



2017–2018 Minerals Yearbook

PERU [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF PERU

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

Peru continued to be among the world's leading producers of many nonfuel minerals and base metals. In 2017, the country was ranked second in the world's production of silver (16% of world production) and copper and zinc (12% each); third in production of lead (7%); and fourth in production of molybdenum (9%) and tin (6%). According to the Ministerio de Energía y Minas (MEM) (2018a, p. 38, 40), Peru continued to be Latin America's leading producer of andalusite, gold, indium, kyanite and related minerals, lead, selenium, and zinc; the region's second-ranked producer of cadmium, copper, diatomite, molybdenum, phosphate rock, and silver; and the region's third-ranked producer of tin. The country's world rankings for mineral reserves were as follows: first for silver; third for copper, molybdenum, and zinc; fourth for lead; and seventh for gold (Bennett, 2018, 2019; Flanagan, 2018, 2019; George, 2018; Klochko, 2018, 2019; Polyak, 2018, 2019; Thomas, 2018, 2019; Anderson, 2019).

In 2017, Peru's real gross domestic product (GDP) increased by 2.5% compared with an increase of 4.0% in 2016. The major sectors that contributed to the country's GDP were services (49%), mining and hydrocarbon extraction (14%), and manufacturing (13%). The GDP growth was driven mainly by a 3.4% increase in the country's mining and hydrocarbon sector. Growth in the mining and hydrocarbon sector was attributed to a 10% increase in zinc output from increased production at the Antamina Mine [operated by Compañía Minera Antamina S.A. (Antamina)] and a 4.5% increase in copper mine output from increased production at the Las Bambas Mine [operated by Minera Las Bambas S.A. (Las Bambas)] and at the Toromocho Mine (operated by Minera Chinalco Peru S.A.) (Banco Central de Reserva del Perú, 2018, p. 17, 21, 25; 2019a, p. 24; 2019b; Ministerio de Energía y Minas, 2018a, p. 11).

In the first quarter of 2017, Peru's economy was deeply affected by the El Niño Costero phenomenon, which occurs when ocean surface temperatures warm along the coasts of Ecuador and northern Peru, causing mainly heavy rainfall. Heavy rainfall between December 2016 and May 2017 caused landslides, flooding, and flash floods in the northern regions of the country. El Niño Costero caused loss of life, damaged basic infrastructure, and negatively affected most sectors of the economy, including the mining and hydrocarbon sectors. Mining operations located in the northern and central regions were affected mainly by the closure of roads and railroads, creating disruptions in the transportation of mineral concentrates. The manufacturing sector also was affected by the closure of roads and damage to factories, and by lessened demand for manufactured goods. The country's primary manufacturing facility, the Cajamarquilla refinery, was temporarily closed between March and April as a result of El Niño Costero. The refinery, located in Lima Region, was Peru's sole producer

of cadmium and refined zinc. In addition, anomalous waves resulted in the closure of ports, preventing the departure of ships and delaying the export of goods (Instituto Nacional de Defensa Civil, 2017, p. 11, 13; Banco Central de Reserva del Perú, 2018, p. 9, 26, 32).

Minerals in the National Economy

The mining sector continued to be one of the main contributors of development and economic growth in the country. Peru's mining activity was broadly distributed among 24 of its 25 Regions. Direct employment in the mining sector increased to 200,369 people in 2017 from 171,981 in 2016. Of these 200,369 workers, about 16% worked in Arequipa Region, 9% worked in Junin Region, and 8% worked in La Libertad Region (Banco Central de Reserva del Perú, 2018, p. 22; Ministerio de Energía y Minas, 2018a, p. 100–101; 2019, p. 80–81).

According to the MEM, in 2017, total mining investments increased by 18% to \$3.9 billion from \$3.3 billion (revised) in 2016. The increase was attributed mainly to an increase in the international price of metals during the year. Investments in infrastructure accounted for 39.6% of total mining investments; exploration, for 18.4%; and mining equipment, for 12.5%. Southern Peru Copper Corp. (SPCC) (a subsidiary of Southern Copper Corp. of the United States) invested \$673 million, making it the leading investor in the country. During the year, SPCC continued the Toquepala Mine expansion in Tacna Region, and with the exploration programs at Los Chancas in Apurímac Region and Michiquillay in Cajamarca Region. The Arequipa Region received \$529 million of Peru's mining investments; Tacna, \$518 million; and Cusco, \$387 million (Ministerio de Energía y Minas, 2018a, p. 80–84, 87, 90–92).

Investment in mining in Peru during the next few years was expected to include 49 major projects at various stages of exploration and (or) development, totaling \$58.5 billion. About 47% (\$27 billion) of these investments was for projects at the prefeasibility stage; 29% (\$17 billion) was for projects at the feasibility stage; 20% (\$12 billion) was for projects at the evaluation stage; and 5% (\$3 billion) was for projects at the construction stage. About 20% of the projected investments were from China and the United Kingdom (\$12 billion each); 17%, from Canada (\$10 billion); 16%, from Mexico (\$9 billion); 10%, from the United States (\$6 billion); 7%, from Peru (\$4 billion); and 5%, from Australia (\$3 billion). Copper projects accounted for 69% of the projected total investments in mining; gold and iron ore accounted for 12% each, and phosphates, 4%. The Cajamarca Region was expected to receive 28% of the total investments in mining; the Apurímac Region, 19%; and the Arequipa and Moquegua Regions, 10% each (Ministerio de Energía y Minas, 2018a, p. 90–92).

Government Policies and Programs

Peru's mining sector is regulated by the Ley General de Minería, Decreto Supremo No. 014–92–EM [General Mining Law, Supreme Decree No. 014–92–EM]. The MEM is the Government agency responsible for the administration and regulation of the energy and mining sector. The Instituto Geológico Minero y Metalúrgico [Geological, Mining, and Metallurgical Institute] of the MEM is the authority responsible for all legal matters related to geoscience research and management of land and mining concessions. The Dirección General de Minería [General Mining Directorate] of the MEM has the responsibility to address all legal matters related to mining sector policy. The Dirección General de Asuntos Ambientales [General Directorate of Environmental Affairs] of the MEM has the responsibility to address environmental issues that result from energy and mining activities, and it is mandated to implement environmental laws and regulations. The Dirección General de Formalización Minera (DGFm) [General Directorate of Mining Formalization] of the MEM, which was created by Decree No. 025–2013–EM, is responsible for policies regarding the formalization of the artisanal and small-scale mining sector as well as for issuing and implementing related regulations (Instituto Geológico Minero y Metalúrgico, 2018; Ministerio de Energía y Minas, 2018a, p. 17; 2018b–d).

Peru continued to strengthen its mining formalization process through the implementation of a comprehensive strategy. In December 2016, the Government enacted Legislative Decree No. 1293, which declared of national interest the formalizing of small-scale and artisanal mining activities and created the Proceso de Formalización Minera Integral [Integral Mining Formalization Process]. Under the Proceso de Formalización Minera Integral, the DGFm created the Registro Integral de Formalización Minera (Reinfo) [Comprehensive Mining Formalization Registry] to identify companies and (or) businesses that are dedicated to or benefit from artisanal and small-scale mining. Reinfo would allow the formalization of artisanal and small-scale mining with the purpose of providing economic development opportunities, combatting illegal mining, and promoting natural resource conservation of protected areas. In January, the Government also enacted Legislative Decree No. 1336, which establishes provisions for the Proceso de Formalización Minera Integral, including the simplification of the registration process. In June, the Government enacted Supreme Decree No. 018–2017–EM, which establishes complementary provisions for the simplification of requirements as well as adds economic incentives within the Proceso de Formalización Minera framework. In November, the Government enacted Supreme Decree No. 038–2017–EM, which establishes regulatory provisions for the Instrumento de Gestión Ambiental para la Formalización de Actividades de Pequeña Minería y Minería Artesanal (IGAFOM) [Environmental Management Instrument for the Formalization of Small Mining and Artisanal Mining Activities]. The objective of the IGAFOM is to ensure that artisanal and small-scale mining activities are in compliance with environmental regulations and that miners adopt measures to identify, control, and mitigate environmental impacts, including taking the appropriate measures for the final decommissioning and

reclamation of mines. A total of 5,204 artisanal and small-scale miners from 18 Regions were formalized in 2017. Of the total formalized miners, 34% were located in La Libertad Region; 30%, in Ayacucho Region; 21%, in Puno Region; and 11%, in Arequipa Region (Ministerio de Energía y Minas, 2017a, c; 2018b, p. 18, 20; 2021; Gob.pe, 2021).

PERUPETRO S.A., which was created by law No. 26221, Ley Organica de Hidrocarburos [Organic Law of Hydrocarbons], was responsible for promoting investments in hydrocarbon exploration and mining in Peru. PERUPETRO was also responsible for negotiating, signing, and monitoring contracts and technical agreements for the exploration and mining of hydrocarbons in the country. Petróleos del Peru S.A. (PETROPERU), which was a state-owned company, was responsible for the transportation, refining, distribution, and sale of fuels and other derivatives of petroleum. PETROPERU owned most of the refineries in the country (Petróleos del Peru S.A., 2021b; PERUPETRO S.A., 2021).

Production

In 2017, production of iron ore (gross weight and Fe content) increased by 15% each owing to the startup of the first phase of the Marcona Mine's expansion project (which was owned by Shougang Hierro Perú S.A.A.) and the Minera Shouxin Peru S.A.'s tailings recovery project. Mined production of zinc increased by 10%, which was attributed primarily to a 70% increase in production at the Antamina Mine. Antamina continued to be the leading zinc producer in the country. Industrial minerals for which production increased by more than 10% were mica (by 111%), onyx (107%), talc (68%), pyrophyllite (27%), and barite and unspecified crushed stone (15% each). Mineral fuels and related materials for which production increased included anthracite coal (by 26%), lubricants (17%), and jet fuel (10%).

During the year, production of artisanal gold decreased by 17% and primary copper electrowon decreased by 15%. Industrial minerals for which production decreased by more than 10% included bentonite (by 96%), gypsum (35%), marble (28%), andalusite and slate (22% each), phosphate rock (gross weight) (21%), phosphate rock (P₂O₅ content) (20%), travertine (13%), construction sand and gravel (12%), and feldspar (10%). In 2017, the mineral fuels and related materials for which production decreased included distillate fuel oil (by 63%), residual fuel oil (24%), and gasoline (10%). Inkabor S.A.C., which was Peru's sole producer of boron, did not produce boron in 2017. Data on mineral production are in table 1.

Structure of the Mineral Industry

The majority of mining operations in Peru were privately owned. In 2017, the country's copper mining companies included Antamina, Las Bambas, Sociedad Minera Cerro Verde S.A.A. (Cerro Verde), and SPCC. The country's leading silver producers included Antamina, Compañía de Minas Buenaventura S.A.A. (Buenaventura), and Compañía Minera Ares S.A.C. The leading zinc producers included Antamina, Nexa Resources Peru SAA (formerly known as Compañía Minera Milpo S.A.A.), and Volcan Compañía Minera S.A.A. (Volcan). Molybdenum was produced as a byproduct of copper

production by Antamina, Cerro Verde, and SPCC (Ministerio de Energía y Minas, 2018a, p. 49, 57, 61, 68, 70).

Minsur S.A. continued to be Peru's sole producer of tin. Shougang Corp. of China, through its subsidiary Shougang Hierro Perú, continued to be the country's leading producer of iron ore. Shougang produced iron ore at the Marcona open pit mine, which was located in the Marcona District, Ica Region. Repsol YPF of Spain held an 82.38% interest in the Refinería La Pampilla S.A.A. La Pampilla, which continued to be the largest petroleum refinery in the country, was located in El Callao Province, Lima Region, and had the capacity to produce about 117,000 barrels per day (bbl/d) (El Comercio, 2017; Repsol YPF, 2017, p. 15; Ministerio de Energía y Minas, 2018a, p. 68, 70). Table 2 is a list of major mineral industry facilities.

Mineral Trade

In 2017, the value of Peru's total exports amounted to \$45.3 billion compared with \$37.0 billion (revised) in 2016, which was an increase of 22%. According to the MEM, the value of Peru's mineral exports equaled \$28.1 billion or 62% of the country's total exports in 2017 compared with \$22.4 billion or 61% of total exports in 2016. In 2017, metals, which included copper, gold, iron, lead, molybdenum, silver, tin, zinc and others, accounted for \$27.2 billion or 58% of the total exports. Copper, valued at \$13.8 billion, continued to be the leading mineral product export, accounting for 51% of Peru's total metal exports and 31% of the country's total exports. Gold accounted for 30% of metal exports and 18% of total exports. The country's leading metal export recipients were, in order of export value, China (which received 36% of Peru's metal exports), the United States and Switzerland (9% each), India and the Republic of Korea (7% each), and Japan (6%). Industrial mineral exports were valued at \$587 million in 2017 compared with \$640 million in 2016. Peru's leading industrial mineral export recipients were, in order of export value, the United States (which received 36% of the country's industrial mineral exports), Chile (14%), and Brazil (11%). In 2017, exports of petroleum and natural gas accounted for \$3.4 billion or 7% of the total exports compared with \$2.2 billion or 6% in 2016 (Ministerio de Energía y Minas, 2018a, p. 44–46; 2019, p. 11, 33).

Peru's exports to the United States were valued at \$7.3 billion in 2017 compared with \$6.3 billion in 2016. Of this amount, nonmonetary gold accounted for \$1.8 billion (or 24% of the country's total exports to the United States, by value); other petroleum products, \$510 million; fuel oil, \$392 million; zinc, \$172 million; tin, \$158 million; copper, \$119 million; and crude petroleum, \$23 million. Imports from the United States were valued at \$8.7 billion in 2017 compared with \$7.9 billion in 2016; these included \$1.7 billion in fuel oil; \$855 million, other petroleum products; \$227 million, excavating machinery; \$93 million, other coal and fuels; and \$88 million, crude petroleum (U.S. Census Bureau, 2018a, b).

Commodity Review

Metals

Copper.—In 2017, Peru's leading copper companies were, in order of output, Cerro Verde, which accounted for 21% of the country's total copper production, Las Bambas (19%), Antamina (18%), and SPCC (13%). Arequipa Region continued to rank first among the country's copper-producing regions in 2017, accounting for 21% of total output, followed by Apurímac (19%), Ancash (18%), and Cusco (13%). During the year, copper mine output increased by 5%, which was attributed mainly to an increase in the production of copper at Las Bambas, by 38%, and at Chinalco, by 16%. Las Bambas (located in Cotabambas, Apurímac Region) began commercial production in 2015, and Chinalco (located in the Morococha District, Junín Region) began operations in 2016 (Ministerio de Energía y Minas, 2018a, p. 48–51).

Chinalco continued its plan to invest an additional \$1.3 billion to further expand the Toromocho Mine's capacity to 300,000 metric tons per year (t/yr) of copper from 250,000 t/yr by 2020. The company expected to begin the construction in 2018. Hudbay Minerals Inc. of Canada owned 100% interest in the Constancia Mine, which included the Pampacancha deposit. Pampacancha was located about 3 kilometers southeast of Constancia in Chumbivilcas Province, Cusco Region. Hudbay Minerals expected to begin operations at Pampacancha by 2019. Total proven and probable reserves at Pampacancha were reported as 39.9 million metric tons (Mt) at average grades of 0.32% copper, 3.07 grams per metric ton (g/t) silver, 0.058 g/t gold, and 0.0099% [reported as 99 g/t] molybdenum. Hudbay Minerals planned to produce between 95,000 and 115,000 metric tons (t) of copper in 2018. SPCC continued its expansion project at Toquepala (located in Tacna Region), which was valued at \$1.2 billion and had the capacity to produce about 150,000 t/yr of copper. The expansion project was expected to be completed in 2018 and to add an additional capacity of 100,000 t/yr of copper and 3,100 t/yr of molybdenum (Hudbay Minerals Inc., 2018a, p. 10–11; 2018b; Ministerio de Energía y Minas, 2018a, p. 92, 95).

Gold and Silver.—In 2017, Peru's leading gold producers were, in terms of output, Minera Yanacocha S.R.L. and Minera Barrick Misquichilca S.A., each of which accounted for 11% (22% total) of the country's gold production. La Libertad Region accounted for 28% of the country's total gold production, followed by Cajamarca (22%), Arequipa (15%), and Madre de Dios (9%). During the year, artisanal gold-mining production decreased to 20,695 kilograms (kg) from 25,069 kg (revised) in 2016, and included production from the regions of Arequipa, Madre de Dios, Piura, and Puno. Production of gold from large- and medium-scale operations accounted for 79% of the country's total production; estimated artisanal mining accounted for 14%, and small-scale operations accounted for 7% (Ministerio de Energía y Minas, 2018a, p. 52–55; 2020b).

The leading silver producers were, in terms of output, Buenaventura, which produced about 17% of the country's total silver production; Antamina (15%); and Compañía Minera Ares (12%). The Ancash Region was ranked first among the country's silver-producing Regions and accounted for about 19% of the

country's silver output; Junin and Lima, 18% each; and Pasco, 14%. In 2017, production of silver at large- and medium-scale operations accounted for 96% of the country's total production (Ministerio de Energía y Minas, 2018a, p. 60–63).

In August, Buenaventura began commercial production at its wholly owned Tambomayo polymetallic underground mine located in Caylloma Province, Arequipa Region. As of December 31, total proven and probable mineral reserves were reported as 1.9 Mt at average grades of 306 g/t silver, 8.76 g/t gold, 2.50% zinc, and 1.25% lead. During the year, the mine produced 50,695 kg of silver, 1,820 kg of gold, 2,906 t of zinc, and 2,070 t of lead. Tambomayo was expected to produce between 3,100 and 3,700 kg of gold in 2018 (Compañía de Minas Buenaventura S.A.A., 2018a, p. 45; 2018b, p. 19, 74, 86).

Shahuindo S.A.C., which was owned by Tahoe Resources Inc. of the United States, produced gold and silver at its Shahuindo open pit mine. Shahuindo, located in the Cajamarca Region, began commercial production in 2016 and had an estimated mine life of about 12 years. In 2017, Shahuindo produced 3,300 kg of silver and 2,200 kg of gold. Proven and probable mineral reserves at Shahuindo were reported to be 128 Mt at an average grade of 0.46 g/t gold. Tahoe Resources continued its expansion plans at Shahuindo (phase II), which included the construction and commissioning of a crushing and agglomeration circuit. The expansion was expected to be completed by the end of 2018 and to increase Shahuindo's ore-processing capacity to 36,000 metric tons per day (t/d) from 10,000 t/d. The company expected to produce between 2,300 and 3,100 kg of gold in 2018 (Tahoe Resources Inc., 2018a, p. 5, 9–10, 26; 2018b, c).

Barrick Gold Corp. of Canada, through its subsidiary Minera Barrick Misquichilca, owned and operated the Lagunas Norte Mine in La Libertad Region. Gold production at Lagunas Norte was 10,970 kg in 2017 compared with 12,330 kg in 2016, which was a decrease of 11%. The decrease was attributed mainly to lower ore grades and lower recovery rates. The company planned to produce between 6,500 and 7,700 kg in 2018; the expected decrease was owing to the progressive oxide ore depletion at Lagunas Norte. As of December 31, total proven and probable mineral reserves at Lagunas Norte were reported to be 55.4 Mt at an average grade of 2.25 g/t gold (Barrick Gold Corp., 2018, 55–56, 91).

Iron Ore.—Shougang expected to complete Marcona's expansion project by late 2018 and to increase its production capacity to about 10 million metric tons per year (Mt/yr) of iron concentrate. As of 2017, proven and probable reserves at the Marcona project were reported as 2.2 billion metric tons of iron ore. In July, Minera Shouxin Peru S.A., which was a joint venture between Baiyin Nonferrous Group Co. (51%) and Shougang Hierro Perú (49%), began operations at its iron ore tailings recovery project. The project processed the low-grade copper, iron, and zinc that had been accumulating for decades in the tailings of the Marcona Mine. During the year, Minera Shouxin Peru produced 138,360 t of iron. The project's concentrator plant had the capacity to process 6.8 Mt/yr of mine tailings and to produce 350,000 t/yr of iron and 23,000 t/yr of copper. Planned investments for iron ore in Peru included Pampa de Pongo at an investment cost of \$2.5 billion; the

site is located in Arequipa Region and was owned by Jinzhao Mining Peru S.A. The project was expected to have a production capacity of about 15 Mt/yr. Jinzhao Mining Peru planned to begin the construction of Pampa de Pongo by 2020 and expected to begin production by 2023 (Ministerio de Energía y Minas, 2017b; 2018a, p. 68–69, 92; 2019, p. 77; Shougang Hierro Perú S.A.A., 2018, p. 6).

Lead and Zinc.—Peru's leading lead producers were Compañía Minera Chungar S.A.C. (Chungar), which accounted for 10% of the country's total lead production in 2017, followed by Buenaventura and Sociedad Minera El Brocal S.A.A. (8% each). The Pasco Region was ranked first among the country's lead-producing Regions, accounting for 31% of the tonnage produced, followed by Lima (17%), Junin (14%), and Ancash (13%). Production of lead by large- and medium-scale companies accounted for 98% of the total production (Ministerio de Energía y Minas, 2018a, p. 64–67).

In 2017, Antamina continued to be the leading zinc producer in Peru, accounting for 30% of the country's total zinc production, followed by Nexa (11%) and Volcan (10%). The leading zinc-producing Regions were, in order of output, Ancash (which produced about 34%), Junin (20%), Pasco (16%), and Ica (11%) (Ministerio de Energía y Minas, 2018a, p. 56–59, 64–67).

Sociedad Minera El Brocal, a subsidiary of Buenaventura, operated the Colquijirca production unit, which mined lead and zinc at its Tajo Norte open pit mine and copper at its Marcapunta Norte underground mine. Colquijirca was located in Cerro de Pasco Province, Pasco Region. In 2017, the company increased its lead production by 50% as a result of an increase in lead output at its Tajo Norte Mine. During the year, Buenaventura increased its total lead and zinc production by 21% and 25%, respectively. These increases were attributed to the rampup of the Tambomayo Mine (Compañía de Minas Buenaventura S.A.A., 2018b, p. 9; Ministerio de Energía y Minas, 2018a, p. 64–67).

Tin.—Minsur's tin operations included the San Rafael underground mine located in Puno Region, and the Pisco smelter and refinery located in Ica Region. Production of tin in the country had been steadily decreasing since 2009, which was attributed mainly to the gradual depletion of reserves at the San Rafael Mine in Puno Region. During the year, mine production of tin decreased by 5% compared with that of 2016. As of December 2017, total proven and probable reserves at San Rafael were reported to be 6.8 Mt at an average grade of 1.72% tin compared with 6.9 Mt at an average grade of 1.60% tin in 2016. Peru exported a total of 18,700 t of tin valued at \$370 million in 2017 compared with 19,400 t valued at \$344 million in 2016. The United States and the Netherlands combined received 65% of the country's tin exports. Minsur also continued with its plans to develop the B2 tailings project, which was to recover tin from the San Rafael tailings. As of December 2017, total proven and probable reserves at the B2 tailings project were reported as 7.6 Mt at an average grade of 1.03% tin. The project was expected to be completed by the end of 2019 and to produce 45,000 t of tin (about 5,000 t/yr) during an estimated mine life of 9 years (Ministerio de Energía y Minas, 2018a, p. 70–71; Minsur S.A., 2018, p. 20, 27).

Industrial Minerals

Phosphate Rock.—In 2017, Vale S.A. of Brazil entered into an agreement with Mosaic Co. of the United States for the sale of its fertilizer businesses, which included the company's stake in the Compañía Minera Miski Mayo S.R.L, which operated the Bayovar open pit mine. The agreement would allow Mosaic to acquire an additional 40% interest in the joint venture, in which it already held a 35% interest. The remaining 25% interest was held by Mitsui & Co., Ltd. of Japan. Vale expected to complete the sale by early 2018. The Bayovar Mine is located in the Sechura desert, Piura Region, and had the capacity to produce 4.0 Mt/yr of phosphate rock. As of 2016, total proven and probable reserves at Bayovar were reported as 247.2 Mt at an average grade of 15.8% phosphorus pentoxide (P₂O₅). Expansion plans were underway at Bayovar to increase the production capacity of the mine to 5.8 Mt/yr at an investment cost of about \$520 million (Vale S.A., 2017, p. 22, 79; 2018, p. 7; Ministerio de Energía y Minas, 2018a, p. 96).

Mineral Fuels

Coal.—Anthracite and bituminous coal were produced mainly in the Regions of Ancash, Cajamarca, La Libertad, and Lima. In 2017, anthracite coal production increased to 186,305 t from 147,993 t in 2016. The increase was attributed mainly to an increase in production in the Ancash Region, which accounted for 45% of the total anthracite produced in the country, followed by Cajamarca, La Libertad, and Lima. Production of bituminous coal, which was produced mainly in Ancash and Lima Regions, decreased by nearly 3% in 2017. The decrease was driven mainly by a 60% decrease in production in Ancash Region. Peru's leading coal producers were Compañía Minero Cerro Negro S.A.C., Obras Civiles y Mineras S.A.C., Mineral Concepción S.A.C., Minera Santa Mercedes E.I.R.L., and San Roque F.M. S.A.C. (tables 1, 2; Ministerio de Energía y Minas, 2018a, p. 75; 2018e).

Natural Gas and Petroleum.—Crude petroleum in Peru was produced in the Noroeste, Selva, and Zocalo zones. The country's leading producers of crude petroleum were China National Petroleum Corp., Pluspetrol Norte S.A. (Pluspetrol), and Savia Peru S.A. In 2017, production of crude petroleum increased by 8% to 15.9 million barrels (Mbbbl) from nearly 14.8 Mbbbl in 2016. The increase in crude petroleum production was attributed mainly to the restart of operations at Block 8 (owned by Pluspetrol), which had been suspended between September and November of 2016 owing to local community protests in the Loreto Region. The increase also was attributed to the restart of operations at Block 192 (owned by Pacific Stratus Energy del Peru S.A.) in February. The suspension of production at Block 192 in 2016 occurred after the rupture of the Nor Peruano oil pipeline. Blocks 8 and 192 are located in the Selva Norte zone and produced 2.1 Mbbbl and 1.4 Mbbbl of crude petroleum, respectively, in 2017. During the year, production of gross natural gas decreased by 8% compared with that of 2016, to 12.9 million cubic meters. The leading natural-gas-producing zones were Nor-Oeste, Selva, and Zocalo. In 2017, the Selva zone, which included Selva Norte, Selva Central, and Selva Sur, accounted for 97% of the total natural gas production in Peru.

The decrease in natural gas production was attributed mainly to lower production at Pluspetrol's Blocks 88 and 56, which accounted for 51% and 33% of the country's total natural gas production, respectively, in 2017 (Banco Central de Reserva del Perú, 2018, p. 25; PERUPETRO S.A., 2018a, p. 21, 32; 2018b, p. 17–18).

PETROPERU continued with its modernization program of the Talara refinery, located in Piura Region, at an investment cost of about \$5.0 billion. The company expected to increase the production capacity at Talara to 95,000 bbl/d from 65,000 bbl/d and to complete the modernization program by 2020 (Petróleos del Peru S.A., 2021a; Rumbo Minero, 2018).

Reserves and Resources

Table 3 lists Peru's reserves of major minerals.

MINERAL INDUSTRY HIGHLIGHTS IN 2018

Minerals in the National Economy

In 2018, Peru continued to be among the world's leading producers of many nonfuel minerals and base metals. The country's real GDP increased by 4.0% compared with an increase of 2.5% in 2017. The mining and hydrocarbon and manufacturing sectors continued to be a significant part of the economic activities in Peru, contributing 13% to the country's total GDP. In 2018, however, the mining and hydrocarbon sector's contribution to the GDP decreased by 1.5% owing to decreases in the production of metals, such as copper, gold, lead, molybdenum, and silver. Direct employment in the mining sector increased to 201,547 workers in 2018 from 200,369 workers in 2017. Of these workers, 16% worked in Arequipa Region; 9%, in Junin Region; and 8%, in La Libertad Region (Banco Central de Reserva del Perú, 2019a, p. 11, 17, 24; 2019b; Ministerio de Energía y Minas, 2019, p. 80–81).

In 2018, the value of Peru's total exports amounted to \$48.9 billion compared with \$45.3 billion in 2017. The country's mineral exports accounted for \$29.4 billion, or 60% of the total exports. Metals accounted for \$28.8 billion compared with \$27.5 billion in 2017. The increase in the value of metal exports was attributed mainly to an increase in the value of exports of molybdenum (by 69%), iron ore (13%), copper (8%), and zinc (7%). Copper, which continued to be the leading mineral product export, accounted for 52% of Peru's total metal export products, followed by gold (29%), zinc (9%), and lead (5%). The country's leading metal export recipients were, in order of value, China (38%), India (10%), the United States (9%), and Switzerland (8%). In 2018, exports of petroleum and natural gas increased by 20% to \$4.0 billion, and exports of industrial minerals, by 7% to \$628 million (Ministerio de Energía y Minas, 2019, p. 32–34).

Production

In 2018, estimated production of refined indium increased by 10% to 11,000 kg. The industrial minerals for which output increased by more than 10% were bentonite (215%), feldspar (112%), barite (70%), gypsum (59%), limestone (51%), phosphate rock (P₂O₅ content) (30%), phosphate rock (gross weight) (28%), pyrophyllite and unspecified stone (17% each),

estimated kyanite production (14%), and travertine (11%). Inkabor, which stopped production of boron in 2017, restarted operations in October and produced a total 100,522 t of boron for the remainder of the year. Mineral fuels and related materials for which production increased notably included distillate fuel oil (increased by 132%) and crude petroleum (12%). Industrial minerals for which production decreased by more than 10% included slate (54%), onyx (34%), mica (22%), common clay (18%), and kaolin (10%). Mineral fuels and related materials for which production decreased by more than 10% were anthracite coal (45%), liquefied petroleum gas (34%), lubricants (27%), and residual fuel oil (12%) (table 1).

Structure of the Mineral Industry

In January, Mosaic completed the acquisition of Vale's fertilizer businesses, which included the Bayovar phosphate mine. After the completion of the sale, Mosaic held 75% interest in Compañía Minera Miski Mayo and the remaining 25% interest continued to be held by Mitsui & Co. (table 2; Mosaic Co., 2019, p. 2).

Commodity Review

Metals

Copper.—Cerro Verde continued to be Peru's leading copper producer, accounting for about 20% of the country's total copper production in 2018, and Arequipa Region continued to rank first among the country's copper-producing regions. In the fourth quarter of 2018, SPCC completed its Toquepala expansion project, which included a new copper concentrator that would increase copper production capacity to about 250,000 t/yr in 2019. In August, Anglo American plc (60%) and Mitsubishi Corp. (40%), through their subsidiary Anglo American Quellaveco S.A., began the development of the Quellaveco project located in Moquegua Region. The project's mineral reserves were reported to be 1.3 billion metric tons at an average grade of 0.57% copper. The company expected to develop Quellaveco as an open pit mine and to begin copper production by 2022. The project, which was expected to reach full production by 2023, would have the capacity to produce an average of 300,000 t/yr of copper during the first 10 years of operation (Anglo American plc, 2019, p. 19; Grupo Mexico, S.A.B. de C.V., 2019; Ministerio de Energía y Minas, 2019, p. 37–39).

Gold.—Gold production from the regions of Arequipa, Cajamarca, and La Libertad accounted for about 63% of the country's total gold production. The country's leading gold producers, in terms of output, continued to be Minera Yanacocha (11% of the country's total gold production) and Minera Barrick Misquichilca (7%). Newmont Mining began gold production at the Quecher Main project at Yanacocha in late 2018. The project, which was expected to begin commercial production in the second quarter of 2019, would add oxide production at Yanacocha, extending the mine life to 2027. The company expected to produce an average of about 5,700 kilograms per year between 2020 and 2025. In 2019, gold production from Lagunas Norte decreased by more than 30%, which was attributed to the progressive depletion of oxide ores.

As of December, total proven and probable mineral reserves at Laguna Norte were reported to be 44.9 Mt at an average grade of 2.74 g/t gold. Barrick Gold reported that the company would no longer present Lagunas Norte as a reportable operating segment in 2019, after it failed to meet the company's investment criteria (Barrick Gold Corp., 2019, p. 58, 87; Ministerio de Energía y Minas, 2019, p. 40–43; Newmont Mining Corp., 2019, p. 2).

Iron Ore.—In July, Shougang completed Marcona's expansion project at an investment cost of about \$1.2 billion. After the completion of the expansion project, Marcona increased its annual capacity to 10 Mt of iron concentrate. In 2018, production at Marcona increased to 9.1 Mt from 8.7 Mt in 2017. In 2018, Minera Shouxin Peru's tailings recovery project, which began operations in 2017, increased production by 216% to 436,877 t in 2018 from 138,360 t in 2017. As a result, Minera Shouxin Peru accounted for 5% of the country's total iron content production in 2018 compared with 2% in 2017 (Ministerio de Energía y Minas, 2019, p. 56–57; Shougang Hierro Perú S.A.A., 2019, p. 6–7).

Tin.—In 2018, production of mined tin increased by 5%, which was the first increase in tin output since 2009. The increase was attributed mainly to the restart of San Rafael's ore-sorting preconcentration plant, which was on care-and-maintenance status during the fourth quarter of 2017. As a result, Minsur reported higher volume fed to the concentrator plant as well as a higher a recovery process (to 93.4% in 2018 from 92.2% in 2017). Total proven and probable reserves at San Rafael were reported to be 8.0 Mt at an average grade of 1.74% tin. San Rafael, which had an estimated mine life of about 11 years, had the capacity to produce 30,000 t/yr of tin. Minsur also began the construction of its B2 tailings project in the first quarter of 2018 and expected to complete the project by the end of 2019. The B2 tailings project was expected to produce a total of 45,000 t of tin (or 5,000 t/yr) during a mine life of about 9 years (Ministerio de Energía y Minas, 2019, p. 56–57; Minsur S.A., 2019, p. 22, 29–30).

Industrial Minerals

Phosphate Rock.—Fosfatos del Pacifico S.A. (a joint venture between FOSSAL S.A.A., 70%, and Mitsubishi Corp., 30%) planned to invest \$831 million in the development of its Bayovar 9 concession. A feasibility study for Bayovar 9, located in Piura Region, was underway in 2018. Mineral reserves at Bayovar 9 were reported as 108 Mt at average grade of 17.8% P₂O₅. Fosfatos del Pacifico expected to begin operations at Bayovar 9 in 2021 and projected a production capacity of about 2.5 Mt/yr of phosphate rock concentrate with a content of about 30% of P₂O₅ (Fosfatos del Pacifico S.A., 2019, p. 14).

Outlook

Peru's real GDP growth is expected to increase by 2.2% in 2019 compared with growth of 4.0% in 2018. The country's mining and hydrocarbon sector is expected to continue to contribute more than 10% to Peru's total GDP and to account for more than 60% of the country's total exports. Peru's mining subsector output is expected to decrease by nearly 1% because

of an expected decrease in the production of gold and silver. The output of the hydrocarbon subsector is likely to increase by about 5% in 2019, however, owing mainly to an expected increase in the production of crude petroleum and natural gas. Mineral exports are likely to continue to represent a major part of Peru's total exports, and copper is likely to continue to be the leading mineral export, accounting for about 50% of the country's total exports. Significant investments in the mining subsector are likely to include investments in large copper projects, such as the construction of the Quellaveco project and the Toromocho expansion project, as well as the construction of the B2 tailings project (tin) and Quecher Main project (gold) (Banco Central de Reserva del Perú, 2020, p. 11, 17, 23, 47; Ministerio de Energía y Minas, 2020a, p. 53–56, 90–94).

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TABLE 1
PERU: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018
METALS					
Cadmium, refinery, primary	769	757	820	797	765
Copper:					
Mine, Cu content	1,293,842	1,627,727	2,280,005	2,383,163	2,370,693
Smelter, primary	314,615	327,909	309,469	316,882	327,821
Refinery, primary:					
Electrowon	83,800	73,091	73,854	62,421	66,257
Other	263,597	279,869	257,470	272,996	270,541
Total	347,397	352,960	331,324	335,417	336,798
Gold, mine, Au content:					
Mine kilograms	132,221 ^r	134,647 ^r	127,921	131,269	123,767
Artisanal do.	7,867	12,175	25,069 ^r	20,695	18,875
Total do.	140,088 ^r	146,822 ^r	152,990 ^r	151,964	142,642
Indium, refinery, primary do.	14,000	10,000	10,000	10,000	11,000
Iron ore, mine:					
Gross weight thousand metric tons	10,731	10,908	11,418	13,121	14,200
Fe content do.	7,193	7,321	7,663	8,806	9,534
Iron and steel: ³					
Direct-reduced iron do.	88	72	11	--	--
Steel:					
Raw steel do.	1,078	1,082	1,168	1,207	1,217
Products, hot rolled do.	1,434	1,335	1,417 ^r	1,517	1,500 ^e
Lead:					
Mine, Pb content	277,294 ^r	315,525	314,422	306,794	289,195
Refinery, primary	142	1,494	--	--	--
Mercury, Hg content ^{e,4}	40	35	40 ^r	40	40
Molybdenum, mine, Mo content	17,018	20,153	25,757	28,141	28,034
Selenium, refinery, Se content ^e kilograms	40,000	40,000	45,000 ^r	45,000	45,000
Silver:					
Mine, Ag content do.	3,768,147	4,101,568	4,375,337 ^r	4,303,541	4,162,658
Refinery, primary	183	190	183 ^r	183	175
Tin:					
Mine, Sn content	23,105	19,511	18,789	17,790	18,601
Smelter, primary	24,462	20,396	19,390	17,906	18,255
Tungsten, mine, concentrate, W content	61	110	--	--	--
Zinc:					
Mine, Zn content	1,315,215	1,421,218	1,337,081 ^r	1,473,037	1,474,674
Smelter, primary	336,454	335,422	341,518	312,339	333,677
INDUSTRIAL MINERALS					
Barite	106,071	28,407	7,953	9,182	15,621
Boron, ulexite	239,725	578,910	33,792	--	100,522
Cement, hydraulic thousand metric tons	10,676	10,410	10,094	9,980	10,049
Clay:					
Bentonite	37,375	21,341	19,200 ^{e, r}	756	2,384
Common clay	1,273,154	1,419,778	1,368,114 ^r	1,382,743	1,137,960
Kaolin	19,964	43,251 ^r	19,300 ^{e, r}	17,700	16,004
Diatomite	151,398	120,672	107,265	110,000	110,000 ^e
Feldspar	18,019	16,979	16,629 ^r	14,929	31,588
Gypsum, mine	543,856	438,025	438,025 ^r	286,657	456,356
Kyanite and related minerals, andalusite ^{e,5}	30,000	35,000	45,000 ^r	35,000	40,000
Lime ^e	240,000	240,000	250,000 ^r	250,000	250,000
Mica	109	115	111	234	183

See footnotes at end of table.

TABLE 1—Continued
PERU: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018
INDUSTRIAL MINERALS—Continued					
Nitrogen, ammonia, N content	13,000	5,000 ^r	5,000 ^{e,r}	--	-- ^e
Phosphate rock: ⁶					
Gross weight thousand metric tons	3,801	3,881	3,853	3,040	3,900
P ₂ O ₅ content do.	1,155	1,180	1,156	922 ^e	1,200 ^e
Salt, all types	1,175,157	1,471,131	1,450,415	1,481,398	1,509,564
Stone, sand and gravel construction:					
Sand and gravel, sand thousand metric tons	1,213	1,874 ^r	1,699 ^r	1,502	1,578
Stone:					
Crushed:					
Limestone do.	21,986	24,662	18,819 ^r	20,273	30,526
Quartzite	47,491	84,854	74,634	73,022	67,296
Other, unspecified thousand metric tons	9,993	9,392 ^r	7,238 ^r	8,357	9,790
Dimension:					
Marble	557	707	304	220	223
Onyx	370	158	271	562	372
Slate	77,847	65,593	65,553	51,436	23,731
Travertine	394,478	567,686 ^r	149,294	129,906	144,454
Talc and related minerals:					
Pyrophyllite	17,859	26,209	17,872	22,760	26,675
Talc	28,847	26,758	11,507	19,363	20,634
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite	97,889	143,208	147,993	186,305	103,142
Bituminous	131,323	108,580	118,215	114,745	113,439
Natural gas:					
Gross million cubic meters	12,923	12,494	14,001	12,942	12,720
Marketable ⁷ do.	12,910 ^r	12,500 ^r	14,000 ^r	12,901	12,642
Petroleum:					
Crude thousand 42-gallon barrels	25,296	21,173	14,773	15,900	17,840
Natural gas liquids do.	37,767	33,360	49,445	49,034	49,036
Refinery:					
Asphalt do.	1,710	1,480	1,610	1,685	1,785
Distillate fuel oil do.	28,336	24,100	23,754	8,750	20,270
Gasoline do.	13,349	9,754	12,085	10,930	10,630
Jet fuel do.	5,835	4,840	4,402	4,850	4,950
Liquefied petroleum gas do.	2,151	2,190	2,551	2,714	1,780
Lubricants do.	227	260	193	226	166
Residual fuel oil do.	8,741	10,680	24,032	18,297	16,100
Total do.	60,300	53,300	68,600	47,500	55,700

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

¹Table includes data available through August 27, 2019. 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.

²Source: Ministerio de Energía y Minas del Perú.

³Source: World Steel Association.

⁵Byproduct mercury.

⁴Estimated based on export data.

⁶Source: Vale S.A. (2014–2016) and Mosaic Co. (2018).

⁷Source: Organization of the Petroleum Exporting Countries (OPEC), Annual Statistical Bulletin, 2019.

TABLE 2
PERU: 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	Annual capacity ^c	
Andalusite	Andalucita S.A. (private, 100%)	Mine at Paita, Piura Region	60	
Barite	Compañía Minera Agregados Calcareos S.A.	Mine at Tarma, Junin Region	NA	
Bentonite	do.	Mine at Cerro Blanco, Piura Region	2	
Boron, ulexite	Inkabor S.A.C.	Mine at Arequipa, Arequipa Region	NA	
Cadmium	Nexa Resources Camarquilla S.A. (Nexa Resources S.A., 99.91%)	Cajamarquilla refinery, Lima Region	800	
Cement	Caliza Cementos Inca S.A. (private, 100%)	Cajamarquilla plant, Lima Region	400	
Do.	Cementos Pacasmayo S.A.A. (private, 100%)	Pacasmayo plant, La Libertad Region	2,900	
Do.	Cementos Selva S.A. (Cementos Pacasmayo S.A.A.)	Rioja plant, San Martin Region	440	
Do.	Cementos Sur S.A. (private, 100%)	Arequipa plant, Arequipa Region	340	
Do.	Union Andina de Cementos S.A.A. (private, 100%)	Atocongo plant, Lima Region	5,500	
Do.	do.	Condorcocha plant, Junin Region	2,100	
Do.	Yura S.A. (private, 100%)	Yura plant, Arequipa Region	3,000	
Coal, anthracite	Compañía Minero Cerro Negro S.A.C.	Mine at Cajamarca, Cajamarca Region	4	
Do.	Minera Concepción S.A.C.	Mine at Yungay, Ancash Region	8	
Do.	Minera Santa Mercedes E.I.R.L.	Mine at Oyon, Lima Region	10	
Do.	San Roque F.M. S.A.C.	Mine at Yungay, Ancash Region	40	
Coal, bituminous	Obras Civiles y Mineras S.A.C.	Mine at Oyon, Lima Region	100	
Copper	Compañía Minera Antamina S.A. (BHP Billiton plc, 33.75%; Glencore plc, 33.75%; Teck Cominco Ltd., 22.5%; Mitsubishi Corp., 10%)	Antamina Mine, Ancash Region	500	
Do.	Compañía Minera Antapaccay S.A. (Glencore plc, 100%)	Antapaccay Mine, Cusco Region	220	
Do.	HudBay Peru S.A.C (Hudbay Minerals Inc., 100%)	Constancia Mine, Cusco Region	130	
Do.	Minera Chinalco Perú S.A. [Aluminum Corporation of China Overseas Holding Ltd., 100%]	Toromocho Mine, Morococha District, Junin Region	250	
Do.	Minera Las Bambas S.A. (MMG Ltd., 62.5%; GUOXIN International Investment Corp. Ltd., 22.5%; CITIC Metal Co., Ltd., 15%)	Las Bambas Mine, Cotabambas, Apurimac Region	460	
Do.	Minera Shouxin Peru S.A. (Shougang Hierro Perú S.A.A. and Baiyin Nonferrous Group Co., 51%)	Marcona Tailings Project, Ica Region	23	
Do.	Southern Copper Corp. (Grupo Mexico S.A.B. de C.V., 54.1%; Marmon Corp, 15%; Freeport-McMoRan Inc., 13.9%)	Cuajone Mine, Moquegua Region;	200	
Do.	do.	Toquepala Mine, Tacna Region	150	
Do.	Southern Copper Corp. (Grupo Mexico S.A.B. de C.V., 88.9%)	Ilo Smelter, Moquegua Region	360	
Do.	do.	Ilo Refinery, Moquegua Region	280	
Do.	Sociedad Minera Cerro Verde S.A.A. (Freeport-McMoRan Inc., 53.56%; Sumitomo Metal Mining Co. Ltd., 21%; Compañía de Minas Buenaventura S.A.A., 19.58%; others, 5.86%)	Cerro Verde Mine, Arequipa Region	500	
Do.	Sociedad Minera El Brocal S.A.A. (Compañía de Minas Buenaventura S.A.A., 61.43%)	Marcapunta Norte Mine, Pasco Region	50	
Gold kilograms	Compañía de Minas Buenaventura S.A.A. (private, 100%)	Julcani, Huancavelica Region, and Orcopampa and Tambomayo Mines, Arequipa Region	8,000	
Do.	do.	Compañía Minera Ares S.A.C. (Holchschild Minig plc, 100%)	Arcata Mine, Arequipa Region; ¹ Inmaculada and Pallancata Mines, Ayacucho Region	6,500
Do.	do.	Compañía Minera Poderosa S.A. (private, 100%)	Poderosa Mine, La Libertad Region	9,000
Do.	do.	Minera Barrick Misquichilca S.A. (Barrick Gold Corp., 100%)	Lagunas Norte Mine, La Libertad Region	10,000
Do.	do.	Minera Yanacocha S.R.L. (Newmont Mining Corp., 51.35%; Compañía de Minas Buenaventura S.A.A., 43.65%; International Finance Corp., 5%)	Yanacocha Mine, Cajamarca Region	16,000
Do.	do.	Shahuindo S.A.C. (Tahoe Resources Inc., 100%)	Shahuindo Mine, Cajamarca Region	2,400

See footnotes at end of table.

TABLE 2—Continued
PERU: 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	Annual capacity ^c
Iron ore, concentrate		Shougang Hierro Perú S.A.A. (Shougang Corp., 98.52%)	Marcona Mine, Ica Region	10,000
Do.		Minera Shouxin Peru S.A. (Shougang Hierro Perú S.A.A. and Baiyin Nonferrous Group Co., 51%)	Marcona Tailings Project, Ica Region	440
Lead		Compañía de Minas Buenaventura S.A.A. (private, 100%)	Julcani Mine, Huancavelica Region;; Mallay and Uchucchacua Mines, Lima Region;; Tambomayo Mines, Arequipa Region	30
Do.		Compañía Minera Raura S.A. (private, 100%)	Raura Mine, Huanuco Region	30
Do.		Compañía Minera Chungar S.A.C. (Volcan Compañía Minera S.A.A., 100%)	Chungar Mine, Pasco Region, and Alpamarca Mines, Junin Region	30
Do.		Sociedad Minera El Brocal S.A.A. (Compañía de Minas Buenaventura S.A.A., 61.43%)	Tajo Norte Mine, Pasco Region	20
Do.		Volcan Compañía Minera S.A.A. (private, 100%)	Cerro de Pasco Mine, Pasco Region, ² and Yauli Mines, Junin Region	40
Molybdenum		Compañía Minera Antamina S.A. (BHP Billiton plc, 33.75%; Glencore plc, 33.75%; Teck Cominco Ltd., 22.5%; Mitsubishi Corp., 10%)	Antamina Mine, Huari, Ancash Region	7
Do.		Minera Las Bambas S.A. (MMG Ltd., 62.5%; GUOXIN International Investment Corp. Ltd., 22.5%; CITIC Metal Co., Ltd., 15%)	Las Bambas Mine, Cotabambas, Apurimac Region	5
Do.		Sociedad Minera Cerro Verde S.A.A. (Freeport-McMoRan Copper and Gold Inc., 53.56%; Sumitomo Metal Mining Co. Ltd., 21%; Compañía de Minas Buenaventura S.A.A., 19.58%; others, 5.86%)	Cerro Verde Mine, Arequipa Region	13
Do.		Southern Copper Corp. (Grupo Mexico S.A.B. de C.V., 84.6%)	Cuajone Mine, Moquegua Region, and Toquepala Mine, Tacna Region	12
Natural gas	thousand cubic meters per day	Pluspetrol Peru Corp. (Pluspetrol S.A., 27%; Hunt Oil Co, 25%; SK Innovation Co., Ltd., 18%; Repsol YPF, 10%; Sonatrach, 10%; Tecpetrol S.A., 10%)	Onshore, Blocks 56 and 88, Ucayali Basin	30,000
Do.	do.	Repsol YPF, 53.84%, and China National Petroleum Corp., 46.16%	Onshore, Block 57, Ucayali-Madre de Dios Basin	5,000
Petroleum, crude	42-gallon barrels per day	China National Petroleum Corp., 100%	Onshore, Block X, Talara Basin	13,000
Do.	do.	Pacific Stratus Energy del Peru S.A.	Onshore, Block 192, Northern Marañón Basin	8,600
Do.	do.	Pluspetrol Norte S.A. (Pluspetrol S.A., 100%)	Onshore, Block 8, Marañón Basin	7,000
Do.	do.	Savia Peru S.A., 100%	Offshore, Block Z-2B, Punta Laguna	8,000
Petroleum products	do.	Refinería La Pampilla S.A.A. (Repsol YPF, 82.38%)	La Pampilla refinery, Lima Region	117,000
Do.	do.	Petroperú S.A.	Talara refinery, Piura Region	65,000
Do.	do.	do.	Conchan refinery, Lima Region	15,500
Do.	do.	do.	Iquitos refinery, Loreto Region	12,000
Do.	do.	do.	Pucallpa refinery, Ucayali Region	3,300
Do.	do.	do.	El Milagro refinery, Amazonas Region	2,000
Do.	do.	Pluspetrol S.A.	Shiviyacu refinery, Loreto Region	5,000
Phosphate rock		Compañía Minera Miski Mayo S.R.L. (Mosaic Co., 75%, and Mitsui & Co., Ltd., 25%)	Bayovar Mine, Piura Region	4,000
Silver	kilograms	Compañía Minera Chungar S.A.C. (Volcan Compañía Minera S.A.A., 100%)	Chungar Mine, Pasco Region, and Alpamarca Mine, Junin Region	200,000
Do.	do.	Compañía Minera Ares S.A.C. (Holchschild Mining plc, 100%)	Arcata Mine, Arequipa Region; ¹ Inmaculada and Pallancata Mines, Ayacucho Region	500,000
Do.	do.	Compañía de Minas Buenaventura S.A.A. (private, 100%)	Julcani Mine, Huancavelica Region;; Uchucchacua Mine, Lima Region; and Orcopampa and Tambomayo Mines, Arequipa Region	700,000

See footnotes at end of table.

TABLE 2—Continued
PERU: 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	Annual capacity ^c
Silver— Continued	kilograms	Volcan Compañía Minera S.A.A. (private, 100%)	Cerro de Pasco Mine, Pasco Region, ² and Yauli Mines, Junin Region	400,000
Do.	do.	Compañía Minera Antamina S.A. (BHP Billiton plc, 33.75%; Glencore plc, 33.75%; Teck Cominco Ltd., 22.5%; Mitsubishi Corp., 10%)	Antamina Mine, Huari, Ancash Region	600,000
Do.	do.	Southern Copper Corp. (Grupo Mexico S.A.B. de C.V., 88.9%)	Ilo Smelter and Refinery, Moquegua Region	150,000
Do.	do.	Shahuindo S.A.C. (Tahoe Resources Inc., 100%)	Shahuindo Mine, Cajamarca Region	3,300
Do.	do.	Nexa Resources Camarquilla S.A. (Nexa Resources S.A., 99.91%)	Cajamarquilla Refinery, Lima Region	55,000
Steel		Empresa Siderurgica del Peru S.A.A. (Gerdau S.A.)	Plant at Chimbote, Ancash Region	650
Do.		Acero Arequipa S.A., 100%	Plant at Pisco, Ica Region	360
Tin	metric tons	Minsur S.A. (private 100%)	San Rafael Mine and plant, Puno Region	30,000
Do.	do.	do.	Pisco smelter and refinery, Ica Region	45,000
Zinc		Compañía Minera Antamina S.A. (CMA) (BHP Billiton plc, 33.75%; Glencore plc, 33.75%; Teck Cominco Ltd., 22.5%; Mitsubishi Corp., 10%)	Antamina Mine, Ancash Region	450
Do.		Compañía Minera Raura S.A. (private, 100%)	Raura Mine, Lima Region	50
Do.		Compañía Minera Chungar S.A.C. (Volcan Compañía Minera S.A.A., 100%)	Chungar Mine, Pasco Region, and Alpamarca Mine, Junin Region	130
Do.		Nexa Resources Peru S.A.A. (Nexa Resources S.A., 80.06%)	Atacocha and El Porvenir Mines, Pasco Region, and Cerro Lindo, Ica Region	300
Do.		Nexa Resources Camarquilla S.A. (Nexa Resources SAA, 99.91%)	Cajamarquilla refinery, Lima Region	330
Do.		Sociedad Minera El Brocal S.A.A. (Compañía de Minas Buenaventura S.A.A., 61.43%)	Tajo Norte Mine, Pasco Region	70
Do.		Volcan Compañía Minera S.A.A. (private, 100%)	Cerro de Pasco Mine, Pasco Region, ² and Yauli Mines, Junin Region	220

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

¹Arcata Mine operations were on care-and-maintenance status in 2018.

²Cerro de Pasco operations suspended in 2018.

TABLE 3
PERU: RESERVES OF MAJOR MINERALS IN 2018¹

(Thousand metric tons unless otherwise specified)

Commodity	Reserves ²
Copper	91,721
Gold	metric tons 2,694
Iron ore	1,475
Lead	6,085
Molybdenum	2,701
Natural gas	trillion cubic meters 350 ³
Natural gas liquids	million barrels 610 ³
Petroleum crude	do. 420 ³
Phosphate rock	400,000 ^{e,4}
Silver	metric tons 91,148
Tin	140
Zinc	20,264

^eEstimated; estimated data are rounded to no more than three significant digits.

¹ Proven and probable reserves.

²Source: Ministerio de Energía y Minas del Perú: Anuario Minero 2019.

³Source: Ministerio de Energía y Minas del Perú: Libro Anual de Recursos de Hidrocarburos 2018.

⁴Sources: USGS Mineral Commodity Summaries 2019.