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MINERALS IN THE WORLD ECONOMY

U.S.
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MINES

1990

UNITED STATES DEPARTMENT OF THE INTERIOR • Bruce Babbitt, Secretary

BUREAU OF MINES

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Preface

This edition of the Minerals Yearbook records the performance of the worldwide minerals industry during 1990 and provides background information to assist in interpreting that performance. Content of the individual Yearbook volumes follows:

Volume I, Metals and Minerals, contains chapters on virtually all metallic and industrial mineral commodities important to the U.S. economy. In addition, a chapter on survey methods used in data collection with a statistical summary of nonfuel minerals and a chapter on trends in mining and quarrying in the metals and industrial mineral industries is included.

Volume II, Area Reports: Domestic, contains chapters on the minerals industry of each of the 50 States and Puerto Rico, Northern Marianas, Island Possessions, and Trust Territory. This volume also has a chapter on survey methods used in data collection, including a statistical summary of domestic nonfuel minerals.

Volume III, Area Reports: International, contains the latest available mineral data on more than 150 foreign countries and discusses the importance of minerals to the economies of these nations. The 1990 review is presented as five area reports and one world overview: Mineral Industries of Africa, Mineral Industries of Asia and the Pacific, Mineral Industries of Latin America and Canada, Mineral Industries of Europe and the U.S.S.R., Mineral Industries of the Middle East, and Minerals in the World Economy.

The U.S. Bureau of Mines continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the yearbook are welcomed.

Acknowledgments

The U.S. Bureau of Mines, in preparing these Volume III Minerals Yearbook Reports, extensively utilized statistics and data on mineral production, consumption, and trade provided by various foreign Government minerals and statistical agencies through various 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. Preparation of this summary volume would not be possible without the contributions of the country specialists and the Branch Chiefs of the Division of International Minerals, the commodity specialists of the Division of Mineral Commodities, and the International Data Section of the Division of Statistics and Information Services, all components of the Information and Analysis Associate Directorate.

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MINERALS IN THE WORLD ECONOMY

By Charles L. Kimbell and William L. Zajac

INTRODUCTION

This study is intended to serve three roles. First, it is the second annual edition of this study in a separate volume that represents a global overview and summary to supplement and complement the five regional volumes that now constitute the U.S. Bureau of Mines international, geographically arranged studies. In this regard, it also extends previous works under this title that appeared in the international volume of the Minerals Yearbook from the inception of that volume (the 1963 edition) until it was subdivided into six separate volumes in 1989. Following the traditional format of past chapters under this title, the basic statistical presentations herein deal chiefly with 1990, and in a few instances with 1988 or 1989; these latter two only because more recent, comprehensive global statistics simply are not yet available owing to delays in data collection and processing in some countries and continued governmental suppression of data in others.

The second role of this study is to provide an update to the coverage of events impacting on the world's mineral industry that have occurred between the end of 1990 and the preparation of this study. Inclusion of this update is almost essential because of the potential effect of some of these events on global mineral industry activities.

Finally, this study, in parallel with the regional volumes that it summarizes and complements, includes limited materials on the short-term outlook for the world's mineral industry, at least insofar as the impact of events covered in the update can be examined. To simplify the outline of this study, the update and outlook appear as a single section with regional subdivisions following the 1990 review. This arrangement was followed because most of the noteworthy events are regional in nature and most seem destined to have their greatest impact on the specific regions rather than on the world as a whole.

1990 SUMMARY

In broadest overview, a substantial part of the world's mineral industry in 1990 registered small gains over its 1989 performance, but traditional statistical measures of mineral industry performance, namely global production, trade, and consumption levels, failed to mirror these gains. This was because of the sharp downturns in the mineral industry activity in the U.S.S.R. and the former centrally planned economy nations of eastern Europe. These downturns in this one geographic area had influences on almost all traditional statistical series, in some cases simply significantly reducing growth, in other cases providing for a global downturn, in almost all cases despite considerably brighter outlooks based on activities in other world areas.

To be sure, the U.S.S.R. and eastern Europe were not the only places on the planet suffering problems of one type or another in 1990 that impacted on minerals industry activity, but with the acquisition of information presently available, it seemed almost assured that the difficulties of these economies in transition will be the most difficult of problems to resolve in the long run. It certainly appeared that the legacy of the half century or more of economic central planning will be a decade or more of very difficult adjustments, and a number of these will greatly affect not only the minerals industry of these transition countries, but also the rest of the globe's mineral industry as well.

Before detailing statistical assessments of global mineral industry performance, some attention must be given to other politico-economic events of 1990 that bore upon mineral industry operations, and heading that list must be the Iraqi invasion of virtually defenseless Kuwait and the response of the United States-led United Nations coalition, code-named "Desert Shield." Embargoes established by the United Nations vote sharply influenced the pattern of oil exports globally, for not only were supplies of oil from Kuwait and Iraq interdicted, but compensatory deliveries from other countries were increased to fill the gaps produced by embargoes on shipments from these two countries. The trade restrictions affected not only oil exports, but also exports of materials such as sulfur from Iraq, and caused dislocation in trade patterns for mineral commodities and other materials in neighboring states, such as Jordan and Turkey. By yearend 1990, the buildup of coalition forces in Saudi Arabia and Turkey, together with the reasonably effective embargo, demonstrated that the vast majority of world powers were substantially supportive of the announced goals of forcing the invading Iraqis from Kuwait's soil and that expulsion by force was imminent if the army of Saddam Hussein did not withdraw unilaterally.

The possibility that in the event of war significant damage might occur to mineral industry facilities—primarily oil-producing and processing operations, but including other minerals operations as well—loomed large at the close of the year.

In mineral-rich, technologically advanced Republic of South Africa, a degree of Government flexibility in internal racial policies was demonstrated that offered the potential for possible reconciliation between that country and a number of other nations. However, civil strife between rival groups had a

negative influence on mineral operations there. Elsewhere in Africa, civil war in Liberia essentially closed down the country's once-robust iron ore industry. Other nations suffered from less marked internal strife as well as from international financial problems, with all such events serving as a deterrent to mineral industry development.

In Asia, the events of Tiananmen Square in China in 1989 continued to serve as a detriment to the country's efforts to significantly increase its international involvement in many economic areas, including mineral industry activities. China's potential, both as a source of raw materials and as a market, remained large, but the rate of development of international linkages was retarded. Elsewhere in the region, Taiwan and the Republic of Korea continued to demonstrate potential as emerging industrialized areas, with their import-based steel industries as major showpieces in the minerals industry area. Other states, perhaps most notably Thailand, proceeded with diversification efforts and increases in industry activity, particularly in downstream operations in the minerals area among others. Generally high levels of activity were noted in Australia, and mineral resource development was furthered in such widely scattered areas as Papua New Guinea, New Caledonia, and Mongolia. On the negative side, widely touted plans for expansion of activities in North Korea seemed more propagandistic bombast than engineering possibilities, particularly with the limited availability of capital to fund such development. The unsettled political situation in the Philippines contributed to lackluster industrial performance as well as to a poor investment climate, not only for mineral industry ventures but for other economic endeavors as well.

In the Western Hemisphere, mineral industry operations in Canada, the United States, and the larger mineral-producing Latin American nations served to significantly counterbalance lower levels of performance in eastern Europe and the U.S.S.R. Among the Latin American states, inflation and international debt problems continued to mitigate against expansion of many major mineral industry operations. The Near East crisis, which drove energy prices upward, was at least to the major oil producers of Latin America, Mexico, Venezuela, Colombia, and Ecuador (listed in order of output), a temporary boon, but the same crisis worked to the disadvantage of those countries like Brazil and Chile, which though well endowed with nonfuel mineral resources, and in possession of a considerable processing capability, remained substantial net importers of energy.

Shifting back finally to Europe, 1990 was a year in which the countries of the European Community (EC) seemed to be growing closer, despite some complex problems, and as a more firmly linked group, they represent a formidable economic force. The linkage of the former German Democratic Republic and the Federal Republic of Germany in mid-fall 1990 brought both assets and liabilities to the merged state and to the EC. This merger without question offered to the former German Democratic Republic certain advantages with respect to its former Council for Mutual Economic Assistance (CMEA) fellow member states, such as Bulgaria, Czechoslovakia, Hungary, Poland, and Romania, that would at least to some extent make the economic rationalization of its mineral industry somewhat smoother.

As the nations of the EC edged toward closer linkages, there were disturbing moves toward disintegration of other nations in Europe—moves that could vastly complicate efforts at attaining economic viability within a market economy world. The former Lithuanian Republic of the U.S.S.R. declared its independence in 1990, and movements for similar actions by other Republics were active at yearend, these including the other Baltic Republics of Latvia and Estonia, as well as some of the Moslem Republics in the U.S.S.R.'s southwest.

Similarly there were groups espousing the breakup of Yugoslavia into separate states, and there were some thoughts of dissolving the link between the Czech and Slovak Republics that comprise Czechoslovakia. The immediate effect of such proposals on mineral industry activities, as on economic activities in general, has been a weakening of investment climate, if only because potential foreign investors are not sure of what government they may be dealing with. A far more serious threat to investment and even to present levels of activities laid in the chance for civil war, a prospect that seemed to be facing at least some of those components advocating separation of Yugoslavia.

In the light of the foregoing recital of difficulties and potential difficulties facing world mineral operations, it may be surprising to some that the global industry did as well as it did in 1990. There was an almost imperceptible decline in the estimated value of world crude mineral output between 1989 and 1990—0.3% in 1983 constant dollars—to $1,159.7 billion ($1,501.5 billion in 1990 dollars), but as previously noted, this drop was largely the result of shortfalls in output in the U.S.S.R. and eastern Europe. Similar cutbacks in export trade in these countries were more than compensated by trade growth elsewhere, and the global aggregate value of mineral commodity exports in 1990 increased 8.4% to $646 billion. Global consumption of a number of major mineral commodities was slightly down, but again chiefly because of reduced demand in eastern Europe and the U.S.S.R. Despite cutbacks there, the global aggregate of consumption for cement and sulfur, as well as for total energy, advanced in 1990. Notably, the modest total energy upturn was achieved by increased use of natural gas and primary electricity (hydro-, geothermal, and nuclear power), with both solid fuels and liquid fuels registering small declines.

A comprehensive assessment of 1990 worldwide mineral industry investment is impossible owing to the incompleteness of available data. In fact, as of this writing, little summary data were available additional to that included in the previous edition of this study. The Latin American Iron and Steel Federation (ILAFA) recorded a significant upturn in the aggregate investment in steel facilities by the countries that it covers, but similar data for the members of the European Coal and Steel Community (ECSC) and for members of the Organization for Economic Cooperation and Development (OECD) updating that which was included in the 1989 edition of Minerals in the World Economy were not received in time for inclusion herein.

The unit prices paid for most metallic mineral commodities in 1990 declined with respect to 1989 levels. Among the nonferrous metals reviewed in the section of this study dealing with prices, only cobalt, gold, and lead advanced in terms of annual averages. The 1990 average prices, however, generally remained above the 1987 levels for the major metals, and in some instances were above the 1988 level as well. Direct compari-

sons of published prices, however, are somewhat deceptive, in that they do not take into account inflation. Thus, the 1990 price levels were higher in terms of current dollars than they would be if they were adjusted to constant dollars.

The Near East crisis produced a flurry of upturns in oil prices when it first developed, shortly after midyear, but the prices subsided to more reasonable levels once it became apparent that there was to be no shortage of oil for refining as a result of Iraq and Kuwait essentially ceasing to contribute to global supplies by August or September.

PRODUCTION

The estimated value of world crude mineral production in 1990 exceeded $1,501.5 billion in terms of current (1990) dollars, or almost $1,160 billion in terms of constant 1983 dollars. This latter figure was 0.3% below the 1989 level and about 3.9% below the record high to date of $1,207.1 billion 1983 dollars set in 1980. Table 1 provides the latest available revised time series of the estimated value of world crude mineral production both in terms of 1983 constant dollars and in terms of current dollars. It also provides one of the two statistical bases for this estimation, this being the data on the value of production of a group of key commodities that was compiled for and published in the authoritative French language mineral industry periodical, Annales des Mines, for selected years up to 1983.[1]

It should be stressed that the values just discussed and those presented in the tabulation are for crude minerals only, and by no means reflect adequately the role of the entire mineral industry in the world economy. These figures represent only the value of mineral materials as they are mined or otherwise extracted from the earth. They do not reflect the value added to these materials through downstream processing within the facilities commonly accepted as mineral industry plants. That is, value added through beneficiation of ores, smelting, refining, and similar processing is not included in these figures. Comprehensive world data on the value added by such processing are not available; however, a conservative estimate of the total value of processed output from mineral industry plants derived wholly from primary (newly mined) materials would be on the order of about $2,780 billion constant 1983 dollars or $3,600 billion in terms of 1990 dollars.

To evaluate fully the worth of the total output of mineral industry plants would require the addition of a substantial (as yet unestimated) increment for the output derived from secondary raw materials, such as scrap and other reclaimed substances. Such recovery for some mineral materials is virtually nonexistent or inconsequential (as in the cases of sand and gravel and fuels, for example), but for others it is very substantial. For example, in 1990, almost 30% of world steel production, 45% of world refined lead output, and more than 15% of world refined copper production were clearly identified as being derived from scrap. Similarly, for market economy countries (data on centrally planned economy countries are not available), about 25% of total aluminum output was from scrap.

It is also important to note that the overall impact of the mineral industry extends far beyond the worth of all its products, whether of primary or secondary origin. Mineral products constitute the overwhelmingly dominant share of the total raw material supply for all manufacturing operations. This encompasses not only the traditional "smokestack" industry facilities that use steel and other metals in the production of industrial equipment and consumer durables and the construction industry that converts mineral products into a host of structural types, but also such industries as textile mills whose raw materials are increasingly synthetic fabrics. In the areas of agricultural and forestry industries, mineral fertilizers and other mineral-based soul treatment products are indispensable for maintaining high production and productivity. Mineral products are essential to the transportation industry as the raw materials for roads, railroads, runways, and docking facilities, as well as for conveyances that use them, and, in addition, the minerals industry is a major user of transportation networks. Moreover, the mineral industry itself provides all but a small share of the total energy required for the mining and processing or other mineral commodities and of agricultural materials from crude forms to the manufactures derived therefrom, and additionally provides the overwhelmingly dominant share of the energy required to transport all raw materials, products, and the world's population around this planet. Finally, all electrical energy—that derived from hydroelectric and geothermal sites as well as that from nuclear and conventional thermal powerplants—could not be produced and distributed without equipment and transmission lines fabricated from mineral commodities.

Production Index Patterns

Table 2 summarizes the development pattern of the world's extractive mineral industry output over recent years, as reflected by the extractive industry components of the United Nations' industrial production indexes. The table demonstrates the upturn in overall productive operations during 1986-89, as well as the slight downturn in 1990. From the quarterly results, the overall global downturn for the first 9 months, together with the measurable recovery in the fourth quarter, is evident. Quite apparent also is the fact that the fuels sectors broken out separately—coal as well as crude petroleum together with natural gas—showed the pattern of decline across the first three quarters, with a slight upturn for the fourth quarter, whereas the metals industry preserved an unbroken run of increases after the slight slump between the fourth quarter of 1989 and the first quarter of 1990.

What this global summary fails to reveal is that the world area that most significantly was responsible for the slump was the U.S.S.R. and its former CMEA associates of eastern Europe. Examination of detailed regional statistics in the source publications for these data clearly show the impact of output cutbacks in this area on the global aggregate.

Comparison of the index levels and growth trends for the extractive mineral industry shown in table 2 with the index levels and growth trends provided by the same source and published in table 3 of this study demonstrates the lack of parallelism between the raw mineral production and mineral processing. In the case of the processing industries, both nonmetallic mineral products and base metals registered declines between 1989 and 1990, with only chemicals, petroleum, coal, and rubber products logging growth between 1989 and 1990. On the other hand, reviewing quarterly returns,

nonmetallic mineral products advanced rather sharply between the first and second quarters and then suffered drops through the third and fourth quarters, while chemicals, petroleum, coal, and rubber products showed a decline between the fourth quarter of 1989 and the first quarter of 1990, an upturn into the second quarter of 1990, a slump in the third quarter, and then a recovery in the fourth quarter. Different yet was the pattern for base metals, which logged an increase between the last quarter of 1989 and the first quarter of 1990, as well as continued gain into the second quarter, followed by a slump in 1990's third quarter and a modest recovery in the fourth quarter.

As was the case with the United Nations' extractive industry production indexes reported here, what is not shown in table 3 is the fact that the global mineral processing industry did not perform monolithically. Indeed, as was the case with minerals extraction, shortfalls in processing of mineral raw materials in the U.S.S.R. and other former CMEA states were the major contributors to the downturn in the indexes. Generally, market economy mineral processors benefited from conditions in 1990, and their output edged upward. For those interested in regional comparatives, the source of tables 2 and 3 should be useful.

Quantitative Commodity Output

Of the 101 distinct mineral commodities and/or subdivisions of mineral commodities for which world mineral production as measured by the U.S. Bureau of Mines is presented in table 1 for 1986-90,[2] only 35 registered increases in 1990 relative to their 1989 levels of production, 65 showed declines, and 1 registered an output level unchanged from that of 1989. These results were almost the reverse of those for 1989, when 63 commodities logged increases and 38 recorded declines, on the basis of revised data available to the U.S. Bureau of Mines. Without question, 1990 results were far less satisfactory than those of any year 1986-89 inclusive, at least for the world as a whole. It is important, however, at this point, to reemphasize that production declines of 1990 were chiefly the result of shortfalls in the U.S.S.R. and the formerly centrally planned economy nations of eastern Europe. Space considerations preclude detailing the production statistics on a commodity by commodity basis in this text, but examination of the leading producers tables that appear at the end of this study will clearly demonstrate shortfalls for the major producers of selected important commodities within this geographic area.

Of the 53 metallic mineral commodities recorded separately in table 4, only 17 recorded production gains in 1990 and 36 showed declines. Of the 17 showing gains, 11 reached new production highs in 1990. Those that reached new high output levels in 1990 were (in the order they appear in table 4): bauxite, alumina, mine copper, primary refined copper, mine gold, secondary smelter lead, secondary refined lead, primary magnesium, mine platinum-group metals, mine silver, and mine zinc. Others logging output gains with respect to 1989 levels but not achieving record output levels, together with the year in which they reached historic output highs, were: cobalt metal (1986); monazite concentrate (1985); selenium (1979); tellurium (1985); primary smelter tin (1980); and mine vanadium (1988).

Of the metals for which gains were recorded, gold registered an increase for the 10th consecutive year; mine copper, primary refined copper, and platinum-group metals recorded gains for the 8th consecutive year; secondary refined lead output increased for the 7th year in a row; bauxite, alumina, and secondary smelter lead registered gains for the 5th consecutive year; primary magnesium, mine silver, primary smelter tin, and mine zinc showed increases for the 4th consecutive year; monazite logged an increase for the 2d year; and cobalt metal, smelter selenium, smelter tellurium, and mine vanadium each registered an increase after a decline in 1989.

Of the 36 metallic commodities showing lower output levels than in 1989, mine tungsten dropped for the fifth straight year and had recorded a peak output in 1980; beryl concentrate and mine uranium recorded output drops for the fourth straight year having attained record production levels in 1961 and 1980, respectively; and arsenic trioxide output fell for the third consecutive year, thus remaining below the record output level of 1985. Commodities that registered declines for the second consecutive year, and the year in which they registered record outputs (parenthetically), were: mine antimony (1987); smelter bismuth (1986); smelter cadmium (1988); mine cobalt (1986); columbium-tantalum concentrates (1988); mine lead (1973); primary smelter lead (1985); mine mercury (1971); plant nickel (1988); and secondary smelter tin (1988). The remaining 22 metallic commodities recorded declines in 1990 after logging increases in 1989. Of the latter group, the following had set to-date record production highs in 1989: unalloyed aluminum ingot, mine bismuth, chromite, primary smelter copper, secondary smelter copper, secondary refined copper, iron ore, pig iron, ferroalloys, crude steel, secondary magnesium, mine molybdenum, mine nickel, titanium slag, primary smelter zinc, and zirconium concentrates. Others in this group showing declines in 1990 following increases in 1989, but which had attained record production highs prior to 1989, were as follows, with the year of record production provided parenthetically: primary refined lead (1985); manganese ore (1980); mine tin (1979); ilmenite (1974); rutile (1980); and secondary smelter zinc (1982 and 1983).

Of the 37 individual categories of nonmetallic minerals and their products listed in table 1 under the heading "Industrial Minerals," only 12 registered gains in 1990 compared to their 1989 output levels. Of those recording gains, eight attained new production highs in 1990. These, in the order they appear in the table, were: cement, bentonite, fuller's earth, kaolin, gem diamond, iodine, soda ash (sodium carbonate), and strontium minerals. Other commodities in this group that logged output gains between 1989 and 1990, but with a 1990 output that fell short of their previous record highs, together with the year in which they reached record-to-date output, were: natural corundum (1980), industrial diamond (1986), pumice (1973), and byproduct sulfur (1988).

Of the nonmetals registering gains, cement attained a 15th consecutive year of growth; kaolin registered an increase for the 8th consecutive year; bentonite and soda ash enjoyed their 5th consecutive year of output growth; strontium minerals output increased for the 4th consecutive year; gem diamond, industrial diamond, and iodine each logged their 3d consecutive year of growth; output of fuller's earth increased for the 2d in a row; and natural corundum, pumice, and byproduct sulfur logged output gains after reductions in 1988 and 1989.

Of the 25 other commodities in the group of nonmetals, 1, barite, recorded a total global output equal to that of 1989, and as a result, both 1989 and 1990 represent the record-high output. The remaining 24 nonmetallic commodities logged declines in output. Of these, eight—boron materials, bromine, feldspar, fluorspar, gypsum, guano, salt, and talc—had achieved record production highs in 1989 and logged reduced output levels for 1990. Lime, sodium sulfate, and elemental sulfur also registered downturns in 1990 with respect to 1989 output levels, but for these commodities, 1989 had not been the year of record-high output. In the case of lime, output had been increasing for several years prior to 1989, but earlier had fallen from the 1980 record-high level. In the case of sodium sulfate, likewise there had been an increase for several consecutive years prior to 1989, but the level of that year did not reach the peak set in 1979. Finally, in the case of elemental sulfur, annual world output for several years has vacillated between 14.3 and 15.2 million tons, but remained substantially below the almost 17.8 million ton level of 1974.

Six more nonmetallic commodities, diatomite, nitrogen, perlite, phosphate rock, potash, and industrial (silica) sand, attained their to-date-record output highs in 1988 and logged declines in 1990 for the second straight year. Five more commodities also recorded declines for a second consecutive year, but had achieved record highs in output in the more distant past. These, together with their years of record-high output provided parenthetically, were: asbestos (1976), natural graphite (1963), magnesite (1986), Thomas slag (1979), and sulfur from pyrite (1971). Finally, two nonmetallic commodities, mica and vermiculite, were in their third consecutive year of output decline in 1990; both commodities' record outputs to date had been achieved in 1978.

Of the 11 mineral fuel commodities listed in table 1, only 6 registered output gains between 1989 and 1990. Considering first the production of primary energy commodities, crude oil output increased for the fourth consecutive year, but still remained short of its 1979 record high, and marketed natural gas output (gross production less that flared, vented, and reinjected into reservoirs for pressure maintenance) increased for the eighth consecutive year, reaching a new historic high as increases from gasfields were augmented by increases in recovery from fields in which the gas occurs as a byproduct of oil. The recovery of natural gas liquids, chiefly butane, propane, and natural gasoline, derived as a byproduct of natural gas, also reached a new high in 1990, the fifth year of such growth. In the cases of the three classes of coal reported, both anthracite and lignite showed downturns in 1990, chiefly as a result of reduced output in the U.S.S.R. (for both anthracite and lignite) and in other former CMEA countries of eastern Europe (lignite only). Indeed, even bituminous coal output advanced less than 1%, for reduced Soviet and East European output almost offset gains elsewhere. The growth in bituminous coal output, modest though it was, prolonged the production trend to its ninth consecutive year. The decline in anthracite output broke a 7-year streak of growth. In the case of lignite, revisions in 1989 data lowered the total for that year to a level below that of 1988. Hence, the 22-year streak of growth output for that commodity noted in the 1989 edition of this chapter was, in reality, only a 21-year streak ending in 1988, and lignite output has now declined 2 years in a row.

Peat is listed among mineral fuels because of its origin and nature, both similar to low-rank coals. However, about 80% of total peat output is used as a soil conditioner and for other nonfuel purposes. Revised statistics for 1989 reduced the total for that year downward, and as a result, 1986 regained status as the historic high production year, and output in 1989 was lower than that of 1988, hence the commodity registered 2 consecutive years of output decline. (It should be noted that U.S. Bureau of Mines-published figures for peat output in the late 1970's and early 1980's are even higher than the 193,052,000 tons now reported for 1986, but these figures included estimates for the U.S.S.R. that subsequently were revised substantially downward.)

As for the four mineral fuel products listed in the table, refined oil, although increasing for the fifth consecutive year, still fell short of the 1979 record-high level. Carbon black output, up for a fourth consecutive year, reached a new high in 1990. Output of both metallurgical and other cokes diminished in 1990, chiefly reflecting cutbacks in the U.S.S.R. and several East European states; and with these declines, clearly neither achieved past record levels of performance, with that for metallurgical coke having been set in 1980, and that for other coke in 1979.

The overall performance of the nonfuel mineral industry can only be summarized in terms of the value of production, and for these nonfuel commodities, exactitudes on the relative role of each commodity in the aggregate are not available for any year subsequent to 1983 (see "Value of World Mineral Production"). Amongst fuel commodities, however, the overall pattern of output level changes and their interrelationships can be demonstrated by reporting each fuel in terms of a common unit measuring its energy content. This has been done in this chapter on the basis of standard coal equivalents (SCE), as reported by the United Nations. Table 5 summarizes world output of energy commodities for 1980-90 as reported by the United Nations.

The negative effects of the political and economic changes and problems that began to impact on mineral industry activities in the U.S.S.R. and eastern Europe in 1989 had a greater impact on energy production than was first thought, and as a result, estimations of 1989 global energy output appearing in the 1989 edition of this study were overly optimistic. The world total was estimated at a level that proved to be 0.6% over that actually achieved. Of the commodity components, solid fuels were almost 1% low, liquid fuels 1.6% high, natural gas 0.1% high, hydroelectric power and geothermal power collectively almost 0.8% high, and nuclear power 1.2% high.

Preliminary results for 1990 indicate an increase of 1.7% in total energy production, but this includes a 0.5% decline in solid fuel output, this the result of the U.S.S.R. and eastern Europe that were not fully compensated by production increases elsewhere. This drop, however, was somewhat more than offset by increases of 2.2% for liquid fuels, 3.2% for natural gas, 3% for hydroelectric power and geothermal power, and 4.3% for nuclear power.

An examination of data on power output and generating capacity continues to show a shift toward nuclear power. This is significant to world mineral economics not only because the mineral industry is the source of raw materials for thermal and nuclear power, but also because the mineral industry is a significant user of electrical energy in the mining,

processing, and transport of minerals and products derived from them. Table 6 presents statistics on electric power generation subdivided by the type of plant for 1981 and 1870-90, and table 7 provides comparable statistics on capacity by plant type for the same years.

In the 10 years 1981-90, output by world nuclear powerplants increased 147%, including a 4.2% growth between 1989 and 1990. In 1990, electricity generated by nuclear plants was 16.9% of all power generated, and 47.4% of all primary electricity, as shown in table 6. While the 1981-90 growth in geothermal power was 150%, and an increase of 2.6% was logged between 1989 and 1990, this remained a very minor source of total energy. As a result of drought conditions in 1989 in a number of global areas, hydropower generation fell by 0.8% despite a gain of 2.1% in installed capacity in that year. In 1990, however, output advanced almost 3.2% with only a 1% gain in capacity.

The global production of thermal power increased 1.8% in 1990, a far less significant growth than the 4.8% increase logged for 1989, and compared favorably with the 1.7% increase in thermal generating capacity between 1989 and 1990. The proportionally much larger output increase of 1989 over that of 1988 was accomplished chiefly through greater utilizations of previously installed capacity; the thermal generating capacity increase between 1988 and 1989 was only 1.9%.

In the previous edition of this study, it was suggested that there was a continuing trend in the power generation area away from the so-called "self-producers," that is, plants with capacities essentially dedicated to some specific industry or group of industries, and toward public utilities. Data for 1990, as well as revised data for earlier years, indicated that this trend reversed. Although the "self-producers" account for well under 10% of total global power generations, they have very modestly increased their share of total power production since 1987. In that year, they accounted for 6.8% of total output, and their share increased to 6.9% in 1988, 7% in 1989, and 7.2% in 1990.

Generally speaking, output by both public utilities and self-producers increased for each source plant type (hydro, geothermal, nuclear, and thermal) between 1987 and 1990, the only departures from that trend of increase being those of self-producer nuclear plants between 1989 and 1990, and of public utility hydroelectric plants between 1988 and 1989. However, the rates of change varied considerably. Users of this study desiring details are referred to the United Nations' 1990 Energy Statistics Yearbook, the source publication for this part of this study. The United Nations volume also provides details on electric power generation and capacity on a country by country basis, detailing both self-producers and public utilities for the years 1987-90 inclusive, and as such may be useful in attempting to assess specific use of electric power for mineral ventures, at least for some countries.

Value of World Mineral Production

The value of world crude mineral production in 1990 was estimated at $1,159.7 billion in constant 1983 dollars, or $1,501.5 billion current (1990) dollars. Details on the basic methodology employed to prepare this estimate are outlined in the 1985 edition of this chapter, to which the reader is referred.

Geographic Distribution of World Mineral Output Value

Available information is inadequate to extrapolate reliably to 1990 the 1983 data on geographic distribution of world crude mineral output value published in the July-September 1985 edition of Annales des Mines and reproduced in summary form in the 1985 edition of the Minerals Yearbook. These data for 1983 appear in the 1985 "Minerals in the World Economy" chapter (table 2) together with corresponding figures for 1950 and 1978 and with some textual comments on this materials. The reader is referred to this publication, as well as to its original source, for further information.

Commodity Distribution of World Mineral Output Value

As is the case with geographic distribution of world mineral output value, the inadequacy of data precludes any reliable extrapolation to 1990 of the various commodities' shares of the totals shown for 1983 in the 1985 edition of this chapter. Clearly, some major shifts in percentage shares, if not in ranking, will have occurred as a result of unit price changes such as in the cases of crude oil and gold, to cite but two of the more notable commodities. For details on the 1983 distribution of the total, the reader is referred to the 1985 edition of this chapter, particularly to table 3, and to the source publication for that table.

TRADE

In 1990, the aggregate value of world international export trade in mineral commodities was estimated at more than $64 billion in current (1990) dollars, about 8.4% higher than that in 1989, but still 8.7% below the record high set in 1980. Table 8 provides a data series for the estimated value of world export trade in all mineral commodities from 1979 through 1990, as well as a breakdown of this total into fuel and nonfuel commodities. It is noteworthy that for this 1990 edition, trade data for the year of review were available in time for inclusion, whereas in previous editions, the latest available global trade data were for the year prior to the year of review. Hence, as regards trade, this edition of Minerals in the World Economy updates the 1989 edition by 2 years rather than by only 1. For this reason, it is appropriate to note that the 1989 global total value for international export trade in mineral commodities was almost $596 billion, 11.1% above the revised 1988 level of more than $536 billion, both figures expressed in current dollars for the appropriate year.

Despite the considerable increase in the dollar value of mineral commodity exports, their share of total export merchandise trade declined to 19.1% in 1990 from 19.7% in 1989. At 19.1%, this share was very near the recent year record low of 19.0% reached in 1988. The year 1990 was the fourth in a row in which the total value of world mineral commodity export trade increased.

Having briefly commented on the upturn in the total value of export trade in mineral commodities in 1988-90, it appears essential to reflect on the differences in performance between the country groups including the U.S.S.R. and the formerly centrally planned economy states of eastern Europe and the rest of the world. Although table 8 demonstrates the substantial growth in global export trade values from 1986 to 1990, it should be understood that the recorded

growth rates are by no means universal. Between 1989 and 1990, for example, the global growth in the value of mineral commodity exports was 8.4%, but the U.S.S.R. and the former centrally planned economy countries of eastern Europe in aggregate showed a decline of more than 5.8%, while the rest of the world logged an increase of more than 10.3%. Between 1988 and 1989, an increase of 11.1% was recorded for global mineral exports, but the U.S.S.R. and east European countries logged a decrease of almost 5.7%, while the rest of the world achieved an almost 13% increase. Similarly, between 1987 and 1988, a global increase of 7.5% was recorded, but this was possible only because of a 9.4% growth in mineral commodities for the aggregate of market economy countries and the centrally planned economy states of Asia and the Western Hemisphere, for exports of the U.S.S.R. and eastern Europe dropped by 3.4%. Indeed, even between 1986 and 1987, the last set of years in which mineral commodity exports logged a gain in the U.S.S.R. and eastern Europe, that gain was only 2.8%, compared with almost 10.5% for the rest of the world and 9.8% for the global aggregate. The downturns in value of exports from the U.S.S.R. and its former CMEA partners in eastern Europe presumably reflect not only reductions in output levels, and hence in exports, occasioned by moves toward economic rationalization of industry in these countries, but also adjustments of monetary exchange rates from the artificially high levels employed at the outset of this timespan to more realistic levels reflecting actual trading with market economy countries that were in effect by 1990.

The data presented in table 8 have been developed from United Nations export trade data presented in table 9, and derivatives thereof, relating to distribution of value of world export trade by major mineral commodity groups and growth of value of world export in major mineral commodities that appear in tables 10 and 11, respectively, these tables representing extensions of data series that have been included in the Minerals in the World Economy study for many years.

The impact of cutbacks in mineral industry activity in the U.S.S.R. and the centrally planned economy countries of eastern Europe on global mineral trade are immediately apparent when it is shown that of the total value of 1989 world major mineral commodity exports of $519,032 million (presented in table 9), almost 12.6%, or $65,371 million came from these economies in transition, and yet in 1990, with the total value of world major mineral commodity exports rising more than 9.7% to $569,533 million, slightly less than 10.9% or $61,994 million originated in these same countries. That is, in a time in which the value of major mineral commodity exports from all other countries aggregated increased by $53,878 million, the value of major mineral commodity exports from the U.S.S.R. and its eastern European neighbors declined by $3,377 million.

Examining these same results in terms of the five main commodity groups included, the country group including the U.S.S.R. and the other centrally planned economy countries of eastern Europe registered not only a lower share of the world total in 1990 than in 1989 in each of the five groups, but also a lower current dollar value for each group. Further, it is noteworthy that if the 1990 values were to be converted to 1989 dollars, the disparity would be even greater.

CONSUMPTION

Nonfuel Mineral Commodities

Available statistics on 1990 worldwide consumption of selected nonfuel mineral commodities shown in table 12 indicate downturns for all but 3 of the 15 listed commodities with 1 more commodity even with its 1989 level and only 2 exceeded their 1989 levels. It must be stressed, however, that in most instances, the decline in use was largely the result of falling consumption in the U.S.S.R. and the former centrally planned economy nations of eastern Europe, a fact that also should be evident from the table, at least in the case of the nonferrous metals. Among these important commodities, only in the case of refined lead was there a downturn among market economy countries as well as among centrally planned economy countries. Also notably, cadmium use showed no significant change from 1990 levels in either group of countries.

Global consumption of iron ore fell by only 1.3% or about 12 million tons, but this was a greater decline than that logged for production of marketable iron ore and related products, which was down by only 0.7% or 6.8 million tons, thus it would seem that there was some addition to stocks. The 1990 drop in iron and steel scrap use was about 3.8% or about 13 million tons, somewhat under the 1.4% or 10.7-million-ton drop in global steel production. Although consumption of iron ore and iron and steel scrap are not broken down by region in table 12, it can nonetheless be stated with absolute assurity that drops in use in the U.S.S.R. and eastern Europe were more than sufficient to account for the global decline, and that among market economy countries as a group, there were upturns for both materials. On a global basis, it would appear that there was a slight shift in the ratio of pig iron to scrap in steel furnace charges, the shift being toward a slightly larger proportion being pig iron, with a corresponding decline in the share accounted for by scrap.

Before summarizing the nonferrous metal use situation, it is essential to comment on the nature of some of the data published. Examination of table 12 shows that separate statistics have been provided for market economy countries and for centrally planned economy countries. This has been done for two reasons: first, the consumption trends from year to year for these two groups of countries differ because, in market economy countries, use trends are influenced to a significant extent by variations in the broader economies of the countries, whereas in centrally planned economy countries they are regulated by rigid central government economic planning; second, however, and perhaps more importantly, the consumption figures provided for the centrally planned economy countries without exception are apparent consumption figures. That is, they represent the sum of production (often estimated) and imports, minus exports, plus or minus variations in stocks. For these countries, however, both import and export data may be significantly incomplete, and data on stocks generally are not available. Under the definition of apparent consumption, any change in the level of component figures will result in a change in the calculated apparent consumption. Aside from the lack of stock data and the questionable nature of the completeness of trade reporting, there is the problem of the estimate of the level of production.

For several commodities in this group, there are significant differences between production estimates by the U.S. Bureau of Mines and those of Metallgesellschaft AG, the source of these consumption figures. Hence, the consumption numbers provided here would differ if Bureau production numbers were substituted in the equations for those of Metallgesellschaft.

Bearing the foregoing in mind, and thus considering the consumption data for the centrally planned economy countries to be more an indicator of trends from year to year, rather than a precise quantification of materials consumed, one can examine consumption changes and the relationship to production changes.

Of the eight nonferrous metals reported, all except cadmium logged declines in the global aggregate and in the centrally planned economy country group, whereas among the market economy countries, only lead fell below the 1989 level, with cadmium essentially unchanged and aluminum, copper, primary magnesium, nickel, tin, and zinc all logging increases. In the case of aluminum, the 2% decline in consumption was greater than the 1.1% shortfall in output, suggesting additions to stocks. In contrast, cadmium output declined while consumption was but little different than that of 1989, indicating a slight drawdown of stocks. For copper, the 14.4% drop in consumption contrasted with a fractional upturn in total refined metal output, suggesting an increase in stocks. In the case of refined lead, the global drop in consumption was much greater than the drop in production, providing for additions to stocks. Stocks of magnesium also presumably increased as the reduced 1990 consumption level was accompanied by a slight upturn in output. In the case of nickel, a 1.4% consumption decline was appreciably smaller than the 5.3% drop in production, indicating a stock drawdown. Tin stocks apparently increased very marginally as 1990 consumption fell by 1.6%, while output advanced almost imperceptibly. Finally, slab zinc use declined 8.7% in 1990, although output fell by only 2.2%, suggesting measurable additions to stocks.

Comparing 1990 nonferrous metal consumption trends in market economy countries to those in the centrally planned economy countries, the information published in table 12 makes it apparent that there were increases in most cases for the eight listed commodities in market economy countries, whereas there were declines in the centrally planned economy countries. What the table does not show is that the latter shortfalls were in the U.S.S.R. and eastern Europe as opposed to being in China.

Considering next the so-called industrial minerals (traditionally nonmetals in older U.S. Bureau of Mines reporting and in the reporting of a number of other countries), it should be noted that cement has been added for the first time. This is one of the few commodities in the entire table registering a consumption increase in 1990 on the global basis. Each of the three fertilizer materials logged declines in 1990, again chiefly because of diminishing use levels in the U.S.S.R. and eastern European countries. Sulfur, the most prominent chemical material produced, went counter to the general consumption decline, with global consumption advancing 1.4% between 1989 and 1990. This gain, considerably greater than the minute 0.1% increase in output, apparently reflects a slight drawdown of stocks.

Mineral Fuel Commodities

Data on mineral fuel consumption in table 12 have been provided in terms of SCE to facilitate interfuel comparisons. The aggregate grew to a new record high of 10,285 million tons SCE, in 1990, but this was only a 0.7% increase, a markedly lower growth rate than was recorded in any recent year.

Considering the relative share of total energy consumption provided by each of the listed fuels, natural gas continued to gain in relative importance, very closely approaching 24% of the total, and primary electricity, both nuclear and hydropower together with geothermal power, logged gains in share as well, while consumption of solid fuels and liquid fuels grew proportionally slightly less significant, although quantitatively increasing.

INVESTMENT

Updated information on market economy country petroleum industry capital and exploration expenditures by geographic area (table 14) was not available in time for inclusion here, thus this information remains the same as was presented in the previous edition of this chapter. The salient statistics on U.S. foreign investment in mineral industry activities (table 15) as reported by the U.S. Department of Commerce has been revised to show the latest information for the years 1986-90.

TRANSPORTATION

Marine Transport

Tables 16 through 19 continue the series of providing the world merchant fleet distribution by type of vessel and the ranking of the major fleets by country of registry. Table 20 this year provides a summary of the world's liquid gas carrier fleet. These vessels are included in the totals given for the world's tanker fleet, but gives a breakdown demonstrating the growth of the importance of natural gas in the world's energy commodity consumption.

Panama and Suez Canals

Tables 21 and 22 provide the latest available information on the transit of mineral commodities through the Panama Canal, by number of vessels, direction, and the commodities transported. Although the number of vessels transiting the Panama Canal dropped slightly (0.5%) between 1989 and 1990, the total amount of cargo moved rose by 3.6% and the amount of mineral commodities moved rose by 7.2%.

Information on commodity and vessel movements through the Suez Canal have not been available to the U.S. Bureau of Mines since 1987; therefore, no new information has been presented on this important international waterway for the past 3 years.

Overland Transport

The paucity of detailed information available has prevented a comprehensive study of the overland international transport of mineral commodities. Large-scale international rail shipments of mineral commodities were confined chiefly of movements between the United States and Canada and Mexico and to transfers within Europe south of the Baltic Sea. Notable exceptions continued to be the shipment of large quantities of iron ore

from Sweden to Narvik, Norway, for loading onto vessels for export through that port, and to the flow of a variety of minerals from several southern African nations through the Republic of South Africa for export through that country's ports. Information on rail and pipeline transport of mineral commodities within certain individual countries is provided in the appropriate country chapter.

PRICES

The series summarizing the prices of the major nonferrous metals on the stock exchanges of the United States and the United Kingdom has been continued this year in tables 23 and 24. As a result of the lack of availability of comprehensive data on the prices of metals in Canada, the table that had presented that information in past years in this chapter has been discontinued and the price series for nickel that had been in that table now appears in the table presenting metal prices in the United States.

STATISTICAL SUMMARY OF WORLD PRODUCTION AND TRADE OF MAJOR MINERAL COMMODITIES FOR 1990

The final 26 tables of this chapter, tables 25-50, extend and expand the statistical series on production that was started in the 1963 edition of the "Area Reports: International" volume of the "Minerals Yearbook" and that was subsequently updated and expanded in the 1965 and 1967-89 editions. Continuing the practice started in 1989, a column has been included in each of these tables providing a 5-year average for 1986-90, inclusive. This should provide a clearer picture more rapidly of the role of each major producer over the 5-year period. The listing order of major producers, however, continued to be, as in past years, in descending order of rank in the year of review, 1990.

With the inclusion of silver and uranium in the 1988 edition of this chapter, this group of tables now includes each of the crude minerals that ranked from 1st to 19th in 1983 terms of value of their output (as well as four others of lesser rank). These 23 crude mineral commodities accounted for 93% of the estimated value of world crude mineral production in 1983. In addition, world output of five key downstream products—aluminum, steel, cement, nitrogen in ammonia, and refined oil—are included because of their significance as products.

These 26 tables are primarily a supplement to other statistical data within this chapter but also summarize international production data for major mineral commodities covered in greater detail on a commodity basis in Volume I of the 1990 "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 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 the problems of scheduling the compilation of tables in the numerous commodity and country reports in the separate 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, often prevent 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 possibly be obtained by adding figures presented in the individual country chapters. By so doing, however, great attention must be directed to definitions, to ensure that the number presented in the country chapter represents precisely the same stage of production that is established for the world commodity production table. In a number of instances, output of selected commodities as reported in country chapters does not correspond, definitionally speaking, to that presented in world commodity production tables. For summary purposes, however, in most instances, the tables of this chapter are sufficiently correct without the inclusion of revisions from the county chapters.

The series on world trade in major mineral commodities that appeared in earlier editions of this chapter (tables 57-69 in the 1967 editon) could not be included because of scheduling problems.

UPDATE AND OUTLOOK

General Summary

World political events that occurred subsequent to yearend 1990, but that bear heavily on the global mineral industry, have been of such importance that they cannot be disregaded, and certainly they contribute to any type of "outlook." However, to write of them simply as "forecasts" in an "outlook" section of this study would be to unjustly pretend to status as prophets. Thus, this section covers events that have occurred not as predictions but rather as history.

Despite the end of the cold war, the world remained fractionated, at least from the limited perspective of its mineral industry. The fractionation was not so much the result of adversarial politics between countries and groups of countries, although to be sure, such conflicts had not disappeared. Rather, the fractionation was in the widely divergent patterns of performance that resulted from the diverse conditions and problems facing the different countries and country groups.

For all the press notoriety associated with the shift in the Near East crisis from the defensive posture to "Desert Shield" to the restoration of Kuwaiti sovereignty through "Desert Storm," this was not the dominant event governing global economic thinking in 1991 and the first half and more of 1992. This is not to make light of the importance of events in the Near East— of the aggression by militant Iraq against its much smaller neighbor Kuwait or of the organization of an outwardly dissimilar set of states into a coalition to restore Kuwait's territory to the original Government. Moreover, it is not to say that the vengeful destruction of Kuwait's oil industry by the otherwise defeated Iraqi forces was not a crime against all people for the ecological problems presented, as well as for the wanton, wasteful destruction of the Kuwaiti lives, resources, and facilities. Rather, it is to say that from the global perspective, the momentous political changes in the area that was the U.S.S.R. and in the smaller emerging transitional economy states of

eastern Europe will have even greater current and long-lasting effects on world mineral industry activities than the important crisis in the Near East.

Insofar as a summary of global mineral industry activity for the period between the end of 1990 and the time of preparation of this study, quantification in terms of global aggregates is impossible, because data are not yet available. Rather, the post-1990 activities of the world's mineral industry will herein be summarized in a series of geographically restricted vignettes focusing on specific commodities and/or commodity groups in individual countries and/or country groups. These will generally be restricted to commodities of major economic significance and to countries that are either major mineral producers, major mineral processors, or major mineral consumers, with some special inclusions on commodities and countries that show marked changes from their 1990 situation. Because of the overriding importance of developments in eastern Europe and the former U.S.S.R., this region will be examined first.

The Former U.S.S.R.—As 1991 began, moves to dissolution of the U.S.S.R. intensified, and by yearend, the Union was broken, replaced by the far weaker Commonwealth of Independent States that linked eight of the former Soviet Republics and by the seven nonlinked independent states—Armenia, Azerbaijan, Estonia, Georgia, Latvia, Lithuania, and Moldavia. The breakup added to the economic chaos already evident as the various individual industrial operations strove to move toward market-economy-style operations—activities driven by market conditions rather than mandates from a central planning body. Output of major indicator commodities fell rather steadily through 1991, except for expectable upturns in energy production in the late fall, and although official statistics were not available for any month in 1992, general information suggested continued downturns into 1992 for many commodities, again with the possible exceptions of some energy materials for essential human needs.

Lest anyone doubt the severity of output cutbacks in 1991, the following examples should illustrate the situation. For 1991, Soviet steel output was only 139.9 million tons, almost 10% below the 1990 level and more than 14% below the record high of 1988. Perhaps more significantly, during 1991, output fell from an average daily rate of almost 436,000 tons for January to only 312,000 tons for December. The downtrend, although not without minor fluctuations in the first half of the year, was steadily downward from August on. No 1992 comprehensive data were available, but unless there was a significant upturn following December 1991, a 1992 level of only 114 million tons for the aggregate of the 15 Republics was indicated, which would reduce output for the former U.S.S.R.'s constituent states for little more than that of Japan.

There was an even greater reduction in Soviet iron ore output in 1991, with the tonnage produced dropping to less than 75% of the 1990 level. This reflected not only the U.S.S.R.'s domestic steel output drop, but also pointed to reduced exports to such countries as Bulgaria, Czechoslovakia, Hungary, Poland, and the states of Germany that until October 1990 were the German Democratic Republic.

Soviet cement production fell to about 122 million tons in 1991, about 89% of the 1990 level and only 87% of the record high set in 1989. As with steel, there were some departures from a constant downturn across the year 1991, but from September on, in the case of cement, the downturn was constant. If the yearend daily production rate did not improve in 1992, a level of little over 109 million tons would be indicated for 1992.

There were concomitant declines in Soviet 1991 energy commodity production. In the case of anthracite and bituminous coal, a drop of about 10% was indicated, to only slightly more than 405 million tons, and in this instance, modest gains in average daily rates were logged for September through December, providing, at least from the viewpoint of coal producers in this area, a somewhat brighter outlook than that of their nonenergy commodity-producing colleagues. Output of lignite and brown coal fell precipitously in 1991, to only 152 million tons, about 81% of the 1990 level and 79% of the to-date record set in 1989. Crude oil production presented the darkest outlook for all Soviet energy sources, with the daily rate of production falling modestly in every month in 1991, resulting in an annual total that was only 91% of that of 1990 and marking the third consecutive year of lower levels. Without a reversal in trend, a 1992 level of at least 5% below the 1991 level would be the highest possible result. Natural gas output did not decline in direct proportion to the oil shortfall. A decline of only 1.1% in 1991 was registered, and no consistent downturn was evident across the year, so that the 1992 outlook would be for a stabilization near the 1991 level. Overall, however, the process of rationalization, exacerbated by civil strife in some areas, presented a dim prospect for rapid recovery, and the highly confused and confusing political situation made the prospects of economic assistance and involvement from abroad more than a little speculative.

Other Ex-CMEA Countries.—In Czechoslovakia, where 1991 saw some expressions of discontent over continued linkage of the Czech Republic with Slovakia, the efforts at industrial rationalization led to drops in steel and cement output to about 80% of 1990 levels for 1991, with the former falling from about 40,300 tons daily for January to only 26,100 tons daily for December, and the latter from about 17,300 tons daily for January to only 11,500 tons daily for December. No 1992 results were available in time for inclusion here, but unless the daily output levels were increased over those of December 1991, a further decline to 80% or less of the 1991 steel output of just under 12.1 million tons and of an almost unbelievable 52% or less of the 1991 cement output of about 8.3 million tons would be indicated. Declines in these and other basic nonfuel industries were involved in 1991 cutbacks of bituminous coal and lignite and brown coal production to about 85% and 91%, respectively, of 1990 levels. Bituminous coal production fell from an average daily rate of more than 55,000 tons in January to under 43,000 tons in December, and average daily lignite and brown coal output dropped from more than 257,000 tons in January to 197,000 tons in December. Although hardly of global significance, an upturn in Czech aluminum output to about 49,000 tons for 1991 was indicated by preliminary figures. If this proves correct, it represents one of the few positive events in the country's 1991 productive performance.

Shortly after mid-1992, the once popular Vaclav Havel resigned the presidency of the country because of internal discord, and disunion of the two component Republics loomed as a distinct possibili-

ty, a situation viewed by many as one not conducive to foreign investment.

In Poland too, the effects of rationalization led to a 1991 drop in steel output to a level little over 75% of the 1990 level, to a level of about 10.4 million tons. If 1992 sees no improvement over yearend 1991 levels, a further drop of 15% or more would be recorded for 1992. In Poland, however, unlike in Czechoslovakia, the national cement industry registered only a 4% drop in output between 1990 and 1991 to a level slightly above 12 million tons, and yearend figures suggested that a similar decline could be expected in 1992. Also, unlike Czechoslovakia, Poland's coal industry, long a reliable export source of quality bituminous coal, logged only a 5% downturn in output in 1991 with respect to the 1990 level to about 140 million tons, this apparently in response chiefly to the decline in domestic industrial needs, and a worst-case scenario would probably be for a 1992 drop to 90% of the 1991 level. Counter to the regional trend, Polish output of brown coal and lignite edged up 2.6% to more than 69 million tons, but this still fell short of the 1988 record high of 73 million tons. On the strength of yearend 1991 operation levels, an increase in output in 1992 might be forecast, but the environmental problems of these low-rank coals mitigated against such growth.

Statistics on Poland's other major mineral commodity export industries, copper and sulfur, were not as well fixed as were those for steel, cement, and coal, but no drastic downturns were foreseen for either 1991 or 1992 because of the importance of these commodities as sources of much-needed foreign exchange.

The sharp drops in Czech and Polish steel output in 1991 were mirrored in Hungary and Bulgaria, and although Romania reversed the trend, logging a substantial output increase, the latter was possible only because of the huge drop registered in 1990 and because output in 1991 was only about 7.1 million tons, far below the record 9.9 million tons of 1987. Hungarian steel output fell about one-third in 1991 and that in Bulgaria dropped about one-quarter, reaching, respectively, just under 1.0 million tons and just over 1.6 million tons. Downturns in output of brown coal and lignite occurred in 1991 for Bulgaria, Hungary, and Romania, although final results were not sufficiently reliable at this writing to fix output levels.

Yugoslavia.—Through 1991 and 1992, the geographic area that was the Republic of Yugoslavia up through and beyond the end of 1990 was the scene of intense civil disorder that at times escalated to open warfare. The ultimate outcome could not be foreseen through the clouds of war, but at the time of this manuscript's preparation, the former Yugoslavian states of Slovenia and Croatia had achieved independence, the state of Bosnia-Hercegovina was striving for independence but was enmeshed in conflict, and there was talk of a separation of the state of Macedonia from the central government of the already diminished Yugoslav Republic. Should Bosnia-Hercegovina achieve independence and Macedonia be able to sever its ties, Yugoslavia would be reduced to only the states of Serbia and Montenegro. Regardless of the future political outcome, however, it was evident that 1991 and 1992 would be logged as years of economic disaster for the region as a whole. Although through this writing, open combat had been confined chiefly to Bosnia-Hercegovina and Croatia (the latter to a lesser extent), economic activity in all component states suffered to a greater or lesser degree as a result of the strife; transport and communications dislocations, energy shortages, and the inevitable manpower problems combined with the open warfare to reduce production levels sharply, and the impact was of course felt in the minerals sector. Reliable statistical assessment of mineral production for this region was out of the question at this writing, but the downtrends were clear; it only remained to assess the extent of the downturns.

The European Community (EC) Countries.—The addition of the former German Democratic Republic to the Federal Republic of Germany represented a significant change in the composition of the EC. To the former Federal Republic of Germany, the reunification, no matter how desirable it may have appeared, brought major problems, not the least of which were some relating to the mineral industries of both parts of the reunited country. Although the technology available to the former Eastern states was among the best, if not the best in all of the centrally planned economy states, it was assuredly not up to market economy and particularly EC standards. The difficulties of maintaining reasonably full employment while economically rationalizing these additions of both resources and processing facilities to market economy realities and at the same time addressing the inherited environmental problems of the installations have proven large, and by no means are they yet all resolved.

The effects of rationalization on a few key industries is evident in production statistics. In the case of steel, in August 1990, the last month prior to unification for which separate statistics were published, Germany produced a total of 3,518,000 tons, of which 3,194,000 tons was from the Western states (then the Federal Republic of Germany), and 374,000 tons was from the Eastern states (then the German Democratic Republic), whereas in October, the month of unification, the monthly total was only 3,421,000 tons. In terms of annual output, the effect is even more striking; output of the two areas totaled 48.9 million tons in 1989, the last full year prior to reunification, including 7.8 million tons in the area now termed the Eastern states; in 1991, the first full year after reunification, the national total was down to 38.8 million tons, which reflected reductions in both groups of states. The potash industry, in which the two separate areas were the world's third and fourth leading producers in 1989 (with the German Democratic Republic holding third rank), showed a decline from a total of 6 million tons in that year (3.8 million from the Eastern states and 2.2 million from the Western states) to 4.9 million tons in 1990 (2.7 million from the Eastern states and 2.2 million from the Western states), and to an undistributed total of only 3.9 million tons in 1991. Finally, in the case of brown coal and lignite, output in 1989 aggregated 411 million tons, including 301 million tons from the Eastern states and 110 million tons from the Western states, but this was reduced to 388 million tons in 1990, including 280 million tons from the Eastern states and 108 million tons from the Western states, and by 1991, the unseparated aggregate was down to only 279 million tons.

The most significant aspects of the reunification from the viewpoint of both the EC and Germany as a member state were the addition to the EC and Germany of the resources, both natural and human, of the Eastern states and the first priority commitment of the financial resources of the former Western states to the task of implementing the economic

transition of the Eastern states to market economy operations.

In addition to the reunification of the two Germanies, another important post-1990 mineral industry activity in the EC as a whole was the investigation of possibilities in involvement in other transitional economy areas, both in the U.S.S.R. and the other emerging east European states. At this writing, it was too soon to gauge the long-range final results of such efforts, but it was clear that the corporate entities within the EC states were very active in this area, seeking linkages both for resources and for mineral product markets.

The Near East and Desert Shield/Desert Storm.—As 1991 began, the nations of the coalition formed in opposition to Iraq's takeover of Kuwait moved from the passive position of enforcing a virtually total trade embargo against Iraq to the active position of driving the Iraqi forces back to their own national soil from occupied Kuwait. Operation Desert Shield—the program of prevention of further Iraqi incursions into neighboring states that had been steadily building from the time of the initial invasion of Kuwait in August—gave way to Operation Desert Storm in January, and within about a month, Kuwait's soil had been totally cleared of invaders. The overall Desert Shield/Desert Storm operations timespan was not without severe cost to the minerals industry of Kuwait, however. From the outset of the Iraqi invasion, the invading forces looted, plundered, and damaged oil production and processing installations in Kuwait, and with the outbreak of open warfare under "Desert Storm," the looting and destruction intensified, excerbated by war damage stemming from coalition actions. The latter included "smart bomb" attacks on oil pipeline valve stations in the port areas, to put an end to the Iraqi policy of intentional oil spills that were polluting the Persian Gulf.

Despite the vast number of Kuwait's oil wells that were set afire by the Iraqis and dire predictions as to the time that would be required to subdue the flames, professional oil well firefighters from the United States and other nations snuffed out the last of the fires by fall 1991, and repair of the devastated industry was well under way at yearend. These activities, particularly in light of the looting of industry equipment before the fighting began, stimulated importation of petroleum industry equipment, as well as mineral-based construction materials to repair and/or replace buildings, roads, bridges, airfields, and the like. The replacement of oil production and processing equipment with new units in Kuwait not only stimulated manufacture of such units in a time when the need for new equipment otherwise was checked by the glutted oil market, but it also potentially altered the competetive position of Kuwait in the post-Desert Storm market.

Quite possibly the most important positive aspect of the Near East crisis of 1990-91 was the establishment of linkages between countries that comprised the coalition that previously were distinctly antagonistic to each other. Post-Desert Storm dialogs between these countries may lead to unprecedented improvements in international relations within this region. Clearly, only recalcitrant Iraq and perhaps its semi-ally, Jordan, remained wholly out of the spirit of dialog. Improved relations in this region could lead to regional recovery and development and to an improved investment climate after years of restraint that have resulted from the constant regional instability.

North America.—Perhaps the most significant event of 1991 and 1992 up to this writing in the northern Western Hemisphere insofar as its possible future impact on the countries' mineral industries was the completion of the draft plan for the so-called North American Free Trade Agreement, involving Canada, Mexico, and the United States. Although still requiring legislative branch approval in each of the countries to become effective, and with the recognition that such approval is by no means assured, the fact that the draft plan was prepared at all is in itself significant and no doubt reflects concerns throughout the region of the possible affects of a strengthened EC.

Insofar as 1991 mineral industry performance is concerned, that of the United States was mixed, and overall somewhat lackluster. Output of both anthracite and bituminous coal and of lignite fell slightly, while crude oil and natural gas output edged upward very modestly, evidently in response to the Near East problem. Iron ore output advanced slightly, but in contrast, steel production slumped significantly. Refined aluminum and refined copper logged modest output gains, but both refined lead production and slab zinc output fell slightly, and cement production registered an 8% decline. The 1992 outlook was mixed. In Canada, the overall picture for 1991 was brighter for energy commodities, with coal, oil, and gas showing gains and only lignite declining slightly. Iron ore output fell very marginally, but steel output was up; refined aluminum, copper, lead, and zinc all edged upward, but cement fell 14%.

Mexico's oil and gas industry experienced a good year in 1991 and seemed soundly based to accommodate market vicissitudes in 1992, whereas the country's nonferrous metals industry registered mixed results, with copper and silver output increasing while that of lead and zinc was curtailed.

South and Central America.—Brazil, the dominant single diversified mineral industry country of South America, in 1991 registered gains in its iron and steel sector, modest cutbacks in its nonferrous industry (except for zinc), improvements in nonmetals, and modest declines in fuels in an investment climate plagued with balance of payments problems. The continent's second most significant nonfuel minerals operator remained Chile, where both mine and refinery copper output advanced in 1991, and these upturns, coupled with growths in production of copper byproducts, provided a relatively optimistic outlook into 1992.

The northern tier South American oil producers—Colombia, Ecuador, and Venezuela—seemingly benefited from the interdiction of Iraqi and Kuwaiti oil from midyear 1990 on into 1991, but continued increased output into 1992 was questionable. Peru, the continent's other significant nonferrous metal producer, continued to suffer from the internal strife generated by the "Shining Path" revolutionary movement in both 1991 and 1992, but these problems did not prevent appreciable upturns in output of copper, lead, and zinc and a more modest increase in silver in 1991.

Africa.—The continent's single highly industrialized country, the Republic of South Africa, continued to experience internal problems despite the decision to abandon the racial policies of apartheid that had served to alienate the state from many other nations. Mineral production in 1991 in broadest terms was lacklus-

ter—modest gains for some commodities, modest losses for others, but in general similar to 1990 levels for most major commodities.

Elsewhere on the continent, mineral industry operations were influenced by problems that often affected the overall economic climate. Epidemic-proportion AIDS afflictions were already of significance in countries like Malawi, Uganda, and Zaire, and threatened to worsen and to spread geographically. This and other medical problems, including simple malnutrition, may indeed impact significantly on mineral industry operations as well as on other economic endeavors in the near future. This problem was far from the only one facing many of the developing economy states.

A number of countries suffered from internal strife and political instability. Foreign exchange problems were endemic, even in several countries with relatively stable Governments. The combinations of these medical, political, and economic conditions, coupled with competition for limited foreign investment monies by east European countries undergoing economic transition, served to dim the outlook for significant econom-ic progress. Nonetheless, a number of international mining companies showed renewed interest in select mineral industry projects on the African continent.

China.—Despite the setback in China's moves toward full global participation that was the result of the events surrounding the Tianenmen Square incident, the country's mineral industry activity continued to demonstrate quantitative upturns in almost all of the limited number of major commodities that are officially reported. In 1991, there was a 2% drop in output of coal, but crude oil and natural gas production advanced 1% and 1.2%, respectively. A production increase of 3.5% was claimed for iron ore, of 9.1% for crude steel, and an almost unbelievable 16.7% for cement, suggesting a general upward trend for the entire mineral industry. Although no 1992 results were available at the time of this writing, there seemed no outward indications of any causes that would retard continued upturns in output, most of which appeared driven by growth in internal consumption requirements.

Japan.—In Japan, with its mineral industry oriented to an almost total dependence on imported raw materials to make possible the country's huge mineral processing and downstream manufacturing activities, there was an almost imperceptible downturn in 1991 steel output, but production of most major nonferrous metals advanced, and the cement and mineral commodity-based chemical industries apparently did well.

Australia.—The other really significant mineral producer of the Asia-Pacific area, Australia, logged rather disappointing results for steel and cement and there was a modest downturn for refined copper, but output of major crude mineral products such as bauxite, iron ore, coal, copper, lead, petroleum, and zinc advanced in 1991. The outlook for 1992 was somewhat clouded, chiefly by reporting inadequacies alluded to else-where in this study, but in broadest overview, no major pitfalls seemed evident.

India.—Asia's other large raw material source, and at least theoretically a potential giant market, seemed to be successfully, if slowly, edging forward through a multitude of problems in 1991, but once again slow reporting made assessments of 1992 performance almost impossible. Output of coal apparently would prove to be up by about 4% for 1991, that of iron ore by almost 20% (on the basis of 8 months' data), that of cement by almost 9% (from 9 months' data), and although actual steel data were not available, a modest upturn was expected for 1991 at least. Despite an evident downturn in bauxite output, aluminum production evidently made respectable gains, perhaps of 12%, and refined copper output also seemingly advanced.

Other Asia and Pacific Countries.—The Republic of Korea and Taiwan continued to better their positions as processors of imported mineral materials, mirroring the practices of Japan, in the post-1990 world. North Korea was claiming developments and development plans that seemed overly ambitious in the light of evidenced capital availability and potential markets. In the Pacific Islands, Papua New Guinea's growing copper industry showed progress, but it was a growth curtailed by problems of civil strife that severely limited output from the Bougainville island property.

AVAILABILITY OF DATA

Following the pattern established in the 1989 edition of this study, the concept of data availability must be addressed, because there are perceptible changes from year to year, and the availability of accurately reported, precisely defined statistics and nonstatistical information provides the only sound basis for analytical studies of any type.

As the countries of eastern Europe, including the numerous states that formerly comprised the U.S.S.R., undergo the transition from centrally planned economies to market economies, there has been a perceptible increase in information availability for rather obvious reasons. Any industrial operation seeking economic assistance from government and/or private sources outside the country in which the facility is sited must provide some appraisal of its operations at the time it seeks assistance, as well as some information on previous performance to serve as tools in evaluating its potential under the proposed development scheme for which it seeks financial assistance. This situation, coupled with governmental recognition that concealment of much of the national mineral production, trade, and consumption data for purposes of national security probably never was really necessary and certainly proved unnecessary with the end of the so-called cold war, has led to the publication of increasing amounts of both statistical and nonstatistical information in the countries undergoing economic transition.

Virtually complete openness was clearly essential for the German Democratic Republic as it reunited with the Federal Republic of Germany, a member of the EC. Progress in increasing minerals industry reporting in other eastern European nations was evident in 1990 and beyond, but there were doubts as to whether certain of the recent reporting was definitionally equivalent to the limited previously published historical reporting. Certainly, care must be exercised in the use of such data to ensure definitional comparability.

At the time of the preparation of this study, it remained unclear as to what would transpire regarding the reporting of trade for the states formerly comprising the U.S.S.R. For years the Soviets published a trade book, which, albeit in-

complete, was of considerable use as a tool in the assessment of mineral industry activity in the country. Just how the member states of the Commonwealth of Independent States (C.I.S.) and the other fully independent former Soviet Republics will take up the task of documenting their foreign trade remains to be seen.

Even as the global mineral industry is presented with increasing reporting from states that were long quite secretive in this regard, however, there are some decidedly negative trends relative to information availability in some major and some minor countries that in prior years have provided production, trade, and consumption information rather freely. A part of the overall problem relates to the disintegration of countries such as Yugoslavia. The tasks of collection and publishing such data were formerly the responsibility of the Yugoslav central statistical agency, but with the establishment of separate Republics such as Croatia and Slovenia, the responsibility shifted to components of the central governments of the emerging independent states. These unfortunately were immediately confronted with national and international problems more crucial to national survival than routinely statistically accounting mineral industry activity.

Another cause for interruption in a part of global mineral reporting obviously was the international crisis over Iraq's invasion of neighboring Kuwait. Mineral industry operations in both countries were clearly impacted, but reporting was virtually nonexistent. Because of the embargo on trade with Iraq, there was evident loss of reporting on the part of countries that continued to deal with Iraq. Moreover, that country clearly was not willing to advertise publicly its own 1990 mineral operations losses stemming not only from the embargo, but also the loss of mineral industry workers to the expanded military of the country. The impact of Operation Desert Shield would give way to the even more severe impact of Operation Desert Storm in early 1991, but regional mineral industry activity, not only in Iraq and Kuwait, but in neighboring states as well, was ill-reported during the latter half of 1990 and thereafter.

For rather obvious political reasons, the Republic of South Africa has failed to officially report its mineral trade for several years, and this loss of reporting for so important a producer mandates considerable laborious effort on the part of analysts to reconstruct South African trade by examination of the trade returns of trading partner countries.

There is a similar concern regarding reporting on the mineral industry of Australia, another major traditional supplier of mineral materials among market economy nations. There have been marked reductions in frequency and detail of the reporting of production and consumption of mineral commodities in Australia. Moreover, reporting of trade in mineral commodities, long provided on the awkward basis of a July 1 fiscal year, has been cut back, particularly in regard to the declared destination of some key exports, to the extent that analysts around the globe have registered annoyance.

Similarly, difficulties have been encountered in assessing the performance of India's mineral industry. Reporting of production has proven generally adequate, and reporting of consumption, albeit delayed, seems sufficiently comprehensive, but trade for this important raw materials source and significant mineral consumer has never been ideal, being based on the unusual April 1 starting "trade year," and of late deficient because of delays in availability.

A different type of problem exists in production reporting, for which Canada, by virtue of its importance as a supplier and consumer, may serve as the best example. Here, the general practice essentially is to report shipments as a measure of production. (Some other countries, particularly those with no substantial domestic processing industry, record exports as production.) The problem with this practice is that it does not reflect the buildup or drawdown of producers' stocks, figures on which, in themselves, may serve to significantly affect market prices for certain commodities. The point to be made here is not that information on shipments is unimportant—it is often a crucial figure—but instead that actual production is an important statistical fact, distinct and apart from data on shipments and/or exports. Again it should be stressed that although Canada was specifically cited as a country following this practice, others routinely do so, and unlike Canada, which provides actual production statistics for concerned researchers, a number of countries simply do not do so.

There has also been a reduction in production data from the viewpoint of the commodity scope of coverage for a number of countries in recent years. A great bulk of such cutbacks in data have resulted from mergers among producers and closures of other producers that have so reduced the number of producing firms in some countries that to publish a national total would reveal company proprietary data. This problem has forced the U.S. Bureau of Mines to cease publishing total national output of several commodities over the past 10 years, and other countries have been faced with similar situations.

As this study goes to press, a threatened problem is that of the loss of separate trade reporting for the 12 countries of the EC. As of this writing, it appears that plans call for a fairly prompt reporting of EC trade with extra-EC countries, but a delayed reporting of intra-EC country trade. On the face of things, this would appear to be undesirable from the viewpoint of any single member country in the EC, for it would eliminate key statistics in assessing the effects of membership in the EC on any single member state. On the other hand, it must be recognized that a considerable cost accrues as a result of maintaining reliable intra-EC trade data, and there will be no tariffs or other charges being paid that could be regarded as offsetting income. Hence, it becomes questionable as to whether the need for information justifies the cost of obtaining it. Clearly, if we are to continue to treat the EC countries as 12 separate entities, we will be unable to assess the minerals industry importance of each unless we can measure the trade between them.

ACKNOWLEDGMENTS AND SOURCES

For a study such as this, which summarizes and amalgamates much information collected, compiled, and utilized by the numerous U.S. Bureau of Mines country specialists and branch chiefs for inclusion in their country and regional reports that comprise the five other volumes of the international studies of the Minerals Yearbook, it is clearly impossible to cite all sources of information used in its presentation, but some recognition seems due.

Generally speaking, this study and its related detailed studies on countries and

areas would be much more difficult, if not impossible, without the efforts of the personnel of our counterpart agencies throughout the world. Information they collect, compile, and then publish, either in their own volumes or those of central statistical agencies in their countries, are the foundations on which this work rests. Thus, we must begin by expressing our appreciation to the multitude of persons employed by these agencies for their contributions.

At this point, it is appropriate to recognize some of the employees of the Department of State, Regional Resource Officers and others, who have ensured that publications and other informational materials from the countries for which they are responsible flow into the U.S. Bureau of Mines.

Next, acknowledgment must be given to Bureau country- and commodity-specialist colleagues in the Division of International Minerals and the Division of Mineral Commodities, respectively, who regularly process vast volumes of material to gain from it the information that we aggregate herein. Special recognition must also be given to the personnel of the International Data Section of the Division of Statistics and Information Services for painstakingly compiling foreign trade information and coordinating the assembly of world production data on the various commodities provided by the country specialists and approved by the appropriate commodity specialists.

Beyond the realm of our own Government, we must acknowledge the work of the highly professional staffs of the Statistical Office of the United Nations as well as similar offices in the Organization for Economic Cooperation and Development and the EC. These organizations provide certain statistical aggregates that are beyond the financial and staff capabilities of the U.S. Bureau of Mines.

Particular appreciation is due to the mineral statistics personnel of the International Lead and Zinc Study Group; the International Nickel Study Group; the French-based firm Metalleurop; the German-based firm Metallgesellschaft; the Italian-based firm Nuova Samim; and the World Bureau of Metal Statistics of the United Kingdom, with whom U.S. Bureau of Mines employees are in regular contact, because of their special competence in international data on nonferrous metals.

Similarly, for their cooperative consultations relating to many mineral commodities not only in their own countries but in other world areas as well, special individual acknowledgment must be given to the internationally oriented personnel of the British Geological Survey and to our colleagues with Canada's mineral agency, Energy, Mines, and Resources Canada.

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[1]Callot, F. Production et consummation mondiales de minerals en 1983. Annales des Mines. Nos. 7, 8, 9, July-Aug.-Sept. 1985, pp. 3-123.

[2]Table 4 contains 104 data lines, but 3 of these are totals of others; these total lines are not included in the total of 101 distinct commodities or forms of commodities counted here. The total of 101 is 1 greater than in the last edition of this study; Industrial (silica) sand was added for the first time.

TABLE 1

ESTIMATED VALUE OF WORLD CRUDE MINERAL PRODUCTION

Year	Value of 53[1] major crude mineral commodities[2]		Value of all crude mineral commodities[3]	
	Billion current dollars	Billion 1983 constant dollars	Billion current dollars	Billion 1983 constant dollars
1950	25.9	103.5	29.5	117.9
1953	37.0	135.1	42.5	155.3
1958	50.0	173.5	60.1	208.5
1963	59.0	192.0	72.3	235.3
1968	77.9	222.3	94.5	269.8
1973	159.2	357.3	191.6	430.0
1978	477.0	728.5	539.6	824.1
1979	656.5	901.2	733.2	1,006.5
1980	902.9	1,094.6	995.7	1,207.1
1981	912.0	1,008.1	993.2	1,097.9
1982	902.9	938.1	971.2	1,009.1
1983	930.4	930.4	988.7	988.7
1984	r1,006.3	r964.3	r1,069.4	r1,024.7
1985	r1,032.1	r953.4	r1,096.8	r1,013.1
1986	r1,092.2	r982.9	r1,160.2	r1,044.5

See footnotes at end of table.

TABLE 1—Continued

ESTIMATED VALUE OF WORLD CRUDE MINERAL PRODUCTION

Year	Value of 53[1] major crude mineral commodities[2]		Value of all crude mineral commodities[3]	
	Billion current dollars	Billion 1983 constant dollars	Billion current dollars	Billion 1983 constant dollars
1987	r1,139.8	r994.0	r1,211.2	r1,056.2
1988	r1,248.1	r1,047.5	r1,326.3	r1,113.1
1989	r1,360.7	r1,094.6	r1,446.0	r1,163.2
1990	1,412.9	1,091.3	1,501.5	1,159.7

rRevised.

[1]The list of commodities included has been varied slightly by the authors of the basic source article over the years, and the number 53 may be regarded as debatable. Forty-eight commodities were included in every study, 1950-83 inclusive, and are included in a listing in table 3 of the 1985 edition of this chapter; this list of 52 entries also includes columbium-tantalum (as a single entry), kyanite, and uranium (each of which has been included in the study from 1958-83 inclusive, and beryl (which was included in the study from 1950-68 inclusive). Additionally, a generic group (natural abrasives), perlite, and vermiculite were incorporated into the 1950 study but dropped thereafter; lithium was included in 1958 only; and asphaltic limestone was included from 1950-68 inclusive. The alterations in the number of commodities had little, if any, significant effect on the totals, with the possible exception of uranium's omission in 1950 and 1953.

[2]Data for 1950, 1953, 1958, 1963, 1968, 1973, 1978, and 1983 are as reported in Annales des Mines, July-Aug.-Sept. 1985, p. 9. Data in constant dollars for 1979-82 and 1984-90 inclusive are extrapolated from the 1983 Annales des Mines figures on the basis of the United Nations index of extractive mineral industry production in the United Nations Monthly Bulletin of Statistics, May 1992, p. 238. Data in current dollars for 1979-82 and 1984-90 inclusive are derived from the constant dollar estimates using reciprocals of the most recent available U.S. price deflators.

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

TABLE 2

INDEX NUMBERS OF WORLD MINERAL INDUSTRY EXTRACTIVE PRODUCTION

(1980 = 100)

Year	Coal	Crude petroleum and natural gas	Metals	Extractive industry total
Annual averages:				
1978	93.8	104.4	98.2	102.0
1982	102.4	80.7	96.9	85.7
1983	101.3	79.5	97.1	84.9
1984	100.7	82.6	103.8	88.1
1985	105.5	79.7	108.0	87.1
1986	107.1	82.7	r108.7	r89.7
1987r	107.0	83.2	112.7	90.8
1988	r107.5	87.9	r123.0	95.8
1989r	107.4	92.6	133.9	100.4
1990	98.9	92.3	147.3	100.5
Quarterly results:				
1989:				
1st quarterr	111.7	88.9	128.0	97.4
2d quarterr	106.6	90.5	133.7	98.9
3d quarterr	102.4	92.9	136.6	100.4
4th quarterr	108.8	98.2	137.5	105.0
1990:				
1st quarter	100.1	96.4	145.0	103.1
2d quarter	99.3	94.9	145.4	102.3
3d quarter	97.2	87.3	150.1	97.0
4th quarter	99.1	90.5	148.7	99.4

rRevised.

Source: 1978 only—United Nations. Monthly Bulletin of Statistics, v. 45, No. 2, Feb. 1991, p. 236; all other data—United Nations. Monthly Bulletin of Statistics, v. 45, No. 11, Nov. 1991, p. 236.

TABLE 3

INDEX NUMBERS OF MINERAL-RELATED INDUSTRY PRODUCTION

(1980 = 100)

Year	Non-metallic mineral products	Chemicals, petroleum, coal, rubber products	Base metals
Annual averages:			
1978	96.7	95.8	100.4
1982	94.3	r99.2	89.3
1983r	96.7	104.4	91.8
1984r	100.7	110.8	99.2
1985r	101.7	114.4	100.5
1986r	104.7	119.0	99.3
1987r	108.2	125.6	103.2
1988r	114.1	133.5	110.7
1989r	118.1	138.4	113.1
1990	117.5	138.9	111.7
Quarterly results:			
1989:			
1st quarterr	114.3	136.6	114.4
2d quarterr	122.0	139.8	115.7
3d quarterr	117.9	135.9	110.6
4th quarterr	118.2	141.1	111.7
1990:			
1st quarter	115.2	137.8	112.3
2d quarter	120.4	139.3	113.6
3d quarter	117.5	137.2	109.7
4th quarter	117.1	141.1	111.1

rRevised.

Source: 1978 only—United Nations. Monthly Bulletin of Statistics, v. 45, No. 2, Feb. 1991, p. 237; all other data—United Nations. Monthly Bulletin of Statistics, v. 45, No. 11, Nov. 1991, p. 237.

TABLE 4

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1986	1987	1988	1989	1990
METALS						
Aluminum:						
Bauxite, gross weight[2]	thousand metric tons	r88,173	r91,891	r98,357	r105,695	109,118
Alumina, gross weight	do.	r32,827	r34,856	r37,034	r38,929	40,105
Unalloyed ingot metal	do.	r15,412	r16,420	r17,500	r18,020	17,817
Antimony, mine output, Sb content	metric tons	r 359,677	r69,955	r 370,547	r 366,283	362,004
Arsenic, trioxide[4]	do.	r52,296	r53,637	r52,093	r48,562	47,632
Beryl concentrate, gross weight[3]	do.	r8,891	r8,632	8,302	r7,532	7,138
Bismuth:[3]						
Mine output, Bi content	do.	r3,658	r3,173	r3,220	r3,556	3,200
Smelter	do.	r4,077	r4,078	r4,098	r4,082	3,710
Cadmium, smelter	do.	r18,828	r19,099	r21,794	r21,075	20,207
Chromite, gross weight[4]	thousand metric tons	r11,797	r11,637	r12,593	r13,542	12,846

See footnotes at end of table.

TABLE 4—Continued

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1986	1987	1988	1989	1990
METALS—Continued						
Cobalt:						
Mine output, Co content	metric tons	r50,199	r40,902	r43,639	r43,030	37,136
Metal, refined	do.	r31,399	r27,956	r26,700	r25,516	25,775
Columbium-tantalum concentrate, gross weight[4 5]	do.	34,835	r22,596	r40,055	r39,867	35,939
Copper:						
Mine output, Cu content	thousand metric tons	r7,939	r8,256	r8,455	r8,730	8,815
Metal:						
Smelter:						
Primary[6]	do.	r7,814	r7,985	r8,219	r8,440	8,368
Secondary[7]	do.	r963	r911	r1,032	r1,070	1,010
Refined:						
Primary[6]	do.	r8,075	r8,177	r8,570	r8,944	9,009
Secondary[7]	do.	r1,430	r1,534	r1,629	r1,668	1,633
Gold, mine output, Au content	kilograms	r1,606,569	r1,660,529	r1,848,237	r1,999,458	2,049,946
Iron and steel:						
Iron ore, iron ore concentrates, iron ore agglomerates, gross weight	thousand metric tons	r863,650	r889,627	r907,522	r926,070	919,255
Metal:						
Pig iron	do.	r507,934	r523,011	r551,072	r562,788	554,963
Ferroalloys	do.	r16,563	r16,567	r18,422	r18,862	18,299
Steel, crude	do.	r712,705	r734,589	r777,536	r782,642	771,979
Lead:						
Mine output, Pb content	do.	r3,345	r3,425	r3,430	r3,368	3,367
Metal:						
Smelter:						
Primary	do.	r3,150	r3,284	r3,301	r3,267	3,216
Secondary	do.	r2,272	r2,403	r2,510	r2,582	2,658
Refined:						
Primary	do.	r3,191	r3,194	r3,246	r3,285	3,214
Secondary	do.	r2,361	r2,524	r2,604	r2,702	2,728
Magnesium metal, smelter:						
Primary	metric tons	322,408	323,930	r334,348	r344,043	351,198
Secondary	do.	r65,974	65,825	r70,835	r73,875	72,862
Manganese ore, gross weight	thousand metric tons	r24,926	r23,537	r24,393	r25,115	24,665
Mercury, mine output, Hg content	metric tons	r7,782	r5,534	r6,595	r6,263	5,785
Molybdenum, mine output, Mo content	do.	r93,218	r89,871	r95,172	r116,799	111,652
Monazite concentrate (source of rare-earth metals and thorium)[3]	do.	31,218	26,008	r23,767	r24,854	26,720
Nickel:						
Mine output, Ni content	do.	r852,511	r892,504	r923,547	r966,525	937,070
Metal, plant output	do.	r805,500	r853,807	r930,228	r929,545	879,827
Platinum-group metals, mine output, metals content	kilograms	r260,193	r273,581	r281,853	r283,158	286,704
Selenium, smelter[4 5]	metric tons	r 31,397	r 3,408	r1,700	r1,615	1,818
Silver, mine output, Ag content	do.	r13,034	r13,844	r14,333	r14,760	15,108
Tellurium, smelter[3 4 5]	do.	85	74	78	r65	67
Tin:						
Mine output, Sn content	do.	r173,170	r181,316	r205,135	r233,773	219,333
Metal, smelter:						
Primary	do.	r182,289	r189,156	r214,860	r230,624	231,864
Secondary	do.	15,591	r16,224	r19,482	r19,133	17,940

See footnotes at end of table.

TABLE 4—Continued

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1986	1987	1988	1989	1990
METALS—Continued						
Titanium concentrate, gross weight:						
Ilmenite[3 8]	thousand metric tons	3,420	r3,937	r3,034	r4,236	4,051
Rutile[3 4]	do.	394	439	434	r454	452
Titaniferous slag	do.	1,285	1,575	1,725	1,765	1,485
Tungsten, mine output, W content	metric tons	r43,480	r42,474	r 342,202	r 342,099	340,350
Uranium, mine output, U_3O_8 content[4 5]	do.	43,921	r43,441	r43,177	r40,535	33,602
Vanadium, mine output, V content	do.	32,418	31,471	r34,310	r33,549	33,868
Zinc:						
Mine output, Zn content	thousand metric tons	r6,842	r7,176	r6,967	r7,191	7,325
Metal, smelter:						
Primary[6]	do.	r6,401	r6,724	r6,777	r6,858	6,701
Secondary[7]	do.	291	314	r337	345	340
Zirconium concentrate	do.	3741	3753	r929	r988	889
INDUSTRIAL MINERALS						
Asbestos	do.	r4,029	r4,235	r4,316	r4,243	3,980
Barite	do.	r4,688	r4,712	r5,472	r5,577	5,577
Boron materials	do.	2,511	r2,684	r2,924	r2,926	2,906
Bromine[4]	do.	375	391	r411	r442	438
Cement, hydraulic	do.	r1,008,507	r1,053,736	r1,108,746	r1,132,716	1,134,348
Clays:[4]						
Bentonite	do.	r9,278	r9,283	r9,003	r8,987	9,472
Fuller's earth[5]	do.	2,961	3,084	r3,003	r3,060	3,471
Kaolin	do.	r21,492	r22,129	r23,929	r24,522	25,024
Corundum, natural	metric tons	9,694	9,241	9,411	8,994	9,000
Diamond, natural:						
Gem[e]	thousand carats	r42,038	r41,042	r45,402	r45,992	46,921
Industrial[e]	do.	r53,702	r50,472	r51,494	r51,751	52,175
Total	do.	r95,741	r91,514	r96,896	r97,743	99,096
Diatomite[4]	thousand metric tons	r1,843	1,822	r1,866	r1,851	1,838
Feldspar[4]	do.	r4,115	r4,410	r4,899	r5,176	5,023
Fluorspar	do.	r4,850	r4,817	r5,207	r5,586	5,107
Graphite	metric tons	624,718	648,156	r 3660,168	r 3648,827	660,600
Gypsum	thousand metric tons	r88,202	r92,715	r96,354	r98,984	97,638
Iodine	metric tons	312,971	r 312,703	r14,926	r15,459	17,017
Lime[4]	thousand metric tons	r123,619	r126,822	r134,179	r138,682	136,295
Magnesite[3]	do.	r12,348	r11,356	r11,381	r11,343	10,713
Mica[4]	do.	r274	r276	r252	r230	215
Nitrogen: N content of ammonia	do.	r91,053	r93,595	r99,242	r99,016	98,025
Perlite[4]	do.	r1,699	r1,785	r1,846	r1,790	1,782
Phosphate, gross weight:						
Phosphate rock	thousand metric tons	r139,043	r145,630	r160,041	r158,966	154,106
Thomas slag	do.	2,037	r1,793	r1,867	r1,804	1,688
Guano	do.	16	12	10	r56	47
Potash, marketable, K_2O equivalent	do.	r28,763	r30,459	r31,892	r29,210	28,310
Pumice[4 5]	do.	r11,125	r11,671	r12,403	r10,913	10,964
Salt	do.	r174,729	r178,600	r182,810	r190,477	183,311
Sodium compounds, n.e.s.:[4]						
Soda ash	do.	r29,360	r30,203	r31,269	r31,939	32,429
Sulfate	do.	r4,609	r4,800	r4,937	r5,009	4,998

See footnotes at end of table.

TABLE 4—Continued

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1986	1987	1988	1989	1990
INDUSTRIAL MINERALS—Continued						
Strontium materials[4 5]	metric tons	r152,909	r201,795	r236,157	r234,189	234,600
Sulfur, elemental basis:						
Elemental[9]	thousand metric tons	r15,208	r14,797	r14,562	r15,189	14,291
From pyrites	do.	r8,861	r9,746	r10,196	r10,114	9,822
Byproduct[10]	do.	r29,667	r32,039	r33,770	r33,414	33,555
Total	do.	r53,736	r56,582	r58,528	r58,717	57,668
Talc, soapstone, pyrophyllite	do.	r7,755	r7,799	r7,960	r8,271	8,251
Vermiculite[4 5]	metric tons	r620,784	r658,164	r643,323	r631,112	583,302
MINERAL FUELS AND RELATED MATERIALS						
Carbon black[4 5]	thousand metric tons	4,434	4,548	4,760	4,832	4,872
Coal:						
Anthracite	million metric tons	r337	r354	r366	r380	345
Bituminous	do.	r3,058	r3,129	r3,224	r3,283	3,306
Lignite	do.	r1,184	r1,206	r1,232	r1,230	1,165
Total	do.	4,579	r4,689	r4,822	r4,892	4,815
Coke:[11]						
Metallurgical	thousand metric tons	r336,893	r334,744	r346,416	r346,962	332,511
Other	do.	r11,939	r16,473	r14,582	r14,767	12,669
Gas, natural, marketed	billion cubic meters	r1,801	r1,892	r1,955	r1,988	2,067
Natural gas liquids[4]	million 42-gallon barrels	1,628	1,650	1,663	1,695	1,772
Peat	thousand metric tons	r193,052	r186,417	r191,784	r190,540	180,611
Petroleum:						
Crude	million 42-gallon barrels	r20,664	r20,744	r21,225	r21,553	22,183
Refined	do.	r22,029	r22,263	r22,896	r23,562	23,732

eEstimated. rRevised.

[1]Figures generally conform to those published in appropriate commodity chapters of volume I of the "Minerals Yearbook," 1990 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 metal.

[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]Includes leucoxene.

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

[10]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.

[11]Production of coke other than metallurgical by China and the U.S.S.R. is included with "Coke: Metallurgical."

TABLE 5

WORLD PRIMARY ENERGY PRODUCTION

(Million metric tons of standard coal equivalent)

Year	Coal	Crude petroleum and natural gas liquids	Natural gas	Primary electricity		Total
				Hydro and geothermal	Nuclear	
1980	r2,623	r4,422	r1,842	r216	r83	r9,187
1981	2,635	4,250	1,859	220	99	9,063
1982	2,712	4,027	1,844	226	107	8,916
1983	2,719	3,982	1,856	237	124	[1]8,917
1984	2,851	4,032	2,022	245	150	9,300
1985	r3,062	r3,985	r2,081	249	178	r9,555
1986	r3,075	r4,178	r2,124	r253	190	r [1]9,821
1987	r3,202	r4,198	r1,117	255	209	r10.092
1988	r3,281	r4,386	r2,329	r264	r226	r10,486
1989	r3,335	r4,452	r2,416	r263	r233	r10,699
1990	3,317	4,551	2,494	271	243	10,876

rRevised.

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

Sources: 1980, 1985, and 1987-90—United Nations. 1990 Energy Statistics Yearbook, New York, 1992, pp. 2, 428; 1981—United Nations. 1984 Energy Statistics Yearbook, New York, 1986, pp. 2, 691; 1982—United Nations. 1985 Energy Statistics Yearbook, New York, 1987, pp. 2, 380; 1984—United Nations. 1987 Energy Statistics Yearbook, New York, 1989, pp. 2, 392; 1986—1989 Energy Statistics Yearbook, New York, 1991, pp. 2, 386.

TABLE 6

WORLD ELECTRIC POWER PRODUCTION, BY GENERATING PLANT TYPE

Source plant type	1981		1987		1988		1989		1990	
	Production (billion kilowatt hours)	Share of total (percent)	Production (billion kilowatt hours)	Share of total (percent)	Production (billion kilowatt hours)	Share of total (percent)	Production (billion kilowatt hours)	Share of total (percent)	Production (billion kilowatt hours)	Share of total (percent)
Primary electricity:										
Hydroelectric	1,776	21.2	r2,041	r19.3	r2,112	r19.1	2,095	18.3	2,162	18.4
Geothermal	16	.2	r36	.3	r36	.3	39	.3	40	.3
Nuclear	801	9.6	1,075	16.1	r1,837	r16.6	1,903	16.6	1,982	16.9
Total	[1]2,592	[1]30.9	3,782	35.7	r [1]3,986	r36.0	[1]4,036	35.2	[1]4,183	35.6
Secondary electricity:										
Thermal	5,792	69.1	r6,805	r64.3	r7,073	r64.0	7,414	64.8	7,551	64.4
Grand total	8,384	100.0	r10,587	100.0	r11,059	100.0	11,450	100.0	11,734	100.0

rRevised.

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

Source: 1981—United Nations. 1984 Energy Statistics Yearbook, New York, 1986, p. 384; 1987-90—United Nations. 1990 Energy Statistics Yearbook, 1992, p. 428.

TABLE 7

WORLD ELECTRIC POWERPLANT CAPACITY, BY GENERATING PLANT TYPE

Plant type	1981		1987		1988		1989		1990	
	Capacity (million kilowatts)	Share of total (percent)	Capacity (million kilowatts)	Share of total (percent)	Capacity (million kilowatts)	Share of total (percent)	Capacity (million kilowatts)	Share of total (percent)	Capacity (million kilowatts)	Share of total (percent)
Primary plants:										
Hydroelectric	488	23.1	r596	22.9	r609	23.0	622	23.0	628	22.9
Geothermal	3	.1	8	.3	r8	.3	9	.3	9	.3
Nuclear	161	7.6	306	11.8	r317	r12.0	330	12.2	337	12.3
Total	652	30.8	r910	r35.0	r934	35.3	961	35.5	974	35.5
Secondary plants:										
Thermal	1,462	69.2	r1,691	r65.0	r1,710	64.7	1,743	64.5	1,772	64.5
Grand total	2,114	100.0	r [1]2,600	100.0	r [1]2,645	100.0	2,704	100.0	2,746	100.0

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

Sources: 1981—United Nations. 1984 Energy Statistics Yearbook, New York, 1986, p. 328; 1987-90—United Nations. 1990 Energy Statistics Yearbook, New York, 1992, p. 372.

TABLE 8

VALUE OF WORLD MINERAL COMMODITY EXPORT TRADE AND ITS ROLE IN TOTAL WORLD EXPORT TRADE

Year	Value of mineral commodity export trade (million current dollars)			Change in total from previous year (percent)	Mineral commodities' share of all commodities exported (percent)
	Mineral fuels	Nonfuel minerals[1]	Total		
1979	333,031	188,416	521,447	41.3	31.9
1980	r480,789	r226,761	r707,550	r35.7	35.4
1981	474,266	199,328	673,594	r-4.8	34.3
1982	430,384	180,950	611,334	-9.2	33.1
1983	384,188	174,724	558,912	-8.6	30.8
1984	378,398	184,701	563,099	.7	29.5
1985	361,646	r188,673	r550,319	-2.3	28.5
1986	r260,126	r194,258	r454,384	r-17.4	r21.6
1987	r280,401	r218,346	r498,747	9.8	20.1
1988	r262,984	r273,328	r536,312	7.5	19.0
1989	292,150	303,840	595,990	11.1	19.7
1990	343,414	302,819	646,233	8.4	19.1

rRevised.
[1]In part estimated, based on data for major commodity groups presented in table 9 of this chapter.

TABLE 9

VALUE OF EXPORT TRADE IN MAJOR MINERAL COMMODITY GROUPS[1]

(Million U.S. dollars)

Commodity group	1984	1985	1986	1987	1988	1989	1990
Metals:							
All ores, concentrates, scrap	25,753	24,943	r23,879	r26,440	r31,812	37,787	36,271
Iron and steel	66,126	70,318	r74,025	r80,850	r98,626	107,590	107,326
Nonferrous metals	36,185	35,656	r36,617	r44,567	r60,727	67,860	68,922
Total	128,064	130,917	r134,521	r151,857	r191,165	213,237	212,519
Nonmetals, crude only	9,855	9,963	r10,534	r11,185	r12,993	13,645	13,600
Mineral fuels	378,398	361,646	r260,126	r280,401	r262,984	292,150	343,414
Grand total	516,317	502,526	r405,181	r443,443	r467,142	519,032	569,533
All commodities	1,909,303	1,933,434	r2,104,252	r2,477,240	r2,819,131	3,024,779	3,391,752

rRevised.

[1]Data presented are for selected major commodity groups of the Standard International Trade Classification, Revision 2 (SITC-R2) and as such exclude some mineral commodities classified in that data array together with other (nonmineral) commodities. SITC-R2 categories included are as follows: All ores, concentrates, scrap-Div. 28; iron and steel-Div. 67; nonferrous metals-Div. 68; nonmetals (crude only)-Div. 27; and mineral fuels-Div. 3. Major items not included are the metals, metalloids, and metal oxides of Group 513; mineral tar and other coal-, petroleum-, and gas-derived crude chemicals of Div. 52; manufactured fertilizers of Div. 56; and nonmetallic mineral manufactures of Groups 661, 662, 663, and 667. Data include special category exports, ship stores and bunkers, and other exports of minor importance, and exclude the trade between the Federal Republic of Germany and the German Democratic Republic. Data for centrally planned economy countries of Asia are based on imports of China.

Sources: 1987-90 data: United Nations. Monthly Bulletin of Statistics, v. 46, May 1992, pp. 262-305; 1986 data: United Nations. Monthly Bulletin of Statistics, v. 45, May 1991, pp. 260-303; 1985 data: United Nations. Monthly Bulletin of Statistics, v. 44, May 1990, pp. 260-303; 1984 data: United Nations. Monthly Bulletin of Statistics, v. 43, May 1989, pp. 250-293.

TABLE 10

DISTRIBUTION OF VALUE OF WORLD EXPORT TRADE IN MAJOR MINERAL COMMODITY GROUPS[1]

(Percent)

Commodity group	1984	1985	1986	1987	1988	1989	1990
Metals:							
All ores, concentrates, scrap	5.0	5.0	5.9	6.0	r6.8	7.3	6.4
Iron and steel	12.8	14.0	r18.3	r18.2	r21.1	20.7	18.8
Nonferrous metals	7.0	7.0	r9.0	10.1	r13.0	13.1	12.1
Total	24.8	26.0	r33.2	r34.3	r40.9	41.1	37.3
Nonmetals, crude only	1.9	2.0	2.6	2.5	r2.8	2.6	2.4
Mineral fuels	73.3	72.0	r64.2	r63.2	r56.3	56.3	60.3

rRevised.

[1]For detailed definition of groups, see footnote 1, table 9.

TABLE 11

GROWTH OF VALUE OF WORLD EXPORT TRADE IN MAJOR MINERAL COMMODITY GROUPS[1]

(Percent change from that of previous year)

Commodity group	1984	1985	1986[r]	1987	1988	1989	1990
Metals:							
All ores, concentrates, scrap	+1	-3.2	-4.3	[r]+10.7	[r]+20.3	+18.8	-4.0
Iron and steel	+	+6.3	+5.3	[r]+9.2	[r]+22.0	+9.1	-.2
Nonferrous metals	-1.1	-1.5	+2.7	[r]+21.7	[r]+36.3	+11.7	+1.2
All metals	+	+2.2	+2.8	+12.9	[r]+25.9	+11.5	-.3
Nonmetals, crude only	+	+1.1	+5.7	[r]+6.2	[r]+16.2	+5.0	-.3
Mineral fuels	-1.5	-4.4	-28.1	[r]+7.8	[r]-6.2	+11.1	+17.5
All major mineral commodity groups	+	-2.7	-19.4	[r]+9.4	[r]+5.3	+11.1	+9.7
All commodities	+	+1.3	+8.8	[r]+17.7	+13.8	+7.3	+12.1

[r]Revised.
[1]For detailed definition of groups, see footnote 1, table 9.

TABLE 12

WORLD CONSUMPTION OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		1986	1987	1988	1989	1990
Ferrous metals: World:						
Iron ore, gross weight[e]	million metric tons	864	884	897	923	911
Iron and steel scrap, gross weight	do.	318	324	344	[r]341	328
Nonferrous metals:						
Market economy countries:						
Aluminum, refined		[r]12,799	[r]13,652	[r]14,364	[r]14,676	14,901
Cadmium		15 16	[r]16	[r]17	17	
Copper, refined		7,674	8,012	[r]8,211	[r]8,629	8,762
Lead, refined		4,070	[r]4,163	[r]4,242	[r]4,477	4,342
Magnesium, primary		[r]155	161	[r]167	[r]160	161
Nickel[1]		574	635	662	664	670
Tin, refined		164	[r]172	[r]179	[r]180	183
Zinc, slab		[r]4,847	[r]4,972	[r]5,270	[r]5,215	5,228
Centrally planned economy countries:						
Aluminum, refined		[r]3,272	[r]3,404	[r]3,391	[r]3,448	2,860
Cadmium		4	4	4	[r]3	3
Copper, refined		[r]2,401	[r]2,408	[r]2,340	[r]2,358	2,019
Lead, refined		[r]1,425	[r]1,450	[r]1,422	[r]1,318	1,190
Magnesium, primary		105	[r]108	[r]111	[r]109	98
Nickel[1]		[r]202	[r]200	[r]196	[r]190	172
Tin, refined		[r]59	[r]58	[r]58	[r]56	49
Zinc, slab		[r]1,865	[r]1,916	[r]1,924	[r]1,911	1,744

See footnotes at end of table.

TABLE 12—Continued

WORLD CONSUMPTION OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		1986	1987	1988	1989	1990
Nonferrous metals—Continued:						
World total:						
Aluminum, refined		r16,071	r17,056	r17,755	r18,124	17,761
Cadmium		19	20	r20	r20	20
Copper, refined		r10,075	r10,420	r10,551	r10,987	10,781
Lead, refined		r5,495	r5,613	r5,664	r5,795	5,532
Magnesium, primary		r260	r269	278	r269	259
Nickel[1]		r776	r835	r858	r854	842
Tin, refined		r223	r230	237	r236	232
Zinc, slab		r6,712	r6,888	r7,194	r7,126	6,972
Industrial minerals: World:						
Cement	million metric tons	1,006	1,049	1,112	1,135	1,151
Fertilizers:[2]						
Nitrogenous, contained N		87,667	93,965	r97,510	r99,636	95,927
Phosphatic, contained P_2O_5		32,961	34,758	r36,385	r37,619	37,061
Potassic, K_2O equivalent		25,543	26,024	r27,126	r27,852	26,683
Sulfur, elemental S equivalent		56,938	58,945	r63,065	r61,106	61,184
Mineral fuels: World:						
Solid fuels	million metric tons of standard coal equivalent	r3,073	r3,218	r3,313	r3,387	3,328
Liquid fuels	do.	r3,701	r3,786	r3,933	r3,985	3,979
Natural gas	do.	r2,097	r2,207	r2,313	r2,403	2,463
Primary electricity:						
Hydro and geothermal	do.	r252	256	r265	r263	272
Nuclear	do.	r191	210	r227	r235	244
Total[3]	do.	r9,315	r9,677	r10,050	r10,272	10,285

eEstimated. rRevised.

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

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

[3]Data may not add to totals 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); European Cement Association (Cembureau). World Statistical Review Nos. 13A and 13B/Special Edition, and World Cement Market in Figures 1913/1990, Brussels 1992, 237 pp. British Sulphur Corp. Ltd. (fertilizer materials and sulfur); and 1990 United Nations Energy Statistics Yearbook (all mineral fuels for 1986-89). Data on iron ore and iron and steel scrap for all years and on mineral fuels for 1990 compiled from a variety of sources by the U.S. Bureau of Mines.

TABLE 13

ANNUAL INVESTMENT IN THE STEEL INDUSTRY FOR SELECTED COUNTRIES

(Million dollars)

Country or country group	1985	1986	1987	1988	1989
Organization for Economic Cooperation and Development (OECD):					
European Community:					
Belgium	229	308	321	372	NA
France	504	420	489	429	NA
Germany, Federal Republic of	1,268	914	851	786	NA
Ireland and Denmark	8	6	8	7	NA
Italy	583	978	855	575	NA
Luxembourg	50	71	85	81	NA
Netherlands	239	348	278	206	NA
Portugal	([1])	1	8	12	NA
Spain	([2])	650	701	476	NA
United Kingdom	263	365	479	546	NA
Subtotal[3]	3,159	4,081	4,075	3,490	NA
EFTA[4]	372	457	612	806	NA
Other:[5]					
Australia	134	485	e550	e650	NA
Canada	432	766	651	478	NA
Japan	2,892	4,011	3,488	4,177	NA
Spain[6]	395	XX	XX	XX	NA
Turkey	210	146	98	120	NA
United States	1,641	862	1,160	1,836	NA
Subtotal	5,704	6,270	5,947	7,261	NA
Total OECD[7]	9,235	10,808	10,634	11,557	NA
Latin America:[8]					
Argentina	184	191	262	202	74
Brazil	472	413	540	394	362
Chile	1	4	1	22	112
Colombia	13	10	11	25	47
Ecuador	2	NA	NA	NA	NA
Mexico	491	119	171	324	495
Peru	4	2	1	2	6
Uruguay	1	1	—	([9])	1
Venezuela	25	121	111	123	214
Central America	NA	NA	1	9	6
Total	1,193	861	[10]1,099	1,101	1,317
Grand total	10,428	11,669	11,733	12,658	NA

eEstimated. rRevised. NA Not available. XX Not applicable; included with EC figures.

[1]1984-85 figures included with EFTA total; joined EC in 1986.

[2]1984-85 figures listed separately; joined EC in 1986.

[3]Source: EUROSTAT Iron and Steel Statistical Yearbook 1989. Luxembourg 1990. Source reports in million European Currency Units (ECU). 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 ECU, average for the period: 1984—0.78899; 1985—0.76219; 1986—0.98119; 1987—1.15432; and 1988—1.18388.

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

[5]Data for New Zealand have not been available since 1979. Estimates for Australia for 1987-88 by the U.S. Bureau of Mines.

[6]Portugal and Spain became members of the EC effective Jan. 1, 1986.

[7]Sources for OECD other than EC and Canada: The Iron and Steel Industry in 1985. Paris, 1987, p. 32; The Iron and Steel Industry in 1986. Paris, 1987, p. 32; The Iron and Steel Industry in 1987. Paris, 1988, p. 32; The Iron and Steel Industry in 1988. Paris, 1989, p. 34. Source for Canada: Canadian Minerals Yearbook 1986-89.

[9]Less than 1/2 unit.

[8]Source for Latin America: Instituto Latinamericano del Fierro y el Acero. Statistical Yearbook of Steelmaking and Iron Ore Mining in Latin America 1989. Santiago, p. 189.

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

TABLE 14

MARKET ECONOMY COUNTRY PETROLEUM INDUSTRY CAPITAL AND EXPLORATION EXPENDITURES, BY GEOGRAPHIC AREA

(Million dollars)

Area and type of expenditure	1983	1984	1985	1986	1987
United States:					
Capital	4,400	3,710	3,710	2,800	2,960
Exploration	46,260	48,060	43,640	24,830	19,760
Total	50,660	51,770	47,350	27,630	22,720
Other North America:					
Capital	1,720	2,760	3,330	2,100	1,610
Exploration	6,810	9,490	8,790	6,380	5,930
Total	8,530	12,250	12,120	8,480	7,540
Central and South America:					
Capital	1,220	980	850	820	800
Exploration	6,920	4,750	4,910	4,870	4,430
Total	8,140	5,730	5,760	5,690	5,230
Western Europe:					
Capital	2,050	1,720	1,650	1,480	2,730
Exploration	11,960	12,100	11,620	11,550	12,030
Total	14,010	13,820	13,270	13,030	14,760
Africa and Middle East:					
Capital	1,880	1,750	990	940	1,020
Exploration	5,970	4,530	4,010	3,160	2,770
Total	7,850	6,280	5,000	4,100	3,790
Far East and Oceania:					
Capital	2,130	1,630	2,110	3,090	3,420
Exploration	5,240	4,970	4,400	3,680	2,100
Total	7,370	6,600	6,510	6,770	5,520
Tankers	4,300	2,050	990	1,580	1,510
World:					
Capital (including tankers)	17,700	14,600	13,630	12,810	14,050
Exploration	83,160	83,900	77,370	54,470	47,020
Grand total	100,860	98,500	91,000	67,280	61,070

Source: Chase Manhattan Bank, Global Energy Component. Capital Investments of the World Petroleum Industry 1987. New York.

TABLE 15

SALIENT STATISTICS ON U.S. FOREIGN INVESTMENT IN MINERAL INDUSTRY ACTIVITIES

(Million dollars; inflows [-])

	1986	1987	1988[r]	1989[r]	1990
Direct foreign investment: Total	259,800	314,307	335,893	370,091	421,494
Of which:					
Mining, smelting, refining	7,923	8,004	7,939	8,103	9,776
Petroleum	58,497	59,774	57,807	54,049	59,736
Reinvested earnings of foreign affiliates: Total	10,021	19,714	13,327	22,370	22,250
Of which:					
Smelting and fabricated metals	235	572	1,176	898	590
Petroleum	-1,180	189	-1,112	21	4,055
Equity and intercompany account flows: Total	8,657	11,331	11,767	28,916	39,616
Of which:					
Smelting and fabricated metals	243	-275	1,105	-538	1,788
Petroleum	3,331	2,009	-1,768	-10,253	4,681
Income: Total	30,900	40,588	50,437	53,997	54,444
Of which:					
Mining, smelting, refining	471	706	1,520	1,303	1,012
Petroleum	7,271	7,159	7,890	7,637	10,854

[r]Revised.

Source: U.S. Department of Commerce. Survey of Current Business, v. 71, No. 8, Aug. 1991.

TABLE 16

WORLD MERCHANT FLEET DISTRIBUTION, BY TYPE[1]

		1986	1987	1988	1989	1990
Number of vessels:						
Bulk carriers		5,481	5,302	5,332	5,335	5,446
Freighters[2]		12,786	12,572	12,518	12,195	12,441
Tankers		4,999	5,090	5,250	5,133	5,361
Other[3]		352	343	368	320	348
Total		23,618	23,307	23,468	22,983	23,596
Gross tonnage:						
Bulk carriers	thousand long tons	130,654	128,468	130,225	131,135	137,154
Freighters[2]	do.	93,157	93,966	95,932	94,780	97,296
Tankers	do.	134,660	135,010	140,833	137,129	147,815
Other[3]	do.	3,798	3,688	4,367	3,720	4,471
Total	do.	362,179	361,132	371,357	366,764	386,736
Deadweight tonnage:						
Bulk carriers	do.	227,325	224,309	227,515	233,139	244,253
Freighters[2]	do.	118,845	116,937	118,077	118,060	120,037
Tankers	do.	245,584	245,906	254,796	251,923	271,749
Other[3]	do.	1,476	1,405	1,531	1,367	1,454
Total	do.	[4]593,229	588,557	601,919	604,489	637,493

[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 the year indicated.
[2]Includes refrigerated freighters.
[3]Excludes refrigerated freighters.
[4]Data do not add to total shown because of independent rounding.

Source: U.S. Department of Transportation, Maritime Administration. Merchant Fleets of the World. Annual issues for 1986-89 and unpublished information for 1990.

Table 17

WORLD BULK CARRIER FLEET, BY DEADWEIGHT TONNAGE AND COUNTRY OF REGISTRY

(As of December 31, 1990)

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)
Liberia	578	31,503
Panama	713	27,175
Greece	429	19,573
Japan	267	17,569
Cyprus	433	17,143
Norway	250	13,299
Philippines	254	11,173
British dependencies	169	10,136
China	268	8,842
Korea, Republic of	155	8,533
Bahamas	145	6,971
U.S.S.R.	239	6,529
India	127	5,429
Taiwan	69	5,293
Brazil	94	5,182
Italy	70	4,617
Singapore	81	4,183
Turkey	85	4,082
Yugoslavia	94	3,553
Malta	112	3,239
Romania	71	3,165
Poland	92	2,595
Vanuatu	53	2,048
Belgium	19	1,847
Australia	29	1,804
Iran	50	1,771
Other	500	16,999
Total	5,446	244,253

TABLE 18

WORLD FREIGHTER FLEET, BY DEADWEIGHT TONNAGE AND COUNTRY OF REGISTRY

(As of December 31, 1990)

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)
Panama	1,631	15,657
U.S.S.R.	1,681	11,604
China	897	8,878
United States	367	7,326
Liberia	364	5,944
Cyprus	572	5,273
Germany, Federal Republic of	383	4,296
Japan	393	3,393
Singapore	214	2,897
Taiwan	142	2,792
British dependencies	276	2,700
Greece	238	2,548
Bahamas	251	2,378
Netherlands	267	2,257
Denmark	156	2,109
Norway	195	2,002
Yugoslavia	166	2,002
Korea, Republic of	211	1,943
Philippines	230	1,692
Romania	219	1,665
India	111	1,592
Malta	185	1,491
United Kingdom	84	1,417
Poland	144	1,404
Italy	187	1,482
Other	2,877	23,295
Total	12,441	120,037

TABLE 19

WORLD TANKER FLEET, BY DEADWEIGHT TONNAGE AND COUNTRY OF REGISTRY

(As of December 31, 1990)

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)
Liberia	581	54,494
Panama	579	24,981
Norway	324	23,804
Greece	214	18,431
United States	233	15,650
Bahamas	188	15,442
Japan	286	14,215
Cyprus	140	11,748
British dependencies	118	9,769
U.S.S.R.	419	6,443
Iran	39	6,281
Singapore	132	6,004
Italy	238	5,215
Denmark	72	4,084
Brazil	87	3,716
France	44	3,421
Malta	90	3,281
Spain	72	3,216
India	63	3,051
China	183	2,868
Kuwait	23	2,120
Saudi Arabia	36	1,750
Isle of Man	40	1,901
United Kingdom	63	1,724
Iraq	21	1,543
Turkey	50	1,488
Other	1,076	26,597
Total	5,361	271,749

TABLE 20

WORLD LIQUID GAS CARRIER FLEET, BY NUMBER AND CAPACITY

	1989		1990	
	Number of vessels	Capacity thousand m^3	Number of vessels	Capacity thousand m^3
World:				
Liquefied natural gas	75	7,023	77	7,287
Liquefied petroleum gas	682	8,138	716	8,828
Total	775	15,161	793	16,115
Of which OPEC:				
Liquefied natural gas	6	678	6	678
Liquefied petroleum gas	17	501	20	437
Total	23	1,179	26	1,115
Percent of OPEC of world:				
Liquefied natural gas	8.0	9.6	7.8	9.3
Liquefied petroleum gas	2.5	6.2	2.3	5.0
Total	3.0	7.8	3.3	6.9
Percent of world tanker fleet:				
Liquefied natural gas	1.5	NA	1.4	NA
Liquefied petroleum gas	13.3	NA	13.4	NA
Total	15.1	NA	14.8	NA

NA Not available.

Source: OPEC Annual Statistical Bulletins, 1989 and 1990, Vienna.

TABLE 21

PANAMA CANAL: TRANSITS AND COMMODITY MOVEMENTS

	Fiscal year[1]				
	1986	1987	1988	1989	1990
Number of transits:					
Commercial ocean traffic	11,925	12,230	12,234	11,989	11,941
Other traffic	1,353	1,214	1,207	1,400	1,384
Total	13,278	13,444	13,441	13,389	13,325
Cargo moved (thousand metric tons):					
Commercial ocean traffic:					
Mineral commodities	74,139	68,890	69,586	69,461	74,491
Other commodities	68,052	82,187	89,408	84,609	85,103
Subtotal	142,191	151,077	158,994	154,070	159,594
Other traffic	184	212	303	236	254
Total	142,375	151,289	159,297	154,306	159,848

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

TABLE 22

MOVEMENT OF MINERAL COMMODITIES THROUGH THE PANAMA CANAL

(Thousand metric tons)

	1988			1989			1990		
	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	181	1,404	1,585	137	2,286	2,423	233	3,089	3,322
Chromite	7	25	32	31	67	98	6	47	53
Copper	40	871	911	49	579	628	68	479	547
Iron	135	776	911	119	287	406	185	420	605
Lead	2	212	214	—	225	225	8	228	236
Manganese	72	198	270	99	286	385	87	318	405
Tin	—	9	9	—	31	31	—	12	12
Zinc	43	670	713	38	549	587	30	775	805
Other and unspecified	268	1,660	1,928	275	1,885	2,160	192	2,162	2,354
Subtotal	748	5,825	6,573	748	6,195	6,943	809	7,530	8,339
Ingots and semimanufactures:									
Aluminum	422	39	461	288	14	302	416	13	429
Copper	14	785	799	2	886	888	8	906	914
Iron and steel[1 2]	5,042	4,187	9,229	6,439	3,686	10,125	6,833	3,040	9,873
Lead	7	62	69	—	68	68	15	81	96
Tin[1]	13	10	23	22	7	29	11	11	22
Zinc	15	171	186	25	166	191	7	224	231
Other	37	73	110	53	59	112	49	19	68
Subtotal	5,550	5,327	10,877	6,829	4,886	11,715	7,339	4,294	11,633
Total	6,298	11,152	17,450	7,577	11,081	18,658	8,148	11,824	19,972
INDUSTRIAL MINERALS									
Borax	1	438	439	1	399	400	3	431	434
Cement	152	1	153	238	4	242	552	5	557
Clays, fire and china	480	25	505	562	40	602	633	88	721
Fertilizer materials	10,454	1,878	12,332	11,890	2,542	14,432	11,901	2,112	14,013
Salt	42	813	855	21	718	739	34	1,396	1,430
Sulfur	9	3,641	3,650	7	2,189	2,196	66	2,753	2,819
Other[3]	187	191	378	283	130	413	334	271	605
Total	11,325	6,987	18,312	13,002	6,022	19,024	13,523	7,056	20,579
MINERAL FUELS AND RELATED MATERIALS									
Carbon black	40	1	41	78	2	80	28	1	29
Coal and coke	5,477	3,237	8,714	5,386	3,692	9,078	5,146	3,100	8,246
Petroleum:									
Crude	2,865	6,063	8,928	2,123	5,877	8,000	2,730	6,681	9,411
Refined	9,183	6,958	16,141	7,891	6,730	14,621	9,183	7,071	16,254
Subtotal	12,048	13,021	25,069	10,014	12,607	22,621	11,913	13,752	25,665
Total	17,565	16,259	33,824	15,478	16,301	31,779	17,087	16,853	33,940
Grand total	35,188	34,398	69,586	36,057	33,404	69,461	38,758	35,733	74,491

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

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

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

Source: Panama Canal Commission Annual Report 1990.

TABLE 23

NONFERROUS METAL PRICES IN THE UNITED STATES

(Average cents per pound unless otherwise specified)

Year and month	Aluminum[1]	Cadmium[2]	Cobalt[3]	Copper[4]	Lead[5]	Nickel[6]	Silver[7]	Tin[8]	Zinc[9]
1986	55.869	1.248	7.49	64.652	22.047	3.200	5.470	2.941	37.995
1987	72.295	1.988	6.56	81.096	35.943	2.277	7.009	3.156	41.923
1988	110.087	7.598	7.09	119.107	37.140	6.091	6.535	3.310	60.197
1989	87.843	6.278	7.46	129.534	39.350	5.982	5.499	3.973	82.019
1990:									
January	69.667	5.155	7.58	107.244	39.813	3.169	5.243	3.069	67.631
February	65.539	4.787	7.67	109.816	41.840	3.068	5.278	2.871	64.748
March	70.852	4.509	8.03	127.014	54.107	4.136	5.058	2.972	73.781
April	71.560	4.300	8.23	125.536	48.727	4.188	5.046	3.036	80.739
May	72.307	3.916	8.13	123.174	45.214	4.127	5.074	2.991	85.601
June	73.083	3.186	8.14	115.946	45.160	3.938	4.906	2.880	87.192
July	72.571	2.893	9.11	124.715	50.128	4.358	4.859	2.808	86.098
August	80.348	2.839	11.70	133.558	50.362	5.048	4.982	2.798	78.984
September	88.053	2.658	12.43	132.815	49.472	4.950	4.790	2.748	77.771
October	82.227	2.182	13.53	128.782	46.158	4.142	4.366	2.883	67.535
November	72.525	1.515	12.63	118.362	42.747	3.995	4.169	2.832	62.941
December	69.750	2.600	13.93	114.211	38.521	3.763	4.068	2.637	62.089
Average	74.040	3.378	10.09	121.764	46.021	4.074	4.820	2.877	74.593

[1]Metals Week U.S. market price.
[2]U.S. dollars per pound: 1986-88—producer; 1989-90—New York dealer market price.
[3]U.S. dollars per pound, average annual spot for cathodes.
[4]Electrolytic, f.o.b. refinery, producer.
[5]Refined lead, North America producer price.
[6]U.S. dollars per pound: 1986—Canadian producer price; beginning Jan. 1987—New York dealers, cathode.
[7]U.S. dollars per troy ounce, 0.99 fine, New York.
[8]U.S. dollars per pound, New York dealer.
[9]United States high-grade.

Source: American Bureau of Metal Statistics Inc. except cobalt, which is compiled by the U.S. Bureau of Mines.

TABLE 24

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]
1986	52.179	62.314	367.512	18.429	5.465	2.723	34.194
1987	71.004	80.847	446.470	27.041	7.024	3.035	36.197
1988	117.334	118.010	437.047	29.727	6.531	3.199	56.262
1989	88.508	129.201	381.431	30.513	5.507	3.871	75.124
1990:							
January	69.320	107.349	410.109	32.077	5.245	2.990	58.663
February	65.965	107.055	416.810	35.314	5.288	2.792	63.275
March	71.096	119.096	393.059	48.047	5.076	2.844	75.569
April	69.198	121.842	374.242	37.864	5.060	2.897	76.458
May	69.260	124.373	369.052	37.414	5.070	2.869	80.495
June	71.023	117.234	352.331	37.975	4.923	2.765	77.784
July	71.257	125.622	362.530	39.672	4.879	2.687	74.252

See footnotes at end of table.

TABLE 24—Continued

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]
1990—Continued:							
August	80.831	134.129	394.727	39.701	5.010	2.679	73.258
September	93.736	137.501	389.323	37.997	4.801	2.589	69.741
October	88.255	124.446	380.739	34.471	4.392	2.749	61.352
November	73.369	117.294	381.725	31.772	4.173	2.713	57.956
December	69.057	112.735	376.947	28.297	4.066	2.547	57.396
Average	74.364	120.723	383.466	36.717	4.832	2.760	68.850

[1]London Metal Exchange.
[2]Unalloyed ingot, 99.5%.
[3]Grade A 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, for 1986-87 Straits tin; beginning 1988 Kuala Lumpur tin market price. (1986 and 1987 average prices were the same on both markets.)
[8]Monthly average cash price, high-grade.

Source: American Bureau of Metal Statistics Inc.

TABLE 25

LEADING WORLD PRODUCERS OF BAUXITE[1]

(Thousand metric tons, gross weight)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
Australia	32,384	34,102	36,192	38,583	[2]40,697	36,392
Guinea[e]	13,300	13,500	[r]15,619	[2]16,523	16,500	15,088
Jamaica	[r]6,930	[r]7,802	7,305	9,601	[2]10,921	8,512
Brazil	6,544	6,567	8,083	8,665	8,750	7,722
U.S.S.R.[e 3]	5,710	5,725	5,715	[r]5,735	5,295	5,636
India	[r]2,662	[r]2,779	3,691	4,768	5,000	3,780
China[e]	1,650	2,400	3,500	4,000	4,000	3,110
Suriname	[r]3,847	2,522	3,434	3,530	[2]3,267	3,320
Yugoslavia	3,459	3,394	3,034	3,252	[2]2,952	3,218
Greece	2,230	2,472	2,533	2,576	2,700	2,502
Hungary	3,022	3,101	2,593	2,644	2,600	2,792
Sierra Leone	1,246	1,390	1,379	1,562	1,600	1,435
Guyana	2,074	2,785	1,774	1,321	1,600	1,911
Total	85,058	88,539	94,852	102,760	105,882	95,418
Other	[r]3,115	3,352	3,505	2,935	3,236	3,229
Grand total	[r]88,173	[r]91,891	98,357	105,695	109,118	98,647

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 14, 1991.
[2]Reported figure.
[3]Includes bauxite equivalent of nepheline syenite concentrate and alunite ore, which are produced in the U.S.S.R. only.

TABLE 26

LEADING WORLD PRODUCERS OF ALUMINUM[1]

(Thousand metric tons)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
United States	3,037	3,343	3,944	4,030	[2]4,048	3,680
U.S.S.R.[e]	2,300	2,400	2,400	2,400	2,200	2,340
Canada	1,355	1,540	1,534	1,555	1,570	1,511
Australia	882	1,004	1,150	1,244	[2]1,234	1,103
Brazil	757	843	874	890	[2]931	859
Norway	726	[r]853	864	863	[2]845	830
China[e]	410	615	[r]710	[r]750	850	667
Germany, Federal Republic of:						
Western states	765	738	744	742	[2]720	742
Venezuela	[r]418	[r]428	437	540	[2]546	474
India	257	265	375	423	[2]433	351
Spain	[r]355	341	323	352	[2]355	345
France	322	323	328	335	[2]326	327
United Kingdom	276	294	300	297	[2]290	291
Netherlands	266	276	278	279	[2]258	271
New Zealand	236	252	264	258	260	254
Yugoslavia[e]	282	244	260	[r]275	290	270
Romania	269	260	265	269	180	249
Indonesia	219	202	185	197	[2]186	198
Italy	243	233	222	219	[2]232	230
Total	[r]13,375	[r]14,454	15,457	15,918	15,754	14,992
Other	[r]2,034	[r]1,964	2,041	2,100	2,064	2,041
Grand total	[r]15,409	[r]16,418	17,498	18,018	17,818	17,032

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 24, 1991.
[2]Reported figure.

TABLE 27

LEADING WORLD PRODUCERS OF CHROMITE[1]

(Thousand metric tons, gross weight)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
South Africa, Republic of	3,907	[r]3,789	4,245	4,951	[2]4,498	4,278
U.S.S.R.	3,640	3,570	3,700	3,800	3,800	3,702
India	[r]630	624	821	1,003	995	815
Turkey	[r]618	762	851	[r e]1,000	850	816
Albania[e]	850	830	750	[r]610	600	728
Zimbabwe	533	570	561	627	600	578
Finland	678	543	[e]700	[r e]498	500	584
Brazil	[r]353	[r]338	410	476	476	411
Philippines	174	188	[e]190	[r e]173	198	185
Total	[r]11,383	[r]11,214	12,228	13,138	12,517	12,096
Other	[r]414	[r]423	365	404	329	387
Grand total	[r]11,797	[r]11,637	12,593	13,542	12,846	12,483

[e]estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 7, 1991.
[2]Reported figure.

TABLE 28

LEADING WORLD PRODUCERS OF MINE COPPER[1]

(Thousand metric tons, Cu content of ore)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
Chile[2]	1,399	1,413	1,472	1,628	[3]1,603	1,503
United States[2]	1,144	1,244	1,420	1,497	[3]1,587	1,378
Canada[2]	699	794	758	704	780	747
U.S.S.R.[e 2]	620	630	640	640	600	626
Zaire	[r]528	516	495	467	370	475
Zambia	462	463	432	[e]445	445	449
Poland	434	438	437	384	380	415
China[e]	185	250	375	375	375	312
Peru[2]	400	418	323	373	[3]334	369
Australia	248	233	238	296	[3]316	266
Mexico	189	254	280	254	298	255
Papua New Guinea	178	218	219	204	[3]170	198
South Africa, Republic of	184	188	168	192	[3]188	184
Philippines	223	216	218	190	184	206
Total	[r]6,893	[r]7,274	7,475	7,648	7,630	7,384
Other	[r]1,046	[r]982	980	1,082	1,185	1,055
Grand total	[r]7,939	[r]8,256	8,455	8,730	8,815	8,439

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 28, 1991.
[2]Recoverable.
[3]Reported figure.

TABLE 29

LEADING WORLD PRODUCERS OF MINE GOLD[1]

(Kilograms)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
South Africa, Republic of	638,047	596,456	617,719	607,460	[2]602,789	612,494
United States	116,296	153,870	200,914	265,541	[2]290,202	205,365
U.S.S.R.[e]	275,000	275,000	280,000	[r]285,000	250,000	273,000
Australia	75,079	110,696	156,950	203,563	[2]242,299	157,717
Canada	102,899	115,818	134,813	159,494	[2]164,991	135,603
China[e]	66,000	72,000	78,000	[r]90,000	100,000	81,200
Brazil[e]	67,500	83,700	100,200	[r]100,000	80,000	86,280
Philippines	40,322	32,599	35,500	35,300	35,000	35,744
Papua New Guinea	35,075	33,250	38,129	27,538	[2]31,035	33,005
Colombia	39,995	26,550	29,020	27,090	28,000	30,131
Chile	[r]17,947	17,035	20,614	22,559	[2]27,591	21,149
Zimbabwe	14,853	14,710	14,191	16,000	[2]16,900	15,331
Ghana	8,931	10,201	11,601	13,358	[2]16,840	12,186
Total	[r]1,497,944	[r]1,541,885	1,717,651	1,852,903	1,885,647	1,699,206
Other	[r]108,625	[r]118,644	130,586	146,555	164,299	133,742
Grand total	[r]1,606,569	[r]1,660,529	1,848,237	1,999,458	2,049,946	1,832,948

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 21, 1991.
[2]Reported figure.

TABLE 30

LEADING WORLD PRODUCERS OF IRON ORE, IRON ORE CONCENTRATES, AND IRON ORE AGGLOMERATES[1]

(Thousand metric tons, gross weight)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	249,959	250,874	249,754	241,348	[2]236,200	245,627
Brazil	[r]129,405	[r]134,497	146,008	153,740	[2]154,370	143,604
Australia[3]	94,015	101,748	96,084	105,810	112,000	101,931
China[e]	90,000	100,000	99,000	100,000	108,000	99,400
United States	39,486	47,648	57,515	59,032	[2]56,408	52,018
India	47,800	51,018	49,961	51,434	[2]53,700	50,783
Canada	36,167	37,702	39,934	39,445	[2]36,443	37,938
South Africa, Republic of	24,483	22,008	25,248	29,958	[2]30,347	26,409
Venezuela	[r]16,753	[r]17,782	18,932	18,390	[2]20,365	18,444
Sweden	[r]20,475	[r]19,363	20,440	21,763	[2]19,877	20,384
Mauritania	[r]9,170	9,002	9,780	12,114	[2]11,420	10,297
Korea, North[e]	8,500	8,500	9,000	9,500	9,500	9,000
France	12,437	[r]11,267	9,872	9,319	[2]8,720	10,323
Chile	6,981	6,637	7,710	8,761	[2]8,248	7,667
Mexico	7,298	7,523	8,431	8,141	[2]8,073	7,893
Turkey	5,249	5,366	5,481	3,602	5,242	4,988
Yugoslavia	6,618	5,983	5,545	5,080	[2]4,132	5,472
Liberia	15,295	13,742	12,767	12,300	[2]4,050	11,631
Spain	6,089	4,492	4,212	4,566	[2]3,030	4,478
Total	[r]798,178	[r]830,935	853,150	872,357	878,913	846,707
Other	[r]65,472	[r]58,692	54,372	53,713	40,342	54,518
Grand total	[r]863,650	[r]889,627	907,522	926,070	919,255	901,225

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 28, 1991.
[2]Reported figure.
[3]Dry weight.

TABLE 31

LEADING WORLD PRODUCERS OF CRUDE STEEL[1]

(Thousand metric tons)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	160,550	161,887	163,037	160,000	154,000	159,895
Japan	98,275	98,513	105,681	107,908	[2]110,339	104,143
United States	74,032	80,877	90,650	88,852	[2]89,726	84,827
China[e]	52,100	56,000	59,000	61,200	66,000	58,860
Germany, Federal Republic of: Western states	37,134	36,248	41,023	41,073	[2]38,435	38,783
Italy	22,883	22,859	23,760	25,213	[2]25,439	24,031
Korea, Republic of	14,554	16,782	19,117	21,873	[2]23,125	19,090
Brazil	21,234	22,231	24,536	25,018	[2]20,572	22,718
France	17,624	17,726	19,003	19,286	[2]19,017	18,531
United Kingdom	14,811	17,425	19,013	18,813	[2]17,908	17,594
Czechoslovakia	15,112	15,356	15,319	15,465	[2]14,813	15,213

See footnotes at end of table.

TABLE 31—Continued

LEADING WORLD PRODUCERS OF CRUDE STEEL[1]

(Thousand metric tons)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
Canada	14,100	14,700	14,778	14,731	[2]14,500	14,562
Romania	14,276	13,885	[e]14,000	14,415	14,000	14,115
Poland	17,144	17,148	16,873	15,094	[2]13,553	15,962
India	11,427	12,883	13,022	12,782	13,000	12,623
Spain	11,976	11,691	11,685	12,684	[2]12,705	12,148
Belgium	9,770	9,787	11,222	10,948	[2]11,426	10,631
Taiwan	5,679	5,949	8,313	9,047	[2]9,554	7,708
Turkey	5,928	7,044	7,982	7,934	[2]9,450	7,668
South Africa, Republic of	8,895	[r]8,991	8,837	9,567	[2]8,738	9,006
Mexico	7,225	7,642	7,779	7,821	[2]8,705	7,834
Korea, North[e]	6,500	6,500	8,000	8,000	8,000	7,400
Total	[r]641,229	[r]662,124	702,630	707,724	703,005	683,342
Other	[r]71,476	[r]72,465	74,906	74,918	68,974	72,548
Grand total	[r]712,705	[r]734,589	777,536	782,642	771,979	755,890

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

[1]Steel ingots and castings. Table includes data available through June 21, 1991.

[2]Reported figure.

TABLE 32

LEADING WORLD PRODUCERS OF MINE LEAD[1]

(Thousand metric tons, Pb content of ore)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
Australia	448	489	466	495	[2]563	492
United States[3]	353	319	394	420	[2]495	396
U.S.S.R.[e]	[r]520	[r]510	[r]520	[r]500	450	500
China[e]	227	[r]267	312	341	[2]315	292
Canada	349	414	368	275	[2]236	328
Peru	194	204	149	192	[2]189	186
Mexico	183	177	171	163	[2]180	175
Korea, North[e]	110	110	110	[r]120	120	114
Sweden	89	90	92	89	90	90
Yugoslavia	[r]103	[r]94	95	86	[2]73	90
Total	[r]2,576	[r]2,674	2,677	2,681	2,711	2,664
Other	[r]769	[r]751	753	687	656	723
Grand total	[r]3,345	[r]3,425	3,430	3,368	3,367	3,387

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

[1]Table includes data available through June 14, 1991.

[2]Reported figure.

[3]Recoverable.

TABLE 33

LEADING WORLD PRODUCERS OF MANGANESE ORE[1]

(Thousand metric tons, gross weight)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	9,300	9,400	9,100	[r e]9,100	8,800	9,140
South Africa, Republic of	3,719	2,892	3,454	3,623	[2]3,673	3,472
China	2,723	2,610	3,212	[r e]3,200	3,200	2,989
Gabon	2,510	2,403	2,254	2,592	2,600	2,472
Australia	1,649	1,853	1,985	2,124	[2]1,988	1,920
Brazil	2,697	2,067	1,991	2,080	2,000	2,167
India	1,213	1,302	1,333	1,334	1,350	1,306
Mexico[e]	459	385	444	[r]394	413	419
Ghana	304	274	260	279	255	274
Hungary	63	78	81	84	85	78
Romania[e]	[2]67	65	65	[r]60	55	62
Total	24,704	[r]23,329	24,179	24,870	24,419	24,300
Other	[r]222	[r]208	214	245	246	227
Grand total	[r]24,926	[r]23,537	24,393	25,115	24,665	24,527

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 17, 1991.
[2]Reported figure.

TABLE 34

LEADING WORLD PRODUCERS OF MINE NICKEL[1]

(Thousand metric tons, Ni content)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.[e]	[r]260	[r]275	[r]280	[r]280	260	271
Canada	164	189	199	196	2/202	190
New Caledonia[e]	62	57	68	[r]99	88	75
Australia	77	75	62	67	70	70
Indonesia	54	58	58	63	58	58
Cuba	32	34	42	44	38	38
South Africa, Republic of[e]	31	34	35	36	36	34
Dominican Republic	22	33	[e]29	[e]32	33	30
Total	[r]702	[r]755	773	817	785	766
Other	151	[r]138	151	150	152	148
Grand total	[r]853	[r]893	924	967	937	915

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 4, 1991.
[2]Reported figure.

TABLE 35

LEADING WORLD PRODUCERS OF MINE SILVER[1]

(Metric tons, Ag content)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
Mexico	2,303	2,415	2,359	2,306	[2]2,346	2,346
United States	1,074	1,241	1,661	2,007	[2]2,170	1,631
Peru	1,926	2,054	1,552	[e]1,840	[2]1,725	1,819
U.S.S.R.[e] (refinery)	1,500	[r]1,510	[r]1,520	[r]1,520	1,400	1,490
Canada (shipments)	1,088	1,375	1,443	1,262	[2]1,380	1,310
Australia	1,023	1,119	1,118	1,075	[2]1,273	1,122
Poland	829	831	1,063	1,003	1,000	945
Chile	500	500	507	545	[2]633	537
Spain	327	350	353	[r e]450	500	396
Morocco	[r]79	[e]44	226	237	236	164
Sweden	[r]263	[r]254	208	228	220	235
South Africa, Republic of	222	208	200	182	[2]161	195
Japan (refinery)	351	281	252	156	[2]150	238
Papua New Guinea	56	61	70	94	130	82
Yugoslavia (refinery)	177	165	139	133	[2]105	144
Namibia	108	[r]103	117	108	90	105
Total	[r]11,826	[r]12,511	12,788	13,146	13,519	12,758
Other	[r]1,208	[r]1,333	1,545	1,614	1,589	1,458
Grand total	[r]13,034	[r]13,844	14,333	14,760	15,108	14,216

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 21, 1991.
[2]Reported figure.

TABLE 36

LEADING WORLD PRODUCERS OF MINE TIN[1]

(Metric tons, Sn content of ore)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
China[e]	15,000	20,000	[r]29,500	[r]40,000	40,000	28,900
Brazil	26,246	[r]30,405	44,102	50,232	[2]39,149	38,027
Indonesia	24,497	26,093	29,590	31,263	[2]30,200	28,329
Malaysia	29,135	30,388	28,866	32,034	[2]28,468	29,778
U.S.S.R.[e]	14,500	16,000	16,000	16,000	15,000	15,500
Thailand	[r]16,800	[r]14,852	14,225	14,922	[2]14,635	15,087
Bolivia	10,462	8,128	10,504	15,849	18,000	12,589
Australia	8,508	7,691	7,009	7,709	[2]7,377	7,659
Peru	4,817	5,263	4,378	5,053	[2]5,134	4,929
United Kingdom	4,276	4,003	3,454	3,846	[2]4,200	3,956
Canada	[r]2,450	[r]3,390	3,300	3,300	[2]3,464	3,181
Zaire	2,650	2,378	2,775	2,346	2,250	2,480
Portugal	196	64	81	63	[2]1,404	362
Zimbabwe	1,470	1,410	1,140	1,300	[2]1,300	1,324
Total	[r]161,007	[r]170,065	194,924	223,917	210,581	192,099
Other	[r]12,163	[r]11,251	10,211	9,856	8,752	10,446
Grand total	[r]173,170	[r]181,316	205,135	233,773	219,333	202,545

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 28, 1991.
[2]Reported figure.

TABLE 37

LEADING WORLD PRODUCERS OF MINE URANIUM[1]

(Metric tons, U_3O_8 content)

Country[2]	1986	1987	1988	1989[P]	1990[P]	Average 1986-90
Canada	13,824	14,666	14,695	13,475	10,374	13,407
Australia	4,899	[r]4,458	4,165	4,311	4,162	4,399
United States	6,126	5,893	5,956	6,276	4,030	5,656
Namibia	4,112	4,175	4,139	3,629	3,787	3,968
Niger	3,671	3,501	3,496	3,514	3,340	3,504
France	3,804	3,981	4,033	3,795	3,321	3,787
South Africa, Republic of	5,460	4,735	4,583	3,456	2,875	4,222
Gabon	1,059	934	1,094	1,047	828	992
Total	[r]42,955	[r]42,343	42,161	39,503	32,717	39,936
Others	[r]967	[r]1,098	1,016	1,032	885	1,000
Grand total	43,922	[r]43,441	43,177	40,535	33,602	40,935

[P]Preliminary. [r]Revised.

[1]Table includes data available through Oct. 31, 1991.

[2]Known market economy producing countries; centrally planned economy countries excluded.

Source for United States—Luther Smith, U.S. Dep. of Energy, 254-5565 (14I92)—concentrate content.

TABLE 38

LEADING WORLD PRODUCERS OF MINE ZINC[1]

(Thousand metric tons, Zn content of ore)

Country	1986	1987	1988	1989[P]	1990[e]	Average 1986-90
Canada	1,291	1,482	1,370	1,273	[2]1,177	1,319
Australia	712	778	759	803	[2]937	798
U.S.S.R.[e]	810	810	810	810	750	798
China	396	458	527	620	619	524
Peru	598	613	485	597	[2]577	574
United States	221	233	256	288	[2]543	308
Mexico	271	[r]272	262	284	[2]322	282
Spain	[r]233	273	275	282	258	264
Korea, North[e]	225	220	225	[r]230	230	226
Poland	185	184	[e]184	[e]184	180	183
Ireland	182	177	173	[e]169	166	173
Sweden	219	219	189	174	157	192
Brazil	124	133	156	157	[2]132	140
Japan	222	166	147	132	[2]127	159
Total	[r]5,689	[r]6,018	5,818	6,003	6,175	5,941
Other	[r]1,153	[r]1,158	1,149	1,188	1,150	1,160
Grand total	[r]6,842	[r]7,176	6,967	7,191	7,325	7,100

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

[1]Table includes data available through July 2, 1991.

[2]Reported figure.

TABLE 39

LEADING WORLD PRODUCERS OF HYDRAULIC CEMENT[1]

(Thousand metric tons)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
China[e]	[r]161,560	180,000	203,000	207,000	203,000	190,912
U.S.S.R.	135,119	137,404	139,499	140,436	137,000	137,892
Japan	71,264	71,551	77,554	79,717	82,000	76,417
United States (including Puerto Rico)	72,499	72,122	70,989	71,268	[2]71,310	71,638
India	36,400	36,980	40,700	42,100	44,000	40,036
Italy	35,938	37,257	[e]37,000	[e]36,500	36,500	36,639
Korea, Republic of	23,403	25,662	28,995	30,474	[2]33,600	28,427
Germany, Federal Republic of: Western states	26,580	25,268	26,215	28,499	30,000	27,312
Brazil	25,297	25,470	25,328	25,883	25,000	25,396
Spain (including Canary Islands)[e]	24,000	23,400	24,000	24,500	25,000	24,180
Turkey	20,004	21,980	22,675	23,800	24,100	22,512
France	[e]23,500	23,560	25,300	[e]24,000	24,000	24,072
Mexico	19,751	[r]22,347	22,513	22,766	[2]22,762	22,028
Taiwan	14,806	15,663	17,281	18,043	18,458	16,850
Poland	15,800	16,100	17,000	17,100	17,000	16,600
United Kingdom	13,413	14,311	16,506	16,000	16,000	15,246
Indonesia	10,941	11,844	12,472	14,099	[2]13,762	12,624
Romania[e]	[2]14,216	14,300	14,000	14,000	13,000	13,903
Greece	13,341	13,168	13,053	12,535	12,500	12,919
Iran	12,273	12,729	12,202	[e]12,500	12,500	12,441
Canada	10,602	12,603	12,350	12,591	[2]11,252	11,880
Germany, Federal Republic of: Eastern states	11,988	12,430	12,510	[e]12,500	10,000	11,886
Total	[r]792,695	[r]826,149	871,142	886,311	882,744	851,808
Other	[r]215,812	[r]227,587	237,604	246,405	251,604	235,802
Grand total	[r]1,008,507	[r]1,053,736	1,108,746	1,132,716	1,134,348	1,087,611

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

[1]Table includes data available through June 28, 1991.

[2]Reported figure.

TABLE 40

LEADING WORLD PRODUCERS OF NATURAL DIAMOND[1]

(Thousand carats)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
Australia	29,211	30,333	34,826	35,080	[2]34,662	32,822
Zaire	23,304	19,425	18,163	17,755	18,000	19,329
Botswana	13,090	13,208	15,229	15,252	[2]17,352	14,826
U.S.S.R.[e]	[r]14,800	[r]14,800	[r]15,000	[r]15,000	15,000	14,920
South Africa, Republic of	10,228	9,053	8,504	9,116	[2]8,694	9,119
Angola[e]	250	190	1,000	[2]1,245	1,280	793
China[e]	1,000	1,000	1,000	1,000	1,000	1,000
Namibia	1,010	[r]1,021	938	927	[2]748	929
Brazil	625	[r]500	533	500	500	532
Total	[r]93,518	[r]89,530	95,193	95,875	97,236	94,270
Other	[r]2,223	[r]1,984	1,703	1,868	1,860	1,928
Grand total	[r]95,741	[r]91,514	96,896	97,743	99,096	96,198

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

[1]Gem and industrial grades undifferentiated. Table includes data available through May 17, 1991.

[2]Reported figure.

Table 41

LEADING WORLD PRODUCERS OF NITROGEN IN AMMONIA[1]

(Thousand metric tons, N content)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	19,600	20,000	20,200	19,500	18,500	19,560
China[e]	15,500	14,500	16,200	17,000	18,000	16,240
United States	10,804	12,004	12,544	12,201	[2]12,646	12,040
India[3]	4,933	5,300	6,205	6,661	[2]7,022	6,024
Netherlands	[r]2,185	[r]2,287	2,956	3,001	3,163	2,718
Canada	2,910	2,887	3,289	3,340	[2]2,964	3,078
Indonesia	2,299	2,364	2,367	2,526	2,600	2,431
Mexico	1,602	[r]1,743	2,067	2,100	[2]2,164	1,935
Poland	2,124	2,177	2,338	[r e]2,300	1,950	2,178
Romania	3,040	2,788	[e]2,800	[e]2,600	1,900	2,626
Germany, Federal Republic of: Western states	1,570	[r]1,931	1,824	1,749	[2]1,634	1,742
France	2,022	2,029	[e]1,832	[e]1,476	[2]1,586	1,789
Japan	1,508	1,556	1,524	1,539	[2]1,531	1,532
Trinidad and Tobago	1,141	1,128	1,386	[e]1,514	[2]1,520	1,338
Bulgaria	1,091	1,070	1,342	[r e]1,300	1,200	1,201
Italy	1,553	1,435	1,561	1,446	1,197	1,438
Pakistan	1,154	1,179	1,173	[r e]1,175	1,180	1,172
United Kingdom	1,388	1,415	1,105	1,037	1,148	1,219
Germany, Federal Republic of: Eastern states	1,193	1,176	1,156	[e]1,150	1,000	1,135
Total	[r]77,617	[r]78,969	83,869	83,615	82,905	81,395
Other	[r]13,436	[r]14,626	15,373	15,401	15,120	14,791
Grand total	[r]91,053	[r]93,595	99,242	99,016	98,025	96,186

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

[1]Table includes data available through May 31, 1991.

[2]Reported figure.

[3]Data are for years beginning Apr. 1 of that stated.

TABLE 42

LEADING WORLD PRODUCERS OF PHOSPHATE ROCK[1]

(Thousand metric tons, gross weight)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
United States	38,710	40,954	45,389	48,866	[2]46,343	44,052
U.S.S.R.[e]	33,900	34,100	34,400	34,400	33,500	34,060
Morocco[3]	21,178	21,300	25,015	18,067	[2]21,396	21,391
China[e]	6,700	9,000	[r]16,600	[r]17,000	17,300	13,320
Tunisia	5,951	[e]6,390	6,103	6,610	[2]6,259	6,263
Jordan	6,249	6,800	6,611	6,900	[2]5,925	6,497
Israel	3,673	3,798	3,479	3,922	[2]3,516	3,678
South Africa, Republic of	2,920	2,623	2,850	2,963	[2]3,165	2,904
Brazil	4,509	4,777	4,672	3,655	[2]2,968	4,116
Togo	2,314	2,644	3,464	3,355	[2]2,314	2,818
Total	[r]126,104	[r]132,386	148,583	145,738	142,686	139,099
Other	[r]14,925	[r]15,231	13,458	13,228	11,420	13,652
Grand total	[r]141,029	[r]147,617	162,041	158,966	154,106	152,752

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

[1]Includes only phosphate rock; Thomas slag and guano are excluded. Table includes data available through May 31, 1991.

[2]Reported figure.

[3]Includes output from Western Sahara.

TABLE 43

LEADING WORLD PRODUCERS OF MARKETABLE POTASH[1]

(Thousand metric tons, K_2O equivalent)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	10,228	10,888	11,301	10,200	9,500	10,423
Canada	6,753	7,668	8,154	7,074	[2]7,372	7,404
Germany, Federal Republic of:						
Eastern states	3,485	3,510	3,510	3,200	2,700	3,281
Western states	2,161	2,199	2,290	2,182	2,200	2,206
United States	1,202	1,262	1,521	1,595	[2]1,713	1,459
Israel	1,255	1,253	1,244	1,338	1,350	1,288
France	1,617	1,539	1,502	1,195	1,300	1,431
Total	[r]26,701	[r]28,319	29,522	26,784	26,135	27,492
Other	[r]2,061	[r]2,141	2,372	2,426	2,175	2,235
Grand total	[r]28,762	[r]30,460	31,894	29,210	28,310	29,727

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 19, 1991.
[2]Reported figure.

TABLE 44

LEADING WORLD PRODUCERS OF SALT[1]

(Thousand metric tons)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
United States (including Puerto Rico)[e]	[r]33,326	[r]33,141	[r]34,361	[r]35,292	36,959	34,616
China[e]	17,300	18,000	22,000	28,000	20,000	21,060
U.S.S.R.	15,300	15,400	14,800	15,000	14,500	15,000
Germany, Federal Republic of: Western states	13,102	13,466	12,447	[e]13,100	12,550	12,933
Canada	10,332	10,129	10,687	11,057	[2]11,097	10,660
India[e]	10,118	9,902	9,204	[r e]9,603	9,503	9,666
France[e]	[2]7,084	7,840	[r]7,570	[r]7,500	7,450	7,489
Australia	6,130	6,486	7,165	[e]7,345	7,400	6,905
Mexico	6,205	6,393	6,788	6,942	7,135	6,693
Romania	5,355	5,395	[e]5,400	6,771	6,500	5,884
United Kingdom	6,855	7,081	6,130	[r e]5,700	5,700	6,293
Poland	[r]5,419	[r]6,175	6,179	[r e]4,670	4,800	5,449
Italy[e]	4,007	4,265	[r e]4,289	[r e]4,186	4,080	4,165
Brazil	2,200	4,550	4,356	3,653	3,800	3,712
Netherlands	3,763	3,979	3,693	3,756	3,800	3,798
Spain	3,101	3,195	[r e]3,455	[e]3,100	3,200	3,210
Germany, Federal Republic of: Eastern states	3,134	3,134	3,060	[r e]3,060	2,555	2,989
Japan	1,370	1,397	1,363	1,367	1,370	1,373
Turkey	1,172	1,218	1,358	[e]1,350	1,350	1,290
Total	[r]155,273	[r]161,146	164,305	171,452	163,749	163,185
Other	[r]19,456	[r]17,454	18,505	19,025	19,562	18,800
Grand total	[r]174,729	[r]178,600	182,810	190,477	183,311	181,985

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 14, 1991.
[2]Reported figure.

TABLE 45

LEADING WORLD PRODUCERS OF ELEMENTAL SULFUR[1]

(Thousand metric tons)

Country	1986				1987			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[2]4,043	W	7,044	11,087	[2]3,202	W	7,336	10,538
U.S.S.R.[e]	[3]3,500	2,090	3,075	[r]8,665	[3]3,500	2,150	4,100	[r]9,750
Canada[e]	—	—	[r]6,472	[r]6,472	—	—	[r]6,687	[r]6,687
Poland[e]	[3]4,987	—	220	5,207	[3]5,104	—	220	5,324
China[e]	300	2,500	300	3,100	300	3,700	500	4,500
Japan	—	158	[r]2,240	[r]2,398	—	79	[r]2,270	[r]2,349
Mexico	[2]1,588	—	[re]590	[re]2,178	[2]1,806	—	[re]655	[re]2,461
Germany, Federal Republic of: Western states[e]	—	—	1,773	1,773	—	—	[r]1,824	[r]1,824
Saudi Arabia	—	—	1,446	1,446	—	—	1,432	1,432
Iraq[e]	[2]600	—	200	800	[2]707	—	250	[4]957
Spain	—	1,195	[e]220	[e]1,415	—	960	[e]235	[e]1,195
France[e]	—	—	[r]1,317	[r]1,317	—	—	[r]1,263	[r]1,263
Italy	—	309	[re]185	[re]494	—	[r]314	[re]190	[re]504
South Africa, Republic of	—	499	[e]218	[e]717	—	468	[e]215	[e]683
Finland	—	275	302	577	—	[r]313	[re]270	[re]583
Kuwait[e]	—	—	260	260	—	—	310	310
Yugoslavia	—	320	[e]178	[e]498	—	258	[e]178	[e]436
Sweden	—	227	174	401	—	215	[re]180	[e]395
Philippines	—	113	[e]120	[e]233	—	158	[e]140	[e]298
Brazil	[2]6	92	174	272	[2]6	77	230	313
Iran[e]	30	—	250	280	30	—	300	330
Belgium[e]	—	—	300	300	—	—	300	300
Total	[r]15,054	[r]7,778	[r]27,058	[r]49,890	14,619	8,615	28,255	51,489
Other	[r]154	[r]1,083	[r]2,608	[r]3,845	178	1,131	3,784	5,093
Grand total	[r]15,208	[r]8,861	[r]29,666	[r]53,735	[r]14,797	[r]9,746	[r]32,039	[r]56,582

Country	1988				1989[p]			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[2]3,174	W	7,572	10,746	[2]3,888	W	7,704	11,592
U.S.S.R.[e]	[3]3,500	2,150	5,115	[r]10,765	[3]3,450	2,150	4,300	[r]9,900
Canada[e]	—	—	[r]6,996	[r]6,996	—	—	[r]6,697	[r]6,697
Poland	[3]5,090	—	[e]190	[e]5,280	[3]4,960	—	190	[re]5,150
China[e]	300	3,900	550	4,750	300	4,000	600	4,900
Japan	—	71	2,361	2,432	—	62	2,560	2,622
Mexico	[2]1,628	—	[e]750	[e]2,378	[2]1,528	—	[re]841	[re]2,369
Germany, Federal Republic of: Western states[e]	—	—	[r]1,747	[r]1,747	—	—	1,885	1,885
Saudi Arabia	—	—	1,378	1,378	—	—	[re]1,400	[re]1,400
Iraq[e]	[2]700	—	350	1,050	[2]900	—	370	1,270
Spain	—	1,057	[re]120	[re]1,177	—	938	[re]120	[re]1,058
France[e]	—	—	[r]1,181	[r]1,181	—	—	[re]1,036	[re]1,036
Italy	—	310	[re]190	[re]500	—	[re]320	[re]190	[re]510
South Africa, Republic of	—	505	233	738	—	461	224	685
Finland	—	271	[e]287	[re]558	—	365	[re]271	[re]636
Kuwait[e]	—	—	360	360	—	—	575	575
Yugoslavia	—	252	[e]173	[e]425	—	[e]255	[e]173	[e]428
Sweden	—	286	170	[re]456	—	[re]233	[re]165	[re]398

See footnotes at end of table.

TABLE 45—Continued

LEADING WORLD PRODUCERS OF ELEMENTAL SULFUR[1]

(Thousand metric tons)

Country	1988				1989[p]			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
Philippines	—	[e]160	[e]150	[e]310	—	[e]195	[e]185	[e]380
Brazil	[2]6	103	213	322	[2]6	72	223	301
Iran[e]	30	—	300	330	30	—	300	330
Belgium[e]	—	—	310	310	—	—	320	320
Total	14,428	9,065	30,696	54,189	15,062	9,051	30,329	54,442
Other	134	1,131	3,074	4,339	127	1,063	3,085	4,275
Grand total	14,562	10,196	33,770	58,528	15,189	10,114	33,414	58,717

Country	1990[e]				Average 1986-90			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[3 4]3,726	W	[4]7,834	[4]11,560	[2]3,607	W	7,498	11,105
U.S.S.R.[e]	[3]3,000	1,900	4,125	9,025	[3]3,390	2,088	4,143	9,621
Canada[e]	—	—	6,947	6,947	—	—	6,760	6,760
Poland	[3]4,850	—	180	5,030	4,998	—	200	5,198
China[e]	300	4,000	600	4,900	300	3,620	510	4,430
Japan	—	[4]53	2,650	2,703	—	85	2,416	2,501
Mexico	[3]1,450	—	890	2,340	1,600	—	745	2,345
Germany, Federal Republic of: Western states[e]	—	—	1,835	1,835	—	—	1,813	1,813
Saudi Arabia	—	—	1,500	1,500	—	—	1,431	1,431
Iraq[e]	[2]800	—	250	1,050	741	—	284	1,025
Spain	—	950	135	1,085	—	1,020	166	1,186
France	—	—	1,045	1,045	—	—	1,168	1,168
Italy	—	300	190	490	—	311	189	500
South Africa, Republic of	—	[4]452	236	[4]688	—	477	225	702
Finland	—	360	272	632	—	317	280	597
Kuwait[e]	—	—	400	400	—	—	381	381
Yugoslavia	—	250	173	423	—	267	175	442
Sweden	—	235	165	400	—	239	171	410
Philippines	—	185	185	370	—	162	156	318
Brazil	[2]6	90	220	316	6	87	212	305
Iran[e]	30	—	300	330	30	—	290	320
Belgium[e]	—	—	320	320	—	—	310	310
Total	14,162	8,775	30,452	53,389	14,636	8,585	28,712	51,934
Other	129	1,047	3,105	4,279	173	1,162	3,777	5,112
Grand total	14,291	9,822	33,557	57,668	14,809	9,748	32,489	57,046

[e]Estimated. [p]Preliminary. [r]Revised. W Withheld to avoid disclosing company proprietary data; included with "Byproduct."

[1]Includes all recorded production of sulfur, regardless of the form in which it is recovered. Thus, it includes elemental sulfur, whether mined by conventional methods or by the Frasch process, as well as (1) elemental sulfur and the S content of compounds such as H_2S, SO_2, and H_2SO_4 recovered as a principal product of pyrite mining and as a byproduct of the recovery of crude oil and natural gas and as a byproduct of petroleum refining, coal treatment, and metal smelting and/or refining, and (2) sulfur recovered from tar sands, spent oxides, and other miscellaneous sources. Table includes data available through May 17, 1991.

[2]Entirely Frasch process sulfur.

[3]Includes Frasch process sulfur as follows, in thousand metric tons: Poland: 1986—4,437, 1987—4,410, 1988—4,411, 1989—4,300, and 1990—4,200 (estimated); the U.S.S.R. (estimated): 1986—1,100, 1987—1,100, 1988—1,100, 1989—1,100, and 1990—1,000; and total of individually listed countries and grand total: 1986—11,774, 1987—11,231, 1988—11,019 (revised), 1989—11,722 (revised), and 1990—11,182.

[4]Reported figure.

TABLE 46

LEADING WORLD PRODUCERS OF COAL (ALL GRADES)[1]

(Million metric tons)

Country	1986			1987			1988		
	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total
China[e]	(2)	894	894	(2)	928	928	(2)	985	985
United States	69	738	808	71	762	833	77	785	862
U.S.S.R.	163	588	751	r164	595	r759	172	599	771
German Democratic Republic	311	—	311	309	—	309	310	—	310
Australia	38	170	208	r44	r179	r222	43	177	220
India	8	163	171	8	177	186	13	189	202
Poland	67	192	259	73	193	266	74	193	267
Germany, Federal Republic of	114	81	195	109	76	185	109	73	182
South Africa, Republic of	—	177	177	—	177	177	—	181	181
Czechoslovakia	103	26	129	102	26	128	100	26	126
United Kingdom	(4)	108	108	(4)	105	105	(4)	104	104
Korea, North	14	48	62	15	55	70	18	62	80
Yugoslavia	70	(4)	70	71	(4)	72	72	(4)	73
Canada	8	50	58	10	51	61	12	58	71
Turkey	45	r8	r53	46	8	54	39	7	46
Greece	39	—	39	45	—	45	48	—	48
Romania	40	11	51	44	12	56	51	12	63
Spain	17	22	38	16	19	35	17	19	36
Bulgaria	35	(4)	35	35	(4)	35	35	(4)	35
Colombia	—	12	12	—	15	15	—	15	15
Hungary	21	2	23	21	2	23	19	2	21
Total	1,162	r3,290	r4,452	r1,183	r3,380	r4,564	1,209	3,487	4,698
Other	r22	r105	r127	r23	r103	r125	23	103	124
Grand total	r1,184	r3,395	4,579	r1,206	r3,483	r4,689	1,232	3,590	4,822

Country	1989[p]			1990[e]			Average 1986-90		
	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total
China[e]	(2)	1,040	1,040	(2)	1,053	1,053	(2)	980	980
United States	78	811	890	3,81	3,858	3,940	75	791	867
U.S.S.R.	164	577	740	157	543	700	164	580	744
German Democratic Republic	301	—	301	300	—	300	306	—	306
Australia	48	190	238	3,48	3,198	3,246	44	183	227
India	13	199	212	14	209	223	11	187	199
Poland	72	178	250	68	148	215	71	181	251
Germany, Federal Republic of	110	77	187	3,108	3,77	3,184	110	77	187
South Africa, Republic of	—	176	176	—	175	175	—	177	177
Czechoslovakia	94	25	119	86	23	109	97	25	122
United Kingdom	(4)	101	101	(3,4)	3,99	3,99	(4)	103	103
Korea, North	20	65	85	22	68	90	18	60	77
Yugoslavia	70	(4)	71	76	(4)	76	72	(4)	72
Canada	11	60	71	3,9	3,59	3,68	10	56	66
Turkey	52	7	59	46	6	52	46	7	53
Greece	50	—	50	50	—	50	46	—	46
Romania	53	8	61	34	4	38	44	9	54
Spain	17	19	36	16	19	35	17	20	36
Bulgaria	34	(4)	34	3,32	(3,4)	3,32	34	(4)	34

See footnotes at end of table.

TABLE 46—Continued

LEADING WORLD PRODUCERS OF COAL (ALL GRADES)[1]

(Million metric tons)

Country	1989[p]			1990[e]			Average 1986-90		
	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total
Colombia	—	19	19	—	20	20	—	16	16
Hungary	18	2	20	[3]16	[3]2	[3]18	19	2	21
Total	1,205	3,554	4,760	1,163	3,561	4,723	1,184	3,454	4,639
Other	11	44	54	62	97	160	28	90	118
Grand total	1,216	3,598	4,814	1,225	3,658	4,883	1,213	3,545	4,757

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 31, 1991. Data may not add to totals shown because of independent rounding.
[2]Output small; included under "Bituminous and anthracite."
[3]Reported figure.
[4]Less than 1/2 unit.

TABLE 47

LEADING WORLD PRODUCERS OF MARKETED NATURAL GAS[1]

(Million cubic meters)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	685,850	727,400	756,115	745,459	795,000	741,965
United States	[r]454,743	[r]470,645	484,295	490,185	[2]503,404	480,654
Canada	76,334	80,553	89,031	98,771	[2]103,393	89,616
Netherlands (gross)	74,037	74,247	65,610	74,570	[2]71,762	72,045
Algeria	[r]37,560	[r]43,170	46,290	48,400	50,640	45,212
United Kingdom	41,454	43,690	41,761	41,228	[2]49,667	43,560
Indonesia	[r]35,374	[r]36,550	38,510	44,332	[2]48,604	40,674
Mexico	33,278	33,817	34,512	30,414	[2]34,138	33,232
Saudi Arabia	[r]25,200	[r]26,800	29,100	29,800	30,500	28,280
Romania	39,371	37,418	33,000	32,000	28,000	33,958
Norway	28,102	29,868	29,754	29,334	[2]25,380	28,488
Iran	15,200	16,000	20,000	22,200	23,710	19,422
United Arab Emirates	[r]15,220	[r]18,890	19,368	22,380	22,100	19,592
Venezuela	[r]19,074	18,589	18,794	18,660	[2]21,401	19,304
Australia	14,710	15,025	15,386	17,806	20,529	16,691
Argentina	[r]15,510	[r]15,150	17,960	18,990	17,830	17,088
Italy	15,893	16,324	16,634	16,978	17,300	16,626
Germany, Federal Republic of (gross)	13,865	15,871	16,320	16,200	15,860	15,623
China[e]	13,690	13,800	14,285	[r]15,050	15,210	14,407
Pakistan	11,100	11,880	12,590	13,450	14,290	12,662
Malaysia (Sarawak)	[r]11,783	[r]12,944	13,123	13,964	14,230	13,209
India	5,890	7,530	8,410	10,880	11,290	8,800
Total	[r]1,683,238	[r]1,766,161	1,820,848	1,851,051	1,934,238	1,811,107
Other	[r]118,257	[r]125,820	133,805	137,023	132,960	129,573
Grand total	[r]1,801,495	[r]1,891,981	1,954,653	1,988,074	2,067,198	1,940,680

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Comprises all gas collected and utilized as a fuel of 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. 31, 1991.
[2]Reported figure.

TABLE 48

LEADING WORLD PRODUCERS OF NATURAL GAS PLANT LIQUIDS[1]

(Million 42-gallon barrels)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
United States	571	588	594	570	[3]584	581
U.S.S.R.[e]	290	288	249	263	251	268
Saudi Arabia	150	126	149	154	[3]195	155
Mexico	[r]118	123	133	139	[3]156	134
Canada	120	134	139	150	[3]155	140
Algeria	[r]41	[r]46	55	56	[3]62	52
United Arab Emirates[e]	[r]68	53	47	46	47	52
United Kingdom	67	66	58	51	[3]42	57
Total	[r]1,290	1,305	1,319	1,332	1,403	1,330
Other	[r]334	333	341	356	419	357
Grand total	[r]1,624	[r]1,638	1,660	1,688	1,822	1,686

[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 output. Table includes data available through Oct. 31, 1991.

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

[3]Reported figure.

TABLE 49

LEADING WORLD PRODUCERS OF CRUDE OIL[1]

(Million 42-gallon barrels)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
U.S.S.R.	4,520	4,589	4,586	4,462	4,190	4,469
United States	3,168	3,047	2,963	2,762	[2]2,664	2,921
Saudi Arabia[3]	[r]1,746	[r]1,451	1,862	1,849	[2]2,346	1,851
Iran	[r]744	[r]839	844	1,027	[2]1,162	923
China[e]	[r]956	[r]981	[r]1,003	[r]1,003	1,010	991
Mexico	889	930	919	920	[2]932	918
Venezuela	654	664	576	638	[2]779	662
Iraq	[r]685	[r]861	1,003	1,017	776	868
United Arab Emirates	[r]478	[r]517	552	678	[2]752	595
United Kingdom	905	878	821	653	[2]657	783
Norway	[r]324	[r]376	428	586	[2]641	471
Nigeria	535	[r]483	501	626	[2]630	555
Canada	538	[r]534	504	488	[2]567	526
Indonesia	507	479	492	514	[2]534	505
Libya	[r]477	[r]355	377	412	[2]509	426
Kuwait[3]	[r]452	[r]355	511	534	430	456
Total	[r]17,126	[r]16,984	17,431	17,635	18,149	17,465
Other	[r]3,538	[r]3,490	3,794	3,918	4,034	3,755
Grand total	[r]20,664	[r]20,474	21,225	21,553	22,183	21,220

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

[1]Table includes data available through Oct. 31, 1991.

[2]Reported figure.

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

TABLE 50

LEADING WORLD PRODUCERS OF REFINED OIL[1]

(Million 42-gallon barrels)

Country	1986	1987	1988	1989[p]	1990[e]	Average 1986-90
United States (including Puerto Rico and Virgin Islands)	5,430	5,532	5,708	6,125	[2]6,173	5,794
U.S.S.R.[e]	3,229	3,255	3,160	3,000	2,790	3,087
Japan	1,272	1,237	1,153	[e]1,340	1,474	1,295
China[e]	700	710	725	725	730	718
United Kingdom	624	625	658	670	[2]678	651
Germany, Federal Republic of	649	622	670	612	[2]625	636
Italy	660	656	670	683	[2]757	685
France	584	539	593	587	590	579
Canada	594	641	645	639	[2]651	634
Mexico	505	520	522	540	[2]606	539
Brazil	476	[r]457	450	461	470	463
Netherlands	430	436	476	473	452	453
Venezuela	391	364	367	[e]380	377	376
Saudi Arabia[e 3]	[r]487	[r]506	[r]528	[r]495	390	481
India	323	345	347	378	380	355
Spain (including Canary Islands)	416	398	405	429	[2]453	420
Singapore	238	254	246	300	[2]329	273
Total	[r]17,008	[r]17,097	17,323	17,837	17,925	17,438
Other	[r]5,021	[r]5,166	5,573	5,725	5,807	5,458
Grand total	[r]22,029	[r]22,263	22,896	23,562	23,732	22,896

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

[1]Table includes data available through Oct. 31, 1991.

[2]Reported figure.

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