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The Mineral Industry of Argentina

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In 2016, the mineral sector of Argentina was dominated by the production of aluminum, boron, cadmium, copper, crude petroleum, gold, iron and steel, lead, lithium, molybdenum, natural gas, silver, and zinc. Argentina was estimated to be the world's third-ranked producer of lithium, accounting for 15% of world production after Chile (38%) and Australia (37%); and the fifth-ranked producer of boron, accounting for about 5% of world production after Turkey (74%), Peru (7%), and Chile and Kazakhstan (5% each). Argentina was not a globally significant producer of mineral fuels in 2016, but it had world-class shale oil and gas potential. Argentina was the third country in the world (after the United States and Canada) to commercially develop tight oil and shale gas resources. The country's main shale oil and gas formation, known as Vaca Muerte, is located within the Neuquen basin in the western part of the country and spans about 30,000 square kilometers (Cefeidas Group, 2015, p. 23; U.S. Energy Information Administration, 2017; Crangle, 2018; Jaskula, 2018).

In 2016, Argentina's real gross domestic product (GDP) decreased by 2.2%. The country's nominal GDP was $554.8 billion, which was the lowest since 2011, when it registered $530.1 billion. Newly implemented tax measures by the newly elected Government were expected to take shape and revitalize key sectors of the economy, however, including mining. The new administration eliminated export taxes of 5% on mining products, which enabled mining operations such as Minera Alumbrera Ltd.'s Alumbrera Mine to extend the life of the mine until December 2018. Alumbrera, which was the leading copper-producing mine in the country, had initially been scheduled to close in mid-2017 (BBVA Research S.A., 2017, p. 18–19; El Economista, 2017; Comisión Económica para América Latina y el Caribe, 2018a).

Minerals in the National Economy

In 2016, the value added to the nominal GDP by the mining and quarrying sector was about 3.2%, or $17.8 billion, which was a slight decrease compared with that of 2015. The country's manufacturing sector accounted for 13.6% of the total GDP, and the construction sector, 2.9%. The mining and quarrying sector, including hydrocarbons, employed more than 80,000 workers in 2016. Large-scale mining companies accounted for about 85% of the total number of people employed in mining and quarrying (Comisión Económica para América Latina y el Caribe, 2018a; Ministerio de Trabajo, Empleo y Seguridad Social, 2017).

In 2016, Argentina's foreign direct investment (FDI) inflows decreased by about 64% to $4.2 billion from $11.8 billion (revised) in 2015 owing in part to regulatory changes instituted by the country's new administration. The lithium sector received about 36% of the country's total FDI, including an investment of $750 million by Canada's Energi Group operating in Salta Province in the northwestern part of the country. Another notable lithium investment was in Jujuy Province, where a joint venture between Canadas's Lithium Americas Corp. and Sociedad Química y Minera de Chile S.A. (SQM) announced a $550 million investment to develop the Cauchari-Olaroz lithium project. The Cauchari-Olaroz salar was considered to be the third largest lithium brine resource in the world. In 2016, overall FDI inflows to Latin America decreased by about 14% to $167.2 billion (Market Wired, 2016; Sociedad Química y Minera de Chile S.A., 2017, p. 111; Comisión Económica para América Latina y el Caribe, 2018b, p. 35, 62).

Government Policies and Programs

The mineral industry in Argentina was composed of domestic and foreign private and public companies. In 2016, Argentina's Secretaría de Minería de la Nación [Mining Secretariat] is responsible for proposing and implementing Federal mining policies. Servicio Geológico Minero Argentino [Geological and Mining Service of Argentina] (SEGEMAR) is the scientific and technological organization responsible for the generation and dissemination of geologic, technological, mining, and environmental information, which facilitates the sustainable development of the country's natural resources. The legislative framework for the mineral sector in Argentina is provided by the Mining Code, law No. 1919 of 1886. Argentine law is based upon the principle that all mineral deposits are state owned. The mining code creates the legal framework for agreements between the state and those entities that take part in mining activities through the issuance of an exploration permit or mining concession. The mining rights are given in perpetuity if the annual tax is paid and investments are made for each stage of the mining activity. The country is divided into 23 Provinces grouped into 5 regions. Provinces have their own enforcement authorities that control mining activities within their respective geographic boundaries (Ministerio de Energia y Mineria, 2017b, p. 11, 14, 40).

Argentina's Dirección Nacional Minería [National Mining Directorate] (DNM) oversees the administration, development, and promotion of mining and mining investment. The DNM is one of the departments administered by the Ministerio de Planificación Federal, Inversion Pública y Servicios [Ministry of Federal Planning, Public Investment and Services]. The Dirección Nacional de Planificación Estratégica Regional [National Directorate of Regional Strategic Planning] and the SEGEMAR are under the authority of the Mining Secretariat. The Cámara Argentina de Empresarios Mineros [Argentine Chamber of Mining Companies] (CAEM) is a mining industry association that advocates for development of the mineral industry. El Grupo de Empresas Mineras Exploradoras de la República Argentina [The Association of Exploration Mining Companies of the Republic of Argentina (GEMERA)], whose members are exploration companies, is a business association that is part of the CAEM. GEMERA partners with Provincial mining chambers to address local and national mining issues (Ministerio de Energia y Mineria, 2017c; Ministerio de Justicia y Derechos Humanos, 2017).

In 2016, the newly elected Government adopted Decree 349/2016, which removed a 5% export tax on all mineral products that had been in place since December 2007. The elimination of the export tax was expected to have a positive effect on the mining sector as investors could take advantage of the new measure to advance mining and energy projects forward. Decree 160/2015, which became effective in January 2016, had eliminated export duties on raw and semifinished gold, and silver (Adaro, 2016; Boletín Oficial de la República Argentina, 2016; EY, 2016).

Production

In 2016, copper production increased by about 33% to 81,902 metric tons (t) from 61,766 t in 2015. Production of lithium carbonate increased by nearly 16% compared with that of 2015, realizing a steady increase since 2013, when production totaled 9,248 t. Lithium chloride production increased by 11%. The production of direct-reduced iron decreased by about 38%, and that of raw steel by about 18%. Cadmium production decreased by about 15% to 91 t, after averaging about 120 t since 2012. Silver production decreased by about 10% compared with that of 2015. Increases in the production of other industrial minerals in 2016 included those of dolomite (69%), other (unspecified) gemstones (35%), and gypsum (19%). Mineral fuels production increases were led by peat (67%). Decreases in the output of industrial minerals were led by kaolin (58%), talc (52%), boron (40%), rhodochrosite (39%), bentonite (37%), vermiculite (33%), dimension stone (24%), feldspar (17%), silica (14%), and travertine (14%). The largest decrease in mineral fuels production was that of bituminous coal (by 16%). Data on mineral production are in table 1.

Structure of the Mineral Industry

In 2016, Minera Alumbrera, which was a joint venture among Glencore plc of Switzerland (50% interest), Goldcorp Inc. of Canada (37.5%), and Yamana Gold Inc. of Canada (12.5%), continued to be Argentina's sole copper producer with a production capacity of about 140,000 metric tons per year (t/yr). The company continued to be among the leading gold producers in the country with an annual production capacity of 12 t/yr. Other leading gold producers included Valadero Gold Mine (solely owned by Barrick Gold Corp. of Canada) and Casposo Gold Mine (solely owned by Austral Gold Ltd. of Australia). The country's lithium producers included Salar del Hombre Muerto (solely owned by FMC Corp. of the United States) with a production capacity of 17,500 t/yr and Salar de Olaroz, a joint venture among Orocobre Ltd. of Australia (66.5%), Toyota Tsucho Corp. of Japan (25%), and Jujuy Energia y Mineria of Argentina (8.5%), with a production capacity of about 23,000 t/yr. Table 2 is a list of major mineral industry facilities.

Mineral Trade

In 2016, Argentina's total free on board (f.o.b.) value of exports increased by 1.6% to about $57.7 billion. The value of Argentina's imports in 2016, as reported in terms of cost, insurance, and freight (c.i.f.) arrangements, decreased by 7% to $55.6 billion. A total of about $3.7 billion ($3.6 billion in 2015) worth of goods classified as mineral products (including base metals and manufactured articles thereof) was exported from Argentina in 2016 and accounted for 6.4% of total exported goods compared with 6.5% (revised) in 2015. Of the value in 2016, about 38% ($1.4 billion) was mineral fuels, mineral oils and products of their distillation, bituminous substances, and mineral waxes; 32% ($1.2 billion) was base metals and manufactured articles thereof; 26% ($979.9 million) was ore, slag, and ash; and the remaining 2.5% ($91.1 million) was other mineral products, including cement, salt, stone, and sulfur. Argentina imported about $7.7 billion worth of mineral products in 2016 (compared with $10.9 billion in 2015), which accounted for 14% of imported goods. Of that value, about 58% was mineral fuels, mineral oils and products of their distillation, bituminous substances, and mineral waxes; and 34% was base metals and manufactured articles thereof. Base metals and manufactured articles thereof traded between Argentina and other countries included aluminum, copper, iron and steel, lead, nickel, tin, and zinc (Instituto Nacional de Estadistica y Censos, 2017, p. 10–12).

In 2016, Argentina's leading export partners were Brazil (received 16% of Argentina's exports), China (8%), and the United States (8%). Exports to the United States were valued at about $4.6 billion in 2016 compared with about $3.9 billion in 2015. Of this value, coal and related fuels accounted for about $1.2 billion, aluminum accounted for about $318 million, and gold and other precious metals accounted for about $178 million. In 2016, Argentina's leading import partners were Brazil (supplied 24% of Argentina's imports), China (19%), and the United States (13%). Imports from the United States were valued at about $8.5 billion compared with about $9.4 billion in 2015. Of this value, petroleum products accounted for about $332 million; drilling and oil field equipment, about $115 million; and iron and steel, about $22 million (Instituto Nacional de Estadistica y Censos, 2017, p. 4; U.S. Census Bureau, 2017a, b).

Commodity Review

Metals

Aluminum.—In 2016, Aluar Aluminio Argentino S.A.I.C. (Aluar) continued to be Argentina's only primary aluminum producer. The company produced 412,283 t of primary aluminum during its production year, which ended on June 30. About 70% of Aluar's production was exported to Brazil, Germany, Japan, and the United States. The company, which produced aluminum alloys, billets, pure ingot, semimanufactures, and wire rods, exported aluminum from Puerto Madryn, located in the Province of Chubut. Aluar had the capacity to produce 460,000 t/yr of aluminum and employed slightly more than 2,000 people (table 1; Aluar Aluminio Argentino S.A.I.C., 2017).

Copper.—The Alumbrera Mine, which is located in the Province of Catamarca in the northwestern region of the country, was the only operating commercial copper mine in Argentina in 2016. Alumbrera Mine, which is a copper, gold, and molybdenum deposit, exported $685.9 million worth of mineral products from the Port of General San Martin, located in the Province of Santa Fe. The mine which operated with 1,154 employees during the year, increased its copper

production by about 33% to 81,902 t. The increase in production was owing to an increase in ore milled and higher grades and recoveries. At yearend 2016, Alumbrera revised the mine's planned closure date to the end of 2018 owing partly to the elimination of the export mining tax. Alumbera has been in operation since 1997 (Minera Alumbrera, 2016, p. 3, 5, 9; Goldcorp Inc., 2017, p. 42).

Gold.—In 2016, gold production from Argentina totaled 56,998 kilograms (kg), compared with 61,310 kg (revised) in 2015. Of that amount, about 47% (26,527 kg) was produced in Santa Cruz Province, which is located in the southern part of the country. During the year, five mining companies produced about 80% of the country's total gold production. Since 2012, annual gold production in the country averaged about 56,400 kg. In 2016, gold exploration spending in Argentina was about $64 million, accounting for about 46% of the total nonferrous metal exploration budget. Yamana Gold's and Gold Corp.'s exploration spending during the year was about $19.5 million and $14 million, respectively. Gold exploration spending in the country has been decreasing steadily since 2012, when it reached about $222 million (Ministerio de Energia y Mineria, 2017c; S&P Global Market Intelligence, 2017).

At Barrick Gold's wholly owned Veladero Mine, 16,925 kg of gold was produced in 2016 compared with 18,724 kg in 2015. Gold production was 10% lower primarily owing to lower ore grades and the temporary suspension of operations at the mine site, to complete upgrades to the berms surrounding the leach pad. In September 2016, ice rolling down the slope of the leach pad at the mine damaged a pipe carrying processed solution, causing some material to leave the leach pad. The material, mainly crushed ore saturated with process solution, was contained and returned to the leach pad. After a judicial inspection by the San Juan Provincial mining authority, Veladero was able to resume normal operations. The Veladero deposit is an oxidized, high sulfidation gold-silver deposit located in the Province of San Juan. In 2016, the mine had the capacity to produce 35,000 kilograms per year (kg/yr) of gold. Barrick planned to increase its production in 2017 to about 24,000 kg/yr owing to an increase in expected ore grades at the Federico pit (Barrick Gold Corp., 2017, p. 3, 58–60).

At Goldcorp of Canada's wholly owned Cerro Negro Mine, 11,291 kg of gold was produced in 2016, a decrease of about 28% compared with that of 2015, when the mine had its first full year of production. The decrease was partly owing to labor disruptions associated with the operational restructuring process undertaken to reduce the workforce. Cerro Negro, which is located in Santa Cruz Province, projected a 13% increase in production in 2017. The mine was also expected to process about 4,000 metric tons per day of ore during the second half of 2018. Cerro Negro consisted of low-sulfidation, epithermal gold-silver deposits situated on the low Patagonian plains in southern Argentina. Proven and probable gold reserves at the Cerro Negro Mine were estimated to be 137,000 kg of contained gold (Goldcorp Inc., 2017, p. 20, 30–31, 64).

Silver and Zinc.—In 2016, silver production from Argentina totaled 1,055,700 kg, which was an increase of about 10% compared with 2015. Of that amount, 54% or 570,290 kg was produced in Santa Cruz Province in the southern part of the country. Since 2012, silver production in Argentina averaged about 980,000 kg/yr. Silver production in 2016 included 324,160 kg from the Pirquitas Mine (an operation jointly owned by Silver Standard Resources Inc., 75%, and Golden Arrow Resources Corp., 25%), and 208,100 kg from the San José Mine operated by Minera Santa Cruz (an operation jointly owned by Hochschild Mining plc, 51%, and McEwen Mining Inc., 49%). During the year, Pirquitas and San José accounted for about 50% of the country's total silver production. Pirquitas, which began commercial production in 2009, achieved record production in 2016 and reported cumulative total production of 2,085 t of silver and 39,825 t of zinc. Pirquitas was scheduled to close in 2017 owing primarily to low ore grades. Closure costs were projected to be $3.6 million. AR Zinc S.A., which was a subsidiary of Glencore, operated the Aguilar Mine and the AR smelter. Zinc production from AR Zinc, located in Jujuy Province, was not publicly available; however, based on Provincial production data, the mine was estimated to have produced almost 23,000 t of zinc in 2016 (table 2; Ministerio de Energia y Mineria, 2017a; Silver Standard Resources Inc., 2017a, p. 3, 28, 218; 2017b).

Industrial Minerals

In 2016, Argentina produced about 109 million metric tons (Mt) of industrial minerals (excluding lithium) compared with 124 Mt in 2015, which was a decrease of about 12%. Of that amount, construction sand and gravel accounted for about 51% of the country's total industrial mineral production, followed by limestone (18%), and clays (9%) (Ministerio de Energia y Mineria, 2017a).

Boron.—The largest economically viable deposits of borates in the world are located in the Mohave Desert of the United States, the Alpine belt in southern Asia, and the Andean belt of South America where Argentina is located. These areas are associated with volcanic activity and arid climates. In Argentina, the main deposits of borates are found in the Provinces of Catamarca, Jujuy, and Salta. In 2016, the Province of Jujuy produced 73,783 t of borate compounds and the Province of Salta produced 74,609 t. Asia continued to be the leading consumer of borates, accounting for about 50% of total global consumption (Ministerio de Energia y Mineria, 2017a; Crangle, 2018).

Orocobre Ltd. of Australia, through its subsidiary Borax Argentina S.A., held 100% interest in the El Porvenir open pit mine, which islocated in Jujuy Province, and the Sijes and the Tincalayu open pit mines, which are located in Salta Province. Borax Argentina also owned the Campo Quijano refinery located in Salta Province. The company expected to complete a feasibility study in 2017 to evaluate a potential expansion of the Tincalayu refined borates operation from its current production capacity of 30,000 t/yr to between 100,000 to 120,000 t/yr. Borax Argentina produced products that were divided into three main groups: boric acid, minerals, and refined products. Boric acid was produced from the acidification of hydroboracite tailings. The minerals produced were colemanite, hydroborocite, and ulexite. The refined products consisted of borox anhydrous, borax decahydrate, and borax pentahydrate (Orocobre Ltd., 2017a).

Lithium.—In 2016, Argentina's lithium carbonate production increased by about 16% to 24,409 t from 21,111 t (revised) in 2015; production of lithium chloride increased by about 11% to 6,468 t from 5,848 in 2015. The country exported about 23,078 t of lithium carbonate in 2016, compared with 13,799 t in 2015. The United States received 9,827 t of lithium carbonate exports from Argentina, followed by Japan (8,160 t); exports to the United States and Japan accounted for 78% of Argentina's lithium carbonate exports and 74% of its lithium carbonate production in 2016 (table 1; United Nations Statistics Division, 2017).

FMC, through its chemical division subsidiary Minera del Altiplanos S.A., produced 12,563 t of lithium carbonate and 6,468 t of lithium chloride from the Salar del Hombre Muerto in 2016. FMC extracted the ore from naturally occurring lithium-rich brines located in the Salta Province in the northwestern part of the country. In May, FMC announced plans to triple its capacity to manufacture lithium hydroxide by 2019. FMC entered into a long-term supply partnership with Nemaska Lithium Inc. of Canada and had begun multiple expansion projects to increase lithium carbonate production. Nemaska Lithium intended to become a lithium supplier to the emerging lithium battery market that was largely being driven by increased production of electric vehicle and large-scale lithium battery storage. Minera del Altiplanos has operated the Salar del Hombre Muerto since 1995 (FMC Corp., 2017, p. 14, 28; Ministerio de Energia y Mineria, 2017a; Nemaska Lithium Inc., 2017).

The Salar del Olaroz facility, which was located in Jujuy Province in northern Argentina, was a joint venture among Orocobre (66.5%), Toyota Tsusho Corp. of Japan (25%), and the Jujuy Energía y Minería Sociedad del Estado (JEMSA) (8.5%). The first sale of lithium carbonate from the Salar del Olaroz lithium facility took place in April 2015. A total of 11,862 t of lithium carbonate was produced from the Salar del Olaroz in 2016, which was the first full year of the operation's commercial production. The operation had the capacity to produce 17,500 t/yr of battery-grade lithium carbonate. The Salar del Olaroz had measured and indicated mineral resources of 6.4 Mt of lithium carbonate capable of sustaining a mine life of more than 40 years at the current production rate (Ministerio de Energia y Mineria, 2017a; Orocobre Ltd., 2017b).

Mineral Fuels

Petroleum and Natural Gas.—Crude petroleum production decreased by about 3.8% to about 187 million barrels in 2016. About 59 companies in Argentina were involved in the production of petroleum in 2016. YPF S.A. and Pan American Energy LLC accounted for about 64% of the total petroleum production in 2016. YPF accounted for 45% of total petroleum production and 31% of total natural gas production. Natural gas production increased by about 4.9% in 2016 compared with that of 2015. A total of 1,098 wells were drilled in Argentina in 2016, of which 687 were petroleum production wells; 441 of the petroleum production wells belonged to YPF and 177 belonged to Pan American Energy (Instituto Argentino del Petroleo y del Gas, 2017a, b).

Outlook

Argentina has a diverse and large mineral endowment that provides the country with many options to continue to develop the mineral sector in the future. Although Argentina's economy contracted in 2016, it is expected to recover in 2017 with an anticipated increase in global industrial and precious metal prices, coupled with favorable economic tax reforms undertaken by the country's newly elected Government. With global lithium consumption expected nearly to triple by 2025, Argentina is poised to take advantage and bring new supply to market as the Federal Government looks to harmonize Provincial regulations within the lithium industry to increase investment in the sector. Argentina, which is part of the lithium triangle along with Bolivia and Chile, holds 54% of the word's lithium resources (Economist, The, 2017).

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TABLE 1
ARGENTINA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons, gross weight, unless otherwise specified)

Commodity[2]		2012	2013	2014	2015	2016
METALS						
Aluminum, metal, primary[3]		390,370 r	439,690 r	441,597 r	433,478 r	412,283
Cadmium:						
Mine, Cd content		144	111	115	107	91
Refinery, primary, metal		37	28	30 e	30 e	30 e
Copper:						
Mine, Cu content		135,743	109,631	102,557	61,766	81,902
Refinery, secondary[e]		13,000	14,000	14,000	14,000 r	14,000
Gold, mine, Au content	kilograms	54,664	48,906 r	60,162 r	61,310 r	56,998
Iron and steel:						
Direct-reduced iron	thousand metric tons	1,607	1,466 r	1,663 r	1,252	773
Pig iron	do.	2,073	2,650	2,766	2,685	2,141
Raw steel	do.	4,996	5,188	5,488	5,028	4,126
Lead:						
Mine, Pb content		26,475	28,673	29,911	29,834	28,016
Refinery:[e]						
Primary		16,400 r	13,800	12,000	8,000	7,000
Secondary		73,800 r	69,900	28,000	33,000	32,000
Molybdenum, mine, Mo content		1,575	1,802	908	811	800 e
Silver, mine, Ag content	kilograms	799,277	890,152 r	989,950 r	1,175,760	1,055,700
Zinc:						
Mine, Zn content		39,602	39,424	28,038	30,498	22,792
Smelter:						
Primary		37,797	36,712	29,122	30,000 e	25,000 e
Secondary		2,844	2,844	2,300	2,400	2,000 e
INDUSTRIAL MINERALS						
Asbestos		102	101	--	130 r	--
Barite		9,416	26,792	16,265	12,917 r	12,389
Boron, materials, crude		479,412	424,811 r	395,058 r	248,683 r	148,390
Cement, hydraulic	thousand metric tons	10,716	11,892	11,408	11,000 e	11,000 e
Clay and shale:						
Bentonite		191,795	262,899	280,407 r	229,715 r	145,723
Common clay		8,296,690	8,952,465 r	9,058,397 r	9,377,879 r	9,355,023
Kaolin		66,574	77,245 r	45,892 r	62,214 r	26,198
Diatomite, mine		278,126	56,312 r	52,039 r	60,951 r	57,113
Feldspar, mine		273,896	219,666 r	162,854 r	186,974 r	155,217
Fluorspar, mine		35,874	38,601 r	39,433 r	65,282 r	14,222
Gemstones:						
Rhodochrosite	kilograms	87,243	65,432	58,889	79,405 r	48,152
Other, unspecified	do.	11,916	8,700	7,330	11,781 r	15,863
Gypsum, crude	do.	1,432,517	1,585,942 r	1,560,960 r	1,314,655 r	1,558,390
Lithium:						
Lithium carbonate		10,535	9,248	11,698	21,111 r	24,409
Lithium chloride		4,297	5,156	7,370	5,848	6,468
Mica		800 r, e	871 r	575 r	583 r	564
Perlite		24,663	27,737 r	22,680 r	23,282 r	17,905
Pozzolan		3,961	3,244	4,900 e	4,900 e	4,000 e
Pumice		6,252	7,320	7,320	7,110 r	7,000
Salt, common		1,843,975	1,669,323 r	1,537,478 r	1,400,762 r	1,812,191
Stone, sand, and gravel:						
Sand and gravel, construction:						
Gravel		19,443,773	28,691,365	29,963,911	28,172,910 r	18,640,942
Unspecified		32,134,756	41,097,162	42,748,291	43,531,705 r	37,149,385
Silica, mine, unspecified		615,256	658,673	673,253	1,098,056 r	949,313

See footnotes at end of table.

TABLE 1—Continued
ARGENTINA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons, gross weight, unless otherwise specified)

Commodity[2]		2012	2013	2014	2015	2016
INDUSTRIAL MINERALS—Continued						
Stone, sand, and gravel:—Continued						
Stone, crushed:						
Basalt		3,147,922	1,765,902	1,826,751	2,120,290 r	1,639,955
Dolomite, calcareous		1,560,949	1,209,097	1,280,570 r	1,616,428 r	2,730,786
Granite, block		72,913	54,844	30,808 r	39,353 r	11,768
Limestone, calcareous		19,855,622	18,611,879 r	20,220,775 r	21,543,473 r	19,798,241
Quartz, crushed		216,697	216,224	181,070	182,000	180,000 e
Quartzite, crushed		1,370,053	1,475,547	1,564,080	1,570,000	1,500,000 e
Serpentine		237,000	335,500	346,800	361,800 r	210,000
Shell, calcareous		487,633	541,273	573,749	590,962 r	608,691
Unspecified		28,836,324	29,399,326	29,518,229	29,600,000 e	29,800,000 e
Stone, dimension, flagstone		189,493	123,769 r	142,749 r	121,524 r	92,458
Stone, size and shape unspecified:						
Calcite, calcareous		223,049	180,915	196,789 r	358,067 r	406,461
Marble, onyx, travertine		169,383 r	186,975 r	233,744 r	243,101 r	209,445
Strontium		22,750	5,246	700	700 r	700 e
Sulfur compounds, sulfates:						
Magnesium, epsomite		1,784	1,873	1,934 r	1,973 r	1,909
Sodium, mirabilite		48,389	15,000 r	--	--	--
Talc		13,372	31,905 r	47,442 r	33,774 r	16,266
Vermiculite, elemental content		320	120	90	90	60
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen:						
Natural (asphaltite)		1,411	1,110	2,000 e	2,000 e	2,000 e
Byproduct of refinery		531,831	607,207	550,000 e	55,000 e	55,000 e
Coal, bituminous	thousand metric tons	86 r	183	174 r	49 r	41
Coke, metallurgical	do.	765 r	794 r	840 r	1,337 r	1,406
Natural gas	million cubic meters	44,123	41,708	41,484	42,895	44,988
Peat, horticultural use, turba		6,639	5,508	5,109	1,436 r	2,400
Petroleum:						
Crude	thousand 42-gallon barrels	200,495 r	197,100 r	194,253 r	194,290 r	186,861
Refinery products	do.	193,195 r	190,858 r	191,151 r	195,494 r	185,091

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

[1]Table includes data available through March 2, 2018. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits.

[2]In addition to the commodities listed, ammonia, antimony, iron ore, manganese, mercury, pozzolan, silicon, and urea may have been produced in Argentina, but available information was inadequate to make reliable estimates of output.

[3]Production is on a fiscal year basis, ending on June 30 of the year listed.

TABLE 2
ARGENTINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Aluar Aluminio Argentino S.A.I.C. [private, 77%; Government, 10%; National Social Security Administration, 13%]	Abasto, Buenos Aires Province, and Puerto Madryn, Chubut Province	460.
Boron		Borax Argentina S.A. (Orocobre Ltd., 100%)	El Porvenir Mine and plant, Jujuy Province; Sijes and Tincalayu Mines and plants, and Campo Quijano refinery, Salta Province	250.
Do.		Procesadora de Boratos Argentinos S.A. (Ferro Corp.)	Loma Blanca Mine, Jujuy Province, and plant at Palpala, Jujuy Province	36.
Do.		Ulex S.A. (private, 100%)	Sol de Mañana Mine, Salta Province	2.
Cadmium	metric tons	Glencore plc, 100%	AR Zinc smelter, Santa Fe Province	72.
Cement		Cementos Loma Negra C.I.A.S.A. (private, 100%)	Buenos Aires, Catamarca, Cordoba, Corrientes, Jujuy, Neuquen, and San Juan Provinces	6,000.
Do.		Cementos Avellaneda S.A. (Corporación Uniland S.A. and C. Molins International S.A.)	La Calera plant, San Luis Province, and Olavarria plant, Buenos Aires Province	2,800.
Do.		Juan Minetti S.A. (LafargeHolcim Ltd., 100%)	Cordoba, Jujuy, and Mendoza Provinces	1,700.
Coal		Yacimientos Carbonífero Río Turbio S.A. (private, 100%)	Rio Turbio, Santa Cruz Province	210.
Copper		Minera Alumbrera Ltd. (Glencore plc, 50%; Goldcorp Inc., 37.5%; Yamana Gold Inc. 12.5%)	Alumbrera Mine, Catamarca Province	140.
Fluorite		Fluorita Cordoba S.A. (private, 100%)	Mine and flotation plant, Cerro Negros, Cordoba Province	NA.
Gold	metric tons	Cerro Vanguardia S.A. [AngloGold Ashanti Ltd., 92.5%, and FOMICRUZ S.E. (Government of Santa Cruz Province), 7.5%]	Cerro Vanguardia Mine, Santa Cruz Province	10.
Do.	do.	Minera Santa Cruz (Hochschild Mining plc, 51%, and McEwen Mining Inc., 49%)	San Jose Mine, Santa Cruz Province	3.
Do.	do.	Minera Argentina Gold S.A. (Barrick Gold Corp., 100%)	Veladero Mine, San Juan Province	35
Do.	do.	Austral Gold Ltd. (private, 100%)	Casposo Gold Mine, San Juan Province	48.
Do.	do.	Pan American Silver Corp., 100%	Manantial Espejo Mine, Santa Cruz Province	2.
Do.	do.	Yacimientos Mineros de Agua de Dionisio (YMD) (Government, 100%)	Farallon Negro, Hualfin, and Belen Mines, Catamarca Province	1.
Do.	do.	Yamana Gold Inc., 100%	Gualcamayo Mine, San Juan Province	6.
Do.	do.	Minera Alumbrera Ltd. (Glencore plc, 50%; Goldcorp Inc., 37.5%; Yamana Gold Inc., 12.5%)	Alumbrera Mine, Catamarca Province	12.
Do.	do.	Goldcorp Inc., 100%	Cerro Negro Mine, Santa Cruz Province	16.
Iron and steel		Siderar S.A.I.C. (Ternium S.A., 60.93%)	San Nicolas, Buenos Aires Province	2,880 steel, 4,500 semimanufactures.
Do.		Acindar S.A. (AcelorMittal Group, 65%)	Plant Nos. 1 and 3, Buenos Aires Province; and Plant No. 2, near Rio Parana, Santa Fe Province	1,350 steel, 1,000 DRI.[2]
Do.		Siderca S.A.I.C. (Techint Group)	Buenos Aires Province	900 steel, 670 DRI.[2]
Iron ore[1]		MCC Minera Sierra Grande S.A.	Sierra Grande, Rio Negro Province	450 iron ore.
Lead		AR Zinc Group (100%)	Aguilar Mine, Jujuy Province	11.
Lead and silver		do.	Palpala smelter, Jujuy Province	NA.
Lime		Cementos Avellaneda, S.A. (Corporación Uniland S.A. and C. Molins International S.A.)	La Calera plant, San Luis Province, and Olavarria plant, Buenos Aires Province	220.

See footnotes at end of table.

TABLE 2—Continued
ARGENTINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Lithium	metric tons	Sales de Jujuy S.A. [Orocobre Ltd., 66.5%; Toyota Tsusho Corp., 25%; Jujuy energía y Minería Sociedad del Estado [JEMSA], 8.5%]	Salar de Olaroz, Jujuy Province	17,500
Do.	do.	Minera del Altiplano S.A. (FMC Corp.)	Salar del Hombre Muerto, Salta Province; plants in Catamarca Province	23,000.
Molybdenum		Minera Alumbrera Ltd. (Glencore plc, 50%; Goldcorp Inc., 37.5%; Yamana Gold Inc., 12.5%)	Alumbrera Mine, Catamarca Province	2.
Natural gas	thousand cubic meters	YPF S.A.	Chubut, Formosa, Jujuy, La Pampa, Mendoza, Neuquen, Rio Negro, Salta, Santa Cruz, and Tierra del Fuego Provinces	13,100.
Do.	do.	Pan American Energy LLC (Sucursal Argentina) [BP p.l.c., 60%, and Bridas Corp., 40%]	Offshore Chubut and Santa Cruz Provinces	2,700.
Petroleum	million 42-gallon barrels	YPF S.A.	Chubut, Formosa, Jujuy, La Pampa, Mendoza, Neuquen, Rio Negro, Salta, Santa Cruz, and Tierra del Fuego Provinces	366.
Do.	do.	Pan American Energy LLC (Sucursal Argentina) [BP p.l.c., 60%, and Bridas Corp., 40%]	Offshore Chubut and Santa Cruz Provinces	100.
Do.	do.	Chevron Argentina S.R.L. (Chevron Corp., 100%)	El Trapial field, Neuquen Province, and other concessions	46.
Do.	do.	Petrobras Energia S.A. (Petroleo Brasileiro S.A., 100%)	La Pampa, Mendoza, Neuquen, Rio Negro, Salta, and Santa Cruz Provinces	15.
Do.	do.	Petro Andina Resources Ltd. (Pluspetrol S.A., 100%)	Neuquen basin	10.
Do.	do.	Tecpetrol S.A.	Golfo San Jorge basin, Neuquen basin, Northwest basin	10.
Do.	do.	Total Austral S.A. (Total S.A., 100%)	Neuquen Province	NA.
Silver	metric tons	Silver Standard Resources Inc., 75%, and Golden Arrow Resources Corp., 25%	Pirquitas Mine, Jujuy Province	350.
Do.	do.	Troy Resources Ltd., 100%	Casposo Mine, San Juan Province	34.
Do.	do.	Minera Santa Cruz S.A. (Hochschild Mining plc, 51%, and McEwen Mining Inc., 49%)	San Jose Mine, Santa Cruz Province	215.
Do.	do.	Cerro Vanguardia S.A. [AngloGold Ashanti Ltd., 92.5%, and FOMICRUZ S.E. (Government of Santa Cruz Province), 7.5%]	Cerro Vanguardia Mine, Santa Cruz Province	60.
Do.	do.	Goldcorp Inc., 100%	Cerro Negro Mine, Santa Cruz Province	173.
Zinc		AR Zinc S.A. (Glencore plc, 100%)	Aguilar Mine, Jujuy Province	44.
Do.		do.	AR smelter, Santa Fe Province, 100%	40.

Do., do. Ditto. NA Not available.

[1]Mill capacity per year.

[2]Abbreviations used in this table include the following: DRI—direct-reduced iron.