THE MINERAL INDUSTRY OF

MEXICO

By Ivette E. Torres

In 2001, Mexico's gross domestic product (GDP) was $617.5 billion[1] ($920 billion in terms of purchasing power parity); this was a decrease of 0.3% from that of 2000 after a 6.6% increase (revised) from that of 1999, which was the largest increase in 19 years (Banco de México, 2002§[2]). The largest decrease was in the construction sector (4.5%), followed by the manufacturing sector (3.9%); mining decreased by 0.6%. The value of total exports decreased by almost 5% to $158.4 billion. Exports of petroleum were 8% of total exports. Imports, which exceeded exports, totaled $168.4 billion, which was a decrease of 3.5% from those of 2000; petroleum accounted for 11% of Mexico's imports (Instituto Nacional de Estadística, Geográfica e Informática, 2002§). Inflation decreased to 6.5% (U.S. Central Intelligence Agency, 2002§).

Like the rest of the economy, Mexico's mineral sector was affected by a number of factors in 2001. Low metal prices, the strength of the currency, and high energy prices had great impacts on the health of the sector. The situation was aggravated by the economic slowdown of the U.S. economy; the United States was the largest importer of Mexico's mineral production. Large and small producers were forced to close mines, and several projects that were scheduled for development were halted.

Investment in the mining sector by companies associated with the Cámara Minera de México (Mexican Chamber of Mines) decreased by 46% to $380 million, after a decrease of 12% in 2002 and 24.7% in 1999 (Cámara Minera de México, 2000, p. 38; 2001, p. 48; 2002, p. 9). In 1997, investment in the mining sector had reached a level of $1.2 billion (Metals & Minerals Latin America, 2001e).

Government Policies and Programs

Under the Mexican Constitution, minerals are part of the national patrimony. Under article 27 of the Constitution, the Mining Law is the Government legislation that governs Mexico's mining industry. The Mining Law of 1992 became effective in September 1992 and was amended in 1996. The amendment was published in the Diario Oficial de la Federación (Official Diary of the Federation) on December 24, 1996.

The Mining Law covers exploration for production and beneficiation of minerals. It removes many of the restrictions of the previous law regarding the participation of private and foreign companies in the Mexican mining industry at a time when the Government was privatizing State mining companies and decontrolling its mining reserves. The Mining Law permits direct investment with up to 100% ownership of equity in exploration and development and allowed up to 100% foreign participation in production.

This law permits the participation of the private sector in the production of some minerals previously reserved to the Government, such as coal, iron, phosphorus, potassium, and sulfur. Minerals or substances exempted from the law are hydrocarbons, radioactive minerals, substances contained in suspension or dissolution in subterranean waters as long as they did not originate from mineral deposits different from the components of the land, rocks, or their fragmentation that could only be used for the fabrication of materials for construction or ore destined for such purposes, products derived from the fragmentation of the rocks mined principally by open pit, and salt formed by evaporation of brines from playas.

The exploration concessions are awarded for 6 years and are not renewable. Exploitation concessions are awarded for 50 years and are renewable for a similar period. The 1992 Law eliminates the concession for ore beneficiation plants.

On February 15, 1999, revisions to the mining regulations were published in the Diario Oficial de la Federación. The new regulations were geared to increase the participation of the private sector in mining and the competitiveness of the mining companies in Mexico. The regulations decreased the administrative procedures by 20% and established time limits for most of the procedures. The regulation also established automatic approval when no Government response has been received by the expiration of the time limit. The Public Service Manual on Mining-Related Issues was published in July 1999. The manual established administrative procedures for all mining matters of the mining law and its regulations.

In 1994, the responsibility for the mining sector was transferred to the Secretaría de Comercio y Fomento Industrial (SECOFI). In 2001, SECOFI was renamed Secretaría de Economía. Dirección General de Minas is responsible for

[1]Where necessary, 2001 values have been converted from Mexican pesos (Mex$) to U.S. dollars at the rate of Mex$9.3466=US$1.00.

[2]References that include a section twist (§) are found in the Internet References Cited section.

This and previous Minerals Yearbook chapters on Mexico have benefited from the work of Ing. Javier Moya Ruiz, who retired from the U.S. Embassy in Mexico City in April 2003 after 15 years of service. His dedication and collaboration, his in-depth research, and his timely reporting of events and issues that affected Mexico's mineral industry have characterized the individual technical support to the U.S. Bureau of Mines and the U.S. Geological Survey (USGS) in the areas of mining and mineral processing. His understanding of Mexico's mineral industry and his ability to communicate with industry and Government officials at the highest levels were great assets to the USGS.

revisions to the Mining Law and its regulations, and granting mining concession titles.

Environmental Issues

Although various environmental laws and regulations have been promulgated since 1946, protection of the environment became a priority for the Government of Mexico because the population has increased and the mining industry has grown in size and importance. Accordingly, La Ley General del Equilibrio Ecológico y Protección al Ambiente (the General Law of Ecological Balance and Environmental Protection) (LGEEPA), which is a key element of environmental legislation, was passed in 1992 (Ordal and Moya, 1996, p. 5). Environmental responsibilities that resided in various Government agencies were transferred to the Secretaría del Medioambiente, Recursos Naturales, y Pesca (Ministry of Environment, Natural Resources, and Fisheries) (SEMARNAP) in 1994. Enforcement of environmental regulations is buttressed by the Environmental Attorney's Office.

Under SEMARNAP, mineral exploration and mining required a number of environmental permits and authorizations to conform to the statutes of LGEEPA starting with a preliminary environmental impact statement for all major activities or projects. Besides an operating license, the necessary permits for any mine or plant include explosives, hazardous material handling, land use, water discharge, and water well usage. Other regulations are concerned with dumps and tailings, electrical transformers, gas and dust emissions, noise, and storage of oil and fuel.

Water-discharge regulations are specified in the Federal Law Concerning Water Rights (LFDMA) of January 1992 and the National Water Law of December 1992. According to the LFDMA, water pumped from mining works is not subject to discharge fees as long as it is not used in the "exploitation and/or metallurgical treatment of ore" or for other industrial or domestic use. Discharge fees, however, are required for water that contains more than 2,500 milligrams per liter of total dissolved solids, unless the discharged water can meet the minimum quality standards set by the Consejo Nacional de Agua (CONAGUA). Although water discharged to runoffs or water basins is also exempted from payments of a discharge fee if it meets CONAGUA water-quality standards, all other types of water discharge require payment of a fee according to schedules set in the LFDMA.

In 1998, SEMARNAP published the Norma Oficial Mexicana NOM-120-ECOL.1997 in the Diario Oficial de la Federación. The law established environmental protection for direct mining activities in coniferous forests, deciduous tropical forests, dry and temperate climate with xerophilous underbrush, and holm oaks. In January 1999, a clarification of the law was published by SEMARNAP.

Production

As an important mineral producer, Mexico ranked among the top world producers in a variety of nonfuel minerals. According to the U.S. Geological Survey, it was the world's leading producer of bismuth (with 30% of the world's total), celestite (with 47% of the world's total), and silver (with 15% of the world's total), as shown in table 1, and a significant supplier of mining and mineral products to the United States. In 2001, Mexico maintained its position as an important producer of many mineral commodities despite losing ranking status on several of them-fluorspar, 2d (with 15% of the world's total); cadmium, 5th; barite, gypsum, lead (mine), and molybdenum, and zinc (mine), 6th; salt and graphite, 7th; manganese ore (metal content) and sulfur 9th; copper (mine), 11th; cement, 12th; and gold and crude steel, 17th.

In 2001, the total value of Mexico's mineral production (excluding petroleum and natural gas) increased to $4.77 billion[3] in 2001 from $4.33 billion in 2000 (revised); metals contributed 43% of the total, or $2.1 billion. Production of sand and gravel (combined) was the highest in terms of value of all mineral commodities (excluding petroleum and natural gas) at $896 million; this was a 11% increase from that of 2000. Copper ranked second after sand and gravel and contributed $659 million, or about 28% of the metal value and 12% of the total. Silver and zinc followed with about 21% and 20% of the metal value, respectively. The value of coal production was $226 million, or 4.7% of mineral production (excluding petroleum and natural gas) and about 8.4% of industrial mineral value (Consejo de Recursos Minerales, 2002, p. 25). The value of production of cement and steel was unavailable.

Geographically, northern Mexico dominates the production of minerals. A few States produced a large portion of Mexico's minerals. The State of Sonora was the leading producer of copper with more than 80% of the total output. Sonora was the largest producer of gold followed by the State of Durango. The State of Zacatecas was the principal producer of silver. The State of Chihuahua was the leading producer of lead and zinc.

Petroleum continued to dominate Mexico's mineral sector. Petróleos Mexicanos S.A. de C.V. (PEMEX), which was Mexico's national petroleum company, had revenues of $51.2 billion and provided almost 70%, or $35.8 billion, in direct and indirect taxes (Petróleos Mexicanos S.A. de C.V., 2002b, p. 65). Mexico was the world's sixth largest producer. In the Western Hemisphere, only the United States produced more crude petroleum during 2001 (Petróleos Mexicanos S.A. de C.V., 2002c, p. 65).

Trade

In 2001, Mexico's total exports were valued at $158.4 billion. Of that total, the value of mineral exports (excluding petroleum and natural gas) accounted for $1.2 billion, or less than 1% of the total. The value of metal exports totaled $866 million, or 70.3 % of total mineral exports (excluding petroleum and natural gas). Total imports were valued at $168.4 billion. Mineral imports (excluding petroleum and natural gas) accounted for $1.7 billion, or 1% of total imports (Consejo de Recursos Minerales, 2002, p. 125, 129).

During the year, about 72.7% of Mexico's mineral exports went to the United States, and 55.3% of its mineral imports originated in the United States (Consejo de Recursos Minerales, 2002, p. 126, 134). The value of exports to the United States increased, and the value of imports from the United States decreased.

[3]Where necessary, 2000 values have been converted from Mexican pesos (Mex$) to U.S. dollars at the rate of Mex$9.4556=US$1.00.

Silver was the largest source of foreign exchange with $320 million, or 21.3% of total mineral exports, followed by copper ($248.7 million) and zinc ($113.6 million) (Consejo de Recursos Minerales, 2002, p. 122).

Metal imports were led by gold with 26% of the value of the total followed closely by copper with 23.8%. Industrial mineral imports were led by coal and coke with a combined 11.6% of the value of total mineral imports (Consejo de Recursos Minerales, 2002, p. 131-132).

Mexico exported 624 million barrels (Mbbl) of crude petroleum with a value of $11.6 billion, $3 billion less, or a 22% decrease, compared with that of 2000. Mexico was a net importer of natural gas and refinery products. Of the total crude exports, 75.1% of the petroleum exported went to the United States followed by Spain (8.4%) and the Netherlands Antilles (7.7%). About 2.4% of Mexico's exports went to countries ascribed to the San José Accord (Barbados, Belize, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, and Panama). The average export price for Mexican crude was $28.57, which was a 24.6% decrease compared with that of 2001 (Petróleos Mexicanos S.A. de C.V., 2002a, p. 46-49).

Structure of the Mineral Industry

In 1994, Government responsibilities for the mining sector were transferred from the Secretaría de Energía, Minas e Industrial Paraestatal (SEMIP) to SECOFI. SEMIP then became the Secretaría de Energía and retained the responsibilities for electricity and petroleum. In 2001, SECOFI became the Secretaría de Economía.

The Coordinación General de Minería, which is the Secretaría de Economía's highest office charged with mining policies, is responsible for fostering new investment and maintaining a healthy mining sector. It is supported by the Consejo de Recursos Minerales (CRM), the Dirección General de Minas, the Dirección General de Promoción Minera, and the Fideicomiso de Fomento Minero. The CRM is responsible for integrating the inventory of Mexico's national resources. The main functions of the Dirección General de Minas are to award mining concessions and to maintain the national mapping and mining registers. The Dirección General de Promoción Minera is responsible for promotion of the mining sector, which includes incentives for the domestic and foreign investment in the sector. The Fideicomiso de Fomento Minero is responsible for financial, administrative, and technical assistance to the mining sector by the Government.

The Cámara Minera de México, which is another important organization in Mexico's mining sector, promotes the interest of the private sector and maintains the dialogue between the private mining sector and the Government. Other prominent mineral-related organizations include the Asociación Nacional de Fabricantes de Cal (National Association of Lime Manufacturers), the Cámara Nacional de la Industria del Hierro y el Acero (National Chamber of Iron and Steel), the Federación Nacional de Mineros Pequeños (National Federation of Small Miners), and the Instituto Mexicano del Aluminio A.C. (Mexican Aluminum Institute).

In 2001, employment in the mineral sector totaled 262,574; this was a 1.4% decrease from 285,625 (revised) in 2000. Of the total, 36,931 were employed in the production and beneficiation of nonmetals; 23,199, in the extraction and beneficiation of metals; 133,775, in manufacturing of nonmetallic mineral products; and 68,669, in base-metal industries (Cámara Minera de México, 2002, p. 11). Nearly all miners were represented by the Sindicato Nacional de Trabajadores Mineros, Metalúrgicos y Similares de la República Mexicana. The Confederación de Trabajadores de México, which was the largest Mexican union, represented the cement employees.

Several large diversified companies—Corporación Industrial San Luis S.A. de C.V., Empresas Frisco S.A. de C.V., Grupo Acerero del Norte S.A. de C.V. (GAN), Grupo México S.A. de C.V., and Industrias Peñoles S.A. de C.V. (Peñoles)—dominated the production of nonfuel minerals (table 2). These companies operated about 40 mining units throughout the country. The medium-sized mining companies operated 20 mining units and produced 100% of the celestite, feldspar, fluorspar, gypsum, and silica sand and almost 90% of the graphite. The small-sized mining companies operated 170 mining units and produced almost 75% of the kaolin.

Mexico's cement industry was dominated by Cementos Mexicanos, S.A. de C.V. (CEMEX), which was the world's third largest producer of cement after LaFarge Group of France and Holderbank AG of Switzerland. Cementos Apasco, S.A. de C.V. and Cooperativa Manufacturera de Cemento Portland La Cruz Azul S.C.L. also were important producers of cement in Mexico.

The production of crude petroleum, basic petrochemicals, and natural gas, which was also reserved for the Government under article 27 of the Constitution, was entrusted to PEMEX. It operated through Pemex Exploración y Producción (Pemex Exploration and Production), Pemex Refinación (Pemex Refining), Pemex Gas y Petroquímica Básica (Pemex Gas and Basic Petrochemicals), Pemex Petroquímica (Pemex Petrochemicals), and Pemex Internacional (Pemex International). At yearend 2001, PEMEX's total employment was 138,701 (Petróleos Mexicanos S.A. de C.V., 2002b, p. 28).

Commodity Review

Metals

Copper.—In 2001, mine production of copper in Mexico increased slightly to 367,279 metric tons (t). Through its subsidiaries Industrial Minera Mèxico S.A. de C.V. (IMMSA), Mexicana de Cananea S.A. de C.V., and Mexicana de Cobre S.A. de C.V., Grupo Mèxico was Mexico's largest copper producer with 85% of the production. Mexicana de Cobre's La Caridad mine in the State of Sonora was Grupo Mexico's largest producer with about 140,800 t of copper in concentrate and 20,600 t of copper by solvent extraction/electrowinning (SX-EW). The second largest producing mine was Cananea, which was owned by Grupo Mèxico through its subsidiary Mexicana de Cananea S.A. de C.V. Production from Cananea was 82,200 t of copper in concentrate and 40,000 copper by SX-EW. Expansion of the Mexicana de Cananea SX-EW plant was completed by yearend. IMMSA's underground mines produced 28,400 t. Cananea had Mexico's largest reserves of copper

with 16.74 million metric tons (Mt) in copper recoverable by concentration and 5.14 Mt in copper recoverable by SX-EW (Grupo Mèxico S.A. de C.V., 2002, p. 13-14).

Peñoles, which was one of Mexico's largest mining companies, was a small producer of copper in 2001 with about 3% of the country's output. During the year, the company continued its surface diamond drilling exploration program in its Milpillas copper project in the State of Sonora. The company expected to conclude the prefeasibility study on Milpillas by the second quarter of 2002 and planned to produce 60,000 metric tons per year (t/yr) of electrowon copper beginning in 2005 (Industrias Peñoles S.A. de C.V., 2002, p. 19).

Gold and Silver.—Mexico's mine production of gold was 23,543 kg, which was a 10.7% decrease compared with that of 2000. Peñoles was the largest producer of gold with an output of about 10,800 kilograms (kg) (reported as 347,585 ounces) (Industrias Peñoles S.A. de C.V., 2002, p. 19). La Herradura, which was a mine operated by Minera Pendmont S. de RL. de C.V [a joint-venture company of Peñoles (56%) and Newmont Mining Corporation (44%)] in the State of Sonora, was Mexico's largest gold mine with an output of almost 7,000 kg. Production from the open pit La Herradura began in 1998 and contributed to 36% of Peñoles total output, or 3,900 kg (reported as 125,407 ounces) in 2001. At La Herradura, a third leaching pad was under construction during the year, which was expected to be completed by the first quarter of 2002; the goal was to increase production by about 20% (Industrias Peñoles S.A. de C.V., 2002, p. 17). La Ciénega in the State of Durango was Peñles second largest gold producer with 32% of the company's production.

Empresas Frisco S.A. de C.V. closed two of its precious metals mines during the year—the San Francisco del Oro mine in the State of Chihuahua and San Felipe in the State of Baja California. The San Felipe mine had been producing gold and silver since 1994 (Metals & Minerals Latin America, 2001c).

In 2001, Minera Hecla S.A. de C.V. (a subsidiary of Hecla Mining Company of the United States) began production from its San Sebastián silver and gold mine in the State of Durango. The mine was about 90 kilometers (km) northeast of the city of Durango. Hecla acquired the mine, which is in the Saladillo exploration concession, from Monarch Resources Investment Limited in 1999. Production from the San Sebastián mine began with surface mining and followed by the development of the underground operation. Production from the Francine vein began in September by cut-and-fill stoping. In April, Hecla acquired a plant to process San Sebastián's ore from BLM Minera Mexicana S.A. de C.V. for $7.4 million. The plant, which is about 100 km from the San Sebastián mine, had a capacity to process about 450,000 t/yr of ore. Ore processing was by conventional leaching, counter current decantation, and Merrill Crow precipitation. The precipitate was refined by Peñoles in Torreón, State of Coahuila. Silver and gold production from San Sebastián was 29,548 kg and 497 kg, respectively. At yearend, proven and probable reserves were 266,839 kg (reported as 8,579,060 ounces) of contained silver and 2,839 kg (reported as 91,267 ounces) of contained gold (Hecla Mining Co., 2000, 2002§; Metals & Minerals Latin America, 2001d, p. 5).

Mexico was the world's largest silver producer. In 2001, mine production increased to 2,759 t. Peñoles, which was the largest producer, owned Fresnillo (Proaño) in the State of Zacatecas, which was the world's largest producing mine. The mine, with one of the lowest cash cost in the industry, produced more than 50% of Peñoles silver production during the year. After a recent expansion, Proaño milled 1.4 Mt of ore (Industrias Peñoles S.A. de C.V., 2002, p. 17).

Despite being offered financing to begin full development of La Colorada silver mine in west central Mexico, Pan American Silver Corp. opted to defer construction of the mine and mill complex and, instead, began production at a small scale. The company cited low silver prices and difficult hedging requirements by the project lenders for the decision. During the year, the company slowly increased production to a level of 200 metric tons per day. Production for 2001 totaled about 24,300 kg (reported as 782,853 ounces) of silver. Pan American Silver acquired 100% of La Colorada in 1998. At $4.50 per ounce of silver, $275 per ounce of gold, and $1,000 per metric ton of zinc at yearend 2001, the project's proven reserves totaled 424,600 t with 506 grams per ton (g/t) silver and 0.46 g/t gold in oxide ore and 201,400 t with 581 g/t silver, 0.53 g/t gold, 1.07% zinc, and 2.17% lead in sulfide ore. Probable reserves were estimated to be 1.89 Mt with 426 g/t silver and 0.56 g/t gold in oxide ore and 227,200 t with 531 g/t silver, 0.43 g/t gold, 1.00% zinc, and 2.41% lead (Pan American Silver Corp., 2002§).

Iron and Steel.—The iron and steel industry in Mexico continued to be affected by low world prices and oversupply. Production of iron ore decreased by about 22% to 8.78 Mt. Production of pig iron decreased by 10.2% and that of direct-reduced iron (DRI) decreased by 34.3%.

From September 2000 through January 2001, the high cost of natural gas forced Hylsamex S.A. de C.V. to close temporarily or reduce production of its DRI plants in Monterrey, State of Nuevo León, and Toxtla, State of Puebla. As prices declined, Hylsamex announced that it would reopen its 4M DRI plant, which had been closed in January 2001. In June, two other plants in Monterrey were to open, at least temporarily (Hylsamex S.A. de C.V., 2000§, 2001a§, b§).

In 2001, production of steel decreased by 14.7% to about 13.3 Mt, the lowest level since 1997. Minimills were the largest contributors to the production with about 3.1 Mt. The largest integrated producer was AHMSA (a subsidiary of GAN) with 3 Mt. After being the largest producer in 1999 and 2000, Ispat Mexicana S.A. de C.V. (IMEXA) in Lázaro Cárdenas, Michoacán (a subsidiary of Ispat International N.V.), reduced output by 34% to 2.4 Mt. Hylsamex produced 2.2 Mt, and Siderúrgica Lázaro Cárdenas-Las Truchas S.A. de C.V. (Sicartsa), 1.7 Mt. The only producer that increased crude steel output during the year was Tubos de Acero S.A. de C.V. in the State of Veracruz (Cámara Nacional de la Industria del Hierro y del Acero, 2002, p. 12).

On September 5, Mexico's Government increased import tariffs to steel imports from countries without a free trade agreement with Mexico. The tariffs were scheduled to be in effect for a year (Hylsamex S.A. de C.V., 2002§).

Lead and Zinc.—Mexican mine production of lead decreased slightly compared with that of 2000 to about 136,400 t. Production has been decreasing since 1997 when it reached about 174,600 t. The largest producer continued to be Peñoles with about 58% of the total. Naica in the State of Chihuahua was Peñoles's largest producing lead mine with an output of about 43,000 t. IMMSA produced 25% of the lead in 2001 from four of its mines. Santa Bárbara in the State of Chihuahua was IMMSA's largest producing mine with 20,900 t (Grupo México S.A. de C.V., 2002, p. 25). Mexico's refinery production of primary lead was 143,345 t, which was a slight increase compared with that of 2000 (table 2).

Mine production of zinc increased by 9.2% to 428,828 t compared with that of 2000. During the year, Peñoles became Mexico's largest producer of zinc, surpassing Grupo México's output and producing 51% of the country's total. Since 1997, Peñoles's production has increased by about 81%. The company's production in 2001 increased by 44,000 t, in part because of its new mine Francisco I. Madero in the State of Zacatecas, which was inaugurated in September. The mine, which required an investment of $121 million, had reserves of 36.7 Mt with 4.05% zinc, 0.42% lead, 0.19% copper, and 27 g/t gold. Production capacity was 110,000 t/yr of zinc. Peñoles expected Francisco I. Madero to reach its production capacity by the second quarter of 2002. Production from the mine was being refined at Peñoles's subsidiary Met-Mex Peñoles S.A. de C.V. in Torreón, State of Coahuila; its capacity was expanded to 220,000 t/yr of zinc (Industrias Peñoles S.A. de C.V., 2002, p. 18, 35, 38). The largest producing zinc mine for the year, however, was Charcas (a subsidiary of Grupo México) in the State of San Luis Potosí with a production of 63,900 t (Grupo México S.A. de C.V., 2002, p. 18). Low zinc prices during the year forced IMMSA and Peñoles to close several mines. One of the mines that were closed during the year was Minera Rey de Plata in the State of Guerrero [a joint venture of Peñoles (51%), Dowa Mining Co. (39%), and Sumitomo Corporation (10%)]. The mine, which had been inaugurated in September 2000, was closed in December 2001 (Industrias Peñoles S.A. de C.V., 2002, p. 17, 34). Three of IMMSA's zinc-producing mines—Rosario in the State of Sinaloa, Santa Eulalia in the State of Chihuahua, and Velardeña in the State of Durango—also were closed.

The feasibility study of the San Nicolás polymetallic deposit in the State of Zacatecas was completed at yearend. The study, which estimated a capital cost of $245.6 million for the project, called for an open pit mine with a capacity to produce about 80,000 t/yr zinc, 55,000 t/yr copper, 440 kilograms per year (kg/yr) gold, and 46,600 kg/yr silver. The study estimated proven and probable reserves at San Nicolás to be 65 Mt with 1.32% copper, 2.04% zinc, 0.53 g/t gold, and 32.1 g/t silver. Because of the low zinc price that prevailed during 2001, the joint-venture partners in the project, Teck Cominco Ltd. and Western Copper Holdings Ltd., decided to postpone plans to begin development of the property (Mining Journal, 2002).

Mexico's production of refined zinc increased by 29% from that of 2000. The main reason for the increase was the output increase from Met-Mex Peñoles, which increased by 54% compared with that of 2000 after the company completed the expansion in December 2000. In 2001, Peñoles produced 64% of Mexico's refined zinc. The Met-Mex electrolytic plant reached a production capacity utilization of 89% (Industrias Peñoles S.A. de C.V., 2001, p. 5; 2002, p. 35).

Manganese and Ferroalloys.—Production of manganese (metal content of ore produced) in 2001 decreased by 36% to 99,751 t. Production was by Minera Autlán S.A. de C.V. The company produced manganese carbonate, oxide nodules, ceramic-grade manganese dioxide, battery-grade manganese dioxide, and manganous oxide. The company had three ferroalloy plants in Mexico. It produced silicomanganese and medium- and low-carbon ferromanganese in the Tamós plant in the State of Veracruz. The Teziutlán plant in the State of Puebla produced silicomanganese. Ferromanganese and silicomanganese were produced at the Gómez Palacio plant in the State of Durango. Among the factors that contributed to Autlán's manganese production decrease were the adverse situation of the Mexican and United States steel markets and the high price of natural gas, which resulted in the temporary stoppage of nodule production. Production of ferroalloys also decreased significantly. Output of ferromanganese decreased by 34% to 60,000 t, and production of silicomanganese decreased by 31% to 74,000 t. Output was affected by the reduction in crude steel output in Mexico, which was the result of low steel prices and domestic consumption, and an increase in steel imports to Mexico. Mexico's ferroalloy exports, which decreased by 45%, were affected by the strength of the Mexican currency and the world steel oversupply situation (Cámara Minera de México, 2002, p. 71; Cámara Nacional de la Industria del Hierro y del Acero, 2002, p. 2, 30). During the year, Autlán agreed with its creditors to reschedule a $70 million debt. The company was also forced to close its Gómez Palacio and Tamós ferroalloys plants temporarily because of market conditions. In August, Autlán was reportedly looking for a investment partner among the leading world producers of ferroalloys (Metals & Minerals Latin America (2001a, b).

Industrial Minerals

Fluorspar.—Mexico was the world's second largest producer of fluorspar after China. In 2001, it produced about 14% of the world's total despite production decreasing by 2.5% compared with that of 2000 to 619,498 t. The State of San Luis Potosí was the leading producer with almost 75% of the country's production. Cía. Minera Las Cuevas S.A. de C.V., which had operations in the States of Coahuila and San Luis Potosí, was the leading producer with a capacity of 520,000 t/yr.

Limestone.—In 2001, production of limestone in Mexico increased by 8.5% compared with that of 2000 to 63.3 Mt. The State of Coahuila was the largest producer with 8.7 Mt. The second largest producing State was Quintana Roo with 7.4 Mt. In Quintana Roo, limestone was produced by Industriales del Carmen S.A (CALICA), which was a joint venture between Vulcan Minerals Company of the United States and Empresas ICA Sociedad Controladora (ICA). Aggregate production from CALICA was marketed mainly in the U.S. Gulf Coast. In January, Vulcan announced its intent to purchase ICA's 50% equity in the joint venture for $121.1 million. In addition to the

limestone quarry, the processing plant, and the deep-water port, Vulcan purchased the Vulica Shipping Co. Ltd. and the joint venture's distribution company (Vulcan Minerals Company, 2001).

Mineral Fuels

Coal.—In 2001, production of coal decreased by 14.8% compared with that of 2000 to 12.2 Mt. The principal producer was Minera Carbonífera Río Escondito (MICARE) in Nava, State of Coahuila, from two open pits and three underground deposits. In 2001, MICARE produced 5.7 MT of coal; this was a 12.7% decrease compared with that of 2000. At yearend, the company was finalizing the details to renew its contract to supply thermal coal to Mexico's Comosión Nacianal de Eléctricidad (CFE). In early JAnuary 2002, the company announced that it would supply 4.3 Mt/yr of coal to feed the Carbón II's CFE plant until 2010; this contract will result in revenues of $180 million per year (Cámara Minera de México, 2002, p. 71; El Norte, 2002§).

Petroleum and Natural Gas.—Production of crude petroleum [3,127 barrels per day (bbl/d)] plus condensate (433 bbl/d) increased by 3.2% compared with that of 2000. Mexico had 4,185 producing well in 301 oilfields and 185 offshore platforms. More than 80% of crude production was from offshore wells, 54.3% of which was produced from Cantarell, which was the largest oilfield in Mexico and is in the Marina Norte region. This region, which also includes the Ku, Maloob, and Zaap fields, produced 63.5% of Mexico's crude petroleum. Heavy crude accounted for 64% of the production. Light and superlight crude were 21% and 15%, respectively, of the total. Of the total production, 56% was sent to export terminals, and 36.5% went to the domestic refineries. Of the crude produced, the petrochemical plants received 4.6%, and the maquiladora industry, 2% (Petróleos Mexicanos S.A. de C.V., 2002a, p. 14, 16-17).

Production of natural gas decreased by 3.6% compared with that of 2000. With 13.5% of the production, Cantarell was the largest producing field. Mexico's natural gas production has been decreasing since 1998.

On January 1, 2002, Mexico's total hydrocarbons reserves were 52.951 billion barrels (Gbbl) of crude equivalent. Of this total, 30.838 Gbbl of crude equivalent, or 58.2%, was in proven reserves, or less than 21 years of production at the 2001 output level. Exploration efforts during the year yielded 215.8 Mbbl of crude equivalent, or about 15% of the 2001 production of crude and condensate. In recent years, reserves have been decreasing because exploration efforts have not replaced production (Petróleos Mexicanos S.A. de C.V., 2002a, p. 12; 2002c, p. 37-39).

As reserves have continued to decrease, PEMEX's programs have been focused on developing new reserves and increased production of light crude petroleum and nonassociated natural gas. The country has been increasing the imports of natural gas, and the Government estimated that the domestic growth of natural gas consumption could be as high as 8.9% per year between 2001 and 2010. This could result in an import dependence of 23% of the domestic demand. In view of this and the advance technology and capital required to the rapid development desired by the company, PEMEX planned to use service contracts to amplify the development of the Burgos Basin. The company expected to begin the bidding process by yearend 2002 (Petróleos Mexicanos S.A. de C.V., 2002§).

Refinery Products.—Mexico had six refineries in operation in 2001. Refinery production increased by less than 2% to 1.262 million barrels per day (Petróleos Mexicanos S.A. de C.V., 2002a, p. 30).

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Major Sources of Information

Asociación de Ingenieros de Minas, Metalurgistas y Geólogos de México, A.C.
Jaime Torres Bodet No. 176
Colonia Santa María La Rivera
06400 México, D.F., Mexico

Asociación Mexicana del Cobre, A.C.
Sonora No. 166, Piso 1
Colonia Roma
06100 México, D.F., Mexico

Cámara Minera de México
Sierra Vertientes 369
Lomas de Chapultepec
11000 México, D.F., Mexico

Cámara Nacional del Cemento, A.C.
Leibnitz No. 77
Colonia Anzures
11590 Méico, D.F., Mexico

Cámara Nacional de la Industria del Hierro y del Acero, A.C.
Amores No. 338
Colonia del Valle
03199 México, D.F., Mexico

Consejo de Recursos Minerales
Blvd. Felipe Angeles
Carretera México-Pachuca, Km. 93.5
42080 Pachuca, Hidalgo, Mexico

Fideicomiso de Fomento Minero
Puente de Tecamachalco No. 26
Colonia Lomas de Chapultepec
11000 México, D.F., Mexico

Instituto Mexicano del Aluminio, A.C.
Bosques de Ciruelos No. 130, Piso 4
Colonia Bosques de las Lomas
11700 México, D.F., Mexico

Instituto Nacional de Estadística, Geografía e Informática
Francisco Sosa No. 383
Esq. Salvador Novo
Colonia del Carmen
04000 México, D.F., Mexico

Secretaría de Economía
Dirección General de Minas
Morena No. 811
Colonia Narvarte
03020 México, D.F., Mexico

Secretaria de Energía
Ave. Insurgentes Sur 552
Colonia Roma Sur
06769, México, D.F., Mexico

Sindicato Nacional de Trabajadores Mineros, Metalúrgicos y Similares de la República Mexicana
Dr. Vertiz No. 668
Colonia Narvarte
A.P. 12-872
03020 México, D.F., Mexico

Sociedad Geológica Mexicana
Jaime Torres Bodet No. 176
Colonia Santa María La Rivera
06400 México, D.F., Mexico

U.S. Embassy-Mexico City
Ing. Javier Moya Ruiz
Economic Section
Paseo de la Reforma, 305
México 5, D.F., Mexico
Telephone: (52) 55 5080-2000, ext. 2418

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TABLE 1
MEXICO: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
METALS						
Aluminum, metal:						
Primary		66,358	61,848	62,736	61,200 r/	51,500
Secondary		123,179	217,857	362,866	350,000 e/	350,000 e/
Antimony:						
Mine output, Sb content		849	338	126	39	--
Metal 3/		1,909	1,301	273	52	81
Arsenic 4/		2,999	2,573	2,419	2,522	2,381
Bismuth:						
Mine output, Bi content 5/		1,642	1,204	548	1,112	1,390
Metal, refined		990	1,030	412	1,083	1,390
Cadmium:						
Mine output, Cd content		1,327	1,739	1,311	967 r/	1,245
Metal, refined		1,223	1,218	1,275	1,268	1,421
Copper:						
Mine output, Cu content:						
By concentration or cementation		342,319	335,822	330,232	308,966	306,779
Leaching (electrowon)		48,217	48,819	50,952	55,600	60,500
Total		390,536	384,641	381,184	364,566	367,279
Metal:						
Anode and blister		348,290	378,302	352,700	323,000	344,500
Refined:						
Primary		282,217	432,000	411,952	396,000	409,000
Secondary e/		14,783 6/	15,000	14,000	15,000	15,000
Total		297000	447000	425952	411000	424000
Gold:						
Mine output, Au content	kilograms	26,001	25,426	23,755	26,375	23,543
Metal, refined	do.	24,532	25,298	22,050	24,074	25,749
Iron and steel:						
Iron ore, mine output:						
Gross weight	thousand tons	10,467	10,557	11,475	11,325	8,783
Fe content	do.	6,280	6,334	6,885	6,795	5,270
Metal:						
Pig iron	do.	4,450	4,532	4,808	4,856	4,363
Direct-reduced iron	do.	4,440	5,584	6,070	5,589	3,674
Total	do.	8890	10116	10878	10445	8037
Ferroalloys: 7/						
Ferromanganese	do.	68 r/	87 r/	80 r/	91	60
Silicomanganese	do.	105 r/	105 r/	114	108	74
Total	do.	173 r/	192 r/	194 r/	199	134
Crude steel	do.	14,254	14,182	15,243	15,586 r/	13,292
Rolled products 8/	do.	11,309	10,789	11,319 r/	11,747 r/	11,105
Lead:						
Mine output, Pb content		174,661	166,060	125,656	137,975	136,413
Metal:						
Smelter:						
Primary 9/		169,510	163,645	111,136	143,223	143,523
Secondary (refined) e/		10,000	10,000	10,000	10,000	10,000
Total e/		180000	174000	121000	153000	154000
Refined:						
Primary 10/		168,164	163,206	108,978	142,856	143,345
Secondary e/		10,000	10,000	10,000	10,000	10,000
Total e/		178,000	173,000	119,000	153,000	153,000
Manganese ore: 11/						
Gross weight		534,000	510,000	459,000	435,000	277,000
Mn content		192,825	187,103	169,107	156,117	99,751
Mercury, mine output, Hg content e/		15	15	15	15	15
Molybdenum, mine output, Mo content		4,841	5,949	7,961	6,886	5,518
Silver:						
Metallurgical products, Ag content:						
In copper bars	kilograms	378,557	395,251	357,017	276,438	283,539
Mixed gold and silver bars	do.	243,188	237,868	259,715	249,136	195,086
Metal, refined, primary	do.	1,928,812	2,100,493	1,596,876	2,037,131	2,330,811

See footnotes at end of table.

TABLE 1--Continued
MEXICO: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
METALS--Continued						
Silver--Continued:						
Mine output, Ag content	kilograms	2,679,090	2,686,021	2,466,981	2,620,495	2,759,985
Tin:						
Mine output, Sn content		5	5	4	4	8
Metal, smelter, primary		1,188	1,078	1,258	1,200	1,107
Tungsten, mine output, W content		179	130	11	--	--
Zinc:						
Mine output, Zn content		379,252	395,391	362,811	392,791	428,828
Metal, refined, primary		231,444	230,325	218,913	235,073	303,810
INDUSTRIAL MINERALS						
Abrasives, natural 12/		8,271	9,274	6,208	7,000 e/	7,000 e/
Barite		236,606	161,555	157,953	127,420	145,789
Cement, hydraulic		27,548	27,744	29,413	31,677	29,966
Clays:						
Bentonite		111,503	185,729	208,611	269,730	415,133
Common		5,078,048	5,601,071	6,964,647	9,689,936	13,236,949
Fuller's earth		51,430	48,016	47,522	51,685	148,194
Kaolin		235,278	339,013	489,993	532,268	681,700
Diatomite		59,463	66,812	65,146	96,448	69,474
Feldspar		155,760	197,866	262,241	334,439	329,591
Fluorspar:						
Acid-grade	thousand tons	291	331	323	335	343
Metallurgical-grade	do.	262	267	234	300	276
Total	do.	553	598	557	635	619
Graphite, natural:						
Amorphous		46,707	42,893	27,781	30,330	21,442
Crystalline		1,275	568	--	--	--
Total		47,982	43,461	27,781	30,330	21,442
Gypsum and anhydrite, crude (yeso)		5,869,175	7,045,197	6,953,756	5,654,060 r/	6,237,056
Lime, hydrated and quicklime e/	thousand tons	6,500	6,500	6,500	6,500	6,500
Magnesium compounds:						
Magnesite		231	274	308	335	350 e/
Magnesia 13/		77,300	78,000	70,600	76,500	37,600
Mica, all grades		975	890	971	1,658	648
Nitrogen, N content of ammonia		1,448,300	1,449,300	1,002,700	700,600 r/	547,500
Perlite		51,758	54,840	61,596	68,702	80,297
Phosphate rock 14/		713,662	756,349	950,649	1,052,464	787,283
Salt, all types	thousand tons	7,933	8,412	8,236	8,884	8,501
Sodium compounds, n.e.s.: e/						
Carbonate (soda ash), synthetic		290,000	290,000	290,000	290,000	290,000
Sulfate, natural (bloedite) 15/		598,200	597,100	591,300	560,400	547,000
Stone, sand and gravel:						
Calcite, common		490,531	592,412	682,249	820,149	2,711,889
Dolomite		902,710	785,516	415,284	403,664	670,797
Limestone	thousand tons	43,706	44,372	45,449	58,267	63,346
Marble		516,805	663,945	744,377	1,034,529	4,155,745
Quartz, quartzite, glass sand (silica)		1,564,348	1,733,439	1,700,527	1,802,545	1,720,211
Sand	thousand cubic meters	60,104	54,703	58,912	67,491	67,712
Gravel	do.	43,636	43,947	45,050	50,176	57,157
Strontium minerals, celestite		134,707	118,230	164,682	157,420	145,789
Sulfur, elemental, byproduct:						
Of metallurgy e/	thousand tons	417	474	474 r/	474 r/	572
Of petroleum and natural gas	do.	923	913	856	851	878
Total e/	do.	1,340	1,390	1,330 r/	1,330 r/	1,450
Talc		13,586	18,843	18,981	20,569	77,650
Vermiculite		295	--	--	--	--
Wollastonite		20,655	41,264	44,126	30,836	39,830

See footnotes at end of table.

TABLE 1--Continued
MEXICO: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Run-of-mine:						
Metallurgical	thousand tons	4,479	4,823	4,748	6,372	5,242
Steam	do.	8,228	7,566	8,555	7,915	6,935
Total	do.	12,707	12,389	13,303	14,287	12,177
Washed metallurgical coal	do.	1,906	1,826	1,944	2,259	2,000 e/
Coke: 16/						
Metallurgical	do.	2,100	2,166	2,187	2,185	2,025
Breeze	do.	37	37	41	50	40
Total	do.	2,137	2,203	2,228	2,235	2,065
Gas, natural:						
Gross	million cubic meters	46,158	49,506	49,506	48,349	46,624
Marketed	do.	28,930	29,105	27,999	28,847	28,984
Petroleum:						
Crude	thousand 42-gallon barrels	1,103,030	1,120,550	1,060,690	1,099,380	1,141,355
Condensate (natural gas liquids)	do.	141,620	156,585	159,505	159,870	158,045
Total	do.	1,244,650	1,277,135	1,220,195	1,259,250	1,299,400
Refinery products:						
Liquefied petroleum gas	do.	13,980	10,512	11,315	9,089 r/	10,147
Motor gasoline	do.	141,730	150,344	148,117 r/	143,445 r/	142,423
Jet fuel	do.	20,440	20,842	21,097 r/	20,185 r/	20,696
Kerosene	do.	1,132	694	292 r/	110 r/	110
Distillate fuel oil (diesel)	do.	100,521	105,850	99,244 r/	96,871 r/	102,784
Lubricants	do.	2,044	1,971	3,030 r/	2,190	1,898
Residual fuel oil	do.	155,563	162,717	156,184 r/	154,249 r/	159,104
Asphalt	do.	9,417	10,841	11,060 r/	11,352 r/	10,476
Other, refinery fuel, and losses	do.	20,877	21,241	18,394 r/	17,263 r/	14,854
Total	do.	465,704	485,012	468,733 r/	454,754 r/	462,492

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.
1/ Table includes data available through December 13, 2002.
2/ In addition to the commodities listed, additional types of crude construction materials are produced, but output is not reported; available information is inadequate to make estimates of output levels.
3/ Sb content of antimonial lead and impure bars plus refined metals.
4/ Arsenic content of white and black (impure) arsenic trioxide.
5/ Bismuth mine production in 2001 was zero. The series reports refined metal plus bismuth content of impure smelter products.
6/ Reported figure.
7/ Reported by Cámara Nacional del Hierro y del Acero.
8/ Includes flat, nonflat, and seamless pipe steel products.
9/ Lead content of impure bar, antimonial lead, plus refined metal.
10/ Includes lead content of antimonial lead.
11/ Mostly oxide nodules; includes smaller quantities of direct-shipping carbonates and oxide ores for metallurgical and battery applications.
12/ Based on exports that comprise mostly pumice stone and emery (a granular, impure variety of corundum).
13/ Reported by Industrias Peñoles S.A. de C.V. as the only major producer. Includes caustic, electromelt, hydroxide, and refractory.
14/ Includes only output used to manufacture fertilizers.
15/ Series reflects output reported by Industrias Peñoles plus an additional 40,000 tons estimated output by other producers.
16/ Includes coke made from imported metallurgical coal.

TABLE 2
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity
Aluminum		Aluminio y Derivados de Veracruz, S.A. de C.V. (private Mexican, 100%)	Smelter in Veracruz, Ver.	65.
Antimony		Cía. Minera y Refinadora Mexicana, S.A. (private Mexican, 51%; Cookson Ltd., 49%)	San José mine, Catorce, S.L.P.	365.
Barite		Barita de Sonora, S.A. [Grupo Acerero del Norte, S.A. de C.V. (GAN), 100%]	Mazatán, Son.	219.
Bismuth		Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles, S.A. de C.V., 100%)	Torreón, Coah.	1.2.
Do.		Minerales y Arcillas, S.A. de C.V. (private Mexican, 100%)	San Francisco del Huerto mine in San Pedro, Coah., La Escondida and Angelita mines and plant in Galeana	55.
Do.		Barita de Santa Rosa, S.A. de C.V. (private Mexican, 100%)	Muzquiz, Coah.	256.
Cement		Cementos Mexicanos, S.A. de C.V. (CEMEX) (private Mexican, 100%)	Ensenada, B. C.N.; Torreón, Coah.; Barrientos, D.F.; Arotonilco and Huichapán, Hgo.; Guadalajara and Zapotilic, Jal.; Hidalgo and Monterrey, N.L.; Tepeaca, Pue.; Tamuín and Valles, S.L.P; Hermosillo and Yaquí, Son.; and Mérida,Yuc.	26,650.
Do.		Cementos Apasco, S.A. de C.V. (Holderbank Financière Glaris, Ltd., 49%)	Apasco, Mex.; Ramos Arizpe, Coah.; Macuspana, Tab.; Tecomán, Col.; Orizaba, Ver.; Acapulco, Gro.	8,900.
Do.		Cooperativa La Cruz Azul, S.C.L. (private Mexican, 100%)	Cruz Azul, Hgo., Lagunas, Oax.	5,000.
Do.		Cementos de Chihuahua, S.A. de C.V. (CEMEX, 36%; private Mexican, 64%)	Chihuahua, Cuidad Juarez, and Samalayuca, Chih.	2,000.
Coal		Minerales de Monclova, S.A. [Altos Hornos de Mexico, S.A. de C.V. (AHMSA), 100%]	Mimosa, Palau mines, and Muzquiz washing plant at Palau, Coah., and coking plant at Monclova, Coah.	3,000.
Do.		Carbonífera de San Patricio, S.A. de C.V. (private Mexican, 100%)	Progreso, Coah.	1,314.
Do.		Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A. de C.V., more than 90%)	Nueva Rosita, Coah.	1,500.
Do.		Minera Carbonífera Río Escondido, S.A. (GAN, 51%; Mission Energy, 49%)	Mina I, Mina II, and Tajo I at Nava and Piedras Negras, Coah.	4,000.
Copper		Mexicana de Cobre, S.A. de C.V. (Grupo México, S.A. de C.V., more than 90%)	La Caridad mine, smelter, refinery and rod plant at Nacozari de García, Son.	350 smelter, 50 SX-EW (2/); 300 refinery; 150 rod plant.
Do.		Mexicana de Cananea, S.A. de C.V. (Grupo México, S.A. de C.V., more than 90%)	Mine and smelter at Cananea, Son.	29,200 mill; 33 SX-EW. 2/
Ferroalloys		Cía. Minera Autlán S.A. de C.V. (Grupo Ferrominero, S.A. de C.V., 54%; Minas de Basis, S.A. de C.V., 32%; BHP Ltd., 14%)	Plant in Tamós, Ver.	140.
Do.		do.	Plant in Teziutlan, Pue.	38.
Do.		do.	Plant in Gómez Palacio, Dgo.	35.
Fluorspar		Cía. Minera Las Cuevas, S.A. de C.V. (Grupo Industrial Camesa, S.A. de C.V.) 3/	Salitera (Zaragoza), S.L.P.	520.
Do.		Fluorita de México S.A. de C.V. (Corp. Alfil, 51%; Applied Industrial Minerals Corp., 49%)	Mines at La Encantada district and plant at Muzquiz, Coah.	150.
Gold	kilograms	Cía. Fresnillo S.A. de C.V. (Industrias Peñoles, S.A. de C.V., 100%)	Fresnillo/Proaño mine, Zac.	1,000.
Do.	do.	Minera Piedmont S. de R.L. de C.V. (Industrias Peñoles S.A. de C.V., 56%; Newmont Mining Corporation, 44%)	La Herrdura mine, Son.	6,300.
Do.	do.	Minera Mexicana La Ciénega S.A. de C.V. (Industrias Peñoles S.A. de C.V.)	La Ciénega Mine, Dgo.	3,700.
Do.	do.	Minas Luismín, S.A. de C.V. (SANLUIS Corporación, S.A. de C.V., 100%)	Tayoltita and Santa Rita, Dgo.; San Antonio, Sin.; San Martín, Qro.; La Guitarra, Mex.	2,700.
Do.	do.	Cía. Minera de Santa Gertrudis (Grupo Ariztegui, 51%; Phelps Dodge Corp., 49%)	Santa Gertrudis mine, Son.	1,600.

See footnotes at end of table.

TABLE 2--Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity
Gold--Continued:	kilograms	Exploraciones El Dorado S.A. de C.V. (70%), Minerales Sotula (30%)	La Colorada mine, Son.	800.
Do.	do.	Walhalla Mining Co. NL (private foreign, 100%)	Amelia mine, Son.	1,300.
Do.	do.	Sociedad Cooperativa Minero Metalúrgica Santa Fe de Guanajuato (private Mexican, 100%)	Guanajuato, Gto.	438.
Do.	do.	Cía. Minera las Torres, S.A. de C.V. (Industrias Peñoles, S.A. de C.V., 100%)	do.	450.
Do.	do.	Cía. Minera El Cubo, S.A. de C.V. (private Mexican, 100%)	do.	128.
Do.		Met-Mex Peñoles, S.A. de C.V.(Industrias Peñoles, S.A. de C.V., 100%)	Torreón, Coah.	22,700 refinery.
Graphite		Grafitos Mexicanos S.A. (Cummings Moore Graphite Co. of the United States, 25%; private Mexican, 75%)	Lourdes and San Francisco mines, Son.	60.
Do.		Grafito Superior S.A. de C.V. (Superior Graphite Co., 100%)	Covalmar, Santa Clara, and Río Mayo mines, and plant in Son.	25.
Gypsum		Cía. Occidental Mexicana S.A. (private Mexican, 51%; Domtar, Ltd., of Canada, 49%)	Santa Rosalía on San Marcos Island, B.C.S.	2,500.
Iron ore		Consorcio Minero Benito Juárez Peña Colorada S.A. de C.V. (Ispat International N.V., 49%; Hylsamex S.A. de C.V., 51%)	Peña Colorada mine and pellet plant near Manzanillo, Col.	3,500.
Do.		AHMSA (GAN, 74%)	La Perla mine, Chih.; Hércules mine, Coah.; and Cerro de Mercado mine, Dgo.	5,000.
Do.		Siderúrgica Lázaro Cárdenas-Las Truchas, S.A. de C.V. (SICARTSA) (Grupo Villacero, 100%)	Ferrotepec, Volcán, and Mango deposits in Las Truchas project area and pellet plant, Mich.	2,350.
Lead and zinc		IMMSA (Grupo México, S.A. de C.V., more than 90%)	Charcas, S.L.P.; San Martín, Zac.; Santa Eulalia, Chih.; Taxco, Gro.; Rosario, Sin.; Santa Bárbara, Chih.; Velardeña, Dgo; lead refinery at Monterry, N.L.; zinc refinery at S.L.P.	70 (lead), 110 refined zinc.
Do.		Industrias Peñoles, S.A. de C.V. (private Mexican, 97%; private U.S., 3%)	Mines at La Encantada, Coah.; Fresnillo, Zac.; Naica, Chih.; Bismark, Son; Rey de Plata, Gro. (Peñoles, 51%; Dowa Mining Co., 39%); metallurgical complex at Torreón, Coah., with silver, lead, and zinc smelter and refineries operated by Met-MexPeñoles (Peñoles, 100%)	180 refined lead, 220 refined zinc.
Do.		do.	Francisco I. Madero mine, Zac.	100,000 zinc.
Do.		Minera San Francisco del Oro S.A. de C.V. (Empresas Frisco, S.A. de C.V., 100%)	San Francisco del Oro, near Hidalgo del Parral, Chih.	15 (lead), 21 (zinc).
Do.		Minera Real de Angeles S.A. de C.V. (Empresas Frisco, S.A. de C.V., 100%)	Noria de Angeles, Zac.	45 (lead), 47 (zinc).
Manganese		Cía. Minera Autlán S.A. de C.V. (Grupo Ferrominero S.A. de C.V., 81.75%; private Mexican, 18.25%)	Molango, Naopa, and Nonoalco mines, Hgo.	600 ore and concentrate.
Molybdenum		Mexicana de Cobre S.A. (Grupo México, S.A. de C.V., more than 90%)	La Caridad mine, molybdenum plant, Son.	6.
Petroleum 4/	thousand berrels per day	Petróleos Mexicanos S.A. de C.V. (PEMEX) (Government, 100%)	Comalcalco, Poza Rica, Ver., and Gulf of Campeche, Cam., districts	3,500.
Salt		Exportadora de Sal S.A. (Fideicomiso de Fomento 51%; Mitsubishi Corp., 49%)	Solar salt complex at Guerrero Negro, B.C.S.	6,000.
Silver	kilograms	Industrias Peñoles, S.A. de C.V. (private Mexican, 97%; private U.S., 3%)	Naica, Chih.; Fresnillo, Zac.; Las Torres, Gto., La Ciénega, Dgo.; Tizapa, Gro.; La Encantada, Coah.; and other locations	750,000.
Do.	do.	Cía. Fresnillo S.A. de C.V. (Industrias Peñoles, S.A. de C.V., 100%)	Fresnillo/Proaño mine, Zac.	950,000.
Do.	do.	IMMSA (Grupo México, S.A. de C.V., more than 90%)	San Martín mine, Sombrerete, Zac.; Taxco, Gro.; Charcas, S.L.P.; Santa Eulalia, Chih.; refiney at Monterrey, N.L.	467.

See footnotes at end of table.

TABLE 2--Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity
Silver--Continued:	kilograms	Minera Real de Angeles, S.A. de C.V. (Empresas Frisco, S.A. de C.V., 100%)	Open pit mine and concentrator at Noria de Angeles, Zac.	924.
Do.	do.	Minera Hecla S.A. de C.V. (Hecla Mining Co.)	San Sebastián mine and Verladeña plant, Dgo.	29,500 mine.
Do.	metric tons	do.	do.	450,000 mill.
Do.	kilograms	Met-Mex Peñoles S.A. de C.V. (Industrias Peñoles, S.A. de C.V.,100%)	Torreón, Coah.	1,240,000 refinery.
Do.	do.	Pan American Silver Corp.	La Colorada mine, Zac.	24,300.
Sodium sulfate		Química del Rey, S.A. de C.V. (Industrias Peñoles, S.A. de C.V., 100%)	Plant at Laguna del Rey, Coah.	620.
Steel		AHMSA (GAN, 74%)	Steelworks at Monclova, Coah.	3,700, 3,550 pellet.
Do.		Hylsamex S.A. de C.V. (Grupo Industrial ALFA, 100%)	Steel works and direct-reduction units at Monterrey, N.L., and Puebla, Pue., and pelletizing plant in Col.	3,100, 1,500 pellet.
Do.		DEACERO S.A. de C.V. (private Mexican, 100%)	Steelworks at Saltillo, Coah., and Celaya, Gto.	1,450.
Do.		ISPAT Mexicana, S.A. de C.V. (Ispat International N.V., 100%)	SICARTSA II plant facilities at Lázaro Cárdenas, Mich.	5,300, 4,000 pellet.
Do.		SICARTSA (Grupo Villacero, 100%)	Port Lázaro Cárdenas, Mich.	2,350, 1,850 pellet.
Do.		Tubos de Acero de México, S.A. (private Mexican, 100%)	Veracruz, Ver.	1,000.
Strontium (celestite)		Cía. Minera La Valenciana (private Mexican, 100%)	San Agustín mine in Torreón, Coah.	50.
Sulfur		PEMEX	Nationwide petroleum operations	890.
Tin 5/		Fundidora Marni, S.A.	San Luis Potosí, S.L.P.	NA.
Do.		PIZUTO, S.A.	do.	NA.

NA Not available.
1/ State abbreviations: Baja California Norte (B.C.N.), Baja California Sur (B.C.S.), Campeche (Cam.), Chiapas (Chia.), Chihuahua (Chih.), Coahuila (Coah.), Colima (Col.), Distrito Federal (D.F.), Durango (Dgo.), Guanajuato (Gto.), Guerrero (Gro.), Hidalgo (Hgo.), Jalisco (Jal.), Mexico (Mex.), Michoacan (Mich.), Nuevo León (N.L.) Oaxaca (Oax.), Puebla (Pue.), Queretaro (Qro.), San Luis Potosí (S.L.P.), Sinaloa (Sin.), Sonora (Son.), Tabasco (Tab.), Veracruz (Ver.), Yucatan (Yuc.), and Zacatecas (Zac.).
2/ Solvent extraction-electrowinning.
3/ Grupo Industrial Camesa, S.A. de C.V. was owned by Banco Internacional (34%), Banco del Atlántico (34%), Banamex (17%), Noranda Inc. of Canada (4%), Free Float (12%).
4/ PEMEX operates six refineries with an installed capacity of 1.68 million barrels per day.
5/ Smelter output from mostly imported concentrates.