



2017–2018 Minerals Yearbook

MEXICO [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF MEXICO

By Alberto Alexander Perez

Note: In this chapter, information for 2017 is followed by information for 2018.

Mexico was the world's leading producer of silver, by volume, accounting for 23% of the world's production. The country was second in world production of strontium (27% of world production) and fluorspar (18%); third in the production of wollastonite (11%); fourth in the production of bismuth (3%); fifth in the production of molybdenum (5%), lead (5%), and zinc (5%); and seventh in the production of cadmium (5%) (Secretaría de Economía, 2018, p. 8; Bennett, 2019; Curry, 2019; Klochko, 2019; McRae, 2019; Polyak, 2019; Singerling, 2019; Thomas, 2019; Tolcin, 2019).

Mexico was the 11th-ranked crude petroleum producer, by volume, in the world and the 4th-ranked producer in the Americas, after the United States, Canada, and Brazil. In 2017, the country continued to be a significant crude petroleum exporter, exporting the majority of its crude petroleum to the United States (U.S. Energy Information Administration, 2020, p. 1–4).

Minerals in the National Economy

In 2017, Mexico's real gross domestic product (GDP) increased by 2.0% and the average annual inflation was about 6%. The country's mineral sector accounted for 5.4% of the total GDP. In 2017, as reported by Cámara Minera de México, the mining and processing of "metallic minerals" accounted for 2.5% of the country's total GDP and 8.3% of the industrial sector GDP (Cámara Minera de México, 2018, p. 19–20). The production and processing value of the metallic minerals sector increased by 1.8% in 2017 compared with that of 2016. Gold accounted for a 32% share of the total value of production of the mineral and metal processing sector in 2017, followed by copper (22.3%), silver (17.3%), zinc (9.1%), coke (3%), iron pellets (3%), lead (3%), molybdenum (1.9%), coal (1.7%), and salt (1%) (Cámara Minera de México, 2018, p. 19–20).

In 2016 (the latest year for which data were available), a total of 25,652 mining concessions were registered for an area of 220,650 square kilometers (km²), or about 11.2% of the country's territory. The State of Sonora had the most concessions, at 4,454; the State of Durango had 3,603 concessions, the State of Chihuahua had 3,369, and the States of Zacatecas and Coahuila had 2,311 and 1,977, respectively (Secretaría de Economía, 2018, p. 39).

In terms of value, the State of Sonora was the principal producer of nonfuel minerals in 2017, accounting for about 30.7% of the country's total production. The principal minerals that Sonora produced were, in order of the value of production, gold, silver, copper, molybdenum, coal, iron ore, graphite, barite, and silica sand. The State of Zacatecas was the second-ranked producer of nonfuel minerals by value, accounting for about 17.4% of the country's total production. The principal minerals that Zacatecas produced were, in order of the value

of production, gold, silver, copper, lead, and zinc. The State of Chihuahua was the third-ranked producer of nonfuel minerals by value, accounting for about 13.4% of the country's total production. The principal minerals that Chihuahua produced were, in order of production value, gold, silver, lead, copper, zinc, iron ore, barite, dolomite, kaolin, and gypsum. The rest of the principal 10 States that produced nonfuel minerals were, in order of production value, Durango, Coahuila, Guerrero, San Luis Potosi, Baja California Sur, Colima, and Mexico, which together accounted for about 32.2% of total value of Mexico's production (Secretaría de Economía, 2018, p. 18).

In 2016 (the latest year for which data were available), employment in the mineral and metal processing sector accounted for about 3.7% of the total workforce in the country and increased by 2.8% to 354,702 workers from 344,912 workers in 2015. According to Cámara Minera de México, of the total number of people employed in this sector, 39.3% worked in the processing of "nonmetallic minerals"; 29.6% worked in the processing of "metallic minerals"; 19.9% worked in the mining and processing of "metallic mineral ores"; 10.6% worked in the mining of coal, graphite, and nonmetallic minerals; and 0.6% worked in the mining of salt (Cámara Minera de México, 2017, p. 51). The State of Nuevo Leon accounted for 15% of the total employment in the mineral and metal processing sector, followed by the States of Coahuila (10.9%), Mexico (8.7%), Guanajuato (5.6%), Chihuahua (5.5%), and Sonora (5%) (Cámara Minera de México, 2017, p. 164; Secretaría de Economía, 2018, p. 49–51).

In 2017, investments in the mineral and metal processing sector totaled \$4.3 billion compared with \$3.8 billion in 2016, which represented an increase in investment of about 13.1%. About 11% of these investments were in mineral exploration, 21% were in expansion projects, 14% were in new projects, and the rest were investments in equipment, worker safety, environmental programs, and other mining-related areas (Servicio Geológico Mexicano, 2018, p. 20).

In 2017, a total of 290 companies were involved in 988 mining projects in Mexico. Of these companies, 188 had their headquarters in Canada; 47 were headquartered in the United States; 13, in China; 12, in Australia; 5 each, in Japan and the United Kingdom; 4, in the Republic of Korea; 3, in Spain; 2 each, in Chile, France, India, and Peru; and 5 in other countries. Of the 988 projects in Mexico, about 67% were at the exploration stage, 18% were postponed or on hold, 11% were in production, and about 5% were in the development stage. Precious metals, particularly gold and silver, were the primary targets for 560 of the projects, whereas polymetallic minerals were the targets for another 144 projects. Copper and iron ore accounted for 193 and 53 projects, respectively, and the remaining were diverse projects involving various

mineral commodities. The State of Sonora accounted for 24% of all projects involving foreign direct investment, followed by Chihuahua (13%), Durango and Sinaloa (11% each), Zacatecas (8%), and Jalisco (6%) (Servicio Geológico Mexicano, 2018, p. 528–531).

Government Policies and Programs

In 2017, there were no significant changes to Mexico's mining laws and regulations. However, in 2016, Mexico enacted the 2015 Energy Reform Law in which *Petróleos Mexicanos S.A. de C.V. (PEMEX)*, which was the state-owned petroleum company, was restructured into seven state-owned subsidiaries. These included *Pemex Exploración y Producción* [Pemex Exploration and Production], *Pemex Perforación y Servicios* [Pemex Drilling and Services], *Pemex Transformación Industrial* [Pemex Industrial Transformation], *Pemex Logística* [Pemex Logistics], *Pemex Etileno* [Pemex Ethylene], *Pemex Fertilizantes* [Pemex Fertilizers], and *Pemex Cogeneración y Servicios* [Pemex Co-Generation and Services]. This restructuring assigned each subsidiary a particular sector of PEMEX's production, such as gas, fertilizers, or petroleum exploration or production. Previously, each sector was centrally structured; the new changes allow for private investment in the new subsidiaries, although petroleum production and ownership continue to be by the Government (*Petróleos Mexicanos S.A. de C.V.*, 2017, p. 10–11).

The mineral sector is administered by the *Secretaría de Economía* [Ministry of Economy]. The *Dirección General de Regulación Minera* [General Department of Mining Regulation], which is part of the *Secretaría de Economía*, is the organization in charge of revising the mining law and its regulations as well as of granting concession licenses and mining titles. The *Servicio Geológico Mexicano* [Mexican Geological Survey], which is part of the *Secretaría de Economía*, is responsible for generating and providing information for land management 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 deals with 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, April 2005, and 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 can be granted only by the *Secretaría de Economía*. 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* [Rules of the Mining Law], which was published in the *Diario Oficial* [Official Journal] of the Mexican Congress in 2012, was modified in October 2014. The *Reglamento de la Ley Minera* regulates the granting and 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*, 2014a, p. 1–3; 2014b, p. 1, 3, 11, 27; 2014c, p. 3–5; 2016, p. 1).

Mexico's energy sector is regulated by the *Secretaría de Energía* [Ministry of Energy] and the *Comisión Nacional de Hidrocarburos* [National Hydrocarbons Commission]. In 2013, the Government enacted constitutional reforms that ended PEMEX's monopoly on hydrocarbon production and opened the industry to foreign investment. On November 15, 2016, reforms to the *Ley de Hidrocarburos* [Hydrocarbons Law] were published in the *Diario Oficial* of the Mexican Congress. Under the law, all hydrocarbon resources are still considered to be the property of the Mexican State. The law establishes that the *Secretaría de Energía*, with technical assistance from the *Comisión Nacional de Hidrocarburos*, is responsible for awarding contracts and licenses to PEMEX or any other state-owned company to conduct exploration for and extraction of hydrocarbons. The reforms enacted also allow for the issuing of new types of exploration and production contracts, which grant PEMEX the right to enter into partnerships with private companies and establishes the parties' rights and obligations with respect to production- and profit-sharing (*Cámara de Diputados del H. Congreso de la Unión*, 2016, p. 1, 4, 8; U.S. Energy Information Administration, 2017, p. 1–3).

As stipulated in the reform, PEMEX is allowed first refusal on developing the country's resources before private companies can begin bidding, which is known as "round zero." Round zero intends to reach a balance between the resources that PEMEX would develop and those that the state would manage and grant to others for development through subsequent bidding rounds. In round zero, PEMEX sends requests to the *Secretaría de Energía* for the allocation of new leases for exploration areas and leases for production areas, according to the company's operational capabilities at that time (*Secretaría de Energía*, 2014, p. 3–4; U.S. Energy Information Administration, 2017, p. 3).

The *Ley de Inversión Extranjera* [Foreign Investment Law], which establishes the parameters for foreign direct investment in the country, 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 to the *Secretaría de Relaciones Exteriores* [Ministry of Foreign Affairs] a statement of agreement accepting the conditions established in Article 27. Companies are also responsible for obtaining the corresponding mining permits from the *Secretaría de Economía*. The law also establishes that foreign investors may hold a 100% share in any Mexican corporation or partnership, except in those few areas subject to limitations under the law (*Cámara de Diputados del H. Congreso de la Unión*, 2014a, p. 7; U.S. Department of State, 2015).

Production

In 2017, bentonite production increased by an estimated 330% to 470,000 metric tons (t) from 109,176 t in 2016; barite production increased by an estimated 129% to 390,000 t from a revised 170,000 t; antimony production, by 109% to 243 t from a revised 116 t; feldspar mine production, by 91% to 233,050 t from 122,176 t; and construction sand production, by 84% to 210,286 t from 114,276 t (revised). Also, the production of wollastonite increased by 37% to 87,562 t from 63,683 t in 2016; metallurgical fluorspar, by an estimated 30% to 325,000 t from a revised 250,000 t; celestite, by an estimated 22% to

40,699 t from 33,230 t; mined molybdenum, by 18% to 13,985 t from 11,896 t; mined silver, by 13% to 6,108,722 kilograms (kg) from 5,408,521 kg; and silicomanganese, by 10% to 148,130 t from 134,251 t. Other commodities for which production increased by 10% or more were kaolin (increased by 27%), construction gravel (by 14%), and direct-reduced iron (by 13%) (table 1).

Notable decreases in production in 2017 included that of phosphate rock [and its calculated phosphorus pentoxide (P_2O_5) content], by 34% to 1,926,000 t from 2,909,000 t in 2016, and mercury, by about 14% to 225 t from 262 t (revised). Production of refined gold decreased by 20% to 37,974 kg from 47,526 kg in 2016; sulfur, by 18% to 551,218 t from 673,285 t; dolomite, by 16% to 6,059,970 t from 7,236,944 t; bituminous coal, by 10% to 7,280,000 t from 8,130,000 t; and refined primary copper, by 5% to 243,100 t from 256,200 t. Data on mineral production are in table 1.

Structure of the Mineral Industry

Mexico's leading silver and gold producers included Fresnillo plc. (Fresnillo); Goldcorp Inc. of Canada through such subsidiaries as Desarrollos Mineros San Luis S.A. de C.V.; 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. Industrias Peñoles, through its subsidiary Metalúrgica Met-Mex Peñoles S.A.B. de C.V., was the leading producer of bismuth in the country; its refinery located 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 between the Government (51% interest) and Mitsubishi Corp. of Japan (49%), was the leading producer of salt in the country. Exportadora de Sal was located in Guerrero Negro in the State of Baja California Sur and had the capacity to produce about 9.5 million metric tons (Mt) of salt. Minera Roca Rodando, S. de R.L. de C.V. (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 located in Hermosillo, State of Sonora. Fluorita de México, S.A. de C.V. and Mexichem Fluor, S.A. de C.V. (Mexichem Fluor) were wholly owned by Mexichem, S.A.B. de C.V., which was the leading producer of fluorspar in the country. Fluorita de México operated La Sabina Mine, which is located in the State of Coahuila and had the capacity to produce about 100,000 t/yr of fluorspar. Mexichem Fluor operated the Las Cuevas Mine, which is located in the State of San Luis de Potosi. The mine had the capacity to produce about 1.2 million metric tons per year of fluorspar. Table 2 is a list of major mineral industry facilities.

Mineral Trade

Mexico's mineral exports were valued at \$16.6 billion in 2017, which was an increase of 5.7% compared with the country's export value of \$15.7 billion in 2016. The country's major mineral export partners were, in descending order of export value, the United States, China, the Republic of Korea, the United Kingdom, Japan, Switzerland, Canada, Belgium, Brazil, Australia, Italy, and Germany. The total value of

Mexico's mineral imports in 2017 was about \$9.4 billion, which was an increase of 17.4% compared the export value of \$8 billion in 2016. Mexico's major import partners were, in descending order of import value, the United States, Colombia, Canada, China, Brazil, Russia, Chile, the United Arab Emirates, India, and South Africa (Secretaría de Economía, 2018, p. 62, 64; Servicio Geológico Mexicano, 2018, p. 201, 207).

Mineral and metal processing exports in 2017 increased by about 7.6% to \$15.6 billion from \$14.5 billion in 2016. The increase in exports was attributed to an increase of 16.6% in the exports of base metals, precious metals, and industrial minerals, which accounted for 92.8% of the total mineral and metal processing exports in 2017. Gold accounted for about 31.2% of these exports, followed by copper (17.6%), silver (15.4%), lead (7.6%), zinc (7.2%), and iron ore (3.4%). Aluminum accounted for 29.1% of the mineral and metal processing imports, followed by iron ore (16.1%), copper (10.6%), and coal (7.4%) (Secretaría de Economía, 2018, p. 57–60).

In 2017, PEMEX exported 428,510 thousand barrels of crude petroleum, which was a decrease of 1.7% compared with the 435,810 thousand barrels exported in 2016. In 2017, Mexico's exports to the United States were valued at about \$313 billion, which was a 6% increase from the \$294 billion (revised) exported to the United States in 2016. Mexico's imports from the United States amounted to \$244 billion, which was an increase of 6% from the \$230 billion imported from the United States in 2016. Mexico imported \$15.6 billion in petroleum products from the United States in 2017, which was an increase of 27% from the \$12.3 billion imported in 2016 (Banco de México, 2017, p. 42–44; U.S. Census Bureau, 2019a, b).

Commodity Review

Metals

Antimony.—Production of antimony by United States Antimony Corp. (USAC) increased to 243 t in 2017. The increase in production was due to the restarting of operations at the plant in the State of Zacatecas and the streamlining of processing at the rest of USAC's plants in Mexico. In November, the company reported that major cost reductions had been made at its Wadley property in San Luis Potosi; the company estimated that, by 2018, the gravity mill at Wadley would be started on lower grade ore to process direct-shipment ore received for its smelter. Also, the company reported that a powder-processing plant was being built to restart production of direct-shipment ore and mill feed from the Soyatal district mines in the State of Queretaro. The company also reported that production of antimony at the Santa Monica Mine in the State of Zacatecas would resume and that the mine would produce direct-shipment ore and mill feed (United States Antimony Corp., 2017).

Copper.—In 2017, Grupo México reported that copper production at its operations in Mexico had decreased by about 4% compared with production in 2016. The decrease in production was mostly a result of the mining of lower grade ore and because harder rock at the mines was being drilled. Grupo México reported that the Pilares project in the State of Sonora would be developed as an open pit mine with a production capacity of 35,000 t/yr of copper concentrates. The company

expected to transfer high-grade ore from this project to feed the main crushers at the La Caridad project's copper concentrator, which was located 6 kilometers from the Pilares project, and by doing so, to improve the average ore grade of the mine. The company reported that the average ore grade at La Caridad was about 0.34% Cu and that it expected the ore grade of the Pilares Mine to be 0.78% Cu. The budget for the project was \$159 million, and the company stated that operations would likely begin in 2019 (Grupo México S.A.B. de C.V., 2018, p. 2, 6).

Industrias Peñoles reported that its production of cathodic copper for use at its refinery had decreased by an estimated 17.3% in 2017. This decrease was due to the mining of lower grade ore at the Milpillas Mine, which in turn yielded concentrates with lower content of copper to be used to produce cathodic copper. This decrease was the main cause of the 20% reduction in all refined copper (including cathodic copper) production in Mexico in 2017 (Industrias Peñoles, S.A.B. de C.V., 2018, p. 13).

Gold.—In 2017, mined gold production in Mexico decreased by 1.5%. Three companies produced about 42% of Mexico's total gold output. The three companies were Fresnillo, which was the principal producer in terms of volume, followed by Canadian companies Goldcorp and Agnico Eagle Mines Ltd. In 2017, gold refinery production decreased by about 20% (Cámara Minera de México, 2018, p. 40).

The State of Sonora was the region where most gold was mined in Mexico; the State accounted for 33% of the total mined gold production in 2017. Gold production from Sonora decreased by 10.9% in 2017 compared with that of 2016, however, even though production at some individual mines increased. The mine with the most notable increase in the State was the Mulatos Mine, owned by Alamos Gold Inc. of Canada, which produced 4,976 kg of gold. The Santa Elena Mine, owned by First Majestic Corp., also of Canada, reported an increase in production to 1,530 kg (Cámara Minera de México, 2018, p. 41–42).

Goldcorp held 100% interest in the Peñasquito Mine through its subsidiary Minera Peñasquito S.A. de C.V., and in the Los Filos Mine through its subsidiary Desarrollos Mineros San Luis S.A. de C.V. In 2017, gold production from the Peñasquito Mine, which is located in the State of Zacatecas, increased by 2.4% to 14,805 kg from 14,463 kg in 2016. As of December 31, 2017, total proven and probable mineral reserve estimates at the Peñasquito Mine were reported to be 515 Mt at an average grade of 32.5 grams per metric ton (g/t) silver and 0.53 g/t gold. Goldcorp announced in April that the company had completed the sale of the Los Filos Mine to Leagold Gold Corp. Inc. of Canada for \$350 million before capital adjustments. The payment consisted of \$71 million in Leagold common shares, \$250 million in cash, and a \$29 million short-term promissory note, which was paid in July (Cámara Minera de México, 2018, p. 41–42; Goldcorp Inc., 2018a, p. 26; 2018b, p. 8; Secretaría de Economía, 2018, p. 32).

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 Juárez Peña Colorada S.A. de C.V. In 2016 (the latest year for which data were available), Mexico was ranked 14th among the world's leading producers of crude steel and 2d among Latin America's leading

producers. According to the Cámara Nacional de la Industria del Hierro y del Acero, in 2017, steel production in Mexico increased by 6% compared with that of 2016. In 2017, the country had an installed capacity of 29.2 Mt of crude steel production, including pellets, and produced 19.9 Mt. The State of Coahuila was ranked first among the country's crude-steel-producing States, accounting for about 29% of the volume produced, followed by the States of Michoacan (18%), Nuevo Leon (16%), Guanajuato (11%), Veracruz (7%), and San Luis Potosí (6%) (table 2; Cámara Nacional de la Industria del Hierro y del Acero, 2016, p. 3, 6, 8–11; World Steel Association, 2018, p. 9).

Lead and Zinc.—In 2017, Grupo México reported that its Buenavista Zinc project at the Buenavista deposit in the State of Sonora would have a concentrator with the capacity to produce 80,000 t/yr of zinc and 20,000 t/yr of copper. The company reported that the basic engineering had been completed and that the main equipment was in the process of being purchased. Grupo México's budget for the project, which the company expected to be operational by 2020, was \$413 million. The company stated that once the project is operational, the output of its zinc mining division would double (Grupo México S.A.B. de C.V., 2018, p. 2).

The Peñasquito Mine, which was the largest zinc-producing mine in the country in terms of output, produced about 163,000 t of zinc in 2017. Peñasquito was also the largest lead producer in the country in terms of output and produced 60,590 t of lead in 2017. The Fresnillo and El Saucito Mines, which were owned by Fresnillo plc, were the second- and third-ranked producers of mined lead in the country, producing 20,500 t and 17,700 t, respectively, in 2017. All these mines were polymetallic mines however, and the main metals being produced were silver and zinc, not lead. According to Industrias Peñoles, which was one of the country's leading producers of lead and zinc, the Velardeña Mine accounted for about 30% of the company's zinc production, producing about 80,730 t. The Velardeña Mine, which is located in the State of Durango, was Mexico's second largest zinc mine in terms of output (Cámara Minera de México, 2018, p. 50–54, 56–58; Goldcorp Inc., 2018a, p. 28; Industrias Peñoles, S.A.B. de C.V., 2018, p. 79, 87).

Silver.—In 2017, several transactions took place regarding the ownership of projects and mines, including Santa Cruz Silver Mining Ltd. of Canada's acquisition of the Membrillo polymetallic prospect from Grupo México. The property is located in the State of San Luis Potosí and was expected to produce gold, lead, silver, and zinc. Also, Goldcorp sold its San Nicolas project in the State of Zacatecas to Teck Resources Inc. of Canada. The San Nicolas polymetallic project was expected to produce copper, gold, silver, and zinc (Cámara Minera de México, 2018, p. 37).

In 2017, Zacatecas was the principal silver-producing State in Mexico, accounting for 42% of Mexico's total silver production. The three largest silver producing mines, in terms of output, were all located in Zacatecas. The Peñasquito Mine was the leading silver-producing mine in the country, producing 669 t in 2017. The Saucito Mine, which was the second-ranked silver mine, produced 659 t of silver in 2017, and the Fresnillo Mine produced 513 t (Cámara Minera de México, 2018, p. 45–46).

In 2017, there were several companies that continued with plans to begin silver production within the next 5 years, including Endeavour Silver Inc. of Canada, which planned to develop the El Compas project in the State of Zacatecas. Although Endeavour did not report the initial production targets in 2017, it stated that it had invested \$11.3 million in the project and expected to begin production in 2018. Fresnillo was developing the Planta Piritas and the Juancipio projects, both of which are also located in the State of Zacatecas, and was expanding the La Cienega Mine, which is located in the State of Durango. Fresnillo planned to begin producing about 109 t/yr of silver at the Planta Piritas project by 2018, in which it had already invested \$155 million, and 311 t/yr at the Juancipio project by 2020, in which it had already invested \$305 million. The La Cienega Mine expansion was expected to begin production in 2019. Telson Resources Inc. of Canada was developing the Tahuehueto project in the State of Durango; the project was expected to produce 6.2 t of silver by 2018, and, as of yearend 2017, the company had invested \$32.3 million in the project. Industrias Peñoles was developing the Rey de Plata project in the State of Guerrero and had already invested \$303 million; the project was expected to produce an estimated 146 t/yr and to begin production in 2019. As of yearend, Endeavour Silver Inc. had invested \$69 million in its Terronera project in the State of Jalisco; the project was expected to produce an estimated 50 t/yr of silver and to begin production by 2019. Torex Gold Resources Inc. of Canada invested \$482 million in the Media Luna project in the State of Guerrero, from which it planned to produce about 53 t/yr of silver by 2020 (Cámara Minera de México, 2018, p. 47).

Industrial Minerals

Barite.—In 2017, barite production in Mexico increased by 129%. The increased production was due to the expansion of production at operations in the State of Nuevo Leon and, to a lesser degree, to operations in the State of Sonora. This increased production followed the growth of barite demand in international markets (Servicio Geológico Mexicano, 2018, p. 391).

Bentonite.—In 2017, production of bentonite in Mexico increased by 330% compared with that of 2016. The increase was a result of a recovery in market prices and higher demand for bentonite in the international market (Servicio Geológico Mexicano, 2018, p. 395–397).

Feldspar.—In 2017, feldspar production in Mexico increased by 91% owing to the opening of the Pihuamo Mine in the State of Jalisco and increased production at the Ahuazotepec project in the State of Puebla. The increase in production was likely owing to an increase in demand for feldspar in international markets (Servicio Geológico Mexicano, 2018, p. 431).

Phosphate Rock.—Production of phosphate rock in Mexico decreased by 34% in 2017. In 2016, PEMEX had acquired Grupo Fertinal and its subsidiary Roca Fosfórica S.A., which owned and operated the phosphate rock mine in La Paz, Baja California Sur. Because of a change in administration and labor issues, phosphate rock production decreased in 2017 (Petróleos Mexicanos S.A. de C.V., 2016; Servicio Geológico Mexicano, 2018, p. 437).

Mineral Fuels

Crude Petroleum and Natural Gas.—According to PEMEX, as of January 1, 2018, proven crude petroleum reserves were estimated to be about 8.6 billion barrels, of which 66% was offshore and 34% was onshore. Proven natural gas reserves were estimated to about 533 billion cubic meters (reported as 18,833 billion cubic feet) (Petróleos Mexicanos S.A. de C.V., 2018, p. 15, 16).

In 2017, PEMEX reported that it had produced an average of 1,948 million barrels per day (Mbb/d) of crude petroleum compared with 2,154 Mbb/d in 2016. PEMEX reported that the decrease in crude petroleum production was mainly attributable to the decrease in the production of heavy crude petroleum from the Cantarell field; the decrease in the production of extra light crude petroleum from the Pijije, the Sen, and the Terra fields; and the decrease in light crude petroleum production from the Bellota-Jujo, the Cantarell, and the Litoral de Tabasco fields (Petróleos Mexicanos S.A. de C.V., 2018, p. 22, 30, 31).

In October 2015, the Comisión Nacional de Hidrocarburos [National Hydrocarbons Commission] announced the results of its second auction phase of Round 1, which included five areas located in the shallow waters of the Gulf of Mexico in the southeastern basins. Eni International B.V. of Italy was awarded Area 1, which included the Amoca, the Mizton, and the Tecoalli fields. The fields, which covered an area of 67 km², had estimated 2P (proven + probable) reserves of 107 million barrels (Mbb) of light crude and 2.0 billion cubic meters of natural gas; hydrocarbon resources are found in Pliocene sands in water 33 meters (m) deep. The consortium between Pan American Energy LLC of Argentina and E&P Hidrocarburos y Servicios S.A. de C.V. was awarded with an Area 2 exploration license, which included the Hokchi field and covers an area of 40 km². The Hokchi field had estimated 2P reserves of 61 Mbb of light crude and 820 million cubic meters of natural gas found in Tertiary sands in water 28 m deep. Also, the consortium of Fieldwood Energy LLC of the United States and Petrobal, S.A.P.I. de C.V. was awarded Area 4 (the Ichalkil and the Pokoch fields), which covers an area of 58 km² and had estimated 2P reserves of 68 Mbb of light crude and 2.6 billion cubic meters of natural gas found in Cretaceous and Jurassic limestone in water 45 m deep (Comisión Nacional de Hidrocarburos 2015a–e).

In December 2015 and January 2016, the Comisión Nacional de Hidrocarburos awarded 25 onshore exploration fields in its third auction phase of Round 1. The awarded companies were Compañía Petrolera Perseus, S.A. de C.V. (Fortuna Nacional and Tajón fields); Consorcio Manufacturero Mexicano, S.A. de C.V. (Calibrador and Mareógrafo fields); Construcciones y Servicios Industriales Globales, S.A. de C.V. (Duna field); Diavaz Offshore, S.A.P.I. de C.V. (Barcodón and Catedral fields). Also Grupo Diarqco, S.A. de C.V. (Calicanto and Mayacaste fields); Renaissance Oil Corp. S.A. de C.V. of Canada (Malva, Mundo Nuevo and Topén fields); Sarreal, S.A. de C.V. (San Bernardo field), and Servicios de Extracción Petrolera Lifting de México, S.A. de C.V. (Cuichapa-Poniente field) were awarded exploration fields. The rest of the fields awarded were as follows: Strata Campos Maduros, S.A.P.I. de C.V. (Carretas, Peña Blanca, and Ricos fields); the consortium made up of Canamex Dutch B.V. of the Netherlands,

Perfolat de México, S.A. de C.V., and American Oil Tools S. de R.L. de C.V. (Moloacán field); the consortium made up of Geo Estratos, S.A. de C.V. and Geo Estratos Mexoil Exploración y Producción, S.A.P.I. de C.V. (La Laja, Paso de Oro, Ponton and Tecolutla fields); the consortium made up of Grupo R Exploración y Producción, S.A. de C.V. and Constructora y Arrendadora México, S.A. de C.V. (Secadero field); the consortium made up of Roma Energy Holdings, LLC of the United States, Tubular Technology, S.A. de C.V., and Gx Geoscience Corporation, S. de R.L. de C.V. (Paraiso field); and the consortium made up of Sistemas Integrales de Compresión, S.A. de C.V., Nuvoil, S.A. de C.V., and Constructora Marusa, S.A. de C.V. (Benavides-Primavera field) (Comisión Nacional de Hidrocarburos, 2015f).

MINERAL INDUSTRY HIGHLIGHTS IN 2018

In 2018, Mexico was estimated to be the world's leading producer of silver, by volume, accounting for nearly 23% of world production. The country also ranked third among the world's leading producers of strontium (18% of world production) and fluorspar (16% of the world production); third in the production of sodium sulfate (4% of world production); fourth among the world's leading producers of bismuth (nearly 2% of world production); third among the world's leading producers of wollastonite (8% of world production); fifth among the world's leading producers of molybdenum (5% of world production) and lead (5% of world production); sixth among the world's leading producers of zinc (6% of world production); and seventh among the world's leading producers of barite (4% of world production), cadmium (5% of world production), and diatomite (3% of world production) (Cámara Minera de México, 2018, p. 198; Bolen, 2020; Callaghan, 2020a, b; Crangle, 2020; Curry, 2020; George, 2020; Klochko, 2020; McRae, 2020a, b; Ober, 2020; Polyak, 2020; Tolcin, 2020).

Minerals in the National Economy

In 2018, as reported by Cámara Minera de México, the mining and processing of metallic minerals accounted for 2.4% of the country's total GDP and 8.2% of the industrial sector GDP. The production and processing value of the metallic minerals sector remained about the same as in 2017. Gold accounted for a 29.7% share of the total output value of the mineral industry in 2018, followed by copper (24.6%), silver (14.8%), zinc (8.9%), iron pellets (4.9%), coke (2.8%), lead (2.3%), molybdenum (3.2%), coal (1.9%), and salt (1.1%) (Cámara Minera de México, 2019, p. 18–19).

In 2018, the State of Sonora was the principal producer of nonfuel minerals by value, producing about 34.7% of the country's total production. The principal minerals produced in Sonora were, in order of production value, gold, silver, copper, molybdenum, graphite, barite, dolomite, silica sand, gypsum, salt, and wollastonite. The State of Zacatecas was the second-ranked producer of nonfuel minerals by value, accounting for about 21.6% of the country's total production. The principal minerals produced in Zacatecas were, in order of production value, gold, silver, copper, lead, and zinc. The State of Chihuahua was the third-ranked producer of nonfuel minerals by value, accounting for about 10.9% of the country's

total production. The principal minerals produced in Chihuahua were, in order of production value, gold, silver, lead, copper, zinc, iron ore, barite, kaolin, dolomite, and gypsum. The remainder of the leading 11 States that produced nonfuel minerals were as follows (ranked in order of production value): Durango, Coahuila, Guerrero, San Luis Potosi, Baja California Sur, Oaxaca, [State of] Mexico, and Colima, which together accounted for about 23.1% of the total value of Mexico's mineral production (Servicio Geológico Mexicano, 2019, p. 19).

In 2018, 13.4% of those employed in the mineral industry worked in the mining of quarry minerals, such as clay, sand, and stone and gravel; 10.6% were employed in the operation of mining machinery and beneficiation equipment at mines and quarries; 6.9% worked in mining operations support activities; and 7.5% worked in the mining of metallic minerals. At the national level, the majority of those employed in the mineral industry were located in the States of Chihuahua, Coahuila, and Sonora (Servicio Geológico Mexicano, 2019, p. 19–20).

In 2018, a total of 242 companies were involved in 1,189 mining projects in Mexico. Of these companies, 161 had their central offices in Canada and 32 were headquartered in the United States; 11 were headquartered in China; 9, in Australia; 5 each, in Japan and the United Kingdom; 4, in Spain; 3 each, in Chile and Italy; and 1 each, in India and Luxembourg. Other countries (not identified) had 6 companies operating in Mexico as well. Of the 1,189 projects in all stages in the country, about 50% were at the exploration stage, 37% had been postponed or were on hold, 8% were in production, and about 4% were at the development stage. Precious metals, particularly gold and silver, were the primary targets for 710 of the projects, and another 164 were polymetallic projects. Copper and iron ore accounted for 184 and 72 projects, respectively, and the remaining were diverse projects involving various mineral commodities. The State of Sonora accounted for 23% of all projects involving foreign direct investment, followed by Chihuahua (14%), Durango (10%), Sinaloa (10%), Zacatecas (8%), and Jalisco (6%) (Servicio Geológico Mexicano, 2019, p. 533–535).

Production

In 2018, notable increases in mineral production included that of wollastonite (by 67%), lead (secondary; 43%), mined cobalt (40%), dolomite (25%), iron ore (gross weight; 20%), iron ore content (20%), metallurgical-grade fluorspar (17%), cement (16%), and lead (primary; 12%). In addition, production of cadmium increased by nearly 19% to 1,357 t from 1,142 t in 2017, and production of antimony increased by 7% to an estimated 260 t from 243 t. Decreases in mineral production included that of nitrogen (by 70%), refined cobalt (46%), bismuth (35%), calcite (27%), phosphate rock (gross weight; 20%), sulfur (19%), marble (17%), natural gas liquids (15%), and phosphate rock (P₂O₅ content; 15%). Mine production of feldspar decreased by 10% to 209,770 t from 233,050 t in 2017, and production of copper solvent extraction decreased by 10%. The production of silver (both mined and refined) remained about the same, whereas production of gold (ore and refined) decreased by about 10% and 8%, respectively. Crude petroleum production decreased by 7% to 675,980 thousand barrels from 723,065 thousand barrels in 2017. Data on mineral production are in table 1.

Commodity review

Metals

Copper.—In 2018, Grupo México was the main copper producer in the country, producing 552,000 t of copper, including cathodic copper. The company's Buenavista del Cobre complex produced 414,000 t of copper in concentrates and cathodes, and the company's La Caridad Mine produced 106,000 t of copper in concentrates and 26,440 t in cathodes. Another major producer of copper in Mexico in 2018 was Industria Minera México, which reported production of about 6,000 t of copper (Cámara Minera de México, 2019, p. 44).

Gold.—In 2018, five companies produced more than 50% of the gold produced in Mexico; they were, in order of production amount, Fresnillo, Torex Gold Resources, Agnico Eagle Mines, Goldcorp, and Minera Frisco S.A. de C.V. The La Herradura Mine, owned by Fresnillo, produced 16.25 t of gold and was the leading gold producer in the country. The Limon-Guajes Mine, owned by Torex Gold, produced 12.3 t of gold and was the second-ranked gold-producing mine, and the Peñasquito Mine, owned by Goldcorp, produced 9.32 t of gold and was the third-ranked producing mine (Cámara Minera de México, 2019, p. 37).

Silver.—Of the silver-producing companies, Fresnillo was the leading producer of silver in Mexico and in the world. In 2018, the company produced one-third of the silver produced in Mexico and alone accounted for 7% of the world's production of silver. Other important producers of silver in Mexico were, in order of the amount of production, Goldcorp, Grupo México, Pan American Silver, and Industrias Peñoles (Cámara Minera de México, 2019, p. 41).

In 2018, the El Saucito Mine, owned by Fresnillo, produced 679 t of silver and was the leading silver producer in the country. The Peñasquito Mine produced 627 t of silver and was the second-ranked silver-producing mine, and the Fresnillo Mine, owned by Fresnillo, produced 518 t of silver and was the third-ranked silver-producing mine in Mexico (Cámara Minera de México, 2019, p. 41).

Industrial Minerals

Barite.—In 2018, with the expansion of its Grecia Mine, which is located in Aramberri in the State of Nuevo Leon, Baramin S.A. de C.V. produced 293,000 t of barite. Baramin was the leading producer of barite, in terms of output, in Mexico.

The company Asociación de Mineros y Cooperativa México S.A. de C.V. announced in 2018 that it had started operations at the El Regalo Mine, which is located in Mazapil in the State of Zacatecas. The company stated that it would be extracting up to 10,000 metric tons per month of barite from the mine (Cámara Minera de México, 2019, p. 68).

Mineral Fuels

Crude Petroleum and Natural Gas.—In 2018, PEMEX reported that drilling and exploration work had been carried out in the Ixachi-IDL and the Doctus-IDL wells. The company confirmed the extension of the Ixachi and Doctus oilfields, which together had 3P (proven + probable + possible) reserves of 957 Mbbl of crude petroleum. The Ixachi field is an onshore

field located near the city of Veracruz, and the Doctus field is located offshore in the Gulf of Mexico (Petróleos Mexicanos S.A. de C.V., 2019, p. 6).

PEMEX reported that, in 2018, Mexico's crude and gas production remained at about the same levels as in the previous year. Also, PEMEX reported that it had exported 1,184 thousand barrels per day of crude petroleum, principally to the United States (Petróleos Mexicanos S.A. de C.V., 2019, p. 6).

Outlook

Mexico's mineral industry is dependent on its exports and, in particular, its economic and commercial relationships with the United States and Canada. The European Union (EU) and Mexico have a free trade pact that was scheduled to be updated in 2020; the new pact would virtually eliminate all trade duties between Mexico and the EU. However, the largest portion of Mexico's trade by volume, including its mineral exports, is with the United States and Canada. It remains to be seen whether new trade agreements, such as the one with the EU, will diversify trade for the Mexican mineral industry and improve its economic position as a result of having more competitive markets in which to sell its products.

The production of precious metals, in particular silver and gold, is likely to remain the most profitable mineral activity for the country. Mexico will likely continue to be a world leader in the production of silver as new silver mining projects come online.

Foreign direct investment in the Mexican mineral industry from companies based in Canada and the United States as well as the foreign direct investment from China-based companies are likely to increase for the foreseeable future. Copper, gold, lead, silver, and zinc are likely to be Mexico's leading mineral exports in 2019, and aluminum, copper, coal, and iron ore are likely still to be the leading mineral imports.

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TABLE 1
MEXICO: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

| Commodity ^{2,3} | 2014 | 2015 | 2016 | 2017 | 2018 | |
|--|----------------------|----------------------|------------------------|----------------------|------------------|------------------------|
| METALS | | | | | | |
| Antimony, mine, Sb content | 270 ^c | 90 ^{c,r} | 116 ^r | 243 | 260 ^c | |
| Bismuth, refinery, Bi content | 864 | 603 | 539 | 513 | 333 | |
| Cadmium, refinery, primary | 1,409 | 1,283 | 1,244 ^r | 1,142 | 1,357 | |
| Cobalt: | | | | | | |
| Mine, Co content ^c | -- | -- | 980 | 1,000 | 1,400 | |
| Refinery, metal | -- | -- | 419 | 420 ^c | 226 | |
| Copper: | | | | | | |
| Mine, Cu content: | | | | | | |
| Concentrates | 329,600 ^r | 386,400 ^r | 536,800 ^r | 527,000 | 558,300 | |
| Solvent extraction | 185,400 ^r | 208,100 ^r | 230,000 ^r | 215,200 | 192,700 | |
| Smelter: | | | | | | |
| Primary | 258,000 | 256,300 | 267,800 ^r | 270,000 | 286,200 | |
| Secondary ^c | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| Refinery: | | | | | | |
| Primary, other | 262,000 ^r | 272,400 ^r | 256,000 ^r | 243,100 | 239,200 | |
| Secondary ^c | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| Ferroalloys: | | | | | | |
| Ferromanganese | 67,506 ^r | 67,920 ^r | 84,530 ^r | 90,013 | 95,468 | |
| Silicomanganese | 164,855 ^r | 139,361 ^r | 134,251 | 148,130 | 152,000 | |
| Gold: | | | | | | |
| Mine, Au content | kilograms | 117,771 | 134,758 | 132,413 | 130,470 | 117,323 |
| Refinery | do. | 32,808 | 46,769 | 47,526 | 37,974 | 35,000 ^c |
| Iron ore, mine: | | | | | | |
| Gross weight | thousand metric tons | 16,500 ^r | 21,400 ^r | 19,200 ^r | 18,600 | 22,300 |
| Fe content | do. | 10,400 | 13,462 ^r | 12,090 ^r | 11,713 | 14,021 |
| Iron and steel: | | | | | | |
| Direct-reduced iron | do. | 5,976 | 5,499 | 5,306 | 6,011 | 5,970 ^c |
| Pig iron | do. | 5,116 | 4,573 | 4,476 | 4,245 | 4,428 |
| Steel: | | | | | | |
| Raw steel | do. | 18,900 ^c | 18,218 | 18,809 | 19,924 | 20,110 |
| Products, rolled | do. | 17,742 | 17,573 | 18,697 | 18,694 | 18,872 |
| Lead: | | | | | | |
| Mine, Pb content | | 250,462 | 263,772 | 241,271 | 243,022 | 240,000 ^c |
| Refinery: | | | | | | |
| Primary | | 118,000 ^c | 263,772 ^r | 94,725 | 92,535 | 104,100 ^c |
| Secondary ^c | | 245,000 | 230,000 | 230,000 | 230,000 | 330,000 |
| Manganese: | | | | | | |
| Mine: | | | | | | |
| Gross weight ^c | | 652,000 | 600,000 | 600,000 | 590,000 | 570,000 |
| Mn content | | 235,686 | 217,466 | 205,645 | 211,510 | 210,000 ^c |
| Mercury, Hg content ^c | | 301 ^r | 306 ^r | 262 ^r | 225 | 234 |
| Molybdenum, mine, Mo content | | 14,370 | 12,279 | 11,896 | 13,985 | 15,149 |
| Silver: | | | | | | |
| Mine, Ag content | kilograms | 5,765,662 | 5,591,510 ^r | 5,408,521 | 6,108,722 | 6,116,000 |
| Refinery, primary, metallurgical products: | do. | 2,272,620 | 2,237,672 | 2,109,248 | 2,222,668 | 2,200,000 ^c |
| Zinc: | | | | | | |
| Mine, Zn content | | 659,878 | 694,544 ^r | 661,646 ^r | 671,444 | 690,895 |
| Smelter, primary | | 320,924 | 326,642 ^r | 321,159 ^r | 327,003 | 336,300 |

See footnotes at end of table.

TABLE 1—Continued
MEXICO: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

| Commodity ^{2,3} | 2014 | 2015 | 2016 | 2017 | 2018 | |
|--|----------------------------|------------------------|-----------------------|----------------------|------------------------|------------------------|
| INDUSTRIAL MINERALS | | | | | | |
| Barite ^e | 460,000 ^r | 310,000 ^r | 170,000 ^r | 390,000 | 380,000 | |
| Celestite | 64,931 | 79,022 | 33,230 | 40,699 | 40,000 ^e | |
| Cement, hydraulic | thousand metric tons | 36,597 | 39,613 | 40,577 | 41,601 | 48,328 |
| Clay: | | | | | | |
| Bentonite | | 474,025 | 294,236 | 109,176 | 470,000 ^e | 470,000 ^e |
| Common clay | | 8,552,374 | 7,651,234 | 8,068,940 | 7,397,721 | 8,042,884 |
| Fuller's earth | | 245,147 | 108,215 | 111,713 | 110,860 | 110,000 ^e |
| Kaolin | | 342,917 | 155,100 | 259,272 | 330,080 ^e | 330,000 |
| Diatomite | | 87,849 | 89,800 ^{e,r} | 96,686 | 96,374 | 96,000 ^e |
| Feldspar, mine | | 150,726 | 159,372 | 122,176 | 233,050 | 209,770 |
| Fluorspar: | | | | | | |
| Acid grade | thousand metric tons | 632 | 624 | 649 ^r | 692 | 700 ^e |
| Metallurgical grade | do. | 478 | 250 ^{e,r} | 250 ^{e,r} | 325 ^e | 380 ^e |
| Graphite, amorphous, natural ⁴ | | 9,200 ^r | 8,100 ^r | 8,500 ^{e,r} | 9,000 ^e | 9,000 ^e |
| Gypsum, including anhydrite | | 5,495,594 | 5,456,829 | 5,402,691 | 5,400,000 ^e | 5,400,000 ^e |
| Magnesite | | 101,000 ^r | 101,000 ^r | 101,000 ^r | 101,000 | 100,000 ^e |
| Mica, all grades | | 160 ^e | 145 | 145 | 145 ^e | 150 ^e |
| Nitrogen, ammonia, N content | | 714,000 ^r | 473,000 ^r | 438,000 ^r | 411,000 | 124,000 |
| Perlite | | 26,000 | 26,000 ^{e,r} | 19,000 | 20,000 ^e | 20,000 ^e |
| Phosphate rock: | | | | | | |
| Gross weight | thousand metric tons | 1,663 | 1,930 | 2,909 | 1,926 | 1,539 |
| P ₂ O ₅ content | do. | 466 | 540 ^e | 815 ^e | 540 ^e | 460 ^e |
| Salt, all types | do. | 10,251 | 9,088 | 8,907 | 9,000 ^e | 9,000 ^e |
| Stone, sand and gravel: | | | | | | |
| Sand and gravel, construction: | | | | | | |
| Gravel | do. | 93,448 | 109,003 | 98,399 | 112,546 | 119,337 |
| Sand | do. | 108,765 | 115,565 | 114,276 ^r | 210,286 | 212,733 |
| Stone, crushed: | | | | | | |
| Calcite, common | | 4,790,427 | 3,947,721 | 3,623,086 | 3,859,373 | 2,808,875 |
| Dolomite | | 8,277,102 | 7,703,900 | 7,236,944 | 6,059,970 | 7,554,796 |
| Limestone | thousand metric tons | 54,497 ^r | 569,505 | 361,704 | 362,654 | 355,592 |
| Marble | | 6,307,616 ^r | 1,571,288 | 2,162,521 | 2,352,614 | 1,964,041 |
| Quartz and quartzite | | 2,548,336 | 1,750,548 | 2,398,971 | 2,356,000 | 2,356,000 ^e |
| Sulfur, S content | | 992,939 | 858,127 | 673,285 | 551,218 | 447,114 |
| Talc | | 752,077 | 20,452 | 11,392 | 12,000 ^e | 12,000 ^e |
| Vermiculite | | 226 | 299 | 310 | -- ^e | -- ^e |
| Wollastonite | | 54,579 | 57,451 | 63,683 | 87,562 | 145,814 |
| MINERAL FUELS AND RELATED MATERIALS | | | | | | |
| Coal: | | | | | | |
| Bituminous and subbituminous | thousand metric tons | 13,435 | 7,245 | 8,130 | 7,280 | 6,773 |
| Metallurgical | do. | 4,733 | 4,769 | 4,235 | 4,637 | 4,630 ^e |
| Coke, breeze and metallurgical | do. | 2,230 | 1,779 | 1,368 | 1,295 | 1,180 |
| Natural gas, marketable | million cubic meters | 37,621 | 35,120 | 31,492 | 31,573 | 31,570 |
| Petroleum: | | | | | | |
| Crude | thousand 42-gallon barrels | 886,585 | 827,455 | 786,210 | 723,065 | 675,980 |
| Condensate | do. | 132,860 | 118,260 | 111,325 | 90,520 | 77,015 |

^eEstimated. ^rRevised. do. Ditto. NA Not available. -- Zero.

¹Table includes data available through January 28, 2020. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits.

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

³Sources: The Instituto Nacional de Estadística y Geografía and the Servicio Geológico Mexicano, Secretaría de Economía.

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

TABLE 2
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities ¹ | Annual capacity ² |
|-----------|---|---|--|
| Antimony | United States Antimony Corp., 100% | San Jose (Wadley) Mines, S.L.P. | 365. |
| Barite | Asociación de Mineros y Cooperativa México (private Mexican, 100%) | El Regalo Mine, in Mazapil, Zac. | NA. |
| Do. | Baramin S.A. de C.V. (private Mexican, 100%) | Galeana and La Huiche Mines, Galeana N.L. Grecia Mine in Aramberri, N.L. | NA. |
| Do. | Barita de Santa Rosa, S.A. de C.V. (private Mexican, 100%) | Mine in Muzquiz, Coah. | 256. |
| Do. | Barita de Sonora, S.A. (Grupo Acerero del Norte, S.A. de C.V., 100%) | Mine in 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 Metalurgica Met-Mex Peñoles, S.A.B. de C.V. (Industrias Peñoles S.A.B. de C.V., 100%) | Refinery in Torreon, Coah. | 1,440. |
| Cement | CEMEX México [Cementos Mexicanos, S.A.B. de C.V. (CEMEX), 100%] | Cement plants in 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. (LafargeHolcim Group, 100%) | Cement plants in 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. (Cementos Molins S.A., 50%, and Buzzi Unicem SpA, 50%) | Cement plant in Apazapan, Ver.; Cerritos, S.L.P.; and Tepetzingo, Mor. | 7,800. |
| Do. | Cooperativa La Cruz Azul, S.C.L. (private Mexican, 100%) | Cement plant in Cruz Azul, Hgo; and Lagunas, Oax. | 9,000. |
| Do. | Grupo Cementos de Chihuahua, S.A.B. de C.V. | Cement plant in Chihuahua, Cuidad Juarez, and Samalayuca, Chih. | 2,500. |
| Do. | Cementos Fortaleza S.A. de C.V. (Elementia, S.A. de C.V., 100%) | Cement plant in El Palmar, Tula, and Vito, Hgo. | 3,500. |
| Coal | Minera Carbonifera Río Escondido, S.A. [Altos Hornos de Mexico, S.A.B. de C.V. (AHMSA), 100%] | Mina I, Mina II, and Tajo I at Nava and Piedras Negras, Coah. | 6,500. |
| Do. | Altos Hornos de Mexico, S.A.B. de C.V. (Grupo Acerero del Norte, S.A. de C.V., 64.1%) | Mines at Coah. and coking plant at Monclova, Coah. | 3,000. |
| Do. | Carbonifera de San Patricio, S.A. de C.V. (private Mexican, 100%) | Mine in Progreso, Coah. | 1,314. |
| Do. | Industrial Minera México, S.A. de C.V. (IMMSA) (Grupo México, S.A.B. de C.V., 90%) | Mine in Nueva Rosita, Coah. | 900. |
| Copper | Mexicana de Cobre, S.A. de C.V. (Grupo México, S.A.B. de C.V., 90%) | La Caridad Mine, smelter, refinery, SX-EW ² plant at La Caridad, Son. | 170 concentrates, 300 smelter, 25 SX-EW, ² 300 refinery. |
| Do. | 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. | 150 concentrates, 150 SX-EW. ² |
| Do. | Minera y Metalurgica El Boleo S.A. P. I. de C.V. (MMB) (Korea Resources Corp., 90%, and Baja Mining Corp., 10%) | Boleo Mine and SX-EW ² plant in B.C.S. | 20 concentrates, 20 SX-EW. ² |
| Do. | Cobre del Mayo S.A. de C.V. (Investure Group S. A. de C. V., 100%) | Piedras Verdes Mine and SX-EW ² plant, Son. | 20 concentrates, 32 SX-EW. ² |
| Do. | Cia. Minera La Parreña de C.V (IndustriasPeñoles, 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 |

See footnotes at end of table.

TABLE 2—Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities ¹ | Annual capacity ^c | |
|------------------|---|--|--|---------------------|
| Copper—Continued | Red Tiger Mining Inc., 100% | Luz de Cobre Mine and SX-EW ² plant at San Antonio del Huerta, Son. | 8 SX-EW. ² | |
| 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. | 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 | Mexichem Fluor, S.A. de C.V. (Mexichem, 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.; Saucito, Zac. | 23,700. |
| Do. | do. | Minera Peñasquito S.A. de C.V. (Goldcorp Inc., 100%) | Peñasquito Mine, Zac. | 27,000. |
| Do. | do. | Desarrollos Mineros San Luis S.A. de C.V. (Leagold Gold Corp., 100%) | Los Filos Mine, Gro. | 6,000. |
| Do. | do. | Torex Gold Resources Inc., 100% | El Limon-Guajes (ELG) Mine, Gro. | 10,200. |
| Do. | do. | Minas de las Altas Pimerias, S.A. de C.V. (Goldcorp Inc., 100%) | El Sauzal Mine, Chih. | 8,500. ³ |
| Do. | do. | Minera Frisco S.A.B. de C.V., 100% | El Coronel Mine, Zac. | 5,300. |
| Do. | do. | Primero Empresa Minera, S.A. de C.V. (Primero Mining Corp., 100%) | Mine in San Dimas, Dgo. | 4,500. |
| Do. | do. | Agnico Eagle Mines Ltd., 100% | Pinos Altos Mine, Chih.; and La India Mine, Son. | 4,800. |
| Do. | do. | Alamos Gold Inc., 100% | Mulatos Mine, Son. | 4,300. |
| 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. | Yamana Gold Inc., 100% | Las Mercedes Mine, Son. | 3,200. |
| Do. | do. | GoGold Resources Inc., 100% | Santa Gertrudis Mine, Son. | 1,600. |
| Gold, refined | do. | Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles S.A.B. de C.V., 100%) | Refinery in Torreon, Coah. | 53,900. |
| Graphite | Grafitos Mexicanos, S.A. de C.V., 100% | Lourdes, Topiyeca, and San Juan Mines, Son. | 60. | |
| Gypsum | Cía. Occidental Mexicana, S.A. de C.V. (private Mexican, 51%, and Domtar, Ltd., 49%) | Quarry Santa Rosalia on San Marcos Island, B.C.S. | 2,500. | |
| Iron ore | Altos Hornos de Mexico, S.A.B. de C.V. (Grupo Acerero del Norte, S.A. de C.V., 64.1%) | La Perla Mine, Chih.; Hercules Mine, Coah.; 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. | Industrial Minera México, S.A. de C.V. (Grupo México, S.A.B. de C.V., 90%) | Mines in Charcas, S.L.P.; Santa Barbara and Santa Eulalia, Chih.; and San Martin, Zac. | 35. | |
| Do. | Fresnillo plc (Industrias Peñoles, S.A.B. de C.V., 75%) | Mines at Fresnillo, Zac.; La Cienega, Dgo.; and Saucito, Zac. | 43. | |

See footnotes at end of table.

TABLE 2—Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | | Major operating companies and major equity owners | Location of main facilities ¹ | Annual capacity ^e |
|--------------------|--------------------------|--|--|------------------------------|
| Lead—Continued | | 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. | | Metalurgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles S.A.B. de C.V., 100%) | Refinery in 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 | thousand barrels per day | Petróleos Mexicanos S.A. de C.V. (PEMEX) (Government, 100%) | Wells onshore and offshore in Comalcalco, Poza Rica, Ver., and Gulf of Campeche, Cam. | 3,500. |
| Petroleum products | do. | do. | Refineries in 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. (PEMEX), 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. (Goldcorp Inc., 100%) | Peñasquito Mine, Zac. | 794,000. |
| 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. (Grupo México, S.A.B. de C.V., 90%) | Mines in Charcas, S.L.P.; San Martin, Zac.; Santa Barbara, Chih; Santa Eulalia, Chih.; and Taxco, Gro. | 336,000. |
| Do. | do. | Pan American Silver Corp., 100% | La Colorada Mine, Zac.; and Alamo Dorado Mine, Son. | 283,000. |
| Do. | do. | Coeur Mexicana S.A. de C.V. (Coeur Mining, Inc., 100%) | Palmarejo Mine, Chih. | 190,000. |
| Do. | do. | Primero Empresa Minera, S.A. de C.V. (Primero Mining Corp. 100%) | San Dimas Mine, Dgo. | 170,000. |
| Do. | do. | Fortuna Silver Mines Inc., 100% | San Jose Mine, Oax. | 125,000. |
| Do. | do. | Minera Mexicana La Ciénega, S.A. de C.V. (Fresnillo plc., 100%) | La Cienega Mine, Dgo. | 114,000. |
| Do. | 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. | 150,000. |
| Do. | do. | Co. Minera Sabinas, S.A. de C.V. (Industrias Peñoles, S.A.B. de C.V., 100%) | Sabinas Mine, Zac. | 140,000. |
| Do. | do. | GoGold Resources Inc., 100% | Parral tailings project, Chih. | 34,000. |
| Do. | do. | Golden Minerals Co., 100% | Mine in Velardeña, Dgo. | 16,000. ⁴ |
| Do. | do. | Argonaut Gold Inc., 100% | La Colorada Mine, Son. | 10,000. |
| Silver, refined | do. | Metalurgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles S.A.B. de C.V., 100%) | Refinery in Torreon, Coah. | 3,350,000. |
| Sodium sulfáte | | 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. |

See footnotes at end of table.

TABLE 2—Continued
MEXICO: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities ¹ | Annual capacity ^c |
|-----------------------|--|--|-------------------------------|
| Steel | ArcelorMittal Lazaro Cardenas S.A de C.V. (ArcelorMittal Holdings AG, 100%) | Steel manufacturing plant at Lazaro Cardenas, Mich. | 7,500 steel, 4,000 pellet. |
| Do. | Altos Hornos de Mexico, S.A.B. de C.V. (Grupo Acerero del Norte, S.A. de C.V., 64.1%%) | Steel manufacturing at Monclova, Coah. | 4,320 steel, 3,800 pellet. |
| Do. | Hylsa S.A. de C.V. (Ternium S.A., 88.72%) | Steel manufacturing and direct-reduction units at Monterrey, N.L., and Puebla, Pue.; pelletizing plant in Col. and El Encino, Jal. | 4,100 steel, 1,500 pellet. |
| Do. | DEACERO, S.A. de C.V. (private Mexican, 100%) | Steel manufacturing at Saltillo, Coah.; and Celaya, Gto. | 3,000. |
| Do. | Tubos de Acero de México, S.A. (Teranis S.A., 100%) | Gto.Veracruz, Ver. | 1,000. |
| Strontium (celestite) | Minas de Celestita, S.A. de C.V. | Octubre Mine, Coah. | NA. |
| Sulfur | Petróleos Mexicanos, S.A. de C.V. (PEMEX) (Government, 100%) | Nationwide petroleum operations, onshore and offshore | 890. |
| Wollastonite | Minera Roca Rodando S. de R.L. de C.V. (S&B Industrial Minerals S.A.) | 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%) | Mines in Charcas, S.L.P.; Santa Barbara and Santa Eulalia, Chih.; and San Martin, Zac. | 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. | Metalurgica Met-Mex Peñoles, S.A. de C.V. (Industrias Peñoles S.A.B. de C.V., 100%) | Refinery in 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. |

^cEstimated. Do., do. Ditto. NA Not available.

¹State 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.).

²Solvent extraction-electrowinning.

³Closed.

⁴Suspended.