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The Mineral Industry of Mexico

By Alberto Alexander Perez

In 2022, Mexico's real gross domestic product (GDP) increased by 3.9% compared with 5.8% in 2021, and Mexico's average inflation for the year was about 7.9%. The country's nonfuel mineral sector accounted for 8.6% of the industrial sector's portion of the GDP and 2.5% of the total GDP. Mexico was estimated to be the world's leading producer of silver by volume, accounting for about 24% of world production. The country also ranked second among the world's leading producers of fluorspar (accounting for 12% of world production); third among the world's leading producers of sodium sulfate (5% of world production) and wollastonite (8% of world production); fourth among the world's leading producers of celestite (7% of world production) and lead (6% of world production); fifth among the world's leading producers of cadmium (5% of world production), magnesium sulfate (3% of world production) and molybdenum (6% of world production); sixth among the world's leading producers of diatomite (4% of world production), gold (4% of world production), and zinc (6% of world production); nineth among the world's leading producers of salt (3% of world production), and tenth among the world's leading producers of copper (3% of world production) (Cámara Minera de México, 2023, p. 24, 200; Servicio Geológico Mexicano, 2023, p. 8, 14–17; Bolen, 2024; Callaghan, 2024; Crangle, 2024; Flanagan, 2024; International Monetary Fund, 2024; Klochko, 2024; Hartingh, 2024; Hatfield, 2024; McRae, 2024; Polyak, 2024; Sangine, 2024; Sheaffer, 2024; Tolcin, 2024).

Minerals in the National Economy

In 2022, Mexico's total mineral output by volume increased by 6.7% compared with that in 2021. Total mineral output by value, however, decreased by 5.3%, owing mostly to a decrease in the international price of various metals, including copper, lead, tin, and iron ore. Metallic minerals accounted for 27% of the value of Mexico's total mineral output, whereas nonmetallic minerals accounted for 73%. Stone aggregates accounted for 57% of the country's total mineral production by value, iron ore accounted for 16.5%; sand, 10%; gold, 3.4%; copper, 2.9%; volcanic rock aggregate (tezontle), 2%; silver, 1.9%; zinc, 1.4%; and lime, 1.3% (Servicio Geológico Mexicano, 2023, p. 24, 61, 77).

In 2022, a total of 762 mineral projects were registered in the country and were distributed among 26 States. Of these, 391 projects were postponed, 259 were at the exploration stage, 73 were in production, 33 were under development, and 6 were mining operations at the end of their productive lives (estimated depletion dates not specified). A total of 522 of these projects were for precious metals, 100 for polymetallic minerals, 55 for copper, 14 for iron ore, and 71 for other metals and minerals. The State of Sonora hosted 205 of these projects, the State of Durango hosted 95, and the State of Chihuahua hosted 92; the rest were distributed among 23 other States in the country (Servicio Geológico Mexicano, 2023, p. 45).

In 2022, employment in the mineral- and metal-processing sector accounted for nearly 1% of Mexico's total workforce. The number of people employed in this sector in 2022 totaled 417,380, which was 2.8% more than the number of people employed in the sector in 2021. Of this total, about 39% were employed in the processing of nonmetallic minerals (not including coal or crude petroleum); 33% were employed in the metallic minerals industry; 19% were employed in the mining and processing of metallic mineral ores; 8% were employed in the mining of coal, graphite, and nonmetallic minerals (not including salt); and 1% were employed in the mining of salt (Cámara Minera de México, 2023, p. 234; Servicio Geológico Mexicano, 2023, p. 48).

A total of 166 foreign companies held shares in mining companies that operated in Mexico. Of these companies, 73.5% were headquartered in Canada; 10.2% were headquartered in the United States; 2.4% were headquartered in Australia, China, and the United Kingdom, respectively; and the rest were headquartered in Argentina, Chile, France, India, Japan, and Switzerland (Servicio Geológico Mexicano, 2023, p. 45).

Government Policies and Programs

In April 2022, the Government of Mexico approved a series of reforms to the country's mining law that changed how concessions of minerals deemed strategic to Mexico, and the authorization to have them produced, would be treated differently from all other minerals. Crude oil and gas were not included because these mineral fuels are regulated by separate legislation (Secretaría de Economía, 2022, p. 38–39).

The Mexican Congress approved legislation that forbade the issuing of concessions, exploration licenses, contracts, permits, or authorizations in relation to the extraction of lithium and declared it a good of "public interest." This classification means that lithium is a good deemed essential to the country, and as such, only the Government has the right to manage, develop, and commercialize its production. The Government stated that the country's lithium reserves were the property of the nation and created a State-owned company called LitioMx. Through this new entity, the Government would seek partnerships with companies from Canada and the United States to develop these resources (Secretaría de Economía, 2022, p. 29, 39).

Mexico's mineral sector is administered by the Secretaría de Economía [Ministry of Economy], and the energy sector is regulated by the Secretaría de Energía [Ministry of Energy] and the Comisión Nacional de Hidrocarburos [National Hydrocarbons Commission]. The Dirección General de Regulación Minera [General Department of Mining Regulation], which is part of the Ministry of Economy, is the organization in charge of revising the mining law and its regulations, as well as granting concessions and titles. The Servicio Geológico Mexicano [Mexican Geological Survey], which is also part of the Ministry of Economy, is responsible for generating and providing knowledge for territory planning and for facilitating the development of the country's natural resources. Mineral commodities are considered part of the national patrimony of Mexico under its Constitution. Article 27 of the Constitution addresses issues of ownership and the mining of natural resources. The Ley Minera [Mining Law] became effective in 1992 and was subsequently modified and expanded in 1996, in April 2005, in June 2006, and on August 11, 2014. The Mining Law provides the legal framework for the exploration, production, and processing of the country's mineral resources. Neither petroleum and its derivatives nor radioactive materials are covered by this law. Under the law, mining concessions may be granted only by the Ministry of Economy. Exploration concessions are granted for 6 years and are not renewable. Production concessions are awarded for 50 years and are renewable for an additional 50 years. The Reglamento de la Ley Minera [Mining Law Regulations], which was published in the Diario Oficial [Official Journal] of the Mexican Congress in 2012, was modified in October 2014. The Mining Law Regulations regulate the granting and the administration of mining concessions and how the rights and obligations derived therefrom are exercised and fulfilled (Cámara de Diputados del H. Congreso de la Unión, 2014b, p. 2, 4, 5; 2014c, p. 1, 3, 11, 27).

The Ley de Inversion Extranjera [Foreign Investment Law], which establishes the parameters for foreign direct investment in Mexico, was published in 1993 and amended in 2014. Under the law, foreign investors seeking to obtain exploration and mining concessions within the country must submit a statement of agreement accepting the conditions established in Article 27 to the Secretaría de Relaciones Exteriores [Ministry of Foreign Affairs]. Companies are also responsible for obtaining the corresponding mining permits from the Ministry of Economy. The law also establishes that foreign investors may hold 100% of the capital stock of any Mexican corporation or partnership, except in those few areas expressly subject to limitations under the law (Cámara de Diputados del H. Congreso de la Unión, 2014a, p. 7).

Production

In 2022, production of sulfur increased by 64% to 289,125 metric tons (t) from 176,321 t in 2021. Celestite production increased by 58% to 33,787 t from 21,351 t in 2021. Production of feldspar increased by 39% to 494,671 t from 355,600 t in 2021. Production of copper by solvent extraction increased by 17% to 155,000 t from a revised 133,000 t in 2021, and production of ammonia (N content) increased by 14% to 229,000 t compared with 201,000 t in 2021. Production of refined cadmium increased in 2022 by 12% to 1,174 t from a revised 1,051 t in 2021, and amorphous graphite production increased by 11% to 2,000 t from a revised 1,800 t in 2021. These increases were likely caused by increased demand for these mineral commodities; in 2022, no new operations related to these minerals were constructed, and existing projects were not expanded (table 1).

Decreases in production included that of refined cobalt, by 50% to an estimated 110 t from an estimated 220 t in 2021; mined cobalt, by 45% to 600 t (estimated) from 1,100 t; pig iron, by 20% to 2.19 million metric tons (Mt) from 2.747 Mt in 2021; wollastonite, by 18% to 84,713 t from 102,711 t; metallurgical grade fluorspar, by 14% to about 180,000 t from 210,000 t; refined gold, by 13% to 32,658 kilograms (kg) from 37,324 kg in 2021, and phosphate rock (P_2O_5 content), by 12% to 132,000 t from 150,000 t. These changes were most likely in response to decreased demand in the fertilizer industry. Data on mineral production are in table 1.

Structure of the Mineral Industry

Mexico's leading silver and gold producers included Fresnillo plc, Newmont Corp. of the United States, Grupo México S.A.B. de C.V. (Grupo México), Industrias Peñoles, S.A.B. de C.V. (Industrias Peñoles), and Pan American Silver Corp. of Canada. Grupo México was also one of two leading producers of copper and zinc and a leading producer of molybdenum. The other leading producer of copper and zinc was Industrias Peñoles, which, through its subsidiary Metalúrgica Met-Mex Peñoles S.A.B. de C.V., also produced bismuth as a byproduct of copper and lead mining and from the processing of imported scrap. The refinery, which was in Torreon in the State of Coahuila, had the capacity to produce 1,440 metric tons per year (t/yr) of bismuth. Exportadora de Sal, S.A. de C.V., which was a joint venture of the Government (51% interest) and Mitsubishi Corp. of Japan (49%), was the leading producer of salt in the country. Exportadora de Sal operated a solar salt complex, which was in Guerrero Negro in the State of Baja California Sur and had the capacity to produce about 9.5 million metric tons per year (Mt/yr) of salt. Minera Roca Rodando, S. de R.L. de C.V., which was a subsidiary of S&B Industrial Minerals S.A. of the United States, owned the Pilares Mine, which was the only mine in the country that produced wollastonite. The Pilares Mine is in Hermosillo, State of Sonora, and had the capacity to produce about 150,000 t/yr of wollastonite. Mexichem, S.A.B. de C.V., through its wholly owned subsidiaries Fluorita de México, S.A. de C.V. and Mexichem Fluor, S.A. de C.V., was the leading producer of fluorspar in the country. Fluorita de México operated La Sabina Mine, which is in the State of Coahuila and had the capacity to produce about 100,000 t/yr of fluorspar. Mexichem Fluor operated Las Cuevas Mine, which is in the State of San Luis Potosi. The mine had the capacity to produce about 1.2 Mt/yr of fluorspar. Table 2 is a list of major mineral industry facilities.

Mineral Trade

In 2022, metals accounted for 93.4% of the country's total mineral commodity exports, and industrial minerals and fuels accounted for 6.6%. Precious metals made up 42.5% of metallic mineral exports, and industrial metals, 50.8%. Notable decreases in mineral commodity exports compared with those in 2021 included those of gold, by 7.2%; silver, by 14%; copper, by 12%; and lead, by 7.5%. Zinc exports increased by 53% (Servicio Geológico Mexicano, 2023, p. 266).

In 2022, the country's major minerals export trade partner was the United States (which received 56.1% of Mexico's mineral exports), followed by China (33.6%), Switzerland (4.3%), and the Republic of Korea (4.2%). The remainder was divided among several countries, which received less than 1% each of Mexico's mineral exports. Mexico's major mineral import partners were the United States (which supplied 81% of Mexico's mineral imports, by value), China (6.5%), and Canada (1.5%). The remainder was divided among several countries, which supplied less than 1% each of Mexico's total mineral imports (Servicio Geológico Mexicano, 2023, p. 275, 285).

Commodity Review

Metals

Antimony.—U.S. Antimony Corp. of the United States, which operated an antimony smelter in the State of Coahuila, stated in its bimonthly report for November to December that lower-grade material processed at the smelter during 2022 resulted in higher natural gas costs and a lower antimony recovery rate. To address these issues, the company performed a series of tests and developed an improved processing flow for ores with Sb content as low as 17%. The company also decided during the year to install a gravity recovery circuit at the smelter to upgrade the ores' Sb content and improve the efficiency of furnacing. The water for the gravity circuit would be recycled during the process. The company also stated that it had earmarked about $2 million for the construction of a building to enclose the furnaces. The project was expected to create a more controlled processing environment sheltered from rain, wind, and daily temperature fluctuations and was expected to dramatically improve Sb recovery and decrease downtime and maintenance. The company expected this would allow it to synthesize finished antimony oxide in Mexico for direct shipment to clients, rather than continue to provide finished antimony ingots from the smelter. Included in the earmarked $2 million was the company's plan to build new concrete floors, new furnace molds, a refractory for dated furnace linings, associated equipment, and forklifts (United States Antimony Corp., 2023).

Copper.—In 2022, production of copper concentrate decreased less than 1% to 598,900 t from a revised 601,100 t, and solvent-extracted copper production increased by 17% to 155,000 t from a revised 133,000 t in 2021. The five primary copper-producing States in 2022 were Sonora, Zacatecas, San Luis Potosi, Chihuahua, and Baja California Sur. The State of Sonora was the largest producer of copper in the country, producing 75.6% of the national production. Zacatecas was the second-largest producer by volume with a share of 13.7% of national production, San Luis Potosi was third with a 4.3% share, Chihuahua was fourth with a 2.9% share, and Baja California Sur was fifth with a 1.8% share (table 1; Cámara Minera de México, 2023, p. 274).

In 2022, Grupo México was the largest copper producer by volume in Mexico, producing 552,883 t of copper (or 75% of all copper produced in Mexico) from its mines and operations, which were (in descending order of volume production) in Sonora, Chihuahua, San Luis Potosi, and Zacatecas. Grupo México reported that the Pilares project, located about 6 kilometers from Grupo México's La Caridad operation (both in Sonora), had begun operations in the last quarter of 2022. The project consisted of an open pit mine that had a projected capacity of 35,000 t/yr of copper in concentrates. The company stated that the ore would be transported from the pit to the primary crushers of La Caridad plant's copper concentrator by a 25-meter-wide off-road route for mining trucks. The company expected that the Pilares project would significantly improve the overall mineral ore grade of both the Pilares and La Caridad Mines by combining the estimated ore grades from the Pilares Mine (0.78% copper) with those of La Caridad Mine (0.34% copper) (Southern Copper Corp., 2019, p. 7; Grupo México S.A.B. de C.V., 2020, p. 26; Cámara Minera de México, 2023, p. 274).

The 10 largest mining operations producing copper concentrate in 2022 were the Buenavista del Cobre, La Caridad, NEMISA, Cozamin, Aranzazú, El Boleo, Campo Morado, Bolívar, Milpillas, and Capela Mines. Buenavista del Cobre Mine, majority-owned by Grupo México, is in the State of Sonora and produced 431,920 t in 2022. La Caridad Mine, majority-owned by Grupo México, is also in the State of Sonora; it produced 111,829 t in the year. NEMISA Mine, owned by Negociación Minera Santa María de la Paz S.A. de C.V., is in the State of San Luis Potosi and produced 26,016 t. Cozamin Mine, owned by Capstone Mining Corp. of Canada, is in the State of Zacatecas and produced 24,451 t. Also, in the State of Zacatecas, Aranzazú Mine, owned by Aura Minerals Inc. from the British Virgin Islands, produced 16,242 t in 2022. El Boleo Mine, owned by Korea Mine Rehabilitation and Mineral Resources Corporation of Korea, is in the State of Baja California Sur and produced 14,469 t. Campo Morado, owned by Luca Mining Corp. from Canada, is in the State of Guerrero and produced 11,158 t. Bolívar Mine, owned by Sierra Metals Inc. from Canada, is in the State of Chihuahua and produced 5,709 t. Milpillas Mine, owned by Industrias Peñoles, is in the State of Sonora and produced 5,530 t. Capela Mine, also owned by Industrias Peñoles, is in the State of Guerrero and produced 3,377 t (table 2; Cámara Minera de México, 2023, p. 275).

Gold.—In 2022, mined gold production in Mexico was estimated to be 120,000 kg. The State of Zacatecas was the country's principal gold-producing State, accounting for 28.8% of the country's total production. The amount of gold produced in the State of Sonora in 2022 accounted for 25.7% of the country's total gold production, whereas the States of Guerrero, Durango, Chihuahua, and Oaxaca accounted for most of the remaining production. The five largest gold-producing companies, in terms of volume, were Fresnillo plc, Newmont of the United States, Torex Gold Resources Inc. of Canada, First Majestic Silver Corp. of Canada, and Agnico Eagle Mines Ltd. of Canada. These companies produced 42.3% of all mined gold in Mexico in 2022 (Cámara Minera de México, 2023, p. 303).

The 10 principal gold-mining operations in 2022 were Peñasquito Mine, which produced 17,604 kg of gold; Limón-Guajes Mine, 14,752 kg; La Herradura Mine, 10,877 kg; Dolores Mine, 4,258 kg; Mulatos Mine, 4,183 kg; Los Filos Mine, 4,159 kg; Palmarejo Mine, 3,319 kg; Pinos Altos-Crestón Mascota Mine, 3,001 kg; San Dimas Mine, 2,513 kg; and Noche Buena Mine, 2,476 kg (Servicio Geológico Mexicano, 2023, p. 29).

In 2022, Industrias Peñoles, through its subsidiary Fresnillo plc, owned a 75% interest in the Cienega, the Fresnillo, the Herradura, and the Noche Buena gold mines. The company continued work at the Centauro Profundo deep pit, which is below the Centauro main pit at Herradura. The mine had indicated and inferred gold resources of about 68,428 kg and was expected to start production in 2024 (Cámara Minera de México, 2020, p. 37–39; Fresnillo plc, 2020, p. 3).

Iron and Steel.—Mexico's leading iron ore producers included ArcelorMittal Holdings AG of Luxembourg, Minera del Norte, S.A. de C.V. (a subsidiary of Altos Hornos de Mexico S.A.B. de C.V.), and Consorcio Minero Benito Juarez Peña Colorada S.A. de C.V. In 2022, Mexico ranked 14th among the world's leading producers of raw steel in 2022 and was second after Brazil among Latin America's leading producers. In 2022, raw steel production remained at about the same level as that in 2021, mostly owing to a decrease in the national construction sector and a decrease in the international demand for steel. Consumption of steel in Mexico in 2022 was 28.1 Mt, which was a decrease of about 1.3% from that in 2021 (table 2; Cámara Nacional de la Industria de Hierro y del Acero, 2020, p. 1; World Steel Association, 2020, p. 7–16; Cámara Minera de México, 2023, p. 318).

Lead and Zinc.—In 2022, most of the lead production in Mexico was obtained as a byproduct of mining other minerals, such as copper, gold, silver, and zinc. Mined lead production, which was 273,000 t, remained at about the same level as in 2021. Primary refined lead production decreased by 9% in 2022 compared with that in 2021. Six companies produced 71.4% of Mexico's lead production: Newmont, which accounted for 24.8%; Fresnillo plc, 18.4%; Industrias Peñoles, 8.5%; Gatos Silver, 7.3%; Minera Frisco, 6.3%; and Grupo México, 6.1%. Newmont owned the Peñasquito Mine, which, in addition to being the country's leading gold-producing mine, was also the country's leading lead-producing mine (Fresnillo plc, 2020, p. 52; Cámara Minera de México, 2023, p. 294).

In 2022, the production of mined zinc in Mexico increased slightly to 744,341 t from 742,926 t (revised) in 2021, and that of primary smelted zinc decreased by about 6% to 337,027 t from 357,066 t in 2021. The State of Zacatecas produced about 48.4% of the country's total mined zinc, and in particular, Newmont's Peñasquito Mine produced about 23% of the country's mined zinc output in 2022. Industrias Peñoles, Fresnillo, Grupo México, and Minera Frisco represented about 50% of the total production of zinc in the country in 2022 (table 1; Industrias Peñoles, S.A.B. de C.V., 2020, p. 35, 29, 42; Cámara Minera de México, 2023, p. 287).

Silver.—In 2022, Mexico's silver mining production was 6,195 t, an increase of 2% from 6,096 t (revised) in 2021. The State of Zacatecas was the principal producer of silver by volume in the country, producing 35.8% of the national total produced in 2022. The State of Durango was the second-largest producer of silver in the country and accounted for 21.1% of the country's total. Durango experienced an increase in its production of 53.2% in 2022 compared with that in 2021. The State of Chihuahua was the third-largest producer of silver in the country with a 20.7% share. Sonora was the fourth-largest producer with a share of 6.5%, and Oaxaca was the fifth-largest producer with a 5.3% share (table 1; Servicio Geológico Mexicano, 2023, p. 30).

In terms of output, the Peñasquito Mine was Mexico's leading silver mine. The mine produced 922,529 kg of silver in 2022. Other leading silver mines included those owned by Fresnillo plc: the San Julian Mine, which produced 443,224 kg of silver, the Fresnillo Mine, which produced 423,007 kg; and El Saucito Mine, which produced 372,308 kg (Servicio Geológico Mexicano, 2023, p. 31).

Of the top four silver-producing mines in the country, the Fresnillo, El Saucito, and the Peñasquito Mines are all in the State of Zacatecas, whereas the San Julian Mine is in the State of Chihuahua. As of December 31, 2019, measured and indicated mineral resources at El Saucito Mine were reported to be 14.61 Mt at average grades of 334 grams per ton (g/t) silver, 1.93 g/t gold, 3.07% zinc, and 1.57% lead, and the inferred mineral resources were reported to be 26.49 Mt at average grades of 255 g/t silver, 1.05 g/t gold, 1.68% zinc, and 0.95% lead. Proven and probable reserves were reported to be 12.98 Mt at average grades of 313 g/t silver, 1.75 g/t gold, 2.93% zinc, and 1.49% lead. The Fresnillo underground mine, which was one of the world's oldest polymetallic mines, began operating in 1554. In 2019, the measured and indicated mineral resources at Fresnillo were estimated to be 33.3 Mt at average grades of 397 g/t silver, 0.85 g/t gold, 3.34% zinc, and 1.67 % lead, and the inferred mineral resources were reported as 31.38 Mt at average grades of 319 g/t silver, 0.70 g/t gold, 2.45% zinc, and 1.24 % lead. Proven and probable reserves were reported as 21.17 Mt at average grades of 296 g/t silver, 0.77 g/t gold, 3.53% zinc, and 1.75% lead (Fresnillo plc, 2020, p. 1, 3, 15, 20, 50, 52, 225, 229, 238, 240; Cámara Minera de México, 2020, p. 41–43; Servicio Geológico Mexicano, 2023, p. 31).

Industrial Minerals

Celestite.—In 2022, celestite production in Mexico increased by 58% to 33,787 t from 21,351 t in 2021. Minas de Celestita S.A., the largest producer of celestite in the country, increased production to meet increased international demand and to capitalize on the commodity's high market value. Greater celestite production led to an increase in celestite exports, principally to China, which incentivized further increases in production. Although Mexico was the fourth-ranked producer of celestite in the world, the value of celestite production represented less than 1% of the total value of production of the mineral industry in Mexico. All celestite was produced in the State of Coahuila (table 1; Cámara Minera de México, 2023, p. 326, 331; Servicio Geológico Mexicano, 2023, p. 171).

Feldspar.—In 2022, the production of feldspar in Mexico increased by 39% compared with that in 2021. The increase was due to an increase in the demand for ceramic flooring, bathroom furniture, and glass containers, the manufacture of which requires feldspar. In 2022, feldspar was produced in the States of Jalisco, Puebla, San Luis Potosi, and Tlaxcala. The company Grupo Materias Primas S.A., owned by Covia Corp., is the main producer of feldspar in Mexico. Although Mexico was the 14th-ranked producer of feldspar in the world, its total value of production was much less than 1% of the total value of all mineral production in the country (Cámara Minera de México, 2023, p. 200, 334; Servicio Geológico Mexicano, 2023, p. 76, 175).

Mineral Fuels

Crude Petroleum and Natural Gas.—According to Pemex, as of January 1, 2020, the latest year for which data were available, proved crude petroleum reserves were estimated to be about 5.6 billion barrels (Gbbl), of which 4.2 Gbbl were located offshore and 1.4 Gbbl were located onshore. Proved natural gas reserves were estimated to be about 244 billion cubic meters (reported as 8,630 billion cubic feet). About 60% of the proved natural gas reserves were onshore and about 40% were offshore (Petróleos Mexicanos S.A. de C.V., 2020, p. 40).

In 2022, Mexico produced 672.7 million barrels (Mbbl) of crude petroleum compared with 632.9 Mbbl in 2021. Pemex, the State-owned petroleum company, divides Mexico into three regions in terms of operations: Marine, North, and South. In 2020, the latest year for which data were available, the Marine region accounted for 78% of total crude petroleum production; the South region, 17%; and the North region, 5%. Pemex also reported that the total decrease in crude petroleum production was mainly attributed to the decrease in production of heavy crude petroleum from the Cantarell oilfield and the production of extra light crude petroleum from the Pijije, the Sen, and the Terra oilfields, and production of light crude petroleum from the Cantarell, the Bellota-Jujo, and the Litoral de Tabasco oilfields (table 1; Petróleos Mexicanos S.A. de C.V., 2018a–d; 2020, p. 42, 122).

Outlook

Mexico's economic growth slowed down by the end of 2022. The production of metals, precious metals in particular, will likely continue to generate the largest amount of Government revenues for Mexico. However, the mining reforms that are likely to be introduced in 2023 will present a challenge for foreign investors because the Government plans to establish greater control over the development of the country's mineral industry. Canada, as the most important commercial partner of Mexico in the mining industry, will likely continue to play an important role in the development of mining projects in the country, in particular in the precious metals sector; most foreign-owned precious-metal-producing mines are owned by Canada-based entities. Copper, gold, lead, silver, and zinc are likely to be Mexico's leading mineral exports in the near future, and aluminum, coal, and iron ore are likely to continue to be the leading mineral imports into the country.

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TABLE 1

MEXICO: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons, gross weight, unless otherwise specified)

Commodity[2, 3]		2018	2019	2020	2021	2022
METALS						
Antimony, mine, Sb content[e]		800	800	700	700	700
Cadmium, refinery, primary		1,307 r	952 r	978	1,051 r	1,174
Cobalt:						
Mine, Co content[e]		1,400	1,100	1,000	1,100	600
Refinery, metal		226	215	190 e	220 e	110 e
Copper:						
Mine, concentrates, Cu content		517,300	526,100	566,100	601,100 r	598,900
Solvent extraction		179,300	187,600	166,800	133,000 r	155,000
Total		696,600	713,700	732,900	734,100	753,900
Smelter:						
Primary		286,200	277,700	283,600	287,400 r	285,500
Secondary[e]		5,000	5,000	5,000	5,000	5,000
Refinery:						
Primary		289,300	294,300	320,100	334,800 r	326,100
Secondary[e]		5,000	5,000	5,000	5,000	5,000
Ferroalloys:						
Ferromanganese		95,468	73,000	58,000 r	72,000	73,000
Silicomanganese		152,000	154,000	148,000	171,000	176,000
Gold:						
Mine, Au content	kilograms	117,323	111,404	101,631	120,000 e	120,000 e
Refinery	do.	35,000 e	35,000 e	31,100 e	37,324	32,658
Iron ore, mine:						
Gross weight	thousand metric tons	22,300	11,300	9,300	10,800	10,800
Fe content	do.	14,021	7,141	5,859	6,807	6,800
Iron and steel:						
Direct-reduced iron	do.	5,972	5,975	5,170	5,792	5,840
Pig iron	do.	4,428	3,845 r	2,436	2,747	2,190
Steel:						
Raw steel	do.	20,204	18,387 r	16,803	18,473	18,386
Products, rolled	do.	18,872	18,131	18,100 e	18,100 e	18,100 e
Lead:						
Mine, Pb content		240,304	259,457	260,390	272,231	273,000
Refinery:						
Primary		104,100 e	119,000	112,000 e	120,000	109,000
Secondary		330,000 e	328,000	300,000 e	300,000	310,000
Manganese, mine:						
Gross weight		560,000 e	576,440	575,280	580,421 r	581,903
Mn content		209,023	219,046	218,606	220,560 r	221,123
Mercury, Hg content		230	50	70	20 r	--
Molybdenum, mine, Mo content		15,149	16,890	18,562	16,319	15,496
Silver:						
Mine, Ag content	kilograms	6,049,626 r	5,841,233 r	5,604,847 r	6,096,281 r	6,195,813
Refinery, primary, metallurgical products	do.	2,200,000 e	2,200,000 e	2,488,000	2,581,589	2,550,485
Zinc:						
Mine, Zn content		690,895	676,677	688,461	742,926 r	744,341
Smelter, primary		336,300	388,511	363,343	357,066	337,027
INDUSTRIAL MINERALS						
Barite		366,234	378,295	372,262	320,642	315,736
Celestite		35,489	39,215	38,304	21,351	33,787
Cement, hydraulic	thousand metric tons	48,328	45,163	47,833	51,559	49,800 e

See footnotes at end of table.

TABLE 1—Continued

MEXICO: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons, gross weight, unless otherwise specified)

Commodity[2, 3]		2018	2019	2020	2021	2022
INDUSTRIAL MINERALS—Continued						
Clay:						
Bentonite		264,800	24,321	79,219	79,000	79,000 e
Common clay		8,042,884	7,388,578 r	7,681,189	7,680,000 e	7,680,000 e
Fullers earth[e]		110,000	110,000	110,000	110,000	120,000
Kaolin		143,156	122,431	236,033	240,000 e	240,000 e
Diatomite[e]		96,000	96,000	96,000	96,000	96,000
Feldspar, mine		209,770	304,084	318,120	355,600	494,671
Fluorspar:[e]						
Acid grade	thousand metric tons	800	940	680	790	820
Metallurgical grade[e]	do.	380	290	230	210	180
Graphite, amorphous, natural[4]		4,130	2,300 e	2,033	1,800 r	2,000
Gypsum, including anhydrite[e]		5,400,000	5,400,000	5,400,000	5,400,000	5,400,000
Magnesite[e]		100,000	1,000	-- r	-- r	--
Mica, all grades[e]		150	150	150	150	150
Nitrogen, ammonia, N content		124,000	--	112,000	201,000	229,000
Perlite		26,400	24,497	24,000 e	24,000 e	24,000 e
Phosphate rock:						
Gross weight	thousand metric tons	742	558	577	488	442
P_2O_5 content[e]	do.	210	160	170	150	132
Salt, all types[e]	do.	9,500	9,500 r	9,500 r	8,700 r	8,700
Stone, sand and gravel, construction:						
Sand and gravel:						
Gravel	do.	119,337	116,272 r	120,000 e	120,000 e	120,000 e
Sand	do.	212,733	182,770 r	213,000 e	213,000 e	213,000 e
Stone, crushed:						
Calcite, common		2,808,875	2,636,941	3,547,290	3,548,000 e	3,550,000 e
Dolomite		7,554,796	6,346,295 r	9,165,515	9,166,000 e	9,170,000 e
Limestone	thousand metric tons	355,592	233,526 r	248,248	245,248	245,300 e
Marble		1,964,041	1,557,159 r	468,501	469,000 e	469,000 e
Quartz and quartzite		2,511,246	2,671,422	2,514,378	2,500,000 e	2,700,000 e
Sulfur, S content		442,657	364,967	264,078	176,321	289,125
Talc		8,448	7,202	29,122	29,000 e	30,000 e
Vermiculite		244	148	104	100 e	100 e
Wollastonite		145,814	159,498 r	131,518	102,711	84,713
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous and subbituminous	thousand metric tons	6,773	5,288	4,195	4,407	4,407 e
Metallurgical	do.	3,897	3,275	3,897 r	4,165 r	4,165 e
Coke, breeze and metalurgical	do.	1,180	991	697	777	777 e
Natural gas, marketable	million cubic meters	31,570	28,702	28,578	24,000	24,000 e
Petroleum, crude	thousand 42-gallon barrels	675,980	612,470 r	605,900	632,910	672,695

[e]Estimated. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through January 19, 2024. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]In addition to the commodities listed, secondary aluminum, bismuth, additional types of crude construction materials, and petroleum refinery products may have been produced, but available information was inadequate to make reliable estimates of output.

[3]Sources: The Instituto Nacional de Estadistica y Geografia and the Servicio Geologico Mexicano, Secretaria de Economia.

[4]Figures based on U.S. import data from the U.S. Census Bureau.

TABLE 2
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Antimony		United States Antimony Corp., 100% (USAC)	San Jose (Wadley) Mines, S.L.P. Smelter in Madero, Coah.	365.
Barite		Baramin S.A. de C.V. (private Mexican, 100%)	Galeana and La Huiche Mines, Galeana N.L.	NA.
Do.		Barita de Santa Rosa, S.A. de C.V. (private Mexican, 100%)	Muzquiz, Coah.	256.
Do.		Barita de Sonora, S.A. (Grupo Acerero del Norte, S.A. de C.V., 100%)	Mazatan, Son.	219.
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, N.L.	55.
Bismuth	metric tons	Metalúrgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Refinery, Torreon, Coah.	1,440.
Celestite		Minas de Celestita, S.A. de C.V.	Octubre Mine, Coah.	NA.
Cement		CEMEX México (Cementos Mexicanos, S.A.B. de C.V., CEMEX 100%)	Ensenada, B.C.N.; Torreon, Coah.; Barrientos, D.F.; Arotonilco and Huichapan, Hgo.; Guadalajara and Zapotilic, Jal.; Hidalgo and Monterrey, N.L.; Tepeaca, Pue.; Tamuin and Valles, S.L.P.; Hermosillo and Yaqui, Son.; and Merida,Yuc.	29,500.
Do.		Holcim Mexico S.A. de C.V. (Holcim Group, 100%)	Acapulco, Gro.; Apaxco, Mex.; Hermosillo, Son.; Macuspana, Tab.; Orizaba, Ver.; Ramos Arizpe, Coah.; and Tecoman, Col.	12,200.
Do.		Corporación Moctezuma, S.A.B. de C.V. (Buzzi Unicem SpA, 50%, Cementos Molins S.A., 50%)	Apazapan, Ver.; Cerritos, S.L.P.; and Tepetzingo, Mor.	7,800.
Do.		Cooperativa La Cruz Azul, S.C.L. (private Mexican, 100%)	Cruz Azul, Hgo.; Lagunas, Oax.; Palmar De Bravo, Pue.; and Tepezala Ags	9,000.
Do.		Grupo Cementos de Chihuahua, S.A.B. de C.V.	Chihuahua, Cuidad Juarez, and Samalayuca, Chih.	2,500.
Do.		Cementos Fortaleza S.A. de C.V. (Elementia, S.A. de C.V., 100%)	Planta Progreso, El Palmar, Tula, and Vito, Hgo.	3,500.
Coal		Minera Carbonífera Río Escondido, S.A. [Altos Hornos de México, S.A.B. de C.V. (AHMSA), 100%]	Mina I, Mina II, and Tajo I at Nava and Piedras Negras, Coah.	7,000.
Do.		Altos Hornos de México, S.A.B. de C.V. (AHMSA), (Grupo Acerero del Norte, S.A. de C.V., 64.1%)	Plants at Coah. and coking plant at Monclova, Coah.	4,000.
Do.		Carbonífera de San Patricio, S.A. de C.V. (private Mexican, 100%)	Progreso, Coah.	1,400.
Do.		Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A.B. de C.V., 90%)	Nueva Rosita, Coah.	900.
Copper		Mexicana de Cananea, S.A. de C.V. (Grupo México, S.A.B. de C.V., 90%)	Buenavista del Cobre Mine and SX–EW[2] plant at Cananea, Son.	340 concentrates 150 SX–EW.[2]
Do.		Mexicana de Cobre, S.A. de C.V. (Grupo México, S.A.B. de C.V., 90%)	La Caridad Mine, Pilares Mine, smelter, refinery, SX–EW[2] plant at La Caridad, Son.	170 concentrates 300 smelter, 25 SX–EW,[2] 300 refinery.
Do.		Negociacion Minera Santa Maria de la Paz, S.A. de C.V.	Nemisa Mine, in Villa de la Paz, S.L.P.	25.
Do.		Minera y Metalúrgica, El Boleo S.A.P. I. de C.V. (MMB) (Korea Mine Rehabilitation and Mineral Resources Corporation of Korea (KOMIR), 90%, and Baja Mining Corp., 10%)	El Boleo Mine and SX–EW[2] plant, B.C.S.	20 concentrates 20 SX–EW.[2]
Do.		Cobre del Mayo S.A. de C.V. (Invecture Group S.A. de C.V., 100%)	Piedras Verdes Mine and SX–EW[2] plant, Son.	20 concentrates 32 SX–EW.[2]

See footnotes at end of table.

TABLE 2—Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Copper—Continued		Aura Minerals Inc. (100%)	Aranzazu Mine, in Concepcion del Oro, Zac.	12.
Do.		Sierra Metals Inc. (100%)	Bolivar Mine, in Piedras Verdes, Chih.	12.
Do.		Grupo México, S.A.B. de C.V. (100%)	Santa Bárbara Mine, in Santa Bárbara, Chih.; San Martin Mine, in San Martin, Zac.; Charcas Mine, in Charcas, S.L.P.	5. 4. 4.
Do.		Industrias Peñoles, S.A.B. de C.V. (100%)	Sabinas Mine, in Sabinas, Zac. and Capela Mine, in Teleolapan, Gro.	4. NA.
Do.		Minera Frisco S.A. de C.V. (100%)	Tayahua Mine, in Mazapil, Zac.	4.
Do.		Gold Resource Corp. (100%)	El Aguila Mine, in San Pedro Toloapa, Oax.	2.
Do.		Capstone Mining Corp. (100%)	Cozamin Mine, near the town of Zacatecas, Zac.	18.
Do.		Cia. Minera La Parreña de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Milpillas Mine and SX–EW[2] plant at Santa Cruz, Son.	45 SX–EW.[2]
Do.		Minera María S.A. de C.V. (Minera Frisco, S.A.B. de C.V., 99.6%)	Maria Mine and SX–EW[2] plant at Cananea, Son.	20 SX–EW.[2]
Do.		Red Tiger Mining Inc. (100%)	Luz de Cobre Mine and SX–EW[2] plant at San Antonio del Huerta, Son.	8 SX–EW.[2]
Do.		Luca Mining corp. (100%)	Campo Morado Mine, near the town of Arcelia, Gro.	NA.
Ferroalloys		Compañía Minera Autlán, S.A.B. de C.V. (Grupo Ferrominero, S.A. de C.V., 81.75%, and private Mexican, 18.25%)	Plant in Tamos, Ver.; Teziutlan, Pue.; and Gomez Palacio, Dgo.	140.
Do.		Compañía Minera Autlán, S.A.B. de C.V. (Grupo Ferrominero, S.A. de C.V., 81.75%, and private Mexican, 18.25%)	Plant in Teziutlan, Pue.	38.
Do.		do.	Plant in Gomez Palacio, Dgo.	35.
Fluorspar		Orbia, S.A.B. de C.V. (100%)	Las Cuevas Mine, Zaragoza, S.L.P.	1,200.
Do.		Fluorita de México, S.A. de C.V. (Mexichem, S.A.B. de C.V., 100%)	La Sabina Mine, Muzquiz, Coah.	100.
Gold, mine	kilograms	Fresnillo plc. (Industrias Peñoles, S.A.B. de C.V., 75%)	Cienega, Dgo.; Fresnillo, Zac.; La Herradura, Son.; Noche Buena, Son.; and Saucito, Zac. Mines.	23,700.
Do.	do.	Minera Peñasquito S.A. de C.V. (Newmont Corp., 100%)	Peñasquito Mine, Zac.	27,000.
Do.	do.	Torex Gold Resources Inc., 100%	El Limón-Guajes (ELG) Mine, Gro.	14,500.
Do.	do.	Minas de la Alta Pimeria , S.A. de C.V. (Newmont Corp., 100%)	El Sauzal Mine,[3] Chih.	8,500.
Do.	do.	Desarrollos Mineros San Luis, S.A. de C.V. (Equinox Gold Corp., 100%)	Los Filos Mine, Gro.	6,500.
Do.	do.	Minera Frisco S.A.B. de C.V. (100%)	El Coronel Mine, Zac.	6,000.
Do.	do.	Primero Empresa Minera, S.A. de C.V. (First Majestic Silver Corp., 100%)	San Dimas Mine, Dgo.	6,000.
Do.	do.	Agnico Eagle Mines Ltd., 100%	Pinos Altos Mine, Chih.; and La India Mine, Son.	6,000.
Do.	do.	Alamos Gold Inc., 100%	Mulatos Mine, Son.	5,000.
Do.	do.	Timmins Gold Corp., 100%	San Francisco Mine, Son.	3,500.
Do.	do.	Minera Mexicana La Ciénega, S.A. de C.V. (Fresnillo plc., 100%)	La Cienega Mine, Dgo.	3,400.
Do.	do.	Ocampo Mining, S.A. de C.V. (Minera Frisco S.A.B. de C.V., 100%)	Ocampo Mine, Chih.	3,300.
Do.	do.	Bear Creek Mining Inc., (100%)	Las Mercedes Mine, Son.	3,200.
Do.	do.	GoGold Resources Inc., 100%	Santa Gertrudis Mine, Son.	1,600.
Gold, refined	do.	Metalúrgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Torreon, Coah.	53,900.
Graphite		Grafitos Mexicanos, S.A. de C.V., 100%	Lourdes, Topiyeca, and San Juan Mines, Son.	60.

See footnotes at end of table.

TABLE 2—Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Gypsum		Cía. Occidental Mexicana, S.A. de C.V. (private Mexican, 100%)	Santa Rosalia on San Marcos Island, B.C.S.	2,500.
Iron ore		Altos Hornos de Mexico, S.A.B. de C.V. (AHMSA) (Grupo Acerero del Norte, S.A. de C.V., 64.1%)	La Perla Mine, Chih.; Hercules Mine, Coah.; and Cerro de Mercado Mine, Dgo.	5,000.
Do.		Consorcio Minero Benito Juarez Peña Colorada S.A. de C.V. (ArcelorMittal Holdings AG, 50%, and Ternium S.A., 50%)	Peña Colorada Mine, Col.	4,500.
Do.		ArcelorMittal Mexico, S.A. de C.V. (ArcelorMittal Holdings AG, 100%)	El Volcan Mine, Son.	3,600.
Do.		ArcelorMittal Las Truchas, S.A. de C.V. (ArcelorMittal Holdings AG, 100%)	Las Truchas Mine, Mich.	2,600.
Lead		Industrias Peñoles, S.A.B. de C.V. (private Mexican, 100%)	Mines at Bismark, Chih.; Francisco I. Madero, Naica, Chih.; and Sabinas, Dgo.	51.
Do.		Fresnillo plc. (Industrias Peñoles, S.A.B. de C.V., 75%)	Mines at Fresnillo, Zac., La Cienega, Dgo.; and Saucito, Zac.	43.
Do.		Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A.B. de C.V., 90%)	Charcas, S.L.P.; Santa Barbara and Santa Eulalia, Chih.; and San Martin, Zac. mines	35.
Do.		Minera San Francisco del Oro, S.A. de C.V. (Minera Frisco, S.A.B. de C.V., 99.6%)	San Francisco del Oro Mine, Chih.	13.
Do.		Minera Tayahua, S.A. de C.V. (Minera Frisco, S.A.B. de C.V., 89.9%)	Tayahua Mine, Zac.	10.
Do.		Minera Tizapa S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 51%; Dowa Mining Co., 39%; Sumitomo Corp., 10%)	Tizapa Mine, Mex.	10.
Do.		Metalúrgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Torreon, Coah.	180 refined lead.
Manganese		Cía. Minera Autlán, S.A.B. de C.V. (Grupo Ferrominero, S.A. de C.V., 81.75%, and private Mexican, 18.25%)	Molango, Naopa, and Nonoalco Mines, Hgo.	600 ore and concentrate.
Molybdenum		Mexicana de Cobre, S.A. de C.V. (Grupo México, S.A.B. de C.V., 90%)	La Caridad Mine and molybdenum plant, Son.	11.
Do.		Mexicana de Cananea, S.A. de C.V. (Grupo México, S.A.B. de C.V., 90%)	Buena Vista del Cobre Mine and molybdenum plant, at Cananea, Son.	2.
Petroleum, crude	thousand 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.
Petroleum refinery products	do.	do.	Cadereyta, N.L.; Madero, Tamps.; Minatitlan, Ver.; Salamanca, Gto.; Salina Cruz, Oax.; and Tula de Allende, Hgo.	1,700.
Phosphate rock		Pemex Fertilizantes (Petróleos Mexicanos, S.A. de C.V., 100%)	San Juan de la Costa Mine, B.C.S.	NA.
Salt		Exportadora de Sal, S.A. de C.V. (Government, 51%, and Mitsubishi Corp., 49%)	Solar salt complex at Guerrero Negro, B.C.S.	9,500.
Silver, mine	kilograms	Fresnillo plc. (Industrias Peñoles S.A.B de C.V., 75%)	Fresnillo Mine, Zac.	1,100,000.
Do.	do.	Minera Peñasquito S.A. de C.V. (Newmont Corp., 100%)	Peñasquito Mine, Zacatecas; San Julian, Chih.	1,000,000.
Do.	do.	Fresnillo plc. (Industrias Peñoles S.A.B de C.V., 75%)	Saucito Mine, Zac.	567,000.
Do.	do.	Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A.B. de C.V., 90%)	Charcas, S.L.P.; San Martin Mine, Zac.; Santa Barbara, Chih; Santa Eulalia, Chih.; and Taxco, Gro. mines	336,000.
Do.	do.	Pan American Silver Corp., 100%	La Colorada Mine, Zac.; Alamo Dorado Mine, Sonora, and Dolores Mine, Chih.	283,000.
Do.	do.	Coeur Mexicana S.A. de C.V. (Coeur Mining, Inc., 100%)	Palmarejo Mine, Chih.	220,000.
Do.	do.	Primero Empresa Minera, S.A. de C.V. (Primero Mining Corp., 100%)	San Dimas Mine, Dgo.	250,000.

See footnotes at end of table.

TABLE 2—Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Silver, mine—Continued	kilograms	Minera Tizapa S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 51%; Dowa Mining Co., 39%; Sumitomo Corp., 10%)	Tizapa Mine, Mex.	220,000.
Do.	do.	Co. Minera Sabinas, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Sabinas Mine, Zac.	220,000.
Do.	do.	Fortuna Silver Mines Inc., 100%	San Jose Mine, Oax.	210,000.
Do.	do.	Minera Mexicana La Ciénega, S.A. de C.V. (Fresnillo plc., 100%)	La Cienega Mine, Dgo.	114,000.
Do.	do.	GoGold Resources Inc., 100%	Parral tailings project, Chih.	34,000.
Do.	do.	Golden Minerals Co., 100%	Velardeña Mine,[4] Dgo.	16,000.
Do.	do.	Argonaut Gold Inc., 100%	La Colorada Mine, Son.	10,000.
Silver, refined	do.	Metalúrgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Torreon, Coah.	3,350,000.
Sodium sulfate		Industrias Magnelec, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Química del Rey plant, Laguna del Rey, Coah.	780.
Steel		ArcelorMittal Lazaro Cardenas S.A de C.V. (ArcelorMittal Holdings AG, 100%)	Facilities at Lazaro Cardenas, Mich.	5,500 steel, 4,000 pellet.
Do.		Altos Hornos de Mexico, S.A.B. de C.V. (AHMSA) (Grupo Acerero del Norte, S.A. de C.V., 64.1%)	Steelworks at Monclova, Coah.	3,320 steel, 3,800 pellet.
Do.		Hylsa S.A. de C.V. (Ternium S.A., 88.72%)	Steelworks and direct-reduction units[5] at Monterrey, N.L., and Puebla, Pue.; pelletizing plant in Col. and El Encino, Jal.	3,100 steel, 1,500 pellet.
Do.		DEACERO, S.A. de C.V. (private Mexican, 100%)	Steelworks at Saltillo, Coah., and Celaya, Gto.	1,450.
Do.		Tubos de Acero de México, S.A. (Teranis S.A. 100%)	Veracruz, Ver.	1,000.
Sulfur		Petróleos Mexicanos, S.A. de C.V. (Pemex) (Government, 100%)	Nationwide petroleum operations	890.
Wollastonite		Minera Roca Rodando S. de R.L. de C.V. (S&B Industrial Minerals S.A., 100%)	Pilares Mine, Hermosillo, Son.	150.
Zinc		Industrias Peñoles, S.A.B. de C.V. (private Mexican, 100%)	Mines at Bismark, Chih.; Francisco I. Madero, Naica, Chih.; Sabinas, Dgo.; and Velardeña, Dgo.	210.
Do.		Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A.B. de C.V., 90%)	Charcas, S.L.P.; Santa Barbara and Santa Eulalia, Chih.; and San Martin, Zac. mines	130.
Do.		Fresnillo plc. (Industrias Peñoles, S.A.B. de C.V., 75%)	Mines at Fresnillo, Zac.; La Cienega, Dgo.; and Saucito, Zac.	48.
Do.		Minera Tayahua, S.A. de C.V. (Minera Frisco, S.A.B. de C.V., 89.9%)	Tayahua Mine, Zac.	40.
Do.		Minera Tizapa S.A. de C.V. (Industrias Peñoles S.A.B. de C.V., 51%; Dowa Mining Co., 39%; Sumitomo Corp., 10%)	Tizapa Mine, Mex.	38.
Do.		Minera San Francisco del Oro, S.A. de C.V. (Minera Frisco, S.A.B. de C.V., 99.6%)	San Francisco del Oro Mine, Chih.	23.
Do.		Metalúrgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%)	Refinery, Torreon, Coah.	350 refined zinc.
Do.		Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A.B. de C.V., 90%)	Zinc refinery at S.L.P.	105 refined zinc.

[e]Estimated. Do., do. Ditto. NA Not available.

[1]State abbreviations used in this table include the following: Baja California Norte (B.C.N.), Baja California Sur (B.C.S.), Campeche (Cam.), Chihuahua (Chih.), Coahuila (Coah.), Colima (Col.), Distrito Federal (D.F.), Durango (Dgo.), Guanajuato (Gto.), Guerrero (Gro.), Hidalgo (Hgo.), Jalisco (Jal.), Mexico (Mex.), Michoacan (Mich.), Morelos (Mor.), Nuevo Leon (N.L.), Oaxaca (Oax.), Puebla (Pue.), San Luis Potosi (S.L.P.), Sinaloa (Sin.), Sonora (Son.), Tabasco (Tab.), Tamaulipas (Tamps.), Veracruz (Ver.), Yucatan (Yuc.), and Zacatecas (Zac.).

[2]Solvent extraction-electrowinning.

[3]Closed.

[4]On care-and-maintenance status.

[5]Annual production capacity for direct reduced iron units was not available in 2022.

TABLE 3
MEXICO: RESERVES OF MAJOR MINERALS IN 2022

(Thousand metric tons unless otherwise specified)

Commodity[1]		Reserves
Copper		53,000
Gold	metric tons	1,400
Lead		5,600
Molybdenum		130
Phosphate rock (P_2O_5 content)		30,000
Silver	metric tons	37,000
Zinc		14,000

[1]In addition to the commodities listed, Mexico may hold significant reserves of other commodities, but available information was inadequate to make reliable estimates of reserves.