	14,000
Petroleum:					
Crude thousand 42-gallon barrels	43,100	41,600	39,324	42,649	42,000
Refinery products:					
Gasoline do.	1,085	1,391	1,498	1,546	1,500
Kerosine do.	1,684	1,837	2,277	2,085	2,000
Distillate fuel oil do.	3,016	3,156	3,025	2,988	3,000
Residual fuel oil do.	4,099	4,380	3,545	3,937	4,000
Other do.	325	414	445	460	400
Refinery fuel and losses do.	652	1,336	197	235	200
Total do.	10,861	12,514	10,987	11,251	11,100

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 10, 1985.
[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. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[3]From domestic and imported ores.
[4]Reported figure.

COMMODITY REVIEW

NONMETALS

Cement.—Société des Ciments de Jebel Oust began work on building a new cement plant at Tadjerouine, approximately 200 kilometers southwest of Tunis. The turnkey project was to be a complete grinding and bagging operation with product capacity of 400,000 tons per year. Société Tuniso-Algerienne de Ciment Blanc was planning for the construction of a 200,000-ton-per-year white cement plant to be located at Feriana near the Algerian border. This would be the first industrial common project between the two countries, with production from the plant being used for domestic needs in both countries. Construction on the plant was expected to begin in 1985 and to be completed by yearend 1987. Creusot Loire Entreprises Groupe Technip of France was managing the project.

Fertilizer Materials.—A contract for construction of a new phosphoric acid plant complex on behalf of SIAPE was awarded to Spie Batignolles S.B. of France during March. Valued at $101 million, the contract agreement was signed by appropriate party representatives in Tunis on July 5. Heurtey Industries, also of France, was subcontracted to carry out design and engineering work. The plant, SIAPE-2, was to be built at La Skhira on the Gulf of Gabès, approximately 300 kilometers south of Tunis. The plant complex was to be comprised of two 550-ton-per-day phosphoric acid lines, two 1,750-ton-per-day sulfuric acid lines, and one 1,000-ton-per-day concentrated phosphoric acid line. The phosphoric acid lines were to incorporate a SIAPE process, the sulfuric acid lines were to use the Monsanto Envirochem process, and the concentrated phosphoric line was designed to use Whiting Corp.'s Swenson technology. Construction time for the facility was estimated at 2 years, with production capacity upon completion of 330,000 tons per year of superphosphoric acid. Phosphate rock feedstock was to come from the Gafsa area. Also to be built as part of the project were desalination units, a seawater pipeline, and an electrical powerplant. The contract with the French companies was believed to contain a significant counter trade element, with payment in Tunisian agricultural products, textiles, and phosphates. In 1984, SIAPE was a joint venture company owned 51% by the Tunisian Government and 49% by the Kuwait Petroleum Corp., which acquired its equity in December of 1983.

Industries Chimiques de Gafsa started up its new phosphate fertilizer facility at M'dilla at yearend 1984. Located just 12 kilometers from phosphate mines in the Gafsa Basin, the complex consists of a 495,000-ton-per-year sulfuric acid unit, a 158,000-ton-per-year P_2O_5 phosphoric acid plant, and two 95,000-ton-per-year P_2O_5 granular TSP facilities. The plant was expected to be fully operational early in 1985.

Early in 1984, Compagnie des Phosphates de Gafsa awarded a contract to Brazil's Paulo Abib Engenharia S.A. for the development of a technique for concentrating low-grade carbonate phosphate ore from the underground mines of Moulares, Redeyef, and H'Rata. The project work was to first involve laboratory analyses of the various ores, followed by laboratory-scale pilot tests, and then final analysis and selection of the most suitable concentration process.

During midyear, the International Bank for Reconstruction and Development made a loan of $13.6 million to the Government of Tunisia for financing further engineering and cost studies for both phosphate mining modernization and expansion plans, and for the mining of potassium in the southern part of the country at the Sebkha el Melah potassium sulfate deposits. A feasibility study for developing the potassium sulfate brine deposits near Zaris was completed by PEC Engineering and Spie Batignolles of France during the latter half of 1984. By yearend, the government agency, Société de Developpement des Industries Chimiques du Sud, was developing the technical scope of the project and cost guidelines for the requested tenders. Related to the project were plans for building a new commercial port at Zaris through which potassium exports would be handled. A contract to construct the port was awarded to Dragos y Construcciónes of Spain late in the year. Project work was to include 11.5 million cubic meters of dredging, 1.9 million cubic meters of earthfill, construction of breakwaters and quays, installation of 6,900 tons of steel piling, and laying of 10,500 cubic meters of concrete.

MINERAL FUELS

Natural Gas.—On June 28, 1984, the Société Tunisienne de l'Électricité et du Gaz (STEG) and the National Oil Distribution Co. signed a contract with two subsidiary companies of Combustion Engineering Inc. of Paris, France, for the construction of a liquefied petroleum gas (LPG) recovery system for El Borma Oilfield in central Tunisia. In the past, condensates from the Borma Field have been flared off. The two contract awardees were Lummus Crest Snarl of Paris, and C-E Randall Co. of Houston, TX. The project was to consist of a fractionating unit with stockpiling and bottling in Gabès, and a gas compression unit at El Borma. The finished facility was to process 24 million cubic feet per day of gas and produce 236,000 gallons per day of LPG, mainly propane, butane, and gasoline. Lummus Crest Snarl and C-E Randall were responsible for the designing, construction, and implementation of the units, as well as training of operator personnel. Completion of the project was scheduled for early spring of 1986. Estimated cost was $20 million.

In conjunction with the Borma-Gabès LPG recovery project, a contract for 300 kilometers of pipeline necessary to connect the compression unit at El Borma to the condensate processing unit at Gabès was awarded in late October by STEG to Bouchammaoui Petroleum Activities Co. (BAP) of Tunisia. STEG also awarded two other pipeline contracts to BAP at the same signing ceremonies. These involved laying 5 kilometers of pipeline to supply the Rades thermal electric power station with Algerian natural gas and 15 kilometers of pipeline to supply the Jebel Oust cement plant with natural gas. Total estimated cost of the three pipeline contracts was $9 million.[3]

Petroleum.—Pennzoil Co. of the United States announced in October that a subsidiary, Pennzoil Tunisia Inc., began drilling operations on its first exploration well in the Didon-Elyssa permit area offshore of southeast Tunisia in the Gulf of Gabès. The wildcat well, identified as Selim No. 1, was spudded in approximately 70 meters of water about 75 kilometers off the coast. Plans for the well called for drilling to a depth of 3,530 meters to test the Eocene El Gueria and Cretaceous formations.

On November 7, 1984, Tunisia's Entreprise Tunisienne des Activities Petroliers (ETAP) awarded two petroleum prospecting permits to the Springfield Oil Co. of the United States. The negotiated areas were 1,920 square kilometers in the Cap Bon area, offshore 60 kilometers southeast of Tunis, and 4,632 square kilometers onshore near Makhtar, 160 kilometers southwest of Tunis. Under the agreements, exploration activities would cover an initial period of 4 years, and a minimum expenditure of $5.5 million was to be committed for each permit area. Springfield Oil was required to finance all activities at its own risk. In the event of a commercial discovery, ETAP would hold a 55% share of ownership in production operations, while Springfield Oil would control the remaining 45%. This project would be Springfield Oil's first petroleum prospecting activity in Africa.

Natomas Petroleum Tunisia Inc., a subsidiary of the Diamond Shamrock Corp. of the United States, conducted seismic exploration surveys during the year on their 1.1-million-acre Gabès Meridional concession, located in Tunisian offshore waters just north and east of the island of Djerba. Under the contract agreement that Natomas had negotiated with the Ministry of National Economy in late 1983, the U.S. company was committed to drill two wells within a 3-year period, and in the event of a commercial discovery, ETAP was to have 55% ownership and pay any further development costs. At Isis, another offshore area located about 150 kilometers southwest of Sfax, Global Marine Drilling Co. began drilling activities on behalf of the concession partners, Compagnie Française des Pétroles (CFP), Shell Oil Co. (United States), Azienda Generali Italiana Petroli S.p.A., and ETAP. The Isis Field was discovered in 1974, but has awaited development owing to a demarcation dispute with Libya. CFP was the major partner with 40% ownership in the concession. The other concession partners each had a 20% share at yearend 1984.

Work that began on the Skhira oil products storage terminal at the end of 1983 continued throughout the year. Paktank Mediterranee, a subsidiary of Paktank Europa of the Netherlands, was handling the $25 to $30 million first-phase project located on the Gulf of Gabès. The terminal was to have a storage capacity of 300,000 cubic meters upon completion of the first phase in 1985. Two followup phases were to increase the capacity of the depot to 500,000, then 1,000,000 cubic meters. The Government's plan was for La Skhira to become a main distribution center for petroleum products headed for European markets from the gulf area. The first facilities to be built were to be used for storing heavy fuel oil, gas oil, kerosine, and naphtha. The second phase was to add 200,000 cubic meters of storage for methanol and various other petrochemicals.

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[1]Physical scientist, Division of International Minerals.

[2]U.S. Embassy, Tunis, Tunisia. Third Quarter Economic Performance: More of Same. State Dep. Telegram 9533, Dec. 3, 1984.

[3]Where necessary, values have converted from Tunisian dinars (D) to U.S. dollars at the rate of D0.78=US$1.00.

The Mineral Industry of Turkey

By George J. Coakley[1] and Kevin Connor[1]

In a region dominated by fossil fuel production, Turkey possessed the largest nonfuel minerals industry in the Middle East. The mineral industry produced over 45 nonfuel minerals along with coal, natural gas, and petroleum. A world class producer of several of these minerals, Turkey ranked second in boron, producing about one-third of the world's supply. It ranked among the top three miners of strontium ore with an estimated 26% of world output in 1984. As the world's fourth largest producer of chromite, Turkey was responsible for 6% of the total supply of this material. It also ranked sixth in the world as a producer of natural sodium sulfate, although 56% of the world's consumption of sodium sulfate compounds was from synthetic sources.

Pushed by a Government policy that encouraged increased mineral exports and by a gradual reprivatization of some of the mining sector, mineral production in 1984 increased significantly. However, production failed to meet domestic demand for many commodities and capacity underutilization continued to be a problem.

Government Policies and Programs.— The new Turkish Government placed emphasis on two main policy areas in 1984. The first was to restore and promote private ownership and investment in the mining sector, and the second was to reduce high fuel import costs by promoting energy conservation and the priority development of domestic energy sources.

Between mid-1983 and late 1984, the Government reduced the number of the large State Economic Enterprises (SEE) from 43 to 21 and encouraged cooperative joint venture projects with the private sector. This reduction was created by the implementation of the decree law of December 28, 1983, which supplemented the Foreign Investment Law No. 6224 of 1954. The changes were designed both to encourage more competition between the SEE and to attract foreign investors. The passing of Decree Law 30 in July 1984 also helped streamline the foreign investment procedures. The Foreign Investment Department can now authorize any investment up to $50 million[2], with projects larger than $50 million requiring approval of the council of ministers. New trade and investment incentives included guarantees to allow capital and profit repatriation; exemption of duties and taxes on imported machinery and equipment; and the deduction of up to 100% of investment allowances and 20% of export earnings from corporate taxes. Also, foreign companies may wholly own subsidiaries with minimum equity requirements dependent on the nature and location of the industry. By yearend 1984, about 267 foreign companies had been given approval for $1.2 billion in foreign investments within the economy.

In the latter half of the year, the Ministry of Energy and Natural Resources proposed 16 amendments to the Government's mining codes that, if passed, would completely restore ownership of mines nationalized by the 1979 law to their former owners.

In the energy sector, the Government was seeking over $5 billion in investments to build a number of large thermal and hydroelectric power projects to reduce its dependency on imports, which currently accounted for 75% of Turkey's energy needs. Only 11% of the estimated potential hydroelectric capacity of 100,000 million kilowatt hours had been tapped. By yearend, four major hydroelectric schemes, Kayraktepek, Sir, Duzkeme-Berked, and Ataturk, totaling 3,263 megawatts were in the tender stage or being built.

In addition to plans to develop 2,100 megawatts of geothermal power by the year 2000, a $1.5 billion program has been set up to quadruple Turkey's lignite and hard coal mine production for use for domestic heating and in several new planned coal-fired thermal powerplants.

PRODUCTION AND TRADE

Changes in Government policy toward the mineral industries during 1983 and 1984 were beginning to show a positive impact on mineral production in 1984. The return of many mines to the private sector encouraged increased productivity while permitting the Government to concentrate its resources on the improved operation of fewer large state-owned mining and mineral processing facilities.

Substantial increases in production were reported for alumina and aluminum, antimony, barite, boron, cement, chromite, copper, ferrochrome, lead, nitrogenous fertilizers, steel, and zinc. Substantial production declines were experienced in bauxite and tungsten and minor drops in coking coal and crude petroleum while manganese and natural gas output remained the same. Many mining sectors continued to have underutilized capacity and were unable to supply the domestic demand for some minerals, thus aggravating the country's import trade deficit.

The buildup in production was part of a Government-led policy to let exports drive an economic recovery. Aided by Arab investments and loans, many of the mineral exports were directed at satisfying demands of local Middle East markets.

The gross domestic product grew at a rate of 5.9% to approximately $45.9 billion. Total Turkish exports increased by 24.5% to $7.13 billion. Industrial exports led all other sectors at $5.14 billion, of which $240 million was exports of mining products, an increase of 2.6% over that of 1983. Total Turkish imports increased by 16% to $10.76 billion creating a balance of trade deficit of $3.63 billion. Imports of raw materials increased from $6.67 billion to $7.62 billion, of which crude oil imports were $3.37 billion. Although crude oil imports were up 4% over those of 1983, they fell from 35% to 31% as a share of total imports. Export markets for Turkey's principal nonfuel minerals were China, Romania, and Sweden for chromite; Finland, the Netherlands, and the United States for the ferroalloys, principally ferrochrome; and the United States, Western Europe, and Japan for boron materials.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[p]
METALS					
Aluminum:					
Bauxite	546,468	589,008	508,392	296,280	128,413
Alumina	137,520	131,400	84,204	57,420	79,125
Metal, primary	33,574	39,985	36,520	32,200	37,900
Antimony:					
Ore, mine output:					
Gross weight	22,029	27,949	35,982	28,000	33,891
Metal content	969	838	1,079	840	203
Regulus	87	45	144	198	412
Chromite:					
Gross weight (34% to 43% Cr_2O_3)	550,719	574,474	616,539	511,464	607,578
Salable product	381,998	422,550	407,697	[e]330,000	[e]400,000
Copper:					
Mine output, metal content	26,400	31,881	34,430	25,025	[e]34,000
Metal:					
Smelter	15,937	27,273	25,313	18,516	32,021
Refined	15,571	24,220	32,200	30,000	[e]33,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[p]
METALS —Continued					
Iron and steel:					
Iron ore, gross weight thousand tons	2,579	2,935	2,855	3,953	4,037
Metal:					
Pig iron and ferroalloys:					
Ferrochromium	[e]32,000	40,775	39,862	30,175	48,081
Ferrosilicon	--	--	4,300	4,500	6,902
Pig iron and other ferroalloys thousand tons	2,040	1,954	2,329	2,953	3,015
Steel, crude including castings do.	2,536	2,363	2,795	3,542	3,900
Lead:					
Mine output, metal content[2]	[r]7,800	[r]8,400	10,700	8,900	14,600
Metal, smelter, primary	[r]2,800	[r]2,500	3,100	4,000	5,000
Manganese ore, gross weight	41,634	14,937	7,308	3,204	[e]3,200
Mercury 76-pound flasks	4,437	5,927	7,144	4,699	[e]4,700
Silver, mine output, metal content[e] thousand troy ounces	200	200	220	220	220
Tungsten, metal content of concentrate	96	153	[e]150	325	150
Zinc:					
Mine output, metal content[3]	23,300	30,721	31,500	11,100	20,840
Metal, smelter, primary	12,600	18,100	14,900	14,300	19,500
NONMETALS					
Abrasives, natural: Emery	39,940	45,824	35,164	22,846	20,025
Asbestos	18,162	3,860	958	975	[e]1,000
Barite	128,352	185,555	107,393	76,764	172,900
Boron materials thousand tons	801	843	787	685	1,400
Cement, hydraulic do.	12,875	15,043	15,778	13,596	15,738
Clays:					
Bentonite	[e]20,000	30,687	[e]31,000	[e]31,000	28,093
Kaolin	[e]50,000	44,795	[e]45,000	[e]55,000	54,932
Other	[e]110,000	150,942	152,188	107,865	71,777
Diatomite[e]	9,500	10,000	10,000	9,600	2,540
Feldspar[e]	72,000	70,000	70,000	9,212	NA
Fluorspar[e]	6,000	1,986	2,000	2,000	2,000
Graphite	NA	NA	3,360	3,360	[e]4,000
Gypsum	[e]72,200	90,470	90,500	75,572	57,875
Lime thousand tons	1,000	900	900	1,000	[e]1,000
Magnesite, crude ore	825,876	783,966	905,159	719,484	719,021
Meerschaum kilograms	6,250	17,600	12,850	11,400	15,000
Nitrogen: N content of ammonia	184,000	325,800	306,360	320,000	290,000
Perlite	25,800	45,000	121,527	28,693	60,452
Phosphate rock	21,285	42,500	[4]35,400	104,482	308,475
Pyrites, cuprous, gross weight	77,272	67,632	[e]50,000	36,400	[e]50,000
Salt, all types thousand tons	1,179	1,396	1,313	[e]1,400	1,290
Sodium compounds, n.e.s.:					
Carbonate[e]	60,000	60,000	60,000	38,835	40,000
Sulfate	88,021	65,822	65,188	53,337	[e]55,000
Stone, sand and gravel, n.e.s.:					
Limestone thousand tons	90	467	338	342	350
Marble	15,871	36,832	24,110	39,110	40,000
Quartzite	[e]240,000	197,883	[e]200,000	239,201	240,000
Sand, siliceous	[e]60,000	113,826	[e]110,000	[e]110,000	110,000
Strontium minerals: Celestite[e]	16,000	15,000	15,000	38,835	35,000
Sulfates, natural, n.e.s.: Aluminum sulfate (alunite)	[e]6,000	11,543	[e]11,500	14,682	13,971
Sulfur:					
Native, other than Frasch	23,051	28,270	28,500	[e]31,000	[e]39,000
S content of pyrites	33,382	29,217	30,100	[e]25,000	[e]25,000
Byproduct	70,000	120,000	126,444	132,000	[e]135,000
Total	126,433	177,487	185,044	[e]188,000	[e]199,000
MINERAL FUELS AND RELATED MATERIALS					
Asphalt, natural thousand tons	559	560	523	[e]750	[e]750
Carbon black	15,900	18,108	19,922	[e]20,000	[e]20,000
Coal:					
Anthracite thousand tons	2	NA	NA	750	225
Bituminous do.	[r]6,599	[r]7,630	7,161	6,122	7,103
Lignite do.	[r]16,967	[r]18,924	20,512	23,723	26,825

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Coke and semicoke:					
Metallurgical ---------- thousand tons--	1,928	1,875	2,102	2,380	2,401
Gashouse[e] ----do----	300	250	300	121	100
Breeze[e] ----do----	125	100	125	260	174
Total ----do----	2,353	2,225	2,527	2,761	2,675
Gas, natural:					
Gross ---- million cubic feet--	30,000	[e]29,000	26,050	[e]27,000	[e]27,000
Marketed[e] ----do----	[5]1,000	3,000	3,500	3,500	3,500
Petroleum:					
Crude ------ thousand 42-gallon barrels--	16,682	16,918	16,697	15,779	14,941
Refinery products:					
Gasoline ----do----	16,131	16,341	15,140	16,956	18,380
Jet fuel ----do----	1,165	1,716	2,360	2,263	2,472
Kerosine ----do----	3,682	2,386	2,035	2,375	2,593
Distillate fuel oil ----do----	36,891	38,557	43,580	47,664	50,570
Residual fuel oil ----do----	20,682	23,431	26,490	34,178	38,433
Lubricants ----do----	1,200	[e]1,000	[e]1,100	1,563	1,486
Liquefied petroleum gas ----do----	4,324	3,742	3,430	4,865	5,585
Naphtha ----do----	114	[e]210	[e]210	226	58
Asphalt ----do----	1,615	2,177	1,875	2,534	2,960
Unspecified ----do----	3,547	3,814	4,480	7,532	9,787
Refinery fuel and losses ----do----	[e]1,200	[e]1,200	1,200	1,905	2,248
Total ----do----	90,551	94,574	101,900	122,061	134,572

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through May 8, 1985. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[2]Includes Pb content of lead ores and mixed ores known to to be intended for treatment for lead recovery.
[3]Includes Zn content of zinc and lead-zinc ores but excludes Zn content of lead ore.
[4]Run-of-mine ore contains 27% P_2O_5.
[5]Reported figure.

Table 2.—Turkey: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	31,686	57,332	--	France 44,330; United Kingdom 7,700.
Metal including alloys:				
Unwrought	1,006	1,244	--	All to Iran.
Semimanufactures	12,868	19,355	--	Iran 11,146; Kuwait 2,559; Saudi Arabia 1,289.
Arsenic: Ore and concentrate	6	--		
Chromium: Ore and concentrate	303,821	362,668	--	China 124,300; Romania 62,134; Sweden 44,325.
Copper: Metal including alloys:				
Unwrought	--	18	--	All to Belgium-Luxembourg.
Semimanufactures	2,991	11,678	85	Iran 10,602.
Iron and steel: Metal:				
Scrap	13	219	--	West Germany 100; Netherlands 48; Libya 35.
Pig iron, cast iron, related materials	255	16,052	--	North Korea 15,999.
Ferroalloys	38,040	32,825	20,383	Netherlands 6,400; Finland 3,000.
Steel, primary forms	59,451	132,911	--	Iran 65,098; West Germany 23,383.
Semimanufactures:				
Bars, rods, angles, shapes, sections	602,116	730,763	--	Iran 614,780; Iraq 72,061.
Universals, plates, sheets	24,696	47,139	--	Iran 40,821; Iraq 5,716.
Hoop and strip	322	6,537	--	Iran 2,580; Iraq 913.
Wire	16,307	3,314	--	Iraq 2,487.
Tubes, pipes, fittings	114,448	134,374	98	Iran 120,645.
Castings and forgings, rough	2,814	5,440	3	Iraq 2,352; Libya 1,627.
Lead:				
Ore and concentrate	2,022	2,725	--	Italy 1,725; Bulgaria 1,000.
Oxides	--	109	--	France 99; United Kingdom 10.
Metal including alloys:				
Unwrought	--	7	--	Libya 6.
Semimanufactures	72	107	--	Libya 103.

See footnote at end of table.

Table 2.—Turkey: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Manganese: Oxides	--	320	25	United Kingdom 150; Belgium-Luxembourg 80; West Germany 65.
Mercury ... 76-pound flasks	9,195	7,020	1,392	Netherlands 5,570.
Silver: Metal including alloys, unwrought and partly wrought ... value, thousands	$16	$38	--	All to West Germany.
Titanium: Oxides	--	2,250	3	West Germany 1,232; Czechoslovakia 460.
Tungsten:				
Ore and concentrate	--	180	--	West Germany 87; United Kingdom 75.
Metal including alloys, all forms	29	305	180	Austria 120.
Uranium and thorium: Metal including alloys, all forms ... value, thousands	$2	$3	--	All to West Germany.
Zinc:				
Ore and concentrate	750	1,200	--	All to Bulgaria.
Oxides	--	100	--	All to Netherlands.
Metal including alloys, unwrought	--	183	--	All to Iran.
Other:				
Ores and concentrates	610	330	--	France 270; West Germany 60.
Base metals including alloys, all forms	201	601	--	Netherlands 220; Belgium-Luxembourg 140.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	27,077	22,913	--	France 14,108; Netherlands 5,100; United Kingdom 3,240.
Grinding and polishing wheels and stones	75	320	--	Saudi Arabia 148; Jordan 123.
Barite and witherite	171,484	162,580	12,216	Switzerland 67,232; U.S.S.R. 34,600; Trinidad and Tobago 11,818.
Boron materials:				
Crude natural borates	419,210	622,537	100,300	Italy 120,426; United Kingdom 48,823; Japan 43,180.
Oxides and acids	13,128	7,022	3,000	West Germany 1,126; Romania 1,000.
Cement ... thousand tons	4,125	2,284	--	Algeria 685; Libya 355; Egypt 313.
Chalk	5,866	3,174	--	Iraq 1,124; Lebanon 1,000; Libya 700.
Clays, crude	65,162	64,183	--	Romania 48,988; U.S.S.R. 5,200.
Diatomite and other infusorial earth	138	15	--	All to West Germany.
Feldspar, fluorspar, related materials	3,048	5,045	--	Lebanon 3,000; Kuwait 1,490.
Fertilizer materials: Manufactured:				
Ammonia	86	668,424	107,155	U.S.S.R. 379,102; Libya 75,693; Venezuela 45,996.
Phosphatic	257,436	77,951	--	China 33,800; Saudi Arabia 21,951; Egypt 12,200.
Unspecified and mixed	3,864	15,000	--	Nigeria 6,000; China 5,000.
Gypsum and plaster	254	2,651	--	Libya 1,598; Lebanon 608; Egypt 350.
Lime	6,806	2,638	--	Iraq 1,960; Kuwait 453.
Magnesite	135,733	92,070	3,676	U.S.S.R. 49,378; Austria 19,924; West Germany 5,090.
Meerschaum, amber, jet	3	5	--	Italy 4; Austria 1.
Mica: Crude including splittings and waste	20	20	--	All to Kuwait.
Pigments, mineral:				
Natural, crude	177	197	--	United Kingdom 177; Iraq 20.
Iron oxides and hydroxides, processed	--	381	--	West Germany 354; Japan 21.
Precious and semiprecious stones other than diamond: Synthetic ... value, thousands	$24	--		
Pyrite, unroasted	301	15	--	All to Iraq.
Salt and brine	28,634	6,258	--	Iraq 5,546; Bulgaria 500.
Sodium compounds, n.e.s.: Manufactured:				
Carbonate	51,957	61,883	--	Iran 17,335; Algeria 13,600; Greece 10,784.
Sulfate	53,608	55,758	--	Italy 31,850; Netherlands 6,941; Switzerland 3,321.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	39,325	40,739	79	Libya 9,279; Saudi Arabia 7,205; Italy 5,051.
Worked	7,538	8,704	68	Libya 4,265; Saudi Arabia 2,140.
Dolomite, chiefly refractory-grade	153	74	--	Iraq 50; Greece 24.
Gravel and crushed rock	12,068	8,965	--	Iraq 4,523; Libya 2,007.
Limestone other than dimension	300	515	--	All to Iraq.
Quartz and quartzite	109	160	--	Iran 100; Iraq 51.
Sand other than metal-bearing	601	750	--	All to Libya.
Sulfur: Sulfuric acid	100	--		
Talc, steatite, soapstone, pyrophyllite	987	679	--	Iraq 330; Libya 300.

See footnote at end of table.

Table 2.—Turkey: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Other:				
Crude	20,600	40,223	--	West Germany 32,185; U.S.S.R. 5,000.
Slag and dross, not metal-bearing	--	18,617	--	Greece 8,295; Israel 6,350; United Kingdom 2,150.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	536	72	--	Jordan 40; Libya 19; Iraq 13.
Carbon black	500	575	--	All to Iraq.
Coal: Anthracite and bituminous	4,450	--		
Coke and semicoke	62	--		
Petroleum:				
Crude and partly refined thousand 42-gallon barrels	1,526	2,943	--	Italy 1,949; France 646; Greece 205.
Refinery products:				
Gasoline, motor do	2,558	1,813	--	Italy 1,133; Greece 593.
Kerosine and jet fuel do	1,429	919	--	Italy 509; Egypt 374.
Distillate fuel oil do	299	17	--	All to Iraq.
Lubricants do	3	4	--	Iraq 2; Italy 1.
Residual fuel oil do	4,868	1,012	--	Italy 1,011.
Bituminous mixtures do	9	1	--	Mainly to Iraq.

[1]Table prepared by Virginia A. Woodson.

Table 3.—Turkey: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	1,025	--	Italy 1,000; Netherlands 25.
Oxides and hydroxides	330	258	([2])	West Germany 208; Switzerland 34.
Metal including alloys:				
Unwrought	35,102	59,953	445	Spain 33,208; Canada 9,186; Italy 3,111.
Semimanufactures	1,110	915	8	West Germany 557; Switzerland 79; Poland 50.
Arsenic: Oxides and acids	90	150	--	Belgium-Luxembourg 80; United Kingdom 46.
Chromium:				
Ore and concentrate	1	11	--	All from United Kingdom.
Oxides and hydroxides	244	308	--	Poland 92; Italy 63; West Germany 50.
Cobalt: Oxides and hydroxides	42	60	--	Belgium-Luxembourg 40; Switzerland 5; Canada 4.
Copper:				
Ore and concentrate	--	16,202	--	Morocco 10,202; Bulgaria 6,000.
Matte and speiss including cement copper	211	50	--	All from France.
Metal including alloys:				
Scrap	2,697	928	500	West Germany 122; Netherlands 83.
Unwrought	6,164	26,110	754	Chile 13,686; Belgium-Luxembourg 4,660; Netherlands 1,364.
Semimanufactures	8,499	10,820	6	West Germany 4,758; United Kingdom 2,354; Italy 846.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	1,171	1,329	57	Brazil 540; Sweden 391; Liberia 182.
Pyrite, roasted do	4	--		

See footnotes at end of table.

Table 3.—Turkey: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap ______ thousand tons__	1	1	1	
Pig iron, cast iron, related materials ________do____	52	68	(2)	Brazil 26; Italy 11; United Kingdom 10.
Ferroalloys:				
Ferromanganese___do____	30	21	4	Republic of South Africa 6; Brazil 3; Norway 3.
Unspecified______do____	10	22	(2)	Norway 7; U.S.S.R. 3; Brazil 2.
Steel, primary forms ___do____	304	929	6	Netherlands 112; U.S.S.R. 109; Bulgaria 104.
Semimanufactures:				
Bars, rods, angles, shapes, sections_______do____	127	103	(2)	West Germany 27; Romania 22; Belgium-Luxembourg 7.
Universals, plates, sheets do____	366	317	2	Japan 52; West Germany 50; Bulgaria 35.
Hoop and strip ____do____	5	3	(2)	West Germany 1; Austria 1.
Rails and accessories do____	11	10	--	Republic of South Africa 9.
Wire __________do____	4	2	(2)	Belgium-Luxembourg 1; West Germany 1.
Tubes, pipes, fittings do____	77	43	2	West Germany 16; United Kingdom 7; Japan 6.
Castings and forgings, rough do____	17	5	(2)	U.S.S.R. 4; West Germany 1.
Lead:				
Oxides ____________________	100	109	--	France 99; United Kingdom 10.
Metal including alloys:				
Unwrought______________	3,828	8,735	442	Spain 3,863; Bulgaria 938; United Kingdom 868.
Semimanufactures _________	43	1	--	Mainly from United Kingdom.
Magnesium: Metal including alloys:				
Unwrought _________________	84	124	20	Norway 44; Switzerland 22; France 20.
Semimanufactures value, thousands__	$656	$10	--	Switzerland $6; West Germany $4.
Manganese:				
Ore and concentrate, metallurgical-grade__________________	1,952	1,910	--	Belgium-Luxembourg 1,871; United Kingdom 29.
Oxides ___________________	580	320	25	United Kingdom 150; Belgium-Luxembourg 80; West Germany 65.
Nickel:				
Matte and speiss _____________	443	651	20	Canada 212; United Kingdom 194; Belgium-Luxembourg 67.
Metal including alloys:				
Unwrought______________	1	29	--	All from Netherlands.
Semimanufactures _________	121	155	5	West Germany 110; Canada 14; Switzerland 11.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands__	$477	$360	--	Italy $235; West Germany $103.
Silver: Metal including alloys, unwrought and partly wrought _______do____	$361	$356	$1	West Germany $322; Switzerland $31.
Tin:				
Oxides ____________________	2	3	--	West Germany 2.
Metal including alloys:				
Unwrought______________	657	995	--	United Kingdom 299; Malaysia 261; Netherlands 154.
Semimanufactures _________	7	4	--	West Germany 3; United Kingdom 1.
Titanium: Oxides_______________	1,746	2,250	3	West Germany 1,232; Czechoslovakia 460.
Tungsten: Metal including alloys, all forms ____________________	7	5	--	West Germany 2; Netherlands 1; United Kingdom 1.

See footnotes at end of table.

Table 3.—Turkey: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc:				
Oxides	542	250	--	West Germany 243; France 7.
Blue powder	--	29	--	All from West Germany.
Metal including alloys:				
Unwrought	6,184	7,910	--	Bulgaria 2,980; Italy 1,286; United Kingdom 1,199.
Semimanufactures	14	--		
Other:				
Ores and concentrates	3,009	3,894	200	Australia 1,798; Sweden 1,000.
Oxides and hydroxides	211	482	--	France 147; West Germany 110; United Kingdom 85.
Base metals including alloys, all forms	NA	142	4	Netherlands 72; United Kingdom 32; France 20.
NONMETALS				
Abrasives, n.e.s:				
Artificial: Corundum	1,189	1,490	--	West Germany 739; Czechoslovakia 432; Poland 257.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$337	$295	$101	Netherlands $74; United Kingdom $52.
Grinding and polishing wheels and stones	309	274	1	Italy 127; West Germany 69; Norway 40.
Asbestos, crude	20,012	20,575	1,000	U.S.S.R. 8,021; Republic of South Africa 3,368; Switzerland 3,289.
Boron materials: Oxides and acids	7	2	(2)	West Germany 1.
Cement	1,810	1,594	--	West Germany 1,111; United Kingdom 195; France 146.
Chalk	10	--		
Clays, crude	7,551	4,259	1,041	United Kingdom 2,672; West Germany 289.
Cryolite and chiolite	22	20	--	All from Denmark.
Diamond: Industrial stones value, thousands	$1,162	$455	$31	United Kingdom $349; Republic of South Africa $53.
Diatomite and other infusorial earth	337	73	23	Italy 50.
Feldspar, fluorspar, related materials	81	23	--	West Germany 20; Sweden 3.
Fertilizer materials: Manufactured:				
Ammonia	364,115	668,424	107,155	U.S.S.R. 379,102; Libya 75,693; Venezuela 45,996.
Nitrogenous	399,302	916,617	35,842	Romania 545,933; Italy 137,804; Yugoslavia 50,679.
Potassic	56,931	38,381	--	Israel 23,392; Belgium-Luxembourg 5,500; Switzerland 5,489.
Unspecified	195	148,561	91,304	Belgium-Luxembourg 27,969; Spain 15,518.
Graphite, natural	326	334	--	All from West Germany.
Magnesite	296	60	1	Austria 47; West Germany 10.
Mica:				
Crude including splittings and waste	23	39	--	West Germany 31; Netherlands 5.
Worked including agglomerated splittings	44	63	--	Spain 24; Belgium-Luxembourg 8; West Germany 6.
Phosphates, crude	625,537	922,641	--	Tunisia 247,356; Jordan 239,787; Morocco 23,979.
Pigments, mineral: Iron oxides and hydroxides, processed	245	381	--	West Germany 354; Japan 21.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$82	$19	--	West Germany $17; Italy $2.
Synthetic do	$65	$20	--	Switzerland $13; East Germany $4.
Pyrite, unroasted	70,427	89,995	--	Norway 40,000; Spain 23,284; Albania 11,209.
Salt and brine	67	81	--	All from West Germany.
Sodium compounds, n.e.s.: Manufactured:				
Carbonated	38,853	20,140	5	Bulgaria 15,074; Spain 1,995.
Sulfate	53,608	55,758	--	Italy 31,850; Netherlands 6,941; West Germany 2,599.

See footnotes at end of table.

Table 3.—Turkey: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Quartz and quartzite	107	266	--	West Germany 153; Switzerland 55.
Sand other than metal-bearing	1,693	33	--	United Kingdom 29; West Germany 4.
Sulfur:				
Elemental:				
Crude including native and by-product	114,696	76,878	--	Saudi Arabia 39,113; Kuwait 16,840; Poland 14,460.
Colloidal, precipitated, sublimed	90	140	--	West Germany 62; United Kingdom 68; France 20.
Sulfuric acid	18	73,539	--	Japan 29,788; Switzerland 26,849; Spain 14,690.
Talc, steatite, soapstone, pyrophyllite	227	321	--	West Germany 299; Belgium-Luxembourg 22.
Other: Crude	1,469	2,030	--	West Germany 1,010; United Kingdom 834.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	69	40	40	
Carbon black	5,852	7,701	46	Italy 4,935; West Germany 2,157.
Coal:				
Anthracite and bituminous thousand tons	1,033	902	862	Australia 39.
Briquets of anthracite and bituminous coal	4,978	33	33	
Lignite including briquets	24,825	11,831	--	All from Republic of South Africa.
Coke and semicoke	65,035	78,919	--	Netherlands 46,515; Belgium-Luxembourg 13,292; Italy 13,000.
Petroleum:				
Crude thousand 42-gallon barrels	13,862	102,665	--	Iran 39,441; Iraq 29,143; Libya 22,967.
Refinery products:				
Liquefied petroleum gas do.	(3)	1,969	--	Kuwait 1,918.
Gasoline, motor do.	3	48	--	All from Italy.
Distillate fuel oil do.	103	4,786	--	U.S.S.R. 2,321; Romania 1,102; Bulgaria 859.
Lubricants do.	13	113	26	United Kingdom 29; Belgium-Luxembourg 16; Netherlands 14.
Residual fuel oil do.	258	3,019	681	Iran 1,730; Romania 401.
Bituminous mixtures do.	20	98	94	Netherlands 2.
Petroleum coke do.	72	807	266	Syria 541.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]Value only reported at $123,752,000.

COMMODITY REVIEW

METALS

Aluminum.—A continued shortage of energy supplies kept aluminum metal production at an estimated 60% of capacity. As a consequence, Turkey has had to more than double imports to meet demand since 1981. However, Turkey's 85% increase in investment in the energy sector was expected to permit the Seydisehir smelter to operate closer to its 60,000-ton-per-year capacity in 1985. Negotiations continued with the Soviet Union to develop terms to increase aluminum capacity by an additional 30,000 tons per year. Etibank (the industry monopoly established by the Government in 1979) reportedly wanted the Soviet Union to guarantee to import 80,000 tons per year of alumina between 1986 and 1988 as part of any agreement. Joint venture negotiations were also under way between Etibank and the Dubai Aluminium Co. Ltd. to build a $170 million, 250,000-ton-per-year alumina plant to process bauxite ore from the mines in the Milas region.

Chromite.—Production of chromite increased 19% for the year although the industry operated at only 73% of its full operating mine capacity of 218,000 tons of contained chromium in chromite ore per year. Reserves of chromite in Turkey were estimated at 4.5 million tons of contained chromium, equal to less than 1% of world reserves. In 1984, Turkey ranked fourth and sixth in world production and reserves of chromite, respectively.

Chromite was mined in five main areas. In order of importance, these were the Guleman-Elazig area in eastern Turkey, the Fethiye-Koycegiz area in southwestern Turkey, the Bursa-Orhaneli region in the northwest, the Pozanti-Karsanti region in the south-central part of the country, and Kopdag area in north-central Turkey.

Etibank, with five concentrators at Karagedik in the Fethiye region and at Sori and Kefdag in the Guleman region of Elazig Province, was the principal producer. The remainder of chromite output came from private sector mine operators. Etibank also operated the country's only two ferrochrome smelters, a 20,000-ton-per-year low-carbon ferrochrome plant at Antalya and a 50,000-ton-per-year high-carbon ferrochrome plant at Elazig. In 1984, Etibank increased ferrochrome production by 54% by making more chromite concentrates available to the underutilized Elazig plant.

Copper.—Phelps Dodge of Turkey Inc., an exploration subsidiary of the U.S. copper company Phelps Dodge Corp., earned a 49% interest in the Cayeli zinc-copper-silver-gold deposit by funding a program of drilling bulk sampling and metallurgical testing and the completion of a preliminary feasibility study at a cost of over $3 million. In 1983, a Turkish company, Cayeli Bakir AS, was formed by Etibank, Phelps Dodge of Turkey, and Gama Industries TAS, a private Turkish company, to hold and develop this deposit. Development costs were estimated at $150 million.

A similar $60 million joint venture agreement was also signed in 1984 between Etibank and Preussag AG of the Federal Republic of Germany to develop the Siirt-Madenkoy copper deposit in the southeast corner of Turkey. Preliminary plans called for a mine capable of producing 300,000 tons of copper ore per year.

Iron Ore.—Turkiye Demir ve Celik Isletmeleri (TDCI), the Turkish iron and steel works, a 100% Government-owned enterprise, controlled over three-quarters of domestic iron ore production, principally through its Divirigi Mine at Sias in the Malataya region of central Turkey. The continued growth in iron ore output to over 4 million tons was attributed to the concentration of Government resources and efforts at the Divirigi Mine and to increases in output from the smaller mines that had been returned to private sector ownership.

Iron and Steel.—TDCI had a total or partial interest in Turkey's three largest steel mills at Tskenderun, Karabuk, and Eregli. The three mills had a combined capacity of 4.5 million tons of steel per year. The private sector controlled about 25% of domestic capacity, and this share was expected to grow. Production of crude steel was estimated for 1984 at 3.9 million tons or about 65% of installed capacity. Both production levels and capacity were expected to increase in response to a growing domestic demand related to the Government's energy and other economic development projects. There was also a need to reduce primary and semimanufactured steel exports which increased in 1983. The Fifth Development Plan, approved in July 1984, planned for an increase in crude steel capacity to 8 million tons per year by 1989.

Lead and Zinc.—The industry was comprised of two companies. Cinko-Kursun Metal Saniyii AS (Cinkur) with a smelter at Kayseri was owned 47% by Etibank and 53% by private interests. The second company, Keban Lead and Zinc Works, was at Elazig and could process 10,000 tons per year of lead-zinc concentrate. A comprehensive technical journal article described the 1977-83 operating results and a flowsheet of the Cinkur smelter.[3] In 1977, two pyrometallurgical process Waelz kilns were installed at the zinc smelter to treat the zinc-lead oxide ores of the Zamanti District. The Waelz plant was designed to treat 240,000 tons of ore per year averaging 21.82% zinc, 2.1% lead, and 0.007% cadmium. The process used a rotary kiln to recover metal values through volatilization. Coke breeze, fuel oil, limestone, and bituminous coal from the Zonguldak coal deposit were used to reduce the oxide ores at 1,100° C to 1,200° C kiln temperatures. In 1983, the plant treated 109,535 tons of ore grading 20.14% zinc yielding 34,378 tons of a 54.5% zinc concentrate. This represented an 85.0% recovery with a loss of 2.8% zinc in the slag. The article noted that the zinc and lead grades in the Waelz oxide product were below design levels and impurities were high; however, a recirculating of material collected in the first and second radiation coolers served to upgrade the final oxide product.

Plans were announced to spend $37.5 million to expand and modernize the Balikesir-Balya lead-zinc mine to produce 300,000 tons per year of ore from reserves estimated at 7.4 million tons. Costs were to be shared between Etibank, Metallgesellschaft AG of the Federal Republic of Germany, and Demir Export Ltd.

NONMETALS

Boron.—During August, the new sodium borate processing plant at Kirka in west-central Turkey began producing pentahydrate borax and by yearend was also producing anhydrous borax. The plant capacities were reported to be 160,000 tons per year of pentahydrate and 60,000 tons per year of anhydrous borax. Prior to startup of the Kirka plant, all borate processing was accomplished at facilities at the port city of Bandirma, on the coast of northwestern Turkey. Finished products from the Kirka plant were being shipped by rail to handling and storage facilities at the port of Bandirma. Almost all of Turkey's annual borate concentrate and derivative chemical production was exported in 1984, making Turkey the world's largest exporter of boron products. The Kirka plant and continued expansion of existing boron chemical facilities at Bandirma reaffirmed the Government's commitment to converting borates into higher valued chemicals prior to export. Ore feedstock for processing at the Kirka plant was coming entirely from the nearby Kirka Mine, which in 1984 produced approximately 450,000 tons of ore yielding 300,000 tons of concentrate. The Kirka area had proven reserves in the north of 480 million tons of ore graded 27% boric oxide (B_2O_3) and smaller tonnages of ore graded 42% B_2O_3 in the south. The Kirka area also contained the only known commercial sodium borate deposits in Turkey. Other major commercial borate deposits, mainly calcium-based colemanite, were at Emet, Bigadic, and Kestelek. The existing borate mines of Turkey were basically restricted to the western part of the country and continued to be operated in 1984 by Etibank. Although all borate mines were nationalized in 1979, former private sector producers had until January 1, 1985, to sell or trade whatever borate stocks they had in their possession prior to nationalization.

Cement.—During the year, three new plants built by the Government agency Turkiye Cimento Sanayii TAS (Cisan) began operations. Included were a plant at Lanik with a clinker capacity of 580,000 tons per year that went on-stream in January; a 590,000-ton-per-year clinker plant at Siirt that began operations during the first quarter of 1984; and a plant at Ergani that started up operations in midyear. Several other cement plants were still under construction at yearend. The three nearest completion were a planned 550,000-ton-per-year plant at Urfa, scheduled for startup in 1985; a planned 550,000-ton-per-year plant at Edirne scheduled to come on-stream during 1986; and a 600,000-ton-per-year plant at Denizli, scheduled on-line in 1986. Dyckerhoff Engineering GmbH was handling the engineering consulting on the plant construction projects, and Humboldt Wedag was supplying the plant equipment. All six of the new Cisan plants mentioned were equipped or to be equipped with identical equipment, with minor exceptions made for varying altitude constraints and raw material properties. Completion of the new plants would increase the number of operating Cisan plants to 26. Upon completion of the plants still under construction at yearend, the cement manufacturing capacity of Turkey would increase to almost 25 million tons annually, with the Government and private sector portions of the industry each contributing about one-half the total capacity. Approximately 60% of Turkey's cement output in 1984 came from approximately 20 privately owned and operated manufacturing facilities within the country.

Fertilizer Materials.—A project to modernize Turkey's fertilizer manufacturing industry continued throughout 1984. Assisted by a $44 million loan from the International Bank for Reconstruction and Development (World Bank) granted in 1982, the project was increasing manufacturing capacities and modernizing existing sulfuric and phosphoric acid facilities within Turkey. A program has begun to increase fertilizer utilization rates within Turkey's agricultural industry. Fertilizer consumption was expected to increase 50% over the 5-year period 1984-89. An important part of the World Bank-sponsored project was to reopen the ISKUR sulfuric and phosphoric acid manufacturing plant in Bandirma. Commissioned in 1981, the plant went into bankruptcy in 1983 and closed, forcing its sole customer of downstream fertilizer products, Bandirma Gubre Fabrikalari AS, to import its feedstock requirements of sulfuric and phosphoric acid. ISKUR was manufacturing almost 150,000 tons per year of phosphoric acid, one-half of the country's domestic production. Almost all of the raw materials for Turkey's fertilizer industry were imported in 1984. Etibank operated the only phosphate rock mine in the country at Mazidagi near the Syrian border. Opened in 1976, the mine had yet to exceed 50,000 tons per year of produced concentrate. Etibank continued also to be the only domestic primary sulfur producer in Turkey during 1984, with a small native sulfur mine at Keciborlu producing about 30,000 tons annually.

A decision was announced in midyear by the Turkish Government to build a fourth fertilizer complex within the country, in the Province of Cukutova near the town of Mersin. The proposed complex was to comprise facilities for the production of 1,400 tons per day of diammonium phosphate (DAP), 1,500 tons per day of ammonium nitrate, and 1,150 tons per day of nitric acid. The project plans were being developed by the state fertilizer agency Azot Sanayii TAS. An estimated 60% of the proposed financing for the project was to come from foreign interests, with potential financial partners being Petro-Chemical Industries Co. of Kuwait, Le Groupe Chimique Tunisien of Tunisia, and the Arab Groupe Petroleum Investments Corp. Capacity plans for the complex included an initial production of 400,000 tons per year of DAP and 500,000 tons per year of ammonium nitrate, with further product diversification expected in the 1990's. The facilities were expected to take 4 years to construct at an estimated cost of $220 million, with construction beginning before the end of 1985.

The Spanish engineering firm Técnicas Reunidas, upon Government approval, was awarded a contract in midyear to build a nitrogen-phosphorus (NP) plant at Ceyhan in eastern Turkey. The new plant was to be added to the existing fertilizer facilities at the site operated by the Turkish fertilizer company Toros Fertilizer & Chemicals Co. Capacity of the plant was to be either 1,600 tons per day of DAP, or alternatively 1,000 tons per day of 20-20 NP. The plant was expected to be completed before yearend 1985. A new process involving low recycling of raw materials was to be incorporated into the plant. A reported advantage of the process was that 98% of the phosphorus pentoxide was produced in water soluble form instead of the conventional 92% of traditional DAP manufacture.

MINERAL FUELS

Coal.—During the first quarter of 1984, a guarantee for a $184 million coal-development loan was secured by the Turkish Government from the Export-Import Bank. The loan was to be used for purchasing coal mining equipment from manufacturers in the United States. The Turkish Government-owned coal mining enterprise, Turkiye Komuleri Isletmeri, was expected to purchase draglines, excavators, bulldozers, dump trucks, and other pieces of equipment for its lignite mining operations in eastern and western Turkey.

Completion work continued throughout the year on the 1.7-gigawatt Elbistan-A powerplant, built at an estimated completion cost of over $1,800 million. The plant was the first of four powerplants originally planned for the Elbistan area, which contained proven reserves of 1.8 billion tons of lignite coal. The actual cost versus estimated cost of building the plant trebled over the years of its construction, and subsequently the Turkish Government was envisioning a considerably slower pace of construction for the Elbistan power station than originally scheduled. Another high cost factor for mine-mouth power generation utilizing the Elbistan lignite coal deposits was the long power transmission distance from the Elbistan area in eastern Anatolia to the industrialized population centers in western Turkey. A United Nations Development Program study, completed early in 1984, proposed a careful reassessment of the economics of the remaining three planned Elbistan powerplants and suggested feasibility studies for building the powerplants closer to western customers, and alternatively railing in Elbistan lignite coal or importing necessary coal supplies, or some combination of these alternatives.

Natural Gas.—All of Turkey's nonassociated gas production was produced by the state-owned petroleum company, Turkiye Petrolleri Anonim Ortakliki (TPAO). Gas continued to be produced from two main areas: the Thrace Basin in northwestern Turkey on the European side of the Bosphorus and from the southeastern part of the country at Marlin-Camurlu within the Hakkari Basin. Marketed natural gas production from the Hakkari Basin began in 1976 and from the Thrace Basin in 1982. Completion and connection of new gas wells and expansion of a pipeline collection and distribution system for the Hamitabad Gasfield continued throughout 1984. Plans were to transport gas supplies to the eastern shore of the Marmara Sea for use as feedstock in two fertilizer plants, and to the northern shore of the sea for use as fuel in a powerplant that was estimated to have consumed $500,000 per day of imported fuel oil to generate electricity in 1984.

With the financial assistance of a $55 million loan from the World Bank, the Government of Turkey continued all year with an ambitious natural gas exploration program in the country's western Thrace Basin. A considerable portion of Turkey's marketed gas came from within the Thrace Basin, specifically from the Hamitabad Field. The basin's share of the country's annual gas production was expected to increase steadily over the remainder of the 1980's. TPAO was to provide almost $44 million in financing for the project, bringing the total project funds to almost $100 million. There had been several additional gas discoveries in the basin since the discovery of the Hamitabad Field in 1982, and project officials expected proven reserves for the basin to reach 1 trillion cubic feet. Also as part of the project, 1,100 miles of seismic survey and 11 wildcat wells were to be completed during the period 1984-86. Other ongoing aspects of the project were geological and sedimentological studies and technical assistance to TPAO.

Petroleum.—Changes made in 1980 within Turkey's economic system that liberalized investment and, in particular, changes made in the 1983 petroleum law that encouraged oil exploration and production, resulted in substantially increased activity within the petroleum exploration sector in 1984. Since passage of Law-2808 in March 1983, several foreign petroleum companies had either signed exploration contracts with Turkey's TPAO or were, by yearend 1984, negotiating for concessions. In addition to exploration being carried out by TPAO, Mobil Exploration Mediterranean Inc., Royal Dutch/Shell NV, and Roy M. Huffington Co. were drilling wells in 1984. TPAO drilled 15 wells in the Cemberlitas Field of southeastern Turkey's Adiyaman Province during the year and tapped high gravity oil in 6 of them. The results were encouraging enough that seven more exploration wells were to be drilled in 1985. The Cemberlitas Field had been closed down in the early 1970's after initial exploration efforts proved disappointing.

In the latter part of 1984, Amoco Turkey Petroleum Co. signed a joint venture contract with TPAO and began exploration work on a 1.7-million-acre concession in the Hakkari Basin. Based on seismic studies, the company could begin exploration drilling as soon as mid-1985. The Amoco concession was in mountainous terrain on the easternmost portion of a thrust belt, and exploration was expected to be difficult. Also awarded to Amoco was one onshore block and five onshore and offshore blocks in westernmost Turkey in an area between Kusadasi and Edremit. All together, the six blocks covered an area of 711,322 acres. With low onshore elevations and shallow offshore waters, Amoco expected exploration to be relatively trouble free. No startup date for the western concession exploration work was set by yearend.

Two wells were drilled during the year under a joint venture between TPAO and Salen Energy AB of Sweden, in a concession area that included Iskenderun Bay. Both wells were abandoned, although one yielded a noncommercial volume of light oil. TPAO extended Salen's contract until August 31, 1985, and Salen hoped to begin drilling a third well during the first half of 1985. A consortium of United States, Canadian, and Norwegian firms led by Seahawk Oil International Inc. of California completed geophysical work in the Saros Bay region. Initial geophysical studies were completed by Barrick Petroleum Corp. of Toronto, Canada, in the eastern and central Black Sea area and the onshore Sinop and Samsum Basins, and drilling program plans were being developed at yearend. Geophysical information on the Salt Lake Basin of central Turkey was being studied by the Scottish firm Lennox Oil Co. TPAO and the Atlantic Richfield Co. of the United States signed a letter of intent in late 1984 and were expected to finalize a joint venture exploration agreement for a concession area in the central thrust belt early in 1985. Another possible exploration program for a thrust belt concession in 1985 was being negotiated between TPAO and Occidental Petroleum Corp. of the United States. During 1984, TPAO concluded two exploration contracts for concession areas in southeastern Turkey with Shell International Petroleum Co. Also negotiating with TPAO at yearend were Denison Mines Ltd. of Toronto, Canada, and Texaco Inc. of the United States, concerning possible exploration in Adana Bay.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Turkish lira (TL) to U.S. dollars at the rate of TL366.68=US$1.00.
[3]Dogan, Z. Cinkur's Waelz Plant in Turkey: Operational Results and Problems. Min. Mag. (London), v. 151, No. 2, Aug. 1984, pp. 98-103.

The Mineral Industry of the U.S.S.R.[1]

By Richard M. Levine[2]

The U.S.S.R. occupies approximately one-sixth of the world's land surface and, accordingly, has large resources and reserves of most materials. In 1984, it was one of the largest mineral producing and consuming countries in the world. The U.S.S.R. was self-sufficient in minerals except for a small number of commodities and was a large exporter of minerals. It was one of the world's largest producers of mineral commodities including aluminum, asbestos, cement, chrome ore, coal, copper, diamonds, gold, graphite, iron ore, lead, manganese ore, natural gas, nickel, petroleum and petroleum products, phosphate rock, platinum-group metals, potash, steel, sulfur, and zinc.

In 1984, production of iron ore, crude steel, rolled steel, and steel pipes increased slightly. Crude oil production decreased slightly. The drop, although reportedly only 0.6%, was the first time oil production failed to increase since World War II. Coal production again decreased, which was the fifth decrease in production in the last 6 years. Natural gas production continued to increase at a rapid rate, again exceeding the plan. Production increases were reported for caustic soda, cement, mineral fertilizers, and sulfuric acid. The 1984 plan for the production of aluminum, chrome ore, manganese ore, nickel, and rare metals was reported fulfilled. In 1985, the majority of investments in nonferrous metallurgy was to be directed toward developing copper, lead and zinc, molybdenum, and tungsten resources.

In February 1984, a new Minister of Construction of Petroleum and Gas Industry Enterprises was appointed. Shortly after yearend, a new Minister of the Petroleum Industry was appointed, who, prior to this appointment, was serving as Minister of the Gas Industry. The head of the West Siberian natural gas production association "Tyumengazprom," which produced over 50% of the country's natural gas, was named the new Minister of the Gas Industry.

In early October, the spike was driven marking completion of the Baikal-Amur Mainline (BAM) Railroad, although rail laying and tunneling work was not completed; 773 kilometers of the 3,200-kilometer mainline was in operation. The completion of BAM would help in the development of a vast array of Siberian natural resources.

The Soviet Union issued a proclamation declaring a 200-mile marine economic zone effective March 1, as envisaged under the Law of the Sea Treaty. The decree stipulated that persons guilty of violating the provisions of the decree would be held responsible if the violations entailed criminal acts in accord with Soviet legislation.

The Soviet Union was engaged in a large port construction program. New construction and expansion was under way at such ports as Archangelsk, Il'ychevsk, Leningrad, Magadan, Odessa, Riga, Tallin, Ust-Dunaisk, Vladivostok, and Vostochnyy. The program included container, grain, and coal facilities as well as ferry berths.

Geology.—Geological exploration and research was conducted by a number of organizations including the Ministry of Geology, the geological organizations of the mining ministries, and geological institutes of the U.S.S.R. Academy of Sciences. The leading organization was the Ministry of Geology, which in 1984 accounted for over 70% of the exploration in the country. The Ministry of Geology was comprised of 4 Republic Ministries of Geology (Kazakh S.S.R., Russian S.F.S.R., Ukrainian S.S.R., and Uzbek S.S.R.) and 11 geological directorates in the remaining Republics. In 1984, the U.S.S.R. was host to the 27th session of the International Geological Congress, in which there were over 5,000 participants from different countries of the world.

The Soviets were engaged in a program of drilling deep and extra deep boreholes as an aid for determining mineral contents within the country's major regions. Work began on drilling a 12-kilometer-deep borehole in the Krivoy Rog iron ore basin in the Ukrainian S.S.R. (Ukraine) and of a hole in the Muruntau Region of the Uzbek S.S.R. (Uzbekistan), which is known for its gold reserves. Plans called for the Muruntau hole to reach a depth of 6,000 to 7,000 meters with a target of 2,000 meters set for 1986.

Technology.—In nonferrous mining, over 60% of the ore extracted and one-third of the metal obtained was from open pit mining. Open pit mining was conducted to a depth of 350 meters, and underground mining was conducted to a depth of 1,500 meters, at Noril'sk. The average capacity of dump trucks used in nonferrous metallurgy was 36.6 tons, which was a 10% increase in size in comparison with that of 1980.

The Soviets fell behind in their plans to produce metal powders. The production of iron powders was 38% lower and copper powders 44% lower than the target figure. Powders were still being produced only in small quantities and often in the form of experimental batches at high prices.[3]

The mining and metallurgy sector used much outmoded equipment. The average period of use for equipment in nonferrous mining and metallurgy was far longer than the Soviet established standard time period, and this resulted in increasing breakdowns and repair costs. In the Ukraine, over one-half of the capacity of iron ore beneficiation plants was put into operation over 25 years ago, and the majority of equipment at these plants needed replacement. Approximately one-half of the equipment at nonferrous ore concentration plants needed replacing. However, a significant portion of state-of-the-art equipment was not produced domestically.[4]

Reportedly, there was a shortage of manganese, molybdenum, columbium, tungsten, and vanadium for alloying use. With technological improvements, chrome ore and manganese usage could be reduced by one-half.[5]

Construction began of a metallurgical research complex near Tashkent in the Uzbek S.S.R., which would make use of a solar-powered furnace designed to reach a temperature of 3,000° C. It would smelt extremely pure and high refractory materials.

Mineral Industry Labor.—Despite inducements that increased considerably for working in northern areas or on particularly difficult assignments, the country was experiencing difficulty in filling mining jobs. These problems existed not only in the far north and east, but throughout the mining and metallurgical sectors, and reflected the problems that the Soviet Union was experiencing because of the sharp slowdown in the growth of the labor force during the 1980's. In Pravda, a Communist Party City Secretary stated that if metallurgical capacities expanded without proper planning, "we will have to bring in workers to the southern regions by aircraft, the way they are brought in today to the oilfields of Mangyshlak or Tyumen'."[6] One method the Soviets were using to increase the labor force in mining was to encourage those who could retire at age 50 to work longer and to induce those who had already retired to return to work. Another problem of the mining work force was rapid labor turnover, which the Soviets were trying to reduce to hold on to the more experienced workers. Although there were numerous problems in attracting workers to remote northern regions, reportedly, industrial enterprises in Noril'sk in East Siberia, the site of a large nonferrous metals mining complex, had an enviable rate of labor turnover of only 10%. Every third worker had 10 years longevity at Noril'sk and every ninth worker more than 20 years. The good labor turnover record was reportedly due to its widely developed social infrastructure.[7]

Nevertheless, the serious problem existed of what the Soviets termed "rolling stones," those who go to remote northern regions for short periods. Two-thirds of those recruited to work in Tyumen' Oblast', the main oil and gas producing region in the country, left after 1 year.[8] Reportedly, it was a popular conception that only those under 35 years of age could endure the northern areas. A number of health risks were cited in the extreme north, particularly during the long polar nights, and special preventive measures had to be taken.

No statistics were available on mine safety, but the coal mining sector did report that approximately 50% of the underground mines did not experience serious accidents during 1984.[9] There were 31 underground mines that had not had a serious accident for 5 years and 48 underground mines that had not had a serious accident in 3 years.[10] No explanation was given in the report as to what constituted a serious accident.

PRODUCTION

Statistics on output, enterprise capacity, and production plans in physical units of output for nonferrous, precious, and rare metals and some nonmetallics were 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 some ferrous metals and some nonmetallics. In 1984, a new law was passed imposing stricter penalties for revealing to foreigners information regarded as secret.

Still, some information was available on most mineral commodities that could be used to determine the relative size or growth of the mineral industry. However, Soviet information had to be carefully qualified. Making comparisons with market economy countries regarding production, consumption, production costs, labor productivity, etc., would be difficult owing to the great difference in economic systems.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2]

(Thousand metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[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	615	615
Alumina	2,700	2,800	3,000	3,200	3,300
Metal, smelter:					
Primary	1,760	1,800	1,850	2,000	2,100
Secondary	170	180	190	200	210
Total	1,930	1,980	2,040	2,200	2,310
Antimony, mine output, recoverable metal content tons	8,200	8,600	9,000	9,200	9,300
Arsenic, white (As_2O_3) do.	7,700	7,750	7,800	7,900	8,000
Beryllium: Beryl, cobbed, 10% to 20% BeO do.	1,800	1,800	1,850	1,900	1,900
Bismuth, mine output, recoverable metal content do.	72	75	78	80	82
Cadmium metal, smelter do.	2,850	2,900	2,950	3,000	3,000
Chromium:					
Chrome ore, crude	[3]3,400	[3]3,300	[r]3,350	3,350	3,450
Chrome ore, marketable	2,900	2,900	2,940	2,940	3,000
Cobalt:					
Mine output, recoverable metal content tons	2,100	2,200	2,300	2,400	2,600
Metal, smelter do.	4,200	4,300	4,300	4,500	4,700
Copper:[r]					
Ore:					
Gross weight, 0.5% to 2% Cu	83,000	83,000	83,000	84,000	85,000
Metal content, recoverable	590	570	560	570	580
Metal:					
Blister:					
Primary	665	673	680	700	725
Secondary	135	137	138	139	141
Refined:					
Primary	720	730	759	776	790
Secondary	135	137	138	139	141
Gold, mine output, metal content thousand troy ounces	8,300	8,425	8,550	8,600	8,650
Iron and steel:					
Iron ore, 55% to 63% Fe[3]	244,713	242,417	244,411	245,200	247,000
Iron ore, metal content[3]	132,885	131,071	132,055	133,563	134,800
Agglomerated products:[4]					
Sinter	153,818	154,657	151,846	151,000	151,000
Pellets	50,894	54,023	55,826	59,800	63,100

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	1980	1981	1982	1983	1984[p]
METALS —Continued					
Iron and steel —Continued					
Metal:					
Pig iron and blast-furnace ferroalloys:					
Pig iron for steelmaking[3]	99,958	100,576	[r]99,706	102,958	103,600
Foundry pig iron[4]	6,600	6,600	6,400	6,700	6,700
Spiegeleisen[5]	50	50	50	50	50
Ferromanganese[5]	550	550	550	650	550
Other blast-furnace ferroalloys[4]	100	--	--	--	--
Total[3 6]	107,283	107,766	106,723	110,453	110,900
Electric-furnace ferroalloys[r]	3,000	3,000	3,000	3,200	3,300
Steel, crude[3]	147,941	148,445	146,165	152,514	154,000
Semimanufactures:[4]					
Sections	38,483	38,285	37,700	NA	NA
Wire rods	8,066	7,877	7,880	[3]8,300	[3]8,400
Pipe stock	6,020	6,122	6,245	[3]6,400	[3]6,400
Tubes from ingots	1,976	1,917	1,848	[3]1,900	[3]1,900
Plates and sheets:					
More than 5 millimeters thick	13,700	NA	NA	NA	NA
Other	19,700	NA	NA	NA	NA
Total	33,400	NA	NA	NA	NA
Strip	10,898	11,010	10,220	NA	NA
Railroad track material	4,137	3,900	4,131	NA	NA
Wheels, tires, axles	1,115	1,084	1,014	NA	NA
Unspecified shapes for sale	725	NA	NA	NA	NA
Other and unspecified	70	59	63	NA	NA
Total semimanufactures[4 6]	104,878	104,880	104,151	NA	NA
Selected end products:					
Total pipes and tubes[3]	18,169	18,268	17,944	18,732	18,900
Cold-rolled sheet[4]	6,887	7,551	7,808	NA	NA
Electrical sheet[4]	1,173	1,136	1,113	NA	NA
Cold-reduced strip[4]	[e]500	NA	NA	NA	NA
Lead:					
Mine output, recoverable metal content	420	425	430	435	435
Metal, smelter:					
Primary	475	480	485	490	495
Secondary	225	235	245	255	260
Magnesium metal, including secondary	75	78	81	83	85
Manganese concentrate:[3]					
Gross weight	9,750	9,150	9,821	9,876	10,100
Metal content	3,040	2,761	2,957	2,976	3,000
Mercury metal, including secondary 76-pound flasks	62,000	63,000	64,000	64,000	64,000
Molybdenum, mine output, metal content tons	10,400	10,700	11,000	11,100	11,200
Nickel:					
Mine output, metal content	154	158	165	170	175
Metal, smelter	172	178	180	188	194
Platinum-group metals, mine output, metal content thousand troy ounces	3,250	3,350	3,500	3,600	3,700
Silver metal including secondary do	46,000	46,500	46,900	47,100	47,400
Tin:					
Mine output, recoverable metal content[r] tons	34,000	34,000	35,000	36,000	36,000
Metal, smelter:					
Primary do	38,000	37,000	38,000	38,000	38,500
Secondary do	12,000	12,000	12,000	12,000	12,000
Total do	50,000	49,000	50,000	50,000	50,500
Titanium:					
Concentrates:					
Ilmenite do	420,000	425,000	430,000	435,000	440,000
Rutile do	10,000	10,000	10,000	10,000	10,000
Metal do	37,000	38,500	40,000	41,000	41,500
Tungsten concentrate, metal content do	8,700	8,700	9,000	9,100	9,100
Vanadium do	9,500	9,500	9,500	9,500	9,500
Zinc:					
Mine output, recoverable metal content	785	790	800	805	805
Metal:					
Primary	815	820	830	840	850
Secondary	80	85	90	95	95
Zirconium metal	75	75	80	80	80

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	1980	1981	1982	1983	1984[p]
NONMETALS					
Asbestos	2,070	2,105	2,180	2,250	2,300
Barite	510	510	520	520	530
Boron minerals and compounds:					
Gross weight	200	200	200	200	200
B_2O_3 content	40	40	40	40	40
Bromine	67	68	68	68	70
Cement, hydraulic[3]	125,049	127,169	123,681	128,156	130,000
Clays: Kaolin including china clay	2,500	2,500	2,500	2,600	2,700
Corundum, natural tons	8,600	8,600	8,600	8,700	8,700
Diamond:					
Gem[r 7] thousand carats	2,250	2,100	2,100	3,700	3,800
Industrial[r] do	8,600	8,500	8,500	7,000	7,100
Total do	10,850	10,600	10,600	10,700	10,900
Diatomite	230	230	235	235	240
Feldspar	310	320	330	330	330
Fluorspar	520	530	540	540	550
Graphite	80	70	75	80	80
Gypsum	4,900	4,900	4,900	4,900	4,900
Iodine tons	2,000	2,000	2,000	2,000	2,100
Lime, dead-burned	28,400	[3]28,400	[3]28,700	[3]29,500	[3]29,500
Lithium minerals, not further specified	55	55	60	60	60
Magnesite:					
Crude	4,700	4,800	4,900	5,000	5,000
Marketable product	2,350	2,400	2,450	2,500	2,500
Mica	46	47	48	49	49
Nitrogen: N content of ammonia	12,400	[r]13,300	[r]13,300	15,400	15,600
Perlite	360	[r]370	[r]380	390	400
Phosphate rock:					
Crude ore:					
Apatite, 15% P_2O_5	[3]46,500	[3]46,400	[3]48,000	49,000	50,000
Sedimentary rock	[3]24,800	25,400	26,000	26,200	26,400
Total	71,300	71,800	74,000	75,200	76,400
Concentrate:					
Apatite, 38.2% to 39.6% P_2O_5	17,900	18,000	18,300	18,500	18,700
Sedimentary rock, 19% to 30% P_2O_5[r]	12,400	12,700	13,000	13,100	13,200
Total[r]	30,300	30,700	31,300	31,600	31,900
Potash:					
Ore, gross weight	[3]60,800	63,000	66,000	76,000	80,000
K_2O equivalent[3]	8,064	8,449	8,079	9,294	9,800
Pyrite, gross weight	7,900	8,000	[r]7,800	7,600	7,600
Salt, all types[3]	14,600	15,200	15,800	16,200	16,500
Sodium compounds, n.e.s.:					
Carbonate[3]	4,780	4,860	4,763	5,099	5,100
Sulfate:					
Natural	350	350	360	360	360
Manufactured	250	250	250	250	250
Sulfur:					
Frasch	800	800	800	800	800
Other native	2,000	2,000	1,900	1,800	1,800
S content of pyrite	3,550	3,600	[r]3,500	3,400	3,400
Byproduct:[r]					
Of metallurgy	400	425	425	450	450
Of natural gas	2,600	2,650	2,700	2,750	2,800
Of petroleum	400	425	425	450	450
Total[r]	9,750	9,900	9,750	9,650	9,700
Sulfuric acid[3]	23,033	24,095	23,801	24,714	25,300
Talc	490	500	510	510	520
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Hard coal (anthracite and bituminous)[3]	552,954	544,213	555,400	557,800	556,000
Lignite and brown coal[3]	163,417	159,831	162,700	158,300	156,000
Total[3 8]	716,371	704,044	718,100	716,100	712,000
Coke: Coke oven, beehive, breeze, gas coke	86,000	86,000	86,000	86,000	86,000

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	1980	1981	1982	1983	1984[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Fuel briquets:					
From anthracite and bituminous coal	600	600	600	600	600
From lignite and brown coal	6,185	6,200	5,800	4,800	4,900
Total[3]	6,785	6,800	6,400	5,400	5,500
Gas, natural, marketed:					
As reported[3] million cubic meters	435,217	465,262	500,700	536,100	587,000
Converted million cubic feet	15,369,000	16,430,000	17,700,000	18,900,000	20,700,000
Oil shale	37,389	36,928	[3]35,236	[3]33,256	[3]33,204
Peat:					
Agricultural use	[3]235,000	[3]280,000	300,000	300,000	300,000
Fuel use	60,000	60,000	60,000	60,000	60,000
Petroleum:					
Crude:					
As reported, gravimetric units[3]	603,207	608,820	612,600	616,000	613,000
Converted, volumetric units thousand 42-gallon barrels	4,433,600	4,475,800	4,500,000	4,530,000	4,505,000
Refinery products[4 9]	436,588	445,590	453,200	461,234	[e]459,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Production estimated unless otherwise specified.
[2]Includes data available through Oct. 5, 1984.
[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 independent rounding.
[7]Series changed to include near gem and cheap gem quality.
[8]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).
[9]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

Minerals accounted for over 80% of Soviet hard-currency-earning exports, and the Soviet Union provided its Council for Mutual Economic Assistance (CMEA)[11] partners with the majority of their raw material requirements in nonhard currency transactions. The Soviets were dependent on imports for only a small number of mineral commodities, and there was no mineral commodity for which they were entirely dependent on imports. Mineral fuels remained the largest hard-currency-earning export, accounting for about 70% of these earnings. Mineral exports to market economy countries in the 1980's included petroleum and petroleum products, natural gas, gold, platinum-group metals, diamonds, and a number of other metals and nonmetallics, depending on market conditions and domestic supply. The Soviets set prices to capture the percentage of the market necessary to meet hard-currency-earning targets rather than to cover production costs. In addition to hard currency transactions, the Soviet Union also engaged in mineral trade with developing countries, usually in nonhard currency transactions in which considerations included both economic and political factors. In contrast to trade with market economy countries, the Soviets supplied the CMEA countries with the majority of the minerals required for their economic development. In 1984, there was no major change in Soviet mineral trading policy.

Table 2.—U.S.S.R.: Mineral trade with the United States in 1984

(Metric tons unless otherwise specified)

Commodity[1]	Quantity
Leading U.S. exports:	
Oil, insulating or transformer ---- barrels	249,169
Petroleum coke, calcined	70,214
Phosphoric acid, 65% or more available phosphorus pentoxide equivalent	718,771
Leading U.S. imports:	
Aluminum, other than uniform circular cross section throughout its length, not in coil	5,937,428
Aluminum waste and scrap	4,243,064
Ammonia, anhydrous	883,657
Gasoline ---- barrels	107,593
Kerosine derived from petroleum, shale oil, or both (except motor fuel) ---- do	146,978
Oils, heavy fuel, testing 25° API or more Saybolt Universal viscosity at 100° F of more than 125 seconds ---- do	200,822
Oils, light fuel, testing 25° API or more, Saybolt Universal viscosity at 100° F of less than 45 seconds ---- do	5,291,896
Palladium, metal content ---- kilograms	12,239
Palladium bars, plates, etc., metal content ---- do	3,153
Petroleum, crude, testing under 25° API (heavy fuel oils) ---- barrels	332,904
Platinum bars, plates, etc., metal content ---- kilograms	269
Platinum sponge, metal content ---- do	319
Potassium chloride, crude or muriate of potash	125,233
Rhodium, metal content ---- kilograms	209
Urea	378,796

[1]Items selected based on dollar value.

Table 3.—U.S.S.R.: Estimated production, trade, and consumption of mineral commodities in 1984

(Thousand metric tons unless otherwise specified)

Commodity	Production	Exports	Imports	Apparent consumption
METALS				
Aluminum:				
Bauxite	4,600	--	4,600	9,200
Nepheline concentrate	2,500	--	--	2,500
Alunite	615	--	--	615
Alumina	3,300	--	1,500	4,800
Metal:				
Primary	2,100	650	(1)	1,450
Secondary	210	70	--	140
Antimony ---- tons	9,300	400	1,000	9,900
Arsenic, white (As_2O_3) ---- do	8,000	50	--	7,950
Beryllium, 10% to 20% BeO ---- do	1,900	(1)	(1)	1,900
Bismuth ---- do	82	--	200	282
Cadmium ---- do	3,000	50	250	3,200
Chrome ore, marketable	3,000	[2]496	--	2,504
Cobalt ---- tons	2,600	--	2,100	4,700
Copper:				
Mine output, metal content	580	(1)	145	725
Unwrought, unalloyed	790	180	35	645
Secondary	141	15	(1)	126
Gold ---- thousand troy ounces	8,650	3,860	--	4,790
Iron and steel:				
Iron ore	[2]247,000	[2,3]45,922	(1)	201,078
Pig iron and ferroalloys	[2]111,500	4,500	(1)	107,000
Steel:				
Crude	[2]154,000	800	(1)	153,200
Rolled	[2]107,000	6,000	9,000	110,000
Lead:				
Mine output, metal content	435	--	60	495
Primary	495	100	45	440
Secondary	260	--	--	260
Magnesium metal	85	3	--	82
Manganese ore	10,100	[2]1,081	340	9,359
Mercury ---- 76-pound flasks	64,000	(1)	--	64,000
Molybdenum ---- tons	11,200	(1)	2,200	13,400
Nickel:				
Mine output, metal content	175	--	19	194
Smelter	194	55	--	139
Platinum-group metals ---- thousand troy ounces	3,700	1,700	(1)	2,000
Silver ---- do	47,400	--	10,000	57,400
Tin:				
Mine output, metal content ---- tons	36,000	--	2,500	38,500
Primary ---- do	38,500	--	16,500	55,000
Secondary ---- do	12,000	--	--	12,000

See footnotes at end of table.

Table 3.—U.S.S.R.: Estimated production, trade, and consumption of mineral commodities in 1984 —Continued

(Thousand metric tons unless otherwise specified)

Commodity	Production	Exports	Imports	Apparent consumption
METALS —Continued				
Titanium metal tons	41,500	3,500	--	38,000
Tungsten do	9,100	(1)	6,900	16,000
Zinc:				
Mine output, metal content	805	--	45	850
Primary	850	80	65	835
Secondary	95	--	--	95
NONMETALS				
Asbestos	2,300	700	(1)	1,600
Barite	530	--	500	1,030
Cement[2]	130,000	2,534	563	128,029
Clays	2,700	(1)	(1)	2,700
Corundum, natural tons	8,700	4,000	--	4,700
Diamond:				
Gem thousand carats	3,800	3,000	(1)	800
Industrial stones do	7,100	700	(1)	6,400
Diatomite	240	(1)	(1)	240
Feldspar	330	--	40	370
Fertilizer materials:				
Nitrogen: N content	15,600	3,500	100	12,200
Phosphate rock	31,900	5,000	--	26,900
Potash, K_2O equivalent	9,800	[2]2,261	--	7,539
Fluorspar	550	--	625	1,175
Graphite	80	(1)	(1)	80
Gypsum	4,900	150	(1)	4,750
Lime, dead-burned	[2]29,500	(1)	(1)	29,500
Magnesite, crude	5,000	30	800	5,770
Mica	49	--	7	56
Salt, all types	16,500	[2]375	(1)	16,125
Sulfur, all types	9,440	300	1,200	10,340
Sulfuric acid	[2]25,300	[2]230	150	25,220
Talc	520	(1)	(1)	520
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite and bituminous	556,000	27,000	12,000	541,000
Lignite and brown coal	156,000	(1)	(1)	156,000
Gas, natural million cubic meters	[2]587,000	70,000	4,000	521,000
Oil shale	33,200	--	--	33,200
Peat:				
Agricultural	300,000	--	--	300,000
Fuel use	60,000	--	--	60,000
Petroleum:				
Crude	[2]613,000	135,000	15,000	493,000
Refinery products	459,000	55,000	1,000	405,000

[1]Less than 1/2 unit.
[2]Reported in Soviet sources.
[3]Includes concentrates and pellets.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	31,417	3,950	--	Poland 3,770; Finland 180.
Metal including alloys:				
Scrap	50,689	11,552	--	Finland 7,432; Italy 3,709.
Unwrought	431,167	491,140	118	Hungary 162,864; Czechoslovakia 73,000; Japan 68,020.
Semimanufactures	17,615	18,709	113	Yugoslavia 8,568; Poland 8,088.
Antimony:				
Oxides	416	433	--	Japan 200; France 87; Austria 80.
Metal including alloys, all forms	--	18	18	

See footnotes at end of table.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Chromium:[2]				
Ore and concentrate thousand tons	561	496	(3)	Poland 132; Czechoslovakia 116; Japan 78.
Oxides and hydroxides	4,026	5,365	--	France 693; Czechoslovakia 501; Yugoslavia 500.
Copper:				
Sulfate[2]	23,188	22,444	--	Bulgaria 6,990; Hungary 3,500; Yugoslavia 1,140.
Metal including alloys:				
Scrap	13,619	14,178	--	Austria 8,859; Italy 1,977; West Germany 1,806.
Unwrought	59,118	63,678	--	Czechoslovakia 40,000; West Germany 9,868; Finland 6,000.
Semimanufactures	769	606	--	Poland 228; Pakistan 222; Greece 53.
Germanium: Metal including alloys, all forms kilograms	49	NA		
Gold:				
Ore and concentrate value, thousands	--	$40	$40	
Waste and sweepings do	--	$10	$10	
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,688	667	3	West Germany 395; Japan 252.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	42,836	42,805	--	Czechoslovakia 13,566; Poland 8,835; Romania 7,645.
Metal:				
Scrap[2] do	2,859	3,370	--	Italy 708; Yugoslavia 652; Spain 468.
Pig iron, cast iron, related materials do	1,981	1,777	--	Czechoslovakia 777; Bulgaria 376; Hungary 260.
Ferroalloys:				
Ferrochromium do	21	21	--	Hungary 6; Austria 5; Belgium-Luxembourg 5.
Ferromanganese do	26	25	--	Hungary 24.
Ferrosilicochromium do	1	(3)	--	Mainly to France.
Ferrosilicomanganese do	7	16	--	Japan 9; Finland 7.
Ferrosilicon do	24	59	15	Romania 21; West Germany 7; Hungary 7.
Unspecified do	14	12	--	Belgium-Luxembourg 3; Turkey 3; Sweden 2.
Steel, primary forms do	666	1,007	--	Hungary 404; Yugoslavia 198; Italy 147.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	789	497	--	East Germany 227; Hungary 143; Bulgaria 48.
Universals, plates, sheets do	1,371	1,331	--	East Germany 479; Cuba 456; Hungary 171.
Hoop and strip do	14	18	--	Yugoslavia 13; Bulgaria 4.
Rails and accessories do	2	3	--	Mainly to Yugoslavia.
Wire do	3	9	--	West Germany 4; Hungary 3.
Tubes, pipes, fittings do	89	92	--	Cuba 40; West Germany 15; Saudi Arabia 14.
Castings and forgings, rough do	45	45	--	Cuba 41; Turkey 3.
Unspecified do	673	594	--	All to Poland.
Lead:				
Oxides	25	50	--	All to Finland.
Metal including alloys:				
Scrap	24,168	17,326	--	Czechoslovakia 10,000; Finland 7,003.
Unwrought	8	10	--	All to Yugoslavia.
Lithium: Oxides and hydroxides	380	90	--	Japan 85.
Magnesium: Metal including alloys, unwrought	528	NA		
Manganese: Ore and concentrate, metallurgical-grade[2] thousand tons	1,144	1,079	--	Poland 539; Czechoslovakia 295; East Germany 85.
Mercury 76-pound flasks	1,044	NA		

See footnotes at end of table.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	481	734	--	All to Sweden.
Metal including alloys:				
Scrap	140	107	--	All to Austria.
Unwrought	33,878	35,426	4,009	West Germany 12,298; Japan 5,410; Czechoslovakia 5,038.
Semimanufactures	331	480	18	Yugoslavia 451; Ireland 10.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$96,911	$303,481	$58,011	Japan $156,976; West Germany $39,149; Switzerland $38,995.
Rare-earth metals including alloys, all forms	10	(3)	--	Mainly to Japan.
Silicon, high-purity kilograms	200	400	--	All to West Germany.
Silver:				
Waste and sweepings value, thousands	$82	NA		
Metal including alloys, unwrought and partly wrought do.	--	$225	$20	Italy $205.
Tellurium, elemental and arsenic	3	13	--	West Germany 7; United Kingdom 4.
Thallium: Metal including alloys, all forms	--	13	13	
Titanium:				
Oxides	25,909	NA		
Metal including alloys, all forms	1,148	1,147	179	West Germany 660; Sweden 298.
Zinc:				
Oxides	--	300	--	All to Yugoslavia.
Ash and residue containing zinc	231	NA		
Metal including alloys:				
Unwrought	14,848	14,803	--	Czechoslovakia 10,000; Poland 3,767.
Semimanufactures	11	1	--	All to Yugoslavia.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	63	520	--	Yugoslavia 516.
Artificial:				
Corundum	1,371	4,191	--	West Germany 3,644; Hungary 197; France 142.
Silicon carbide	3,223	3,544	--	West Germany 3,151; France 275.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$949	$1,286	$130	Yugoslavia $393; Canada $266; Belgium-Luxembourg $187.
Asbestos, crude	264,034	275,875	--	Poland 69,077; Japan 42,804; Yugoslavia 34,367.
Boron materials:				
Crude natural borates	1,805	618	--	All to Japan.
Oxides and acids	[2]10,149	[2]11,403	--	Hungary 1,850; Japan 1,720; Yugoslavia 1,441.
Cement[2] thousand tons	2,221	2,279	--	Hungary 557; Egypt 552; Jordan 231.
Clays, crude:				
Kaolin	44,618	38,431	--	Poland 32,762; Austria 5,669.
Unspecified	12,781	21,271	--	Yugoslavia 14,938; Poland 4,794.
Diamond:				
Gem, not set or strung value, thousands	$332,484	$231,102	$351	Belgium-Luxembourg $157,834; West Germany $30,583; Switzerland $27,316.
Industrial stones do.	$708	$857	--	Belgium-Luxembourg $838.
Fertilizer materials:				
Crude, n.e.s	--	359	--	All to West Germany.
Manufactured:				
Ammonia thousand tons	1,373	2,030	583	Turkey 379; Italy 323; Finland 266.
Nitrogenous[2] do.	4,077	4,226	406	Hungary 618; Vietnam 602; Cuba 590.
Phosphatic[2] do.	690	692	--	Cuba 293; Hungary 135; Mongolia 36.
Potassic[2] do.	4,956	4,513	97	Poland 1,185; Hungary 699; Czechoslovakia 239.
Unspecified and mixed do.	68	46	--	Hungary 45.
Graphite, natural	519	37	--	All to Finland.
Gypsum and plaster	25,000	[2]22,400	--	Do.
Iodine kilograms	268	291	--	All to Hungary.
Lime	--	22,071	--	All to Jordan.
Magnesium compounds:				
Magnesite	6,256	5,679	--	All to Hungary.
Other	10,740	11,785	1,999	Finland 6,278; Netherlands 3,508.

See footnotes at end of table.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Mica: Crude including splittings and waste	--	724	--	All to Yugoslavia.
Nitrates, crude	--	52,486	--	All to West Germany.
Phosphates, crude ---- thousand tons	3,535	3,364	--	Bulgaria 883; Poland 591; Hungary 463.
Phosphorus, elemental[2]	51,864	55,707	--	Poland 13,319; undetermined 40,426.
Pigments, mineral: Iron oxides and hydroxides, processed	896	917	--	Yugoslavia 892.
Potassium salts, crude	2,083	1,888	--	All to Hungary.
Precious and semiprecious stones other than diamond:				
Natural ------ value, thousands	$7,153	$280	$31	United Kingdom $136; Italy $53; Austria $34.
Synthetic ---- do	$808	$708	--	Austria $362; Japan $246; United Kingdom $36.
Pyrite, unroasted[2] ---- thousand tons	359	362	--	Bulgaria 262; Hungary 80.
Salt and brine[2]	460,815	338,931	--	Czechoslovakia 120,339; Hungary 70,443; Finland 62,284.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	29,174	20,195	--	Finland 18,208; United Kingdom 1,139.
Sulfate, manufactured[2]	46,053	43,901	--	Yugoslavia 10,147; Italy 8,467; Sweden 6,516.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	16,372	11,039	--	Italy 3,718; West Germany 3,055; Japan 1,770.
Limestone other than dimension	--	33,763	33,763	
Sulfur:				
Elemental, crude including native and byproduct	25,491	37,171	--	Hungary 33,616; Yugoslavia 2,593.
Sulfuric acid[2]	197,060	206,136	--	Czechoslovakia 156,738.
Talc, steatite, soapstone, pyrophyllite	1,153	1,306	--	Poland 1,304.
Vermiculite, perlite, chlorite	74,361	106,943	--	Belgium-Luxembourg 65,938; France 26,505.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black[2]	106,823	103,769	--	Bulgaria 28,202; Hungary 24,220; East Germany 22,628.
Coal:				
Anthracite and bituminous thousand tons	14,149	19,067	--	Bulgaria 5,227; Czechoslovakia 3,252; East Germany 2,958.
Lignite including briquets ---do	78	133	--	Yugoslavia 106; Japan 26.
Coke and semicoke ---do	2,369	2,084	--	East Germany 1,025; Finland 671; Bulgaria 274.
Gas, natural: Gaseous million cubic feet	1,551,318	1,420,550	--	Czechoslovakia 327,330; Italy 308,260; East Germany 226,437.
Peat including briquets and litter	169,243	166,414	--	West Germany 39,440; France 26,616; Belgium-Luxembourg 16,863.
Petroleum:				
Crude - thousand 42-gallon barrels	541,734	554,713	--	East Germany 125,325; Poland 92,279; Finland 65,211.
Refinery products:				
Liquefied petroleum gas -do	1,912	2,259	--	West Germany 619; France 366; Belgium-Luxembourg 280.
Gasoline ---do	38,912	43,797	--	West Germany 20,973; Netherlands 8,641; France 6,454.
Mineral jelly and wax ---do	25	11	--	Hungary 6; Finland 4.
Kerosine and jet fuel ---do	2,720	2,219	--	Hungary 983; United Kingdom 514; Ireland 419.
Distillate fuel oil ---do	102,725	122,045	1,504	Netherlands 35,934; Switzerland 16,686; West Germany 13,012.
Lubricants ---do	668	2,140	--	Sweden 988; Denmark 484; Austria 439.
Residual fuel oil ---do	82,453	84,683	197	Netherlands 17,282; Finland 10,941; Italy 10,706.
Bitumen and other residues do	--	21	--	All to France.
Petroleum coke ---do	650	1,326	--	Italy 677; Japan 587.
Unspecified ---do	15,539	17,439	--	All to Poland.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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.

Table 5.—U.S.S.R.: Net exports of selected minerals and metals as a percent of consumption in 1984[1]

Commodity	Percent of consumption
Aluminum	45
Asbestos	44
Chromium ore	20
Diamond, gem	375
Gas, natural	13
Gold	81
Iron ore and concentrate	23
Manganese concentrate	11
Nickel, smelter	40
Nitrogen fertilizer	29
Petroleum, crude and refinery products	43
Phosphate	19
Platinum-group metals	85
Potash	30

[1]Selection made from commodities for which exports comprise 10% or more of consumption.

Table 6.—U.S.S.R.: Net import reliance of selected minerals and metals as a percent of consumption in 1984

Commodity	Percent of consumption	Principal sources
Antimony	4	Romania, Yugoslavia.
Barite	49	Bulgaria, North Korea, Yugoslavia.
Bauxite and alumina	49	Greece, Guinea, Hungary, India, Jamaica, Yugoslavia.
Bismuth	71	Peru.
Cadmium	6	Japan, Peru.
Cobalt	45	Cuba.
Feldspar	11	Thailand.
Fluorspar	53	China, Mongolia, Thailand.
Iron and steel, high-quality products	4	Belgium-Luxembourg, West Germany, Italy, Japan.
Magnesite	13	North Korea.
Mica	13	India.
Molybdenum	16	Mongolia.
Silver	17	Switzerland, United Kingdom.
Sulfur	9	Poland.
Tin	34	Malaysia, Singapore, United Kingdom.
Tungsten	43	China, Mongolia.
Zinc	3	Bulgaria, Finland, Netherlands, Norway, Poland, Sweden.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	1,003	990	--	Greece 587; Yugoslavia 235; Jamaica 167.
Oxides and hydroxides do	761	880	--	Yugoslavia 498; Hungary 353.
Metal including alloys:				
Unwrought	9,088	18	--	All from Italy.
Semimanufactures	7,992	4,604	--	West Germany 1,554; Finland 941; France 636.
Antimony: Oxides	12	NA		
Bismuth: Metal including alloys, all forms	131	5	--	All from Japan.
Cadmium: Metal including alloys, all forms	515	230	--	Do.
Chromium: Oxides and hydroxides	1	NA		

See footnotes at end of table.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Cobalt:				
Oxides and hydroxides kilograms	19	NA		
Metal including alloys, all forms	7	6	--	All from Netherlands.
Columbium and tantalum:				
Ore and concentrate	170	NA		
Metal including alloys, all forms, tantalum	(2)	31	--	Singapore 22; Netherlands 9.
Copper:				
Ore and concentrate	91,659	NA		
Matte and speiss including cement copper	1,326	NA		
Metal including alloys:				
Scrap	2,017	NA		
Unwrought	1,626	3	--	All from Italy.
Semimanufactures	27,005	19,943	8	Poland 12,020; Japan 3,102; West Germany 2,481.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	32	2	--	All from Japan.
Iron and steel: Metal:				
Scrap	24,448	22,131	--	Mongolia 22,100.
Pig iron, cast iron, related materials	4,514	5,599	--	Sweden 5,179; West Germany 412.
Ferroalloys:				
Ferromolybdenum	63	NA		
Ferrosilicon	2,790	[3]3,100	--	All from North Korea.
Silicon metal	10,573	NA		
Unspecified	467	498	--	Brazil 429.
Steel, primary forms	10,223	27,325	--	West Germany 11,087; United Kingdom 5,424.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	1,115	678	--	Italy 178; Hungary 87; France 75.
Universals, plates, sheets do	2,740	2,589	(2)	West Germany 777; Japan 478; Austria 417.
Hoop and strip do	271	218	--	West Germany 146; Italy 18; France 14.
Rails and accessories do	(2)	1	--	NA.
Wire do	27	29	(2)	Yugoslavia 8; Japan 7; Italy 4.
Tubes, pipes, fittings do	4,145	4,578	(2)	Japan 1,247; West Germany 1,404; Italy 820.
Castings and forgings, rough do	4	5	--	West Germany 3; Italy 2.
Lead:				
Ore and concentrate	14,800	49,785	--	Finland 42,708; Greece 5,000.
Oxides	4,871	3,452	--	West Germany 2,001; France 800; Italy 646.
Metal including alloys:				
Unwrought	28,131	30,792	--	Sweden 13,039; Canada 12,498; France 3,248.
Semimanufactures	29	70	--	Yugoslavia 41; Austria 17.
Magnesium: Metal including alloys, semimanufactures	--	1,886	--	All from France.
Manganese:				
Ore and concentrate, metallurgical-grade	4,000	NA		
Oxides	--	3,274	1,274	Japan 1,200; Ireland 800.
Mercury 76-pound flasks	58	NA		
Molybdenum:				
Ore and concentrate	1,042	848	--	Netherlands 831; West Germany 17.
Metal including alloys, all forms	16	19	15	Japan 4.
Nickel:				
Matte and speiss	610	NA		
Oxides and hydroxides	646	1,745	--	All from Cuba.
Metal including alloys:				
Unwrought	--	31	--	United Kingdom 20; West Germany 11.
Semimanufactures	332	82	2	Japan 33; Sweden 22; Yugoslavia 19.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$52	$4,163	$773	United Kingdom $3,209; France $163.
Silver: Ore and concentrate do	$50,863	$12,778	$3,454	Belgium-Luxembourg $4,677; United Kingdom $3,519.
Tin:				
Ore and concentrate	2,231	2,005	--	All from Singapore.
Metal including alloys:				
Unwrought	3,709	7,249	--	Malaysia 6,160; Singapore 1,081.
Semimanufactures	1	102	--	Italy 101.

See footnotes at end of table.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	2,109	10,000	--	All from Netherlands.
Oxides	--	1,750	--	All from West Germany.
Metal including alloys, all forms	3	NA		
Tungsten:				
Ore and concentrate	1,205	475	--	Netherlands 421; United Kingdom 54.
Metal including alloys, all forms	56	37	4	Japan 32.
Vanadium: Oxides and hydroxides	803	354	--	All from Finland.
Zinc:				
Ore and concentrate	25,614	45,006	--	Sweden 36,020; Finland 8,986.
Oxides	46	NA		
Metal including alloys:				
Unwrought	33,002	20,499	--	Norway 5,999; Finland 5,000; Netherlands 4,042.
Semimanufactures	2,261	1,671	--	Poland 1,612; Yugoslavia 47.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3	4	--	All from West Germany.
Artificial: Corundum	1,779	1,999	--	Hungary 1,977; West Germany 22.
Dust and powder of precious and semiprecious stones including diamond kilograms	32	153	--	All from Italy.
Grinding and polishing wheels and stones	2,384	2,042	18	Austria 691; Italy 396; France 283.
Barite and witherite	96,904	34,720	--	Turkey 34,600.
Cement[3]	254,000	262,000	--	North Korea 204,000; Finland 47,422.
Clays, crude	1,836	5,200	--	All from Turkey.
Diamond:				
Gem, not set or strung value, thousands	$24	$410	--	United Kingdom $253; Belgium-Luxembourg $157.
Industrial stones do	$1,932	$2,005	--	Belgium-Luxembourg $1,790; United Kingdom $199.
Feldspar, fluorspar, related materials	65,845	32,000	--	All from Thailand.
Fertilizer materials: Manufactured:				
Nitrogenous	43,502	41,925	--	Afghanistan 21,400; North Korea 20,200.
Phosphatic[3]	141,155	112,849	9,897	Morocco 80,649; Yugoslavia 18,026.
Unspecified and mixed	165,638	294,242	--	Finland 255,404; Yugoslavia 38,838.
Graphite, natural	22	93	53	France 40.
Magnesium compounds:				
Magnesite	705,112	516,503	--	North Korea 515,739.
Oxides and hydroxides	28,648	2,825	--	France 1,925; West Germany 520; Japan 380.
Other	--	55,143	--	Turkey 49,378; Greece 5,001.
Mica: Crude including splittings and waste	1	2	--	All from United Kingdom.
Nitrates, crude	--	2,720	--	All from Bulgaria.
Pigments, mineral: Iron oxides and hydroxides, processed	1,264	2,506	--	Japan 1,628; West Germany 864.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$582	$135	--	United Kingdom $133.
Synthetic do	$11	$38	--	Austria $31; West Germany $7.
Salt and brine	102,016	4,120	--	Italy 4,100.
Sodium compounds, n.e.s.: Carbonate, manufactured	469,558	524,728	--	Bulgaria 475,710; Poland 49,018.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	21,310	8,989	--	Hungary 8,841; Finland 104.
Worked	1,656	1,141	--	Yugoslavia 671; Finland 405.
Gravel and crushed rock	9,897	4,849	--	Finland 4,805.
Limestone other than dimension	--	2,959	--	All from Sweden.
Quartz and quartzite	199	1,015	--	Brazil 370; Sweden 325; Finland 320.
Sand, construction cubic meters	2,460	5,535	--	All from Hungary.
Sulfur:				
Elemental, crude including native and byproduct thousand tons	846	1,112	--	Poland 914; Canada 198.
Sulfuric acid	89,589	105,640	--	Poland 105,134; Japan 300.
Talc, steatite, soapstone, pyrophyllite	10,995	2,511	--	Finland 2,500.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	872	1,535	--	Finland 1,498; Yugoslavia 37.
Carbon: Carbon black	[3]392	401	6	West Germany 187; Japan 160.

See footnotes at end of table.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983^p	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite and bituminous thousand tons	8,870	11,564	--	All from Poland.
Lignite including briquets do	16	23	--	All from Hungary.
Coke and semicoke do	718	723	--	Poland 722.
Gas, natural: Gaseous million cubic feet	336	383	--	All from Hungary.
Peat including briquets and litter	54	34	--	All from Finland.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	4	1	--	Mainly from Finland.
Gasoline do	3	21	--	West Germany 17; Finland 3.
Mineral jelly and wax do	3	1	--	Mainly from West Germany.
Kerosine and jet fuel do	256	24	--	Yugoslavia 18; Greece 5.
Distillate fuel oil do	542	386	--	Italy 248; Finland 36; Singapore 35.
Lubricants do	2,311	1,323	201	Finland 299; Italy 171; West Germany 163.
Residual fuel oil do	433	141	--	Netherlands 119; Greece 14.
Bitumen and other residues do	10	12	--	Hungary 8; Finland 3.
Bituminous mixtures do	8	92	--	Finland 91.
Petroleum coke do	31	174	144	Japan 30.
Unspecified do	1,132	NA		

^p Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. 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]Less than 1/2 unit.
[3]Official Trade Statistics of the U.S.S.R.

COMMODITY REVIEW

METALS

Aluminum.—The 1984 plan for the production of aluminum was reported fulfilled ahead of schedule. Along with bauxite, the U.S.S.R. produced a small portion of its alumina from nepheline syenite and a very small portion from alunite. Open pit mining accounted for about 70% of aluminum raw materials production.

In June, a national conference was held devoted to accelerating scientific and technical progress in the aluminum industry. Increasing aluminum output was stated to be one of the country's major tasks. The conference discussed accelerating the construction of the Kransoyarsk, Tadzhik, and Sayansk aluminum plants.

At yearend, metal output was planned to commence at the new Sayansk plant in Siberia. At the Tadzhik (Regar) plant, the southern sectors of potlines Nos. 11 and 12 were to be put into operation.

In Armenia, the Kanaker aluminum plant stopped production of primary aluminum, but continued to produce aluminum foil, wire, and other fabricated products. Pollution problems were cited as the reason for discontinuing production. Owing to the growth of the city of Yerevan, the Kanaker plant is now close to the residential areas. The amount of primary aluminum production at Kanaker was quite small in comparison with the newer, large Siberian plants.

In Azerbaidzhan S.S.R. (Azerbaidzhan), the Kirovabad alumina plant, which was the only Soviet plant that produced alumina from alunite, reported adding production capacity. Reportedly, the production association Alumina (Glinozem) in Pikalevo, Leningrad Oblast', which produced alumina from nepheline syenite concentrate, was unable to produce high-quality alumina, and research to improve the alumina quality was under way.[12] At the Pavlodar alumina plant in the Kazakh S.S.R. (Kazakhstan), completion of construction was announced of a new complex to produce alumina from low-grade bauxites. The complex would increase capacity at Pavlodar, which was one of the largest alumina producers in the country.

The Turgay bauxite mining directorate in Kazakhstan reported fulfilling its 1984 production plan ahead of schedule. Since the start of production, the depth of mining at the Turgay directorate had increased threefold, and the ratio of overburden to ore had greatly increased; technological improvements had not occurred to compensate for the worsening mining conditions.[13] Alumina production in Kazakhstan was projected to decrease in 1985 owing to an insufficient supply of raw material.[14]

The Tadzhik aluminum plant planned to increase production 21.4% in 1985 owing to the commissioning of a new potline. Secondary aluminum production at the Tashkent "Vtortsvetmet" plant in Uzbekistan was to be expanded.

A recommendation was made in an article in the Soviet nonferrous metallurgy journal "Tsvetnye metally" that aluminum production be started in northern Kazakhstan in the Ekibastuz-Pavlodar territorial-production complex based on energy from the Ekibastuz lignite deposit and alumina from the Pavlodar alumina plant.[15] A long history existed of plans for aluminum production in this region that had never been carried out.

Aluminum exports accounted for 65% of the total value of nonferrous metals exports, and aluminum exports were projected to increase.[16] In 1984, the U.S.S.R. agreed to export 10,000 tons of aluminum to India and agreed to increase aluminum exports to Finland during the 1986-90 period. The European Economic Commission decided that the case for Soviet aluminum dumping could not be substantiated for 1983, but was proved for 1982.

Regarding foreign trade and assistance, the Soviet Union was assisting Guinea, which was a major supplier of bauxite to the U.S.S.R., to expand bauxite production at the Kindia Mine. Elsewhere in Africa, the Soviet Union agreed to aid Ghana in the exploitation of a major bauxite deposit at Kiki in eastern Ghana and had been invited to make a feasibility study regarding the exploitation of other bauxite deposits. Discussions were held concerning a joint CMEA venture to develop bauxite deposits in Vietnam.

The Soviet Union and Greece signed an agreement for a joint venture for constructing an alumina refinery in Greece with output of up to 700,000 tons per year. The Soviets would take 380,000 tons per year and the Bulgarians possibly 200,000 tons per year for 10 years. The Soviet Union would pay for the alumina it was to import from Greece in hard currency or its equivalent in natural gas. The Soviet Union was also assisting North Korea in the construction of an aluminum plant at Pyongyang.

Antimony.—Reportedly, the 1984 plan for antimony production was being successfully fulfilled. The Kadamzhay antimony complex in the Kirgiz S.S.R. (Kirgiziya) exceeded its production plan for the first 4 years, 1981-84, of the 11th 5-year plan. The U.S.S.R. reported importing antimony from Romania and Yugoslavia.

Arsenic.—Arsenic production began at the Almalyk copper complex in Uzbekistan. This would enable the Almalyk complex to discontinue purchasing arsenic. The high price and scarcity of arsenic had led to the move.

Bismuth.—Byproduct bismuth production increased in 1983. It was reported in the Western press that in 1984 the U.S.S.R. was purchasing up to 200 tons of bismuth from Peru. The U.S.S.R. reported importing bismuth from Romania.

Cadmium.—The Leninogorsk polymetallic complex in Kazakhstan exceeded its 1983 plan for cadmium production. A new Waelz kiln at Leninogorsk was working at its design capacity for processing 700,000 tons of slag per year from which cadmium was extracted. It was reported in the Western press that Peru finalized details for the sale of 150 tons of cadmium rods to the U.S.S.R. with delivery to begin at the end of 1984. Also, the U.S.S.R. reportedly was making inquiries to purchase 100 tons of cadmium for 1985. The U.S.S.R. reported importing cadmium from Romania.

Chromium.—The Soviets exceeded their 1984 chrome ore production target by 50,000 tons, while in 1983, 42,000 tons of chrome ore above the planned target was produced. With technological improvements in metallurgy, chrome ore consumption could be reduced by one-half.[17]

In 1984, prospecting of the Almaz-Zhemchuzhina chrome ore deposit in Kazakhstan was completed. Kazakhstan, where the Donskoye chrome mining and beneficiation complex was located, produced 97% of the country's chromite. Kazakhstan contains 95% of the country's economic reserves. Unsatisfactory utilization of new capacity was occurring at the Donskoye complex.[18] At the mining directorate "Imeni 40 let Kazakhskoy S.S.R." of the Donskoye complex, a 2-million-ton-per-year ore crushing and grinding facility was put into operation. The finely ground ore was then sent to a plant for byproduct extraction. The commissioning of the second stage of the Molodezhnaya Mine at the Donskoye complex was planned for 1985. The first stage was commissioned in 1982 with a design capacity of 800,000 tons per year of ore averaging 45% to 51% chromium oxide; the final design capacity of the Molodezhnaya Mine was planned to be 2 million tons of ore per year.

In 1984, the Soviets reduced chrome ore exports. Japan, which was previously excluded from reduced exports, was now also receiving a reduced amount. The Soviet foreign trade organization Soyuzpromeksport, which was responsible for chrome ore trade, declared that the chrome ore export situation in 1985 would not be much changed from that of 1984, and that the Soviet Union would have only very limited tonnages to offer. Promsyr'yeimport, the foreign trade organization responsible for, among other things, exports and imports of ferroalloys, stated that it was currently exporting about 20,000 to 30,000 tons per year of bulk alloys, of which ferrochrome and ferrosilicon accounted for roughly equal parts. This statement appeared to refer only to exports to market economy countries.

Cobalt.—Cobalt was one of the few minerals for which the U.S.S.R. was import dependent. One-third of cobalt production was reported used in manufacturing cutting instruments.[19] Open pit mining accounted for about 65% of nickel-cobalt mining in 1980 but was expected to drop to 55% by 1985, as the major expansion of cobalt production was occurring from deep underground mines at the Noril'sk complex in East Siberia where ores containing cobalt, copper, nickel, platinum-group metals, and other byproducts were being mined. At the new Taymyr underground mine at Noril'sk, which was over 1,000 meters deep, ore output was projected to increase by one-third in the near future. In 1984, the Noril'sk Complex fulfilled its ore extraction plan. During the past 10 years, cobalt production at Noril'sk was reported to have increased 6.5%. The 1984 production plan for Noril'sk called for a 1.4% increase in cobalt production.[20] For the next 15 years, production at Noril'sk would come from rich ores, which would then be depleted in some mines, and it would then be necessary to add additional capacity to maintain production.[21]

The opening of the first production line was reported at Cuba's Punta Gorda plant, which was built as a result of a cooperative agreement between Cuba and the U.S.S.R. The plant, when fully operational, was planned to produce 30,000 tons per year of nickel-cobalt concentrate, a percentage of which would go to the Soviet Union in payment for its assistance. The Soviet Union along with other CMEA countries was cooperating in the construction of another 30,000-ton-per-year nickel-cobalt concentrate plant at Las Camariocas, 20 kilometers from Punta Gorda. One-half of the output from Las Camariocas would go to the participating CMEA countries.

Copper.—The rate of growth in copper consumption in the U.S.S.R. during the past decade was significantly higher than in the market economy countries.[22] In 1984, in Kazakhstan, which produced about 30% of the country's copper, the plan for copper ore extraction and copper production was not fulfilled,[23] although the 1983 plan for Kazakhstan had been fulfilled. In 1985, production of refined copper in Kazakhstan was expected to decrease owing to an insufficient supply of raw materials.[24] During the past 10 years, the copper content of ore in Kazakhstan had decreased by 20%.[25] Nationally, ore containing 0.2% copper was now considered economic. At Nikol'skiy in Dzhezkazgan Oblast', Kazakhstan, the first stage of the No. 3 concentration plant, part of the Dzhezkazgan copper mining and metallurgical complex, went into operation in 1984. The concentration plant was designed to produce copper, lead, zinc, and other metals from very low-grade ore that had not been exploited. In Kazakhstan, Mine No. 67 at the Dzhezkazgan complex was to be put into operation during 1985. In Uzbekistan, the Almalyk copper mining and metallurgical complex fulfilled its 1984 production plan, and in Armenia, the Alaverdi copper mining and metallurgical complex fulfilled its 1984 copper production plan.

The Balkhash copper mining and metallurgical complex, also in Kazakhstan, fulfilled its 1984 production plan. A Soviet-developed fluidized bed autogenous smelting shop was being installed at the smelter; work began in 1982 and was reported progressing slowly. The first smelter was scheduled for commissioning in 1984, but the schedule was not met. In expectation of the commissioning of the smelter, one of the reverberatory furnaces was dismantled. To maintain production at existing levels, it was then necessary to increase production at the three remaining reverberatory furnaces. During December, owing to a power shortage at the Balkhash mining and metallurgical complex, the complex was forced to shut down many of its basic operations, resulting in losses amounting to millions of rubles.

In the Urals, despite prospecting efforts, no progress was made in increasing the copper ore reserves[26] although an increase in copper ore extraction was reported in 1983. In 1984, the Gay copper mining and beneficiation complex in Orenburg Oblast' in the Urals successfully fulfilled its plan for ore extraction. At Gay, the second stage of the Glubokiye Gorizonti Mine, which was more than 800 meters deep, was being developed, and new ore extraction capacity was commissioned. In the Urals, the Degtyarka mining directorate, which consisted of the Gumeshevskiy, Krylatovskiy, and Degtyarka Mines, fulfilled its 1981-83 production plan as well as its 1984 production plan. The Uchaly mining and beneficiation complex in the Urals also fulfilled its 1984 plan for ore extraction.

On the Kola Peninsula, no success was achieved in expanding the reserves of high-grade copper-nickel ores. At the Moscow secondary smelter and refinery, a new installation for producing copper foil was put into operation. In Uzbekistan, expansion of extraction and processing capacity was planned at the Almalyk complex. In Armenia, the Alaverdi plant planned to install a shop for producing copper powder. During the 5-year period 1986-90, the Alaverdi plant was planned to become one of the major copper powder producers.

In 1984, the Noril'sk mining and metallurgical complex in East Siberia successfully fulfilled its ore extraction plan. During the past 10 years, copper production at Noril'sk was reported to have increased 45%.[27] At Noril'sk, for the next 15 years, production was to be from rich ores, which would then be depleted in some mines, and it would then be necessary to add additional capacity to maintain production.[28] Output from the recently commissioned Taymyr Mine at Noril'sk was projected to increase by one-third in the near future.

Copper exports in the future were projected to either remain stable or decrease.[29] The U.S.S.R. reported that during the 1986-90 period, copper exports to Finland would increase. The U.S.S.R. reported importing copper from Bulgaria and Yugoslavia. In 1984, the U.S.S.R. was supplying equipment to Bulgaria for developing the Assarel copper mining and beneficiation complex and for expanding the copper smelting complex in Srednogorie.

Ferroalloys.—Ferroalloys were being produced at 10 plants in the U.S.S.R. Reportedly, the entire growth in steel production was achieved without increasing consumption of the basic ferroalloys. Kazakhstan, which contained the Aktyubinsk and Yermak ferroalloy plants, produced 18% of the country's ferroalloys.[30] There were plans to construct a new East Siberian ferroalloy plant near the planned Srednyeyeniseyskiy hydroelectric powerplant to be built on the Yenisey River just below its confluence with the Angara River. The plant would be oriented toward producing ferromanganese and would obtain ore from the nearby Porozhinskoye deposit. Originally, the Nikopol deposit in the Ukraine was to be the source of manganese ore for this plant, but it was not now clear what percentage of ore, if any, would come from Nikopol.

According to a 1984 trade agreement with China, the U.S.S.R. was to export unspecified ferroalloys to China. Promsyr'yeimport, the foreign trade association responsible for exports and imports of ferroalloys, stated that its current exports of bulk alloys were about 20,000 to 30,000 tons per year, of which ferrochromium and ferrosilicon accounted for roughly equal parts. This statement appeared to refer only to exports to market economy countries.

Gold.—To maintain gold production in the future from placer deposits, the Soviets declared that it would be necessary to increase ore processing tenfold. In Magadan Oblast' in the Soviet Far East, where major Soviet placer mines were located and where lode mining was also being developed, the Ministry of Nonferrous Metallurgy declared that during the 12th 5-year plan period, 1986-90, it planned to double investment in this region in comparison with that of the 1981-85 plan period.

In 1984, in the Kirgiz S.S.R., construction of the Sary-Dzhazskiy gold mining and beneficiation complex in Issyk-Kul'skaya Oblast' continued. As part of a program of drilling deep and extra deep boreholes to determine mineral content within the country's main regions, drilling began of a 6,000- to 7,000-meter-deep borehole in the Muruntau region of Uzbekistan, which is known for its gold reserves. The hole was planned to reach a depth of 2,000 meters in 1986.

In 1984, Soviet gold sales rebounded to about 120 tons after having fallen to 60 tons in 1983, the lowest level of sales since the demonitarization of gold in 1971. The Soviet Union's Swiss-based Wozchod-Handelsbank, which provided one of the main outlets for Soviet gold sales to market economy countries, dismissed its chief gold dealer, a Swiss national, claiming that he "exceeded his authority." Improprieties were discovered during an internal audit. The bank apparently suffered substantial losses, and the Soviet Government stated that it would fulfill all of its commitments to the bank. In Africa, the U.S.S.R. agreed to aid Ghana in rehabilitating a gold refinery in Tarkwa and was assisting Ethiopia in constructing a gold extraction facility. The Soviet Union and Mali signed a draft cooperation agreement for Soviet assistance in expanding the Kalana gold operation.

Iron Ore.—The 1984 plan for iron ore production was fulfilled. At yearend, the third and final stage of the Kostamush complex in Karelia was commissioned. The complex was designed to produce a total of 9 million tons of pellets per year from 24 million tons of ore. Finland, which assisted in the construction of Kostamush, was to import 270,000 tons of pellets from the facility in 1984. An average of 1,700 Finns were employed at Kostamush during construction, and in the peak year, 1979, the figure was almost 4,000.

The majority of Soviet iron ore reserves are in the western part of the country. Kazakhstan contains only 12% of total reserves, and Siberia and the Soviet Far East, 10% of total reserves. Furthermore, the reserves in the eastern part of the country have lower iron content and are harder to concentrate. It was not expected that there would be discoveries of high-grade, easy-to-concentrate ores in the east.[31]

In the major iron ore producing region, the Krivoy Rog Basin in the Ukraine, which produced over 40% of national output, problems existed with the increasing depth of underground mining and of decreasing ore grades of the taconite-type ore accessible by open pit mining. Mines in the Krivoy Rog Basin accounted for 50% of underground ore output; approximately 15% of the country's total iron ore production was from underground mines. At underground mines in the Krivoy Rog Basin, ore was being extracted containing up to 53% iron, which could be used without beneficiation. This rich ore, however, was being rapidly depleted, and remaining reserves were of lower grade ores, only a small amount of which was being mined. In the Urals and Siberia, underground mining was also under way, but the ore was not as rich, containing 28% to 35% iron, and required beneficiation.

Expansion of mining capacity was occurring in the Kursk Magnetic Anomaly (KMA), which ranked first in iron ore reserves and produced over 15% of national output. During the year, capacity for extracting 2.5 million tons of iron ore per year and producing 1.7 million tons of concentrates per year was commissioned at the Stoylensk mining and beneficiation complex in the KMA, and the concentrate was shipped to the Novolipetsk steel mill. New iron ore extraction capacity was reported commissioned at the Lebedi mining and beneficiation complex in the KMA.

Plans for 1985 called for commissioning 500,000 tons of new ore extraction capacity per year at Lebedi and 1 million tons per year at the Mikhaylovaskiy mining and beneficiation complex, also in the KMA. Owing to mine renovation, capacity was planned to increase for 1985 by 1 million tons of ore per year at the Tsentral'nyy mining and beneficiation complex in the Krivoy Rog Basin. In addition, at Krivoy Rog, the CMEA countries were involved in a joint venture to construct the No. 6 concentrator for processing tailings with a capacity of 14 million tons of concentrates per year. In the eastern part of the country, there were plans for 1985 to commission 3 million tons of ore extraction capacity per year at the Kachar mining and beneficiation complex in Kazakhstan and 600,000 tons of ore extraction capacity per year at the Kazaskiy mining directorate in Kemerovo Oblast' in Siberia.

The proportion of sintered exports to total iron ore raw materials exports to market economy countries was increasing. The U.S.S.R. expected that in the future there would be a substantial increase in pellet exports to Japan. To accomplish this, the U.S.S.R. planned to construct additional facilities for pellet production and to construct a specialized wharf for shipment at one of the ports in the Soviet Far East.

Iron and Steel.—In 1984, production of crude steel, rolled steel, and steel pipe increased in comparison with that of 1983, but only the plan for steel pipe production was fulfilled. There were plans to increase production of rolled steel to 109.4 million tons and steel pipe production to 19.7 million tons in 1985. To improve steel production, plans called for increasing the production of high-quality steels, which was not adequate for meeting national needs. It was intended to rapidly introduce continuous casting, which in 1984 accounted for 12.4% of steel production, and to replace open hearths with oxygen converter and electric furnaces. Steel production by process in

1984 was as follows, in percent:

Open hearth	57.0
Oxygen converter	31.6
Electric	11.2
Bessemer	.2
Total	100.0

During the 1981-85 plan period, the Soviets announced plans to construct four minimills that would make use of local scrap. The mills were to consist of electric furnaces, continuous casters, and a rolling mill. The sites selected for the four mills were Zhlobin in the Byelorussian S.S.R. (Byelorussia), Rybnitsa in the Moldavian S.S.R. (Moldavia), Komsomol'sk-na-Amure in the Soviet Far East, and Petrovsk in Chita Oblast' in East Siberia. It appeared that plans to build the Petrovsk plant were postponed. Two of the minimills, the Zhlobin and Rybnitsa, were put into operation in 1984.

The Zhlobin minimill, which was built on a turnkey basis by Austria's Voest-Alpine AG (VA), subcontracted by firms from the Federal Republic of Germany, Italy, and other West European countries, had a design capacity of 700,000 tons of raw steel per year, 500,000 tons of which was to be made into mill products and 200,000 tons of which was to be made into castings. Output from Zhlobin would be adequate for supplying the Byelorussia construction industry. The minimill at Rybnitsa, which would employ 2,400 workers, had the same capacity and output as the Zhlobin mill and was built with the assistance of the German Democratic Republic's Sket firm. Sket was also assisting in the construction of the minimill at Komsomol'sk na Amure, which was scheduled to be commissioned in 1985 with a capacity to smelt 700,000 tons of steel per year.

At the Oskol plant, the country's first direct-reduction-based steelworks, which was under construction near Kursk, two 150-ton electric furnaces were put into operation. There were plans to equip the first shop with four electric furnaces. Also, initial production was reported in June from the first Midrex module, which was officially commissioned in 1983. It was the first of an eventual 12 Midrex modules planned. Oskol, upon achieving full capacity, would become the world's largest direct reduction plant. When operating at full capacity, the Oskol plant was projected to employ 15,000 workers. Also, in 1984, the first stage of a plate mill at the Zhdanov "Il'ich" steel mill was commissioned as was a new tinplate shop at the Karaganda steel mill.

The country's pig iron production was affected by a shortage of coke. The average expenditure of coke per ton of pig iron was 540 to 550 kilograms, which was high in comparison with that of a number of market economy countries.[32] To economize on coke usage, the Soviets introduced a process for using pulverized coal to produce pig iron. Coal dust from low-grade coal was to be injected into a blast furnace designed for this purpose. In 1984, the Soviets commissioned the sixth coke battery with a capacity of 445,000 tons of coke per year at the Kommunarsk coke and chemicals plant; they also commissioned the third coke battery with a capacity of 1 million tons per year at the Altay coke and chemicals plant. There were plans to commission the fourth 1-million-ton-per-year coke battery at the Altay plant in 1985.

In foreign trade, Austria's VA was awarded a contract to build a steel cord plant in Zhlobin, Byelorussia, where VA built the minimill commissioned in 1984. The steel cord plant would be supplied by the minimill, and was scheduled for completion by the end of 1986. The cord would be used for making tires.

The Soviet Union signed an agreement with Mexico to provide technical assistance to help Mexico upgrade its steel industry. In exchange, the U.S.S.R. would receive steel products, of which the main one was expected to be steel pipe. Also, the Soviet Union signed an agreement to supply a coke oven battery for Finland's Raahe steelworks. The project was scheduled for completion by the end of 1987. In 1984, the U.S.S.R. continued to import several million tons of steel pipe from countries such as the Federal Republic of Germany, Italy, and Japan, and had signed contracts for pipe imports for 1985.

The Soviet Union in 1984 planned to export 500,000 tons of rolled steel products to China according to a representative of the Soviet foreign trade association Promsyr'yeimport. This amount would be double the amount exported in recent years and would mark a return to the volume of steel trade that existed before the cooling of relations between the countries in the 1960's.

Lead and Zinc.—For the second year in a row, a shortage of zinc in the national economy was reported.[33] In Kazakhstan, which produced 70% of the country's lead and 50% of the country's zinc, the plans for lead and zinc mining and smelting were not fulfilled.[34] In 1983, Kazakhstan was able to fulfill its plans for lead and zinc production and in 1982 had also reported an increase in lead and zinc production. In Kazakhstan, during the past 10 years, the lead content of ore decreased 40% and the zinc content 90%.[35]

In Kazakhstan, the second stage of the Waelz kiln was put into operation at the Leninogorsk polymetallic complex in 1984; the Waelz kiln had a design capacity for processing about 700,000 tons of slag per year from which more than 90,000 tons of lead and zinc per year could be produced. The Leninogorsk complex reported exceeding its 1983 plan for zinc production.

The Ust'-Kamenogorsk complex in Kazakhstan exceeded its 1984 plan for lead and zinc production, and planned to increase output 3.9% in 1985. The Ust'-Kamenogorsk complex was the country's leading zinc producer, and in addition, produced more than 24 different byproducts including bismuth, cadmium, indium, tellurium, and thallium; these byproducts made up more than 50% of the complex's output. The Achisay lead-zinc mining and beneficiation complex in Kazakhstan fulfilled its plan for the first 4 years, 1981-84, of the 11th 5-year plan.

Development began of the new Maleyevskiy Mine at the Zyryanovsk complex in Kazakhstan. The first stage of the new mine was scheduled to go into operation in 1988. When the Maleyevskiy Mine reached capacity, output at Zyryanovsk was projected to double. At the Irtysh, Leninogorsk, and Zyryanovsk complexes in Kazakhstan, the richest ore was depleted. In 1984, the Tekeli complex in Kazakhstan reported not being able to achieve its target for zinc concentrate production owing to the low metal content of the ore. Problems in lead and zinc mining reportedly affected the work of the metallurgical enterprises in Kazakhstan.[36]

New mining facilities were commissioned at the Adramanskiy lead-zinc complex in the Tadzhik S.S.R. (Tadzhikistan). The new facilities were reported comparable to a new mine. They consisted of an inclined transport shaft extending more than 2 kilometers below the surface, vertical and horizontal workings, ore chutes, and a loading station. When these facilities were operating at full capacity, the output of ore would reportedly double.

The completion of an 800-meter adit occurred at the Sadonskiy zinc complex in Severnaya Ossetiya. Sadonskiy was in the mountains of the central Caucasus, 3,000 meters above sea level. The zinc would be processed by the Elektrotsink plant in Severnaya Ossetiya.

In the Urals, the Degtyarka mining directorate, which mined copper-zinc ore, fulfilled its plan for the 1981-83 period, and exceeded its production plan for 1984. Also, the Gay and Uchaly copper-zinc mines in the Urals successfully fulfilled their 1984 ore extraction plans as did the Salair lead-zinc mine in Siberia. Exploration was completed at the Kholodinskoye lead-zinc deposit in the Buryat A.S.S.R.

In Kazakhstan, for 1985, the Government intended to put into operation a Kivcet-CS smelter at the Ust'-Kamenogorsk lead-zinc complex, to commission new extractive capacity at the Achisay, Irtysh, and Zyryanovsk complexes, and to begin production at the Zhayremsk lead-zinc complex. In the Georgian S.S.R. (Georgia), at the Kvaisi lead-zinc enterprise, production was projected to increase 50% by 1986 owing to the start of exploitation of a new deposit.

Lead and zinc exports in the future were expected to remain at their current level or decrease.[37] The U.S.S.R. agreed to export 15,000 tons of zinc to India during the 1986-90 period and agreed to increase exports of lead to Finland. The U.S.S.R. signed a contract with Sweden's Boliden AB to import 70,000 tons of zinc concentrate over a 4-year period. The meeting of the third Soviet-Mexican joint commission on trade ended with the signing of a protocol calling for the U.S.S.R. to increase, among other things, its purchases of lead and zinc concentrates in exchange for tractors, drilling installations, and other machinery. The U.S.S.R. reported importing lead and zinc from Bulgaria and Yugoslavia. The U.S.S.R. supplied Bulgaria with equipment for the construction of the Erma River lead-zinc mining and beneficiation complex and assisted Yugoslavia in expanding capacity at the Toranica lead-zinc ore mining and beneficiation complex to 600,000 tons of ore per year. In Africa, the U.S.S.R. reported assisting the Congo in developing lead-zinc mining and beneficiation.

Magnesium.—In September, the 1984 plan for magnesium production was reported being successfully implemented. During 1984, growth in metal output occurred at the Ust'-Kamenogorsk titanium-magnesium complex in Kazakhstan, and Ust'-

Kamenogorsk successfully fulfilled its plan for the first 3 years, 1981-83, of the 11th 5-year plan for magnesium metal production. However, the Ust'-Kamenogorsk complex was experiencing a shortage of carnallite, which was not being supplied by the Ministry of Mineral Fertilizer Production. Carnallite used in magnesium production at Ust'-Kamenogorsk was shipped from the potash producing enterprises in the Urals. Lack of raw material resulted in the new magnesium production facilities at Ust'-Kamenogorsk standing idle, and prospects for improving the situation were declared not in sight for the 1986-90 plan period.[38]

Manganese.—The 1984 plan for manganese production was reported fulfilled. Concentrate production from the Nikopol Basin in the Ukraine remained at its 1983 level of 7.2 million tons, and concentrate production from the Chiatura Basin in Georgia increased 7% to 2.8 million tons. Manganese was one of several alloying elements that were in short supply, and with technological improvements, it would be possible to reduce manganese consumption by one-half.[39]

In the Ukraine, the Nikopol Basin contained the Ordzhonikidze and Marganets manganese mining and beneficiation complexes. At the Ordzhonikidze complex, there were eight open pits in operation. At the Marganets complex, there were 2 open pits and underground mines in operation. In 1984, the second stage of underground mine No. 9/10 was put into operation. Mine No. 9/10 was to be the largest underground mine in the Nikopol Basin, with a planned total production of 1.9 million tons of ore per year.

Development was planned of the Bol'shoy Tokmak deposit in the Nikopol Basin; plans called for development at Bol'shoy Tokmak of at least five underground mines and two open pits.

In Georgia, work was completed at Chiatura on bringing into operation an open pit with a capacity of 200,000 tons of concentrate per year. During 1985, another new mine was to be put into operation at Chiatura with a capacity of 125,000 tons of concentrate per year. The Zestafoni ferroalloys plant in Georgia introduced a process for producing ferroalloys based on calcium, manganese, and silicon. This process would make use of relatively low-grade carbonate ore from the Chiatura deposit. Renovation was also scheduled at the Zestafoni ferroalloys plant.

Plans for the construction of the new East Siberian ferroalloys plant were reported; it was to be near the planned Srednyeyeniseyskaya hydroelectric powerplant, which was to be built on the Yenisey River just below its confluence with the Angara River. The ferroalloys plant would be oriented toward ferromanganese production. It was originally intended to ship ore thousands of kilometers from the Nikopol Basin, but it was now declared possible to obtain suitable ore from the nearby Porozhinskoye deposit.[40] It was not clear now what percentage of ore, if any, would come from the Nikopol deposit. Exploration work was completed at the Porozhinskoye deposit, and exploration was progressing on an additional manganese ore base in Kazakhstan.

An official of the Soviet foreign trade association Soyuzpromeksport, which was responsible for manganese ore trade, stated that Soviet manganese imports stemmed from a combination of the depletion of traditional sources, a rise in domestic demand, and increased requirements for higher quality materials.

Soviet imports of manganese ore in 1984 were estimated at about 340,000 tons with imports from Australia, Brazil, and Gabon. However, it was speculated by Western trading sources that Soviet imports could have been as high as 500,000 tons. Future Soviet imports were also a subject of speculation. Soyuzpromeksport gave conflicting signals, indicating at different times that during 1985, imports would remain at their 1984 level, and to the contrary, that they would be significantly reduced from their 1984 level. Soyuzpromeksport also stated that the U.S.S.R. had only a limited surplus of ferromanganese, which it exported to its CMEA partners, and that no additional ferromanganese above the current level would be available for export for several years.

Nickel.—The 1984 plan for nickel production was fulfilled. Open pit mining accounted for 65% of nickel-cobalt production in 1980, and by 1985, it was anticipated that the share of open pit mining would drop to 55% owing to the fact that the major increase in nickel output was projected to come from deep underground mines at Noril'sk. During the past 10 years, nickel production at Noril'sk had increased 50%.[41] The 1984 plan for Noril'sk had called for a 2.5% increase in nickel production, and Noril'sk reported successfully fulfilling the plan. The new 1,000-meter-deep Taymyr Mine at Noril'sk, which began operation in

1983, was projected to increase its output by one-third in the near future. For the next 15 years, production at Noril'sk would be from rich ores, which would then be depleted in some mines, and it would then be necessary to add additional capacity to maintain production.[42]

At the Monchegorsk complex on the Kola Peninsula, a nickel production facility was put into operation that would reportedly increase metal production by almost 50% in 1985. The Pechenga nickel complex, also on the Kola Peninsula, did not fulfill its 1983 production plan, but was successful in fulfilling its 1984 plan. Despite prospecting efforts, no success was achieved in increasing the high-grade nickel ore reserve base on the Kola Peninsula.[43] The Soviet Union was attempting to increase its nickel cathode cutting capacity. Soviet practice was to internationally market full plate nickel cathode; the additional cut cathodes could be used for export as well as domestically.

Despite initial reports that the Soviets were reducing nickel sales to market economy countries in 1984, it appeared that 1984 sales to market economy countries were at approximately their 1983 level. Nickel exports in the future were projected to increase.[44]

The first production line was reported opened at Cuba's Punta Gorda nickel plant, which was being built with Soviet assistance. The plant, when fully operational, would produce 30,000 tons per year of nickel-cobalt concentrate per year, a percentage of which would be sent to the Soviet Union in exchange for its assistance. The Soviet Union and other CMEA countries were also assisting in the construction of another 30,000-ton-per-year nickel plant at Las Camariocas, 20 kilometers from Punta Gorda. One-half of the output from Las Camariocas would be sent to the countries assisting in the construction.

Platinum-Group Metals.—It was claimed that the U.S.S.R. was the world's largest producer of platinum-group metals.[45] The major increase in platinum-group metals production was to come from the Noril'sk complex in East Siberia. In 1984, the Noril'sk complex fulfilled its plan for ore extraction. The 1,000-meter-deep Taymyr Mine at Noril'sk, which began production in late 1983, was projected to increase its output by one-third in the near future. For the next 15 years, production at Noril'sk was projected to come from rich ore, which would then be depleted in some mines, and it would then be necessary to add additional capacity to maintain production.[46] In 1984, it was estimated that Soviet platinum exports decreased to 200,000 troy ounces, but that palladium exports increased to 1.5 million troy ounces.

Rare Metals.—The 1984 plan for rare metals production was fulfilled. There was a shortage of cadmium, columbium, molybdenum, tungsten, and vanadium for alloying purposes.[47] Reportedly, the Ust'-Kamenogorsk titanium-magnesium complex was the largest producer of vanadium pentoxide among the country's titanium-magnesium enterprises, producing as much vanadium pentoxide as these other enterprises combined. In the area of foreign assistance, the U.S.S.R. was assisting Mozambique in operating and modernizing an enterprise producing tantalum concentrates from the Morrua deposit.

Tin.—In September, it was announced that the 1984 plan for tin production was being successfully implemented. Development began of a third mine at the Khingan tin mining complex in Birobidzhan Jewish Autonomous Oblast' in the Soviet Far East.

Development of a tin mining complex was being planned in the Kirgiz S.S.R. It was deemed necessary to accelerate tin development at the Yultin and Solnechnyy tin mining complexes in the Soviet Far East.

Over 50% of the country's prospective tin reserves are in Yakutia, a region that was made more accessible with the opening of additional Siberian railway lines. Possibilities for increased production also existed through improving processing technology, as the complaint was raised that currently one-third of the tin content of ore was lost in beneficiation.[48]

The Soviet Union offered to build a new tin volatilization plant capable of processing low-grade concentrate for Bolivia's state-run tin production corporation, Corporación Minera de Bolivia (COMIBOL). The Soviet Union also offered to assist in the development of COMIBOL's Bolivar Mine.

Titanium.—In September, it was announced that the 1984 plan for titanium production was being successfully implemented. The Ust'-Kamenogorsk titanium-magnesium complex in Kazakhstan exceeded its 1984 production plan and also had fulfilled the plan for the first 3 years, 1981-83, of the 11th 5-year plan. The Irshansk titanium mining enterprise in the Ukraine also fulfilled its 1984 production plan.

Large dumping margins were found on

titanium sponge imported into the United States from the Soviet Union during the period August 1, 1982, through July 31, 1983. The 150,000 pounds of sponge imported from the U.S.S.R. during the review period was assessed penalties equal to the dumping margin of 83.69% of the price paid. Subsequent imports of Soviet titanium sponge were subject to a deposit equal to the antidumping margin until publication of the results of the next annual review period from August 1, 1983, to July 31, 1984. Annual reviews of sponge imports from the U.S.S.R. were made as a result of a 1968 antidumping order. No U.S. imports for consumption of titanium sponge had been reported since the third quarter of 1983.

It was reported in the Western press that in 1985 the Soviet Union would reduce ferrotitanium exports to West European markets with indications that there would be a 30% reduction in supply. The Soviets stated that the cutbacks were due to increased domestic demand and market considerations. It was also reported that titanium scrap from the Soviet Union was in short supply.

Tungsten.—Native tungsten sources are not adequate for supplying the growth in tungsten consumption, and the U.S.S.R. was a tungsten importer.[49] Tungsten was declared in short supply for alloying purposes. There was a scarcity of tungsten steels, and their efficient use in metal cutting tools was declared a pressing need for the national economy.[50] Reportedly, one-third of the country's tungsten production was used to manufacture cutting instruments.[51] It was declared a priority matter to produce hard alloys for metal cutting instruments that did not contain tungsten. Such hard alloys currently comprised only 1.9% of total production.[52] It was stated that it was also necessary to develop technology for recycling tungsten.

In Kazakhstan, work began on the new Kayraktin mining and metallurgical complex, which was to be based on renovation of Verkhne-Kayraktin mining facilities; the concentration plant had already been completely renovated. Additional tungsten production capacity was commissioned in the Soviet Far East. The Nal'chik tungsten metal plant in the North Caucasus fulfilled its tungsten production plan for the first half of 1984. The first stage of a tungsten powder plant was brought to design capacity at the Ordzhonikidze plant, which was planned to become a major supplier of improved quality tungsten. The Tyrny-Auz tungsten complex in the North Caucasus reported significantly improving its production in comparison with that of 1983. The Akchatau tungsten-molybdenum complex in Kazakhstan reported surpassing its 1984 ore extraction plan. The Akchatau complex faced the problem of increasing ore concentration capacity.

The Soviet Union reentered the Western tungsten concentrate market in July for the first time since mid-1982 to buy 2,000 to 3,000 tons of wolframite. It had previously obtained most of its wolframite needs from China. North Korea also supplied tungsten to the Soviet Union. Owing to the Soviet Union's practice of sporadically entering the market to buy concentrate, the Soviet Union was considered a destablizing factor in the world tungsten market.

NONMETALS

Bromine-Iodine.—At the Neftechala iodine-bromine plant in Azerbaidzhan, the first stage of renovation of this enterprise was completed and a new workshop was put into operation. At the Nebit-Dag iodine-bromine plant in the Turkmen S.S.R. (Turkmenistan), there were plans to install an experimental-industrial facility during the 1986-90 period to extract a number of other elements from the natural iodine-bromine solutions. It was estimated that there are 250 grams of salts of various elements such as boron, calcium, magnesium, and sodium per liter of iodine-bromine water. Only iodine and bromine were being produced at the Nebit-Dag plant and at similar iodine-bromine operations.

Clays.—The U.S.S.R. planned to construct 10 plants for cleaning and preparing bentonite for drilling muds near the Astrakhan sour gas deposit, which was under development. Warman International GmbH received an order to supply 62 pumps to a West German company that would reexport them to the U.S.S.R. for use in the plants. The Angren Coalfield in Uzbekistan, it was claimed, contains 42% of the country's kaolin reserves, but the reserves were not being exploited. The Angren area produced only coal, but the possibility of exploiting the kaolin was under discussion.

Cement.—Complaints were raised about long delays in the construction of cement plants using the energy-efficient dry processing method. Leading officials of the Ministry of the Construction Materials Industry were criticized. Owing to the lag in construction of dry process cement plants, the

U.S.S.R. expanded 50% more fuel per ton of clinker than its CMEA partners in Czechoslovakia, the German Democratic Republic, and Hungary, despite the fact that it was claimed that the first kiln for dry processing was constructed in the Soviet Union, earlier than in France, Japan, the United States, and other countries.[53]

Diamond.—At the Mirnyy diamond deposit in Yakutia, the upper level of the open pit was widened to create conditions for mining at a greater depth. The pit was now reported to be several hundred meters deep. The Yakutia diamond mining association announced the discovery of a high-quality, 71.55-carat diamond, which it named "Indira Gandhi." A diamond mining complex on the banks of the Lena River was reopened after a long shutdown for renovation and for installation of purification filters to prevent water pollution.

It was reported in the Western press that Soviet diamond exports increased in 1984, causing a drop in world diamond prices. Soviet diamonds were reported to have sold at levels from 5% to 10% and even lower below market prices. The Soviets reported that during the past 15 years Soviet diamond sales to Hungary increased greatly.

Fluorspar.—The U.S.S.R. imported over 50% of its fluorspar from Mongolia. Fluorspar mining in Mongolia was conducted by the joint Soviet-Mongolian company, Mongolsovtsvetmet, in which the Soviets had a declared 92% interest. Practically all of Mongolia's fluorspar output was shipped to the Soviet Union. The U.S.S.R. was assisting Mongolia in expanding the Berh fluorspar mine and in constructing the Borondor fluorspar ore dressing plant. During the 1986-90 period, the Kerulen mining and beneficiation complex in Mongolia with a capacity of 400,000 tons of fluorspar per year was to be commissioned. In Uzbekistan, reportedly, based on existing reserves in Tashkent Oblast', it was deemed feasible to maintain fluorspar production at the Toytepa mill for an extended period of time.

Graphite.—The Zaval'yevskiy graphite complex in the Ukraine produced 60,000 tons of crystalline graphite per year, which amounted to 75% of the Soviet Union's graphite output. With a total output of 80,000 tons per year, the Soviet Union was the world's second largest producer of graphite. The graphite content of the ore in the Zaval'yevskiy deposit ranges from 5% to 8%, occasionally reaching 12%.

The Zaval'yevskiy complex consisted of an open pit, a beneficiation plant, and a chemical purification plant. Until 1969, the Soviet Union produced graphite containing less than 97.5% carbon, which inhibited the use of Soviet graphite in accumulators, electric brushes, electrocarbons, lubricants, and synthetic diamond production. However, using chemical purification techniques, the Zaval'yevskiy complex produced 3,500 tons of high-quality graphite containing 99% to 99.9% carbon per year.

For the past 24 years, graphite production at Zaval'yevskiy had increased steadily despite occasional small drops in production, most recently in the early 1980's when a fall in production coincided with a curtailment of exports to major Western markets (from 3,261 short tons of graphite to the United States in 1980 to none in 1982 and from 5,056 short tons to Japan in 1980 to 112 short tons in 1982).

Gypsum.—Although during the past 20 years cement production doubled, there had been practically no increase in gypsum production. The Soviet Union produced 18 tons of gypsum per 1,000 persons, compared with an average of over 60 tons of gypsum per person in some advanced industrial countries.[54]

It was considered necessary for the gypsum industry to make more extensive use of the phosphogypsum that results from the production of phosphoric acid by wet processing. Approximately 13 million tons of phosphogypsum per year was sent to waste dumps. The total supply in dumps exceeded 100 million tons, but only about 200,000 tons of phosphogypsum per year was being used for construction purposes owing to problems in removing harmful impurities. It was stated that the U.S.S.R. was considering the possibility of exporting phosphogypsum.[55]

Lime.—Approximately 20% to 22% of the national output and 40% to 42% of the Ukraine's output of fluxing raw materials was produced by the Komsomol'skiy mining directorate in the Ukraine.[56] The mining directorate, created in 1934, was based on the Karakubskoye high-quality limestone deposit and used open pit mining. Processing of the limestone occurred at two crushing and beneficiation plants. Production capacity in 1983 at the No. 1 plant was 9.88 million tons per year and at the No. 2 plant, 4.94 million tons per year of marketable fluxing limestone.[57]

The Degtyarka mining directorate in the Urals, which mined copper-zinc ore, consisted of three underground mines as well as an open pit mine with a capacity of 700,000 tons per year of limestone, two crushing and sorting plants, and a calcining plant, which consisted of six shaft furnaces, of which five were in continuous operation and one in repair. Each furnace had a design capacity of 88 tons per 24-hour period, and the plant produced 160,000 tons of quicklime per year. The Degtyarka directorate exceeded its 1984 production plan and fulfilled its plan for the 1981-83 period.

Mica.—At the Orlovskiy mining and beneficiation complex in Chita Oblast', which open pit mined tungsten and tantalum from the Spokoyenskoye and Orlovskoye deposits, it was pointed out that use was not being made of the muscovite found in this ore. It was reported in the Western press that the U.S.S.R. concluded a contract with India for the import of mica valued at 100 million rubles and that it was expected that the U.S.S.R. would conclude an additional contract for mica supplies worth about 40 million rubles.

Nitrogen.—During 1984, the Government planned to put five 450,000-ton-per-year ammonia complexes into operation. Reportedly, a 450,000-ton-per-year unit went into operation at the Nitrogen Association in Kemerovo, and during the fourth quarter of 1984, similar complexes were to be put into operation at the Cherepovets nitrogenous fertilizer plant, the nitrogenous fertilizer production association in Dneprodzerzhinsk, the Gorlovka styrene production association, and the Nitrogen Association in Grodno. However, of these four complexes, it appeared from reporting in the Soviet press that only the complex in Dneprodzerzhinsk was actually put into operation.

Regarding other facilities, the first stage of a nitrogenous fertilizer plant with a capacity of 750,000 tons of ammonium nitrate per year was commissioned near the town of Mary in Turkmenistan. Reportedly, later in the year, the second complex for producing liquid ammonia with a capacity of 200,000 tons per year was put into operation at the Turkmen nitrogenous fertilizer plant. At the Odessa dockside plant, "Priportovoy zavod," a 330,000-ton-per-year urea installation was put into operation, and first output was reported from a 330,000-ton-per-year urea plant at the Angarsk petroleum organic synthesis association in Irkutsk Oblast', Siberia. Startup was reported of a 150,000-ton-per-year urea facility at the Severodonetsk nitrogenous fertilizer association.

The Soviet Union had been increasing nitrogen fertilizer exports, with the greatest growth being in urea exports, which more than doubled between 1980 and 1983. The U.S.S.R. underwent a large expansion in urea production in the last 7 to 8 years, which was almost completed. Increased Soviet urea exports coincided with a slump in international urea prices. According to the Soviet foreign trade association Soyuzpromeksport, which was responsible for urea trade, Soviet urea exports were expected to remain in the 3-million-ton-per-year range for some time.

Perlite.—Approximately 2.5 million cubic meters of expanded perlite and 600,000 cubic meters of products made from it were produced at 65 enterprises, the largest of which was the Mytishchi Stroyperlit complex, which produced more than 300,000 cubic meters of expanded perlite per year. The U.S.S.R. reported that in the past 10 years, production of expanded perlite had almost doubled, but there had been almost no change in quality or product mix. The majority of expanded perlite was produced in vertical ovens in the form of fine, light granules of up to 1.25 millimeters in size and was used in perlite aggregate concrete refractories for boiler linings in electric powerplants. The production of large-size granules for use in lightweight concrete construction components had not taken place on a large scale owing to technological problems, although the need for this material was said to be great. To solve this problem, a new process was successfully tested at the Dmitrovsk thermal insulating perlite products plant to produce large expanded perlite granules using a fluidized-bed-type furnace. The Dmitrovsk plant was subsequently undergoing renovation to install this technology.

Phosphate.—The U.S.S.R. claimed to have the third largest reserves of phosphate raw material in the world, following Morocco and the United States.[58] Nevertheless, the U.S.S.R. faced a possible shortage of phosphate raw materials with the rapidly increasing demand for phosphate. The two major centers for phosphate production in the U.S.S.R. were the Khibiny apatite complex on the Kola Peninsula and Karatau complex in Kazakhstan. The largest producer, the Khibiny apatite deposit, could soon be nearing peak production, and then could experience a decrease in production. Khibiny accounted for 70% of all phosphate ore mined and 80% of all phosphate used in fertilizer production. It also accounted for practically all exports of phosphate rock. The Karatau complex produced about 90% of the raw material used to produce elemental phosphorus and about 40% of the raw material used to produce phosphate feed.

At the Apatit complex on the Kola Peninsula, a third concentrator was put into operation. It was designed to process lower-grade ores from the Koashva and N'yurpakh open pits. First output from N'yurpakh was reported. The initial capacity of the No. 3 concentrator was 300,000 tons per year. Work was progressing on completion of the first stage of the concentrator, which, when completed, would have a capacity of 1.2 million tons per year. At the Apatit association, it was planned to increase production from 18 million tons of concentrate in 1984 to 19 million tons of concentrate in 1985, thus achieving its planned goal. In an environmental issue, officials at the Apatit complex were accused of dumping untreated waste water into Lake Imandra and of not being truthful regarding the installation of a purifying system for the complex's waste water.

Based on current explored reserves at Karatau, the second largest phosphate producing region, production would not be adequate to compensate for increasing demand and the peaking of production at Khibiny.[59] At the Karatau complex, three open pits were being developed along with the Aksay underground mine. Reportedly, if planned new capacities were commissioned by 1985, phosphate rock production at Karatau would increase to 11 million tons per year. Problems, however, were occurring in the construction of a beneficiation plant and a calcining plant. For Karatau to reach its production potential, it must solve technological problems in ore extraction and processing.[60] Ore from Karatau was among the most difficult to concentrate, and a large percentage of the reserves are in deep horizons, which necessitates the extensive use of underground mining. Over 80% of the ore was being surface mined. Nevertheless, Karatau ore has a higher phosphate content and presents more favorable mining conditions than ore from other parts of the country.[61]

The Chilisay phosphorite basin in Aktyubinsk Oblast' was under development and was to be a major center of phosphorite production; the first stage of the Chilisay complex was planned to produce 700,000 tons of phosphate concentrate per year from 3 million tons of ore per year.

The Soviet Union signed a trade agreement with Morocco for the 1985-90 period in which the U.S.S.R. pledged to increase purchases of phosphate rock, superphosphoric acid, and phosphate fertilizers. The U.S.S.R. in exchange would supply Morocco with ammonia, nitrogen, and potassium fertilizers and a variety of other goods. In 1984, the U.S.S.R. was assisting Vietnam in expanding the capacity of the Lam Thao superphosphate plant from 120,000 tons per year to 300,000 tons per year.[62]

Potash.—In April, the Byeloruskaliy potash association began production of potassium sulfate with the commissioning of a 50,000-ton-per-year unit. Previously, the country was producing little sulfate, but agricultural requirements called for chlorine-free potash. The new unit should reduce imports of potassium sulfate from Europe. First production of byproduct granular potash began at the Kirovabad alumina plant in Azerbaidzhan, which processed alunite to make alumina. The plant, reportedly, would produce 120,000 tons per year; although unspecified, this would probably be product. At Karlyuk in Turkmenistan, a 700,000-ton-per-year potash solution mine with solar evaporation was being developed. In 1984, at Karlyuk, an experimental-industrial installation reportedly was put into operation for leaching potassium salts.

The U.S.S.R. reported that the Ventspils port in Latvia was being modernized to handle increased potassium chloride exports.[63] In March, U.S. potash producers filed a complaint with the U.S. International Trade Commission and the U.S. Department of Commerce that four countries including the Soviet Union were dumping potash in the United States. The complaint alleged that potash sales from these countries were being subsidized and that U.S. producers were injured by these sales. An investigation of this complaint took place, and it was concluded that Soviet potash exports to the United States did not damage the U.S. potash industry. In 1984, Soviet potash exports equaled 5.345 million tons of potash fertilizer, equivalent to approximately 2.261 million tons potash equivalent, which was an 8% increase in comparison with 1983 exports.

Salt.—Although the U.S.S.R. was the world's second largest salt producer, shortages of salt were reportedly inhibiting the development of oil extraction, rubber production, and thermal electric power generation.[64] Problems in salt production were attributed to the low level of technology at all stages of salt mining, beneficiation, and processing. Problems existed in the limited assortment of the product mix and in salt transport as the number of rail cars and ships designed for salt shipment was not adequate.[65] Despite the fact that the majority of salt produced in the U.S.S.R. was not used for food, the majority of salt production occurred at enterprises subordinate to the Ministry of Food Processing Industry. Approximately 15% of the country's salt production occurred at enterprises subordinate to the Ministry of Mineral Fertilizer Production. Salt production also occurred at enterprises subordinate to other ministries including the Ministry of the Chemical Industry and the Ministry of the Lumber, Pulp and Paper, and Wood Processing Industry. Approximately three-fourths of the country's salt production occurred at two places, the Artemsol' production association in Donetsk Oblast' and the Bassol' complex in Astrakhan Oblast', which produced salt from Lake Baskunchak. This concentration of production greatly aggravated transport problems.[66]

In the largest Soviet Republic, the Russian S.F.S.R., there had been practically no increase in salt production in recent years. Development of the Tyretsikiy mining directorate in the Russian S.F.S.R., which was planned to supply developing regions of Siberia and the Soviet Far East, had been considerably delayed, which was contributing to the supply problem. It was recommended that salt mining be initiated at a number of rich salt deposits located throughout the U.S.S.R. to both increase production and alleviate transport problems. In addition, much byproduct salt was being wasted and sent to dumps by potash producing enterprises in the Urals and Byelorussia. It was further recommended that all salt production be subordinated to a single ministry rather than several ministries.[67]

Sulfur.—Byproduct production of sulfur constituted 40% of all sulfur production. In 1980, sulfur from natural gas had accounted for 27% of total sulfur produced. Reportedly, sulfur produced as a byproduct of nonferrous metal smelting accounted for 4% of total sulfur production and 25% of sulfuric acid production. Sulfur produced as a byproduct of steel production accounted for 1% of total sulfur production, and sulfur produced as a byproduct of the petrochemical industry accounted for 5% of total sulfur produced. Only about 7% to 10% of the sulfur in crude oil was recovered, and this accounted for only a very small amount of sulfur production.[68]

The nonferrous smelting industry recovered from 41% to 58% of the gaseous sulfur dioxide available from processing. The steel industry utilized from 48% to 57% of the available gaseous hydrogen sulfide. The Ministry of the Coal Industry did not recover sulfur from gases. Sulfur was not otherwise recovered from low-sulfur oils, slags, metals, gases, slimes from open-hearth furnaces and agglomerate plants, phosphogypsum, bitumen, shale, and other sources. In nonferrous smelting, the highest percentage of sulfur recovery was in the lead-zinc industry where 80% of the sulfur was recovered. The lowest percentage was in the nickel-cobalt industry where only 7% was recovered. In steel production, of the total amount of sulfur contained in coal used for producing coke and agglomerate, only 6% was recovered, equal to about 70,000 tons per year.[69]

In 1980, sulfur from sour gas was being recovered by the Mubarek and Orenburg gas processing plants. At the Mubarek plant in Uzbekistan, a third production unit was put into operation in 1984, and construction of a fourth unit was under way. The new unit would not increase production at the plant, the throughput of which was 53 billion cubic feet of sour gas per year, but would instead allow for a regular rotation schedule for maintenance. Construction was under way at the new Astrakhan sour gas complex. The first stage of the complex was projected to produce 2 million tons of sulfur per year from processing 106 billion cubic feet of sour gas per year. With the completion of Astrakhan scheduled for the 1986-90 period, it was envisaged that the Soviet Union would discontinue hard currency imports of sulfur and begin exporting 1 million tons of sulfur per year.[70]

At the Gaurdak sulfur complex in Turkmenistan, which produced native sulfur, sulfur production had been decreasing. In 1981, production at Gaurdak peaked at 548,000 tons of sulfur, of which 267,000 tons was extracted by the Frasch process. In 1983, sulfur production at Gaurdak had dropped to 480,000 tons; both 1982 and 1983 sulfur production fell short of the plan. Problems were attributed to depletion of reserves. At the Yavorov sulfur production association in the Ukraine, which produced over 2 million tons of native sulfur per year, the fourth stage of the Tsentral'nyy open pit at the Yazov deposit was put into operation in 1984.

Vermiculite.—Exploration began of a vermiculite deposit near Tommot in Yakutia, and a beneficiation plant and an exfoliation plant were constructed in Tommot on the banks of the Aldan River.

Zeolites.—During the past 15 years, the U.S.S.R. established a large natural zeolite base with reserves reportedly totaling over 1 billion tons.[71] High-quality zeolite reserves are in the western part of the country in the the Crimea, the Trans-Carpatheans, the Trans-Caucasus, and in the Soviet Far East. Recent development had begun of high-quality economic zeolite deposits in southern and western Siberia. It was planned to expand zeolite production; the possibility of developing zeolite export markets in the West was under consideration.

MINERAL FUELS

Over 40% of capital investment in industry, which was equal to about 20% of the entire capital investment, went for the development of the fuel and energy sectors. The long-term goals of the Soviet energy program included energy conservation, better utilization of oil through deeper refining, intensified development of nuclear power, developing lignite open pits in the eastern part of the country, developing means for transporting energy from the eastern to the western part of the country, and ensuring adequate amounts of gas and oil for export.

Coal.—Coal production again decreased in 1984 for the fifth time in the past 6 years. The 1984 production figure of 712 million tons was far short of the goal set for the 11th 5-year plan of achieving an output of from 770 to 800 million tons per year by 1985. The current plan for 1985 called for production to increase to 718 million tons. In the winter of 1984-85, the Soviets reported facing a shortage of coal for heating and energy needs.[72] Coal stocks were lower than in the preceeding winter, and production of high-grade coals and coal briquets for home heating was down. Also, Poland reported exporting a record high amount of coal to the U.S.S.R.

Since 1975, the number of workers mining coal had increased 15% while the labor productivity of these workers during this period had decreased 13%.[73]

Table 8.—U.S.S.R.: Major planned additions to coal mine capacity, 1985

Mine	Location	Increase (thousand metric tons)
Open pit:		
Vostochnyy	Ekibastuz Basin, Kazakhstan	15,000
Neryungri	Yakutia	2,000
Pavlovsk No. 1	Primor'ye, Soviet Far East	1,000
Angren	Uzbekistan	700
Tal Yuryakh	Magadan Oblast', Soviet Far East	300
Underground:		
Yuzhno-Donets No. 3	Donetsk Oblast', Ukraine	1,200
Komsomlets	Kemerovo Oblast', Siberia	500
Aktas	Karaganda Oblast', Kazakhstan	200
Dolina	Sakhalin Island, Soviet Far East	200
Anadyr	Magadan Olbast', Soviet Far East	50

Source: Ekonomicheskaya gazeta (Economic Gazette) (Moscow). No. 1, Jan. 1985, p. 11.

Table 9.—U.S.S.R.: Estimated primary energy balance in 1984

(Million metric tons of standard coal equivalent)

	Production	Exports	Imports	Apparent consumption
Coal (lignite, anthracite, bituminous, coke)	475	27	10	458
Fuelwood	23	--	--	23
Hydropower	23	3	--	20
Natural and associated gas	694	82	5	617
Nuclear power	16	--	--	16
Oil, crude and petroleum products	901	278	30	653
Oil shale	11	--	--	11
Peat	9	--	--	9
Total	2,152	390	45	1,807

The average depth of underground coal mines was 460 meters with the average exceeding 600 meters in the Donets Basin, 500 meters in the Pechora and Karaganda Basins, and about 350 meters in the Kuznetsk Basin; there were 25 mines in the country working at a depth of 1,000 meters or greater. Coal losses that occurred during rail shipment were reported as approximately 3% of the total amount of coal mined, and ways were being sought to reduce these losses.[74]

The increasing ash content of coal delivered to electric powerplants was causing a loss in electric generating capacity, increased labor and equipment costs, and environmental problems. Pulverized coals shipped to electric powerplants were not beneficiated, and the issue was raised concerning constructing beneficiation plants to treat these coals.[75]

In the Donets Basin in the Ukraine, the country's largest coal producing basin, practically all upper horizons were depleted, and production could only occur through intensified deep mining that would exploit thinner coal seams under more difficult mining conditions.[76] Production in the Donets Basin reached a record high of 225 million tons in 1976 and was about 200 million tons in 1984. The average mine depth in the Donets Basin was 630 meters. It was projected that about two-thirds of the coal in the Donets Basin would be extracted at a depth of more than 700 meters and one-third at a depth of more than 1,000 meters. Despite these problems, the Donets Basin still contains large reserves, with an estimated 55 billion tons of reserves, 19% of which are in existing mines and 14% of which are in areas designated for new development. Thus, it was claimed that 67% of the reserves totaling 37.5 billion tons are in areas that have not yet been designated for industrial development.[77]

In addition, the ash content of Donets coal was projected to increase by 30% or more.[78] In the Donets Basin, which has some of the country's highest quality coal deposits, the ash content of run-of-mine coal increased from 29.1% in 1976 to 35.8% in 1983 and for marketable coal from 18.1% in 1976 to 19.6% in 1983. In certain parts of the Donets Basin, the ash content of run-of-mine coal was over 40%. A shortage of freight cars was affecting shipment of coal from the Donets Basin during the winter of 1984-85. There was said to be a backlog of 3 million tons awaiting shipment. Problems with the timely unloading of freight cars were faulted for the freight car shortage.

Approximately one-half of the shortfall in coal production was attributed to the Kuznetsk Basin in Siberia where work was far behind schedule in providing the needed deepening and renovation of mines. Although production in the Kuznetsk Basin for 1984 was targeted at 162 million tons, reportedly, it was unlikely that production would reach 150 million tons. The majority of coal from the Kuznetsk Basin came from 68 underground mines, 28 of which were being renovated. The Kuznetsk Basin contained 25 beneficiation plants, which processed about 45% of extracted coal including all coking coal. The Kuznetsk Basin was considered to have good potential for future development with economic reserves estimated at 265 billion tons; only 10% to 12% of the coal-bearing area was now being exploited. Reportedly, it was possible to reach an exploitation level of 60% to 65% and for the Kuznetsk Basin to replace the Donets Basin as the coal supplier to the western part of the country. Nevertheless, in the Kuznetsk Basin, no new mines had been developed in the past 25 years, and development through renovation of existing mines had not prevented output from falling as the most productive seams were being depleted.[79] There had been much development of open pit mining in the Kuznetsk Basin, but coking coal, which was in short supply, was produced mainly underground.

The Kansk-Achinsk lignite basin in Siberia was being developed, and in 1984, the German Democratic Republic agreed to supply the U.S.S.R. with equipment for open pit development of this basin. There was one open pit in operation in the Kansk-Achinsk Basin with a planned capacity of 50 to 60 million tons per year, and ambitious plans were discussed for producing over 10 times this amount of coal from Kansk-Achinsk. Nevertheless, at Kansk-Achinsk, the problem still had not been solved as to how to make this lignite accessable to consumers in the western part of the country. Kansk-Achinsk was one of a number of massive Siberian lignite deposits where the problem of transportation existed. It would require more rail capacity than was currently available to ship the lignite to the western part of the country and would also require additional facilities as lignite, owing to its physical characteristics, presents a number of special transport problems.

To solve the problem of utilizing Siberian lignite, a number of solutions had been proposed. These included constructing large electric powerplants near the deposits for connection to long distance electricity networks, constructing long distance coal slurry pipelines, and transforming the coal into liquid fuels. A main task that was set for the 11th 5-year plan was the development of mainline coal slurry transport. Laying was planned to begin of a 16-inch, 155-mile coal slurry pipeline from Byelovo in Siberia's Kuznetsk Basin to an electric powerplant in Novosibirsk. The pipeline was scheduled for completion at the end of 1985. Development of the Byelovo-Novosibirsk coal slurry line was intended as an experimental project for developing processes and equipment for long branched systems.[80]

The official Soviet news agency Telegraph Agency of the Soviet Union announced that the Occidental Petroleum Corp. was discussing constructing a coal slurry pipeline for the Soviets using U.S.-developed technology. The pipeline, reportedly, would be approximately 150 miles long and would be built near the city of Novosibirsk.

The criticism was raised that little progress was being made on the program for utilizing Siberian lignite through conversion to liquid fuel.[81] Startup was reported of the country's first experimental-industrial coal liquefaction plant at the Belkovskaya lignite mine in the Tula region south of Moscow. A similar plant with 15 times greater capacity was under construction in Siberia at the Kansk-Achinsk coal basin. The Belkovskaya plant was designed to produce 1-ton-per-day of diesel fuel, fuel oil, and gasoline from 5 tons of coal. The Siberian plant would process 75 tons per day of coal into 15 tons of diesel fuel, fuel oil, and gasoline.

The Neryungri coking coal complex in southern Yakutia was being developed jointly by Japan, and the U.S.S.R. Japan originally was to import over 3 million tons of coking coal per year from Neryungri starting in 1983, but this schedule was not met. In 1984, first exploitation was reported of coking-grade coal, which lies under the steam coal that was being mined. Initially, production at Neryungri was to come from open pit mining and then subsequently from underground mining. The first three stages of an open pit capable of producing 9 million tons per year were in operation; in 1984, it was planned to increase the open pit's capacity to 11 million tons per year and in 1985 to its design capacity of 13 million tons per year, of which 9 million tons per year was to be coking coal. Planned 1984 production was 7 million tons.

A washing plant was commissioned at Neryungri at the end of 1984 with a design capacity of 9 million tons per year of coking coal. The plant would produce 5 million tons per year of clean coal, a large percentage of which was to be sent to Japan. Initial contracts for 1985 and 1986 called for Japanese imports of 3.2 million tons and 4.2 million tons, respectively. Output from the Neryungri washing plant was reportedly sent to the western Ukraine in 1984.

Table 10.—U.S.S.R.: Growth in open pit coal mining, by major producing region

(Million metric tons)

Region	1965	1970	1975	1980	1983
Ekibastuz Basin	14.3	22.7	45.8	66.5	73.7
Irkutsk Basin and Trans-Baykal Region	18.0	22.0	29.9	35.5	37.6
Kansk-Achinsk Basin	13.8	18.1	27.6	34.8	38.5
Kuznetsk Basin	22.1	32.4	45.8	52.3	58.7
Soviet Far East	14.5	17.3	21.5	25.9	26.8
Urals	34.7	30.5	25.5	23.6	17.4
Total for Ministry of the Coal Industry[1]	139.3	164.6	223.9	268.9	288.8

[1]Includes other areas not listed above.

Source: Ugol' (Coal Journal) (Moscow). No. 9, Sept. 1984, p. 41.

Table 11.—U.S.S.R.: Number of open pit coal mines, by size and coal type

Average daily output (metric tons)	Hard coal		Brown coal	
	1982	1983	1982	1983
Less than 1,000	1	1	3	3
1,000 to less than 5,000	12	10	10	14
5,000 to less than 10,000	6	9	12	8
10,000 to less than 25,000	10	10	6	7
25,000 to less than 50,000	--	--	2	2
50,000 to less than 75,000	1	1	1	1
75,000 to less than 100,000	--	--	--	--
100,000 or more	1	1	--	--
Total	31	32	34	35
Average daily output per mine (metric tons)	13,407	13,667	10,192	9,664

Natural Gas.—Soviet natural gas production again grew at a faster than planned rate; natural gas production increased 10% to 20.7 trillion cubic feet. Production was planned to increase 8% to 22.3 trillion cubic feet in 1985. West Siberia was planned to produce 12.4 trillion cubic feet, 6.5 trillion cubic feet of which was planned to come from the Urengoi deposit. The head of the Soviet foreign trade association Soyuzgazeksport stated that gas would soon replace oil as the country's chief hard-currency-earning export. Shortly after yearend, the Minister of the Gas Industry was given a new appointment as Minister of the Petroleum Industry following the first annual decrease in petroleum production since World War II. A Deputy Minister of the Gas Industry, who since 1983 was also head of the West Siberian natural gas production association "Tyumengazprom," that produced over 50% of the country's natural gas, was named the new Minister of the Gas Industry. In March, an earthquake struck the Soviet Central Asian town of Gazli, a natural gas production center. Power lines were reported out and gas production interrupted.

The major increase in gas production during the 1986-90 period was planned to come from the development of the Yamburg Field in West Siberia, which was projected to produce about 7 trillion cubic feet per year by the end of the decade. Plans were to drill approximately 500 wells in the Yamburg Field and to construct up to 10 gas treatment plants that would treat natural gas and condensate. Condensate production was scheduled to commence in 1987. Plans called for construction of six 56-inch pipelines to connect Yamburg with the western part of the country. An export pipeline was to be constructed from Yamburg to the East European countries, which would supply Eastern Europe with between 706 to 777 billion cubic feet of natural gas per year. By yearend 1984, two development wells had been drilled at Yamburg. Construction began of the first pipeline from Yamburg to Yelets southeast of Moscow; the pipeline was scheduled to go into operation at the end of 1986. However, the Soviets reported that the start of gas shipments from Yamburg was delayed 1 year to 1987, and additional rigs were added to speed drilling operations.

In Turkmenistan, development was proceeding of the Dauletabad Field with a total capacity for processing 1.6 trillion cubic feet of natural gas per year. Development was also occurring of smaller fields in Turkmenistan, some of which required sulfur treatment facilities. Sour gas treatment facilities were also being constructed at gasfields in Uzbekistan in Central Asia where production was planned of sulfur and condensate along with the natural gas.

Construction of the fifth of six trans-Siberian pipelines, the Urengoi-Tsentr I pipeline connecting the Urengoi Field in West Siberia with the town of Yelets southeast of Moscow, was completed. Work was progressing on the sixth line scheduled for completion in 1985, the Urengoi-Tsentr II line, which would also terminate in Yelets. Delays in constructing compressor stations prevented both the Urengoi-Tsentr I line and the Urengoi gas export pipeline from achieving their full throughput capacity in 1984. Reportedly, natural gas exports in 1984 totaled 2.5 trillion cubic feet with 1.3 trillion cubic feet going to centrally planned economy countries and 1.2 trillion cubic feet going to market economy countries.[82] From 1980 to 1983, Soviet natural gas exports were reported to have increased by 190 billion cubic feet,[83] and there was a major increase in natural gas exports in 1984 owing to the opening of the trans-Siberian gas export pipeline. Besides increasing gas exports to Western Europe, the U.S.S.R. planned to expand gas exports to the CMEA countries.

Gas deliveries commenced in 1984 to Western Europe through the new trans-Siberian gas export pipeline. Deliveries to France officially began at the end of 1983 while deliveries to Austria were scheduled to begin in July and to the Federal Republic of Germany in October. Snam, a subsidiary of Italy's state hydrocarbon conglomerate Ente Nazionale-Idrocarburi, signed an agreement in May to import a minimum of 158 billion cubic feet and a maximum of 194 billion cubic feet of natural gas by 1991 through the export pipeline, and after 1992, Snam was committed to taking between 170 to 211 billion cubic feet per year until 1999. The Federal Republic of Germany was able to achieve a price reduction for Soviet gas based on the terms of the Italian-Soviet agreement. France was requesting a reduction in the level of gas shipment agreed upon in 1982.

It appeared that Soviet gas exports to Western Europe through the trans-Siberian pipeline would be in the neighborhood of 850 billion cubic feet per year rather than the 1.4 trillion cubic feet originally planned. Belgium and the Netherlands, which at one time expressed interest in Soviet gas, had not signed any contracts. Nevertheless, reportedly by 1990, the Soviet Union could supply Western Europe, both through the new Urengoi gas export pipeline and according to previously existing gas export agreements, with 45% of Western Europe's gas imports, which would be equal to 20% of Western Europe's consumption. Italy could import as much as 35% of its gas requirements from the Soviet Union, and the Federal Republic of Germany, 30%. Austria would be the Western European country most dependent on Soviet gas, importing almost 75% of its gas requirements.

Finland and the U.S.S.R., in 1984, agreed to increase imports of Soviet gas to between 97 to 106 billion cubic feet per year. The Finns had been importing 49 billion cubic feet per year based on a contract signed in 1972. The U.S.S.R. also signed a contract to construct a 250-kilometer pipeline in Finland from Kouvola to Tampere with a branch to Helsinki that would enable the Finns to import up to the 106 billion cubic feet per year agreed upon. The new line could be an extension of an older line built to Kouvola by the Soviet Union.

In other agreements, the U.S.S.R. signed an agreement with Turkey to supply Turkey with up to 212 billion cubic feet of natural gas starting in 1987 and extending for a 25-year period. Deliveries would be made via a pipeline through Bulgaria. The Soviet Union, which recently concluded an agreement to import alumina from Greece, would pay for the alumina either in hard currency or its equivalent in natural gas. The Soviet Union was holding talks with Greece concerning construction of a gas export pipeline that would go to Athens via Bulgaria. Japan and the Soviet Union agreed on terms for the proposed development of the Chayvo project off Sakhalin Island following a final Soviet feasibility study. Production would begin in 1990 with Japan receiving 25,000 barrels of crude oil per day and 3 million tons of liquefied natural gas for a 20-year period. The projects would include two 1.5-million-ton-per-year liquefaction plants and would involve the use of a number of foreign contractors.

Regarding gas shipment to the CMEA countries, the U.S.S.R. agreed to considerably increase gas shipments to Hungary and Romania. Poland and the U.S.S.R. were constructing a pipeline from Byelorussia to Warsaw, scheduled for completion in 1986, which would enable Poland to increase imports of Soviet gas.

Oil Shale.—In the Estonian S.S.R. (Estonia), which produced approximately 90% of Soviet oil shale, in 1984, production fell 0.2% below the 1983 level to 27.4 million tons. Declining oil shale production was attributed to decreased demand.

At the country's largest oil shale deposit, the Estonian, it was estimated that reserves were adequate for 80 to 100 years. The Estonian and Leningrad oil shale fields in the Baltic Basin were considered well explored, and an increase in reserves was not expected. Expansion of oil shale production before the year 2000 would only be expedient in the Baltic Basin. Exploitation of oil shale deposits in other regions was inhibited by their low quality, difficult mining conditions, and lack of adequate processing technology.[84]

At the Estonia shale mining association "Estonslanets," approximately 50% of production was from open pits. Underground shale mines used basically the room-and-pillar system, resulting in a loss of 30% to 40% of the shale in pillars. It was stated that it was necessary to improve the room-and-pillar system and to introduce other underground mining systems. At open pits, there was selective mining, and shale losses amounted to about 20%. In 1984, reportedly, the Kiviol Mine in the Estonian oil shale field was being shut down owing to depleted reserves.

Plans were to develop a new oil shale mine in Leningrad Oblast' with a capacity of 9 million tons per year. It would be part of the Leningrad oil shale association. A beneficiation plant was to be built next to it.

Petroleum.—Soviet oil production, which was reported as 613 million tons, decreased by 0.6% in comparison with that of 1983. The drop, although slight, was the first time oil production failed to increase since World War II. The fall in production was caused by difficulties in maintaining output in the West Siberian fields, which for many years had been the source of increased Soviet production and which accounted for about 60% of Soviet oil output. Although this was the first decline in oil production in many years, for the previous 5 years the rate of increase in oil production had slowed considerably. Major discussions were held, and it may be assumed that major efforts would be undertaken to improve oil production in West Siberia. The discussions centered around improving recovery techniques, improving labor productivity, and providing for better construction, maintenance, energy supply, and other functions. It was stressed that the period has passed when "oil would gush from the ground of its own accord." Production problems were also occurring in the Volga-Urals regions, the country's second largest oil producing region, which had experienced sharp production declines. Despite these difficulties, the Soviet oil trade situation in 1984 was approximately the same as in previous years with the Soviets being able to supply the CMEA East European countries and even to increase exports to world markets.

In 1984, the Soviet Union achieved a record high in the amount of exploratory and development drilling, although the planned target was not achieved and the amount of Soviet drilling was still less than one-third the amount drilled in the United States. Also, the rate of increase in Soviet drilling of 5.6%, over 80% of which occurred in West Siberia, was considerably less than the rate of increase in previous years.

The 1985 plan called for oil production to increase to 628 million tons. Shortly after the yearend, the appointment was announced of a new Soviet Minister of the Petroleum Industry, who prior to his appointment was Minister of the Gas Industry. The decline in oil production in West Siberia led to the removal of practically all responsible administrators.[85]

Reportedly, the petroleum industry had reached a stage where a large number of fields had entered the last stage of exploitation resulting in a reduction in oil production and increasing production costs.[86] It was now necessary to rely on improved technology and equipment to increase output. In West Siberia, in 1984, production fell below its 1983 level. Increasing production in West Siberia would depend on a number of factors. These included the discovery of new fields as production at older fields including the giant Samotlor Field has already peaked, the introduction of advanced recovery techniques, acquiring better exploration and drilling equipment, better management, and better worker accommodation to reduce labor turnover. One specific reason cited for the decline in production in West Siberia was the fact that only about one-half of the new deposits that were planned to be commissioned during the 1981-83 period were actually put into operation. There was also a lack of attention to well repair. In West Siberia, there were over 2,000 wells capable of producing oil that were shut down because of needed repairs or low-quality repairs.[87] There was a shortage of well workover crews in West Siberia where the average was 1 crew per 68 wells compared with the national average of 1 crew per 54 wells. Problems in energy supply were cited as there were more than 1,000 power failures in West Siberia in 1984. Production problems were also blamed on unusually poor weather.

The only regions of the country with increasing oil production were Kazakhstan and Azerbaidzhan. The Komi A.S.S.R., where production in 1984 remained unchanged, produced over 20 million barrels of crude oil and condensate per year, but new fields would have to be brought into production in 1985 for output to be maintained. This would be difficult owing to deficient exploration work in the more accessible areas. The Kharyaga Field, the only field sufficiently explored for development, was over 100 kilometers to the north of existing developed fields, far beyond the Arctic Circle, and there would be many problems in providing the necessary infrastructure to develop this field.

By acquiring more equipment and

through more intensive development, the Soviets were hoping to increase offshore production. Caspian Sea offshore production accounted for 70% of oil production in Azerbaidzhan, and in 1984, Azerbaidzhan fell 1% short of fulfilling its oil production plan. During 1981-83, 42 wells were sunk in the Caspian Sea, 32 of which were declared to be producers. A jack-up rig, the *28th of April rig,* was added to the Caspian Sea drilling fleet. The rig was able to operate in water about 250 feet deep.

The Soviet Union was preparing the first of a series of Finnish-built semisubmersible rigs for use in the Barents Sea. The four rigs were to be completed by the end of 1985. In the Baltic Sea, the Soviets announced that at least 4 of 12 wildcats drilled by the Soviet, East German, and Polish consortium "Petrobaltic" had found hydrocarbons and that preparations were occurring for the first Baltic Sea oil production. Japan and the Soviet Union agreed on terms for the proposed development of the Chayvo project off Sakhalin Island. Production would begin in 1990 with Japan receiving 25,000 barrels of crude oil per day and 3 million tons of liquefied natural gas per year for a 20-year period.

Despite falling oil production, the Soviets were able to increase oil exports to Western countries. The largest increases in Soviet oil exports went to Austria, Belgium, the Federal Republic of Germany, and Italy. The Soviet Union's oil trade with developing countries was minor and was concentrated in countries such as Argentina, Brazil, India, and some Central American countries. In 1984, the Soviet Union appeared to have been able to increase imports of Mideast oil, which was reexported mainly to Europe. From 1980 to 1983, reportedly, Soviet oil exports increased by 83 million barrels and exports of petroleum products increased by 12.6 million tons.[88] In the future, the U.S.S.R. claimed that it would try to keep petroleum exports to world markets at their current level.[89] Despite the desire of the CMEA countries for additional Soviet oil deliveries during the 1986-90 period, the Soviet Union stated it would not increase oil exports to CMEA over the current level.[90]

In 1984, the Soviet Union agreed to supply Romania with 11 million barrels of oil on the same terms as other CMEA countries. Romania previously had to pay for Soviet oil in "hard goods," i.e., goods that could be sold competitively on the world market. The U.S.S.R. signed a protocol to assist Cuba in oil production. First results were reported from the joint Soviet-Vietnamese exploratory oil and gas drilling venture Vietsovpetro, on Vietnam's South China Sea Shelf where Soviet drill ships reported finding oil at about 3,000 meters. The Soviet Union planned to lay a 249-mile oil pipeline in Laos extending from the capital of Vientiane to the Vietnam border. The pipeline would help reduce Laos' dependence on Thailand for crude oil imports.

Uranium and Nuclear Power.—The Soviet Union was introducing fast breeder reactors that would be able to use uranium-238. Their present reactors used only uranium-235. By making use of uranium-238, the U.S.S.R. would be able to increase its energy supply from natural uranium.

The Soviet Union held discussions with Libya concerning the construction of a nuclear powerplant. The Soviet Union would provide the design and equipment. The Soviet Union was currently assisting Libya in operating the Taigura atomic research center and in training specialists for this center. The Soviet Union signed an agreement with Iraq to study the feasibility of constructing a nuclear reactor in Iraq.

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[1]This publication is based on a review of sources published in the U.S.S.R.
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[4]Pravda (Moscow), Feb. 14, 1984, p. 2.
[5]Metallurg (Metallurgy) (Moscow). No. 9, Sept. 1984, pp. 1-3.
[6]Pravda (Moscow). Mar. 18, 1985, p. 3.
[7]Sovetskaya Rossiya (Soviet Russia) (Moscow). Dec. 13, 1984, p. 2.
[8]Work cited in footnote 7.
[9]Bezopasnost' truda v promyshlennosti (Labor Safety in Industry) (Moscow). No. 8, Aug. 1984, p. 5.
[10]Work cited in footnote 9.
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[14]Narodnoye khozyaystvo Kazakhstana (The National Economy of Kazakhstan) (Alma-Ata). No. 1, Jan. 1985, pp. 3-11.
[15]Tsvetnye metally (Nonferrous Metals) (Moscow). No. 3, Mar. 1985, pp. 48-50.
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[20]Pravda (Moscow). July 13, 1985, p. 2.
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[22]Tsvetnye metally (Nonferrous Metals) (Moscow). No. 1, Jan. 1985, p. 69.
[23]Kazakhstanskaya pravda (Kazakhstan Truth) (Alma-Ata). Jan. 31, 1985, p. 1.

[24]Work cited in footnote 14.
[25]Vestnik Akademii Nauk Kazakhskoy S.S.R. (Report of the Kazakhstan Academy of Sciences) (Alma-Ata). No. 8, Aug. 1984, pp. 3-6.
[26]Razvedka i okhrana nedr (Exploration and Conservation of Mineral Resources) (Moscow). No. 3, Mar. 1984, pp. 2-8.
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[28]Work cited in footnote 21.
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[32]Izvestiya (Moscow). July 6, 1984, p. 2.
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[34]Work cited in footnote 25.
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[37]Work cited in footnote 16.
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[41]Work cited in footnote 20.
[42]Work cited in footnote 21.
[43]Work cited in footnote 26.
[44]Work cited in footnote 16.
[45]Foreign Trade (Moscow). No. 4, Apr. 1985, p. 31.
[46]Work cited in footnote 21.
[47] Work cited in footnote 5.
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[56]Gornyy zhurnal (Mining Journal) (Moscow). No. 10, Oct. 1984, pp. 3-10.
[57]Work cited in footnote 56.
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[66]Work cited in footnote 64.
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The Mineral Industry of the United Arab Emirates

By Kevin Connor[1]

Despite a steady decline in oil export revenues since 1976, the petroleum sector continued to dominate the economy of the United Arab Emirates, with 1984 crude oil export receipts accounting for an estimated 35% of the country's gross domestic product (GDP). Revenues from the sale of natural gas liquids (NGL) accounted for another 5% of the GDP. As of 1984, the United Arab Emirates ranked 12th in world production of crude petroleum, 7th in proven petroleum reserves, 7th in processed natural gas production, and 15th in proven gas reserves. Other mineral products produced in the United Arab Emirates were cement, ammonia and urea fertilizer, and aluminum from imported bauxite.

Crude oil was first exported from Abu Dhabi in 1962 and Dubai in 1969. Since that time, the United Arab Emirates have had one of the fastest growing economies in the world, particularly following the sharp rise in petroleum prices in 1973. Government spending in the early to mid-1980's showed a downturn due to the general economic contraction caused by the worldwide oil surplus and subsequent depressed market prices. The contraction of the economy has not been a major setback, however, as major infrastructural necessities for the nation were largely completed by 1982. Despite the oil-related economic downturn, petroleum and gas revenues have continued to provide the bulk of national revenues to the United Arab Emirates. The per capita income in 1984 was $24,000, one of the highest in the world.[2]

PRODUCTION AND TRADE

Proven oil reserves sufficient to last over 70 years at current production levels ensure the United Arab Emirates long-term rank as a major producer. With the 1979 discovery of one of the world's largest natural gas fields under the offshore oilfield of Umm Shaif, natural gas processing should become an increasingly important aspect of the United Arab Emirates economy. Continued exploration is expected to add substantial quantities to known reserves of both oil and gas. During 1984, Abu Dhabi became an exporter of sulfur. The central gas complex at the Habshan Field was equipped to handle sour gas and during 1984 began producing 800 tons per day of pelletized sulfur. All of this product was slated for export, and a 40,000-ton storage facility had been built at Ruwais to house, reclaim, and transport the sulfur to ships. With construction completed on the 900,000-ton-per-year urea and ammonia fertilizer plant at Ruwais in November 1983, and plans well under way for a 500,000-ton-per-year urea and ammonia plant to be located at Sharjah, the fledging nitrogen-based fertilizer industry was expected to grow steadily along with the natural gas industry. Business activity surrounding the oil and gas industry was expected to continue to expand in the United Arab Emirates despite the present depressed state of the petroleum market.

Table 1.—United Arab Emirates: Production of mineral commodities[1]

Emirate[2] and commodity[3]	1980	1981	1982	1983[p]	1984[e]
ABU DHABI					
Cement, hydraulic thousand metric tons	[e]500	[e]700	[e]780	800	800
Gas, natural:					
Gross million cubic feet	508,445	472,508	410,000	NA	NA
Marketed do.	115,500	320,126	300,000	NA	NA
Natural gas liquids thousand 42-gallon barrels	32,200	[e]35,000	38,000	NA	NA
Petroleum:					
Crude do.	492,154	413,910	319,400	283,000	300,000
Refinery products:					
Gasoline do.	1,500	[e]6,000	13,000	20,000	20,000
Kerosine do.	400	[e]1,000	6,000	10,000	10,000
Distillate fuel oil do.	1,600	[e]6,500	10,000	25,000	25,000
Residual fuel oil do.	1,400	[e]5,600	7,000	10,000	10,000
Naphtha do.	100	[e]1,000	5,000	10,000	10,000
Refinery fuel and losses do.	500	[e]500	2,000	5,000	5,000
Total do.	5,500	[e]20,600	43,000	80,000	80,000
Sulfur: Byproduct from petroleum refining metric tons	--	[e]5,000	10,000	15,000	15,000
DUBAI					
Aluminum, primary ingot do.	25,000	[e]106,000	148,739	151,170	155,333
Cement, hydraulic thousand metric tons	500	[e]500	[4]350	800	800
Gas, natural:[e]					
Gross million cubic feet	142,000	146,000	140,000	150,000	150,000
Marketed do.	23,800	38,000	70,000	120,000	120,000
Natural gas liquids:					
Propane thousand 42-gallon barrels	1,500	[e]2,500	5,000	10,000	10,000
Butane do.	1,000	[e]1,100	3,000	8,000	8,000
Natural gasoline do.	1,000	[e]1,700	4,000	9,000	9,000
Petroleum, crude do.	127,818	130,889	[4]133,850	121,830	120,000
FUJAYRAH					
Cement, hydraulic thousand metric tons	--	--	--	520	550
RA'S AL-KHAYMAH					
Cement, hydraulic do.	500	[e]800	[4]750	1,200	1,200
Lime[e] do.	[4]44	40	40	45	45
SHARJAH					
Cement, hydraulic[e] do.	220	220	[4]188	685	700
Gas, natural:					
Gross[e] million cubic feet	6,600	20,000	30,000	40,000	40,000
Condensate thousand 42-gallon barrels	--	--	4,500	6,000	6,000
Petroleum, crude do.	3,586	3,540	[4]2,555	3,932	4,000

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through July 27, 1984.
[2]In addition to the Emirates listed, Ajman and Umm al-Qaywayn record no mineral production but presumably produce small quantities of crude construction materials.
[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. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[4]Reported figure.

Table 2.—United Arab Emirates: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	961	26,660	--	Iran 25,806; Pakistan 395.
Copper: Metal including alloys:				
Scrap	--	100	--	All to Kuwait.
Semimanufactures	210	119	--	United Kingdom 59; Qatar 54.
Iron and steel: Metal:				
Scrap	3,836	6,363	132	Pakistan 4,225; Qatar 1,487.
Pig iron, cast iron, related materials	118	NA		
Ferroalloys	4	--		
Steel, primary forms	--	40	--	All to Qatar.
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,715	14,929	NA	Bahrain 4,769; Qatar 3,354; Iraq 3,098.
Universals, plates, sheets	3,404	2,650	NA	Saudi Arabia 1,601; Iraq 171.
Hoop and strip	1	1	--	All to Saudi Arabia.
Rails and accessories	21	13	--	Saudi Arabia 10; Qatar 2.
Wire	227	465	--	Netherlands 159; Yemen (Sanaa) 105; Qatar 72.
Tubes, pipes, fittings	5,541	9,074	37	Saudi Arabia 2,710; Bahrain 1,708; Iraq 1,701.
Lead: Metal including alloys, semimanufactures	--	3	--	All to Saudi Arabia.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$10	--	All to Switzerland.
Silver: Ore and concentrate do	$81	--		
NONMETALS				
Cement	4,574	57,931	--	Qatar 49,075; Yemen (Aden) 4,772.
Chalk	36	--		
Clays, crude	25	38	--	Qatar 25; Pakistan 13.
Diamond: Gem, not set or strung value, thousands	$9,673	$4,753	$297	United Kingdom $1,898; Belgium-Luxembourg $1,825.
Fertilizer materials:				
Crude, n.e.s	1,264	686	--	All to Yemen (Aden).
Manufactured:				
Ammonia	22	13	--	All to Qatar.
Nitrogenous	2	--		
Unspecified and mixed	244	18	--	Saudi Arabia 11; Qatar 6.
Gypsum and plaster	266	19	--	Iraq 12; Qatar 7.
Lime	493	793	--	Kuwait 671; Saudi Arabia 67; Qatar 35.
Precious and semiprecious stones other than diamond: Natural value, thousands	$435	$1,582	--	United Kingdom $615; Hong Kong $590; Thailand $114.
Salt and brine	968	283	--	Qatar 244; Iran 35.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	97	10	--	All to Qatar.
Sulfate, manufactured	1,267	244	--	Iraq 150; Saudi Arabia 45; Qatar 36.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked value, thousands	--	$2	--	All to Bahrain.
Worked	430	698	--	Qatar 329; Saudi Arabia 237.
Dolomite, chiefly refractory-grade	125	--		
Gravel and crushed rock	26	121	--	All to Qatar.
Sand other than metal-bearing	1,248	1,272	--	Qatar 827; Saudi Arabia 297.
Sulfur:				
Elemental, crude including native and byproduct value, thousands	$1	--		
Sulfuric acid	83	9	--	All to Bahrain.
Other: Crude	--	20	--	Bahrain 15; Pakistan 5.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Crude thousand 42-gallon barrels	[2]525,236	431,252	12,155	Japan 152,497; France 20,914; Italy 13,031.
Refinery products:				
Liquefied petroleum gas value, thousands	$36	$5	--	Bahrain $2; Qatar $2.

See footnotes at end of table.

Table 2.—United Arab Emirates: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Gasoline, motor thousand 42-gallon barrels	51	NA		
Kerosine and jet fuel do	143	--		
Distillate fuel oil do	171	94	--	Oman 72; Qatar 20.
Lubricants do	34	(3)	--	
Bitumen and other residues do	1	1	--	Mainly to Qatar.
Bituminous mixtures value, thousands	--	$20,000	--	Egypt $10,000; Qatar $8,000.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Annual Statistical Bulletin 1982 published by Organization of Petroleum Exporting Countries, Vienna, Austria. Since this source only reports crude exports for Abu Dhabi, crude production by Dubai and Sharjah have been added to the totals because their production is believed to be wholly exported; however, their destinations are unavailable.
[3]Value only reported at $19,002,000; $9,913,000 was exported to Iraq and $6,206,000 to Saudi Arabia.

Table 3.—United Arab Emirates: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals value, thousands	$8	$77	--	France $76.
Aluminum:				
Ore and concentrate	9,013	--		
Oxides and hydroxides	187,028	304,984	--	Australia 304,887.
Metal including alloys:				
Scrap	340	1,117	28	Kuwait 468; Qatar 393; Saudi Arabia 111.
Semimanufactures	10,313	8,761	609	Belgium-Luxembourg 1,677; Bahrain 1,245; Italy 702.
Copper:				
Ore and concentrate	35	--		
Metal including alloys:				
Scrap	3,401	594	16	Saudi Arabia 296; Qatar 111; Netherlands 101.
Unwrought	19	31	--	United Kingdom 29.
Semimanufactures	5,338	4,862	253	United Kingdom 1,781; Japan 851; Republic of Korea 398.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	98,920	41,248	--	All from India.
Metal:				
Scrap	313	525	45	Kuwait 334; Bahrain 44; Saudi Arabia 32.
Pig iron, cast iron, related materials	1,347	1,340	2	Netherlands 1,318.
Ferroalloys:				
Ferromanganese	--	10	--	All from United Kingdom.
Unspecified	923	590	133	Norway 386; United Kingdom 48.
Steel, primary forms	616	11,265	--	West Germany 5,973; East Germany 1,998.
Semimanufactures:				
Bars, rods, angles, shapes	389,681	367,725	356	Japan 234,987; Qatar 78,501.
Universals, plates, sheets	112,926	104,694	527	Japan 70,656; West Germany 10,291.
Hoop and strip	715	817	21	West Germany 530; Italy 153.
Rails and accessories	342	242	--	United Kingdom 194; France 29.
Wire	29,148	20,725	4	China 4,379; Belgium-Luxembourg 4,294; Japan 4,106.
Tubes, pipes, fittings	334,484	357,332	21,057	Japan 133,310; West Germany 51,929; France 51,773.
Castings and forgings, rough	22	3	--	United Kingdom 2.

See footnotes at end of table.

Table 3.—United Arab Emirates: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead:				
Oxides	NA	18	--	All from Spain.
Metal including alloys:				
Unwrought	43	13	--	West Germany 10; United Kingdom 3.
Semimanufactures	108	67	1	West Germany 58; Japan 5.
Manganese: Oxides	--	21	21	
Mercury value, thousands	$3	$2	--	All from United Kingdom.
Nickel: Metal including alloys:				
Unwrought	16	--		
Semimanufactures	9	38	1	United Kingdom 34.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$929	$9	--	Sweden $6.
Silver:				
Ore and concentrate do	$274	--		
Waste and sweepings do	$48	--		
Metal including alloys, unwrought and partly wrought do	$16,406	$46,489	--	Singapore $15,944; Pakistan $10,896.
Tin:				
Oxides	7	--		
Metal including alloys:				
Unwrought	73	12	--	Mainly from Denmark.
Semimanufactures	841	29	--	Japan 18; Saudi Arabia 5.
Titanium: Oxides value, thousands	$995	$1,468	$457	West Germany $405; Spain $236.
Zinc:				
Ore and concentrate	--	17	17	
Blue powder	--	16	--	All from United Kingdom.
Metal including alloys:				
Unwrought	287	165	2	Spain 61; Netherlands 50; United Kingdom 28.
Semimanufactures	715	225	10	West Germany 62; United Kingdom 37; Bulgaria 25.
Other:				
Oxides and hydroxides	--	177	--	West Germany 62; Norway 54; Singapore 23.
Base metals including alloys, all forms value, thousands	$198	$714	$224	France $267; Norway $165.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	20,844	18,854	42	Netherlands 18,190; India 607.
Grinding and polishing wheels and stones	902	1,026	26	Italy 722; United Kingdom 62.
Asbestos, crude	10,359	9,217	33	Republic of South Africa 4,080; Canada 3,049; Romania 1,000.
Barite and witherite	24,843	25,823	--	India 23,818.
Cement	857,209	478,747	--	Republic of Korea 232,869; Japan 148,844.
Chalk	2,364	2,256	--	Belgium-Luxembourg 2,010; United Kingdom 106.
Clays, crude	13,500	18,737	1,285	India 13,352; Singapore 2,124.
Diamond:				
Gem, not set or strung value, thousands	$12,827	$8,873	$472	Belgium-Luxembourg $4,583; India $3,151.
Industrial stones do	$8	--		
Fertilizer materials:				
Crude, n.e.s	21,563	49,265	--	Pakistan 48,720.
Manufactured:				
Ammonia	106	50	5	India 17; United Kingdom 11; Kuwait 7.
Nitrogenous	2,638	5,410	1	Belgium-Luxembourg 973; Kuwait 865; Netherlands 856.
Phosphatic	908	486	--	Belgium-Luxembourg 182; Qatar 150; Italy 89.
Potassic	--	41	--	All from Belgium-Luxembourg.
Unspecified and mixed	10,965	15,299	25	Denmark 6,338; Netherlands 5,921; Romania 1,682.
Graphite, natural	12	NA		
Gypsum and plaster	2,489	2,604	9	West Germany 610; Lebanon 419; Denmark 373.
Lime	1,244	1,729	--	Belgium-Luxembourg 1,529; France 50.
Magnesite value, thousands	$199	$83	--	Netherlands $43; China $33.

See footnotes at end of table.

Table 3.—United Arab Emirates: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Mica: Crude including splittings and waste	430	196	44	India 127; United Kingdom 17.
Pigments, mineral:				
Natural, crude	36	241	7	United Kingdom 122; India 83.
Iron oxides and hydroxides, processed value, thousands	$123	$583	$28	Japan $257; West Germany $213.
Precious and semiprecious stones other than diamond:				
Natural do	$3,603	$1,779	--	United Kingdom $446; Sri Lanka $424; Thailand $354.
Synthetic do	--	$29	--	All from India.
Salt and brine	20,777	27,486	242	Netherlands 9,108; China 6,422; India 1,855.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	2,039	3,122	10	West Germany 1,446; France 599; Romania 303.
Sulfate, manufactured	1,662	1,663	113	West Germany 658; Belgium-Luxembourg 394.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8,391	8,818	662	Italy 7,118; India 629.
Worked	16,797	20,906	80	Italy 18,432; India 667.
Dolomite, chiefly refractory-grade	7,353	4,420	--	India 2,901; Norway 1,168.
Gravel and crushed rock	6,439	12,334	387	India 5,768; Jordan 4,432; France 1,036.
Limestone other than dimension	35	--		
Sand other than metal-bearing	11,837	5,629	370	Netherlands 1,518; Mozambique 1,013; India 845.
Sulfur:				
Elemental:				
Crude including native and byproduct	391	235	--	All from Bahrain.
Colloidal, precipitated, sublimed	295	NA		
Sulfuric acid	1,496	1,793	5	Kuwait 1,753; United Kingdom 30.
Talc, steatite, soapstone, pyrophyllite	--	515	96	Norway 403; Finland 14.
Other: Crude	4	7,122	33	Netherlands 2,867; West Germany 2,745; Belgium-Luxembourg 1,230.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	33	73	35	Netherlands 23; United Kingdom 15.
Carbon black	--	14	--	West Germany 7; United Kingdom 2.
Coal:				
Anthracite value, thousands	--	$6	--	Mainly from Lebanon.
Briquets of anthracite and bituminous coal	9	26	1	Syria 25.
Lignite including briquets	64	181	181	
Coke and semicoke	53	5	--	All from United Kingdom.
Peat including briquets and litter	--	149	--	Sweden 52; Netherlands 25; West Germany 19.
Petroleum:				
Crude value, thousands	--	$17	--	All from France.
Refinery products:				
Liquefied petroleum gas do	$5,004	$813	$419	Saudi Arabia $129; United Kingdom $123; Belgium-Luxembourg $83.
Gasoline, motor thousand 42-gallon barrels	2,469	147	--	Mainly from Bahrain.
Mineral jelly and wax do	1	(2)	(2)	
Kerosine and jet fuel do	3,597	228	--	Kuwait 134; Bahrain 86.
Distillate fuel oil do	8,350	4,051	--	Bahrain 1,740; Kuwait 1,727; France 221.
Lubricants value, thousands	$64,746	$44,927	$2,068	Australia $10,133; United Kingdom $8,040; Belgium-Luxembourg $7,033.
Nonlubricating oils thousand 42-gallon barrels	7	(2)	(2)	
Residual fuel oil do	3,526	6,942	--	Kuwait 3,133; Bahrain 2,681.
Bitumen and other residues do	1,264	913	6	Bahrain 727; Saudi Arabia 54.
Bituminous mixtures value, thousands	$29,828	$25,736	$339	Bahrain $18,104; Netherlands $3,098.
Petroleum coke do	$12,357	$10,064	$10,015	Saudi Arabia $46.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

The Dubai Aluminium Co. (DUBAL) continued to increase production at its Jebel Ali plant in 1984, with an output for the year that was 15% above the plant's rated capacity of 135,000 tons. An equally if not more impressive aspect for the year was that production costs were decreased by approximately 11% from those of 1983. During 1984, the company exported a total of 150,389 tons of aluminum, of which 75% went to Japan, the United States, and Iran. An associated function of the plant was its desalinization plant, which supplied the city of Dubai with salt and almost 19 million gallons of drinking water. DUBAL was 100% owned by the Dubai Government.

NONMETALS

As of the end of December, the total installed cement clinker production capacity within the United Arab Emirates was 4.2 million tons per year, and the clinker grinding capacity was 8.7 million tons per year. Ajman Cement Co. began operating a new 750,000-ton-per-year clinker grinding plant at Ajman in May. Ube Industries Ltd. of Japan built the plant, and APCEM Engineering Ltd. was acting as a consultant and assisting with technical management operations. Construction of the new 300,000-ton-per-year white cement plant at Ra's al-Khaymah continued throughout 1984, with a commissioning date of November 1985 expected. The plant was being built by Hitachi Zosen Engineering and Construction Co. Ltd. of Japan. and APCEM Engineering was acting as consultant and assisting in technical management planning for the operation. The plant's expected white cement product was to be exported mainly to other Gulf countries. National Cement Co. continued work throughout the year on increasing the clinker grinding capacity at its Dubai plant, converting the existing wet process to a dry process. Expected grinding capacity should increase to 500,000 tons per year. Umm al-Qaywayn Cement Industries Co. finalized plans to build a 500,000-ton-per-year clinker grinding plant to be built and commissioned by the end of 1986. This was to be the first phase of a three-phase project, later phases of which would build an additional 500,000-ton-per-year clinker grinding plant and clinker production plant. The contract for the first phase was awarded to Hitachi Zosen of Japan. W. S. Atkins Group Consultants performed the feasibility study work for the project.[3]

MINERAL FUELS

Natural Gas.—Several major gas projects became operational during 1984. Chiyoda Chemical Engineering and Construction Co. of Japan finished its turnkey contract to build and initially operate the Ruwais Fertilizer Industries Co. Ltd. (FERTIL) Abu Dhabi plant complex, and officially turned the facility over to FERTIL company personnel at the end of August. FERTIL was owned 66.7% by Abu Dhabi National Oil Co. (ADNOC) and 33.3% by Compagnie Française des Pétroles (CFP) of France. The plant complex was designed to use feedstock gas from Abu Dhabi's onshore fields for fuel at the plant, as well for the manufacture of ammonia and urea, all for exportation. Construction of the plant, which was designed to produce 1,000 tons per day of ammonia and 1,500 tons per day of urea, was completed in November 1983. Contracts have been negotiated and finalized in 1984 with 225,000 tons of the plant's annual production destined for India, a progressive increase of up to 80,000 tons per year to China, and the balance of the annual production going to Japan. The latter two contracts were for periods of 7 years each.

The Emirates General Petroleum Corp. (EGPC) continued with the construction of a pipeline network to the northern Emirates power stations and industries, supplying natural gas produced from Amoco Sharjah Oil Co.'s Sajaa Field gas and condensate operation. Construction of the pipeline network, by Dodsal of Frankfurt, the Federal Republic of Germany, was begun in 1983, and was completed during 1984 to two Sharjah power stations at Layyah and Dhaid, supplying a total of up to 80 million cubic feet per day (mmcf/d) to the two plants. Construction of the network to connect power stations in Ra's al-Khaymah, Ajman, Fujayrah, and Umm al-Qaywayn was to continue in 1985. EGPC was 100% owned by the United Arab Emirates Federal Government.

Associated with and dependent upon the newly developed Sajaa Field in Sharjah, construction began in the latter half of the year on a liquefied petroleum gas (LPG) plant south of the field and a new ocean port at Hamriya to handle export products. The project, Sharjah Amoco Liquid Petroleum Gas Co., was expected to cost $300 million[4] upon completion, the target date for which was mid-1986. Ownership of the company was divided as follows: Sharjah

Government, 60%; Amoco Sharjah, 25%; Tokyo Boeki, 7.5%; and C. Itoh Co. Ltd., 7.5%. The principal construction contractor for the turnkey project, Japan Gasoline Co., began laying foundations for propane and butane tanks at Hamriya on October 27. Capacity and products expected from the completed facility were 13,000 barrels per day (bbl/d) of mixed LPG, 7,500 bbl/d of propane, and 6,000 bbl/d of butane. The plant was also expected to produce an additional 1,500 bbl/d of condensate. By yearend, development drilling and expansion of gas plant capacity had increased production from the Amoco International onshore Sajaa Field operation to 59,800 bbl/d of condensate, and 58 mmcf/d of natural gas. Amoco Sharjah drilled and plugged one exploratory well on its 590,000-acre concession during 1984 and had begun drilling a second exploratory well by yearend.

On-stream since April 1984, the Thamama gas-gathering and processing operation reached a peak capacity of 265 mmcf/d during August. The project was designed and construction-managed by Fluor Corp. Owned 100% by ADNOC, the operation consisted of 50 kilometers of sour gas-gathering trunk lines connecting 19 wells in the Bab Field to processing facilities located at Habshan. Products from Habshan included sweet gas, which was transported through existing gas lines to Ruwais and Abu Dhabi for use as fuel and feedstock in utilities and industries, NGL, stabilized condensate, and granulated sulfur. Abu Dhabi Co. for Onshore Oil Operations (ADCO) operated the gas-gathering section of the system for ADNOC. Expected peak production for 1985 was 350 mmcf/d. Design capacity of the facility was 450 mmcf/d of sour gas throughput, producing 375 mmcf/d of sweet gas, 4,500 bbl/d of NGL, 26,000 bbl/d of condensate, and 800 tons per day of sulfur.

The Margham Field gas-condensate development concession within Dubai was owned 66.67% by Arco Dubai Inc., a subsidiary of Atlantic Richfield Co., and 33.33% by British Petroleum Ltd. Discovered in 1982, 12 wells had been drilled to the Margham structure by yearend 1984, with more drilling planned for 1985. The gas-gathering and condensate recovery system was designed by Fluor, and constructed portions of the system were built by Dodsal, Mina Jebel Ali Construction Co., and CCC Wescon. During 1984, the produced gas was flared, while condensate was pumped via a 40-kilometer pipeline to Jebel Ali, where storage tanks and a loading terminal were located. Approximately 800,000 barrels of condensate were exported to Mitsui & Co. of Japan in November and December, with long-term contracts waiting on Mitsui's analysis and a final assessment of the condensate's quality. The 350 mmcf/d of gas being produced from the field was to be reinjected as soon as construction of the injection system was completed. The reinjection should optimize recovery of condensate.

Other projects ongoing during 1984 were expansions of existing systems for Abu Dhabi Gas Liquefaction Co. (ADGAS) and Abu Dhabi Gas Industries Ltd. (GASCO) of Abu Dhabi, and Dubai Natural Gas Co. (DUGAS) of Dubai. For ADGAS, CBI Constructors Ltd. was building three new liquefied natural gas and four new LPG storage tanks on Das Island, at an overall project cost of $550 million. In association with this construction, ADNOC was pressing ahead with development of the Khuff gas formation under the offshore Umm Shaif Oilfield. Four wells were completed into the Khuff Formation by the end of 1984. GASCO completed a $150 million project at Bu Hasa during the year to improve the efficiency of the gas extraction system there. Subsequently all three GASCO extraction systems, at Bu Hasa, Asab, and Bab, were operating at gas extraction efficiencies of approximately 97%. DUGAS completed a $140 million expansion project on its gas-gathering and processing system during the year, with the production capacity of the Jebel Ali liquefaction plant increased approximately 35%. Coming on-stream in April 1980, GASCO's system was capable of gathering and processing 100 mmcf/d. The expansion project increased the systems' capacity to 250 mmcf/d. At the end of 1984, 150 to 155 mmcf/d of gas was being processed along with a natural flow of 14,000 bbl/d of NGL. Gas processing produced 9,715 bbl/d of propane, 6,960 bbl/d of butane, and 7,000 bbl/d of condensate.

Petroleum.—Production operations in the Bundug Oilfield, which had been discontinued in October 1979 owing to reservoir pressure maintenance problems, were resumed at the beginning of 1984. Production rates for the first half of the year varied between 6,000 and 10,000 bbl/d and rose to 15,000 bbl/d by the end of the year. Production was expected to increase to 26,000 bbl/d by the end of 1986. Reactivation of the field was the result of a secondary recovery program begun in early 1981. In 1984, to maintain the proper pressure and ratio of oil to gas produced, an average of 70,000 bbl/d of brine was injected into the field. The Bundug Oilfield straddled the offshore border between Abu Dhabi and Qatar, and production has been shared between them on a 50-50 basis. Operator of the field was the Bundug Oil Co., which was owned equally by the United Petroleum Development Co. of Japan, British Petroleum, and CFP of France.

The largest petroleum development production company in the United Arab Emirates continued to be ADCO. Owned 60% by ADNOC, the Government parastal started seven exploration-appraisal wells during 1984 and completed two others begun in 1983, for a total footage drilled of 73,666 feet. Of the seven wells started, four were completed and three were still being drilled or tested at yearend. Two of the appraisal wells were in the Arab and Sahil Fields to evaluate the Thamama reservoirs down to the Hanshan Formation. Offshore, the Hail-3 exploratory well resulted in ADCO's first significant gas discovery in the Permian Khuff Formation. The well was drilled to 18,700 feet. ADCO produced an average of 453,082 bbl/d of oil, compared with 496,622 bbl/d in 1983. The decrease in production was attributed to company-imposed quotas, and not to a loss in production capacity. The Asab and Bu Hasa Fields each produced approximately 45% of the total daily yield, with the Bab, Shah, and Sahil Fields together producing the remaining 10%. In addition, ADCO produced an average of 10,682 bbl/d of condensate from the Thamama F and C Formations. Of the total produced, approximately 25% was supplied to the Ruwais refinery, 8% was sent to the Umm al-Nar refinery, and the remaining 67% was exported from the Jebel Dhanna terminal.

Abu Dhabi Marine Areas Operating Co. (ADMA-OPCO) handled almost all offshore petroleum development and production operations in Abu Dhabi during 1984. ADMA-OPCO, the third largest oil producing company in the United Arab Emirates, as with ADCO, was also owned 60% by ADNOC. In the exploration area, ADMA-OPCO drilled six wells, compared with eight in 1983. The most successful was Hair Delma 3, 196 kilometers west of Abu Dhabi City, which yielded significant natural gas in the pre-Khuff Formation. Of the other wells, some yielded evidence of hydrocarbons and 2,410 kilometers of marine seismic survey indicated a number of additional exploration possibilities. In addition to the exploration work, a total of 30 oil and gas projects valued at $40 million was completed on Das Island. ADMA-OPCO reported a production of 188,500 bbl/d of crude production during 1984, a 9.7% decrease from that of 1983. All of the production came from the two offshore fields of Umm Shaif and Lower Zakum. ADMA-OPCO exports followed the general pattern of previous years, with 75% of its crude production going to Japan. Other export destinations included other Far Eastern countries, India, France, African countries, and Australia.

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[1]Physical scientist, Division of International Minerals.

[2]Financial Times (London). United Arab Emirates. Section III, Jan. 7, 1985, p. 7.

[3]Rock Products. United Arab Emirates. V. 88, No. 4, Apr. 1985, pp. 53-54.

[4]Where necessary, values have been converted from United Arab Emirate dirhams (UAED) to U.S. dollars at a rate of UAED3.67=US$1.00.

The Mineral Industry of the United Kingdom

By Tatiana Karpinsky[1]

In 1984, the United Kingdom was entering its third year of economic recovery. Economic growth was estimated at 1% to 2% despite the coal miners' strike, which began March 12, and continued through yearend. The strike was the primary reason that real gross domestic product expanded at a lower rate than originally envisioned at the beginning of the year.

Nonmetallic minerals produced in the United Kingdom made an important contribution to the economy. The United Kingdom continued to be a major world producer of several important industrial minerals including ball clay, china clay, fuller's earth, and gypsum, and also produced significant amounts of barite, celestite, chalk, common clay, fire clay, dolomite, fluorspar, limestone, potash, salt, industrial sand, and talc.

Production of metals from nonferrous ores included mainly lead, mostly from northern England, and tin, mostly from Cornwall. Small amounts of copper and silver were produced in association with tin and zinc. The United Kingdom continued to be self-sufficient in petroleum and petroleum products as a result of the continued growth in offshore oil production. Coal production was reduced severely.

The United Kingdom Department of Industry reported that total disbursements under the 1972 Mineral Exploration and Investment Grants Act (MEIGA) totaled $13 million[2] through March 31, 1984, and that projects attracting a further $800,000 were under consideration. The MEIGA scheme allowed companies to apply for up to 35% of the costs of searching for nonferrous metals, barite, fluorspar, and potash in the United Kingdom. Since its inception in 1972, 63 companies involved in minerals exploration in 235 projects have sought assistance. Following a review of the scheme in the summer of 1984, the Secretary of State for Trade and Industry suspended any further offers for assistance on July 30, pending discussions with the mining industry on whether the scheme should continue and, if so, on what basis.

The British Government was to dispose of a stockpile of strategic minerals, because it was no longer considered necessary. The stockpile had been built up in 1983, after the Falkland Islands war highlighted fears of a possible shortage of certain metals and minerals, especially those produced in southern Africa. It was believed to include various forms of chromium, cobalt, manganese, and vanadium.

PRODUCTION

Coal, deep mined by the National Coal Board, fell 15 million tons to 90 million tons, while surface-mined coal production was unchanged at 16 million tons. Deep-mined production decreased in value by $770 million, while opencast production increased by $280 million. In the second quarter of 1984, steel production fell by about 6%, owing almost entirely to lower coal deliveries; however, the total production for the year remained at the 1983 level. Production of refined aluminum, copper, fluorspar, lead, and tin increased, as did production of potash. Crude oil production increased only slightly.

Table 1.—United Kingdom: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Alumina	102,000	90,000	88,000	93,100	95,000
Metal (refined):					
Primary	374,446	339,183	240,800	252,500	286,000
Secondary	162,056	148,009	114,600	128,300	168,000
Cadmium: Metal including secondary	375	278	354	[e]340	390
Copper:					
Ore and concentrate, metal content	200	700	649	[e]600	[2]657
Metal, refined:					
Primary	68,290	59,834	63,200	[e]67,500	69,500
Secondary	93,048	76,329	71,000	[e]76,800	67,400
Total	161,338	136,163	134,200	144,300	136,900
Iron and steel:					
Iron ore:					
Gross weight thousand tons	916	731	470	384	[2]383
Iron content do	238	161	103	81	[2]82
Metal:					
Pig iron do	6,412	9,470	8,327	9,477	[2]9,562
Ferroalloys, blast furnace: Ferromanganese do	52	84	61	83	[2]75
Steel, crude do	11,272	15,573	13,704	14,986	[2]15,121
Semimanufactures do	10,335	13,241	15,139	[e]16,000	16,000
Lead:					
Mine output, metal content	3,600	7,000	3,993	3,793	4,000
Metal:					
Smelter:					
Primary[3]	30,039	26,556	34,100	40,740	40,700
Secondary (refined)[4]	211,385	197,992	175,210	185,288	191,000
Total	241,424	224,548	209,310	226,028	231,700
Refined:					
Primary[5]	113,405	135,369	130,984	136,908	140,000
Secondary[4]	211,385	197,992	175,210	185,288	191,000
Total	324,790	333,361	306,194	322,196	331,000
Magnesium metal including secondary	2,700	1,900	1,758	[e]1,800	1,800
Nickel metal, refined	19,300	25,400	6,900	23,200	21,000
Silver metal thousand troy ounces	NA	61	105	85	90
Tin:					
Mine output metal content	2,982	3,869	4,208	4,025	4,600
Metal:					
Primary	5,829	6,839	8,200	6,500	6,100
Secondary (refined)	5,535	6,071	5,400	6,900	7,100
Zinc:					
Ore and concentrate, metal content	4,400	10,900	10,186	[e]9,000	[2]7,159
Metal, smelter	86,682	81,650	79,300	[e]87,700	85,600
NONMETALS					
Barite and witherite	54,000	63,000	81,000	36,000	70,000
Bromine	26,400	27,600	29,800	25,800	27,000
Calcite	18,000	18,000	18,000	10,000	12,000
Cement, hydraulic thousand tons	14,805	12,729	12,962	13,396	[2]13,481
Chalk do	14,049	11,756	11,616	12,430	12,700
Clays:					
Fire clay do	1,217	992	850	689	650
Fuller's earth do	210	205	243	267	290
Kaolin (china clay) do	3,964	3,800	3,558	2,722	4,100
Pottery clay and ball clay do	14	23	43	40	20
Other including clay shale do	19,811	18,776	20,280	22,385	23,500
Diatomite[e] do	1	1	1	1	1
Feldspar (china stone)[e] do	50	50	50	50	50
Fluorspar, all grades do	171	116	98	131	160
Gypsum and anhydrite[6] do	3,447	2,944	2,741	2,967	3,000
Lime: Quicklime and hydrated lime do	[2]2,980	3,000	3,000	3,000	3,100
Nitrogen: N content of ammonia do	1,633	1,780	1,716	1,720	1,700
Potash, K_2O equivalent do	321	285	401	302	360
Salt:					
Brine (in brine for purposes other than saltmaking) do	1,608	1,454	1,554	1,394	1,400
Rock do	1,746	1,350	2,209	1,316	1,500
Other do	3,800	3,916	3,874	3,601	3,600
Sodium compounds: Sodium carbonate[e] do	1,360	1,300	1,300	1,300	1,300

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone, sand and gravel:					
Chert and flint thousand tons	14	10	[e]10	174	150
Igneous rock do	34,676	30,772	36,138	36,873	38,000
Limestone and dolomite do	88,773	79,067	85,450	93,985	37,300
Sandstone including ganister do	12,597	12,233	13,336	14,736	15,200
Slate do	225	350	785	494	190
Crushed rock, not further described do	102,533	92,000	102,848	112,082	115,000
Sand and gravel:					
Common sand and gravel do	104,467	97,000	97,753	107,246	110,000
Special sands do	5,708	4,451	4,123	4,025	4,000
Strontium minerals	6,700	14,500	[e]18,000	12,000	12,000
Sulfur, byproduct:					
Of metallurgy[e] thousand tons	50	50	50	50	50
Of spent oxides do	4	4	4	4	4
Of petroleum refinery do	80	75	59	55	55
Total do	134	129	113	109	109
Talc, soapstone, pyrophyllite[e]	17,300	18,000	19,000	[r]16,000	16,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black thousand tons	172	153	[e]150	[e]150	NA
Coal:					
Anthracite do	2,902	[r]2,123	2,884	2,016	1,200
Bituminous and other do	127,198	124,591	121,816	117,238	51,000
Coke:					
Metallurgical do	7,829	7,367	7,203	7,192	7,200
Breeze, all types do	673	603	502	357	400
Fuel briquets, all grades do	2,484	2,065	1,933	1,784	1,800
Gas, natural:					
Gross million cubic feet	1,287,899	1,284,141	1,263,341	1,295,824	[2]1,340,000
Marketed do	[r]1,316,878	1,320,762	NA	NA	NA
Natural gas liquids thousand 42-gallon barrels	[r]11,800	[r]11,100	21,400	30,200	35,400
Petroleum:					
Crude including field condensate do	581,758	[r]648,600	740,644	816,600	893,000
Refinery products:					
Gasoline do	141,764	146,197	163,563	179,324	NA
Jet fuel do	41,584	36,472	35,656	37,784	NA
Kerosine do	15,764	14,756	14,345	13,718	NA
Distillate fuel oil do	165,261	152,259	153,534	156,876	NA
Residual fuel oil do	157,842	127,000	105,281	89,797	NA
Lubricants do	8,750	7,441	6,930	6,552	NA
Other do	65,938	63,178	63,945	64,662	NA
Refinery fuel and losses do	50,288	44,441	47,499	44,999	NA
Total do	647,191	591,744	590,753	593,712	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through June 1985.
[2]Reported figure.
[3]Bullion produced entirely from imported ore.
[4]Includes a small quantity of primary lead from domestic ore.
[5]Produced entirely from imported bullion and includes antimonial lead product.
[6]Excludes plasters.

TRADE

Exports of petroleum, petroleum products, and related materials reached $19.8 billion[3] or 21% of total exports, compared with 19% in 1983. Exports of iron and steel reached $2 billion or about 3% of the total, and the value of exports of nonferrous metals was approximately the same. The import value of petroleum, petroleum products, and related materials accounted for 10% of the total import value; iron and steel accounted for 2.5%; and nonferrous metals for 1.3%. The strength of the U.S. dollar remained the major obstacle to U.S. exports to the United Kingdom; the dollar reached a new record high against the pound sterling in the second quarter of 1984, when the pound fell at one period to below $1.30.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	749	717	2	Sweden 390; Ireland 138; Netherlands 47.
Oxides and hydroxides	37,018	37,926	1,352	Finland 5,973; Republic of South Africa 4,083; Norway 3,343.
Ash and residue containing aluminum	1,873	3,105	664	West Germany 1,434; Netherlands 347.
Metal including alloys:				
Scrap	60,351	78,863	1,904	West Germany 32,600; Japan 19,110; France 6,858.
Unwrought	119,517	132,414	23,199	West Germany 41,372; Netherlands 17,018.
Semimanufactures	98,675	95,031	4,409	Ireland 14,415; West Germany 12,239; France 9,874.
Antimony: Metal including alloys, all forms	118	75	NA	NA.
Arsenic: Oxides and acids	2,468	4,278	NA	NA.
Beryllium:				
Oxides and hydroxides	4	2	1	West Germany 1.
Metal including alloys, all forms	1	18	18	
Bismuth: Metal including alloys, all forms	r319	353	86	West Germany 58; France 44.
Cadmium: Metal including alloys, all forms	r144	194	3	France 58; Canada 32.
Chromium:				
Ore and concentrate	980	112	--	Turkey 54; Sweden 30; Netherlands 27.
Oxides and hydroxides	2,745	12,614	2,622	France 1,401; Australia 805.
Metal including alloys, all forms	1,945	3,037	1,616	West Germany 405; Japan 109.
Cobalt:				
Oxides and hydroxides	500	387	72	Belgium-Luxembourg 62; Italy 35.
Metal including alloys, all forms	514	743	89	Netherlands 225; Australia 84.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	(2)	(2)	NA	NA.
Tantalum	6	27	9	West Germany 14; France 4.
Copper:				
Ore and concentrate	39	667	1	Chile 650; West Germany 10; Austria 5.
Matte and speiss including cement copper	76	150	--	Finland 106; Netherlands 43.
Oxides and hydroxides	454	446	100	Singapore 42; France 38.
Sulfate	6,100	899	NA	NA.
Ash and residue containing copper	9,138	5,158	--	Spain 1,590; Belgium-Luxembourg 1,494; West Germany 1,236.
Metal including alloys:				
Scrap	92,718	104,701	375	West Germany 46,350; Belgium-Luxembourg 21,367; Italy 20,714.
Unwrought	32,643	32,803	735	Italy 9,402; West Germany 8,827; France 3,318.
Semimanufactures	102,468	94,266	4,587	Ireland 11,823; France 7,859; Israel 7,067.
Gallium: Metal including alloys, all forms	11	17	NA	NA.
Germanium: Metal including alloys, all forms	r3	3	1	West Germany 1.
Gold:				
Waste and sweepings value, thousands	$35,073	$7,042	--	Spain $5,548; Switzerland $203.
Metal including alloys, unwrought and partly wrought thousand troy ounces	r295	177	--	Israel 23; Ireland 13; Sweden 13.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	685	965	(2)	Ireland 415; Cuba 204; West Germany 172.
Pyrite, roasted	4	--		
Metal:				
Scrap thousand tons	3,052	3,794	3	Spain 2,419; West Germany 175; Turkey 153.
Pig iron, cast iron, related materials	32,583	69,434	156	Egypt 18,680; Belgium-Luxembourg 16,024; France 7,624.
Ferroalloys:				
Ferromanganese	23,902	14,040	--	West Germany 7,995; Belgium-Luxembourg 2,241.
Ferrosilicon	1,173	1,699	519	NA.
Unspecified	r11,832	14,649	--	West Germany 3,284; Netherlands 2,128; Italy 701.
Steel, primary forms	331,897	722,127	20,296	Greece 153,769; West Germany 116,547; Iran 109,735.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,332,604	1,353,209	225,433	West Germany 111,165; Singapore 110,601.
Universals, plates, sheets	980,428	1,128,482	64,484	India 129,822; West Germany 113,068.
Hoop and strip	106,970	109,900	4,328	France 11,651; West Germany 10,352; Ireland 9,309.
Rails and accessories	120,869	160,838	2,137	Kenya 25,883; Iraq 22,333; Colombia 20,192.
Wire	93,473	97,884	18,047	Canada 11,168; Ireland 10,272.
Tubes, pipes, fittings	669,332	559,218	35,849	Norway 38,239; Sweden 36,280.
Castings and forgings, rough	52,643	40,021	7,203	Saudi Arabia 7,713; Sweden 5,049.
Lead:				
Ore and concentrate	2,496	10,095	18	Finland 6,636; Belgium-Luxembourg 1,749; France 1,557.
Oxides	5,376	5,267	([2])	Ireland 1,977; Trinidad and Tobago 584; Nigeria 539.
Ash and residue containing lead	5,149	1,401	--	West Germany 578; Denmark 329.
Metal including alloys:				
Scrap	22,607	22,314	18	West Germany 5,791; Netherlands 4,609; Ireland 4,170.
Unwrought	128,036	113,049	1,301	West Germany 27,838; Belgium-Luxembourg 25,783; Italy 14,063.
Semimanufactures	2,213	3,116	69	France 633; Saudi Arabia 411; Netherlands 367.
Lithium:				
Ore and concentrate	98	117	NA	NA.
Oxides and hydroxides	NA	94	--	France 34; West Germany 20.
Metal including alloys, all forms	17	97	NA	NA.
Magnesium: Metal including alloys:				
Scrap	341	353	61	Italy 145; Pakistan 53.
Unwrought	971	921	422	West Germany 207; France 100.
Semimanufactures	754	767	67	West Germany 85; Ireland 85.
Manganese:				
Ore and concentrate, metallurgical-grade	6,659	1,414	--	Italy 1,009; Republic of South Africa 250; Sri Lanka 54.
Oxides	1,004	2,697	56	Nigeria 1,374; Spain 458; Israel 300.
Metal including alloys, all forms	r877	1,232	38	France 360; Netherlands 121; Venezuela 81.
Mercury ... 76-pound flasks	6,177	3,597	29	Netherlands 1,131; Spain 522; Australia 348.
Molybdenum:				
Ore and concentrate	5,769	6,120	2	Netherlands 3,636; Belgium-Luxembourg 620.
Oxides and hydroxides	1,854	1,035	--	West Germany 586; Netherlands 165.
Metal including alloys, all forms	374	460	18	Netherlands 144; West Germany 140.
Nickel:				
Ore and concentrate	1	10	--	Hong Kong 6; Ireland 2; Yugoslavia 2.
Matte and speiss	2,010	573	21	Sweden 216; Spain 116; France 77.
Oxides and hydroxides	294	150	--	Netherlands 87; West Germany 27.
Ash and residue containing nickel	1,515	4,504	--	Canada 2,911; Norway 401; China 341.
Metal including alloys:				
Scrap	5,136	5,637	602	Sweden 1,856; West Germany 868.
Unwrought	11,426	13,737	365	West Germany 2,718; Belgium-Luxembourg 2,710; Canada 1,375.
Semimanufactures	7,842	7,718	412	Japan 1,295; France 1,195; West Germany 1,005.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ... thousand troy ounces	1,415	1,511	707	Switzerland 289; Japan 96.
Selenium, elemental	107	153	NA	NA.
Silicon, high-purity	350	1,179	NA	NA.
Silver:				
Ore and concentrate[3] ... value, thousands	$127	$182	$72	India $40; West Germany $22.
Waste and sweepings[3] ... do	$10,400	$33,743	$322	Belgium-Luxembourg $24,090; France $6,279; West Germany $1,875.
Metal including alloys, unwrought and partly wrought ... thousand troy ounces	85,457	81,309	41,056	Switzerland 29,739; France 1,704; China 1,382.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983 United States	Destinations, 1983 Other (principal)
METALS —Continued				
Tellurium and arsenic	58	44	NA	NA.
Tin:				
Ore and concentrate	1,866	1,601	--	Netherlands 1,501; Malaysia 80.
Oxides	385	501	123	Spain 173; Netherlands 75.
Ash and residue containing tin	397	453	7	Spain 199; Denmark 153.
Metal including alloys:				
Scrap	356	373	--	West Germany 190; France 128.
Unwrought	6,610	1,897	31	West Germany 442; Italy 288; Netherlands 273.
Semimanufactures	493	558	26	Ireland 102; Jamaica 71; Italy 60.
Titanium:				
Ore and concentrate	970	513	--	Belgium-Luxembourg 442; West Germany 45.
Oxides	10,494	14,018	4,675	Japan 1,336; Hungary 908.
Metal including alloys, all forms value, thousands	r$37,981	$22,315	NA	NA.
Tungsten:				
Ore and concentrate	1,364	218	(2)	Japan 105; U.S.S.R. 54; Belgium-Luxembourg 25.
Oxides and hydroxides	167	8	NA	NA.
Ash and residue containing tungsten	18	25	NA	Austria 9; West Germany 2.
Metal including alloys, all forms	421	543	176	West Germany 178; Italy 30.
Uranium and/or thorium:				
Ore and concentrate value, thousands	$231	$2	--	Mainly to Israel.
Metals including alloys, all forms do	$228,881	$236,318	NA	NA.
Vanadium:				
Oxides and hydroxides	56	182	NA	Belgium-Luxembourg 170.
Ash and residue containing vanadium	112	--		
Metal including alloys, all forms	17	73	NA	Zambia 56; West Germany 10.
Zinc:				
Ore and concentrate	18,576	7,538	2	France 5,970; Belgium-Luxembourg 1,556.
Oxides	8,179	7,728	307	Belgium-Luxembourg 1,978; West Germany 1,006; Ireland 971.
Blue powder	2,747	2,702	1,148	NA.
Matte	1,230	868	--	West Germany 650; Spain 187.
Ash and residue containing zinc	26,808	8,764	--	West Germany 3,830; Sweden 3,299.
Metal including alloys:				
Scrap	11,034	14,495	--	West Germany 7,687; France 1,639; Belgium-Luxembourg 1,631.
Unwrought	17,506	25,561	5,108	France 4,023; Netherlands 3,327.
Semimanufactures	5,498	3,928	260	Nigeria 1,545; Iran 833.
Zirconium:				
Ore and concentrate	539	596	--	West Germany 264; France 87.
Oxides and hydroxides	NA	872	331	West Germany 134; Japan 94.
Other:				
Ores and concentrates	60	5	NA	NA.
Ashes and residues	11,607	17,041	766	Belgium-Luxembourg 8,170; Sweden 3,486; Canada 1,710.
Base metals including alloys, all forms	r2	2	NA	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,300	1,968	NA	NA.
Artificial: Corundum	4,510	2,839	892	West Germany 878; Sweden 299.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$3,283	$2,502	$141	India $471; Belgium-Luxembourg $368.
Grinding and polishing wheels and stones	4,687	3,611	120	France 659; Iran 380; Sweden 365.
Asbestos, crude	1,860	1,283	--	Belgium-Luxembourg 939; Egypt 89; West Germany 82.
Barite and witherite	11,427	10,464	--	Norway 6,582; Netherlands 1,200.
Boron materials:				
Crude natural borates	82	447	--	Republic of South Africa 443.
Oxides and acids	814	985	(2)	Netherlands 900; Japan 51; Spain 11.
Bromine	2,151	1,918	NA	NA.
Cement	306,734	393,128	211	Nigeria 314,435; Ireland 27,416; Sudan 8,826.
Chalk	37,848	40,265	625	Nigeria 10,763; Singapore 4,488; Lebanon 2,018.
Clays, crude: Unspecified thousand tons	2,501	2,599	NA	NA.
Cryolite and chiolite	16	29	--	Ireland 28; Egypt 1.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung value, thousands	$1,605,261	$1,905,570	$197,855	Belgium-Luxembourg $726,965; Switzerland $419,385; India $354,908.
Industrial stones do	$38,052	$15,932	$2,148	Romania $3,384; Belgium-Luxembourg $2,095.
Diatomite and other infusorial earth	377	309	--	Trinidad and Tobago 55; Denmark 53; Iran 40.
Feldspar, fluorspar, related materials	18,813	13,394	--	Netherlands 8,216; West Germany 1,326.
Fertilizer materials:				
Crude, n.e.s	5,181	3,054	48	Netherlands 2,630; West Germany 123.
Manufactured:				
Ammonia	301,998	232,568	18	Spain 55,443; France 50,055; Belgium-Luxembourg 35,075.
Nitrogenous	147,384	118,330	3	Netherlands 49,319; West Germany 27,080; Belgium-Luxembourg 18,536.
Phosphatic	2,170	1,706	--	Ireland 1,515; Saudi Arabia 116; Sudan 33.
Potassic	77,684	145,994	302	Finland 34,010; Norway 31,692; France 19,456.
Unspecified and mixed	238,784	330,071	683	Ireland 156,370; West Germany 56,573; Finland 25,978.
Graphite, natural	2,956	3,126	41	West Germany 1,243; France 566; Italy 220.
Gypsum and plaster	16,523	21,715	19	Saudi Arabia 8,431; Ireland 3,644; Hong Kong 1,220.
Iodine	132	96	NA	NA.
Lime	32,163	21,737	--	France 5,212; Nigeria 3,262; Trinidad and Tobago 2,055.
Magnesium compounds	65,612	89,210	NA	NA.
Mica:				
Crude including splittings and waste	3,448	3,676	1	West Germany 1,317; Netherlands 255.
Worked including agglomerated splittings	60	113	([2])	West Germany 31; Belgium-Luxembourg 12.
Nitrates, crude	132	196	--	Ireland 105; Singapore 54; West Germany 24.
Phosphates, crude	966	10,395	5	West Germany 10,000; Australia 231; Ireland 109.
Pigments, mineral:				
Natural, crude	1,601	800	NA	NA.
Iron oxides and hydroxides, processed	6,700	--		
Potassium salts, crude	213	--		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$92,834	$105,676	$29,233	Switzerland $46,413; France $10,789.
Synthetic do	$126	$265	$2	Japan $143; France $73.
Pyrite, unroasted	72	52	--	France 40; Portugal 7.
Salt and brine	484,659	378,864	10	Nigeria 136,163; Sweden 77,336; Ireland 50,336.
Sodium compounds, n.e.s.: Carbonate, manufactured	162,093	91,525	48	Finland 14,022; Nigeria 8,550; Norway 5,005.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,151	8,820	1	West Germany 5,353; Denmark 1,181; Gibraltar 1,090.
Worked	7,469	5,602	207	St. Helena 1,183; Ireland 994; Netherlands 614.
Dolomite, chiefly refractory-grade	14,616	24,012	--	Norway 7,896; West Germany 3,989; New Zealand 3,041.
Gravel and crushed rock thousand tons	3,628	2,413	4	Belgium-Luxembourg 1,101; France 775; Netherlands 222.
Limestone other than dimension	625,647	668,629	--	Norway 173,460; Belgium-Luxembourg 136,869; West Germany 135,386.
Quartz and quartzite	201	1,081	--	Ireland 503; United Arab Emirates 251; Nigeria 70.
Sand other than metal-bearing	50,151	58,981	--	Ireland 24,411; Sweden 16,780.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	1,201	1,688	3	Ireland 145; Angola 131; Iran 118.
Colloidal, precipitated, sublimed	295	176	--	Ireland 87; Netherlands 30; Yugoslavia 14.
Dioxide	117	57	NA	NA.
Sulfuric acid	77,607	59,779	35	Belgium-Luxembourg 29,041; Ireland 28,495.
Talc, steatite, soapstone, pyrophyllite	3,573	4,272	20	Netherlands 1,291; Nigeria 941; Ireland 917.
Vermiculite	974	1,353	--	West Germany 526; France 281; Switzerland 58.
Other:				
Crude	25,529	31,469	207	Netherlands 10,215; Sweden 3,050.
Slag and dross, not metal-bearing	68,674	46,706	499	West Germany 37,793; Sweden 1,077.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3,171	4,128	7	Ireland 2,113; Denmark 284; Portugal 246.
Carbon: Carbon black	37,475	32,004	35	Nigeria 5,138; Ireland 3,028; West Germany 2,984.
Coal:				
Anthracite	551,945	517,119	--	France 166,000; Morocco 136,445; Belgium-Luxembourg 68,587.
Bituminous thousand tons	6,837	5,827	(2)	Denmark 1,575; France 1,399; Finland 764.
Briquets of anthracite and bituminous coal	126,338	124,540	(2)	Norway 107,004; Venezuela 6,849; Ireland 4,995.
Lignite including briquets	489	809	--	United Arab Emirates 287; New Zealand 100; Pakistan 84.
Coke and semicoke thousand tons	1,416	878	--	Norway 200; Netherlands 135; Finland 126.
Peat including briquets and litter	7,232	8,265	19	France 2,805; Spain 1,694; Egypt 1,645.
Petroleum:				
Crude thousand 42-gallon barrels	453,518	497,964	130,418	Netherlands 113,771; France 75,483.
Refinery products:				
Liquefied petroleum gas do.	16,783	23,188	199	Netherlands 6,688; France 2,788; Spain 2,429.
Gasoline:				
Aviation do.	17,920	21,942	1,835	Netherlands 5,754; Ireland 4,978; France 3,993.
Motor do.	9,577	12,637	847	Netherlands 5,632; Sweden 2,357; West Germany 1,164.
Mineral jelly and wax do.	290	267	47	West Germany 52; Nigeria 25.
Kerosine and jet fuel do.	3,902	4,074	39	Ireland 2,077; Iran 514; Netherlands 304.
Distillate fuel oil do.	35,450	37,236	30	France 10,316; Netherlands 6,690; Ireland 6,090.
Lubricants do.	4,834	3,668	16	Netherlands 513; Sweden 412; West Germany 361.
Residual fuel oil do.	22,713	21,897	4,456	Ireland 4,260; Sweden 3,364.
Bitumen and other residues do.	552	673	--	Ireland 519; Iceland 73.
Bituminous mixtures do.	204	174	(2)	Ireland 36; Netherlands 12; Saudi Arabia 12.
Petroleum coke do.	1,798	2,077	NA	NA.

[r]Revised. NA Not available.
[1]Table prepared by V. L. Paytes.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—United Kingdom: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	310,130	256,068	25	Brazil 133,318; Ghana 62,048; Greece 45,975.
Oxides and hydroxides	457,033	488,882	4,943	Jamaica 462,213; West Germany 8,024.
Ash and residue containing aluminum	304	1,626	--	Belgium-Luxembourg 908; Norway 348.
Metal including alloys:				
Scrap	4,085	10,897	64	Ireland 3,667; East Germany 2,491.
Unwrought	154,833	163,637	69	Norway 106,065; Netherlands 11,763.
Semimanufactures	209,211	237,742	16,742	West Germany 70,978; France 34,111; Belgium-Luxembourg 33,704.
Antimony:				
Oxides	856	737	--	France 447; Belgium-Luxembourg 198; U.S.S.R. 66.
Metal including alloys, all forms	297	617	--	China 439; Switzerland 99.
Beryllium:				
Oxides and hydroxides	6	8	7	West Germany 1.
Metal including alloys, all forms	1	1	([2])	Mainly from West Germany.
Bismuth: Metal including alloys, all forms	351	337	19	Canada 61; West Germany 61; Peru 55.
Cadmium: Metal including alloys, all forms	r872	77	NA	Netherlands 25; France 24.
Chromium:				
Ore and concentrate	64,547	100,475	2	Republic of South Africa 91,938.
Oxides and hydroxides	3,054	1,206	72	Netherlands 295; U.S.S.R. 272.
Metal including alloys, all forms	38	161	7	Japan 72; France 36; West Germany 16.
Cobalt:				
Ore and concentrate	2	7	NA	Finland 2.
Oxides and hydroxides	363	344	19	Canada 254.
Metal including alloys, all forms	1,219	1,918	65	Belgium-Luxembourg 758; Zambia 442; Netherlands 134.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	r4	17	7	West Germany 9.
Tantalum	32	51	21	West Germany 20; France 5.
Copper:				
Ore and concentrate	683	1,000	([2])	Mainly from Czechoslovakia.
Oxides and hydroxides	1,613	2,063	35	Norway 777; West Germany 645; Australia 432.
Ash and residue containing copper	50,098	45,466	878	Sweden 31,912; Netherlands 8,555.
Metal including alloys:				
Scrap	10,021	10,008	273	Republic of South Africa 2,017; Ireland 1,800; West Germany 1,008.
Unwrought	324,880	284,908	1,787	Chile 50,626; Canada 47,012; Peru 46,484.
Semimanufactures	99,927	92,091	1,448	West Germany 29,800; France 15,645.
Gallium: Metal including alloys, all forms	23	21	NA	NA.
Germanium: Metal including alloys, all forms	r5	11	--	West Germany 8; France 1.
Gold:				
Waste and sweepings value, thousands	$128,994	$127,555	$82,423	Belgium-Luxembourg $17,805; Sweden $12,946.
Metal including alloys, unwrought and partly wrought thousand troy ounces	r694	1,438	35	Hong Kong 569; Singapore 402; Brazil 116.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	10,572	13,170	([2])	Canada 5,268; Australia 2,513; Brazil 1,640.
Pyrite, roasted	210,265	230,637	--	Sweden 219,874; Norway 10,762.
Metal:				
Scrap	37,317	11,193	194	Ireland 6,014; West Germany 1,041.
Pig iron, cast iron, related materials	167,940	106,685	145	Brazil 25,072; Norway 22,816; Netherlands 21,129.
Ferroalloys:				
Ferromanganese	58,031	98,949	([2])	Republic of South Africa 66,119; Norway 21,596.
Ferrosilicon	75,484	69,725	NA	NA.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys —Continued				
Unspecified	124,743	139,003	254	Norway 31,901; Sweden 26,118; Republic of South Africa 25,405.
Steel, primary forms	875,068	847,207	210	West Germany 388,077; Netherlands 123,927.
Semimanufactures:				
Bars, rods, angles, shapes, sections	952,256	766,227	1,777	Belgium-Luxembourg 106,767; West Germany 97,076; Spain 92,838.
Universals, plates, sheets	1,497,239	1,315,606	7,956	West Germany 291,421; Netherlands 243,678; Belgium-Luxembourg 221,592.
Hoop and strip	134,162	150,949	1,517	West Germany 63,525; Belgium-Luxembourg 22,061; France 18,157.
Rails and accessories	12,933	2,466	65	Spain 944; Ireland 543; Belgium-Luxembourg 451.
Wire	56,176	53,484	345	Belgium-Luxembourg 17,803; France 11,858; West Germany 9,822.
Tubes, pipes, fittings	404,264	298,762	3,028	West Germany 58,029; Netherlands 51,586; Italy 21,855.
Castings and forgings, rough	19,961	20,556	117	West Germany 6,157; France 2,195; Italy 1,700.
Lead:				
Ore and concentrate	39,216	34,571	--	Canada 20,947; Ireland 4,665; Spain 3,604.
Oxides	755	979	2	West Germany 528; Netherlands 384.
Ash and residue containing lead	8,830	7,526	4,014	Australia 632; Italy 603.
Metal including alloys:				
Scrap	953	1,246	89	Ghana 260; Sweden 233.
Unwrought	173,649	139,931	39	Australia 88,416; Canada 29,842; Netherlands 18,226.
Semimanufactures	5,016	6,713	82	Belgium-Luxembourg 3,117; Ireland 2,382.
Lithium:				
Oxides and hydroxides	r1,054	1,522	269	West Germany 99; China 47.
Metal including alloys, all forms	--	7	NA	NA.
Magnesium: Metal including alloys:				
Scrap	16	168	18	Netherlands 77; West Germany 62.
Unwrought	4,288	4,332	--	Netherlands 1,902; Norway 1,815; Canada 299.
Semimanufactures	509	1,115	121	Norway 376; Canada 222; Netherlands 179.
Manganese:				
Ore and concentrate, metallurgical-grade	178,945	368,494	--	Republic of South Africa 193,097; Brazil 119,249; Congo 25,900.
Oxides	4,524	2,645	160	Belgium-Luxembourg 1,335; Ireland 728.
Metal including alloys, all forms	2,741	3,421	140	Republic of South Africa 2,152; France 405; Mozambique 311.
Mercury 76-pound flasks	7,569	5,367	261	Spain 2,872; Netherlands 1,886.
Molybdenum:				
Ore and concentrate	17,738	14,419	6,754	Canada 2,035; Chile 1,554.
Oxides and hydroxides	195	191	--	Netherlands 132; West Germany 35.
Metal including alloys, all forms	179	308	62	Austria 129; West Germany 63.
Nickel:				
Matte and speiss	15,015	25,937	--	Canada 22,687; Australia 1,851.
Oxides and hydroxides	216	511	--	Australia 207; Canada 125; West Germany 114.
Ash and residue containing nickel	575	689	159	Sweden 222; Albania 90.
Metal including alloys:				
Scrap	3,359	2,299	345	Netherlands 543; France 221.
Unwrought	15,252	10,890	71	Netherlands 3,179; Australia 2,397.
Semimanufactures	2,527	3,056	1,089	West Germany 913; France 420.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	643,020	333,425	32,151	Switzerland 64,301; Republic of South Africa 32,151.
Silver:				
Ore and concentrate[3] value, thousands	$170,445	$285,543	$1,430	Republic of South Africa $228,645; Canada $46,762.
Waste and sweepings[3] do	$175,617	$212,210	$118,047	Sweden $17,260; Hong Kong $11,877.
Metal including alloys, unwrought and partly wrought thousand troy ounces	46,940	79,627	739	United Arab Emirates 13,117; West Germany 10,867; Mexico 7,041.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	20,386	22,407	136	Peru 8,727; Bolivia 8,108; Chile 3,657.
Oxides	4	20	--	Italy 19; Netherlands 1.
Ash and residue containing tin	12,072	19,497	6,678	Republic of South Africa 4,787; West Germany 2,660.
Metal including alloys:				
Scrap	1,533	2,902	350	Netherlands 1,822; Japan 158.
Unwrought	7,630	7,350	429	Netherlands 1,968; Indonesia 1,465.
Semimanufactures	94	135	2	West Germany 50; Netherlands 41.
Titanium:				
Ore and concentrate	354,873	281,399	20	Australia 160,381; Norway 69,177; India 26,471.
Oxides	8,304	11,024	6,062	France 1,801; West Germany 1,632.
Metal including alloys, all forms	r1,555	1,332	436	Japan 591; West Germany 108.
Tungsten:				
Ore and concentrate	1,768	693	--	Bolivia 228; China 142; Belgium-Luxembourg 122.
Oxides and hydroxides	244	18	--	All from Republic of Korea.
Ash and residue containing tungsten	41	23	19	Sweden 1.
Metal including alloys, all forms	245	213	14	Republic of Korea 70; Austria 57; West Germany 35.
Uranium and/or thorium:				
Ore and concentrate	1,826	--		
Oxides and other compounds value, thousands	$114	--		
Metals including alloys, all forms do	$27,280	$37,274	NA	NA.
Vanadium:				
Oxides and hydroxides	745	1,929	--	Finland 1,380; Netherlands 287; China 225.
Metal including alloys, all forms	41	142	--	West Germany 131; Belgium-Luxembourg 11.
Zinc:				
Ore and concentrate	166,084	167,171	--	Peru 47,332; Ireland 36,779; Australia 35,125.
Oxides	4,514	3,378	9	West Germany 1,951; Italy 234.
Blue powder value, thousands	$2,922	$2,037	--	Belgium-Luxembourg $573; West Germany $570; Netherlands $519.
Matte	48	47	--	All from France.
Ash and residue containing zinc	2,374	14,361	758	West Germany 9,762; Canada 1,178.
Metal including alloys:				
Scrap	2,065	1,817	--	Finland 727; Canada 326; France 242.
Unwrought	128,669	122,880	(2)	Netherlands 34,659; Finland 33,248; Canada 29,655.
Semimanufactures value, thousands	$5,845	$6,302	$399	West Germany $2,091; France $1,331.
Zirconium:				
Ore and concentrate	36,792	38,000	29	Australia 23,640; Republic of South Africa 13,434.
Metal including alloys, all forms	r80	142	114	West Germany 5; France 3.
Other:				
Ashes and residues	6,975	5,456	2,425	France 313; Norway 313.
Base metals including alloys, all forms	r21	20	NA	NA.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	183,466	221,318	--	NA.
Artificial: Corundum	18,874	10,690	137	Canada 5,991; Netherlands 1,537; France 1,434.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$13,269	$11,676	NA	NA.
Grinding and polishing wheels and stones	5,302	4,925	117	France 906; Netherlands 798; West Germany 754.
Asbestos, crude	52,260	45,145	54	Canada 33,566; Republic of South Africa 5,190.
Barite and witherite	116,386	138,226	--	Ireland 74,765; Morocco 41,995.
Boron materials: Oxides and acids	2,976	3,935	4	Belgium-Luxembourg 1,747; France 1,441.
Cement	281,770	429,958	216	Netherlands 165,948; Ireland 87,236; West Germany 83,940.
Chalk	4,559	5,538	24	Denmark 4,437; France 632.
Clays, crude	167,316	173,420	29,787	France 56,299; Greece 23,200; Republic of South Africa 14,463.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Cryolite and chiolite	481	412	--	Denmark 411.
Diamond:				
Gem, not set or strung value, thousands	$1,658,735	$2,094,121	NA	NA.
Industrial stones do	$41,239	$27,719	NA	NA.
Diatomite and other infusorial earth	14,352	17,601	3,127	Denmark 11,348; France 2,440.
Feldspar, fluorspar, related materials	129,874	109,836	205	Norway 64,328; Finland 13,120; Spain 11,222.
Fertilizer materials:				
Crude, n.e.s	1,522	2,389	2	Ireland 1,779; France 281.
Manufactured:				
Nitrogenous	506,657	608,565	4	Netherlands 258,113; Belgium-Luxembourg 159,228.
Phosphatic	118,278	181,097	--	Netherlands 43,253; Morocco 29,434; Tunisia 27,859.
Potassic	495,693	484,429	([2])	East Germany 210,210; West Germany 155,010.
Unspecified and mixed	435,731	567,590	2,159	Netherlands 105,129; Belgium-Luxembourg 90,477; Norway 64,429.
Graphite, natural	17,862	28,352	98	West Germany 12,633; China 4,659; Madagascar 4,431.
Gypsum and plaster	78,115	85,582	464	Ireland 41,538; France 38,184.
Iodine	1,471	2,043	NA	NA.
Lime	2,629	2,166	1	Ireland 1,325; France 356; Sweden 354.
Magnesium compounds	r87,860	125,969	276	Greece 44,709; Spain 32,075; Netherlands 16,825.
Mica:				
Crude including splittings and waste	14,073	16,408	53	China 10,263; France 1,859.
Worked including agglomerated splittings	480	492	69	Belgium-Luxembourg 108; China 69; Switzerland 60.
Nitrates, crude	5,774	7,701	--	Chile 7,288.
Phosphates, crude thousand tons	1,312	1,489	75	Morocco 919; Senegal 350.
Pigments, mineral:				
Natural, crude	r3,922	5,231	--	Austria 1,958; Cyprus 1,078; India 934.
Iron oxides and hydroxides, processed	23,391	30,494	1,166	West Germany 25,307.
Potassium salts, crude	22,492	25,720	--	West Germany 17,327; East Germany 8,393.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$117,304	$103,852	$23,155	Switzerland $50,310; France $5,570.
Synthetic do	$870	$454	$296	Singapore $54; U.S.S.R. $36.
Pyrite, unroasted	15,690	24,346	NA	NA.
Salt and brine	183,607	93,957	305	Italy 43,638; West Germany 28,616.
Sodium compounds, n.e.s.: Carbonate, manufactured	120,481	66,164	44,927	Poland 12,114; Bulgaria 2,999.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	25,668	60,642	226	Sweden 27,681; France 13,737.
Worked	40,164	56,661	197	Italy 21,871; Portugal 14,509.
Dolomite, chiefly refractory-grade	99,788	123,808	30	Spain 95,260; Norway 22,592.
Gravel and crushed rock	709,444	573,437	389	Ireland 215,842; France 140,068; Netherlands 113,906.
Limestone other than dimension	2,137	3,002	21	France 1,815; Denmark 690.
Quartz and quartzite	7,757	7,643	218	West Germany 3,546; Finland 1,073.
Sand other than metal-bearing	61,611	59,558	1,625	Belgium-Luxembourg 43,752.
Sulfur: Elemental:				
Crude including native and byproduct	849,549	840,416	NA	NA.
Colloidal, precipitated, sublimed	842	457	3	France 310; West Germany 140.
Talc, steatite, soapstone, pyrophyllite	58,508	59,846	--	Norway 15,675; France 9,866; Finland 7,128.
Vermiculite	121,605	109,265	--	Italy 59,820; Republic of South Africa 26,968; Greece 9,167.
Other:				
Crude	241,585	284,555	5,261	Netherlands 76,852; Turkey 47,609; Spain 37,590.
Slag and dross, not metal-bearing	105,504	204,713	241	Netherlands 58,791; Belgium-Luxembourg 58,643; France 52,118.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	12,412	12,053	1,642	Trinidad and Tobago 5,630; France 4,258.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Carbon: Carbon black	79,909	84,620	--	France 16,757; Norway 9,424; undetermined 35,565.
Coal:				
Anthracite	616,870	672,255	5,656	West Germany 410,101; Belgium-Luxembourg 105,016.
Bituminous thousand tons	3,445	3,687	1,021	Australia 1,848; Poland 509.
Briquets of anthracite and bituminous coal	89,374	94,113	2,021	West Germany 44,087; France 19,071.
Lignite including briquets	2,090	5,902	79	East Germany 3,561; West Germany 1,173.
Coke and semicoke	451,125	702,206	17	Japan 658,355; Belgium-Luxembourg 9,200.
Gas, natural: Gaseous million cubic feet	381,065	396,609	--	Norway 396,509.
Peat including briquets and litter	144,858	159,544	421	Ireland 144,592; U.S.S.R. 10,050.
Petroleum:				
Crude thousand 42-gallon barrels	206,808	165,828	--	Norway 46,792; Saudi Arabia 30,924; Nigeria 13,768.
Refinery products:				
Liquefied petroleum gas do	5,586	4,187	--	Saudi Arabia 1,328; Netherlands 1,257.
Gasoline:				
Aviation do	7,205	5,888	--	Netherlands 3,221; Italy 1,192.
Motor do	22,726	15,986	120	U.S.S.R. 2,752; Netherlands 2,651; Algeria 2,101.
Mineral jelly and wax do	194	107	2	West Germany 23; Netherlands 18.
Kerosine and jet fuel do	5,769	4,812	154	Netherlands 2,095; Belgium-Luxembourg 842; U.S.S.R. 514.
Distillate fuel oil do	12,751	13,037	77	U.S.S.R. 7,393; Netherlands 2,253; Sweden 1,254.
Lubricants do	7,571	12,817	434	Sweden 4,163; Belgium-Luxembourg 3,887; Netherlands Antilles 1,133.
Residual fuel oil do	61,545	64,434	478	Netherlands 15,186; Spain 7,056; West Germany 6,390.
Bitumen and other residues do	584	1,571	36	Belgium-Luxembourg 1,203.
Bituminous mixtures do	72	42	3	France 19; Netherlands 7.
Petroleum coke do	1,736	1,751	654	Netherlands 801.

[r]Revised. NA Not available.
[1]Table prepared by V. L. Paytes.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—The Alcan Aluminium Co. (United Kingdom) Ltd. bought the money-losing British Aluminium Co. Ltd. in 1982 and merged it with its own ailing British operations. After reducing the work force by 20% and closing down 15% of production capacity, the new company, British Alcan Corp., turned in a profit in 1983 of $25 million, compared with a $40 million loss in 1982. British Alcan kept its Lynemouth aluminum smelter running for the duration of the coal miners' strike, even though forced by the strike to purchase power from the national grid instead of utilizing electricity from its own powerplant. Although this was considerably more expensive, Alcan operated the smelter at full capacity, and the company was expecting to be profitable during the second half of 1984. The power station normally supplied all the electricity for Alcan's primary aluminum smelter, Britain's largest, with 125,000 tons per year of capacity. Alcan operated the smelter at full capacity. British Alcan's Extrusion Div. set up a new operation under the name Banbury Aluminium Ltd., which offers customers a scrap-to-extrusion-billet, same-day tolling service. The move followed the company's announcement of a 20,000-ton increase in extrusion billet capacity, which was expected to be fully utilized within 2 years.

Anglesey Aluminium Ltd.'s planned modernization, costing between $9 million and

$13 million, was aimed at saving energy and improving efficiency. The company was using 200 megawatts of power to produce just over 100,000 tons of aluminum metal per year. Completion of the project was scheduled for 1986.

Iron and Steel.—The British Steel Corp. (BSC) suffered from the effects of the coal strike, and contingency measures, including supplying raw materials by road to some of its works, were costing about $19 million per week. Total output was comparable with that of 1983, and lower than expected. BSC compensated for the shortfall in output at its three hardest hit works by stepping up production at its electric-furnace plants and at Port Talbot and Teeside, which, with their own import terminals, were not affected by the coal and dock strikes. The United Kingdom's steel output in September, however, recovered to its highest level since March, when the coal strike began. Output of steel averaged 313,000 tons per week in September, up from the 271,000 tons per week in May and 236,000 tons per week in August. Over the first 9 months of the year, the United Kingdom's steel output increased to an average of 290,000 tons per week, compared with 288,000 tons per week in 1983, but this included an extremely high level of production during the first 3 months of the year.

Lead and Zinc.—AM&S Europe Ltd. saved its Avonmouth zinc smelter, operated by Commonwealth Smelting Ltd. (CSL), from closure in 1983. Productivity continued to improve, and costs were decreased by cutting the work force from 700 to 300 and changing the type of concentrate feed. Although production of primary zinc decreased, an operating profit was shown. Production of secondary (refined) lead increased from about 185,000 tons in 1983 to 191,000 tons in 1984. CSL planned two key capital expenditures to modernize and improve efficiency at the Avonmouth plant. One project was to spend $3 million on the construction of a third Cowper Stove for the plant's Imperial Smelting Furnace, and the second was to spend $1 million to construct a briquetting plant. The Cowper Stove was due on-stream in 1985.

Nickel.—Inco Europe Ltd. announced a 3-month suspension of production of nickel pellets and powder at its Clydach refinery in Wales beginning January 1, 1985. The refinery had been operating at 22,700 tons per year for the past 18 months or 42% of its installed capacity. The intention was to reduce stocks to a level consistent with anticipated market conditions. Feed will still be imported from Canada during the shutdown. Operations were expected to resume in April 1985, subject to market conditions. About 370 employees were to be laid off during the shutdown unless required for maintenance work or emergencies.

Tin.—In Cornwall, three companies operated underground tin mines: South Crofty PLC, which operated the South Crofty and Pendarves Mines; Geevor Tin Mines PLC, which operated the Geevor Mine; and Carnon Consolidated Tin Mines Ltd., which operated the Wheal Jane and Mount Wellington Mines.

South Crofty, near Camborne in Cornwall, announced an operating loss of $1.3 million for 1983, largely owing to a rockfall in the Robinson shaft during the earlier part of the year and to the poor performance of the Pendarves Mine. To refurbish the operations and improve productivity, major development studies were taking place, including an extensive survey of the Pendarves Mine, costing $650,000, to ascertain whether it could be reopened by 1986 following scheduled cessation of production at yearend 1984. A $2.5 million capital program was also planned for the South Crofty Mine. Geological studies to date predicted a long life, and the company was prepared to spend several million pounds to bring the South Crofty Mine up to the competitiveness of other local mines.

Great Western Ore Ltd., a subsidiary of South Crofty, applied for planning permission to carry out surface exploratory drilling in an area 600 to 800 meters north of its Wheal Pendarves tin mine near Camborne, Cornwall. The company planned to drill six holes to depths of 250 to 400 meters to investigate possible western extensions of the Stray Park and Dolcoath lodes.

In the year ending March 31, 1984, Geevor produced 980 tons of tin in concentrate, up from 879 tons in the previous 12 months, with the increase partly attributed to the treatment of a greater amount of dump material. Proven ore reserves at the end of 1984 were 490,000 tons containing 0.75% tin. Further improvement to the treatment plant, which had been completed in August 1983, enabled the mine to process a record-high tonnage of ore during the year, leading in turn to an 11.5% increase in the production of concentrates. Cost per ton of tin produced thus rose by less than 1%, and the overall profit before tax amounted to

$235,000 against a loss of $35,000 for the 1982-83 period. The new heavy-medium system operated satisfactorily. The final expenditure was within the estimated cost of $330,000, toward which a U.K. Department of Trade and Industry grant aid of $70,000 was receivable. It was intended further to increase plant throughput by installing two 3-foot cone crushers (one short head and one standard head) to replace a single standard head unit. The flotation equipment was also replaced with more modern cells and conditioners, increasing removal of sulfides.

At Geevor, it was planned to extend the subincline shaft a further 670 meters and to establish lode intersections on the 20th, 21st, 22d, and 23d levels. A grant of $470,000 was received from the Department of Trade and Industry toward total costs estimated at $2.9 million. Geevor also applied for planning permission to prospect for minerals in the alluvium in and around the Hayle River in the Godolphin Bridge area between Helston and Hayle in Cornwall.

In 1983, the Rio Tinto Zinc Corp.'s (RTZ) metals subsidiary, Carnon Consolidated, treated 283,000 tons of ore at its Wheal Jane tin mine in Cornwall and recovered in concentrates 1,600 tons of tin, 9,000 tons of zinc, 650 tons of copper, and significant quantities of silver. Whether or not Carnon Consolidated decides to go ahead with its expansion depends upon the current efforts to prove additional reserves. In 1984, measured, indicated, and inferred reserves totaled 2.7 million tons, sufficient for a mine life of 9 years.

RTZ agreed in principle to buy Charter Consolidated PLC's 60% stake in Wheal Crofty Holdings Ltd. for about $12.6 million. RTZ already held the other 40% share as well as several tin interests in Cornwall, including the Wheal Jane and Mount Wellington properties and a 19.6% interest in the Geevor Mine.

Tungsten.—The United Kingdom Department of the Environment refused permission for the development of tungsten and tin deposits at Hemerdon in Devon. The yearlong inquiry had concluded that although the deposit could be exploited economically, the proposals submitted for its development should be changed to solve environmental problems. The mine was jointly owned by Hemerdon Mining and Smelting Ltd. and Amax Tungsten Ltd., but under an agreement signed early in 1983 and extended through 1984, Billiton Ltd. had an option to purchase the Hemerdon Mining and Smelting interest once planning permission approval was granted.

NONMETALS

Clays (Kaolin).—Production of kaolin in the United Kingdom was concentrated in the Counties of Devon and Cornwall, where production from the St. Austell granite accounted for about 75% of the output, and the remainder was produced on the southwestern margins of the Dartmoor granite. Smaller quantities came from the Bodmin Moor and Land's End granites. English China Clay PLC, through its subsidiary, English Clay Lovering Pochin & Co. Ltd., was the world's largest producer of kaolin from its operations around St. Austell in Cornwall and Lee Moor in Devon. Production capacity was about 3 million tons per year, and 90% of the output was exported worldwide. Three other companies produced much smaller amounts of kaolin. The world's largest producer of ball clay, Watts, Blake Bearne & Co. Ltd., extracted about 130,000 tons of kaolin from its quarry at Cornwood in West Devon. The two remaining kaolin producers, Goonrean & Rostowzack China Clay Co. Ltd. and Steetley Minerals Ltd., had respective annual production capacities of 105,000 and 80,000 tons; their kaolin was consumed in the paper industry. Goonrean & Rostowzack produced kaolin from three locations in Cornwall: at St. Stephen near St. Austell, at Rostowzack Pit near St. Dennis, and at Great Wheal Prosper China Clay Works at Roche, also near St. Austell. The company was operating at about 80% of capacity. Steetley Mineral's kaolin operations were based on two pits at Greensplat near St. Austell and at Bodelva, near St. Blazey Gate. The 80,000-ton output was largely exported to the paper industry of northern Europe. A development in 1984 involved the production of ground kaolin at the Steetley Refractories milling plant at Dudley, using material transported from the Cornish quarries.

Fluorspar.—Production of fluorspar increased to 160,000 tons, about 23% above that of 1983. For 1983, exports were almost in balance with imports of 10,758 tons, mainly from Spain. There were two British producers of fluorspar: Laporte Industries Ltd. with a 120,000-ton-per-year plant at Stoney Middleton near Sheffield, in the southern Pennine Orefield, and Minworth Ltd. with its two 80,000-ton-per-year flotation plants in Weardale, in the northern Pennine Orefield. Laporte's flotation plant at Stoney Middleton was operating at 70,000 to 75,000 tons per year, in line with market demand. About one-third of the ore was derived from the Salet Hole mining operations while the remainder was brought in from a variety of surface operations, mainly in northern Derbyshire. About one-half of the surface-mined material was supplied by small operators while the other one-half was produced by Laporte using subcontractors. In addition to supplying acidspar to the market, Laporte was also a major consumer of acidspar at its Rotherham-based fluorine chemical plant.

In Weardale, Minworth controlled two subsidiary companies, Weardale Minerals Ltd., which operated the Broadwood plant, and Weardale Mining and Processing Ltd., which operated the Blackdene plant. At Broadwood, a fluorspar head feed grade of 40% CaF_2 was processed, based on raw material derived from the Hope level of the Cambokeels Mine (47% CaF_2), from subcontractors (65% CaF_2), and waste dumps (27% CaF_2).

Weardale Mining and Processing operated the White Heaps Mine and the Blackdene Mine (48% CaF_2), which was reopened in 1983. An extension to the Broadwood plant costing $170,000 was recently completed by Minworth to improve recovery.

Fluorspar also was produced by a few smaller operators such as W. Smith Fluorspar Ltd. and Deepwood Mining Ltd.

Potash.—In the 1983-84 fertilizer year, demand for potash in the United Kingdom increased by 8% to about 900,000 tons of product. Almost all of this increase, approximately 65,000 tons, was supplied by the domestic producer Cleveland Potash Ltd., which covered over one-half of the total United Kingdom's consumption. Increasing British production of blended fertilizers prompted Cleveland Potash to invest $1.6 million in doubling the production capacity of the compaction plant at its mine at Boulby. The new compactor, expected to be in operation by autumn 1985, should bring the company's output of screened granular potash to about 280,000 tons per year; this investment was the first of any significance since potash mining began on the site in 1973. Demand for granular-grade potash in the United Kingdom increased from about 18% of the total potash requirement in 1977-78 to about 31% in 1983, and the company predicted that the figure would continue to rise over the next few years, to as much as 45%.

MINERAL FUELS

The United Kingdom was independent in energy supply. Primary energy consumption from fuels, hydroelectric, and nuclear generation was 249 million tons of standard coal equivalent for the period from January 1984 to October 1984. Of this, petroleum accounted for 43%; coal, 26%; gas, 24%; nuclear energy, 6%; and hydroelectric energy, 1%. Consumption of coal decreased 10% owing to the coal strike, compared with consumption in the same period in 1983, while consumption of petroleum increased 10%.

Coal.—The National Coal Board (NCB) was about to achieve productivity targets set in the Plan for Coal the previous autumn, but the effects of the strike by members of the National Union of Mineworkers resulted in a record loss of $1.2 billion, despite a Government subsidy of $2.56 billion in the financial year ending March 1984.

NCB's underground production fell 15 million tons to 90 million tons, while contract and surface production remained at last year's figure of 16 million tons. NCB coal sales fell 10% to 108 million tons. Power station use of coal fell from 86 million to 75 million tons. Industrial sales were down slightly, while domestic coal sales dropped 10% to 4.6 million tons. Imports were up slightly to 5 million tons, exports remained constant at 7 million tons, and British coal supply fell 13 million tons compared with that of 1983.

Bechtel (Great Britain) Ltd. and British Petroleum PLC (BP) were to jointly develop a new technology for the transport of coarse coal, up to 2-inch size, by slurry pipeline. A test facility was to be built and operated by BP and Bechtel at BP's Isle of Grain refinery site in the United Kingdom; it will incorporate large-diameter pipelines of up to 4 miles in length.

The $1,575 million Selby project in Yorkshire was an example of the new coal industry development. The Selby mining complex was planned to produce 10 million tons of coal per year when completed in the late 1980's. This new coalfield covers an area of 110 square miles and has five coal seams, all at minable depths, which together contain 2,000 million tons of coal. Of these, the Barnsley seam, which alone contains 600 million tons, was under development. Five vertical shaft mines were being sunk. Each mine was planned to have at least four coal faces costing about $6 million apiece to equip and were to produce 2 million tons of coal per year. The project had started in 1976, and by 1984 coal was flowing to nearby power stations from four of the five mines. Work continued on the remaining shaft sinking and underground development.

Other recently approved projects included a new $15 million coal preparation plant for the Yorkshire Main Mine near Doncaster, which supplied 720,000 tons of coal per year. Many smaller coal mine projects also were under development. The United Kingdom continued to invest at the rate of about $1.1 billion per year for coal mining development.

Natural Gas.—The production of gas from the Southern Basin fields in 1984 accounted for 60% of total supplies.

The British Government, having rejected British Gas Corp.'s (BGC) agreement to purchase gas from the Norwegian Sleipner Field, created conditions for a major boost in British North Sea development.

Despite losing a battle for tax relief similar to that given marginal oilfields, companies put forward plans for nine new gas development projects. These included Hamilton Bros. in the Esmond, Forbes, and Gordon Fields; BP; Amoco (United Kingdom) Ltd. in the Leman Field; Conoco (United Kingdom) Ltd. in the Victor Field, a satellite of the Viking Field; Phillips Petroleum (United Kingdom) Ltd. in the Audrey Field; and Shell/ESSO in the Leman Field.

The official estimate of proven and probable gas reserves remaining in the United Kingdom's Continental Shelf was 49 trillion cubic feet with an additional 19 trillion cubic feet in the possible category.

The European Economic Community moved to cut Europe's dependence on imported energy by granting a new $13 million European Investment Bank loan for North Sea gas development. The loan, which was to the Hamilton Group, was to develop three gas reservoirs in the British sector of the North Sea with total proven reserves of over 565 billion cubic feet. The project, which was known as the Esmond gas complex, was expected to produce 212 million cubic feet of gas per day for at least 10 years and was expected to cost about $420 million. The loan was to go toward the installation of a central gas-gathering facility, individual production platforms, and pipelines between the three gasfields. The whole complex was to be linked to the British mainland by a 215-kilometer pipeline to a terminal located at Bacton, in Norfolk.

British reserves were boosted in February by BP's announcement that it had four new commercial fields in the southern sector. The company stated that it was already negotiating with BGC "and other potential customers" over the sale of the gas, envisaging starting production in 1987. The four fields were named Cleeton, Ravenspurn, Hyde, and Hoton, and were all in the vicinity of BP's existing West Sole Field. Recoverable reserves were estimated by BP at 2.5 trillion cubic feet.

Development of the four fields would be a major undertaking, likened by BP to the development of its Magnus Field, which cost $2.7 billion. Seven or eight platforms, standing in water 100 to 150 feet deep, will be required, and a new landing terminal will be needed at Humberside.

Amoco and partners in the East Leman Gasfield were scheduling a $116 million expansion project under which a new platform would be installed in the G area of the field. The new facilities would handle 300 million cubic feet per day, maintaining the group's position as supplier of nearly one-third of British gas needs. Production was scheduled for October 1985. Amoco completed its expansion of East Leman H and J areas in October 1984.

Conoco confirmed a northerly extension of its Miller Field with the 16/8b-6 well, which tested three zones at a combined 10,500 barrels per day of oil with 13 million cubic feet per day of gas. Shares were held by Conoco, 50%; Saxon Group, 30%; and Santa Fe Ltd., 20%. Saxon indicated that its interest in the find gave it "at least 45 million barrels of oil and 50 to 60 billion cubic feet of salable gas." The field extends into BP's block 16/7b.

Conoco announced two gas discoveries in block 29/2A (central North Sea) and 44/22 (southern sector), the former testing 26 million cubic feet per day with 1,850 barrels per day of condensate, and the latter, 3 million cubic feet per day with 33 barrels per day of condensate. The 44/22 find was to be appraised in 1984.

The Shell/ESSO joint venture started work on a $350 million project to increase production and recoverable reserves in its part of the Leman Gasfield. Unmanned platforms, Leman F and G, were to be installed to tap additional reserves of 627 billion cubic feet. The gas was to be delivered to the existing A platform for landing at

Bacton, with startup set for October 1987.

BGC, in August 1984, made a gas discovery in the south of Britain, 4 miles off Bournemouth's main beach in the English Channel, block 98/11. It was the first gas discovery in the channel, and was in an area where industry had expected any strike would be oil.

Petroleum.—Production continued to climb and was expected to reach its peak in 1985. Production from the United Kingdom's Continental Shelf averaged 2.57 million barrels per day in 1984, 9% higher than in 1983, and the North Sea accounted for over 5% of the gross national product; it was expected to generate about $16 billion in tax revenues in 1985. Production averaged 2.68 million barrels per day in December 1984—a new monthly record. Average net exports fell from 1.17 million barrels per day in the first quarter of 1984 to an estimated 0.57 million barrels per day in the fourth quarter, owing to increased consumption of fuel oil as a result of the coal strike. Exploration and appraisal drilling increased to a record high of 182 wells drilled, compared with 128 wells drilled in 1983; there were 23 significant discoveries. In 1984, the remaining recoverable reserves of oil in the Continental Shelf amounted to about 14 billion barrels.

According to the United Kingdom's Offshore Operator's Association, $80 billion equivalent in 1984 pounds sterling was to be spent between 1984 and the year 2000 to develop 80 new fields and build 100 production platforms.

About 147 applications were received in the ninth round of leasing in the Continental Shelf, setting a new record for an offshore licensing round. This compared with 60 in the eighth and 125 in the seventh round. The blocks offered were spread through all parts of the Continental Shelf and included a larger number of blocks in frontier or deepwater areas than in the past. The ninth round raised $163 million, nearly four times the $44 million raised in the eighth round.

Two major fields went on-stream: Hutton in the East Shetland Basin, with an expected production peak of 100,000 barrels per day in 1985, and Mobil's Berly B. In 1985, Texaco's Highlander Oilfield, with peak production of 16,000 barrels per day was expected to go on-stream, and in 1987, the following three oilfields were scheduled to start production: North Alywyn, Total, with peak production of 86,000 barrels per day; Balmore, Sun, with peak production of 35,000 barrels per day; and Clyde, Britoil, with 49,000 barrels per day.

Four onshore oil licenses were awarded in 1984. A Charterhall-headed group was awarded two permits covering areas northeast of the producing East Midland Oilfields, while a group headed by RTZ was awarded a north Dorset permit. BP was awarded a technically onshore area of the Firth of Clyde. The Government planned to introduce new procedures for onshore licensing by introducing a 6-year exploration license, a 5-year appraisal license, and a 20-year development license.

In 1984, the British National Oil Corp. continued in existence, wholly within the public sector, as an oil trader with rights through agreements with other oil companies to purchase up to 51% of oil currently produced; however, the corporation was to be abolished. Some of its functions were to be transferred to and carried out by a smaller organization, to be set up later.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Where necessary, values have been converted from pounds sterling (£) to U.S. dollars at the rate of £1.00= US$1.33, the average rate during 1984.

[3]Central Statistical Office (London). Annual Abstract of Statistics, 1985 Edition. Pp. 231 and 233.

The Mineral Industry of Venezuela

By Harold R. Newman[1]

Even though Venezuela's economy contracted for the second consecutive year in 1984, the mineral resource sector showed increased activity. Petroleum continued to be Venezuela's major source of revenue. There was increased production of steel, aluminum, and alumina by state-owned industries. The mining sector activity increased nearly 25% over that of 1983 as a result of a significant increase in iron and steel production. Gold production increased 53% and coal production increased 30% from that of 1983; however, production of nonmetallic minerals fell 3% below that of 1983.

On the overall economic picture, Venezuela's gross domestic product declined 1.7% from that of 1983 compared with a 4.8% contraction in 1983, compared with that of 1982. The country's economic problems are a major constraint on growth. Economic adjustment measures adopted by the Government, including further devaluation of the currency, increases in local fuel prices, and a cutback in state expenditures, were expected to provide the basis for a recovery in economic activity.

Major progress was made on rescheduling the foreign debt. In September 1984, the Government and creditor bank representatives reached an agreement in principle on rescheduling about $21 billion of the total $26.4 billion debt, and at yearend, were close to agreement on a long-term schedule for repayment.

Venezuela's conscientious adherence to its Organization of Petroleum Exporting Countries (OPEC) oil production quota of 1.6 million barrels per day (bbl/d) resulted in oil exports rising only modestly in value from $13.8 billion[2] in 1983 to $14.7 billion, down from a peak of $19.1 billion in 1981. This situation continued to impact foreign exchange earnings. There was increased interest in maximizing the use of natural gas, of which Venezuela is a major world producer. The Government had plans to construct additional gas pipeline systems in order to double domestic consumption of natural gas. This would make available substantial volumes of fuel oil and diesel oil, which could then be exported without increasing crude oil production.

There was a relaxation in attitude by the Government toward foreign investment. It was recognized that foreign investment represents a vital source of external financing and that increased foreign investments would boost growth and diversify the oil-dependent economy. Reportedly, new direct foreign investment increased 16% in 1984 over that of 1983 in terms of Venezuela's currency. In dollar terms, total foreign investments were about $2.5 billion, with the United States accounting for 58% of the total.

PRODUCTION

Petroleum continued to be the major component of Venezuela's mineral production. Petroleum provided over 60% of Government revenue, accounted for 25% of the gross national product, and brought in 90% of export earnings in 1984. Petroleum production in 1984 averaged 1.86 million bbl/d including condensates and natural gas liquids, which was virtually the same as 1983. Development of the Orinoco Heavy Oil Belt continues at a reduced rate, with a goal of producing 400,000 bbl/d by the end of the century. Exploration continues to emphasize searching for additional onshore light crude, but total exploration activity has declined sharply and was expected to remain around current levels as long as the world oil market is depressed. Production drilling has also dropped sharply, because production capacity of 2.55 million bbl/d significantly exceeds Venezuela's OPEC quota. About 568 production wells were reported drilled in 1984.

The aluminum industry's production continued to increase and represented the second largest source of foreign currency revenues after petroleum. The total aluminum production was 386,150 tons, which represented a 16% increase over that of 1983. Interamericana de Alúmina C.A. (INTERALUMINA) increased alumina production by 103% from 560,000 tons in 1983 to 1,139,000 tons in 1984. Domestic use of alumina by the Aluminio del Caroní S.A. (ALCASA) and Industria Venezolana de Aluminio C.A. (VENALUM) smelters accounted for 766,000 tons with the remaining 372,000 tons of alumina exported. ALCASA and VENALUM increased production and profits in 1984 because of the favorable foreign exchange rate. Both plants ran close to capacity, and a majority of the output was exported. Venezuela currently has the largest aluminum smelting capacity in Latin America.

Iron ore production increased to 12.7 million tons from 9.7 million tons in 1983. Both domestic and export sales improved, leading to projections of further growth in production; however, construction of the country's second integrated iron and steel works, the Siderzulia project, has been canceled. Although steel ingots and semimanufactures production increased 15% and 28%, respectively, in 1984, CVG Siderúrgica del Orinoco C.A. (SIDOR) was still operating well below capacity, and no major investment was contemplated in basic steelmaking capacity. Gold production was reported to be almost 51,000 troy ounces; however, the Government was still concerned that a significant portion of gold output has been smuggled out of the country.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Alumina	--	--	--	560,000	1,139,000
Metal, unalloyed ingot	327,900	313,523	273,633	332,000	386,150
Gold, mine output, metal content troy ounces	13,565	27,810	27,993	33,200	50,885
Iron and steel:					
Iron ore and concentrate thousand tons	16,103	[r] [e]14,929	11,200	9,715	12,723
Metal:					
Pig iron[2] do	2,367	2,230	2,357	2,246	3,185
Ferroalloys:					
Ferromanganese do	[e]2	[e]2	2	2	2
Ferrosilicomanganese do	1	10	9	9	9
Ferrosilicon[3] do	[r]59	44	42	46	44
Total do	[r]62	56	53	57	55
Steel ingots and castings do	[r]1,975	[r]2,030	2,296	2,558	2,940
Semimanufactures, hot-rolled do	[r]1,680	[r]1,619	1,738	1,919	2,460
Lead, secondary, smelter[e]	10,000	10,000	10,000	10,000	8,000
NONMETALS					
Cement, hydraulic	4,843,363	4,876,253	5,431,860	4,444,104	3,648,759
Clays:[4]					
Kaolin	[e]22,000	65,642	65,000	11,250	43,489
Other thousand tons	[e]2,000	2,629	2,600	[e]2,600	1,688
Diamond:					
Gem carats	210,520	97,000	83,000	45,367	40,739
Industrial do	455,336	403,000	357,000	233,553	232,183
Total do	665,856	500,000	440,000	278,920	272,922
Feldspar	6,065	21,684	7,000	37,400	28,800
Gypsum	117,476	218,234	159,000	204,600	151,200
Lime, hydrated	--	1,888	[e]1,900	[e]2,000	--

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Nitrogen: N content of ammonia	360,653	414,689	440,433	379,652	463,000
Salt, all types	243,145	394,660	455,000	310,650	NA
Stone, sand and gravel:[4]					
Stone:					
Dolomite	NA	254,540	182,000	83,000	157,420
Granite	208	1,256	1,200	770,970	431,900
Limestone thousand tons	19,074	31,690	5,760	27,302	10,847
Marble cubic meters	[e]200	292	189	169	68
Sand and gravel thousand tons	12,248	9,945	13,105	5,250	8,853
Sand, glass do	--	[r]440	280	107	331
Sulfur, byproduct of petroleum and natural gas[e]	85,000	85,000	84,000	85,000	86,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e] thousand tons	23	19	18	18	51
Coal, bituminous	39,421	45,735	43,100	39,100	50,870
Gas, natural:					
Gross million cubic feet	1,251,864	1,224,586	1,163,973	1,222,100	1,150,364
Marketable do	589,046	584,349	527,000	508,460	517,664
Natural gas liquids:[5]					
Natural gasoline thousand 42-gallon barrels	5,472	5,177	5,642	4,483	4,708
Liquefied petroleum gas do	16,448	14,889	15,720	13,949	13,945
Total do	[r]21,920	[r]20,066	21,362	18,432	18,653
Petroleum:					
Crude[6] do	793,397	767,552	691,689	657,365	658,279
Refinery products:					
Gasoline:					
Aviation do	276	284	328	430	539
Motor do	57,557	59,578	62,694	67,500	46,100
Jet fuel do	11,699	11,369	14,362	14,500	14,486
Kerosine do	4,352	5,266	3,675	4,440	4,277
Distillate fuel oil do	63,688	61,890	62,745	67,510	69,744
Residual fuel oil do	168,906	147,117	140,052	108,740	117,466
Lubricants do	3,277	2,741	2,481	[e]2,400	2,340
Liquefied petroleum gas do	2,537	1,765	1,955	[e]2,000	1,868
Asphalt and bitumen do	7,634	10,082	9,313	8,660	8,930
Naphtha do	12,752	8,534	10,140	[e]10,000	19,800
Refinery gas[7] do	6,497	8,518	8,578	9,200	12,020
Unspecified do	2,292	1,870	1,479	27,260	27,813
Total do	341,467	319,014	317,802	322,640	325,383

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

[1]Table includes data available through July 1, 1985.

[2]Includes sponge iron.

[3]Figure represents combined 45% silicon content and 75% silicon content production.

[4]Data prior to 1981 was 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.

[5]From nonassociated natural gas only.

[6]Includes associated natural gas lease condensate and natural gasoline. Lease condensate is included as follows, in thousand 42-gallon barrels: 1980—1,227; 1981—1,661; 1982—1,771; 1983—3,127; and 1984—not available. Natural gasoline is included as follows, in thousand 42-gallon barrels, reported: 1980—308; 1981—307; 1982—293; 1983—229; and 1984—not available.

[7]Liquid equivalent.

TRADE

Petróleos de Venezuela S.A. (PDVSA) exported about 1.5 million bbl/d of crude oil and derivatives during 1984. Export revenues were estimated to be $14.9 billion at an average price for crude and derivatives of $26.78 per barrel, PDVSA diversified its exports sales; however, the United States continued to receive nearly 43% of Venezuelan exports of crude and derivatives, either directly or indirectly. PDVSA continued to export about 60,000 bbl/d of crude to Caribbean and Central American countries on concessional terms under the San José agreement between Venezuela and Mexico.

The value of other exports, mainly aluminum and iron and steel, totaled $1.2 billion. Aluminum exports fell to 124,000 tons, down from 298,256 tons in 1983, because of suspension of exports to Japan in the last quarter of 1984. There was a dispute over contract prices, which was being negotiated at yearend. This decrease in exports was partially offset by a rise in domestic sales from 22,000 tons in 1983 to 54,000 tons. INTERALUMINA increased its exports of alumina from 131,000 tons in 1983 to 371,000 tons in 1984, which yielded $62 million in foreign exchange earnings. Venezuela's main export market for steel products was the United States, which took about 555,000 tons, 45% of the country's total shipments. Total export sales of iron ore were 8.3 million tons, of which 1.4 million tons went to the United States.

Table 2.—Venezuela: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	(2)	784	730	Japan 54.
Unwrought	228,614	298,256	40,547	Japan 192,670; Netherlands 49,709.
Semimanufactures	808	21,059	13,879	Japan 4,957; Costa Rica 824.
Copper: Metal including alloys:				
Scrap	1,308	975	525	Belgium-Luxembourg 280; Netherlands 100.
Semimanufactures	3	602	417	Italy 161; Colombia 14.
Iron and steel: Metal:				
Scrap	(2)	1,742	4	Japan 1,738.
Pig iron, cast iron, related materials	239,799	381,088	173,724	France 83,024; Italy 42,412.
Ferroalloys, ferrosilicon	43,707	67,130	32,113	Japan 32,808; Netherlands 2,209.
Steel, primary forms	115,653	103,733	12,093	Philippines 15,907; Japan 15,341; Republic of Korea 15,182.
Semimanufactures:				
Bars, rods, angles, shapes, sections	4,332	302,270	44,131	Belgium-Luxembourg 51,984; Algeria 40,216.
Universals, plates, sheets	117,892	363,799	148,001	Thailand 62,040; Japan 36,352.
Hoop and strip	880	--		
Rails and accessories	9	22	(2)	Mainly to Colombia.
Wire	122	1,361	180	Colombia 1,143; Canada 36.
Tubes, pipes, fittings	11,258	43,013	39,658	Colombia 2,822; Uruguay 255.
Castings and forgings, rough	76	146	59	Colombia 87.
Unspecified	53,735	55,723	--	Thailand 20,766; Taiwan 12,112; Egypt 7,655.
Magnesium: Metal including alloys, unwrought	--	100	100	
Zinc: Metal including alloys, semimanufactures ... kilograms	2,877	19	19	
Other:				
Ashes and residues	425	--		
Base metals including alloys, all forms	--	8	8	
NONMETALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	602	(2)	--	All to Netherlands Antilles.
Asbestos, crude	8	3	--	Do.
Boron materials: Crude natural borates	230	--		
Cement	14	259,429	145,172	Barbados 19,234; Netherlands Antilles 13,504.
Clays, crude: Bentonite	8	--		
Graphite, natural ... kilograms	--	350	--	All to Spain.
Gypsum and plaster	8,633	--		
Lime	--	6	--	All to Netherlands Antilles.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	467	334	--	Do.
Gravel and crushed rock	102	5,774	--	Colombia 5,740; Netherlands Antilles 17.
Quartz and quartzite	--	34	--	Italy 32; Japan 2.
Sand other than metal-bearing	2,350	1,023	--	All to Colombia.
Other:				
Crude	1	--		
Slag and dross, not metal-bearing	6	3	--	All to Brazil.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Crude ... thousand 42-gallon barrels	386,134	351,276	56,648	Netherlands Antilles 122,786; West Germany 21,572.
Refinery products:				
Gasoline ... do	25,185	51,830	NA	NA.
Residual fuel oil ... do	110,230	93,440	60,955	Netherlands Antilles 6,935.
Unspecified ... do	42,705	42,340	NA	NA.

NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less tha 1/2 unit.

Table 3.—Venezuela: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	67	1,719	88	Brazil 832; Guyana 409; Sierra Leone 75.
Metal including alloys:				
Scrap	(2)	1	1	
Unwrought	924	342	51	Canada 150; Peru 90.
Semimanufactures	23,425	14,455	5,689	Belgium-Luxembourg 3,134; West Germany 1,840.
Antimony: Metal including alloys, all forms	544	38	4	Bolivia 28; Japan 6.
Arsenic: Ore and concentrate kilograms	15	--		
Beryllium: Metal including alloys, all forms do	51	--		
Bismuth: Metal including alloys, all forms do	69	--		
Cadmium: Metal including alloys, all forms	2	1	1	
Chromium:				
Ore and concentrate	11,000	3,914	(2)	Philippines 3,910; France 4.
Metal including alloys, all forms	8	1	1	
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	4	10	10	
Copper: Metal including alloys:				
Unwrought	2,940	2,249	32	Peru 1,917; India 250; Chile 50.
Semimanufactures	20,648	12,738	4,697	Belgium-Luxembourg 1,625; Canada 1,564.
Indium: Metal including alloys, all forms kilograms	3,133	141	106	Peru 35.
Iron and steel:				
Iron ore and concentrate, including roasted pyrite	5,823	11	10	West Germany 1.
Metal:				
Scrap	20,491	18,581	18,081	Netherlands Antilles 500.
Pig iron, cast iron, related materials	3,188	1,779	909	Brazil 398; Peru 150.
Ferroalloys:				
Ferrochromium	47	36	11	Sweden 20; West Germany 3.
Ferromanganese	19,059	20,430	(2)	France 15,000; unspecified 5,000.
Ferromolybdenum	1	2	1	Netherlands 1.
Ferronickel	--	2	2	
Ferrosilicomanganese	2,420	3	--	All from West Germany.
Ferrosilicon	20	26	18	Italy 8.
Ferrovanadium	110	442	347	West Germany 94.
Unspecified	391	423	182	Brazil 123; United Kingdom 75.
Steel, primary forms	119,100	3,462	2	West Germany 1,374; Italy 1,288; Japan 598.
Semimanufactures:				
Bars, rods, angles, shapes, sections	91,230	23,969	832	Japan 5,515; West Germany 5,265; Netherlands 4,054.
Universals, plates, sheets	255,862	83,547	4,796	Japan 46,761; France 12,243; West Germany 9,202.
Hoop and strip	3,610	1,428	571	Brazil 312; Japan 193.
Rails and accessories	3,571	7,120	395	France 5,217; West Germany 903.
Wire	2,124	864	23	Brazil 401; France 308.
Tubes, pipes, fittings	466,550	108,289	23,424	Japan 21,733; Italy 18,225.
Castings and forgings, rough	626	229	79	Italy 46; France 42.
Unspecified	51,261	27,815	1,734	Japan 17,170; France 1,750.
Lead: Metal including alloys:				
Unwrought	6,080	5,233	(2)	Peru 5,232.
Semimanufactures	3,247	1,910	58	Peru 1,654; West Germany 162.
Magnesium: Metal including alloys:				
Unwrought	506	228	--	Norway 125; Mexico 59; West Germany 43.
Semimanufactures	4	5	5	
Manganese: Ore and concentrate, metallurgical-grade	54,436	5,150	--	All from Mexico.
Molybdenum: Metal including alloys, all forms kilograms	1,915	296	189	Italy 101; United Kingdom 6.
Nickel:				
Ore and concentrate	3	2,663	(2)	Mexico 2,500; Australia 145.
Metal including alloys:				
Scrap	--	6	1	Canada 5.
Unwrought	185	109	46	Canada 46; Norway 10.
Semimanufactures	178	107	86	West Germany 18.

See footnotes at end of table.

Table 3.—Venezuela: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Tin: Metal including alloys:				
Unwrought	216	257	216	Bolivia 29; Brazil 11.
Semimanufactures	458	209	145	United Kingdom 61; France 1.
Tungsten: Metal including alloys, all forms	4	13	12	Italy 1.
Zinc: Metal including alloys:				
Unwrought	15,300	9,672	955	Peru 6,457; Canada 2,201.
Semimanufactures	983	217	150	West Germany 21; Norway 21.
Other:				
Ores and concentrates	467	26,863	35	Mexico 15,350; Panama 6,000; Brazil 5,003.
Ashes and residues	40	(2)	NA	NA.
Base metals including alloys, all forms	237	131	110	United Kingdom 21.
NONMETALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	236	157	88	West Germany 37; Italy 15.
Asbestos, crude	7,354	4,734	568	Canada 3,715; Brazil 402.
Barite and witherite	146,025	62,266	33	Peru 33,238; Taiwan 15,748; Ireland 7,000.
Boron materials: Crude natural borates	88	241	116	Italy 79; Netherlands 40.
Cement	603,308	34,016	2,367	Cuba 14,440; Colombia 8,324; Denmark 6,049.
Chalk	2,607	353	--	Colombia 261; Belgium-Luxembourg 80.
Clays, crude:				
Bentonite	31,804	20,662	20,450	Colombia 170.
Kaolin	24,757	6,612	6,310	Italy 79; Colombia 67.
Unspecified	10,441	1,551	1,337	France 186; Spain 15.
Cryolite and chiolite	7	5,156	(2)	Denmark 5,152; West Germany 2.
Diatomite and other infusorial earth	7,719	7,150	6,875	Mexico 247; Portugal 25.
Feldspar, fluorspar, related materials:				
Feldspar	1,205	545	415	Finland 124; West Germany 5.
Fluorspar	200	155	81	West Germany 52; Mexico 19.
Unspecified	56	(2)	(2)	
Graphite, natural	737	594	344	Netherlands 180; Hong Kong 51.
Gypsum and plaster	78,704	35,140	250	West Germany 24,554; Spain 10,000.
Lime	67	68	61	Colombia 7.
Magnesium compounds:				
Magnesite	238	27	23	France 4.
Oxides and hydroxides	342	11,914	33	Austria 8,400; Mexico 3,481.
Mica: Crude including splittings and waste	1,969	656	580	France 55; West Germany 10.
Phosphates, crude	74,898	34,463	(2)	Colombia 301; unspecified 34,160.
Pigments, mineral: Natural, crude	192	15	9	Netherlands 3; United Kingdom 2.
Pyrite, unroasted	89	17	17	
Salt and brine	96	49	7	West Germany 37; Mexico 5.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	7,208	3,323	32	Italy 2,855; Uruguay 128.
Dolomite, chiefly refractory-grade	59,595	35,723	35,723	
Gravel and crushed rock	456	113	2	France 100; Brazil 10.
Quartz and quartzite	23	96	(2)	France 85; Belgium-Luxembourg 10.
Sand other than metal-bearing	895	486	463	Italy 17; West Germany 5.
Sulfur: Elemental, crude including native and byproduct	168	126	126	
Talc, steatite, soapstone, pyrophyllite	9,438	5,156	3,378	Brazil 732; China 305.
Vermiculite, perlite, chlorite	304	61	47	Spain 8; Mexico 5.
Other:				
Crude	1,271	338	195	Australia 101; Canada 18.
Slag and dross, not metal-bearing	9	24	1	West Germany 23.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	558	NA		
Carbon: Gas carbon	9	NA		
Coal:				
Anthracite	4,880	NA		
Bituminous	33,287	NA		
Briquets of anthracite and bituminous coal	8	NA		
Lignite including briquets	809	NA		
Coke and semicoke	70,152	NA		
Peat including briquets and litter	52	NA		

See footnotes at end of table.

Table 3.—Venezuela: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude ________ 42-gallon barrels__	1,175	NA		
Refinery products:				
Liquefied petroleum gas do____	455	NA		
Gasoline __________ do____	125,041	NA		
Naphtha and white spirits do____	66,332	NA		
Mineral jelly and wax __ do____	31,707	NA		
Kerosine and jet fuel ___ do____	452	NA		
Distillate fuel oil _____ do____	1	NA		
Lubricants _________ do____	18,544	NA		
Nonlubricating oils ____ do____	27,672	NA		
Residual fuel oil ______ do____	83	NA		
Bitumen and other residues do____	319,544	NA		
Petroleum coke ______ do____	427,409	NA		

NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Both VENALUM and ALCASA primary smelters ran close to capacity in 1984. Installed aluminum reduction capacity in Venezuela is 400,000 tons per year. Both plants have expansion plans. ALCASA was intending to add a new production line with a capacity of 84,000 tons per year and to modernize its existing potlines, providing an additional 12,000 tons per year of output. VENALUM announced it would increase its smelting capacity by 70,000 tons per year with the addition of a fifth potline, raising the plants present 280,000-ton-per-year capacity to 350,000 tons per year. ALCASA was proceeding with contracting for the expansion of its rolling facilities to enable the hot rolling of 60,000 tons per year of can stock and 8,000 tons per year of alloys using a continuous casting process.

Alumina.—Alumina production at INTERALUMINA rose to 1.1 million tons in 1984, exceeding the company's goal by 14%. About 67% of production went to supply the needs of ALCASA and VENALUM, with the remaining exported to the United States and Norway. INTERALUMINA considered buying Martin Marietta Corp.'s 630,000-ton-per-year alumina refinery in St. Croix, Virgin Islands. This was in anticipation of the increased demand from Venezuela's aluminum industry; however, preliminary studies indicated the takeover was not an economical move, and negotiations were terminated. The company was in the process of installing additional bauxite processing equipment for the bauxite ore expected to start coming from the Los Pijiguaos project in 1986.

Bauxite.—CVG Bauxita de Venezolana C.A. (BAUXIVEN) awarded two civil works contracts relating to its Los Pijiguaos bauxite mining project. The contracts cover access roads and a 52-kilometer railroad to a port on the Orinoco River. The project, in Bolivar State about 500 kilometers south of Caracas, contains an estimated 200 million tons of bauxite with an alumina content of 49.5%. Initial production of 1 million tons per year was scheduled to begin in the last quarter of 1986. The project was scheduled to be completed in the final quarter of 1987 when output capacity would rise to 3 million tons per year. The open pit mine has been divided into nine blocks of ore. Mining will commence on block 1, block 2, and one-half of block 3. These blocks were estimated to contain a 20-year supply of bauxite. Completion of the project was expected to save the Government $140 million per year in foreign exchange for bauxite imports and result in a 15% reduction in production costs for INTERALUMINA, Venezuela's alumina smelter. With the startup of the mine, Venezuela's aluminum industry, the country's second most important foreign exchange earner after petroleum, will be fully integrated. Also in the planning stages at Los Pijiguaos was a 6.5-kilometer conveyor system to move the bauxite ore from the mine to the railroad, infrastructure for a town of 2,000 people, and a bauxite ore crushing plant. The Government was planning to invest $400 million in the project over the next 2 years.

Iron Ore.—There was a significant increase in production of iron ore by CVG Ferrominera Orinoco C.A. (FERROMINERA) in 1984. An estimated 12.7 million tons was produced in 1984 compared with 9.7 million tons in 1983. Export sales also showed a gain to 8.4 million tons, of which 1.4 million tons was shipped to the United States and the remainder to Europe. FERROMINERA was continuing development of the San Isidro iron ore deposit. A 16-kilometer railway was constructed to connect with the main Cerro Bolivar-Puerto Ordaz line. The San Isidro deposit sits alongside the Cerro Bolivar Mine. Development of the San Isidro deposit, which contains an estimated 400 million tons of 65% iron ore, will further improve the competiveness of FERROMINERA. There will not be an increase in overall iron ore capacity. Production from San Isidro will replace a portion of production from Cerro Bolivar. A major part of the 2.3-million-ton-per-year output would be purchased by SIDOR. At yearend, $20 million had been expended in development costs. By 1987, the San Isidro Mine was expected to be producing 5 million tons per year.

Iron and Steel.—After a serious recession in 1983, the Venezuelan steel market showed encouraging signs of a recovery in 1984. Apparent consumption grew almost 42% over that of 1983, which had declined 48% from that of 1982. SIDOR was still operating well below capacity with no major investment contemplated in basic steelmaking capacity; however, expansion of the tube sector was planned. Conduven C.A. was reported to have substantially increased exports of tubes and pipes from 30,000 tons in 1983 to about 120,000 tons in 1984. Exports accounted for about 60% of Conduven's shipments. The United States was Conduven's main foreign market.

Other Metals.—Gold production rose significantly in 1984 owing to new developments in the Amazonas region. However, the Government, which strictly controls the domestic gold market, considers smuggling to be a major problem. Gold was thought to be smuggled out of the country and sold to dealers in Brazil and Colombia, who were reportedly paying a large premium over the Government-established gold price. The Government announced the discovery of a large titaniferous deposit on the coast at Yaracury, 250 kilometers from Caracas.

MINERAL FUELS

Coal.—Carbones del Zulia C.A. (CARBOZULIA) was continuing the development of the Guasare Coalfield in the State of Zulia, approximately 100 kilometers northwest of Maracaibo. The 6-million-ton-per-year open pit project was originally intended to supply coal to a planned 5-million-ton-per-year steel mill and a 2,000-megawatt thermal powerplant. Both of these projects have been indefinitely postponed. The coalfield has proven reserves of 160 million tons and probable reserves of 3 billion tons. CARBOZULIA was developing the project in terms of export potential. The Japanese company Idemitsu Kosan held discussions with CARBOZULIA about developing the project. In Anzontegui State in eastern Venezuela, Venezolana de Cementos C.A. (VENCEMOS) and Compañía Auxiliar de Valaduras S.A. (CAVOSA) established a private sector company, VENCEMOS-CAVOSA (Cavoven), to develop an open pit coal mine southeast of Boca de Uchire in an area thought to contain some 80 million tons of coal. The project, known as Fila Maestra, would be developed to produce coal for export. Cavoven has a 22-year contract with the Government granting it the right to mine up to 40 million tons of coal over the course of the contract.

Petroleum and Natural Gas.—Venezuela's proven crude oil and condensate reserves rose to 26.7 billion barrels by mid-1984. At the current production level of 1.8 million bbl/d, this is enough for about 40 years of production. The proven category consists of reserves that can be produced with present technology and infrastructure. PDVSA announced that the 1979-83 Orinoco Heavy Oil Belt project involving 1,223 wells and investment of $1.3 billion has demonstrated the existence of 1,200 billion barrels of oil in place, of which 250 billion barrels may be recoverable. A second 5-year program has been initiated that will concentrate on production, refining, and transport of the extra heavy crudes. PDVSA signed a bilateral technical cooperation agreement with the Federal Republic of

Germany in 1978 designed to focus on development and upgrading extra heavy crude oil. This agreement was renewed in November 1984 for 4 years. Venezuela's crude oil production capacity was 2,554 million bbl/d and was expected to stay at the same level over the next several years.

In 1984, PDVSA completed a refinery upgrading program that involved the investment of $1.1 billion over the 1977-83 period.

Venezuela's proven natural gas reserves have been growing steadily from 48.21 trillion cubic feet in 1981 to 55.37 trillion cubic feet at the beginning of 1984. Present production capacity is about 4,150 million cubic feet per day, virtually all of which is in association with crude oil.

Corpoven S.A. was proceeding with the Nurgas project, which is divided into two stages. The first involves construction of a 600-kilometer line from the central gas gathering station in Anaco westward to Morón, site of the El Centro electricity plant. The first stage is designed to minimize foreign exchange costs and maximize stimulations of domestic industry. Substantial volumes of gas would be moved in order to make available fuel oil and diesel for export. The second stage consists of a 150-kilometer pipeline from Morón to Río Seco to connect up with Lagoven S.A.'s existing line to the Amuay refinery.

Construction of the Oriente Cryogenic project, an 800-million-cubic-foot-per-day extraction plant, was almost complete at yearend, and startup was scheduled for mid-1985. Most of Venezuela's gas production is "wet" or "rich," which means it contains a high volume of carbon compounds that can be condensed into liquid form; therefore, liquid extraction will become increasingly important both as a source of high-value liquid products not subject to the OPEC crude oil production ceiling and as a necessary stage in producing dry gas for domestic consumption.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, unless otherwise specified, values have been converted from Venezuelan bolivars (Bs) to U.S. dollars at the rate of Bs7.5=US$1.00.

The Mineral Industry of Yugoslavia

By Roman V. Sondermayer[1]

Although conditions improved toward the end of 1984, the mineral industry of Yugoslavia had a difficult year. Lack of foreign currencies adversely affected the mineral industry and the country's economy by causing shortages of energy and imported spare parts. Equipment for drilling oil and gas, open pit mining, and for crude oil and natural gas production was extremely difficult to maintain because of a lack of spare parts; in some instances where spare parts were not available, broken down equipment was cannibalized.

By world standards, the mineral industry was modest, as in the past. Production of alumina, antimony, bauxite, mine lead, and magnesite contributed between 3% and 5% of the world totals. These percentages were the highest among the minerals produced in the country.

Employment in the mineral mining and processing industry was close to 6.2% of the total employment. The share of the mineral industry in the gross social product was about 7.8%. Details are shown in the following tabulation for 1983 at 1983 prices, the latest year for which complete data are available:

Branch	Production value (million dinars)[1]	Employment (thousands)
Coal:		
Production	43,892	60.8
Processing	6,591	3.8
Crude oil:		
Production	29,847	4.2
Processing	21,658	11.2
Iron and steel:		
Iron ore production	3,544	5.4
Steel production	56,891	58.5
Nonferrous metals:		
Production of ores	23,610	31.3
Metal production	26,885	19.1
Metal processing	17,246	15.2
Nonmetallics:		
Production	6,628	13.0
Processing	25,713	56.0
Sand and gravel	9,099	22.8
Construction materials	37,836	76.7
Total	309,440	378.0

[1]The dinar (din) is not convertible currency. A meaningful conversion to U.S. currency is impractical. At yearend 1984, the official exchange rate was 210din=US$1.

During 1984, the Government managed to reschedule repayments of foreign loans. However, strict economic measures were imposed by foreign banks, led by the International Bank for Reconstruction and Development (World Bank), on procedures to manage the country's economy.

Principal events related to the mineral

industry were as follows: The newest copper mine, Veliki Krivelj, reached its designed capacity; construction of a new blast furnace began at Smederevo iron and steel works; a new barite mine was developed near Plevlja; new bituminous coal reserves were discovered near Baljevac; planning was completed for a new lignite gasification plant near Obilic; and design of a project for oil shale mining and crude oil production was completed.

Government Policies and Programs.— With foreign credits almost impossible to obtain, the authorities changed the basic law for investment of foreign capital in the country's economy, hoping to attract capital for development of new mining facilities. The revised law deals only with joint ventures involving less than 100% foreign equity. The major differences between the old and revised law are as follows:

1. The maximum limit on the foreign partner's equity (formerly 49%) has been eliminated. There is now, theoretically, no limit on the size of the investment, but 100% foreign equity investments would not be approved.
2. There is no longer any ceiling on the profits that can be earned or repatriated by the foreign partner.
3. Joint venture partners will be able to raise loans in Yugoslav domestic financial markets up to the amount of the original capital invested.
4. The foreign partner is entitled to a maximum of 50% representation on the management board of the joint venture, regardless of the size of the investment.
5. Foreign third parties may become partners in the joint venture provided the original partners agree.
6. Procedures for approval of joint venture proposals have been simplified.

The Yugoslav Assembly also approved changes in the existing law that exempts foreign partners from mandatory assessments for national defense, depreciation exceeding that specified by law, fines related to business offenses or violations where no liability of the foreign partner has been established, and insurance premiums for social resources and material rights unrelated to joint business operations. The Assembly did not agree to exempt obligations for workers' housing and scholarships and educational expenses as had been proposed in earlier drafts. Foreign investment, henceforth, will be allowed in the health and recreational sectors, including tourism, but no foreign joint ventures will be permitted in the insurance, domestic trade, or public services sectors. This provision, however, can be waived by the Federal Executive Council.

A foreign joint venture agreement will not be approved if (1) it restricts exports of products that are the object of the agreement if such restriction is not in conformity with the policies and economic relations between Yugoslavia and other countries, (2) if the agreement is contradictory to the defense or security interests of Yugoslavia, (3) if the provisions of the agreement are contrary to the social plan of Yugoslavia, and (4) if the provisions are contrary to the established strategy of technological development in Yugoslavia.

The new law is a further step toward liberalization of the country's economic system and its opening to the world economy. Although spectacular results cannot be expected because of general economic conditions in the world and the organizational weaknesses in the country's system, the new law prepares the ground for attracting badly needed new capital in the future.

PRODUCTION

The mineral industry of Yugoslavia was state owned. Private capital from abroad could be invested, providing all requirements of Yugoslav laws on self-management in the industry were observed. At yearend 1984, only three ventures with foreign capital invested were in operation in Yugoslavia. All three were in exploration for petroleum in the offshore Adriatic Sea.

The largest enterprises of the mineral industry included, among others, Rudarsko Topionicarski Bazen Bor (RTB Bor), copper; Zajaca, Rudarsko Topionicarski Bazen, antimony; Energoinvest, bauxite, alumina, and aluminum; Dalmacija Cement, cement; Jugohrom, Hemijsko-Metalurski-Kombinat, ferroalloys; Rudarsko-Metalurski-Kombinat Zenica (RMK Zenica), iron ore, pig iron, and steel; Rudarsko-Metalursko-Hemijski Kombinat za Olovo I Cink Trepca (RMHK Trepca), lead and zinc ores, concentrates, and metal; Industrija Nafte (INA), crude oil, natural gas, and refined petroleum products.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum:					
Bauxite thousand tons	3,138	3,249	3,668	3,500	[3]3,347
Alumina do.	1,058	1,037	1,017	[e]1,015	1,000
Metal ingot:					
Primary	161,366	172,683	220,100	[e]250,000	NA
Remelted[4]	23,394	24,084	26,263	33,559	NA
Total	184,760	196,767	246,363	283,559	[3]301,567
Antimony:					
Mine and concentrator output:					
Ore, gross weight	70,062	66,517	62,996	[e]51,000	[3]51,000
Metal content of ore	1,680	1,455	1,517	950	900
Concentrate, gross weight	3,809	3,413	3,690	[e]3,000	2,700
Metal (regulus)	2,237	2,198	1,872	895	[3]1,263
Bismuth, smelter output	83	102	49	45	[3]30
Cadmium, smelter output	201	208	174	48	100
Chromium: Chromite concentrate (produced largely from imported ores)	99,012	105,135	81,648	[e]80,000	85,000
Copper:					
Mine and concentrator output:					
Ore, gross weight thousand tons	19,559	18,337	19,733	23,443	[3]25,279
Cu content of ores	114,786	110,961	119,299	129,500	150,000
Concentrate, gross weight thousand tons	496	478	514	[e]600	700
Metal:					
Blister and anodes:					
Primary	93,745	92,505	94,013	119,300	120,000
Remelted[4]	78,617	86,175	86,865	[r] [e]86,000	90,000
Refined:					
Primary	91,755	90,660	82,456	[e]91,000	94,000
Remelted[4]	39,533	41,943	44,414	32,708	33,611
Total	131,288	132,603	126,870	123,708	[3]127,611
Gold, refined troy ounces	106,226	115,164	135,387	[e]120,000	140,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	4,478	4,794	5,106	5,018	[3]5,321
Fe content do.	1,413	1,510	1,680	[e]1,600	1,700
Iron concentrate, gross weight do.	2,097	2,451	2,669	[e]2,600	2,700
Metal:					
Pig iron do.	2,425	2,817	2,703	2,845	[3]2,855
Ferroalloys:					
Ferrochromium	68,564	69,194	50,591	[e]62,000	NA
Ferromanganese	33,738	51,126	38,895	[e]39,000	NA
Ferrosilicon	66,171	80,201	70,888	[e]80,000	NA
Silicon metal	30,094	28,358	29,818	[e]35,000	NA
Ferrosilicomanganese	33,097	28,600	20,286	[e]25,000	NA
Ferrosilicochromium	10,326	5,873	6,129	[e]6,000	NA
Other	630	1,072	3,997	[e]4,000	NA
Total	242,620	264,424	220,604	251,000	[3]304,000
Steel, crude:					
From oxygen converters thousand tons	1,149	1,424	1,349	1,598	[3]1,644
From Siemens-Martin furnaces do.	1,459	1,504	1,464	1,432	[3]1,440
From electric furnaces do.	1,026	1,048	1,037	1,105	[3]1,152
Total do.	3,634	3,976	3,850	4,135	[3]4,236
Semimanufactures do.	4,244	4,780	4,513	4,649	[3]5,667
Lead:					
Mine and concentrator output:					
Ore, gross weight (lead-zinc ore) do.	4,284	4,365	4,252	4,063	[3]4,634
Pb content of ores	121,465	118,556	113,119	[r] [e]114,000	120,000
Concentrate, gross weight	158,191	155,791	148,210	[e]145,000	150,000
Metal:					
Smelter:					
Primary	85,000	74,000	74,008	[e]75,000	70,000
Secondary[5]	39,664	46,456	35,000	35,000	30,000
Total	124,664	120,456	109,008	[e]110,000	100,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
METALS —Continued					
Lead —Continued					
Metal —Continued					
Refined:					
Primary[6]	84,751	73,901	72,000	77,531	NA
Secondary	17,000	12,500	10,248	[e]20,000	NA
Total	101,751	86,401	82,248	[3]97,531	[3]82,815
Magnesium metal	--	3,859	4,216	[r e]4,250	4,300
Manganese ore:					
Gross weight	30,250	31,149	27,494	[e]26,000	27,000
Mn content	10,624	10,872	9,819	[e]9,000	10,000
Mercury 76-pound flasks	--	--	--	[e]1,500	1,700
Nickel:					
Mine output:					
Ore, gross weight thousand tons	--	--	452	[e]500	600
Metal content of ore[e]	--	2,000	4,000	3,000	4,000
Nickel content of ferronickel[e]	--	--	1,500	1,500	2,000
Platinum-group metals:					
Palladium troy ounces	4,501	3,119	2,893	[e]3,000	3,100
Platinum do	418	482	418	[e]420	450
Selenium metal, refined kilograms	45,140	35,600	42,323	40,000	45,000
Silver, metal refined including secondary thousand troy ounces	4,790	4,437	3,343	3,987	[3]4,051
Zinc:					
Zn content of lead and zinc ore	95,253	88,640	83,813	[r]86,800	87,000
Concentrator output, gross weight	154,845	150,366	149,411	[e]150,000	170,000
Smelter including secondary	84,537	96,370	86,767	88,049	[3]92,649
NONMETALS					
Asbestos, all kinds	12,106	13,591	11,657	10,502	[3]8,556
Barite	47,818	44,179	32,114	[e]30,000	35,000
Cement, hydraulic thousand tons	9,315	9,780	9,718	9,592	[3]9,315
Clays:					
Ceramic clay, crude	84,777	113,714	121,709	[e]122,000	125,000
Fire clay:					
Crude	342,748	374,671	337,073	[e]640,000	650,000
Calcined	74,460	72,804	60,009	[e]60,000	70,000
Kaolin	197,124	224,797	236,485	[e]240,000	250,000
Feldspar, crude	57,710	53,240	42,265	[e]43,000	45,000
Gypsum:					
Crude thousand tons	619	669	640	[e]600	700
Calcined	132,982	123,194	108,498	[e]105,000	110,000
Lime:					
Quicklime thousand tons	1,504	1,614	1,550	[e]1,600	1,400
Hydrated do	880	950	860	[e]900	600
Magnesite:					
Crude	261,841	299,676	328,456	304,000	[3]326,000
Sintered	147,808	154,339	152,676	[e]150,000	160,000
Caustic calcined	11,343	14,841	11,712	[e]12,000	15,000
Mica, all grades	249	265	1,403	[e]1,400	1,500
Nitrogen: N content of ammonia thousand tons	404	421	422	[e]420	400
Pumice and related volcanic materials: Volcanic tuff	360,438	533,679	516,514	[e]500,000	550,000
Quartz, quartzite, glass sand:					
Quartz and quartzite thousand tons	200	212	205	[e]200	220
Glass sand do	2,100	2,424	2,418	[e]2,200	2,300
Total do	2,300	2,636	2,623	[e]2,400	2,520
Salt:					
Marine	22,081	36,185	37,980	NA	NA
From brines	186,435	189,976	191,746	NA	NA
Rock	168,921	192,579	198,500	NA	NA
Total	377,437	418,740	428,226	425,000	[3]380,000
Sand and gravel excluding glass sand thousand cubic meters	27,029	26,589	24,912	24,205	[3]21,464
Sodium compounds: Sodium carbonate	129,069	147,156	181,880	[e]190,000	185,000
Stone excluding quartz and quartzite:					
Dimension:					
Crude:					
Ornamental thousand cubic meters	71	78	72	NA	NA
Other do	2	1	12	NA	NA
Partly worked facing thousand square meters	1,944	2,058	2,134	NA	NA
Cobblestones, curbstones, other thousand cubic meters	27	38	29	NA	NA

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone excluding quartz and quartzite —Continued					
Dolomite thousand tons	668	928	930	NA	NA
Limestone do	4,061	4,081	4,872	NA	NA
Shale do	8,386	8,759	8,324	NA	NA
Crushed and broken, n.e.s. thousand cubic meters	[e]9,000	4,562	4,872	NA	NA
Milled marble and other do	18,239	18,420	NA	NA	NA
Sulfur, pyrite, pyrrhotite:					
Pyrite, gross weight thousand tons	607	652	810	[e]850	800
Pyrrhotite, gross weight do	22	29	32	[3]33	30
Sulfur:					
Sulfur content of pyrite[7] do	252	274	340	357	320
Sulfur content of pyrrhotite[7] do	9	12	13	13	12
Byproduct:					
Of metallurgy[e] do	200	200	200	180	160
Of petroleum[e] do	5	4	4	3	3
Total[e] do	466	490	557	553	495
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	26,232	23,945	24,670	[e]25,000	24,000
Coal:					
Bituminous thousand tons	388	384	389	392	[3]389
Brown do	9,665	10,581	10,744	11,303	[3]11,391
Lignite do	36,949	41,279	43,545	46,889	[3]53,651
Total do	47,002	52,244	54,678	58,584	[3]65,431
Coke:					
Metallurgical do	2,285	2,349	2,427	NA	NA
Breeze do	177	171	183	NA	NA
Foundry do	166	174	170	NA	NA
Total do	2,628	2,694	2,780	[3]3,440	[3]3,516
Gas:					
Manufactured (excluding petroleum refinery gas):					
From coke plants million cubic feet	29,845	29,633	30,904	NA	NA
From lignite gasification plants do	3,393	4,112	3,621	NA	NA
Natural, gross production do	64,272	77,585	80,728	73,816	[3]70,523
Natural gas plant liquids: Propane and butane thousand 42-gallon barrels	533	746	NA	NA	NA
Petroleum:					
Crude:					
As reported thousand tons	4,229	4,375	4,340	4,125	[3]4,044
Converted thousand 42-gallon barrels	31,324	32,405	32,146	30,525	29,954
Refinery products:					
Gasoline do	21,930	20,119	23,042	22,283	[3]33,175
Liquefied petroleum gas do	2,888	2,818	2,939	NA	NA
Jet fuel do	2,736	2,480	2,433	NA	NA
Kerosine do	100	109	110	NA	NA
Distillate fuel oil: Diesel do	24,790	22,924	24,546	25,856	[3]27,273
Residual fuel oil do	33,373	27,672	35,990	36,203	[3]32,560
Lubricants do	3,325	3,352	3,045	3,227	[3]3,171
Paraffin do	142	133	235	NA	NA
White spirit do	221	247	254	NA	NA
Asphalt and bitumen do	3,897	3,527	3,254	NA	NA
Petroleum coke do	237	370	326	NA	NA
Other do	2,458	11,257	2,278	NA	NA
Total do	96,097	95,008	98,452	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 10, 1985.
[2]In addition to the commodities listed, bentonite, common clay, diatomite, germanium, and talc 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.
[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]Calculated from pyrite and pyrrhotite concentrate using 42% as average sulfur content.

TRADE

The trade in minerals accounted for about 35% of the country's imports and about 10% of the country's exports. The trade balance in minerals was negative. By value, imports of fuels topped the list.

Table 2.—Yugoslavia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	603,716	555,412	--	U.S.S.R. 235,090; Czechoslovakia 199,364; Romania 117,848.
Oxides and hydroxides	506,364	515,606	--	U.S.S.R. 498,260; Italy 6,708.
Metal including alloys:				
Scrap	509	1,674	--	France 779; Italy 553.
Unwrought	91,044	143,636	4,430	East Germany 35,094; France 34,048; Italy 17,939.
Semimanufactures	50,055	69,365	9,394	Czechoslovakia 15,356; West Germany 7,381; Sweden 7,259.
Chromium:				
Ore and concentrate	12,477	12,450	--	All to Czechoslovakia.
Oxides and hydroxides	62	88	--	Italy 86.
Cobalt: Oxides and hydroxides value, thousands	$9	--		
Copper:				
Ore and concentrate	--	2,095	--	Zaire 2,092.
Matte and speiss including cement copper	--	347	--	All to Bulgaria.
Metal including alloys:				
Scrap	3,048	6,062	--	West Germany 4,134; Italy 1,392.
Unwrought	7,320	4,101	--	East Germany 3,338.
Semimanufactures	38,183	25,252	2,084	Czechoslovakia 4,079; Italy 3,985; Algeria 3,367.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	20,806	--		
Pyrite, roasted	58,453	61,195	--	Hungary 44,915; West Germany 10,035.
Metal:				
Scrap	63,343	70,383	--	Italy 65,141; West Germany 2,737.
Pig iron, cast iron, related materials	11,667	7,469	--	Hungary 2,644; West Germany 2,567.
Ferroalloys:				
Ferromanganese	12,166	10,946	9,391	Italy 1,000; Albania 330.
Unspecified	85,942	118,557	44,547	Italy 16,558; West Germany 13,248.
Steel, primary forms	24,854	20,847	--	Italy 10,043; Poland 7,811.
Semimanufactures:				
Bars, rods, angles, shapes, sections	175,215	309,306	--	Egypt 97,050; West Germany 43,004; Iran 42,061.
Universals, plates, sheets	34,753	73,843	--	China 29,591; Austria 14,319.
Hoop and strip	6,168	10,533	--	West Germany 5,614; Poland 2,051.
Rails and accessories	16,914	10,528	--	Romania 8,564; Albania 1,407.
Wire	17,714	31,058	--	Italy 9,161; U.S.S.R. 8,270.
Tubes, pipes, fittings	130,171	130,055	122	East Germany 16,928; West Germany 16,160; China 12,925.
Castings and forgings, rough	4,574	4,256	--	Austria 1,181; West Germany 1,072.
Lead:				
Ore and concentrate	9,116	4,274	--	Turkey 4,032.
Oxides	330	4	--	Czechoslovakia 1; Iraq 1.
Metal including alloys:				
Unwrought	18,921	18,105	--	Czechoslovakia 7,586; Austria 3,254.
Semimanufactures	2,054	3,203	--	Italy 2,276; France 665.
Magnesium: Metal including alloys:				
Scrap	16	35	--	West Germany 24.
Unwrought	2,782	3,361	657	West Germany 1,572.
Semimanufactures	367	122	--	West Germany 100.
Manganese: Ore and concentrate, metallurgical-grade	3,030	5,175	--	Switzerland 3,800; Italy 1,375.
Mercury 76-pound flasks	174	58	--	All to Switzerland.
Nickel: Metal including alloys:				
Scrap	170	93	--	Switzerland 44.
Unwrought	25	46	--	Austria 30; Netherlands 16.
Semimanufactures	47	128	--	Austria 109; U.S.S.R. 19.

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings[2] value, thousands	$91	$156	--	West Germany $135.
Metal including alloys, unwrought and partly wrought do	$23,586	$33,151	--	United Kingdom $14,038; West Germany $8,315.
Tin: Metal including alloys:				
Unwrought	22	7	--	Italy 3; U.S.S.R. 3.
Semimanufactures	5	2	--	Iraq 1; U.S.S.R. 1.
Titanium: Oxides	12,847	13,866	179	East Germany 11,173; Italy 612.
Tungsten: Metal including alloys, all forms	7	27	--	West Germany 26.
Zinc:				
Ore and concentrate	1,181	3,404	--	All to Belgium-Luxembourg.
Oxides	1,893	1,879	--	Romania 900; Hungary 440.
Metal including alloys:				
Scrap	156	363	--	Austria 193; Portugal 103.
Unwrought	22,810	25,024	--	East Germany 10,487; Czechoslovakia 9,865.
Semimanufactures	7,731	8,105	--	Czechoslovakia 5,506.
NONMETALS				
Abrasives, n.e.s.:				
Artificial: Corundum	12,465	10,873	--	Romania 3,755; Italy 2,728.
Grinding and polishing wheels and stones	2,306	2,809	39	West Germany 571; Bulgaria 429; Poland 395.
Asbestos, crude	2,589	2,152	--	Albania 1,705; Iran 400.
Barite and witherite	20,452	17,680	--	Hungary 17,494.
Boron materials: Oxides and acids	1,725	736	--	Italy 640; Romania 56.
Cement	913,576	1,052,236	1,875	Egypt 294,063; Italy 209,265; Pakistan 89,400.
Clays, crude	12,779	4,109	--	Greece 3,278; Hungary 395.
Cryolite and chiolite	6	5	--	All to Malta.
Feldspar, fluorspar, related materials	1,010	3,311	--	East Germany 2,544; Hungary 500.
Fertilizer materials: Manufactured:				
Ammonia	--	193	--	Austria 190.
Nitrogenous	53,199	113,406	--	Turkey 65,911; West Germany 24,671.
Phosphatic	209,746	220,086	--	Hungary 98,964; Czechoslovakia 90,027.
Unspecified and mixed	228,154	270,152	--	Hungary 103,506; Italy 50,422; West Germany 40,344.
Graphite, natural	15	13	--	West Germany 10.
Gypsum and plaster	124	119	--	U.S.S.R. 71; Iraq 26.
Lime	28,805	37,120	--	Hungary 33,017; Austria 1,426.
Magnesium compounds	24,524	5,050	--	Italy 2,673; Hungary 999.
Pyrite, unroasted	20,954	95,764	--	Egypt 35,490; Turkey 34,311.
Salt and brine	82	59	--	Iraq 47; Canada 10.
Sodium compounds, n.e.s.: Carbonate, manufactured	5,784	15,128	--	Italy 8,889; China 5,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	47,064	34,514	3	Italy 20,184; Czechoslovakia 7,928.
Worked	12,415	15,051	121	Czechoslovakia 5,032; Austria 3,288.
Dolomite, chiefly refractory-grade	11	32	NA	NA.
Gravel and crushed rock	7,918	12,408	--	Italy 7,359; Hungary 2,219.
Quartz and quartzite	9,418	12,523	--	West Germany 8,225; Spain 4,240.
Sand other than metal-bearing	9,164	13,206	--	Greece 6,095; Albania 3,510.
Sulfur:				
Elemental:				
Crude including native and byproduct	--	(3)	--	All to Iraq.
Colloidal, precipitated, sublimed	34	110	--	All to Thailand.
Sulfuric acid	300	12,327	--	Bulgaria 12,316.
Talc, steatite, soapstone, pyrophyllite	905	944	--	Albania 940.
Other:				
Crude	608	1,309	--	Pakistan 504; Romania 470.
Slag and dross, not metal-bearing	11,151	33,608	--	Greece 32,643.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	81	160	--	Austria 77; U.S.S.R. 37.
Carbon: Carbon black	1,459	306	--	West Germany 296.
Coal: Lignite including briquets	569,825	395,775	--	Austria 349,514; Italy 43,111.
Coke and semicoke	98,391	216,226	--	Hungary 170,594; Romania 42,428.
Peat including briquets and litter	651	1,934	--	All to Italy.

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	--	8	--	All to Switzerland.
Refinery products:				
Liquefied petroleum gas do.	(3)	396	--	Italy 204; West Germany 192.
Gasoline do.	1,901	3,080	(3)	Netherlands 1,187; West Germany 738.
Mineral jelly and wax do.	34	61	--	West Germany 27; Italy 25.
Kerosine and jet fuel do.	200	136	3	France 28; United Kingdom 24.
Distillate fuel oil do.	155	629	1	Netherlands 609.
Lubricants do.	592	579	--	West Germany 220; Austria 181.
Residual fuel oil do.	3	8	--	Jamaica 4; U.S.S.R. 1.
Bitumen and other residues do.	179	969	--	Austria 717; Italy 241.
Bituminous mixtures do.	2	(3)	--	Mainly to Iraq.
Petroleum coke do.	32	19	--	West Germany 18.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	177,445	158,761	--	Guinea 115,528; Greece 21,047.
Oxides and hydroxides	33,738	101,374	2	Guinea 88,920; Italy 11,019.
Metal including alloys:				
Unwrought	31,390	37,537	2	U.S.S.R. 35,178; United Kingdom 1,719.
Semimanufactures	12,475	12,018	2	U.S.S.R. 8,568; West Germany 1,292.
Arsenic: Oxides and acids	57	NA		
Chromium:				
Ore and concentrate	189,700	202,819	--	Albania 144,631; U.S.S.R. 51,170.
Oxides and hydroxides	679	575	--	U.S.S.R. 500; West Germany 45.
Cobalt: Oxides and hydroxides	21	27	7	France 6; West Germany 6.
Copper:				
Ore and concentrate	9,691	--		
Metal including alloys:				
Scrap	175	400	--	Switzerland 301.
Unwrought	52,334	26,844	3	Zambia 16,183; Zaire 3,519.
Semimanufactures	4,192	8,734	9	Poland 4,551; West Germany 1,642.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	1,477	1,568	--	Canada 510; U.S.S.R. 277; Brazil 276.
Metal:				
Scrap	508,000	738,094	--	U.S.S.R. 600,807; Poland 69,102.
Pig iron, cast iron, related materials	98,650	63,704	3	Algeria 32,149; U.S.S.R. 16,632.
Ferroalloys:				
Ferromanganese	425	2,483	--	Italy 1,219; West Germany 786.
Unspecified	4,845	6,330	10	West Germany 2,982; Austria 1,047.
Steel, primary forms	624,308	695,163	--	Czechoslovakia 258,572; U.S.S.R. 197,582.
Semimanufactures:				
Bars, rods, angles, shapes, sections	242,176	212,136	7	Romania 45,396; U.S.S.R. 41,628.
Universals, plates, sheets	441,468	429,549	2,182	Czechoslovakia 108,326; Italy 73,433.
Hoop and strip	106,869	113,224	2	Poland 40,119; West Germany 28,318.
Rails and accessories	5,330	3,973	--	U.S.S.R. 3,387; West Germany 582.
Wire	39,105	21,734	19	Czechoslovakia 7,849; Bulgaria 2,606.
Tubes, pipes, fittings	70,499	55,176	14	East Germany 14,832.
Castings and forgings, rough	5,751	3,431	--	Czechoslovakia 1,654.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	--	6,537	--	All from Greece.
Oxides	1,298	2,653	4	Austria 1,603; Bulgaria 716.
Metal including alloys:				
Unwrought	15,624	10,740	--	Peru 9,715; Mexico 996.
Semimanufactures	31	47	(2)	West Germany 35; U.S.S.R. 10.
Magnesium: Metal including alloys:				
Unwrought	3	2	--	All from West Germany.
Semimanufactures	98	17	--	West Germany 10.
Manganese:				
Ore and concentrate, metallurgical-grade	109,044	130,169	15	Republic of South Africa 41,926; Gabon 40,538; U.S.S.R. 31,424.
Oxides	925	1,166	--	France 548; West Germany 344.
Mercury 76-pound flasks	1,450	1,914	290	West Germany 464; United Kingdom 377.
Molybdenum: Metal including alloys, all forms	17	26	(2)	Austria 16; Hungary 5.
Nickel:				
Matte and speiss	232	53	--	Australia 47.
Metal including alloys:				
Scrap	21	(2)	--	All from West Germany.
Unwrought	1,076	1,395	1	U.S.S.R. 1,070; Bulgaria 110.
Semimanufactures	1,092	1,192	3	U.S.S.R. 451; West Germany 202.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$427	$2,001	$2	U.S.S.R. $1,629; West Germany $298.
Silver: Metal including alloys, unwrought and partly wrought do	$1,553	$2,212	$5	Austria $651; Zaire $550.
Tin:				
Oxides	9	(2)	--	All from Netherlands.
Metal including alloys:				
Unwrought	1,187	1,125	--	Malaysia 524; Bolivia 266.
Semimanufactures	279	164	(2)	West Germany 83; Austria 43.
Titanium: Oxides	1,267	775	10	West Germany 429; Italy 187.
Tungsten: Metal including alloys, all forms	15	29	(2)	France 9; Hungary 4.
Uranium: Metal including alloys, all forms	$17	$2	$1	Italy $1.
Zinc:				
Ore and concentrate	58,596	29,382	1,926	Czechoslovakia 12,747; Canada 8,740.
Oxides	1,614	3,125	--	Czechoslovakia 1,280; Austria 1,032.
Metal including alloys:				
Unwrought	13,866	27,893	3,972	United Kingdom 7,446; Algeria 7,252.
Semimanufactures	119	844	--	Czechoslovakia 550; Poland 250.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	256	618	--	U.S.S.R. 516; Italy 61.
Artificial: Corundum	647	1,538	5	Poland 847; Austria 392.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1,044	$1,134	$158	U.S.S.R. $393; Belgium-Luxembourg $256.
Grinding and polishing wheels and stones	1,047	1,387	12	Austria 344; Poland 255.
Asbestos, crude	58,611	45,656	--	U.S.S.R. 34,367; Republic of South Africa 7,689.
Barite and witherite	498	151	--	Spain 150.
Boron materials:				
Crude natural borates	48,798	35,209	11,359	Turkey 22,917.
Oxides and acids	1,999	2,650	--	U.S.S.R. 1,441; Italy 435.
Cement	544,497	343,451	--	U.S.S.R. 134,294; Hungary 122,205.
Chalk	457	3,073	--	Italy 1,462; Austria 1,012.
Clays, crude	142,725	122,159	1,089	Czechoslovakia 71,169; U.S.S.R. 14,938.
Cryolite and chiolite	200	900	--	Denmark 700; Sweden 200.
Diamond:				
Gem, not set or strung value, thousands	$457	$263	--	Belgium-Luxembourg $238.
Industrial stones do	$1,179	$697	--	United Kingdom $234; Italy $168.
Diatomite and other infusorial earth	446	616	--	Italy 284; Austria 224.
Feldspar, fluorspar, related materials	7,354	8,958	--	China 5,060; France 1,811.
Fertilizer materials:				
Crude, n.e.s	--	100	--	Hungary 60; France 40.
Manufactured:				
Ammonia	91,423	130,681	--	Hungary 60,317; Austria 45,115.
Nitrogenous	422,045	373,873	--	U.S.S.R. 147,009; Hungary 93,359.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured —Continued				
Phosphatic	31,119	31,494	--	Tunisia 17,680; Romania 13,814.
Potassic	451,533	543,376	--	U.S.S.R. 276,974; East Germany 264,072.
Unspecified and mixed	58,139	100,440	59,362	Romania 26,287; Tunisia 13,968.
Graphite, natural	1,853	3,003	1	Czechoslovakia 2,000; Austria 470.
Magnesium compounds	39,905	45,549	--	Greece 26,201; Turkey 12,469.
Mica:				
Crude including splittings and waste	249	983	--	U.S.S.R. 724; Netherlands 100.
Worked including agglomerated splittings	91	115	--	Czechoslovakia 44; Austria 19.
Phosphates, crude ___ thousand tons	1,265	1,802	--	Togo 673; Morocco 492; Jordan 251.
Pigments, mineral: Iron oxides and hydroxides, processed	3,171	2,799	10	U.S.S.R. 892; West Germany 673.
Precious and semiprecious stones other than diamond:				
Natural ___ value, thousands	$69	$91	--	West Germany $74.
Synthetic ___ do	$400	$264	--	West Germany $83; Czechoslovakia $78.
Pyrite, unroasted	11,750	--		
Salt and brine	294,721	241,125	--	Romania 132,611; Tunisia 59,850.
Sodium compounds, n.e.s.: Carbonate, manufactured	89,128	68,237	--	Romania 29,740; Bulgaria 24,463.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,641	2,137	--	Albania 949; East Germany 720.
Worked	140	94	--	Italy 87.
Dolomite, chiefly refractory-grade	342	1,011	--	Italy 880; West Germany 125.
Gravel and crushed rock	450	201	--	France 100; Italy 100.
Limestone other than dimension	375	--		
Quartz and quartzite	5,724	2,716	50	West Germany 1,548; Greece 980.
Sand other than metal-bearing	52,308	50,829	44	Hungary 22,959; West Germany 14,767.
Sulfur:				
Elemental:				
Crude including native and byproduct	68,859	121,581	--	Poland 100,061; Switzerland 5,200.
Colloidal, precipitated, sublimed	740	1,869	--	Poland 1,438; West Germany 312.
Dioxide	355	272	--	Italy 268.
Sulfuric acid	134,138	93,097	11	Hungary 57,226; East Germany 21,604.
Talc, steatite, soapstone, pyrophyllite	3,615	4,037	--	West Germany 1,300; Austria 917.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	289	757	218	Albania 500.
Carbon: Carbon black	29,348	30,866	30	Italy 19,548; U.S.S.R. 10,394.
Coal:				
Anthracite and bituminous thousand tons	3,537	4,005	1,002	U.S.S.R. 2,105; West Germany 333; Poland 274.
Briquets of anthracite and bituminous coal	78	9,400	--	All from U.S.S.R.
Lignite including briquets	114,749	139,611	--	U.S.S.R. 106,338; East Germany 23,882.
Coke and semicoke	25,094	27,435	--	Italy 16,661; West Germany 10,645.
Gas, natural ___ million cubic feet	94,685	99,630	--	All from U.S.S.R.
Peat including briquets and litter	15,044	8,351	--	U.S.S.R. 7,365; Poland 600.
Petroleum:				
Crude ___ thousand 42-gallon barrels	63,041	69,835	--	U.S.S.R. 24,294; Iraq 23,016; Iran 10,944.
Refinery products:				
Liquefied petroleum gas do	866	1,216	--	West Germany 534; Bulgaria 274.
Gasoline ___ do	422	381	(2)	Italy 138; Albania 101.
Mineral jelly and wax ___ do	14	18	--	West Germany 9.
Kerosine and jet fuel ___ do	633	428	--	Italy 220; Czechoslovakia 127.
Distillate fuel oil ___ do	802	1,904	(2)	U.S.S.R. 1,013; Italy 402.
Lubricants ___ do	681	561	6	Bulgaria 128; Hungary 114.
Residual fuel oil ___ do	7,432	4,214	128	U.S.S.R. 988; Italy 802.
Bitumen and other residues do	--	3	--	Albania 2.
Bituminous mixtures ___ do	2	2	(2)	Austria 1.
Petroleum coke ___ do	510	511	388	U.S.S.R. 52; West Germany 30.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Power shortages adversely affected the operations of aluminum smelters. Almost all smelters operated below capacity. For the country as a whole, the industry, which produced bauxite, alumina, and aluminum, was far less profitable than it could have been, because it was not in a position to export its products at the highest level of processing. To acquire technology and capital, the Government concluded agreements with those foreign countries providing money and know-how, to pay back their loans and pay for services with products of the aluminum industry. For these reasons, Yugoslavia had to export bauxite, alumina, and metal ingots instead of aluminum-manufactured products. Small changes in the production processes were introduced throughout the industry. However, capacities of all components of the industry remained unchanged.

Copper.—After 6 years of development and 2 years after the start of production, the newest copper mine and mill operated by RTB Bor, Veliki Krivelj, near Zajecar, eastern Serbia, reached its designed capacity in copper concentrates. Reportedly, recovery of byproducts was delayed and should start in 1985. When in full operation, the Veliki Krivelj mill will produce, in addition to 28,000 tons of copper in concentrates, 136,000 tons of pyrite, 56,000 tons of magnetite, 280 tons of molybdenum concentrates and unspecified quantities of gold, silver, rhenium, platinum, and selenium.

At the RTB Bor smelter, a fire in the electric installations in the smelter stopped production in early 1984. Production by the smelter, sulfuric acid plant, the gold extraction plant, and the copper wire plant resumed after repairs lasting several days.

Iron and Steel.—During 1984, financial difficulties slowed down activities of the sector. Lower imports of needed supplies for production, lack of spare parts, and shortages of energy caused by lack of foreign currency were the major problems.

Development of the Omarska Mine at the Ljubija mining complex in Bosnia, operated by the RMK Zenica, continued, and first production of ores was expected during 1985.

The management of RMK Zenica asked for bids for designing and supplying necessary equipment for a magnetic separation plant for iron ores mined at Dobre Vode, which is part of the Radovan Mine in Bosnia. Planned capacity was 400,000 tons of iron ore with an output of 150,000 tons of concentrates. RMK Zenica also planned construction of a 340,000-ton-per-year alloy steel plant at Zenica, Bosnia. The contract for basic engineering for a pollution control program at the new plant was given to Bethlehem International Engineering Corp. of the United States.

A new 850,000-ton-per-year blast furnace was to be built at the Smederevo iron and steel plant, in Smederevo, Serbia. With this new blast furnace, second in the combine, the total pig iron capacity at Smederevo should be about 1.7 million tons per year. Equipment and know-how were to be provided by the U.S.S.R. Foundations for this blast furnace had been built during 1975, but lack of funds stopped further construction. With timely deliveries, the new plant should be completed in 26 months.

Lead and Zinc.—Mine production of both metals decreased in 1984 because of declining ore grades and increased depth of mining. Additional exploration near the Sasa lead-zinc mine in Macedonia confirmed reserves in a deposit known as Golema Reka.

Researchers from the Mining Institute of Belgrade and the Mining School of the University of Belgrade developed a method for recovery of copper concentrates from the polymetallic ores mined at the Rudnik Mine in Serbia. Details of the method were not described, but reports stated that the method represents a technological innovation.

At the RMHK Trepca lead smelter, near Titova Mitrovica, Serbia, a general overhaul of all installations was completed. About 40 days of lead production were lost. In addition to the overhaul, electrostatic precipitators were installed and the new 300-meter-high chimney became operational. Capacity was not expanded, but pollution of the environment in the vicinity of the smelter should be reduced.

Nickel.—A new plant for the production of 56,000 tons per year of ferronickel started production in the fall in Glogovac, Serbia. Nickel content of the ferronickel averaged between 23% and 25%. Nearby mines provided ore for the plant.

The ferronickel plant at Kavadarci, Macedonia, and the nearby mines at Razanovo were definitely closed by the Parliament of Macedonia. An inquiry was started to determine responsibility for one of the most expensive investment fiascos in Macedonia. The closure was due to losses caused by the grade of ore being lower than the results of exploration had indicated and by a shortage of electric power.

NONMETALS

Barite.—Development of a barite mine near Plevlja, Montenegro, was underway during 1984. Startup of the mine was planned during 1985 at a capacity of 27,000 tons per year of barite. In addition, some barite was recovered as a byproduct of milling lead and zinc ore at the Vares Mine in Bosnia.

Dolomite.—Large reserves of dolomite were located near Gostivar in Macedonia. A new mine, Cajle, started production, delivering to a nearby dolomite products factory. Production reached 70,000 tons during 1984 and was expected to double in 1985. In addition, new deposits of dolomite were located near the localities of Makednsko Brdo, Kunovo, and Pakliste.

Feldspar.—Reserves of orthoclase feldspar in deposits recently discovered near Prilap, Macedonia, were reported as estimated at 10 million tons. Preliminary plans call for construction of facilities for production of 50,000 tons per year of final products. Tests showed that the deposits contained first-quality potassium feldspar, which is widely used in the electrical industry.

Quartz.—A new quartz mine started production at Tisovac near Busovaca in Bosnia during the fall of 1984. The quality of quartz was reported as good, with low content of iron. Most of the mine production should be used by the nearby refractory plant operated by Vatrostalna, one of the major producers of refractories in the country.

Salt.—At the beginning of 1984, a controlled leaching process was started in the Tusanj Mine near Tuzla in Bosnia. Output was reported at 300,000 tons of salt in about 1 million cubic meters of brine.

MINERAL FUELS

Although toward the end of 1984 the energy situation did improve somewhat and gasoline rationing was ended by the Government, shortages of electric power and of almost all sources of primary energy adversely affected production of minerals and related products as well as other industrial goods. The economic impact was close to disastrous because of the country's need to export to repay its large outstanding foreign debt. Domestic consumption of energy reached about 54 million tons of standard coal equivalent (SCE); net imports were about 40% of the apparent consumption. During 1983, for the third year in a row, the share of net imports in apparent consumption declined because administrative measures and lack of foreign currencies curbed imports of liquid fuels. Coal remained the principal primary energy carrier produced in the country amounting to about 22.2 million tons of SCE. Lignite, equal to 16.4 million tons of SCE, comprised the bulk of coal output and all of the energy produced in the country. Petroleum, with 16% of total consumption, was followed by natural gas with 9% and electric power with 8%. About 85% of the fuel import value was bituminous coal and liquid fuels.

Coal.—Exploration of the Koromacno bituminous coal deposit, part of the Rasa mining district in Istria, Croatia, continued during 1984. Preliminary results indicated reserves of about 13 million tons of "good" quality bituminous coal. One 1,700-meter-long adit was completed at Karamacno for exploration and to find out if communication between underground waters and the nearby sea existed and to what extent closeness to the sea might affect future production in the karst area. In addition to exploring at Karamacno, the Tupljak and Ripenda Mines were also being expanded in the Rasa District. However, various difficulties were encountered during 1984 at Tupljak and Ripenda. Larger than usual rainfall caused water influxes far above average. As a result, flooding occurred in the deeper parts of the mines, and many days of production were lost. In addition, the equipment used was old and broke down frequently. Spare parts were hard to obtain, and new equipment could not be ordered for lack of funds. Furthermore, peculiar geological conditions prevented ordering standard equipment for mining. Coal seams are of various heights, hardness varies, and seams are imbedded with very hard layers of limestone. Another problem that faced all the Rasa Mines during 1984 was that funds for mine modernization due from the consumers and the powerplants were not received on time.

Discovery of new reserves totaling 3.5 million tons of bituminous coal in the general area of the Baljevac coal mine in Serbia was reported. In recent years, the Baljevac

Mine produced about 180,000 tons per year. The new reserves should extend the life of the mine by another 18 to 19 years at the present rate of production. Electroprivreda BiH of Sarajevo and Titovi Rudnici Kreka Banovici have ordered three 145-T-RH 75 shovels and one 210-T-RH 120 shovel for overburden removal, one 74-T-Rh 4OC shovel for coal mining, and G-350 graders for cleaning roads. This new equipment was to be used in the Ugljevik Mine in Bosnia. In addition, two RH-40 shovels were ordered for the Dobrnja-Lukavac open pit lignite mine, also in Bosnia. Two small shovels were ordered for the Kraka-Banovici Mine. All equipment is electrically powered. Orenstein & Koppel GmbH (O&K) of the Federal Republic of Germany will produce the equipment in its Dortmund works. O&K has in the past delivered several large shovels to mines in Yugoslavia.

Near the opencast lignite mine at Obilic, Kosovo, Serbia, a new lignite gasification plant was planned to produce 500 million cubic meters per year of gas. International bids were asked. The new gasification plant would be the second in this area; the first had a capacity of about 400 million cubic meters per year.

On the Jablanica Mountain, in the vicinity of Struga, Macedonia, reserves of 5 million tons of lignite were discovered. Calorific values ranged from 2,000 to 4,000 kilocalories. Reportedly, a new mine with a capacity to produce 60,000 tons of lignite per year was planned; the lignite would be used locally as a substitute for imported fuel oil.

At the Mostar brown coal project, plans were completed for opening a new mine based on 20 million tons of reserves at the Cim deposit, and development began during the fall. Production at the new mine was to start in 1987 with an output of 350,000 tons of coal per year. At the Suvodol Mine, in Pelagonia near Bitola, Macedonia, new reserves of about 140 million tons of lignite were discovered and confirmed during 1984. Added to reserves of 195 million tons already confirmed at Suvodol, the future of the mine is more than assured.

Oil Shale.—Work on a project to recover crude oil from the Aleksinac oil shale deposit was near completion at yearend 1984. Reportedly, all details of the project should be finalized during 1985, and first production of crude oil was planned for 1987. Reserves of oil shales at Aleksinac were reported ranging from 2.3 to 3 billion tons, with an average oil content between 9% and 20%. Energoprojekt of Belgrade, which is in charge of the Aleksinac project, expects that costs of production will be $190 per ton of crude oil from oil shale, not counting the value of recoverable byproducts. When the value of byproducts is included, Energoprojekt expects the production cost to be $138 per ton of crude.

Petroleum and Natural Gas.—Lack of foreign currencies affected the petroleum industry of the country in two ways. First, was the impossibility of purchasing new equipment and spare parts; this resulted in fewer wells completed and lower production of oil and gas. Second, was that the country could not afford adequate imports of crude. Refineries operated at about 50% of their capacity and shortages of petroleum refinery products were detrimental to many branches of the Yugoslav economy. Naftagas, from Novi Sad, Vojvodina, Serbia, announced discovery of crude oil with natural gas in the Babusnica No. 1 well, in Stig, near Požarevac, Serbia. Reports indicated an oil- and gas-bearing formation at a depth between 1,926 and 1,935 meters. If this well becomes a producer, it would be the first commercial producer in Serbia proper.

The foreign partners, in a joint venture in the offshore Adriatic Sea with INA-Naftaplin of Zagreb, have requested expansion of the area slated for exploration by an additional 1,700 square kilometers. Apparently, the requested expansion was granted.

INA-Naftaplin started crude oil production from new fields at Djeletovci, Privlaka, and Ilaca in the eastern part of Slavonia, Croatia. Expected total production from all three fields is 74,000 barrels per year.

Work on development of two large gasfields, Molve and Kalinovac, resumed during 1984. Loans from abroad, including one of about $30.3 million by the International Finance Corp., an arm of the World Bank, were granted for purchases of needed equipment and tools from abroad. Drilling and production conditions were extremely severe in both fields. Gas formations are found at depths of about 3,300 meters. Gas pressure was 480 to 500 bars, and temperatures ranged between 180° and 200° C. Gas was sour with carbon dioxide. The gas in the Kalinovac Field contains by far more condensate than the gas from Molve. At Molve, two central gas stations were completed by yearend 1984. Drilling programs called for completion of 18 wells. When all planned wells are completed, gas production from

Molve and Kalinovac should reach 1 billion cubic meters per year, which equals the output of INA-Naftaplin in 1984. Two large investments in the petroleum industry—the trunk pipeline connecting the oil terminal at Krk Island with inland refineries in Yugoslavia, Czechoslovakia, and Hungary and the large Dina petrochemical combine at Krk Island—were in serious trouble. Dina was considering closing the installations at Krk after 1 year of production at a loss. Hungary and Czechoslovakia pulled out of the venture during the year, and Yugoslavia alone processed and moved limited quantities of crude oil, and consequently generated losses. Authorities were seriously considering closure of this pipeline.

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The Mineral Industry of Zaire

By George A. Morgan[1]

Changes in the mining law and in currency foreign exchange regulations resulted in increases in reported production of several minerals in 1984, particularly diamond and cassiterite. Zaire was the leading world producer of diamond and cobalt. Output of copper, the major metal produced, was near full capacity despite generally low world copper prices. Production of cobalt, all a byproduct of copper mining, was up sharply. Crude petroleum offtake increased by 2.4 million barrels.

Zaire's public debt was estimated at $4.4 billion[2] in 1984, and most of the Government's revenue was for debt service. A positive trade balance estimated at nearly $600 million was achieved, but the overall balance was a negative $461 million. The independent Government-owned company La Générale des Carrières et des Mines du Zaire (Gécamines) was the major source of state revenue from taxes and dividends on the sale of its mineral products. It also provided most of the revenue for transport services to other Government-owned companies.

Gécamines underwent a major restructuring with the creation of a holding company and three separate subsidiaries, Gécamines Mining, Gécamines Trading, and Gécamines Development. The mining subsidiary had responsibility for the exploration, mining, and processing of minerals prior to their sale to the state. The trading subsidiary was responsible for marketing mineral output, taking over this function from the Société Zairoise de Commercialisation de Minerais (Sozacom). Sozacom, formerly a separately run, Government-owned agency, was abolished in June 1984. The latter restructuring has enabled Gécamines to more closely monitor the sale and shipment of its products in concert with market conditions, and along with changes in contract sales, has led to positive cash flow. The development subsidiary was responsible for all food and agricultural product output and distribution.

PRODUCTION AND TRADE

Output of copper by Gécamines stabilized, and investment plans included increasing the quality of products exported rather than expanding production. The Government-sanctioned presence of licensed counters-buyers in the mining areas, along with a floating exchange rate, led to an increase in reported output of diamond, tin, and certain tin byproducts. Reported gold production was low owing to the remote nature of the producing sites in northeastern Zaire. The number of artisanal workers increased as former farm and plantation laborers, as well as miners, left their jobs to seek their fortune with their own efforts.

Success in improving the efficiency of the mining sector, particularly by Gécamines, continued to be adversely affected by an unreliable transport system. Low water levels on the Kasai River, as well as road and railroad transport delays, have increased the average residence time of mineral products in transit to over 90 days. As much as 20% of Gécamines' output was in transit at a given time. The lack of tanker transport to move imported fuel from the river and railroad port of Ilebo to the Kolwezi mining area resulted in a severe threat to copper and cobalt production. Railroad shipment of fuel by the Republic of South Africa resolved the crisis.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Cadmium, smelter	168	230	280	308	317
Cobalt:					
Mine output, metal content[e]	15,400	15,400	11,300	11,300	18,000
Refined	14,482	11,124	5,573	5,370	9,142
Columbium-tantalum concentrate:					
Gross weight kilograms	92,000	75,000	53,000	37,262	45,810
Columbium content[e] do.	25,800	20,400	[r]14,600	[r]10,200	12,600
Tantalum content[e] do.	19,500	20,800	[r]15,200	[r]10,700	13,100
Copper:					
Mine output, metal content[2]	539,500	555,100	519,000	536,500	540,000
Blister and leach cathodes	447,800	480,400	473,500	466,600	465,945
Refined	144,000	151,300	175,000	227,231	224,501
Gold[3] troy ounces	40,864	64,430	62,233	147,885	80,335
Manganese ore and concentrate	6,321	18,214	--	--	15,518
Monazite concentrate, gross weight	51	35	32	8	1
Silver thousand troy ounces	2,733	2,580	1,751	3,754	3,974
Tin:					
Mine output, metal content	3,159	3,321	3,144	2,930	4,120
Smelter, primary	216	450	353	181	98
Tungsten, mine output, metal content	[r]69	[r]46	38	44	31
Zinc:					
Mine output, metal content	67,000	63,300	82,100	76,215	72,000
Metal, primary, electrolytic	43,800	57,600	64,400	62,786	66,148
NONMETALS					
Cement, hydraulic thousand tons	[r]402	[r]494	541	513	525
Diamond:					
Gem[e] thousand carats	345	450	450	3,319	5,110
Industrial[e] do.	9,890	8,550	8,550	8,663	13,349
Total do.	10,235	9,000	[e]9,000	11,982	18,459
Lime	113,600	123,500	103,800	106,993	110,000
Stone, crushed thousand tons	353	335	317	387	320
Sulfur:					
Byproduct of metallurgy, S content of sulfuric acid from sphalerite[e]	24,800	25,000	25,000	36,000	36,000
Sulfuric acid, gross weight	142,700	142,900	146,400	159,864	160,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	[r]140	[r]130	123	109	104
Petroleum:					
Crude thousand 42-gallon barrels	6,566	[r]7,668	8,385	9,297	11,704
Refinery products:					
Gasoline do.	530	375	173	62	NA
Kerosine and jet fuel do.	346	289	132	42	NA
Distillate fuel oil do.	706	498	82	105	NA
Residual fuel oil do.	1,273	798	316	101	NA
Liquefied petroleum gas do.	6	--	([4])	([4])	NA
Refinery fuel and losses do.	154	130	47	34	NA
Total do.	3,015	2,090	750	344	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 25, 1985.
[2]Content of concentrate produced.
[3]Excludes gold recovered from blister copper.
[4]Revised to zero.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	--	50	--	Ivory Coast 28; Belgium-Luxembourg 22.
Beryllium: Ore and concentrate	--	8	8	
Bismuth: Metal including alloys, all forms	--	6	--	All to France.
Cadmium: Metal including alloys, all forms	243	205	--	All to Belgium-Luxembourg.
Cobalt: Metal including alloys, all forms	3,674	4,933	3,502	Japan 805; France 527.
Columbium and tantalum:				
Ore and concentrate	82	19	14	West Germany 5.
Ash and residue containing tantalum	--	199	--	All to West Germany.
Copper:				
Ore and concentrate	83,093	91,882	--	Japan 91,782.
Matte and speiss including cement copper	408	150	--	All to Greece.
Ash and residue containing copper	--	256	--	All to West Germany.
Metal including alloys:				
Scrap	334	626	--	France 336; Belgium-Luxembourg 157; West Germany 115.
Unwrought	390,755	320,720	29,103	Belgium-Luxembourg 171,107; West Germany 62,847; Italy 18,009.
Semimanufactures	--	403	403	
Gold:				
Waste and sweepings value, thousands	$110	$205	--	All to West Germany.
Metal including alloys:				
Unwrought and partly wrought troy ounces	--	2,218	--	West Germany 1,768; United Kingdom 450.
Bullion value, thousands	$100	$83	$83	
Iron and steel: Metal:				
Ferroalloys: Ferrochromium	94	--		
Semimanufactures:				
Universals, plates, sheets	--	79	--	All to Trinidad and Tobago.
Tubes, pipes, fittings	--	27	--	Netherlands 19; Taiwan 8.
Lead: Ore and concentrate	158	--		
Manganese:				
Ore and concentrate, metallurgical-grade	16,287	629	--	All to France.
Nickel:				
Matte and speiss	--	27,011	--	All to Belgium-Luxembourg.
Metal including alloys, unwrought	5	41	--	France 22; Netherlands 19.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$51	--	All to Belgium-Luxembourg.
Silver:				
Ore and concentrate[2] do	$3,189	$60	--	All to West Germany.
Metal including alloys, unwrought and partly wrought do	$39	$633	--	Yugoslavia $550; West Germany $61.
Tin:				
Ore and concentrate	2,337	1,884	--	Netherlands 1,750.
Oxides value, thousands	$226	--		
Metal including alloys, unwrought	218	196	10	France 80; Belgium-Luxembourg 79.
Tungsten: Ore and concentrate	74	53	--	West Germany 26; United Kingdom 17.
Uranium and thorium: Ore and concentrate value, thousands	$86	--		
Zinc: Metal including alloys:				
Scrap	25	--		
Unwrought	30,397	32,672	24,593	Taiwan 2,215; Japan 1,567.
Semimanufactures	10	154	--	All to Cyprus.
Other:				
Ores and concentrates	145	9	--	West Germany 5; Austria 3.
Ashes and residues	1,733	588	--	West Germany 570.
Base metals including alloys, all forms	1,241	1,158	--	West Germany 733; Belgium-Luxembourg 205.
NONMETALS				
Abrasives, n.e.s.: Dust and powder of precious and semiprecious stones including diamond kilograms	113	--		

See footnotes at end of table.

Table 2.—Zaire: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Diamond:				
Gem, not set or strung value, thousands	$31,549	$77,262	$2,940	Belgium-Luxembourg $74,310.
Industrial stones do	r$39,033	$15,107	--	Belgium-Luxembourg $13,208; West Germany $1,402.
Dust and powder do	$93	$1,271	$20	Japan $1,251.
Precious and semiprecious stones other than diamond:				
Natural do	r$1,003	$6,741	$351	Hong Kong $6,196; West Germany $144.
Synthetic do	$2	$51	$49	Belgium-Luxembourg $2.
Salt and brine	25	--		
Sodium compounds, n.e.s.: Carbonate, manufactured	--	1,256	--	All to France.
Other: Crude	43	--		
MINERAL FUELS AND RELATED MATERIALS				
Petroleum: Crude thousand 42-gallon barrels	[3]5,886	9,289	8,018	Japan 406.

rRevised.
[1]Table prepared by Virginia A. Woodson. Owing to the lack of available 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]May include waste and sweepings and platinum-group metals.
[3]Energy Balances of Developing Countries, 1971/82, International Energy Agency, OCED, Paris, France, 1984.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate value, thousands	--	$2	--	All from Switzerland.
Oxides and hydroxides	33	--		
Metal including alloys:				
Unwrought	5	--		
Semimanufactures	649	1,130	--	Belgium-Luxembourg 336; Brazil 290; Hong Kong 238.
Copper:				
Ore and concentrate	--	2,092	--	All from Brazil.
Metal including alloys:				
Unwrought	47	5	--	All from Belgium-Luxembourg.
Semimanufactures	32	46	--	Belgium-Luxembourg 34; Italy 7.
Iron and steel: Metal:				
Pig iron, cast iron, related materials value, thousands	--	$1	--	All from Switzerland.
Ferroalloys	19	7,496	--	Belgium-Luxembourg 7,477.
Steel, primary forms	1,747	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	10,659	2,542	([2])	West Germany 1,354; France 1,003.
Universals, plates, sheets	20,692	19,225	([2])	Belgium-Luxembourg 10,858; France 3,832; Japan 3,206.
Hoop and strip	844	1,193	--	West Germany 799; Belgium-Luxembourg 251.
Rails and accessories	7,866	13,605	--	France 12,017; Belgium-Luxembourg 1,588.
Wire	1,236	605	--	Belgium-Luxembourg 274; Netherlands 148; France 128.
Tubes, pipes, fittings	7,832	6,496	--	Belgium-Luxembourg 2,135; West Germany 1,217; Sweden 853.
Castings and forgings, rough	2,884	1,459	--	Italy 1,430; Belgium-Luxembourg 19.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead:				
Oxides	22	23	--	Belgium-Luxembourg 13; West Germany 10.
Metal including alloys:				
Unwrought	154	337	--	West Germany 250; Belgium-Luxembourg 87.
Semimanufactures	15	16	--	Belgium-Luxembourg 11; Italy 5.
Magnesium: Metal including alloys, all forms value, thousands	--	$6	--	All from Canada.
Manganese: Ore and concentrate, metallurgical-grade	3	--		
Molybdenum: Metal including alloys, all forms value, thousands	--	$2	--	All from Switzerland.
Nickel: Metal including alloys:				
Unwrought	--	10	--	All from Belgium-Luxembourg.
Semimanufactures	--	2	--	Belgium-Luxembourg 1; Switzerland 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$8	$2	--	All from Belgium-Luxembourg.
Silver: Metal including alloys, unwrought and partly wrought do	$139	$272	--	Belgium-Luxembourg $196; Switzerland $76.
Titanium: Oxides	8	68	--	West Germany 50; Belgium-Luxembourg 18.
Zinc:				
Oxides	33	4	--	Belgium-Luxembourg 2; Italy 2.
Blue powder	--	12	12	
Metal including alloys, semimanufactures	4	20	1	Italy 12; Belgium-Luxembourg 7.
Other:				
Ores and concentrates	20	5	--	All from Belgium-Luxembourg.
Oxides and hydroxides	--	143	--	All from West Germany.
Base metals including alloys, all forms value, thousands	--	$1	--	All from Switzerland.
NONMETALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones including diamond do	--	$29	--	All from Belgium-Luxembourg.
Grinding and polishing wheels and stones	40	30	(2)	Belgium-Luxembourg 19; Japan 4.
Asbestos, crude	17	325	--	All from Canada.
Barite and witherite	227	--		
Cement	1,455	1,260	--	Belgium-Luxembourg 1,187; Italy 46.
Chalk	34	18	--	All from Italy.
Diamond:				
Gem, not set or strung value, thousands	$148	--		
Industrial stones do	$1	--		
Diatomite and other infusorial earth	116	249	8	France 147; West Germany 89.
Fertilizer materials: Manufactured:				
Ammonia	61	22	--	All from Belgium-Luxembourg.
Nitrogenous	13,749	13,853	--	France 12,605; West Germany 963.
Phosphatic	--	16	--	All from Belgium-Luxembourg.
Potassic	10	2,558	--	West Germany 1,770; Belgium-Luxembourg 788.
Unspecified and mixed	3,537	6,553	--	Belgium-Luxembourg 5,396; West Germany 1,157.
Graphite, natural	1	6	--	All from Belgium-Luxembourg.
Gypsum and plaster	16	22	--	West Germany 15; Belgium-Luxembourg 7.
Lime	21,780	1,183	--	West Germany 1,000; Belgium-Luxembourg 183.
Magnesite	--	2	--	Belgium-Luxembourg 1; West Germany 1.
Mica: Crude including splittings and waste	2	3	--	All from Belgium-Luxembourg.
Phosphates, crude	728	758	--	Do.
Pigments, mineral:				
Natural crude	--	83	--	All from West Germany.
Iron oxides and hydroxides, processed	48	--		

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Precious and semiprecious stones other than diamond: Natural value, thousands	--	$14	--	Mainly from Switzerland.
Salt and brine	353	337	33	Belgium-Luxembourg 155; West Germany 149.
Sodium compounds, n.e.s.: Carbonate, manufactured	783	751	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	34	--		
Worked	159	247	--	Italy 213; Belgium-Luxembourg 19.
Gravel and crushed rock	171	--		
Quartz and quartzite	4,124	--		
Sand other than metal-bearing	140	88	83	Belgium-Luxembourg 5.
Sulfur:				
Elemental: Crude including native and byproduct	13	78	--	Belgium-Luxembourg 58; West Germany 20.
Sulfuric acid	150	179	--	Belgium-Luxembourg 177.
Talc, steatite, soapstone, pyrophyllite	235	30	--	Belgium-Luxembourg 23; West Germany 7.
Other: Crude	--	449	--	Belgium-Luxembourg 299; West Germany 150.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	40	10	--	All from Belgium-Luxembourg.
Carbon black	457	764	1	West Germany 729.
Coke and semicoke	--	703	--	All from Belgium-Luxembourg.
Petroleum:				
Crude thousand 42-gallon barrels	[3]5,494	730	--	NA.
Refinery products:				
Gasoline, motor do.	160	1,293	--	Brazil 787; Netherlands 469.
Mineral jelly and wax do.	3	9	([2])	Netherlands 5; West Germany 3.
Kerosine and jet fuel do.	171	1,894	--	Brazil 1,356; Netherlands 496.
Distillate fuel oil do.	42	2,242	147	Brazil 2,070; France 25.
Lubricants do.	--	167	2	Brazil 138; Belgium-Luxembourg 15.
Nonlubricating oils do.	87	--		
Residual fuel oil do.	15	607	--	Netherlands 527; Brazil 80.

NA Not available.

[1]Table prepared by Virginia A. Woodson. Owing to a lack of 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 trading partner countries. Unless otherwise specified, data are compiled from the trade statistics of individual trading partners.

[2]Less than 1/2 unit.

[3]Energy Balances of Developing Countries, 1971/1982, International Energy Agency, OCED, Paris, France, 1984.

COMMODITY REVIEW

METALS

Cobalt.—Output of cobalt from copper ores mined by Gécamines increased sharply but was well below the 15,000-ton-per-year capacity. The Kamoto section of the DIMA-Kamoto concentrator facility near Kolwezi supplied most of the cobalt produced. Recovery of metal from the oxide and mixed oxide-sulfide copper-cobalt ores averages about 35%. Cobalt granules were produced at Likasi, and cobalt flakes were produced at Luilu.

Copper.—Gécamines proposed a $700 million investment program for its copper and cobalt mining and processing facilities. The major portion of the investment would be for maintaining and improving the existing plant. Gécamines expected to provide most of the cost, with the remaining estimated $200 million to be obtained through external financing. Research was under way for improving the recovery of copper, which has declined to a yield of less than 78%, as well as byproduct cobalt. Testing of new methods for open pit design and ore extraction was ongoing. The construction of a new copper and cobalt smelting and refining complex at Luilu to process existing concentrator output remained a goal of Gécamines. Currently about 125,000 to 150,000 tons per year of copper is refined in Belgium under a 3-year contract.

The Government-owned Société de Développement Industriel et Minière du Zaire (Sodimiza) produced copper concentrate from ore mined from the Musoshi and Kinsenda underground mines in southern Shaba Region. The concentrate, grading 52% copper, was shipped to Zambia for smelting and refining. Sodimiza continued to expand output at the Kinsenda Mine with its higher ore grade.

The Société Minière de Tenke-Fungurume (SMTF), originally created in 1970 to produce 150,000 tons per year of copper and about 6,000 tons per year of cobalt, was liquidated in October. Despite the importation of heavy equipment and completion of much infrastructure, SMTF was unable to complete production facilities because of falling copper prices, the closure of the Benguela Railroad through Angola in August 1975, and the withdrawal of bank loan proposals for the project's completion.

Germanium.—Copper and ores of copper and germanium were reported as being produced, 55 tons in 1983 and 743 tons in 1982. Germanium content and recovery method were not reported, and no production was reported for 1984. Germanium has been exported in the past both as a magnetic copper-germanium concentrate and as a filter cake containing about 12% germanium recovered from smelter fumes.

Tin.—There were five producers of tin concentrate in 1984: Société Minière et Industrielle de Kivu (Sominki), Société Zairetain (Zairetain), Société Minière de Goma (SMDG), Entreprise Minière du Zaire (EMZ), and Société Minière de Kania (Somika). The documentation of new deposits by the Bureau de Recherches Géologiques et Minières of France and the creation of new mining companies such as SMDG, EMZ, and Somika have increased output.

Sominki was the largest producer and increased its output by nearly 760 tons over that of 1983, owing to updating of one of its main open pit concentrators. Zairetain, the only tin metal producer in Zaire, had a decline in output to less than 240 tons of cassiterite and 100 tons of metal. Lack of financing for necessary plant and equipment was the reason for the decline. Research was under way at Zairetain for both delineation and recovery of reserves in new ore and tailings and waste dumps, and a proposal was made for expanding metal output to about 1,000 tons per year. SMDG, EMZ, and Somika were relatively new producers with small reserves and production, and operated in generally remote areas.

Artisanal producers accounted for over 700 tons of cassiterite output in 1984, production that has normally been unreported. Owing to changes in the mining code for Zairian citizens, the presence of licensed counters-buyers, and a floating exchange rate, output by artisanal miners has become available for sale and export. The exodus of people from farms, plantations, and organized mining camps to artisanal workings has also led to expanded output.

NONMETALS

Diamond.—Zaire was the largest producer of diamond in the world, as indicated from statistics published by the Centre National d' Expertise (CNE). CNE was responsible for monitoring purchases of diamond by licensed counters-buyers and for the enforcement of regulations pertaining to their operation. The Société Minière de Bakwanga (MIBA) was the only licensed producer and operated at Mbuji Mayi in the East Kasai subregion. Outside of the MIBA concession area at Mbuji Mayi, and at Tshikapa in the West Kasai subregion, artisanal operators were permitted to mine diamonds. However, security was difficult to maintain over MIBA's concession area, and poaching of easily minable diamond has caused the loss of some reserves. MIBA was developing a new mining site at Tshibua, 35 kilometers southwest of Mbuji Mayi, where output would be from kimberlite, and alluvial and eluvial material.

Zairians, by virtue of their citizenship, were permitted to mine diamond without a permit in nonconcession areas. Private ownership and transport of diamond in Zaire was also legal, but exports were only by licensed counters-buyers. Artisanal output accounted for most of the diamond produced, in particular gem diamond. Many operations were in the Tshikapa area, the traditional location for gem-quality stones. There were about 12 licensed counters-buyers in Zaire, including Zaire-British Diamond Distributors Ltd. (Britmond) and Société d'Evaluation du Diamont au Zaire (Sediza), both affiliates of De Beers Central Selling Organization (CSO). Britmond was the sole purchaser and marketing agent for output by MIBA at a guaranteed floor price of $8.55 per carat. Sediza purchased diamonds on the open market for the account of CSO at an appraised value, while other independent counters-buyers purchased diamond in a like manner for their own account.

MINERAL FUELS

Zaire relied upon imports of coal, coke, and petroleum refinery products for its fuels comsumption. Domestically generated electricity was available to the principal mining centers, and its use continued to increase. About 25% of electric energy consumed in Shaba was from the Inga-Shaba hydroelectric complex.

Natural Gas.—The Communauté Economique des Pays des Grand Lacs, which includes Zaire, Burundi, and Rwanda, invited bids for the further study of natural gas potential of Lake Kivu. The gas is generated by the biological digestion of sediments on the lake floor, at a depth of about 250 meters. Reserves of the gas, consisting mainly of carbon dioxide and to a lesser extent methane, were estimated at 2,100 billion cubic feet.

Petroleum.—Output from offshore wells continued to increase, and practically all production was exported for refining. Crude petroleum was imported for processing at the country's sole refinery at Kinlao, but most demand was met by imports of refined products. Consumption of refined products in 1983, the latest year available, was 5.24 million barrels, and consisted mainly of diesel fuel, jet fuel, and gasoline.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from zaires (Z) to U.S. dollars at the rate of Z40.45=US$1.00 for 1984.

The Mineral Industry of Zambia

By Thomas O. Glover[1]

Zambia's mining industry was dominated by copper and byproduct cobalt production, which accounted for over 90% of Zambia's export earnings. It was the world's fifth largest producer of copper and the second largest producer of cobalt. The country continued to experience serious economic and financial difficulties attributed in part to the long-term depressed prices for copper. As a result, Zambia's economy continued to experience recession with declining imports, rising unemployment, and growing foreign debt. During 1984, Zambia's foreign exchange earnings continued to fall from the already depressed levels of 1983. The gross domestic product fell by 1.3%, while the budget deficit amounted to approximately $150 million.[2] The Government was making efforts to restructure the economy away from dependence on mining and toward more emphasis on agriculture. Under a standby program reached with the International Monetary Fund (IMF) in April 1983, the Government further depreciated the kwacha to US$0.47 as of December 31, 1984. This amounted to a 29% depreciation since December 31, 1983.

Zambia Consolidated Copper Mines Ltd. (ZCCM) proposed a 5-year investment target for its mines totaling $700 million. A total of $148 million proposed for 1984 included a $75 million loan from the International Bank for Reconstruction and Development (World Bank), a $27 million African Development Bank (ADB) loan, and a $46 million European Economic Community loan. The project was comprised of three components consisting of a rehabilitation program for equipment and spare parts, a personnel training program, and technical studies on economic levels of production. On March 20, 1984, the $75 million World Bank loan was approved by the World Bank's board of directors. The 20-year World Bank loan to Zambia included a 5-year grace period with a standard variable interest rate. The proceeds of the loan were in turn loaned to ZCCM for 15 years, including a 3-year grace period, at a fixed interest rate equal to the World Bank rate at the time of the loan plus 10%. ZCCM bore the foreign exchange risk.

Zambia applied for a loan from the ADB in late 1984 to rehabilitate its Maamba coal mine. The rehabilitation was to cost $28.78 million, of which $25.75 million would be from ADB funds.

The nation rescheduled most of its $2.6 billion public debt in 1984 and was expected to obtain $225 million in additional credits from the IMF after the reschedulings.

Memaco Trading, a metals and minerals trading arm, was established in 1984. It was jointly owned by the state-controlled Metal Marketing Corp. of Zambia Ltd. and ZCCM. Memaco Trading planned to buy and sell in both futures and physical markets of Zambian and non-Zambian products, unlike Memaco Services, which handled the physical sales of Zambian metal and mineral products, exclusively.

PRODUCTION AND TRADE

Zambia's production of refined copper metal decreased by over 9% in 1984, while the production of refined cobalt metal increased by over 44%. Copper ore milled in fiscal year 1983-84 decreased 7% below that of fiscal year 1982-83 with the grade of ore remaining practically the same. ZCCM production came from 10 underground and 7 open pit mines at the company's 7 operating divisions. Installed in 1983, the Nchanga open pit trolley line assist system operated successfully with 15 trucks; 55 trucks were still to be converted. Work on the Nchanga cobalt ore concentrator project's primary crusher and conveyor tunnel was completed during the year. Work commenced on the rehabilitation of the high-grade leach plant at the Nchanga Mine. Expansion of the concentrator at the Chibuluma Mine continued with a third ball mill and a new filter plant commissioned during the year.

The Government of Zambia amended the method by which it taxed imports based on the f.o.b. (free on board) value to the value based on c.i.f. (cost, insurance, and freight) in order to raise more revenue. The change became effective October 1, 1984. In addition, a new minimum rate of import duty of 10% was applied to imported items that had previously had a free-entry status or a rate of less than 10%. Petroleum products were exempt by law.

The major countries receiving Zambian copper were France, the Federal Republic of Germany, India, Italy, Japan, the United Kingdom, and the United States. The value of exported electrolytic copper in 1984 was $1.22 billion compared with $848 million in 1983.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
METALS					
Cadmium metal	1	--	--	--	--
Cobalt:					
Mine output, metal content of concentrate	4,400	4,000	[e]3,251	3,199	4,620
Metal	3,310	2,570	2,446	2,407	3,472
Copper:					
Mine output:					
Total content of ore	760,200	697,943	720,290	868,251	668,688
Recoverable content of concentrate	595,757	588,000	[r]567,800	[r] [2]574,507	[2]540,961
Leaching (electrowon including that in recoverable content)	124,768	122,171	130,875	118,975	[2]134,377
Metal:					
Blister and anodes, Cu content[3]	609,935	560,565	584,680	[e]581,200	[e]525,000
Refined	607,592	560,446	584,613	575,423	521,871
Gold[4] troy ounces	10,576	10,545	13,439	10,160	12,185
Iron ore: Magnetite	378	1,434	797	715	595
Lead:					
Mine output, metal content of ore	[e]13,900	17,152	21,240	25,865	18,124
Metal, smelter and refined[5]	10,047	9,866	14,645	14,572	8,825
Selenium, recoverable content of:					
Refinery muds kilograms	[e]45,000	[6]48,703	[6]42,668	[6]42,752	[e]33,650
Elemental, refined locally do	22,704	23,929	22,453	22,051	[2]17,355
Silver[7] thousand troy ounces	764	714	887	933	795
Tin concentrate, gross weight	([8])	([8])	10	22	4
Zinc:					
Mine output, metal content of ore	31,985	40,557	51,967	55,163	41,128
Metal, smelter plus electrolytic	32,686	33,298	39,186	37,882	29,177
NONMETALS					
Cement, hydraulic thousand tons	160	144	154	155	241
Clays, building, unspecified do	8,392	28	27	9	209
Feldspar	475	452	362	226	184
Gem stones:					
Amethyst kilograms	3,360	45,222	23,476	38,799	24,827
Emerald do	--	--	--	17	23
Lime, hydraulic and quicklime thousand tons	182	201	185	193	232
Nitrogen: N content of ammonia	[r]20,000	[r]18,100	27,200	28,100	[e]28,100
Pyrite, gross weight	2,600	--	--	--	--
Sand, construction	[r]20,000	276,522	365,437	182,752	52,513
Stone:					
Limestone thousand tons	515	499	427	511	916

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983	1984[p]
NONMETALS —Continued					
Stone —Continued					
Phyllite thousand tons	8	4	9	10	17
Miscellaneous (building)	335,147	302,401	4,338,653	193,625	72,741
Sulfur, elemental basis (produced as sulfuric acid):					
From pyrite	1,122	5	1,239	25,513	18,172
From copper ores	91,233	90,154	83,870	[e]79,525	[e]79,000
Total	92,355	90,159	85,109	[e]105,038	[e]97,172
Talc	258	921	271	1,313	367
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	569	527	604	453	510
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels	1,095	NA	NA	NA	[9]1,016
Jet fuel do	365				[9]350
Kerosine do	365				[9]217
Distillate fuel oil do	2,190				[9]1,706
Residual fuel oil do	2,190				[9]768
Other do	NA				[9]60
Refinery fuel and losses do	365				[9]240
Total do	6,570	NA	NA	NA	[9]4,357

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 15, 1985.
[2]Fiscal year (Apr. 1, 1983, through Mar. 31, 1984). ZCCM Annual Report.
[3]Includes leach cathodes.
[4]Primarily contained in blister copper and refinery muds.
[5]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.
[6]Selenium output for fiscal year ending Mar. 31, includes elemental selenium recovered from exported refinery muds by overseas refiners amounting to 24,774 kilograms in 1981, 20,215 kilograms in 1982, and 20,701 kilograms in 1983.
[7]Refined silver and silver contained in blister copper and refinery muds.
[8]Less than 1/2 unit.
[9]Fiscal year (Apr. 1, 1984, through Mar. 31, 1985).

COMMODITY REVIEW

METALS

Copper, Cobalt, Byproduct Gold, Selenium, and Silver.—ZCCM treated approximately 29.3 million tons of ore in 1984 yielding about 540,960 tons of copper metal. Ore reserves, as published in the ZCCM Annual Report for the year ending March 31, 1984, were estimated at 14.9 million tons of contained copper and about 1.1 million tons of contained cobalt. Zambia had agreed with Zaire to a selling price of $11.70 per pound for cobalt cathodes.

The Nchanga division continued to be ZCCM's biggest copper producer, operating the largest open pit copper mine in Zambia in addition to an underground copper mine. The Nchanga division's metallurgical plant included a high-grade concentrates leach plant and a tailings leach plant, which was undergoing expansion. Nchanga's labor force numbered 10,017 at yearend. The concrete structures and bases for the primary crusher and conveyor tunnel in the cobalt ore project were completed during the year, and work was begun on rehabilitation of the high-grade leach plant.

The Mufulira division was ZCCM's second largest copper producer. Production came from one of the world's largest underground copper mines and from its concentrating, smelting, and refining metallurgical operations. Mufulira's Ndola copper refinery included a precious metals recovery plant that recovered gold, silver, and selenium from anode slimes collected from all of ZCCM's electrolytic copper refineries. Mufulira's labor force numbered 9,005 at yearend.

Table 2.—Zambia: Copper production and ore reserves of Zambia Consolidated Copper Mines Ltd., by mine[1]

Mine	Ore milled 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)
Baluba[2]	2,356	1.72	93.47	50,964	2.54	0.16
Bwana Mkubwa[3]	476	1.39	70.15	--	--	--
Chambishi[2]	2,244	1.33	94.12	25,042	2.79	--
Chibuluma[2]	620	2.79	94.55	7,525	3.55	.21
Kansanshi[3]	--	--	--	4,501	2.93	--
Konkola[2]	1,714	2.90	86.77	53,284	3.80	.08
Luanshya[2]	3,426	1.32	92.15	43,049	2.46	--
Mufulira[2]	4,602	2.10	93.95	93,253	3.05	--
Nchanga[2 3]	9,929	2.81	63.34	122,034	3.74	.66
Nkana[2]	3,808	1.61	92.03	83,848	2.38	.13
Nkana[3]	594	1.35	46.05	--	--	--
Total or average	29,769	2.13	78.75	483,500	3.08	.22

[1]Data shown are for fiscal year Apr. 1, 1983, through Mar. 31, 1984.
[2]Underground.
[3]Open pit.

Source: Zambia Consolidated Copper Mines Ltd. 1983 Annual Report.

The Nkana division had Zambia's deepest underground mining operation, with two shafts more than 4,200 feet below the surface. Early in the year, three small open pit mines were in operation; however, these mines were closed later in the year owing to the depletion of economic reserves. The process plants included both oxide and sulfide concentrators, a cobalt plant, a smelter, and a refinery. The cobalt plant operated throughout the year. The Nkana labor force numbered 11,608 at yearend. Underground exploration at both the Mindola shaft and the Central shaft continued throughout the year. At the Central shaft, an additional 4 million tons of ore was discovered. Production decreased by over 100,000 tons in 1984, owing to hoisting and crushing constraints and poor availability of diesel and air loaders and locomotives. Development was also behind schedule owing to compressor problems and a shortage of drilling spares. The main open pit of the Bwana Mkubwa copper mine ceased operation in February when economic reserves were depleted. The Bwana Mkubwa concentrator continued operation on ore stockpiles and was slated to be shut down when the stockpiles were exhausted.

Production of cobalt at the Nkana cobalt plant was below forecasts owing to the lower than anticipated head grades in the concentrates treated.

The Luanshya division operated both the Luanshya and Baluba Mines. The Baluba Mine, which produced cobalt and copper, was expanding production. The Luanshya Mine production declined owing to ore reserve depletion. Development at both the Luanshya and Baluba Mines was behind scheduled planning, owing to shortages of essential spares and explosives accessories. At Luanshya, the production rate declined as planned; but at Baluba, the production rate did not meet expectations, owing to shortages of spare parts and consumable supplies. Luanshya's labor force numbered 8,885 at yearend.

The Kalulushi division operated the Chibuluma and Chambishi underground copper mines. Chibuluma and Chambishi each had concentrators, and Chibuluma used differential flotation for recovering copper and cobalt minerals. At the Chambishi Mine, a roast-leach-electrowin plant was used to recover both copper and cobalt from concentrates. At the Chambishi Mine, both production and development performance were adversely affected by the poor availability of loaders and drilling equipment, which was caused by shortages of spare parts and overuse of old equipment. Kalulushi's labor force numbered 5,275 at yearend.

The Konkola division's underground copper mine was one of the world's wettest mines with a daily pumping rate of approximately 100 million gallons. The division was also responsible for the Kansanshi open pit copper mine. The division's concentrator produced copper concentrates from domestic ore. Konkola's labor force, including Kansanshi, numbered 5,474 at yearend.

Lead, Zinc, and Byproduct Cadmium.—The Kabwe division included the Kabwe and Nampundwe Mines and concentrator near Lusaka. The Kabwe Mine produced zinc and lead, with silver as a byproduct, and was ZCCM's oldest operating mine. The metallurgical plants consisted of a concentrator, a leaching and electrolytic zinc plant, a Waelz kiln complex, sinter plant, Imperial smelting furnace, and a lead refinery. The division's force numbered 2,176 at yearend. Reserves of lead and zinc ore at the Kabwe Mine were expected to be exhausted within 5 years. Production could be continued from the Karenda deposit near Mumbwa in Central Province. Production from a new mine could start in 1986. The Nampundwe Mine and concentrator produced copper from pyrite concentrates. The Kabwe Mine hoisted 226,287 tons of ore at grades of 11.3% lead and 23.3% zinc. Byproduct cadmium was produced in very small amounts. The Nampundwe Mine hoisted 190,936 tons of ore at grades of 16.1% sulfur and 1.1% copper.

Tin.—The Zambian Department of Marketing and Cooperatives helped restart two tin mining cooperatives in Choma and Kalomo. In previous years, the tin had been sold to the Kamative Mine in Zimbabwe.

NONMETALS

Fertilizer Materials.—Japan's Overseas Economic Cooperation Fund loaned Zambia $26 million for the rehabilitation of the nitrogen fertilizer plant project at Kafue. Japan had previously assisted in the construction of the existing sulfuric acid plants at Nitrogen Chemicals of Zambia. Japan also signed a technical and financial agreement with Zambia for the prospecting and exploitation of phosphate deposits in the Eastern, Western (at Mumbwa), and Northern Provinces of Zambia. A Japanese technical team was on-site in mid-1984, studying the possibility of making fertilizers with the phosphates that would be suitable for use in Zambia.

Gem Stones (Amethyst, Emerald, and Tourmaline).—Three companies, from India, the Middle East, and the Republic of South Africa, entered into a partnership with Zambia's Reserve Minerals Corp. (RMC) for the mining of emeralds in Zambia. The four parties established a new company called Kagem Ltd. with offices in Kitwe. Orders for the production equipment at the Fwayafwaya site were placed. RMC was to market future production of emeralds. The new emerald exploitation program followed cancellation of a previous program with a Saudi Arabian company, the International Development and Construction Co. Twenty kilograms of emeralds was sold in 1984 for $619,000 with 20 international emerald dealers attending the sale. Amethyst and tourmaline are also mined in Zambia. Value of amethyst and tourmaline production for the year exceeded $6.8 million.

MINERAL FUELS

Coal.—Production of coal at the Maamba Collieries increased approximately 13% from that of 1983, to 509,643 tons. Owing to the devaluation of the kwacha, the total value of coal sales decreased almost $1 million in 1984. The ADB was considering a multimillion-dollar loan to Maamba Collieries in late 1984 to rehabilitate the mine.

Petroleum.—The Zambian oil exploration program, financed by the World Bank at a cost of $8 million, entered its second phase. The first phase of the program undertook a study of the basins of the Western Zambezi, Kafue, and Lukanga regions, as well as the areas around Lake Tanganyika, Mwerv, and Bangweulu. The processing and interpretation of the data collected in phase 1 was completed by early 1984. The results from the first phase were sufficiently positive to warrant continuing the studies. Three helicopters were used in phase 2 in late 1984 to conduct a gravity survey over the large areas surveyed in phase 1. The gravity survey represented the final stage in determining the availability of oil and other forms of hydrocarbon deposits.

Uranium.—Companies prospecting for uranium in many areas of Zambia had reported discoveries. Reports of new discoveries near Siavonga in the Southern Province and Mwinilunga and Solwezi in the Northwestern Province showed signs of potential. The three international firms carrying out the uranium exploration were Azienda Generali Italiana Petroli S.p.A. of Italy, Saarberg Interplan of the Federal Republic of Germany, and Power Nuclear Reactors Corp. of Japan. Saarberg's uranium program in the Ndola region was reported to have reached an advanced stage.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, Zambian kwachas (K) have been converted to U.S. dollars at the rate of K1=US$0.5573.

The Mineral Industry of Zimbabwe

By Peter J. Clarke[1]

In terms of basic production volume, Zimbabwe's mineral industry continued to expand in 1984, with total output valued at over $530 million,[2] up 7% from the 1983 level. Stockpiles for most minerals also declined, reflecting the upsurge in both consumption and sales. Nevertheless, the industry remained financially troubled, largely because increases in output volume and sales did not keep pace with skyrocketing costs, primarily for power and labor. Much of the increase in sales was largely due to the devaluation of the Zimbabwean dollar by over 40% since the end of 1982, making mineral exports more competitive on the international market, rather than to real efficiency gains in the industry. Since 1980, the Government had taken over many mining and mineral marketing functions previously handled by private companies. As profitability of certain mining operations declined owing to depressed worldwide prices and high costs within the country, the Zimbabwean Treasury had to bear the increasing burden of supporting financially troubled mining operations.

Despite these problems, Zimbabwe remained an important supplier of several minerals in 1984, including asbestos, chromite, cobalt, copper, gold, nickel, and tin. The major developments in the industry were the sale of M.T.D. (Mangula) Ltd. and other assets of the copper-producing Messina Ltd. to the Government's Zimbabwe Mining Development Corp. (ZMDC), development of a residual tin recovery plant at Kamativi, and the start of negotiations toward reopening of Empress Nickel Mining Co.'s (ENMC) Eiffel Flats nickel smelter and refinery, which was closed in 1982. The Mineral Marketing Corp. (MMC), the Government's mineral sales agency, completed its second full year of operation as the primary sales agent for Zimbabwe's minerals, generally with support from the major mineral producers because of its stabilizing influence. Finally, the Government instituted a price floor for gold sales, designed to maintain the level of gold production; gold is Zimbabwe's leading earner of foreign exchange.

PRODUCTION

Production of Zimbabwe's major mineral commodities was generally up, although only marginally. Significant gains were registered in the production of both chromite and ferrochrome, and also in asbestos, coal, iron ore, and tungsten. The volume index of crude mineral production was 96.5, compared to 88.9 in 1983 (1980=100). This was the highest value of the index since 1980. The unit value of all minerals produced was likewise up nearly 10% from 1983, although the increase in this index was substantially impacted by Government price floors and the devaluation of the Zimbabwean dollar. Gold remained as the highest valued mineral, with total output valued at $205 million, compared with $193 million in 1983. Other minerals earning significant revenue were, in order of decreasing importance, asbestos, coal, nickel, copper, and chrome. The total value of mineral production was $532 million, compared with $470 million in 1983.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
METALS					
Aluminum: Bauxite, gross weight	4,281	5,139	7,533	23,145	20,000
Antimony, mine output, metal content[2]	83	145	206	143	150
Arsenic, white	79	21	--	--	--
Beryllium: Beryl concentrate, gross weight	9	42	52	47	50
Cesium minerals: Pollucite	88	[e]100	[e]80	--	--
Chromium: Chromite, gross weight thousand tons	554	536	432	431	465
Cobalt:					
Mine output, recoverable metal content[e]	120	100	100	73	70
Metal (including content of refinery sludges)	115	94	98	73	70
Columbium and tantalum: Tantalite concentrate:					
Gross weight kilograms	41,000	45,000	36,000	32,330	32,000
Columbium content[e] do.	4,500	6,800	5,400	5,400	5,000
Tantalum content[e] do.	10,400	15,900	12,600	12,600	12,000
Copper:					
Mine output, metal content	26,901	24,583	24,693	21,600	23,600
Metal:[3]					
Smelter, primary[e]	26,100	23,000	23,200	[r]21,600	22,000
Refinery, primary	[e]3,100	[e]8,000	[e]23,000	21,560	21,600
Gold, mine output, metal content thousand troy ounces	367	371	426	453	470
Iron and steel:					
Iron ore:					
Gross weight thousand tons	1,622	1,096	837	924	1,057
Metal content[e] do.	973	660	500	555	635
Metal:					
Pig iron[e] do.	600	400	250	[r]600	700
Ferroalloys:					
Ferromanganese	[e]2,400	2,000	2,123	2,085	2,100
Ferrochromium	[e]260,000	209,072	179,838	157,914	170,000
Ferrosilicon chrome	NA	NA	12,815	27,542	28,000
Total	[e]262,400	211,072	194,776	187,541	200,100
Steel, crude thousand tons	804	600	528	672	700
Nickel:					
Mine output, metal content	15,075	13,018	13,309	10,147	10,250
Metal, smelter[e 4]	14,100	12,000	[r]12,200	9,150	9,100
Platinum-group metals:					
Platinum troy ounces	2,990	2,300	1,704	1,693	1,700
Palladium do.	6,784	5,200	2,765	2,395	2,400
Total do.	9,774	7,500	4,469	4,088	4,100
Silver, mine output, metal content thousand troy ounces	949	857	918	935	950
Tin:					
Mine output, metal content[e]	1,300	1,600	1,660	1,700	1,700
Metal, smelter	934	1,157	1,197	1,235	1,220
Tungsten, concentrate output:					
Gross weight	194	119	67	50	72
Metal content[e]	90	55	[r]52	25	34
NONMETALS					
Abrasives: Natural corundum	18,681	12,202	8,714	5,120	5,500
Asbestos thousand tons	251	248	198	153	165
Barite	195	--	800	980	1,000
Cement, hydraulic thousand tons	469	[r]588	576	580	580
Clays:					
Bentonite (montmorillonite)	69,153	78,403	85,490	63,097	70,000
Fire clay	17,005	14,658	11,746	9,255	10,000
Kaolin	4,450	4,657	2,442	470	450
Feldspar	1,263	2,393	666	1,645	1,600
Gem stones, precious and semiprecious:[5]					
Amethyst kilograms	4,001	NA	NA	NA	NA
Garnet do.	25	NA	NA	NA	NA
Topaz do.	--	NA	NA	NA	NA
Tourmaline do.	5	NA	NA	NA	NA
Graphite	7,385	11,218	8,225	8,000	8,000
Kyanite	716	870	2,207	[e]2,300	2,300
Lithium minerals, gross weight	19,942	16,444	9,787	19,193	17,000
Magnesite	78,217	60,194	60,660	24,071	25,000
Mica	1,022	1,406	861	544	550
Nitrogen: N content of ammonia thousand tons	57	52	84	71	75
Phosphate rock, marketable concentrates do.	130	122	122	[e]120	125
Pigments, iron oxide[e]	1,000	1,200	1,000	1,000	1,000
Pyrite, gross weight thousand tons	68	65	58	57	60
Quartz[6] do.	166	142	669	47	50

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1980	1981	1982	1983[p]	1984[e]
NONMETALS —Continued					
Stone: Limestone thousand tons	1,218	1,409	1,270	1,222	1,300
Sulfur:[e]					
S content of pyrite do	29	25	25	[r]24	25
Byproduct of coal and metallurgy do	5	5	5	5	5
Total do	34	30	30	[r]29	30
Talc	456	386	270	551	550
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	3,134	2,867	2,769	3,437	3,500
Coke, metallurgical[7] do	235	200	166	203	200

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through May 15, 1984.
[2]Content of concentrates.
[3]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 subsequent years includes electrolytic copper from the new refinery at Mangula.
[4]Includes Ni content of nickel oxide and nickel fonte.
[5]Other gem stones produced are as follows in kilograms: 1981—beryl, 327, and chrysoberyl, 2; 1982—beryl, 1,080, and aquamarine, 36.
[6]Includes rough and ground quartz as well as silica sand. Quartz crystal was also produced in the amount of 3 metric tons in 1979.
[7]Data represent output by the Wankie Colliery Co. Ltd. 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

Zimbabwe's primary exports, in terms of value of foreign exchange earnings, were gold, which accounted for 24% of the total value of $504 million; asbestos, which earned $56 million; nickel, which earned $46 million; and ferroalloys, which grossed $114 million. Zimbabwe's major imports were mineral fuels, of which half were from the Republic of South Africa, and electricity, accounting for about 30% of the total import value. Zimbabwe's major trading partners continued to be the Republic of South Africa, the United Kingdom, the United States, and the Federal Republic of Germany. Trade with nations in the Far East was increasing rapidly. While Zimbabwe continued to show a surplus in its merchandise trade account, largely a result of mineral exports, deficits in the services sector remained responsible for the deficits in the current account. Because of a shortage of foreign exchange, foreign currency was strictly rationed to importers. In March, the Government suspended the rights of individuals and companies to repatriate dividends and profit out of the country. The restriction was imposed for a minimum of 12 months.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Beryllium: Ore and concentrate	NA	17	17	
Cobalt: Metal including alloys, all forms	3	14	14	
Columbium and tantalum: Metal including alloys, all forms: Tantalum[2] value, thousands	$211	$115	--	NA.
Copper: Metal including alloys, all forms[2]	22,661	24,898	--	NA.
Gold: Metal including alloys, unwrought and partly wrought[2] value, thousands	$153,000	$1,240	$1,240	
Iron and steel: Metal:				
Pig iron, cast iron, related materials[2]	5,001	144	--	NA.
Ferroalloys:				
Ferrochromium	113,394	48,444	46,392	Canada 2,052.
Ferromanganese	225	NA		
Ferrosilicochromium	11,869	1,299	1,299	
Unspecified[2]	182,634	246,711	--	NA.
Steel, primary forms[2]	252,525	286,263	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	86,791	131,405	--	NA.
Universals, plates, sheets	NA	7,667	--	All to Ivory Coast.
Rails and accessories[2]	2,593	1,436	--	NA.
Wire[2]	8,438	18,240	--	NA.
Tubes, pipes, fittings	NA	393	--	All to Jordan.
Lithium: Ore and concentrate[2]	9,793	16,172	--	NA.
Nickel:				
Matte and speiss	1	NA		
Metal including alloys, all forms	[2]11,974	[2]16,237	4,417	NA.
Platinum-group metals: Waste and sweepings value, thousands	$369	NA		
Silver:				
Ore and concentrate[2 3] do	$352	--		
Waste and sweepings do	$1,206	NA		
Metal including alloys, unwrought and partly wrought do	--	$2,907	$2,907	
Tin:				
Ore and concentrate	2	NA		
Metal including alloys, all forms	[2]1,030	[2]427	376	NA.
Tungsten: Ore and concentrate[2]	52	24	--	NA.
Other:				
Ores and concentrate	[2]352	--		
Ashes and residues	59	--		
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	2	NA		
Asbestos, crude[2]	168,812	161,177	89	NA.
Cement[2]	49,171	96,959	--	NA.
Diamond: Gem, not set or strung[2] value, thousands	$3,210	$4,198	--	NA.
Fertilizer materials:				
Crude, n.e.s	30,196	NA		
Manufactured, phosphatic	7	NA		
Graphite: Natural	--	124	124	
Magnesite[2] value, thousands	$1,294	$544	--	NA.
Precious and semiprecious stones other than diamond: Natural[2] do	[r]$4,572	$33	$33	
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2	NA		
Worked	16	NA		
Quartz and quartzite	174	NA		
Talc, steatite, soapstone, pyrophyllite value, thousands	NA	$8	$8	
Other: Crude	3,809	NA		
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets[2]	66,217	113,761	--	NA.
Coke and semicoke[2]	128,221	135,272	--	NA.

[r]Revised. NA Not available.

[1]Table prepared by Virginia A. Woodson. 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 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]Central Statistical Office, Harare, Zimbabwe. Quarterly Digest of Statistics. Dec. 1984.

[3]May include other precious metals.

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

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	21	--		
Metal including alloys:				
Unwrought	1,361	--		
Semimanufactures value, thousands	[2]$4,850	$6,619	$274	NA.
Copper: Metal including alloys semimanufactures	160	--		
Iron and steel: Metal:				
Pig iron, cast iron, related materials	36	--		
Ferroalloys:				
Ferrosilicomanganese	17	--		
Unspecified[2] value, thousands	$373	$1,338	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2] do	$5,195	$4,056	--	NA.
Universals, plates, sheets[2] do	$27,468	$21,282	--	NA.
Hoop and strip	269	--		
Rails and accessories[2] value, thousands	$3,195	$111	--	NA.
Wire	232	--		
Tubes, pipes, fittings[2] value, thousands	$9,023	$6,934	$4	NA.
Castings and forgings, rough	3	--		
Lead: Metal including alloys, semimanufactures	17	--		
Manganese: Oxides	NA	85	85	
Mercury 76-pound flasks	29	--		
Nickel: Ore and concentrate, including matte[2] value, thousands	$7,489	--		
Metal including alloys:				
Unwrought	1	--		
Semimanufactures	2	--		
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$11	--		
Titanium: Oxides	120	102	102	
Zinc:				
Oxides	40	--		
Metal including alloys, all forms[2] value, thousands	$2,160	$2,026	--	NA.
Other: Oxides and hydroxides	2	--		
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	17	([3])		
Boron materials: Crude natural borates	887	--		
Chalk	36	--		
Clays, crude	192	--		
Diamond:				
Gem, not set or strung value, thousands	[4]$15	NA		
Industrial stones do	$4	--		
Fertilizer materials: Manufactured:				
Ammonia[2] do	$9,327	$6,029	--	NA.
Nitrogenous[2] do	$8,157	$5,253	--	NA.
Potassic	13,250	--		
Unspecified and mixed[2] value, thousands	$8,987	$4,121	--	NA.
Graphite, natural	6	4	4	
Gypsum and plaster	49	1	1	
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$41	$1	$1	
Synthetic do	$2	--		
Salt and brine[2] do	$1,311	$1,793	--	NA.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	54	--		
Sulfate, manufactured value, thousands	$1,900	$1,701	--	NA.
Sulfur:				
Elemental, crude including native and byproduct[2]	$2,415	$1,243	--	NA.
Sulfuric acid	2	--		
Other: Crude	6	--		

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	133	--		
Coal: All grades including briquets[2] value, thousands	$2,711	$3,164	--	NA.
Petroleum:				
Crude do.	[2]$154,755	--		
Refinery products:				
Gasoline[2] do.	$48,630	$61,798	--	NA.
Mineral jelly and wax thousand 42-gallon barrels	15	9	--	All from Brazil.
Distillate fuel oil[2] do.	2,062	2,635	--	NA.
Lubricants[2] do.	137	102	1	NA.
Nonlubricating oils do.	NA	1	--	All from West Germany.
Unspecified value, thousands	$12,025	$11,109	--	NA.

[r]Revised. NA Not available.

[1]Table prepared by Virginia A. Woodson. 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 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]Central Statistical Office, Harare, Zimbabwe. Quarterly Digest of Statistics. Dec. 1984.

[3]Value only reported at $3,984 exported by the United States.

[4]Excludes 23 carats imported from Hong Kong.

COMMODITY REVIEW

METALS

Chromite.—Total production from Zimbabwe's two major chromite producers increased nearly 8%. Zimbabwe Alloys Ltd. (Zimalloys), a subsidiary of Anglo American Corp. (Zimbabwe) Ltd., and Zimbabwe Mining and Smelting Co. (ZIMASCO), a subsidiary of Union Carbide Corp. of the United States, produced the bulk of the chromite from mines along the Great Dike. Zimalloys purchased the Inyala Mine from the Inyala Chrome Co. in order to ensure a stable supply of lumpy ore for its refinery. Zimalloys planned to renew production at the rate of 2,000 tons of ore per month from the mine in Mberengwa, which had been closed since 1978. The cost of restarting the operation was estimated at $1.2 million. The Inyala Mine was expected to supply close to 10% of Zimalloy's chrome for its refining and ferrochrome industry.

Zimalloys' financial status also improved, despite the continued depressed market for chrome, largely a result of the devaluation of the Zimbabwean dollar. Chrome export volume increased nearly 20%, while chrome export value increased nearly 30%, making chrome second only to gold in terms of export value. Prices for ferrochrome remained fairly strong, allowing Zimalloys to operate near the break-even point after recording a substantial loss in 1983. For the quarter ending in September 1984, Zimalloys reported a profit of $2.4 million, following a loss of $5.4 million from January through June.

Production of ferrochrome increased slightly, following nearly 5 years of production declines. The increase was largely due to ZIMASCO's increase in output of high-carbon ferrochrome following reactivation of one of its furnaces, thus raising total high-carbon ferrochrome capacity to 150,000 tons per year from the previous 120,000-ton-per-year level. ZIMASCO's ferrochrome plant is located in Que Que. Zimalloys' annual ferrochrome capacity is approximately 50,000 tons of high-carbon ferrochrome and 30,000 tons of low-carbon ferrochrome. ZIMASCO produced roughly 70% of Zimbabwe's ferrochrome output in 1984.

Cobalt.—The Bindura Nickel Corp. Ltd. (BNC) remained the sole producer of byproduct cobalt from the Bindura Smelting and Refining Ltd. plant at Bindura. The refinery produces dried cake by precipitating cobalt from a nickel-cobalt hydroxide. Production of cobalt was at 50% of its 1980 level, following closure of ENMC's Empress Mine and the Eiffel Flats nickel smelter, both of which were owned by Rio Tinto (Zimbabwe) Ltd., which in turn was owned 58.4% by the Rio Tinto Zinc Corp. Ltd. of the United Kingdom. The mine and refinery were closed in 1983 as a result of excessively high operating costs. The mine was likely to remain closed, although the refinery may resume production by toll smelting copper-nickel matte from Botswana.

Copper.—Copper output, primarily from Mangula, remained stable in 1984, increasing only slightly. World copper prices continued to fall, but the loss incurred from the price decline was more than offset by depreciation of the Zimbabwean dollar, which fell nearly 20% against the U.S. dollar. Mangula, which controls Mangula Mines and Lomagundi Smelting and Mining Co., produced roughly 90% of Zimbabwe's copper and 70% of its silver.

In an unportended development, Messina, which holds 55% of the equity of Mangula and 65% of Lomagundi, agreed in September 1984 to sell all its mining assets in Zimbabwe to ZMDC, a parastatal organization of the Government of Zimbabwe. Messina had been preparing to close down its operations in Zimbabwe because of rising production costs, an increasing debt burden, low metal prices, and accelerated depletion of payable ore reserves. The Government acted primarily to prevent closure of the mines and smelting operations. Messina had reported a net loss for 1984 and did not pay an interim or final dividend on its publicly traded stock. Besides the equity in Mangula and Lomagundi, ZMDC also acquired from Messina 100% of M.T.D. Management Services Ltd., which controlled 100% of Bar 20 Mines (Pvt.) Ltd., 85% of Sabi Consolidated Gold Mines, 50% of Jena Mines, and 100% of M.T.D. Sanyati (Pvt.) Ltd.

ZMDC was planning on maintaining operations of the Mangula Mine and the Miriam concentrator, the principal copper-producing mine, and also pushing ahead with development of the Copper Queen and Copper King deposits at Sanyati. Messina had delayed development of the Copper Queen Mine, mainly because of low copper prices and high electricity costs. Messina had already invested $1 million in developing the deposit when operations were postponed.

Gold.—Falcon Mines PLC, Falconbridge Investments (Zimbabwe) (Pvt.) Ltd., and Corsyn Consolidated Mines Ltd. were the largest gold producers in Zimbabwe, although smaller private operations produced more than 50% of the country's output. Gold is also produced as a byproduct of the larger copper and nickel operations. The major gold producing mines were the Dalny Mine, operated by Falcon, the Arcturus, Mazowe, Muriel, and Viceroy Mines, operated by Corsyn on behalf of the Lonrho Investment Group, and the Blanket and Kopje Mines, operated by Falconbridge Investments. Total gold production from these mines was approximately 175,000 troy ounces, with the remainder coming from small operations and byproducts from other major mineral producers in the country.

Again, increased output in the gold mining industry was partially offset by lower gold prices throughout most of 1984. This revenue decline was almost equally offset, however, by the depreciation of the Zimbabwean dollar. In an attempt to negate the impact of lower gold prices, the Reserve Bank of Zimbabwe, to which all gold production must be sold, announced a guaranteed floor price for all purchases of gold from domestic producers. The price was equivalent to approximately $349 per ounce at the prevailing exchange rate. The price floor was instituted in November and was designed to protect gold mines from fluctuating exchange rates and prices. When gold prices slipped below the floor price, producers would be paid the minimum floor price. When the price rose above this minimum, the Reserve Bank was to hold 25% of the differential between the market price and the floor price on all gold purchases until the account had been returned to a zero balance, after which gold producers would receive the full market price. The Bank was not to accumulate any credits on the price scheme. The price support had an immediate impact, as the world gold price slipped to about $300 per ounce late in 1984. The price floor was to be reviewed and/or extended every 6 months.

Iron and Steel.—Total iron ore production rebounded to 1 million tons per year after two consecutive sub-par years in 1982 and 1983. The increased output was due to the continuing expansion of the Zimbabwe Iron and Steel Co. Ltd.'s (ZISCO) Ripple Creek Mine. The bulk of ZISCO's production was still derived from the Buchwa Mine, located 200 kilometers south of Radcliff, site of ZISCO'S steelworks. Mining at Buchwa was reduced to operation of only the West deposit. The Ripple Creek Mine, located only 15 kilometers from Radcliff, was undergoing a major expansion project, which included installation of a new sintering plant to provide increased ore supply.

The expansion at Ripple Creek was part of a $150 million capital development program designed to increase the efficiency at the ZISCO steelworks and make its products more competitive on the international market. The development program was being sponsored by the Government, following losses of $43 million and $54 million in 1982 and 1983, respectively. The Government involvement followed the recommendation of Voest-Alpine AG of Austria, which was hired in 1982 to assist in revitalizing and restructuring the company toward profitability. The Government also agreed to cover some of the company's cash shortfalls for the previous years. Among other improvements, the program called for installation of a large aggregation unit and two supplementary continuous pour lines, which should enable the company to export up to 200,000 tons per year of steel, about double the 1984 volume, at 50% lower prices. Total production capacity of the plant was expected to remain at 1 million tons of crude steel per year.

In a related development, the Industrial Development Corp. (IDC) and ZISCO assumed ownership of Lancashire Steel (Pvt.) Ltd., formerly a subsidiary of British Steel Corp. The company had operated at a profit until 1981, after which higher costs and a declining market contributed to losses which reportedly reached $180,000 per month. Both IDC and ZISCO are controlled by the Zimbabwean Government, and the takeover further solidified the Government's position in the mineral production and manufacturing sectors. Lancashire produced approximately 1,000 tons per month of metal wire and bars for export to the Republic of South Africa.

Nickel.—Closure of Rio Tinto Zimbabwe's ENMC nickel smelter and refinery at Eiffel Flats left BNC as the country's only nickel-cobalt producer. The permanent closure of the Empress Mine had left the Eiffel Flats smelter operating only on nickel-copper matte imported from Botswana. Closure of the smelter may be only temporary, however, as an agreement was being negotiated by Cantametall AG and ENMC under which ENMC would refine 10,500 tons per year of matte imported from BCL Ltd. in Botswana. Commencement of operations at Eiffel Flats was subject to termination of BCL's existing refinery contract with AMAX Nickel Inc. in Botswana. Cantametall, an international trading company based in Switzerland, has had an ongoing association with both BCL and ENMC. The earliest possible startup of the refinery was July 1985.

BNC's production rose slightly in 1984 following its takeover of the Shangani Mining Co. Ltd.'s nickel mine in 1983. BNC thus became the sole primary nickel producer in the country. Production from the Trojan, Shangani, Madziwa, and Epoch Mines averaged 220,000 tons of ore per month containing 61% nickel. The Trojan and Shangani Mines produce 70% of their output, and reserves are expected to last until 1999. Reserves at Madziwa and Epoch should be exhausted in the early 1990's. The concentrate production is roughly 1,350 tons per month averaging 12% nickel. The concentrates are smelted in a submerged arc electric furnace and then electrolytically refined to 99.9% nickel cathode. BNC had an accumulated loss of $15.4 million at the end of 1983, mainly due to depressed prices.

Tin.—Tin production from the Kamativi Tin Mines Ltd. mine in northwest Zimbabwe remained stable at the 1,700-ton level in 1984. Kamativi was owned 91% by IDC and was thus largely Government controlled. The mine produced approximately 1 million tons per year of ore containing cassiterite as well as some beryllium, lithium, and tantalite. The ore is crushed and gravity-separated before smelting. Recovery of tin in the smelter has been improved by addition of a new plant to recover residual tin, which had been stockpiled since 1978 awaiting development of a recovery process. The stockpile was estimated to contain tin worth up to $1 million. The West German firm Klöckner Humboldt-Deutz AG finally developed a process consisting of an attrition cell, three agitator cells, and a wet magnetic separator to remove iron powder left in the residue from wear in the ball mill. The concentrate produced averages 50% to 55% tin and contains less than 0.3% iron. The plant was commissioned in August 1983.

NONMETALS

Asbestos.—Asbestos output increased marginally in 1984, to 165,000 tons from 153,000 tons in 1983. Shabani and Mashaba (Pvt.) Ltd. continued to account for nearly 70% of the country's output. MMC announced that India had agreed to buy at least 9,000 tons of asbestos, with possibly another 6,000 tons in 1985. The initial delivery of 5,500 tons was to be paid for in cash, with the remaining quantity to be paid for in goods from India. The contract was a result of a visit by the Indian Minerals and Metals Trading Corp., which also agreed to purchase the bulk of Zimbabwe's output of emeralds.

Fertilizer Materials.—Zimbabwe produced both nitrogenous and phosphatic fertilizers in 1984, although neither at a rate sufficient to satisfy the domestic market. Sable Chemical Industries of Que Que was the only producer of nitrogenous fertilizer, with output averaging about 75,000 tons of nitrogen in ammonia per year, or about 80% of domestic demand. Zimbabwe Phosphate Industries (Zimphos) was the primary phosphate rock and phosphate fertilizer producer. Zimphos operated a superphosphate and compound fertilizer plant, as well as two sulfuric acid plants, a 55,000-ton-per-year pyrites-based unit in Harare, which was commissioned in 1958, and a 75,000-ton-per-year brimstone-based plant, also in Harare, which was commissioned in 1965. Capacity at the latter unit was upgraded from 65,000 tons per year in 1984. Plans were also made to expand capacity of the former unit, to 75,000 tons per year, by 1986. The expansion project was the alternative to constructing a new 600-ton-per-day pyrites-based plant, plans for which were shelved in 1984 owing to high capital costs and the potentially depressing effect the added output would have on domestic fertilizer prices and on profitability of the existing plants. In April, the Government raised domestic fertilizer prices by 40%, aiding the fertilizer manufacturers but causing some difficulties for the country's farmers.

MINERALS FUELS

Coal.—Wankie Colliery Co. Ltd. continued to be the only coal producer in Zimbabwe, producing approximately 3.5 million tons, more than enough to satisfy domestic consumption. Coal production and sales have followed an increasing trend for the past several years, with earnings up 91% from 1982 to 1983. Wankie, owned 40% by the Zimbabwean Government and 60% by the Anglo American Group, recently completed an opencast expansion project designed to meet increased coal demand from the Hwange power station. However, opening of the station was delayed in 1983, and deliveries to the station in 1984 were considerably below expectations, leading to the development of a substantial stockpile during the year. Hwange had originally contracted to purchase 1.2 million tons per year of coal from Wankie, but actual deliveries were estimated at less than one-half that level. Wankie did not declare a dividend for the year ending March 1984 because of the expected adverse financial effects of lower than predicted deliveries to Hwange.

Coke production from Wankie's 32 ovens remained at about the 17,000-ton-per-month level, with only about one-half of the ovens operating during the year. ZISCO was the other coke producer, operating its own coke ovens at Que Que, consuming approximately 65,000 tons per month of coal purchased from Wankie. Coal exports increased significantly in 1984, owing mainly to the depreciation of the Zimbabwean dollar. Profitability of Wankie also increased owing to a price rise for coal and coke, which the Government agreed to support in October 1983.

Petroleum.—Zimbabwe was relatively unique among its southern African neighbors, in that it did not produce crude oil or natural gas, nor did it operate a petroleum refinery. The country remained totally reliant on refined product imports, most of which were pipelined from the Port of Biera in Mozambique to Umtali in Zimbabwe. Lesser amounts were also transported via tank truck from the Republic of South Africa. The National Oil Co. of Zimbabwe was formed in 1983 to take over operation of the pipeline and the storage and distribution of petroleum products. These functions had been performed by a consortium consisting of private companies in Zimbabwe and the Mozambique Government.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Zimbabwean dollars (ZD) to U.S. dollars at the rate of ZD1.24=US$100. The Zimbabwean dollar actually fluctuated between ZD1.11 and ZD1.50 to the U.S. dollar in 1984.

The Mineral Industry of Other Central African Countries

By Thomas O. Glover[1]

CONTENTS

CAMEROON

Cameroon's mineral industry continued to be dominated by crude petroleum. The country's economic development depended on the production and export of crude oil. Oil output was estimated to be 56 million barrels in 1984 compared with 47 million barrels in 1983 and 39 million barrels in 1982. The country's only refinery processed approximately 16,000 barrels per day of crude oil in 1984, operating at slightly over 50% capacity. This volume, however, supplied the domestic need for motor fuel and heating oils.

Cameroon's economy continued to expand despite problems and setbacks stemming from the attempted coup of April 6, 1984. Gross domestic product (GDP) growth in 1984 was 6.5%, the same rate as in 1983. Offshore crude petroleum production was the chief factor in the sustained economic growth. The country also maintained a relatively strong balance-of-payments position through oil exports. Investment, ranging up to 25% of the GDP, greatly contributed to sustained growth. The oil sector contributed approximately 14% to Cameroon's GDP in both 1983 and 1984.

Forecasts[2] on Cameroonian petroleum production predicted that production will remain at near 165,000 barrels per day for a few years with production tapering off in the late 1980's, in the absence of significant new strikes. The ultimate recoverable reserves have been calculated to be 750 million barrels of oil, about a 12.5-year supply at current rates of production.

An estimated natural gas reserve of 100 billion cubic meters has been discovered in Cameroon, but the gas was not being exploited owing to the lack of demand. Plans for a multibillion-dollar liquefied natural gas plant near Kribi were shelved.

During the French-Cameroonian meeting during the Economic Week in late 1984, five investment projects were discussed involving the mining sector. The first project involved the industrialization of gold exploitation in the Eastern Province. Three sites are known that include riverbeds and underground pits. The second project involved the reopening of the Mayo Darle tin mine and its extension to the Wum Bayo area. The third project involved the exploitation of deposits of disthene and rutile in the banks of the Dja and Yoo Rivers southeast of Akonolinga. Proven reserves were

200,000 tons for each mineral. Probable reserves were 667,000 tons of disthene and 447,000 tons of rutile. The fourth project involved the exploitation of granite on Mont Des Elephants, northeast of Kribi. The fifth project involved the evaluation of the potential industrial clay around the cities of Douala, Edéa, and Yaounde.

Cameroon revised its investment code in order to attract foreign capital. The United States signed a Bilateral Investment Treaty with Cameroon in 1984, protecting and assuring equal treatment for U.S. investments, once established. Sté. de Laminange de Douala, a subsidiary of the Bastos Group, was reported to be planning construction of a steelworks.

Table 1.—Other countries of Central Africa: Production of mineral commodities[1]

Country[2] and commodity[3]	1980	1981	1982	1983[p]	1984[p]
CAMEROON					
Aluminum metal, primary ______ metric tons__	43,160	36,756	85,358	77,649	74,154
Cement, hydraulic ______________ do____	[4]508,000	[e] [4]516,000	[4]530,000	[4]610,000	NA
Gold, mine output, metal content __ troy ounces__	72	316	136	261	NA
Petroleum, crude _ thousand 42-gallon barrels__	20,045	32,000	39,000	47,000	[e]56,000
Pozzolana ______________ metric tons__	NA	53,025	81,028	NA	NA
Stone:					
Limestone ______________ do____	39,962	66,625	83,379	50,675	NA
Marble ______________ do____	NA	NA	NA	NA	251,600
Tin ore and concentrate:					
Gross weight ______________ do____	19	15	[e]15	NA	14
Metal content ______________ do____	13	10	[e]10	NA	NA
CENTRAL AFRICAN REPUBLIC					
Diamond:					
Gem ______________ carats__	227,000	208,903	186,573	229,681	235,589
Industrial stones ______________ do____	115,000	103,000	90,000	65,677	101,562
Total ______________ do____	342,000	[e]311,903	276,573	295,358	337,151
Gold ______________ troy ounces__	2,000	1,386	1,000	2,492	6,953
Uranium ore, metal content ______ kilograms__	1,500	--	--	--	--
CHAD					
Sodium carbonate, natural (natron), slabs (plaques), broken __________ metric tons__	8,000	5,000	[e]5,000	NA	NA
CONGO					
Cement, hydraulic ______________ do____	34,000	49,298	39,242	15,034	NA
Copper, mine output, metal content ____ do____	1,300	245	149	35	NA
Gas, natural:					
Gross[e] ____________ million cubic feet__	10,000	13,000	13,000	13,000	NA
Marketed ______________ do____	350	350	350	350	NA
Gold, mine output, metal content[e] _ troy ounces__	([5])	48	83	267	NA
Lead, mine output, metal content __ metric tons__	7,000	7,682	4,095	4,000	1,740
Lime ______________ do____	--	--	--	--	[6]7,061
Petroleum, crude _ thousand 42-gallon barrels__	19,861	30,860	33,000	40,271	NA
Potash, crude K_2O equivalent ____ metric tons__	--	--	8,000	NA	NA
Zinc, mine output, metal content[e] _____ do____	3,500	3,000	3,000	3,000	2,703

[e]Estimated. [p]Preliminary. NA Not available.
[1]Includes data available through Aug. 1985.
[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, sand and gravel, and stone) 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, sand and gravel, and stone) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[4]Includes imported clinker.
[5]Revised to zero.
[6]Lime production available only for 10 months.

CENTRAL AFRICAN REPUBLIC

Reported mineral production of diamonds and gold in 1984 was valued at approximately $28.4 million.[3] The economy began reversing the nearly 5-year decline in per capita economic growth. The International Monetary Fund (IMF) approved a 1-year standby agreement with the Government on July 6, 1984. Elsewhere, the IMF, the International Bank for Reconstruction and Development, and others were working with the Government to assist the country in restoring health to key economic sectors.

Mineral activity centered almost entirely in the diamond sector. Diamonds accounted for 95% of the value of minerals produced in 1984, accounting for roughly one-quarter of total export earnings. Diamond production increased partly in response to the reduction of diamond export taxes. The petroleum potential was being assessed by ongoing exploration efforts by the Exxon Corp.

CHAD

The Government of Chad faced significant budget deficits in 1984 despite austerity measures and foreign donor assistance. Scheduled payments on external debt could not be met. U.S. economic interests in Chad remained minimal. Chad rejoined the Customs and Economic Union of Central Africa after an absence of 16 years, a move that the Government hopes would improve the country's economy and possibly create an atmosphere conducive to mineral exploration. After 15 months of military presence of France and Libya in Chad, both parties agreed to withdraw from Chad. Such action, when completed, would make exploration for minerals in the northern one-half of the country more likely.

A consortium of oil companies, with Exxon as the operating partner, resumed petroleum exploration in southern Chad in late 1984 in the hope of finding oil in commercial quantities. Mobil Oil Co. (which retailed refined oil products) was the only other U.S. company operating in Chad.

CONGO

The second consecutive year of Government austerity programs became increasingly evident throughout the Congolese economy. Petroleum production rose for the seventh straight year; however, a soft world oil market and high production costs kept revenues more or less static. Government personnel costs continued to climb. Debt service consumed more than one-third of Government revenues. The Congo's real economic growth rate held firm at about 3%, owing to continuing growth in the petroleum industry. Owing to rising oil purchases on the spot market, the United States remained the Congo's leading overall trading partner in 1984, despite lagging U.S. exports. The U.S.-based Amoco Oil Co. (Amoco) commenced exploration activities in Pointe Noire in late 1984.

In what was essentially a one-commodity economy, petroleum production dictated the pace of all other activities. The Congo's petroleum was produced by Société Nationale Elf Aquitaine (SNEA) and Azienda Generali Italiana Petroli S.p.A. (AGIP), working in partnership. The value of crude oil exports during 1984 was $1.1 billion. Crude oil exports amounted to approximately 40.5 million barrels. SNEA announced the discovery of a new offshore field at Tchibouela in 1984, and development began immediately. Other promising activities included the expansion by AGIP of the Loango Field and continuing investment by SNEA in a steam injection project intended to increase yields in the mammoth Emeraude Field. Both projects were expected to be completed in 1986.

In mid-1984, Hydro-Congolaise de Raffinage signed a partnership agreement with Amoco to take over a concession previously held by Cities Service Oil Co. Amoco was planning two offshore wells in the Marine One concession in 1985. Another U.S. firm, Coastal States Oil Co., left the Congo in 1984 after the expiration of its onshore concession with Hydro-Congolaise.

The refinery, owned by Hydro-Congolaise and SNEA, produced 50,000 barrels per day of fuel oil for export.

The mining sector, while offering great potential, continued to be largely unexploited. Cooperation from Spain was expected with studies of the iron ore deposits of Mayoko. The deposits are in the Niari region in south Congo. Exploration for lead and zinc continued at Lekoumou and Mindouli. The National Cement Works at Loutete, ravaged by fire in 1983, received a loan from Belgium-Luxembourg to assist in rebuilding the plant. Other minerals produced in the Congo were copper, gold, lead, lime, natural gas, and zinc.

EQUATORIAL GUINEA

Equatorial Guinea, called Spanish Guinea prior to independence from Spain in 1968, was still struggling with its battered economy in 1984. This country of 300,000 people had received $30 million in nonrepayable financial aid commencing in 1982. A significant step in assisting the country's economy was taken in 1984 when it joined the Bank of Central African States (BEAC) and the Communauté Financiére Africaine franc zone. Equatorial Guinea became the sixth member of BEAC joining with Cameroon, Chad, Congo, Central African Republic, and Gabon.

Despite the poor economic status of the country, there were known deposits of minerals containing gold, manganese, and uranium in Rio Muni.

A group of petroleum companies signed an exploration and production-sharing agreement with the Government. The group included Elf Aquitaine Equatorial Guinea (25%), operator; AGIP Africa Ltd. (25%); Murphy Equatorial Guinea Oil Co. (12.5%); Rimrock Offshore Ltd. (12.5%); and Ultramar Exploration Ltd. (25%). The agreement covered a 2,200-square-kilometer area off Rio Muni and called for sonar exploration and two exploratory wells during the initial 3-year period.

Equatorial Guinea and Venezuela signed an agreement on May 18, 1984, concerning personnel assistance for oil exploration undertaken on Equatorial Guinean territory.

SÃO TOMÉ E PRINCIPE

A fuel shortage scheme in São Tomé e Principe costing several million dollars received 78% of the total cost from the Arab Bank for Economic Development. The loan will be repayable over 12 years including a 2-year grace period. Interest rate was set at 6% per year.

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[1]Physical scientist, Division of International Minerals.

[2]U.S. State Department. Economic Trends Report. Feb. 25, 1985, p. 7.

[3]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF437.0=US$1.00.

The Mineral Industry of Other East African Countries

By Kevin Connor[1]

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BURUNDI

During 1984, minerals exploited in Burundi included gold, kaolin, lime, and peat. Over 1,100 troy ounces of gold was extracted and traded during the year as a result of the lifting of the Government ban on gold mining in mid-1983 and the establishment of an artisan mining program and licensed trading counters. Almost 2,000 tons of kaolin was mined for the manufacture of insecticides. Lime production was for domestic fertilizer applications. Amoco International and the Government signed an accord late in the year for a petroleum exploration program covering 600,000 acres of Burundi's onshore Ruzizi Plain and part of northeastern Lake Tanganyika. Amoco was expected to begin the exploration program by mid-1985. Anticipated program costs could run as high as $200 million.[2]

The Finnish company Ekono Oy completed its peat industrial energy development studies for the Buyongwe peat deposits of northern Burundi by the end of the year. The project assessed the quantity and fuel quality of 13,000 hectares of peatland and was part of a larger study for developing the Musangati lateritic nickel deposits of Burundi, estimated at 3% of the world's reserves of nickel. The Buyongwe peat would fuel dryers and an electrical generating plant for supplying power to nickel ore processing facilities. Briquetted peat would also be used as a substitute for wood and charcoal, presently the main sources of rural energy in the country and rapidly depleting because of deforestation. The study also evaluated the most economical methods to harvest the peat bogs. The study was financed by the International Development Association (IDA), United Nations Development Program (UNDP), Finnish Aid-Finnida, and the Burundi Government.

In the latter half of the year, Ekono undertook a short drilling program to further delineate the Matongo-Bandaga carbonatites. Ekono was interested in investigating the cement producing potential for the carbonatite that underlies phosphatic limestone, which was the subject of a British Sulphur Corp. Ltd. fertilizer study in 1983. Burundi was forced to import approximately 70,000 tons of cement in 1984 at a cost of about $210 per ton.

In addition to the development of its indigenous peat deposits for energy and its search for natural gas and petroleum deposits, the Government of Burundi has been accelerating the development of the country's excellent hydroelectric sites. With technical and financial assistance from the Federal Republic of Germany, construction work proceeded all year on the Rwegura hydroelectric dam installation on the Kitenge River. Begun in July 1983, the 18-megawatt installation was expected to be completed in September 1986. Upon the completion of the dam complex and power transmission network, also under construction in 1984, the system was expected to supply electricity to the capital city of Bujumbura, and the Rwegura-Kayanza-Ngozi region. Other financial partners for the project were the Organization of Petroleum Exporting Countries (OPEC) Fund, the European Development Fund, and the French Government. Another hydroelectric dam, which was completed during the year on the Mugere River, was built with Chinese technical and financial assistance. The 8-megawatt installation, only a few miles south of Bujumbura, was to begin supplying electricity to the capital in 1985. Other hydroelectric projects underway during the year were the large Ruzizi II project, which involved joint Zairian, Rwandan, and Burundi participation; small hydroelectric plants near Nyemanga on the Sikuvyaye River and at Marangara on the Ndurumu River; and the Muyinga project.

Table 1.—Other countries of East Africa: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983^{p}	1984^{e}
BURUNDI[2 3]					
Clays: Kaolin	^{e}2,000	2,000	^{e}2,000	4,053	[4]1,990
Gold troy ounces	^{e}130	^{e}100	^{e}100	272	[4]1,115
Lime	^{e}200	283	302	^{e}300	[4]42
Peat	^{e}9,000	^{e}9,500	^{e}14,000	13,293	[4]14,000
Tin ore and concentrate:					
Gross weight	(5)	--	--	--	--
Metal content	(5)	--	--	--	--
ETHIOPIA[2]					
Cement, hydraulic^{e}	110,000	130,000	140,000	150,000	160,000
Clays: Kaolin	55,235	9,000	^{e}9,000	^{e}9,000	9,000
Gold, mine output, metal content troy ounces	9,000	11,930	^{e}12,000	^{e}14,000	14,000
Gypsum and anhydrite, crude	900	4,200	^{e}4,000	^{e}4,000	4,200
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	706	798	801	855	900
Kerosine and jet fuel do	304	230	466	465	500
Distillate fuel oil do	1,176	1,344	1,493	1,514	1,500
Residual fuel oil do	1,598	2,224	2,173	2,033	2,000
Unspecified do	125	37	129	146	150
Refinery fuel and losses do	813	696	548	475	500
Total do	4,722	5,329	5,610	5,488	5,550
Platinum, mine output, metal content troy ounces	113	^{e}125	^{e}125	^{e}125	125
Pumice cubic meters	1,724	30,300	^{e}30,000	5,625	6,000
Salt:					
Rock^{e}	15,000	15,000	15,000	15,000	15,000
Marine	100,000	110,000	^{e}110,000	^{e}110,000	120,000
Stone, sand and gravel:					
Limestone	1,800	[4]5,500	^{e}5,000	^{e}5,000	5,000
Sand cubic meters	407,421	655,000	^{e}650,000	^{e}650,000	650,000
Unspecified	402,085	1,970,000	^{e}2,000,000	^{e}2,000,000	2,000,000
KENYA[2]					
Barite	6,647	6,000	--	300	210
Beryl, gross weight	(5)	--	--	--	NA
Carbon dioxide gas	3,014	3,000	2,700	NA	3,161
Cement, hydraulic thousand tons	1,272	1,300	^{e}1,300	1,280	1,164
Clays:					
Bentonite	--	--	--	200	NA
Kaolin	1,487	1,400	1,077	650	295
Corundum	(5)	--	(5)	NA	NA
Diatomite	1,677	1,700	1,783	1,570	1,512
Dolomite	--	--	--	1,920	2,865
Feldspar	387	400	--	700	685
Fluorspar	93,378	90,000	88,726	59,084	46,578

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	1980	1981	1982	1983[p]	1984[e]
KENYA[2] —Continued					
Gem stones, precious and semiprecious:					
Amethyst ---------- kilograms--	--	--	3	5	17
Aquamarine ---------- do----	35	NA	([5])	4	7
Garnet ---------- do----	237	NA	63	68	107
Ruby ---------- do----	414	NA	--	98	187
Sapphire ---------- do----	148	NA	33	--	NA
Tourmaline ---------- do----	39	NA	11	37	13
Gold, mine output, metal content troy ounces--	125	100	21	100	600
Gypsum and anhydrite ----------	--	--	300	1,350	NA
Iolite ----------	--	--	--	5,504	23,000
Iron and steel:					
Iron ore:					
Gross weight ----------	14,567	14,000	4,310	NA	NA
Iron content[e] ----------	9,469	9,000	NA	NA	NA
Steel, crude[e] ----------	10,000	10,000	NA	NA	NA
Kyanite ----------	--	--	--	5,447	1,000
Lime ----------	26,025	27,000	21,941	34,869	20,855
Magnesite ----------	1	10	--	NA	311,254
Phosphatic materials: Guano ----------	--	50	([5])	--	([5])
Petroleum refinery products:					
Gasoline, motor thousand 42-gallon barrels--	3,629	NA	NA	NA	NA
Jet fuel ---------- do----	3,492	NA	NA	NA	NA
Distillate fuel oil ---------- do----	4,540	NA	NA	NA	NA
Residual fuel oil ---------- do----	8,824	NA	NA	NA	NA
Asphalt ---------- do----	188	NA	NA	NA	NA
Liquefied petroleum gas ---------- do----	280	NA	NA	NA	NA
Unspecified ---------- do----	693	NA	NA	NA	NA
Refinery fuel and losses ---------- do----	679	NA	NA	NA	NA
Total ---------- do----	22,325	22,000	22,000	22,000	22,000
Salt:					
Crude ----------	26,966	27,000	NA	NA	72,885
Refined ----------	20,050	21,000	24,411	NA	28,000
Sodium compounds, n.e.s.:					
Soda, crushed, raw ----------	1,530	1,600	2,412	4,260	5,288
Soda ash ----------	203,768	250,000	160,440	193,690	226,050
Stone, sand and gravel:					
Calcareous:					
Coral (for cement manufacture)[e] ----	NA	1,000,000	1,442,928	NA	NA
Kunkur (for cement manufacture) ----	121,460	125,000	NA	NA	NA
Limestone (for cement manufacture)--	1,540,777	[r]1,500,000	--	1,579,960	1,444,234
Sand ----------	NA	25,000	NA	74	95
Shale ----------	295,183	300,000	259,426	231,069	789,484
Vermiculite ----------	2,558	2,600	1,556	--	872
Wollastonite ----------	--	50	--	--	NA
LESOTHO[2]					
Diamond:					
Gem[e] ---------- carats--	42,971	42,000	33,119	--	--
Industrial[e] ---------- do----	10,743	10,921	9,000	--	--
Total ---------- do----	53,714	52,921	42,119	--	--
Stone[e] ---------- cubic meters--	25,000	25,000	25,000	25,000	25,000
MALAWI[2]					
Cement, hydraulic ------ thousand tons--	92	78	53	70	[4]70
Lime ----------	NA	NA	2,041	2,190	[4]2,005
Stone: Limestone ----------	122,814	116,118	79,758	109,186	100,000
MAURITIUS[2]					
Lime ----------	7,000	7,000	7,000	[e]7,000	7,000
Salt ----------	6,000	6,000	6,000	[e]6,000	6,000
Stone: Basalt, not further described ----------	[r][e]1,000,000	1,083,500	942,000	[e]1,100,000	1,100,000
MOZAMBIQUE[2]					
Asbestos[e] ----------	800	800	800	800	800
Beryllium: Beryl concentrate, gross weight---	20	[r][e]18	[r][e]15	[e]15	15
Cement, hydraulic ------ thousand tons--	236	232	350	420	450
Clays, bentonite[e] ----------	1,500	1,500	1,500	500	500
Coal, bituminous ------- thousand tons--	408	[e]450	[e]500	[e]500	200
Copper, mine output, salable ore and concentrate:[e]					
Gross weight ----------	1,000	1,000	1,000	1,000	1,000
Metal content ----------	200	200	200	200	200

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	1980	1981	1982	1983[p]	1984[e]
MOZAMBIQUE[2] —Continued					
Gem and ornamental stones:					
Beryl crystals ---------- kilograms--	2,000	[e]2,000	[e]2,000	[e]2,000	2,000
Garnet ---------------do----	12,000	[e]12,000	[e]12,000	[e]12,000	12,000
Lime, hydraulic[e] ----------------	10,000	10,000	10,000	10,000	10,000
Petroleum refinery products:					
Gasoline -- thousand 42-gallon barrels--	510	[e]470	NA	NA	NA
Kerosine and jet fuel ---------do----	330	[e]310	NA	NA	NA
Distillate fuel oil -----------do----	746	[e]670	NA	NA	NA
Residual fuel oil -------------do----	1,332	[e]1,200	NA	NA	NA
Unspecified ------------------do----	323	[e]80	NA	NA	NA
Refinery fuel and losses -------do----	130	[e]100	NA	NA	NA
Total ------------------do----	3,371	[e]2,830	NA	NA	NA
Salt, marine[e] ----------------------	28,000	28,000	28,000	28,000	28,000
RWANDA[2]					
Beryllium: Beryl concentrate, gross weight---	108	59	69	32	44
Columbium and tantalum ores and concentrates: Columbite-tantalite, gross weight---	60	57	62	50	52
Gold, mine output, metal content troy ounces--	944	1,200	286	623	240
Lithium minerals: Amblygonite[e] ---------	30	NA	--	--	--
Tin:					
Mine output, metal content -----------	1,464	1,266	1,171	1,068	1,093
Smelter output, metal content --------	--	--	908	1,110	NA
Tungsten, mine output, metal content -----	[r]367	[r]281	324	231	291
SEYCHELLES[2]					
Guano ------------------------------	[6]4,285	[e]4,500	[e]4,500	[e]4,500	4,500
SOMALIA[2]					
Salt, marine[e] ----------------------	30,000	30,000	30,000	30,000	30,000
Sepiolite, meerschaum ----------------	--	--	9	10	10
SWAZILAND[2]					
Asbestos: Chrysotile -----------------	32,833	[r]35,264	30,145	26,287	25,832
Coal, anthracite ---------------------	[r]184,216	[r]157,701	115,043	101,652	124,569
Stone: Quarry product ----- cubic meters--	[r]72,045	82,053	82,041	151,468	97,657
Tin, mine output, metal content ---------	--	[r]10	7	5	1
TANZANIA[2]					
Cement, hydraulic ------ thousand tons--	300	[r]393	[e]400	[r] [e]420	[4]370
Clays:					
Bentonite ---------------------------	80	50	50	[e]75	75
Kaolin[e] ----------------------------	1,100	750	750	1,276	[4]1,885
Coal, bituminous[e] -------------------	1,000	1,000	1,000	9,996	[4]9,722
Diamond[7] ------------------ carats--	273,705	[e]250,000	250,000	260,574	[4]265,976
Gem stones, precious and semiprecious excluding diamond:[8]					
Amethyst ------------- kilograms--	48	[e]50	NA	NA	NA
Aquamarine ---------------do----	533	560	NA	NA	NA
Beryl (gem only) ------------do----	([5])	[e]5	NA	NA	NA
Chrysoprase and opal ---------do----	([5])	12	12	NA	NA
Corundum (gem only)[e] --------do----	7	7	NA	NA	NA
Garnet and rhodolite ---------do----	9	13	13	NA	NA
Ruby and sapphire -----------do----	10	[e]11	NA	NA	NA
Scapolite[e] ----------------------	10	10	NA	NA	NA
Tourmaline ---------------do----	2	[e]3	NA	NA	NA
Zircon -------------------do----	3	[e]4	NA	NA	NA
Zoisite (tanzanite) -----------do----	2	[e]3	NA	NA	NA
Unspecified ---------------do----	9	[e]10	10	NA	NA
Total ------------------do----	[e]633	[e]688	NA	646	NA
Gold, refined ------------- troy ounces--	246	[e]400	[e]600	[e]800	[4]2,680
Gypsum and anhydrite, crude[e] ----------	11,300	12,000	12,000	12,000	12,000
Lime, hydrated, and quicklime ----------	[e]6,500	[e]6,800	[e]6,800	3,006	3,000
Mica, sheet ------------------------	[e]10	5	5	([5])	([5])
Nitrogen: N content of ammonia[e] --------	5,500	6,000	6,000	6,000	6,000

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	1980	1981	1982	1983[p]	1984[e]
TANZANIA[2] —Continued					
Petroleum refinery products:[e]					
Gasoline -- thousand 42-gallon barrels	780	800	800	800	800
Kerosine do	300	300	300	300	300
Jet fuel do	240	220	220	220	220
Distillate fuel oil do	1,000	1,050	1,050	1,050	1,050
Residual fuel oil do	1,700	1,750	1,750	1,750	1,750
Liquefied petroleum gas do	80	80	80	80	80
Refinery fuel and losses do	300	300	300	300	300
Total do	4,400	4,500	4,500	4,500	4,500
Phosphate minerals: Apatite	--	--	--	--	[4]14,536
Salt, all types	[e]40,000	[e]41,000	[e]37,000	28,297	[4]21,659
Soda ash	--	--	--	--	[4]298
Tin, mine output, metal content	[e]10	9	9	6	6
UGANDA[2]					
Cement, hydraulic	(9)	[r]6,695	17,015	[e]20,000	20,000
Copper, mine output, metal content[e]	--	--	1,400	1,000	1,000
Lime, hydrated and quicklime	[r]76	[r]84	74	413	500
Phosphate minerals: Apatite[e]	--	--	--	100	100
Salt, evaporated[e]	500	5,000	5,000	5,000	5,000
Tin, mine output, metal content	[r]1	(9)	4	25	25
Tungsten, mine output, metal content	[r]5	[r]1	4	4	4

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Sept. 6, 1985.
[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]Reported figure.
[5]Less than 1/2 unit.
[6]Data represented sales; actual production is not reported.
[7]Diamond figures are estimated to represent 70% gem-quality or semigem-quality and 30% industrial-quality stones.
[8]Exports.
[9]Revised to zero.

COMOROS

There were no known commercially exploitable minerals on the islands in 1984. The Federal Islamic Republic of the Comoros was one of the poorest countries in the world in 1984, with a per capita income of slightly over $300.[3] The country consists of four main islands situated in Mozambique Channel west of the northern end of the island-nation of Madagascar. Only small sand and gravel excavations were operated during the year to supply local construction needs. All other mineral-related requirements were imported.

DJIBOUTI

Phase II of a geothermal exploration and development project in the Hanle-Gaggade area of Djibouti was approved for financial support by the IDA on May 31, 1984. The IDA approved credit for the project was $6 million, with additional funding of $4.4 million pledged from the Italian Government, $2.5 million from the African Development Bank (AFDB), $1 million each from the OPEC Fund and the UNDP, and the remaining $1.7 million of the $16.6 million project being pledged by the Djibouti Government.[4] The project was to include the drilling of two temperature gradient wells to approximately 450 meters depth; up to four exploratory wells to approximately 2,000 meters depth; and complementary surface exploration studies to include gravity and electrical resistivity surveys, related studies, technical assistance and training, and contract management and supervision. The drilling work for the gradient wells was completed by yearend, and the estimated completion date of all phase II work was

April 1987.

Other donor assisted projects underway in Djibouti in 1984 were improvements to the Ambouli International Airport, construction of 115 kilometers of asphalted roadway between the port cities of Djibouti and Tadjoura, renovation and extension of the Boulaos power station, and installation of additional power generating equipment for the towns of Dikil and Ali Sabieh.

ETHIOPIA

The only significant mineral production in 1984 was cement, gold, and salt, plus a small amount of platinum. Exploration for natural gas and petroleum continued in the Ogaden and southwest regions of Ethiopia; however, little progress was reported during the year in either region. The Soviet Union assisted in the search for petroleum in the Ogaden, where three exploratory wells were to be drilled in 1984. Chevron Overseas Petroleum Inc. was investigating for petroleum in the Gambela region in southwestern Ethiopia, near the Sudanese border.

The European Development Fund was supplying funding for geothermal exploration along the Rift Valley area. Italy's ELC-Electroconsult was in charge of exploration. In the Lake Langano area of the valley, drilling work by contractor Mowlem International of the United Kingdom, under the supervision of Geothermal Energy of New Zealand, was completed by yearend. Other areas in the Rift Valley area being studied were Shalla and Abaya.

A feasibility study for developing the potash reserves of the Danakil Depression in northern Ethiopia continued throughout the year. The Ethiopian Mineral Resources Development Corp. had awarded the potash feasibility study to the French consulting firm PEC Engineering in 1983. The study was to continue in 1985, and its conclusions and results were not expected to be released until mid-1986. The last major study on the Danakil potash deposits was completed in 1969, the results of which stated that mining problems of very high water inflow would make a dry mining scheme unprofitable, and that ore handling and preparation problems associated with a wet mining scheme would result in the same unprofitable situation. Another problem with the area was the remoteness of the location. A preliminary estimate of $300 million was assessed as necessary capital to open a mining operation at the location, with over one-half of the financing going into infrastructure development.[5] The economics of a mining operation at Danakil in the latter 1980's may be different, however, considering that potash world market prices in 1984 were approximately four times the market price for potash in 1969. Also during the year, a preliminary survey for phosphate deposits was conducted by UNDP with positive results reported on an Eocene Formation in the lower Ogaden area of Harer Province. Further survey work was expected in 1985 by Ethiopian geologists, and promising areas were to be core drilled for rock quality and reserve estimations. The United Nations study stated that the deposits were close enough to the surface for dragline mining.

In August, the Government held official inauguration ceremonies for the Muger cement plant located 75 kilometers north of the city of Heleta. The plant complex, with a production capacity of 300,000 tons per year, cost approximately $100 million to build. Included in this cost was the construction of a small residential town for the plant's 300 employees, and a 650-meter-long dam on the nearby Birete River, which supplied the cement manufacturing operations with 1.6 million gallons of water per day. The plant's construction began in 1974, but because of financial and technical assistance delays, did not become operational until 1984. Quarries that supplied the plant with the necessary feedstocks of clay, gypsum, limestone, and pumice were situated in different areas, from 2 to 200 kilometers from the plant. The Muger cement plant became the fourth and largest cement manufacturing facility in the country.

KENYA

Major minerals produced in Kenya for export were cement, fluorspar, and soda ash, while cement, limestone products, salt, and small tonnages of other minerals were produced for local consumption. Mineral production from major producers remained largely unchanged in 1984, but mineral exports suffered from low prices and shrinking markets owing to continued weak markets for these commodities.

The financial loan picture was greatly improved, with expanded credit to the private sector. Foreign donors played an important financial role in the economy of Kenya. The International Monetary Fund extended credits under a standby agreement for balance of payments financing. Total resources available to the Government of Kenya exceeded $100 million.[6] Total external debt was about $2.9 billion with the debt servicing ratio over 27%.

Despite the drilling of 16 exploration wells since the country's independence, there have been no commercial discoveries of natural gas or oil. Of the wells completed, 14 were onshore, and the remaining 2 were offshore. New proposed legislation and regulations were released in late 1984, which would replace the Oil Production Act of 1924. A new parastatal organization in Kenya, the National Oil Co., may replace multinational oil companies in the overall development of the oil industry if and when any discovery wells become operational.

New geological data in Kenya, the recent natural gas and petroleum finds in nearby countries, and the need to eliminate costly petroleum imports created renewed interest for oil exploration. Kenya opened six blocks onshore and offshore in 1984 for gas and oil exploration and made available existing exploration data to interested oil companies. Petro-Canada International Assistance Corp. sponsored a $2.5 million project to conduct seismic surveys in Kenya in Block-4. Amoco Kenya Petroleum entered a production sharing contract with the Government of Kenya in Block-10. In other mineral exploration areas, the Government of Kenya issued geological prospecting licenses to four Belgian companies to undertake geological prospecting in the Siaya District, southwest of Kakamega. Exploration emphasis was for diamond and gold deposits.

In an effort to control foreign exchange, Kenya was diversifying its energy resources by developing its geothermal and hydroelectric potential. A 140-megawatt hydroelectric dam under construction on the Tana River was scheduled for completion in 1987. A third 15-megawatt geothermal powerplant, in the Rift Valley, was to come on-line in 1986.

Bamburi Portland Cement Co. produced 814,000 tons of cement product in 1984, of which 628,000 tons was exported. This represented a decrease in production of 16% from that of 1983 and was mainly attributed to marketing problems. Conversion of the Bamburi plant complex to coal-fired kilns was completed. East African Portland Cement Co. produced a record high tonnage of 320,000 tons of cement for the year.

The poor world market for acid-grade fluorspar continued to restrict sales and production from Kenya Fluorspar Co. Ltd., Kenya's sole fluorspar producer. Plant production for the year was voluntarily cut back almost 18% from the 1983 level; however, company officials felt the marketplace would improve in 1985, and a scheduled plant shutdown in 1984 allowed the company to make extensive repairs to a ball mill and to complete a new tailings dam.

There was varied performance from the smaller mineral producers. Production from the African Diatomite Industries Ltd. operation declined owing to poor agricultural conditions and subsequent reduced demand for diatomite; however, the company continued with a modernization project at the plant. Production of limestone for lime-related fertilizer products also declined owing to the reduced agricultural demand. There was a small improvement in production of barite and gypsum from Athi River Mining Ltd. Mineral Mining Corp. continued unchanged, producing a variety of industrial minerals from mostly small mines around the country for consumption of local markets.

Construction of a new steel rolling mill at Eldoret, 165 miles northwest of Nairobi, neared completion. The mill will bring the country's total capacity for bars and structural shapes to 200,000 tons per year. Plans for a new tinplate plant were drawn up that would feed a new 80,000-ton-per-year cold rolling mill in Mombasa, which was brought on-stream in 1983.

LESOTHO

During 1984, there were no commercial mining operations in Lesotho. Lesotho's only mineral exploitation for the year encompassed small sand and gravel operations for local construction purposes. Lesotho continued, however, to export mine labor to the

Republic of South Africa's mining industry, which in 1984 employed an estimated 61,000 citizens of Lesotho. This was an increase of almost 16% over that of 1983, and annual wage remittances increased 23% to approximately $130 million.[7] The Republic of South Africa's farms and mines together employed almost 160,000 Basotho during the year, 40% of Lesotho's available male labor force, and remittances from the migrant labor represented 70% of the country's total operating revenue for the year.

MALAWI

A detailed geological evaluation of the Livingstonia subbituminous coalfield in the Rumphi District was completed during 1984, and measured, indicated, and inferred reserves were put at slightly less than 800 million tons. Combined with the 9 million tons of measured and indicated reserves at Kapembe in the Ngana Coalfield, total Malawi coal reserves at yearend were officially put at 807 million tons. Malawi imported all of its fuel requirements, and owing to a rapid increase in coal import costs and to uncertainty of supply, the Government was moving expediently to assess the economics of developing its indigenous coal deposits.

Trial excavations of the Livingstonia Coalfield by the Malawi Development Corp. (MDC) were scheduled to begin early in 1985. The mining trials were to be part of an estimated $100,000 program to assess operational economics of supplying coal as kiln fuel for the country's only mineral processing operation, Portland Cement Co. Malawi Ltd., as well as meeting local demands for heating fuel in northern Malawi where the Livingstonia Field is located.[8] The cement manufacturer conducted preliminary kiln-fuel trials in the last half of 1984, extracting over 1,000 tons of coal from the field. A subsidiary of MDC, Portland's operation at Changalume in south-central Malawi consumed the majority of Malawi's imports of coal in 1984, which totaled over 72,000 tons.

Other mineral development projects underway during the year were a gypsum mining pilot project at Mponela in central Malawi, a ceramic clays processing operation at Linthipe, and a graphite prospecting operation at Dedza. The gypsum mining pilot project was a collaboration between the Malawi Departments of Geological Survey and Mines. The ceramic clays processing operation and the graphite prospecting operation were both near Lilongwe.

A countrywide airborne geophysical survey began during May, and by yearend, over 80% of the country had been overflown. The expected information from the $4 million study, being funded through the UNDP, was to be used in locating new mineral exploration targets for followup ground surveys. The program work was being conducted by Hunting Geophysics of the United Kingdom, which completed 97,000 line-kilometers of survey in 1984. The Government was expected to initiate a program, based on the survey results, to attract international mining companies to invest in mineral exploration and development within Malawi. The Geological Survey was contracted to undertake exploratory drilling by the British Central Electricity Generating Board of the United Kingdom, which was granted a 3-year Exclusive Prospecting License to explore for uranium in parts of Karonga in northern Malawi. Discoveries of undefined size but that were potentially exploitable were reported by the survey at yearend. Lonrho Malawi Ltd. surrendered its mining license for the Kangankhunde concession strontianite-monazite deposit. Although feasibility studies for mining the deposit were positive, transportation of ore concentrates out of the area was considered too difficult by Lonrho.

MAURITIUS

The mineral industry of Mauritius remained insignificant in 1984, with only small amounts of lime and salt produced, along with some sand and gravel and stone for local building needs. Retail value of the minerals produced was estimated at $5 million.[9] All other mineral needs for the year were imported, including 1.4 million barrels of petroleum products valued at approximately $50 million. Construction work was virtually completed on a new hydroelectric dam on the Champagne River. The dam complex was built by the Italian company COGEFAR and the French firm Spie Batignolles Travaux Public. The total power capacity of the dam's two turbine generators was reported to be 30 megawatts, and the dam was expected to generate 40 million kilowatt hours of electricity per year.

MOZAMBIQUE

A new foreign investment code that in general terms was to cover all forms of foreign investments, including mineral developments and petroleum joint ventures, associations of financial partners, and exclusive foreign enterprises, was passed by the Mozambique legislature in August and took effect early in September. Provisions for arbitration in the case of disputes, guarantees of repatriation of profits, and fair compensation in the event of unavoidable nationalization were all addressed in the new code. Previous legislation covering mineral investments, which was still considered applicable, has become incorporated under the new code. The code, which contains 7 chapters and 30 articles, was considered a major improvement over the old code, eliminating most of the legal impediments to foreign investment.

The Mozambican mining industry has continued to suffer from problems of inadequate and antiquated equipment for exploration, mining, and ore transportation purposes; a lack of technical personnel; civil insurgency problems; lack of infrastructure and remoteness of mineral deposits; and inadequate operating capital. The country had measurable mineral deposits of apatite, bauxite, coal, copper, fluorite, graphite, kaolin, magnesite, marble, radioactive materials, semiprecious stones, tantalum, and titanium. Other minerals such as asbestos and gold are also known to exist. Foreign technical assistance projects ongoing during 1984 to assist the Mozambique Government in advancing the country's mineral industries were mineral prospecting in Cabo Delgado District with Bulgarian assistance, heavy minerals prospecting in Zambezia District with Italian assistance, inventory assessment in Tete, Manica, and Solfala Districts with United Kingdom assistance, and UNDP specialists in an advisory capacity.

Esso Petroleum Co. was ahead of schedule and had finished a first phase of seismic work on its Cabo Delgado concession before the end of the year. The concession covered an onshore area stretching from the Rovuma River on the northern border with Tanzania to Pemba 70 miles south, all geologically called the Rovuma Basin. There was also a small offshore section to the concession, but Esso had no plans to explore this portion within the current project. A second phase of more thorough surveying, covering promising areas identified by preliminary findings, was to be conducted in 1985. Esso was to choose a drilling site after the second phase and drill at least the mandatory one well of its concession contract with the Mozambique Government. Drilling was expected to begin in 1986.

Amoco Mozambique Production Co. and the Government signed a petroleum exploration and production contract on October 17 for four offshore blocks of the Zambezi Delta northeast of the port city of Beira. The contract was to have an initial duration of 3 years, with an option for two 2-year extensions. The 5.2-million-acre exploration concession was the third one negotiated by the Mozambique Government since its independence from Portugal in 1975. At that time, all petroleum exploration activities ceased. The Government's recognition of the need for finding and developing indigenous energy resources has prompted the renewed exploration activity, ongoing since 1982. The Japanese National Oil Co. was also involved with exploration activities during 1984. The Japanese firm had a concession offshore of Inhambane District.

British Petroleum Ltd. became the fourth active petroleum concession holder in Mozambique during 1984, after signing a contract in November with the Government for three blocks of offshore southern territory. The blocks covered approximately 10,000 square kilometers off the coast of Gaza and Maputo Districts.

Feasibility studies and assessments continued on a proposed fertilizer plant in southern Mozambique, based on identified gas reserves in the Pande area. Fluor Corp., which completed a feasibility study for a large-scale plant in 1982, was commissioned early in 1984 to conduct a study for a small-scale, 1,000-ton-per-day ammonia plant.

British Sulphur Corp. was contracted during the year by the AFDB to evaluate all of the studies that have been done to establish a nitrogen-based fertilizer plant near Pande. In addition to Fluor's efforts, Quimigal Co. of Portugal conducted a study in 1983.

Cia. Industrial de Fundicao e Laminagem S.A.R.L. (Cifel), the Government-controlled iron and steel company, began making pencil ingots from steel scrap during 1984. An estimated 1,000 tons of the pencil ingots were manufactured using Cifel's existing Bessemer converter. Prior to this conversion, Cifel had been using imported steel billets and the Bessemer converter for recasting. Cifel's new use of the Bessemer was considered the agency's first step in its plans to become a primary steel manufacturer. Cifel had existing facilities in Maluto for rolling a capacity of 60,000 tons per year of ingots or billets into tube, wire, and rebar products, as well as producing iron and steel castings, although, owing to severe foreign exchange problems, has not been able to import raw iron and steel feedstock.

REUNION

Reported mineral activity on the island of Reunion 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. Reunion, an island of approximately 2,500 square kilometers in area, had slightly over 500,000 inhabitants in 1984 and remained an overseas department of France.

RWANDA

Rwanda's mineral industry contributed only 2% of the country's overall gross domestic product while accounting for a much larger share of the country's export revenues, at nearly 20%. Almost all mineral production of commercial value was exported, mainly to Europe and the United states, through Belgium's Compagnie Geólogique et Miniére des Ingenieurs et Industriels Belges, the majority shareholder in Rwanda's sole mining company, Société Minière du Rwanda (SOMIRWA). Production of tin metal at SOMIRWA's smelter north of Kigali was 12% less than in 1983, although the company's cassiterite ore production was slightly greater. Production of wolfram and columbotantalite concentrates were up moderately, while gold production decreased for the fifth consecutive year; a sector of the industry considered a marginal activity because of rapidly depleting reserves. In an attempt to improve the economics of legal gold trading within the country, SOMIRWA's monopoly on buying gold from artisans was not renewed by the Government in 1984, and instead, private buyers and competitive bidding were allowed entry into the market. The cement plant at Mashyuza, expected to be completed and operating by mid-1984, was still under final construction at yearend with a new startup date of mid-1985. With assistance from Belgium, France, the European Investment Bank (EIB), and the International Financial Corp., planning for a $20 million investment program to increase mineral production in Rwanda continued throughout the year.[10]

During July, a shortlist of prequalified consultants was drawn up for the second phase of a feasibility study for utilizing methane gas from Lake Kivu. Funded by the European Economic Community, the study was expected to consider the economics of extracting gas from up to 300-meter lake depths, with the extraction equipment located on a raft platform. An earlier study completed proposed that the gas extraction, besides serving as a fuel source, could provide nitric acid as a coproduct from ammonia manufacture. The nitric acid could prove to be an important trade or barter item with neighboring Burundi as an acidulating agent for producing processed fertilizer from Burundi's recently investigated phosphate deposits at Matongo-Bandaga. Other than some small lime production, neither Burundi nor Rwanda produced any chemical fertilizers in 1984, yet both relied heavily on agricultural production for domestic needs and international trade revenues. The methane gas could also be used in Rwanda's new cement industry or for methanol production. A brewery company, Bralirwa, an affiliate of the Dutch firm Heineken Inc., has been utilizing the gas for some time at its brewery plant in Gisenyi.

Table 2.—Rwanda: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982: United States	Destinations, 1982: Other (principal)
Beryllium: Ore and concentrate	60	80	--	All to Netherlands.
Columbium and tantalum: Ore and concentrate	52	60	--	All to Belgium-Luxembourg.
Gold: Ore and concentrate value, thousands	$485	--		
Tin: Ore and concentrate	1,865	67	--	Do.
Tungsten: Ore and concentrate[2]	542	596	--	France 126; West Germany 105; Japan 55.
Other: Ores and concentrates	2	--		

[1]Table prepared by Virginia A. Woodson.
[2]Data presented under "Destinations" are imports reported by that country.

Table 3.—Rwanda: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982
METALS		
Aluminum: Metal including alloys, semimanufactures	391	312
Copper: Metal including alloys, semimanufactures	1	6
Iron and steel: Metal, semimanufactures:		
Bars, rods, angles, shapes, sections	2,300	2,363
Universals, plates, sheets	8,551	13,377
Wire	1,190	1,628
Tubes, pipes, fittings	2,773	2,795
Lead: Metal including alloys, all forms	45	2
Nickel: Metal including alloys, all forms kilograms	30	--
Tin: Metal including alloys, all forms	1,378	182
Zinc: Metal including alloys, all forms	662	665
Other:		
Ores and concentrates including waste and scrap	424	(2)
Metals including alloys, all forms	1	--
NONMETALS		
Cement	36,339	43,292
Fertilizer materials, manufactured	457	1,783
Salt	17,711	16,482
Other, crude	--	725
MINERAL FUELS AND RELATED MATERIALS		
Petroleum refinery products:		
Gasoline:		
Aviation 42-gallon barrels	2,295	2,450
Motor do	249,696	232,957
Kerosine and jet fuel do	46,468	41,920
Distillate fuel oil do	122,504	145,666
Other: Unspecified mineral fuels including products	12,314	6,543

[1]Table prepared by Virginia A. Woodson. Sources of imports for 1981 and 1982 were not available at the time of publication.
[2]Less than 1/2 unit.

SEYCHELLES

Exploration of the ocean bottom around Seychelles' Amirantes Islands, which was conducted with technical and equipment assistance from the Indian Government, showed a high yield of large metallic nodules. Samples collected averaged 6.9 kilograms of potato-size nodules per square meter of ocean bottom area, containing cobalt, copper, iron, manganese, and nickel. More exploration and sample testing was being planned at yearend to better evaluate the extent of the nodule fields and ascertain the potential economic viability of harvesting the nodule minerals.

Approval was expected early in 1985 from AFDB on a commercial port expansion project for Seychelles' capital city of Victoria. According to project planning officials, Victoria's existing commercial port facilities were in need of major renovation, expansion, and addition of special equipment for various demands of container cargo handling. The existing port was limited in both area and facilities, with a usable quay of only 240 meters, a depth of 10.6 meters, and four warehouse sheds covering 6,700 square meters. Total port area was approximately 5.5 hectares. The expansion and renovation project would dredge the port for more draft, increase the port's acreage by 16.5 hectares, add 6,600 square meters of concrete surfaced container handling area, add 12,000 square meters of outdoor asphalted storage area, construct new berthing and discharge facilities, add 120 meters of quays, and construct additional storage sheds. The estimated cost of the project was $9 million.[11]

SOMALIA

Mining was restricted to sepiolite or meerschaum, sea salt for domestic consumption, and limestone for clinker production at the new cement plant at Berbera, which was completed in 1984. Actual cement manufacture wasn't expected to begin until mid-1985.

Full-scale production of the integrated ammonia-urea complex at the Indian Ocean Port of Mogadisho was expected by early 1985. The small-capacity plants of 401,000 tons per year of ammonia and 30,000 tons per year of urea were operating on a trial basis at the end of the year. The construction contracts for the two plants took less than 2 years to complete. The Somali Ministry of Agriculture had awarded Snamprogetti S.p.A. of Italy the contract for building the urea plant using its own technology, and Technipetrol of Italy had been awarded the construction contract for the ammonia plant. Technipetrol was to be the operating manager of the fertilizer complex. Initially, 85% of the output of the 150-ton-per-day-capacity plant was expected to be exported.

Construtora Andrade Gutierrez S.A. of Brazil announced preliminary plans to build a $300 million uranium mine and smelter complex in the Galgudud region of Somalia. The uranium deposits at Galgudud were estimated to have a reserve base of at least 6,400 tons of uranium recoverable at a cost of $80 to $130 per kilogram.[12] The Galgudud deposits were delineated and under concessional control of the Somali Arab Mining Co. (SORAMICO), a joint venture between the Somali Government and the Arab Mining Co. The uranium mill was to have a production capacity of 500 tons per year. No dates for beginning or completion of construction of the project were released by yearend; however, SORAMICO was expected to begin limited ore extraction operations at Galgudud early in 1985.

In May, the International Bank for Reconstruction and Development (World Bank) agreed on an $18 million loan for a project to delineate and preliminarily exploit the gasfields of the Afgoy area of southeastern Somalia. In September, EIB announced a grant of $5.2 million for the same project. Total cost of the natural gas project was estimated at $24.5 million and included drilling two delineation-production wells, well testing and performance evaluations, equipment and training, and the subsequent development of plans for a full-scale production operation at Afgoy. The gas production was to be transported by pipe to Mogadisho for energy usage.

Esso Exploration Juba S.A. and Royal Dutch/Shell agreed in the latter half of the year to share exploration costs on Esso's petroleum concession area. The estimated $17 million exploration costs were for aeromagnetic and seismic studies. Esso was not committed to drill and was not expected to make that decision until all the seismic work was completed. Aeromagnetic work was completed in August.

Situated near Bula Berte, the second well drilled by the Atlantic Richfield Co. (ARCO) came up dry. ARCO's only other well was also a dry one, and based on the poor results, ARCO pulled out of Somalia at the end of 1984. Royal Dutch/Shell began drilling the first of two wells off the north coast of Las Koreh in midyear, and the Italian firm Azienda Generali Italiana Petroli S.p.A. was moving ahead with plans to begin drilling off the northeast coast at the beginning of 1985. The French firm Société Nationale Elf Aquitaine was expected to conduct seismic and aeromagnetic studies on its concession offshore north of Mogadisho in 1985. Quintana Oil Co. and Deutsche Texaco had been actively seeking drilling partners for their concessions, but with no success as of yearend, were expected to surrender their concessions in 1985.

SWAZILAND

The most important mining operations in Swaziland remained the asbestos mine at Havelock and the coal mine at Mpaka. Asbestos production decreased in 1984, as did export revenues, which went from $8.7 million in 1983 to $8 million in 1984.[13] The reductions were a direct reflection of international market conditions. Coal production increased over 22%, and export sales rose from 76,161 tons in 1983 to 83,376 tons in 1984. Stone quarries continued to represent a small but significant percentage of mining revenues, with sales of $640,000 reported for almost 100,000 cubic meters of rock quarried. Adverse weather conditions drastically decreased tin concentrate production at the small alluvial operation at Sinceni, and revenues for the year fell to $6,700. A small diamond production, mostly of industrial quality, was reported from exploration work at Dokolwayo.

Langa National Brickworks began manufacturing operations during the spring of 1984, and exports were believed to have begun in August. Production for the partial first year of operation was estimated to be almost 50 million bricks. The nearby clay deposits being exploited for the plant had proven reserves to supply the brick manufacturing operation for 25 years of capacity production, with estimated additional reserves for another 25 years. The majority of products exported in 1984 went to Natal and Transvaal in the Republic of South Africa.

In late 1983, prospecting operations began at Dvokolwako in southern Swaziland for diamonds. Throughout 1984, the prospecting operations continued, and based on core analyses, a decision was made in the latter half of the year to begin mining operations at the location early in 1985. The mining operation, the Dvokolwako Diamond Mines, was to be a 50-50 ownership arrangement between the exploration company, Trans-Hex Co. of Cape Town, the Republic of South Africa, and the Government of Swaziland. A decision on the size of the mine was still pending at yearend, although the diamonds mined would be industrial, small in size, with a percentage of near-gem quality. In addition, a small percentage of the diamonds were expected to be good quality gem stones. Approximately 90 Swazi were expected to be employed at the mine, along with 15 to 20 expatriates. The diamonds were expected to be exported to Antwerp, Belgium.

A phase II drilling program to further delineate the anthracite coal resources of Lubhuku Coalfield began in June 1984. The phase drilling was part of a continuing program effort between the Japanese International Cooperation Agency and the Swaziland Government. Phase I drilling completed in 1983 proved out at least 200 million tons of reserves. Regarding Swaziland's existing coal mine operation at Mpaka, negotiations between Anglo American Corp. of South Africa Ltd. and Tibyo Taka Ngwane (TTN) of the Swaziland Government for the sale of Anglo American's 48% interest in Mpaka to TTN had still to be finalized at yearend. Negotiations began in 1983 when Anglo American decided not to apply for renewal of its mining lease, which expired in July of that year.

TANZANIA

The final feasibility study for a proposed Kahama gold mining project was submitted to the Tanzanian Government in December. An ongoing effort since November of 1982, exploration drilling and coring, appraisal, and feasibility work was conducted during 1983-84 by the two Finnish firms, Outokumpu Oy and Kone Oy Corp. The study results reported ore reserves of 3.6 million tons grading 0.33 troy ounce of gold per ton, 0.32 troy ounce of silver per ton, and 0.4% contained copper. A proposed treatment plant would process 150,000 tons of ore per year. Based on the positive study results, an agreement to begin development of the mine was expected early in 1985. Mining and mineral processing operations would be carried out by Kahama Gold Mines Ltd., a company formed in 1983 between Tanzania's State Mining Corp. and Outokumpu and Kone. The project study was financed by the Finnish International Development Agency. The study plans called for producing a copper-gold matte to be shipped to Finland for refining.

At the existing underground Buckreef gold mine, production in 1984 was reported at 2,555 troy ounces from approximately 28,000 tons of ore. The targeted production for 1985 was over 5,400 troy ounces. Development of the Buckreef Mine began in 1982. Construction work on surface buildings and mine infrastructure was to continue in 1985. Other gold mining operations operating during the year were small alluvial workings in the Lupa Goldfields. Production was limited to less than 40 troy ounces.

Tanzania continued to be totally dependent on imports for all its petroleum oil and natural gas needs. Seven international oil companies were engaged in petroleum and gas exploration activities during the year in Tanzania. As of yearend 1984, only natural gas deposits had been located. Three of these, situated at Kimbiji, Mtwara, and Songo Songo, were of significant size. Estimates of reserves at Kimbiji and Songo Songo were 130 and 43 billion cubic meters, respectively.

During the year, planning and gasfield development work continued with the U.S. firm Agrico Chemicals Inc. for the construction of a urea and phosphate fertilizer plant using Songo Songo's natural gas for manufacturing the urea. Five production wells had been completed by December. Also late in the year, the project received loan guarantees and risk insurance from the Overseas Petroleum Investment Corp. (OPIC); the first project involvement for OPIC in Tanzania. Construction work was expected to commence on the fertilizer plant complex in 1985.

There were two major efforts and several minor efforts in the petroleum exploration sector underway in 1984. The two major efforts, which were onshore drilling operations, were in the east-central area near the Selous game reserve, operated by Shell Oil Co. and Exxon Exploration Co., and near the northern town of Tanga, operated by the Vienna-based International Energy Development Corp. (IEDC). Shell and Exxon had completed one well by yearend, and IEDC had completed two. Both concession operators planned to do more drilling in 1985. In addition to these major efforts, other companies have been conducting seismic activities along the central and southern coasts and onshore southwest basins.

The Government negotiated during the year with Amoco International and Shell on exploration agreements for the Rukwa Basin in the southwestern part of the country. Detailed gravity surveys had been conducted in the area during 1983, and based on the results, several international oil companies had expressed interest. Negotiations were concluded with Shell in October, and an agreement was expected to be concluded with Amoco early in 1985. Amoco has also expressed strong interest in exploring on Lake Tanganika and has negotiated an agreement with the Government of Burundi, but as of yearend, little progress had been made with the Tanzania Government.

In November, the Government signed an agreement with the Middle Eastern mining firm, Dar Tadine Al Umma (DTU), for five gold exploration and mining concession areas in northern Tanzania. The properties cover about 7,000 square kilometers of land in the greenstone belt, known for its gold mineralizations. DTU's contract called for an initial investment of $25 million, with first-phase work entailing retreating of old gold mine tailings and exploration for alluvial and eluvial deposits.[14] A subsequent second phase was to entail exploration for primary gold mineralization. Survey work was awarded by DTU to Geosurvey International of the United Kingdom, which already had extensive experience in mineral exploration in Tanzania. Under the production sharing agreement, the Government of Tanzania was to receive one-third of all gold produced as well as an interest-free loan of $10 million.

The Chinese Government agreed in September to assist the Tanzanian Government with the development of a second coal mine at Kiwira, along with the construction of a coal-fired power station. The estimated project cost was approximately $56 million for building both the mine facilities and powerplant, with Chinese financial assistance contributing 50% of the cost. The proposed mine capacity was to be 150,000 tons of coal per year, with local employment expected to be about 1,200. The infrastructure to be built as part of the project was to include roads, bridges, water and solid waste treatment facilities, and an entire township to house the operations' employees. The Songwe-Kiwira Coalfield was geologically investigated extensively in the late 1970's, with coal reserves estimated at 27 million tons of minable reserves. The project was expected to be completed in 1988.

During 1985, further extensive coal exploration was to be conducted in the Tukuyu highlands region. The World Bank agreed in latter 1984 on a $19.5 million loan for the project. Also planned for the Tukuyu region was the expansion of the Ilima annual coal production from 10,000 to 48,000 tons per year. The Ilima Mine, like both the existing and planned mine at Kirwa, have been Chinese-assisted projects.

Lurgi of the Federal Republic of Germany prepared a report released during the year that stated that it would be technically and economically feasible to use the country's iron ore deposits at Liganga for a steelworks complex. The Liganga deposits, situated in the Iringa region, were estimated at 45 million tons of ore. According to the Lurgi study, the concentrated ore would need to be enriched from 51% iron to 64% iron. A 500,000-ton steel products plant has been envisioned, supplied by 1.56 million tons of run-of-mine ore per year. The feasibility study, which cost approximately $300,000, was financed by the United Nations Industrial Development Organization (UNIDO). Proposed Government plans based on the study also envisioned the installation of a 300,000-watt power generating station based on the Mchuchuma coal deposits, along with the iron ore enrichment plant and steelworks facility built at Mahanje in the Njombe District. Three hundred kilometers of railway would also need to be constructed from Milmba to Manda, as well as construction of a road from Mahanje to Manda. The projected cost of the iron ore enrichment plant, steelworks complex, and coal-fired powerplant was estimated at $700 million. Securing the financial resources for such a large-scale project was expected to be difficult and not foreseen in the Government's near future. Demand for steel products in Tanzania in 1984 was approximately 285,000 tons, but was expected to rise to 460,000 tons by 1990.

UGANDA

Early in the year, the Bearden Potter Corp. of the United States finished its feasibility study of the phosphate deposits at Sukulu. The Sukulu deposits were first discovered to be of economic significance in the 1950's, and in 1965, a small plant for recovering apatite was put into production. The Sukulu deposits, situated in a circular carbonatite complex approximately 4 kilometers in diameter, were mined for apatite until the late 1970's, when all operations ceased. Although the original carbonatite has been considered subeconomic, leaching and weathering of the rock has resulted in over 200 million tons of residual soil, in which apatite, baddeleyite, magnetite, pyrochlore, and zircon have been concentrated to levels well above the parent carbonatite. Based on the Bearden Potter study results, the Government of Uganda was moving ahead during 1984 with plans for constructing a 80,000-ton-per-year superphosphate fertilizer plant at nearby Tororo, where the original plant facilities were located. Preliminary cost estimates for the fertilizer project were about $100 million.[15] Fertilizer products from the plant were expected to supply both domestic and export markets.

Agreement was reached in midyear between the Ugandan and Italian Governments on financial aid arrangements for renovating the Jinga steelworks of the East African Steel Co. (EASCO). The estimated $12 million project was to rehabilitate the plant's electric arc furnace, install a twin-strand, continuous billet caster, upgrade the rolling by mechanizing the existing manual roughing stand, and install 3 additional finishing stands for a total of 15 stands. The arc furnace was to be increased in capacity from 22,000 to 26,500 tons per year by replacing and enlarging the furnace shell and fitting the furnace with a new burner. Demand for steel products in Uganda was expected to recover to 14,000 tons by 1986 and increase to 22,000 tons by 1990. The remelting of iron and steel scrap has historically been the feedstock for Uganda's iron and steel industry. EASCO officials felt that scrap supplies in the country were sufficient to produce 25,000 tons per year of iron and steel products, but that the expected increasing demand for steel products in the 1990's would necessitate the building of a direct-reduction steel plant in Uganda by the end of the century.

Results of the seismic and geophysical work carried out in Uganda in 1983-84 had been promising enough that at yearend IDA was preparing plans for negotiating a $4 million credit with the Ugandan Government for a petroleum exploration promotion project in 1985. The project as foreseen would include both further geophysical work where necessary and a technical assistance team for providing a wide range of services including the promotion of concession acreages to international petroleum companies. The IDA Executive Board was expected to make a final decision on the project early in 1985.

Large high-grade iron ore deposits have been located at Muko Ridge in western

Uganda. In collaboration with Hungarian experts, detailed chemical analyses have been conducted on core samples from the deposits, and the ore has been found to average a 68% iron content, one of the highest grades in the world. The major problem with developing the Muko deposits has been the remoteness of the area, which would necessitate a large capital investment to construct necessary support infrastructure. Iron ore with commercial potential has also been located at Sukulu near Tororo; however, these deposits contain titanium, which is a difficult pollutant when processing iron ore for iron and steel manufacture.

Late in the year, the AFDB Fund agreed to finance a study to address the rehabilitation needs of the Uganda cement industry. The project was to include a comprehensive study of the clay and limestone reserves in the Tororo area, machinery needs for quarrying including crushing and transportation equipment, all rehabilitation facets for the cement plant, engineering specifications for all proposed project construction, administration and managerial needs of the industry, and a financial and market analysis by plant. The cost of the feasibility study was estimated at $1.3 million and was to be completed in 12 months. The thrust of the project was expected to investigate the rehabilitation needs and cost factors of the existing Tororo and Hima installations, as well as define better the quality and quantity of the Tororo limestone deposits. Recent studies on these deposits have indicated large amounts of limestone in the Tororo area, but to date no indepth study had been undertaken to assess the quality and quantity of commercial-grade limestone in these deposits.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Burundi francs (FBu) to U.S. dollars at the rate of FBu120.0=US$1.00.

[3]Where necessary, values have been converted from Communauté Financière Africaine francs (CFAF) to U.S. dollars at the rate of CFAF468.75=US$1.00.

[4]Where necessary, values have been converted from Djibouti francs (DF) to U.S. dollars at the rate of DF177.67=US$1.00.

[5]Where necessary, values have been converted from Ethiopian birr (EB) to U.S. dollars at the rate of EB2.07=US$1.00.

[6]Where necessary, values have been converted from Kenyan shillings (K Sh) to U.S. dollars at the rate of K Sh14.41=$1.00.

[7]Where necessary, values have been converted from Basotho maloti (M) to U.S. dollars at the rate of M2.1=US$1.00.

[8]Where necessary, values have been converted from Malawian kwacha (K) to U.S. dollars at the rate K1.33=US$1.00.

[9]Where necessary, values have been converted from Mauritian rupees (Mau Rs) to U.S. dollars at the rate of Mau Rs15.12=US$1.00.

[10]Where necessary, values have been converted from Rwandan francs (RF) to U.S. dollars at the rate of RF100.96=US$1.00.

[11]Where necessary, values have been converted from Seychelles rupees (Sey Rs) to U.S. dollars at the rate of Sey Rs7.28=US$1.00.

[12]Where necessary, values have been converted from Somali shillings (So. Sh.) to U.S. dollars at the rate of So. Sh.26.0=US$1.00.

[13]Where necessary, values have been converted from Swazi emalangeni (E) to U.S. dollars at the rate of E2.1=US$1.00.

[14]Where necessary, values have been converted from Tanzanian shillings (T Sh) to U.S. dollars at the rate of T Sh17.0=US$1.00.

[15]Where necessary, values have been converted from Ugandan shillings (U Sh) to U.S. dollars at the rate of U Sh495.00=US$1.00.

The Mineral Industry of Other West African Countries

By Ben A. Kornhauser[1]

CONTENTS

BENIN

Petroleum production was the principal component of the mineral industry, followed by cement production and some salt output.

The French Central Fund for Economics Cooperation loaned $9.15 million[2] to the Communauté Electrique du Benin (CEB), which served Benin and Togo, toward financing the construction of a dam on the Mono River at Nangbeto, Togo. The dam was to supply hydroelectric power to reduce the energy dependence of the two countries and to irrigate crops. Nine other international financial organizations, including the International Bank for Reconstruction and Development (World Bank), the African Development Bank, the Arab Bank for African Economic Development, and the French Aid and Cooperation Fund, contributed to the estimated $140 million cost of the dam. The CEB also was to contribute to the financing. Contracts amounting to $60 million already had been awarded to West German and Canadian firms. The dam was expected to be completed in 1987.

COMMODITY REVIEW

The Seme Oilfield, which was about 10 miles offshore in depths of 100 to 115 feet and near the Nigerian border, produced about 8,000 barrels per day from five wells in 1984 as compared with 4,000 to 5,000 barrels per day in 1983. Norway's Saga Petroleum Co., which developed and operated the field, continued to train local personnel and to arrange for Benin to take over operation of the oilfield in 1988 or 1989. The World Bank furnished much of the $2.5 million, used to date, of the $4 million allocated for the personnel training. Oil operations only provided 5% of the gross national product (GNP).[3]

Table 1.—Other countries of West Africa: Production of mineral commodities[1]

Country[2] and commodity[3]	1980	1981	1982	1983[p]	1984[e]
BENIN					
Cement, hydraulic[4] metric tons	284,530	297,000	314,542	[e]315,000	315,000
Petroleum, crude thousand 42-gallon barrels	--	--	--	[e]1,000	2,500
Salt, marine[e] metric tons	400	400	100	100	100
Stone: Gravel[e] do	22,000	22,000	NA	NA	NA
BURKINA FASO (formerly Upper Volta)					
Phosphate rock[e] thousand metric tons	3	3	3	3	3
CAPE VERDE ISLANDS					
Pumice and related volcanic materials[e] metric tons	15,000	10,000	NA	10,000	10,000
Salt do	22,134	6,445	[e]6,500	[e]6,500	6,500
IVORY COAST					
Cement[e] [4] thousand metric tons	1,300	1,200	1,100	[r]636	536
Petroleum:[5]					
Crude thousand 42-gallon barrels	[e]240	2,220	3,278	[e]8,760	9,960
Refinery products:[6]					
Gasoline do	[r]2,550	[r]1,980	2,040	2,125	2,130
Kerosine and jet fuel do	[r]1,264	[r]1,264	1,225	1,256	1,260
Distillate fuel oil do	[r]2,909	[r]3,849	3,805	4,566	4,594
Residual fuel oil do	[r]2,531	[r]2,557	2,331	3,397	3,400
Liquefied petroleum gas do	[r]116	[r]116	116	116	116
Total do	[r]9,370	[r]9,766	9,517	11,460	11,500
MALI					
Cement, hydraulic metric tons	20,000	20,000	27,000	20,000	[7]25,365
Gold, mine output, metal content[e] troy ounces	10,000	16,000	13,000	13,000	[7]16,075
Phosphate rock[e] metric tons	2,000	5,000	10,000	10,000	[7]3,250
Salt[e] do	4,500	4,500	4,500	4,500	4,500
Stone:					
Marble do	500	[e]500	NA	NA	[7]758
Limestone do	4,600	[e]4,600	NA	NA	NA
NIGER					
Cement, hydraulic do	41,000	37,000	38,000	[e]40,000	40,000
Coal do	--	72,800	75,000	118,609	[7]123,644
Gypsum[e] do	2,720	2,720	3,000	3,000	3,000
Molybdenum concentrate, metal content do	122	113	42	[e]40	33
Phosphate rock do	1,000	6,000	1,000	[e]1,000	1,000
Salt[e] do	3,000	3,000	3,000	3,000	3,000
Stone, sand and gravel:					
Gravel cubic meters	180,000	180,000	NA	NA	NA
Sand do	6,000	6,000	NA	NA	NA
Tin, mine output, metal content metric tons	64	55	41	[e]40	76
Uranium concentrate, U_3O_8 content do	4,869	5,137	5,014	4,041	[7]3,276
SENEGAL					
Cement, hydraulic do	386,234	371,600	363,470	394,916	[7]384,821
Clays: Fuller's earth (attapulgite) do	3,978	32,973	98,999	100,375	[7]115,498
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	1,057	1,144	738	484	[7]546
Jet fuel and kerosine do	1,101	942	651	442	[7]401
Distillate fuel oil do	1,178	996	825	538	[7]675
Residual fuel oil do	1,985	1,593	1,200	566	[7]786
Other do	87	75	40	20	23
Refinery fuel and losses do	188	186	147	137	233
Total do	5,596	4,936	3,601	2,187	[7]2,664
Phosphate rock and related products:					
Crude:					
Aluminum phosphate thousand metric tons	224	199	279	1,187	[7]279
Calcium phosphate do	1,408	1,500	902	1,254	[7]1,932
Manufactured:					
Aluminum phosphate, dehydrated do	132	106	136	144	[7]142
Other[8] do	8	5	5	3	[7]7
Salt[e] metric tons	140,000	140,000	160,000	170,000	[7]165,000
TOGO					
Cement products:					
Clinker thousand metric tons	468	602	868	693	[7]154
Cement[9] do	303	285	279	232	[7]243

See footnotes at end of table.

Table 1.—Other countries of West Africa: Production of mineral commodities[1] —Continued

Country[2] and commodity[3]	1980	1981	1982	1983[p]	1984[e]
TOGO —Continued					
Iron and steel:[e]					
Crude thousand metric tons	5	5	5	[r]2	--
Semimanufactures do	10	10	10	[r]2	--
Petroleum refinery products:[10]					
Gasoline thousand 42-gallon barrels	[r]578	638	663	638	640
Kerosine and jet fuel do	[r]558	581	574	542	545
Distillate fuel oil do	[r]1,007	1,380	1,343	1,343	1,360
Residual fuel oil do	[r]733	1,032	1,099	1,066	1,080
Minor products, refinery fuel and losses do	[r]51	68	76	68	75
Total do	[r]2,927	3,699	3,755	3,657	3,700
Phosphate rock, beneficiated product thousand metric tons	2,933	2,215	2,800	2,010	[7]2,400
Salt[e] metric tons	600	600	100	--	--
Stone: Marble, dimension square meters	NA	NA	15,087	5,177	[7]5,317

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Aug. 8, 1985.
[2]In addition to the countries listed, The Gambia and Guinea-Bissau, 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]Data are for years ending July 30 of that stated.
[6]1983 United Nations Energy Statistics Yearkbook, New York, NY, p. 287. Refinery fuel and losses were consumed from residual fuel oil.
[7]Reported figure.
[8]Products marketed under the trade names "Balifos," "Phospal," and "P 125."
[9]One-third of domestically produced clinker from limestone mined at Tabligbo, Togo, is used domestically for cement production. Ghana and the Ivory Coast each received one-half of the remaining clinker output. Togo also imports clinker for the production of cement by Ciment du Togo.
[10]Togo's national refinery closed in 1981, and its salt company closed in 1982. 1983 United Nations Energy Statistics Yearbook, New York, NY, p. 288. Refinery fuel and losses were consumed from residual fuel oil.

BURKINA FASO (formerly Upper Volta)

The mineral industry consisted of phosphate rock production only. However, the Government's expectations for improving its economy rested on exploiting its gold, manganese, and silver deposits.

The Government, which took power in 1983, emphasized developing the mining sector to provide export earnings and to generate economic growth. In 1984, the governing military leadership renamed Upper Volta, Burkina Faso, aiming at developing economic self-reliance. However, its landlocked location, lack of infrastructure and indigenous energy, and poor agricultural base impeded economic development. A prerequisite for such development would be the construction of a railway system that would link the promising mining projects to railroads connected to the Atlantic Ocean port of Abidjan in the Ivory Coast.

COMMODITY REVIEW

Gold.—On October 18, the Poura gold mine was commissioned. The deposit, which was 96 miles southwest of Ouagadougou, had been in operation from 1959 to 1966 and had estimated recoverable reserves of more than 43,000 troy ounces in ore averaging 0.35 troy ounce per ton. The mine, which was expected to produce 4,300 troy ounces per year, was operated by the Société de Recherche Minière (SOREMI). SOREMI was owned by the Government, 60%; the Islamic Development Bank, 20%; and Compagnie Française des Mines S.A., a subsidiary of France's Bureau de Recherches Géologiques et Minières, 20%.

The financing for a mine complex of over $30 million was provided by SOREMI, 20%, with the balance from a group of international development banks. The infrastructure and other work was financed by the European Development Fund and French aid agencies. Other gold deposits under investigation were at Dori-Yalogo in the far north at Bouroum and at Kivademen in the Tenado region. The feasibility of mining the Dori-Yalogo deposit was being evaluated by the Société des Mines du Sahel, which was owned by the Government, 65%, and San Martin Mining Co. of the United States, 35%.

Manganese.—The Government was attempting to stimulate interest in the 13.3-million-ton reserves of manganese oxide ore at Tambao on Burkina Faso's northern border. The deposit contained 50% to 55% manganese, 1% to 4% silica, 0.14% to 0.15% phosphorus, 0.6% to 0.8% iron, 2.6% alumina, and 1.5% sodium oxide and potassium oxide, and overlaid at least 13 million tons of 48% manganese carbonate. However, the project was not backed because of the depressed state of the world's steel industry and the large investment required for rail and road infrastructure and handling facilities at the Ivory Coast port.

Phosphate Rock.—Studies continued on expanding phosphate production from the significant deposits at Koodjan, estimated at 80 million tons grading 18% to 33% phosphorus pentoxide. The quantities currently produced were used locally.

Zinc.—The zinc-silver deposit, discovered at Perkoa to the west of Koudougou, was reported unofficially to contain 10 million tons of ore with portions having grades of 20% zinc and about 2 troy ounces of silver per ton. A study, started in September to evaluate the size and ore grade of the deposit, was to be followed by a second phase on mine design and on tax and legislation to induce foreign investments. The World Bank was providing $7.1 million for both phases, which were expected to cost $7.5 million. The cost of developing Perkoa, including the infrastructure, was estimated at $100 million. Perkoa was in the center of Burkina Faso about 24 miles from a main railroad link to the Atlantic Ocean.

CAPE VERDE ISLANDS

The mineral industry was based on the production of cement, salt, and volcanic materials. The Island of Maio's cement factory, construction of which had stopped in 1983, was to be financed for $27 million mainly by the African Development Fund with some funding by the Government. Construction of a dock and other infrastructure, for which the Special Nigerian Fund agreed to furnish $6.3 million, also had been postponed. The original completion date for the entire project had been July 1988.[4]

THE GAMBIA

Mineral activity was insignificant in 1984. Agriculture accounted for most of the $140 million estimated GNP.

GUINEA-BISSAU

In 1984, mineral activity was insignificant, excluding the production of unknown quantities of crude construction materials. Gross national production in 1983 was estimated at $155 million, derived essentially from agriculture. The major trading partners were European countries, mostly Portugal and Spain.

IVORY COAST

The mineral industry consisted almost entirely of petroleum production, which made the country 85% self-sufficient in its fuel needs and accounted for 4% of the gross domestic product (GDP). Cement production, the other factor in the mineral industry, decreased 16% from that of 1983. Despite considerable exploration activity for nonfuel minerals, no production was reported for such minerals although the Government attempted to attract foreign investment and financial assistance to develop the extractive sector.

Power supplies were based mainly on oil and hydroelectric power. Hydroelectric energy, which could supply 90% of the domestic electricity requirements, fell sharply owing to low reservoir water levels, which resulted from continued dry spells. Electrical consumption was rationed and affected industrial output. In 1984, construction of the new dam at Soubre was delayed for 2 years because of financial constraints and technical changes, setting back electrical self-sufficiency. Enough natural gas had been found to consider its exploitation for power generation and industrial and household use. The vicissitudes of the world oil market were expected to have little impact on the Ivory Coast, which was almost self-sufficient in oil supplies.

The GDP was $6.7 billion,[5] a 10.3% increase over that of 1983. Exports amounted to $2.6 billion, a 42% increase over that of 1983 while imports remained at $1.3 billion. The principal exporters to the Ivory Coast, in million dollars, were France, $430; Nigeria, $104; the Federal Republic of Germany, $69.3; the Netherlands, $64; and the United States, $63.5. U.S. exports were about 5% of the market but increased about 6% over that of 1983. U.S. imports were $469 million, a 3% increase over that of 1983.

COMMODITY REVIEW

Cement.—In April, the power shortage closed the Société des Ciments de l'Afrique de l'Ouest (CIMAO), which was owned jointly by Ghana, the Ivory Coast, and Togo, and from which clinker was supplied to their cement plants. CIMAO planned to reduce its operational staff from 630 to 79 and to remain closed until 1986.

Diamond.—Eden Roc Mineral Corp., operators of the Ivory Coast Syndicate, recommended a program of diamond drilling in the Afema area, pilot processing of alluvials in the Asupiri River, and bulk sampling of alluvials where the diamond occurrence was located. The Ivory Coast Syndicate was owned 49% by three Canadian companies, Golden Rule Resources, Dibi Resources Inc., and Eden Roc, and 51% by the state-owned Société pour le Développement Minière de la Cote d'Ivoire.[6]

Gold.—Gold also was delineated by Eden Roc in the Afema area where diamond activity was focused. One geochemical anomaly in the Afema shear zone was delineated at 0.5 troy ounce of gold per ton between depths of 18 and 122 meters. The deposit was open pit at depth and along the strike. Bulk sampling of portions of the Asupiri River revealed 237,000 cubic meters of available alluvial material grading 0.023 troy ounce of gold per cubic meter within 0.5 meter of the surface.

Manganese.—A grinding mill, which was being installed at Union Carbide Corp.'s alkaline battery plant in Abidjan, was expected to cut costs significantly. Previously, the manganese was mined in Gabon, milled in Belgium, and shipped to the Ivory Coast. The plant was scheduled to be on-stream in March 1985.[7]

MALI

Mali was essentially an agricultural country with minimally known mineral resources that consisted of cement, gold, phosphate rock, salt, and stone from small local mines. In 1984, production of these minerals was valued at $2.6 million from a GDP of $1.08 billion.[8] The country had a negative trade balance of $180 million and a foreign debt of $1.2 billion slightly larger than its GDP. France continued to be Mali's leading trading partner and creditor.

In an agreement signed between the Malian Government and the U.S.S.R. in November, the U.S.S.R. added $8 million to the 1981 loan of $14 million to extend the Kalana gold operations in the southwestern part of the country. The money would fund equipment, parts, construction work, and technical assistance being furnished by the Soviets.

NIGER

The mineral industry consisted primarily of the production of cement, coal, gypsum, molybdenum, phosphate rock, salt, tin, and uranium. In 1984, uranium production, which continued its 4-year decline, worsened Niger's economic situation. Uranium remained the primary contributor to the GNP and export earnings. The export value of molybdenum, tungsten, and uranium shipments was estimated at $214 million.[9] Coal production, which increased about 4% over that of 1983, still was used domestically to generate electricity at the Arlit powerplant for use by the uranium industry. The estimated value of the coal was $2.5 million.

COMMODITY REVIEW

Petroleum.—Oil exploration, which had focused on the Academ Basin in eastern Niger north of Lake Chad, was inactive. The World Bank also had concluded that a domestic refinery was not feasible because of the current oil glut, black marketing of Nigeria's gasoline, and remote possibility of the commercial exploitation of the Academ Basin.

Uranium.—The worldwide depressed prices of uranium continued to postpone the development of several promising uranium deposits by mining concerns. However, exploration proceeded at a reduced level.

SENEGAL

The mineral industry consisted primarily of the production of cement, clays, petroleum refinery products, and phosphate rock and related products.

For the past several years, Senegal was in severe financial and economic straits owing largely to Government deficits and factors such as drought, falling prices for exports, and the general decline in world trade. To negotiate standby arrangements with the International Monetary Fund (IMF) and the Paris Club, the Government took various deflationary measures and indicated a reduction in public sector enterprises in 1984. The GNP was $2.24 billion while foreign debt was $1.14 billion.[10]

Phosphate rock continued as the principal mineral export. Export earnings increased with the export of value-added phosphate and fertilizer production, which came on-stream in 1984. Total sales of phosphate rock amounted to $60.4 million, of which $51.3 million came from exports. France remained the country's largest trading partner supplying about 45% of imports and purchasing about 40% of Senegal's exports.

COMMODITY REVIEW

Clays.—By yearend 1985, the Société Sénégalaise des Phosphates de Thies (SSPT) expected to triple its attapulgite production capacity to 300,000 tons per year from 100,000 tons per year in 1984 from its mine at Lam Lam in the Thies District at a cost of $4.6 million. Until recently, SSPT, which was owned equally by the Government and Rhône-Poulenc S.A. of France, concentrated on mining phosphate rock from Lam Lam. This operation was Rhône-Poulenc's major source of attapulgite and supplied about 20% of Western Europe's domestic and industrial absorbent markets, cat litter being a major one. In 1981, attapulgite production was only 10,000 tons rising to 70,000 tons in 1983.

Iron Ore.—The unfavorable outlook for iron ore in 1984 caused the Société des Mines de Fer du Senegal Oriental to reduce its project proposal. Annual production was projected at 6 million tons of marketable ore from the Koudekourou deposit. The investment requirement of more than $700 million involved construction of a 240-kilometer rail link to the existing railway to Dakar, a new port at Bargny (29 kilometers south of Dakar), a minesite, a concentrator, and power facilities.

Petroleum.—Société Nationale Elf Aquitaine (SNEA) of France relinquished its oil prospecting permits in 1984. SNEA, in conjunction with its partners, Wintershall AG and Petrofina, had been prospecting in Ziguinchot and Djourbel.

The domestic refinery treated 2.66 million barrels of crude oil, which cost $80 million. The total value of the refined products was $83.4 million, $11.4 million more than the 1983 value.

Phosphate Rock.—The installations of Société des Industries Chimiques du Senegal (ICS), which were established by the Government to provide phosphate exports of added value, came on-stream in April, on time and under budget. The $57.2 million investment was funded by loans from a larger number of economic development funds and banks.

ICS, which used the Compagnie Sénégalaise des Phosphates de Taiba's (CSPT) phosphate as feed, consumed 460,000 tons of phosphate and was responsible for CSPT's increased 1984 output. ICS' consumption of phosphate in 1985 was expected to reach 700,000 tons. The shareholders of ICS included the Senegalese Government, 23.3%; the Governments of Cameroon, the Ivory Coast, and Nigeria, 9.4% each; a consortium of Indian companies, 18.9%; the Islamic Development Bank, 9.4%; the Société Commerciale des Potasses et de l'Azote, 8.7%; and CSPT, 6.6%.

TOGO

The mineral industry consisted primarily of the production of cement, dimension marble, and beneficiated phosphate rock.

The IMF agreed to a $20 million[11] standby arrangement in May based on Togo's conforming in 1983 to IMF's monetary and fiscal criteria. Also, the Paris Club rescheduled the country's debt in June for the fourth time. Under the World Bank's $40 million structural adjustment program for 1983-84 and with IMF's urging, efforts continued to revitalize, sell, or close inefficient and/or unprofitable state enterprises. Sectors that did not have an important strategic role in Togo's economy would be sold or leased to private enterprise. Except for the processing of imported semifinished steel, all mineral production was managed by partially or entirely state-owned enterprises. The mining sector represented about 10% of Togo's GDP.

The GDP was $673 million, an increase of 3.7% over that of 1983, and external debt amounted to $666 million. Debt service, after rescheduling, amounted to 30.6% of export earnings. Exports to the United States were $35.1 million, an increase of 76.4% over that of 1983, and imports from the United States were $13.3 million, a decrease of 22.2% from that of 1983. Togo relied on foreign aid to support its budget and to finance much needed development projects.

The state-owned steel company, Société Nationale de la Sidérurgie (SNS), which produced reinforcing bar (rebar) and was the first company to be "privatised" by SNS, was leased to the Société Togolaise de Sidérurgie (STS), which was owned by a U.S. entrepeneur. Negotiations were in progress on selling or leasing the oil refinery at Lome. If leased, the facilities would probably be used for storing petroleum products intended for the regional market.

The CEB, owned jointly by Togo and Benin, started to build a $140 million hydroelectric dam in the fall of 1984 on the Mono River at Nangbeto under financing from the World Bank, the African Development Bank, France, and others. The dam was expected to be completed in 1988 and to reduce reliance on Ghana's Aksombo Dam power.

Erosion along the Gulf of Guinea reached serious proportions, apparently caused by the Aksombo Dam on the Volta River. The dam retained sediment once carried to the Gulf of Guinea. Previously, this sediment, deposited along the coast by the current, compensated for the wave erosion of the shore. Since 1965, the sediment deposited at the river mouth decreased significantly. Port Lome's phosphate enrichment plant, 50 feet from the coast, eroded away in 2 days. The foundations of the phosphate wharf at Kpeme was considered to be endangered.

COMMODITY REVIEW

Cement.—CIMAO, a cement clinker producer owned equally by the Governments of Ghana, the Ivory Coast, and Togo, closed at the end of March because of the electricity cutoff from Ghana's Aksombo Dam. The plant was expected to remain closed for 2 more years while a study was made to determine how to make the operation viable. Only 154,000 tons of clinker was produced before the closing.

Les Ciment du Togo, owned equally by the Government and L. Lambert Freres et Cie. Ets. S.A., produced 243,000 tons of cement, which was about 5% above 1983's level and valued at $9.8 million. Of this production, about 60,000 tons was exported and 179,000 tons was sold domestically. Production capacity was approximately 1 million tons per year.

Iron and Steel.—The Government-owned steel mill, SNS, near the Port of Lome, was leased for 10 years to a U.S. investor in July and resumed operation as STS in December. The initial production of rebar was expected to meet the demands of the domestic market, Burkino Faso, Ghana, Mali, and Niger. Production was based on processing imported steel billets. STS was granted the right to import raw materials tax free and, in addition, was protected by Togo's previous 41% import duty on rebar and higher domestic rebar prices.

Marble.—The Société Togolaise de Marbrerie et de Matériaux (SOTOMA) produced 5,317 square meters of marble, an increase of 2.7% over that of 1983. The 837 square meters that was exported was valued at $35,000. SOTOMA, which had a production capacity of 250 square meters per day, had not operated profitably for years, and the Government was examining methods to reverse the losses.

Phosphate Rock.—Phosphate rock production was Togo's most important mineral resource, representing 13.7% of the 1984 GDP and accounting for 42% of export earnings. Production of 2.4 million tons exceeded that of 1983 by 19.4%. All the production was exported but only represented 65% of operating capacity.

[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF462=US$1.00. The official CFAF exchange was maintained and freely convertible at 50 CFAF per French franc.

[3]Aftenposten (Oslo, Norway). Feb. 6, 1985, p. 29.

[4]Praia Voz Di Povo (Praia, Cape Verde). Dec. 26, 1984, p. 2.

[5]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF424=US$1.00.

[6]Mining Journal (London). V. 303, No. 7779, Sept. 21, 1984, p. 200.

[7]Metal Bulletin (London). No. 6939, Nov. 20, 1984, p. 15.

[8]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF437=US$1.00. Mali returned to the CFAF community in 1984.

[9]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF450=US$1.00.

[10]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF437=US$1.00.

[11]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF434=US$1.00.

The Mineral Industry of the Islands of the Caribbean

By Doris M. Hyde[1]

CONTENTS

BAHAMAS

The impact of mining activities on the economy in both 1983 and 1984 was minimal. The most recent available data on the gross domestic product (GDP) indicated a level of $1.6 billion in 1983.[2] The estimated value for the production of cement, aragonite, and salt was about $17 million in that year, down from the estimated $20 million in 1982. No data are available on the economic impact of the large petroleum refinery at Freeport on Grand Bahama Island, but it represents the major mineral-related activity. Cement production remained at only a fraction of the 800,000 tons per year of plant capacity.

The offshore search for hydrocarbons continued in 1984, and some companies were about to enter the third year of seismic and geological surveying around Andros and Grand Bahamas Islands. Getty Oil (Bahamas) Co. Inc.; Breoco Ltd., a subsidiary of REO Development Corp. of Tulsa, Oklahoma; and Natomas Petroleum (Bahamas) Ltd. were the first companies to be awarded exploration licenses. These companies were committed to drilling at least one well before the end of the third exploration year. Other companies actively engaged in exploration included Exxon Corp., Atlantic Richfield Co. (ARCO), Chevron Oil Bahamas Ltd., and Esso Oil Bahamas Ltd. Geophysical Services Inc. (GSI) of Dallas, Texas, and Petroleum Services (Bahamas) Ltd. of Englewood, Colorado, ran another seismic survey line during 1984. This 1,533-mile line was in the Great Bahama Bank and Cay Sal Bank areas off the southeast Florida coast, and tied in with a 4,530-mile program GSI ran in 1981-82. These surveys were nonexclusive and publicly available through GSI.

A trade journal reported that Charter Oil Co., one-half owner of the 500,000-barrel-per-day refinery of Bahamas Oil Refining Co. on Grand Bahamas Island, was considering the sale of its interest in the facility because of increasing financial losses.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country[2] and commodity	1980	1981	1982	1983[p]	1984[e]
BAHAMAS[3]					
Cement, hydraulic thousand tons	472	29	[e]64	26	--
Petroleum refinery products[e] thousand 42-gallon barrels	67,880	68,650	[r]70,810	[r]62,780	63,000
Salt thousand tons	684	970	816	862	870
Stone:					
Aragonite do.	3,266	3,423	3,049	2,337	2,200
Limestone, for cement manufacture do.	550	532	--	--	--
Sulfur, byproduct of petroleum[e] do.	5	5	5	5	5
BARBADOS[3]					
Cement, hydraulic do.	--	--	--	--	150
Gas, natural:					
Gross[e] million cubic feet	584	450	550	570	800
Marketed do.	311	284	[e]350	[e]360	370
Petroleum:					
Crude thousand 42-gallon barrels	305	211	[e]265	380	630
Refinery products do.	1,364	1,408	[e]1,455	[e]1,480	1,500
CUBA[3 4]					
Cement, hydraulic thousand tons	2,831	3,292	3,163	3,231	[5]3,347
Chromite do.	29	21	27	34	[5]38
Cobalt[6]	1,613	1,715	[e]1,500	1,621	1,400
Copper, mine output, metal content	3,305	2,908	2,645	[5]2,667	[5]2,700
Gas, natural:					
Gross[e] million cubic feet	1,560	1,450	2,000	2,300	2,300
Marketed do.	630	470	378	293	117
Gypsum thousand tons	122	130	127	[e]130	130
Iron and steel: Steel, crude do.	304	330	301	364	[5]338
Lime do.	146	140	145	145	150
Nickel:					
Mine output, Ni-Co content of oxide and sulfide	38,207	40,260	37,600	39,300	[5]33,200
Metallurgical products, Ni content:[6]					
Granular oxide and powder	7,926	8,487	[r]9,001	[r]9,342	8,000
Oxide sinter	11,856	12,115	[r]11,750	[r]11,542	8,400
Sulfide	16,812	17,943	[r]15,346	[r]16,752	15,400
Total	36,594	38,545	[r]36,097	[r e]37,636	31,800
Nitrogen: N content of anhydrous ammonia thousand tons	136	167	98	86	[5]172
Petroleum:					
Crude[7] thousand 42-gallon barrels	1,819	1,684	3,539	4,937	5,125
Refinery products do.	44,337	46,686	47,340	48,180	48,340
Pyrite, gross weight thousand tons	53	33	48	[5]13	50
Salt do.	131	161	198	[5]180	200
Sulfur:[e]					
S content of pyrite do.	22	14	20	[r]5	20
Byproduct of petroleum do.	8	8	8	8	8
Total do.	30	22	28	[r]13	28
DOMINICAN REPUBLIC[3]					
Aluminum: Bauxite, dry equivalent, gross weight do.	606	457	141	--	--
Cement, hydraulic do.	1,015	951	[r e]960	1,064	1,109
Copper, mine output do.	3	3	[e]3	[e]3	--
Gold thousand troy ounces	370	408	[e]380	348	338
Gypsum:					
For cement manufacture thousand tons	185	180	[e]180	[e]180	180
Other do.	50	24	[e]30	[e]30	30
Iron and steel: Ferroalloys, ferronickel[8]	46,614	49,073	14,161	56,685	64,760
Lime[e]	40,000	40,000	40,000	40,000	40,000
Mercury 76-pound flasks	159	77	49	[e]40	30
Nickel:[8]					
Mine output, metal content	16,347	18,689	5,296	[e]20,200	24,300
Metal, smelter, Ni content of ferronickel shipments	16,552	18,679	5,484	21,200	24,220
Petroleum refinery products thousand 42-gallon barrels	9,841	10,529	10,250	10,910	11,000
Salt[e]	[5]55,556	60,000	60,000	60,000	25,144
Silver thousand troy ounces	1,623	2,034	2,100	[e]1,350	1,204
GUADELOUPE[3]					
Abrasives, natural: Pumice thousand tons	250	240	[e]240	[e]240	240
Cement do.	183	160	[e]160	[e]160	160

See footnotes at end of table.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country[2] and commodity	1980	1981	1982	1983[p]	1984[e]
HAITI[3]					
Aluminum: Bauxite, dry equivalent, gross weight thousand tons	312	427	377	--	--
Cement, hydraulic do	243	[r]236	213	216	220
JAMAICA[3]					
Aluminum:					
Bauxite, dry equivalent, gross weight do	12,054	11,682	8,378	7,683	[5]8,735
Alumina do	2,456	2,556	1,758	1,907	[5]1,749
Cement, hydraulic do	144	165	211	277	261
Gypsum do	105	[r]180	108	108	[5]180
Lead, refined (secondary)[e]	1,000	1,000	1,000	1,000	1,000
Lime thousand tons	159	133	114	121	[5]115
Petroleum refinery products thousand 42-gallon barrels	8,201	5,758	[e]6,100	8,366	[5]8,243
MARTINIQUE[3]					
Cement, hydraulic thousand tons	180	180	[e]200	[e]200	200
Petroleum refinery products thousand 42-gallon barrels	3,990	4,357	[e]4,320	[e]4,300	4,300
Pumice, converted from cubic meters thousand tons	153	156	[e]156	[e]150	150
NETHERLANDS ANTILLES[3]					
Petroleum refinery products[e] thousand 42-gallon barrels	214,350	217,700	[r]158,100	[r]171,550	180,000
Phosphate rock thousand tons	--	--	--	3	3
Salt[e] do	400	400	400	[r]202	210
Sulfur, byproduct of petroleum[e] do	91	90	90	[r]87	90
ST. VINCENT[3]					
Salt do	50	50	50	50	50
TRINIDAD AND TOBAGO[3]					
Asphalt, natural do	41	23	30	49	50
Cement, hydraulic do	186	139	189	390	390
Gas, natural:					
Gross million cubic feet	[r]197,270	[r]195,700	[r]203,966	220,648	[5]247,160
Marketed do	[r]59,860	[r]68,255	[r]93,440	[r]108,405	[5]113,515
Iron and steel:					
Iron, sponge thousand tons	22	180	237	284	239
Steel, crude do	3	53	183	210	187
Semimanufactures (wire rod) do	--	29	118	167	135
Lead, refined (secondary)[e]	2,000	2,000	2,000	2,000	2,000
Natural gas liquids thousand 42-gallon barrels	40	[e]40	35	[e]40	40
Nitrogen: N content of ammonia thousand tons	459	348	772	981	[5]1,052
Petroleum:					
Crude thousand 42-gallon barrels	77,616	69,112	64,618	58,344	[5]61,918
Refinery products do	84,600	63,344	55,107	26,933	[5]27,993
Sulfur, byproduct of petroleum[9] thousand tons	57	44	13	8	7

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

[1]Table includes data available through June 6, 1985.

[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 reported, 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, stone, 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]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.

[5]Reported figure.

[6]Anuario 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]Cuba reports crude oil production in metric tons. A conversion to barrels was made using a factor of 6.652. Some published production figures indicate a need to use a conversion factor of 7.3 to balance the units of measurement. However, pending more accurate information, the original factor will continue to be used in this publication.

[8]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.

[9]Limited quantities of sulfur as a byproduct of natural gas may also be produced.

BARBADOS

Cement as an additional export commodity and increased domestic crude oil production were both expected to assist Barbados' economic recovery. Based on preliminary data, real economic growth was expected to reach 2% in 1984. In 1983, with a GDP of $955 million,[3] there was no perceptible real growth, and in 1982, the economy declined by 4.6%. In 1984, unemployment remained relatively high at almost 16%, but inflation stayed below the 5% level.

Barbados' small, construction-oriented minerals sector expanded when the new Arawak Cement Co. Ltd. plant went onstream in May. The $100 million facility in St. Lucy Parish is jointly owned by the Governments of Barbados (51%) and Trinidad and Tobago (49%). Designed capacity was 315,000 tons per year. Export sales were at first limited to members of the Caribbean Community and Common Market (CARICOM). Cement sales to Trinidad and Tobago were at a rate less than the 80,000 tons per year expected when the project was initiated. In October, the company received a cement quality certification from a U.S. industry group, The Portland Cement Association. This meant that Arawak cement could be sold anywhere in the United States. The first sale outside CARICOM was for 2,000 tons to Umar Cement Co. in Puerto Rico. Umar agreed to make additional purchases. The Barbadian cement venture is organized as a private company and receives no favored treatment or subsidy from either owner.

Barbados increased crude oil production by 68% over the 1983 level and provided about one-half of its domestic petroleum needs. In 1981, Barbados reportedly spent over $46 million on oil imports. This amount fell to $28 million in 1983, and although no 1984 figures were available, lower market prices and reduced imports necessarily had a favorable impact on the balance-of-trade deficit. It was reported that Barbados exported 45,000 barrels of oil to Curaçao during 1984. Presumably this was crude oil, although the refinery's production of diesel fuel exceeded domestic consumption. Natural gas production also increased, and the Government was considering the construction of a liquefied petroleum gas plant.

In May, Petro-Canada International Assistance Corp. began a well-drilling program in the northeastern Scotland District. Petro-Canada was also conducting an offshore seismic survey in the Tobago Basin on behalf of Barbados, St. Lucia, St. Vincent, and Grenada. The Tobago Basin is a deepwater area extending north-south about midway between Barbados and the other countries. Cluff Oil Ltd. began a 2-year offshore seismic survey and was expected to eventually drill a test well.

CUBA

Petroleum was the outstanding growth area in Cuba's mineral sector during 1984. Cuba's crude oil output reached as high as 15,400 barrels per day. Average daily production was estimated at about 14,350 barrels, an increase of about 4.7% over that of 1983. Future prospects were encouraging because offshore reserves have yet to be delineated, and deep stratigraphic tests drilled in western Cuba indicated conditions favorable to hydrocarbon accumulation.

The Government continued to emphasize the importance of energy conservation and import substitution as the primary means of improving Cuba's economy. Cuba reported a growth rate of over 7% in the economy as a whole at 1983 constant prices.[4] The balance of trade deteriorated between Cuba and both centrally planned economy and market economy countries. Total exports remained fairly steady, but imports increased by about 17%. The Government stated that it regarded its export obligations to the Council for Mutual Economic Assistance (CMEA) countries as taking priority over all others. When production falls below planned volumes, shortfalls result in decreased exports to non-CMEA markets. As a result, Cuba's access to convertible currency could become more constricted.

Cuban nickel export data have become less available since the United States began to require foreign company certification that U.S. imports of stainless steel products do not contain Cuban nickel. Although nickel sales to Europe were apparently only slightly affected by this requirement in 1983, Cubaníquel officials reported no difficulty selling available 1984 production. Sales of nickel to Europe and Japan were estimated to have declined, but apparently sales to the U.S.S.R. were increased. Market analysts projected increased nickel sales to Europe and Japan in 1985.

New mineral investments were scheduled for 1985. One project was to overhaul Cuba's sulfo-metals plant, the Patrice Lumumba sulfuric acid facility at Santa Lucia in Pinar del Río Province. The acid is used in the fertilizer, electrochemical, and synthetic textile industries. Improvements to the plant were estimated to cost over $18 million and would expand its capacity to 80,000 tons per year from the present level of 43,000 tons per year.

A Spanish company, Internacional de Ingeniería y Estudios Técnicos S.A., was awarded a $10 million contract to build an ammonia plant at Nuevitas in Camagüey Province. The plant was scheduled for a 1986 completion, but capacity was not reported.

The Punta Gorda nickel plant was scheduled to go on-stream in October 1984, but the inauguration was rescheduled for November 1985. The work was reported as 83% complete, about the same percentage reported early in 1984. A trade newspaper published a series of articles on Cuba's metalworking, nickel, and steel industries.[5] Based on interviews with Cuban officials, the informative reports tended to emphasize future plans for establishing a greater diversity of nickel products, several cobalt separation plants, a nickel refinery, and also included information on Cuba's nickel export plans. A new metalworking plant was reported on-stream in May. It was to produce spare parts and effect repairs for the nickel industry.

The Empresa Siderúrgica José Martí (Antillana de Acero) steel plant at Cotorro, Havana, was to undergo a long-discussed modernization to increase capacity from the present 450,000 tons per year. A Spanish engineering firm was selected to install two 50- or 60-strand continuous casters with a combined capacity of 500,000 tons per year of billets 90, 100, and 130 millimeters square. The continuous caster would be fed by two electric furnaces. The new minimill plant construction is adjacent to the present open-hearth steelmaking facility. The cost of this new facility and a rolling plant was estimated at about $450 million.

The search for oil and gas involved deep drilling in 1984. Wells at La Maya in northern Matazas Province reached 13,000 feet, and in Piñar del Río Province, two stratigraphic test wells were drilled over 18,000 feet in depth. Cooperating in Cuba's oil programs were engineers from Mexico and the U.S.S.R. Additional deep tests were planned for western Cuba to confirm mounting evidence that this area contains substantial hydrocarbon potential. Almost all present production comes from three fields east of Havana along the northern coast. All were discovered some years ago: Guanabo in 1968, Boca de Jaruco in 1969, and Varadero in 1971.

The U.S.S.R. has continued to supply Cuba with crude oil and petroleum products totaling as much as 200,000 barrels per day. However, Soviet crude oil production showed a slight decline in 1984, which apparently would persist into 1985. Although there has been no indication of a lessening commitment to supply Cuba, it would be to both countries advantage if Cuba acquired greater domestic capacity.

Transporting crude oil from the northern fields to the Havana refinery has been a vexing problem for Cuba. Reliance on inadequate trucking facilities has forced production curtailments.

Construction continued on the 130,000-barrel-per-day refinery at Cienfuegos on the southern coast. A section of this refinery was designed to accommodate Cuba's domestic production, which is heavy and has a high sulfur content.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983
METALS			
Chromium: Ore and concentrate, refractory grade	[2]21,651	[2]29,050	West Germany 1,062.
Copper: Ore and concentrate[2]	2,789	2,500	NA.
Iron and steel: Metal:			
Scrap	NA	43,835	All to Italy.
Steel, primary forms	NA	30,299	Jordan 24,949; Italy 5,350.
Semimanufactures	[2]18,925	[2]17,121	Algeria 10,605; Cyprus 2,570; Jordan 1,638.
Lead: Metal including alloys, all forms	NA	75	Cyprus 50; Greece 25.
Nickel:[3]			
Sinter, metal content[2]	11,927	11,631	West Germany 3,876; Italy 1,446; Czechoslovakia 976.
Oxides and hydroxides, metal content[2]	9,241	8,728	Czechoslovakia 2,172; U.S.S.R. 1,745; Italy 1,367.
Sulfide, metal content[2]	16,837	17,448	All to U.S.S.R.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983
METALS —Continued			
Silver: Waste and sweepings value, thousands	NA	$745	All to Canada.
Other: Ores and concentrates	NA	5,011	Hungary 5,000; Italy 11.
NONMETALS			
Cement[2]	297,864	213,107	NA.
Stone, sand and gravel: Dimension stone:			
Crude and partly worked:			
Quantity thousand tons	NA	1,423	Hungary 1,330; Japan 93.
Value[2] thousands	$1,115	$1,590	NA.
Worked[2] do	$390	$340	NA.
MINERAL FUELS AND RELATED MATERIALS			
Petroleum:			
Crude 42-gallon barrels	NA	592,182	Belgium-Luxembourg 447,334; Portugal 144,848.
Refinery products:			
Gasoline: Motor do	NA	400,478	All to West Germany.
Bitumen and other residues do	NA	139	All to Italy.

[p]Preliminary. NA Not available.
[1]Table prepared by W. L. Zajac. Owing to a lack of official trade data published by Cuba, 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. The United States reported no trade in mineral commodities with Cuba in 1982 or 1983.
[2]Anuario Estadistico de Cuba, 1983.
[3]Includes contained cobalt.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983
METALS			
Aluminum:			
Oxides and hydroxides	NA	59	All from Japan.
Metal including alloys:			
Unwrought	NA	23	Japan 19; Italy 4.
Semimanufactures	11,856	15,660	Hungary 4,003; Belgium-Luxembourg 16; West Germany 4.
Copper: Metal including alloys:			
Unwrought	NA	31	Japan 25; Finland 5; Belgium-Luxembourg 1.
Semimanufactures	NA	75	West Germany 51; Canada 21; Yugoslavia 3.
Iron and steel: Metal:			
Scrap	NA	97,445	All from U.S.S.R.
Semimanufactures:			
Bars, rods, angles, shapes, sections	NA	8,113	Hungary 7,407; West Germany 666; Japan 40.
Universals, plates, sheets	[2]559,108	[2]670,050	Poland 17,355; Hungary 3,626; Japan 3,546.
Hoop and strip	NA	304	West Germany 178; Belgium-Luxembourg 97; Japan 29.
Rails and accessories	NA	26	All from Portugal.
Wire	NA	1,095	West Germany 508; Belgium-Luxembourg 477; Italy 105.
Tubes, pipes, fittings	[2]64,344	[2]75,491	West Germany 1,937; Sweden 20; Canada 1.
Castings and forgings, rough	[2]164,296	[2]182,213	NA.
Lead:			
Oxides	NA	2	All from West Germany.
Metal including alloys, semimanufactures	NA	444	West Germany 315; Belgium-Luxembourg 114; Japan 15.
Magnesium: Metal including alloys, all forms kilograms	NA	6	All from Japan.
Manganese:			
Ore and concentrate	NA	375	Do.
Oxides	NA	206	Do.
Nickel: Metal including alloys, unwrought	NA	3	West Germany 2; Canada 1.

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983
METALS —Continued			
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	NA	$13	All from West Germany.
Silver: Metal including alloys, unwrought and partly wrought do.	NA	$2	Do.
Tin: Metal including alloys, unwrought	NA	82	All from Denmark.
Titanium: Oxides	NA	28	All from West Germany.
Zinc:			
Oxides	NA	23	All from Japan.
Metal including alloys:			
Unwrought	NA	535	Algeria 460; Japan 75.
Semimanufactures	NA	33	All from Japan.
Other: Base metals including alloys, all forms	NA	17	Italy 15; Canada 1; West Germany 1.
NONMETALS			
Abrasives, n.e.s.:			
Artificial: Corundum	NA	3	All from West Germany.
Grinding and polishing wheels and stones	NA	6	Italy 5; Japan 1.
Asbestos, crude	NA	1,794	All from Canada.
Boron materials: Oxides and acids	NA	326	Italy 325; West Germany 1.
Cement	NA	24,903	U.S.S.R. 21,000; Denmark 3,903.
Diatomite and other infusorial earth	NA	30	All from Italy.
Feldspar, fluorspar, related materials	NA	22	All from West Germany.
Fertilizer materials: Manufactured:			
Ammonia	[2]15,817	[2]16,276	West Germany 10.
Nitrogenous	[2]595,241	[2]641,337	U.S.S.R. 590,179; West Germany 1.
Phosphatic (total)	312,583	342,351	U.S.S.R. 292,500.
Of which:			
Superphosphate, simple[2]	255,683	296,851	NA.
Superphosphate, triple[2]	56,900	45,500	NA.
Potassic (total)	333,764	340,208	U.S.S.R. 183,900.
Of which:			
Potassium chloride[2]	311,345	315,502	NA.
Potassium sulfate[2]	22,419	24,706	NA.
Graphite, natural	NA	233	All from Japan.
Gypsum and plaster	NA	158	All from West Germany.
Magnesium compounds	NA	12	Do.
Mica: Worked including agglomerated splittings kilograms	NA	1,432	All from Japan.
Phosphates, crude	NA	5,010	All from Algeria.
Pigments, mineral: Iron oxides and hydroxides, processed	NA	64	Japan 46; West Germany 18.
Sodium compounds, n.e.s.: Carbonate, manufactured	NA	6	All from West Germany.
Stone, sand and gravel:			
Dimension stone, worked	NA	23	All from Belgium-Luxembourg.
Quartz and quartzite	NA	48	All from Sweden.
Sulfur:			
Elemental:			
Crude including native and byproduct	169,000	185,000	Canada 83,175; Belgium-Luxembourg 7.
Colloidal, precipitated, sublimed	NA	4	All from West Germany.
Sulfuric acid	NA	52	West Germany 28; Japan 24.
Talc, steatite, soapstone, pyrophyllite	NA	50	All from Japan.
Other: Crude	NA	4,000	All from Algeria.
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	NA	3,838	U.S.S.R. 2,906; West Germany 616; Japan 316.
Coal: Anthracite[2]	207,786	75,219	NA.
Coke and semicoke	[2]60,019	[2]56,274	Japan 549.
Petroleum:			
Crude[2] thousand 42-gallon barrels	45,600	50,090	NA.
Refinery products:			
Gasoline: Motor[2] do.	2,232	2,121	NA.
Mineral jelly and wax do.	NA	1	All from West Germany.
Distillate fuel oil[2] do.	25,649	28,232	NA.
Lubricants do.	[2]966	[2]854	West Germany 29; Italy 29; Canada 1.
Residual fuel oil[2] do.	8,642	7,265	NA.
Unspecified[2] value, thousands	$44,700	$53,400	NA.

[p]Preliminary. NA Not available.
[1]Table prepared by W. L. Zajac. Owing to a lack of official trade data published by Cuba, 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. The United States reported no trade in mineral commodities with Cuba in 1982 or 1983.
[2]Anuario Estadistico de Cuba, 1983.

DOMINICAN REPUBLIC

The operational minerals sector has remained relatively static in recent years, except for the loss of bauxite as an export commodity. However, the Government has been in the midst of a very active program to evaluate and develop the country's promising minerals and energy potential. The Government undertakings were carefully planned to be consistent with available financial resources and to optimize opportunities for technical training. Financial and technical assistance has been obtained from multilateral organizations and foreign public and private entities.

Midyear projections on economic performance indicated that the 1984 GDP could reach more than $10 billion.[6] The real growth rate was estimated at 2%. These estimations could be subject to substantial changes later as a result of adjustment measures taken during the year under the International Monetary Fund program. Exchange rate adjustments[7] made during 1984 contributed to an inflation rate estimated at 34%.

A key element in the Government's mineral strategy was the $50 million exploration, evaluation, and mapping program of mineral and energy potentials undertaken with U.S. Geological Survey (USGS) assistance. USGS projects underway included a study of phosphate potential, the continuation of a marine geologic survey; cooperation in a land and marine petroleum evaluation study financed by an $11 million Inter-American Development Bank (IADB) loan; a study of the geothermal potential of the Constanza area in the Cordillera Central; an evaluation of the base metal potential in the Jayaco District; and the construction of a new geological laboratory.

A mission from Japan entered the second phase of its 3-year Central Cordillera exploration program. Working jointly with Government geologists, the team planned to continue studies on the Las Cañitas copper deposit. The group does not plan to continue work on the Mata Grande copper deposit. Las Cañitas was explored earlier by Falconbridge Dominicana C. por A. (Falcondo) and the French Bureau de Recherches Géologiques et Minières, and they determined the deposit was not large enough to be exploited. It was reported that the Japanese exploration was more extensive and found additional reserve indications.

Falcondo continued copper exploration at the Cerro de Maimón Prospect southeast of its Bonao ferronickel plant in the Quisqueya concession. A total of 3 million tons of proven ore grading 4% copper was defined. The Maimón Formation, extending some 80 kilometers from Pueblo Viejo to La Vega, has been mapped and sampled in a continuing exploration program by Rosario Dominicana S.A. and the Dirección General de Minería. The area adjoins Falcondo's Quisqueya concession. The Spanish company Hullera-Vasco-Leonesa S.A. was to continue its earlier exploration and prefeasibility studies on a copper-gold prospect in the El Yujo area of the Jarabacoa Mountains. The Spanish firm began exploration activities in 1979 when it agreed to a joint venture with the Government to explore and possibly exploit a 4,000-hectare area in the central highlands.

The oxide reserves at Rosario's Pueblo Viejo precious metals mine are projected for depletion by the end of the 1980's. Processing the underlying sulfide ore poses technical problems, and would require a $300 million investment. Processing costs were estimated at $300 per ounce. The 2,000 tons per day of byproduct sulfuric acid produced could be used in a proposed superphosphate fertilizer plant. Consultants from AMAX Inc. and Fluor Corp. were evaluating the proposal. Meanwhile, Rosario continued to explore the nearby Pueblo Viejo II areas of Monte Negro, Los Cacaos, and El Callejón. Rosario assumed responsibility for the Fiscal Mining Reserves (FMR) at Los Hojanchos, Yuvina, and La Cuaba to the southeast of Pueblo Viejo. These areas may contain base metals and precious metal oxide deposits.

Complejo Metalúrgico Dominicano C.A., the Government-owned steel producer, was granted licenses to search for iron ore in three areas totaling 7,000 hectares. The licensed areas included ferrotitanium sands near Montecristi in the northwest that were explored by a West German firm in 1982. Another ferrotitanium area exists in the south-central part of the country near Las Calderas. Three magnetite deposits have been reported near Hatillo in the central area.

On March 30, 1984, the Aluminum Co. of America (Alcoa) formally notified the Government that it was immediately relinquishing its Pedernales bauxite concession. Alcoa had worked the property since 1945, but ceased active mining in 1982. An estimated 140,000 tons of stockpiled bauxite ore was to be passed to the Government. The concession area, was declared a FMR to be managed by Rosario.

Alcoa continued to mine and export limestone from its nearby Cabo Rojo concession. Late in 1984, there was an unconfirmed report that the company was negotiating for the sale of this operation. Ideal Basic Industries Ltd., a U.S. cement producer, was reported as having cost-control problems at its Mobile, Alabama, plant because of the high moisture content of local stone. It was further reported that Basic planned on acquiring limestone concessions in the Dominican Republic as a new source of low-moisture raw material.

Falcondo operated its Bonao ferronickel plant at 84% capacity in 1984 and shipped over 53 million pounds. The increased output was obtained from the operation of only one electric furnace through a combination of improved technology and the selective mining of higher grade ore. Ore reserves at yearend totaled more than 41 million tons grading 1.77% nickel.

HAITI

Several geological research projects were underway or initiated in 1984, but they did not affect Haiti's normally construction-oriented minerals sector. Preliminary reports indicated the GDP reached $1.8 billion.[8] In real terms, the economy grew by less than 2%. The industrial and construction sectors were the major contributors.

The country's hydroelectric potential is not considered sufficient to satisfy projected power requirements, and new thermal plant capacity was, therefore, under study. The IADB granted $1.2 million for prefeasibility and feasibility studies directed toward determining the optimum size and type of a future thermal powerplant.

The IADB also made a technical cooperation grant of $1.6 million to prepare a geologic report on Haiti and to strengthen the Ministére des Mines et des Resources Energetiques (MMRE). This program complements a Petro-Canada grant of $2.7 million to carry out a seismic study of the Continental Shelf. The geologic work sponsored by the IADB was to include tectonics, structural geology, stratigraphy, and physiography of all onshore areas as well as the Continental Shelf.

An ongoing United Nations Development Program and MMRE exploration project in northern Haiti resulted in the discovery of a gold-bearing ore body at Morne Bossa in the Milot area about 12 kilometers south of Cap Haitian. Drilling indicated about 2 million tons of ore averaging 2.25 grams of gold per ton. For the first phase of a mining operation, reserves of 1 million tons were to be selected with an average grade of 2.74 grams per ton. The gold occurs in a siliceous gossan on the oxidized portion of polymetallic sulfides contained in silicified Cretaceous rhyolites and volcanic breccias. The ore body was found at depths varying between 17 and 64 meters below the surface.

JAMAICA

Government expectations for a rejuvenation of its depressed bauxite and alumina industries dimmed as the year progressed. Although total bauxite production was over 14% greater than in 1983, a fourth quarter drop of 16% from third quarter output cast a shadow on 1985 production projections. Among the solemn prospects facing the Government was the cessation of production by Jamaica Reynolds Bauxite Partners Ltd., cutbacks in North American aluminum capacities, and the completion of production for sales to the U.S. Government. On the positive side was the start of the first full year of a contract with the U.S.S.R. for a total of 7 million tons of bauxite over a 7-year period.

Jamaica's net earnings from the bauxite and alumina industry dropped by an estimated $30 million in 1984. This was because of the Jamaica Reynolds closure, reduced output from Alumina Partners of Jamaica (Alpart), the devaluation of the Jamaican dollar, and a reduction in the bauxite production levy. After a real economic growth of about 2% in 1983, the GDP for 1984 was not expected to show any positive growth in real terms. The rate of inflation increased to about 31% in 1984, and this was attributed primarily to the continued devaluation of the currency and the removal of subsidies on many basic goods and services. After a series of devaluations, at the end of November, the Jamaican dollar was allowed to float freely against the U.S. dollar.[9] The exchange rate was determined by the lowest bid exhausting the available supply of foreign exchange. The available supply was determined by the amount left after the Government allocated specified proportions to pay for essential imports, such as oil and the service of debt obligations.

The trade deficit narrowed as export earnings rose at a faster pace than imports for the first time in 4 years. Bauxite and alumina exports accounted for about $502 million, or almost 68% of the total estimated foreign exchange earnings.

One of the major costs to all industry in Jamaica was energy. The Government has encouraged the conversion to coal as an alternative fuel to petroleum, which also must be paid for in scarce foreign exchange. It has been argued that the investment for this conversion would considerably reduce the cost of producing electricity, cement, and processing bauxite to alumina.

In April, the features of the newly negotiated bauxite production levy were announced. The levy has been renegotiated on a 5-year basis since its first introduction in 1974 at 7.5% of the average realized price of primary aluminum ingot, as quoted in the American Metal Market. In 1979, the rate was reduced to 6.5%. Effective February 15, 1984, the levy rate was to remain constant at 6%, but to be based on the average realized price of primary ingot as reported to the U.S. Securities and Exchange Commission. The quarterly levy payment schedule was replaced by a monthly system. The measured weight basis was to be by metric tons instead of long dry tons. Levy payments were to be made on actual shipments rather than the previous system of provisional tonnage. Royalty payments remained at $0.50 per ton, but in U.S. currency rather than in Jamaican currency. Incentives were introduced for increased productivity. They included a lower basic levy rate for production above 70% of each company's defined plant capacity and allowances for improved energy efficiency, plant modernization, and expansion.

Jamaica continued to seek new markets for bauxite and alumina because the 1984 increased bauxite shipments did not necessarily reflect a recovery in the prevailing weak world market. Rather, they included increased final shipments of slightly more than 1 million tons by Jamaica Reynolds, the final shipment of 800,000 tons to the U.S. National Defense Stockpile, and the shipment of 800,000 tons to the U.S.S.R. in the first full year of a 7-year contract to purchase 7 million tons.

Alumina shipments fell by more than 11% because of reduced output from Alcoa Minerals of Jamaica Inc. and a nearly 3-month shutdown of the Alpart refinery.

Jamaica concluded a countertrade agreement with Yugoslavia under which alumina would be exchanged for low-cost housing and construction material. During the 5-year term of the agreement, Jamaica is to send about 450,000 tons of alumina valued at about $75 million. The first shipment of 50,000 tons was made in 1984 in exchange for 1,500 housing units.

Jamaica and Colombia signed a preliminary agreement for a joint venture to construct a 140,000-ton-per-year aluminum plant on the Colombian north coast. The refinery cost was estimated at between $400 and $500 million. About 240,000 tons per year of alumina feedstock would be supplied by Jamaica. Sales were projected to be made to Colombia, Central America, and eventually as markets improve, to the United States. Energy needs of the refinery would be met by Colombia from the Urra hydroelectric project and by coal from the El Cerrejón region. Several years would be required to complete evaluation and feasibility studies. Financing arrangements were under discussion with the International Finance Corp. of the International Bank for Reconstruction and Development. Allied with the aluminum smelter project was an agreement of mutual intent to exchange the Jamaican alumina feedstock for Colombian coal that would be used for Jamaica's planned conversion from petroleum to coal by major industrial energy consumers.

In 1983, Jamaica Reynolds reduced its work force and rate of mining. In February 1984, Reynolds Metals Co. informed the Government it was phasing out its interest in the bauxite operation, with mining to cease in April and shipping to stop in May or June. The company cited the poor world aluminum market and the availability of feedstock from more economically advantageous sources. The Government, a 51% owner of Jamaica Reynolds, was considering its options in regard to the feasibility of effectively continuing the mining operation. The Reynolds Metals pullout was partly responsible for an increased strain on Jamaica's financial resources. The full impact of foreign exchange losses was expected in 1985.

In June, a few months after the Reynolds Metals closure announcement, Alpart responded to a threatened labor strike notice by closing down its 1.2-million-ton-per-year alumina plant for 10 weeks. The company is owned by Kaiser Aluminum & Chemical Corp. (36.5%), Reynolds Metals (36.5%), and ARCO (27%). Alpart had just completed a $100 million, 9-mile conveyor belt to bring mined ore to the alumina plant. The company had been operating at 50% of capacity for about 2 years, and there was little optimism for increasing production above 800,000 tons per year in the near future. The shutdown was primarily responsible for alumina output falling 11% below that of 1983. ARCO announced it would dispose of its share of Alpart as part of a planned withdrawal from metals operations worldwide. At the end of 1984, ARCO had not sold its interest, and the intentions of the other partners and the Government were uncertain.

Alcoa continued with its 5-year plan to increase the efficiency of its bauxite mining and alumina processing operations. However, production remained at 50% of the plant's new 800,000 tons per year capacity, and the company did not anticipate increasing this volume in the near future.

Petro-Canada loaned the state-owned Petroleum Corp. of Jamaica (Petrojam) $4 million to explore petroleum prospects off the island's southern coast. The project cost was estimated at $12 million and Jamaica sought investors to assist in financing. If possible, Petrojam wanted to retain one-third interest in the 100-block New Bank section of Area F where drilling was planned. The Government offered liberalized terms to potential investors.

Table 4.—Jamaica: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	4,080	3,120	2,953	U.S.S.R. 167.
Oxides and hydroxides do	1,753	1,904	415	Canada 467; United Kingdom 457; Brazil 66.
Metal including alloys:				
Scrap	504	34,342	34,301	United Kingdom 23; Canada 18.
Semimanufactures	411	396	17	Trinidad and Tobago 328; West Germany 18.
Copper: Metal including alloys, scrap	208	302	146	United Kingdom 80; Belgium-Luxembourg 38.
Gold: Waste and sweepings value, thousands	--	$8	--	All to Bermuda.
Iron and steel: Metal:				
Scrap	86	41	41	
Semimanufactures:				
Bars, rods, angles, shapes, sections	20	37	--	Trinidad and Tobago 5; Cayman Islands 3; unspecified 29.
Universals, plates, sheets	4,926	4,450	--	Trinidad and Tobago 4,189; Belize 113; Antigua 62.
Wire	--	2	--	Mainly to Belize.
Tubes, pipes, fittings	47	102	--	Trinidad and Tobago 99.
Castings and forgings, rough	29	5	--	Mainly to Netherlands Antilles.
Platinum-group metals:				
Waste and sweepings value, thousands	NA	$29	--	All to Canada.
Metals including alloys, unwrought and partly wrought troy ounces	--	32	32	
Silver: Waste and sweepings value, thousands	NA	$6	$5	Canada $1.
Tin: Metal including alloys:				
Scrap	414	525	508	Suriname 17.
Semimanufactures	95	90	90	
Zinc: Metal including alloys, scrap	r37	35	--	Spain 19; West Germany 16.
Other: Base metals including alloys, all forms	--	18	--	All to Belgium-Luxembourg.
NONMETALS				
Cement	2	494	--	Cayman Islands 470.
Chalk	--	1,460	--	Trinidad and Tobago 1,160; Antigua 300.
Clays, crude value	--	$65	--	All to Italy.

See footnotes at end of table.

Table 4.—Jamaica: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials: Manufactured, nitrogenous	--	2	--	All to Cayman Islands.
Gypsum and plaster	87,634	57,730	24,116	Trinidad and Tobago 9,458; Cayman Islands 9,308.
Lime	288	105	--	All to Suriname.
Salt and brine thousand tons	1,562	1,132	135	Trinidad and Tobago 882; Barbados 60.
Stone, sand and gravel:				
Gravel and crushed rock	9	--		
Limestone other than dimension	8,250	30	NA	NA.
Sand other than metal-bearing	--	32	NA	NA.
Sulfur: Sulfuric acid	61	14	--	All to Haiti.
Talc, steatite, soapstone, pyrophyllite	--	2	--	Barbados 1; Trinidad and Tobago 1.
Other: Slag and dross, not metal-bearing value, thousands	--	$3	$3	
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Kerosine and jet fuel 42-gallon barrels	106,292	(2)	(2)	
Distillate fuel oil do	120,104	31,304	--	Trinidad and Tobago 31,078.
Lubricants do	r96,638	133,288	--	Guatemala 27,557; Guyana 19,525; Dominican Republic 16,011.
Residual fuel oil do	131,690	239,019	--	Trinidad and Tobago 175,700; Netherlands 62,898.
Bitumen and other residues do	r6	6	6	

rRevised. NA Not available.
[1]Table prepared by V. L. Paytes.
[2]Unreported quantity valued at $361.

Table 5.—Jamaica: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	r18	22	15	Canada 5; United Kingdom 2.
Metal including alloys:				
Scrap	--	199	--	All from Canada.
Unwrought	1,570	1,494	--	Do.
Semimanufactures	2,096	1,933	944	United Kingdom 417; Canada 385.
Copper:				
Sulfate	8	1	1	
Metal including alloys:				
Unwrought	18	2	(2)	Mainly from United Kingdom.
Semimanufactures	r1,149	750	86	United Kingdom 369; Hong Kong 276.
Gold:				
Waste and sweepings value, thousands	r$2	--		
Metal including alloys, unwrought and partly wrought troy ounces	2,829	2,540	NA	West Germany 1,350; United Kingdom 1,125; Canada 64.
Iron and steel: Metal:				
Scrap value, thousands	r$12	--		
Pig iron, cast iron, related materials	r24	4	1	Canada 3.
Ferroalloys	NA	201	(2)	Brazil 190; Canada 11.
Steel, primary forms	7,435	11,940	3,173	Trinidad and Tobago 8,123; United Kingdom 637.
Semimanufactures:				
Bars, rods, angles, shapes, sections	r15,204	14,273	5,606	Trinidad and Tobago 3,405; United Kingdom 1,622.
Universals, plates, sheets	35,246	37,467	11,545	United Kingdom 13,113; Japan 8,291; North Korea 2,246.

See footnotes at end of table.

Table 5.—Jamaica: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Hoop and strip	600	300	198	United Kingdom 96; Belgium-Luxembourg 6.
Rails and accessories	r326	255	193	United Kingdom 37; France 25.
Wire	3,775	4,426	373	Belgium-Luxembourg 2,127; United Kingdom 905; West Germany 566.
Tubes, pipes, fittings	3,025	10,137	3,362	Japan 5,740; North Korea 280; China 271.
Castings and forgings, rough	52	134	41	Barbados 49; United Kingdom 26; China 8.
Lead:				
Oxides thousand tons	403	153	68	Mexico 81; Netherlands 4.
Metal including alloys:				
Unwrought	55	168	19	Canada 149.
Semimanufactures	75	30	28	United Kingdom 2.
Magnesium: Metal including alloys, semimanufactures value	$1,100	$600	$500	United Kingdom $100.
Manganese: Ore and concentrate	167	219	--	Spain 105; United Kingdom 60; West Germany 54.
Molybdenum: Metal including alloys:				
Unwrought kilograms	1	--		
Semimanufactures do	252	1,928	1,908	United Kingdom 20.
Nickel: Metal including alloys:				
Unwrought value, thousands	--	$5	--	All from Canada.
Semimanufactures	15,356	5,095	536	West Germany 3,886; United Kingdom 672.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	1,447	386	257	United Kingdom 64; Canada 32.
Silver:				
Ore and concentrate value	$4,006	--		
Waste and sweepings do	--	$69	$69	
Metal including alloys, unwrought and partly wrought troy ounces	r32,729	35,880	9,581	West Germany 18,776; United Kingdom 7,523.
Tin: Metal including alloys:				
Scrap	--	98	--	All from United Kingdom.
Unwrought	2	4	--	All from Denmark.
Semimanufactures	8,752	7,195	1,533	United Kingdom 4,221; Japan 895.
Titanium: Oxides	660	761	97	United Kingdom 459; West Germany 100; Mexico 100.
Tungsten:				
Ore and concentrate value	--	$135	$135	
Metal including alloys, semimanufactures kilograms	1	141	131	United Kingdom 10.
Uranium and/or thorium: Metal including alloys, all forms	(2)	2	2	
Zinc:				
Oxides	174	82	43	Venezuela 20; Netherlands 17.
Blue powder	6	12	12	
Metal including alloys:				
Scrap value	--	$46	--	All from United Kingdom.
Unwrought	935	918	218	Canada 700.
Semimanufactures	NA	125	119	United Kingdom 5; Canada 1.
Other:				
Ores and concentrates	4	6	--	All from United Kingdom.
Oxides and hydroxides	r32	21	2	West Germany 7; Norway 6.
Base metals including alloys, all forms	1	1	1	
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$14	$65	$63	Canada $1; United Kingdom $1.
Dust and powder of precious and semiprecious stones excluding diamond do	r$1	--		
Grinding and polishing wheels and stones	r17	24	6	Italy 14; West Germany 1; United Kingdom 1.
Asbestos, crude	491	16	12	United Kingdom 4.
Boron materials: Crude natural borates	4	2	2	
Cement	10,401	7,273	341	Mexico 5,204; Colombia 1,275.

See footnotes at end of table.

Table 5.—Jamaica: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Chalk	1	12	(2)	West Germany 10; United Kingdom 2.
Clays, crude	881	265	248	United Kingdom 14; West Germany 3.
Diamond: Industrial stones value	r$795	$384	$298	United Kingdom $86.
Diatomite and other infusorial earth	58	38	38	
Feldspar, fluorspar, related materials	13	30	30	
Fertilizer materials:				
Crude, n.e.s value, thousands	--	$1	$1	
Manufactured:				
Ammonia	247	203	85	United Kingdom 116; Canada 2.
Nitrogenous	11,406	24,911	395	Canada 17,853; Netherlands Antilles 6,623.
Phosphatic	84,329	7,414	312	Netherlands 5,093; Canada 2,009.
Potassic	8,477	6,726	8	Canada 6,718.
Unspecified and mixed	6,505	1,592	37	Canada 1,554; West Germany 1.
Graphite, natural	r$2	$2	$1	United Kingdom $1.
Gypsum and plaster	408	162	102	Canada 60.
Lime	500	1	1	
Magnesium compounds: Oxides and hydroxides	--	2	--	All from United Kingdom.
Mica:				
Crude including splittings and waste	77	134	4	Norway 129; Belgium-Luxembourg 1.
Worked including agglomerated splittings kilograms	974	5,038	5,015	United Kingdom 23.
Nitrates, crude	r(2)	1	--	All from West Germany.
Phosphates, crude	463	17,804	17,804	
Pigments, mineral:				
Natural, crude	r(3)	12	--	West Germany 11; United Kingdom 1.
Iron oxides and hydroxides, processed	97	159	6	West Germany 84; United Kingdom 32; Belgium-Luxembourg 27.
Potassium salts, crude value	$23	$14	--	All from United Kingdom.
Precious and semiprecious stones other than diamond value, thousands	r$21	$7	$7	
Salt and brine	r45,387	18,235	18,211	United Kingdom 13; Canada 6.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	3,555	5,634	5,378	Netherlands 244; Poland 8.
Sulfate, manufactured	3,636	4,147	3,428	West Germany 501; Netherlands 211.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	(4)	60	6	Italy 54.
Worked	5	29	(2)	Mexico 24; Belize 5.
Gravel and crushed rock	138	7	7	
Limestone other than dimension value	--	$10	$10	
Quartz and quartzite	5	7	7	
Sand other than metal-bearing	184	377	372	United Kingdom 5.
Sulfur:				
Elemental:				
Crude including native and byproduct	24	19	9	Belgium-Luxembourg 10.
Colloidal, precipitated, sublimed	301	2,962	2,961	United Kingdom 1.
Dioxide	3,001	--		
Sulfuric acid	r3,930	27	25	United Kingdom 1.
Talc, steatite, soapstone, pyrophyllite	287	505	381	Norway 119.
Other: Crude	1	17	16	United Kingdom 1.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	51	53	53	
Carbon: Carbon black	832	816	97	Mexico 462; Venezuela 207; Canada 38.
Coal: Briquets of anthracite and bituminous coal	--	8	8	
Coke and semicoke	215	90	76	United Kingdom 14.
Peat including briquets and litter value	$7	--		
Petroleum:				
Crude thousand 42-gallon barrels	r336	547	547	
Refinery products:				
Liquefied petroleum gas do	r172	167	153	Venezuela 10; Netherlands Antilles 4.
Gasoline:				
Aviation do	18	12	--	All from Netherlands Antilles.
Motor do	r286	172	(2)	Mainly from Netherlands Antilles.

See footnotes at end of table.

Table 5.—Jamaica: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Mineral jelly and wax thousand 42-gallon barrels	16	10	2	United Kingdom 3; West Germany 2.
Kerosine and jet fuel do	r309	248	(2)	Netherlands Antilles 220; Panama 27.
Distillate fuel oil do	r363	202	--	All from Netherlands Antilles.
Lubricants do	r39	32	7	Netherlands Antilles 20; Trinidad and Tobago 4.
Residual fuel oil do	r13,032	14,212	1,000	Netherlands Antilles 5,274; Venezuela 4,904; Mexico 2,092.
Bitumen and other residues do	r27	9	9	
Petroleum coke value	--	$580	$580	

rRevised. NA Not available.
1Table prepared by V. L. Paytes.
2Less than 1/2 unit.
3Unreported quantity valued at $3,312.
4Unreported quantity valued at $9,055.

TRINIDAD AND TOBAGO

Petroleum and natural gas remained the foundation on which Trinidad and Tobago's economy has grown and prospered. Petroleum has traditionally accounted for over 80% of total export earnings, and over 50% of total Government revenue income. Abundant natural gas has been the foundation for large industrial developments at Point Lisas.

Recent tax reductions and other incentives appeared to have had a positive effect on new hydrocarbon drilling and secondary recovery efforts. A 6-year downtrend in crude oil output was finally reversed in 1984. The fertilizer sector operated at near capacity levels, and an expansion was announced that will substantially increase production by 1988. The iron and steel complex has had compounding problems since startup in 1981, and could face a shutdown in the near future unless a partner is found to provide capital and technical expertise.

The fall in world petroleum market prices and declining domestic production seriously reduced Trinidad and Tobago's foreign exchange earnings and caused the Government to impose an economic austerity program in 1984. To encourage petroleum production efforts, during 1983 and 1984, the Government eased some taxes and introduced accounting modifications. These changes could result in less immediate tax revenue, but increased production would be more meaningful and more than compensate for reductions arising from tax and accounting changes.

Although official figures were not available, it was generally estimated that the real GDP decreased by 5.2% in 1983. A further downturn of over 7% was projected for 1984. The petroleum sector represented 40% of the GDP in 1980, but it dropped to 23% in 1983. An economic adjustment program during 1984 included some tax increases and reductions in spending and imports. By the end of September, Government spending had decreased 13% and capital expenditures were down 34% from 1983 levels. A trade deficit of $195 million during 1983 was reversed in 1984.[10]

The Government (51%) and Federation Chemicals Ltd. (49%), a subsidiary of W. R. Grace & Co., joint owners of the Trinidad and Tobago Nitrogen Co., agreed to invest $250 million to increase the anhydrous ammonia plant's capacity from 400,000 tons per year to about 900,000 tons per year. The expansion was scheduled for completion in early 1988. The other large ammonia company, Fertilizers of Trinidad and Tobago Ltd. (Fertrin), jointly owned by the Government (51%) and Amoco International Oil Co. (49%), began the year with a capacity of 750,000 tons per year of anhydrous ammonia. The Government reported that proposals for additional ammonia plant constructions by foreign companies are under consideration.

The Government-owned new urea plant operated by Fertrin was commissioned on December 2, 1983, and produced 10,797 tons during that month. After producing 14,916 tons in January 1984, the plant was shut down with the expectation of reopening in late July. The new $160 million methanol plant at Point Lisas was commissioned in March. The plant's capacity was designed at 1,200 tons per day.

At yearend, the Iron and Steel Co. of Trinidad and Tobago (ISCOTT) was holding separate discussions with several potential foreign partners. These included Bechtel Group Inc. of the United States, Voest-Alpine AG of Austria, and Hamburger Stahlwerke GmbH of the Federal Republic of Germany. ISCOTT has had problems since its startup in 1981. A 1984 Government-sponsored study recommended a temporary closure until a partnership could be formed to obtain the technical expertise necessary to operate the plant efficiently. The Government declined to close the plant but began actively searching for a partner. There was a report in early 1984 that Cuba had contracted to purchase 60,000 tons of wire rods and, if true, this could eliminate participation by a U.S. partner.

The Government initiated actions to halt declining crude oil production. The Supplemental Petroleum Tax (SPT) was introduced in 1981 as a tax on gross revenues from crude oil production. In 1983, the SPT on land-based production was reduced from 35% to 15%. In November 1984, the SPT on marine production was reduced from 60% to 55%. An oil production tax was reduced from about $1.25 per barrel to 25 to 50 cents per barrel, depending on grade. A new law allowed costs arising from repair and maintenance to be considered expenses rather than additional infusions of capital. This action mollified producers that had anticipated a greater reduction in the marine SPT. Other changes that were expected to be forthcoming in the near future included revisions of the petroleum policy, including a reduction in the Government's share under production-sharing contracts. Tenders were solicited for exploration rights in a large area off the northern coast.

The 6-year crude oil production decline showed signs of a reversal in 1984 as all operating companies except Texaco Trinidad Inc. (Textrin) increased output. The estimated production for 1984, with 1983 in parenthesis, was as follows, in barrels per day: Amoco Trinidad Oil Co. Ltd., 90,187 (81,733); Trinidad Marine Ltd., 38,074 (36,891); Trinidad-Tesoro Petroleum Co. Ltd., 22,700 (21,405); Textrin, 9,693 (11,211); Trinidad and Tobago Oil Co., 8,600 (8,009); and Premier Consolidated Oilfields Ltd., 385 (327).

The average daily production figures may be misleading in that output increased as the year progressed, and by December was reported to total as high as 179,000 barrels. This volume was expected to level off somewhat during 1985. Secondary recovery efforts and new drilling by Amoco Trinidad and Trinidad-Tesoro were cited as responsible for the major share of this increase.

Amoco Trinidad accounted for over 80% of total natural gas production. The company continued to develop the Cassia Field. The Natural Gas Co. of Trinidad and Tobago commissioned the onshore portion of a 30-inch gas pipeline from the Cassia Field. This completion expanded the natural gas transmission system to a capacity of about 1 billion cubic feet per day.

Tesoro Petroleum Co. and the Government, joint owners of Trinidad-Tesoro, continued negotiations for the acquisition of Tesoro's 49% interest. Negotiations began in August 1982, but there was an irreconcilable difference in the price each party set. A joint audit was completed in 1984, and the value of Tesoro's interest was determined to be $188 million. The Government had until mid-January 1985 to agree to the purchase, after which time Tesoro would be free to seek other buyers. Trinidad-Tesoro produces from land-based wells.

Also in August 1982, Textrin announced it wanted to sell its 275,000-barrel-per-day refinery at Pointe-a-Pierre. Refinery input had dropped to about 26,000 barrels per day because Textrin's processing contracts were not renewed. In January 1983, Textrin proposed that the Government assume a 75% interest in the refinery and agree to supply 75,000 barrels per day of crude oil; otherwise, the refinery would be closed. Since 1983, the Government supplied the refinery with 37,000 barrels of crude oil per day, but serious purchase negotiations did not begin until March 1984. In August, the Government announced that an agreement in principle had been reached to purchase the refinery and Textrin's other land-based assets for $175 million. The announcement proved premature and an agreement was not reached in 1984.

The Textrin refinery averaged about 60,000 barrels per day, or less than 22% of capacity. The Point Fortin refinery, owned by the Trinidad and Tobago Oil Co., had a throughput of about 15,000 barrels per day, or less than 18% of capacity. All of the crude oil processed was from Trinidad. Production from the Amoco Trinidad and Trinidad-Tesoro holdings in southeastern Trinidad has always been shipped to the United States for refining. Regardless of the future Textrin refinery ownership, the serious problem remains of obtaining sufficient crude oil to operate at a break-even level of input.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Bahamian dollars (B$) to U.S. dollars at the rate of B$1.00=US$1.00.

[3]Where necessary, values have been converted from Barbadian dollars (Bds$) to U.S. dollars at the rate of Bds$2.00=US$1.00.

[4]Where necessary, values have been converted from Cuban pesos (CP$) to U.S. dollars at the rate of CP$1.13=US$1.00.

[5]American Metal Market. V. 92, Nos. 118-125, June 18-25, 1984.

[6]Where necessary, values have been converted from Dominican Republic pesos (RD$) to U.S. dollars at the official exchange rate of RD$1.00=US$1.00.

[7]The official rate, RD$1.00=US$1.00, applies to certain basic food payments, debts contracted prior to April 1984, Government purchases abroad, new public debt, and petroleum imports for the Dominican Electric Corp. Petroleum imports since August 1984 are at the rate of RD$1.50=US$1.00. The parallel market rate (PMR) floats the peso against the U.S. dollar and is used for all other imports, except medicine. The PMR fluctuated somewhat, but averaged RD$2.80=US$1.00 in 1984. Exporters of traditional products received RD$1.48=US$1.00, and exporters of nontraditional manufactured goods could exchange 85% of their U.S. dollar earnings at the PMR. Nontraditional agricultural exporters received the full PMR in exchange for their U.S. dollars.

[8]Where necessary, values have been converted from Haitian gourdes (HG$) to U.S. dollars at the rate of HG$5.00=US$1.00.

[9]Where necessary, values have been converted from Jamaican dollars (J$) to U.S. dollars at the average rate of J$3.94=US$1.00. In January 1984, the exchange rate was J$1.93=US$1.00. By the end of 1984, the exchange rate was J$4.93=$1.00.

[10]Where necessary, values have been converted from Trinidad and Tobago dollars (TT$) to U.S. dollars at the rate of TT$2.40=US$1.00.

Table 6.—Trinidad and Tobago: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxide	--	1	--	All for ship stores.
Metal including alloys, all forms	5	14	1	Barbados 11; Dominica 1.
Copper:				
Matte and speiss	11	16	16	
Metal including alloys, all forms	433	519	(2)	United Kingdom 312; West Germany 158.
Iron and steel:				
Iron ore and concentrate	27,000	--		
Metal:				
Scrap	116	9	9	
Pig iron, cast iron, related materials	27,185	42,263	NA	Spain 42,253.
Steel, primary forms	24,562	7,927	--	Belgium-Luxembourg 3,647; France 2,744.
Semimanufactures	63,945	120,763	52,918	West Germany 22,437; Jamaica 9,599.
Lead:				
Oxides	417	(2)	NA	NA.
Metal including alloys, all forms	10	166	--	Honduras 68; Brazil 57.
Silver: Waste and sweepings kilograms	--	389	--	All to Canada.
Tungsten: Metal including alloys, all forms kilograms	--	4	NA	NA.
Zinc: Metal including alloys, all forms	2	7	7	
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	1	1	--	All to Guyana.
Barite and witherite	--	3,757	3,757	
Cement	7	15	--	Guyana 9.
Diamond: Gem, not set or strung value, thousands	$8	$5	$5	
Fertilizer materials, manufactured:				
Ammonia	712,467	1,196,655	557,476	Denmark 161,258; United Kingdom 100,416.
Nitrogenous	72,111	54,223	28,763	Guyana 17,334; Suriname 5,735.
Phosphatic	--	10	--	All to Guyana.
Unspecified and mixed	2	7	--	St. Lucia 4; St. Vincent 3.
Pigments, natural: Iron oxides and hydroxides, processed	1	(2)	NA	NA.
Pyrites, unroasted	--	18	--	All to Barbados.

See footnotes at end of table.

Table 6.—Trinidad and Tobago: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Salt and brine	237	259	--	Barbados 250; Jamaica 5.
Sodium compounds, n.e.s.: Sulfate	296	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	42	NA		
Worked	11	NA		
Gravel and crushed rock	4	5	3	NA.
Sand other than metal-bearing	12	3	--	All for ship stores.
Sulfur:				
Elemental: Crude including native and byproduct	--	18	--	All to Barbados.
Sulfuric acid kilograms	15	5	NA	NA.
Talc, steatite, soapstone, pyrophyllite	1,785	10	--	All to Guyana.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	16,068	15,353	35	West Germany 12,073; United Kingdom 2,697.
Carbon: Carbon black	4	--		
Coal: All grades including briquets	127	--		
Petroleum:				
Crude thousand 42-gallon barrels	31,964	32,570	30,928	Italy 1,475; bunkers 167.
Refinery products:				
Liquefied petroleum gas do	403	212	(2)	Guyana 53; Barbados 39.
Gasoline do	8,615	5,465	2,055	Guyana 418; Suriname 351.
Mineral jelly and wax do	(2)	1	(2)	Mainly to Barbados.
Kerosine and jet fuel do	3,720	2,769	--	Barbados 713; Nigeria 429; Antigua 303.
Distillate fuel oil do	9,212	5,793	771	Guyana 645; bunkers 1,046.
Lubricants do	450	338	156	Ivory Coast 22; Nigeria 19.
Residual fuel oil do	28,273	16,404	4,269	Suriname 1,656; Netherlands 1,487; Guinea 885.
Bitumen and bituminous mixtures do	12	47	(2)	West Germany 24; United Kingdom 14.

[r]Revised. NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

Table 7.—Trinidad and Tobago: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	286	240	45	Jamaica 150; Suriname 45.
Oxides and hydroxides	10	124	46	Jamaica 77.
Metal including alloys, all forms	5,047	12,341	7,696	Italy 2,594; Sweden 1,213.
Copper:				
Sulfate	13	31	1	West Germany 18; United Kingdom 9.
Metal including alloys, all forms	1,367	1,559	516	United Kingdom 824.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	201,746	246,596	--	Brazil 235,592.
Metal:				
Scrap	8	1,734	822	Barbados 912.
Pig iron, cast iron, related materials	2,589	888	383	United Kingdom 10.
Ferroalloys	9,282	3,885	2,222	Norway 1,014.
Steel, primary forms	13,652	8,379	37	Japan 5,957; France 1,943.
Semimanufactures	445,866	231,644	11,203	Japan 125,513; United Kingdom 44,567.

See footnotes at end of table.

Table 7.—Trinidad and Tobago: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead:				
Oxides	584	855	([2])	United Kingdom 840; Spain 5.
Metal including alloys, all forms	671	10,055	9,498	United Kingdom 483.
Magnesium: Metal including alloys, all forms	39	3	3	
Manganese: Ore and concentrate	200	NA		
Nickel: Metal including alloys, all forms	14	7	1	United Kingdom 4; Canada 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	1,672	2,090	NA	United Kingdom 193.
Silver:				
Waste and sweepings kilograms	7	25	NA	NA.
Metal including alloys, unwrought and partly wrought troy ounces	59,093	47,454	NA	Canada 28,518; United Kingdom 2,025.
Tin: Metal including alloys, all forms	3,170	618	16	United Kingdom 589.
Titanium: Oxides	844	1,042	222	United Kingdom 808.
Tungsten: Metal including alloys, all forms kilograms	1,335	109	109	
Zinc:				
Oxides	173	231	39	United Kingdom 101.
Metal including alloys, all forms	187	24	7	Canada 11; Norway 3.
Other:				
Ores and concentrates	5	6	6	
Oxides and hydroxides	15	7	2	West Germany 3.
Base metals including alloys, all forms	3	19	19	
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	10	30	23	West Germany 5.
Dust and powder of precious and semiprecious stones value	$400	$200	$200	
Grinding and polishing wheels and stones	2,144	6,079	6,007	Venezuela 35.
Asbestos, crude	8	--		
Barite and witherite	22,543	35,811	2	Turkey 23,518; Brazil 6,150.
Boron materials: Crude natural borates	3	1	--	All from United Kingdom.
Cement	331,573	265,324	2,117	Colombia 238,075; United Kingdom 18,695.
Chalk	844	798	38	United Kingdom 373; France 215.
Clays, crude	1,117	2,176	2,034	United Kingdom 141.
Diamond:				
Gem, not set or strung carats	2,441	1,992	162	Belgium-Luxembourg 696; United Kingdom 123.
Industrial stones do	5,000	30,000	25,000	United Kingdom 5,000.
Diatomite and other infusorial earth	552	92	62	United Kingdom 19.
Feldspar, fluorspar, related materials	84	55	--	Netherlands 51; Canada 4.
Fertilizer materials: Manufactured:				
Ammonia	70	8	3	United Kingdom 5.
Nitrogenous	571	372	35	France 170; West Germany 162.
Phosphatic	1,080	11	11	
Potassic	1,540	973	38	West Germany 422; Dominican Republic 260.
Unspecified and mixed	1,349	5,913	3,870	West Germany 1,177.
Graphite, natural	1	1	([2])	Mainly from United Kingdom.
Gypsum and plaster	6,084	9,760	2,406	Jamaica 6,010; Venezuela 350.
Lime	6,528	3,866	107	United Kingdom 3,659.
Magnesium compounds: Magnesite	8	40	--	United Kingdom 39; Japan 1.
Mica:				
Crude including splittings and waste	184	197	--	Norway 92; United Kingdom 88.
Worked including agglomerated splittings kilograms	440	132	78	United Kingdom 12.
Phosphates, crude	350	478	478	
Pigments, mineral: Iron oxides and hydroxides, processed	131	122	21	Canada 41; United Kingdom 29.
Potassium salts, crude	11	--		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$2,988	$1,179	$246	Canada $562; India $167.
Synthetic do	$149	$96	$20	Canada $43; France $7.
Salt and brine	18,354	53,486	196	Jamaica 19,137; United Kingdom 18,362.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	2,498	5,118	1,977	United Kingdom 3,134.
Sulfate, manufactured	3,135	2,388	3	Belgium-Luxembourg 2,322; Netherlands 43.

See footnotes at end of table.

Table 7.—Trinidad and Tobago: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982[r]	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	158	210	82	China 70; Italy 38.
Worked	274	23	2	United Kingdom 9; Barbados 6.
Dolomite, chiefly refractory grade	158	133	--	Republic of Korea 130.
Gravel and crushed rock	2,214	2,298	810	China 672; Italy 292.
Limestone other than dimension	18,517	233,476	5,258	Barbados 210,410; Netherlands 13,470.
Quartz and quartzite	16	193	9	Netherlands 180.
Sand other than metal-bearing	539	9,996	4,976	Canada 5,014.
Sulfur:				
Elemental:				
Crude including native and byproduct	52	3,062	--	All from United Kingdom.
Colloidal, precipitated, sublimed	8	6	3	Netherlands 3.
Sulfuric acid	837	143	40	West Germany 41; United Kingdom 31.
Talc, steatite, soapstone, pyrophyllite	592	2,413	739	Austria 1,417; Norway 234.
Other, crude	213	5	5	
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2	4	4	
Carbon: Carbon black	1,319	1,570	485	Venezuela 1,080; West Germany 3.
Coal: All grades including briquets	1,623	375	352	Canada 10; Guyana 10.
Coke and semicoke	266	30	--	West Germany 20; United Kingdom 10.
Peat including briquets and litter	174	328	13	Norway 176; Ireland 51.
Petroleum:				
Crude thousand 42-gallon barrels	26,553	692	--	Ecuador 497; Panama 195.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	52,021	106,117	44,579	Nigeria 38,083; Netherlands Antilles 20,462.
Mineral jelly and wax do.	3,297	2,597	378	United Kingdom 1,283; Japan 433.
Kerosine and jet fuel do.	--	436,588	52,847	Bahamas 199,252; Brazil 183,869.
Distillate fuel oil do.	--	7	7	
Lubricants including nonlubricating oils do.	170,549	572,040	29,099	Netherlands Antilles 356,587; United Kingdom 179,970.
Residual fuel oil do.	333	--		
Bitumen and bituminous mixtures do.	42,093	15,350	679	United Kingdom 13,756; Barbados 576.
Petroleum coke do.	1,892	3,668	3,668	

[r]Revised. NA Not available.
[1]Table prepared by W. L. Zajac.
[2]Less than 1/2 unit.

The Mineral Industry of Central American Countries

By Doris M. Hyde[1]

CONTENTS

BELIZE

New mineral activity focused on increased petroleum exploration activities, while the established construction-oriented minerals sector operated without substantial change from previous years.

After showing a 1% real growth in the $154 million[2] gross domestic product (GDP) for 1983, preliminary estimates for 1984 indicated that the same growth pattern prevailed. The negative trade balance at midyear had worsened over the negative balance for the same period in 1983. An upward trend in import costs partly reflected the impact of Mexican inflation, which made that country's goods more expensive and led to increased imports from North America and Europe. On the other hand, by midyear, the reexport trade with Mexico indicated an upward climb from the 1983 low of $12.7 million.

Belize maintained a receptive policy toward foreign investment and exercised an active role in the provision of public services and infrastructure. Infrastructural shortcomings included water and land transportation routes, although the latter was being repaired. The deepest port is near Belize City, but it cannot handle ships with a draft of more than 16 feet of water. There is no national power grid, and electricity has been generated by diesel-fueled units situated in major towns. A shortage of skilled workers remained a persistent problem in Belize because trained personnel tend to emigrate to countries with higher wage scales.

Petroleum exploration in Belize remained attractive to foreign oil companies because of proximity to U.S. markets, favorable contract terms, a stable Government, and promising geological conditions. Recent activity was centered in two areas: northern onshore concessions, where the geology was believed to be similar to Guatemala's Rubelsanto area, and southern offshore areas, where seismic studies indicated a structural similarity to Mexico's productive Campeche Bay.

Belize oil concessions are generally held by investor-owned companies, with operations then farmed out to large oil companies for individual drilling ventures. The cast of companies involved in any particular exploration effort in a concession can become complex as several farm-out agreements may be made for varying percentage interests in each drilling venture. Also, concessions may change ownership over a period of time.

In October, Marathon Petroleum Belize

Ltd. began drilling an offshore test well in southernmost Belize on a concession held by Central American Exploration Co. (Caxco). Completion of the Snake Cays No. 1 well in waters 20 miles east of Punta Gorda, Toledo District, was expected early in 1985.

In 1984, Alston Oil and Gas Co. of Texas was merged into Eagle American Diversified Holdings of Toronto, Canada. Alston, now Eagle American, held a 50% interest in two western Belize concessions with D & S Exploration Ltd. of Canada. Alston (Eagle) also had a 38% interest in an eastward adjoining block held by Katana Resources Belize Ltd. and Petro-Belize Ltd., an associate of Hughes Services. In December, this latter group spudded the Eagle American No. 1 well in the Katana block just outside the city of Belmopan. Well completion was expected in early 1985.

Pecten International Ltd., a subsidiary of Shell Oil Co., completed onshore and offshore seismic work in its east-central concession along the Stann Creek and Belize Districts. Pecten planned to evaluate the data before making any drilling decision. Spartan Petroleum Co., Prairie Producing Co., Belize Ltd., and Seneca Oil Co., joint owners of an onshore-offshore concession abutting the Mexican border, were completing exploration work before making a decision to proceed with two test wells. Belize Oil and Minerals Ltd., owned by a Texas company, held an onshore-offshore lease east and south of the Spartan concession. J. Rose & Associates of Texas farmed into 42,500 acres of this tract and planned to drill two to four wells in 1985 near the town of Maskall. Telstar Energy Co. of Texas held an onshore-offshore block northeast of the Caxco-Marathon lease. Atlantic Richfield Co. was contracted to conduct seismic work for Telstar preparatory to drilling a test well in 1985.

About 6 to 10 test wells were expected to reach completion in 1985. Since the first well was drilled in 1955, sporadic activity has resulted in 42 well completions in Belize, 35 of which yielded noncommercial shows of hydrocarbons, and the remainder were dry holes. Even without a commercial find, Belize has benefited financially from the $0.10 per acre annual rent fee and an annual administrative fee of $10,000 per leased block of 10 square kilometers. If commercial quantities of crude oil were to be found, Belize would receive a 20% royalty rate (18% to 19.5% on older contracts) that the company could credit against a 40% to 45% net income tax on production. Belize would also receive a production bonus of $250,000 for output of 5,000 barrels per day for 30 successive days. This bonus would rise in like increments, pro rata, to 20,000 barrels per day. Over 20,000 barrels per day would amount to $1 million for each additional 10,000 barrels per day of production.

Table 1.—Central American Countries: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983[p]	1984[e]
BELIZE					
Stone, sand and gravel:					
Limestone	336,900	479,640	356,130	608,860	600,000
Marl	2,064,300	617,460	503,930	--	--
Sand and gravel	625,000	589,290	521,030	554,370	500,000
COSTA RICA					
Cement	553,699	[r]460,319	423,700	385,300	350,000
Clays: Kaolin	500	450	522	[e]500	500
Diatomite	600	550	470	[e]450	450
Gold[e] troy ounces	18,000	20,000	27,000	30,000	35,000
Lime[e]	7,500	7,000	9,000	[r]10,000	10,000
Petroleum refinery products thousand 42-gallon barrels	3,781	[e]3,750	[e]3,700	2,298	2,200
Pumice[e]	1,200	1,300	1,500	1,500	1,500
Salt, marine[e]	40,000	39,000	110,200	110,000	110,000
Silver[e] troy ounces	1,600	1,500	2,000	2,000	2,000
Stone, sand and gravel:					
Crushed rock and rough stone[e] cubic meters	600,000	550,000	534,600	525,000	500,000
Limestone and other calcareous materials[e]	55,000	70,000	109,100	110,000	100,000
Sand and gravel[e] cubic meters	250,000	250,000	276,700	280,000	250,000
EL SALVADOR					
Aluminum metal including alloys, semimanufactures	1,587	1,175	1,143	1,344	[2]1,154

See footnotes at end of table.

Table 1.—Central American Countries: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983[p]	1984[e]
EL SALVADOR —Continued					
Cement	519,892	457,897	417,796	431,552	[2]407,482
Gold troy ounces	2,492	3,883	3,300	650	[2]285
Gypsum[e]	9,000	6,000	5,000	4,500	4,500
Iron and steel: Metal:					
Steel, crude	[e]14,000	[e]10,000	7,265	15,281	15,000
Semimanufactures	30,959	25,420	16,166	15,799	[2]27,985
Limestone	850,000	810,000	800,000	850,000	[2]870,000
Petroleum refinery products thousand 42-gallon barrels	4,572	4,432	4,002	[e]4,000	4,450
Salt, marine[e]	[r]1,600	[r]1,700	[r]1,800	[r]2,000	2,500
Silver, fine troy ounces	146,202	137,005	85,713	21,988	[2]21,750
GUATEMALA					
Antimony, mine output, metal content	556	511	[e]500	--	90
Barite	4,610	5,200	2,000	[e]300	300
Cement	568,875	[r]514,074	506,369	451,913	[2]785,327
Clays:					
Bentonite	2,600	[e]2,500	2,500	[e]8,000	8,500
Other	169,861	165,641	160,000	137,672	144,000
Copper, Cu content of concentrates	842	726	[e]700	([3])	--
Feldspar	21,530	10,044	[e]12,000	[r] [e]6,000	5,000
Gas, natural, gross million cubic feet	584	515	1,097	1,118	1,200
Gypsum, crude:					
For cement manufacture	19,310	18,588	[e]17,000	16,588	[2]14,635
Other	13,939	10,134	[e]11,000	[e]22,000	[2]11,017
Iron and steel:					
Iron ore, gross weight	3,500	4,025	4,000	860	365
Steel, crude	NA	NA	25,000	[e]28,000	28,000
Semimanufactures	NA	NA	27,600	34,892	34,500
Lead:					
Mine output, metal content	[e]100	--	--	--	--
Metal including secondary	92	41	40	60	[2]64
Lime	35,580	24,655	[e]24,500	[e]24,500	[2]50,534
Nickel, mine output, metal content[4]	6,940	--	--	--	--
Petroleum:					
Crude thousand 42-gallon barrels	1,513	1,494	2,292	2,549	1,900
Refinery products do	5,381	5,345	4,508	4,306	4,760
Pumice and related materials:					
Pumice[e]	18,000	15,000	12,000	[r]15,000	13,200
Volcanic ash	12,721	5,451	[e]4,000	[r] [e]100	200
Salt	9,526	13,679	[e]14,000	[r] [e]15,100	16,200
Silver, mine output, metal content[e] troy ounces	10,000	8,000	[r]3,000	([3])	--
Stone, sand and gravel:					
Limestone thousand tons	920	920	950	[e]1,215	1,200
Marble cubic meters	1,353	1,226	1,200	[e]1,000	1,200
Silica sand	69,553	35,582	35,000	[e]18,400	18,000
Sand and gravel cubic meters	604,323	269,844	250,000	[e]525,000	370,000
Tungsten, mine output, W content of concentrate	50	42	40	--	--
Zinc, mine output, metal content	--	2,996	[e]1,000	--	--
HONDURAS					
Antimony, mine output, metal content	23	[e]20	--	--	320
Cadmium, mine output, metal content	[r]175	[r]177	270	386	415
Cement	445,000	[r]310,888	277,440	485,435	500,000
Copper, Cu content of lead and zinc concentrates	269	454	450	[e]650	770
Gold troy ounces	2,027	1,579	1,711	2,151	2,550
Gypsum	22,600	20,000	20,000	[e]22,000	2,200
Iron and steel: Metal, semimanufactures[e]	24,500	20,000	20,000	20,000	22,000
Lead, mine output, metal content	13,315	12,592	15,120	19,291	[2]20,544
Petroleum refinery products thousand 42-gallon barrels	3,648	1,901	685	3,938	4,363
Salt[e]	32,600	30,000	30,000	30,000	30,000
Silver thousand troy ounces	1,766	[r]1,823	2,100	2,587	2,650
Stone:[e]					
Limestone	500,000	450,000	500,000	500,000	500,000
Marble	43,000	40,000	40,000	40,000	40,000
Zinc, mine output, metal content	16,026	16,190	24,554	37,980	[2]41,483
NICARAGUA					
Cement	153,926	167,361	[e]100,000	[e]100,000	100,000
Gold, mine output, metal content troy ounces	[r]59,984	61,913	54,384	46,428	34,000
Gypsum and anhydrite, crude[e]	40,000	30,000	20,290	[r]11,350	10,000
Lime[e]	40,000	30,000	[r]5,000	4,700	3,000

See footnotes at end of table.

Table 1.—Central American Countries: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983[p]	1984[e]
NICARAGUA —Continued					
Petroleum refinery products thousand 42-gallon barrels	4,087	3,925	4,244	3,914	3,277
Salt, marine[e]	20,000	18,000	18,000	18,000	15,000
Sand and gravel cubic meters	NA	NA	502,812	481,743	490,000
Silver, mine output, metal content troy ounces	164,060	140,136	75,552	63,417	50,000
PANAMA					
Cement	565,000	520,000	349,991	326,170	[2]303,950
Clays and clay products:					
Crude	183,182	99,071	84,261	58,284	[2]71,104
Products cubic meters	40,603	52,010	60,606	18,255	[2]32,649
Petroleum refinery products thousand 42-gallon barrels	13,642	10,524	11,845	11,755	11,500
Salt, marine[5]	18,583	32,100	24,300	85,491	95,000
Stone, sand and gravel:					
Limestone[6]	536,250	393,722	439,952	448,145	[2]212,205
Other thousand cubic meters	731	842	894	802	[2]712

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Aug. 17, 1985.
[2]Reported figure.
[3]Revised to zero.
[4]Ni content of sinter.
[5]Data for 1980 refer to refined salt. Figures for 1981 and later years reflect crude salt production.
[6]Excludes approximately 8,000 cubic meters per year, apparently dimension stone.

COSTA RICA

Gold and silver continued to be produced in Costa Rica, but construction-oriented materials dominated mineral activity. Neither metallic nor nonmetallic minerals impacted on the country's shaky economy, as the Government attempted to deal with servicing a massive public debt that required an estimated 40% of total foreign exchange earnings. The Government continued to apply austere economic measures to comply with International Monetary Fund stabilization requirements. Preliminary data suggested the economy reached a growth rate of about 6%, compared with less than 1% in 1983.

A bill to regulate the exploration, exploitation, and distribution of hydrocarbons was scheduled to be discussed by the Costa Rica Assembly. The legislation would regulate how private contractors are to be granted exploration permits and what percentage of any recovered petroleum would belong to the state, which is the owner of all such deposits. Among those awaiting passage of the legislation were several U.S. companies and Petro-Canada.

Rea Gold Corp. was appointed operator of the Midland Energy Corp. and Westlake Resources Inc. joint Bella Vista-Montezuma gold mining venture in Costa Rica. An interest in the property may also be retained by Rembrandt Gold Mines Ltd. and American Energy Corp. Rea was to receive a management fee equal to 10% of profits, and also first right to refusal should either joint partner decide to relinquish its interest. A feasibility study was completed in 1984 that established 137,800 tons of proven and probable reserves at the Bella Vista-Montezuma gold property located 130 kilometers south of San José. The reserves averaged 0.275 troy ounce of gold and 0.33 troy ounce of silver per ton. Inferred reserves were estimated at 194,000 tons containing 0.26 troy ounce of gold per ton. Metallurgical tests indicated a 96% recovery for gold and a 75% recovery for silver. Discussions were underway to finance a 150-ton-per-day mill costing over $3 million. Payback was estimated at slightly more than 11 months with the price of gold at $350 per troy ounce. Meanwhile, the mine continued to be worked with a 25-ton-per-day mill.

Mallon Minerals Corp. decided to expand the exploration program on its 6,900-acre concession at Río Chiquito. Drill samples indicated about 3.6 million tons of ore reserves assaying as high as 0.6 troy ounce of gold and 2.8 troy ounces of silver per ton across 10-meter widths. If the project were to be developed, Mallon would pay 21% in royalties.

The primary gold producer in Costa Rica

was Minera Macacona S.A., from the Santa Clara Mine near Esparaza in Puntarenas Province. The mine is operated by the U.S. firm Kappers, Cassidy, and Associates and is owned by United Hearnes Resources Ltd. (60%) and Canadian Barranca Corp. Ltd. (40%). Output in early 1984 averaged 350 to 400 troy ounces per month and this was expected to increase as the year progressed.

The U.S. Geological Survey and scientists from the state refinery company, Refinadora Costarricense de Petróleo S.A. (Recope), continued their program on the exploration and development of coal resources. Reconnaissance mapping was conducted in the Zent, Venado, San Carlos, and Baja Talamanca coal areas.

Petróleos Mexicanos (Pemex) continued to work on the problem-plagued San José No. 1 drilling site in the Talamanca region near the Panamanian border. Pemex encountered many delays that caused the drilling of a 6,000-meter well to be considerably more expensive than planned. The second well in the project may not be drilled by Pemex.

A grant by the International Bank for Reconstruction and Development to Recope financed petroleum exploration in the southeastern Talamanca area. In mid-June, Recope announced that 32° API low-sulfur crude oil was being extracted from three Campo Diablo wells. The wells averaged about 600 feet in depth and produced at about 5 barrels per day. Recope planned additional exploration.

Bids were submitted for the construction of a 1-million-barrel-per-day, transoceanic, crude oil pipeline. For various reasons, no selection was made during 1984, and it was expected that the bidding would be reopened. The rejected bids had each estimated the project cost at $750 million or higher.

EL SALVADOR

Gold and silver output declined further as civil unrest and security from guerrilla attacks continued to interfere with mining efforts. International financial assistance played an important role in maintaining stability in the El Salvadoran economy. Private industry paused in long-term growth programs, awaiting signals from the newly formed Government for clarification of its political and economic policies.

Table 2.—El Salvador: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	--	99	--	All to Guatemala.
Semimanufactures	1,313	1,476	13	Guatemala 1,118; Costa Rica 126.
Iron and steel: Metal:				
Scrap	21	--		
Pig iron, cast iron, related materials	--	2	--	All to Honduras.
Semimanufactures	787	81	--	Guatemala 71; Costa Rica 8.
Lead: Metal including alloys:				
Unwrought	45	--		
Semimanufactures	17	6	--	All to Guatemala.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$632	$231	$21	Switzerland $210.
Tin: Metal including alloys, semimanufactures	4	--		
Other: Base metals including alloys, all forms	223	170	157	Guatemala 13.
NONMETALS				
Cement	48,125	43,284	--	All to Guatemala.
Clays, crude	1,377	387	--	Panama 250; Costa Rica 96; Honduras 41.
Fertilizer materials: Manufactured:				
Nitrogenous	21	--		
Phosphatic	--	20	--	All to Guatemala.
Unspecified and mixed	28	--		
Salt and brine	16,555	12,824	--	Guatemala 12,734; Honduras 50; Costa Rica 40.

See footnotes at end of table.

Table 2.—El Salvador: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone, worked	4	--		
Limestone other than dimension	446	--		
Sulfur: Sulfuric acid	404	1,130	--	Guatemala 687; Nicaragua 341; Costa Rica 97.
Other: Crude	99	36	--	All to Guatemala.
MINERAL FUELS AND RELATED MATERIALS				
Coke and semicoke	3	--		
Petroleum refinery products:				
Gasoline 42-gallon barrels	--	1,130	--	Do.
Mineral jelly and wax do	--	31	--	Do.
Distillate fuel oil do	276,863	447,764	--	Panama 212,259; Guatemala 152,132; Netherlands Antilles 83,373.
Lubricants do	42,063	8,911	--	Guatemala 5,523; Nicaragua 1,666; Honduras 882.
Residual fuel oil do	51,109	62,684	--	Guatemala 62,671; Costa Rica 13.

[1]Table prepared by H. D. Willis.

Table 3.—El Salvador: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	431	1,530	598	Canada 737; France 192.
Semimanufactures	1,993	2,546	479	Venezuela 1,005; Costa Rica 285.
Copper: Metal including alloys:				
Unwrought	2	2	--	All from Belgium-Luxembourg.
Semimanufactures	1,082	1,793	125	Mexico 814; Peru 548.
Iron and steel: Metal:				
Scrap	233	186	--	Nicaragua 149; West Germany 37.
Pig iron, cast iron, related materials	7	9	7	Guatemala 2.
Ferroalloys	122	304	--	Mexico 175; Belgium-Luxembourg 128.
Steel, primary forms	747	2,000	1,998	Guatemala 2.
Semimanufactures:				
Bars, rods, angles, shapes, sections	6,936	7,694	207	Guatemala 5,613; Taiwan 782.
Universals, plates, sheets	15,387	21,758	1,623	Republic of Korea 6,752; West Germany 4,635; Japan 3,930.
Hoop and strip	961	463	14	West Germany 288; Japan 75.
Wire	16,221	6,451	202	Guatemala 1,576; Mexico 1,469; Venezuela 1,001.
Tubes, pipes, fittings	4,780	5,396	1,354	Guatemala 3,754; Costa Rica 109.
Castings and forgings, rough	3	--		
Lead: Metal including alloys:				
Unwrought	19	56	40	Mexico 14.
Semimanufactures	77	114	(2)	Mexico 110; Japan 3.
Nickel: Metal including alloys, all forms	1	1	(2)	Mainly from Canada.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$29	$30	--	All from West Germany.
Tin: Metal including alloys, all forms	9	9	3	United Kingdom 5.
Zinc: Metal including alloys:				
Unwrought	518	1,016	53	Mexico 925; Peru 38.
Semimanufactures	5	15	11	Norway 1.
Other:				
Ores and concentrates	2	2	(2)	Mainly from West Germany.
Base metals including alloys, all forms	105	7	(2)	Belgium-Luxembourg 5.

See footnotes at end of table.

Table 3.—El Salvador: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	483	653	6	Costa Rica 364; Guatemala 280.
Grinding and polishing wheels and stones	106	87	3	West Germany 41; Guatemala 14; Czechoslovakia 10.
Asbestos, crude	3,286	3,955	--	All from Canada.
Boron materials: Oxides and acids	11	3	1	West Germany 2.
Cement	1,112	1,015	--	United Kingdom 352; West Germany 326; Japan 121.
Clays, crude	4,649	5,413	978	Guatemala 4,426; West Germany 9.
Diatomite and other infusorial earth	346	544	238	Mexico 302; West Germany 4.
Fertilizer materials: Manufactured:				
Nitrogenous	106,806	215,662	121,970	Belgium-Luxembourg 33,954; Romania 19,111.
Phosphatic	38	164	--	All from Guatemala.
Potassic	17,195	240	--	Costa Rica 210; Guatemala 21.
Unspecified and mixed	24,580	34,196	322	Spain 11,707; Belgium-Luxembourg 10,714; Finland 6,501.
Graphite, natural	2	12	--	Guatemala 9; West Germany 3.
Gypsum and plaster	15,281	10,595	9	Guatemala 10,539; West Germany 47.
Lime	1,186	1,163	--	Guatemala 1,154.
Mica:				
Crude including splittings and waste	--	4	4	
Worked including agglomerated splittings	3	--		
Phosphates, crude	--	21	--	All from West Germany.
Precious and semiprecious stones other than diamond: Natural value, thousands	$6	$42	--	West Germany $19; Switzerland $16.
Salt and brine	67	82	62	Canada 16; West Germany 4.
Sodium compounds, n.e.s.: Carbonate, manufactured	2,887	5,514	3,422	Denmark 965; West Germany 555.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,802	2,329	--	All from Guatemala.
Worked	58	83	--	Do.
Gravel and crushed rock	1,453	1,237	15	Guatemala 1,128; Mexico 94.
Limestone other than dimension	8,705	5,825	53	Guatemala 5,414; Mexico 268; Costa Rica 90.
Quartz and quartzite	266	353	1	Mexico 352.
Sulfur:				
Elemental, crude including native and byproduct	17	2,481	2,478	West Germany 3.
Sulfuric acid	1,454	1,305	1,190	Costa Rica 91; Mexico 20.
Talc, steatite, soapstone, pyrophyllite	297	390	111	Guatemala 136; Taiwan 71.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	3	187	61	West Germany 60; Guatemala 46.
Coke and semicoke	225	363	111	Colombia 111; West Germany 75.
Petroleum:				
Crude thousand 42-gallon barrels	5,628	5,159	--	Venezuela 2,669; Mexico 2,490.
Refinery products:				
Gasoline do	34	61	2	Guatemala 32; Netherlands Antilles 25.
Mineral jelly and wax do	17	17	6	West Germany 6; Taiwan 3.
Kerosine and jet fuel do	4	7	5	Netherlands 1.
Lubricants do	36	43	33	Netherlands Antilles 6; Jamaica 2.

[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

GUATEMALA

The minerals sector remained somewhat static for the major part of 1984, as economic problems, trade restrictions, and doubts about the security of operations continued to inhibit private and public investment commitments. Nonfuel mineral production was again almost entirely restricted to construction-oriented materials. Crude oil production was disappointingly low, and exports dropped from more than 2 million barrels valued at over $59 million in 1983 to slightly more than 1 million barrels valued at $34 million.

Traditionally one of the richest countries in Central America, Guatemala was not expected to show any real economic growth in 1984. Actions by guerrilla insurgents continued to disrupt social and economic sectors, and there was a continuance of other negative economic factors that have progressively worsened in the last several years. Industrial output was at about 60% of capacity as manufacturers felt the loss of traditional Central American markets and also had difficulties obtaining foreign exchange to purchase parts and raw materials. The unemployment rate was about 14%, with 40% underemployment. Foreign exchange reserves have plunged from $800 million in 1977 to a low of $32 million at yearend 1984. International market prices and demand for traditional agricultural exports declined, and the members of the Central American Common Market tightened their trade restrictions with one another in response to payments issues and their own economic austerity programs. Guatemala's balance of payments deficit rose to $314 million in 1984.

In the latter one-half of the year, the Government announced it intended to help reactivate as many as 120 small lead-zinc mining operations in the Department of Huehuetenango. Mining from this area had ceased owing to security problems related to guerrilla activity.

Minas de Guatemala S.A. indicated that in early 1985 it would reopen the Annabella and Los Lirios antimony-tungsten mines near Ixtahuacán in Huehuetenango Department. The mines were closed in 1981 because of low market prices and security problems. At full operation, employment could reach as many as 300 miners, but this goal would probably not be reached during 1985.

The Government also announced that in 1985 it would implement plans to put exploration and mining contracts out to tender. A Japanese technical team that had previously worked in the El Pato national reserve area of Chiquimula Department was appointed to proceed with development planning. In December, the Ministry of Mines revealed that precious metals mineralization in quartz veins had been discovered in the Departments of Chiquimula, Zacapa, and Izabal. Details as to ore grades or exact locations were not made available.

The Dirección General de Energía Nuclear reported it would undertake a $258,000 uranium exploration program. The agency was to work under the guidance of the International Atomic Energy Organization. The project was triggered by the recognition of geophysical similarities in the northern Departments to uranium deposits found in Peru and Mexico.

Crude oil exploration prospects in the Chapayal-Peten Basin were at a low level since the groups that had contracted for Areas AA, D, and E all relinquished their concessions during the latter part of 1983. This reduced active exploration to Areas I and L.

Area I is a joint venture of Société Nationale Elf Aquitaine (SNEA), acting as operator, Basic Resources International (Bahamas) Ltd. (BRISA), and Hispánica de Petróleos S.A. (Hispanoil). Before a legal dispute over accounting between SNEA and BRISA could be presented to an international arbitration tribunal, SNEA indicated it would withdraw as operator and from the joint venture. This was to take place as soon as the Government approved the transfer, probably in early 1985.

In December, the Government issued a call for exploration and exploitation bids for Areas AA and D. Hispanoil was the former operator of Area AA and had drilled two producing wells, which were shut in when the contract area was given up. The wells were reported as producing 31° API and 37° API gravity crude oil at the rate of 600 and 700 barrels per day. In Area D, a group headed by Texaco Exploration Guatemala Inc. had drilled one producing well, which reportedly produced 16° API gravity crude oil.

HONDURAS

There was little change in the mineral industries during 1984. The El Mochito Mine of AMAX Inc. continued to dominate the mineral sector, and mine output increased in response to an expansion program.

Antimony returned to the list of Honduran mineral exports as Cía. Minera Norcro S.A. opened a new mine near Santa Rita in northwestern Honduras. Production of antimony oxide and lump sulfides began about midyear at the rate of 110 tons per month. This was increased during the year to 175 tons per month. Planned full capacity was 300 tons per month. The oxide ore graded 45% to 53% antimony, with less than 0.5% lead and arsenic combined. The lump sulfide ore graded about 30% antimony. The production was mostly shipped to the Anzon America Inc. plant in Laredo, Texas.

A small gold placer operation owned by U.S. investors, Cía. Minera Guayape S.A., installed new machinery at its concession east of San Salvador.

The Inter-American Development Bank approved a $1.2 million technical cooperation grant to Honduras. The grant was to strengthen the structure of the Dirección General de Minas e Hidrocarburos through an on-the-job training program. It would also fund the preparation of a mining survey and metallogenic map of the country. Honduras was to provide an additional $247,000 for the program. Foreign governments were invited to present bid proposals for this mineral resources survey, but no selection had been made by yearend.

In April, the Government capitalized the sizable debt of Cementos de Honduras S.A. and effectively took control of the company. Private shareholder equity was reduced to about 5%. Completion of construction at the El Cajón hydroelectric facility will result in excess cement capacity. However, high production costs were expected to make the cement uncompetitive in the export market.

After 2 consecutive years of decline, the economy improved slightly in 1984. The GDP rose to about $3.2 billion[3] and grew in real terms by almost 3%. Honduras faced a shortage of private foreign credit, weak export markets for traditional products, and a continued lack of investor confidence and foreign exchange. Inflation was reduced to under 5% from almost 9% in 1983. The balance of trade continued to deteriorate and showed a $415 million gap between imports and exports. Metallic mineral exports were valued at $63 million and represented over 7% of total exports. Petroleum accounted for almost 15% of total imports. The upcoming completion of the 292-megawatt El Cajón hydroelectric project should reduce the need for imported petroleum to fuel electricity generation.

Table 4.—Honduras: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	--	10	10	
Semimanufactures	22	--		
Cadmium: Cd content of zinc concentrates	NA	161	44	Belgium-Luxembourg 47; United Kingdom 46.
Copper: Metal including alloys:				
Unwrought	213	--		
Semimanufactures	11	([2])	--	All to Nicaragua.
Gold:				
Au content of lead concentrates value, thousands	--	$813	$571	Japan $242.
Au contained in activated charcoal do.	--	$530	$530	
Metal including alloys, unwrought do.	--	$64	$64	
Iron and steel: Metal:				
Pig iron, cast iron, related materials	101	--		
Ferroalloys	10	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	2	--		
Wire	1,374	998	--	Guatemala 879; El Salvador 59; Costa Rica 40.
Tubes, pipes, fittings	11	6	--	All to Guatemala.
Castings and forgings, rough	5	1	1	

See footnotes at end of table.

Table 4.—Honduras: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate, gross weight	13,251	NA		
Pb content of lead concentrates	NA	17,264	9,249	Japan 5,284; Spain 2,731.
Pb content of zinc concentrates	NA	357	357	
Metal including alloys, semimanufactures	18	29	--	All to Guatemala.
Silver:				
Ore and concentrate, gross weight value, thousands	$9,302	--		
Ag content of silver concentrates do	--	(2)	(2)	
Ag content of lead concentrates do	--	$30,560	$17,700	Japan $9,206; Spain $3,654.
Ag content of zinc concentrates do	--	$6,710	$2,650	Belgium-Luxembourg $1,650; Netherlands $1,083.
Ag contained in activated charcoal do	--	$6	$6	
Zinc:				
Ore and concentrate, gross weight	37,818	NA		
Zn content of zinc concentrates	NA	31,069	10,964	Belgium-Luxembourg 8,594; United Kingdom 4,639.
Metal including alloys:				
Unwrought	--	10	10	
Semimanufactures kilograms	NA	240	--	All to Belize.
Other:				
Ores and concentrates	2,638	NA		
Ashes and residues	80	85	65	West Germany 20.
Base metals including alloys, all forms	2	(2)	(2)	NA.
NONMETALS				
Asbestos, crude	--	20	--	All to Guatemala.
Cement	12,299	--		
Fertilizer materials:				
Crude, n.e.s	3	18	--	Do.
Manufactured: Nitrogenous	--	150	--	All to Belize.
Lime	146	--		
Pigments, mineral: Natural, crude	513	159	--	All to Guatemala.
Salt and brine	1,531	1,937	--	Guatemala 1,916; El Salvador 21.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	20	2	(2)	Mainly to Belize.
Worked	13	--		
Limestone other than dimension	1,235	--		
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Lubricants 42-gallon barrels	3,465	4,557	--	Guatemala 3,318; Nicaragua 861; Panama 378.
Residual fuel oil do	--	126,360	--	All to Trinidad and Tobago.

NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

Table 5.—Honduras: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	471	676	302	El Salvador 124; Costa Rica 90.
Copper:				
Sulfate	--	231	163	Mexico 67.
Metal including alloys:				
Unwrought	--	58	12	Mexico 29; Costa Rica 17.
Semimanufactures	420	504	69	Peru 261; Japan 65.
Gold:				
Ore and concentrate and refined value, thousands	--	$34	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	161	--		

See footnotes at end of table.

Table 5.—Honduras: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap	--	1	([2])	Mainly from Guatemala.
Pig iron, cast iron, related materials	([2])	30	2	Italy 18; West Germany 6.
Ferroalloys	104	--		
Steel, primary forms	324	4,773	1,037	Venezuela 1,429; Mexico 999.
Semimanufactures:				
Bars, rods, angles, shapes, sections	8,410	12,448	3,526	France 3,767; Belgium-Luxembourg 1,254.
Universals, plates, sheets	15,490	17,901	4,456	Japan 5,552; France 2,149.
Hoop and strip	1,106	675	107	West Germany 261; Austria 193.
Rails and accessories	705	58	44	Guatemala 14.
Wire	4,711	8,971	3,227	Venezuela 1,492; Republic of South Africa 1,334.
Tubes, pipes, fittings	3,710	6,443	864	Guatemala 2,245; United Kingdom 1,677.
Castings and forgings, rough	2,434	1,532	243	Italy 1,265; Canada 12.
Lead: Metal including alloys:				
Unwrought	568	636	116	Mexico 520.
Semimanufactures	3	21	6	Denmark 5; West Germany 5.
Nickel: Metal including alloys:				
Unwrought kilograms	--	374	374	
Semimanufactures	2	3	2	Sweden 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, unspecified troy ounces	--	5,369	5,369	
Silver: Metal including alloys, unwrought and partly wrought do	NA	3,665	3,537	West Germany 96; Sweden 32.
Tin: Metal including alloys:				
Unwrought	16	21	6	Peru 15.
Semimanufactures	15	29	16	West Germany 4; Panama 2.
Zinc: Metal including alloys:				
Unwrought	743	1,086	20	Mexico 1,026; Peru 40.
Semimanufactures	12	169	7	Mexico 84; Guatemala 68.
Other:				
Ores and concentrates	285	545	244	Mexico 300; Costa Rica 1.
Base metals including alloys, all forms	8	7	7	
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	13	4	3	NA.
Grinding and polishing wheels and stones	49	--		
Asbestos, crude	864	1,522	18	Canada 1,504.
Boron materials: Oxides and acids	1	3	2	West Germany 1.
Cement	1,697	2,104	29	Denmark 1,155; West Germany 720; Belgium-Luxembourg 142.
Clays, crude: Unspecified	4,483	5,489	1,240	Guatemala 4,149; El Salvador 41.
Diamond: Industrial stones thousand carats	NA	805	805	
Diatomite and other infusorial earth	283	305	236	Mexico 47; Guatemala 21.
Fertilizer materials:				
Crude, n.e.s	--	1	1	
Manufactured:				
Nitrogenous	37,986	50,302	17,502	West Germany 17,908; Venezuela 8,642.
Phosphatic	2,527	4,377	2,872	West Germany 1,505.
Potassic	4,108	5,845	4	West Germany 5,837; Guatemala 4.
Unspecified and mixed	8,734	15,563	3,593	Netherlands 5,329; Costa Rica 4,534.
Graphite, natural	8	14	([2])	Mainly from Mexico.
Gypsum and plaster	45	32	19	Guatemala 10; West Germany 2.
Lime	1,236	31	--	United Kingdom 26; Guatemala 5.
Mica:				
Crude including splittings and waste kilograms	--	245	245	
Worked including agglomerated splittings do	NA	72	19	Netherlands 48; Switzerland 5.
Phosphates, crude	183	([2])	([2])	
Pigments, mineral: Natural, crude	--	65	65	
Precious and semiprecious stones other than diamond: Natural value, thousands	$6	$1	--	All from West Germany.
Salt and brine	222	316	200	Netherlands 41; El Salvador 30.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	544	2,938	28	Romania 2,467; Belgium-Luxembourg 404.
Sulfate, manufactured	4,965	--		

See footnotes at end of table.

Table 5.—Honduras: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	23	30	--	All from Guatemala.
Worked	18	12	(2)	Guatemala 10; Costa Rica 2.
Dolomite, chiefly refractory-grade	--	2	2	
Gravel and crushed rock	14	--		
Limestone other than dimension	1,358	95	--	Guatemala 48; Costa Rica 43.
Sand and gravel	--	24	3	Spain 21.
Sulfur:				
Elemental, crude including native and byproduct	104	97	56	Netherlands 30; Sweden 11.
Sulfuric acid	316	376	48	Netherlands 121; West Germany 102.
Talc, steatite, soapstone, pyrophyllite	106	281	160	China 71; Italy 20.
Other: Crude	253	214	57	Mexico 102; West Germany 55.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	--	56	1	West Germany 55.
Coal: All grades including briquets	37	70	49	Mexico 13; Belgium-Luxembourg 7.
Coke and semicoke	62	409	409	
Petroleum:				
Crude thousand 42-gallon barrels	332	2,721	18	Venezuela 2,224; Mexico 479.
Refinery products:				
Liquefied petroleum gas do	106	89	21	Mexico 68.
Gasoline do	698	510	3	Trinidad and Tobago 321; Panama 163; Netherlands Antilles 18.
Mineral jelly and wax do	15	12	3	West Germany 5; Japan 2.
Kerosine and jet fuel do	449	297	14	Panama 146; Trinidad and Tobago 86; Netherlands Antilles 49.
Distillate fuel oil do	1,990	1,170	--	Trinidad and Tobago 560; Panama 435; Netherlands Antilles 96.
Lubricants do	67	61	55	Jamaica 3; Netherlands Antilles 1.
Residual fuel oil 42-gallon barrels	139,414	73	47	Trinidad and Tobago 26.

NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

NICARAGUA

Nicaragua's nationalized mining industry continued to produce quantities of gold and silver despite shortages of spare parts, a deterioration of mine equipment, and periodic absences of skilled workers. Guerrilla warfare in the northeastern portion of Zelaya Department slowed output from the Bonanza, Siuna, and Rosita mining areas. The search for increased gold ore reserves at La Luz was successful, and future production could return to prior levels.

The prospects for an improved economy in the near future appeared to be rather bleak, and the Government alerted citizens to prepare for difficult years of shortages and austere economic measures. The country suffered from uncontrollable outside economic pressures, which contributed to credit restrictions and widespread shortages of fuels, consumer goods, industrial spare parts, and foreign exchange. The rate of inflation soared, and tightened import restrictions did not slow the unfavorable balance of trade growth.

Overall trade with the United States was less than 17% of the total, as compared with over 30% in 1980. Trade with centrally planned economy countries rose from 1% in 1980 to almost 20% in 1984. A part of this trade growth was attributable to an increased reliance on petroleum imports from the U.S.S.R. as a result of payment problems for volumes normally received from Mexico under the San José oil facility agreement. Nicaragua also arranged a countertrade agreement with Libya to supply agricultural products for crude oil.

Efforts were under way to reduce the dependence on electrical power generation from thermal plants. Four projects were especially mentioned as having the potential to save millions of dollars annually in petroleum import costs. One was the 40-megawatt Asturias hydroelectric facility to be located 150 kilometers north of Managua. Another hydroelectric facility was planned on the Ye-Ye River on the Atlantic coast. Two more 35-megawatt geothermal plants were to be built at Momotombo and Hoyo Montegalan and would complement the 35-megawatt geothermal plant already in operation at Momotombo. Funding was obtained for the second Momotombo plant, and also partial funding for the Asturias hydroelectric facility. The hydroelectric facility on the Ye-Ye River would reportedly be built with assistance from an unidentified Eastern European country.

A guerilla attack on the El Salto hydroelectric facility in Zelaya Norte reduced gold production from the Bonanza and Siuna areas, which normally together produced about 15,000 troy ounces of gold per year. In the Bonanza complex, two new open pit areas were being worked, the Elefante Blanco and Capitán. Mining was also underway at the Neblina and Foundling underground mines. Exploration for additional reserves at the La Luz open pit mine indicated proven reserves of about 2 million tons grading about 0.045 troy ounce of gold and 0.5 troy ounce of silver per ton. At the Lone Star and Highland Mines in eastern Nicaragua, about 680,000 tons of ore grading 0.18 troy ounce of gold per ton was identified. According to reports by Nicaragua, the Zelaya Norte area may contain as much as 26 million tons of gold and silver ore as well as base metals.

The mining sector has suffered from the effects of Nicaragua's economic problems and from the persistent harassment by invading guerilla forces. The lack of foreign exchange has resulted in shortages of spare parts for the mining operations. Terrorist activity damaged the Salto Grande dam and caused destruction at two small ports at Isabel and Limbayca where mining materials and equipment were disembarked. Labor at the mines was sometimes interrupted or curtailed as miners were mobilized into armed units to combat and pursue attacking forces.

Nicaragua's income from the mining sector has been affected by an increased black market in gold. By law, all mineral mining, processing, and marketing activity is the responsibility of the state, and all gold must be sold to the state. However, unknown but presumably sizable quantities of gold are panned by individuals, and some of this gold was thought to clandestinely find its way to Costa Rica and Honduras. To combat this illegal traffic, Nicaragua raised the price it paid for gold by using a higher exchange rate to calculate value, thus making it more attractive for the miners to sell to the Government. Also, violators became subject to a prison term of up to 3 years and a fine equal to twice the value of the gold involved.

As part of its program to curb imports and expand exports, the Government announced it would construct an industrial salt plant. The $8 million facility would be situated in Salinas Grandes in the northwestern Department of León. The project would encompass a total of 350 hectares of uncultivated land, of which 200 hectares would become evaporation lakes. A starting construction date and financing source were not made known. Nicaragua imports about 30,000 tons of salt annually, and the new plant was to satisfy domestic needs and provide about 20,000 tons per year for export.

Nicaragua's hydrocarbon potential was to be placed under study by three groups. The French Petroleum Institute agreed to study offshore Caribbean areas; Norconsult, a Norwegian entity, was considering an agreement to study the offshore Pacific areas; and technicians from the U.S.S.R. were reviewing existing onshore data.

PANAMA

There has been no new investment in the minerals sector for several years. Development of the Cerro Colorado copper project was stopped in 1982 because of depressed prices in the international copper market, and this condition did not improve. In addition to the production of construction-oriented minerals, a small amount of unquantifiable gold placer mining has occurred. According to 1982 statistical data, only 300 people were employed in the mining sector.

Mining accounted for only 0.2% of the $4.4 billion[4] GDP, a percentage that probably has been fairly steady for many years. In real terms, Panama's economy contracted by over 1% as all sectors except financial, Government services, and other services indicated a negative position relative to that of 1983. The depressed level of private investment and the poor economies of other Latin American countries were mirrored in Panama's agricultural and service-oriented economy. The Government's policies were designed to accelerate private investment and deemphasize the state's role in the economy. Investment incentives have been provided through many tax and income-related advantages, but the 1963 mineral resources code was considered outdated by many potential investors. There is no specific petroleum legislation, but the term "mineral" in the mineral resources code was defined as including all hydrocarbon compounds.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Belizian dollars (B$) to U.S. dollars at the rate of B$2.00=US$1.00.
[3]Where necessary, values have been converted from Honduran lempiras (L) to U.S. dollars at the rate of L2.00=US$1.00.
[4]Where necessary, values have been converted from Panamanian balboas (B) to U.S. dollars at the rate of B1.00=US$1.00.

Table 6.—Panama: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
Aluminum: Metal including alloys:				
Unwrought	91	18	18	
Semimanufactures	67	118	--	Costa Rica 109; El Salvador 4; Honduras 3.
Fertilizer materials: Manufactured, phosphatic	[r]14	--		
Iron and steel: Metal:				
Scrap	1,018	--		
Steel, primary forms	12	30	--	All to Costa Rica.
Semimanufactures:				
Bars, rods, angles, shapes, sections	200	88	--	All to Nicaragua.
Universals, plates, sheets	--	11	--	All to Costa Rica.
Hoop and strip	--	2	--	Do.
Lead: Metal including alloys, unwrought	520	174	40	Ecuador 124; Costa Rica 10.
Petroleum refinery products thousand 42-gallon barrels	[r]2,594	1,357	--	Trinidad and Tobago 82; unspecified 1,275.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	--	$1,271	NA	NA.
Other: Base metals including alloys, scrap	1,343	1,970	1,811	Japan 132; Taiwan 27.

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.

Table 7.—Panama: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	1,340	500	382	France 118.
Semimanufactures	1,236	833	376	El Salvador 75; Norway 67.
Copper: Metal including alloys:				
Unwrought	64	9	3	Republic of South Africa 6.
Semimanufactures	690	782	191	Chile 302; Portugal 181.
Iron and steel: Metal:				
Scrap	114	1,026	--	NA.
Pig iron, cast iron, related materials	14,806	13,382	137	Venezuela 10,668; Mexico 1,450; Chile 999.
Ferroalloys	141	2	2	
Steel, primary forms	17,242	4,250	525	Costa Rica 1,220; Italy 706; Republic of Korea 477.
Semimanufactures:				
Bars, rods, angles, shapes, sections	15,738	12,052	640	Belgium-Luxembourg 2,656; Republic of Korea 1,733; Brazil 1,413.
Universals, plates, sheets	27,921	30,843	4,977	Japan 11,020; France 4,858.
Hoop and strip	560	1,050	31	Japan 968; Brazil 37.
Rails and accessories	495	3	2	NA.
Wire	5,273	5,412	143	Brazil 3,621; Republic of Korea 505; Belgium-Luxembourg 444.
Castings and forgings, rough	4	54	4	Costa Rica 35; Spain 15.

See footnotes at end of table.

Table 7.—Panama: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Lead: Metal including alloys:				
Unwrought	262	320	--	All from Mexico.
Semimanufactures	17	34	5	Taiwan 29.
Nickel: Metal including alloys, all forms	NA	1	1	
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$5	$5	
Silver: Metal including alloys, unwrought and partly wrought do	$55	$167	$110	Guatemala $41; Italy $13.
Tin: Metal including alloys:				
Unwrought	7	10	6	Bolivia 1; West Germany 1.
Semimanufactures	2	1	NA	NA.
Zinc:				
Oxides	27	36	16	Mexico 10; Peru 8.
Metal including alloys:				
Unwrought	398	478	12	Peru 416; Canada 50.
Semimanufactures	22	21	11	Costa Rica 3.
Other:				
Ores and concentrates	--	1	1	
Base metals including alloys, all forms	24	30	8	France 1; unspecified 21.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5	3	3	
Grinding and polishing wheels and stones	5	70	12	Italy 40; Brazil 7.
Asbestos, crude	320	450	--	Mainly from Canada.
Cement	8,202	9,512	421	Republic of Korea 3,400; Costa Rica 1,645; Mexico 1,477.
Clays, crude	817	664	352	El Salvador 286; West Germany 4.
Diamond: Industrial stones value, thousands	$9	$5	--	Italy $4.
Diatomite and other infusorial earth	443	221	58	Mexico 163.
Feldspar, fluorspar, related materials	430	1,100	20	Guatemala 1,080.
Fertilizer materials:				
Crude, n.e.s	1	4	NA	NA.
Manufactured:				
Nitrogenous	17,217	21,987	7,922	Hungary 4,000; West Germany 3,555.
Phosphatic	6,068	1,299	1,246	Costa Rica 42; Mexico 5.
Potassic	7,501	3,517	15	West Germany 3,500; Italy 2.
Unspecified and mixed	26,341	24,709	5,631	Costa Rica 13,694; West Germany 3,934.
Graphite, natural	31	2	2	
Gypsum and plaster	9,530	191	131	Dominican Republic 19.
Lime	1,401	3,074	1,933	Costa Rica 1,141.
Mica:				
Crude including splittings and waste	32	18	18	
Worked including agglomerated splittings	([2])	6	2	Colombia 4.
Pigments, mineral: Natural, crude	33	3	3	
Precious and semiprecious stones other than diamond value, thousands	$297	$145	$26	United Kingdom $70; Taiwan $20.
Salt and brine	8,713	949	553	Canada 246; United Kingdom 105.
Sodium and potassium compounds, n.e.s.:				
Carbonate, manufactured	3,390	1,976	1,537	France 174; West Germany 92.
Sulfate, manufactured	2,649	3,103	153	Mexico 2,950.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	689	856	9	Italy 480; Canada 296.
Worked	139	239	11	Mexico 60; Spain 33; Italy 26.
Gravel and crushed rock	--	51	51	
Limestone other than dimension	3,165	2,742	20	Costa Rica 2,722.
Sand other than metal-bearing	6,435	9,712	9,701	Colombia 8; Denmark 3.
Sulfur: Elemental, colloidal, precipitated, sublimed	10	32	7	Nicaragua 20; Belgium-Luxembourg 2.
Talc, steatite, soapstone, pyrophyllite	206	233	168	Hong Kong 60; Costa Rica 5.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	101	37	26	Peru 5; West Germany 4.
Coke and semicoke	61	94	94	

See footnotes at end of table.

Table 7.—Panama: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	11,976	11,929	45	Mexico 4,092; Ecuador 4,040; Venezuela 3,703.
Refinery products:				
Liquefied petroleum gas do	399	334	156	Netherlands Antilles 57; Italy 41.
Gasoline do	3,014	1,128	501	Netherlands Antilles 311; Venezuela 223.
Mineral jelly and wax do	12	10	1	Brazil 4; China 1; Hong Kong 1.
Kerosine and jet fuel do	7	8	6	Netherlands Antilles 2.
Lubricants do	33	18	15	Do.
Residual fuel oil do	6	11	8	Netherlands Antilles 3.
Unspecified do	5	--		

NA Not available.
[1]Table prepared by H. D. Willis.
[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]

Bangladesh, whose population probably passed 100 million by yearend, remained one of the poorest countries in the world, with a per capita gross domestic product (GDP) of $126.[2] Its only economically significant mineral production was natural gas. A few other minerals or mineral-based commodities were also produced, generally for local consumption. These included cement, clays, nitrogenous fertilizers, limestone, salt, steel, and pilot plant production of ilmenite and rutile. Exploration for oil was a continuing quest, which was hindered by a lack of funding and a hesitancy on the part of foreign petroleum companies to make long-term or expensive exploration commitments.

PRODUCTION AND TRADE

Production of natural gas continued to increase as more use was being made of the abundant gas reserves variously put at between 7 and 16 trillion cubic feet. The main consumers were nitrogenous fertilizer producers and electric powerplants, but other industries were converting to natural gas from imported coal or fuel oil wherever possible.

The production of other minerals was consumed almost entirely by local industry or by other parts of the domestic sector.

Bangladesh's principal exports scored impressive gains during fiscal year 1984.[3] Total exports increased by 17% to $795 million, but mineral exports were insignificant. Imports totaled $2.4 billion in fiscal year 1983 and were expected to reach $2.8 billion in fiscal year 1984. The import of crude oil and petroleum products in fiscal year 1983 cost the country $325 million, which was 41% of export earnings.[4]

A major problem of the Bangladesh economy has been an increase in the inflation rate. The official Dhaka Middle Class cost of living index increased between 10% and 12% during 1984. The underlying or actual rate of inflation was probably over 15% during the period.[5]

COMMODITY REVIEW

Metals.—*Mineral Sands.*—The Government has been studying the heavy mineral beach sands that were discovered in the early 1960's between Teknaf Bazar and Kutubdia Island north of Cox's Bazar. Reserves of 3.5 million tons of heavy minerals have been identified, of which over 1 million tons was titanium minerals. A small pilot plant was opened in May 1981 and has produced 220 tons of ilmenite and nearly 1 ton of rutile to date. The pilot plant study indicated that the minerals can be separated successfully and a semicommercial plant was to be designed and installed at Cox's Bazar in the near future.

Nonmetals.— *Cement.*— Bangladesh Chemical Industries Corp. was making plans for the rehabilitation and expansion of the 220,000-ton-per-year-capacity Chittagong clinker grinding plant and the conversion of the 210,000-ton-per-year-capacity Chatak cement plant from the existing wet process to a semidry process in order to improve efficiency and productivity. The Asian Development Bank was considering a loan of $26 million for the project. Completion of the project would reduce cement imports and costs. Bangladesh produced one-third of its cement needs in recent years.

Fertilizer Materials.—Toyo Engineering Corp. of Japan was awarded the contract for the ammonia-urea plant to be built at Chittagong in southeastern Bangladesh. The plant is to have a capacity of 1,000 tons per day of ammonia and 1,725 tons per day of urea.[6] Site preparation was reportedly begun in 1984.

Mineral Fuels.—*Petroleum and Natural Gas.*—Bangladesh Shell Petroleum Co., the country's only foreign concessionaire, suspended its search for oil in the Chittagong Hill Tracts in January after several of its employees were abducted by an anti-Government rebel group. Bangladesh Shell was working under a $120 million production-sharing contract and had just completed lengthy seismic surveys and pinpointed two favorable sites for drilling. The company was reluctant to begin drilling until the Government could guarantee the security of its employees.

The state-owned Bangladesh Oil and Gas Corp. (Petrobangla) continued exploration at various sites, but at a fairly slow pace because of a scarcity of funding. Petrobangla contracted out two seismic surveys, one to a British firm and one to a French firm. Both projects began late in 1984 and were to run well into 1985. They were funded by a $23 million credit from the International Development Association and are to cover previously unsurveyed areas in the south and west Ganges Delta.

Petrobangla completed construction of the 180-kilometer Bakhrabad to Chittagong gas pipeline and the main gas distribution lines in the Chittagong area. Commercial production began in June. Considerable additional development was underway or planned. Only a few of the 13 proved gasfields were being used, and some of them had only a few producing wells each. Most of the development was being funded by various international lending institutions, the Asian Development Bank and the International Development Association being the largest contributors. Several new fields are expected to be developed by Petrobangla, gas treatment plants built, and additional pipeline systems laid. The Government's goal is to double gas production by the end of the decade. Work on one of these projects is to start in 1985 and would produce the country's first significant amounts of natural gas condensates. The plan consists of surveying and drilling development wells at three presently unused fields in the northeastern part of the country—Kailashtila, Beanibazar, and Rashidpur. In addition, three gas condensate treatment units and a new pipeline system would be built. Foreign exchange savings from the natural gasoline fraction would amount to more than $20 million per year.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area and commodity	1980	1981	1982	1983[p]	1984[e]
BANGLADESH[2]					
Cement, hydraulic[3]	335,964	344,830	326,247	306,688	[4]272,619
Clays: Kaolin[3]	10,442	9,982	5,862	2,269	[4]3,457
Gas, natural, marketed[3 5] million cubic feet	45,364	49,936	63,717	70,133	[4]80,257
Iron and steel: Metal:[3]					
Steel, crude (ingot only)	137,557	139,343	108,624	47,401	[4]73,387
Steel products	169,327	186,013	172,080	54,552	[4]100,741

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	1980	1981	1982	1983[p]	1984[e]
BANGLADESH[2] —Continued					
Nitrogen: N content of ammonia	139,361	152,493	182,252	178,695	[4]378,600
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	440	NA	NA	NA	NA
Jet fuel do.	18	NA	NA	NA	NA
Kerosine do.	2,499	NA	NA	NA	NA
Distillate fuel oil do.	1,168	NA	NA	NA	NA
Residual fuel oil do.	2,574	NA	NA	NA	NA
Naphtha do.	785	NA	NA	NA	NA
Unspecified do.	312	NA	NA	NA	NA
Refinery fuel and losses do.	287	NA	NA	NA	NA
Total do.	8,083	9,420	8,853	7,168	[4]7,958
Salt, marine[3]	463,000	276,000	574,790	243,091	[4]671,832
Stone: Limestone, industrial[3]	45,480	38,550	44,592	32,101	[4]24,564
BRUNEI[2]					
Gas, natural:					
Gross million cubic feet	367,000	350,000	343,000	[e]352,000	330,000
Marketed do.	328,072	312,533	306,459	[e]315,000	300,000
Natural gas liquids:					
Condensate thousand 42-gallon barrels	3,780	4,230	5,570	[r][e]5,910	5,460
Natural gasoline do.	765	196	289	[r][e]305	280
Liquefied petroleum gas do.	232	104	166	[r][e]125	115
Total do.	4,777	4,530	6,025	[r][e]6,340	5,855
Petroleum:					
Crude do.	86,010	60,614	60,225	63,875	58,560
Refinery products:					
Gasoline do.	178	408	697	553	605
Distillate fuel oil do.	433	276	321	358	395
Residual fuel oil do.	7	1	7	7	8
Other including refinery fuel and losses do.	336	283	200	250	272
Total do.	954	968	1,225	1,168	1,280
CHRISTMAS ISLAND[2]					
Phosphate rock, marketable:					
Gross weight thousand tons	1,713	1,423	1,328	1,094	[4]1,259
P_2O_5 content do.	602	499	466	385	443
HONG KONG[2]					
Cement, hydraulic do.	1,489	1,517	1,436	1,717	[4]1,847
Clays: Kaolin	748	8,216	286	834	[4]70
Feldspar	2,974	194	1,744	5,275	[4]23,101
Feldspar sand	12,964	3,325	31,114	51,272	[4]92,293
Iron and steel: Steel, crude[e]	90,000	120,000	120,000	120,000	120,000
Quartz	12	--	--	--	--
KAMPUCHEA[e] [2]					
Salt	30,000	[4]24,390	[4]38,100	40,000	40,000
NORTH KOREA[e] [2]					
Aluminum metal ingot, primary	10,000	10,000	10,000	10,000	10,000
Barite	110,000	[r]100,000	([6])	([6])	--
Cadmium, smelter	140	130	100	100	100
Cement, hydraulic thousand tons	8,000	8,000	8,000	8,000	8,000
Coal: Anthracite do.	36,000	36,000	36,000	36,000	36,000
Coke do.	2,900	3,000	3,000	3,000	3,000
Copper:					
Mine output, metal content	15,000	15,000	15,000	15,000	15,000
Metal:					
Smelter, primary and secondary	18,000	18,000	18,000	18,000	18,000
Refined, primary and secondary	22,000	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	25,000	25,000	25,000	25,000	25,000
Iron and steel:					
Iron ore and concentrate, marketable:					
Gross weight thousand tons	8,000	8,000	8,000	8,000	8,000
Fe content do.	3,200	3,200	3,200	3,200	3,200
Metal:					
Pig iron[r] do.	5,400	5,000	5,250	5,500	5,750
Ferroalloys, furnace type unspecified do.	120	120	120	120	120
Steel, crude[r] do.	5,800	5,500	5,800	6,100	6,500

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	1980	1981	1982	1983[p]	1984[e]
NORTH KOREA[e 2] —Continued					
Lead:					
Mine output, metal content	125,000	110,000	95,000	[r]75,000	75,000
Metal, primary and secondary	65,000	65,000	60,000	60,000	60,000
Magnesite:					
Crude thousand tons	1,850	1,900	1,900	1,900	1,900
Calcined do.	770	800	800	800	800
Nitrogen: N content of ammonia do.	450	450	450	450	450
Phosphate rock[r]	500,000	500,000	500,000	500,000	500,000
Salt, all types	570,000	570,000	570,000	570,000	570,000
Silver, mine output, metal content[r] thousand troy ounces	1,600	1,600	1,600	1,600	1,600
Sulfur[r] thousand tons	280	255	230	230	230
Talc, soapstone, pyrophyllite	170,000	170,000	170,000	170,000	170,000
Tungsten, mine output, metal content[r]	2,200	2,200	2,200	500	1,000
Zinc:[r]					
Mine output, metal content	140,000	140,000	140,000	140,000	140,000
Metal, primary	120,000	120,000	120,000	120,000	120,000
LAOS[e 2]					
Gypsum	[4]20,000	[4]40,500	[4]60,000	70,000	[4]82,000
Salt, rock	20,000	20,000	[4]8,949	10,000	10,000
Tin, mine output, metal content	290	200	[4]225	[r e]265	[4]315
MONGOLIA[2]					
Cement, hydraulic thousand tons	178	210	350	336	350
Coal:					
Anthracite and bituminous[e] do.	250	250	250	250	250
Lignite and brown[e] do.	4,126	4,350	4,980	5,180	5,600
Total do.	4,376	4,600	5,230	5,430	5,850
Copper, mine output, metal content	44,000	71,800	90,000	104,000	118,000
Fluorspar, all grades thousand tons	604	595	670	700	740
Gypsum[e] do.	30	32	32	32	32
Lime, hydrated and quicklime[e] do.	50	50	60	62	67
Molybdenum, mine output, metal content[e]	487	661	830	960	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	16,000	16,000
NEPAL[7]					
Cement, hydraulic	30,744	30,574	[e]25,000	45,587	[4]39,225
Clays for cement manufacture	4,000	2,000	[e]2,000	[e]2,000	2,000
Coal: Lignite	3,461	8,174	[e]8,000	8,244	[4]7,595
Copper ore:					
Gross weight	6	6	6	11	NA
Cu content	1	2	2	4	NA
Gem stones:					
Garnet kilograms	[8]41,295	105,925	NA	23,000	20,000
Tourmaline do.	NA	13	[e]10	[e]10	12
Lime, agricultural[e]	10,000	10,000	10,000	10,000	[4]7,000
Magnesite, crude	[e]15,000	[e]20,000	[e]20,000	15,016	[4]14,603
Salt	8	8	[e]10	6	[4]700
Stone:					
Limestone	32,400	83,565	[e]80,000	50,422	45,000
Marble:					
Chips	343	366	[e]400	482	[4]609
Cut square meters	3,083	3,561	[e]4,000	3,208	3,000
Craggy cubic meters	[e]800	963	[e]1,000	3,530	[4]708
Talc	1,460	71	[e]3,000	15,263	[4]7,595
SINGAPORE[2]					
Cement, hydraulic thousand tons	1,952	2,253	2,695	3,153	3,000
Iron and steel: Metal: Steel, crude do.	340	350	350	350	350
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	19,144	21,072	14,562	19,738	[4]17,731
Jet fuel do.	32,914	35,228	28,922	30,690	[4]43,578
Kerosine do.	20,610	27,224	29,144	31,377	[4]14,338
Distillate fuel oil do.	63,321	83,008	91,992	88,258	[4]76,677
Residual fuel oil do.	81,309	99,270	80,902	81,906	[4]87,418
Lubricants do.	4,269	3,740	3,152	3,852	[4]3,959
Other do.	30,453	35,728	44,966	41,663	[4]45,560
Refinery fuel and losses do.	10,404	6,755	11,391	8,536	[4]4,024
Total do.	262,424	312,025	305,031	306,020	293,285

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	1980	1981	1982	1983[p]	1984[e]
SINGAPORE[2] —Continued					
Stone: Granite, broken thousand cubic meters	3,185	4,474	5,947	7,569	[4]7,422
Sulfur, byproduct of petroleum	11,347	378	15,188	3,666	[4]5,557
SRI LANKA					
Cement, hydraulic thousand tons	571	642	[e]650	506	500
Clays:					
Ball clay	11,457	9,234	9,291	11,980	[4]16,500
Kaolin	6,614	7,292	8,206	7,976	[4]11,100
Brick and tile clay[e]	[4]62,518	60,000	60,000	60,000	[4]70,000
Clays for cement manufacture	21,148	39,081	62,591	51,931	50,000
Feldspar, crude and ground	3,955	[e]4,000	2,922	2,609	[4]5,200
Gem stones, precious and semiprecious, other than diamond value, thousands	$42,819	$201	NA	$39,814	[4]$20,569
Graphite, all grades	7,794	7,573	8,803	5,528	[4]5,623
Iron and steel: Metal: Semimanufactures	NA	--	--	24,546	[4]15,990
Mica, scrap	145	182	291	171	200
Nitrogen: N content of ammonia	--	43,100	103,600	62,700	70,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	[e]910	NA	968	806	1,100
Jet fuel do	[e]270	NA	908	517	700
Kerosine do	[e]1,600	NA	1,226	1,047	1,400
Distillate fuel oil do	[e]3,550	NA	4,783	3,703	5,000
Residual fuel oil do	[e]4,800	NA	4,833	3,235	4,350
Other do	[e]1,450	NA	[e]1,000	1,252	1,650
Refinery fuel and losses[e] do	520	NA	600	600	800
Total do	[e]13,100	NA	14,318	11,160	15,000
Phosphate rock	5,000	15,294	[e]20,000	[e]16,000	[4]13,685
Rare-earth metals: Monazite concentrate gross weight	63	60	304	[e]300	[4]147
Salt	114,279	104,388	176,437	129,222	[4]107,000
Stone:					
Limestone thousand tons	1,261	1,812	1,616	947	1,000
Quartz, massive	741	[e]800	794	764	[4]1,100
Titanium concentrate, gross weight:					
Ilmenite	33,956	80,011	68,282	81,778	[4]102,048
Rutile	12,789	13,301	7,212	8,093	[4]6,467
Zirconium: Zircon concentrate, gross weight	3,031	3,266	5,789	5,721	[4]3,708
VIETNAM[9]					
Bauxite: Gross weight[e]	--	--	1,000	3,000	5,000
Cement, hydraulic thousand tons	641	545	[e]800	928	1,100
Chromium: Chromite[e]	15,000	15,000	16,000	16,000	16,000
Clays: Kaolin[e]	1,250	1,250	1,000	1,200	1,000
Coal: Anthracite thousand tons	5,300	5,900	5,700	6,019	5,000
Gypsum[e]	15,000	15,000	25,000	25,000	25,000
Iron and steel: Metal:[e]					
Steel, ingot thousand tons	120	110	120	100	100
Steel, rolled do	62	65	40	40	40
Nitrogen: N content of ammonia	([10])	([10])	([10])	([10])	([10])
Phosphate rock:[r] [e]					
Gross weight thousand tons	83	181	110	200	200
P_2O_5 content do	27	60	36	66	66
Salt do	437	403	650	890	800
Tin:					
Mine output, metal content	370	380	[e]500	[e]550	500
Metal, smelter	--	--	475	[e]520	475
Zinc:[e]					
Mine output, metal content	6,500	6,000	6,000	7,000	7,000
Metal, smelter, primary	5,500	5,000	5,000	6,000	6,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 13, 1985.
[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 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]Revised to zero.
[7]Data are for the Nepalese fiscal year ending mid-July of that stated.
[8]Figure includes both gem- and industrial-grade garnet: 4,295 kilograms of gem quality and 37,000 kilograms of industrial quality.
[9]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.
[10]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.

BRUNEI[7]

As of January 1, 1984, the Independent Sultanate of Brunei, the 5,765-square-kilometer, oil-rich, British-protected state on the northwest coast of the Island of Borneo, officially became the State of Brunei Darussalam, but this shift to technical independency had little direct effect on the area's one major industry—the production and processing of crude petroleum and natural gas.

With the advent of independence, Brunei almost immediately linked itself to the Commonwealth, and seemed to be taking an active role in that country group. Press reports commented on the significance of the linkage both to Brunei and other Commonwealth member states, noting Brunei's need for technologic assistance and its obvious ability to pay for such assistance on the basis of petroleum and gas industry income. The new country also linked itself to the Association of Southeast Asian Nations almost immediately, and in September became the 159th member state of the United Nations. Despite independence, firm ties were maintained with the United Kingdom, whose protectorate Brunei formerly had been, at least with regard to national defense. Under arrangements agreed to before independence, British loan service officers direct and train Brunei's military forces, and British Gurkha troops comprise a part of the country's military establishment. By and large, however, British expatriates in civilian Government posts were replaced by Bruneians.

Reflecting the nationalistic attitude was the selection of Malay as the official language of the country, but significantly, stress was laid on bilingual education, in the national school system, with mathematics and science courses to be taught in English so as to prepare students for technical education abroad in English-speaking countries.

Another aspect of independence was shown in a Governmental ruling that at least one-half of the members of the board of directors of every company based in Brunei be Bruneian nationals or residents. This law, which allowed a year for the necessary restructuring, also instructed firms to discontinue the use of "Limited" and "Private Limited" in their names, substituting the Malay terms "Berhad" and "Seudirian Berhad."

Press reports on Brunei's relatively excellent financial position and job opportunity situation, both stemming from the country's oil revenues, have led to problems with immigration. Large numbers of persons have sought visas to work in Brunei and additional numbers of people have entered the country illegally, and the Government took actions to stem the influx.

Brunei's foreign trade picture is completely dominated by its petroleum and gas exports. In 1983, mineral commodities accounted for over 99% of the nation's total commodity export and reexport value of $3,385 million. The total included crude petroleum, $1,889 million; liquefied natural gas, $1,365 million; refined petroleum, $94 million; other mineral commodities, $4 million; and nonmineral commodities, $33 million. In contrast, imports of all commodities totaled only $726 million, and included only $99 million worth of minerals, including $52 million for iron and steel, $11 million for cement, and $10 million for refined petroleum products.

With regard to crude petroleum production, it was noted near yearend that in a reaction to reduce worldwide demand, the daily production rate was reduced from the level of 175,000 barrels that had been maintained for most of the year to only 110,000 barrels, giving an annual average of 160,000 barrels. The reduction apparently was put into effect for the last 2 months of 1984. Production of natural gas and natural gas liquids, although not precisely reported, apparently declined as well. Reserves of 1.4 billion barrels of petroleum and 7.3 trillion cubic feet of gas were reported; the country's production was obtained from 649 wells.

Brunei Shell Petroleum Co.'s new refinery at Seria was officially opened in September. This opening was ceremonial in nature, for the $104 million, 10,000-barrel-per-day facility was actually completed in October 1983, and started operations in November 1983. The facility replaces a smaller refinery of the same firm that has been in operation for 30 years. The new plant reportedly has sufficient capacity for gasoline, jet fuel, kerosine, and some grades of distillate fuel oil to meet not only present local requirements, but anticipated local demand through the year 2000.

In August, the Philippines Energy Minister visited Brunei as a part of ongoing negotiations regarding sale of crude petroleum to the Philippines, either under a deferred payment program or a barter arrangement for goods and labor in exchange for crude petroleum. It was reported that the firm Philippines Shell Petroleum was currently obtaining about 2.1 million barrels of petroleum annually from Brunei Shell Petroleum, but this supply was being obtained without a petroleum purchase contract between the two countries.

Table 2.—Brunei: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	77	22	--	Malaysia 15; Singapore 7.
Copper: Metal including alloys, all forms	34	18	--	Singapore 15.
Iron and steel: Metal:				
Scrap	4,979	8,640	--	Singapore 2,032; Thailand 2,032.
Semimanufactures	3,178	2,570	5	Thailand 1,524; Malaysia 696.
Lead: Metal including alloys, all forms	4	21	--	Singapore 20.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1	$5	--	All to Singapore.
Tin: Metal including alloys, all forms	7	--		
Zinc: Metal including alloys, all forms	4	6	--	Malaysia 5.
Other: Ashes and residues	323	68	--	Malaysia 63.
NONMETALS				
Cement	11,931	11,333	--	All to Malaysia.
Other: Crude	1	100	--	Do.
MINERAL FUELS AND RELATED MATERIALS				
Gas, natural: Liquefied[2] value, thousands	$1,530	$1,365	--	All to Japan.
Petroleum:				
Crude thousand 42-gallon barrels	60,783	62,372	7,837	Japan 28,897; Republic of Korea 8,905; Singapore 5,937.
Refinery products:				
Gasoline, motor 42-gallon barrels	3,072,053	3,052,197	1,038,122	Japan 1,219,232; Singapore 766,513.
Kerosine and jet fuel do.	10,896	279	--	All to Singapore.
Lubricants do.	119	266	--	Malaysia 238.
Nonlubricating oils do.	--	13	--	All to Malaysia.
Bituminous mixtures do.	5,024	9,375	--	Do.

[1]Table prepared by Audrey D. Wilkes.
[2]May include small amounts of liquefied petroleum gas.

Table 3.—Brunei: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	903	1,092	27	Singapore 549; Japan 188; United Kingdom 97.
Chromium: Oxides and hydroxides	51	--		
Copper: Metal including alloys, all forms	760	669	22	Singapore 207; Japan 123; United Kingdom 95.
Iron and steel: Metal:				
Steel, primary forms	61	21	--	Japan 20.
Semimanufactures:				
Bars, rods, angles, shapes, sections	49,217	37,853	73	Japan 15,719; Singapore 1,621; China 591.
Universals, plates, sheets	7,246	6,421	7	Japan 3,112; Singapore 2,042.
Tubes, pipes, fittings	47,833	34,152	1,160	Japan 19,304; Singapore 4,408; France 1,568.
Unspecified	1,990	1,604	19	Singapore 695; United Kingdom 324.
Lead: Metal including alloys, all forms	95	81	--	United Kingdom 33; Singapore 17; Japan 10.

See footnotes at end of table.

Table 3.—Brunei: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Mercury value, thousands	$6	$1	--	All from United Kingdom.
Nickel: Metal including alloys, all forms	55	29	1	Mainly from Singapore.
Rare-earth metals including alloys, all forms value, thousands	$1	$14	--	Mainly from United Kingdom.
Silver: Metal including alloys, unwrought and partly wrought do.	$23	$70	--	Do.
Tin: Metal including alloys, all forms	32	89	NA	Japan 80.
Uranium and/or thorium: Ore and concentrate value, thousands	--	$27	$24	United Kingdom $3.
Zinc: Metal including alloys, all forms	30	16	1	Singapore 13.
Other:				
Oxides and hydroxides	371	299	--	Singapore 236.
Ashes and residues	7,982	8,502	142	Japan 5,775; Singapore 2,575.
Base metals including alloys, all forms	2	2	--	All from Singapore.
NONMETALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones value, thousands	$128	$96	$2	Japan $42; Singapore $24.
Cement	192,083	172,848	2,670	Singapore 15,219; Republic of Korea 5,044; Japan 4,818.
Clays, crude	3,989	3,645	48	Indonesia 1,940; India 1,524.
Fertilizer materials: Manufactured:				
Ammonia	20	11	--	Singapore 10.
Nitrogenous	95	181	--	Japan 52; West Germany 15.
Phosphatic	5	47	--	Japan 39.
Potassic	67	111	--	West Germany 55; Singapore 51.
Unspecified and mixed	1,112	155	3	Singapore 44; West Germany 35; Malaysia 35.
Gypsum and plaster	296	236	2	Thailand 116; Singapore 67.
Lime	442	377	5	Singapore 370.
Mica: Crude including splittings and waste	13	24	24	
Nitrates, crude	44	329	233	Singapore 93.
Phosphates, crude	33	111	1	Malaysia 103.
Pigments, mineral:				
Natural, crude	1,390	54	--	All from Japan.
Iron oxides and hydroxides, processed	--	10	--	All from Netherlands.
Potassium salts, crude	102	84	--	West Germany 46; Singapore 38.
Salt and brine	1,056	1,133	2	Thailand 474; Singapore 320; Netherlands 232.
Stone, sand and gravel: All types	13,431	18,046	441	Malaysia 10,283; Italy 3,736; Singapore 2,531.
Sulfur: Sulfuric acid	50	44	1	Singapore 42.
Other: Crude	1,713	11,434	43	Thailand 8,296; Philippines 2,000; Singapore 1,079.
MINERAL FUELS AND RELATED MINERALS				
Asphalt and bitumen, natural	6	--		
Carbon: Carbon black and gas carbon value, thousands	$8	$4	--	Mainly from Singapore.
Coke and semicoke	11	--		
Peat including briquets and litter	7	--		
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	266,858	299,923	17	Singapore 299,880.
Mineral jelly and wax do.	--	39	--	Singapore 16.
Kerosine and jet fuel do.	558	884	39	Singapore 845.
Lubricants do.	31,766	31,794	938	Singapore 27,986; United Kingdom 2,065.
Nonlubricating oils do.	1,373	3,251	107	Singapore 2,810.
Bitumen and other residues do.	3,054	67	--	All from Republic of Korea.
Bituminous mixtures do.	4,006	6,315	--	Singapore 5,830.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.

CHRISTMAS ISLAND[8]

Tiny Christmas Island, roughly 360 kilometers south of the western tip of Java in the Indian Ocean, showed a modest gain in production of phosphate rock, its only commercial mineral product, but the future of the phosphate industry seemed questionable. With a remaining reserve of about 26 million tons, roughly one-half about 35% P_2O_5 and the other one-half somewhat under that grade, the island's sole producer, Phosphate Mining Co. of Christmas Island, reportedly was expected to show an operating loss of $5.8 million[9] for fiscal year 1984,[10] this on the heels of a $4.2 million loss in fiscal year 1983; these figures were in sharp contrast to a profit of $8.6 million for fiscal year 1982. Data on production and trade, however, suggest that there may have been some improvement in the latter half of 1984, for both output and shipment levels for that year were somewhat up compared with 1983 results. Reduction in demand and a relatively poor competitive position of the Christmas Island products in traditional markets of Australia and New Zealand are reflected in the regional distribution of exports shown in table 4, as an effort to expand sales elsewhere and to diversify export destinations. Australia and New Zealand accounted for 88% of Christmas Island exports in 1982, about the same share as in 1980 and 1981; in 1983, this figure fell to 79% and in 1984 to 71%.

The Australian Government, which controls the island as a territory, reportedly stated that it would not be prepared to subsidize the operation, and that in the long-term, mining of phosphate would depend wholly upon the economic viability of the operation.

Table 4.—Christmas Island: Exports of phosphate rock, by destination

(Thousand metric tons)

Destination	1982	1983	1984
Australia	780	536	493
China	--	21	55
Indonesia	2	6	--
Japan	--	--	40
Korea, Republic of	16	31	35
Malaysia	143	165	208
New Zealand	426	302	387
Taiwan	--	5	16
Total	1,367	1,066	1,234

HONG KONG[11]

At the end of 1984, there was only one mining lease and three mining licenses in effect in Hong Kong. Mine production was limited to feldspar, kaolin, and quartz from small operations in the New Territories. In addition to processing mining and prospecting applications, the Mines Division of the Labour Department enforces legislation and safety regulations for mining and explosives. During the year, consumption of explosives was 4,338 tons. However, most of the consumption of explosives was not for mining operations but for tunneling of the island trunkline of the Mass Transit Railway. The resultant broken rock was used as aggregate for the construction industry.

Under three treaties concluded in 1843, 1860, and 1898, Hong Kong was to be administered as a British Crown Colony under a 99-year lease. On December 19, 1984, an agreement was reached between the Governments of China and the United Kingdom to return Hong Kong to Chinese sovereignty on July 1, 1997, and voiding the treaties of 1843 and 1860 whereby Hong Kong Island, the southern part of Kowloon Peninsula, and Stonecutters Island were to be ceded in perpetuity to Britain. In 1997, Hong Kong is to become a Special Administrative Region under Chinese sovereignty. For 50 years beyond the transfer date, Hong Kong's economic and social system was to remain unchanged.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals	40	48	--	Mainly to Taiwan.
Aluminum:				
Ore and concentrate	8,120	18,110	--	Taiwan 13,840; Indonesia 2,200; Republic of Korea 1,520.
Oxides and hydroxides	3,115	2,523	--	Indonesia 2,400.
Metal including alloys:				
Scrap	16,810	19,179	144	Japan 18,767.
Unwrought	48,910	25,150	--	Thailand 9,600; Malaysia 3,185; Taiwan 2,504.
Semimanufactures	13,034	10,924	1,927	China 1,426; Taiwan 1,398; Singapore 980.
Arsenic: Oxides and hydroxides	295	51	--	Burma 22; Taiwan 17; Vietnam 10.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Beryllium: Metal including alloys, all forms value, thousands	--	$3	$3	
Chromium:				
Ore and concentrate	--	70	--	All to Nigeria.
Oxides and hydroxides including acid	19	37	(2)	Indonesia 18; Vietnam 10.
Cobalt: Oxides and hydroxides	13	16	--	Republic of Korea 4; Singapore 4; Taiwan 4.
Copper: Metal including alloys:				
Scrap	19,302	22,212	735	Japan 14,785; Republic of Korea 4,032; China 1,083.
Unwrought	431	145	--	China 63; Taiwan 32; Singapore 18.
Semimanufactures	3,204	4,361	8	Taiwan 1,074; China 1,021; Singapore 741.
Gold:				
Waste and sweepings value, thousands	$2,544	$2,640	$165	Switzerland $2,448.
Metal including alloys, unwrought and partly wrought thousand troy ounces	829	1,147	1	United Kingdom 882; West Germany 151; Switzerland 65.
Iron and steel: Metal:				
Scrap	296,651	329,556	4	Taiwan 177,520; Japan 87,584; Indonesia 41,623.
Pig iron, cast iron, related materials	7,121	4,421	--	Indonesia 4,365.
Ferroalloys:				
Ferromanganese	813	102	--	Indonesia 52; Vietnam 50.
Ferrosilicon	1,187	610	--	All to Indonesia.
Unspecified	200	162	--	Nigeria 150.
Steel, primary forms	3,986	24,217	--	China 22,617; Taiwan 1,600.
Semimanufactures	128,920	295,412	364	China 218,454; Indonesia 30,655; Macau 20,889.
Lead:				
Oxides	51	96	--	Indonesia 66; Vietnam 30.
Metal including alloys:				
Scrap	2,291	2,596	--	Taiwan 2,084; Japan 354; Philippines 149.
Unwrought	208	233	--	Taiwan 124; Bangladesh 50; China 27.
Magnesium: Metal including alloys, all forms	116	39	--	Japan 31; North Korea 8.
Manganese:				
Ore and concentrate, metallurgical-grade	6	323	--	All to Republic of Korea.
Oxides	1,145	1,431	--	Indonesia 778; Bangladesh 249; Singapore 200.
Mercury 76-pound flasks	777	2,210	--	North Korea 1,884; Vietnam 290.
Nickel:				
Oxides and hydroxides	109	146	--	Taiwan 89; Republic of Korea 30; Singapore 16.
Metal including alloys:				
Scrap	487	378	--	Japan 351; United Kingdom 22.
Unwrought	2,793	4,277	--	Taiwan 2,394; Japan 802; Republic of Korea 431.
Semimanufactures	353	814	--	Taiwan 335; Republic of Korea 282; Thailand 151.
Platinum-group metals:				
Waste and sweepings value, thousands	$1,399	$5,488	$58	United Kingdom $4,262; West Germany $693; Australia $322.
Metals including alloys, unwrought and partly wrought troy ounces	6,190	8,741	25	Switzerland 3,215; Japan 2,859; United Kingdom 721.
Silver:				
Ore and concentrate value, thousands	$3	--		
Waste and sweepings do	$24,523	$127,769	$760	United Kingdom $97,347; West Germany $17,541; France $8,867.
Metal including alloys, unwrought and partly wrought thousand troy ounces	722	373	--	United Kingdom 233; Taiwan 74; Singapore 44.
Tin:				
Ore and concentrate	10	--		
Metal including alloys:				
Scrap	496	66	--	United Kingdom 30; China 15; Japan 11.
Unwrought	1,027	627	--	Taiwan 338; Japan 125; Republic of Korea 89.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys —Continued				
Semimanufactures	674	809	(2)	Taiwan 253; Singapore 183; Philippines 182.
Titanium: Oxides	1,814	2,055	1	Indonesia 1,242; Burma 146; Republic of Korea 105.
Tungsten: Ore and concentrate	4,740	--		
Zinc:				
Oxides	434	357	--	Indonesia 187; China 127; Vietnam 30.
Metal including alloys:				
Scrap	74	30	--	Japan 28.
Unwrought	1,954	2,714	--	Macau 1,862; China 341; Japan 290.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	227	524	--	Macau 301; Singapore 62; Australia 48.
Artificial:				
Corundum	3,095	6,023	--	Republic of Korea 3,919; Taiwan 1,844; Philippines 105.
Silicon carbide	253	477	1	Republic of Korea 217; Indonesia 125; Taiwan 75.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$17	$7	--	China $5; Australia $2.
Grinding and polishing wheels and stones	1,443	1,212	89	Indonesia 695; Republic of Korea 114; China 91.
Asbestos, crude	1,141	84	--	Indonesia 70; China 14.
Barite and witherite	759	886	--	Taiwan 663; Indonesia 88; Republic of Korea 85.
Boron materials: Oxides and acids	982	246	--	Republic of Korea 88; North Korea 81; Taiwan 68.
Cement	73,846	318,459	--	China 243,806; Macau 74,031.
Clays, crude:				
Kaolin	9,936	2,997	--	Taiwan 2,776.
Unspecified	71,586	90,590	--	Taiwan 67,732; Republic of Korea 13,558; Indonesia 5,728.
Diamond:				
Gem, not set or strung carats	507,938	390,871	42,251	Singapore 90,934; Belgium-Luxembourg 66,611; Thailand 62,788.
Industrial stones do	186,296	1,984	94	China 1,890.
Diatomite and other infusorial earth	44	26	--	India 23.
Feldspar, fluorspar, related materials	11,664	17,038	36	Taiwan 11,228; Indonesia 5,355.
Fertilizer materials:				
Crude, n.e.s	1,727	3,331	(2)	Taiwan 1,956; China 1,025.
Manufactured:				
Ammonia	18	5	--	China 3; Vietnam 1.
Nitrogenous	4,978	105,133	--	China 105,055; Macau 60.
Unspecified and mixed	3,988	7,377	3	China 5,115; Vietnam 2,250.
Graphite, natural	188	53	--	Republic of Korea 36; Taiwan 14.
Gypsum and plaster	2,185	6,738	5	Macau 5,302; Indonesia 1,351.
Lime	577	92	--	Nigeria 60; China 23.
Magnesium compounds: Oxides and hydroxides	r10,977	15,416	--	Taiwan 14,990; Nigeria 240.
Meerschaum, amber, jet	35	--		
Mica:				
Crude including splittings and waste	11	27	--	China 18; Indonesia 4; Taiwan 4.
Worked including agglomerated splittings	16	75	--	Republic of South Africa 19; Indonesia 18; China 13.
Pigments, mineral:				
Natural, crude	512	416	--	Indonesia 275; Dominican Republic 71; Japan 70.
Iron oxides and hydroxides, processed	923	1,926	--	Indonesia 1,284; China 501; Japan 52.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$114,202	$88,507	$26,163	Japan $26,233; Singapore $11,046; Thailand $6,681.
Synthetic do	$1,319	$731	$273	Switzerland $168; Republic of Korea $111; Japan $57.
Salt and brine	2,955	6,497	--	Philippines 6,000; China 241; Papua New Guinea 130.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Sodium compounds, n.e.s.:				
Carbonate, manufactured	1,555	41,924	--	China 35,615; Indonesia 6,000.
Sulfate, manufactured	1,971	1,715	--	Vietnam 640; Republic of Korea 517; Indonesia 500.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,124	5,559	48	Taiwan 4,677; Indonesia 380.
Worked	1,226	2,603	69	China 1,201; Macau 546; Philippines 527.
Unspecified	866	3,171	650	China 970; Indonesia 600; Japan 364.
Sulfur:				
Elemental:				
Crude including native and byproduct	42	21	--	Macau 18.
Colloidal precipitated, sublimed	3	4	--	Mainly to China.
Sulfuric acid	225	97	--	China 71; Philippines 20.
Talc, steatite, soapstone, pyrophyllite	11,852	14,121	--	Indonesia 11,066; Taiwan 2,226.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	771	936	--	Indonesia 407; Philippines 328; North Korea 100.
Coke and semicoke	3,610	3,598	--	Indonesia 3,500; Nigeria 92.
Petroleum refinery products thousand 42-gallon barrels	1,845	2,075	(2)	Macau 907; China 685; Singapore 173.

[r]Revised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 6.—Hong Kong: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals	40	48	--	All from China.
Aluminum:				
Ore and concentrate	10,172	17,504	--	Do.
Oxides and hydroxides	3,848	2,308	3	China 2,234; Japan 62.
Metal including alloys:				
Scrap	672	1,083	155	Macau 529; China 147; Taiwan 80.
Unwrought	72,204	55,796	289	Canada 23,662; Australia 7,826; Spain 4,807.
Semimanufactures	22,809	31,951	1,088	Australia 7,788; Japan 7,741; China 7,633.
Arsenic: Oxides and acids	157	61	--	China 46; France 15.
Beryllium: Metal including alloys, all forms value, thousands	$4	$3	--	All from China.
Chromium:				
Ore and concentrate	5	172	--	All from Philippines.
Oxides and hydroxides	435	337	42	West Germany 188; United Kingdom 60; China 27.
Cobalt: Oxides and hydroxides	26	28	--	United Kingdom 10; Australia 8; China 8.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$71	--		
Copper:				
Oxides and hydroxides	210	200	(2)	West Germany 108; Norway 54; United Kingdom 18.
Sulfate	187	277	5	China 86; France 54; Italy 54.
Metal including alloys:				
Scrap	2,010	2,898	482	Vietnam 1,410; China 257; Singapore 257.
Unwrought	1,093	748	175	Finland 207; Republic of South Africa 182; Japan 101.
Semimanufactures	47,248	52,051	1,714	Japan 24,741; China 10,070; Taiwan 5,779.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Gold:				
Waste and sweepings value, thousands	$4,843	$2,475	$32	Papua New Guinea $2,021; Singapore $283; Philippines $127.
Metal including alloys, unwrought and partly wrought thousand troy ounces	3,936	971	34	United Kingdom 446; Switzerland 224; Australia 169.
Iron and steel: Metal:				
Scrap	64,112	26,883	646	China 14,072; Macau 6,013; Japan 2,423.
Pig iron, cast iron, related materials	12,755	12,145	81	China 7,797; Japan 4,213.
Ferroalloys:				
Ferromanganese	1,976	563	--	Republic of South Africa 313; Australia 200; China 50.
Ferrosilicon	1,750	1,259	--	China 600; Philippines 450; Republic of South Africa 191.
Unspecified	1,864	1,240	4	Republic of South Africa 608; Taiwan 240; Australia 199.
Steel, primary forms	91,326	72,371	--	Australia 25,467; Brazil 19,597; West Germany 14,817.
Semimanufactures[3] thousand tons	1,765	1,766	20	Japan 789; China 388; Taiwan 206.
Lead:				
Oxides	188	218	--	China 82; West Germany 68; Japan 30.
Metal including alloys:				
Scrap	205	157	--	Australia 87; Taiwan 37.
Unwrought	2,336	2,591	--	North Korea 1,437; China 723; Canada 278.
Semimanufactures	167	224	--	Republic of South Africa 114; Japan 44; Belgium-Luxembourg 43.
Magnesium: Metal including alloys, unwrought	78	20	--	China 10; Netherlands 8.
Manganese:				
Ore and concentrate, metallurgical-grade	5	204	--	All from China.
Oxides	2,053	2,983	54	China 2,491; Japan 322; Republic of South Africa 105.
Mercury 76-pound flasks	2,033	2,888	--	China 2,573; Spain 300.
Molybdenum: Metal including alloys, all forms value, thousands	$6	$3	--	Mainly from Japan.
Nickel:				
Oxides and hydroxides	100	280	--	Canada 219; China 55.
Metal including alloys:				
Unwrought	3,312	5,009	8	Canada 3,193; Norway 648; United Kingdom 320.
Semimanufactures	400	880	22	Norway 395; Japan 231; West Germany 100.
Platinum-group metals:				
Waste and sweepings value, thousands	$138	$2,805	--	All from Taiwan.
Metals including alloys, unwrought and partly wrought troy ounces	72,779	10,758	100	United Kingdom 3,552; China 3,215; Australia 1,742.
Silver:				
Waste and sweepings value, thousands	$375	$594	--	Indonesia $256; Taiwan $225; Singapore $40.
Metal including alloys, unwrought and partly wrought thousand troy ounces	772	909	23	Australia 185; United Kingdom 178; Singapore 106.
Tin:				
Ore and concentrate	10	--		
Metal including alloys:				
Scrap	6	1	--	All from China.
Unwrought	1,451	1,675	([2])	China 634; Thailand 376; Malaysia 375.
Semimanufactures	553	576	18	China 389; Japan 57; Singapore 53.
Titanium: Oxides	5,103	6,108	578	Japan 2,139; Australia 869; China 820.
Tungsten:				
Ore and concentrate	2,254	--		
Metal including alloys, all forms value, thousands	[r]$353	$445	$71	Japan $205; Austria $53; Thailand $39.
Uranium and/or thorium: Oxides and other compounds	12	109	([2])	Japan 101.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Zinc:				
Oxides	761	715	8	China 290; West Germany 114; Canada 108.
Blue powder	25	129	--	United Kingdom 45; West Germany 30; Japan 21.
Metal including alloys:				
Scrap	39	46	--	Nigeria 38.
Unwrought	22,983	33,467	206	Australia 16,173; Canada 6,631; Belgium-Luxembourg 4,704.
Semimanufactures	r327	334	--	West Germany 129; Japan 104; Belgium-Luxembourg 80.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,841	5,742	295	Japan 2,979; China 1,268; Indonesia 702.
Artificial:				
Corundum	3,243	7,435	63	China 7,032; Japan 242.
Silicon carbide	372	712	--	China 650.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$88	$53	$7	United Kingdom $20; Belgium-Luxembourg $11; Japan $10.
Grinding and polishing wheels and stones	2,340	2,284	65	China 1,093; Japan 678; Taiwan 201.
Asbestos, crude	1,336	101	--	China 88.
Barite and witherite	1,173	1,252	--	China 1,072.
Boron materials: Oxides and acids	743	397	223	China 173.
Cement thousand tons	3,355	3,037	--	Japan 1,661; Taiwan 772; Republic of Korea 296.
Chalk	--	3	3	
Clays, crude:				
Kaolin	25,336	13,234	2	China 11,912; Macau 856.
Unspecified	78,674	105,849	3,599	China 74,737; Macau 18,100; Japan 4,845.
Cryolite and chiolite	17	8	--	All from Denmark.
Diamond:				
Gem, not set or strung thousand carats	1,442	1,286	91	India 521; Israel 273; Belgium-Luxembourg 249.
Industrial stones do	127	20	7	Australia 8; Belgium-Luxembourg 4.
Diatomite and other infusorial earth	427	484	482	Singapore 2.
Feldspar, fluorspar, related materials	14,440	16,267	--	All from China.
Fertilizer materials:				
Crude, n.e.s	1,970	3,589	6	China 2,689; Netherlands 658.
Manufactured:				
Ammonia	1,353	1,917	27	China 1,671; Japan 90.
Nitrogenous	10,522	110,637	26	U.S.S.R. 83,268; West Germany 14,934; Singapore 6,054.
Unspecified and mixed	12,705	14,287	129	West Germany 10,026; Republic of Korea 2,276; United Kingdom 1,119.
Graphite, natural	548	494	--	China 490.
Gypsum and plaster	104,289	77,842	78	Japan 46,740; Thailand 24,336; China 4,974.
Lime	33,137	36,024	--	China 35,394; Taiwan 600.
Magnesium compounds: Oxides and hydroxides	17,826	20,378	--	China 19,461.
Mica:				
Crude including splittings and waste	42	19	18	Japan 1.
Worked including agglomerated splittings	509	769	1	Japan 584; Belgium-Luxembourg 135.
Pigments, mineral:				
Natural, crude	438	367	--	China 355.
Iron oxides and hydroxides, processed	1,870	3,029	522	China 1,223; Japan 722; West Germany 358.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$23,633	$80,132	$9,902	Thailand $22,705; Singapore $12,887; India $6,394.
Synthetic do	$3,343	$1,781	$198	West Germany $869; Japan $445; Switzerland $121.
Salt and brine	79,955	101,053	18	China 94,458; Israel 3,878; West Germany 1,961.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	23,359	84,116	48,408	East Germany 10,543; France 6,714; Japan 5,171.
Sulfate, manufactured	11,385	15,878	20	China 14,494; Taiwan 810.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	4,136	7,651	--	China 7,278.
Worked	26,360	17,772	31	Italy 13,161; China 3,155.
Unspecified thousand tons	1,605	3,695	(2)	China 2,419; Japan 665; Macau 591.
Sulfur:				
Elemental:				
Crude including native and by-product	1,189	696	6	West Germany 234; Singapore 216; Japan 150.
Colloidal, precipitated, sublimed	13	273	--	Singapore 198; Japan 50.
Dioxide	500	39	39	
Sulfuric acid	8,425	4,135	42	China 3,914; Japan 111.
Talc, steatite, soapstone, pyrophyllite	12,807	15,526	221	China 14,770; Norway 252.
Other:				
Crude	7,640	4,463	223	China 4,076; Republic of South Africa 58.
Slag and dross, not metal-bearing	742	892	--	China 481; Thailand 191; Japan 150.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	68	124	18	United Kingdom 51; Trinidad and Tobago 18; Republic of Korea 17.
Carbon: Carbon black	1,236	1,347	77	China 996; France 135; Philippines 55.
Coal:				
Anthracite	3,213	2,309	3	Vietnam 1,380; China 908.
Bituminous thousand tons	1,451	3,416	266	Republic of South Africa 1,411; Australia 1,069; China 450.
Coke and semicoke	6,130	4,851	--	Japan 3,705; China 676; Taiwan 470.
Petroleum refinery products thousand 42-gallon barrels	r50,215	52,843	3,496	Singapore 26,412; China 9,768.

rRevised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Excludes unreported quantity of rails and accessories valued at $803,559 in 1982 and $1,738,761 in 1983.

KAMPUCHEA[12]

The Kampuchean mineral industry consisted of one cement plant, a very small salt output, and some manual exploitation of construction materials, which were utilized within a few kilometers of their production sites. The small cement plant was in Kampot and reportedly resumed operating after being idle for an unknown period.

Because of the present military and political situation, no realistic plans for the development of additional mineral-based industries could be made. The maintenance and development of even the most basic transportation network was severely handicapped by continuing military activity in northern, central, and western Kampuchea. The economy continued to be based almost totally on small farm and subsistence agriculture. A further hindrance to economic development was the primitive electric power system. Electricity was available most of the time in only a few of the major population centers. A rural electric power grid did not exist.

Mineral trade during the year was believed to have been imports only including 135,000 tons of petroleum products, 4,000 tons of coal, and 10,000 tons of chemical fertilizers. Nearly all of which was believed to have been assistance from the U.S.S.R.

NORTH KOREA[13]

In terms of output, North Korea's largest mining sector is anthracite, followed by iron ore, magnesite, and lead and zinc. The year of 1984 marked the final year of the second 7-year Plan (1978-84) under which the country's output target for coal was to reach 70 to 80 million tons; cement, 10 to 13 million tons; steel, 7.4 to 8 million tons; chemical fertilizers, 5 million tons; and nonferrous metals, 1 million tons. According to the Central Statistical Board, the production goals for cement, coal, and chemical fertilizers were attained by the end of 1984, and the output of steel was close to three times that of 1977. There was no reference to the output of nonferrous metals.

Projects completed under the second 7-year plan included the expansion of the Anju coal mining complex; construction of the third ore dressing plant at Komdok (lead-zinc); installation of the rolling mill, cold-rolling mill, and the tin- and zinc-plate shop at the ironworks in Kim Chaek; construction of the second ore dressing plant at the Sangnong iron mine; expansion of the iron mine at Muson; installation of rolling mills at the ironworks at Hwanghae and at Kangson; first stage construction of the Tanchon smelter (lead and zinc); commissioning of the Puk Chang smelter (aluminum); construction of a second smelter at Hungnam (lead-zinc); and installation of a 110-meter revolving kiln at the magnesite operation in Tanchon.

The planned mineral output targets for 1990 were coal, 120 million tons; cement, 20 million tons; steel, 15 million tons; chemical fertilizers, 7 million tons; and nonferrous metals, 1.5 million tons.

Construction of the country's first aluminum refinery, begun in 1975 at Puk Chang, was completed in April. The 20,000-ton-per-year refinery was built with Soviet assistance.

Construction of a 15,000-ton-per-year copper refinery, begun in 1981 at the nonferrous smelter complex at Nampo, was completed in May. The copper mines in Yanggang were being modernized and expanded.

North Korea's lead-zinc smelting facilities are based in Hungnam, Munpyong, Nampo, Pyongbuk, and Tanchon. Expansion of the Tanchon facility was under way as well as the renovation of the Munpyong installation. Plans to quadruple metal output at Pyongbuk in 1986 were being considered. Ore storage capacity was being increased, and a settling basin for dust ore was being added. In addition, a slaked lime plant was being constructed at Pyongbuk. North Korea's lead-zinc mining districts are at Komdok and Tanchon. Both districts were undergoing expansion. According to the Seventh Supreme People's Assembly, the country produces 600,000 to 700,000 tons annually of lead and zinc; sufficient to meet domestic demand as well as to increase decisively the export of these metals.

North Korea's largest iron ore mine is at Muson, which was being expanded to meet the planned target for steel. Expansion of the country's steel production capacity was centered around Chongjin, Kangson, and Kim Chaek. Annual steel output capacity at Chongjin was being expanded to 6 million tons and at Kangson to 3 million tons.

Cement production capacity was 4 million tons in 1960, increased to 8.8 million tons in the ensuing decade, and was to reach 10 to 13 million tons in 1984. Construction of 30 small cement plants was in progress as well as the expansion of 20 plants. New plant construction included Koksan, Pyongsan, Singye, and Sinpyong in North Hwanghae Province, and Anju, Mundok, and Sukchon in South Pyongan Province. Projects for output expansion included plants in Sohung and Yontan in North Hwanghae, Songsan, and Tokchan in South Pyongan. Other projects either for new construction or plant expansion were in Kangwon Province, Nampo Municipality, and South Hwanghae Province.

To meet the output target for coal, development of 12 large underground mines, 31 open pits, and over 80 small underground mines was in progress. Large-scale mine development included Haktong, Hamyon, Hoeyang, Madong, Nongpo, Pongsan, Sepo, Youngso, and Yonpung. Fourteen new pits were being developed at six coal mining complexes in the Kangdong District. Other projects included increasing coal transport capacity at Chonsong, Hakpo, and Kumya.

On September 8, 1984, the Government of North Korea promulgated a joint venture law inviting foreign capital and technology. The first was a Japanese joint venture for a general merchandise department store, and the second a French venture for hotel construction. Subsequent to the enactment of the joint venture law, the ports of Chongjin and Wonsan were under consideration to be opened to foreign ships, a further step to an open-door policy. Moreover, the Government was encouraging the development and expansion of foreign trade, particularly exports.

During the inter-Korea talks for economic cooperation and exchange between the north and south, North Korean proposals included mutual assistance for development of mineral resources; sale of coal, iron ore, and magnesite to the south; purchases of industrial products such as steel and tungsten from the south; and opening ports and restoring service on the Seoul-Sinuiju Railroad.

Table 7.—North Korea: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Principal destinations, 1983
METALS			
Aluminum: Metal including alloys, semimanufactures	1	178	All to Indonesia.
Cadmium: Metal including alloys, all forms	30	NA	
Copper: Metal including alloys:			
Unwrought	NA	99	All to Japan.
Semimanufactures	2	1	All to Indonesia.
Gold: Metal including alloys, unwought and partly wrought troy ounces	273,966	232,868	All to West Germany.
Iron and steel: Metal:			
Scrap	13,227	6,400	Japan 4,400; Indonesia 2,000.
Pig iron, cast iron, related materials	50,899	31,466	All to Japan.
Ferrosilicon	2,790	3,100	All to U.S.S.R.
Steel, primary forms	34,535	57,800	Thailand 28,235; Japan 12,231; Philippines 10,554.
Semimanufactures:			
Bars, rods, angles, shapes, sections	111	1,665	Singapore 1,194; Jamaica 183; Turkey 157.
Universals, plates, sheets	26,989	57,377	Japan 41,356; Cuba 5,042; Indonesia 4,629.
Hoop and strip	40	20	All to Indonesia.
Wire	137	227	Jamaica 205; Indonesia 20.
Tubes, pipes, fittings	122	409	Jamaica 333; Trinidad and Tobago 57.
Castings and forgings, rough	25	101	Turkey 77; Sweden 20.
Lead:			
Ore and concentrate	107	NA	
Metal including alloys, unwrought	22,815	9,554	West Germany 3,974; Japan 3,924; Hong Kong 1,437.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	([2])	2,478,766	West Germany 2,346,808; United Kingdom 130,500.
Zinc:			
Ore and concentrate	60,165	17,067	All to Japan.
Metal including alloys, all forms	29,372	23,641	Japan 20,124; Poland 2,252; Portugal 984.
Other:			
Ores and concentrates	3	4	All to Japan.
Ashes and residues	3,098	1,862	Do.
NONMETALS			
Asbestos, crude	1,803	NA	
Cement	69,226	216,064	U.S.S.R. 204,000; Pakistan 12,064.
Clays, crude	8,368	7,691	Mainly to Japan.
Diamond: Gem, not set or strung value, thousands	$44	NA	
Feldspar	NA	189	All to Japan.
Fertilizer materials: Manufactured:			
Nitrogenous	7,918	40,382	U.S.S.R. 20,200; Japan 19,165.
Phosphatic	3,465	NA	
Potassic	2,000	NA	
Unspecified	NA	1,000	All to Malta.
Graphite, natural	7,031	1,400	All to Japan.
Magnesium compounds:			
Magnesite	128,972	264,798	Poland 105,595; Japan 102,992; West Germany 54,863.
Other	491,719	516,339	U.S.S.R. 515,739.
Mica: Worked including agglomerated splittings	22	9	All to Indonesia.
Precious and semiprecious stones other than diamond value, thousands	$16	$12	All to Switzerland.
Stone, sand and gravel:			
Dimension stone, crude and partly worked	NA	8,887	All to Japan.
Gravel and crushed rock	220	216	Do.
Quartz and quartzite	1,634	922	Do.
Sulfur: Elemental: Crude including native and byproduct	119	NA	
Talc, steatite, soapstone, pyrophyllite	35,430	25,511	Japan 23,617; Poland 1,724.
Other:			
Crude	604	406	All to Japan.
Slag and dross, not metal-bearing value, thousands	$1	NA	
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	119	53	All to Indonesia.
Coal: Anthracite	40,450	30,276	All to Japan.
Petroleum refinery products:			
Kerosine and jet fuel 42-gallon barrels	16,000	NA	
Distillate fuel oil do	29,997	NA	
Lubricants do	NA	35	All to Turkey.
Residual do	NA	60,579	All to Hong Kong.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. 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]Unreported quantity valued at $28,285,000.

Table 8.—North Korea: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983^p	Principal sources, 1983
METALS			
Aluminum:			
Oxides and hydroxides	NA	20,433	All from Japan.
Metal including alloys:			
Unwrought	3,647	2,489	Hong Kong 2,269; Hungary 200.
Semimanufactures	995	1,752	Japan 1,173; Belgium-Luxembourg 417.
Chromium:			
Ore and concentrate	16,000	14,000	All from U.S.S.R.
Oxides and hydroxides	51	138	Japan 136.
Cobalt: Oxides and hydroxides	(2)	3	All from Japan.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	343	426	Do.
Copper:			
Ore and concentrate	13,517	4,508	All from Philippines.
Metal including alloys:			
Scrap	1,197	1,945	All from Japan.
Unwrought	349	NA	
Semimanufactures	49	221	Do.
Germanium: Metal including alloys, all forms kilograms	200	NA	
Gold: Metal including alloys, unwrought and partly wrought troy ounces	3,576	1,081	All from Philippines.
Iron and steel: Metal:			
Scrap	1,559	1,735	All from Japan.
Pig iron, cast iron, related materials	NA	15,999	All from Turkey.
Ferroalloys:			
Ferromanganese	13,892	13,321	Japan 10,821; Brazil 2,500.
Unspecified	2,983	1,693	Japan 1,683.
Steel, primary forms	NA	199	All from Japan.
Semimanufactures:			
Bars, rods, angles, sections	11,379	3,071	Japan 3,039.
Universals, plates, sheets	9,282	3,340	Japan 3,300.
Hoop and strip	120	132	All from Japan.
Rails and accessories	1,438	6,496	Do.
Wire	310	728	Do.
Tubes, pipes, fittings	6,497	7,207	Japan 7,191.
Lead:			
Ore and concentrate	4,807	3,000	All from Japan.
Oxides	2	NA	
Metal including alloys:			
Unwrought	1,947	2,394	Do.
Semimanufactures	1	1	Do.
Magnesium: Metal including alloys, all forms	59	34	Singapore 22; Hong Kong 8.
Manganese:			
Ore and concentrate	28,193	20,170	U.S.S.R. 20,000; Singapore 170.
Oxides	1,755	230	Japan 130; Singapore 100.
Mercury 76-pound flasks	2,040	1,884	All from Hong Kong.
Molybdenum: Metal including alloys, all forms kilograms	6	2,039	All from Japan.
Nickel: Metal including alloys:			
Unwrought	898	387	Hong Kong 237; Cuba 150.
Semimanufactures	3	4	All from Japan.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	737	749	Japan 427; West Germany 322.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$111	$54	All from Japan.
Tin:			
Oxides	(2)	3	Do.
Metal including alloys:			
Unwrought	278	1	Do.
Semimanufactures	1	239	All from Singapore.
Titanium:			
Oxides	109	105	All from Japan.
Metal including alloys, all forms	6	(2)	Do.
Tungsten:			
Ore and concentrate	105	60	All from Singapore.
Metal including alloys, all forms	1	(2)	All from Japan.
Zinc:			
Ore and concentrate	3,880	NA	
Metal including alloys, semimanufactures	160	201	Do.
Other:			
Ashes and residues	NA	18	All from West Germany.
Oxides and hydroxides	14	NA	
Base metals including alloys, all forms	119	112	Hong Kong 92; Japan 20.
NONMETALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	NA	20	All from Japan.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	NA	25	Do.
Grinding and polishing wheels and stones	68	42	Do.

See footnotes at end of table.

Table 8.—North Korea: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Principal sources, 1983
NONMETALS —Continued			
Asbestos, crude value, thousands	$3	NA	
Boron materials: Oxides and acids	36	207	Italy 126; Hong Kong 81.
Cement	163	30	All from Japan.
Diamond: Industrial stones carats	NA	500	Do.
Diatomite and other infusorial earth kilograms	NA	3	Do.
Fertilizer materials: Manufactured:			
Ammonia	NA	89	Do.
Nitrogenous	NA	22,258	All from U.S.S.R.
Potassic	53,239	99,012	Do.
Fluorspar	NA	130	All from Japan.
Graphite, natural	47	NA	
Gypsum and plaster	17,665	25	Do.
Kyanite and related materials	NA	3	Do.
Mica, all forms	1	(2)	Do.
Phosphorus, elemental	30	NA	
Precious and semiprecious stones other than diamond:			
Natural value, thousands	$2	NA	
Synthetic do	$19	$502	Do.
Salt and brine	471	404	Do.
Sodium compounds, n.e.s.: Sulfate, natural and manufactured	80	NA	
Stone, sand and gravel: Dimension stone, all types	348	86	All from Italy.
Sulfur:			
Elemental: Crude including native and byproduct	NA	13,000	All from Poland.
Sulfuric acid	4	2	All from Japan.
Talc, steatite, soapstone, pyrophyllite	7	NA	
Other: Crude	3	2	Do.
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	60	100	All from Hong Kong.
Coke and semicoke	126,002	140,276	Japan 72,276; Poland 68,000.
Petroleum refinery products:			
Liquefied petroleum gas 42-gallon barrels	81	NA	
Mineral jelly and wax do	5,010	2,006	West Germany 1,141; Japan 708.
Kerosine and jet fuel do	2,254	113	All from Japan.
Distillate fuel oil do	168,462	746	Yugoslavia 671; Japan 75.
Lubricants do	5,580	4,632	Japan 2,875; Hong Kong 1,708.
Bitumen and other residue do	NA	12	All from Japan.
Petroleum coke do	NA	32,725	Do.
Unspecified do	1,966	1,279	All from Yugoslavia.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. 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]Less than 1/2 unit.

LAOS[14]

Although insignificant by world standards, the Laotian mineral industry has increased in importance to the national economy and is becoming a significant foreign exchange earner. The export of electric power, derived from Laos' water resources, was the largest source of external income. Exports of tin concentrate and gypsum have gained in importance in each of the last 3 years and will continue to increase if the Government's plans are realized. Exploration and mapping for additional mineral deposits was being assisted by the Soviet Union and Czechoslovakia.

Workers at the Nam Ngum hydroelectric plant installed the dam's fifth generator, its second 40,000-kilowatt unit. They plan to bring the unit on-line by yearend, giving the plant a capacity of 150,000 kilowatts. Most of the plant's power is exported to Thailand, furnishing the country's largest source of foreign exchange earnings.

Metals.—The mines at Bo Neng, Nong Seun, and Phontiou in Khammouan Province produced 790 tons of tin concentrate in "1983-84" according to a Laos press release. Planned production for 1984 was 500 tons. Tin production capacity at the mines continued to be expanded with aid from the Soviet Union. In addition, the ore recovery was being enhanced by additional technical refinements. Refurbishing is planned for completion in 1985 when the capacity of the concentrator is expected to be 1,500 tons per year. The mining complex employed 600 persons.

Nonmetals.—Two Soviet-aided rock crushing and screening plants were officially turned over to the Lao Government in June. Each plant was designed to turn out 200,000 cubic meters of sized aggregate per year for construction projects and road building. One plant was in Vientiane Province, the other in central Khammouane Province. Five similar plants were planned for other areas of the country.

Construction of a 10,000-ton-per-year cement plant was begun in June 1983 with Vietnamese assistance and was completed at Thong Pong (also spelled Tong Pon) in March 1984. A 200,000-ton-per-year cement plant also was believed to be under construction at Vangviang with Soviet assistance.

Development of the large gypsum deposit at Dong Hen continued with Vietnamese aid. It was planned that production capacity would reach 100,000 tons per year by yearend 1984.[15] Expansion was to continue to a final capacity of 200,000 tons per year. Most of the output was exported to Vietnam for use in the cement industry.

Mineral Fuels.—Detailed survey and right-of-way preparations continued on the Soviet-aided, 522-kilometer pipeline from the port city of Vinh in Vietnam to Vientiane. Work on the project began in early 1982 and included site clearing, building of living quarters, and geological studies of the route, storage sites, pumping stations, and river crossings. The survey work was scheduled for completion in March 1984. In May 1984, Lao and Soviet officials signed a series of documents concerning the supplying of machinery and materials for the pipeline and for line construction. The pipeline reportedly was to have a capacity of 300,000 tons per year of petroleum products. Most of Laos' needs for petroleum have come from or through Thailand via barges, railroad cars, and trucks.

A Lao Government press report in October stated that the pipeline has been completed.[16] Although modern pipelaying equipment could lay over 3 kilometers of small-diameter pipe per day, it seems very unlikely that such a schedule could be maintained throughout the monsoon rains. In addition, pumping stations and storage tanks generally require several months to be equipped and integrated once the pipe is laid. The October press report probably referred to the completion of the right-of-way and support structures rather than the pipeline system.

Table 9.—Laos: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983^{p}	Destinations, 1983: United States	Destinations, 1983: Other (principal)
Copper: Metal including alloys, scrap	138	304	--	Hong Kong 257; Japan 47.
Diamond: Gem, not set or strung value, thousands	$83	$63	$63	
Iron and steel: Metal:				
Scrap	1	960	--	All to Thailand.
Semimanufactures: Tubes, pipes, fittings	NA	10	10	
Tin: Ore and concentrate	1,528	NA		

^{p}Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. 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	1982	1983^{p}	Principal sources, 1983
METALS			
Aluminum: Metal including alloys, all forms	3	NA	
Copper: Metal including alloys, semimanufactures	103	NA	
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	129	All from Switzerland.
Iron and steel: Metal, semimanufactures:			
Bars, rods, angles, shapes, sections	1,038	789	Japan 665; Thailand 124.
Universals, plates, sheets	3,215	2,541	Japan 2,511; Thailand 30.

See footnotes at end of table.

Table 10.—Laos: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Principal sources, 1983
METALS —Continued			
Iron and steel: Metal, semimanufactures —Continued			
Hoop and strip	27	--	
Rails and accessories	--	21	All from Japan.
Wire	712	30	Thailand 28.
Tubes, pipes, fittings	441	554	Japan 278; Thailand 230.
Castings and forgings, rough	(2)	--	
Lead: Metal including alloys:			
Unwrought	4	10	Japan 9.
Semimanufactures	1	--	
Zinc: Metal including alloys:			
Unwrought	59	502	Japan 369; Thailand 133.
Semimanufactures	860	NA	
NONMETALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones	2	2	Mainly from Thailand.
Cement	12,311	7,740	Thailand 7,739.
Chalk	40	NA	
Clays, crude	2	NA	
Fertilizer materials: Manufactured:			
Ammonia	1	4	All from Thailand.
Nitrogenous	2,056	200	All from Japan.
Potassic	62	NA	
Gypsum and plaster	NA	15	All from Thailand.
Precious and semiprecious stones other than diamond: Natural value, thousands	$52	NA	
Sodium compounds, n.e.s.:			
Carbonate, natural and manufactured	72	NA	
Sulfate, natural and manufactured	539	NA	
Stone, sand and gravel:			
Dimension stone: Worked	108	7	Do.
Limestone other than dimension	32	NA	
Sulfur: Elemental: Colloidal, precipitated, sublimed	3	16	Do.
Other: Crude	50	NA	
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	6	10	Do.
Petroleum refinery products:			
Liquefied petroleum gas 42-gallon barrels	NA	23	All from Japan.
Gasoline do.	86,606	96,467	All from Singapore.
Mineral jelly and wax do.	67	NA	
Kerosine and jet fuel do.	79,008	35,418	Do.
Distillate fuel oil do.	99,322	143,299	Do.
Lubricants do.	1,192	5,299	Singapore 5,173.
Unspecified do.	10	309	All from Thailand.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. 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.

MONGOLIA[17]

Mongolia remained the world's leading producer of fluorspar and a significant producer and exporter of copper and molybdenum among the centrally planned economy countries. In 1984, production of fluorspar reached a new record high. The fluorspar produced from three mines was concentrated at a new ore dressing plant at Bor-ondor and then exported to the U.S.S.R. Production of copper and molybdenum at the Erdenet complex also reached a new record high. All concentrates from the Erdenet Mine were exported to the U.S.S.R. However, beginning in 1985, Czechoslovakia is to import copper concentrate from Mongolia. The first phase of the cement and lime complex at Hotol was completed and came on-stream in early 1984. The first phase of the Baga Nuur coal mine was also completed and came on-stream in late 1984.

As a result of a geological expedition in cooperation with the Council for Mutual Economic Assistance countries in Mongolia, a number of metallic and nonmetallic mineral deposits reportedly were discovered in 1984. According to Mongolia's Ministry of Geology and Mining Industry, the new finds included a copper and molybdenum deposit in Aryr Nuur, a polymetallic ore deposit in Salhit, a tungsten deposit in Sala, a zinc-molybdenum-tungsten deposit as well as a fluorspar deposit in Hentiy, a fluorspar deposit in Omnogobi, and the Hovsgol phosphorite deposit in northern Mongolia.[18]

COMMODITY REVIEW

Metals.—The Erdenet copper-molybdenum operation in northern Mongolia reportedly was operating at full capacity in 1984. At full capacity, the concentrator at the Erdenet complex was expected to process 16 million tons per year of ore and to produce 118,000 tons of copper and 1,000 tons of molybdenum contained in concentrate per year. The typical Erdenet copper concentrate contains 33% copper, and the molybdenum concentrate contains 50% molybdenum. In past years, all concentrates were exported to the U.S.S.R. However, according to a trade agreement signed between Mongolia and Czechoslovakia in 1984, Mongolia will export copper concentrate to Czechoslovakia beginning in 1985.

During 1984, four additional vein stockworks reportedly were discovered in the Erdenet area. These porphyry reserves previously were estimated at 300 million tons of ore grading 0.85% copper and 0.012% molybdenum.[19] A plan to increase the capacity of the concentrator at the Erdenet complex to 22 million tons per year was announced in October.

At the Erdenet complex, a small steelworks and an automated production control system reportedly were commissioned in 1984. The steelworks was expected to produce 4,500 tons per year of steel for manufacture of casting products such as components and spare parts for mining machinery. The automated production control system was to improve measuring of the weight and metal content of ore feed to the concentrator.

Table 11.—Mongolia: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Principal destinations, 1983
Cement[2]	9,200	6,900	NA.
Copper: Ore and concentrate	NA	4,631	All to West Germany.
Iron and steel: Metal, scrap	23,700	22,100	All to U.S.S.R.
Precious and semiprecious stones other than diamond, natural ... value, thousands	NA	$63	All to Switzerland.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. 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	1982	1983[p]	Principal sources, 1983
Cement[2]	48,000	45,300	NA.
Fertilizer materials: Manufactured:[2]			
Nitrogenous	7,500	8,000	NA.
Phosphatic (P_2O_5 content)	22,900	14,100	NA.
Iron and steel: Metal, semimanufactures:			
Wire	6	NA	
Tubes, pipes, fittings[2]	13,400	10,800	NA.
Unspecified[2]	73,100	48,000	NA.
Petroleum refinery products[2]	4,448	4,894	NA.
Precious and semiprecious stone, other than diamond, natural ... value, thousands	NA	$35	All from Singapore.
Salt and brine	3,060	NA	
Sodium compounds, n.e.s.: Carbonate, natural and manufactured[2]	1,400	1,300	NA.
Sulfur: Sulfuric acid[2]	1,900	1,700	NA.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. 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.

Nonmetals.—Production of fluorspar continued to increase. Mining of fluorspar was at Berh, Bor-ondor, and Dzuuntsagaandel. The ore was concentrated at the Bor-ondor ore dressing plant, which was still undergoing expansion. A large-scale, fluorspar ore dressing combine reportedly was scheduled to come on-stream in the last quarter of 1985 at Herlen. The ore dressing plant will have an annual capacity of 119,000 tons of fluorspar concentrate. Mongolia exported all of its fluorspar, principally to the U.S.S.R.

The first phase of the cement and lime complex at Hotol, between Darhan and Erdenet, in central Mongolia was completed and went into operation. The annual capacity of the Hotol cement and lime complex will be 500,000 tons of cement and 65,000 tons of lime when the complex is completed in 1986.[20]

Mineral Fuels.—Coal production rose sharply to over 5.6 million tons as expansion and modernization of the major coal mines continued in 1984. About 75% of the country's coal output reportedly was from the Baga Nuur, Nalayh Capital, and Sharna Gol Mines. The Aduunchuluun Mine in eastern Mongolia was still undergoing modernization. A coking coal deposit at Tavantolgoyt in southern Mongolia was expected to be developed in 2 years. In 1984, the first phase production of brown coal at the Baga Nuur Mine started at an annual rate of 2 million tons. The Changantal coal mine reportedly also increased its output above the planned level.

NEPAL[21]

The mining sector contributes minimally to the economy of Nepal. The landlocked, mountainous country of Nepal was dependent on subsistence agriculture for its people's livelihood. Only 1% of the population derived their living from the industrial sector and only a small fraction of those were employed in mining or mineral processing. Several projects were under way that will affect the economy to a modest extent and furnish employment to a significant number of people in the localities involved.

Development of the Ganesh Himal lead and zinc mine progressed very slowly while the Royal Nepal Army constructed the road to the mine and concentrator site. From where the road construction ended in December, it still took 2 days of trekking to reach the deposits at an elevation of 4,419 meters above sea level. Large-scale mine development cannot be done yet. Currently, tunneling to reach the deposit is under way but is being done only with backpackable equipment. The main ore body should be reached by yearend 1985 from the adit, which is at 4,095 meters above sea level.

An international tender for the concentrator, estimated to cost about $2 million, is to be offered when the road is nearly completed, sometime in 1987. The concentrator design is to be a standard lead-zinc flotation system. Ore will be transported either by aerial tramway or a slurry pipeline from the mine to the concentrator site, a distance of 1,500 meters with a drop of nearly 600 meters.

The development of the magnesite mine at Kharidhunga in Dolakha District progressed satisfactorily. Construction of the 14-kilometer aerial tramway from the mine to Lamosangu was under way. Tenders for the civil construction at Lamosangu, the site of the dead-burnt magnesite kiln, were offered during the year and were to be opened by yearend. Construction was scheduled to begin in March 1985. The project currently employs 110 persons directly and generated jobs for about 1,000 more indirectly. Once operating at full capacity, Nepal Orind Magnesite (Pvt.) Ltd. is to employ 500 workers and generate about 2,000 additional jobs indirectly. The planned refractory plant will not be built under present economic conditions.

Officials of the Department of Mines and Geology reported that the seismic surveys of the Siwaliks and Terai regions for petroleum, conducted during the last 2 years and financed by the International Development Association (IDA), "had yielded positive findings."[22] As a result of the survey, the Government was making positive efforts to attract multinational companies to begin on-site exploration. The IDA loan would also enable Nepal to employ experienced consultants to assist with contract negotiations. Nepal's petroleum needs are met entirely by imports, causing a considerable strain on its limited economy. Almost any petroleum discovery would be very helpful, even if it were quite small by normal world standards.

SINGAPORE[23]

The only primary mining operations in Singapore are granite quarrying for use as aggregate for the construction industry. In 1984, there were 17 quarrying establishments for granite and 5 establishments for cement. In the metals sector, small amounts of iron and steel manufactures are produced from scrap and imported metal. Tin metal is believed to be produced from concentrates allegedly smuggled out of neighboring countries. Singapore's largest mineral-related activity is oil bunkering and refining. Output of petroleum refinery products was about 300 million barrels in 1984.

In terms of industrial production, the value-added output of electronic products was $1.1 billion, followed by petroleum refining, $652 million, and machinery, $606 million. In comparison, the value-added output of cement and concrete products was $144 million; iron and steel, $55 million; nonferrous metals, $19 million; and nonmetallic mineral products, $9 million.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	691	1,476	--	Malaysia 1,460.
Metal including alloys:				
Scrap	7,450	8,789	--	Japan 7,923; Malaysia 373; Taiwan 246.
Unwrought and semimanufactures	12,663	27,891	82	Malaysia 15,991; Philippines 2,697; Thailand 1,210.
Chromium:				
Ore and concentrate	5	66	--	Philippines 60.
Oxides and hydroxides	49	41	--	All to Malaysia.
Cobalt: Oxides and hydroxides	2	14	--	India 10; Malaysia 4.
Columbium and tantalum: Metal including alloys, all forms, tantalum	10	22	--	All to U.S.S.R.
Copper: Metal including alloys:				
Scrap	15,328	19,507	15	Japan 6,108; India 5,516; Republic of Korea 3,845.
Unwrought and semimanufactures	14,065	8,981	7	Malaysia 8,088; India 204; Brunei 117.
Iron and steel: Metal:				
Scrap	7,877	119,468	17	Malaysia 47,766; Japan 35,106; Thailand 21,031.
Pig iron, cast iron, related materials	9,683	6,887	--	Malaysia 5,264; Bangladesh 1,552.
Ferroalloys	2,119	601	--	Malaysia 362; India 218.
Steel, primary forms	3,673	4,416	--	Malaysia 4,410.
Semimanufactures	426,304	264,490	4,977	Malaysia 148,566; Thailand 22,803; India 20,759.
Lead:				
Ore and concentrate	100	34	--	India 33.
Oxides	624	1,148	--	Japan 802; Malaysia 307.
Metal including alloys:				
Scrap	2,812	1,862	--	Taiwan 701; Thailand 637; India 270.
Unwrought and semimanufactures	1,720	2,514	17	Thailand 1,008; Malaysia 635; Sri Lanka 424.
Magnesium: Metal including alloys, all forms	3	330	--	Thailand 304; North Korea 22.
Manganese:				
Ore and concentrate, battery-grade	19,104	27,449	--	Republic of Korea 5,940; Philippines 3,523; India 3,030.
Oxides	2,065	1,399	--	Malaysia 1,298; North Korea 100.
Mercury ——— 76-pound flasks	1,450	434	--	Mainly to North Korea.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS —Continued				
Nickel:				
Ore and concentrate	1	201	--	All to India.
Matte and speiss	6	145	--	India 144.
Metal including alloys:				
Scrap	533	413	35	Japan 209; Taiwan 147.
Unwrought and semimanufactures	2,830	9,534	--	India 9,324; Japan 102.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$135	$125	$9	Hong Kong $98; Malaysia $17.
Rare-earth metals including alloys, all forms	1	24	NA	NA.
Silver:				
Ore and concentrate[2] value, thousands	$14	$95	$95	
Waste and sweepings[2] do	$1,087	$5,827	$424	United Kingdom $4,458; Japan $595; Australia $212.
Metal including alloys, unwrought and partly wrought do	$1,608	$4,103	$996	United Arab Emirates $875; Switzerland $585; Malaysia $582.
Tin:				
Ore and concentrate	4,048	10,604	359	Netherlands 4,266; Spain 2,741; U.S.S.R. 2,005.
Metal including alloys:				
Scrap	186	551	12	Taiwan 254; Japan 156; Hong Kong 80.
Unwrought and semimanufactures	18,751	20,975	6,579	Japan 6,364; Malaysia 1,599; Netherlands 1,379.
Titanium: Oxides	685	827	--	Malaysia 588; Japan 187.
Tungsten:				
Ore and concentrate	630	875	311	West Germany 268; India 110; North Korea 60.
Metal including alloys, all forms	72	91	70	France 7; West Germany 4; Italy 3.
Zinc:				
Oxides	1,068	1,027	--	Japan 770; Bangladesh 57; China 52.
Metal including alloys:				
Scrap	886	1,050	--	Japan 633; Taiwan 323.
Unwrought and semimanufactures	4,612	4,275	--	Malaysia 3,840; Thailand 208.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	89	22	--	Malaysia 21.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$9	$5	--	Japan $2; Malaysia $1.
Grinding and polishing wheels and stones	369	315	7	Malaysia 246; Brunei 37.
Asbestos, crude	8,940	8,692	3	Malaysia 8,108; Burma 530.
Barite and witherite	10,204	15,821	--	Malaysia 8,063; Papua New Guinea 7,258; New Zealand 499.
Boron materials:				
Crude natural borates	363	508	--	All to Malaysia.
Oxides and acids	139	116	--	Malaysia 86; Philippines 30.
Cement	433,513	462,276	--	Malaysia 427,040; Brunei 17,506; Australia 9,102.
Chalk	1,660	2,073	--	Brunei 1,535; Malaysia 378; Nigeria 120.
Clays, crude	35,373	37,455	--	Malaysia 21,339; Thailand 5,738; United Arab Emirates 3,559.
Diamond:				
Gem, not set or strung value, thousands	$13,582	$7,456	$1,340	Belgium-Luxembourg $2,786; Malaysia $865; Hong Kong $578.
Industrial stones do	$1,307	$546	$176	Hong Kong $186; Belgium-Luxembourg $142.
Diatomite and other infusorial earth	377	795	--	Philippines 320; Thailand 206; Brunei 104.
Feldspar, fluorspar, related materials	2,915	4,894	--	All to Malaysia.
Fertilizer materials:				
Crude, n.e.s	80,914	61,143	--	Mainly to Malaysia.
Manufactured:				
Ammonia	286	331	--	Malaysia 171; Thailand 94; Sri Lanka 26.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials —Continued				
Manufactured —Continued				
Nitrogenous	347,197	301,855	--	China 115,441; Sudan 87,251; Vietnam 48,969.
Phosphatic	1,904	2,324	--	Philippines 979; Burma 500; Bangladesh 260.
Potassic	190,007	205,429	--	Malaysia 103,745; China 38,085; Bangladesh 26,100.
Unspecified and mixed	79,838	56,980	--	Malaysia 54,875; Brunei 1,300; Vietnam 500.
Graphite, natural	89	186	--	Malaysia 183.
Gypsum and plaster	1,483	1,784	--	Malaysia 1,556; Brunei 197.
Lime	5,892	5,019	--	Malaysia 3,296; Brunei 1,178; Thailand 316.
Magnesite	187	151	--	Australia 100; Malaysia 51.
Mica, all forms	206	366	--	Malaysia 76; Thailand 53; Japan 32.
Phosphates, crude	23,791	14,395	--	Malaysia 12,005; Brunei 122; Hong Kong 67.
Pigments, mineral: Iron oxides and hydroxides, processed	621	782	--	Malaysia 752; Burma 12.
Potassium salts, crude	56	68	--	All to Malaysia.
Precious and semiprecious stones other than diamond -- value, thousands	$15,655	$21,841	$136	Hong Kong $12,683; Thailand $4,749; Switzerland $2,607.
Salt and brine	9,272	17,458	--	Malaysia 14,572; Thailand 1,207; Brunei 676.
Sodium compounds, n.e.s.: Carbonate, manufactured	4,620	2,914	--	Malaysia 2,773; Bangladesh 50; Vietnam 20.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	362	232	--	Malaysia 95; Brunei 46.
Worked	5,913	9,156	3	Brunei 5,380; Malaysia 2,780; Italy 483.
Dolomite, chiefly refractory-grade	33	683	--	Papua New Guinea 600.
Gravel and crushed rock	1,281	14,233	--	Brunei 11,871; Malaysia 2,341.
Limestone other than dimension	1,388	2,293	--	Malaysia 2,093; Brunei 94; Hong Kong 84.
Quartz and quartzite	21	1	--	All to Malaysia.
Sand other than metal-bearing	1,176	6,073	--	Republic of Korea 5,000; Brunei 630; Malaysia 378.
Sulfur:				
Elemental:				
Crude including native and byproduct	12,999	28,997	--	Taiwan 13,300; Thailand 10,708; Malaysia 4,401.
Colloidal, precipitated, sublimed	8,126	8,570	--	Malaysia 7,293; Philippines 792; Hong Kong 362.
Sulfuric acid	690	1,130	--	Sri Lanka 496; Malaysia 427; Saudi Arabia 120.
Talc, steatite, soapstone, pyrophyllite	909	981	--	Malaysia 967.
Other:				
Crude	28,651	32,004	--	Malaysia 29,587; Philippines 1,305; Thailand 970.
Slag and dross, not metal-bearing	14,843	7,376	--	Japan 5,340; Malaysia 1,185; Christmas Island 435.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	33,310	28,674	--	Malaysia 21,413; Yemen (Aden) 4,508; United Arab Emirates 1,843.
Carbon: Carbon black	1,572	986	--	Malaysia 385; India 380; Burma 82.
Coal, all grades including briquets	1,157	328	--	Thailand 145; Philippines 71; Malaysia 35.
Coke and semicoke	8,004	7,969	--	Malaysia 6,636; Bangladesh 892; Sri Lanka 346.
Petroleum:				
Crude thousand 42-gallon barrels	2,016	3,395	--	Egypt 1,545; Australia 1,328.
Refinery products do	148,516	172,286	10,149	Japan 35,444; Malaysia 30,523; Hong Kong 25,859.

NA Not available.

[1]Table prepared by Audrey D. Wilkes.

[2]May include platinum-group metals.

Table 14.—Singapore: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	340	--	China 200; United Kingdom 140.
Oxides and hydroxides	10,792	9,605	117	Japan 7,937; China 1,400; India 75.
Metal including alloys:				
Scrap	642	639	--	Malaysia 368; Brunei 67; Australia 44.
Unwrought and semimanufactures	38,923	53,586	2,446	Australia 10,453; Bahrain 6,434; Malaysia 5,718.
Beryllium: Metal including alloys, all forms	--	2	NA	Japan 1.
Chromium:				
Ore and concentrate	35	13	--	All from Japan.
Oxides and hydroxides	221	340	94	Italy 171; Japan 28; West Germany 26.
Cobalt: Oxides and hydroxides	7	8	--	Belgium-Luxembourg 4; Canada 3.
Copper: Metal including alloys:				
Scrap	5,090	4,019	163	Malaysia 3,500.
Unwrought and semimanufactures	36,422	36,922	725	Japan 19,093; Republic of Korea 4,332; Australia 996.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	25,256	13,014	--	Malaysia 12,955.
Metal:				
Scrap	93,027	94,513	55	Netherlands 31,400; Australia 25,809; United Kingdom 22,200.
Pig iron, cast iron, related materials	102,665	57,396	278	Australia 51,826; Japan 3,045.
Ferroalloys:				
Ferromanganese	3,611	287	--	Belgium-Luxembourg 143; Norway 41; Netherlands 27.
Unspecified	7,275	4,426	17	Australia 2,268; Mozambique 1,108; China 305.
Steel, primary forms	200,821	210,607	620	France 44,445; Netherlands 39,565; Spain 31,064.
Semimanufactures thousand tons	2,100	2,218	17	Japan 1,452; United Kingdom 99; Republic of Korea 94.
Lead:				
Ore and concentrate	123	39	--	Morocco 36.
Oxides	446	758	--	Mexico 285; Australia 277; Japan 67.
Metal including alloys:				
Scrap	326	90	--	Brunei 74.
Unwrought	3,163	5,873	10	Australia 2,745; Burma 1,720; Japan 1,011.
Semimanufactures	982	976	13	Australia 365; Taiwan 324; Ireland 115.
Magnesium: Metal including alloys, all forms	54	90	66	Japan 20.
Manganese:				
Ore and concentrate	68,209	44,840	--	NA.
Oxides	2,502	4,801	2	Japan 1,630; China 1,477; Ireland 1,404.
Mercury 76-pound flasks	2,176	812	232	China 406; Turkey 145.
Molybdenum: Metal including alloys, all forms	9	19	7	Philippines 7; Japan 3.
Nickel:				
Ore and concentrate	2	203	--	Philippines 201.
Metal including alloys:				
Scrap	193	145	3	Malaysia 106; Philippines 35.
Unwrought and semimanufactures	1,633	11,612	35	New Caledonia 11,352.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$884	$313	$27	Mauritius $98; Hong Kong $64; United Kingdom $40.
Silver: Metal including alloys, unwrought and partly wrought do	$3,370	$4,760	$257	Australia $2,156; Japan $1,015; United Kingdom $518.
Tin:				
Ore and concentrate	3,041	3,674	NA	Thailand 2,677; Burma 933.
Metal including alloys:				
Scrap	627	2,630	--	Hong Kong 2,409; Australia 104; Malaysia 97.
Unwrought and semimanufactures	1,841	3,548	21	Japan 1,928; Thailand 362; Malaysia 305.

See footnotes at end of table.

Table 14.—Singapore: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Titanium: Oxides	4,636	6,365	468	Japan 2,023; Australia 1,268; United Kingdom 905.
Tungsten:				
Ore and concentrate	971	1,210	184	Burma 970; Thailand 40.
Metal including alloys, all forms	66	94	1	China 62; West Germany 15; Austria 6.
Zinc:				
Oxides	755	575	10	China 228; France 128; United Kingdom 54.
Metal including alloys:				
Scrap	292	479	--	Malaysia 306; Australia 85; Belgium-Luxembourg 70.
Unwrought and semimanufactures	21,730	17,406	532	Canada 6,636; Australia 4,069; Japan 1,114.
NONMETALS				
Abrasives, n.e.s.:				
Natural and artificial	870	570	362	China 79; Japan 51; India 22.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$16	$93	$83	United Kingdom $5; West Germany $4.
Grinding and polishing wheels and stones	1,958	1,835	85	Japan 960; China 188; Italy 133.
Asbestos, crude	9,767	10,215	249	Canada 4,788; Australia 1,584; China 1,212.
Barite and witherite	19,494	21,554	3	Thailand 14,990; Malaysia 5,226; China 824.
Boron materials:				
Crude natural borates	323	408	408	
Oxides and acids	440	755	224	Italy 314; China 170.
Cement thousand tons	2,685	3,607	1	Japan 1,959; Republic of Korea 626.
Chalk	3,076	3,432	15	United Kingdom 1,544; Thailand 1,152; Australia 260.
Clays, crude	69,026	103,025	42,847	Malaysia 33,767; Portugal 7,669; United Kingdom 4,925.
Diamond:				
Gem, not set or strung value, thousands	$47,876	$62,467	$4,178	India $16,451; Israel $15,732; Belgium-Luxembourg $12,674.
Industrial stones do	$3,555	$1,124	$460	India $423; Israel $99; Japan $89.
Diatomite and other infusorial earth	1,061	1,031	895	Philippines 88; Hong Kong 26.
Feldspar, fluorspar, related materials	6,034	7,856	--	India 4,281; Thailand 1,894; China 1,567.
Fertilizer materials:				
Crude, n.e.s	3,317	1,223	--	Thailand 1,100.
Manufactured:				
Ammonia	397	536	59	Belgium-Luxembourg 212; Malaysia 138; Japan 47.
Nitrogenous	400,276	274,483	76,646	U.S.S.R. 107,769; Qatar 51,571; West Germany 32,417.
Phosphatic	3,173	2,761	3	Malaysia 2,657; Netherlands 100.
Potassic	261,503	269,136	4	Canada 99,589; Jordan 72,979; Israel 42,602.
Unspecified and mixed	69,969	54,139	82	West Germany 49,677; Finland 2,436.
Graphite, natural	583	455	3	China 185; Japan 95; Republic of Korea 90.
Gypsum and plaster	117,306	149,291	74	Australia 112,384; Thailand 26,759; Japan 8,443.
Lime	20,549	26,899	--	Malaysia 19,545; Republic of Korea 3,100; China 2,069.
Magnesite	603	371	19	Japan 110; Norway 73; Hong Kong 59.
Mica, all forms	1,434	1,597	87	India 733; China 549; Malaysia 143.
Nitrates, crude	12	(2)	--	All from Australia.
Phosphates, crude	27,131	16,149	--	Christmas Island 13,769; Malaysia 1,044.
Pigments, mineral: Iron oxides and hydroxides, processed	2,501	2,343	148	West Germany 898; Japan 574; China 430.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$25,566	$17,721	$391	Kenya $7,887; Hong Kong $2,590; Switzerland $2,040.
Synthetic do	$265	$102	--	Thailand $55; Japan $29.

See footnotes at end of table.

Table 14.—Singapore: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Salt and brine	41,703	50,742	152	Australia 28,933; Thailand 10,010; China 4,517.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	14,164	10,459	553	Malaysia 4,990; United Kingdom 2,414; East Germany 740.
Sulfate, manufactured	NA	14,788	293	China 8,280; Taiwan 3,400; Japan 1,150.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,458	3,026	10	Italy 950; China 574; India 386.
Worked	24,772	36,665	61	Italy 23,333; China 4,362; Japan 2,634.
Dolomite, chiefly refractory-grade	4,581	6,047	--	Thailand 5,503.
Gravel and crushed rock	446,978	730,227	--	Malaysia 727,596; France 752; Thailand 639.
Limestone other than dimension	51,962	41,434	--	Malaysia 30,536; Japan 10,863.
Quartz and quartzite	836	1,995	--	Thailand 1,471; China 430.
Sand other than metal-bearing	491,388	1,324,077	3,078	Malaysia 1,318,739; Japan 959; West Germany 771.
Sulfur:				
Elemental:				
Crude including native and by-product	57	69	--	Poland 50.
Colloidal, precipitated, sublimed	262	159	54	Republic of Korea 52; Poland 25; United Kingdom 12.
Sulfuric acid	81	154	22	West Germany 63; Australia 42; Japan 20.
Talc, steatite, soapstone, pyrophyllite	7,660	8,119	155	
Crude	38,653	63,513	5	West Germany 61,282; Malaysia 1,603; Philippines 357.
Slag and dross, not metal-bearing	1,326	7,763	--	Japan 6,187; Hong Kong 1,310.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,345	2,959	256	Japan 1,992; China 478; Republic of Korea 186.
Carbon: Carbon black	7,062	5,597	376	Malaysia 2,981; Japan 1,389; West Germany 360.
Coal, all grades including briquets	2,483	2,163	1,833	United Kingdom 171; Japan 62; Netherlands 47.
Coke and semicoke	9,787	12,307	1	Japan 8,285; Australia 3,073.
Petroleum:				
Crude thousand 42-gallon barrels	96,975	227,895	--	Saudi Arabia 103,590; Malaysia 47,878; United Arab Emirates 21,071.
Refinery products do	61,009	69,958	13,018	Kuwait 15,352; Bahrain 7,489; Saudi Arabia 4,376.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Unreported quantity valued at $23,000.

SRI LANKA[24]

Sri Lanka, an island just off the southeastern tip of India, has a wide variety of mineral deposits. It is a major world producer of nondiamond gem stones and an important producer of heavy mineral beach sands and natural graphite. The beach sands deposit at Pulmoddi is one of the richest in the world. A 25-million-ton deposit of apatite was discovered at Eppawela in 1971. Sizable deposits of raw materials used in the cement, ceramic, and glass industries, i.e., limestone, dolomite, several clay minerals, quartz crystal, feldspar, and glass sands, have also been discovered. More recently, copper mineralization has been found at Seruwila on the eastern coast, and exploration for petroleum and uranium was in progress.

The mining industry accounted for a small but steady share—about 1.9%—of annual GDP, while earnings from mineral exports, including gems, represent about 4% of total export earnings. With the exception of the gem stone industry, where private sector participation was permitted, Sri Lanka's mining industry was controlled by the state. Government corporations, chiefly the Ceylon Mineral Sands Corp., the State Mining and Mineral Development Corp. (SMMDC), the State Gem Corp., and the

Ceylon Petroleum Corp., were responsible for administering the mining, processing, and export of minerals from Sri Lanka. The rationale behind state control of the mining industry was the belief that systematic mining controlled through a central body would ensure the most efficient use of the country's mineral resources and prevent both waste and rapid depletion of deposits.[25]

A major exploration program was being undertaken by the Sri Lanka Geological Survey Department to upgrade information on known mineral resources and locate additional reserves. The project is to take 5 years and cost $22 million.[26]

The Geological Survey Department, working in collaboration with a French geological team, discovered a 4-million-ton deposit of ore grading 1% to 2.5% copper at Arippu in eastern Trincomalee District. Still to be assessed were ore blocks at Kollankulam and Seruwila. A feasibility study was planned to determine whether the discoveries are worth exploiting.[27]

The Eppawela phosphate deposit consists of a phosphate-rich leached zone and a main body of chlorine-rich fluorapatite. Average P_2O_5 content is 33%, and samples containing 39% to 40% are not uncommon. The usefulness of the deposits is severely limited because the phosphate has very low water solubility and has a high chlorine content, which makes the material highly corrosive. SMMDC operated a small mining and grinding operation at Eppawela. The product was only suitable as a long-term, direct-application fertilizer on certain perennial crops, mainly tea and rubber. Government research labs have been investigating processes that could convert the ore into a more useful phosphate fertilizer. In the most promising process, the apatite is roasted to 900° C with soda ash and quartz to obtain a citric-acid-soluble product. The process was recently patented and could lead to a commercial operation.[28]

The Government-owned ammonia-urea plant at Sapugaskanda, Sri Lanka's only producer of nitrogen fertilizer, was shut down at the beginning of 1984 because of high operating costs. The 143,000-ton-per-year nitrogen (content) plant resumed operations on April 2.

It was reported that Moriroku Co. Ltd. of Tokyo and SMMDC were planning to develop a graphite mining operation. The $54 million project would involve rehabilitating abandoned graphite mines at Pussehena and Siyambalptitya, with all the production going to Moriroku. The financial and technical operation would be handled by the Japanese company, with Sri Lanka supplying the resources. The project would bring in much needed foreign exchange and furnish local jobs.[29]

Sri Lanka's lump graphite industry faced competition from flake graphite, which was found in its natural form in Madagascar. In response, SMMDC began manufacturing small quantities of flake graphite by rolling lump graphite. Preliminary exploration has resulted in the discovery of a deposit of natural flake graphite at Meegahatenne, in the southern coastal region of Sri Lanka. If the deposit proves to be commercially exploitable, it would provide a substantial boost to the graphite industry.

Sri Lanka's so far unsuccessful search for oil continued during the year. The sophisticated Canadian seismic survey vessel *Bernier* was used to conduct a 1,000-kilometer survey in the Gulf of Mannar. Data from the survey was being interpreted by another Canadian firm at yearend. In addition to the Bernier survey, a 500-kilometer survey was conducted by the R. J. Walker Oil Group of the United States. Results of this work were to be made known early in 1985. If there are positive signs of oil, R. J. Walker is committed to spend an additional $11 million in exploration under the terms of a 20-year contract.[30]

Table 15.—Sri Lanka: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Iron and steel:				
Ore and concentrate excluding roasted pyrite	9,250	20,279	--	Netherlands 12,000; Japan 4,500; India 2,561.
Pyrite, roasted	14,144	11,190	--	Japan 11,170.
Lead: Metal including alloys, all forms	428	55	--	Bangladesh 37; India 18.
Titanium: Ore and concentrate	14,144	NA		
NONMETALS				
Fertilizer materials: Manufactured:				
Nitrogenous	40,855	--		
Graphite, natural	2,903	4,223	651	Japan 897; United Kingdom 816; Pakistan 499.
Mica: Crude including splittings and waste	1,007	1,043	--	Japan 997.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$32,873	$39,813	$3,460	Belgium-Luxembourg $11,061; Japan $10,979; Switzerland $4,537.
Synthetic do.	$7	$18	$6	Canada $9.
Salt and brine	24,413	86,150	--	Bangladesh 75,750; Tanzania 8,400.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Partly refined 42-gallon barrels	1,267	--		
Refinery products:				
Nonbunker:				
Liquefied petroleum gas do.	139	116	--	Maldives 104.
Gasoline do.	421	961	--	Maldives 901.
Kerosine and jet fuel do.	1,913	222	--	Malaysia 71; Maldives 53.
Distillate fuel oil do.	135,320	656	--	All to Maldives.
Residual fuel oil do.	11	470,616	--	Malaysia 332,001; Singapore 138,242.
Lubricants do.	r36	5,152	--	Maldives 4,886.
Nonlubricating oils do.	1,372,597	NA		
Bunker:				
Jet fuel do.	665,720	593,817		
Distillate fuel oil do.	335,208	283,786		
Residual fuel oil do.	1,329,915	1,317,668		
Lubricants do.	4,232	9,786		

r Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.

Table 16.—Sri Lanka: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	6,215	2,444	12	United Kingdom 643; Malaysia 356; Singapore 198.
Copper: Metal including alloys, all forms	21,581	1,495	3	Japan 421; Australia 263; Singapore 183.
Iron and steel: Metal:				
Ferroalloys	26	732	--	Norway 408; Republic of South Africa 140; West Germany 103.
Steel, primary forms	9,008	6,404	--	Pakistan 5,951; Japan 222.
Semimanufactures	91,377	109,686	444	Japan 40,090; Republic of South Africa 36,651; United Kingdom 7,764.
Lead: Metal including alloys, all forms	957	2,795	NA	Australia 2,573.
Manganese:				
Ore and concentrate: Metallurgical-grade	1,121	867	--	Singapore 779.
Oxides	620	523	--	Singapore 181; India 169; Japan 114.
Mercury 76-pound flasks	5	NA		
Molybdenum: Metal including alloys, all forms	12	40,000	--	All from Japan.
Tin: Metal including alloys, all forms	108	83	--	United Kingdom 74.
Tungsten: Metal including alloys, all forms kilograms	134	NA		

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Zinc:				
Oxides	510	454	--	United Kingdom 166; Belgium-Luxembourg 103; China 77.
Blue powder	1	--		
Metal including alloys, all forms	288	960	--	Canada 546; Japan 196; Australia 138.
NONMETALS				
Asbestos, crude	2,399	7,243	129	Canada 6,284.
Cement	142,971	220,996	1,661	Japan 136,294; Kenya 56,919; Yugoslavia 7,000.
Clays, crude	4,211	3,973	9	Thailand 2,090; United Kingdom 780; Japan 675.
Diamond:				
Gem, not set or strung value, thousands	r$10,746	$21	--	Thailand $12; India $9.
Industrial stones value	$149	--		
Fertilizer materials:				
Crude, n.e.s	17,773	14,407	--	Egypt 6,104; Canada 5,000; Jordan 3,300.
Manufactured:				
Ammonia	137	71	2	Netherlands 21; Singapore 19; United Kingdom 17.
Nitrogenous	36,496	34,680	74	Japan 23,305; West Germany 7,467; Netherlands 1,860.
Phosphatic	22,500	31,065	--	India 8,200; Iraq 7,875; Japan 7,500.
Potassic	70,758	76,314	--	Canada 36,000; West Germany 27,711; Spain 6,950.
Unspecified and mixed	16,756	26,751	37	Portugal 18,804; Japan 6,864.
Gypsum and plaster	2,630	15,007	--	Australia 13,635; United Kingdom 762.
Magnesite	27	1,004	--	Austria 533; United Kingdom 446.
Pigments, mineral:				
Natural, crude	10	--		
Iron oxides and hydroxides, processed	857	727	--	West Germany 371; India 139; Netherlands 136.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$487	$75	$11	Thailand $24; India $17; West Germany $10.
Synthetic do	$5	$16	$1	Thailand $9; Hong Kong $3.
Sodium compounds, n.e.s.: Carbonate, manufactured	308,741	4,013	--	Kenya 1,703; United Kingdom 1,268; East Germany 290.
Stone, sand and gravel	1,305	1,287	--	India 591; Italy 398; Japan 91.
Sulfur:				
Elemental, all forms	548	568	3	Republic of Korea 329; West Germany 65; Belgium-Luxembourg 60.
Sulfuric acid	353	468	1	Singapore 331; Belgium-Luxembourg 74.
Talc, steatite, soapstone, pyrophyllite	1,313	703	1	China 389; India 276.
MINERAL FUELS AND RELATED MATERIALS				
Coal, all grades including briquets	48,767	48,839	--	Republic of South Africa 33,977; India 13,000.
Coke and semicoke	958	1,231	--	Japan 510; Singapore 195; United Kingdom 195.
Petroleum:				
Crude thousand 42-gallon barrels	14,354	(2)	--	NA.
Refinery products:				
Liquefied petroleum gas value	$2,234	$650,000	--	Yemen (Aden) $646,000.
Gasoline 42-gallon barrels	3,503	123,888	--	Singapore 86,020; Saudi Arabia 37,604.
Mineral jelly and wax do	15,803	7,658	31	China 5,328; West Germany 716; Singapore 543.
Kerosine and jet fuel do	186,184	540,322	163	Singapore 284,557; China 103,044; Bahrain 76,338.
Distillate fuel oil do	478,324	2,076,140	--	Singapore 1,755,838; Republic of South Africa 168,790.
Lubricants do	16,465	14,756	497	Singapore 5,264; Republic of Korea 3,689; Netherlands 2,905.
Bituminous mixtures do	12	194	176	United Kingdom 12.
Petroleum coke do	(3)	--		
Unspecified do	93,821	180,176	--	Singapore 179,915.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Unreported quantity valued at $300,579,000.
[3]Less than 1/2 unit.

VIETNAM[31]

Vietnam produced about a dozen economically significant minerals during 1984. Cement, construction clays, coal, phosphate rock, and tin were the most valuable to the economy. Iron pyrite production began during the last 2 years. It will be used to make sulfuric acid for the fertilizer industry. Small amounts of bauxite, chromium, graphite, gypsum, kaolin, salt, and zinc were also produced.

Anthracite, chromite, and tin were exported in small amounts, but the once major phosphorite exports dropped to nothing after the border hostilities with China in 1979.

The major exploration success of the year was the joint Soviet-Vietnamese petroleum strike on the Vietnamese Continental Shelf southeast of Ho Chi Minh City.

A geologic conference with Laos and Cambodia was conducted in Ho Chi Minh City in December. The conference addressed measures to establish geological cooperation among the Indochinese countries and endorsed a long-term technical and scientific cooperation program in this field.

Although some gains were made in industrial and agricultural production, the economy continued to have "serious dislocations in various fields, and economic and social instability." The economic growth rate was slower than that of 1981-83.[32]

Because of shortages of energy, raw materials, and foreign exchange, industrial production stagnated, and a number of plants operated at very low output. The cement and coal sectors were believed to have received more foreign aid in recent years than other sectors. Their performance, however, has been unsatisfactory. For example, coal output in the first 10 months of 1984 only fulfilled one-half of the annual plan.

The continuing occupation of Kampuchea by Vietnam and the maintenance of a large standing army required 30% of the gross national product. This in turn resulted in expending financial and human resources that could otherwise have been used in bolstering the economy.

COMMODITY REVIEW

Metals.—*Aluminum and Bauxite.*—In July, the Vietnamese press revealed that there has been bauxite mining in the country for several years. The mine was referred to as Bao Loc Bauxite Mining Enterprise and was under the jurisdiction of the Government's Basic Chemical Corp. Improvements were made during the year in the ore washing cycle. The aluminum oxide content of the concentrate was increased two to five percentage points, to 45%. The report stated that the mine substantially exceeded its 5,000-ton quota for the year.

Tin.—The U.S.S.R. reportedly signed an agreement with Vietnam for the construction of a tin mining and smelting complex in Nghe Tinh Province. This almost certainly refers to the deposits at Qui Hop where the support facilities for a tin mine were under construction in 1981. Development of the mine was scheduled to have begun in 1982. It is possible that mine development was never started because of economic or technical problems and the generally slow pace of getting new projects under way. The smelter would be the second in the country. A small smelter was built many years ago and is probably still in operation.

Nghe Tinh would be the third Province to have tin production. The oldest workings are in Cao Bang Province where the Tinh Tuc mining area has been expanded and modernized in recent years. The mining in Ha Tuyen Province was in the Son Duong area where small quantities of tin concentrate have been produced since 1980. At least two mines were identified, Bac Lung and Khuon Phay. Khuon Phay was being designed for an ore capacity of 300,000 cubic meters per year and was believed to have started limited operation in 1982. Plans called for the Ha Tuyen Mines to have a combined output similar to the Tinh Tuc Mines.

Nonmetals.—*Cement.*—The Danish- and Japanese-aided Hoang Thach cement plant in Hại Hung Province began grinding clinkers into finished cement in January after starting clinker production in November 1983. Construction began in 1979 but was delayed for more than a year because of a political problem between the participants. Some equipment had to be replaced because of deterioration during the period of idleness. Unlike the Bim Son plant, Hoang Thach reportedly has only one 6- by 89-meter rotary kiln with twin four-stage preheaters and a planetary cooler. The finish mill measures 5 meters by 14 meters and draws 6,500 kilowatts. Design capacity of the kiln is 3,100 tons per day or a nominal 1 million tons per year of clinker.

The Bim Son cement plant in Thanh Hoa Province was formally turned over to Vietnamese authorities by the Soviets in a ceremony in November. The two-kiln plant has a design capacity of 600,000 tons per year per kiln. Production from Bim Son during the year, however, was constrained by external factors. The serious electric power shortages in 1983 appeared to have been eased somewhat during 1984, but were still a factor. The supply of raw material was not mentioned as a problem during the year. Transportation, however, has been the most serious problem for the plant. Only about 1,500 tons per day of cement could be shipped by the low-efficiency railroad servicing the plant. Distribution to the south in particular has been a major bottleneck. The cement plant workers "were actively participating in the repair of 80 railroad cars" in order to increase transportation capability.[33]

Construction Materials.—Ground breaking ceremonies were held in December for the construction of the Dap Cau Glass Factory in Ha Bac Province, north of Hanoi. The plant was to be built with Soviet technical and financial assistance and will have an annual capacity of 2.4 million square meters of glass sheets ranging from 2.5 to 6.0 millimeters in thickness. Planned production would equate to approximately 23,000 tons of glass per year.

A Soviet-aided concrete panel plant began initial production in May in Ha Son Binh Province. Referred to as the Xuan Mai Factory, it was to produce precast wall sections for urban apartment buildings. Capacity was reported to be 90,000 cubic meters of finished slabs per year.

Fertilizer Materials.—The third Geological Group was specializing in exploration for fertilizer-related minerals.[34] The Group was composed of nine subgroups with 2,000 personnel. The Group's jurisdiction covered an area of 60,000 square kilometers in the northern Provinces of Ha Nam Ninh, Ha Son Binh, Hoang Lien Son, Lai Chan, Son La, Thanh Hoa, and Vinh Phu. A major discovery of the Group was the Giap Lai pyrite mine, which was explored in detail over several years and recently turned over to the Minerals General Department for commercial exploitation. Sulfuric acid, obtained from processing the pyrite, has been in short supply and its availability has controlled the superphosphate production at Lam Thao in the Province of Vinh Phu. The Group has also discovered and evaluated several other small pyrite deposits where conditions were favorable for exploitation and easy transportation. During exploration and drilling of these small deposits, 3,200 tons of pyrite was collected and sold to the state. The Group has also expanded the apatite mining zone (presumably referring to Lao Cai in Ha Tuyen Province) and has determined that phosphorite deposits "with fairly large reserves exist in Ha Son Binh, Hoang Lien Son, and Son La Provinces."[35] Evaluation of a Tay Bac deposit, 200 kilometers west of Hanoi, has been completed and a plan for its exploitation submitted to higher authorities. The initial plan was apparently for simple grinding and direct application in the immediate locality.

Work on improving the output of fertilizer has continued under high priority. The Van Dien phosphate fertilizer plant "continued to improve the structure of the 50,000 ton furnaces." The plant produced a roasted phosphate fertilizer, which is more soluble than straight ground apatite and easier to produce than superphosphate. The plant was testing both domestic and imported coals during the year in order to get the most efficient roasting cycle.[36]

The Institute of Industrial Chemistry was experimenting with production of roasted phosphate using one of the Haiphang cement plant's furnaces. A test run of 1,300 tons was completed with good results. The Institute recommended that this type of phosphate be put into production.

Nitrogen fertilizer availability continued to be a major problem. The country's only producer was the small Ha Bac nitrate fertilizer plant. Maintenance problems have plagued the project for years and contributed to very low output. Apparently, the spare parts are designed and built on-site. "Although it did not fulfill the norms, the plant made many changes and clear progress as compared with that of 1982."

The Soviet-assisted expansion of the Lam Thao superphosphate plant began test operations on the new sulfuric acid unit in May. The unit is designed to increase acid output from 60,000 to 100,000 tons per year. This in turn would raise single superphosphate capacity from 200,000 to 300,000 tons per year. The expansion has been under way for 4 years.

Mineral Fuels.—*Coal.*—The vital coal sector has continued to perform poorly. Reports during the year indicated that the quality and quantity of coal delivered to the consumer had gone down, despite urgent attempts by the Government to increase the amount of usable, delivered coal. Many reasons were given for not reaching the sector's goals. Inadequate transportation at all levels was certainly an important factor, and has led to excessive pithead stockpiles at several mines. The underlying causes, however, mentioned repeatedly in the Vietnamese press, were poor management, organization and leadership, and a lack of cooperation and sense of responsibility.[37]

Oil and Natural Gas.—The joint Soviet-Vietnamese offshore exploration team reported the discovery of oil in May off the southern coast of Dong Nai Province.[38] The well was drilled by the Soviet drillship *Mikhail Merchink*. No flow rates or reserves were given, although construction of a fixed offshore platform by the Vung Tau (Dong Nai Province) exploration support base was reportedly speeded up because of the discovery. This would be Vietnam's first known oil production and could be extremely important to the economy if it's proved economically exploitable.

Drilling continued at the small gasfield, southeast of Hanoi, which supplies fuel to the Tien Hai gas-turbine electric power station. Three more wells were planned for the field, which was the only producer of natural gas or oil in the country.

[1]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Bangladesh taka (T) to U.S. dollars at the rate of T24.50=US$1.00 during fiscal years 1983 and 1984.
[3]The Bangladesh fiscal year begins July 1 of the year stated.
[4]Dhaka Bangladesh. The New Nation. Jan. 9, 1985, p. 1.
[5]U.S. Embassy, Dhaka, Bangladesh. State Dep. Airgram A-17, Dec. 18, 1984, p. 8.
[6]Nitrogen. No. 153, Jan.-Feb. 1985, p. 12.
[7]By Charles L. Kimbell, senior mineral specialist, Division of International Minerals.
[8]By Charles L. Kimbell, senior mineral specialist, Division of International Minerals.
[9]Data originally reported in Australian dollars (A$); converted to U.S. dollars at the following rates: A$1.00=US$0.9064, fiscal year 1984; A$1.00=US$0.9384, fiscal year 1983; and A$1.00=US$1.1049, fiscal year 1982.
[10]Years beginning July 1 of the year prior to that stated and ending June 30 of the year stated.
[11]By E. Chin, physical scientist, Division of International Minerals.
[12]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[13]By E. Chin, physical scientist, Division of International Minerals.
[14]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[15]Summary of World Broadcasts. Fe/W 1273/A/15, Feb. 8, 1984. (From Lao radio KPL in English 0903 G.m.t., Jan. 27, 1984).
[16]———. Fe/W 1313/A/24, Nov. 14, 1984. (From Lao radio KPL in English 0912 G.m.t., Oct. 26, 1984).
[17]By John C. Wu, economist, Division of International Minerals.
[18]Novosti Mongolii (Ulaanbaatar). Jan. 27, 1984, p. 3; Feb. 21, 1984, p. 3.
[19]American Metal Market. V. 90, No. 4, Jan. 7, 1982, p. 1.
[20]Novosti Mongolii (Ulaanbaatar). Feb. 11, 1984, p. 1.
[21]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[22]Nepal Press Digest (Kathmandu). V. 28, No. 48, Nov. 26, 1984, p. 36.
[23]By E. Chin, physical scientist, Division of International Minerals.
[24]By E. Chin, physical scientist, Division of International Minerals.
[25]U.S. Embassy, Colombo, Sri Lanka. State Dep. Airgram A-38, Aug. 22, 1984, p. 2.
[26]Mining International. V. 15, No. 8, Aug. 1984, p. 114.
[27]Mining Magazine. V. 151, No. 1, July 1984, p. 11.
[28]———. V. 152, No. 1, Jan. 1985, p. 9.
[29]Mining Journal. V. 304, No. 7810. Apr. 26, 1985, p. 290.
[30]Petroleum News. V. 15, No. 10, Jan. 1985, p. 82.
[31]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[32]Beijing Xinhua Domestic Service in Chinese. 1208 G.m.t., Jan. 12, 1985.
[33]Hanoi NHAN DAM in Vietnamese. Apr. 12, 1984, p. 1.
[34]Cuong, L. V., Third Geological Group Activity Prospects for Minerals Used to Manufacture Fertilizer. Hanoi NHAN DAM in Vietnamese, Nov. 27, 1984, p. 2.
[35]Page 3 of work cited in footnote 4.
[36]Hanoi Cong Hghiep Hoa Chat in Vietnamese. No. 72, Feb. 1984, p. 13.
[37]Hanoi NHAN DAM in Vietnamese. July 18, 1984, p. 2. Hanoi home service (radio). 2,300 G.m.t., June 10, 1984.
[38]Page 88 of work cited in footnote 30.

Table 17.—Vietnam: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Principal destinations, 1983
Aluminum: Metal including alloys, all forms	63	1	All to Hong Kong.
Coal: Anthracite and bituminous	120,707	106,920	Japan 102,040; Thailand 3,500.
Copper: Metal, scrap	1,333	1,417	Hong Kong 1,410.
Diatomite and other infusorial earth	116	NA	
Iron and steel: Metal, scrap	NA	12,091	All to Japan.
Salt and brine	NA	603	All to Singapore.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	NA	$1	All to West Germany.
Stone, sand and gravel: Dimension stone:			
Crude and partly worked	NA	1,461	All to Hungary.
Worked	880	NA	
Tin, metal including alloys, unwrought	110	NA	

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. 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	1982	1983p	Principal sources, 1983
METALS			
Aluminum:			
Oxides and hydroxides	105	250	All from Japan.
Metal including alloys, all forms	616	1,036	Japan 812; Hungary 185.
Arsenic: Oxides and acids	NA	10	All from Hong Kong.
Chromium: Oxides and hydroxides	2	13	Hong Kong 10; Japan 3.
Cobalt: Oxides and hydroxides	6	11	All from Japan.
Copper: Metal including alloys:			
Unwrought	102	55	Do.
Semimanufactures	[2]2	89	Sweden 53; Japan 36.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	NA	759	All from Japan.
Iron and steel: Metal:			
Pig iron, cast iron, related materials	5	--	
Ferroalloys	200	256	Japan 200.
Steel, primary forms	19	2	All from Sweden.
Semimanufactures:			
Bars, rods, angles, shapes, sections	3,545	16,091	Poland 11,398; Japan 3,999; Sweden 443.
Universals, plates, sheets	5,911	9,795	Japan 7,532; Singapore 1,295; Hungary 693.
Hoop and strip	118	59	Hong Kong 39; Japan 10; Sweden 10.
Rails and accessories	34	--	
Wire	1,338	2,295	Japan 1,601; Sweden 561.
Tubes, pipes, fittings	422	851	Sweden 569; Japan 248.
Lead:			
Oxides	NA	80	Japan 50; Hong Kong 30.
Metal including alloys, unwrought	306	4	All from Japan.
Manganese: Oxides	95	360	Japan 305; Hong Kong 55.
Mercury 76-pound flasks	71	290	All from Hong Kong.
Molybdenum: Metal including alloys, all forms kilograms	49	NA	
Nickel: Metal including alloys, semimanufactures	NA	16	Hong Kong 10; Japan 4.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	NA	6,060	Japan 5,417; Hong Kong 643.
Tin: Metal including alloys, all forms	1	(3)	All from Hong Kong.
Titanium: Oxides	107	622	Japan 587.
Tungsten: Metal including alloys, all forms kilograms	342	NA	
Zinc:			
Oxides	322	605	Japan 539; Singapore 36.
Metal including alloys:			
Unwrought	NA	101	Hong Kong 100.
Semimanufactures	145	7	All from Japan.
Other: Oxides and hydroxides	2	2	All from Sweden.
NONMETALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	123	--	
Artificial: Corundum	12	--	
Grinding and polishing wheels and stones	7	29	Hong Kong 24.
Asbestos, crude	--	325	Japan 237; Canada 88.
Boron materials: Oxides and acids	5	29	Japan 27.
Cement	132,811	17,508	Japan 15,705; Belgium-Luxembourg 943; Singapore 715.
Clays, crude	1,261	NA	
Diamond: Gem, not set or strung, natural value, thousands	NA	$1	All from West Germany.
Diatomite and other infusorial earth	200	291	Japan 200; Singapore 91.
Feldspar, fluorspar, related materials	240	130	Japan 110.
Fertilizer materials: Manufactured:			
Ammonia	26	871	Hong Kong 775; Japan 75.
Nitrogenous	513,147	667,917	U.S.S.R. 601,948; Singapore 48,969; Italy 11,000.
Potassic	4,897	23,901	U.S.S.R. 23,900.
Unspecified and mixed	29,250	7,750	Japan 5,000; Hong Kong 2,250; Singapore 500.
Magnesium compounds:			
Magnesite	700	100	All from Japan.
Oxides and hydroxides	NA	32	Do.
Mica: Worked including agglomerated splittings	1	2	Mainly from Japan.
Phosphorus, elemental	27	NA	
Pigments, mineral: Iron oxides and hydroxides, processed	1	110	Japan 100; Hong Kong 10.
Precious and semiprecious stones other than diamond value, thousands	$3	$7	Japan $6; West Germany $1.
Pyrite, unroasted	20,000	20,000	All from U.S.S.R.
Sodium compounds, n.e.s.:			
Carbonate, natural and manufactured	253	1,140	Japan 1,000; Hong Kong 120.
Sulfate, natural and manufactured	300	640	All from Hong Kong.

See footnotes at end of table.

Table 18.—Vietnam: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[P]	Principal sources, 1983
NONMETALS —Continued			
Stone, sand and gravel:			
Dimension stone, worked	51	NA	
Sand other than metal-bearing	177	NA	
Sulfur:			
Elemental: Crude including native and byproduct	NA	3	All from Hong Kong.
Sulfuric acid	110	7	Singapore 4; Japan 3.
Talc, steatite, soapstone, pyrophyllite	37	270	Japan 265.
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	523	1,254	Japan 1,244.
Coal: Anthracite	NA	10,000	All from Indonesia.
Coke and semicoke	370	5,100	All from Japan.
Petroleum refinery products:			
Liquefied petroleum gas 42-gallon barrels	12	NA	
Gasoline do	560	NA	
Mineral jelly and wax do	4,525	9,680	Japan 5,368; Hong Kong 3,312; Singapore 826.
Kerosine and jet fuel do	8,714	302	All from Singapore.
Distillate fuel oil do	2,819	121,583	Do.
Lubricants do	158,969	146,481	Italy 101,150; Japan 41,142; Singapore 2,870.
Bitumen and other residues do	10,605	19,998	Singapore 13,938; Japan 6,060.
Bituminous mixtures do	127	67	All from Singapore.
Unspecified do	548	NA	

[P]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. 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]Excludes exports from Japan and Sweden valued at a total of $3,000.

[3]Less than 1/2 unit.

The Mineral Industry of Other Near East Countries

By Ben A. Kornhauser[1] and Thomas O. Glover[1]

CONTENTS

AFGHANISTAN[2]

The mineral industry consisted primarily of natural gas production and of urea fertilizer, which was manufactured for domestic agriculture. Copper and iron deposits were being developed.

Information regarding the mineral industry of Afghanistan was sparse. The Government continued to emphasize the development of mineral resources that could benefit the economy of the U.S.S.R. and repay Soviet grants. The northern half of the country, north of the Hindu Kush mountain range and adjacent to the U.S.S.R., received considerable Soviet aid to develop mineral resources.

Of the $680 million[3] obtained from exports, natural gas was the only mineral product exported, and it was also the main contributor to the gross domestic product (GDP). Imports of $940 million consisted of food supplies and petroleum products. Major trading partners were the U.S.S.R. and other centrally planned economy countries.

The Ainak copper deposit, south of Kabul in Logar Province, was expected to come onstream in 1985. The project was expected to produce 150,000 tons per year of copper, most of which probably would be exported to the U.S.S.R. The large Hajigak iron ore deposit, 60 miles northwest of Kabul in the Hindu Kush Mountains, also was being developed.

The fertilizer and powerplant complex at Mazar-i-Sharif, which had been developed with Soviet aid in the 1974-76 period, produced urea fertilizer for domestic agriculture worth about $10 million annually. The plant's thermal power was generated with domestic natural gas. The total electric power capacity of the country in 1984 was 465,000 kilowatts.

Table 1.—Other countries of the Near East: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983[p]	1984[e]
AFGHANISTAN[2]					
Barite	3,000	1,000	[e]2,000	[e]2,000	2,000
Cement, hydraulic[e]	50,000	95,000	120,000	150,000	150,000
Coal, bituminous	--	50,000	[e]60,000	[e]70,000	70,000
Gas, natural:					
Gross million cubic feet	97,500	[r]100,000	102,000	[e]100,000	100,000
Marketed do	[e]60,000	79,000	81,225	84,755	80,000
Gypsum	--	--	3,000	[e]5,000	4,000
Natural gas liquids[e] thousand 42-gallon barrels	5	5	110	110	110
Nitrogen: N content of ammonia	9,979	9,070	8,000	[e]8,000	8,000
Salt, rock[e]	5,000	6,000	10,000	10,000	10,000
BAHRAIN					
Aluminum metal: Primary, smelter	126,152	141,000	170,960	170,000	177,000
Gas, natural:					
Gross million cubic feet	123,442	122,000	130,507	139,325	NA
Marketed do	97,468	78,059	91,373	96,321	NA
Natural gas liquids:					
Butane thousand 42-gallon barrels	875	817	890	914	NA
Propane do	1,000	1,028	986	996	NA
Naphtha do	986	1,170	1,139	1,209	NA
Petroleum:					
Crude do	18,338	16,902	16,067	15,164	14,235
Refinery products:					
Gasoline do	8,869	11,173	10,068	4,993	NA
Jet fuel do	13,797	13,456	8,341	9,984	NA
Kerosine do	547	2,617	2,676	1,096	NA
Distillate fuel oil do	20,586	25,270	19,515	16,848	NA
Residual fuel oil do	27,046	28,648	19,866	16,344	NA
Lubricants do	375	22	363	2,340	NA
Other do	[e]12,300	12,615	9,975	10,881	NA
Refinery fuel and losses do	[e]2,100	2,177	1,534	1,822	NA
Total do	[e]85,620	95,978	72,338	64,308	NA
Sulfur, byproduct of petroleum do	32,559	36,000	34,060	49,275	NA
LEBANON[2]					
Cement, hydraulic thousand tons	1,484	2,391	1,800	[e]1,000	1,000
Gypsum	[e]10,000	9,500	[e]5,000	[e]5,000	5,000
Iron and steel: Metal, semimanufactures, thousand tons	[e]220	185	[e]150	[e]100	100
Lime[e] do	120	61	50	20	20
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels	3,400	3,000	2,400	2,300	NA
Jet fuel do	900	600	400	300	NA
Kerosine do	150	100	50	50	NA
Distillate fuel oil do	2,600	2,400	2,000	2,000	NA
Residual fuel oil do	5,000	4,300	3,800	3,500	NA
Liquefied petroleum gas do	300	300	200	175	NA
Unspecified do	200	200	150	125	NA
Refinery fuel and losses do	800	600	500	400	NA
Total do	13,350	11,500	9,500	8,850	NA
Salt[e] thousand tons	12	15	10	5	10
OMAN					
Cement, hydraulic	--	--	--	[e]2,200	[3]477,000
Chromite, gross weight	--	--	--	[e]24,000	[3]7,000
Copper:					
Mine output, metal content	--	--	--	11,300	[3]16,200
Smelter	--	--	--	3,290	[3]21,300
Refinery	--	--	--	3,290	[3]15,100
Gas, natural:					
Gross[e] million cubic feet	117,000	[3]174,835	188,000	195,000	190,000
Marketed do	21,189	45,000	75,000	86,700	85,000
Natural gas liquids:[e]					
Butane thousand 42-gallon barrels	40	[3]46	50	50	50
Propane do	5	[3]5	5	5	5
Natural gasoline do	600	[3]730	800	800	800
Petroleum:					
Crude do	103,528	119,808	122,598	137,970	152,000

See footnotes at end of table.

Table 1.—Other countries of the Near East: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983[p]	1984[e]
OMAN —Continued					
Petroleum —Continued					
Refinery products:					
Gasoline -- thousand 42-gallon barrels	--	--	--	[e]1,500	NA
Jet fuel do.	--	--	--	[e]1,000	NA
Kerosine do.	--	--	--	[e]500	NA
Distillate fuel oil do.	--	--	--	[e]3,000	NA
Residual fuel oil do.	--	--	--	[e]2,500	NA
Liquefied petroleum gas do.	--	--	--	[e]500	NA
Naphtha do.	--	--	--	[e]300	NA
Unspecified do.	--	--	--	[e]200	NA
Refinery fuel and losses do.	--	--	--	[e]100	NA
Total do.	--	--	--	[e]9,600	NA
Sand and gravel thousand tons	102	[e]800	1,343	3,410	[3]6,420
Stone:					
Marble do.	--	[e]20	50	33	[3]37
QATAR[2]					
Cement, hydraulic do.	209	258	261	248	[3]478
Gas, natural:					
Gross million cubic feet	224,000	222,000	[e]190,000	202,136	290,000
Marketed do.	79,935	94,250	[e]95,000	[e]100,000	100,000
Iron and steel, semimanufactures thousand tons	440	453	475	477	475
Natural gas liquids thousand 42-gallon barrels	[e]265	6,126	6,516	[e]10,340	[3]11,853
Nitrogen: N content of ammonia	418,000	366,612	434,016	491,000	[3]547,000
Petroleum:					
Crude thousand 42-gallon barrels	172,554	146,370	120,289	102,000	150,000
Refinery products:					
Gasoline do.	[e]950	1,144	1,010	1,097	[3]2,007
Jet fuel do.	450	480	478	442	[3]860
Kerosine do.	33	33	32	69	[3]13
Distillate fuel oil do.	[e]1,000	1,764	1,320	1,359	[3]1,334
Other[e] do.	75	75	75	82	[3]425
Refinery fuel and losses and partly finished oil do.	[e]1,500	1,500	1,086	NA	NA
Total do.	4,008	4,996	4,001	3,049	4,639
Stone: Limestone thousand tons	2,036	2,300	2,185	[e]1,600	[3]1,500
Sulfur	--	5,600	12,000	19,000	33,000
SYRIA					
Asphalt, natural thousand tons	89	90	71	54	NA
Cement, hydraulic do.	1,995	2,150	2,850	2,850	[3]5,000
Gas, natural:[e]					
Gross million cubic feet	60,000	55,000	52,000	62,050	NA
Marketed do.	7,000	8,000	9,000	15,890	NA
Gypsum	78,636	79,545	[e]80,000	[e]350,000	200,000
Iron and steel: Steel, crude thousand tons	110	110	99	[e]67	[3]69
Nitrogen: N content of ammonia	39,000	30,000	64,900	113,400	NA
Petroleum:					
Crude thousand 42-gallon barrels	60,656	58,990	55,625	61,320	[3]62,460
Refinery products:					
Gasoline do.	5,073	4,818	[e]5,255	[e]5,300	NA
Kerosine and jet fuel do.	3,650	4,051	[e]4,400	[e]4,500	NA
Distillate fuel oil do.	18,980	30,998	[e]32,000	[e]33,000	NA
Residual fuel oil do.	10,950	14,231	[e]17,700	[e]18,000	NA
Liquefied petroleum gas do.	657	1,423	[e]1,500	[e]1,800	NA
Asphalt do.	1,497	2,227	[e]2,250	[e]2,300	NA
Refinery fuel and losses do.	1,241	1,752	[e]1,800	[e]1,800	NA
Total do.	42,048	59,500	[e]64,905	[e]66,700	NA
Phosphate rock thousand tons	1,319	1,321	1,455	1,229	[3]1,500
Salt do.	90	90	102	87	[3]87
Stone, sand and gravel:					
Stone: Dimension, marble cubic meters	84,860	60,000	20,000	71,000	[3]7,100
Sand and gravel thousand tons	19	[e]20	205	5,780	[3]5,829
Sulfur, byproduct of petroleum and natural gas do.	[e]5	6	22	[e]30	NA
Unspecified do.	329	[e]3,000	6,200	11,224	[3]4,530

See footnotes at end of table.

Table 1.—Other countries of the Near East: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1980	1981	1982	1983[p]	1984[e]
PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN					
Petroleum refinery products:[e]					
Gasoline ----- thousand 42-gallon barrels	1,000	1,800	2,000	2,200	NA
Jet fuel ----- do	1,200	2,000	2,300	2,500	NA
Kerosine ----- do	800	1,200	1,500	1,800	NA
Distillate fuel oil ----- do	2,500	3,000	3,500	4,000	NA
Residual fuel oil ----- do	6,000	12,000	13,000	14,000	NA
Other ----- do	800	1,200	1,500	1,800	NA
Refinery fuel and losses ----- do	870	1,000	1,200	1,200	NA
Total ----- do	13,170	22,200	25,000	27,500	NA
Salt[e] ----- thousand tons	80	75	75	75	NA
YEMEN ARAB REPUBLIC[2]					
Cement ----- do	81	82	237	600	[3]850
Gypsum	NA	[e]20,000	21,923	23,138	[3]24,295
Salt[e]	65,000	65,000	57,000	141,000	[3]148,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 1, 1985.
[2]In addition to the commodities listed, asbestos and lapis lazuli (in Afghanistan) and a variety of other crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.

BAHRAIN[4]

Bahrain is a small island state in the Arabian Gulf near Saudi Arabia. Oil, natural gas, and aluminum dominated Bahrain's economy. Bahrain has close economic ties with Saudi Arabia and other Arab states in the region.

Oil and natural gas accounted for about 68% of Government revenues and 25% of the GDP. As important as oil was to the national economy of Bahrain, oil reserves would be depleted in 10 to 15 years. Production of oil was 39,000 barrels per day (bbl/d) in 1984 and declining steadily. The state's natural gas production would last for another 50 years at the 1984 rate of consumption.

Bahrain's trade deficit in 1984 rose to $380.5 million[5] despite an increase in its oil exports of $2.72 billion. Bahrain's imports of crude oil amounted to $1,648 million. Total imports of oil accounted for approximately 47% of all imports to Bahrain.

Oil and natural gas revenues were derived from domestic oil operations and from the Abu Safaa Oilfield, owned and operated by Saudi Arabia. Production of oil from domestic operations amounted to approximately 14.2 million barrels in 1984, a 6.1% reduction from that of 1983. A 35-year development and production-sharing contract was signed with Kuwait Foreign Petroleum Exploration Co. for 2,000 square kilometers offshore. The area was relinquished by Superior Oil Co. of the United States in 1983 after three dry holes had been drilled. The Kuwaitis were committed to new seismic surveys and two exploratory wells within the first 3 years. If commercial oil were found, 70% would go to the Bahrain National Oil Co. (Banoco). Disposition of such gas as might be discovered was left to future agreements between the two companies.

During the last decade, Bahrain had worked diligently to diversify its economy. Bahrain had important aluminum and gas liquefaction installations in addition to the Bahrain Petroleum Co. Ltd. (BAPCO) oil refinery, which had been the island's principal economic asset for almost one-half century. During 1984, Bahrain built a petrochemical complex and an iron ore pelletizing plant. It had already successfully established a major international financial sector that included about 80 offshore banking units and a total of more than 170 financial institutions.

Bahrain's development as a major financial center had been the most successful aspect of its efforts to diversify from oil as its major source of revenue. The regional economic climate in which the institutions operated was difficult owing to a decline in oil revenues and the restrictions put on offshore banking units.

The BAPCO refinery, with a capacity of approximately 240,000 bb/d, was still the most important economic asset of Bahrain. The Government of Bahrain owned 60% of the refinery with California Texas Petroleum Co. (Caltex) owning the remaining 40%. Caltex renewed its contract for management services at the refinery. During 1984, the refinery operated at approximately 80% of capacity. The supply of crude oil from Bahrain's Awali Field was supplemented with crude oil purchased from Saudi Arabia's Abu Safaa Oilfield at the Organization of Petroleum Exporting Countries' (OPEC) price. Owing to OPEC prices, BAPCO's processing of Saudi Arabian crude oil was not profitable.

Bahrain's gas liquefaction plant was very profitable. The plant made use of associated gas that was piped directly from Bahrain's Awali Field to the plant where it was converted into butane, propane, and naphtha. In addition to the associated gas, Bahrain had ample supplies of deep-strata Khuff Formation gas that was used to power many of Bahrain's industries including its aluminum industry.

The Italian firm Snamprogetti S.p.A. was constructing the Gulf Petrochemical Industries Complex (GPIC) in 1984, with the expectation of producing methanol and ammonia in late 1985. The plant was scheduled to produce 1,000 tons of each daily. The GPIC venture was shared equally among Petrochemical Industrial Co. of Kuwait, the Saudi Basic Industries Corp. (SABIC), and the Government of Bahrain. The methanol would be marketed by SABIC while the ammonia would be marketed by Kuwait.

Aluminum Bahrain Ltd. (ALBA) operated an aluminum smelter that was owned principally by the Government of Bahrain and by the Saudi Public Investment Fund. Their combined 78% share of the smelter's output was sold through Bahrain Aluminum Co. (BALCO), which was also owned by both Governments. ALBA produced 177,000 tons of aluminum, and BALCO's profits exceeded $30 million. ALBA was proceeding with its plans to automate the smelter. Eventually, the smelter's capacity was expected to increase to 200,000 tons. Gulf Aluminum Rolling Mill Co. (GARMCO), a joint project of Bahrain, Iraq, Kuwait, Oman, and Saudi Arabia, was planned for completion in 1985. GARMCO will have a capacity of 40,000 tons per year of aluminum sheet, coil, and foil stock. The mill was constructed by Kobe Steel Ltd. of Japan.

Arab Iron & Steel Co.'s iron ore pelletizing plant was completed on schedule late in 1984, and trial operations were conducted late in the year. The plant, constructed by Kobe Steel was scheduled to produce 4 million tons per year of iron ore pellets for export to regional markets. The pelletizing plant was off Sitra. The plant will utilize feedstock iron ore imported from Brazil and India as well as 30 million cubic feet per day of Bahrain's natural gas. The pellets are to be exported to iron and steel rolling mills in Saudi Arabia and Qatar. In the first year of its operation, the plant will operate at one-half of its design capacity and produce 2 million tons of iron ore pellets. The first shipment, consisting of 20,000 tons of pellets, was shipped to Jubail, Saudi Arabia, on December 12, 1984. The company also plans to market its output in Indonesia, Malaysia, Pakistan, and some European states.

Gulf Acid Industries expected to begin operating in early 1985. Its plant was scheduled to produce 30 tons of sulfuric acid per day, using sulfur purchased from Banoco. The plant expected to sell about 60 tons of sulfur per month to Bahrain Aluminum Extrusion Co. and about 250 tons per month to the Abu Jar Jur desalination plant.

LEBANON[6]

The mineral industry consisted primarily of cement and gypsum production, light manufacturing, and oil refining, and contributed an estimated 13% of GDP.

Lebanon's mineral industry and gross national product continued to decline under the chaotic conditions that resulted in continual destruction of the infrastructure, equipment, and plants. At yearend, the balance of payments deficit was estimated at $2 billion[7] owing to factors such as an estimated 50% to 60% decrease in money returned by Lebanese nationals working in oil producing countries and Government spending unsupported by the collection of taxes including duties and their revenues from import and export activities. Illegal or "free" ports first appeared in 1976 when legitimate ports such as Beirut closed or fell to armed factions. Illegal ports usurped the state's functions, deprived the Government of millions of dollars of needed revenues, and also charged lower fees.

Arab countries, in 1984, received 96% of

Lebanon's total exported manufactures, of which Saudi Arabia took about 60%. Exports of mineral and chemical products contributed about 6% and 10%, respectively, to trade income.

The import of crude oil and petroleum products was the principal drain on official, foreign reserves. In addition, the Government's subsidization of petroleum products was estimated to cost the Ministry of Industry and Oil $400 million per year.

The cement company Ciment de Sibline, which was established in 1983, was reported to have an operating plant in Saida, south of Beirut.

The Government-owned oil refinery at Tripoli, north of Beirut, restarted operations after several months of inactivity because of destruction of various units, storage tanks, and the pipeline network by warring factions. At startup, the refinery only produced about 20,000 bbl/d of fuel and heavy oil, which would be helpful to the cement factories in Shikka. Gasoline was to be produced later. The refinery of the Mediterranean Refining Co. (Medreco) in Zahrani, near Sidon, also was back in production, producing about 16,000 bbl/d of gasoline, kerosine, and fuel oils. Medreco was owned equally by the Mobil Oil Corp. and Caltex (a 50-50 venture of Standard Oil Co. of California and Texaco Inc.).

OMAN[8]

The mineral industry was led by oil and gas production, with small but growing input from chromite, copper, gold, and silver.

Accelerated economic activity in 1984 resulted from increased oil production, which was the cornerstone of the economy and offset the decline in oil prices. Oman's oil export terminus at Mina al Fahal, which was outside the embattled Strait of Hormuz, attracted many customers. In 1984, total revenues were $4.53 billion,[9] of which oil contributed $3.71 billion. Government expenditures in that period amounted to $5.12 billion. The budget deficit resulted from such factors as declining oil prices, growing expenditures for defense and security, and civil and industrial development projects. Although nonoil industrial contributions to the GDP were still small, they were growing and being stimulated by Government financial assistance.

East Asian countries consumed 89% of the exported oil, with Japan, the Republic of Korea, and Singapore purchasing 62%, 16%, and 8%, respectively, of that total. Practically all the products required by Oman's developing economy, worth about $3 billion, were imported, but income from oil exports maintained a large trade surplus. Japan, the United Kingdom, and the United States were the major exporters, in the order listed, to Oman. Imports rose to $328 million, an increase of 10.3% over the amount spent in 1983.

The state-owned Oman Mining Co., which operated the Sohar copper deposits, produced 15,100 tons of refined copper, 5,900 tons of chromite, 51,400 troy ounces of silver, and 1,690 troy ounces of gold. The copper was worth about $21 million while the balance was worth about $1.65 million. The small-scale chromite extraction was from a deposit near Ramji. The lump ore was stockpiled at the Majis Jetty, 10 miles north of Sohar, from where both the chromite and copper were exported. The commodities were sold mostly by Amalgamated Metal Corp. and Johnson Matthey PLC to the Federal Republic of Germany, France, and the United Kingdom with about 3,000 tons of copper going to Japan. Most of the chromite was sold to European customers. Since chromite production could be increased, other markets, particularly the United States, were sought.

Exploration and drilling continued vigorously on all major concessions. Petroleum Development Oman (PDO) was the largest concessionaire and major oil producer. PDO's owners were the Government, 60%; Royal Dutch/Shell of the Netherlands, 34%; Compagnie Française des Pétroles (CFP), 4%; and Participations and Exploration Corp. of Portugal, 2%. PDO disclosed reserves of 3.5 billion barrels of crude oil and natural gas liquids at yearend, up 513 million barrels over that of 1983. The bulk of PDO's production came from the north Oman fields. Heavy crudes from Marmul in the south were mixed with lighter crudes from the older northern fields in Lekhwair, Tahud, and Yibal at the only export terminus at Mina al Fakal near the capital, Muscat, to produce Oman's blend of 34° API Arabian light-grade crude oil.

PDO was improving its pipeline system and building new pumping stations in order to produce 650,000 bbl/d, if the oil were discovered. Three pilot plant projects were started to establish the suitability of three different enhanced oil recovery processes. The best process would be used to exploit large reservoirs of heavy oil, mostly in south Oman, where conventional methods often achieved recovery rates of less than 10%. Discussions continued on the economic viability of a proposed Gulf Cooperation Council (GCC) funded pipeline and a 250,000-bbl/d export refinery in the southern city of Salalah. The purpose of the project would be to provide another oil outlet outside the Strait of Hormuz for the GCC states of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

Of PDO's oil discoveries, two were in south Oman at Ihsan and Jarmeel-1, and three were in central Oman at Barakat-2, Burhan-1, and Hassira-2. In February, the Mezoun-1 wildcat in the Wadi Aswad tract of Japex Oil Co., owned by Japan Petroleum Exploration (85%) and C. Itoh Energy Development Corp. (15%), tested up to 700 bbl/d of 44° API crude. Development costs were to be reasonable, and the well classified as commercial because the producing formation was at about 4,500 feet.[10] The Safah Oilfield on the 2.4-million-acre Sunainah block in northwest Oman, owned by Occidental Petroleum Corp. of Oman (65%) and Gulf Oman Petroleum Ltd. (35%), was being developed by Occidental, the operator. Gulf had drilled the discovery well, the seventh drilled so far in the field. This well produced 1,200 bbl/d of light oil in tests. The quality of this crude oil was rated at 42° API and had a low sulfur content. About 530 bbl/d was being produced already from the field. By yearend, the pipeline was expected to be completed linking Safah with Oman's main pipeline system at Lekhevair, about 40 miles south-southwest, which extended to the crude oil export terminal.[11]

Société Nationale Elf Aquitaine Oman relinquished its offshore concession of about 1,500 square miles near the Musandam Peninsula in the Strait of Hormuz. Although gas and condensate had been located at two wells, the finds were not considered commercial because of the very large costs involved and the problems of development and marketing.[12]

Steps were taken toward optimizing the use of associated gas, which was used by powerplants and industry. In May, the $93 million expansion of the Yibal gas processing plant was completed, boosting capacity to 320 million cubic feet per day from 125 million cubic feet per day. Five new wells were drilled at Yibal to supply the plant, which was built by Comprimo Belgie NV of the Netherlands and Nissho-Iwai Corp. and Niigata Engineering Co. Ltd. of Japan. New processing capacity also was being installed at Saih Nihyada in central Oman to process gas from Saih Rawl and other local fields. Output would be used in oil recovery projects in the south. At the Tahud Field, associated gas usage was raised to 80% with the addition of compressor stations and suction grids. Gas flaring had been reduced substantially on the installation of new gas lifts and compression units. Main gas pipelines ran parallel to the oil supply network.[13]

Table 2.—Oman: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	--	6	--	All to United Arab Emirates.
Copper: Metal including alloys:				
Unwrought	--	4,143	--	Netherlands 3,640; United Kingdom 500.
Semimanufactures	22	8	--	All to United Arab Emirates.
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	583	417	--	United Arab Emirates 406.
Universals, plates, sheets	88	542	--	All to United Arab Emirates.
Wire	35	3	--	Do.
Tubes, pipes, fittings	168	641	--	United Arab Emirates 636.
Nickel: Metal including alloys, all forms	--	6	--	All to United Arab Emirates.
Tin: Metal including alloys, all forms	15	16	--	Do.
Other: Base metals including alloys, all forms	1,238	--		

See footnotes at end of table.

Table 2.—Oman: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$4	--		
Grinding and polishing wheels and stones	700	--		
Cement	2,302	1,365	--	All to United Arab Emirates.
Fertilizer materials:				
Crude, n.e.s	240	--		
Manufactured:				
Nitrogenous	106	701	--	Do.
Unspecified and mixed	--	53	--	Do.
Lime	131	21	--	Do.
Salt and brine	--	22	--	Do.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7	1	--	All to France.
Worked	279	3	--	All to United Arab Emirates.
Gravel and crushed rock	5,469	22,392	--	United Arab Emirates 22,376.
Limestone other than dimension	3,109	195	--	All to United Arab Emirates.
Sand other than metal-bearing	7,683	1,470	--	Do.
Other: Crude	769	40	--	Do.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	8	11	--	Qatar 8; United Arab Emirates 3.
Petroleum:				
Crude thousand 42-gallon barrels	116,742	124,173	12,118	Japan 63,043; Netherlands 3,161.
Refinery products:				
Liquefied petroleum gas do	441	58	--	United Arab Emirates 35; Qatar 23.
Gasoline do	NA	33	--	Mainly to United Arab Emirates.
Mineral jelly and wax do	--	(2)	--	Mainly to Japan.
Kerosine and jet fuel do	--	1	--	Mainly to United Arab Emirates.
Lubricants do	2	164	--	Singapore 64; United Kingdom 41.
Residual fuel oil do	--	(2)	--	All to United Arab Emirates.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

Table 3.—Oman: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	1,574	2,487	108	Thailand 652; United Kingdom 362; United Arab Emirates 352.
Copper: Metal including alloys:				
Unwrought	--	1	--	Mainly from United Arab Emirates.
Semimanufactures	233	228	37	United Kingdom 115; Japan 23.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	12	11,321	2,760	Japan 5,984; India 2,500.
Steel, primary forms	184	42	--	United Arab Emirates 24; United Kingdom 15.
Semimanufactures	261,352	255,305	612	Japan 128,065; United Arab Emirates 38,806; West Germany 33,738.
Lead: Metal including alloys, all forms	51	66	--	Austria 25; United Arab Emirates 21.
Nickel: Metal including alloys, all forms	55	2	--	Spain 1.
Silver: Metal including alloys, unwrought and partly wrought[2] value, thousands	$40	$232	--	United Arab Emirates $228.
Tin: Metal including alloys, all forms do	--	$1	--	All from Pakistan.
Zinc: Metal including alloys, all forms do	--	$2	--	All from Japan.
Other: Base metals including alloys, all forms do	--	$8	--	Do.

See footnotes at end of table.

Table 3.—Oman: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	8	--	United Arab Emirates 5; United Kingdom 3.
Grinding and polishing wheels and stones	209	181	NA	Italy 135; United Kingdom 32.
Cement thousand tons	1,004	1,280	--	United Arab Emirates 870; Spain 155.
Diamond: Gem, not set or strung value, thousands	$110	$31	--	Switzerland $15; India $8; United Arab Emirates $8.
Fertilizer materials:				
Crude, n.e.s	--	2,409	--	United Arab Emirates 1,264; Netherlands 364; Ireland 351.
Manufactured	3,982	9,044	11	Belgium-Luxembourg 3,742; West Germany 1,849; United Arab Emirates 965.
Gypsum and plaster	290	6,422	--	Spain 6,050; Denmark 236.
Lime	2,504	7,689	--	United Arab Emirates 7,064.
Salt and brine	8,883	6,133	1	United Arab Emirates 3,340; China 984.
Stone, sand and gravel:				
Dimension stone	2,890	7,488	--	United Arab Emirates 3,040; Italy 2,322; Greece 1,583.
Gravel and crushed rock	423	905	220	India 434.
Limestone other than dimension	1,587	99	--	Belgium-Luxembourg 40; United Arab Emirates 34.
Sand other than metal-bearing	844	1,487	813	United Arab Emirates 320; India 295.
Other: Crude	16,301	20,491	46	Thailand 7,722; United Arab Emirates 5,131.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	157	--		
Petroleum:				
Crude thousand 42-gallon barrels	(3)	--		
Refinery products:				
Liquefied petroleum gas do	170	129	--	United Arab Emirates 128.
Gasoline do	1,963	(3)	--	All from United Arab Emirates.
Kerosine and jet fuel do	1,104	(3)	--	Do.
Distillate fuel oil do	1,936	--		
Lubricants do	184	3	--	Mainly from United Arab Emirates.
Residual fuel oil do	60	--		
Bituminous mixtures do	135	--		

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]May include platinum-group metals.
[3]Less than 1/2 unit.

QATAR[14]

The mineral industry consisted of crude oil, natural gas, petroleum refinery products, and steel.

The country's economy was based on income from the export of crude oil and refinery products to Japan and Western European markets that contributed more than 90% of state revenues and amounted to about $4.17 billion.[15] The value of nonfuel mineral industry products, which included cement, fertilizers, limestone, and steel, was $357 million or about 9% of the value of exported petroleum products. Other mineral-based commodities, ammonia and urea, produced $200 million and were derived from the petroleum industry. Crude oil production reached 150 million barrels, 47% greater than production in 1983 and about 40% above its OPEC quota.

The increased crude oil sales enabled Qatar to begin implementing two major projects: the $2 billion Wusayl electricity generating-desalination plant, which had been shelved in 1983, and the $6 billion development of the North Field gas reserves. Qatar Liquefied Gas Co. (Qaligas) was formed to develop the liquefied natural gas (LNG) project based on the Amiri Decree issued on November 1, 1984. At that time, Qaligas' owners were the state-owned

Qatar General Petroleum Corp. (QGPC), 70%, and British Petroleum Co. PLC (BP) and CFP-Total, each with a 7.5% interest. QGPC was negotiating with two Japanese combines that were interested in acquiring the remaining 15% interest. Qaligas considered the Far East as its main market for LNG, although northwest Europe also was a possible customer. The field development would be in two phases. Phase 1, estimated to cost $1 to $2 billion, would provide 600 million cubic feet of gas per day for domestic use by 1987. Work on phase 1 was to start at once and would include offshore platforms and a pipeline to transport gas to the industrial complex at Umm Said. Depending on market conditions, phase-2 construction on a $4 to $6 billion gas liquefaction plant would begin in 1988 with completion projected for 1992. BP and CFP-Total were to provide the technical staff for both phases.[16] QGPC contracted with the Fluor Corp. to plan the North Field facilities for the production of gas liquids and condensates.

Qatar Petrochemical Co. (QAPCO) had a record high production in 1984, despite a shortage of gas feedstock. The North Field gas project was expected to provide adequate gas feedstock. QAPCO's production of 204,000 tons of ethylene, 150,000 tons of low-density polyethylene, and 33,000 tons of sulfur was 24%, 3%, and 74% greater, respectively, than their 1983 production. QAPCO was owned by QGPC (84%) and Charbonnages de France-Chemie (CDF-Chemie) (16%). QAPCO was constructing a $55 million ethane recovery plant to raise ethane feedstock from 500 to 1,100 tons per day. The plant was being built by CDF-Chemie and was expected to be completed in 1985.[17]

NORDCO, the refining subsidiary of QGPC, brought its 50,000-bbl/d refinery onstream in February. The refinery was built by the French company Compagnie Française d'Etudes de Construction Technip using the U.S. technology of UOP Inc. (a subsidiary of The Signal Companies Inc.). The Government expected the refinery to meet Qatar's domestic needs for petroleum products to the end of the century. BP agreed to purchase 230,000 barrels per month of fuel oil. The new refinery had been processing only 27,000 bbl/d of crude to produce gasoline only. A pipeline to Doha and a products export facility to Umm were to be completed in late 1985, terminating the present transport by truck.

Qatar Steel Co. (QASCO) also had a record high production in 1984 of 500,000 tons of sponge iron and 488,000 tons of steel used in producing 478,000 tons of reinforcing bar (rebar). Rebar sales to the states of the GCC amounted to $129 million. QASCO was owned by the Government, 70%; Kobe Steel, 20%; and Tokyo Boeki Ltd. of Japan, 10%.

SYRIA[18]

The Syrian Government was strongly committed to the development of their economy. With this type of commitment, the Government invested large sums in road and railroad construction. Its economic development program exhibited a strong socialist orientation with emphasis on transfer of productive activity from the private to the public sector and diversion of capital away from agriculture toward heavy industry, such as cement plants. This practice had created a gradual deceleration in the pace of overall economic growth. The Syrian economy was heavily dependent on foreign assistance to stay afloat. Many development projects in Syria were funded by United Nations assistance funds. Syria's socialist system of government, along with the state of the economy, was not encouraging to private initiative.

Syria had experienced steady but comparatively modest economic growth since 1972, a reflection of Syria's limited petroleum resources and the relatively developed state of its economy prior to the oil boom that engulfed many other Arab states. Although Syria did not witness the phenomenal increase in revenue experienced by several other oil exporting countries, in 1984, it was able to capitalize on increased crude oil prices.

Despite efforts to reduce imports, Syria continued to face trade deficits of some magnitude. Exports of crude oil and refined products faced slack international demand and weak prices. Phosphate exports also continued to encounter weak demand.

Syria also had a problem like other developing countries with a shortage of foreign exchange. Syria, however, did not allow itself to become bogged down with unmanageable foreign commercial debt. As reduced demand for crude oil cut the revenues of Syria's primary aid donors and the ensuing economic slump cut economic activity in the Gulf, both aid and remittance receipts were reduced.

For 3 years, Syria had been able to produce approximately 160,000 bbl/d of relatively heavy crude oil. This level of production enabled Syria to preserve a balance between crude oil imports and exports of crude oil and refined products, which generated foreign exchange. Syrian Petroleum Co. would be able to maintain current production only if additional primary production equipment was used plus use of expensive secondary and tertiary recovery techniques. To maximize the utilization of the combined 230,000-bbl/d Homs and Baniyas refineries, in 1984, Syria obtained quantities of lighter crude oil from Iran to blend with heavier domestic oil. To delay the time when imports exceed exports, Syrian Petroleum authorized several studies to maximize drilling performance and to implement enhanced recovery techniques. Several new drilling rigs, one of which was capable of drilling to 5,000 meters, had been ordered. A Bulgarian firm, Bulgargeomin, was engaged in a project of tapping natural gas reserves in the Jubaisseh Field. A Czechoslovak company, Technoexport, was constructing a plant to sweeten the gas and building a pipeline to transport it to Homs. At the same time, a French company, Entrepose, was completing a project to gather and sweeten associated gas from the oilfields of the northeast. The gas was scheduled for use in power generation and in chemical processing plants. Two U.S. oil companies, Marathon Oil Co. and Shell Pecten Co., continued their exploration efforts in central Syria.

Meanwhile, Shell Pecten discovered oil near Deir el-Zor in northeastern Syria. There were three drilling rigs, two deep and one shallow, working in the area of the discovery, which yielded 7,000 bbl/d of light low-sulfur crude. First estimates put the well's productive capacity at 30,000 to 50,000 bbl/d. Appraisal and development work on the discovery was expected to take at least 2 years. An agreement between Syria and Shell Pecten provided for the establishment of a company, Al-Rasafah, that would operate the Deir el-Zor concession after oil was discovered. Syria was to share with its foreign partners, on a 75% to 25% basis, all oil production up to 200,000 bbl/d, and, on an 85% to 15% basis, all oil in excess of 200,000 bbl/d. Prior to the new discovery, all oil production in Syria was heavier high-sulfur crude.

Phosphate rock was produced in two mining areas, Khneifiss and the Ghadir-al-Hamal region of the Palmyrides. The mines were set up through technical assistance of Eastern European countries, particularly Romania. Export sales fell below the 1-million-ton mark in 1984, and this was accompanied by lower price levels. Domestic sales of phosphate rock that are used to make phosphate fertilizers, however, increased substantially.

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN[19]

Raw materials extraction in the People's Democratic Republic of Yemen (PDRY) was limited to industrial minerals and salt, while the processing of minerals was limited to cement manufacturing and oil refining. PDRY reaffirmed the importance of minerals development by creating a Ministry of Energy and Minerals.

Mineral resource development was at an early but active stage in PDRY. Although PDRY did not yet produce crude oil, it was adversely affected by the troubled world oil market because the country received aid from OPEC.

Investment in petroleum exploration was encouraged by PDRY. Interest in PDRY surfaced in 1982 when Azienda Generali Italiana Petroli S.p.A. (AGIP) drilled a 3,000-bbl/d well offshore the Hadhramaut Governate. The concession was renewed in 1983. AGIP drilled two appraisal wells in late 1984. To date, reserves are calculated to be no more than 30 million barrels, but the find was only 8 kilometers offshore, and this location could make it a commercial well. The discovery oil was 43° API gravity, adding to its viability. In other areas of PDRY, Braspetro, the foreign service arm of Petróleo Brasileiro S.A. of Brazil, and Hispánica de Petróleos S.A. (Hispanoil) of Spain share a large onshore lease.

BP purchased from Braspetro a 25% interest in the 42,000-square-kilometer Braspetro-Hispanoil lease in the Haurin-Ghayada block in the eastern part of PDRY. Braspetro previously owned 80% of the lease with Hispanoil owning 20%. Braspetro owned 55% of the equity and was the operator of the lease in 1984. The production-sharing agreement with PDRY's Petroleum Exploration Department provided for a four-well drilling program to start within 3 years. Kuwait's Independent Petroleum Group (IPG) held an offshore lease near Balhalf, showing enough seismic promise to prompt IPG to take an option on an adjacent onshore block. The IPG was committed to drill three holes in the onshore block, commencing in 1985.

Investment in cement producing facilities was at a relatively high level during 1984, and cement capacity was under expansion. India's Development Consultants International submitted plans to PDRY for the Batais Cement Co. project, involving a 1,200-ton-per-day cement plant and a 16-megawatt powerplant. Finance for the venture was offered by the German Democratic Republic, which would supply equipment, and by France, which would provide a government credit coupled with a buyer's credit. PDRY was also developing other production facilities for construction materials. During 1984, PDRY placed a $1.3 million order for equipping a construction sand operation at Lahej.

Plans to develop iron and steel industries seem to have made little progress in 1984, despite the availability of a $1 million[20] Indian Government credit for the construction of an iron foundry. Arab Mining Co. (Armico) announced that it would form a joint holding company with PDRY to supervise mining projects. Armico personnel visited sites in PDRY in 1984 containing occurrences of gold, rare earths, and marble. In still another instance, an exploration agreement was signed between PDRY and the U.S.S.R. for prospecting for gold in the eastern Hadhramaut Governate.

YEMEN ARAB REPUBLIC[21]

Raw minerals extraction in the Yemen Arab Republic (YAR) was limited to salt and building industry minerals. Mineral resource development was at an early active stage. The bright spot in the YAR economy was news that oil was discovered about 200 miles east of Sanaa in July 1984. The discovery in the Ma'rib-Jawf area was made by Hunt Oil Co., a U.S. firm, while drilling its first wildcat well. The well, at a total depth of 13,720 feet, had a potential to produce 10,000 bbl/d of oil. YAR hoped to know by early 1985 if profitable quantities of oil were present. Even if oil was found to be economically producible, exports of oil were projected to be 4 years in the future.

Economic growth in the YAR was expected to remain near the 1982-83 level when the increase in GDP was about 2%. YAR was faced with a problem of diminished foreign loans and grants. YAR used cash payments from foreign governments to pay for capital-investment projects or to cover the Government's budget deficit. The decrease in foreign government cash payments in 1984 caused YAR to extend project schedules in its 1982-86 5-year economic plan.

The YAR Government granted Hunt an extension to its concession in the Ma'rib-Jawf area and approved the company's offshore concession in the Red Sea. The Government also commissioned Hunt to conduct studies on a crude oil export pipeline to the Red Sea and the establishment of a domestic refinery. All of these developments followed Hunt's discovery in the Ma'rib-Jawf area. Hunt was engaged in a nine-well appraisal drilling program in the Alif discovery well vicinity. The first two found oil, but how prolific they were was not disclosed. The other seven wells were scheduled for completion by April 1985. After all drilling results are analyzed, international banks will be approached to provide financing for the development of the field in the range of $1 billion.[22] Early in 1984, Hunt sold a 24.5% interest in the concession to a group from the Republic of Korea, which undertook to provide 49% of the development capital. Estimates on productivity of the new oil discovery in YAR ranged from 75,000 to 300,000 bbl/d.

BP was also exploring for oil in YAR. BP signed a $4 million production-sharing agreement in January 1984 for an exploration permit covering 22,000 square kilometers in the Tihama coastal plain, extending from Midi on the Saudi Arabian border to 10 kilometers south of Hodeida. Seismic work began in April and was planned to be completed by the end of 1985.

Salt was produced from rock salt mines in YAR. The Yemen Co. for Salt Refining and Packing invited bids for a turnkey, 10,000- to 20,000-ton-per-year table salt plant, which would process the output of the Saleef Mine. The plant was to be at Hodeida.

Cement production in YAR was scheduled to increase owing to plant construction and enlargements. The new 300,000-ton-per-year Bajel works, built with the Soviet Union's technical and financial assistance, was commissioned in 1984. Expansion of this plant to 500,000 tons per year had been discussed with the Soviets. The YAR Government announced desire to double the capacity of the earlier Japanese-built works at Amran to 1 million tons per year. The Government also announced a site for a third cement plant at Mafraq, which would be scheduled to produce 500,000 tons per year. Completion of these projects would give YAR a production schedule of 2 million tons per year.

Yemeni Co. for Gypsum Industry, established in 1983, aimed at mining, processing, manufacturing, and marketing gypsum in YAR. Initial production was planned for early 1986. The scheduled capacity of the plant was 85,000 tons per year. Total cost of the project was approximately $7 million. Armico was a 20% shareholder in the venture.

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[1]Physical scientist, Division of International Minerals.

[2]Prepared by Ben A. Kornhauser.

[3]Where necessary, values have been converted from Afghan afghanis (Af) to U.S. dollars at the rate of Af50.60=US$1.00.

[4]Prepared by Thomas O. Glover.

[5]Where necessary, values have been converted from Bahraini dinars (BD) to U.S. dollars at the rate of BD0.376=US$1.00.

[6]Prepared by Ben A. Kornhauser.

[7]Where necessary, values have been converted from Lebanese pounds (LL) to U.S. dollars at the rate of LL6.51=US$1.00. In view of the turmoil in Lebanon, the currency value must be viewed cautiously.

[8]Prepared by Ben A. Kornhauser.

[9]Where necessary, values have been converted from Omani riyals (ORls) to U.S. dollars at the rate of ORls1=US$42.895.

[10]Petroleum Economist. V. 51, No. 5, May 1984, p. 193.

[11]Middle East Economic Survey. V. 28, No. 5, Nov. 12, 1984, p. A6.

[12]———. V. 28, No. 1, Oct. 15, 1984, p. A5.

[13]Petroleum Economist. V. 52, No. 1, Jan. 1985, pp. 21-22.

[14]Prepared by Ben A. Kornhauser.

[15]Where necessary, values have been converted from Qatari riyals (QRls) to U.S. dollars at the rate of QRls 3.64=US$1.00.

[16]Oil and Gas Journal. July 2, 1984, p. 33.

[17]Middle East Economic Survey. V. 28, No. 14, Jan. 14, 1985, p. A11.

[18]Prepared by Thomas O. Glover.

[19]Prepared by Thomas O. Glover.

[20]Where necessary, values have been converted from Yemeni dinars (SYD) to U.S. dollars at the rate of SYD0.345=US$1.00.

[21]Prepared by Thomas O. Glover.

[22]Where necessary, values have been converted from Yemeni rials (Y Rls) to U.S. dollars at the rate of Y Rls5.860=US$1.00.

The Mineral Industry of Other Areas of South America

By Pablo Velasco and H. Robert Ensminger

CONTENTS

ECUADOR[1]

Ecuador had limited mineral output, although the Government attempted to stimulate metallic mineral exploration and also evaluated a gypsum and a phosphate deposit. A pilot plant to exploit gold deposits was established, and there was extensive gold exploration activity in southern Ecuador. Domestic output of iron and steel declined sharply.

Among all minerals, petroleum output was the dominant factor with both exports and production increasing significantly over that of 1983. Crude oil exports contributed 63% of total export earnings and about 70% of the central Government's revenue.

The rate of inflation as measured by the Consumer Price Index was 52.5% in 1983 but in 1984 decreased to 25.1% owing mainly to lower food prices as the agriculture sector recovered from the effects of the world recession. This increased demand and prices for traditional agricultural exports. The value of the sucre depreciated 38% during the year in the free exchange market. One-half of that depreciation took place during the fourth quarter. Preliminary figures based on import and export licenses granted showed a trade surplus of $1.14 billion. In mid-November, the Ecuadorean Government and the International Monetary Fund initiated a letter of intent to establish a 1-year standby fund. This agreement required the Government to raise domestic petroleum products prices and interest rates in order to move the country's economy closer to free market conditions.

At yearend, Ecuador began to feel the effects of the weakening world market for petroleum; export volumes declined, and the price for crude dropped approximately $2 per barrel. The continuing weakened world market for oil and further falling prices could seriously affect the Ecuadorean economy in the foreseeable future.

Table 1.—Other Areas of South America: Production of mineral commodities[1]

Country and commodity	1980	1981	1982	1983[p]	1984[e]
ECUADOR[2]					
Cadmium, mine output, metal content[e] kilograms	480	400	300	350	300
Cement, hydraulic thousand metric tons	1,389	1,450	1,400	1,420	[3]1,400
Clays: Kaolin metric tons	4,000	3,000	4,104	1,000	1,000
Copper, mine output, metal content do	923	825	143	193	180
Gas, natural:					
Gross million cubic feet	15,000	16,000	13,816	14,762	14,499
Marketable do	1,600	1,700	1,158	1,200	1,500
Gold, mine output, metal content troy ounces	225	2,347	2,300	643	1,000
Gypsum (for cement) metric tons	6,000	2,000	2,000	2,000	2,000
Iron and steel:					
Steel, crude do	17,253	27,686	27,768	22,768	19,100
Semimanufactures do	115,747	110,348	146,026	150,755	[3]138,700
Lead concentrate, metal content do	220	200	235	225	200
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	NA	NA	45	NA	NA
Liquefied petroleum gas do	800	820	117	261	496
Total do	NA	NA	162	NA	NA
Petroleum:					
Crude do	74,714	76,797	77,106	86,341	[3]94,915
Refinery products:					
Gasoline do	9,000	7,802	8,232	6,109	[3]7,850
Jet fuel do	1,200	1,118	1,065	907	[3]1,045
Kerosine do	2,500	2,205	2,531	2,059	[3]2,279
Distillate fuel oil do	5,600	5,046	5,221	5,792	[3]10,077
Residual fuel oil do	14,500	14,614	14,491	11,067	[3]9,295
Lubricants do	300	300	320	228	[4]283
Liquefied petroleum gas do	250	733	646	382	[3]580
Unspecified do	400	417	460	430	[3]575
Refinery fuel and losses do	1,000	346	1,043	548	[3]514
Total do	34,750	32,581	34,009	27,522	[3]32,498
Silica metric tons	18,000	41,000	12,919	7,000	7,000
Silver, mine output, metal content troy ounces	28,936	32,151	[e]10,000	322	400
Stone, sand and gravel:					
Limestone (for cement manufacture) thousand metric tons	1,738	2,391	1,200	1,500	1,600
Marble metric tons	400	2,000	23	6,200	5,000
Sulfur:[e]					
Native do	3,700	[r]2,000	4,500	5,000	5,000
Byproduct:					
From petroleum do	5,000	5,000	5,000	5,000	5,000
From natural gas do	5,000	5,000	5,000	5,000	5,000
Total do	13,700	[r]12,000	14,500	15,000	15,000
Zinc, mine output, metal content do	629	742	91	123	100
FRENCH GUIANA					
Gold, mine output, metal content[e] troy ounces	4,000	4,000	4,000	4,000	[3]10,127
Stone, sand and gravel[e] metric tons	[3]507,800	320,000	400,000	400,000	400,000
GUYANA[2]					
Aluminum:					
Bauxite, dry equivalent, gross weight thousand metric tons	[r]3,052	[r]2,396	1,783	1,087	1,333
Alumina do	220	170	[3]73	--	--
Diamond:[e]					
Gem thousand carats	4	4	4	4	3
Industrial stones do	6	6	7	5	4
Total do	10	10	11	9	7
Gold, mine output, metal content troy ounces	11,003	19,262	7,347	4,607	11,131
PARAGUAY					
Cement, hydraulic thousand metric tons	177	[r]156	111	153	[3]109
Clays:					
Kaolin metric tons	50,000	70,000	55,000	45,000	[3]50,000
Other thousand metric tons	2,200	2,400	2,100	1,600	[3]1,700
Gypsum metric tons	12,000	10,000	6,500	4,000	[3]6,000
Lime do	[r]49,118	57,000	53,700	73,891	[3]85,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	906	799	698	434	[3]327
Jet fuel do	101	132	69	88	[3]18

See footnotes at end of table.

Table 1.—Other Areas of South America: Production of mineral commodities[1] —Continued

Country and commodity	1980	1981	1982	1983[p]	1984[e]
PARAGUAY —Continued					
Petroleum refinery products —Continued					
Kerosine thousand 42-gallon barrels	120	176	88	201	[3]88
Distillate fuel oil do	1,931	1,931	698	705	[3]512
Residual fuel oil do	371	384	277	202	[3]149
Liquefied petroleum gas do	52	37	35	81	[3]35
Refinery fuel and losses do	800	735	404	339	[3]167
Total do	4,281	4,194	2,269	2,050	[3]1,296
Pigments, mineral: Natural, ocher metric tons	200	200	120	180	[3]250
Sand including glass sand thousand metric tons	2,600	2,650	2,300	1,602	[3]1,624
Stone:					
Dimension do	258	248	108	71	[3]62
Crushed and broken:					
Limestone (for cement and lime) do	350	335	270	350	[3]175
Other do	6,400	[e]3,600	2,500	1,500	[3]1,730
Talc, soapstone, pyrophyllite metric tons	250	150	150	120	[3]150
SURINAME					
Aluminum:					
Bauxite, gross weight thousand metric tons	[r]4,864	[r]4,006	2,765	2,886	3,454
Alumina do	[r]1,329	[r]1,165	1,055	1,129	1,208
Metal, primary[4] do	[r]55	[r]42	60	29	30
Cement, hydraulic do	69	71	72	74	50
Clays: Common[e] metric tons	115,000	110,000	100,000	100,000	100,000
Gold, mine output, metal content troy ounces	350	823	599	482	322
Sand and gravel:[e]					
Sand, common thousand metric tons	155	150	150	150	150
Gravel do	75	70	70	[r]20	20
Stone, crushed and broken do	72	52	50	50	46
URUGUAY					
Aluminum, secondary metric tons	35	30	21	24	25
Barite do	15	30	80	3	10
Cement, hydraulic thousand metric tons	[r]808	[r]742	659	428	[3]334
Clays, unspecified metric tons	321,406	[e]300,000	278,821	152,155	150,000
Coke, gashouse[e] do	12,000	12,000	12,000	10,000	10,000
Corundum[e] do	187	220	45	[r]50	50
Feldspar do	2,820	[e]2,500	838	1,129	500
Fluorspar[e] do	[3]81	80	80	80	80
Gas, manufactured[e] million cubic feet	760	750	750	700	700
Gem stones, semiprecious:					
Agate metric tons	285	180	94	53	50
Amethyst do	62	30	21	24	20
Gypsum do	16,953	--	122,284	151,832	150,000
Iron and steel:					
Ferroalloys: Electric-furnace ferrosilicon crust do	[e]150	158	([5])	250	160
Steel, crude do	17,590	15,139	28,019	45,674	[3]47,930
Semimanufactures do	[r]56,096	[r]49,264	37,553	33,602	[3]47,221
Lime thousand metric tons	20	[e]50	14	10	[3]8
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	1,953	1,768	1,901	1,570	1,643
Jet fuel do	234	210	231	191	152
Kerosine do	1,032	861	804	642	572
Distillate fuel oil do	3,510	3,514	3,600	3,181	3,348
Residual fuel oil do	5,780	5,387	4,732	2,975	2,725
Lubricants do	45	46	50	41	46
Liquefied petroleum gas do	447	396	445	415	482
Unspecified do	349	221	318	206	251
Refinery fuel and losses do	43	200	401	-288	-151
Total do	13,393	12,603	12,482	8,933	9,068
Sand and gravel:					
Sand:					
Common thousand metric tons	2,964	[e]2,000	2,042	1,598	1,600
Glass[e] metric tons	[4]258,188	200,000	200,000	200,000	200,000
Gravel thousand metric tons	410	[e]350	506	510	500
Stone:					
Dimension do	15	10	9	9	9
Crushed and broken:					
Alum schist metric tons	11,675	[e]11,000	6,320	3,234	3,000
Dolomite thousand metric tons	81	15	[4]14	3	3
Limestone do	1,335	[e]1,250	1,098	757	700
Marble do	8	[e]4	[e]5	4	4

See footnotes at end of table.

Table 1.—Other Areas of South America: Production of mineral commodities[1] —Continued

Country and commodity	1980	1981	1982	1983[p]	1984[e]
URUGUAY —Continued					
Stone —Continued					
Crushed and broken —Continued					
Marl ---------- metric tons--	[r]26,127	[e]11,000	11,480	7,269	7,000
Quartz ---------- do----	7	[e]10	627	481	400
Other including ballast thousand metric tons--	2,028	[e]1,400	2,171	1,837	1,800
Sulfur, elemental, byproduct[e] ---- metric tons--	2,200	2,000	2,000	2,000	2,000
Talc, soapstone, pyrophyllite ---- do----	2,206	[e]1,700	1,145	685	1,200
Tuff: Tufa ---------- do----	--	--	--	2,444	2,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through mid-June 1984.
[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]Data represent exports.
[5]Revised to zero.

METALS

The Ministry of Energy and Natural Resources initiated the first steps to set up a program to encourage both local and foreign investment in metallic mineral explorations. The first phase of this program was undertaken by the Direccíon General de Geología y Minas (DGGM), which initiated a prospecting and exploration program to discover metallic mineral deposits. Emphasis was placed on a reconnaissance of mineralized areas and on gold-bearing placers. Steps were taken to organize mining cooperatives and a mining company in which the Government will have a majority stake. The Central Bank plans to control the sale of gold in order to avoid black market sales.

Exploration results from these programs were successful in detecting promising mineralized areas. However, vast areas of the country, mainly in the eastern region, remain unexplored. The Portovelo gold mine, which was operated by the South American Development Co. until 1950, was taken over by DGGM in 1979, and a new exploration program indicated 250,000 tons of ore reserves assaying 0.22 troy ounce of gold per ton, 2.03 troy ounces of silver per ton, 1.1% copper, and 1.74% zinc. Production from this mine in 1984 was very limited because of lack of capital to rehabilitate the mine and continue exploration of the surrounding areas.

A number of small mines produced copper, gold, zinc, and other minerals. The most important one was the La Plata Mine, owned and operated by Minera Toachi S.A. in Cotopaxi Province. Foreign investors, headed by Outokumpu Oy of Finland (39%), operated the mine, which originally had 233,000 tons of ore reserves grading 4.77% copper, 2.35% zinc, 0.08 troy ounce of gold per ton, and 1.26 troy ounces of silver per ton. A combination of technical, administrative, and operational problems plus financial constraints, along with limited exploration and lower prices in the international market, forced the company to halt production and exploration activities in the mine.

An evaluation program continued in the Chaucha porphyry copper project to delineate ore reserves. Estimated reserves were 220 million tons of ore with an average grade of 0.5% copper and 0.03% molybdenum, with minor gold and silver values.

The Government devised a pilot plan for the exploitation of Ecuador's gold deposits in the eastern and coastal Provinces. A prospect at Río Amarillo evaluated by DGGM showed a gold potential. DGGM concluded that economic development was feasible, even though the ore grade varied between 0.01 to 0.09 troy ounce of gold per cubic meter. The probable reserves were estimated to be about 500,000 cubic meters of gold-bearing material.

In southern Ecuador, the Nambija areas experienced a "gold rush," and reports from the richest areas indicated values of 6 to 7 troy ounces per ton.

DGGM announced the discovery of high-grade copper occurrences at Río Junín in the Imbabura Province. Foreign capital and technology was invited to participate in the exploration and exploitation of the deposit, which has very high reported copper values.

Domestic primary crude steel and semi-manufactures output declined severely, falling 16% and 8%, respectively, compared with that of 1983. The state steel producer, Acerías Nacionales del Ecuador (ANDEC), was forced to stop deliveries after several months of irregular deliveries owing to financial problems. Compañía Ecuatoriana de Siderúrgia S.A., which holds 87% of ANDEC's shares, suffered similar financial difficulties. Primary iron shortages led to speculative activity, and prices doubled over the Government-set levels. The construction industry trade group, La Federación de Cámaras de la Construcción, called on the Government to import primary iron to alleviate these shortages.

NONMETALS

In the nonmetal minerals sector, the Government initiated two big projects at a total cost of $2.8 million. These projects were to evaluate a gypsum and a phosphate deposit. Both are badly needed to supply the construction industry with cement and the fertilizer industry with phosphate rock.

The cement producer, Cementos Selva Alegre, was considering expanding the capacity of its plant, near Otavalo, from 1,100 to 1,500 tons per day. A British firm, Blue Circle Industries Ltd., conducted the feasibility study for this project, which will require a $100 million capital investment.

MINERAL FUELS

On December 12, Occidental Exploration & Petroleum Co., a subsidiary of Occidental Petroleum Corp. of the United States, and the Government initiated work under the new exploration and exploitation contract covering block 15, east of the Sacha and Shushufindi Oilfields in the Oriente region.

The basic provisions of the new contract in the exploration phase call for Occidental Exploration to conduct seismic surveys and drill four wildcat wells. The company will also fund the training of oil technicians during the 4-year exploration program. For this, the firm will be reimbursed for exploration, development, and production costs if a commercial discovery of crude is made. The exploitation phase will be for a period of 20 years. Occidental Exploration will operate the field as a contractor for the consortium of Corporación Estatal Petrolera Ecuatoriana (CEPE), the state oil company.

CEPE invited 60 foreign oil companies soliciting bids for exploration and exploitation risk contracts covering four blocks: two in the Amazon region, one in the Province of Manabí, and one in the Gulf of Guayaquil (Progreso Basin). The blocks will be allocated in mid-1985. So far, about 20 companies have expressed interest, and some have visited the areas being offered. Among the interested companies were Société Nationale Elf Aquitaine, Conoco Inc., Mobil Oil Corp., Idemitsu Oil Development Co. Ltd., and Northern Michigan Exploration Co. of Jackson, Michigan, United States.

CEPE started a new round of negotiations with Belco Petroleum Corp. and an Exxon Corp.-Hispanoil consortium for oil exploration and exploitation of several offshore blocks. CEPE intends to use the new guidelines introduced into the hydrocarbon law in 1984.

Ecuador's production of crude increased almost 10% over that of 1983, and output of natural gas declined 2% to 14.5 billion cubic feet. Exports of oil increased from 131,000 to 141,000 barrels per day, although the Organization of Petroleum Exporting Countries meeting in October had cut Ecuador's oil production quota by 17,000 barrels per day.

The final design for the 180-megawatt second stage of Ecuador's Paute Mazar hydroelectric project was presented to the Instituto Ecuatoriano de Electrificación. The design was prepared by a consortium led by Zurich-based Electrowatt Engineering Services Ltd. Construction of the 540-foot-high Mazar Dam and an underground powerhouse was expected to start in 1987. Consultants predict the job's final price may reach $1 billion. Work was underway on the project's first stage of a 558-foot-high concrete dam on the Paute River.

FRENCH GUIANA[2]

French Guiana, an Overseas Department of Metropolitan France since 1946, had very limited mineral production in 1984 compared with the traditional commodities such as tropical hardwoods, rum, and shrimp. Mineral commodity production was limited to sand and gravel and stone used for domestic consumption and a minor quantity of placer gold. Other known mineral resources are bauxite, cinnabar, copper, low-grade iron ore, manganese, molybdenum, nickel, and tantalite; however, these minerals will likely remain uneconomic for the foreseeable future.

Pinto Malarctic Gold Mines, a Canadian-based gold mining company, was evaluating the possibility of expanding a French-owned gold dredging operation, Soremine, at year-end. The Canadian firm advanced Soremine $85,000 to help finance construction of a dredge and has the option to acquire a 50% interest in the operation for $255,000. The alluvial material to be dredged grades from 0.5 to 1.5 grams of gold per cubic meter.

Table 2.—French Guiana: Exports and reexports of mineral commodities[1]

Commodity	1983	Destinations, 1983	
		United States	Other (principal)
Iron and steel: Metal, semimanufactures:			
Rails and accessories ______ value, thousands__	$5	--	All to West Germany.
Tubes, pipes, fittings __________ metric tons__	10	--	Mainly to Martinique.
Petroleum refinery products: Distillate fuel oil 42-gallon barrels__	119	--	France 89; Suriname 30.
Precious and semiprecious stones other than diamond:			
Natural _______________ value, thousands__	$2	--	All to Martinique.
Tin: Metal including alloys, semimanufactures do____	$1	--	All to Guadeloupe.
Other metals: Ores and concentrates ______do____	$1	--	All to Sweden.
Other nonmetals: Crude ______________do____	$15	$15	

[1]Table prepared by Harold Willis. Detailed export data for 1982 were not available at the time of publication.

Table 3.—French Guiana: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	Sources, 1983	
		United States	Other (principal)
METALS			
Alkaline-earth metals ____________________	(2)	--	All from France.
Aluminum: Metal including alloys, semimanufactures_	59	(2)	France 41; Switzerland 15; Italy 3.
Copper: Metal including alloys, semimanufactures ___	31	--	France 29; Yugoslavia 1.
Iron and steel: Metal:			
Ferroalloys, unspecified _________________	1	--	All from France.
Semimanufactures:			
Bars, rods, angles, shapes, sections ________	2,814	--	France 2,019; Belgium-Luxembourg 644; West Germany 135.
Universals, plates, sheets ______________	2,579	(2)	France 2,466; West Germany 63; Martinique 30.
Hoop and strip __________________	3	--	All from France.
Rails and accessories ________________	212	--	Do.
Wire _________________________	66	--	Do.
Tubes, pipes, fittings________________	785	--	France 689; Spain 64; Belgium-Luxembourg 20.
Castings and forgings, rough____________	33	--	All from France.
Lead:			
Oxides ____________________________	1	--	Do.
Metal including alloys, semimanufactures ______	3	--	Do.
Mercury________________ value, thousands__	$5	--	Do.
Silver:			
Waste and sweepings ______________do____	$1	--	Do.
Metal including alloys, unwrought and partly wrought ____________________do____	$1	--	Do.
Tin: Metal including alloys, semimanufactures do____	$2	--	Do.
Zinc: Metal including alloys, semimanufactures _____	3	--	Mainly from France.
Other:			
Ores and concentrates __________________	20	--	All from France.
Base metals including alloys, all forms value, thousands__	$8	--	Do.
NONMETALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones ___________________________	5	--	Mainly from France.
Cement _____________________________	39,901	--	Martinique 20,394; France 19,462; Suriname 45.
Chalk ______________________________	2	--	All from France.
Clays, crude __________________________	605	--	Do.
Diamond: Gem, not set or strung _ value, thousands__	$11	--	Do.
Diatomite and other infusorial earth ___________	3	--	Do.

See footnotes at end of table.

Table 3.—French Guiana: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued			
Fertilizer materials:			
Crude, n.e.s	4	--	All from France.
Manufactured:			
Ammonia	3	--	Do.
Nitrogenous	172	18	Martinique 72; East Germany 54.
Potassic	17	--	All from France.
Unspecified and mixed	2,069	--	France 1,924; Martinique 108; Belgium-Luxembourg 37.
Lime	711	--	Martinique 558; France 153.
Precious and semiprecious stones other than diamond:			
Natural ... value, thousands	$35	--	Mainly from Brazil.
Salt and brine	368	--	France 180; West Germany 108; Netherlands 43.
Sodium compounds, n.e.s.: Carbonate, manufactured	1	--	All from France.
Stone, sand and gravel:			
Dimension stone, worked	9	--	France 7; Spain 2.
Dolomite, chiefly refractory-grade	78	--	All from France.
Gravel and crushed rock	3	--	All from West Germany.
Sand other than metal-bearing	20	--	All from France.
Sulfur:			
Elemental: Crude including native and byproduct	([2])	--	Do.
Sulfuric acid	14	--	Do.
Other:			
Crude	48	--	France 47; Netherlands 1.
Slag and dross, not metal-bearing	189	--	All from France.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	1	--	Do.
Petroleum refinery products:			
Liquefied petroleum gas ... 42-gallon barrels	22,168	--	Trinidad and Tobago 20,532; Netherlands Antilles 1,230; France 267.
Gasoline ... do	212,576	--	Trinidad and Tobago 212,440; France 136.
Mineral jelly and wax ... do	16	8	France 8.
Kerosine and jet fuel ... do	132,223	--	Trinidad and Tobago 132,200; France 23.
Distillate fuel oil ... do	534,800	2,462	Trinidad and Togago 530,331; Netherlands Antilles 2,007.
Lubricants ... do	11,683	476	Jamaica 4,788; France 4,235; Netherlands Antilles 854.
Residual fuel oil ... do	105,827	--	All from Trinidad and Tobago.
Bitumen and other residues ... do	12	--	All from France.
Bituminous mixtures ... do	267	--	Do.

[1]Table prepared by Harold Willis. Detailed import data for 1982 were not available at the time of publication.
[2]Less than 1/2 unit.

GUYANA[3]

Mining output was up 55% over that of 1983, and output of bauxite continued to dominate Guyana's mineral industry with its production valued at $100 million. The Canadian firm, Noranda Mines Ltd., signed a contract with the Government to start a gold mining project.

After 3 consecutive years of decline, the economy of Guyana improved to register a gross domestic product (GDP) growth in 1984 of slightly in excess of 2% in real terms compared with that of 1983. The GDP declined by 10.6% in 1983 and 13% in 1982. Guyana's positive economic performance in 1984 led the Government to project positive growth for 1985. The improved economy was attributed to the bauxite mining industry, which contributed heavily to the 55% growth in mining. Expenditures exceeded revenues by $94 million. Debt payment comprised 52.6% of total expenditures. As a result of debt rescheduling with internal and foreign creditors, the debt payments for 1985 are projected to comprise approximately 24% of estimated expenditures.

The Government was negotiating a long-term, low-interest loan for its ailing bauxite industry with the European Economic Community. Guyana sought the loan after plunging export receipts made it hard to finance the industry's restructuring, including plant modernization and a new marketing system.

The approximate total value of bauxite

produced was $100 million. The estimated output of the various categories of bauxite were as follows: metal grade, 640,000 tons; calcined refractory grade, 500,000 tons; chemical and aluminous grade, 340,000 tons; and abrasive grade, 45,000 tons.

The state-controlled bauxite company, Guyana Bauxite Industry Development Corp., praised the management assistance given to the bauxite industry by United States Steel Corp., which was a consultant for a year ending in June.

At yearend, the Governments of Guyana and Bulgaria were still considering a contract to cover the payment for four Bulgarian radio transmitters with Guyanese bauxite. Guyana was also seeking a barter agreement with the German Democratic Republic whereby Guyana would receive combine harvesters and vital raw materials for bauxite, rice, and alcohol.

Canada's Noranda Mines signed a contract with the Government of Guyana for a gold mining project at Marudi in the Essequibo region. The site will be developed with the financial backing of Noranda Mines, Guyana Mining Enterprise Ltd., and the Guyana Geology Commission. Any mining will be on a joint venture basis.

A study, by Petroleum Exploration Consultants of Great Britain, was begun in 1984 to make recommendations for future exploration activity on onshore and offshore Guyana. The study, financed by a $2 million loan from the International Development Association, will also look at the country's potential as a producer of very heavy oil and how reserves should be managed.

PARAGUAY[4]

The mineral industry of Paraguay continued to be limited to the production of a number of nonmetallic mineral commodities, including cement, common clay, gypsum, limestone, sand and gravel, and stone.

The Paraguayan economy, of which the GDP in 1983 declined 10.4% below that of 1982, rebounded to 4.7% over that of 1983, mainly owing to the recovery in agriculture, which suffered damage from the disastrous effects of rain and floods in 1983. There was also a devaluation of the guarani exchange rate. However, the expansion of total productivity in Paraguay was insufficient to offset the effect of population growth. Therefore, there was a modest decline of 0.1%, relative to that of 1983, in per capita GDP. This was the third year in a row that per capita GDP declined. According to preliminary estimates, inflation increased to an annual rate of 25%, over double that of 1983.

Imports declined partly owing to the devaluation of the national currency and also as a result of an expected approval of a more liberal customs legislation by the Congress. Total imports amounted to $463 million, a 3% decline below that of 1983.

Exports increased approximately one-third to $358.6 million compared with that of 1983. The trade deficit was $105 million compared with $209 million in 1983.

In the industrial sector, most large Government projects were far behind schedule and others were postponed. A new clinker mill at the Industria Nacional del Cemento plant, owned by the Government, was tested. Cement production was scheduled to start during the first quarter of 1985 using imported clinker. By the end of 1985, the plant was expected to produce cement using its own clinker. Construction of the 60% Government-owned steel mill, Aceros del Paraguay S.A. (ACEPAR), was moving slowly, and production was expected to begin by the end of 1985 (more than 3 years behind schedule). Output of petroleum refinery products in Paraguay have been declining since 1980 and in 1984 were at 51% of maximum capacity. Production of refinery products dropped 37% below that of 1983.

During 1984, there were crude shortages at Petróleos Paraguayos S.A. (PETROPAR), the state-controlled refinery. These were primarily the result of Argentine labor problems, which affected river tanker shipments. There were also lower crude inventories owing to financial problems and PETROPAR's inefficient procedures for scheduling shipments. Crude oil and petroleum products, imported at the exchange rate of 160 guaranies per U.S. dollar, still enjoy an indirect subsidy of over 100% because the guarani was being quoted at over 350 per U.S. dollar in the parallel market.

Algeria continued being the major source of crude oil for Paraguay. Argentina and Brazil were the primary sources for refinery products.

Officials of Yacimientos Petrolíferos Fiscales (YPF) of Argentina, made a proposal to PETROPAR to form a joint venture for petroleum and gas exploration and exploitation in the Paraguayan Chaco, just across the Argentine border. YPF discovered oil in 1983 in this border area, and the oilfield may extend into the Paraguayan Chaco. The successful Palmar Largo well reportedly flows about 3,000 barrels per day of light crude, over 40° API. YPF officials indicated that the surplus of such crude from the Chaco area eventually would be made available to Paraguay. However, according to Paraguayan laws, foreign government participation is prohibited in mineral exploration or development near the border. Also, the Paraguayan Government awarded two concessions in the same area to U.S.-controlled companies.

On October 25, the Presidents of Paraguay and Brazil met at Itaipú on the Paraná River for the formal inauguration of the world's largest hydroelectric project, which will have a capacity of 12,600 megawatts when finished in 1990. The meeting marked a milestone in what might be considered the most visible evidence of Paraguay's movement into the Brazilian economy orbit. At the present time, both partners are now receiving electricity on a test basis from the first 2 of a total of 18 generating units.

A second major hydroelectric project on the Paraná River, Yacyretá, was underway. This is being built jointly with Argentina, which also was responsible for the financing. It is roughly one-third to one-half the scale of the Itaipú project in terms of generating capacity. Originally, the construction pace was expected to peak in 1985, but Argentina's foreign debt problem has prevented the approval of the Yacyretá authorization of $450 million in the 1984 budget, resulting in delays in construction and in the awarding of equipment contracts.

SURINAME[5]

Bauxite was the dominant mineral commodity produced in Suriname. Output was up over that of 1983. Low international prices in the aluminum markets and weakened world demand for aluminum seriously impacted the economy, which at yearend was very weak. A feasibility study was initiated on a gold mining project. Foreign currency was unavailable to pay for the high volume of imported goods that had, until recently, supported a relatively high standard of living. During 1984, low international prices for bauxite, alumina, and aluminum; reduced shipments of bauxite; suspension of Netherlands foreign aid over the past 2 years; an overvalued currency tied to the U.S. dollar; high production costs; and a number of other factors combined to produce a sharp decline in Suriname's foreign currency income. The country's future prospects for increased foreign currency earnings depend to a great extent on the performance of traditional export commodities, bauxite, rice, shrimp, and timber.

Suriname's four major trading partners in recent years have been Japan, the Netherlands, Trinidad and Tobago, and the United States. Brazil has successfully attempted to increase its share of sales to Suriname. Suriname has announced its intention to expand its relations with its neighbors and other developing countries.

Some bauxite production was lost owing to a strike by 7,000 workers at the Suriname Aluminum Co. plant, which began on December 19, 1983, and ended on January 24, 1984.

Development was underway on a shallow heavy oil deposit in Suriname on the central-north coast near Groningen about 38 kilometers from Paramaribo. The state oil company started the development of the Tambaroredjo Field, with Gulf Oil Corp. of the United States providing technical assistance. The 16 wells were producing 1,000 barrels per day by yearend.

A potential 1,000-ton-per-day gold mining site was undergoing a feasibility study by Wright Engineering Co. Ltd. of Vancouver, British Columbia, Canada. The east Suriname samplings indicated reserves of 10 million tons grading 2.5 grams of gold per ton. Another prospect discovered in 1984 was a 10-million-cubic-meter surface deposit at Benzdorp, in southeast Suriname on the French Guiana border, which graded 0.5 gram of gold per ton.

URUGUAY[6]

Actual mineral output was restricted to nonmetallics, although the Administración Nacional de Combustibles, Alcohol y Portland (ANCAP) has determined the existence of 3 million tons of heavy minerals in the beach sands of Aguas Dulces near Montevideo. Only one cement plant was in operation at a very reduced capacity. A group of companies from Brazil, headed by Técnica Nacional de Engenharía S.A., proposed a steel project on a joint venture basis with the Uruguayan Government, similar to the one formed with ACEPAR of Paraguay to construct a 100,000-ton-per-year-capacity steel plant equipped with wood-charcoal blast furnaces for a total $100 million investment. Search for offshore oil and gas in the Pelotas Basin in the south continued in 1984.

The economic crisis, which overwhelmed the region, was severely felt in Uruguay in 1984, where the economy was aggravated by the fact that, during the last 3 years, a leakage of consumer spending to neighboring countries took place, induced by exchange rate advantages. Domestic consumption contracted, owing to a tight public expenditure policy, together with an increase in unemployment and a sharp decline in real wage levels. These policies were implemented by the Government, owing to an external payment crisis. Declining foreign sales contributed to the contraction of total demand. As a result, the GDP declined by an estimated 2.0% in real terms. The inflation rate exceeded 63%, owing to the devaluation of the Uruguayan peso. The nation's currency depreciated abruptly, and inflationary pressure surged. Also, interest rates soared and nonresident's capital fled the country.

Continuing weak domestic demand curbed the expansion of imports in 1983, which led to a 28% fall in crude oil and refinery products consumption. However, in 1984, imports of crude and consumption of refinery products increased 1.5% compared with those of 1983. Exports during the year contributed to a trade surplus of $210 million, the second trade surplus in the last 10 years.

The mineral industry of Uruguay continued to be limited to the production of nonmetallic minerals, including cement. The cement industry operated at 43% of capacity, and only one cement plant operated in the southern part of the country. The decline in the production of cement was a result of reduced public works activity, which was down 27%; private construction business, down 12%; and exports to neighboring countries virtually stopped.

ANCAP, the Uruguayan mining and chemical company, determined the existence of 3 million tons of heavy minerals in the beach sands of Aguas Dulces, 280 kilometers northeast of Montevideo. The ore contains 60% ilmenite, 5% zircon, 1% rutile, and 0.6% monazite.

Beginning in 1980, Uruguay, which has not produced any gold since the end of World War II, became one of the largest exporters of gold to the United States. This trade may represent dishoarded bullion and jewelry originating in neighboring countries. In 1980, Uruguay exported 20,000 troy ounces of gold. This increased to 946,000 troy ounces of gold in 1984, all of which went to the United States.

A group of companies from Brazil, headed by Engineers Tenenge, proposed a joint venture steel project to the Government of Uruguay as ACEPAR. The $100 million project involves construction of a 100,000-ton steel plant equipped with charcoal blast furnaces, converters, and continuous billet casters.

The Brazilian search for oil and gas at the Pelotas Basin offshore the State of Rio Grande do Sul in the south continued in 1984. It appears to have a reasonable exploration potential for petroleum. Uruguay shares a portion of the Pelotas Basin, nearly all of it in its offshore sector.

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[1]By Pablo Velasco, physical scientist, Division of International Minerals.
[2]By H. R. Ensminger, physical scientist, Division of International Minerals.
[3]By H. R. Ensminger, physical scientist, Division of International Minerals.
[4]By Pablo Velasco, physical scientist, Division of International Minerals.
[5]By H. R. Ensminger, physical scientist, Division of International Minerals.
[6]By Pablo Velasco, physical scientist, Division of International Minerals.

Table 4.—Uruguay: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	9	--		
Metal including alloys, semimanufactures	12	17	--	Argentina 16.
Copper: Metal including alloys:				
Unwrought	8	--		
Semimanufactures	(2)	10	--	All to United Kingdom.
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	2,368	4,171	--	Argentina 4,032.
Universals, plates, sheets	9	76	--	Argentina 68.
Wire	3,399	2,864	--	All to Argentina.
Tubes, pipes, fittings	619	833	--	Argentina 484; Chile 256; Brazil 92.
Castings and forgings, rough	172	144	--	All to Argentina.
Lead: Metal including alloys, unwrought	--	16	NA	NA.
Silver: Waste and sweepings value, thousands	--	$4	--	All to Spain.
Zinc: Oxides	488	122	--	Argentina 102; Brazil 20.
Other: Ashes and residues	1	--		
NONMETALS				
Asbestos, crude	41	--		
Cement	1,311	300	--	All to Brazil.
Clays, crude	--	5	--	All to Paraguay.
Fertilizer materials: Manufactured:				
Nitrogenous	18	60	--	Argentina 40; Paraguay 20.
Phosphatic	26,516	3,243	--	Argentina 1,743; Brazil 1,500.
Potassic	295	--		
Unspecified and mixed	894	752	--	Paraguay 425; Argentina 327.
Lime	--	60	--	All to Argentina.
Precious and semiprecious stones other than diamond: Natural value, thousands	$471	$216	$41	West Germany $47; France $41.
Sodium compounds, n.e.s.: Carbonate, manufactured	1,017	7	--	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,317	2,017	194	Japan 1,108; Argentina 523.
Worked	964	860	(2)	Paraguay 709; Argentina 151.
Dolomite, chiefly refractory-grade	54	--		
Gravel and crushed rock	--	21,850	--	All to Argentina.
Sand other than metal-bearing	233,779	144,545	--	Do.
Sulfur: Sulfuric acid	313	22	--	Do.
Talc, steatite, soapstone, pyrophyllite	10	59	--	Do.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Lubricants 42-gallon barrels	259	196	--	NA.
Residual fuel oil do	56,264	31,762	--	All to Paraguay.
Bitumen and other residues do	91	6	--	Do.
Bituminous mixtures do	200	--		

NA Not available.
[1]Table prepared by Harold Willis. Comparable detailed import data for 1982 and 1983 were not available at the time of publication.
[2]Less than 1/2 unit.

The Mineral Industry of Other South Pacific Islands

By Travis Q. Lyday[1]

CONTENTS

FIJI

Gold continued to dominate mineral production in the group of volcanic islands and atolls of Melanesia in the southern Pacific Ocean, which comprise the British Commonwealth nation of Fiji. The Fijian mineral sector, however, remained of minor importance in terms of export earnings, Government revenues, and employment to the economy of the country, which was primarily agrarian with sugar as its mainstay.

The Vatukoula gold-silver mine on the north side of the main island of Viti Levu remained the largest and most important mining operation, as well as Fiji's only operating metalliferous mine. In October, Western Mining Corp. (Fiji) Ltd. (WMCF), a wholly owned subsidiary of Australian-registered Western Mining Corp. Holdings Ltd., increased its interest in the Vatukoula joint venture from 10% to 20% by exercising its option with Emperor Gold Mining Co. Ltd., also of Australia. The assumption of mine management operations at Vatukoula in 1983, with its attendant influx of additional capital and technological expertise, enabled WMCF to increase both efficiency and output at the mine during 1984. Higher output was obtained owing to an increase in underground ore production, which was partly offset by a reduction in opencut tonnage, as well as to modifications in the recovery circuit. Rate of recovery increased from about 75% to over 82% of the gold contained in the ore and from about 40% to 45% of the contained silver.

The feasibility of extracting gold and silver by heap leaching of the tailings at the Vatukoula Mine was being studied by two major West German metals companies, Metallgesellschaft AG and Degussa AG, during the year. The tailings, accumulated at the mine since production began in 1932, were estimated to contain more than 300,000 troy ounces of gold and about 550,000 troy ounces of silver.

In addition to the Vatukoula Mine, active mining in Fiji was limited to quarries for stone and crushed gravel, limestone for cement and lime production, and coral and river sand mining activities. These common construction materials were produced for domestic consumption.

Mineral exploration activity in Fiji continued to be principally directed toward gold and silver, but also to copper, zinc, and other metallic minerals to a somewhat lesser extent, with efforts primarily conducted on the two largest islands, Viti Levu and Vanua Levu.

Fiji renewed all four of the petroleum exploration licenses held by the group of independent oil companies consisting of J. Thomas Stoen Inc., Mobley International Inc., Pacific Energy and Minerals Ltd., and R. G. Barry Inc. The group, with Pacific Energy and Minerals having a controlling interest in all four licenses, planned to drill three wildcat wells at a total cost of $30 million.[3] The licensed areas were north of Viti Levu, east of the Yasawa group of islands, south of the Great Sea Reef, and west of Vanua Levu, covering approximately a 12,000-square-kilometer area of Bligh Water.

Table 1.—Other South Pacific Islands: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area and commodity	1980	1981	1982	1983[p]	1984[e]
FIJI					
Cement, hydraulic	[r]82,900	[r]92,000	88,089	109,900	[2]97,900
Gold, mine output, metal content troy ounces	[r]24,885	[r]30,833	45,750	40,124	[2]48,515
Lime[3]	2,128	4,270	3,811	[e]2,500	2,500
Silver, mine output, metal content troy ounces	6,768	[r]8,391	18,519	13,021	[2]15,207
Stone, sand and gravel:					
Coral sand for cement manufacture	105,436	93,514	99,895	[e]95,000	95,000
River sand for cement manufacture	30,631	27,307	29,773	[e]28,000	25,000
River sand and gravel, n.e.s.[e] cubic meters	370,000	375,000	380,000	375,000	350,000
Quarried stone[e] do.	274,000	210,000	230,000	225,000	225,000
Tellurium metal kilograms	11,350	--	--	--	--
NAURU[4]					
Phosphate rock thousand tons	2,087	1,480	1,359	1,684	[2]1,358
NEW CALEDONIA					
Cement	55,927	50,154	53,191	[e]60,000	60,000
Chromite, gross weight	2,188	4,270	49,825	84,889	[2]84,152
Cobalt, mine output:					
Content by analysis[5]	3,200	2,789	2,133	[e]2,100	2,000
Recovered[6]	358	369	271	[e]270	250
Nickel:					
Ore:					
Gross weight thousand tons	4,571	3,984	3,047	2,200	[2]2,100
Metal content[7]	86,592	78,090	60,101	46,000	41,000
Metallurgical products:					
Ferronickel:					
Gross weight	131,281	109,679	108,606	69,400	92,000
Metal content (nickel plus cobalt)	32,580	27,989	28,006	21,717	[2]34,800
Nickel matte:					
Gross weight	20,779	20,648	9,700	[e]9,750	[2]7,000
Metal content (nickel plus cobalt)	15,479	15,380	7,144	4,578	3,300
Stone, sand and gravel:					
Stone:					
Crude (unspecified) cubic meters	104,706	19,422	19,600	[e]19,000	20,000
Crushed do.	140,079	83,000	91,000	[e]90,000	90,000
Sand do.	95,814	75,802	[e]59,000	[e]60,000	60,000
Silica (for metallurgical use) do.	12,375	24,650	15,240	[e]15,000	15,000
PAPUA NEW GUINEA[4]					
Copper, mine output, metal content	146,813	165,420	170,004	201,876	[2]164,447
Gold, mine output, metal content troy ounces	451,707	540,325	589,258	579,407	835,000
Silver, mine output, metal content do.	1,180,000	1,362,804	1,387,399	1,524,360	[2]1,427,491
SOLOMON ISLANDS[4]					
Gold do.	1,093	1,050	1,318	[e]1,100	[2]2,572
Silver do.	161	150	169	[e]250	--

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 30, 1985.
[2]Reported figure.
[3]Produced from an unreported amount of domestically quarried limestone.
[4]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.
[5]Cobalt content of nickel ores computed assuming average cobalt content to be 0.07% since 1975.
[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).

Table 2.—Fiji: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	35	11	--	Mainly to New Zealand.
Copper: Metal including alloys:				
Scrap	160	120	--	All to Australia.
Semimanufactures	35	13	--	Mainly to Australia.
Gold: Bullion troy ounces	45,833	39,776	--	All to Australia.
Iron and steel: Metal:				
Scrap	1,132	858	--	New Zealand 794.
Pig iron, cast iron, related materials kilograms	--	800	--	All to Tonga.
Steel, primary forms do	258	10	--	All to Tuvalu.
Semimanufactures[2]	1,321	590	--	Tonga 328; American Samoa 172.
Lead: Metal including alloys, scrap	194	82	--	All to Australia.
Silver:				
Waste and sweepings value	$38,095	--		
Metal:				
Bullion troy ounces	17,680	12,716	--	Do.
Unwrought and partly wrought value	$1,874	--		
Tin: Metal including alloys, all forms do	$43	$9,236	--	All to Japan.
Titanium: Oxides	3	1	--	All to Tonga.
Zinc: Metal including alloys, all forms value	--	$551	--	All to Western Samoa.
NONMETALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones excluding diamond do	$763	$422	--	Tonga $264; Tuvalu $158.
Grinding and polishing wheels and stones do	$682	$7,045	--	Australia $6,623.
Barite and witherite kilograms	565	99	--	All to Western Samoa.
Cement	93	1,544	--	Tonga 870; American Samoa 360; Tuvalu 304.
Clays, crude kilograms	367	887	--	Tonga 862.
Gypsum and plaster do	--	4	--	All to Tuvalu.
Lime	1	--		
Precious and semiprecious stones other than diamond value	$41,201	--		
Salt and brine kilograms	540	100	--	Do.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked do	--	48	--	All to Australia.
Gravel and crushed rock do	560	300	--	All to Tonga.
Sand other than metal-bearing do	475	--		
Sulfuric acid value	$27	--		
Talc, steatite, soapstone, pyrophyllite kilograms	250	400	--	Do.
Other: Slag and dross, not metal-bearing	6	--		
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	126	79	--	Mainly to Kiribati.
Gasoline thousand 42-gallon barrels	135	148	--	Western Samoa 40; Tonga 36; Vanuatu 23.
Naphtha do	1	1	--	All to Tonga.
Kerosine and jet fuel do	642	545	--	Tonga 31; Western Samoa 29; bunkers 419.
Distillate fuel oil do	283	270	--	Western Samoa 62; Tonga 57; bunkers 67.
Lubricants do	1	1	--	Mainly to bunkers.
Residual fuel oil do	73	30	--	All to bunkers.
Unspecified do	(3)	(3)	--	Mainly to New Zealand.

[1]Table prepared by Audrey D. Wilkes.
[2]Excludes unreported quantities valued at $30,803 (revised) in 1982 and $21,344 in 1983.
[3]Less than 1/2 unit.

Table 3.—Fiji: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	328	399	(2)	New Zealand 262; Australia 96.
Copper: Metal including alloys, all forms	93	106	3	New Zealand 33; Australia 30; Taiwan 14.
Gold:				
Bullion ---troy ounces	1,128	540	--	Australia 420.
Metal including alloys, unwrought and partly wrought ---do	775	1,037	50	United Kingdom 343; Australia 310; Canada 107.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	2,000	--		
Metal:				
Scrap	--	12	--	New Zealand 8; Japan 4.
Pig iron, cast iron, related materials	79	48	--	Hong Kong 31; Austria 10.
Ferroalloys	4	3	--	New Zealand 2.
Steel, primary forms	9,110	9,336	(2)	Australia 5,322; New Zealand 3,915.
Semimanufactures:				
Bars, rods, angles, shapes, sections	4,183	4,325	3	New Zealand 2,016; Japan 1,491.
Universals, plates, sheets	10,398	13,301	22	Australia 8,906; New Zealand 2,668; Japan 1,165.
Hoop and strip	246	539	--	Australia 440; New Zealand 50.
Rails and accessories value, thousands	$370	$233	--	Japan $74; United Kingdom $71; Australia $68.
Wire	2,232	3,084	--	New Zealand 1,626; Australia 1,337.
Tubes, pipes, fittings[3]	2,109	2,541	5	Australia 835; Taiwan 773; Austria 440.
Castings and forgings, rough	1	1	--	Mainly from Australia.
Lead: Metal including alloys, unwrought and semimanufactures value, thousands	$106	$58	--	New Zealand $22; United Kingdom $17.
Magnesium: Metal including alloys, semimanufactures ---kilograms	1,004	4	--	All from Australia.
Nickel:				
Matte and speiss ---do	50	--		
Metal including alloys, all forms ---do	2	710	20	New Zealand 655.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ---value	$96	$403	--	NA.
Silver: Metal including alloys, unwrought and partly wrought ---do	$2,656	$6,274	--	Mainly from Australia.
Tin: Metal including alloys, all forms value, thousands	$1,940	$2,366	--	Japan $2,335.
Titanium: Oxides	272	297	54	Australia 233.
Tungsten: Metal including alloys, semimanufactures ---value	$123	$180	--	All from New Zealand.
Zinc:				
Blue powder --- value, thousands	$35	$76	--	Australia $74.
Metal including alloys:				
Scrap and unwrought	41	95	--	Australia 92.
Semimanufactures value, thousands	$21	$25	--	Australia $21.
Other:				
Oxides and hydroxides	69	76	--	Australia 39; West Germany 20.
Ashes and residues ---kilograms	136	40	--	All from India.
Base metals including alloys, all forms ---value	$148	$146	--	All from Australia.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1	5	--	All from New Zealand.
Dust and powder of precious and semiprecious stones ---value	$124,351	$77	--	Do.
Grinding and polishing wheels and stones ---do	$60,572	$86,799	$3,990	New Zealand $33,143; Australia $29,429.
Barite and witherite	24	22	--	New Zealand 14; Australia 8.
Boron materials: Crude natural borates	--	1	--	All from New Zealand.
Cement	8,005	31,795	--	Australia 23,015; Japan 7,000.
Chalk	125	93	--	United Kingdom 41; New Zealand 31.
Clays, crude	93	68	1	Australia 46; New Zealand 18.
Diamond: Industrial stones ---value	$356	--		
Diatomite and other infusorial earth	42	87	46	Australia 19; Japan 18.

See footnotes at end of table.

Table 3.—Fiji: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
NONMETALS —Continued				
Fertilizer materials:				
Crude, n.e.s.	--	6	--	All from New Zealand.
Manufactured:				
Nitrogenous	45,579	50,398	351	Japan 37,957; North Korea 5,864; Republic of Korea 5,259.
Phosphatic	13,706	9,979	--	Japan 5,000; Republic of Korea 4,500.
Potassic	3,592	2,289	2	North Korea 1,050; Republic of Korea 900.
Unspecified and mixed	911	856	([2])	West Germany 500; Australia 228.
Graphite, natural kilograms	86	550	--	All from Taiwan.
Gypsum and plaster	3,566	3,056	--	Australia 3,031.
Lime	192	333	--	New Zealand 291.
Magnesite kilograms	310	1,560	--	Australia 800; New Zealand 760.
Mica:				
Crude including splittings and waste	4	2	--	All from New Zealand.
Worked including agglomerated splittings value	$2,396	$1,089	$222	United Kingdom $396; Australia $383.
Nitrates, crude	8	202	142	Australia 52.
Potassium salts, crude kilograms	27	1	--	All from Australia.
Precious and semiprecious stones other than diamond value	$52,402	$2,987	--	Australia $2,101.
Salt and brine	2,598	3,126	([2])	West Germany 2,599; Netherlands 333.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5	56	--	Australia 29; India 25.
Worked value	$31,741	$49,438	$39	New Zealand $18,036; Republic of South Africa $16,182.
Gravel and crushed rock	308	55	--	Australia 50.
Quartz and quartzite	([2])	54	--	All from Republic of South Africa.
Sand other than metal-bearing	248	85	--	New Zealand 74.
Sulfur:				
Elemental:				
Crude including native and by-product	136	35	--	All from Australia.
Colloidal, precipitated, sublimed kilograms	7,468	725	--	Australia 720.
Sulfuric acid value	$54,770	$61,330	--	Australia $37,585; New Zealand $23,728.
Talc, steatite, soapstone, pyrophyllite	46	92	--	Australia 67; New Zealand 25.
Other:				
Crude	18	50	--	All from New Zealand.
Slag and dross, not metal-bearing kilograms	385	215	--	India 201.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	560	2,020	--	Singapore 932; New Zealand 431; Japan 403.
Coal: All grades including briquets	r22,707	18,035	--	Australia 15,874; New Zealand 2,161.
Coke and semicoke	17	13	--	Australia 11.
Peat including briquets and litter	--	1	--	All from New Zealand.
Petroleum:				
Crude 42-gallon barrels	([2])	5	1	Australia 4.
Partly refined do.	1	5	--	Mainly from Australia.
Refinery products:				
Liquefied petroleum gas do.	38,048	45,992	--	Do.
Gasoline do.	506,090	471,042	--	Australia 422,734.
Mineral jelly and wax do.	362	879	2	China 432; New Zealand 189.
Kerosine and jet fuel do.	738,161	688,654	--	Australia 636,540; Singapore 51,183.
Distillate fuel oil do.	1,476,945	1,295,923	--	Australia 1,133,908.
Lubricants do.	39,212	29,653	125	Australia 23,082.
Naphtha do.	22,968	13,885	([2])	Australia 6,970; Singapore 6,915.
Residual fuel oil do.	125,525	63,164	--	All from Australia.
Bitumen and other residues do.	6	163	--	New Zealand 118.
Bituminous mixtures do.	193	506	--	New Zealand 277; Austria 108.
Unspecified do.	973	1,787	2	New Zealand 1,515.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Excludes unreported quantities valued at $843,092 in 1982 and $695,684 in 1983.

NAURU

The Republic of Nauru consists of one island of 21 square kilometers in Micronesia, 42 kilometers south of the Equator. The affluent Nauruan economy was based on the mining of rich phosphate rock reserves, which was virtually the island nation's only natural resource, and Nauru's gross domestic product varies accordingly with the world market price of phosphate. Production of phosphate rock by the Government-owned Nauru Phosphate Corp. from its surface mine decreased 19% in 1984 to 1.36 million tons. All production was exported to Australia (68.3%), New Zealand (27.4%), the Philippines (2.3%), the Republic of Korea (1.5%), and Japan (0.5%).

The phosphate rock was mined from deposits interdigitated with evenly spaced dolomitized coral limestone pillars using grab buckets, leaving the coral as a "forest" of very hard rock pinnacles. Minor amounts of coral mined with the phosphate were removed by hand for use as road aggregate.

NEW CALEDONIA

Nickel, representing 80% of exports, continued to dominate the economy in the French Territory of New Caledonia and Dependencies, comprised of the island of New Caledonia, the Isle of Pines, the Loyalty Islands, Huon Islands, and Chesterfield Islands in Melanesia. New Caledonia's nickel reserves, estimated to be 20% to 25% of world nickel reserves, are second only to those of Cuba, and the country's 1984 nickel production trailed only that of Australia, Canada, Indonesia, and the U.S.S.R. Ore production during the year remained about the same as that of 1983, despite the cessation of production at Société Metallurgique le Nickel's (SLN) Camp des Sapins and Plateau Mines at Thio owing to separatist unrest late in the year. Mining at SLN's larger Meaba Mine at Kouaoua and smelting at the company's Doniambo smelter complex at Noumea were unaffected. The Nepoui Mine and the Poro Mine remained closed.

SLN reopened its third 30,000-kilowatt Demag furnace at the Doniambo smelter during the year owing to a slight improvement in the nickel market and reduced nickel stocks. Smelter feed, supplied by the company's mines at Kouaoua and Thio, as well as from smaller independent mines, produced ferronickel of various grades and nickel matte. Minor amounts of cobalt were also recovered as a component of the nickel matte from refining operations in Le Havre, northern France.

Chromite continued to be produced from the 90,000-ton-per-year underground Tiebaghi Mine in the northern part of the island of New Caledonia, in a joint venture operated by Cromical S.A. and owned by Inco Metals Co. (55%) in partnership with two French companies, Banque de Paris et Pay-Bas (22.5%) and Dong Triew Co. (22.5%). However, Dong Triew became so reluctant during the year to make any additional investment in the Tiebaghi project that it announced it was withdrawing from the project. Thus, Cromical was seeking a new partner in the venture during the year. The Tiebaghi Mine produced refractory-grade ore (low-silica, high-grade fines) in addition to high-grade lumpy ore and high-grade fines. The rapid growth in exports to China during the year stemmed from the fact that China considered New Caledonian chromite as an alternative to Albanian chromite, which China can no longer purchase through official channels.

Table 4.—New Caledonia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	2	43	--	France 39.
Chromium: Ore and concentrate	18,750	--		
Copper:				
Matte and speiss including cement copper	249	102	--	Australia 52; France 50.
Metal including alloys, all forms	1	18	--	Australia 17.
Iron and steel: Metal:				
Scrap	622	3,294	--	Japan 2,190; New Zealand 1,053.
Pig iron, cast iron, related materials	210	--		
Ferroalloys	191,932	88,600	8,842	France 51,612; Japan 15,247; Singapore 10,449.
Semimanufactures	264	236	--	Wallis and Futuna Islands 155; French Polynesia 65.
Lead: Metal including alloys, all forms	15	20	--	Mainly to France.
Nickel:				
Ore and concentrate thousand tons	1,232	893	3	Japan 849; China 38.
Metal including alloys, unwrought	10,800	5,098	--	All to France.
Silver: Waste and sweepings[2] value, thousands	$6	$18	--	Do.
Zinc: Metal including alloys, all forms	7	2	--	All to Wallis and Futuna Islands.
NONMETALS				
Cement	7	21	--	Mainly to Wallis and Futuna Islands.
Fertilizer materials:				
Crude, n.e.s value, thousands	$2	$2	--	All to Wallis and Futuna Islands.
Manufactured, nitrogenous	2	4	--	Do.
Precious and semiprecious stones other than diamond: Natural value, thousands	$5	$9	--	All to France.
Salt and brine	5	--		
Stone, sand and gravel: Dimension stone, worked value, thousands	$1	--		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	2	--	All to Wallis and Futuna Islands.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	441	360	--	Mainly to Wallis and Futuna Islands.
Lubricants do	343	399	--	Wallis and Futuna Islands 308.
Bituminous mixtures do	2,212	709	--	Vanuatu 424; Wallis and Futuna Islands 285.

[1]Table prepared by Audrey D. Wilkes.
[2]May include other precious metals.

Table 5.—New Caledonia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Alkali and alkaline-earth metals value, thousands	$2	$2	--	Australia $1; France $1.
Aluminum: Metal including alloys, all forms	196	203	(2)	France 56; New Zealand 54; Italy 48.
Copper:				
Matte and speiss including cement copper value, thousands	$5	$1	--	All from France.
Metal including alloys, semimanufactures	53	32	(2)	France 31.
Iron and steel: Metal:				
Scrap	(2)	119	--	France 109.
Ferroalloys	79	206	--	Australia 191; West Germany 15.
Semimanufactures:				
Bars, rods, angles, shapes, sections	4,231	3,906	--	France 2,054; New Zealand 861; Belgium-Luxembourg 466.

See footnotes at end of table.

Table 5.—New Caledonia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Universals, plates, sheets	4,307	3,410	--	Australia 1,981; France 468; New Zealand 266.
Hoop and strip	207	130	--	Australia 88; France 24.
Rails and accessories	42	80	--	Mainly from Belgium-Luxembourg.
Wire	944	472	--	France 266; New Zealand 145.
Tubes, pipes, fittings	1,357	1,273	1	France 620; Spain 188; West Germany 155.
Castings and forgings, rough	64	59	--	All from France.
Lead: Metal including alloys, all forms	33	28	--	France 16; Australia 12.
Nickel: Metal including alloys, all forms value, thousands	$6	$3	$3	
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	$14	--	France $10; West Germany $3.
Titanium: Oxides	25	36	--	All from France.
Tungsten: Metal including alloys, all forms value, thousands	$2	$3	--	All from Australia.
Zinc:				
Oxides	--	3	--	All from Netherlands.
Metal including alloys, all forms	5	2	--	All from France.
NONMETALS				
Cement	43,681	26,272	--	Japan 26,110; France 153.
Chalk	90	155	--	France 138.
Clays, crude	11	10	--	France 4; Spain 3.
Diatomite and other infusorial earth	21	12	8	France 4.
Fertilizer materials:				
Crude, n.e.s	1	--		
Manufactured:				
Ammonia	6	4	--	France 3; Australia 1.
Nitrogenous	1,753	2,866	--	France 2,675.
Phosphatic	415	1,000	--	All from West Germany.
Potassic	129	113	--	Belgium-Luxembourg 108.
Unspecified and mixed	22	24	1	New Zealand 9; France 8; Spain 5.
Gypsum and plaster	763	830	--	All from France.
Lime	250	315	--	New Zealand 295.
Magnesite	16	--		
Phosphates, crude	8	27	--	Mainly from France.
Pigments, mineral: Iron oxides and hydroxides, processed value, thousands	$1	$4	--	France $2; West Germany $2.
Precious and semiprecious stones other than diamond:				
Natural do	$176	$149	$2	France $115; Israel $13.
Synthetic do	$2	$1	--	All from France.
Salt and brine	679	523	--	Australia 268; France 131; West Germany 101.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	72	54	--	France 15; West Germany 11; Republic of South Africa 10.
Worked	43	27	--	France 20; Italy 5.
Dolomite, chiefly refractory-grade	62	47	--	All from France.
Gravel and crushed rock	83	21	--	Italy 18.
Sand other than metal-bearing	22	6	--	All from France.
Sulfuric acid	55	36	--	Australia 20; France 14.
Talc, steatite, soapstone, pyrophyllite	6	17	--	Mainly from France.
MINERAL FUELS AND RELATED MATERIALS				
Coal, all grades including briquets	64,990	96,806	18,045	Australia 65,546; Republic of South Africa 13,210.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	71,328	51,481	--	Mainly from Australia.
Gasoline do	794,758	656,548	NA	NA.
Kerosine and jet fuel do	23,087	31,728	NA	NA.
Lubricants do	21,840	13,405	119	Australia 10,276; France 315.
Residual fuel oil do	1,355,810	1,149,303	669,750	Bahrain 254,665; Kuwait 223,876.
Bituminous mixtures do	16,507	17,950	--	Mainly from Singapore.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

PAPUA NEW GUINEA

Papua New Guinea is in the southwest Pacific Ocean and consists of the eastern half of the island of New Guinea, the Bismarck Archipelago, Bougainville and Buka Islands in the Western Solomons, and the Trobriand, Woodlark, D'Entrecasteaux, and Louisiade Island groups to the east of the New Guinea mainland. It is richly endowed with copper and associated gold and silver and has significant, but as yet unexploited, deposits of chromite, cobalt, and nickel.

Despite a massive 50-million-ton landslide centered on the site of the permanent tailings dam at Ok Ma in January, Ok Tedi Mining Ltd. began the production of gold on schedule in May at its porphyry copper-gold-silver deposit on Mount Fubilan in the Star Mountains, 25 kilometers from the Irian Jaya border in Western Province. Mining of the rich gold-silver cap over the main copper deposit was the initial stage of mining operations in what was planned to become a 120,000-ton-per-year copper mine by 1990. The second stage of mining would involve the joint extraction of both gold and copper ores beginning in mid-1987, a delay of 1 year from original plans, at a rate of 80,000 tons per year. By the end of 1989, the gold ore would have been exhausted so that the third stage of mining would be confined exclusively to the copper ore. Minable reserves at Ok Tedi at the start of mining consisted of 34 million tons of leached gold-bearing ore averaging 2.86 grams of gold per ton capping the main deposit; 351 million tons of porphyry copper ore grading 0.7% copper based on a 0.4% cutoff grade; and 26 million tons of skarn grading 1.2% copper.

In early July, the Ok Tedi Mine was temporarily closed owing to the leakage of toxic sodium cyanide, used in processing the gold ore, into the Ok Ma after a valve was left opened. A previous escape occurred 3 weeks earlier in mid-June when the tugboat *Menga* carrying canisters of sodium cyanide sank in heavy seas. The mine was also closed for a short period in August because of alleged problems in the filtering system at the interim tailings dam in the Ok Mani.

Shareholders in the Ok Tedi joint venture consisted of The Broken Hill Pty. Co. Ltd. (30%); Amoco Minerals Ltd. (30%); Kupferexplorationgesellschaft mbH (20%), a Metallgesellschaft subsidiary; and the Papua New Guinean Government (20%).

Bougainville Copper Ltd. (BCL) continued to operate the large surface mine and processing facility at Panguna on Bougainville Island in the North Solomons Province, producing concentrate containing copper, gold, and silver. BCL continued its recent expansion of production capacity, to offset declining ore grades, by announcing the installation of a 13th primary regrind ball mill around mid-1985. The new mill will be a gearless drive mill manufactured by Kobe Steel Ltd. of Japan, which also manufactured the other 12 mills, and will be the first gearless drive mill for copper ore and the second wet-grinding gearless mill in the world. Further expansion was also being investigated; however, the rugged, mountainous terrain surrounding the minesite will make it difficult to increase the number of ball mills to more than about 15.

The decline in average grade of the ore was illustrated by a reevaluation, putting reserves at the beginning of the year at 720 million tons of ore grading 0.4% copper and 0.46 gram of gold per ton compared with 900 million tons of ore grading 0.48% copper and 0.55 gram of gold per ton calculated before mining began in 1972. Diamond drilling continued during the year to define extensions of the ore body around the periphery and at depth, beyond the limits of the present open pit design.

A 16-day industrial action at the Panguna Mine was ended after a Department of Labour Industrial Tribunal decided to grant an additional Consumer Price Index (CPI) adjustment to employees. The new CPI figure of 8.5% added an extra 3.5% to the earlier CPI adjustment of 5% for the 3,800 employees at the mine. BCL was owned by CRA Ltd. (53.6%); the Papua New Guinean Government and its nominee, the Investment Corp. of Papua New Guinea (20.2%); and by private interests.

Placer Development Ltd. commenced a 7,000-meter diamond drilling program at its Porgera gold-silver prospect in the west-central highlands of Enga Province during the year to collect representative samples for metallurgical testing and to explore for possible extensions of the mineralization in the Zone VII area of the prospect. Previously announced reserves for the area were 59 million tons averaging 3.56 grams of gold per ton and 14.4 grams of silver per ton. The Porgera joint venture consisted of Placer Development as operator through wholly owned Placer (PNG) Pty. Ltd., together with the Australian firms Mount Isa Mines Ltd. and Renison Goldfields Consolidated Ltd., each holding a one-third interest.

Promising gold mineralization located along the coastal zone of Lihir Island off the northeast coast of New Ireland, first discovered in 1983, continued to be investigated during the year. The Lihir Island prospect was a joint venture comprised of Kennecott Explorations (Australia) Ltd., acting as manager, and Niugini Mining Ltd. of Australia. Core drilling was also conducted on Simberi Island, within the Tabar Islands off the northern coast of New Ireland, during the year. The project was a joint venture between Kennecott, Nord Resources Corp., and Niugini. Kennecott held the majority interest and operated as manager of the project.

Eastern Copper Mines NL licensed a process to recover copper, gold, and silver using Australia's Commonwealth Scientific and Industrial Research Organization's Sirosmelt furnace system from the Liloki deposit. The furnace will produce a matte containing 60% copper, in which 83% of the copper, 96% of the gold, and 79% of the silver will have been recovered from the ore. The Liloki Mine, together with a 7-ton-per-hour smelter, was expected to begin production in 1985.

Small quantities of alluvial gold were also produced during the year by individual prospectors, primarily tribal operations using labor-intensive methods.

The search for hydrocarbons in Papua New Guinea was on in earnest, and the country was actively seeking to develop its potentially large petroleum resources. Most exploration to date has been done in the Papuan Basin, an area of about 212,000 square kilometers occupying the southern part of the New Guinea mainland and the adjacent area offshore in the Gulf of Papua. Eight discoveries of gas, condensate, and oil have been made to date, although none has yet been developed for commercial production. The recently discovered Juha Field in the rugged southern highlands of central New Guinea, with indicated reserves of up to 1 billion barrels of condensate and 30 to 85 billion cubic meters of gas, was being keenly considered for early development, possibly with condensate on-stream by 1987-88, by the Government in order to finance further expansion of the field. The difficult terrain of the region, almost 500 kilometers inland, however, will prove to be an enormous drawback.

Table 6.—Papua New Guinea: Exports of copper in concentrates, by destination

(Metric tons of copper content)

Destination	1982	1983
China	8,394	14,371
Germany, Federal Republic of	64,593	62,549
Japan	79,586	85,536
Korea, Republic of	2,649	5,467
Spain	15,213	14,550
Unspecified	2,826	--
Total	173,261	182,473

Source: World Metal Statistics, Mar. 1985.

SOLOMON ISLANDS

During the year, mineral production in the ruggedly mountainous volcanic islands and low-lying coral atolls comprising the Solomon Islands, situated in Melanesia in the southern Pacific Ocean, was virtually limited to minor amounts of alluvial gold. Alluvial silver, consisting of only a few hundred troy ounces per year, has been recovered for the past several years, but apparently none was recovered during 1984. Small quantities of clays, crushed stone, and sand and gravel, as well as the harvesting of marine shells for lime used in domestic construction work, were also produced, but consisted of only a few tons. Historically, the minerals sector has had only a small role in the nation's economy.

An agreement between Matoba Mines Ltd. of the Solomon Islands and Zanex Ltd. of Australia reached early in the year enabled Zanex to conduct testing and mining of alluvial gold deposits on Guadalcanal. Under the agreement, Zanex would provide the capital and equipment for the venture in return for a 50% stake in any profits for an initial 2-year period. After the 2-year production period, Zanex would reduce its equity in the project to 30%.

TONGA

The mineral industry of the Kingdom of Tonga Archipelago, comprising about 150 islands covering an 800-kilometer north-south expanse of Polynesia in the southern Pacific Ocean, consisted of the construction materials coral reef limestone, crushed stone, and sand and gravel in minor quantities for domestic use. No other mineral resources are known. Exploration for hydrocarbons, begun in 1970 after discovery of natural crude oil seepages on the islands of Tongatapu and 'Eua in 1968, was assumed to have continued during the year.

VANUATU

The mineral industry of the Republic of Vanuatu, a chain of islands in Melanesia having a total area of about 12,000 square kilometers spread over a distance of 900 kilometers in the southwest Pacific Ocean, remained insignificant. The sector was limited to the production of small quantities of construction materials, including coral reef limestone, crushed stone, and sand and gravel. Mineral commodities, even during the active mining and concentrating of metallurgical-grade manganese ore for export to Japan during the 1961-78 period, have never had a very significant role in the country's economy.

The opencut manganese mine near the village of Forari, 55 kilometers northwest of the Port of Vila, Efate Island, remained closed throughout the year. About 120,000 tons of ore, sufficient for about 3 years, remained when production ceased in November 1978. Other known resources, expected to remain uneconomic in the foreseeable future, included metallurgical-grade limestone on Espíritu Santo Island; manganese deposits, in addition to that of the Forari Mine, on Efate and Erromango Islands; mineral sands containing ilmenite and magnetite on Pentecost Island; and large deposits of pozzolan, a volcanic ash used in cement manufacturing, on some of the islands, especially Ambrym and Efate.

[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Fijian dollars ($F) to U.S. dollars at the rate of $F1= US$0.875, as of Dec. 31, 1984.

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