



2019 Minerals Yearbook

CHILE [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF CHILE

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Chile's position in the world's mineral economy was that of a leading supplier of many minerals, the most economically important of which was copper. The country was also a supplier of metals associated with the mining of copper, such as gold and molybdenum; industrial minerals, such as lithium; and mineral products. In 2019, the country was estimated to be the world's leading producer of mined copper (accounting for 28% of the world production); iodine (67% of world production, excluding United States production); and rhenium (56% of world production). Chile was also estimated to be the world's second-ranked producer of lithium (accounting for 22% of the world production, excluding United States production) and molybdenum (19%); and the sixth-ranked producer of silver (5%). The country's world rankings for mineral reserves were estimated as follows: first for copper, lithium, and rhenium; second for iodine; fourth for molybdenum; and seventh for silver (along with the United States) (Anderson, 2021; Flanagan, 2021; Jaskula, 2021; Polyak, 2021a, b; Schnebele, 2021).

The country's real gross domestic product (GDP) increased by 1.1% in 2019 compared with that of 2018. The mineral sector continued to be a significant part of Chile's economy, accounting for 9.9% of the total GDP. The copper mining sector accounted for 8.9% of the country's total GDP and about 90% of the mineral industry's total contribution to the GDP. The state-owned Corporación Nacional del Cobre de Chile (CODELCO) continued to be the world's largest copper producer in terms of the number of active projects or operations. In 2019, CODELCO accounted for 29% of Chile's total copper production (copper concentrates and solvent extraction). The Escondida Mine, which was owned by Minera Escondida Ltda—a joint venture among BHP Billiton Ltd. of Australia (57.5%), the British-Australian multinational company Rio Tinto plc (30%), and Japan-based JECO Corp. (12.5%)—continued to be the country's leading mine, accounting for about 20% of Chile's total mined copper production (table 2; Banco Central de Chile, 2020a, p. 5; Comisión Chilena del Cobre, 2020a, p. 15, 59; 2021c).

Chile is part of what has become to be known as South America's "lithium triangle"—an area that hosts lithium-bearing salt flats along the borders of Argentina, Bolivia, and Chile. Historically, Chile's lithium production was recovered from two brine operations in the Salar de Atacama, which is located in the Andes Mountains. The Salar de Atacama is one of the driest places on Earth. The two leading producers of lithium in the country were Albemarle Corp. of the United States and Sociedad Química y Minera de Chile S.A. (SQM). In 2019, Chile's lithium carbonate and lithium hydroxide exports amounted to about \$954 million. China, Japan, and the Republic of Korea were the country's leading lithium carbonate and lithium hydroxide export partners. Lithium carbonate and lithium hydroxide were used mainly to produce cathodes for rechargeable batteries. Batteries were the leading application

for lithium, especially for electric vehicle batteries (table 2; Comisión Chilena del Cobre, 2020a, p. 26; 2020c, p. 37; Servicio Nacional de Geología y Minería, 2020, p. 120–121; Sociedad Química y Minera de Chile S.A., 2020, p. 21; Jaskula, 2021).

Chile was heavily dependent on coal, crude petroleum, natural gas, and refined petroleum products imports to meet domestic demand. Crude petroleum and natural gas were produced exclusively from the Magallanes y de Antártica Chilena Region. As of 2018, Chile held about 150 million barrels of proven crude petroleum reserves and about 98 billion of proven cubic meters of natural gas reserves. In 2019, coal, crude petroleum, and natural gas accounted for about 8% of Chile's total imports and for 92% of the country's total mineral commodity imports (Banco Central de Chile, 2020b, p. 58; Servicio Nacional de Geología y Minería, 2020, p. 148–149; U.S. Central Intelligence Agency, 2021).

Minerals in the National Economy

In 2019, the total output value of the mineral industry decreased by 2.3% compared with that in 2018. The slight decrease was mainly attributed to a decrease in the output of copper and iron. In 2019, the mining and quarrying sector accounted for nearly 3% of Chile's total employment, which increased by 9% to 248,803 workers (Banco Central de Chile, 2020a, p. 9; Comisión Chilena del Cobre, 2020a, p. 59, 64).

According to the Comisión Chilena del Cobre (COCHILCO), investments in mining during the next 10 years, which were expected to include 44 projects at various stages of exploration and (or) development, were projected to total \$72.5 billion. Twenty-eight (or 70%) of these were brownfield projects and 16 (or 30%) of them were greenfield projects. About 51% of the estimated investments were from Chile (\$36.6 billion); 21%, from Canada (\$15.2 billion); 10%, from the United Kingdom (\$7.6 billion); 7%, from United States (\$5.3 billion); 7%, from Australia (\$4.8 billion); and 4%, from Poland and South Africa. Among the mining companies investing in the country, CODELCO accounted for about 32% (or \$23.1 billion) of the total investments. Investments in copper accounted for about 90% (or \$65.6 billion) of the total investment in mining, followed by gold and silver, iron, lithium (carbonate and hydroxide), and other industrial mineral projects, which accounted for about 10% (or \$6.8 billion). Of the \$65.6 billion investment in copper, the Antofagasta Region was to receive about 34% of the investment, followed by the Atacama Region (22%), the Libertador General Bernardo O'Higgins and the Tarapaca Regions (12% each), the Valparaíso Region (9%), the Coquimbo Region (7%), and the Metropolitana (Santiago) Region (4%) (Comisión Chilena del Cobre, 2019, p. 4, 6, 8–12).

Government Policies and Programs

Regulations governing Chile's mineral industry are contained in the Decree with Force of Law (DFL) No. 302. The Ministerio de Minería [Ministry of Mining] exercises control of the mineral industry through state-owned companies and regulatory agencies, including the COCHILCO, CODELCO, Empresa Nacional de Minería (ENAMI), and Empresa Nacional del Petróleo (ENAP). The legal framework for mining in Chile is based on the country's Organic Constitutional Law on Mining Concessions [law No. 18.097 of 1982] and the Chilean Mining Code [law No. 18.248 of 1983]. COCHILCO was created in 1976 by law No. 1.349. COCHILCO advises the Government on matters concerning the production of copper, copper byproducts, and other metals, and on industrial minerals mining. CODELCO was involved in industrial, mining, and trade activities. Decree Law 1350 (1976) created CODELCO, which began managing all large scale-mines nationalized in 1971. CODELCO reports to the Government through the Ministry of Mining (Corporación Nacional del Cobre, 2020, 17, 147; Comisión Chilena del Cobre, 2021b, d; Empresa Nacional de Minería, 2021; Ministerio de Minería, 2021).

ENAMI, which is the national mining corporation, was founded in 1960 to promote small- and medium-size private sector mining in Chile. It does so by providing incentives aimed at correcting market failures, and by supplying technical, financial, metallurgical production, and trading services to help the companies be competitive. ENAP was created by Organic Law No. 9618 of June 19, 1950. It operates as a commercial company, under a public law juridical regime and is autonomously managed. ENAP's main line of business is the exploration, production, refining and marketing of hydrocarbons and their byproducts. ENAP participates in the exploration and production of hydrocarbons through its subsidiary Enap Sipetrol S.A. and in the refining, transportation, storage, and marketing of petroleum-based products through Enap Refinerías S.A. (Empresa Nacional de Minería, 2021; Empresa Nacional del Petróleo, 2021; Ministerio de Minería, 2021).

The main environmental law in Chile, law No. 19.300, was enacted on March 1, 1994, and was amended on December 7, 2002, by Decreto Supremo 95, which requires environmental impact studies for any new investment projects that involve either exploration for or extraction of the country's natural resources (including minerals). In July 2011, Chile's Congress approved law No. 20.551 to regulate the closure and environmental remediation of mine sites and mining facilities. The law entered into force on November 11, 2012. On June 18, 2012, Chile's Congress approved law No. 20.600, which established new environmental courts to arbitrate in cases of environmental violations (Biblioteca del Congreso Nacional de Chile, 2013).

In 2015, Chile enacted law No. 20.848, which repealed the 1974 foreign investment statute, known as Decree Law 600 (DL 600). Law No. 20.848, which became official on January 1, 2016, established a new legal framework for foreign direct investment (FDI) in the country and created the Foreign Investment Promotion Agency, also known as InvestChile. InvestChile is the legal successor to the former Foreign Investment Committee and is the agency responsible

for promoting and attracting all types of FDI into the country. Under the new law, the President of Chile established a strategy for the development and promotion of FDI and created a Committee of Ministers for the Development and Promotion of Foreign Investment (Committee of Ministers), whose purpose is to advise the President. The Committee of Ministers is chaired by the Minister of Economy, Development and Tourism and includes the Minister of Finance and all other Ministers whom the President appoints. All foreign investment contracts signed between the Government and foreign investors under the Decree Law 600 before January 1, 2016, remain in force, along with the rights and obligations envisaged in the contracts and are administrated by InvestChile (Biblioteca del Congreso Nacional de Chile, 2015; InvestChile, 2017, p. 1; 2021; U.S. Department of State, 2019).

Production

In 2019, estimated production of rhenium increased by 11% to 30,000 metric tons (t) from 27,000 t. The industrial minerals for which output increased by more than 10% were led by bauxitic clay (which increased by 114%), zeolites (107%), lithium hydroxide (54%), ground calcium carbonate (35%), and lithium carbonate (16%). Among the mineral fuels and related materials, production increases included that of kerosene (which increased by 33%), gasoline (12%), and natural gas (about 10%). Metals for which output decreased by more than 10% were led by lead (the output of which decreased by 99%), zinc (79%), copper sulfate (40%), refined copper (22%), smelted copper (19%), and molybdenum (11%). Industrial minerals for which production decreased by more than 10% included feldspar (the production of which decreased by 98%), peat (70%), kaolin (61%), lithium chloride (51%), potassium chloride (31%), limestone (29%), bentonite (25%), crushed quartzite (20%), boric acid and guano (18% each), pumice (15%), diatomite (14%), and ulexite (12%). In 2019, the mineral fuels and related materials for which production decreased were other petroleum refinery products (the production of which decreased by 90%) and coal (30%). Data on mineral production are in table 1.

Structure of the Mineral Industry

The leading Chile-owned companies in the mineral industry were state-owned CODELCO, and the privately owned Compañía Minera del Pacífico S.A. (CMP), Molibdenos y Metales S.A. (Molymet), and SQM. CMP was the principal producer and exporter of iron ore and pellets in Chile; SQM was among the world's leading producers of iodine, lithium carbonate, and natural potassium nitrate; and Molymet was the world's leading producer of rhenium. CMP was also the sole supplier of iron ore and pellets to the integrated Chile-based steelmaker Compañía Siderúrgica Huachipato S.A. CODELCO wholly owned the Andina, the Chuquicamata, El Teniente, the Gabriela Mistral, the Ministro Hales, the Radomiro Tomic, and the Salvador Mines, all of which were located in northern and central Chile. CODELCO also held 49% ownership in Sociedad Contractual Minera El Abra (in joint venture with Freeport-McMoRan Inc. of Phoenix, Arizona, 51%) and 20% ownership in Anglo America Sur S.A. (a subsidiary of Anglo American plc

of the United Kingdom, 50.1%) (Compañía Minera del Pacífico S.A., 2018). Table 2 is a list of major mineral industry facilities.

Mineral Trade

In 2019, the total value of Chile's exports amounted to \$69.9 billion compared with \$75.5 billion in 2018. The country's leading export partners were, in order of export value, China (which received about 32% of the country's exports), the European Union (11%), and the United States (13%). In 2019, the mineral sector accounted for 55% of Chile's total exports, in terms of value. The total value of Chile's imports in 2019 decreased to \$69.8 billion from \$75.0 billion in 2018. Its major import partners were, in order of import value, China (which supplied 24% of the country's imports), the United States (20%), and the European Union (16%) (Banco Central de Chile, 2019, p. 6–7; 2020b, p. 6–7; Comisión Chilena del Cobre, 2021a, p. 26).

The value of Chile's mineral exports decreased by 9% to \$38.4 billion in 2019 compared with that in 2018. Metal exports, which accounted for 95% of the country's total mineral exports in 2019, decreased by 9% to \$36.7 billion owing mainly to decreases in the value of iron exports (by 32%) and copper exports (by 8%). Copper, which continued to be the leading mineral export product, accounted for 87% of Chile's total mineral exports and 48% of the country's total exports. Chile's leading copper exports partners were China (which received about 46% of the country's total copper exports), Japan (10%), the Republic of Korea (9%), and the United States (8%). The value of the country's industrial mineral exports decreased by 4% to \$1.6 billion in 2019. Lithium carbonate continued to be the leading industrial mineral export commodity, by value (\$834 million), accounting for 53% of total industrial mineral exports, followed by iodine (34%) and sea salt (9%). The value of lithium carbonate exports decreased by 12% in 2019 compared with that in 2018, however. The leading recipients of the country's lithium carbonate exports were, in order of value, the Republic of Korea (which received 36%), Japan (26%), and China (14%) (Comisión Chilena del Cobre, 2020a, p. 26–29; Servicio Nacional de Geología y Minería, 2020, p. 48).

Commodity Review

Metals

Copper.—In 2019, the total (combined) production of copper concentrates and solvent extraction was about 5.8 million metric tons (Mt), which was about the same as the amount produced in 2018. About 97% of the copper output was produced by large-scale mining operations. The Antofagasta Region continued to rank first among the country's copper-producing regions, accounting for about 54% of the total production of copper concentrates and solvent extraction. Chile's leading copper companies were, in order of output, CODELCO, which accounted for 30% of copper production, and Minera Escondida, 21% (table 1; Comisión Chilena del Cobre, 2020a, p. 16, 92; Servicio Nacional de Geología y Minería, 2020, p. 79).

During the year, CODELCO's leading producing mines were the Chuquicamata Mine and the Radomiro Tomic Mine (both located in the Antofagasta Region) and El Teniente

Mine (located in the Libertador General Bernardo O'Higgins Region). Production from these three mines accounted for about 69% of CODELCO's total copper production (production from joint ventures not included). In 2019, total copper production at CODELCO (including its joint ventures with Sociedad Contractual Minera El Abra and Anglo American Sur) decreased to 1.7 Mt from 1.8 Mt in 2018. The decrease was mainly attributed to heavy rain causing flooding in the northern part of Chile in February, a union strike at Chuquicamata in May, and operational and maintenance issues at the Andina and the Chuquicamata concentrators. In August, CODELCO began operations at its Chuquicamata underground mine at a total investment cost of about \$5.5 billion. The company expected to ramp up operations at Chuquicamata underground by 2026, which would allow for the production of more than 320,000 metric tons per year (t/yr) of copper and 16,000 t/yr of molybdenum. The new underground mine would also extend Chuquicamata's mine life by 40 years. As of 2019, proven and probable mineral reserves at Chuquicamata were reported to be about 1.30 Mt at an average grade of 0.73% copper. Copper production from the Chuquicamata Mine increased to 385,309 t in 2019 or by 20% compared with that in 2018 (Comisión Chilena del Cobre, 2020a, p. 16; Corporación Nacional del Cobre, 2019; 2020, p. 30, 90, 99, 102).

The Escondida Mine is a porphyry copper deposit located in the Antofagasta Region in northern Chile. The mine comprised two open pits that fed three concentrator plants, as well as two leaching operations (oxide and sulfide). Mined copper production at Escondida decreased by about 6% to 1.14 Mt in 2019, which was mainly attributed to a 12% decline in copper grades. Copper production at Escondida was forecasted to be between 1.16 Mt and 1.23 Mt in 2020 (BHP Billiton Ltd., 2019, p. 72; Comisión Chilena del Cobre, 2020a, p. 16).

Compañía Minera Doña Ines de Collahuasi SCM (Collahuasi), which was a joint venture among Anglo American plc of the United Kingdom (44%), Glencore plc of Switzerland (44%), and Japan Collahuasi Resources B.V. (12%), operated the Collahuasi Mine, which is located in the Tarapaca Region. In 2019, Collahuasi, which had the capacity to produce about 570,000 t/yr of copper concentrate, accounted for nearly 10% of Chile's total mined copper production. During the year, the company continued with its plans to expand the mine's nominal throughput capacity to 170,000 metric tons per day (t/d) of ore from 37,000 t/d by 2023. The expansion project, at an investment cost of about \$302 million, was expected to add additional capacity of about 30,000 t/yr of copper concentrate and to extend the mine's life until 2040. During the year, Collahuasi Resources also submitted to the Government the results of an environmental impact assessment to further increase its nominal throughput capacity to 210,000 t/d by 2025, at investment cost of about \$3.2 million. The increase would add an additional capacity of about 140,000 t/yr of copper concentrate and cathodes. Total proven and probable mineral reserves at Collahuasi were reported to be about 3.1 Mt at an average grade of 0.92% copper (table 2; Comisión Chilena del Cobre, 2019, p. 4, 20, 53–54, 2020a, p. 16, 2020b, p. 4, 21; Glencore plc, 2020, p. 243; Compañía Minera Doña Ines de Collahuasi, 2021).

Anglo American, through its subsidiary Anglo American Sur, operated and owned 50.1% of Los Bronces Mine located in the Metropolitana (Santiago) Region. In 2019, Los Bronces Mine, which had the capacity to produce about 390,000 t/yr of copper concentrate, accounted for nearly 7% of the country's total mined copper production. In July, the company submitted the results of an environmental impact study to the Government for its Los Bronces Integrated project, which would have an investment cost of about \$3.0 billion. The proposed project, which would include an underground mine, would add an additional capacity of 380,000 t/yr of copper concentrate by 2024. The new project would also allow for the life of the Los Bronces Mine to be extended to 2036 (table 2; Comisión Chilena del Cobre, 2019, p. 4, 20; 2020a, p. 16, 2020b, p. 4, 21).

Antofagasta Plc of the United Kingdom, through its subsidiary Antofagasta Minerals S.A. (AMSA), held a 70% interest in the Antucoya Mine, which produced copper cathodes; a 70% interest in the Centinela Mine, which produced copper concentrates containing gold and silver, molybdenum concentrate, and copper cathodes; a 60% interest in Los Pelambres Mine, which produced copper concentrates containing gold, silver, and molybdenum; and a 50% interest in the Zaldívar Mine, which produced copper cathodes. During the year, AMSA continued with its expansion project at Los Pelambres, which was being accomplished in two phases. In early 2019, the company began the construction of phase 1, which would increase copper production at Los Pelambres by 60,000 t/yr, on average, over 15 years. AMSA expected its first production by the end of 2021, starting at about 40,000 t/yr for the first 4 to 5 years and increasing to about 70,000 t/yr for the remaining years. For phase 2, the company estimated to increase copper production by 35,000 t/yr and to extend the mine's life by 15 years beyond the currently estimated 15 years. AMSA forecasted copper production at Los Pelambres to be between 350,000 and 360,000 t in 2020. In 2019, Los Pelambres accounted for about 6% of Chile's total mined copper production (table 2; Antofagasta plc, 2020, p. 5, 64–65; Comisión Chilena del Cobre, 2020a, p. 16; Antofagasta Minerals S.A., 2021).

In 2019, copper output from the Sociedad Contractual Minera El Abra (El Abra), which was a joint venture between Freeport-McMoRan (51%) and CODELCO (49%), decreased by 10% compared with that in 2018. The decrease was mainly attributed to the mining of lower ore grades. El Abra, which continued to account for about 1% of the country's total mined copper production, was an open pit mining operation located in the Antofagasta Region. The joint venture continued evaluating a potential large-scale expansion at El Abra to process additional sulfide material and to achieve higher recoveries. Technical and economic studies were underway during the year. As of December 31, total recoverable proven and probable reserves were reported as 717 Mt at an average grade of 0.41% copper (Comisión Chilena del Cobre, 2020a, p. 16; Freeport-McMoRan Inc., 2020, p. 10, 39, 121; 2021).

Compañía Minera Teck Quebrada Blanca S.A. (QBSA), which was a joint venture among Teck Resources Ltd. of Canada (60% interest), Sumitomo Metal Mining Co., Ltd. and Sumitomo Corp. of Japan (30% interest), and ENAMI (10% interest),

operated the Quebrada Blanca project, located in the Tarapaca Region. Quebrada Blanca included the Quebrada Blanca Phase 1 operation (QB1) and the Quebrada Blanca Phase 2 (QB2) project. QB1, which began operations in 1994, was an open pit mining operation; the ore was leached and the resulting solution was processed in a solvent extraction–electrowinning (SX–EW) plant to produce copper cathodes. In 2018, QBSA reported that mining operations at QB1 were shut down owing to the depletion of mineral reserves. However, the company expected to continue copper cathode production at QB1 from existing leaching pads and its SX–EW plant until 2020. As a result, in 2019, Quebrada Blanca produced 21,100 t of copper cathode compared with 25,500 t in 2018. QBSA forecasted copper cathode production at Quebrada Blanca to be between 7,000 and 8,000 t in 2020. During the year, construction works at QB2 were underway. Production at the project, which included a mine area with a concentrator plant and tailings facility, was planned to begin by 2021. QB2 was expected to have an average annual copper-equivalent production of about 316,000 t/yr for the first 5 years of operations and an estimated initial mine life of 28 years (Comisión Chilena del Cobre, 2020a, p. 16; Teck Resources Ltd., 2020, p. 3, 18–19; 2021).

Gold and Silver.—The Antofagasta Region was ranked first among the country's leading gold-producing regions, accounting for 65% of total gold production, followed by the Atacama (16%), and the Coquimbo (9%) Regions. Other gold-producing regions included the Aysen, Magallanes, Maule, Metropolitana (Santiago), Libertador General Bernardo O'Higgins, and Valparaíso Regions. In 2019, gold production in the country increased to 38,455 kilograms (kg), or by about 4% compared with that in 2018. About 68% of all gold produced in Chile was recovered as a byproduct of copper and lead and zinc mining. The remaining 32% was produced solely from gold-mining operations. Of these, large-scale gold mining operations accounted for about 69% of output; medium-scale operations, 23%; and small-scale operations, 8%. Gold production from large-scale mining operations was produced mainly in the form of dore (97%). The Antofagasta Region also continued to rank first among Chile's silver-producing regions, accounting for about 68% of production, followed by the Coquimbo (9%) and the Libertador General Bernardo O'Higgins (7%) Regions. Of the 1,309,321 kg of silver produced in 2019, about 88% was from copper-mining operations and the remainder was produced from gold, lead, silver, and zinc mining operations (Servicio Nacional de Geología y Minería, 2020, p. 85–92).

Iron ore.—In 2019, iron ore production decreased by about 6% to 13.1 Mt compared with 14.0 Mt in 2018. Iron ore was produced in the Atacama and Coquimbo Regions, which accounted for about 88% and 12% of the country's total iron ore output, respectively. CMP continued to be the major producer of iron ore in Chile; and the company produced about 99% of Chile's exported iron ore. As of December 31, CMP held 1,847 mining concessions that covered 424,644 hectares and 75 active exploration licenses that covered 30,800 hectares. Its operations were divided into three production units—Valle del Huasco, which included Los Colorados Mine; Valle del Elqui, which included El Romeral Mines; and Valle Copiapo, which included the Cerro Negro Norte Mine. As of December 2019,

total proven and probable mineral reserves at the Cerro Negro Norte and Los Colorados Mines, which were located in the Atacama Region, were reported as 303.4 Mt at an average grade of 33.7% iron and 407.8 Mt at an average grade of 36.1% iron, respectively. Total proven and probable mineral reserves at El Romeral, which is located in the Coquimbo Region, were reported as 93.5 Mt at an average grade of 31.1% iron (Compañía Minera del Pacífico S.A., 2018; 2020, p. 29; Servicio Nacional de Geología y Minería, 2020, p. 93).

Lead and Zinc.—In 2019, lead and zinc were produced from gold, lead, and zinc concentrates. During the year, the country produced 7 t of lead from the Coquimbo Region compared with 712 t in 2018; and 5,620 t of zinc mainly from the Metropolitana (Santiago) Region compared with 26,810 t in 2018. The significant decreases in lead and zinc production were attributed to the closure of Sociedad Contractual Minera El Toqui Ltda.'s (El Toqui) operations in the country after the company filed for bankruptcy in 2019. El Toqui, which was a subsidiary of Laguna Gold Ltd. of Australia, was the only large-scale lead and zinc mining operation in the country. El Toqui's underground mine had the capacity to produce 2,000 t/yr of lead and 38,000 t/yr of zinc (Reporte Minero, 2019; Servicio Nacional de Geología y Minería, 2020, p. 95–97).

Molybdenum.—Molybdenum was produced as a byproduct of copper production and was carried out mainly by large copper mining companies in the country. CODELCO continued to be the leading producer of molybdenum in the country, accounting for about 41% of Chile's total molybdenum production in 2019, followed by Los Pelambres (20%) and Sierra Gorda (17%). In 2019, the production of molybdenum decreased to 53,541 t from 60,248 t; the decrease was mainly attributed to a decrease in production from major producers, including Sierra Gorda SCM (which decreased its production by 25%), Los Pelambres (16%), and CODELCO (7%). The leading producing regions were the Antofagasta, Coquimbo, and Libertador General Bernardo O'Higgins Regions, which accounted for about 40%, 21%, and 15%, respectively, of the country's molybdenum output (tables 1, 2; Servicio Nacional de Geología y Minería, 2020, p. 84; Comisión Chilena del Cobre, 2020a, p. 20).

Minera Centinela, which was a joint venture between Antofagasta (70%) and Marubeni Corp. (30%), operated the Centinela Mine, which is located in the Antofagasta Region. In 2019, Minera Centinela increased molybdenum production by 776% to 2,778 t, which was attributed to the startup of its new molybdenum plant in 2018. The new plant had the capacity to produce about 3,000 t/yr of molybdenum and was expected to produce between 2,500 t and 3,000 t of molybdenum in 2020. Molybdenum production at Los Pelambres decreased to 11,256 t in 2019 from 13,352 t in 2018; the decrease was attributed to the recovery of lower ore grades. As a result, the company expected molybdenum production at Los Pelambres to decrease to between 10,000 and 11,000 t in 2020 (table 1; Antofagasta plc, 2020, p. 56–57; 59; Comisión Chilena del Cobre, 2020a, p. 20).

Sierra Gorda, which is located in the Antofagasta Region, was owned by KGHM International Ltd. of Poland (55%), Sumitomo Metal Mining Co. Ltd. of Japan (31.5%), and Sumitomo Corp. of Japan (13.5%). In 2019, molybdenum production from Sierra Gorda decreased to 9,321 t from 12,413 t

in 2018; the decrease was attributed to the mining of lower ore grades (tables 1, 2; Sierra Gorda SCM, 2019; Comisión Chilena del Cobre, 2020a, p. 20).

In 2019, molybdenum production at CODELCO decreased to 22,353 t from 24,031 t in 2018. The decrease was mainly attributed to decreases at the company's Andina, Salvador, and Chuquicamata and Radomiro Tomic Mines, where molybdenum production decreased by 40%, 24%, and 6%, respectively. Chuquicamata continued to be the company's leading producer, accounting for 51% of CODELCO's molybdenum production (table 2; Comisión Chilena del Cobre, 2020a, p. 20; Corporación Nacional del Cobre, 2020, p. 30).

Industrial Minerals

Boron.—Production of boron (ulexite) and boric acid was mainly from the mining and (or) processing of boron-bearing brines from Andean salt flats in the northern part of Chile, mainly the Arica y Parinacota and Antofagasta Regions. The Arica y Parinacota Region produced about 99% of the country's ulexite output and 100% of the boric acid output. In 2019, production of ulexite decreased to 352,255 t from 398,411 t in 2018, which was attributed to a 76% decrease in output from the Antofagasta Region and an 8% decrease in output from the Arica y Parinacota Region. The largest known ulexite deposit in the world, Salar de Surire, was operated by Quiborax S.A. The ulexite mined from the Salar de Surire, which is located in the Arica y Parinacota Region, was processed at the company's plant, where it was converted into boric acid and agrochemical products. The processing plant, which was located about 69 kilometers (km) from the Port of Arica, had the capacity to produce 36,000 t/yr boric acid. Quiborax also mined ulexite from the Salar Ascotán, which is located in the Antofagasta Region (tables 1, 2; Servicio Nacional de Geología y Minería, 2020, p. 118–119, 153, 157; Quiborax S.A., 2021a, b).

Iodine.—In 2019, the production of iodine, which was extracted from solutions produced by leaching caliche ore, increased by 3% to 20,826 t. The Tarapaca Region accounted for 64% of the country's total iodine production and the Antofagasta Region accounted for the remaining 36%. SQM, through its wholly owned subsidiary SQM Salar S.A., continued to be the country's leading producer of iodine. The company produced iodine at its facilities at the Nueva Victoria plant (includes the Iris plant), which were located in the Tarapaca Region, and the Pedro de Valdivia and María Elena plants, which are located in the Antofagasta Region. In 2019, SQM produced a total of 12,082 t of iodine, which was an increase of about 7% compared with that in 2018. The Nueva Victoria plant continued to produce about 80% of SQM's total iodine production (table 2; Servicio Nacional de Geología y Minería, 2020, p. 143; Sociedad Química y Minera de Chile S.A., 2019, p. 32; 2020, p. 30–31).

Lithium.—The source of Chile's globally significant lithium reserves are the brine deposits of the Salar de Atacama, which is located about 250 km from Antofagasta. The brine deposits of the Salar de Atacama, which is a salt-encrusted depression in the Atacama Desert, contain high concentrations of lithium and potassium as well as significant concentrations of sulfate and boron. Chile's lithium continued to be recovered from two brine operations within the Salar de Atacama that were owned by

Albemarle through its subsidiary Rockwood Litio Ltda., and by SQM. Lithium-bearing brine concentrates were transported and processed at Albemarle's lithium carbonate and lithium chloride plants, located in La Negra, and SQM's lithium carbonate and lithium hydroxide plants, which are located near the city of Antofagasta (Salar del Carmen facilities). The Antofagasta Region has been producing lithium carbonate uninterruptedly since 1984; lithium chloride, since 1998; and lithium hydroxide, since 2005. In 2019, SQM's lithium carbonate production capacity was 70,000 t/yr, and its lithium hydroxide production capacity was 13,500 t/yr. The company reported that it planned to further increase lithium carbonate and lithium hydroxide capacities to 120,000 t/yr and to 21,500 t/yr, respectively, by 2021. During the year, Albemarle continued with its expansion project at La Negra facility. The project, which was expected to increase the facility's battery-grade lithium carbonate capacity, included the commissioning of three new plants—La Negra II, La Negra III, and La Negra IV. La Negra II was commissioned in 2017 and La Negra III and La Negra IV were expected to be commissioned by 2021. After the rampup of La Negra III and La Negra IV plants, Albemarle's total capacity at La Negra's facility would increase to 84,000 t/yr from 44,000 t/yr of battery-grade lithium carbonate (table 2; Albemarle Corp., 2019, p. 63, 85, 101; Servicio Nacional de Geología y Minería, 2020, p. 120–121; Sociedad Química y Minera de Chile S.A., 2020, p. 21, 33, 51).

Pumice.—In 2019, the production of pumice decreased to 680,771 t from 803,916 t in 2018. This decrease was attributed mainly to a 10% decrease in output from operations in the Metropolitana (Santiago) Region, which was the country's leading producing region. No production was reported from the Libertador General Bernardo O'Higgins Region in 2019 (tables 1, 2; Servicio Nacional de Geología y Minería, 2020, p. 129).

Mineral Fuels and Related Materials

Coal.—Coal production from the Magallanes y de la Antartica Chilena Region accounted for 97% of the country's total coal production, followed by the Biobio Region, which accounted for the remaining 3%. Mina Invierno S.A., which was jointly owned by Empresas Copec S.A. and Inversiones Ultraterra Ltd., continued to be the leading producer of coal in the country. Mina Invierno, which mined coal at Isla Riesco in the Magallanes y de la Antartica Chilena Region, had the capacity to produce 6 million metric tons per year. Mina Invierno's mining concessions included the Adela, the Elena, the Invierno, and the Rio Eduardo deposits. In 2019, coal production at Mina Invierno decreased to 1.6 Mt from the 2.3 Mt produced in 2018. The decrease was mainly owing to the suspension of all mining activities at Mina Invierno in June after the Tribunal Ambiental de Valdivia decided to uphold a precautionary measure prohibiting blasting farther down than 100 meters below sea level. The company reported that, owing to its inability to use blasting as a complementary method for the extraction of sterile material (necessary in order to gain access to the coal), all operations at Mina Invierno were expected to be shut down by March 2020 (table 2; Empresas Copec S.A., 2019, p., 133; 2020, p. 144–145; Servicio Nacional de Geología y Minería, 2020, 148; Mina Invierno S.A., 2021).

Reserves and Resources

Table 3 lists Chile's reserves of major mineral commodities.

Outlook

Chile's real GDP is expected to decrease by 5.8% in 2020 compared with an increase of 1.1% in 2019. The mineral sector is expected to continue to be a significant part of the country's economy and to contribute about 10% to the country's total GDP in 2020. The output value of the mineral industry is projected to increase by about 1% in 2020 owing mainly to a projected increase in the production of iron ore and lithium carbonate. The production of lithium carbonate is likely to increase by more than 10% in 2020 owing mainly to the increasing demand for this mineral commodity from electric vehicle battery manufacturers. The copper industry is likely to continue to account for about 9% of Chile's total GDP and to supply about 90% of the output value of the mineral industry. Escondida is expected to remain the world's top copper-producing mine and CODELCO is expected to continue to be the world's largest copper producer in terms of the number of active projects or operations. Mineral exports are likely to account for more than 55% of the country's total exports and are expected to increase by nearly 10% in 2020. The mineral sector is likely to continue to be one of the principal sectors receiving FDI in Chile owing mainly to the growing interest in the country's lithium resources. Chile's economy is likely to be significantly affected by the coronavirus disease 2019 (COVID-19) pandemic in the near term as the Government works to contain the outbreak and spread of the disease (Banco Central de Chile, 2021a, p. 6–7; 2021b, p. 5, 32; Comisión Chilena del Cobre, 2021a, p. 60, 66).

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TABLE 1
CHILE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2015	2016	2017	2018	2019	
METALS						
Copper:						
Mine, Cu content:						
Concentrates	3,993,700	3,892,300	3,917,300	4,256,300	4,207,200	
Solvent extraction	1,778,400	1,660,300	1,586,200	1,575,300	1,580,200	
Copper sulfate	9,496	11,410	11,893	13,523	8,058	
Smelter, primary	thousand metric tons	1,382	1,365	1,265	1,246	1,011
Refinery, primary, other	do.	910	952	843	886	689
Gold, mine, Au content	kilograms	42,501	46,333	37,911	37,066	38,455
Iron ore, mine:						
Gross weight	thousand metric tons	15,448	14,619	15,426	14,013	13,137
Fe content	do.	9,148	9,009	9,549	8,493	8,427
Iron and steel:						
Pig iron	do.	644	678	670	661	595
Raw steel	do.	1,112	1,153	1,158	1,145	1,095
Lead, mine, Pb content		2,979	1,110	1,562	712	7
Mercury, Hg content ^e		14	2	11	10	10
Molybdenum, mine, Mo content		52,398	55,834	62,454	60,248	53,541
Rhenium, Re content ^e	kilograms	26,000	27,000	27,000	27,000	30,000
Silver, mine, Ag content	do.	1,504,271	1,501,436	1,318,582	1,370,237 ^r	1,309,321
Zinc, mine, Zn content		48,071	42,870	29,008	26,810	5,620
INDUSTRIAL MINERALS						
Boron:						
Boric acid, H ₃ BO ₃		101,170	104,299	111,542	105,694	86,535
Ulexite, natural		517,584	558,854	607,076	398,411	352,255
Cement, hydraulic	thousand metric tons	4,320 ^r	4,310 ^r	4,000 ^r	3,990 ^{r,e}	4,210 ^e
Clay:						
Bauxitic clay		29,166	19,113	22,862	12,707	27,157
Bentonite		1,434	1,288	1,584	525	395
Kaolin		60,000	60,000	60,000	88,262	34,081
Diatomite		26,186	26,937	27,557	24,736	21,328
Feldspar, mine		6,577	6,352	4,421	2,789	55
Gypsum, mine		860,075	934,033	1,157,466	909,191	977,397
Iodine, elemental		21,179	18,444	17,976	20,216	20,826
Lime ^e	thousand metric tons	910	920	930	930	920
Lithium:						
Lithium carbonate		50,418	70,831	73,563	87,029	100,787
Lithium chloride		2,069	1,775	2,535	3,826	1,886
Lithium hydroxide		3,888	5,576	5,280	6,468	9,934
Nitrogen, nitrates, crude, natural	thousand metric tons	795	806	853	949	868
Peat, horticultural use		2,306	3,621	7,908	6,249	1,851
Phosphate rock:						
Apatite:						
Gross weight		6,781	1,604	--	--	--
P ₂ O ₅ content ^e		2,000	500	--	--	--
Guano		3,408	4,601	4,238	4,154	3,405
Phosphorite		9,360	--	--	--	--
Potash:						
Compounds:						
Potassium chloride, KCl		1,775,974	1,964,201	1,900,166	1,569,067	1,082,059
Potassium sulfate, K ₂ SO ₄		113,101	123,627	75,085	--	--
Pumice and related materials, pumice and pozzolan		804,121	840,976	838,890	803,916	680,771

See footnotes at end of table.

TABLE 1—Continued
CHILE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2015	2016	2017	2018	2019
INDUSTRIAL MINERALS—Continued					
Salt thousand metric tons	11,831	8,140	7,441	10,012	10,477
Sand and gravel, industrial, silica	824,153	911,729	887,851	792,328	825,327
Stone, sand, and gravel, construction:					
Stone:					
Crushed, quartzite	433,560	399,576	551,765	584,061	465,462
Dimension:					
Marble	2,401	4,395	5,025	3,511	3,623
Travertine	2,999	3,292	1,220	--	--
Other, size and shape unspecified:					
Coquina thousand metric tons	506	481	394	464	491
Ground calcium carbonate do.	44	49	38	20	27
Limestone do.	6,147	6,846	6,591	6,136	4,345
Sulfur, byproduct, metallurgy, S content do.	1,488	1,596	1,524	1,476 ^r	1,500 ^e
Zeolites	--	386	86	122	253
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous ³ thousand metric tons	3,162	2,525	2,495	2,295	1,607
Natural gas million cubic meters	1,064	1,175	1,200	1,221	1,339
Petroleum:					
Crude, including condensate thousand 42-gallon barrels	1,796	1,503	1,242	1,120	1,130
Refinery: ⁴					
Diesel, including distillate fuel oil do.	22,239	21,760	23,000 ^r	23,000	24,000
Gasoline do.	24,320	24,867	26,000 ^r	25,000	28,000
Kerosene do.	5,327	5,534	5,824	6,000	8,000
Liquefied petroleum gas do.	3,050	2,868	3,277	5,000	5,000 ^e
Residual fuel oil do.	8,283	8,075	7,742	7,600	7,000 ^e
Other do.	6,377	6,069	5,138	5,100	500 ^e
Total do.	69,600	69,200	71,000 ^r	71,700	72,500

^eEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through December 7, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the commodities listed, arsenic trioxide, barite, ferroalloys, hydraulic lime, lapiz lazuli, manganese, metallurgical coke, methanol, pyrite, sodium sulfate, and steel semimanufactures may have been produced, but available information was inadequate to make reliable estimates of output.

³Data may include production of subbituminous coal.

⁴Source: Empresa Nacional del Petróleo (ENAMI).

TABLE 2
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Boron:			
Boric acid, H ₃ BO ₃	Quiborax S.A. (private, Chile-based investors, 100%)	Plant at Arica y Parinacota Region	100
Do.	SQM Salar S.A. [Sociedad Química y Minera de Chile S.A., 100%]	Plant at Salar de Atacama salt flat, Antofagasta Region	15
Ulexite, natural	Quiborax S.A. (private, Chile-based investors, 100%)	Mines at Salar del Surire, Arica y Parinacota Region and Salar de Ascotan, Antofagasta Region	520
Cement			
	Cementos Bío Bío S.A. (private, 100%)	Curico plant, Maule Region	500
Do.	do.	La Negra plant, Antofagasta Region	500
Do.	do.	San Antonio plant, Valparaiso Region	1,700
Do.	do.	Talcahuano plant, Biobio Region	300
Do.	Melón S.A. (Inversiones Cordillera del Sur III Ltda., 99.5%)	La Calera and Ventanas plants, Valparaiso Region, Puerto Montt plant, Los Lagos Region	NA
Clay:			
Bentonite	S.C. Industrial Minera Geo Sinter Ltda.	Camaleón 1 al 3 Mine, Arica y Parinacota Region	NA
Do.	Sociedad Legal Minera Mabel Dos Primera de Arica	Zorrito 1 al 2 Mine, Arica y Parinacota Region	NA
Kaolin	Minera Lealtad Ltda.	Lealtad, Metropolitana (Santiago) Region	NA
Coal	Mina Invierno S.A. (Empresas Copec S.A. 50%, and Inversiones Ultraterra Ltd. 50%)	Mina Invierno Mine, Isla Riesco, Magallanes y de la Antartica Chilena Region	6,000
Coke, metallurgical	Compañía Siderúrgica Huachipato S.A. (CAP S.A., 100%)	Plant at Bahía de San Vicente, Talcahuano, Biobio Region	500
Copper, Cu content	Anglo American Sur S.A. (Anglo American plc, 50.1%; Mitsubishi Corp., 20.4%; Corporación Nacional del Cobre (CODELCO), 20%; Mitsui & Co., Ltd., 9.5%)	Los Bronces Mine and SX-EW ¹ plant, Metropolitana (Santiago) Region	40
Do.	Antofagasta Plc, 50%, and Barrick Gold Corp., 50%	Zaldivar Mine and SX-EW ¹ plant, Antofagasta Region	100
Do.	Antofagasta Plc, 70%, and Marubeni Corp., 30%	Antucoya Mine and SX-EW ¹ plant, Antofagasta Region	80
Do.	do.	Centinela Mine (El Tesoro) and SX-EW ¹ plant, Antofagasta Region	90
Do.	Antofagasta Plc, 60%; JX Nippon Mining & Metals Corp., 25%; Mitsubishi Materials Corp., 15%	Los Pelambres Mine, Coquimbo Region	370 ²
Do.	Compañía Contractual Minera Candelaria (Lundin Mining Corp., 80%; Sumitomo Metal Mining Co. Ltd., 15%; Sumitomo Corp., 5%)	Candelaria Mine, Antacama Region	160 ²
Do.	Compañía Minera Carmen de Andacollo [Teck Resources Ltd., 90%, and Empresa Nacional de Minería (ENAMI) (Government, 100%), 10%]	Carmen de Andacollo Mine and SX-EW ¹ plant, Coquimbo Region	2
Do.	Compañía Minera Cerro Colorado Ltda. (BHP Billiton Ltd., 100%)	Cerro Colorado Mine and SX-EW ¹ plant, Tarapaca Region	65
Do.	Compañía Minera Doña Inés de Collahuasi SCM (Anglo American plc, 44%; Glencore plc, 44%; Japan Collahuasi Resources B.V., 12%)	Collahuasi Mine, Tarapaca Region	570 ²
Do.	Compañía Minera Minera Lomas Bayas (Glencore plc, 100%)	Lomas Bayas Mine and SX-EW ¹ plant, Antofagasta Region	75
Do.	Compañía Minera Teck Quebrada Blanca S.A. [Teck Resources Ltd., 60%; Sumitomo Metal Mining Co., Ltd. and Sumitomo Corp. of Japan, 30%; Empresa Nacional de Minería (Government, 100%), 10%]	Quebrada Blanca Mine and SX-EW ¹ plant, Tarapaca Region	25
Do.	Complejo Metalurgico Altonorte S.A. (Glencore plc, 100%)	Altonorte smelter, La Negra, Antofagasta Region	310
Do.	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Chuquicamata Mine and SX-EW ¹ plant, Calama, Antofagasta Region	60
Do.	do.	Chuquicamata smelter, Calama, Antofagasta Region	450
Do.	do.	Gabriela Mistral Mine and SX-EW ¹ plant, Sierra Gorda, Antofagasta Region	125
Do.	do.	Radomiro Tomic Mine and SX-EW ¹ plant, Calama Antofagasta Region	230

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Copper, Cu content:—		Corporación Nacional del Cobre (CODELCO)	El Teniente Mine and SX-EW ¹ plant, Machali,	2
Continued		(Government, 100%)	Libertador General Bernardo O'Higgins Region	
Do.	do.	do.	Caletones smelter, Machali,	400
			Libertador General Bernardo O'Higgins Region	
Do.	do.	do.	Ministro Hales Mine, Calama, Antofagasta Region	180 ²
Do.	do.	do.	Ventanas refinery, Valparaíso Region	410
Do.	do.	do.	Ventanas smelter, Valparaíso Region	120
Do.	do.	do.	Andina Mine, Valparaíso Region	200 ²
Do.	do.	do.	Salvador Mine and SX-EW ¹ plant,	20
			Chañaral, Atacama Region	
Do.	do.	do.	Potrerillos smelter, Chañaral, Atacama Region	140
Do.		Empresa Minera de Mantos Blancos S.A.	Mantos Blancos Mine and SX-EW ¹ plant, Antofagasta	25
		(Consortium led by Audley Capital Advisors LLP)	Region	
Do.	do.	do.	Mantoverde Mine and SX-EW ¹ plant, Atacama Region	45
Do.		Empresa Nacional de Minería (ENAMI)	Hernán Videla Lira smelter, Atacama Region	80
		(Government, 100%)		
Do.		Lundin Mining Corp., 80%, and Sumitomo Corp., 20%	Ojos del Salado Mine, Atacama Region	20 ²
Do.		Minera Escondida Ltda. (BHP Billiton Ltd., 57.5%;	Escondida Mine and SX-EW ¹ plant, Antofagasta Region	250
		Rio Tinto plc, 30%; JECO Corp., 12.5%;		
Do.		Minera Spence S.A. (BHP Billiton Ltd., 100%)	Spence Mine and SX-EW ¹ plant, Antofagasta Region	180
Do.		Sociedad Contractual Minera El Abra	El Abra SX-EW ¹ plant, Antofagasta Region	120
		[Freeport-McMoRan Inc., 51%, and		
		Corporación Nacional del Cobre (CODELCO)		
		(Government, 100%), 49%]		
Do.		Sierra Gorda S.C.M. (KGHM International Ltd., 55%;	Sierra Gorda Mine, Antofagasta Region	100 ²
		Sumitomo Metal Mining Co. Ltd., 31.5%;		
		Sumitomo Corp., 13.5%)		
Copper sulfate	metric tons	Compañía Minera San Gerónimo	Plant at Faena Lambert, El Romero, Coquimbo Region	13,000
Diatomite		Imerys Minerales Arica Limitada	Mines at Carol, Arica y Parinacota Region and Josefina,	NA
			Tarapaca Region	
Feldspar		Eliana Morales Cueto	Quintay Mine, Valparaíso Region	NA
Do.		Juan Schiappacase Ahumada	Guayacan Segunda Mine, Valparaíso Region	NA
Gold, Au content	kilograms	Antofagasta Plc, 60%; JX Nippon Mining Metals	Los Pelambres Mine and plant, Coquimbo Region	1,700
		Corp., 15%; Mitsubishi Materials Corp., 10%;		
		Marubeni Corp., 8.75%; Mitsubishi Corp., 5%;		
		Mitsui & Co. Ltd., 1.25%		
Do.	do.	Cía. Contractual Minera Candelaria, 100%	Candelaria copper mine and plant, Atacama Region	2,500
Do.	do.	Compañía Minera Cerro Bayo Ltda.	Cerro Bayo Mine, ³ Aysen Region	950
		(Mandalay Resources Corp., 100%)		
Do.	do.	Compañía Minera Doña Inés de Collahuasi SCM	Collahuasi Mine and plants, Tarapaca Region	NA
		(Anglo American plc, 44%; Glencore plc,		
		44%; companies led by Mitsui & Co. Ltd., 12%)		
Do.	do.	Compañía Minera Mantos de Oro	La Coipa Mine and plant, Atacama Region,	6,000
		(Kinross Gold Corp., 100%)	140 kilometers north of Copiapo	
Do.	do.	Compañía Minera Maricunga	Maricunga Mine, ⁴ Atacama Region	7,500
		(Kinross Gold Corp., 100%)		
Do.	do.	Corporación Nacional del Cobre (CODELCO)	Andina, Chuquicamata, El Teniente, Radomiro Tomic, and	2,000
		(Government, 100%)	Salvador Divisions (byproduct of copper production)	
Do.	do.	Empresa Nacional de Minería (ENAMI)	Manuel Antonio Matta plant, Paipote; Osvaldo Martínez	400
		(Government, 100%)	plant, El Salado; and Vallenar plant, Atacama	
			Region; and José Antonio Moreno plant, Taltal,	
			Antofagasta Region	

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Gold, Au content:—		Lundin Mining Corp., 80%; Sumitomo Metal Mining Co. Ltd., 16%; Sumitomo Corp., 4%	Ojos del Salado copper mine and plant, Atacama Region	600
Continued	kilograms			
Do.	do.	Minera Escondida Ltda. (BHP Billiton Ltd., 57.5%; Rio Tinto plc, 30%; Japan Escondida Corp., 12.5%)	Escondida copper mine and plants, Antofagasta Region	4,500
Do.	do.	Antofagasta plc, 70%, and Marubeni Corp., 30%	Centinela Mines and plant, Antofagasta Region	8,000
Do.	do.	Minera Florida Ltda. (Yamana Gold Inc., 100%)	Minera Florida Mine, Metropolitana (Santiago) Region	3,000
Do.	do.	Minera Meridian Ltda. (Yamana Gold Inc., 100%)	El Peñón Mine, Antofagasta Region	5,000
Do.	do.	Sociedad Contractual Minera El Toqui Ltda. (Laguna Gold Ltd., 100%)	El Toqui Mine, Coyhaique, Aysen Region,	1,600
Gypsum, mine		Compañía Minera Polpaico Ltda.	Yeso Norte Mine, Antofagasta Region	NA
Do.		Compañía Minera Romeral S.A. (Etex Group S.A., 59.8%, and Melón S.A., 40.2%)	Mine at El Romeral, Metropolitana (Santiago) Region	NA
Do.		Improver S.A.	Corral 1 Mine, Coquimbo Region	NA
Do.		Minera Lo Valdés Ltda.	Mine in Metropolitana (Santiago) Region	NA
Do.		Minera El Way S.A.	Patty Mine, Coquimbo Region	NA
Iodine	metric tons	ACF Minera S.A	Lagunas Mine, Tarapaca Region	3,000
Do.	do.	Algorta Norte S.A. (Inversiones Minerales S.A., 74.5%, and Toyota Tsusho Corp., 25.5%)	Algorta Mine, Antofagasta Region	4,000
Do.	do.	Atacama Chemical S.A. (Cosayach) (Inverraz S.A., 100%)	Chiquinquiray Mine and Cala-Cala, Negreiros, and Soledad plants, Tarapaca Region	6,000
Do.	do.	Atacama Minerals SCM	Aguas Blancas Mine and plant, Antofagasta Region	1,300
Do.	do.	SQM Salar S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Nueva Victoria Mine and plant and Iris plant, Tarapaca Region; María Elena plant and Pedro de Valdivia Mines and plants, Antofagasta Region	14,800
Iron ore, Fe content		Compañía Minera del Pacífico S.A. (CAP S.A., 75%, and Mitsubishi Corp., 25%)	Cerro Negro Norte Mine and Magnetita plant, Atacama Region	4,000
Do.		do.	Los Colorados Mine and Pellets plant, Atacama Region	10,000
Do.		do.	El Romeral Mine, Coquimbo Region	2,000
Iron and steel:				
Pig iron		Compañía Siderúrgica Huachipato S.A (CAP S.A., 100%)	Plant at Bahía de San Vicente, Talcahuano, Biobío Region	1,200
Raw steel		do.	do.	1,500
Do.		Gerdau AZA S.A.	Steel plants in Renca and Colina, Metropolitana (Santiago) Region	520
Lead, Pb content	metric tons	Sociedad Contractual Minera El Toqui Ltda. (Laguna Gold Ltd., 100%)	El Toqui Mine, ⁴ Coyhaique, Aysen Region	2,000
Lithium:				
Lithium carbonate	do.	Rockwood Litio Ltda. (Albemarle Corp., 100%)	La Negra I and II plants, Antofagasta Region	44,000
Do.	do.	SQM Salar S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Salar del Carmen plant, Antofagasta Region	70,000
Lithium chloride	do.	Rockwood Litio Ltda. (Albemarle Corp., 100%)	La Negra I and II plants, Antofagasta Region	6,000
Lithium hydroxide	do.	SQM Salar S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Salar del Carmen plant, Antofagasta Region	13,500
Methanol		Methanex Chile S.A. (Methanex Corp., 100%)	Two methanol plants at Cabo Negro, 28 kilometers north of Punta Arenas City, Magallanes y de la Antártica Chilena Region	1,700
Molybdenum, Mo content	metric tons	Anglo American Sur, S.A. (Anglo American plc, 50.1%; Mitsubishi Corp., 20.4%; Corporación Nacional del Cobre (CODELCO), 20%; Mitsui & Co., Ltd., 9.5%)	Los Bronces Mine and Tortoleros molybdenum flotation plant, Metropolitana (Santiago) Region	3,000
Do.	do.	Antofagasta plc, 70%, and Marubeni Corp., 30%	Centinela Mine and plant, Antofagasta Region	3,000
Do.	do.	Antofagasta Plc, 60%; JX Nippon Mining Metals Corp., 15%; Mitsubishi Materials Corp., 10%; Marubeni Corp., 8.75%; Mitsubishi Corp., 5%; Mitsui & Co. Ltd., 1.25%	Los Pelambres Mine and plant, Coquimbo Region	12,500

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Molybdenum, Mo content:— Continued	metric tons	Compañía Minera Doña Inés de Collahuasi SCM, 100% (Anglo American plc, 44%; Glencore plc, 44%; companies led by Mitsui & Co. Ltd., 12%)	Collahuasi Mine and molybdenum plant, Tarapaca Region	6,000
Do.	do.	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Chuquicamata Mine and plant and Radomiro Tomic Mine and plant, Antofagasta Region	20,000
Do.	do.	do.	El Teniente Mine and plant, Libertador General Bernardo O'Higgins Region	8,000
Do.	do.	do.	Andina Mine and plant, Valparaiso Region	5,000
Do.	do.	do.	Salvador Mines and plant, Atacama Region	1,500
Do.	do.	Molyb Ltda. [Corporación Nacional del Cobre (CODELCO) (Government, 100%)]	Plant at Mejillones, Antofagasta Region	17,000
Do.	do.	Sierra Gorda S.C.M. (KGHM International Ltd., 55%; Sumitomo Metal Mining Co. Ltd., 31.5%; Sumitomo Corp., 13.5%)	Sierra Gorda Mine, Antofagasta Region	9,000
Phosphate rock, guano		Guano Rojo S.A.	Barrancos, Chipana, Esperanza, Pozo Toyo, and Punta de Lobos Mines, Tarapaca Region	NA
Potash, compounds:				
Potassium chloride (KCl)		Rockwood Lithio Ltda. (Albemarle Corp., 100%)	Plant at Salar de Atacama salt flat, Antofagasta Region	NA
Do.		SQM Salar S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	do.	2,680
Potassium sulfate(K ₂ SO ₄)		SQM Salar S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	do.	245
Pumice and related materials, pumice and pozzolan		Compañía Minera Polpaico Ltda.	Puzolana Norte Mine, Antofagasta Region, and Puzolana Pudahue Mine, Metropolitana (Santiago) Region	NA
Do.		Imerys Minerales Santiago Ltda. (IMERYS S.A., 100%)	Gaby 1-4 Mine, Metropolitana (Santiago) Region	NA
Do.		Minera El Way S.A. (Cementos Bio Bio S.A., 100%)	Juana Mine, Antofagasta Region and Condor Mine, Arica y Parinacota Region	NA
Do.		Minera Melon S.A.	Las Casas Mine, Metropolitana (Santiago) Region	NA
Do.		Minera Río Teno S.A. (Cementos Bio Bio S.A., 100%)	Camarico Mine, Maule Region, Las Pataguas Mine, Libertador General Bernardo O'Higgins Region, Popeta Yacimiento Mine, Metropolitana (Santiago) Region	NA
Rhenium, metal	kilograms	Molibdenos y Metales S.A., 100%	Nos plant, San Bernardo, Metropolitana (Santiago) Region	30,000
Do.	do.	Molyb Ltda. [Corporación Nacional del Cobre (CODELCO) (Government, 100%)]	Plant in Mejillones, Antofagasta Region Region	8,000
Salt		Cía. Minera Cordillera Chile S.C.M.	Tenardita Mine, Tarapaca Region	NA
Do.		Inversiones Alpina Ltda.	Irlanda 3 Mine in the Salar Grande de Tarapaca, Tarapaca Region	NA
Do.		Sociedad Minera Punta de Lobos S.A. (K+S Aktiengesellschaft, 100%)	Kainita and Lobera Mines in the Salar Grande de Tarapaca, Tarapaca Region	NA
Sand and gravel, industrial, silica		Aremin E.I.R.L.	Quarry at Biobio Region	NA
Do.		Migrin S.A.	El Turco Quarry, Valparaiso Region	NA
Do.		Minera Toro S.P.A	Quarry at Píntalca, Maule Region	NA
Do.		Minera Faro Carranza S.A.	Quarry at Los Carros, Maule Region	NA
Do.		SML Santa Dorila de Las Arenitas	Quarry at Maule Region	NA

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Silver, Ag content kilograms	Anglo American Sur S.A. (Anglo American plc, 50.1%; Mitsubishi Corp., 20.4%; Corporación Nacional del Cobre (CODELCO), 20%; Mitsui & Co., Ltd., 9.5%)	Los Bronces Mine and plants, Metropolitana (Santiago) Region	35,000
Do.	do. Antofagasta Plc, 60%; JX Nippon Mining Metals Corp., 15%; Mitsubishi Materials Corp., 10%; Marubeni Corp., 8.75%; Mitsubishi Corp., 5%; Mitsui & Co. Ltd., 1.25%	Los Pelambres Mine and plant, Coquimbo Region	42,000
Do.	do. Compañía Minera Cerro Bayo Ltda. (Mandalay Resources Corp., 100%)	Cerro Bayo Mine ³ and concentration plant, Aysen Region	110,000
Do.	do. Compañía Minera Doña Inés de Collahuasi SCM, 100% (Anglo American plc, 44%; Glencore plc, 44%; companies led by Mitsui & Co. Ltd., 12%)	Collahuasi Mine and plants, Tarapaca Region	60,000
Do.	do. Compañía Contractual Minera Candelaria, 100%	Candelaria Mine and plant, Atacama Region	30,000
Do.	do. Compañía Minera Mantos de Oro (Kinross Gold Corp., 100%)	La Coipa Mine and plant, Atacama Region, 140 kilometers north of Copiapo	150,000
Do.	do. Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Andina, Chuquicamata, El Teniente, Radomiro Tomic, and Salvador Mines (byproduct of copper production)	300,000
Do.	do. Empresa Nacional de Minería (ENAMI) (Government, 100%)	Manuel Antonio Matta plant; Osvaldo Martínez Carvajal plant; Vallenar plant, Atacama Region; and José Antonio Moreno plant, Antofagasta Region	6,000
Do.	do. Minera Meridian Ltda. (Yamana Gold Inc., 100%)	El Peñón Mine, Antofagasta Region	130,000
Do.	do. Minera Escondida Ltda. (BHP Billiton Ltd., 57.5%; Rio Tinto plc, 30%; Japan Escondida Corp., 12.5%)	Escondida copper mine and plants, Antofagasta Region	180,000
Do.	do. Lundin Mining Corp., 80%; Sumitomo Metal Mining Co. Ltd., 16%; Sumitomo Corp., 4%	Ojos del Salado copper mine and plant, Atacama Region	4,500
Do.	do. Sociedad Contractual Minera El Toqui Ltda. (Laguna Gold Ltd., 100%)	El Toqui Mine, Coyhaique, Aysen Region,	11,000
Stone:			
Crushed, quartzite	Antonio Zotti Rosetti y Cía. Sociedad Minera	Illapel Mine, Coquimbo Region	NA
Do.	Cedric Fernández y Compañía Ltda.	Nancy Mine, Antofagasta Region	NA
Do.	Eliana Morales Cueto	Quintay Mine, Valparaiso Region	NA
Do.	Migrin S.A.	Las Piedras Mine, Maule Region	NA
Dimension:			
Marble	Compañía Minera Feltre Ltda.	La Pola Quarry, Atacama Region	NA
Do.	Marmolería Italo Cedolin y Cía. Ltda.	Gabriela 1/3 Quarry, Atacama Region	NA
Travertine	Andes Travertine & Stones S.A.	Quarry and plant in Antofagasta Region	NA
Do.	metric tons Mármoles San Marino Chile S.A. (Grupo San Marino S.A., 100%)	Quarry near Calama, Antofagasta Region, and plant in Til-Til, Metropolitana (Santiago) Region	7,000
Other:			
Ground calcium carbonate	Sibelco Chile Ltda.	EL Cristo 1 al 60 Mine, Atacama Region	NA
Do.	Minera Trucco Ltda.	Carmen I Mine, Atacama Region	NA
Limestone	Compañía Minera Polpaico Ltda.	Cerro Blanco Mine, Antofagasta Region	NA
Do.	Compañía Siderúrgica Huachipato S.A. (CAP S.A., 100%)	Guarello Mine, Magallanes y de la Antártica Chilena Region	NA
Do.	Minera El Jilguero S.A. (Cementos Bío Bío S.A., 100%)	Jilguero Mine, Atacama Region	NA
Do.	Minera El Way S.A. (Cementos Bío Bío S.A., 100%)	El Way Mine, Antofagasta Region	NA
Do.	Minera Melón S.A.	Cantera Ñilhue Mine, Valparaiso Region	NA
Do.	Minera Río Colorado S.A. (Cementos Bío Bío S.A., 51%, and Soprocál Calerías e Industrias S.A., 49%)	La Perla Mine, Metropolitana (Santiago) Region	NA
Do.	Minera Río Teno S.A. (Cementos Bío Bío S.A., 100%)	Mina del Fierro Mine, Maule Region	NA
Sulfuric acid	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	El Teniente plant, Libertador General Bernardo O'Higgins Region, Salvador plant, Atacama Region, and Chuquicamata plant, Valparaiso Region	2,900
Do.	Empresa Nacional de Minería (ENAMI) (Government, 100%)	Hernán Videla Lira smelter, Atacama Region	NA

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Zinc, Zn content	metric tons	Minera Florida Ltda. (Yamana Gold Inc., 100%)	Minera Florida Mine, Metropolitana (Santiago) Region	6,000
Do.	do.	Sociedad Contractual Minera El Toqui Ltda. (Laguna Gold Ltd., 100%)	El Toqui Mine, ⁴ Coyhaique, Aysen Region	38,000

^cEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹Solvent extraction and electrowinning.

²Concentrates.

³On care-and-maintenance status.

⁴Closed.

TABLE 3
CHILE: RESERVES OF MAJOR MINERALS IN 2019

(Thousand metric tons unless otherwise specified)

Commodity	Reserves ¹
Copper, Cu content	million metric tons
Gold, Au content	metric tons
Iodine	
Iron ore, Fe content	million metric tons
Lithium, Li content	
Molybdenum, Mo content	
Nitrates	
Silver, Ag content	metric tons

^cEstimated do. Ditto.

¹Source: Servicio Nacional de Geología y Minería (SERNAGEOMIN), Anuario de la Minería de Chile 2016.