



2019 Minerals Yearbook

FINLAND [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF FINLAND

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Finland had a well-developed mineral industry, a good geological knowledge base, ore potential, and infrastructure. In 2019, the country was the leading peat producer in the world and accounted for 37% of world production; the second-ranked mica producer, 18% of world production; and the sixth-ranked selenium producer, 4% of world production (Fraserinstitute.org, 2020; Statistics Finland, 2020d; Anderson, 2021; Briocche, 2021; Jasinski, 2021).

Minerals in the National Economy

In 2019, Finland's real gross domestic product (GDP) increased by 1.1% and the nominal GDP was \$269.4 billion (EUR240.6 billion).¹ In the mining and quarrying sector, the number of employees increased to 6,223 in 2019 from 6,131 in 2018, or by 1.5%, and the number of companies decreased to 894 from 910. Sales in the mining and quarrying sector decreased by 2.3% to \$2.43 billion (EUR2.17 billion). Of this amount, sales from mining of metallic ores amounted to \$1.05 billion (EUR935.0 million) and sales from the extraction of peat amounted to \$601.0 million (EUR536.7 million) (Statistics Finland, 2020a, b).

In 2019, there were 11 metal ore mines and 35 industrial mineral mines in Finland; however, some of them were closed for maintenance. Forty-four companies submitted excavation reports about progress on their projects to the Finnish Safety and Chemicals Agency (TUKES). Excavation of ore decreased by 9% to 44.6 million metric tons (Mt), and total excavation at 44 mines decreased by 12% to 115.1 Mt. Compared with that of 2018, investment in exploration in Finland decreased by 11% to \$70.3 million (EUR62.8 million). The total investment in the mining sector increased by 35% to \$588 million (EUR525 million). The major investments were focused on the Kevitsa copper-nickel mine, the Suurikuusikko gold mine, the Talvivaara nickel mine, and the Siilinjarvi phosphate mine, which together accounted for 87% of the total investments. Finland's allocation of domestic capital to fund exploration and mining activities was limited. The only Government agency participating in exploration activities was the Geological Survey of Finland (GTK), which focused on assessing and modeling potential ore-rich areas (Vasara, 2018, p. 10, 28; Liikamaa, 2019, p. 3; 2020, p. 5, 7; Kaivosteollisuus, 2020).

Government Policies and Programs

The Government regulates the mineral industry through two main laws—the Land Extraction Act (555/1981, effective on January 1, 1982), which regulates the extraction of sand and gravel and the quarrying of natural stone, and the Mining Act (621/2011, effective on July 1, 2011), which regulates the

mining of metallic and industrial minerals other than stone, sand, and gravel. The objective of the Mining Act is to ensure that exploration and mining activities are conducted in an environmentally, economically, and socially sustainable way. The Mining Act takes account of other key laws applicable to exploration and mining, including the Finnish Constitution and legislation concerning the Sami regions in northern Finland. TUKES is the major governing body for the mineral industry and acts as the mining authority. The TUKES grants and supervises permits and enforces compliance with the Mining Act. The Ministry of Employment and the Economy provides guidance for monitoring and development activities related to the Mining Act. The Regional State Administrative Agencies (AVIs) grant the environmental permits required for mining. The Centres for Economic Development, Transport, and the Environment (ELY Centres) supervise and protect the public interest concerning environmental and water issues. The Finnish Government rules on matters related to mining reclamation permits and permits for mining thorium and uranium, whereas the Radiation and Nuclear Safety Authority of Finland (STUK), which is under the Ministry of Social Affairs and Health, is responsible for matters related to radioactive substances (Finlex Data Bank, 1981, 2011, 2020; Finnish Safety and Chemicals Agency, 2020; Koski and Pirinen, 2020; Radiation and Nuclear Safety Authority, 2020).

On April 1, 2019, an act on prohibiting the use of coal in energy production entered into force. According to the act, the use of coal for electricity production and heating would be prohibited as of May 1, 2029. At the same time, on April 1, 2019, an act promoting biofuels use entered into force, with the aim of reducing carbon emissions to European Union standards (Koski and Pirinen, 2020).

Production

In 2019, mineral commodities that had significant increases in production included silver (mine, Ag content), 215%; quartz (silica sand), 163%; and mica (biotite), 28%. The most significant decreases were that for peat (for fuel use), by 42%; palladium (mine, Pd content) and platinum (mine, Pt content), 40% each; refined platinum, 32% (estimated); copper (mine, concentrate, Cu content), 30%; copper (mine, concentrate, gross weight), 28%; pig iron, 23%; mica (concentrate) and peat (for horticultural use), 22% each; refined palladium, 20% (estimated); zinc (mine, Zn content), 20%; nickel matte, 16%; pyrite (gross weight) and raw steel, 15% each; refined copper (primary), 14%; nickel (mine, Ni content) and talc, 12% each; and smelter copper (primary) and crushed limestone including dolomite, 11% each. Data on mineral production are in table 1.

¹Where necessary, values have been converted from euro area euros (EUR) to U.S. dollars (US\$) at an annual average exchange rate of EUR0.893=US\$1.00 for 2019.

Structure of the Mineral Industry

Finland's metallic mineral mines were mostly privately owned by foreign enterprises, although the Government held an equity share in some of the major mineral producers. Most of the metallic mineral mining companies were subsidiaries of international mining companies from Australia, Canada, Sweden, and the United Kingdom. The Hannukainen iron mining project (owned by Hannukainen Mining Oy), the Hautalampi cobalt-nickel mining project (Alandra Oy), the Keliber lithium mining project (Keliber Oy), and the Otso gold mine (Otso Gold Corp.) were four new projects targeted at starting new mining operations. Another project under consideration was the reopening of the Pahtavaara gold mine (Rupert Resources Ltd.). Several ore prospecting projects were underway as well. The country's major mineral facilities and their annual capacities are listed in table 2 (Ministry of Economic Affairs and Employment of Finland, 2017; Vasara, 2018, p. 10, 14; Otso Gold Corp., 2020).

Mineral Trade

In 2019, the total value of Finland's exports was \$72.7 billion (EUR64.9 billion), and the total value of its imports was \$73.5 billion (EUR65.7 billion). The country's leading export products were (in order of value) chemicals (19.1% of total exports), forest industry products (19.0%), and metals and metallic products (15.3%). The leading import products were chemicals (17.4% of total imports), electric and electronics industry products (14.1%), and mining and quarrying products (12.2%). Finland's leading export partners were Germany (which received about 14.6% of the country's total exports), Sweden (10.3%), and the United States (7.4%). The leading import partners were Germany (which supplied about 15.7% of the country's total imports), Russia (13.7%), and Sweden (11.1%) (Statistics Finland, 2020c, p. 42, 43).

Commodity Review

Metals

Cobalt.—On December 2, 2019, Freeport Cobalt Oy—a joint venture of Freeport-McMoRan Inc. of Phoenix, Arizona, Lundin Mining Corp. of Canada, and La Générale des Carrières et des Mines Sarl (Gécamines) of the Democratic Republic of the Congo [Congo (Kinshasa)]—completed the sale of its cobalt refinery in Kokkola and related cobalt cathode precursor activities to Umicore N.V. of Belgium. Freeport Cobalt retained the portion of the business that produced cobalt fine powders, chemicals, catalysts, ceramics, and pigments. Kokkola was Europe's leading cobalt refinery and had a production capacity of 15,000 metric tons per year (t/yr) (table 2; Freeport-McMoRan Inc., 2019; Umicore N.V., 2019).

Copper.—Boliden Mineral AB (Boliden) of Sweden owned and operated the Kevitsa copper-nickel open pit mine (acquired in 2016) and the Kylylahti polymetallic mine (acquired in 2014). In 2019, copper production at the Kevitsa Mine compared with that of 2018 decreased by 28.1% to 19,763 metric tons (t), and that at the Kylylahti Mine decreased by 34.4% to 4,826 t. The Kevitsa Mine produced cobalt, copper, gold, nickel, platinum,

and palladium. The milled volume at the Kevitsa Mine was unchanged at approximately 7.5 Mt of ore, but the amount of copper produced decreased owing to the lower ore grades and a labor strike. Boliden was in the process of increasing the milled volume at Kevitsa to 9.5 million metric tons per year (Mt/yr); the new production capacity was expected to be reached in 2020. The decrease in copper production at the Kylylahti Mine was owing to the lower milled volume, lower ore grades, and technical challenges related to the planned closure of the mine in 2020 (Boliden Group, 2020, p. 2, 19, 45, 106, 114, 115).

First Quantum Minerals Ltd. of Canada owned and operated the polymetallic Pyhasalmi Mine, which is an underground mine located in central Finland. In 2019, the mine produced 8,003 t of copper, 553,664 t of pyrite, and 12,080 t of zinc. Copper production decreased by 32.8% compared with the 11,904 t produced in 2018 owing mainly to lower throughput, which was caused by nearly depleted ore reserves. Although First Quantum had expected 2019 to be the final full year of operation for the Pyhasalmi Mine, the company extended the life of the mine to June 2021 and projected production of 3,000 t of copper in 2020 (First Quantum Minerals Ltd., 2020a, p. 32, 33; 2020b).

Gold.—In 2019, Agnico Eagle Mines Ltd. of Canada produced 5,788 kilograms (kg) of gold at its underground Kittila Mine, which is located in the Lapland region of northern Finland and was one of the largest known gold deposits in Europe. As of December 31, 2019, the 199-square-kilometer property had proven and probable mineral reserves of 29 Mt grading 4.4 grams per metric ton (g/t) gold. Production at the mine started in 2009, and the mine life was estimated to continue through 2034. In 2019, Agnico Eagle Mines continued with the processing plant expansion project at the mine. The expansion would increase the mill throughput to 2 Mt/yr from the current level of 1.6 Mt/yr. The mine expansion project also included construction of a 1,044-meter-deep shaft, which would have hoisting capacity of 2.7 Mt/yr (2 Mt/yr of ore and 0.7 Mt/yr of waste). The expansion project was expected to be completed in 2021 (Agnico Eagle Mines Ltd., 2020).

The first ore delivery from the Kaapelinkulma open pit gold mine to the Vammala plant located 65 kilometers east took place in April 2019. The Kaapelinkulma Mine was owned by Dragon Mining Ltd. and located in the Valkeakoski municipality in southern Finland. As of December 31, 2019, the mine's proven and probable mineral reserves were 61,000 t grading 4.3 g/t gold. In addition to the Kaapelinkulma Mine, Dragon Mining owned two other gold mines in Finland: the Jokisivu and the Orivesi Mines. In June 2019, Dragon Mining ceased production at the Orivesi Mine owing to ore depletion and started mine closure procedures. During its lifetime, the Orivesi Mine had produced 3.3 Mt of ore grading 7.1 g/t gold (Dragon Mining Ltd., 2020a–c).

Nickel.—The Talvivaara Mine and metal production plant, located at Sotkamo, Kainuu Region, and owned by Terrafame Ltd., produced nickel, zinc, and byproduct cobalt and copper using a bioleach process. In 2019, the company produced 27,468 t of nickel compared with 27,377 t in 2018, which was below the company's 30,000-t/yr target level. The lower than target output was owing to production losses caused by the repairs in the bioleaching area and stoppages at the end of the year.

The milled volume and metal production also decreased at Boliden's Kylylahti Mine owing to technical challenges related to the mine's planned closure in 2020. At Boliden's Kevitsa Mine, the milled volume was unchanged; lower ore grades and the worker strike, however, led to lower nickel production in 2019. Production of nickel matte at Boliden's Harjavalta smelter decreased by 16% to 26,000 t in 2019 owing to a maintenance shutdown of the nickel production process in July and a strike at the end of the year (Boliden Group, 2020, p. 45, 47, 117; Terrafame Ltd., 2020, p. 2, 4, 5).

Silver.—The production of silver (mine, Ag content) in Finland increased to 40,461 kg in 2019, or by 215% compared with that of 2018, owing to the commissioning of the Sotkamo silver mine, which was the first silver mine in Finland. The mine was owned by Sotkamo Silver AB. The mine started production in March 2019 and reached its production capacity of 45,000 kilograms per year of silver in September. During the year, the mine milled 343,000 t of ore and produced about 31,000 kg of silver, 84 kg of gold, 932 t of lead, and 1,915 t of zinc in concentrates. The concentrates would be delivered to Boliden's smelters at Kokkola in Finland and Ronnskar in Sweden (Kajastie, 2019; Finnish Minerals Group, 2019; 2020, p. 8; Sotkamo Silver AB, 2020a; 2020b, p. 1).

Zinc.—Zinc production at First Quantum Minerals' Pyhasalmi Mine decreased to 12,080 t, or by 46.8% compared with the 22,716 t produced in 2018. The decrease was owing to lower throughput, lower grades, and a lower recovery rate associated with depletion of mineral reserves. In 2019, the zinc grade was 1.27% and the recovery rate was 89% compared with 2.01% and 91%, respectively, in 2018. The mine was one of the oldest and deepest underground mines in Europe. For the year 2020 (the final full year of operation of the Pyhasalmi Mine) the company forecasted 1,000 t of zinc production. Also, as discussed in the copper section, the zinc production at the Talvivaara Mine and the Kylylahti Mine decreased as well. The Talvivaara Mine produced 55,222 t of zinc compared with 61,608 t in 2018, which was a 10.4% decrease, and the Kylylahti Mine produced 851 t of zinc compared with 1,011 t in 2018, which was a 15.8% decrease (Boliden Group, 2020, p. 114; First Quantum Minerals Ltd., 2020a, p. 32; 2020b; Terrafame Ltd., 2020, p. 4).

Production at Boliden's Kokkola zinc smelter decreased by 1.4% to 290,844 t in 2019 from 295,029 t in 2018. The smelter also produced zinc alloys, silver concentrate, and sulfuric acid. The Kokkola smelter was one of the world's major zinc producers. Most of the zinc concentrate consumed at the Kokkola smelter came from Boliden's mines in Finland, Ireland, and Sweden (table 1; Boliden Group, 2020, p. 19, 21, 117).

Industrial Minerals

Limestone and Wollastonite.—Nordkalk Corp. (owned by Rettig Group Ltd.) was the leading limestone, limestone powder, and wollastonite producer in Finland. Lappeenranta was Nordkalk's largest production site in Finland, in terms of output; it included a quarry, a grinding plant, and two flotation plants. In 2019, an overburden removal project at the Lappeenranta quarry (the main investment activity related to the ongoing expansion at the quarry) was completed (Nordkalk Corp., 2020a; 2020b, p. 9).

Outlook

In recent years, mining activities in Finland have remained at a high level and have been supported by extensive exploration and investments. Finland possesses strong technological expertise in mining machinery along with significant metal refining capability. In 2019, the Orivesi gold mine ceased production; however, the Kaapelinkulma gold mine and the Sotkamo silver mine started up operations. The Kylylahti polymetallic mine and the Pyhasalmi copper-zinc mine are expected to cease production in 2020, and production at the Otso gold mine is expected to start up in 2021. There may be no new mine projects in the next few years; the number of active exploration projects taking place in Finland to discover new deposits that could replace the exhausted ones began to decrease in 2019 and may continue. The coronavirus disease 2019 (COVID-19) pandemic is likely to limit mineral exploration, new mining projects, and the use of international specialists' expertise in the near term (Vasara, 2020).

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TABLE 1
FINLAND: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²		2015	2016	2017	2018	2019
METALS						
Chromium, chromite, mine, ore		1,951,779	2,105,338	1,954,282	2,211,284	2,415,287
Cobalt, Co content:						
Mine, ore, including nonrecoverable		2,119	2,260	1,600	1,377	1,454
Refinery, metal powder and salts		9,615	12,393	12,222	12,874	12,526
Copper:						
Mine, concentrates:						
Gross weight		165,021	193,349	207,264	193,091	138,140
Cu content		41,805	47,488	53,144	46,674	32,861
Smelter, primary		123,700 ^r	126,900 ^r	118,300 ^r	130,000 ^r	115,500
Refinery, primary		127,900	125,100	129,200	135,100	116,200
Ferroalloys, ferrochromium		457,063	469,141	416,285	492,774	505,000
Gold, mine, Au content	kilograms	8,342	8,865	9,102	8,732	7,927
Iron and steel:						
Pig iron	thousand metric tons	2,594	2,670	2,604	2,976	2,300
Steel, raw steel	do.	3,988	4,102	4,004	4,146	3,511
Nickel, Ni content:						
Mine		9,383	20,654	34,641	43,572	38,530
Smelter, matte		17,000	31,000	25,000	31,000	26,000
Refinery:						
Chemicals		7,129	8,048	8,358	10,330	10,608
Metal, electrolytic		36,350	45,606	51,342	50,435	51,792
Platinum-group metals:						
Mine:						
Palladium, Pd content	kilograms	784	901	1,021	1,157	699
Platinum, Pt content	do.	992	1,178	1,418	1,576	953
Refinery: ^c						
Palladium	do.	3,200	2,900	2,300	3,000	2,400
Platinum	do.	2,000	1,900	1,700	1,900	1,300
Selenium, metal, Se content	do.	93,051	104,420	100,198	108,918	115,236
Silver, mine, Ag content	do.	13,051	16,348	13,654	12,849	40,461
Zinc:						
Mine, Zn content		25,332	45,852	66,284	85,335	68,153
Smelter, primary		305,717	290,599	284,992	295,029	290,844
INDUSTRIAL MINERALS						
Feldspar		38,026	18,549	14,926	17,469	17,997
Mica:						
Biotite		38,169	52,310	47,123	50,456	64,505
Concentrate		11,836	10,843	10,740	12,122	9,440
Phosphate rock, apatite, concentrates:						
Gross weight		956,564	939,631	978,613	989,073	994,572
P ₂ O ₅ content ^c		380,000	370,000	420,000	410,000	410,000
Sand and gravel, industrial, quartz, silica sand	thousand metric tons	104	93	72	81	213
Stone, crushed, limestone, including dolomite	do.	3,130	3,539	3,565	3,726	3,312
Sulfur:						
Byproduct, metallurgy, S content	do.	336	340 ^e	340 ^e	340 ^e	340 ^e
Compounds, sulfuric acid	do.	1,760	1,768	1,803	1,793	1,746
Pyrites:						
Gross weight	do.	1,040	719	879	771	659
S content	do.	556	384	470	345 ^r	352
Talc		332,174	345,739	354,819	374,398	329,891

See footnotes at end of table.

TABLE 1—Continued
 FINLAND: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2015	2016	2017	2018	2019	
MINERAL FUELS AND RELATED MATERIALS						
Peat:						
Fuel use	thousand metric tons	9,634	9,907	8,366 ^r	17,306 ^r	10,077
Horticultural use, including environmental uses	do.	1,013	1,046	1,409 ^r	2,272 ^r	1,763

^eEstimated. ^rRevised. do. Ditto.

¹Table includes data available through October 14, 2020. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits.

²In addition to the commodities listed, cement, secondary copper, lead, lime, refined petroleum, sodium sulfate, and wollastonite may have been produced, but available information was inadequate to make reliable estimates of output.

TABLE 2
FINLAND: 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
Cement		Finncement Oy (Irish Cement Ltd., 100%)	Plants at Lappeenranta and Parainen	1,020
Chromium, chromite, ore		Outokumpu Oyj (Solidium Oy, 21.69%)	Mine at Kemi	2,700
Cobalt:				
Ore, Co content	metric tons	Boliden Kevitsa Mining Oy (Boliden Mineral AB, 100%)	Kevitsa Mine at Petkula	600
Do.	do.	Boliden Kylylahti Oy (Boliden Mineral AB, 100%)	Kylylahti Mine near Polvijärvi	280
Do.		TerraFame Ltd. [Finnish Minerals Group, 71.8% (Government owned)]	Talvivaara Mine at Sotkamo	NA
Metal		Freeport Cobalt Oy [Freeport-McMoRan Inc., 56%; Lundin Mining Corp., 24%; La Générale des Carrières et des Mines Sarl (Gécamines), 20%]	Plant at Kokkola ¹	NA
Do.	metric tons	Umicore N.V.	Refinery at Kokkola	15
Copper:				
Ore, Cu content		Boliden Kevitsa Mining Oy (Boliden Mineral AB, 100%)	Kevitsa Mine at Petkula	30
Do.		Boliden Kylylahti Oy (Boliden Mineral AB, 100%)	Kylylahti Mine near Polvijärvi	12
Do.		First Quantum Minerals Ltd.	Pyhasalmi Mine at Pyhäkumpu	18
Do.		TerraFame Ltd. [Finnish Minerals Group, 71.8% (Government owned)]	Mine at Talvivaara, Sotkamo	NA
Metal		Boliden Harjavalta Oy (Boliden Mineral AB, 100%)	Smelter at Harjavalta	210
Do.		do.	Refinery at Pori	155
Feldspar		Sibelco Nordic Oy	Mine and plant at Kemio	50
Ferromanganese		Outokumpu Oyj (Solidium Oy, 21.69%)	Smelter at Tornio	530
Gold:				
Ore, Au content	metric tons	Agnico Eagle Finland Oy (Agnico Eagle Mines Ltd., 100%)	Mine at Kittila	6
Do.	do.	Boliden Kevitsa Mining Oy (Boliden Mineral AB, 100%)	Kevitsa Mine at Petkula	1
Do.	do.	Boliden Kylylahti Oy (Boliden Mineral AB, 100%)	Kylylahti Mine near Polvijärvi	1
Do.	do.	Dragon Mining Ltd.	Mines at Jokisivu, Kaapelinkulma, and Orivesi ²	4
Do.	do.	Endomines AB	Mine at Pampalo, Ilomantsi	2
Do.	do.	Rupert Resources Ltd.	Pahtavaara Mine near Sodankylä ³	2
Metal	do.	Boliden Harjavalta Oy (Boliden Mineral AB, 100%)	Smelter at Harjavalta	4
Iron and steel:				
Raw steel		Ovako AB (Sanyo Special Steel Ltd., 100%)	Plant at Imatra	300
Do.		Rautaruukki Oyj (Government, 39.7%, and SSAB AB, 41.3%)	Plants at Hameenlinna, Kankaanpää, and Raahe	2,100
Stainless steel		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Plant at Tornio	550
Mica		Yara International ASA	Mine and plant at Siilinjärvi	10
Nickel:				
Ore, Ni content		Boliden Kevitsa Mining Oy (Boliden Mineral AB, 100%)	Kevitsa Mine at Petkula	15
Do.		Boliden Kylylahti Oy (Boliden Mineral AB, 100%)	Kylylahti Mine near Polvijärvi	1
Do.		TerraFame Ltd. [Finnish Minerals Group, 71.8% (Government owned)]	Talvivaara Mine at Sotkamo	30
Metal		Boliden Harjavalta Oy (Boliden Mineral AB, 100%)	Smelter at Harjavalta	32
Do.		Boliden Kylylahti Oy (Boliden Mineral AB, 100%)	Plant at Kaavi	NA
Do.		Norilsk Nickel Harjavalta Oy (MMC Norilsk Nickel, 100%)	Smelter at Harjavalta	32
Do.		do.	Refinery at Harjavalta	50
Petroleum, products	thousand barrels per day	Neste Oyj (Government, 35.91%)	Refinery at Naantali	58
Do.	do.	do.	Refinery at Porvoo	206
Phosphate rock		Yara International ASA	Mine and plant at Siilinjärvi	1,000
Platinum-group metal:	metric tons	Boliden Kevitsa Mining Oy (Boliden Mineral AB, 100%)	Kevitsa Mine at Petkula	3
Quartz and quartzite		Sibelco Nordic Oy	Mines at Kemio and Nilsia	250
Selenium		Boliden Harjavalta Oy (Boliden Mineral AB, 100%)	Refinery at Pori	NA

See footnotes at end of table.

TABLE 2—Continued
FINLAND: 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
Silver:				
Ore, Ag content	metric tons	Sotkamo Silver AB	Mine at Sotkamo	45
Metal	do.	Boliden Harjavalta Oy (Boliden Mineral AB, 100%)	Smelter at Harjavalta and refinery at Pori	130
Stone:				
Dolomite		Juuan Dolomiittikalkki Oy	Mine at Paltamo, Reetinniemi	NA
Do.		SMA Mineral AB	Mine at Pieksamaki and Tornio	NA
Limestone		Nordkalk Corp. (Rettig Group Ltd., 100%)	Mines at Lappeenranta and Parainen	1,500
Do.		SMA Mineral AB	Mines at Pieksamaki and Tornio	300
Sulfur		Boliden Harjavalta Oy (Boliden Mineral AB, 100%)	Smelter at Harjavalta	NA
Do.		First Quantum Minerals Ltd.	Pyhasalmi Mine at Pyhakumpu	NA
Talc		Elementis Minerals B.V.	Hormanaho-Pehmytkivi and Karnuka Mines at Polvijarvi and Punasuo and Uutela Mines at Sotkamo	NA
Wollastonite		Nordkalk Corp. (Rettig Group Ltd., 100%)	Mine and plant at Lappeenranta	40
Zinc:				
Ore, Zn content		Boliden Kylylahti Oy (Boliden Mineral AB, 100%)	Kylylahti Mine near Polvijarvi	2
Do.		First Quantum Minerals Ltd.	Pyhasalmi Mine at Pyhakumpu	25
Do.		Terrafame Ltd. [Finnish Minerals Group, 71.8% (Government owned)]	Talvivaara Mine at Sotkamo	60
Metal		Boliden Kokkola Oy (Boliden Mineral AB, 100%)	Smelter at Kokkola	315

Do., do. Ditto. NA Not available.

¹In December 2019, refinery in Kokkola and related cobalt cathode precursor activities were sold to Umicore N.V. Freeport Cobalt Oy retained the cobalt fine powders, chemicals, catalyst, ceramics, and pigments operations.

²In 2019, Dragon Mining Ltd. started production at the Kaapelinkulma Mine and ceased production at Orivesi Mine.

³In 2019, Pahtavaara Mine was not in operation.