THE MINERAL INDUSTRY OF

MEXICO

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In 2000, Mexico's gross domestic product (GDP) was $574.5 billion,[2] which was a 6.9% increase from that of 1999; this was the largest increase in 19 years (Banco de México, 2001, Cuentas nacionales [National accounts], accessed October 25, 2001, at URL http://www.banxico.org.mx/sie/cuadros/CR72.asp). The GDP growth was the result of strong internal consumption, increased private investment, and the continued strength of the price of petroleum. Inflation decreased to less than 10% (Secretaría de Economía, 2001, p. 7). The value of total exports increased by 22% to $166.5 billion. Because of the strong internal demand, however, imports increased at a higher pace of 22.8% to $174.5 billion (World Bank, September 10, 2001, Country at glance—Mexico, accessed October 25, 2001, at URL http://www.worldbank.org/data/country/data). The value of Mexican crude petroleum exported increased to $24.62 in 2000 from an average price of $15.62 per barrel in 1999 (Petróleos Mexicanos, S.A. de C.V., 2001b, cuadro [table] 7).

Incomplete data by the Cámara Minera de México (Mexican Chamber of Mines) shows a decrease in investment of 12% to $698.2 million in the mining sector by companies associated with the Cámara; the decrease was 24.7% in 1999. According to the Cámara, investment in 2001, would further decrease to $646 million (Cámara Minera de México, 2000, p. 38; 2001, p. 48).

Mexico's mineral sector (excluding petroleum and natural gas) was affected by the low international prices that prevailed during 2000. The prices of some of Mexico's mineral commodities of higher value, such as gold, lead, and silver, decreased. Prices of copper and zinc, which were two of the largest contributors to the value of Mexico's nonferrous metals, however, increased. The value of production of many industrial minerals increased at a lower pace than the volume of production. In some cases, volume and value decreased. In general, the profitability of the mineral sector (excluding petroleum and natural gas) was adversely affected by the high value prices of fuels. Between early 1999 to yearend 2000, prices of natural gas, electricity, and diesel increased by 478%, 44%, and 23%, respectively (Cámara Minera de México, 2001, p. 13).

[1]Much of the general and commodity information in this report was provided by Ing. Javier Moya Ruiz, Minerals Specialist of the Embassy of the United States in Mexico City, whose joint efforts have been invaluable in providing a comprehensive, detailed, and timely reporting. Moya not only compiles the annual Minerals Questionnaire, but is also the author of the comprehensive annual Mexico's Outlook Report used extensively as source material for this report. Any datum, statistic, or information in text not referenced elsewhere may be assumed to be from his current (2001) Mexico Mining Report–2000.

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

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 Diario Oficial de la Federación (Official Diary of the Federation) on December 24, 1996.

The mining law covers exploration for, production of, 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 works and activities 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 products of their decomposition that can be used only to produce construction materials or are destined for such purposes, products derived from the decomposition 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 mining 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 (Official Diary of the Federation). The new regulations are geared to increase the participation of the private sector in mining and the competitiveness of the mining companies in Mexico. The regulations decrease the administrative procedures by 20% and establish time limits for most of the procedures. The regulation also establishes 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 establishes 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). SECOFI's Dirección General de Minas is responsible for revisions to the Mining Law and its regulations, and granting mining concession titles. In 2000, 1,900 concessions were granted, which covered an area of 4.9 million

hectares (Mha) (12.3 million acres). Of these, 1,256 concessions, which covered an area of 4.6 Mha (11.5 million acres), were for exploration, and 635 concessions were for production (Secretaría de Economía, 2001, p. 17).

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 as 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 (LGEEPA) (the General Law of Ecological Balance and Environmental Protection), which is a key element of environmental legislation was passed in 1992 (Ordal and Moya, 1996, p. 5). The environmental responsibilities of 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 require 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 water well usage, water discharge, land use, explosives, and hazardous materials handling. Other regulations are concerned with noise, gas and dust emissions, dumps and tailings, storage of oil and fuel, and electrical transformers.

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 establishes environmental protection for direct mining activities in a dry and temperate climate with xerophilous underbrush, deciduous tropical forests, coniferous forests, and holm oaks. In January 1999, a clarification of the law was published by SEMARNAP.

Production

An important mineral producer, Mexico ranked among the top world producers in a variety of nonfuel minerals. According to U.S. Geological Survey data, it was the world's leading producer of bismuth (with 28% of the world's total), celestite (with 40% of the world's total), and silver (table 1) and a significant supplier of mining and mineral products to the United States. In 2000, Mexico maintained its position as a world producer—fluorspar, 2d (with 14% of the world's total); arsenic and graphite, 4th; molybdenum, 5th; cadmium, gypsum, lead (mine), salt, and zinc (mine), 6th; barite, 7th; sulfur, 9th; manganese ore (metal content), 10th; copper (mine) and cement, 11th; gold, 14th; and crude steel, 15th.

In 2000, the total value of Mexico's mineral production (excluding petroleum and natural gas) increased to $4.30 billion in 2000 from $3.78 billion in 1999; metals contributed 54% of the total, or $2.3 billion. Production of sand and gravel (combined) was the highest in terms of value of all mineral commodities (excluding petroleum and natural gas) at $809 million; this was a 25.6% increase from that of 1999. Copper ranked second after sand and gravel and contributed $659 million, or about 28% of the metal value. Silver and zinc followed with about 19% each of the total mining production value (Moya Ruiz, 2001, p. 6-7). The value of coal production was $189 million; this was 4% of the total value of mineral production (excluding petroleum and natural gas) (Cámara Minera de México, 2001, p. 49). The value of production of cement in Mexico was $5.02 billion (Moya Ruiz, 2001, p. 7).

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. The State of Durango was the largest producer of gold followed by the State of Guanajuato. 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. Mexico's national petroleum company Petróleos Mexicanos, S.A. de C.V. (PEMEX) had revenues of $46.8 billion and provided $30.8 billion in direct and indirect taxes, or about two-thirds of the total (Petróleos Mexicanos, S.A. de C.V., 2001b, cuadro [table] 1). With Venezuela's decrease in production of crude petroleum, Mexico became the world's sixth largest producer in 1999. In 2000, Venezuela again surpassed Mexico in production of crude petroleum. Mexico was the seventh largest producing country in the world. In the Western Hemisphere, only the United States and Venezuela produced more crude petroleum than Mexico during 2000 (Petróleos Mexicanos, S.A. de C.V., 2001a, p. 58).

Trade

In 2000, Mexico's total exports were valued at $166.5 billion. Of that total, the value of mineral exports (excluding petroleum and natural gas) accounted for $2.1 billion, or 1.3% of the total. The value of metal exports totaled $1.9 billion, or 91% of mineral exports (excluding petroleum and natural gas). Total imports were valued at $174.5 billion. Mineral imports (excluding petroleum and natural gas) accounted for $1.6 billion, or 0.9% of total imports.

During the year, about 67% of Mexico's mineral exports went to the United States and more than 60% of its mineral imports originated in the United States.

Silver was the largest source of foreign exchange with $439 million, or 21.3% of total mineral exports (excluding petroleum and natural gas), followed by zinc ($218 million), and copper ($200 million). Metal imports were led by copper with 27% of the value of total mineral exports (excluding petroleum and

natural gas). Industrial mineral imports were led by coal and coke with a combined 11.6% the value of total mineral imports (excluding petroleum and natural gas).

Mexico exported 603 million barrels of crude petroleum at a value of $14.9 billion. Mexico was a net importer of natural gas and refinery products. Of the total crude exports, 75.2% went to the United States followed by Spain (8.7%) and the Netherlands Antilles (6.5%). About 2.7% of Mexico's exports went to the countries that 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 $24.62, which was a 57.6% increase compared with that of 1999 (Petróleos Mexicanos, S.A. de C.V., 2001b, cuadros [tables] 104-107).

Structure of the Mineral Industry

Since 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 petroleum and electricity.

The Coordinación General de Minería is SECOFI's highest office charged with coordinating mining policies with the purpose of 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 mining and mapping registers. The Dirección General de Promoción Minera is responsible for promotion of the mining sector, including establishing 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 is another important organization in Mexico's mining sector. It promotes the interest of the private sector and maintains the dialogue between the private mining sector and the Government. Some 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 del Acero, A.C. (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 2000, employment in the mineral sector totaled 220,100; of this total, 58,400 were employed in metal mining; 57,200, in iron and steel; 46,500, in nonmetallic minerals; 28,000, in the cement industry; and 30,000, in other areas (Moya Ruiz, 2001, p. 10). Nearly all miners were represented by the Sindicato Nacional de Trabajadores Mineros, Metalúrgicos y Similares de la República Mexicana (National Syndicate of Mining, Metallurgical and Similar Workers). The largest Mexican union the Confederación de Trabajadores de México (Confederation of Mexican Workers) represented the cement employees.

Five large diversified companies—SANLUIS Corporación 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 sector 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 sector operated 170 mining units and produced almost 75% of the kaolin.

In 2000, 504 international mining companies were exploring in Mexico. Of these, 213 were Canadian, and 199 were from the United States (Secretaría de Economía, 2001, p. 53). Of the total investment by foreign companies, 75% was invested in the State of Sonora.

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 (Moya Ruiz, 2001, p. 16). Cementos Apasco, S.A. de C.V., and Cooperativa La Cruz Azul, S.C.L (Cementos Cruz Azul), were also important producers of cement in Mexico.

The production of crude petroleum, natural gas, and basic petrochemicals, also reserved for the Government under Article 27 of the Constitution, was entrusted to the State company PEMEX. It operated through Pemex Exploración y Producción (Pemex Exploration and Production), Pemex Gas y Petroquímica Básica (Pemex Gas and Basic Petrochemicals), Pemex Internacional (Pemex International), Pemex Petroquímica (Pemex Petrochemicals), and Pemex Refinación (Pemex Refining). At yearend 2000, PEMEX's total employment was about 136,800.

Commodity Review

Metals

Copper.—Mine production of copper was 364,566 metric tons (t), a decrease of 4.4% from that of 1999. The largest producer Grupo Mexico, through its Mexican mining division, mined 319,100 t of copper from two open pit and three underground mines. Production from the two open pit mines included 55,600 t of copper recovered by solvent extraction-electrowinning (SX-EW). The company produced 87.5% of the copper mined in Mexico. Production from Grupo Mexico's two largest mines, Cananea (operated by Mexicana de Cananea, S.A. de C.V.) and La Caridad (operated by Mexicana de Cobre, S.A. de C.V.), which are in the State of Sonora, was 289,700 t (Grupo México, S.A. de C.V., 2001, p. 11). Production from three of its underground polymetallic mines, Charcas in San Luis Potosí, San Martín in Zacatecas, and Santa Bárbara in Chihuahua, totaled 29,400 t of copper.

Peñoles was a small producer of copper from some of its polymetallic mines. In 2000, it produced 9,500 t of copper. Peñoles, however, was investing in two copper projects—Milpillas and Pecobre. Milpillas, which is in the State of Sonora, was in an advanced phase of exploration. Resources were estimated to be 30 million tons (Mt) of ore with 2.5% copper in leachable oxide mineral. During the year, Peñoles acquired 600 hectares for mine and infrastructure development. The company planned to complete the prefeasibility study by 2001 and begin production by 2003. Total investment for Milpillas was estimated to be $180 million. Planned production capacity was 60,000 metric tons per year (t/yr) of copper

cathode (Industrias Peñoles, S.A. de C.V., 2001, p. 19).

Peñoles also continued its exploration program in its Pecobre project with Corporación del Cobre de Chile in the State of Sonora. Total exploration cost of the project in 2000 was $3.2 million with a planned program of $5 million for 2001 (Industrias Peñoles, S.A. de C.V., 2001, p. 19).

Grupo Mexico held a significant portion of Mexico's smelting and refining capacity. The company owned two copper smelters, one in the State of Sonora and the other in the State of San Luis Potosí. The entire smelter production in Mexico, which was from these two smelters, totaled 323,000 t. Most of the smelter production (292,700 t) was from the Sonora smelter in the Mexicana de Cobre's La Caridad metallurgical complex. Grupo Mexico's recently built 300,000-t/yr copper refinery was at the same complex. The company's refinery production, which included SX-EW production, was 299,800 t, or 73% of Mexico's total refinery production of 411,000 t (table 1).

Gold and Silver.—Mine production of gold and silver totaled 26,375 kilograms (kg) and 2,620,495 kg, respectively. The largest producer of gold was Peñoles with 35% of the country's total production. In 2000, Peñoles produced gold from 11 underground mines and 1 open pit.

La Herradura, which was the open pit/heap leaching mine in the State of Sonora that was operated by Minera Penmont, S. de R.L. de C.V. (Penmont), has been in production for 2 years. Penmont was a joint venture between Peñoles (56%) and Newmont Mining Corp. of the United States. Production from La Herradura in 2000 was almost 3,800 kg (reported as 121,200 ounces) (Industrias Peñoles, S.A. de C.V., 2001, p. 18). The mine proven and probable reserves were 49.754 Mt of ore with a grade of 0.809 gram per metric ton (g/t) (reported as 0.026 ounce per metric ton) (Newmont Mining Corp., 2001, p. 50). In 2000, a second crushing stage was added to improve recovery. After the improvement, metal recovery was 71%.

Peñoles was the largest producer of refined gold. In 2000, it produced about 20,000 kg (reported to be 645,750 ounces; this was a 37.6% increase from that of 1999 (Industrias Peñoles, S.A. de C.V, 2001, p. 23).

Peñoles silver mine production was almost 1,391,000 kg of silver, which was about 53% of Mexico's silver mine output. Peñoles' largest producer was the Fresnillo/Proaño mine in the State of Zacatecas. In 2000,the mine produced about 743,400 kg of silver (reported as 23.9 million ounces of silver). About 34,200 kg (reported as 1.1 million ounces) was from tailings. In June, expansion of the mine's mill to 1,200,000 kilograms per year (kg/yr) from 900,000 kg/yr was completed. Peñoles investment in the Fresnillo/Proaño expansion for the year was $24.1 million (Industrias Peñoles, S.A. de C.V., 2001, p. 16, 33). Peñoles produced silver from all its active mines in 2000. In addition to Fresnillo/Proaño, its other principal producers were Naica in the State of Chihuahua, Tizapa in the State of Guerrero, La Ciénega in the State of Durango, and La Encantada in the State of Coahuila.

Peñoles was the largest producer of refined silver in Mexico. It produced 2,300,000 kg of silver in 2000 at the Met-Mex Peñoles, S.A. de C.V., complex in Torreón in the State of Coahuila; Met-Mex was the fourth largest in the world. The refinery at Met-Mex had a silver production capacity of 2,490,000 kg/yr (reported as 80 million ounces per year) (Industrias Peñoles, S.A. de C.V., 2001, p. [1], 20).

In May, Pan American Silver Corp.'s operating company Plata Panamericana, S.A. de C.V., completed the bankable feasibility study on its La Colorada project in the State of Zacatecas. The study recommended production of 1,000 metric tons per day of ore with a mine life of 9 years. Total cost of the mine was estimated at $26 million. Silver production was expected to be about 130,000 kg/yr (reported as 4.2 million ounces per year). After completion of financial arrangements, construction of the mine would take a year (Pan American Silver Corp., 2000a). In October, Pan American Silver announced that it had signed a mandate letter with International Finance Corporation of the World Bank (Pan American Silver Corp., 2000b). La Colorada, which has oxide and sulfide ores, has proven and probable reserves of 2.21 Mt with a grade of 492 g/t silver and 0.42 g/t gold. Tailing stockpiles contained 510,000 t with a grade of 115 g/t silver and 1.00 g/t gold. Plans called for production for the first 5 years to be from the oxide ore. Production of silver and lead concentrate would not begin until the 6th year of operation. Doré production would continue for the entire life of the mine (Pan American Silver Corp., 2000a).

Copper Ridge Explorations Inc. of Canada signed an exploration strategic alliance with the precious-metals producer Minas Luismín, S.A. de C.V. (a subsidiary of Grupo Industrial San Luis). The alliance covered 11 Mexican properties, mainly prospective for epithermal gold-silver vein mineralization held by Luismín, and Copper Ridge. The companies expected to begin exploration work on two or three of these projects in 2000 (Mining Journal, 2000b). Copper Ridge announced that it had reached an agreement to option two silver-gold properties, the Gavilanes and El Salitre in the State of Durango. Gavilanes was discovered in 1700 and has been a producer. El Salitre is a new discovery. Copper Ridge could earn a 55% interest in Gavilanes by spending $1 million in 3 years and issuing 150,000 shares to Luismín, which, in turn, could earn back to 51% by spending $500,000 in exploration and $100,000 in cash. A similar arrangement covered the Salitre property. Due diligence was expected in June (Copper Ridge Explorations Inc., 2000).

Cambior Inc. of Canada sold its Mexican subsidiary Cambior de México, S.A. de C.V., to Glamis Gold Ltd. for $7 million in May (Engineering and Mining Journal, 2000). Of the many exploration and development projects held by Cambior de México, Cerro San Pedro gold-silver project (a joint venture with Metallica Resources Inc.'s subsidiary Minera San Xavier, S.A., in the State of San Luis Potosí) was the most advanced one. Glamis Gold completed a revised feasibility study on Cerro San Pedro by yearend. As a result, because of moderate rate of return at the depressed gold and silver prices, the partners decided to continue limited development of the property (Glamis Gold Ltd., 2000).

Iron and Steel.—Mexico was the second largest producer of primary iron and steel in Latin America after Brazil. Although production of pig iron increased slightly, combined production of pig and directly-reduced iron (DRI) decreased by 3.9% to about 10.4 Mt in 2000. Production of steel increased by 2.7% to 15.7 Mt. The industry, which was the largest consumer of electricity and second largest consumer of natural gas in Mexico, was affected by high energy prices but benefited from higher steel prices; this affected production of DRI as producers reduced output during the third quarter of the year. In September, the vertically integrated steel producer Hylsamex,

S.A. de C.V., announced the suspension of its three DRI plants in Monterrey in the State of Nuevo León and announced reduced production form its Puebla plant by 40% (Metal Bulletin, 2000f). The higher cost of production was accompanied by the low price of DRI (Metal Bulletin, 2000d).

Four large companies produced about 75% of Mexico's steel output in 2000. Ispat Mexicana, S.A. de C.V. (IMEXSA) (a subsidiary of Ispat Internation N.V.), was Mexico's largest steel producer with 3.67 Mt or, 23.4% of total production. Altos Hornos de México, S.A. de C.V. (AHMSA) (a subsidiary of GAN), which was the second largest, produced 3.36 Mt. The other two, Hylsamex and Siderúrgica Lázaro Cárdenas-Las Truchas, S.A. de C.V., produced 2.82 Mt and 1.88 Mt, respectively (Moya Ruiz, 2001, p. 13).

IMEXSA had plans to increase its steel slab output by 25%. The company was investing $60 million in a continuos caster, a ladle furnace, and related infrastructure (Metal Bulletin, 2000e).

Early in the year, the Spanish steel producer Grupo Aceralia was discussing the possibility of acquiring AHMSA (Metal Bulletin, 2000a). AHMSA, which was under court protection, had declared bankruptcy in May 1999 and had suspended interest payments to creditors on a $1.9 billion debt. In June, Aceralia announced its interest in forming a joint venture instead of acquiring AHMSA. The plan was for Aceralia and AHMSA to operate 50% of AHMSA's mill capacity. Higher steel prices and a net profit of $88 million for the first quarter of the year reduced AHMSA's urgency to reach an agreement (Metal Bulletin, 2000c). In August, the company reached an agreement with its creditors to exchange $550 million of debt for 40% of AHMSA's equity (Metal Bulletin, 2000b).

Lead and Zinc.—Production of mined lead increased by 9.8% to about 138,000 t. The largest producer was Peñoles with almost 54% of production (Industrias Peñoles, S.A. de C.V., 2001, p. 31). The largest producer of mined lead was Naica, which was a Peñoles mine in the State of Chihuahua. Grupo Mexico's subsidiary Industrial Minera México, S.A. de C.V. (IMMSA), produced 25% of lead mined in Mexico. Its largest producing mine in 2000 was Santa Bárbara also in the State of Chihuahua with 18,600 t.

Production of refined lead increased by 26% to 153,000 t compared with that of 1999. Lead smelted output from Peñoles metallurgical complex Met-Mex continued to be affected by the environmental requirements imposed by the Procuraduría Federal de Protección al Ambiente (Legal Federal Office for the Protection of the Environment) during the first 2 months of the year. During this time, production of lead bullion was limited to 75% of capacity (Industrias Peñoles, S.A. de C.V., 2001, p. 22).

Through IMMSA, Grupo Mexico was the largest producer of mined zinc in Mexico, with about 45% of Mexico's total output; it was followed very closely by the second largest producer Peñoles with 44% of total zinc mined. Grupo Mexico's largest producer was Las Charcas in the State of San Luis Potosí. It produced 59,700 t of zinc in 2000. Santa Bárbara was the second largest zinc-producing mine with 42,500 t. Other important zinc-producing mines were San Martín in of the State of Zacatecas with 36,400 t, Santa Eulalia in the State of Chihuahua with 14,400 t, and Taxco in the State of Guerrero with 13,400 t.

Peñoles's most important zinc-producing mines were Bismark and Naica in the State of Chihuahua, Zimapán in the State of Hidalgo, Tizapa in the State of Guerrero, and Sabinas in the State of Zacatecas.

In May, Compañía Sabinas, S.A. de C.V. (a Peñoles subsidiary) completed the expansion of the mill capacity at the Sabinas zinc mine in the State of Zacatecas to 840,000 t/yr from 360,000 t/yr (Industrias Peñoles, S.A. de C.V., 2001, p. 17).

IMMSA's lead concentrates were refined at the company's zinc refinery in San Luis Potosí or exported. Peñoles's zinc concentrates were refined at its Met-Mex metallurgical complex.

The Minera Rey de Plata zinc mine was inaugurated in September. The mine [a joint venture of Peñoles (51%), Dowa Mining Co. (39%), and Sumitomo Corp. (10%)] was operated by Minera Rey de Plata, S.A. de C.V., and had a mill capacity of 360,000 t/yr. Production from Rey de Plata was expected to be 26,000 t/yr of zinc, about 74,700 kg/yr of silver, and 5,600 t/yr of lead (Industrias Peñoles, S.A de C.V, 2001, p. 16). The projected life of the mine was 10 years. The mine was partially financed by Peñoles; $32 million was financed by Dowa Mining and Sumitomo. Dowa Mining was going to receive Rey de Plata's entire zinc concentrate production (Metals & Minerals Latin America, 2000a, b).

In December, Peñoles completed the expansion of its Met-Mex electrolytic zinc refinery, which was increased to 220,000 t/yr from 130,000 t/yr, with an investment of $131.4 million (Industrias Peñoles, S.A. de C.V., 2001, p. 5).

The construction of the Francisco I. Madero mine in the State of Zacatecas continued; by yearend, it was 72% complete. Production from this mine was scheduled to begin in July 2001. Annual capacity was planned for 110,000 t/yr. Total investment was estimated to be $127 million (Industrias Peñoles, S.A. de C.V., 2001, p. 17).

Manganese.— Production of manganese ore decreased to 435,000 t. Production of manganese products from Cía. Minera Autlán, S.A. de C.V., decreased by 9% (Jones, 2001, p. 50.7). The company produced manganese carbonate, oxide nodules, ceramic-grade manganese oxide, and battery-grade manganous oxide. High natural gas prices during the year negatively affected the company's production, which resulted in the shutdown of the nodule plant Molango, State of Hidalgo, in December (Mining Journal, 2000a). Autlán's production of ferroalloys, however, increased because of the large increase of ferromanganese, which offset the decrease of silicomanganese.

Because of the worldwide tendency toward manganese and ferroalloys industry consolidation, which began in 1998, analysts believed that Autlán may face long-term competitiveness disadvantages. In addition, the company was trying to restructure a $60 million debt during the year (Metals & Minerals Latin America, 2001). Autlán's main customers were the Mexican steel producers and the United States, which received about 7.6% its imports for consumption of ferromanganese and less than 2% of manganese ore and concentrate in 2000.

Industrial Minerals

Cement.—Production of cement increased by 7.5% compared with that of 1999 and by almost 25% since 1996. CEMEX had a production capacity in Mexico of 27.2 Mt through ownership of 15 plants and minority participation in the 3 plants of Cementos de Chihuahua, S.A. de C.V. The company

also had 216 ready-mix plants, 72 land-distribution centers, and 5 marine terminals (Cementos Mexicanos, S.A. de C.V., December 31, 1999, CEMEX worldwide—Mexico, accessed January 11, 2001, at URL http://www.cemex.com/g/gl-mx.asp). The CEMEX share of Mexico's cement production capacity was about 65%, and the company controlled about 60% of the domestic market.

The second largest cement producer in Mexico was Cementos Apasco, S.A. de C.V. with 6 cement plants, 84 ready-mix plants, 22 land distribution centers, and 3 marine terminals (Cementos Apasco, S.A. de C.V., [2000], Infrastructure—National presence, accessed January 11, 2001, via URL http://www.apasco.com.mx/Apasco1.nsf/B4-1-0?OpenPage).

Cementos Cruz Azul, which had two plants (one in the State of Hidalgo and the other in the State of Oaxaca), was the third largest cement producer in Mexico (Moya Ruiz, 2001, p. 16).

Fluorspar.—Mexico was the world's second largest producer of fluorspar after China. Mexico's production of fluorspar increased by 14% to 635,000 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 (table 2).

Strontium (Celestite).—Mexico was the world largest producer of celestite with 157,420 t, which was a 4.4% decrease compared with that of 1999. In 2000, Mexico produced about 50% of the world's celestite (excludes China and countries of the former Soviet Union for which not enough information is available to make reliable estimates). All Mexican celestite is mined in the State of Coahuila, and most of the production is then converted to strontium carbonate in plants in Durango, Monterrey, and Reynosa.

Chemical Products Corp. of the United States imported Mexican celestite to produce strontium carbonate in its plant in Georgia; the company also owned and operated the 22,000-t/yr strontium carbonate plant in Reynosa, State of Tamaulipas (table 2; Chemicals Product Corp., December 1995, Profile of Chemicals Product Corporation, accessed October 15, 2001, at URL http://www.ceramics.com/cpc/cpc.html).

Mineral Fuels

Coal.—Production of coal increased by 7.4% to 14.3 Mt (table 1). The principal producer was Minera Carbonífera Río Escondido in the State of Coahuila.

Petroleum, Crude, and Natural Gas.— Mexico's crude petroleum reserves in 2000 totaled 41.5 billion barrels (Gbbl), of which 24.6 Gbbl was proven and 9.0 Gbbl, probable. Of the total reserves, 44.2% was in the Región Marina Noreste [Northeastern Marine Region) and 33% was from the Región Norte (Northern Region) (Petróleos Mexicanos, S.A. de C.V., 2001a, p. 13).

Production of crude petroleum increased by 3.6% to 3.012 million barrels per day compared that of 1999. About 81% of the total production was offshore; the Región Marina Noreste accounted for 59% of the total. Heavy crude accounted for 59% of total production, followed by light crude (25%) and extra-light crude (16%). The three highest producing fields, which were offshore, produced 60% of the total output—Cantarell (47%) and Ku (6.8%) in the Región Marina Noreste and Caan (6%) in the Región Marina Suroeste (Southwest Marine Region) (Petróleos Mexicanos, S.A. de C.V., 2001a, p. 17-19).

For 2001, PEMEX's exploration and production division planned to invest $6.28 billion; this was the largest investment program of the subsidiary in 19 years. Of the total, $1.77 billion would be for construction, which would include the construction of offshore platforms, pipelines, and construction of a hydrocarbon separation plant. A small percentage (2%) of the construction budget would go for storage facilities and civil infrastructure (Petróleos Mexicanos, S.A. de C.V., February 18, 2001, Presentan sus programas de inversiones los cuatro organismos subsidiarios de PEMEX ante mimbros de la CMIC [PEMEX"s four subsidiaries present their investment programs before the CMIC (Cámara Mexicana de la Industria de la Construcción)], Boletín 26/2001, accessed October 31, 2001, at URL http://www.pemex.com.bol/262001.html).

Production of natural gas decreased by 2.3% to 48.3 billion cubic meters. The largest producing area was the Región Sur (South Region) with 27% of the total, but the largest production from an individual field was from the Ku field with 11.6% of the total. Of the gas available in Mexico, 46% went for PEMEX's internal use. Of PEMEX's domestic sales, 48% was sold to the industrial sector, and 42% was sold to the electricity distribution sector. Less than 1% of the total was exported (Petróleos Mexicanos, S.A. de C.V., 2001a, p. 21, 24). The 2001-to-2006 PEMEX natural gas sector investment program of $5.4 billion would be geared to improvements in the areas of operations, marketing, and support. Of this total, $4.3 billion would go to construction of cryogenic modular plants, a liquefied petroleum gas terminal in the north of Mexico, two gas pipelines and a compressing station in the State of Tamaulipas, and sulfur recovery plants in six gas-processing centers (Petróleos Mexicanos, S.A. de C.V., February 18, 2001, Presentan sus programas de inversiones los cuatro organismos subsidiarios de PEMEX ante miembros de la CMIC [PEMEX"s four subsidiaries present their investment programs before the CMIC (Cámara Mexicana de la Industria de la Construcción)], Boletín 26/2001, accessed October 31, 2001, at URL http://pemex.com/bol262001.html).

Refinery Products.—In 2000, Mexico had six operating refineries, the largest of which was Salina Cruz; production was pretty evenly distributed among them. Production of refinery products increased by less than 1% compared with that of 1999. PEMEX announced a 2001-to-2010 investment program of $18.9 billion that would address the increasing demand for refinery products in the country, improve gasoline quality, increase operation efficiency, keep up with necessary maintenance of the sector, and improve environmental performance and security. About $2.7 billion would be invested in the reconfiguration of the Manatitlán and the Salina Cruz refineries, $2.3 billion for increasing refinery capacity by 150,000 barrels per day, and $2.27 billion to reduce sulfur in gasoline (Petróleos Mexicanos, S.A. de C.V., February 18, 2001, Presentan sus programas de inversiones los cuatro organismos subsidiarios de PEMEX ante mimbros de la CMIC [PEMEX"s four subsidiaries present their investment programs before the CMIC (Cámara Mexicana de la Industria de la Construcción)], Boletín 26/2001, accessed October 31, 2001, at URL http://www.pemex.com/bol262001.html).

Infrastructure

Mexico had 26,700 kilometers (km) of railroads and 330,000 km of roads. As part of the Toll Highway Program that began in 1989, more than 10,000 km of new highways has been constructed. The country had 155,400 km of rural roads and 50,400 km of gravel roads. In addition, private companies were constructing 1,600 km of roadways and several bridges across the U.S. border with Mexico.

Although the Government was financing the expansion of 2,100 km of highways to four lanes, it allowed the private sector to participate in such projects. The concession holder was allowed to charge tolls on projects developed until construction costs had been recovered and a reasonable profit made at which time ownership of the highway would revert to the Government.

To streamline transportation of freight within Mexico, the Government modified the regulations that governed the trucking industry in 1990. After the elimination of route control by private companies, Mexican carriers could move freight anywhere in the country. In addition, under the North American Free Trade Agreement, U.S. and Canadian trucking lines would be able to avoid transshipment delays at the border by transporting freight directly across national boundaries to destinations in the States of Chihuahua, Coahuila, Nuevo León, and Sonora. Mexican carriers had reciprocal rights to operate in Arizona, California, New Mexico, and Texas.

The country had 108 maritime ports and 2,900 km of navigable rivers and coastal canals. Of the 64 ships in the merchant marine, at least 44 were available for the transportation of mineral products. Within Mexico, most ore and metallurgical products were transported by truck.

During the 1980s, railways declined in importance as the volume of freight and passenger transport dropped by more than 25% owing to increasingly poor and unreliable service. In 1998, the load transported by railroad increased by 50%. Railroads were used mainly for bulk items, such as coal, coke, and iron ore. Grupo México, Luismín, and Peñoles were involved in railroad operations. This became possible in 1995 when the Congress approved the necessary Constitutional amendment to allow the private sector to participate in the operation of Mexico's railroad system by means of 50-year concessions. The Government, however, continued to operate the railroad across the Isthmus of Tehuantepec.

Hydrocarbon output continued to dominate Mexico's energy sector. Crude oil and natural gas generally represented about 90% of all energy produced. The remaining 10% of primary energy production typically was from wood and sugar cane (4.3%), hydroelectric sources (3%), coal (1.5%), geothermal wells (0.7%), and nuclear energy (0.5%).

Crude oil and natural gas were transported mainly through pipelines within Mexico. The six operating refineries received crude oil by pipeline.

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TABLE 1
MEXICO: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1996	1997	1998	1999	2000
METALS						
Aluminum, metal:						
Primary		61,458	66,358	61,848	62,736	65,000 e/
Secondary		84,982	123,179	217,857	362,866	350,000 e/
Antimony:						
Mine output, Sb content		--	849	338	126	39
Metal 4/		983	1,909	1,301	273	52
Arsenic 5/		2,942	2,999	2,573	2,419	2,522
Bismuth:						
Mine output, Bi content 6/		1,070	1,642	1,204	548	1,112
Metal, refined		957	990	1,030	412	1,083
Cadmium:						
Mine output, Cd content		1,455	1,327	1,739	1,311	1,297
Metal, refined		784	1,223	1,218	1,275 r/	1,268
Copper:						
Mine output, Cu content:						
By concentration or cementation		295,303	342,319	335,822	330,232	308,966
Leaching (electrowon)		45,407	48,217	48,819	50,952	55,600
Total		340,710	390,536	384,641	381,184	364,566
Metal:						
Anode and blister (primary)		280,462	348,290	378,302	352,700 r/	323,000
Refined:						
Primary		225,507	282,217	432,000	411,952 r/	396,000
Secondary		16,493	14,783 r/	15,000 e/	14,000 e/	15,000 e/
Total		242,000	297,000 r/	447,000	425,952 r/	411,000
Gold:						
Mine output, Au content	kilograms	24,477	26,001	25,426	23,755	26,375
Metal, refined	do.	22,034 r/	24,532 r/	25,298	22,050 r/	24,074
Iron and steel:						
Iron ore, mine output:						
Gross weight	thousand tons	10,182	10,467	10,557	11,475	11,325
Fe content	do.	6,109	6,280	6,334	6,885	6,795
Metal:						
Pig iron	do.	4,230	4,450	4,532	4,808 r/	4,856
Direct-reduced iron	do.	3,794	4,440	5,584	6,070	5,589
Total	do.	8,024	8,890	10,116	10,878 r/	10,445
Ferroalloys: 7/						
Ferromanganese	do.	126	132	154	71 r/	91
Silicomanganese	do.	105	117	115	114 r/	108
Total	do.	231	249	269	185 r/	199
Crude steel	do.	13,172	14,254	14,182	15,243 r/	15,659
Rolled products 8/	do.	10,341	11,309	10,789	11,319 r/	11,596
Lead:						
Mine output, Pb content		173,831	174,661	166,060	125,656	137,975
Metal:						
Smelter:						
Primary 9/		150,971	169,510	163,645	111,136	143,223
Secondary (refined) e/		10,000	10,000	10,000	10,000	10,000
Total e/		161,000	180,000	174,000	121,000	153,000
Refined:						
Primary 10/		150,395	168,164	163,206	108,978	142,856
Secondary e/		10,000	10,000	10,000	10,000	10,000
Total e/		160,000	178,000	173,000	119,000	153,000
Manganese ore: 11/						
Gross weight		485,000	534,000	510,000	459,000	435,000
Mn content		173,380	192,825	187,103	169,107	156,117
Mercury, mine output, Hg content e/		15	15	15	15	15
Molybdenum, mine output, Mo content		4,210	4,841	5,949	7,961	6,886
Silver:						
Mine output, Ag content	kilograms	2,527,875	2,679,090	2,686,021	2,466,981	2,620,495
Metallurgical products, Ag content:						
In copper bars	do.	375,325	378,557	395,251	357,017	276,438
Mixed gold and silver bars	do.	240,677	243,188	237,868	259,715	249,136

See footnotes at end of table.

TABLE 1--Continued
MEXICO: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1996	1997	1998	1999	2000
METALS--Continued						
Silver--Continued:						
Metallurgical products, Ag content--Continued:						
Metal, refined, primary	kilograms	1,744,464	1,928,812	2,100,493	1,596,876	2,037,131
Tin:						
Mine output, Sn content		2	5	5	4	4
Metal, smelter, primary		1,234	1,188	1,078	1,258	1,200
Tungsten, mine output, W content		188	179	130	40	--
Zinc:						
Mine output, Zn content		377,599	379,252	395,391	362,811	392,791
Metal, refined, primary		221,736	231,444	230,325	218,913	235,073
INDUSTRIAL MINERALS						
Abrasives, natural 12/		9,922	8,271	9,274 r/	6,208 r/	7,000 e/
Barite		470,028	236,606	161,555	157,953	127,420
Cement, hydraulic		25,366	27,548	27,744	29,413	31,677
Clays:						
Bentonite		69,810	111,503	185,729	208,611	269,730
Common		4,048,458	5,078,048	5,601,071	6,964,647	9,689,936
Fuller's earth		41,800	51,430	48,016	47,522	51,685
Kaolin		253,602	235,278	339,013	489,993	532,268
Diatomite		52,494	59,463	66,812	65,146 r/	96,448
Feldspar		139,972	155,760	197,866	262,241	334,439
Fluorspar:						
Acid-grade	thousand tons	279	291	331	323 r/	335
Metallurgical-grade	do.	245	262	267	234 r/	300
Total	do.	524	553	598	557 r/	635
Graphite, natural:						
Amorphous		38,967	46,707	42,893	27,781 r/	30,330
Crystalline		1,445	1,275	568	--	--
Total		40,412	47,982	43,461	27,781 r/	30,330
Gypsum and anhydrite, crude (yeso)		6,064,682	5,869,175	7,045,197	6,953,756	7,554,493
Lime, hydrated and quicklime e/	thousand tons	6,600	6,500	6,500	6,500	6,500
Magnesium compounds:						
Magnesite		200	231	274	308	335
Magnesia 13/		86,500 r/	77,300 r/	78,000 r/	70,600 r/	76,500
Mica, all grades		4,273	975	890	971	1,658
Nitrogen, N content of ammonia		2,053,900	1,448,300	1,449,300	1,002,700	700,000
Perlite		37,417	51,758	54,840	61,596	68,702
Phosphate rock 14/		682,079	713,662	756,349	950,649	1,052,464
Salt, all types	thousand tons	8,508	7,933	8,412	8,236	8,884
Sodium compounds, n.e.s.: e/						
Carbonate (soda ash), synthetic		290,000	290,000	290,000	290,000	290,000
Sulfate, natural (bloedite) 15/		611,300 r/	598,200 r/	597,100 r/	591,300 r/	560,400
Stone, sand and gravel:						
Calcite, common		325,199	490,531	592,412	682,249	820,149
Dolomite		929,933	902,710	785,516	415,284	403,664
Limestone	thousand tons	37,641	43,706	44,372	45,449	58,267
Marble		659,192	516,805	663,945	744,377	1,034,529
Quartz, quartzite, glass sand (silica)		1,424,825	1,564,348	1,733,439	1,700,527	1,802,545
Sand	thousand cubic meters	55,344	60,104	54,703	58,912	67,491
Gravel	do.	40,179	43,636	43,947	45,050	50,176
Strontium minerals, celestite		141,142	134,707	118,230	164,682	157,420
Sulfur, elemental, byproduct:						
Of metallurgy e/	thousand tons	359	417	474	450	450
Of petroleum and natural gas	do.	921	923	913	856 r/	851
Total e/	do.	1,280	1,340	1,390	1,310	1,300
Talc		10,100	13,586	18,843	18,981	20,569
Vermiculite		350	295	--	-- r/	--
Wollastonite		28,365	20,655	41,264	44,126	30,836

See footnotes at end of table.

TABLE 1--Continued
MEXICO: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1996	1997	1998	1999	2000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Run-of-mine:						
Metallurgical	thousand tons	5,131	4,479	4,823	4,748 r/	6,372
Steam	do.	8,616	8,228	7,566	8,555	7,915
Total	do.	13,747	12,707	12,389	13,303 r/	14,287
Washed metallurgical coal	do.	1,712	1,906	1,826	1,944	2,259
Coke: 16/						
Metallurgical	do.	2,141	2,100	2,166	2,187 r/	2,185
Breeze	do.	43	37	37	41 r/	50
Total	do.	2,184	2,137	2,203	2,228 r/	2,235
Gas, natural:						
Gross	million cubic meters	43,348	46,158	49,506	49,506	48,349
Marketed (dry)	do.	27,028 r/	28,930 r/	29,105 r/	27,999 r/	28,847
Petroleum:						
Crude	thousand 42-gallon barrels	1,043,170	1,103,030	1,120,550	1,060,690	1,099,380
Condensate (natural gas liquids)	do.	152,935	141,620	156,585	159,505 r/	159,870
Total	do.	1,196,105	1,244,650	1,277,135	1,220,195 r/	1,259,250
Refinery products:						
Liquefied petroleum gas	do.	22,740	13,980	10,512	11,315	7,665
Motor gasoline	do.	152,023	141,730	150,344	161,330	170,090
Jet fuel	do.	22,520	20,440	20,842	21,170	20,075
Kerosene	do.	2,555	1,132	694	365	--
Distillate fuel oil (diesel)	do.	98,404	100,521	105,850	102,200	102,200
Lubricants	do.	2,446	2,044	1,971	2,920	2,190
Residual fuel oil	do.	152,570	155,563	162,717	153,665	154,395
Asphalt	do.	8,505	9,417	10,841	10,950	11,315
Other, refinery fuel, and losses	do.	21,388	20,877	21,241	18,615	18,980
Total	do.	483,151	465,704	485,012	482,530	486,910

e/ Estimated. r/ Revised. -- Zero.

1/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through October 31, 2001.

3/ 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.

4/ Sb content of antimonial lead and impure bars plus refined metals.

5/ Arsenic content of white and black (impure) arsenic trioxide.

6/ Refined metal plus bismuth content of impure smelter products.

7/ Reported by Cámara Nacional del Hierro y del Acero. Cía. Minera Autlán reported salable production of ferromanganese, in metric tons: 1996--69,000; 1997--68,000; 1998--87,000; 1999--79,000; and 2000, 91,000. For silicomanganese, Autlán reported, in metric tons, the following: 1996--93,000; 1997-98--105,000; 1999--114,000; and 2000, 108,000.

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 comprising 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 refractory, caustic, electromelt, and hydroxide.

14/ Includes only output used to manufacture fertilizers.

15/ Series reflects output reported by Industrias Peñoles plus an additional 40,000 tons of estimated output by other producers.

16/ Includes coke made from imported metallurgical coal.

TABLE 2
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
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.	330 smelter, 22 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. Plant in Teziutlan, Pue. Plant in Gómez Palacio, Dgo.	140. 38. 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.	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.
Do.	do.	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.	Cía. Minera las Torres, S.A. de C.V. (Industrias Peñoles, S.A. de C.V., 100%)	Guanajuato, Gto.	450.
Do.	do.	Cía. Minera El Cubo, S.A. de C.V. (private Mexican, 100%)	do.	128.

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	Sociedad Cooperativa Minero Metalúrgica Santa Fe de Guanajuato (private Mexican, 100%)	Guanajuato, Gto.	438.
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.
Do.		Hylsamex S.A. de C.V. (Grupo Industrial ALFA, 100%)	San Ramón and Aquila mines	1,500.
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.		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	thousand 42-gallon barrels per day	Petróleos Mexicanos S.A. de C.V. (PEMEX) (Government, 100%)	Comalcalco, Poza Rica, Ver., and Gulf of Campeche, Cam., Districts	3,500. 4/
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%) 5/	Naica, Chih.; Fresnillo, Zac.; Las Torres, Gto., La Ciénega, Dgo.; Tizapa, Gro.; La Encantada, Coah.; and other locations	1,760,000.
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.
Do.	do.	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.	Met-Mex Peñoles S.A. de C.V.(Industrias Peñoles, S.A. de C.V.,100%)	Torreón, Coah.	1,240,000 refinery.
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.; pelletizing plant in Col.	3,100, 1,500 pellet.

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
Steel--Continued:	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 6/	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/ Includes capacity from Cía. Fresnillo S.A. de C.V.
6/ Smelter output from mostly imported concentrates.