MINERALS IN THE

WORLD ECONOMY

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INTRODUCTION

In overview, 1988 appeared to be the best year for the world's mineral industry since 1980, although the all-important petroleum component suffered severely from low prices. With this notable exception, the traditional statistical measures of mineral industry performance, namely production, trade, and consumption, reflected growth in most elements of the world mineral industry from crude material extraction through the gamut of downstream processing. Moreover, the growth was reasonably well distributed geographically, with many countries sharing in the substantial upturn in activity.

World crude mineral output value was estimated at over $1,272 billion in current dollars ($1,090 billion in constant 1983 dollars). The value added by the processing component of the mineral industry raised the total value of the industry's output to an estimated $3,057 billion in current dollars ($2,620 billion in constant 1983 dollars). Less easily assessed was the value of mineral commodities moving in 1988's international world trade, particularly because of the declines in world crude oil and refinery product prices. It remained to be seen if increased volume and value in nonfuel mineral and coal exports, coupled with an increase in the volume of oil exports, would be adequate to offset the drop in oil prices. Whether or not the value of world mineral commodity trade topped the 1987 level of over $498 billion, an increase in the volume of mineral commodity trade was almost assured. Similarly, although comprehensive statistics were not available on consumption of all mineral commodities in all countries, available data on selected major commodities in selected major countries suggested that not only had output of most mineral commodities advanced, but so too had consumption levels for most commodities.

Mineral industry investment seemed to be increasing, although there was restraint in the petroleum sector. Even here, however, there were increased expenditures for transportation of materials; both tanker building and pipeline construction expenditures seemed to have edged ahead, although comprehensive statistical confirmation was not available. Among the nonfuel sector commodities, comprehensive statistics on 1988 worldwide investment were lacking. However, reports of individual mine and plant development projects, apparently founded on improved prices and forecasts of growing demand, clearly suggested investment upturns.

The prices paid for most nonfuel mineral commodities either held their ground against inflation or advanced. Of major metals, only gold and silver registered significant downturns; price declines among industrial minerals were uncommon. Among fuel commodities, however, lower crude oil prices tended to check growth in competitive fuels.

Although there were many reasons for the generally improved picture of the worldwide mineral industry, and although there were situations that slowed growth in some areas, one force contributing to the brighter outlook, and hence to improved levels of performance, was the significantly improved relationship between the world's market economy countries and the centrally planned states. The U.S.S.R. and China, the most powerful of the centrally planned economy countries and the only ones that have mineral industries of such commodity breadth and vertical integration to be significantly self-sufficient, seemingly were moving toward greater degrees of personal liberty for their populations through 1988. This keystone in improving relations with the world's democracies provided opportunities for interregional mineral industry activities that had been impossible since the end of World War II. Moreover, in the case of the U.S.S.R., there were evidences of at least some foreign policy shifts toward the other members of the Council for Mutual Economic Assistance (CEMA), which would allow for greater independent action by these countries. The Soviet troop withdrawal from Afghanistan neared completion by December, representing an additional reduction in international tension; direct effect on mineral industry operations there, however, seemed minimal.

It was evident that at upper levels of Government in the U.S.S.R. and China there were conflicting views as to the wisdom of both the general nature of and the timetable for doctrinal changes. Such discord obviously could lead to policy reversals. This, in turn, led to apprehensions in market economy countries as to the ultimate outcome. Such apprehensions restrained overly-rapid changes in attitudes toward and relationships with the centrally planned economy countries, within both the mineral industry and other economic sectors.

The end of the Iran-Iraq war was another international political change that tended to improve the situation for mineral industry activity. Although the Near East could hardly be described as tension free, the termination of this long and bloody open warfare not only permited resumption of certain mineral industry activities and also improved the investment climate, if not in the former belligerent states, then certainly in other countries along the Persian Gulf.

No major obstacles to improved mineral industry performance seemed to exist in such key raw material source countries as Australia and Canada, nor in processing and consumption centers such as Japan and the European Communities (EC) countries. Even in the internally troubled Republic of South Africa, mineral industry operations seemed but little affected by international economic sanctions directed at the Republic's apartheid policy, although output of some commodities decreased marginally. In Asia, the Republic of Korea and Taiwan both registered impressive growth in mineral processing industries. These industries, except for cement and nitrogen, were

based largely on imported raw materials. Even the politically troubled Philippines showed significant growth in output of some key commodities.

On the negative side, general events affecting world mineral industry activities included the outbreaks of ethnic unrest in the southern U.S.S.R., most notably in Azerbaijan and Armenia. Tragic earthquakes in December in this region assuredly had a negative effect on mineral operations; transportation and communications were disrupted, and many workers were employed in rescue operations.

Among the other CEMA countries, Poland experienced strikes that curtailed coal, steel, and copper production below target levels, and also may have affected sulfur output. In Hungary, rationalization of bauxite operations led to reduced output. Romania outwardly was continuing a drive for greater industrialization, but the economic viability of some mineral industry expansions appeared questionable.

In Latin America, there was another type of problem for expanded mineral industry activities. The dual economic problem of rampant inflation and large external debts checked investment and hence expansion. Perhaps hardest hit were such key mineral producing countries as Mexico, Peru, and Brazil. The problems caused by the narcotics industries in Bolivia, Colombia, and Peru also retarded mineral industry expansion.

Central America continued to suffer from political unrest; much of this centered around the Ortega regime in Nicaragua and the Noriega regime in Panama. Although the area ranks only as a small producer and consumer of mineral products, the difficulties there posed a threat to operations of the vital Panama Canal, which remains a key link in worldwide mineral commodity transport.

PRODUCTION

The estimated value of crude mineral production in 1988 exceeded $1,272 billion in terms of current dollars or $1,090 billion in terms of constant 1983 dollars. The latter figure was almost 3% above the 1987 level, but was considerably below the historic high of $1,207.1 billion set in 1980.

The accompanying tabulation provides the latest available revised time series for the value of world crude mineral production in terms of both constant 1983 dollars and current dollars, and provides one of the two statistical bases for the estimation, this being the data on the value of production of a group of key commodities compiled for and published in the authoritative French language mineral industry periodical, Annales des Mines, for years up to 1983.[3]

It should be stressed that the values just discussed, and those presented in the tabulation are for crude minerals only, and do not adequately depict the role of the entire mineral industry in the world economy. These figures represent only the value of mineral materials as they are extracted from the earth, and do not reflect the value added to these materials through downstream processing, such as beneficiation, smelting, and refining, although such processing takes place within facilities commonly accepted as mineral

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	999.7	964.4	1,062.3	1,024.8
1985	1,016.4	952.3	1,080.1	1,012.0
1986	1,077.9	984.1	1,145.5	1,045.8
1987	1,125.6	996.2	1,196.1	1,058.6
1988	1,197.5	1,025.8	1,272.4	1,090.0

[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 1984–88 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, Aug. 1989, p. 236. Data in current dollars for 1984–88 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."

industry plants. Comprehensive world data on the value added by such processing are not available; however, a total on the order of about $2,620 billion (constant 1983 dollars) would be a conservative estimate of the value of the products produced by world mineral industry plants wholly from primary or newly mined materials. To fully evaluate the worth of the products of these installations would require the addition of a further (and in this case unestimated) increment for the products derived from secondary raw materials, such as scrap and other reclaimed substances. For some commodities, production from secondary materials is nonexistent or inconsequential (such as in the case of sand and gravel and fuels). For other commodities, however, production from secondary materials is very substantial, as is the case for steel, lead, and copper, for example.

It is also important to note that the overall economic impact of mineral materials extends far beyond the materials' worth even in processed form. Mineral products constitute not only the overwhelmingly dominant share of the total raw material supply for all manufacturing operations; mineral fertilizers and other soil treatment products are indispensable for the continuation of high production and productivity by the agricultural-forestry sector of the world economy. Moreover, the mineral industry, through its production of the various fuel materials, provides all but a very small share of the total energy required for the processing of other mineral commodities and of agricultural materials from their crude forms through to the manufactures derived therefrom, and additionally provides the dominant share of the energy required to transport these products and the world's population around this planet. Even the energy derived from the non-mineral industry sources—hydroelectric and geothermal power—could not be produced and distributed without equipment and transmission lines fabricated from mineral commodities.

Year	Index numbers (1980 = 100)			
	Coal	Crude petroleum and natural gas	Metals	Extractive industry total
Annual averages:				
1978	r93.8	104.4	r98.3	r102.0
1982	r101.9	r80.7	r97.4	85.7
1983	100.7	79.4	97.6	84.9
1984	r99.5	82.5	r104.2	r88.0
1985	r104.0	79.5	r108.4	r86.9
1986	r106.0	82.6	r110.2	r89.8
1987r	106.1	83.1	114.2	90.9
1988	106.3	84.6	124.8	93.6
Quarterly results:				
1987:				
1st quarterr	108.5	79.7	114.2	88.0
2nd quarterr	104.6	79.7	111.8	88.2
3rd quarterr	102.9	85.6	112.6	92.4
4th quarterr	108.6	87.6	118.0	95.2
1988:				
1st quarter	107.6	83.5	119.5	91.9
2nd quarter	103.7	82.1	123.2	91.6
3rd quarter	103.5	85.0	124.6	93.8
4th quarter	110.4	87.6	131.9	97.1

rRevised.

Source: United Nations. Monthly Bulletin of Statistics, V. 43, No. 8, Aug. 1989, p. 236.

Production Index Patterns

The accompanying tabulation summarizes the development pattern of the world's extractive mineral industry output over recent years, as reflected by the United Nations industrial production indices.

This tabulation incorporates a number of revisions from the previous edition of this chapter, but these revisions generally did not alter the direction of change but only its magnitude, at least insofar as the annual world aggregates reproduced here are concerned. Detailed region-by-region figures in the source showed some regional alterations in trend direction. Incorporation of additional data and/or reappraisal of earlier information produced some changes in trend direction in the quarterly results for 1987 in the case of each of the three sectors (coal, crude petroleum, and metals) but not in the aggregate.

The 1988 quarterly results show a slump for fuels between the last quarter of 1987 and the first quarter of 1988. This slump continued in the case of coal through the third quarter of 1988; in the case of oil and gas it reversed after the second quarter. These fuels-sector slumps were sufficient to carry the extractive industry aggregate downward between the last quarter of 1987 and the first quarter of 1988, and downward further in the second quarter of 1988. Growth in the aggregate index was restrained in the third quarter, despite continual gains in the metals extractive index from the fourth quarter of 1987 on through yearend 1988. Only in the fourth quarter of 1988 were gains registered by each of the component indices and by the aggregate as well; the end result was that the index for each sector and for the extractive industry aggregate registered gains across the

year, comparing first quarter indices with fourth quarter indices.

Comparison of the growth trends for extractive mineral industry operations in the foregoing tabulation with growth trends registered in the same source for certain mineral processing sectors demonstrates the lack of parallelism between raw material production and mineral processing. These growth trends for processing sectors appear in the following tabulation.

Year	Index numbers (1980 = 100)		
	Non-metallic mineral products	Chemicals, petroleum, coal, rubber products	Base metals
Annual averages:			
1978[r]	96.5	95.8	100.4
1982	94.6	[r]99.4	[r]89.2
1983[r]	97.0	104.6	91.8
1984[r]	100.9	111.1	99.2
1985[r]	101.9	114.7	100.3
1986[r]	105.3	119.3	99.1
1987	[r]108.7	125.2	[r]103.3
1988	114.4	133.2	110.3
Quarterly results:			
1987:			
1st quarter[r]	100.7	122.1	101.0
2nd quarter[r]	111.7	125.4	104.1
3rd quarter[r]	110.7	125.6	100.9
4th quarter	[r]111.9	127.7	[r]107.2
1988:			
1st quarter	108.2	130.1	109.9
2nd quarter	116.1	133.4	111.2
3rd quarter	115.9	133.1	108.0
4th quarter	117.4	136.1	112.0

[r]Revised.

Source: United Nations. Monthly Bulletin of Statistics, V. 43, No. 8, Aug. 1988, p. 237.

As was the case with extractive industry output, there were revisions in the United Nations data that affected the rate of change in each of the listed sectors, but in world aggregate, the direction of change in terms of annual results were unaltered. For the 1987 quarterly results, the changes in the more recent appraisal were only in degree and not in direction.

In the case of the 1988 quarterly returns, nonmetallic mineral products showed a slump between the fourth quarter of 1987 and the first quarter of 1988; the other two sectors registered advances. Thereafter, each of the detailed sectors showed growth in the second quarter with respect to the first, followed by a third quarter slump and renewed growth in the fourth quarter; each ended the year well above the level at the start of the year.

Both of these tabulations of indices reflect the aggregate of results from world areas that individually showed quite varied results, both from area to area and from year to year and quarter to quarter. For these regional details too extensive to be included here, the reader is referred to the source publication for the above tabulations.

Quantitative Commodity Output

Of the 99 distinct mineral commodities and/or subdivisions of mineral commodities for which total world production, as measured by the Bureau of Mines, is presented in table 1 for 1984–88,[4] 82 registered increases in 1988 relative to the 1987 level of production, and 17 registered declines. This compares favorably with results between 1986 and 1987, when only 67 items registered gains (on the basis of revised figures) and 32 logged declines, and was far better than the performance between 1985 and 1986, when only 52 items showed increases and 47 showed declines.

Of the 52 metallic mineral commodities recorded separately in table 1, 40 recorded production gains in 1988 and only 12 showed declines. Of the 40 showing increases, 27 reached new production highs in 1988. Those that had peak historical output in previous years were: primary refined lead and monazite concentrate (both in 1985); secondary smelter zinc (1982 and 1983); secondary magnesium (1981); manganese ore, molybdenum, smelter tin, tungsten, and uranium (all 1980); ferroalloys, selenium, and mine tin (all 1979); and ilmenite (1974). Of the group of 40 metallic commodities logging gains, gold achieved an increase for the eighth consecutive year; four of the group, namely, mine copper, primary smelter copper, primary refined copper, and platinum-group metals, logged growth for six consecutive years. Four others, antimony, iron ore, secondary refined lead, and titaniferous slag were in their fifth consecutive year of growth. Four, namely, bauxite, alumina, secondary smelter lead, and primary magnesium, logged output gains for the third consecutive year. Of the 40, 17 registered gains in both 1988 and 1987 and 10 logged increases in 1988 following declines in 1987.

Of the 12 metallic commodities showing declines in output between 1987 and 1988, 2, vanadium and mine zinc, reached record output levels in 1987. Two more, mine cobalt and refined cobalt, set to-date historic production highs in 1986, and were in a second year of diminishing output in 1988. Primary smelter lead attained its to-date record output high in 1985, decreased slightly in 1986, registered a partial recovery in 1987, and experienced a decline again in 1988. Other metallic commodities recording output declines in 1988 included mine lead and rutile, both of which had recorded an increase in 1987 and both of which remained below their record output levels, set, respectively, in 1973 and 1980. Beryl concentrate output declined in both 1987 and 1988 and remained appreciably below the maximum output level reported back in 1961. Mercury production declined for the third consecutive year, and in 1988 was only slightly greater than half the historic high that was set in 1971. The figures shown on production of bismuth at the mine stage and the metal stage of production are published in this form for the first time by the Bureau of Mines in this chapter. The world total for mine bismuth was lower for the sixth consec-

utive year, while that for refined bismuth was lower for the third consecutive year (comparison to Bureau statistics for years prior to 1983 are not yet available). World total tellurium output declined for the third consecutive year in 1988, but long-term historical comparison is not valid because U.S. output has not been included in that total since 1975, when it was two-fifths of the total; the U.S. figure is withheld to avoid disclosing individual company proprietary information.

From the viewpoint of the major components of the metals industry, advances were scored in the mining of iron and most of the related ferroalloying metals. These gains served to meet a second year of growth in the world's steel industry, and compensated for evident stock drawdowns in the key ferroalloying ores, chromite and manganese ore, both of which showed reduced output between 1986 and 1987, despite increased steel output at that time. Among the minor ferroalloying ores, only vanadium and the titanium source, rutile, registered downturns in 1988.

Nickel and tin, which have applications in both the steel industry and the nonferrous metal industry, both showed improved output in 1988 for the second consecutive year at both the mine and metal stages of output.

Among the major nonferrous metals, copper showed general gains for 5 years in terms of mine output and primary smelter and refinery products. The recovery of copper from scrap recorded slight downturns within the past 5 years, but has generally become slightly more important each year, and represented over 15% of total 1988 world refinery output. In the case of lead, secondary recovery has become even more important, accounting for over 44% of total world refinery output in 1988. Thus, although mine output peaked in the 1970's and has continued at only slightly reduced levels since then, refined output had moved continually to higher levels. For zinc, secondary recovery plays only a minor role in total supply, and continual growth in mine output has been necessary to meet increasing demand in the production of nonferrous alloys, zinc castings, and the important need for the metal in galvanizing steel. The slight downturn in mine zinc production in 1988, from the 1987 to-date record high, was in contrast to the general trend; the advance in refined zinc output that continued from 1986 cannot be sustained without a change in the trend of mine output.

The newer, light nonferrous metals continued to enjoy growth in terms of world total output of mine product (bauxite), intermediate product (alumina), and refined primary metal. Although the Bureau of Mines does not collect worldwide data on secondary aluminum output, data from those countries for which comparable secondary figures are available suggest growth here, too. The production of magnesium advanced in 1988, and there are indications that titanium output is up, although the Bureau does not collect comprehensive world statistics on titanium metal production.

Of the 36 individual categories of nonmetallic minerals and their products listed under the heading "Industrial Minerals", 31 recorded increases in output in 1988; of these, 21 set new record production highs. This latter group included boron materials, bromine, cement, bentonite, fuller's earth, kaolin, gem diamond, natural industrial diamond, diatomite, feldspar, fluorspar, gypsum, iodine, nitrogen, perlite, phosphate rock, potash, salt, sodium carbonate, strontium minerals, and byproduct sulfur. The 10 others that showed gains in 1988, together with the year in which they set record production levels were: Asbestos, 1976; barite, 1981; natural corundum, 1980; natural graphite, 1963; lime, 1980; Thomas slag, 1979; pumice, 1973; sodium sulfate, 1979; sulfur from pyrites, 1971; and talc and related materials, 1985.

Of the 31 so-called industrial minerals commodities that increased output in 1988, one, hydraulic cement, logged its thirteenth consecutive year of growth. Four, kaolin, gypsum, nitrogen, and byproduct sulfur, recorded output increases for the sixth consecutive year. Two, feldspar and sodium sulfate, registered increases for the fifth consecutive year. Four, boron materials, graphite, perlite, and sodium carbonate, were in the third consecutive year of production increases. Eleven recorded output growth in both 1988 and 1987. The remaining nine recorded an upturn after a slump between 1986 and 1987.

Only five industrial mineral commodities recorded downturns between 1987 and 1988. World output of magnesite, which had a historic high in 1986, slumped for the second year. Mica output dropped slightly from the 1987 level after logging a slight increase in that year, but remained substantially below the 1978 record high. Production of guano, which is a minor world source of phosphate, declined for the second consecutive year and was substantially below the 1980 record level recorded by the Bureau of Mines (data for years prior to 1978 are not available). Elemental sulfur output, primarily Frasch-process sulfur from the United States, Mexico, Poland, and the U.S.S.R., was lower for the third consecutive year, and was at a level barely more that three-quarters of the record output of 1974, as a result of continued increases in competitive byproduct sulfur output. Finally, vermiculite output dropped marginally from its 1987 level after several years of rising output and remained a little below the record level set in 1978.

In terms of major commodity groups, the industrial nonmetallics dedicated primarily to fertilizer applications, namely nitrogen, phosphatic materials, and potash, all showed upturns except for the inconsequential drop in output in the relatively insignificant guano production. Among other chemical materials, fluorspar, sulfur (in

total), salt, and sodium carbonate reached new highs in 1988 reflecting the strength of the world's chemical industry. It was notable that the sulfur growth was chiefly the result of increased byproduct recovery, undoubtedly driven in part by environmental concerns rather than by expansion of output of elemental sulfur from Frasch and other sulfur mines.

Expansion of worldwide use of construction materials of mineral origin is mirrored in the data presented in the table for cement production. Other construction materials such as construction sand and gravel, dimension stone, and common brick clays are not included due to the lack of comprehensive world data; statistics that are available for some countries suggest world growth and this evaluation is supported by growth in cement output.

Of the 11 mineral fuel commodities listed in table 1, all logged output increases between 1987 and 1988. Of the primary energy sources, crude oil output increased in 1988 after a very slight drop between 1986 and 1987, but the level remained below the historic high set in 1979; the 1988 figure represented about 93% of that of 1979. Output of marketed natural gas (gross production less that flared, vented, and reinjected into reservoirs for pressure maintenance) reached a new historic high, as increases in output from gasfields were augmented by increases in gas recovery from fields in which gas occurs with oil. The year 1988 was the sixth consecutive year in which marketed natural gas production advanced. The recovery of natural gas liquids, chiefly butane, propane, and natural gasoline obtained as byproducts of natural gas production, also reached a new record high in 1988. It was the third year of such an increase following a very minor decrease between 1984 and 1985. Output of all three listed types of coal reached new highs in 1988. Anthracite recorded an increase for the sixth consecutive year, bituminous coal did so for the seventh consecutive year, and lignite output increased slightly to preserve a 21-year streak of growth. Peat is listed among mineral fuels because of its similar origin and nature to low rank coals; however, about 80% of the total output of peat is used as a soil conditioner or for other nonfuel purposes. Peat showed a very modest increase in output from 1987 to 1988, after a modest decline between 1986 and 1987. In all likelihood, 1986 was the year of the historic to-date record production, although published Bureau of Mines totals in earlier editions of Minerals Yearbooks show higher figures in the late 1970's and early 1980's. These earlier high totals, however, included estimates for Soviet output that have been revised downward very substantially. Although revisions of the time series were not completed in time for inclusion in this review, it seems that 1986 will be proven to be the historic high through 1988.

As for the four fuel-derived products listed in the table, refined oil, although increasing for the third consecutive year, still fell short of the 1979 to-date record high by almost 4% in 1988. Carbon black output, up for the second straight year, reached a new peak in 1988. Metallurgical coke recorded an increase for the second consecutive year, but still fell short of the to-date historic high recorded in 1980; output of other coke increased after a slump in 1986 and 1987, but fell short of the to-date record output set in 1979.

The overall performance of the nonfuel mineral industry can only be summarized in terms of the value of production, and for these commodities, exactitudes for each commodity on a worldwide basis are not available for any year subsequent to 1983 (see "Value of World Mineral Production"). Among fuel commodities, however, the overall pattern of output level changes and their interrelationships can be demonstrated by United Nations data, in which production results for each of the forms of primary energy are adjusted to a common energy equivalent basis. The tabulation summarizes world energy commodity output for 1981–87 as reported by the United Nations, and provides Bureau of Mines estimates for 1988.

Year	Million metric tons of standard coal equivalent					
	Coal	Crude petroleum and natural gas liquids	Natural gas	Primary electricity		Total
				Hydro and geothermal	Nuclear	
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	r2,851	r4,032	r2,022	245	150	r9,300
1985	r2,997	r3,996	r2,098	249	r178	r[1]9,519
1986	r3,072	r4,191	r2,148	r252	191	9,854
1987	3,108	4,203	2,276	255	208	10,049
1988[e]	3,161	4,392	2,467	256	225	10,501

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

Source: 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; 1983—United Nations. 1986 Energy Statistic Yearbook, New York, 1988, pp. 2, 378; 1984–87—United Nations. 1987 Energy Statistics Yearbook, New York, 1989, pp. 2, 392; 1988—U.S. Bureau of Mines estimates.

It is perhaps noteworthy that the published United Nations results for 1987 in the tabulation were quite close to the Bureau of Mines' estimates included in the previous edition of this

chapter, estimates that were made well over 6 months prior to the publication of the United Nations data. Total energy production reported was only 0.5% below the figure that had been estimated by the Bureau. The reported coal figure was 1.6% below the estimate, the reported crude petroleum and natural gas liquids figures were 0.7% below the Bureau estimate, the reported natural gas figure was 0.9% above the Bureau estimate, the reported hydroelectric and geothermal power figure was 0.8% below the estimate, and the reported nuclear power figure was 4% above the Bureau estimate.

For 1988, an increase of nearly 4.5% in total energy output has been estimated, chiefly the result of an 8.4% increase for natural gas and a 4.5% increase for the sum of crude oil and natural gas liquids. An increase in coal output of 1.7% is significant to the total energy output only because it applies to so large a component of the total, whereas the 8% growth in nuclear power output is relatively unimportant in total energy because it affects so small a component of the total. Even less significant is the nominal growth in hydroelectric and geothermal power output.

An examination of electric power output and generating capacity shows phenomenal growth in nuclear power generation. This is significant to world mineral economics because of the importance of electric power to the mining, processing, and transportation of mineral materials. In the absence of comprehensive world statistics for 1988, the tabulation compares actual power generation for 1981 with that in 1987.

The quantity of electricity produced by world nuclear plants increased by nearly 112% in just 7 years, and accounted for over 16% of all electric power produced and for 45% of all primary electricity in 1987. Although the growth in geothermal power was even larger on a percentage basis (119%), this energy source remained relatively unimportant in the world picture.

A similar trend in growth of generating capacity, although not precisely parallel, can be seen in the tabulation.

Nuclear generating capacity increased by over 90% between 1981 and 1987; the much less sizable geothermal capacity advanced by 133%, compared with a hydroelectric capacity growth of only 20% and a thermal plant capacity expansion of only 13%. Nuclear plants accounted for over 34% of primary electricity capacity in 1987 compared with only 25% in 1981.

The figures on actual production and capacity show a 3% increase in capacity utilization for all powerplants in aggregate between 1981 and 1987, but the improvement was not universal among the various types of plants. There was a 23% drop in geothermal plant capacity utilization over the 7 year period and a 4.2% drop in capacity utilization of hydroelectric plants. Conventional thermal plants logged a 2% increase in utilization, and nuclear plants recorded an 11.6% increase in capacity utilization.

These shifting patterns, and their implications to such electric power demanding industries as aluminum production, copper recovery and refining, and ferroalloy production cannot be ignored.

Plant type	1981		1987	
	Capacity (million kilowatts)	Share of total (percent)	Capacity (million kilowatts)	Share of total (percent)
Primary plants:				
Hydroelectric	488	23.1	585	22.9
Geothermal	3	.1	7	.3
Nuclear	161	7.6	306	12.0
Subtotal	652	30.8	898	[1]35.2
Secondary plants:				
Thermal	1,462	69.2	1,657	64.8
Total	**2,114**	**100.0**	**[2]2,556**	**100.0**

[1] Percentage shown does not calculate precisely from capacity data because it is calculated from unrounded capacity data.
[2] 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—United Nations. 1987 Energy Statistics Yearbook. New York, 1989, p. 332.

Source plant type	1981		1987	
	Production (billion kilowatt hours)	Share of total (percent)	Production (billion kilowatt hours)	Share of total (percent)
Primary electricity:				
Hydroelectric	1,776	21.2	2,038	19.5
Geothermal	16	.2	35	.3
Nuclear	801	9.6	1,396	16.2
Subtotal	[1]2,592	[1]30.9	3,768	36.0
Secondary electricity:				
Thermal	5,792	69.1	1	64.0
Total	**8,384**	**100.0**	**10,467**	**100.0**

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

Sources: 1981—United Nations. 1984 Energy Statistics Yearbook. New York, 1986, p. 384; 1987—United Nations. 1987 Energy Statistics Yearbook. New York, 1989, p. 392.

Another noteworthy point regarding electric power generation is the proportion accounted for by public utilities as opposed to so-called self producers, that is, plants with capacities essentially dedicated to specific industries. During the 7 years from 1981 to 1987, there was a very small downward shift in the share of output provided by self-producers; this principally was a result of a drop, both quantitatively and in share of total in hydropower output, by such firms. In terms of power actually produced, self-producers accounted for a slightly larger share of thermal power output in 1987 than in 1981, both quantitatively and in share of total. The role of such self-producers can be significant in some mineral producing countries, where such power generation is dedicated primarily to the industry that produces the power. Mineral industry firms that acquire power from public utilities are forced into a competitive position with other sectors of the economy and may well suffer in times of shortage. Specific data on mineral industry control over power facilities for their own use are not available on a comprehensive global basis. For some selected major mineral producing and processing countries, the proportion of total electric power produced by the self-producers in aggregate differs quite widely. In 1987, such plants generated 5.2% of the U.S.S.R.'s total output, 2.3% of total U.S. output, 10.1% of total Japanese output, 16.6% of output in the Federal Republic of Germany, 8.8% in Canada, 7.3% in Australia, 7.1% in India, 20.5% in Chile, 20% in Norway, and 66.9% in Zaire. Contrasting with the relatively high Chilean and Zairian figures is the 2.3% level in Zambia, the other major copper exporter.

Value of World Mineral Production

The value of world crude mineral production in 1988 was estimated at $1,090 billion in constant 1983 dollars, or $1,272.4 billion current (1988) dollars. Details on the basic methodology employed to prepare this estimate are summarized 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 reliably extrapolate to 1988 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 this Minerals Yearbook chapter. 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 material. 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 1988 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 1987, the aggregate value of total world international trade in mineral commodities was estimated at $498 billion, about 8.5% above the revised 1986 level but still 29.8% below the record high set in 1980. Comparable data for 1988 were not available in time for inclusion in this chapter, but incomplete returns suggest an advance over the 1987 level. The tabulation provides a data series for the estimated value of world export trade in all mineral commodities from 1979 through 1987; also shown are the subdivision of those data between nonfuel and fuel commodities, and the percent change from year to year in the total and that total's share of world merchandise trade.

The tabulation shows that 1987 was a

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[2]		
1979	333,031	188,416	521,447	41.3	31.9
1980	483,033	226,848	709,881	36.1	35.4
1981	474,266	199,328	673,594	-5.1	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	360,642	186,605	547,247	-2.8	28.4
1986	263,504	195,392	458,896	-1.5	21.7
1987	277,727	220,395	498,122	8.5	20.0

[1] In part estimated, based on data presented in table 2 of this chapter.
[2] All figures are substantially revised downward from those appearing in the 1987 edition of this chapter, as well as other previous editions, as a result of a revision in the method of estimating nonfuel minerals not included in the reported data in table 2 of this chapter.

watershed year for total mineral commodity trade; the downtrend in value that extended back to 1981 with only a minuscule upturn in 1984, was substantially reversed. Despite this reversal, the growth in value of other merchandise exports was so substantial that the mineral commodity share of total merchandise exports declined for the seventh consecutive year. The tabulation also demonstrates that the decline in value of total mineral commodity exports between 1980 and 1986 was chiefly the result of declines in the fuels commodities. The aggregate estimated value of nonfuel mineral commodities has increased regularly, although not steadily, since 1984, and was only 2.8% below the 1980 to-date record high in 1987.

The tabulation, however, does not show that in terms of constant dollars, the decline in trade value is worse than shown in current dollars. Adjusted for inflation, using the implicit price deflators for exports, the 1987 value of mineral commodity exports was only $448,409 million in terms of 1980 dollars, or only 63% of the record high of 1980.

The role of individual major mineral commodity groups in world export trade for 1982–87 is evident in table 2, as is the contribution of these groups to total merchandise export trade. This table is the basis for the estimates of the total value of all mineral commodity export trade that was presented in the tabulation. Table 3 demonstrates the relative importance of each of these major groups of mineral commodities in the aggregate of export trade in major mineral commodities, and reflects the constantly lower share of the total accounted for by the mineral fuel commodities in each year between 1982 and 1987. Table 4 shows the change in each of the major mineral commodity groups across the same time period in terms of percent change from the previous year.

Information on the geographic pattern of trade by major geographic and political country groups of the major mineral commodity groups shown in table 2 is available in the source publication for these data.

CONSUMPTION

Nonfuel Mineral Commodities

Available statistics on 1988 worldwide consumption of selected major nonfuel minerals shown in table 5 indicate increases over the 1987 levels. This was the second consecutive year in which all listed nonfuel commodities registered an upturn. Although the 1988 results incorporate a number of estimates for countries that theoretically might change with the receipt of final, more complete results, it is strongly believed that the pattern of rising consumption of these major materials will be preserved when the more complete results become available; however, the growth rates calculable from the data may vary somewhat.

Consumption of the two ferrous metal raw materials listed advanced as functions of increased output of pig iron and crude steel. In the case of iron ore, available figures suggested a slight increase in world inventories as the growth rate for production exceeded that for consumption. The estimated upturn in scrap consumption was slightly less than the increase in steel output on a percentage basis, but it is believed that there was little change in the ratio of iron ore to scrap as iron and steel plant feed on a global basis.

Before summarizing the nonferrous metal use situation, it is essential to comment on the nature of some of the data published. Examination of table 5 shows that separate statistics have been provided for market economy countries and centrally planned economy countries. This had been done for two reasons. First, the consumption trends from year to year for these two groups of countries often differ, in that the trends in market economy countries are influenced to a significant extent by variations in the economies of the countries included, whereas the trends in centrally planned economy countries are generally the result of rigid economic planning. Second, however, and perhaps more importantly, the consumption figures for the centrally planned economy countries are universally apparent consumption figures—that is, they represent the sum of production (often estimated) and imports minus exports, plus or minus variations in stocks (where such information is available). As such, any change in the level of any of these component figures will result in a change in the calculated apparent consumption, and for several commodities in this group there are differences between production estimates by the 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 formula. For instance, substitution of the Bureau's estimates for refined copper output for 1988 would lower the centrally planned economy countries consumption by 438,000 tons. Similar but smaller reductions would result for lead and zinc, but results for aluminum, cadmium, magnesium, nickel, and tin would be but little altered.

Bearing the foregoing in mind, and thus considering the consumption data for the centrally planned economy countries to be a measure more of year-to-year trends rather than of precise quantities of materials consumed, one can examine consumption changes and the relationship to production changes. Of the eight nonferrous metals reported, five registered greater percentage increases in production than in consumption in 1988, suggesting the possibility of stock growth. These were aluminum, copper, lead, nickel, and tin. Of these, aluminum and lead had also demonstrated a greater increase in production than in consumption in 1987 as well, whereas for copper, nickel, and tin, the percentage growth in consumption had exceeded that for

production in 1987. Of the remaining three metals—cadmium, magnesium, and zinc—the growth in consumption exceeded that in production between 1987 and 1988. For cadmium and magnesium, the relationship between production and consumption had been similar between 1986 and 1987, with a more substantial percentage increase in the latter, whereas in the case of zinc, the growth in production exceeded that in consumption between 1986 and 1987, in contrast to the 1987 to 1988 pattern.

Examining the differences in performance between the market economy nations and the centrally planned economy states, it is evident that the former group accounted for the entirety of the world increase in use of aluminum, cadmium, copper, magnesium, nickel, and tin, for the centrally planned country consumption of each of these either declined or at least failed to increase. Moreover, growth in world consumption of lead and zinc was dominated by gains in the market economy countries; percentage growth in these two commodities in the market economy states exceeded those logged for the centrally planned economy states. This strong market economy growth was in distinct contrast to the pattern of the early and mid-1980's when growth in consumption in the centrally planned states exceeded that in the market economy states for a number of the metals in a number of years.

Among the fertilizer minerals and sulfur, all showed higher consumption levels for the second consecutive year; all had logged downturns between 1985 and 1986.

Mineral Fuel Commodities

Mineral fuel and primary electric power consumption, shown in table 5 in terms of standard coal equivalent (SCE) to facilitate interfuel comparisons, advanced again in 1988 to a new record high. Indeed, the growth of over 3.4% in the aggregate was the largest registered since that between 1983 and 1984. Considering the relative share of total energy provided by each listed source, solid fuels lost a small share between 1987 and 1988 as did hydroelectric and geothermal power; liquid fuels (including natural gas liquids), natural gas, and nuclear power each showed slight increases. With the gain registered for liquid fuels, 1988 was the first time that the previous record level of 3,947 million metric tons SCE, set in 1979, was topped.

INVESTMENT

Comprehensive world mineral industry investment data do not exist, but limited material published on aggregates of investment in some elements of the world mineral industry suggest an upturn in the investment level, at least in market economy countries in 1988. Steel industry investments in Organization for Economic Cooperation and Development (OECD) countries are not yet available for 1988 but, as shown in table 6, increased somewhat for 1987, assuming level investment for Australia and Canada. The pattern of investment ups and downs varied during 1987 within country blocs and economic alliances showing no particular trends. Although investment in the steel industry by the United States increased by 34.6% between 1986 and 1987, it was still the second lowest amount invested during the 1983–87 period and was 63% less than the amount invested in 1983. Investment in the steel industries of the European Coal and Steel Community (ECSC) dropped somewhat in 1987 after 4 years of steady growth. This drop was the result of lower investments by the Federal Republic of Germany and the Netherlands; investments grew or remained level in the other 10 members of the EC between 1986 and 1987. Decreases in investment in the Japanese (-13%) and Turkish (-32.9%) steel industries were offset by increases registered by the members of the European Free Trade Association (EFTA) of 23.3%, and of the nations of Latin America of 27.6%. The increased investment in the steel industries of Latin America in 1987 reversed the general trend in this area of lower investments but nevertheless were, in toto, only 56% of the amount invested only 4 years earlier, in 1983. If data for the world steel industry as a whole, including those of the centrally planned economy countries, were available, the same pattern presumably would be shown as that reported; that is, it would remain fairly stable, with increases in some countries being offset by decreases in others. However, the lack of comprehensive information on the centrally planned economy countries makes it impossible to determine whether the overall trend was up or down despite recorded increases or decreases in production of the materials involved. Preliminary data show that investment levels in industries dealing with the production and/or processing of mineral commodities for 1988 will probably increase over those of 1987, in some cases substantially.

Market economy petroleum industry investment as reported by the Global Energy Component of the Chase Manhattan Bank has been summarized in table 7 of this chapter but only presents information through 1987. However, the information for 1987 shows that the trend of lower and lower investment in the petroleum industry around the world continued in 1987, with an increase only in Western Europe. The total increase of 13.3% in this area did not offset the decreases in total investment in the United States (-17.8%), other countries of North America (-11.1%), the Far East and Oceania (-18.5%), as well as those in other areas listed. Although the total amount of money invested dropped by 9.2% in 1987 for the areas listed, the amount invested in the construction and maintenance of processing plants and crude oil tankers increased by 9.7%; this partly offset the drop of 13.7% in

investment for the exploration and development of oil and gas reserves. Investment in the construction and maintenance of refineries and natural gas liquids plants increased in all areas listed except the countries of the Western Hemisphere, excluding the United States. Between 1986 and 1987, investment in refineries in Western Europe increased by 84.5% and in liquified natural gas plants in the Far East and Oceania by 12.2%. Although investment in production and processing areas of the industry may have dropped somewhat again, investment in the transportation of the materials probably has been increasing and will result in the expansion of the transportation network. That will, in turn, create a favorable atmosphere for more investment in exploration as well as production facilities. As with the nonfuels sector, decreased investments by some countries will be countered by increased investments by others, such as Iran and Iraq, which probably will modernize and upgrade petroleum industry facilities now that a truce has been declared in their war. Iran, which was forced to begin importing petroleum refinery products in 1988 because of war damage to its refineries, is expected to invest heavily in this sector to help repair its economy. As with the steel industry, the petroleum industry investment rate in centrally planned economy countries was almost assuredly not very much different from that of the rest of the world, although there are indications that investment in production and processing facilities in the U.S.S.R. have been growing at a faster rate than is the case for market economy countries. General information indicates that investment by the Soviets in production has increased almost fivefold between 1970 and 1988, although production of oil and natural gas has increased during the 1980's only slightly.

Data on U.S. foreign investment in mineral industry activity are updated to 1988 in table 8 of this chapter. These data show that U.S. direct foreign investment in the petroleum industry declined somewhat in 1988, while U.S. direct foreign investment in the mining, smelting, and refining industries continued to increase (+12.4% between 1987 and 1988). Reinvested earnings of foreign affiliates showed the same pattern. The reinvested earnings in the smelting and fabricated metals industries again showed a dramatic increase (+32.8%) over the previous year, while those for the petroleum industry reversed from 1987 to a dramatic 97.5% decrease. Income showed the same divergent paths; income from mining, smelting, and refining increasing by 59% in 1988 but there was a decrease of 8.5% in income from the petroleum industry.

TRANSPORTATION

Marine Transport

Bulk carriers, freighters, and tankers are the three classes of marine vessels engaged in transporting mineral commodities. However, vessels in each of these categories are not devoted wholly to mineral commodity transport. Bulk carriers move agricultural products as well as crude minerals and mineral fertilizers. Freighters, owing to their great variety, can be devoted wholly to hauling mineral products or wholly to moving nonmineral goods, as well as carrying mixed mineral and nonmineral cargoes. Tankers, although largely engaged in moving crude oil and refinery products, also transport liquid chemicals, molasses, wine, and other fluids.

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

Bulk Carriers.—During 1988, the world's bulk carrier fleet increased by 30 vessels compared with decreases of 412 vessels in 1987 and 302 vessels in 1986. This was the first increase in 3 years; 227 vessels were added to this fleet in 1985. During 1988, the total deadweight tonnage of bulk carriers increased by 1.5% compared with decreases of 1.3% and 3.6% in 1987 and 1986, respectively. The average deadweight tonnage of bulk carriers increased slightly in 1988 to 42,670 tons from 42,306 tons in 1987. The tabulation shows the distribution of the bulk carrier fleet of the world as of December 31, 1988.

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)
Panama	895	32,191
Liberia	505	27,900
Japan	316	19,703
Greece	470	18,539
Cyprus	423	15,938
Philippines	272	12,230
British Dependencies	183	10,235
Korea, Republic of	148	7,858
China	224	7,429
U.S.S.R.	240	6,386
Norway (NIS)[1]	96	6,157
Brazil	99	5,311
India	114	4,927
Bahamas	104	4,550
Italy	69	4,242
Singapore	72	3,650
Taiwan	55	3,585
Yugoslavia	82	2,859
Romania	68	2,706
Poland	95	2,609
Turkey	57	2,152
Belgium	22	2,103
Australia	33	2,028
Spain	57	1,952
Malta	63	1,836
Iran	51	1,767
Other	519	16,672
Total	**5,332**	**227,515**

[1] Established during 1988.

Freighters.—The world's freighter fleet decreased in 1988 by 54 vessels compared with a decrease in 1987 of 214 vessels and a decrease in 1986 of 1,151 vessels. Despite the decrease in the number of vessels during 1988, the total deadweight tonnage of the freighter fleet increased by 1.14 million tons or 1.0% compared with decreases in 1987 of 6.1% and in 1986 of 6.1%. Thus, there was a nominal increase in the average tonnage of freighters. The tabulation shows the distribution of the world's freighter fleet at the end of 1988.

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)
Panama	1,742	17,583
U.S.S.R.	1,716	11,747
China	833	8,241
United States	381	7,427
Cyprus	587	3,576
Japan	473	4,278
Liberia	285	4,157
Greece	266	3,130
Germany, Federal Republic of	321	3,123
Singapore	218	2,941
Taiwan	150	2,701
British Dependencies	246	2,263
Netherlands	283	2,168
Yugoslavia	167	1,987
Korea, Republic of	221	1,818
Philippines	239	1,811
India	122	1,770
United Kingdom	107	1,644
Romania	219	1,561
Poland	156	1,514
Bahamas	167	1,476
Denmark (DIS)[1]	97	1,458
Italy	194	1,369
Brazil	134	1,280
Turkey	228	1,231
Other	2,966	25,823
Total	**12,518**	**118,077**

[1] Established during 1988.

Tankers.—The world's tanker fleet increased by 160 vessels in 1988, the second straight year of an increase (+91 in 1987) as opposed to decreases of 457 vessels in 1986 and 26 vessels in 1985. Despite the increase of total deadweight tonnage in 1988 of 3.6%, the average deadweight tonnage in 1988 increased only by 0.5%, continuing the trend of the past several years to the use of medium-size tankers. The tabulation presents the distribution of the tanker fleet of the world at the end of 1988.

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)
Liberia	602	57,065
Panama	628	22,974
United States	247	16,708
Japan	314	15,664
Greece	205	15,358
Norway (NIS)[1]	176	12,289
British Dependencies	110	11,674
Cyprus	125	10,516
Bahamas	133	10,415
U.S.S.R.	444	7,270
Singapore	127	5,161
Italy	223	5,036
Iran	33	4,938
France	59	4,107
Brazil	95	3,995
Denmark (DIS)[1]	48	3,890
Spain	87	3,614
India	70	3,329
China	166	2,700
United Kingdom	88	2,654
Saudia Arabia	47	2,617
Isle of Man[1]	58	2,483
Malta	52	1,895
Korea, Republic of	65	1,707
Iraq	21	1,520
Other	1,027	25,217
Total	**5,250**	**254,796**

[1] Established during 1988.

Information gleaned from articles and reports concerning the world's tanker fleet indicated that the total deadweight tonnage of tankers and combined tankers (which can carry liquid or bulk cargo) that was being dismantled and melted down to scrap or was lost during 1988 fell to 3.0 million deadweight tons, a 60% drop from the tonnage scrapped or lost during 1987 and 80% and 90% less than the tonnages scrapped or lost during 1986 and 1985, respectively. This dramatic drop in the deadweight tonnage scrapped or lost can, at least in part, be attributed to the end of hostilities between Iran and Iraq and the consequent end of the "tanker war" in the Persian Gulf. According to industry sources, the war in the Persian Gulf, between April 1984 and August 1988, caused 62 vessels totalling almost 11 million deadweight tons to be declared complete losses. The expected post-war increase in oil production from both Iran and Iraq, intended to provide funds to help pay for repairing their respective infrastructures, will probably lower the price of crude oil on the international market. This lower price in turn could cause marginal- or higher-cost producers to stop pumping, and, as a result, more of the international supply would come from the Middle East. Under these conditions, tanker demand would rise owing to the increased long-haul shipping involved. Increased imports of crude oil by countries such as the United States also require larger tankers that carry oil on longer routes for the imports to be as economical as possible. The resale value of large tankers also remained above scrap metal value in 1988, which helped prevent scrapping.

Information furnished by the Maritime Administration, an agency of the U.S. Department of Transportation, shows that the average deadweight tonnage of new tankers delivered during 1988 was 59,187 long tons, which continued the trend of the past few years to the use of tankers in the small to medium range. This, however, was an increase of 15% over the average deadweight tonnage of the tankers delivered during the previous year. Tankers under

construction at the end of 1988 demonstrated the same trend, with the average deadweight tonnage at 56,507 long tons. The tabulation shows, by country of construction, the number of tankers being built or on order at the end of 1988.

Country	Number of vessels	Deadweight tonnage (long tons)
Korea, Republic of	37	3,995,100
Japan	45	3,043,700
Yugoslavia	18	1,171,100
Spain	13	951,600
Romania	9	699,500
Poland	8	389,100
China	7	283,600
Denmark	7	245,800
Brazil	5	162,500
Taiwan	1	150,200
Germany, Federal Republic of	13	138,400
United Kingdom	4	102,400
Portugal	1	87,500
Italy	11	87,200
Belgium	3	85,500
Bulgaria	3	85,500
Norway	3	72,800
Argentina	2	34,900
U.S.S.R.	1	28,300
Netherlands	9	23,000
Finland	8	20,600
Philippines	1	4,700
Malaysia	1	3,400
Total	**210**	**11,866,400**

Ocean Freight Rates

Data on ocean freight rates that, in the past, had been published by the United Nations are no longer available. Other sources, however, provide information that is indicative of this broad area. Considering ocean shipping rates for iron ore as representative of dry cargo in general, these average rates increased during 1988 from a low of 16% for iron ore shipped from Australia to Europe to a high of 51% for iron ore shipped from Brazil to Japan. This was a greater spread of increases than during 1987 when comparable rates increased from 22% to 46% from Australia and Canada, respectively, to Europe. The yearly average rate for shipping iron ore from Canada to Europe doubled between 1986 and 1988, although there was an increase of only about 15% in the value of the material itself during the same period. In addition to the value of the material being shipped, other factors determine the variance of these rates. These factors include the size of the ship, the availability of different size ships, the cost of marine fuel, and the general economic conditions in the importing countries.

Tanker rates, as usual, generally followed the same trend as for dry cargo, and ended 1988 somewhat higher than at the beginning of the year. The end of the Iran-Iraq war caused investors to reconsider stocks in companies involved in oil shipping, and by the end of the year, some of these stocks were being sold at an increase of 60% over their price at the beginning of the year. Increased demand for internationally shipped crude oil coupled with increased investment in tankers by owners are resulting in increased tanker rates. According to industry sources, rates for large tankers in 1985 averaged about $5,000 a day but by late 1988 the rates had reached an average of $16,000 a day.

Panama and Suez Canals

Data on fiscal year 1988 shipments through the Panama Canal showed a drop in mineral commodity movements, but this decline was miniscule in comparison to the decline registered between 1986 and 1987, as is shown in the tabulation.

In fiscal year 1988, mineral commodities accounted for 43.8% of all commercial ocean traffic through the Panama Canal, a figure lower than the 46.1% in 1987 and only 62.4% of the amount of mineral commodities that were moved through the canal in 1982. Table 10 shows mineral commodity movements through this canal during 1986–88 by major mineral groups.

In terms of major mineral commodity groups, fuels remained dominant in 1988 but dropped again both in terms of quantity and share, registering a 1.2% decline on a tonnage basis to account for only 48.6% of the total mineral commodities transiting the canal compared with 49.4% in 1987 and 56.3% in 1986. Industrial minerals remained in second place in 1988 with a 1.3% increase in tonnage, to account for 26.3% of total mineral commodities compared with 25.9% and 21.1% in 1987 and 1986, respectively. Total metals remained in third place in 1988 with a 1.3% increase in tonnage to account for 25.1% of total mineral commodities, up from 24.7% in 1987

	Fiscal year[1]				
	1984	1985	1986	1987	1988
Number of transits:					
Commercial ocean traffic	11,230	11,515	11,925	12,230	12,234
Other traffic	1,293	1,251	1,353	1,214	1,207
Total	**12,523**	**12,766**	**13,278**	**13,444**	**13,441**
Cargo moved (thousand metric tons):					
Commercial ocean traffic:					
Mineral commodities	72,210	74,128	74,139	69,797	69,586
Other commodities	70,515	66,740	68,052	81,280	89,408
Subtotal	142,725	140,868	142,191	151,077	158,994
Other traffic	336	265	184	212	303
Total	**143,061**	**141,133**	**142,375**	**151,289**	**159,297**

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

and 22.6% in 1986.

Iron and steel ingots and semimanufactures remained the dominant single metals class; fertilizer materials were again the overwhelmingly dominant industrial minerals class; refined petroleum products were again for the fifth year the dominant fuel commodity although they dropped back to less than one-half of the mineral fuels moved through the canal during 1988. The amount of mineral commodities moved through the Panama Canal continued to decrease despite increases in various materials over the years, such as movements of bauxite, alumina, and unspecified ores and concentrates from the Pacific to the Atlantic. Even though the Panama Canal is still being operated on a break-even basis by the United States, increased fees and charges associated with various services are making alternate transportation methods more attractive to shippers. Two of these alternatives are the Trans-Isthmus pipeline, which carries about 600,000 barrels of oil per day from tankers in the Pacific Ocean to the Caribbean Sea, and a growing network of container ships and railroad lines that are carrying U.S. imports originating in countries on the Pacific Ocean from the U.S. west coast to the east coast, thereby bypassing the canal.

Information on mineral commodity shipments through the Suez Canal during 1988 was not available to the Bureau of Mines in time to be included in this edition of this chapter.

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 to 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. During 1988, efforts were continued to restore regular service on rail lines in Mozambique and Zaire to lessen the dependence on the railroads and ports of the Republic of South Africa by the nations in that area, but economic conditions and continuing guerrilla activity prevented this from becoming a reality. Although not on an international railway, a rail tunnel through Canada's western Selkirk Mountains was on the verge of completion at the end of 1988. When this tunnel is completed, it will mean that Canada's transcontinental main line for the first time will be able to carry raw materials such as coal, potash, and sulfur from the Canadian interior smoothly and without interruption to the west coast for shipment to countries on the Pacific Rim. The tunnel, which will be 9.1 miles long when completed, will increase by 60% the railroad's capacity to move material through the mountains and thus for export.

Major international pipeline movements of crude petroleum and natural gas in 1988 were, in general, confined to the same area cited as the centers of rail movements of mineral commodities. Noteworthy here, however, was the continuing operation of the pipelines for both oil and natural gas from the U.S.S.R. to the other centrally planned economy countries and on to some market economy countries of Europe. The end of overt military activity between Iran and Iraq during 1988 lessened the urgency of completing pipelines that would divert oil movements in the area away from the shipping lanes but the fact remains that these pipelines had become operational and provide an alternative to tankers in moving crude petroleum from the producing areas of the Middle East to the consuming areas of Europe.

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

PRICES

Comprehensive data on market prices for crude minerals and mineral products for the world as a whole do not exist, and even the data that are available and published are not compatible between countries, particularly between the market economy countries and the centrally planned economy countries. However, the regularly published prices for selected major commodities in key market areas can be regarded as indicative of general world price trends. Tables 11, 12, and 13 summarize prices for selected metals in the United States, the United Kingdom, and Canada, respectively, for 1984–88 inclusive, with monthly data provided for 1988. In broadest overview, of the 20 prices listed in the tables, all except four showed advances, many quite substantial, between 1987 and 1988. Only the silver price in each market area, and the gold price listed for the United Kingdom alone recorded drops. The drop in the annual average gold price was only 2.1%, but the generally downward trend across the year and high levels of production did not bode well for the outlook for 1989. The drops in the three annual average silver prices ranged from the 7% decrease in the London price, through the 6.8% drop in the U.S. price, to the 6.3% decline in the Canadian price; as with gold, the general downturn after midyear in each of these markets suggested a somewhat less than bright outlook.

In contrast to these downturns were the increases for most metals listed. The U.S. price for aluminum advanced by nearly 53%, and this was a smaller increase than that reported for the United Kingdom market. A 46.8%

growth in the U.S. copper price was only fractionally greater than the growth recorded for the United Kingdom price, and was substantially below the 66% increase in the reported Canadian price. The recorded Canadian nickel price soared, topping the 1987 level by 168%, a markedly greater upturn than the 8% increase recorded for its companion metal, cobalt, on the U.S. market. The 43% growth in the quoted U.S. zinc price topped the increase on the Canadian market but fell short of the increase recorded for the cited United Kingdom price. Clearly most prominent from the viewpoint of the percentage growth among the prices recorded in the three tables was the 282% increase for cadmium on the U.S. market. Increases of about 3% in the annual average lead price on the U.S. and Canadian markets hardly accommodated the inflation rate, but the 9.9% increase in the United Kingdom price was noteworthy. Advances of around 5% in the tin price in both the United States and the United Kingdom undoubtedly were somewhat heartening to tin producers, although they were not as substantial as those logged between 1986 and 1987.

Among the industrial minerals and their chemical derivatives, contract prices for exported sulfur on an f.o.b. basis were slightly higher in the first half of 1988 than in the latter half of 1987 in the U.S. gulf coast market and in the Middle East market, and slightly lower on the Canadian and Polish markets. In the second half of 1988, the reported U.S. gulf coast export price advanced from the $99–$105 per ton f.o.b. range of the first half to a $105–$110 range; the Middle East market price rose from the $97–$100 per ton, f.o.b. Persian Gulf, range of the first half to $100–$104; the Canadian market export price increased from $90–$98 per ton, f.o.b. Vancouver, range of the first half to $98–$105 for the second half; and the Polish market export price moved up from the $96–$99 per ton, f.o.b. Gdansk, range of the first half to $98–$105 for the second half. Thus, in 1988, Polish sulfur, which was more costly than that from the other listed markets through 1987, moved downward relatively to a price level below that of the U.S. gulf coast, but remained more expensive than that from Canada and the Middle East.

Urea export prices ranged from a low of about $102 per ton, f.o.b. East Europe, for bulk material to about $115 per ton, f.o.b. Middle East ports, for bagged product at the start of the year. Thereafter, a series of step-like increases set in, with the f.o.b. East Europe bulk price peaking around $130–$135 per ton and the f.o.b. Middle East bagged price at about $152 per ton in July. Thereafter, the f.o.b. East Europe bulk price declined to a low of about $120 per ton in November, edged upward to $125 in December, and dropped again to about $120 at yearend. In contrast, the f.o.b. Middle East bagged price dropped slightly under $150 per ton by August, edged back to $150 by September, fell to about $138 by October, advanced marginally by November, moved sharply to $150 by December, and fell slightly thereafter, ending the year at about $145 per ton.

In the case of ammonia, the c&f price in northwest Europe remained quite close to $125 per ton from January through August, slumped slightly to about $120 per ton in September and then moved upward to about $135 per ton for December and even more sharply to over $160 per ton by yearend. The f.o.b. price in the Caribbean started the year at nearly $100 per ton, suffered a slight drop in March and recovered to about $100 by May, held that level until October, advanced to about $110 by December, and leapt to almost $135 by yearend.

Ammonium sulfate prices in the U.S. gulf area began the year at about $50 per ton, f.o.b., for bulk material; the West Europe f.o.b. bulk price was about $2 per ton higher. The U.S. gulf price advanced to about $56 per ton by February and then fluctuated at or just below that level until September, when it advanced to about $61 per ton. Thereafter, there was a brief and small advance followed by a drop to around $59 per ton which held through yearend. The West Europe price advanced to about $62 per ton by March, held that level until May, slumped to about $57 per ton by July, rose to about $61 by September, held that level until November, rose to about $63 by December and declined to about $61 per ton again by yearend.

Prices for various phosphatic materials showed rather divergent patterns in 1988. Phosphoric acid began the year at about $290 per ton of P_2O_5, f.o.b. U.S. gulf ports, and in a series of upward steps with a minor slump between September and November, reached $380 per ton by December, a price that held until yearend. In contrast, diammonium phosphate, bulk basis, started the year at $210 per ton, f.o.b. U.S. gulf ports, fell sharply to $175 per ton by April, advanced to $200 per ton by July, and thereafter fluctuated slightly around the $200 level through yearend, when it was about $195 per ton. The triple superphosphate price, f.o.b. U.S. gulf ports for bulk material, began the year at about $152, remained at or near that level until May, advanced in steps to about $163 per ton for October, and held that level to yearend.

Potash prices, as measured by the potassium chloride price, f.o.b. Vancouver, Canada moved upward in steps throughout 1988, starting at about $76 per ton in January, reaching $80 per ton by April, $90 per ton by August, and about $99 per ton by yearend.

The price of cement in the United States, as expressed in terms of the average value at mills, was equivalent to $54.12 per metric ton for 1988, or $0.21 below the 1987 level. This made it one of the few industrial mineral commodities logging even a fractional decline between 1987 and 1988. Space does not permit further detailed recitation of specific prices, but suffice it to say that for most

commodities, either stability or an increase between 1987 and 1988 was more common than declines.

The topic of energy material prices on a global basis is so complex, both from the viewpoint of monetary equivalency and that of the exceedingly variable nature of the materials involved, that the following summary can only touch on broadest generalities and lacks reliable information on much of the material produced and consumed within the centrally planned economy nations. The U.S. Department of Energy's compilation of average world crude oil prices shows a decrease of 18% between January 1, 1988, and January 1, 1989, from $16.57 per barrel to $13.58 per barrel, but these global year-start-to-yearend results are a tremendous oversimplification of the actual changes across the year. For details, either by area or in terms of a time series within the year, the reader is referred to the Energy Information Administration's publication "Weekly Petroleum Status Report." In broadest terms, the global average fluctuated widely across the year, dropping to a low of about $10.10 per barrel in early October and after several sharp up and down variations, was on a rising trend through the month of December. Summarizing only end-of-year figures for major areas, crude oil from OPEC countries showed a decline even greater than that for the world as a whole—20% from $16.77 per barrel on January 1, 1988, to $13.36 per barrel on January 1, 1989. The corresponding figures for all non-OPEC countries were a 13.3% decline from $16.21 per barrel to $14.06 per barrel. The latter figure, however, included many quite different components, with January 1, 1988, prices ranging from $11.10 to $18.50 per barrel, January 1, 1989, prices ranging from $9.97 to $16.00 per barrel, and percent declines ranging from 2% to 35%. Similarly, OPEC crude oils were also quite variable; January 1, 1988, prices ranged from $12.20 to $18.92 per barrel, January 1, 1989, prices ranged from $10.00 to $16.10 per barrel, and percent declines varied between 7.6% and 30.4%. Prices for the variety of refinery products varied appreciably from market area to market area, from product to product, and from month to month, but overall there were evidently downturns related to drops in the price of crude.

Price data for coal were even less comprehensive than for oil and its products, but for the countries for which data were readily available—Australia, Canada, France, the Federal Republic of Germany, Italy, Japan, Sweden, the United Kingdom, and the United States—increases of $1.00 to $3.00 per ton were evident for metallurgical coal and industrial steam coal (including that for electric power generation), and even larger increases were reported for residential steam coal, some of more than $20.00 per ton. Illustrative of individual country-to-country variations, the metallurgical coal price (including taxes) was reported at the equivalent of $22.94 per metric ton in Australia, $58.26 in the Federal Republic of Germany, $44.49 in Sweden, and $52.59 in the United States; Australia and Sweden recorded small drops in price of this grade in 1988 with respect to the 1987 levels. The metric ton price (including taxes) of steam coal for electricity generation was reported for Australia as $24.12, for France as $41.12, for the Federal Republic of Germany as $123.13, for Italy as $50.63, for Japan as $95.15, for Sweden as $49.11, and for the United States as $33.83. Prices for steam coal (including taxes) for use in private residences, in terms of dollars per metric ton, were given as follows: France, $442; the Federal Republic of Germany, $381; Sweden, $224; and the United Kingdom, $176.

Reporting on natural gas prices is also far from comprehensive. For most areas for which figures were available, modest increases were reported, both for industrial and residential users. However, in some instances, the industrial price increased while the residential price declined, and in other areas the reverse was true, thus further complicating the picture.

STATISTICAL SUMMARY OF WORLD PRODUCTION AND TRADE OF MAJOR MINERAL COMMODITIES

The final 26 tables of this chapter, tables 14–39, 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 1967–87 editions. This year, tables showing the leading world producers of mine silver and uranium oxide have been added to this series principally in recognition of contribution these two materials make to the computed value of crude mineral production worldwide. Based on the information presented in table 3 of the 1985 edition of this chapter, mine silver ranked ninth and uranium ranked tenth in value of production in 1983. Their inclusion now leaves no gaps in showing the leading world producers of the principal (based on value) crude minerals produced. These 26 tables are primarily a supplement to other statistical data within this chapter but also serve as a summary of international production data for major mineral commodities covered in greater detail on a commodity basis in volume I of the 1988 "Minerals Yearbook" and on a country basis in volume III.

In this edition, the data presented in these tables, in most instances, correspond with the data in the individual commodity world production tables appearing in volume I and may differ somewhat from a total that might be obtained by adding figures presented for any single commodity in each of the country chapters of volume III. This

apparent disparity results from the problems of scheduling the compilation of tables in the numerous commodity and country chapters 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. For summary purposes, however, the tables of this chapter are sufficiently correct without the inclusion of all of these revisions.

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

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[1] Senior Foreign Mineral Specialist, Division of International Minerals.

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

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

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

TABLE 1

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1984	1985	1986	1987[p]	1988[e]
METALS						
Aluminum:						
Bauxite, gross weight[2]	thousand metric tons	88,266	85,286	88,867	95,094	99,990
Alumina, gross weight	do.	33,712	32,230	32,935	34,794	37,372
Unalloyed ingot metal	do.	15,705	15,398	15,354	16,378	17,304
Antimony, mine output, Sb content	metric tons	54,683	56,235	57,550	68,809	71,196
Arsenic, trioxide[3]	do.	47,070	53,201	53,147	53,696	55,103
Beryl concentrate, gross weight[3]	do.	8,975	8,141	8,946	8,434	8,289
Bismuth[4]:						
Mine output, Bi content	do.	3,451	4,406	3,457	2,886	2,767
Smelter	do.	3,189	4,325	4,295	4,222	3,513
Cadmium, smelter	do.	19,617	19,063	19,064	18,996	19,773
Chromite, gross weight[3]	thousand metric tons	9,776	10,516	11,094	10,917	11,666
Cobalt:						
Mine output, Co content	metric tons	40,972	46,781	50,243	45,742	43,904
Metal, refined	do.	23,703	27,717	31,076	26,840	25,254
Columbium-tantalum concentrate, gross weight[3 5]	do.	33,307	35,503	34,835	22,256	38,935
Copper:						
Mine output, Cu content	thousand metric tons	7,879	7,969	8,001	8,328	8,453
Metal:						
Smelter:						
Primary[6]	do.	7,647	7,698	7,868	8,002	8,022
Secondary[7]	do.	808	957	949	912	1,001
Refined:						
Primary[6]	do.	7,913	8,018	8,244	8,340	8,538
Secondary[7]	do.	1,235	1,456	1,418	1,475	1,534
Gold, mine output, Au content	thousand troy ounces	46,929	49,284	51,534	53,034	58,454
Iron and steel:						
Iron ore, iron ore concentrates, iron ore agglomerates, gross weight	thousand metric tons	829,349	862,158	868,360	890,137	916,431
Metal:						
Pig iron	do.	495,016	504,919	501,486	503,014	538,518
Ferroalloys	do.	14,946	14,937	14,873	14,962	15,783
Steel, crude	do.	711,174	717,886	711,254	733,199	777,784
Lead:						
Mine output, Pb content	do.	3,269	3,430	3,354	3,429	3,381
Metal:						
Smelter:						
Primary	do.	3,176	3,391	3,220	3,313	3,293
Secondary	do.	2,249	2,207	2,302	2,373	2,424
Refined:						
Primary	do.	3,172	3,368	3,206	3,215	3,254
Secondary	do.	2,296	2,301	2,370	2,512	2,601

See footnotes at end of table.

TABLE 1—Continued

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1984	1985	1986	1987[p]	1988[e]
METALS—Continued						
Magnesium metal, smelter:						
Primary	metric tons	327,783	319,633	320,839	327,677	338,167
Secondary	do.	68,525	73,098	66,989	65,825	70,727
Manganese ore, gross weight	thousand metric tons	25,035	25,384	24,982	23,726	23,927
Mercury, mine output, Hg content	76-pound flasks	195,380	198,340	174,890	172,090	166,520
Molybdenum, mine output, Mo content	metric tons	97,695	98,424	92,819	89,178	94,750
Monazite concentrate (source of rare-earth metals and thorium)[4]	do.	30,313	32,305	29,548	23,240	25,404
Nickel:						
Mine output, Ni content	do.	773,540	804,661	770,313	811,568	835,138
Metal, plant output	do.	730,890	753,547	735,557	761,887	806,169
Platinum-group metals, mine output, metals content	thousand troy ounces	7,653	7,941	8,314	8,593	8,668
Selenium, smelter[3 5]	metric tons	1,494	[4]1,325	[4]1,224	[4]1,229	1,503
Silver, mine output, Ag content	thousand troy ounces	418,761	422,642	418,987	442,855	445,270
Tellurium, smelter[3 4 5]	metric tons	100	100	85	74	73
Tin:						
Mine output, Sn content	do.	188,183	180,759	172,899	177,205	200,798
Metal, smelter	do.	192,979	193,703	181,381	187,373	204,340
Titanium concentrate, gross weight:						
Ilmenite[4 8]	thousand metric tons	3,481	3,536	3,424	3,884	3,942
Rutile[3 4]	do.	341	373	394	439	435
Titaniferous slag	do.	1,143	1,280	1,285	1,575	1,725
Tungsten, mine output, W content	metric tons	46,162	46,583	42,799	42,174	[4]43,236
Uranium, mine output, U_3O_8 content[3 5]	do.	43,574	40,224	41,540	40,246	41,105
Vanadium, mine output, V content	do.	33,290	33,352	32,418	37,471	34,270
Zinc:						
Mine output, Zn content	thousand metric tons	6,524	6,799	6,936	7,242	3,977
Metal, smelter:						
Primary[6]	do.	6,189	6,466	6,400	6,692	6,760
Secondary[7]	do.	338	332	299	322	349
Zirconium concentrate	do.	[4]736	[4]815	[4]741	[4]754	923
INDUSTRIAL MINERALS						
Asbestos	do.	4,314	4,274	4,057	4,256	4,361
Barite	do.	5,815	6,066	4,707	4,714	5,305
Boron materials	do.	2,519	2,505	2,511	2,701	2,781
Bromine[3]	do.	397	381	374	389	405
Cement, hydraulic	do.	940,608	959,367	1,000,743	1,045,508	1,100,539
Clays:[3]						
Bentonite	do.	8,822	8,856	8,895	8,831	9,087
Fuller's earth[5]	do.	2,235	2,384	2,271	2,411	2,568
Kaolin	do.	20,633	22,325	23,383	24,012	25,748

See footnotes at end of table.

TABLE 1—Continued

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1984	1985	1986	1987[p]	1988[e]
INDUSTRIAL MINERALS—Continued						
Corundum, natural	metric tons	9,213	9,248	9,717	9,214	9,217
Diamond, natural:						
Gem[e]	thousand carats	26,093	26,233	39,045	37,995	43,606
Industrial[e]	do.	37,359	39,785	52,672	49,620	50,393
Total	**do.**	**63,452**	**66,018**	**91,717**	**87,615**	**93,999**
Diatomite[3]	thousand metric tons	1,750	1,836	1,842	1,817	1,847
Feldspar[3]	do.	3,798	4,042	4,121	4,277	4,294
Fluorspar	do.	4,797	4,923	5,010	4,965	5,181
Graphite[4]	metric tons	624,916	608,345	659,384	661,011	672,657
Gypsum	thousand metric tons	85,779	86,986	89,175	89,650	95,209
Iodine	metric tons	[4]12,488	[4]12,784	[4]12,971	[4]12,637	14,608
Lime[3]	thousand metric tons	117,072	116,076	113,831	113,162	118,997
Magnesite[4]	do.	11,823	12,172	12,313	12,139	12,132
Mica[3]	do.	276	255	289	290	271
Nitrogen: N content of ammonia	do.	88,630	91,135	91,403	94,274	98,948
Perlite[3]	do.	1,634	1,628	1,656	1,750	1,848
Phosphate, gross weight:						
Phosphate rock	thousand metric tons	151,855	148,842	138,870	144,228	163,673
Thomas slag	do.	2,637	2,515	2,037	2,095	2,119
Guano	do.	9	9	14	13	11
Potash, marketable, K_2O equivalent	do.	29,334	29,151	28,694	30,470	31,429
Pumice[3 5]	do.	11,622	10,774	10,245	10,781	10,833
Salt	do.	172,312	172,869	175,101	178,636	183,986
Sodium compounds, n.e.s.:[3]						
Carbonate	do.	29,238	29,137	29,358	30,230	31,081
Sulfate	do.	4,300	4,392	44,334	4,502	4,604
Strontium materials[3 5]	metric tons	139,874	162,572	149,843	181,364	191,600
Sulfur, elemental basis:						
Elemental[9]	thousand metric tons	14,137	15,322	14,708	14,297	13,874
From pyrites	do.	8,737	9,021	8,914	9,855	10,187
Byproduct[10]	do.	29,625	30,318	31,032	32,788	34,335
Total	**do.**	**52,499**	**54,661**	**54,654**	**56,940**	**58,396**
Talc, soapstone, pyrophyllite	do.	7,572	7,666	7,492	7,599	7,657
Vermiculite[3 5]	metric tons	494,022	504,406	525,532	541,679	539,531
MINERAL FUELS AND RELATED MATERIALS						
Carbon black[3 5]	thousand metric tons	4,399	4,487	4,434	4,548	4,760
Coal:						
Anthracite	million metric tons	314	326	337	353	363
Bituminous	do.	2,801	2,955	3,027	3,120	3,181
Lignite	do.	1,110	1,160	1,179	1,203	1,212
Total	**do.**	**4,225**	**4,441**	**4,543**	**4,676**	**4,756**

See footnotes at end of table.

TABLE 1—Continued

WORLD PRODUCTION OF MAJOR MINERAL COMMODITIES[1]

Commodity		1984	1985	1986	1987[p]	1988[e]
MINERAL FUELS AND RELATED MATERIALS—Continued						
Coke:[11]						
Metallurgical	thousand metric tons	338,552	345,813	340,646	343,168	353,610
Other	do.	10,043	11,053	11,042	10,428	10,961
Gas, natural, marketed	billion cubic feet	59,627	61,875	63,420	66,058	67,976
Natural gas liquids[3]	million 42-gallon barrels	1,523	1,517	1,586	1,643	1,687
Peat	thousand metric tons	187,629	181,809	190,039	185,199	185,225
Petroleum:						
Crude	million 42-gallon barrels	19,974	19,535	20,635	20,458	21,405
Refined	do.	21,113	21,054	21,825	21,860	22,459

[e] Estimated. [p] Preliminary.

[1] Incorporates numerous revisions from the corresponding table in previous editions of this chapter. Figures generally conform to those published in appropriate commodity chapters of volume I of the "Minerals Yearbook," 1988 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 China (no adequate basis for estimation available).

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

[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 2

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

(Million U.S. dollars)

Commodity group	1982	1983	1984[r]	1985[r]	1986[r]	1987
Metals:						
All ores, concentrates, scrap	24,481	23,247	25,753	24,854	24,251	27,110
Iron and steel	68,732	61,322	66,126	69,731	74,482	81,595
Nonferrous metals	31,967	36,575	36,185	34,809	36,522	44,669
Total	**125,180**	**121,144**	**128,064**	**129,394**	**135,255**	**153,374**
Nonmetals, crude only	9,938	9,325	9,855	9,947	10,647	11,198
Mineral fuels	430,384	384,188	378,398	360,642	263,504	277,727
Grand total	**565,502**	**514,657**	**516,317**	**499,983**	**409,406**	**442,299**
All commodities	1,848,930	1,812,944	1,909,303	1,928,399	2,117,135	2,491,466

[r] Revised.

[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 of the centrally planned economy countries of Asia and trade between the Federal Republic of Germany and the German Democratic Republic.

Sources: 1984–87 data: United Nations. Monthly Bulletin of Statistics. V. 43, May 1989, pp. 274–301; 1983 data: United Nations. Monthly Bulletin of Statistics. V. 42, May 1988, pp. 274–301; 1982 data: United Nations. Monthly Bulletin of Statistics. V. 41, May 1987, pp. 274–301.

TABLE 3

DISTRIBUTION OF VALUE OF WORLD EXPORT TRADE IN MAJOR MINERAL COMMODITY GROUPS

(Percent)

Commodity group	1982	1983	1984	1985	1986	1987
Metals:						
All ores, concentrates, scrap	4.3	4.5	5.0	5.0	5.9	6.1
Iron and steel	12.1	11.9	12.8	13.9	r18.2	18.5
Nonferrous metals	5.7	7.1	7.0	r7.0	8.9	10.1
Total	**22.1**	**23.5**	**24.8**	**r25.9**	**r33.0**	**34.7**
Nonmetals, crude only	1.8	1.8	1.9	2.0	2.6	2.5
Mineral fuels	76.1	74.6	73.3	r72.1	r64.4	62.8

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

TABLE 4

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

(Percent change from that of previous year)

Commodity group	1982	1983	1984r	1985r	1986	1987
Metals:						
All ores, concentrates, scrap	-13.1	-5.0	+10.8	-3.4	-2.4	+11.8
Iron and steel	-6.4	-10.8	+7.8	+5.4	+6.8	+9.5
Nonferrous metals	-11.9	+14.0	-1.1	-3.8	+4.9	+22.3
All metals	-9.2	-3.2	+5.7	+1.0	+4.5	+13.4
Nonmetals, crude only	-9.3	-6.2	+5.7	+0.9	+7.0	+5.2
Mineral fuels	-9.3	-10.7	-1.5	-4.7	-26.9	+5.4
All major mineral commodity groups	-9.2	-9.1	+0.3	-3.2	-18.1	+8.0
All commodities	-5.9	-1.9	+5.3	+1.0	+9.8	+17.7

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

TABLE 5

WORLD CONSUMPTION OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		1984[r]	1985[r]	1986[r]	1987	1988[p]
Ferrous metals: World:						
Iron ore, gross weight[e]	million metric tons	817	850	855	[r]880	905
Iron and steel scrap, gross weight	do.	312	306	297	301	[e]318
Nonferrous metals:						
Market economy countries:						
Aluminum, refined		12,302	12,540	12,788	13,654	14,462
Cadmium		14	13	15	16	17
Copper, refined		7,668	7,348	7,718	8,068	8,302
Lead, refined		4,050	3,971	4,069	4,157	4,213
Magnesium, primary		194	192	188	210	229
Nickel[1]		582	569	572	632	666
Tin, refined		161	157	165	172	177
Zinc, slab		4,616	4,706	4,854	5,018	5,174
Centrally planned economy countries:						
Aluminum, refined		3,273	3,288	3,252	3,333	3,323
Cadmium		4	4	4	4	4
Copper, refined		2,269	2,356	2,372	2,395	2,373
Lead, refined		1,447	1,470	1,436	1,449	1,453
Magnesium, primary		94	102	105	108	112
Nickel[1]		200	206	206	206	206
Tin, refined		61	58	58	59	58
Zinc, slab		1,837	1,811	1,845	1,906	1,940
World total:						
Aluminum, refined		15,575	15,828	16,040	16,987	17,785
Cadmium		18	17	19	20	21
Copper, refined		9,937	9,704	10,090	10,463	10,675
Lead, refined		5,497	5,441	5,505	5,606	5,666
Magnesium, primary		288	294	293	318	341
Nickel[1]		782	775	778	838	872
Tin, refined		222	215	223	231	235
Zinc, slab		6,453	6,517	6,699	6,924	7,114
Industrial minerals: World:						
Fertilizers:[2]						
Nitrogenous, contained N		87,740	88,162	87,667	93,827	98,259
Phosphatic, contained P_2O_5		32,718	34,158	32,961	34,749	36,598
Potassic, K_2O equivalent		25,493	25,947	25,543	26,010	27,280
Sulfur, elemental S equivalent		58,282	57,916	56,938	59,536	63,245
Mineral fuels: World:						
Solid fuels	million metric tons of standard coal equivalent	2,874	3,037	3,075	3,127	[e]3,170
Liquid fuels	do.	3,657	3,631	3,717	3,784	[e]3,950
Natural gas	do.	2,006	2,103	2,127	2,278	[e]2,385
Primary electricity:						
Hydro and geothermal	do.	245	249	252	255	[e]256
Nuclear	do.	150	178	191	208	[e]225
Total[3]	**do.**	**8,932**	**9,198**	**9,364**	**9,654**	**[e]9,986**

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

[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); British Sulphur Corp. Ltd. (nonmetals); and 1987 United Nations Energy Statistics Yearbook (all mineral fuels for 1984–87). Data on iron ore and iron and steel scrap for all years and on mineral fuels for 1988 compiled from a variety of sources by the U.S. Bureau of Mines.

TABLE 6

ANNUAL INVESTMENT IN THE STEEL INDUSTRY FOR SELECTED COUNTRIES

(Million dollars)

Country or country group	1983	1984	1985	1986	1987
Organization for Economic Cooperation and Development (OECD):					
European Communities:					
Belgium	281	179	229	308	321
France	420	544	504	420	494
Germany, Federal Republic of	618	733	1,268	914	851
Ireland and Denmark	6	7	8	6	6
Italy	550	368	583	978	821
Luxembourg	32	34	50	71	85
Netherlands	132	131	239	348	278
Portugal	([1])	([1])	([1])	1	8
Spain	([2])	([2])	([2])	650	696
United Kingdom	225	297	263	365	479
Subtotal[3]	r2,295	r2,345	r3,159	r4,081	4,045
EFTA[4]	198	274	372	r457	598
Other:[5]					
Australia	64	96	134	485	NA
Canada	156	176	310	476	NA
Japan	3,744	2,669	2,892	r4,011	3,488
Spain[6]	131	290	395	XX	XX
Turkey	232	217	210	146	98
United States	3,137	1,203	1,641	r862	1,160
Total[7]	**r7,662**	**r4,925**	**r5,954**	**r1,107**	**9,389**
Latin America:					
Argentina	164	147	184	191	262
Brazil	1,248	809	472	413	540
Chile	2	11	1	4	1
Colombia	24	8	13	r10	11
Ecuador	NA	NA	2	NA	NA
Mexico	410	526	491	119	171
Peru	5	1	4	2	1
Uruguay	9	1	1	1	—
Venezuela	90	25	25	121	111
Central America	6	([8])	NA	NA	1
Total[9]	**[10]1,959**	**1,528**	**1,193**	**851**	**[8]1,099**
Grand total	**r11,916**	**r8,798**	**r10,306**	**r11,379**	**9,389**

r Revised. NA Not available. XX Not applicable; included with EC figures.

[1] 1983–85 figures included with EFTA total; joined EC in 1986.

[2] 1983–85 figures listed separately; joined EC in 1986.

[3] Source: EUROSTAT Iron and Steel Statistical Yearbook 1988. Luxembourg 1989. 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: 1983—0.89128; 1984—0.78899; 1985—0.76219; 1986—0.98119; and 1987—1.15432.

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

[5] Data for New Zealand have not been available since 1979.

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

[7] Sources for OECD other than EC: The Iron and Steel Industry in 1984. Paris, 1986, p. 32; 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.

[8] Less than 1/2 unit.

[9] Source for Latin America: Instituto Latinamericano del Fierro y el Acero. Statistical Yearbook of Steelmaking and Iron ore Mining in Latin America 1988. Santiago, p. 189.

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

TABLE 7

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 8

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

(Million dollars)

	1985	r1986	r1987	1988
Direct foreign investment:				
Mining, smelting, refining	7,345	7,923	8,135	9,446
Petroleum	57,695	58,497	61,800	59,658
Reinvested earnings of foreign affiliates:				
Smelting and fabricated metals	198	476	862	1,145
Petroleum	2,594	27	1,822	45
Equity and intercompany account flows:				
Smelting and fabricated metals	-136	243	-276	126
Petroleum	-4,026	3,331	1,523	-1,797
Income:				
Mining, smelting, refining	r263	413	593	943
Petroleum	9,306	8,477	8,667	7,932

r Revised.

Source: U.S. Department of Commerce. Survey of Current Business, v. 69, No. 8, Aug. 1989.

TABLE 9

WORLD MERCHANT FLEET DISTRIBUTION, BY TYPE[1]

		1984	1985	1986	1987	1988
Number of vessels:						
Bulk carriers		5,560	5,787	5,481	5,302	5,332
Freighters[2]		14,019	13,937	12,786	12,572	12,518
Tankers		5,482	5,456	4,999	5,090	5,250
Other[3]		363	375	352	343	368
Total		**25,424**	**25,555**	**23,618**	**23,307**	**23,468**
Gross tonnage:						
Bulk carriers	thousand long tons	129,274	135,366	130,654	128,468	130,225
Freighters[2]	do.	94,549	97,284	93,157	93,966	95,932
Tankers	do.	164,451	158,508	134,660	135,010	140,833
Other[3]	do.	3,705	3,898	3,798	3,688	4,367
Total	**do.**	**391,979**	**395,056**	**362,179**	**361,132**	**371,357**
Deadweight tonnage:						
Bulk carriers	do.	225,496	235,833	227,325	224,309	227,515
Freighters[2]	do.	124,758	126,542	118,845	116,937	118,077
Tankers	do.	304,589	292,345	245,584	245,906	254,796
Other[3]	do.	1,579	1,604	1,476	1,405	1,531
Total	**do.**	**656,422**	**[4]656,323**	**[4]593,229**	**588,557**	**601,919**

[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 1984-88.

TABLE 10

MOVEMENT OF MINERAL COMMODITIES THROUGH THE PANAMA CANAL

(Thousand metric tons)

	1986			1987			1988		
	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	103	898	1,001	116	744	860	181	1,404	1,585
Chromite	7	31	38	7	23	30	7	25	32
Copper	41	672	713	36	737	773	40	871	911
Iron	57	187	244	62	534	596	135	776	911
Lead	5	150	155	—	192	192	2	212	214
Manganese	47	195	242	36	193	229	72	198	270
Tin	—	30	30	—	15	15	—	9	9
Zinc	69	575	644	106	1,684	1,790	43	670	713
Other and unspecified	282	1,391	1,673	367	1,157	1,524	268	1,660	1,928
Subtotal	611	4,129	4,740	730	5,279	6,009	748	5,825	6,573
Ingots and semimanufactures:									
Aluminum	215	92	307	371	52	423	422	39	461
Copper	10	926	936	15	840	855	14	785	799
Iron and steel[1 2]	6,076	4,272	10,348	5,859	3,733	9,592	5,042	4,187	9,229
Lead	5	82	87	3	51	54	7	62	69
Tin[1]	21	19	40	14	11	25	13	10	23
Zinc	47	176	223	14	152	166	15	171	186
Other	31	41	72	19	80	99	37	73	110
Subtotal	6,405	5,608	12,013	6,295	4,919	11,214	5,550	5,327	10,877
Total	**7,016**	**9,737**	**16,753**	**7,025**	**10,198**	**17,223**	**6,298**	**11,152**	**17,450**
INDUSTRIAL MINERALS									
Borax	1	406	407	3	385	388	1	438	439
Cement	196	23	219	253	3	256	152	1	153
Clays, fire and china	363	15	378	447	27	474	480	25	505
Fertilizer materials	7,694	2,414	10,108	10,047	2,148	12,195	10,454	1,878	12,332
Salt	103	760	863	120	1,128	1,248	42	813	855
Sulfur	24	3,419	3,443	8	3,278	3,286	9	3,641	3,650
Other[3]	199	21	220	185	39	224	187	191	378
Total	**8,580**	**7,058**	**15,638**	**11,063**	**7,008**	**18,071**	**11,325**	**6,987**	**18,312**
MINERAL FUELS									
Carbon black	22	1	23	6	85	91	40	1	41
Coal and coke	7,655	2,715	10,370	5,997	2,052	8,049	5,477	3,237	8,714
Petroleum:									
Crude	2,980	10,164	13,144	3,447	5,655	9,102	2,865	6,063	8,928
Refined	9,148	9,063	18,211	9,863	7,398	17,261	9,183	6,958	16,141
Subtotal	12,128	19,227	31,355	13,310	13,053	26,363	12,048	13,021	25,069
Total	**19,805**	**21,943**	**41,748**	**19,313**	**15,190**	**34,503**	**17,565**	**16,259**	**33,824**
Grand total	**35,401**	**38,738**	**74,139**	**37,401**	**32,396**	**69,797**	**35,188**	**34,398**	**69,586**

[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 1988.

TABLE 11

NONFERROUS METAL PRICES IN THE UNITED STATES

(Average cents per pound unless otherwise specified)

Year and month	Aluminum[1]	Copper[2]	Lead[3]	Zinc[4]	Tin[5]	Silver[6]	Cadmium[7]	Cobalt[8]
1984	81.000	66.757	25.548	48.601	5.680	8.140	1.693	10.40
1985	81.000	65.566	19.067	40.366	5.259	6.142	1.208	11.43
1986	55.869	64.652	22.047	37.995	2.941	5.470	1.248	7.49
1987	72.295	81.096	35.943	41.923	3.156	7.009	1.988	6.56
1988:								
January	89.711	131.096	38.000	44.439	3.182	6.733	3.283	7.04
February	96.275	106.117	34.845	45.439	3.154	6.325	4.725	6.98
March	107.087	108.320	34.000	47.901	3.191	6.413	8.591	6.85
April	107.119	102.241	34.000	51.501	3.191	6.478	9.550	7.02
May	114.476	102.973	34.571	56.036	3.216	6.543	9.479	7.03
June	126.273	112.875	36.295	62.550	3.309	7.037	9.300	7.00
July	122.250	103.448	36.500	65.644	3.355	7.147	9.300	7.03
August	124.391	100.051	36.522	66.463	3.427	6.708	9.300	7.04
September	111.381	114.720	38.405	68.255	3.449	6.365	6.974	7.10
October	104.725	136.648	39.149	69.446	3.391	6.285	5.925	7.12
November	107.350	150.920	41.375	71.248	3.421	6.275	7.010	7.37
December	110.000	159.870	42.018	73.440	3.428	6.108	7.743	7.49
Average	110.087	119.107	37.140	60.197	3.310	6.535	7.598	7.09

[1] For 1984–85 inclusive: U.S. list price, North American producer; for 1986–88: Metals Week U.S. market price.
[2] Electrolytic, f.o.b. refinery, producer.
[3] Refined lead, 1984–Sept. 1986 inclusive: U.S. producer price; Oct.1986–87; North America producer price.
[4] Prime Western, f.o.b. East St. Louis.
[5] U.S. dollars per pound, New York dealer.
[6] U.S. dollars per troy ounce, 0.99 fine, New York.
[7] U.S. dollars per pound, producer.
[8] U.S. dollars per pound, average annual spot for cathodes.

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

TABLE 12

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]
1984	56.526	62.562	360.438	20.117	8.140	5.566	40.459
1985	47.850	64.904	317.265	17.842	6.132	5.567	36.233
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:							
January	91.260	120.799	476.580	30.206	6.732	3.088	39.810
February	98.260	105.698	442.074	29.706	6.342	3.035	39.722
March	114.580	107.018	443.607	29.390	6.411	3.072	44.501
April	113.850	103.706	451.547	29.414	6.452	3.063	48.462
May	137.050	111.039	451.068	30.267	6.542	3.074	53.332
June	164.870	115.225	451.332	30.678	7.016	3.191	61.867
July	122.640	100.403	437.629	28.057	7.098	3.243	56.081
August	125.240	99.821	431.277	27.254	6.708	3.322	59.345
September	109.790	110.474	413.455	27.629	6.372	3.360	60.298
October	106.530	133.334	406.781	29.683	6.283	3.290	68.851
November	110.420	149.897	420.168	31.327	6.294	3.317	70.634
December	113.520	158.708	419.047	33.117	6.122	3.328	72.236
Average	117.334	118.010	437.047	29.727	6.531	3.199	56.262

[1] London Metal Exchange.
[2] Unalloyed ingot, 99.5%.
[3] For 1984–85, electrolytic wirebars, monthly average settlement price; for 1986–88, 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 1984–87 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: 1983–Aug. 1984 inclusive, slab; Sept. 1984–Dec. 1988, high grade.

Source: American Bureau of Metal Statistics Inc.

TABLE 13

NONFERROUS METAL PRICES IN CANADA

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

Year and month	Copper[1]	Lead[2]	Nickel[3]	Silver[4]	Zinc[5]
1984	63.365	25.805	3.200	8.140	49.006
1985	64.071	19.205	3.200	6.145	41.731
1986	64.222	22.245	3.200	5.474	40.403
1987	73.150	35.948	2.277	6.988	43.910
1988:					
January	135.310	38.000	3.789	6.739	45.600
February	114.919	34.905	3.888	6.329	46.095
March	104.403	34.000	6.161	6.415	48.522
April	110.605	34.000	7.864	6.482	53.500
May	103.790	34.545	7.724	6.550	57.318
June	117.034	36.000	7.000	7.057	63.136
July	96.472	36.000	6.638	7.181	66.000
August	97.393	36.087	6.554	6.726	66.000
September	118.131	38.000	5.207	6.385	68.864
October	129.964	38.857	5.125	6.299	70.571
November	167.158	42.000	5.720	6.295	72.000
December	163.016	42.000	7.421	6.144	74.864
Average	121.516	37.033	6.091	6.550	61.039

[1] Hudson Bay Mining & Smelting Co. Ltd. delivered price for cathode.
[2] Producers' price, carload quantities, pig lead, Cominco Ltd.
[3] U.S. dollars per pound 1984–86 inclusive: Canadian producer price. Beginning Jan. 1987: New York dealers, cathode.
[4] U.S. dollars per troy ounce.
[5] Producers' price, carload quantities, regular high grade, Cominco, Ltd.

Source: American Bureau of Metal Statistics Inc.

TABLE 14

LEADING WORLD PRODUCERS OF BAUXITE[1]

(Thousand metric tons, gross weight)

Country	1984	1985	1986	1987[p]	1988[e]
Australia	31,537	31,839	32,384	34,102	[2]36,192
Guinea	[r]12,740	[r]11,790	13,300	[re]13,500	15,600
Brazil	6,433	5,846	6,544	[re]8,750	8,750
Jamaica	[r]8,735	[r]6,239	6,944	7,660	7,408
U.S.S.R.[e3]	[r]5,690	[r]5,695	[r]5,710	[r]5,715	5,730
India	2,093	2,281	2,322	2,736	[2]3,829
Suriname	3,454	3,738	3,731	2,581	[2]3,434
China[e]	1,600	1,600	1,650	2,400	3,200
Yugoslavia	3,347	3,538	3,459	3,394	[2]3,034
Hungary	2,994	2,815	3,022	3,101	[2]2,906
Greece	2,296	2,453	2,230	2,472	2,400
Guyana	1,333	[e]1,675	2,074	2,785	[2]1,774
Sierra Leone	1,040	1,185	1,246	1,390	1,400
Total	**[r]83,292**	**[r]80,694**	**84,616**	**90,586**	**95,657**
Other	[r]4,974	[r]4,592	4,251	4,508	4,333
Grand total	**[r]88,266**	**[r]85,286**	**88,867**	**95,094**	**99,990**

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

[1]Table includes data available through July 5, 1989.

[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 15

LEADING WORLD PRODUCERS OF ALUMINUM[1]

(Thousand metric tons)

Country	1984	1985	1986	1987[p]	1988[e]
United States	4,099	3,500	3,037	3,343	[2]3,944
U.S.S.R.[e]	2,100	2,200	2,300	2,400	2,400
Canada	[r]1,222	1,282	1,355	1,540	[2]1,535
Australia	758	851	882	1,004	[2]1,150
Brazil	455	549	757	843	874
Norway	765	[r]743	726	806	840
China[e]	400	410	410	[r]615	800
Germany, Federal Republic of	777	745	765	738	744
Venezuela	386	396	423	440	417
Spain	381	370	350	341	[2]323
France	342	293	322	323	322
United Kingdom	288	275	276	294	[2]300
India	269	260	257	245	298
Netherlands	249	251	266	276	[2]278
Romania	244	247	269	260	260
Yugoslavia[e]	270	280	282	244	250
Italy	230	[r]224	243	233	227
New Zealand	243	241	173	249	200
Indonesia	199	217	219	216	180
Total	**[r]13,677**	**[r]13,334**	**13,312**	**14,410**	**15,342**
Other	[r]2,028	[r]2,064	2,042	1,968	1,962
Grand total	**[r]15,705**	**[r]15,398**	**15,354**	**16,378**	**17,304**

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

[1] Table includes data available through May 31, 1989.

[2] Reported figure.

TABLE 16

LEADING WORLD PRODUCERS OF CHROMITE[1]

(Thousand metric tons, gross weight)

Country	1984	1985	1986	1987[p]	1988[e]
South Africa, Republic of	3,407	3,699	3,907	3,789	4,200
U.S.S.R.[e]	2,940	2,940	[r]3,185	3,150	3,240
Albania[e]	720	825	850	830	750
Finland	446	506	678	543	700
India	423	560	630	624	700
Turkey	487	[r]589	543	[e]600	625
Zimbabwe	477	536	533	[re]570	600
Brazil	260	190	223	[e]225	230
Philippines	261	272	174	188	190
Total	**9,421**	**[r]10,117**	**10,723**	**10,519**	**11,235**
Other	355	[r]399	371	398	431
Grand total	**9,776**	**[r]10,516**	**11,094**	**10,917**	**11,666**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Table includes data available through May 3, 1989.

TABLE 17

LEADING WORLD PRODUCERS OF MINE COPPER[1]

(Thousand metric tons, Cu content of ore)

Country	1984	1985	1986	1987[p]	1988[e]
Chile[2]	1,308	1,360	1,399	1,413	[3]1,472
United States[2]	1,103	[r]1,103	1,144	1,244	[3]1,420
Canada[2]	722	739	698	794	756
U.S.S.R.[e 2]	590	600	620	630	640
Zaire	562	558	532	[re]525	530
Poland	431	431	434	438	440
Zambia	533	459	462	463	400
China[e]	180	185	185	[r]250	300
Peru[2]	354	391	397	406	298
Mexico	[r]190	[r]177	189	254	280
Australia	236	260	248	233	246
Papua New Guinea	164	175	178	218	[3]219
Philippines	233	222	223	216	[3]218
South Africa, Republic of	198	195	184	188	[3]170
Total	**[r]6,804**	**[r]6,855**	**6,893**	**7,272**	**7,389**
Other	[r]1,075	[r]1,114	1,108	1,056	1,064
Grand total	**[r]7,879**	**[r]7,969**	**8,001**	**8,328**	**8,453**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Table includes data available through July 5, 1989.
[2] Recoverable.
[3] Reported figure.

TABLE 18

LEADING WORLD PRODUCERS OF GOLD[1]

(Thousand troy ounces)

Country	1984	1985	1986	1987[p]	1988[e]
South Africa, Republic of	21,861	21,565	20,514	19,177	[2]19,881
U.S.S.R.[e]	8,650	8,700	8,850	8,850	9,000
United States	2,085	2,427	3,739	4,947	[2]6,460
Australia	1,296	1,881	2,414	3,559	4,887
Canada	2,683	2,815	[e]3,365	3,724	[2]4,110
Brazil[e]	[r]1,980	[r]2,320	[r]2,170	[r]2,690	3,220
China[e]	1,900	1,950	2,100	2,300	2,500
Papua New Guinea	[r]835	1,187	1,128	1,069	[2]1,226
Philippines	827	1,063	1,296	1,048	[2]1,134
Colombia	731	1,142	1,286	854	[2]933
Chile	541	554	577	548	640
Zimbabwe	478	472	478	473	475
Total	**[r]43,867**	**[r]46,076**	**47,917**	**49,239**	**54,466**
Other	[r]3,062	[r]3,208	3,617	3,795	3,988
Grand total	**[r]46,929**	**[r]49,284**	**51,534**	**53,034**	**58,454**

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

[1] Table includes data available through June 7, 1989.

[2] Reported figure.

TABLE 19

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

(Thousand metric tons, gross weight)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	247,104	247,639	249,959	250,874	251,000
Brazil	112,132	128,251	132,288	134,105	[2]145,040
China[e]	75,000	80,000	90,000	100,000	105,000
Australia	[r]89,046	[r]97,447	94,015	101,748	[2]96,084
United States	52,092	49,533	39,486	47,648	[2]57,515
India	41,026	42,545	47,800	51,018	[2]52,322
Canada	[r]39,930	39,502	36,167	37,702	[2]38,742
South Africa, Republic of	24,647	24,414	24,483	22,008	[2]25,248
Sweden	18,123	20,454	20,489	19,627	20,440
Venezuela	13,054	16,228	19,125	17,782	[2]18,789
Liberia	15,100	15,318	15,295	13,742	[2]12,767
France	14,839	14,447	12,436	10,852	10,650
Mauritania	9,527	9,333	8,929	9,002	[2]10,004
Korea, North[e]	8,000	8,000	8,000	8,000	9,000
Mexico	8,317	7,820	7,298	7,522	[2]8,431
Chile	6,685	6,534	6,981	6,637	[2]7,866
Turkey	4,037	3,994	5,249	5,366	[2]5,693
Yugoslavia	5,321	5,478	6,618	5,983	5,545
Spain	7,261	6,463	6,089	4,700	4,200
Total	**[r]791,241**	**[r]823,400**	**830,707**	**854,316**	**884,336**
Other	38,108	[r]38,758	37,653	35,821	32,095
Grand total	**[r]829,349**	**[r]862,158**	**868,360**	**890,137**	**916,431**

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

[1] Table includes data available through July 19, 1989.

[2] Reported figure.

TABLE 20

LEADING WORLD PRODUCERS OF CRUDE STEEL[1]

(Thousand metric tons)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	154,238	154,668	160,550	161,887	163,000
Japan	105,586	105,279	98,275	98,513	[2]105,681
United States	83,940	80,067	74,032	80,877	[2]90,650
China[e]	[2]43,370	46,700	52,100	56,000	59,000
Germany, Federal Republic of	39,389	40,497	37,134	36,248	[2]41,023
Brazil	18,386	20,456	21,234	22,231	[2]24,536
Italy	24,026	23,744	22,872	22,847	[2]23,668
Korea, Republic of	13,033	13,539	14,554	16,782	[2]19,113
United Kingdom	15,121	15,722	14,811	17,425	[2]19,013
France	[r]19,008	18,832	17,624	17,726	[2]19,003
Poland	16,533	16,126	17,144	17,148	17,000
Canada	14,715	[r]14,600	14,100	14,700	[2]15,175
Czechoslovakia	14,831	15,036	15,112	15,415	15,000
India	10,344	11,054	11,427	12,883	[2]14,198
Romania	14,437	13,795	14,276	13,885	14,000
Spain	13,484	14,235	11,976	11,691	12,000
Belgium	11,303	10,683	9,744	9,787	[2]11,196
South Africa, Republic of	7,827	8,582	[e]8,800	8,400	[2]8,600
German Democratic Republic	7,573	7,853	7,967	8,243	8,400
Korea, North[e]	6,500	6,500	6,500	6,500	8,000
Mexico	7,560	7,367	7,170	7,571	[2]7,794
Total	**[r]641,204**	**[r]645,335**	**637,402**	**656,759**	**696,050**
Other	[r]69,970	[r]72,551	73,852	76,440	81,734
Grand total	**[r]711,174**	**[r]717,886**	**711,254**	**733,199**	**777,784**

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

[1] Steel ingots and castings. Table includes data available through June 12, 1989.

[2] Reported figure.

TABLE 21

LEADING WORLD PRODUCERS OF MINE LEAD[1]

(Thousand metric tons, Pb content of ore)

Country	1984	1985	1986	1987[p]	1988[e]
Australia	441	498	448	489	475
U.S.S.R.[e]	440	440	440	440	440
United States[2]	335	424	353	319	[3]394
Canada	264	268	349	414	[3]368
China[e]	180	200	[3]227	[3]252	300
Mexico	203	198	195	177	[3]170
Peru	194	202	194	204	[3]149
Korea, North[e]	110	110	110	110	110
Yugoslavia	114	115	115	107	100
Total	**2,281**	**2,455**	**2,431**	**2,512**	**1,425**
Other	[r]988	[r]975	923	917	2,001
Grand total	**[r]3,269**	**[r]3,430**	**3,354**	**3,429**	**3,426**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Table includes data available through June 19, 1989.
[2] Recoverable.
[3] Reported figure.

TABLE 22

LEADING WORLD PRODUCERS OF MANGANESE ORE[1]

(Thousand metric tons, gross weight)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	10,089	9,900	9,300	9,400	9,200
South Africa, Republic of	3,049	3,601	3,719	2,892	[2]3,440
China	2,869	2,611	2,723	2,750	2,750
Gabon	2,119	2,340	2,510	2,403	[2]2,250
Australia	1,849	2,003	1,649	1,853	[2]1,985
Brazil	2,693	2,523	2,697	[r e]2,070	1,900
India	1,130	1,240	1,213	1,303	[2]1,324
Mexico[e]	476	396	459	385	439
Ghana	269	[r]357	340	295	252
Hungary	67	63	63	78	75
Romania	66	[r]68	67	[e]65	65
Total	**[r]24,676**	**[r]25,102**	**24,740**	**23,494**	**23,680**
Other	[r]359	[r]282	242	232	247
Grand total	**[r]25,035**	**[r]25,384**	**24,982**	**23,726**	**23,927**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Table includes data available through June 9, 1989.
[2] Reported figure.

TABLE 23

LEADING WORLD PRODUCERS OF MINE NICKEL[1]

(Thousand metric tons, Ni content)

Country	1984	1985	1986	1987[p]	1988[e]
Canada	174	170	164	189	[2]199
U.S.S.R.[e]	175	180	185	185	190
New Caledonia[e]	[2]58	72	62	[r]57	68
Australia	77	86	77	75	[2]62
Indonesia	48	40	54	58	53
Cuba	32	32	[e]33	[r e]36	44
South Africa, Republic of[e]	25	25	32	34	35
Dominican Republic	24	25	22	32	29
Total	**613**	**630**	**629**	**666**	**680**
Other	[r]161	[r]175	141	146	155
Grand total	**[r]774**	**[r]805**	**770**	**812**	**835**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Table includes data available through May 4, 1989.
[2] Reported figure.

TABLE 24

LEADING WORLD PRODUCERS OF MINE SILVER[1]

(Thousand troy ounces, Ag content)

Country	1984	1985	1986	1987[p]	1988[e]
Mexico	75,340	73,167	75,200	77,643	[2]75,841
United States	44,592	39,433	34,524	39,793	[2]53,416
Peru	53,080	58,230	61,916	66,052	[2]49,885
U.S.S.R.[e] (refinery)	47,400	47,900	48,200	48,200	48,000
Canada	42,655	38,484	34,979	44,207	[2]44,094
Australia	31,260	34,914	32,882	35,986	35,848
Poland	23,920	26,717	26,653	26,717	[2]34,176
Chile	15,766	16,633	16,078	16,068	16,700
Spain	9,311	11,797	10,513	11,253	10,000
Japan (refinery)	10,403	10,915	11,294	9,035	[2]8,085
Sweden	7,676	7,442	7,555	6,912	6,800
South Africa, Republic of	6,997	6,700	7,145	6,691	[2]5,759
Yugoslavia (refinery)	4,051	5,015	5,690	4,859	4,850
Morocco	2,410	2,733	1,566	5,208	[2]4,197
Papua New Guinea	1,427	1,483	1,787	1,963	2,264
Namibia	3,255	3,404	3,472	2,411	[2]2,186
Total	**379,543**	**384,967**	**379,454**	**402,998**	**402,101**
Other	39,218	37,675	39,533	39,857	43,169
Grand total	**418,761**	**422,642**	**418,987**	**442,855**	**445,270**

[e] Estimated. [p] Preliminary.
[1] Table includes data available through June 27, 1989.
[2] Reported figure.

TABLE 25

LEADING WORLD PRODUCERS OF MINE TIN[1]

(Metric tons, Sn content of ore)

Country	1984	1985	1986	1987[p]	1988[e]
Brazil	19,957	26,514	26,246	27,364	[2]43,700
Indonesia	23,223	21,759	24,910	26,217	[2]30,590
Malaysia	41,307	36,884	29,135	30,388	[2]28,866
China[e]	15,000	15,000	15,000	[r]20,000	25,000
U.S.S.R.[e]	[r]12,000	[r]13,500	[r]14,500	[r]16,000	16,000
Thailand	21,960	16,864	17,066	15,006	[2]14,225
Bolivia	19,911	16,136	10,479	8,128	[2]10,504
Australia	7,923	[r]6,363	8,508	7,691	[2]7,247
Peru	3,314	[r]3,807	4,817	5,263	[2]4,378
United Kingdom	5,216	5,204	4,276	4,084	3,450
Canada	217	120	2,485	3,397	3,300
Zaire	2,708	3,100	2,650	2,378	2,200
South Africa, Republic of	2,301	2,153	2,054	1,438	[2]1,362
Total	**[r]175,037**	**[r]167,404**	**162,126**	**167,354**	**190,822**
Other	[r]13,146	[r]13,355	10,773	9,899	8,926
Grand total	**[r]188,183**	**[r]180,759**	**172,899**	**177,253**	**199,748**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Table includes data available through June 13, 1989.
[2] Reported figure.

TABLE 26

LEADING WORLD PRODUCERS OF MINE URANIUM[1]

(Metric tons, U_3O_8 content)

Country[2]	1984	1985	1986	1987[p]	1988[p]
Canada	13,171	12,814	13,824	14,664	14,347
South Africa, Republic of	6,762	5,751	5,460	4,735	4,583
United States	4,535	3,900	3,765	2,722	4,309
Australia	5,099	3,781	4,899	4,422	4,165
Namibia[e]	4,400	4,400	3,990	4,175	4,100
France	3,725	3,752	3,804	3,981	4,009
Niger	3,863	3,751	3,671	3,501	3,491
Gabon	1,079	1,105	1,059	934	1,094
Total	**42,634**	**39,254**	**40,472**	**39,134**	**40,098**
Others	940	970	1,068	1,112	1,007
Grand total	**43,574**	**40,224**	**41,540**	**40,246**	**41,105**

[e] Estimated. [p] Preliminary.
[1] Table includes data available through Oct. 31, 1989.
[2] Known market-economy producing countries; centrally planned economy countries excluded.

TABLE 27

LEADING WORLD PRODUCERS OF MINE ZINC[1]

(Thousand metric tons, Zn content of ore)

Country	1984	1985	1986	1987[p]	1988[e]
Canada	1,207	1,172	1,291	1,504	[2]1,352
U.S.S.R.[e]	810	810	810	810	810
Australia	677	759	712	778	766
China[e]	160	300	[2]396	[2]458	[2]527
Peru	466	523	598	613	[2]489
Mexico	304	292	278	272	[2]262
Spain	230	235	223	266	[2]256
United States	278	252	221	233	[2]256
Korea, North[e]	140	180	[r]225	[r]220	225
Sweden	210	216	220	219	[2]187
Poland	191	[r]188	185	184	184
Ireland	206	192	182	177	[2]177
Japan	253	253	222	166	[2]147
Brazil	114	124	124	133	[2]135
South Africa, Republic of	106	97	102	113	89
Yugoslavia	86	89	95	81	80
Thailand	41	78	97	89	[2]78
Greenland	71	70	62	69	78
Germany, Federal Republic of	113	118	104	99	75
Zaire	75	78	81	75	74
Total	**5,738**	**[r]6,026**	**5,607**	**6,559**	**6,247**
Other	786	[r]773	1,329	683	730
Grand total	**6,524**	**[r]6,799**	**6,936**	**7,242**	**6,977**

[e]Estiimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 10, 1989.
[2]Reported figure.

TABLE 28

LEADING WORLD PRODUCERS OF HYDRAULIC CEMENT[1]

(Thousand metric tons)

Country	1984	1985	1986	1987[p]	1988[e]
China[e]	[2]121,080	142,500	161,500	180,000	203,000
U.S.S.R.	129,866	130,722	135,119	137,404	139,000
Japan	78,860	[r]72,847	71,264	71,551	[2]77,554
United States (including Puerto Rico)	71,395	71,540	72,499	72,122	[2]70,989
India	29,030	33,030	36,400	36,980	[2]40,700
Italy	37,782	36,677	35,340	[e]36,200	[2]37,257
Germany, Federal Republic of	28,909	25,758	26,580	25,268	31,010
Korea, Republic of	20,413	20,424	23,403	25,662	[2]28,995
Brazil	19,741	20,612	25,297	25,470	[2]25,328
France	22,724	23,546	[e]23,500	23,560	24,000
Spain (including Canary Islands)	25,435	24,197	[e]24,000	[e]23,400	24,000
Mexico	18,436	20,680	19,751	22,749	[2]22,872
Turkey	15,738	17,581	20,004	21,980	[2]22,675
Taiwan	14,234	14,418	14,806	15,663	[2]17,281
Poland	16,700	15,000	15,800	16,100	15,000
Romania	14,016	12,238	14,216	[e]14,300	14,000
United Kingdom	13,481	13,339	13,413	[e]13,400	13,500
Greece	13,521	13,669	13,341	13,168	13,000
Canada	8,609	10,192	10,602	12,603	[2]12,611
Iran	11,803	12,646	12,273	12,729	12,500
German Democratic Republic	11,555	11,608	11,988	12,430	12,500
Indonesia	8,858	10,081	10,941	11,844	[2]12,472
Total	**[r]732,186**	**[r]753,305**	**792,037**	**824,583**	**870,244**
Other	[r]208,422	[r]206,062	208,706	220,307	230,295
Grand total	**[r]940,608**	**[r]959,367**	**1,000,743**	**1,044,890**	**1,100,539**

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

[1]Table includes data available through July 5, 1989.

[2]Reported figure.

TABLE 29

LEADING WORLD PRODUCERS OF NATURAL DIAMOND[1]

(Thousand carats)

Country	1984	1985	1986	1987[p]	1988[e]
Australia	5,692	7,070	29,211	30,333	[2]35,034
Zaire	18,459	20,159	23,304	19,425	19,000
Botswana	12,914	12,635	13,110	13,207	[2]15,229
U.S.S.R.[e]	10,700	10,800	10,800	[r]10,800	11,000
South Africa, Republic of	10,143	10,200	10,228	9,053	8,382
China[e]	1,000	1,000	1,000	1,000	1,000
Angola	902	714	[e]250	[e]190	1,000
Namibia	930	910	1,010	1,037	[2]938
Brazil	750	450	625	522	610
Total	**[r]61,490**	**[r]63,938**	**89,538**	**85,567**	**92,193**
Other	[r]1,962	[r]2,080	2,179	2,048	1,806
Grand total	**63,452**	**[r]66,018**	**91,717**	**87,615**	**93,999**

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Gem and industrial grades undifferentiated. Table includes data available through May 31, 1989.
[2]Reported figure.

TABLE 30

LEADING WORLD PRODUCERS OF NITROGEN IN AMMONIA[1]

(Thousand metric tons, N content)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	17,700	[r]18,300	19,600	20,000	20,500
China[e]	14,000	15,000	15,500	14,500	16,200
United States	[r]12,454	[r]12,915	10,804	12,002	12,637
India[3]	[r]3,832	[r]4,270	7,933	5,300	6,205
Canada	[r]2,871	[r]2,976	2,910	2,887	[2]3,297
Netherlands	[r]2,382	[r]2,516	2,692	2,828	[2]2,956
Romania	2,861	2,880	3,040	2,788	2,800
Indonesia	1,658	2,057	2,299	2,364	[2]2,367
Poland	[r]1,822	1,812	2,124	2,177	2,200
Mexico	1,773	1,859	1,602	1,744	2,067
France	2,342	2,012	2,022	2,029	1,832
Germany, Federal Republic of	1,963	1,908	1,570	1,932	[2]1,750
Italy	[r]1,460	[r]1,471	1,536	1,494	[2]1,560
Japan	[r]1,675	[r]1,646	1,508	1,556	[2]1,524
Trinidad and Tobago	1,080	[r]1,085	1,141	1,128	[2]1,386
German Democratic Republic	1,203	1,206	1,193	1,315	1,350
Pakistan	1,128	1,107	1,154	1,179	[2]1,202
United Kingdom	1,836	1,767	1,388	1,415	[2]1,105
Bulgaria	1,138	1,138	1,091	1,070	1,050
Total	**[r]75,178**	**[r]77,925**	**81,107**	**79,708**	**83,988**
Other	[r]13,452	[r]13,210	10,296	14,566	14,960
Grand total	**[r]88,630**	**[r]91,135**	**91,403**	**94,274**	**98,948**

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 17, 1989.
[2]Reported figure.
[3]Data are for years beginning Apr. 1 of that stated.

TABLE 31

LEADING WORLD PRODUCERS OF PHOSPHATE ROCK[1]

(Thousand metric tons, gross weight)

Country	1984	1985	1986	1987[p]	1988[e]
United States	49,197	50,835	38,710	40,954	[2]45,389
U.S.S.R.[e]	33,300	33,750	33,900	34,100	38,820
Morocco[3]	21,245	20,737	21,178	[r e]20,000	24,783
China[e]	11,800	6,970	6,700	9,000	15,000
Tunisia	5,346	4,530	5,951	[e]6,390	[2]6,103
Jordan	6,263	6,067	6,249	6,800	5,666
Brazil	3,855	4,214	4,509	4,777	4,672
Israel	3,312	4,076	3,673	3,798	[2]3,479
Togo	2,696	2,452	2,314	2,644	[2]3,464
South Africa, Republic of	2,585	2,433	2,920	2,623	2,850
Total	**139,599**	**136,064**	**126,104**	**131,086**	**150,226**
Other	[r]16,256	[r]12,778	12,766	13,142	13,447
Grand total	**[r]155,855**	**[r]148,842**	**138,870**	**144,228**	**163,673**

[e] Estimated. [p] Preliminary. [r] Revised.
[1] Includes only phosphate rock; Thomas slag and guano are excluded. Table includes data available through May 10, 1989.
[2] Reported figure.
[3] Includes output from Western Sahara.

TABLE 32

LEADING WORLD PRODUCERS OF MARKETABLE POTASH[1]

(Thousand metric tons, K_2O equivalent)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	9,776	10,367	10,228	10,888	11,000
Canada	7,527	6,661	6,452	7,668	[2]8,070
German Democratic Republic	3,465	3,465	3,485	3,500	[2]3,510
Germany, Federal Republic of	2,645	2,583	2,161	2,199	[2]2,290
United States	1,564	1,296	1,202	1,262	[2]1,521
France	1,739	1,750	1,617	1,539	[2]1,502
Israel	1,100	1,200	1,255	1,253	[2]1,244
Total	**27,816**	**27,322**	**26,400**	**28,309**	**29,137**
Other	1,518	1,829	2,294	2,161	2,292
Grand total	**29,334**	**29,151**	**28,694**	**30,470**	**31,429**

[e] Estimated. [p] Preliminary.
[1] Table includes data available through Apr. 26, 1989.
[2] Reported figure.

TABLE 33

LEADING WORLD PRODUCERS OF SALT[1]

(Thousand metric tons)

Country	1984	1985	1986	1987[p]	1988[e]
United States (including Puerto Rico)	r35,615	35,441	33,296	33,142	[2]34,506
China[e]	16,286	14,446	17,300	18,000	22,000
U.S.S.R.	16,500	16,100	15,300	15,400	15,500
Germany, Federal Republic of	12,212	13,080	13,102	13,466	13,605
Canada	10,235	10,085	10,332	10,129	10,647
India[e]	7,728	9,879	10,118	r9,902	8,402
France	7,149	7,113	7,084	r7,840	7,925
United Kingdom	7,126	7,145	6,855	7,081	7,000
Mexico	6,167	6,467	6,205	6,199	[2]6,965
Australia	5,695	5,835	6,130	6,486	6,500
Poland	4,441	4,865	5,421	6,168	5,700
Romania	4,874	5,019	5,355	5,395	5,400
Brazil	4,527	r2,689	2,200	4,550	4,600
Italy	3,978	3,746	re4,233	re4,494	4,500
Netherlands	3,674	4,154	3,763	3,979	[2]3,693
Spain	r3,388	3,240	e3,100	e3,100	3,100
German Democratic Republic[e]	3,133	3,138	3,134	r3,134	3,059
Japan	955	e1,200	1,370	1,397	1,400
Turkey	1,290	1,189	1,172	1,218	1,350
Total	**r154,973**	**r154,831**	**155,470**	**161,080**	**165,852**
Other	r17,339	r18,038	19,631	17,556	18,134
Grand total	**r172,312**	**r172,869**	**175,101**	**178,636**	**183,986**

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

[1] Table includes data available through July 5, 1989.

[2] Reported figure.

TABLE 34

LEADING WORLD PRODUCERS OF ELEMENTAL SULFUR[1]

(Thousand metric tons)

Country	1985				1986			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[2]5,011	W	6,598	11,609	[2]4,043	W	7,044	11,087
U.S.S.R.[e]	[r4]2,760	[r]2,421	[r]4,024	[r]9,205	[r4]3,000	[r]2,090	[r]4,100	[r]9,190
Canada[e]	—	—	[r]6,694	[r]6,694	—	—	6,543	6,543
Poland[e]	[4]4,990	—	220	[r]5,203	[r4]4,987	—	220	[r]5,207
China[e]	300	2,200	400	2,900	300	2,500	300	3,100
Japan	—	253	2,245	2,498	—	158	2,213	2,371
Mexico	[2]1,551	—	[e]629	[e]2,180	[2]1,588	—	[e]632	[e]2,220
Germany, Federal Republic of[e]	—	—	[r]1,769	[r]1,769	—	—	[r]1,773	[r]1,773
Saudi Arabia	—	—	1,100	1,100	—	—	1,446	1,446
Spain	—	1,231	[re]224	[re]1,455	—	1,195	[re]220	[re]1,415
France	—	—	1,723	1,723	—	—	1,306	1,306
Iraq[e]	[2]500	—	70	570	[2]600	—	200	800
South Africa, Republic of	—	562	[e]185	[e]747	—	499	218	717
Italy	1	280	[re]350	[re]631	—	309	[re]385	[re]694
Finland	—	248	302	550	—	275	[e]302	[e]577
Yugoslavia	—	[r]221	[e]173	[re]394	—	327	[e]178	[re]505
Sweden	—	210	146	356	—	227	174	401
Kuwait	—	—	238	238	—	—	[e]260	[e]260
Brazil	[2]4	91	134	229	[2]6	92	174	272
Iran[e]	30	—	150	180	30	—	250	280
German Democratic Republic[e]	—	—	330	330	—	—	315	315
Belgium[e]	—	—	[r]260	[r]260	—	—	[r]300	[r]300
Philippines	—	108	100	208	—	113	[e]120	[e]233
Total	**[r]15,147**	**[r]7,825**	**[r]28,064**	**[r]51,029**	**14,554**	**7,785**	**28,673**	**51,012**
Other	[r]175	[r]1,196	[r]2,255	[r]3,633	155	1,128	2,359	3,643
Grand total	**[r]15,322**	**[r]9,021**	**[r]30,319**	**[r]54,662**	**14,709**	**8,913**	**31,032**	**54,655**

See footnotes at end of table.

TABLE 34—Continued

LEADING WORLD PRODUCERS OF ELEMENTAL SULFUR[1]

(Thousand metric tons)

Country	1987[p]				1988[e]			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	[2]3,202	W	7,336	10,538	[2 3]3,174	W	[3]7,572	[3]10,746
U.S.S.R.[e]	[r 4]3,000	[r]2,150	[r]4,950	[r]10,100	3,000	2,150	5,550	10,700
Canada[e]	—	—	[r]6,588	[r]6,588	—	—	6,907	6,907
Poland[e]	[r 4]5,104	—	220	[r]5,324	[4]4,900	—	190	5,090
China[e]	300	[r]3,700	[r]500	[r]4,500	300	3,900	550	4,750
Japan	—	79	2,237	2,316	—	[3]70	2,377	2,447
Mexico	[2]1,806	—	[e]678	[r e]2,484	[2 3]1,629	—	764	2,393
Germany, Federal Republic of[e]	—	—	[r]1,825	[r]1,825	—	—	1,795	1,795
Saudi Arabia	—	—	1,432	1,432	—	—	1,450	1,450
Spain	—	960	[r e]235	[r e]1,195	—	1,100	240	1,340
France	—	—	[e]1,252	[e]1,252	—	—	1,142	1,142
Iraq[e]	[r 2]707	—	250	[3]957	[2]700	—	350	1,050
South Africa, Republic of	—	468	[r e]215	[r e]683	—	470	230	700
Italy	—	[r e]330	[r e]370	[r e]700	—	320	375	695
Finland	—	311	[e]260	[e]571	—	300	281	581
Yugoslavia	—	264	[e]178	[r e]442	—	258	173	431
Sweden	—	[e]220	[e]175	[e]395	—	224	174	398
Kuwait	—	—	[e]310	[e]310	—	—	360	360
Brazil	[2]6	77	230	313	[2]6	105	240	351
Iran[e]	30	—	300	330	30	—	300	330
German Democratic Republic[e]	—	—	315	315	—	—	315	315
Belgium[e]	—	—	[r]300	[r]300	—	—	310	310
Philippines	—	158	[e]140	[e]298	—	160	150	310
Total	**14,155**	**8,717**	**30,296**	**53,168**	**13,739**	**9,057**	**31,795**	**54,591**
Other	143	1,137	2,492	3,772	136	1,130	2,541	3,807
Grand total	**14,298**	**9,854**	**32,788**	**56,940**	**13,875**	**10,187**	**34,336**	**58,398**

[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 31, 1989.

[2] Entirely Frasch process sulfur.

[3] Reported figure.

[4] Includes Frasch process sulfur as follows, in thousand metric tons: Poland (estimated): 1985—4,326 (revised), 1986—4,437 (revised), 1987—4,410 (revised), and 1988—4,400; the U.S.S.R. (estimated): 1985—960 (revised), 1986—1,100 (revised), 1987—1,100 (revised), and 1988—1,100; and total of individually listed countries and grand total: 1985—12,352 (revised), 1986—11,774, 1987—11,231, and 1988—11,009.

TABLE 35

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

(Million metric tons)

Country	1985			1986			1987[p]			1988[e]		
	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total
China[e]	(2)	850	850	(2)	870	870	(2)	920	920	(2)	946	946
United States	66	736	802	69	738	808	71	762	833	3 70	3 813	3 883
U.S.S.R.	157	569	726	163	588	751	165	595	760	170	602	772
German Democratic Republic	312	—	312	311	—	311	309	—	309	305	—	305
Poland	58	192	250	67	192	259	73	193	266	3 74	3 193	3 267
Australia	37	158	195	38	170	208	44	179	223	40	3 174	214
India	8	149	157	8	163	171	8	177	186	8	189	197
Germany, Federal Republic of	121	82	203	114	81	195	109	76	185	3 109	3 73	182
South Africa, Republic of	—	174	174	—	177	177	—	177	177	—	182	182
Czechoslovakia	102	26	129	103	26	129	101	26	127	102	26	128
United Kingdom	(4)	94	94	(4)	108	108	(4)	104	104	(3 4)	3 104	3 104
Canada	10	60	70	8	58	66	9	61	70	3 10	3 71	3 81
Korea, North	r13	r44	r57	r14	r48	r62	15	55	70	18	62	80
Yugoslavia	69	(4)	70	70	(4)	70	72	(4)	72	3 72	(3 4)	3 72
Romania	r39	r10	r49	40	11	51	44	12	56	45	12	57
Greece	36	—	36	38	—	38	43	—	43	3 47	—	3 47
Turkey	36	9	45	36	9	45	46	8	54	38	7	45
Spain	24	16	40	22	16	38	16	19	35	20	17	37
Bulgaria	r32	(4)	r32	35	(4)	35	35	(4)	35	35	(4)	35
Korea, Republic of	—	25	25	—	24	24	—	24	24	—	24	24
Hungary	21	3	24	21	2	23	21	2	23	3 19	3 2	3 21
Total	**1,141**	**r3,197**	**r4,340**	**1,157**	**3,281**	**4,439**	**1,181**	**3,390**	**4,572**	**1,187**	**3,497**	**4,684**
Other	r19	r84	r101	22	83	103	22	84	104	25	46	71
Grand total	**r1,160**	**r3,281**	**r4,441**	**1,179**	**3,364**	**4,542**	**1,203**	**3,474**	**4,676**	**1,212**	**3,543**	**4,755**

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

[1] Table includes data available through Oct. 31, 1989. 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 36

LEADING WORLD PRODUCERS OF MARKETED NATURAL GAS[1]

(Billion cubic feet)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	20,700	22,700	24,200	25,670	27,200
United States	17,392	16,382	15,991	16,536	[2]16,630
Canada	2,506	2,831	2,696	2,845	[2]3,144
Netherlands (gross)	2,728	2,851	2,615	2,622	[2]2,317
United Kingdom	[r]1,263	[r]1,403	1,474	1,470	[2]1,299
Algeria	[r]1,360	[r]1,360	1,330	1,525	1,585
Mexico	1,243	1,197	1,175	1,194	[2]1,219
Indonesia	1,386	1,149	1,113	1,188	[2]1,312
Romania[e]	[r]1,379	[r]1,374	[r]1,390	[r]1,320	1,165
Norway	[r]997	[r]943	992	1,055	[2]1,053
Saudi Arabia	253	716	848	708	800
Iran	[r]477	[r]516	537	565	710
Italy	489	503	564	576	[2]587
Germany, Federal Republic of (gross)	563	511	490	560	412
Australia	446	475	519	531	[2]543
Argentina	[r]486	[r]517	562	583	625
United Arab Emirates	[r]344	[r]460	530	682	660
China[e]	438	455	485	495	505
Venezuela	518	498	576	465	450
German Democratic Republic[e]	459	459	459	459	425
Malaysia (Sarawak)	325	437	528	547	580
Total	**[r]55,752**	**[r]57,737**	**59,074**	**61,596**	**63,221**
Other	[r]3,875	[r]4,138	4,346	4,462	4,756
Grand total	**[r]59,627**	**[r]61,875**	**63,420**	**66,058**	**67,977**

[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, 1989.

[2] Reported figure.

TABLE 37

LEADING WORLD PRODUCERS OF NATURAL GAS PLANT LIQUIDS[1]

(Million 42-gallon barrels)

Country[2]	1984	1985	1986	1987[p]	1988[e]
United States	597	587	566	582	[3]595
U.S.S.R.[e]	[r]229	[r]250	[r]290	[r]321	318
Mexico	[r]94	99	128	123	135
Saudi Arabia	130	115	111	126	150
Canada	139	125	120	117	121
United Kingdom	55	60	67	66	[3]58
United Arab Emirates[e]	[r]48	[r]58	[r]68	[r]53	55
Algeria	[r]30	[r]33	41	46	35
Total	**[r]1,292**	**[r]1,294**	**1,350**	**1,388**	**1,432**
Other	[r]231	[r]223	236	255	255
Grand total	**[r]1,523**	**[r]1,517**	**1,586**	**1,643**	**1,687**

[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, 1989.

[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 38

LEADING WORLD PRODUCERS OF CRUDE OIL[1]

(Million 42-gallon barrels)

Country	1984	1985	1986	1987[p]	1988[e]
U.S.S.R.	[r]4,503	[r]4,373	4,520	4,588	4,586
United States	3,250	3,274	3,168	3,047	[2]2,979
Saudi Arabia[3]	1,702	1,237	1,841	1,354	1,850
China[e]	836	874	954	978	999
Iraq	438	521	617	792	[2]981
Mexico	[r]982	960	886	927	[2]917
Iran	[r]806	[r]811	696	836	829
United Kingdom	[r]906	[r]914	905	878	[2]817
Venezuela	[r]658	614	657	667	[2]637
Kuwait[3]	424	374	519	497	[2]590
Canada	526	538	538	560	[2]584
United Arab Emirates	[r]427	[r]408	521	542	567
Nigeria	508	[r]540	535	472	[2]511
Indonesia	517	484	507	479	[2]491
Libya	406	392	389	368	374
Total	**[r]16,889**	**[r]16,314**	**17,253**	**16,985**	**17,712**
Other	[r]3,085	[r]3,220	3,382	3,473	3,693
Grand total	**[r]19,974**	**[r]19,534**	**20,635**	**20,458**	**21,405**

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

[1]Table includes data available through Oct. 31, 1989.

[2]Reported figure.

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

TABLE 39

LEADING WORLD PRODUCERS OF REFINED OIL[1]

(Million 42-gallon barrels)

Country	1984	1985	1986	1987[p]	1988[e]
United States (including Puerto Rico and Virgin Islands)	5,223	5,179	5,301	5,339	[2]5,498
U.S.S.R.[e]	[r]3,223	[r]3,136	3,229	3,255	3,290
Japan	1,399	1,304	1,272	1,237	[2]1,274
China[e]	550	655	700	710	725
United Kingdom	[r]615	[r]611	624	625	[2]669
Germany, Federal Republic of	683	665	649	622	671
Italy	629	595	660	656	670
France	570	603	584	539	550
Canada	560	569	594	560	573
Mexico	502	519	505	520	522
Brazil	450	[r]449	476	453	430
Netherlands	407	364	430	436	[2]476
Venezuela	325	379	391	364	[2]368
Saudi Arabia[e 3]	[r]320	[r]363	[r]495	[r]503	520
India	252	306	335	357	368
Spain (including Canary Islands)	[r]345	[r]369	416	398	405
Singapore[e]	[2]293	394	287	282	285
Total	**[r]16,346**	**[r]16,460**	**16,948**	**16,856**	**17,294**
Other	[r]4,767	[r]4,594	4,877	5,004	5,165
Grand total	**[r]21,113**	**[r]21,054**	**21,825**	**21,860**	**22,459**

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

[1] Table includes data available through Oct. 31, 1989.

[2] Reported figure.

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