



2019 Minerals Yearbook

JAPAN [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF JAPAN

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The metal-processing and mineral-processing sectors dominated Japan's mineral industry. In 2019, Japan was estimated to be ranked second in the world in the production of selenium,¹ accounting for 26% of world production, as well as in the production of titanium sponge¹ (25%) and tellurium (10%); it was tied for second with India in the production of pig iron (6%); third in the production of cadmium¹ (8%), refined indium (7%), silicon carbide (6%), and raw steel (5%); and fourth in the production of bromine¹ (5%). Japan was estimated to have the world's largest reserves of iodine at 5 million metric tons (Mt); it accounted for approximately 30% of the world's iodine production, ranking second behind Chile (67%) (Schnebele, 2020; 2021a, b; Anderson, 2021a–c; Apodaca, 2021; Callaghan, 2021; Gambogi, 2021; Tuck, 2021).

Owing to the depletion of domestic mineral resources and the lack of mine production, Japan imported metallic ores and concentrates of copper, gold, iron, lead, nickel, platinum-group metals, silver, tin, and zinc. Japan also imported cadmium metal, refined lead, and refined zinc. In 2019, Japan remained the second-ranked importer of metallic ores, slag, and ash, accounting for 8% of the global trade of these materials, by value, behind China (which accounted for 61%). Japan was the third-ranked importer of mineral fuels, accounting for 7% of the global trade of these materials, by value, behind China (which accounted for 15%) and the United States (9%) (Japan Mining Industry Association, 2020, p. 12–13, 28; United Nations Statistics Division, 2020).

Minerals in the National Economy

In 2019, Japan's nominal gross domestic product (GDP) was \$5.13 trillion (JPY559.7 trillion)²; real GDP decreased by 0.3%. The manufacturing, construction, and mining and quarrying sectors accounted for 20.5%, 5.4%, and 0.1%, respectively, of Japan's GDP in 2019. In 2016 (the latest year for which data were available), 19,467 people were employed in the mining and quarrying sector (Cabinet Office of Japan, 2020, p. 1; Japan Statistics Bureau, 2020).

The total flow of foreign direct investment (FDI) to Japan in 2019 increased by 57.2%, to \$14.6 billion. The FDI in the mining and quarrying sector increased to \$39 million in 2019 from \$30 million in 2018, and that in the manufacturing of metals was \$100 million compared with \$65 million in 2018. FDI in the refining of petroleum products was negative, with divestments of \$805 million in 2019 compared with investments of \$54 million in 2018 (Japan External Trade Organization, 2020a).

In 2019, the total flow of FDI from Japan increased to \$227 billion, or by 58.3% from that in 2018. Outward FDI toward the mining sector was \$9.50 billion in 2019 compared

with \$9.14 billion in 2018. Outward FDI toward industries involved with the manufacturing of metals and the refining of petroleum was \$4.9 billion and \$391 million, respectively, compared with \$3.81 billion and \$597 million, respectively, in 2018 (Japan External Trade Organization, 2020b).

Government Policies and Programs

The objective of the Government of Japan's mineral policy is to secure a stable mineral supply for the country's metal sector and for electricity generation because of the lack of mineral reserves in the country. Japan's mining sector is regulated under the 1950 Mining Act (No. 289 of 1950) as amended by the 2011 Mining Act (No. 84 of 2011). The amendment in 2011 implemented the following changes: additional permission is needed from the Government for applicants to submit documents regarding their financial and (or) technical capabilities; petroleum, natural gas, and deep-sea minerals are designated as "specified minerals" and are deemed particularly necessary for the country's economic stability; and a new procedure is established for granting mining permissions for specified minerals to applicants who match most with the permission criteria (Ministry of Economy, Trade and Industry, 2012; Kikkawa, 2013).

Production

In 2019, significant increases in production included that of refined antimony (which increased by 285%), silicomanganese (45%), titanium sponge (18%), refined tellurium (16%), secondary smelter zinc (12%), and naphtha (10%). Significant decreases in production included that of primary refined gold metal and molybdenum metal (which decreased by 23% each); refined platinum (14%); ferrochromium (13%); and aluminum powder, refined cadmium, and unspecified ferroalloys (10% each). Data on mineral production are in table 1.

Structure of the Mineral Industry

The Agency for Natural Resources and Energy, which was established under the Ministry of Economy, Trade and Industry (METI), is responsible for formulating Japan's mineral policies. Japan Oil, Gas and Metals National Corp. (JOGMEC) is an independent administrative agency that was formed as a merger of the Japan National Oil Co. and the Metal Mining Agency of Japan in 2004. JOGMEC is charged with securing a stable supply of oil, natural gas, nonferrous metals, and other mineral commodities and for implementing mine pollution control measures (Agency for Natural Resources and Energy, 2018; Japan Oil, Gas and Metals National Corp., 2020a).

In 2019, Japan's mineral industry was primarily owned and operated by private companies. The mining of coal and nonferrous metals was a small industry in Japan, but industrial mineral production and the processing of ferrous and nonferrous

¹Excluding production in the United States, which was withheld to avoid disclosing company proprietary data.

²Values have been converted from Japanese yen (JPY) to U.S. dollars (US\$) at the annual average exchange rate of JPY109.008=\$1.00 for 2019.

metals were large industries. The Hishikari gold mine in Kagoshima Prefecture, which was operated by Sumitomo Metal Mining Co. Ltd., was the only active gold mine in Japan (table 2; Sumitomo Metal Mining Co. Ltd., 2020).

In 2016 (the latest year for which data were available), there were 1,664 mining enterprises in Japan, including 1,389 enterprises involved in the extraction of stone, sand, and gravel; 194 enterprises involved in ceramic mineral mining, 25 enterprises that were affiliated with crude petroleum and natural gas production, 17 enterprises involved in coal mining, 6 enterprises involved in metal mining, and 33 enterprises involved in the mining of other minerals (Japan Statistics Bureau, 2020).

Mineral Trade

In 2019, Japan's total exports were valued at \$706 billion. Exports of mineral products were valued at \$14.9 billion, of which exports of ores and concentrates were valued at \$182 million, and mineral fuels and products, \$14.0 billion. Within the mineral fuels and products category, exports of refined petroleum were valued at \$11.0 billion and exports of petroleum gas and hydrocarbons were valued at \$110 million. In 2019, based on the quantity received, Japan's leading five export partners for refined petroleum were Australia (which received 28%), the Republic of Korea (15%), the United States (11%), China (9.2%), and Singapore (6.7%) (Japan Ministry of Finance, 2020a, g).

Japan's exports of nonferrous metals and articles thereof were valued at \$17.0 billion and included 1.12 Mt of copper valued at \$7.58 billion, 591,000 metric tons (t) of aluminum valued at \$2.20 billion, and 43,100 t nickel valued at \$850 million. In 2019, Japan's leading five export partners for nonferrous metals and articles thereof were China (which received 27%, based on the export value), the United States (12%), Thailand (9.1%), Taiwan (9.0%), and the Republic of Korea (7.9%). Exports of ferrous metals and articles thereof totaled 41.7 Mt and were valued at \$36.4 billion. Japan's leading five export partners for ferrous metals and articles thereof were China (which received 16%, based on the export value), the Republic of Korea (16%), Thailand (13%), the United States (7.8%), and Vietnam (5.8%). Exports of precious and semiprecious stones and metals were valued at \$11.5 billion and included gold, which had an export value of \$6.41 billion; silver, \$1.20 billion; platinum, \$1.12 billion; and scraps of precious metal, \$778 million. Japan's leading five export partners for gold were the United Kingdom (which received 27%, based on the export value), Singapore (18%), Hong Kong (a Special Administrative Region of China) and Switzerland (15% each), and Malaysia (4.8%) (Japan Ministry of Finance, 2020b, c).

In 2019, Japan's total imports were valued at \$721 billion. Imports of mineral products [Harmonized System (H.S.) Codes 25–27] were valued at \$179 billion, of which imports of ores and concentrates were valued at \$22.1 billion. Major imported ores and concentrates included 120 Mt of iron valued at \$10.9 billion; 4.79 Mt of copper valued at \$8.19 billion; and 833,000 t of zinc valued at \$743 million. The country's leading five import partners for iron ores and concentrates were Australia (which provided 52%, based on the import value), Brazil (28%), Canada (7.8%), South Africa (3.2%),

and the United States (2.2%). The leading five import partners for copper ores and concentrates were Chile (which provided 39%, based on the import value), Australia (20%), Peru (14%), Canada (7.0%), and the United States (6.8%) (Japan Ministry of Finance, 2020d, g).

Imports of mineral fuels and products (H.S. Code 27, included in the imports of mineral products stated above) were valued at \$156 billion. Of this amount, imports of crude petroleum were valued at \$73.1 billion; petroleum gases and hydrocarbons, \$44.8 billion; and refined petroleum, \$13.2 billion. In 2019, Japan's leading five import partners for crude petroleum were Saudi Arabia (which provided 36%, based on the import value), the United Arab Emirates (30%), Qatar (8.7%), Kuwait (8.4%), and Russia (5.5%). Japan's leading five import partners for refined petroleum were the Republic of Korea (which provided 28%, based on the import value), the United Arab Emirates (15%), Qatar (14%), the United States (5.1%), and Russia (4.6%). Japan's leading five import partners for petroleum gases and hydrocarbons were Australia (which provided 37%, based on the import value), the United States (12%), Qatar (11%), Malaysia (10%), and Russia (6.9%) (Japan Ministry of Finance, 2020d).

In 2019, Japan's imports of nonferrous metals and articles thereof (H.S. Codes 74–83) were valued at \$19.1 billion and included 3.20 Mt aluminum valued at \$8.02 billion, 286,000 t of nickel valued at \$2.81 billion, and 25,300 t of tin valued at \$499 million. In 2019, Japan's leading five import partners for nonferrous metals and articles thereof were China (which provided 23%, based on the import value), the United States (7.6%), Australia (6.7%), Indonesia (6.1%), and Thailand (6.0%). Imports of ferrous metals and articles thereof totaled 10.7 Mt and were valued at \$15.4 billion. In 2019, Japan's leading five import partners for ferrous metals and articles thereof were China (which provided 35%, based on the import value), the Republic of Korea (25%), Taiwan (8.2%), the United States (3.7%), and Vietnam (3.5%). Imports of precious and semiprecious stones and metals (H.S. Code 71) were valued at \$12.8 billion and included platinum valued at \$4.59 billion, scraps of precious metal valued at \$3.48 billion, and jewelry valued at \$2.02 billion. Japan's leading five import partners for platinum were South Africa (which provided 60%, based on the import value), Russia (25%), Germany (3.7%), the United States (3.1%), and the United Kingdom (2.9%) (Japan Ministry of Finance, 2020e, f).

Commodity Review

Metals

Aluminum.—Owing to a combination of a lack of raw materials in the country and a surge in electricity prices in the 1980s following the energy crisis of the 1970s (during which time United States oil production declined and flows of Middle Eastern oil were interrupted), the aluminum industry in Japan shifted from a smelting-based model (peaking at 1.2 million metric tons per year in 1977) to a more downstream-processing-based industry model. In 2015 (the latest year for which data were publicly available), there were 49 aluminum companies in Japan that owned and (or) operated 69 aluminum plants and employed 12,804 people. In 2019, the aggregate

domestic consumption of aluminum in Japan was 4.22 Mt (Japan Aluminium Association, 2015; 2020a; 2020b, p. 4; 2020c, p. 31).

In 2019, Japan imported 1.4 Mt of nonalloyed unwrought aluminum (an 11.2% decrease compared with that in 2018), 1.2 Mt of alloyed unwrought aluminum (an 8.8% decrease), 251,100 t of wrought aluminum (a 22.5% increase), and 44,600 t of aluminum waste and scrap (a 22.6% increase). Japan produced 795,400 t of secondary aluminum in 2019, which was a decrease of 3.8% compared with that in 2018. In 2019, Japan's leading five import partners were, by the quantity of the unwrought aluminum supplied, Australia (which provided 462,415 t), Russia (434,710 t), China (348,176 t), the United Arab Emirates (331,013 t), and New Zealand (191,014 t). In 2019, 4.0 Mt of aluminum products was produced in Japan, of which 48% was rolled and extruded and 36% was casted and diecasted. The transportation industry accounted for 41% of the aluminum products consumed in Japan, followed by the fabricated metal industry (13%), building and construction industry (12%), and the food industry (10%). Japan exported 7.3% of the aluminum products produced domestically in 2019 (Japan Aluminium Association, 2019, p. 1, 5, 6; Japan Ministry of Finance, 2020c).

Antimony.—Production of refined antimony in Japan increased to 127 t, or by 285% compared with that in 2018. Japan had no domestic production of antimony ore owing to the lack of exploitable resources and therefore relied on imports to meet domestic demand. Japan did not produce antimony from imported ore; imports of ore into the country were for evaluation tests or for limited and specialized production (for example, chemicals used on the side of matchboxes). In 2019, Japan imported 509 t of antimony ore, primarily from India (which supplied 72% of the antimony ore imported by Japan). Japan also imported 5,027 t of unwrought antimony as well as 3,528 t of antimony oxides, of which 3,518 t was antimony trioxide and 10 t was antimony trisulfide. The leading five import partners for unwrought antimony were China (which provided 48%, in terms of the tonnage supplied), Vietnam (30%), the Republic of Korea (14%), Thailand (8.0%), and Germany (less than 1%). In 2018 (the latest year for which data were available), domestic demand for antimony trioxide was 5,113 t and was predominantly used for flame retardant products, which accounted for 78% of domestic demand (tables 1, 3; Japan Oil, Gas and Metals National Corp., 2020b, p. 290, 295; Japan Ministry of Finance, 2020d, f).

Cobalt.—Japan did not have any domestic production or imports of cobalt ores and concentrates, instead relying on imports of refined cobalt metal (primarily cobalt matte). In 2019, production of refined cobalt metal in Japan was estimated to be 3,800 t. Production of refined cobalt metal in Japan was conducted exclusively by Sumitomo Metal Mining Co. Ltd. (SMM) at its Niihama and Harima plants. In May, SMM announced that the company planned to spend \$320 million to increase its monthly production of nickel-cobalt-aluminum cathode materials—to 10,000 t from 4,550 t—by March 2028. This was after previous expenditures of \$338 million during the past few years to increase monthly production to the current 4,550 t level from the previous level of 850 t. SMM also replaced one of its cutting lines at the Niihama plant during the second half of the year; the new line was commissioned by yearend, but the interruption in production caused by the replacement resulted

in decreased output and shipments of cut cathodes for the year (tables 1, 2; Darton Commodities Ltd., 2020, p. 20).

In 2019, Japan imported 9,166 t of cobalt matte, unwrought cobalt, and cobalt powder. Japan's leading five import partners for cobalt matte, unwrought cobalt, and cobalt powder were Finland (which provided 53% of Japan's imports of cobalt matte, by quantity), Canada (15%), Zambia (7.1%), Norway (4.2%), and Madagascar (4.1%). There were no domestic producers of cobalt oxide and hydroxide on a large scale, and domestic demand for these commodities was met entirely through imports. In 2019, imports of cobalt oxide and hydroxide were 458 t and 439 t, respectively. In 2018 (the latest year for which data were available), the primary source of domestic demand for cobalt in Japan was cathode materials for lithium-ion batteries, the apparent consumption of which was 8,962 t (table 3; Japan Ministry of Finance, 2020f; Japan Oil, Gas and Metals National Corp., 2020b, p. 150, 152).

Copper.—Japan relied entirely on imports of copper ores and concentrates to supply its copper-refining industry. In 2019, Japan imported 4.79 Mt of copper ores and concentrates. Chile was its leading import partner (46%, by quantity), followed by Peru (17%), Australia (9.9%), the United States (8.7%), and Canada (7.3%). Refined copper production (primary and secondary) was 1.51 Mt, of which approximately 555,000 t was exported. In 2018 (the latest year for which data were available), domestic consumption of copper was 1.06 Mt, of which 66% was used for electric wire (table 3; Japan Ministry of Finance, 2020c, d; Japan Oil, Gas and Metals National Corp., 2020b, p. 7).

Pan Pacific Copper Co. Ltd. (PPC), which was jointly owned by JX Nippon Mining & Metals Co. Ltd. (JX Metals) and Mitsui Mining & Smelting Co. Ltd. (Mitsui Kinzoku) in 2000, was one of the leading refined copper producers in Japan. On December 19, JX Metals and Mitsui Kinzoku announced that they would form their own subsidiaries with the Saganoseki smelter and refinery and the Hitachi refinery, respectively, which were operated by PPC. Meanwhile, the Tamano smelter of Hibi Kyodo Smelting Co. Ltd. (of which PPC held an equity share of 63.51%) would be transferred to Mitsui Kinzoku. JX Metals and Mitsui Kinzoku would have full ownership of their respective subsidiaries, while also maintaining their ownership shares of PPC. These series of decisions, in effect from April 2020, were implemented because JX Metals wanted to strengthen its downstream business processes and Mitsui Kinzoku planned to integrate its existing lead, zinc, and precious metals smelting and refining networks. In its new capacity, PPC would be involved primarily in smelting and refining toll contracts, raw materials procurement, and products marketing (Pan Pacific Copper Co. Ltd., 2019).

Gold.—In 2019, Japan produced 6,322 kilograms (kg) of mined gold from the Hishikari Mine in Kyushu, which was operated by Sumitomo Metal Mining Co. Ltd. Since 1985, the Hishikari Mine had produced more than 240 t of gold at average grades of 30 to 40 grams per metric ton (g/t) gold (table 1; Sumitomo Metal Mining Co. Ltd., 2020).

Following amendments to the Mining Act in 2011, which allowed foreign companies to hold prospecting and mining rights in Japan, Japan Gold Corp. of Canada established multiple projects for gold extraction on Hokkaido, Honshu, and Kyushu Islands. In 2019, Japan Gold had 31 exploration projects in

place in Japan. In the third quarter of 2019, the Ohra-Takamine project in southern Kyushu, which lies 7.5 kilometers (km) southwest of the historic Yamagano Mine within the Hokusatsu-Kushikino Mining District, completed phase 1 scout drill holes totaling 489.3 meters (m). The Yamagano Mine had produced 28,300 kg of gold and had an average grade of 17.4 g/t gold. As of 2019, 11 prospecting rights had been granted to the Ohra-Takamine project. The Ikutahara project in northern Hokkaido, which included the historic Kitano-o Mine, underwent 2,837 m of phase 1 drilling in six diamond drill holes in December 2019 and was scheduled for phase 2 drilling in 2020. The Kitano-o Mine had produced 3,000 kg of gold at an average grade of 5.9 g/t gold. Japan Gold had submitted a number of prospecting rights applications for the Ikutahara project, all of which had been accepted by the METI and 38 of which had been issued prospecting licenses (Japan Gold Corp., 2019, p. 10, 11, 18; 2020a–c; 2021).

Iron and Steel.—In 2019, Japan ranked third in the world in raw steel production (99.3 Mt) after China (996.3 Mt) and India (111.2 Mt). The three leading producers of raw steel in Japan in 2019 were Nippon Steel Corp. (which produced 51.7 Mt compared with 49.2 Mt in 2018), JFE Steel (27.4 Mt compared with 29.15 Mt in 2018), and Kobe Steel Ltd. (6.89 Mt compared with 6.88 Mt in 2018). Nippon Steel was the third-ranked producer of raw steel in the world (World Steel Association, 2020a; 2020b, p. 9).

Japan's steel product production in 2019 included 19.2 Mt of specialty steel products. Total domestic consumption and exports of specialty steel products were 11.4 Mt and 5.16 Mt, respectively. In 2019, the automobile industry was the leading consumer of specialty steel products (accounting for 39.2% of consumption), followed by machinery and equipment (12.5%). Further processing accounted for 32.2% of specialty steel product consumption. For ordinary steel products, the construction sector was the leading consumer (accounting for 25.5%), followed by the automobile industry (20.3%), shipbuilding (9.44%), and machinery and equipment (7.08%); 31.0% was consumed by steel dealers (Japan Iron and Steel Federation, 2019a–c, 2020a; 2020b, p. 7).

Nickel.—Japan relied entirely on imports of nickel ores and concentrates to supply its nickel-refining industry. In 2019, Japan imported 3.84 Mt of nickel ores and concentrates. The import sources included New Caledonia (which supplied 54% of Japan's imports of nickel ores and concentrates, by tonnage), the Philippines (44%), and Indonesia (1.3%). Indonesia was historically Japan's leading import partner of nickel ores and concentrates, accounting for a record high 50.5% share of Japan's imports in 2013, until Indonesia's announcement in 2014 of a nickel ore export ban, which was eased for a 5-year period in 2017 until 2022 but was reinstated in August so that the ban would start from January 2020 instead of 2022. After the imposition of the ban, Indonesia's share of Japan's imports of nickel ores and concentrates dropped to 7.7% in 2014 and then to between 0% and 1.3% from 2015 through 2019. In 2019, ferronickel production (Ni content) was estimated to be 58,000 t, and nickel metal production was 58,777 t. In 2018 (the latest year for which data were available), apparent domestic consumption of ferronickel was 63,300 t.

Domestic consumption of nickel metal was 49,600 t, of which 85% was used for specialty steel (tables 1, 3; Japan Ministry of Finance, 2020h; Japan Oil, Gas and Metals National Corp., 2020b, p. 128, 131–133, 137).

In October, Toho Titanium Co. Ltd. announced a plan to spend approximately \$68.8 million to increase its production capacity for nickel powder at its Wakamatsu plant in Kitakyushu, Fukuoka Prefecture. Construction was expected to conclude in December 2020, and the start of operations was expected to take place in April 2021. In 2019, the plant had a production capacity of 360 metric tons per year (t/yr) of nickel powder (table 2; Toho Titanium Co. Ltd., 2019).

Rare Earths.—No mines produced rare earths in Japan. A deposit of rare earths was discovered under the 5,700-m-deep seabed within Japan's Exclusive Economic Zone (a 2,500-square-kilometer area) located south of Minami-Torishima Island in 2012. Although the technology needed to produce the rare earths on a commercial scale remained to be developed, the deposit was estimated to be large enough to supply all the needs of Japan's high-tech manufacturing industry for the foreseeable future. A 2018 analysis estimated the resources of the deposit to be 16 Mt of rare earths, including yttrium, dysprosium, europium, and terbium in quantities that are hundreds of times that of current global consumption. Research on the Minami Torishima Island site and its development as a potential source of rare earths began in earnest in 2018 as part of a cross-ministerial Strategic Innovation Promotion Program (SIP) administered primarily by the Japan Agency for Marine Earth Science and Technology (JAMSTEC) and conducted in coordination with academia and industry. The objectives of the SIP were to narrow down potential sites, estimate the amount of rare earths at these sites, and establish retrieval technologies using a coordinated fleet of autonomous underwater vehicles (AUVs) that are controlled from the sea surface. As of yearend 2019, the SIP had conducted onboard- and seafloor-level acoustic surveys of the high-concentration rare-earth sites at depths of 6,000 m, collected piston core samples, tested AUV prototypes at 3,000 m, and drafted concepts for the continuous extraction of rare-earth mud at depths of 6,000 m (Asanuma, 2018; Sankei News, The, 2018; Japan Agency for Marine-Earth Science and Technology, 2020, p. 11, 14, 19, 20).

In 2018 (the latest year for which data were available), domestic consumption of rare earths was 18,550 t, of which cerium (34.2%), didymium and neodymium (26.4%), mischmetals (19.9%), and lanthanum (10.6%) accounted for 91.1% of total consumption. Cerium is most commonly used for abrasives, automobile exhaust gas auxiliary catalysts, and fluid catalytic cracking catalysts. However, import restrictions from China since 2010 have resulted in increased recycling initiatives and transitions to zirconia-based abrasives. Despite subsequent decreases in cerium prices, cerium consumption in Japan has greatly decreased, to 6,350 t in 2018 from 11,500 t in 2010 (Japan Oil, Gas and Metals National Corp., 2020b, p. 99, 100).

Selenium.—In Japan, selenium was primarily produced from electrolytic slime during the nonferrous metal refining process (specifically copper refining and, to a lesser extent, nickel refining), as well as from recycling scraps of

selenium photoconductor drums for copiers. In 2019, Japan produced 708,812 kg of selenium. A large amount of the selenium produced in the country is exported because Japan's production of selenium has historically greatly exceeded the domestic demand, with apparent consumption from 2015 to 2019 ranging between 110,265 and 250,822 kg. In 2019, Japan exported 602,857 kg of selenium. Japan's leading five export partners for selenium were India (which received 22% of Japan's selenium, by quantity), China (21%), Hong Kong (13%), Belgium (9.8%), and Germany (8.3%) (table 1; Japan Oil, Gas and Metals National Corp., 2012, p. 327; Japan Ministry of Finance, 2020h).

Titanium.—Japan depends entirely on imports of titanium ores and concentrates to satisfy the country's demand. Although approximately 88% of global titanium ore production consists of ilmenite, Japan has a higher consumption of non-ilmenite ores, such as rutile and rutile alloys (72% of domestic consumption in 2018, which was the latest year for which data were available); rutile and rutile alloys can be used as the raw material for titanium sponge and titanium oxide. In 2019, Japan imported 414,080 t of titanium ores and concentrates; the leading five import partners for titanium ores and concentrates were South Africa (which supplied 27% of Japan's titanium ores and concentrates, by quantity), India (26%), Canada (17%), Australia (16%), and Mozambique (6%). Japan also imported 12,906 t of titanium oxide. In 2019, production of titanium dioxide (TiO₂) was 189,302 t, and production of titanium sponge, 58,200 t. In 2018 (the latest year for which data were available), domestic consumption of titanium was 145,300 t, of which 80% was titanium oxide and 20% was titanium sponge. TiO₂ was used mainly for pigment by the automotive industry (tables 1, 3; Japan Ministry of Finance, 2020d; Japan Oil, Gas and Metals National Corp., 2020b, p. 305, 309, 311, 313, 326).

In 2019, Osaka Titanium Technologies Co. Ltd. (OTC) and Toho Titanium Co. Ltd.—Japan's only titanium sponge producers—had annual titanium sponge production capacities of 40,000 t/yr and 25,200 t/yr, respectively. In April, OTC signed a memorandum of understanding with Titomic Ltd. of Australia and Marubeni Corp. of Japan to expand the sales of spherical titanium powder. OTC would supply titanium powder suitable for a new solid-state additive titanium manufacturing process developed by Titomic (table 2; Osaka Titanium Technologies Co. Ltd., 2019).

Industrial Minerals

Iodine.—Iodine is used for X-ray contrast media, polarizing film, disinfectants, and catalysts. In Japan, raw iodine was extracted from natural gas brine found in the pores of unconsolidated marine sediments. Local governments have regulated the pumping of natural gas brine to prevent land subsidence and, consequently, iodine production had not increased significantly, remaining at a constant level for a decade. Raw iodine production in Japan took place in the Prefectures of Chiba, Miyazaki, and Niigata. The Southern Kanto gas field which is the largest water-soluble natural gas deposit in Japan and has estimated reserves of 4.9 Mt of iodine at concentrations of 100 to 150 parts per million, is located in Chiba Prefecture and has accounted for approximately

80% of raw iodine production in Japan. Japan's production of raw iodine in 2019 was 9,122 t. The country exported 5,014 t of raw iodine in 2019, and its leading export partners were Norway (which received 25% of Japan's exports of iodine, by quantity), China (16%), India (13%), Germany (9.3%), and the United States (8.6%) (tables 1, 3; Godo Shigen Co. Ltd., 2014; Kaneko and Kaiho, 2014, p. 231, 237; Ise Chemicals Corp., 2020; Kanto Natural Gas Development Co. Ltd., 2020).

In October, Toho Earthtech Inc. started full-scale construction work of a plant for iodine production in Nishikan Ward, Niigata Prefecture, to augment production at its Kurosaki facility located approximately 12 km south in the same Prefecture. Production equipment, an iodine enrichment plant, and pipelines would be installed across four phases, with equipment put into operation upon the completion of each phase. Construction was scheduled to be completed in April 2026, and the full iodine production capacity at the new facility was expected to be approximately 400 t/yr (Mitsubishi Gas Chemical Co. Ltd., 2019).

Limestone.—The production of limestone in Japan in 2019 was 139 Mt. Of this amount, 44% was used for cement production; 22%, for concrete aggregate production; 14%, for steel production; 7%, for lime production; 2%, for road construction; 6%, for other applications (including soda and glass production); and 4%, for exports. As of September 2019, there were 226 quarries in operation in Japan, of which 20 quarries accounted for 82.0% of domestic limestone production (Japan Business Federation, 2020, p. 1, 3; Limestone Association of Japan, 2020).

Mineral Fuels, Related Materials, and Other Sources of Energy

In the 3 years after the March 2011 Tohoku earthquake (magnitude 9.1) and the related tsunami that caused the disaster at the Fukushima Daiichi nuclear powerplant, Japan underwent a complete suspension of its nuclear power use (to 0% of total power generation in 2014 from 25% in 2010) and substantially increased its use of other energy sources for power generation, such as natural gas (the use of which increased to 43% in 2014 from 29% in 2010), coal (to 33% from 28%), petroleum (to 11% from 8.6%), and solar energy (to 2.2% from 0.3%). Apart from the production of solar energy (which has continued to increase, to 6.7% of total power generation in 2019), these trajectories have all since reversed, with nuclear power increasing since 2014 to 6.2% of total power generation in 2019, whereas power generation by natural gas decreased to 37%; coal, to 32%; and petroleum, to 6.7%. As of yearend 2019, of the 33 operable nuclear reactors in Japan, 9 had restarted operations and 16 were at various stages in the process of restart approval (Agency for Natural Resources and Energy, 2020a; World Nuclear Association, 2020).

Coal.—In 2019, Japan was the world's third-ranked importer of coal (behind China and India) and imported 5.7 Mt of anthracite coal, 172 Mt of bituminous coal, and 8.5 Mt of other forms of coal (including briquets). In 2019, 5.67% of the total coal supply was used for the manufacturing of iron and steel and 2.51% was used for the manufacturing of ceramic, stone, and clay products. From 2011 to yearend 2019, a total of 25 coal-fired powerplants had been constructed for a total capacity of

4.5 gigawatts (GW), and 20 plants were planned for construction from 2020 to 2026 for a total capacity of 11.8 GW. Japan's Energy for New Era (JERA) Co. Inc. started construction of the 1.3-GW Yokosuka coal-fired powerplant in August amid protests from local environmental groups regarding its CO₂ emissions and air pollutants. A group of local residents filed an administrative lawsuit against the Central Government in May, alleging that the Central Government approved a purportedly simplified environmental impact assessment report for the project (Agency for Natural Resources and Energy, 2020b; International Energy Agency, 2020; Japan Beyond Coal, 2020; Japan Ministry of Finance, 2020d; NS Energy, 2020).

Natural Gas.—In 2019, Japan was the world's leading importer of liquefied natural gas (LNG), comprising 22% of global LNG imports. Its leading import partners were Australia (which supplied 30.1 Mt), Malaysia (9.33 Mt), Qatar (8.73 Mt), Russia (6.40 Mt), and Brunei (4.32 Mt). Japanese LNG imports declined by 6.8% in 2019 compared with those in 2018 because of a slowdown in the country's economic growth, the restart of several nuclear power units, and mild temperatures in the year. In 2019, 1.29% of the total natural gas supply was used in the manufacturing industry (Agency for Natural Resources and Energy, 2020b; International Group of Liquefied Natural Gas Importers, 2020, p. 6, 30; Japan Ministry of Finance, 2020h).

Petroleum and Petroleum Refinery Products.—In 2019, Japan was the world's fourth-ranked importer of crude petroleum, behind China, the United States, and India. Japan produced 3.29 million barrels of crude petroleum, which constituted approximately 0.03% of Japan's domestic consumption. Japan was the sixth-ranked producer of refined petroleum in 2019. Of the refined petroleum consumed domestically, 48% was consumed for transportation; 45%, for industrial applications; and 8%, for residential applications. As of March 2019, 22 petroleum refineries were active in the country and together had a total capacity of 3.52 million barrels per day. As of March 2019, approximately 18,900 people were employed in the petroleum refining and marketing industry (Petroleum Association of Japan, 2019a, p. 9; 2019b, p. 44; Agency for Natural Resources and Energy, 2020b; Enerdata, 2020; United Nations Statistics Division, 2020).

In July, JXTG Nippon Oil & Energy Corp., which was the parent company of Osaka International Refining Co. Ltd., announced that it would shut down its oil-refining operations in Osaka as of October 2020, after which it would transition to a power generation facility that uses asphalt as fuel. Its current refined product export functions would be transferred to its Chiba refinery. The 253 employees at the refinery would be relocated to other facilities owned by the company (Nikkei Keizai Shimbun, 2019).

Outlook

In 2020, Japan's real GDP is expected to decrease by 4.8% owing to the global disruptions caused by the coronavirus disease 2019 (COVID-19) pandemic, followed by an increase of 3.3% in 2021. Japan is likely to continue to rely on imports of ores and concentrates for metal production and to remain the world's second-ranked importer of those materials. Continued development of deep-sea rare earth element deposits may

yield substantial and sustained domestic production in the long term. Gold production may increase in the future, pending the successful development of the dozens of gold extraction projects by foreign companies currently taking place. The import of aluminum and articles thereof, which account for the largest fraction of nonferrous metal imports, is likely to continue to increase in the future. Japan's aggregate demand for aluminum is expected to increase, led by demand from the transportation machinery industry and spurred by lightweight and electric vehicle initiatives in the automobile industry (International Monetary Fund, 2020, p. 9, 52; Japan Aluminium Association, 2020c, p. 31, 32, 34).

The trends in increasing the use of renewable resources and nuclear energy since 2014 are likely to continue in the future as more nuclear facilities are restarted; accordingly, imports and consumption of petroleum products have decreased, and these decreases are likely to continue in the medium term. However, coal consumption has decreased to a lesser extent since 2014, and the contribution of coal to the country's energy consumption is likely to remain high in at least the short term, as the country is in the process of expanding its domestic construction of coal-fired powerplants (Agency for Natural Resources and Energy, 2020b; International Energy Agency, 2020; Japan Beyond Coal, 2020).

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TABLE 1
JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2015	2016	2017	2018	2019
METALS					
Aluminum:					
Alumina ^c	15,000	18,000	20,000	20,000	20,000
Metal, secondary	776,700	788,800	758,500	826,600	795,400
Products, powder	11,648	11,630	12,550	12,695	11,475
Antimony, refinery, metal	15	12	22	33	127
Bismuth, refinery ³	632	428	525	571	540 ^e
Cadmium, refinery, primary	1,959	1,988	2,142	1,979	1,783
Cobalt, refinery, metal	4,259	4,305	4,159	3,669	3,800 ^e
Copper:					
Smelter, blister and anode:					
Primary	1,175,101	1,137,864	1,118,626	1,169,500 ^r	1,112,276
Secondary	296,486	358,810	369,525	421,736 ^r	394,401
Total	1,470,000	1,500,000	1,490,000	1,590,000 ^r	1,510,000
Refinery:					
Primary	1,243,072	1,259,426	1,166,194	1,241,100	1,152,847
Secondary	240,059	293,707	321,886	353,417	342,512
Total	1,480,000	1,550,000	1,490,000	1,590,000	1,500,000
Ferroalloys:					
Ferchromium ^c	16,000 ^r	16,000 ^r	16,000	15,000 ^r	13,000
Ferromanganese	465,952	473,740	456,460	456,518 ^r	462,740
Ferromolybdenum	2,864 ^r	2,972 ^r	3,094 ^r	3,042 ^r	3,000 ^e
Ferronickel:					
Gross weight	396,969	333,448	312,324	339,844	337,790
Ni content	73,400 ^r	61,700 ^r	57,800 ^r	62,900 ^r	58,000 ^e
Ferovanadium ^c	4,350 ^r	4,420 ^r	4,390 ^r	4,390 ^r	4,400
Silicomanganese	22,700	22,700	24,500	21,100	30,600
Other, unspecified	73,651	77,453	79,809	73,094	65,675
Gallium kilograms	5,000	3,000	3,000	3,000	3,000 ^e
Gold:					
Mine, Au content do.	7,700	6,455	6,372	6,453	6,322
Refinery:					
Primary do.	82,029	86,376	80,285	104,736	80,463
Secondary do.	31,717	30,044	29,965	30,255	29,993
Indium, refinery, primary ^e do.	70,000	70,000	70,000	70,000	70,000
Iron and steel:					
Pig iron thousand metric tons	81,011	80,186	78,330	77,328	74,907
Steel:					
Raw steel do.	103,134 ^r	104,775	104,661	104,319	99,284
Products, semimanufactured, hot rolled:					
Ordinary steel do.	74,132	73,187	72,097	71,645	68,526
Specialty steel do.	18,887	19,449	20,344	20,794	19,189
Lead, refinery:					
Primary	85,655	84,660	87,366	78,223	82,098
Secondary	108,736	114,430	112,052	118,338	116,273
Molybdenum, metal	1,025	761	862	893	692
Nickel, Ni content:					
Chemicals	10,045	11,153	16,773	15,624	16,132
Metal	64,068	63,132	61,377	57,517	58,777
Oxide sinter	45,300 ^r	55,500 ^r	51,100 ^r	50,700 ^r	50,000 ^e
Platinum-group metals, refinery, primary, metal:					
Palladium kilograms	7,073	7,172	7,715	8,264	8,305
Platinum do.	1,379	1,485	1,747	1,827	1,575
Selenium, Se content do.	772,768	752,173	729,132	749,677	708,812

See footnotes at end of table.

TABLE 1—Continued
JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2015	2016	2017	2018	2019	
METALS—Continued						
Silver:						
Mine, Ag content	kilograms	4,616	5,076	3,408	3,596	3,492
Refinery, metal:						
Primary	do.	1,096,213	1,228,857	1,186,463	1,101,845	1,032,843
Secondary	do.	786,632	846,627	774,247	759,050	750,245
Tellurium, refinery, Te content	do.	37,356	32,911	37,754	57,231	66,664
Tin, smelter, primary		1,688	1,620	1,624	1,650	1,547
Titanium:						
Dioxide		174,770	179,154	191,997	192,465 ^r	189,302
Sponge		41,900	54,600	50,300	49,300	58,200
Tungsten, metal		3,154	3,391	3,777	4,093	3,904
Vanadium, V content		2,825	2,872	2,852	2,935	2,900 ^e
Zinc:						
Oxide		59,224	56,729	61,901	62,855 ^r	60,648
Smelter, metal:						
Primary		457,786	438,560 ^r	436,656	441,651	437,609
Secondary		108,833	95,129	87,263	79,459	89,108
INDUSTRIAL MINERALS						
Arsenic trioxide ^e		45	45	45	45	45
Bromine ^e		20,000	20,000	20,000	20,000	20,000
Cement:						
Clinker	thousand metric tons	50,471	50,224	51,806	51,014	49,442
Hydraulic	do.	54,827	53,255	55,195	55,307	53,462
Clay, bentonite		250,000 ^e	253,602	250,000 ^e	250,000 ^e	250,000 ^e
Diamond, synthetic, industrial ^e	carats	34,000	34,000	34,000	34,000	34,000
Diatomite		50,000 ^e	40,681	40,000 ^e	40,000 ^e	40,000 ^e
Gypsum, synthetic ^e	thousand metric tons	4,670	4,670	4,600	4,300	4,300
Iodine		10,610	9,993	8,839	9,136	9,122
Lime:						
Quicklime	thousand metric tons	7,336	7,341	7,431	7,575	7,321
Slaked lime	do.	1,378	1,342	1,363	1,381	1,338
Nitrogen, ammonia, N content	do.	790	725	717	673	694
Salt	do.	938	928	926	925 ^e	925 ^e
Sand and gravel, industrial, silica	do.	2,845	2,762	2,695	2,524	2,273
Soda ash, synthetic		230,000	217,000	220,000 ^e	220,000 ^e	220,000 ^e
Stone, construction, crushed:						
Dolomite	thousand metric tons	3,366	3,223	3,359	3,440	3,259
Limestone	do.	142,916	139,332	141,634	142,212	138,534
Quartzite	do.	8,988	9,068	9,261	9,631	9,263
Sulfur, byproduct, S content:						
Metallurgy	do.	1,629	1,700	1,583	1,711 ^r	1,700 ^e
Petroleum	do.	1,733	1,818	1,789	1,697	1,629
Talc and related minerals, pyrophyllite ^e		160,000	160,000	160,000	160,000	160,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, bituminous	thousand metric tons	1,200	1,666	1,700 ^e	1,700 ^e	1,700 ^e
Coke, metallurgical:						
All sources	do.	32,402	33,159	32,739	32,573	32,667
From petroleum refinery	do.	1,213	1,229	1,319	1,297	1,235
Natural gas, gross	million cubic meters	2,734	2,754	3,008	2,707	2,524

See footnotes at end of table.

TABLE 1—Continued
 JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2015	2016	2017	2018	2019	
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude	thousand 42-gallon barrels	3,751	3,453	3,532	3,138	3,286
Refinery:						
Asphalt	do.	19,763	19,385	19,957	16,966	17,025
Distillate fuel oil	do.	199,694	209,355	186,969	184,739	168,926
Gas oil	do.	264,608	258,360	263,408	252,994	264,843
Gasoline	do.	341,865	340,346	338,002	322,852	313,242
Jet fuel	do.	100,303	99,783 ^r	95,256	93,249	101,440
Kerosene	do.	97,692	100,000	100,005	88,298	85,558
Liquefied petroleum gas	do.	50,957	48,953	52,446	46,978	44,362
Lubricating oil	do.	14,861	15,707	13,932	15,447	14,271
Naphtha	do.	120,804	125,811	118,190	103,436	113,762
Paraffin wax	do.	518	458	505	543	567
Total		1,210,000	1,220,000	1,190,000	1,130,000	1,120,000

^eEstimated. ^rRevised. do. Ditto.

¹Table includes data available through December 28, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the commodities listed, chromium, germanium, manganese, rare-earth oxides, and tantalum as a byproduct of metallurgy may have been produced, but available information was inadequate to make reliable estimates of output.

³Refined bismuth was produced as a byproduct of zinc production.

TABLE 2
JAPAN: 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
Antimony	metric tons	Hosokura Metal Mining Co. Ltd. (Mitsubishi Materials Corp., 100%)	Refinery in Hosokura, Miyagi Prefecture	360.
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	500.
Do.	do.	Toho Zinc Co. Ltd.	Chigirishima refinery, Toyoda, Hiroshima Prefecture	1,200.
Alumina		Denka Co. Ltd.	Omuta plant, Omuta, Fukuoka Prefecture	NA.
Bismuth	metric tons	Hosokura Metal Mining Co. Ltd. (Mitsubishi Materials Corp., 100%)	Refinery in Hosokura, Miyagi Prefecture	360.
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	84.
Do.	do.	Toho Zinc Co. Ltd.	Facilities:	
Do.	do.		Chigirishima refinery, Toyoda, Hiroshima Prefecture	180.
Do.	do.		Onahama refinery, Iwaki, Fukushima Prefecture	NA.
Bromine		Tosoh Corp.	Nanyo Complex, Shunan, Yamaguchi Prefecture	24.
Cadmium		Akita Zinc Co. Ltd. [Dowa Metals & Mining Co. Ltd., 86%, and Sumitomo Metal Mining Co. Ltd. (SMM), 14%]	Plant in Iijima, Akita Prefecture	NA.
Do.		Hachinohe Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 85.51%; Toyo Zinc Co. Ltd., 10.48%; Nisso Metallochemical Co. Ltd., 4.01%)	Smelter in Hachinohe, Aomori Prefecture	NA.
Do.		Kamioka Mining & Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 100%)	Plant in Hida, Gifu Prefecture	NA.
Do.		Toho Zinc Co. Ltd.	Annaka refinery, Annaka, Gunma Prefecture	NA.
Cement		Aso Cement Co. Ltd. (Aso Group, 95%, and LafargeHolcim Ltd., 5%)	Facilities:	
Do.	do.	do.	Kanda plant, Miyako District, Fukuoka Prefecture	1,700.
Do.	do.	Denka Co. Ltd.	Tagawa plant, Tagawa, Fukuoka Prefecture	1,900.
Do.	do.	DC Co. Ltd. (Taiheiy Cement Corp., 100%)	Aomi plant, Itoigawa, Niigata Prefecture	2,400.
Do.	do.	Hachinohe Cement Co. Ltd. (Sumitomo Osaka Cement Co. Ltd., 100%)	Kawasaki plant, Kawasaki, Kanagawa Prefecture	1,300.
Do.	do.	Hitachi Cement Co. Ltd.	Plant in Hachinohe, Aomori Prefecture	1,500.
Do.	do.	Mitsubishi Materials Corp.	Plant in Hitachi, Ibaraki Prefecture	940
Do.	do.	do.	Plants in:	
Do.	do.	do.	Kitakyushu and Kanda, Fukuoka Prefecture	7,220
Do.	do.	do.	Higashidori, Aomori Prefecture	826.
Do.	do.	do.	Yokoze, Saitama Prefecture	1,160.
Do.	do.	do.	Ichinoseki, Iwate Prefecture	480.
Do.	do.	Myojo Cement Co. Ltd. (Taiheiy Cement Corp., 100%)	Plant in Itoigawa, Niigata Prefecture	1,710.
Do.	do.	Nippon Steel Blast Furnace Slag Cement Co. Ltd. (Nippon Steel Co. Ltd., 100%)	Plant in Kitakyushu, Fukuoka Prefecture	1,750.
Do.	do.	Nippon Steel Cement Co. Ltd. (Nippon Steel Co. Ltd. and Sumitomo Osaka Cement Co. Ltd.)	Plant in Muroran, Hokkaido	1,600.
Do.	do.	Sumitomo Osaka Cement Co. Ltd.	Plants in:	
Do.	do.	do.	Sano, Tochigi Prefecture	900.
Do.	do.	do.	Motosu, Gifu Prefecture	1,600.
Do.	do.	do.	Ako, Hyogo Prefecture	4,200.
Do.	do.	do.	Susaki, Kochi Prefecture	4,350.
Do.	do.	Taiheiy Cement Corp.	Facilities:	
Do.	do.	do.	Kamiiso plant, Hokuto, Hokkaido	3,624 clinker.
Do.	do.	do.	Ofunato plant, Ofunato, Iwate Prefecture	2,034 clinker.
Do.	do.	do.	Kumagaya plant, Kumagaya, Saitama Prefecture	1,747 clinker.
Do.	do.	do.	Saitama plant, Hidaka, Saitama Prefecture	1,395 clinker.
Do.	do.	do.	Fujiwara plant, Inabe, Mie Prefecture	1,734 clinker.
Do.	do.	do.	Oita plant, Tsukumi, Oita Prefecture	4,105 clinker.
Do.	do.	Tokuyama Corp.	Nanyo plant, Shunan, Yamaguchi Prefecture	6,500.
Do.	do.	Tosoh Corp.	Nanyo office, Shunan, Yamaguchi Prefecture	1,240.

See footnotes at end of table.

TABLE 2—Continued
JAPAN: 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—Continued		Tsuruga Cement Co. Ltd.	Tsuruga Mine, Tsuruga, Fukui Prefecture	840.
Do.		Ube Industries Ltd.	Plants in:	
			Ube, Yamaguchi Prefecture	1,447 clinker.
Do.		do.	Isa, Yamaguchi Prefecture	3,766 clinker.
Do.		do.	Kanda, Fukuoka Prefecture	1,544 clinker.
Do.		Ryukyu-Cement Co. Ltd.	Yabu plant, Nago, Okinawa Prefecture	650.
Do.		Wakayama Blast-Furnace Slag Cement Co. Ltd. (Sumitomo Osaka Cement Co. Ltd., 100%)	Plant in Wakayama, Wakayama Prefecture	1,000.
Coal, bituminous		Kushiro Coal Mine Co. Ltd.	Mine in Kushiro, Hokkaido Prefecture	600.
Cobalt, refined	metric tons	Sumitomo Metal Mining Co. Ltd. (SMM)	Facilities:	
			Niihama plant, Niihama, Ehime Prefecture	4,500
Do.	do.	do.	Harima plant, Harima, Hyogo Prefecture	NA.
Copper, refined		Hibi Kyodo Smelting Co. Ltd. (Pan Pacific Copper Co. Ltd., 63.51%; Nittetsu Mining Co. Ltd., 20.28%; Furukawa Metals & Resources Co. Ltd., 16.21%)	Tamano smelter, Tamano, Okayama Prefecture	200.
Do.		Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	72.
Do.		Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	234.
Do.		Onahama Smelting and Refining Co. Ltd. (Mitsubishi Materials Corp., 55.714%; Dowa Metals & Mining Co. Ltd., 31.621%; Furukawa Metals & Resources Co. Ltd., 12.665%)	Onahama smelter and refinery, Iwaki, Fukushima Prefecture	300.
Do.		Pan Pacific Copper Co. Ltd. (JX Nippon Mining & Metals Co. Ltd., 67.8%, and Mitsui Mining & Smelting Co. Ltd., 32.2%)	Facilities: Saganoseki, Oita Prefecture	270.
Do.		do.	Hitachi, Ibaraki Prefecture	180.
Do.		Sumitomo Metal Mining Co. Ltd. (SMM)	Toyo plant, Saijo, Ehime Prefecture	450.
Gallium	metric tons	Akita Zinc Co. Ltd. [Dowa Metals & Mining Co. Ltd., 86%, and Sumitomo Metal Mining Co. Ltd. (SMM), 14%]	Plant in Iijima, Akita Prefecture	10.
Do.	do.	Nippon Rare Metal Inc.	Yokohama Head Office, Yokohama Prefecture; and Iwaki plant, Fukushima Prefecture	NA.
Gold:				
Mine, Au content	kilograms	Sumitomo Metal Mining Co. Ltd. (SMM)	Hishikari Gold Mine, Hishikari, Kagoshima Prefecture	6,000.
Refined	do.	Ishifuku Metal Industry Co. Ltd.	Soka plant, Saitama Prefecture	10,000.
Do.	do.	Japan Mint	Plant in Kita, Osaka Prefecture	15,000.
Do.	do.	JX Nippon Mining & Metals Co. Ltd.	Plant in Saganoseki, Oita Prefecture	42,000.
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	24,000.
Do.	do.	Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	60,000.
Do.	do.	Mitsui Mining and Smelting Co. Ltd.	Plant in Takehara, Hiroshima Prefecture	22,000.
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Toyo plant, Saijo, Ehime Prefecture	60,000.
Do.	do.	Tanaka Kikinzoku Kogyo K.K.	Shonan plant, Kanagawa Prefecture	NA.
Do.	do.	Toho Zinc Co. Ltd.	Chigirishima refinery, Toyoda, Hiroshima Prefecture	1,800.
Do.	do.	Tokuriki Honten Co. Ltd.	Kuki Factory, Saitama Prefecture	120,000.
Gypsum, synthetic		Hachinohe Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 85.51%; Toyo Zinc Co. Ltd., 10.48%; Nisso Metallochemical Co. Ltd., 4.01%)	Smelter in Hachinohe, Aomori Prefecture	NA.
Do.		Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	120.

See footnotes at end of table.

TABLE 2—Continued
JAPAN: 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
Gypsum, synthetic—Continued		Onahama Smelting and Refining Co. Ltd. (Mitsubishi Materials Corp., 55.714%; Dowa Metals & Mining Co. Ltd., 31.621%; Furukawa Metals & Resources Co. Ltd., 12.665%)	Onahama smelter and refinery, Iwaki, Fukushima Prefecture	336.
Do.		Pan Pacific Copper Co. Ltd. (JX Nippon Mining & Metals Co. Ltd., 67.8%, and Mitsui Mining & Smelting Co. Ltd., 32.2%)	Facilities: Saganoseki, Oita Prefecture	10.
Do.		do.	Tamano, Okayama Prefecture	22.
Do.		Toho Zinc Co. Ltd.	Facilities: Chigirishima refinery, Toyoda, Hiroshima Prefecture	48.
Do.		do.	Annaka refinery, Annaka, Gunma Prefecture	NA.
Indium, metal	metric tons	Akita Zinc Co. Ltd. [Dowa Metals & Mining Co. Ltd., 86%, and Sumitomo Metal Mining Co. Ltd. (SMM), 14%]	Plant in Iijima, Akita Prefecture	70.
Iodine, crude	do.	Godo Shigen Sangyo Co. Ltd.	Plant in Chosei, Chiba Prefecture	2,400.
Do.	do.	Ise Chemical Industries Corp. (AGC Inc., 52.79%; Mitsubishi Corp., 11.33%; BNYM AGT/CLTS Non Treaty JASDEC, 6.34%)	Plants in Shirasato and Ichinomiya, Chiba Prefecture; and Sadowara, Miyazaki Prefecture	3,600.
Do.	do.	Kanto Natural Gas Development Co. Ltd. (K&O Energy Group, 100%)	Plant in Mobara, Chiba Prefecture	1,200.
Do.	do.	Nihon Tennen Gas Co. Ltd. (Kanto Natural Gas Development Co. Ltd., 50%, and Toyota Tsusho Corp., 41%)	Plants in Shirako and Yokoshiba, Chiba Prefecture	1,200.
Do.	do.	Nippon Chemicals Co. Ltd. (Nippon Shokubai Co. Ltd., 17%; Takeda Chemical Industries Ltd., 16.4%; Chugai Boyeki Co. Ltd., 13.6%)	Plant in Isumi, Chiba Prefecture	720.
Do.	do.	Toho Earthtech, Inc. (Itochu Corp., 34.1%; Mitsubishi Gas Chemical Co. Ltd., 32.2%; Nippon Light Metal Holdings Co. Ltd., 31.1%)	Plant in Kurosaki, Niigata Prefecture	720.
Lead, refined	do.	Hachinohe Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 85.51%; Toyo Zinc Co. Ltd., 10.48%; Nisso Metallochemical Co. Ltd., 4.01%)	Smelter in Hachinohe, Aomori Prefecture	40,000.
Do.	do.	Hosokura Metal Mining Co. Ltd. (Mitsubishi Materials Corp., 100%)	Refinery in Hosokura, Miyagi Prefecture	22,200.
Do.	do.	Kamioka Mining & Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 100%)	Plant in Hida, Gifu Prefecture	33,600.
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	25,000.
Do.	do.	Mitsui Mining and Smelting Co. Ltd.	Plant in Takehara, Hiroshima Prefecture	43,800.
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Plant in Harima, Hyogo Prefecture	30,000.
Do.	do.	Toho Zinc Co. Ltd.	Chigirishima refinery, Toyoda, Hiroshima Prefecture	120,000.
Limestone		Asahi Kohmatsu Co. Ltd.	Mines in: Shin-takine, Fukushima Prefecture	341.
Do.		do.	Ishinokura, Ibaraki Prefecture	123.
Do.		do.	Hatayama, Okayama Prefecture	80.
Do.		Buko Mining Co. Ltd. (Taiheiyō Cement Co. Ltd., 100%)	Buko Mine, Yokoze, Saitama Prefecture	5,400.
Do.		Chichibu Taiheiyō Cement Co. Ltd. (Taiheiyō Cement Co. Ltd., 100%)	Facilities: Kano Mine, Kanna, Gunma Prefecture	2,000.
Do.		do.	Miwa Mine, Chichibu, Saitama Prefecture	950.
Do.		Denka Co. Ltd.	Aomi plant, Itoigawa, Niigata Prefecture	2,200.
Do.		Hachinohe Mining Co. Ltd. (Nittetsu Mining Co. Ltd., 70%, and Sumitomo Osaka Cement Co. Ltd., 30%)	Hachinohe Mine, Hachinohe, Aomori Prefecture	4,500.

See footnotes at end of table.

TABLE 2—Continued
JAPAN: 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
Limestone—Continued	INasas Co. Ltd. (Sumitomo Osaka Cement Co. Ltd., 100%)	Plant in Tochikubo, Hamamatsu, Shizuoka Prefecture	NA.
Do.	Ishizaki Co. Ltd. (Taiheiyo Cement Co. Ltd., 100%)	Fujiwara Mine, Inabe, Mie Prefecture	NA.
Do.	JFE Mineral Co. Ltd. (JFE Steel Corp., 100%)	Yoshii Mine, Ibara, Okayama Prefecture	NA.
Do.	Kawara Lime Chemical Industry Co. Ltd.	Kawara Mine, Kawara, Fukuoka Prefecture	480.
Do.	Komagata Inc. Co. Ltd.	Ohkama Mine, Sano, Tochigi Prefecture	132.
Do.	Mitsubishi Materials Corp.	Facilities: Higashitani Mine, Kitakyushu, Fukuoka Prefecture	11,000.
Do.	do.	Nagasaka Mine, Ichinoseki, Iwate Prefecture	1,300.
Do.	Maruai Lime Industries Co. Ltd.	Hirui Mine, Hirui, Ogaki, Gifu Prefecture	120.
Do.	Myojo Cement Co. Ltd. (Taiheiyo Cement Co. Ltd., 100%)	Itoigawa plant, Itoigawa, Niigata Prefecture	2,800.
Do.	Miyagi Lime Industry Co. Ltd.	Iwate plant, Ichinoseki, Iwate Prefecture	NA.
Do.	Nitchitsu Co. Ltd. (Nitchitsu Group, 100%)	Nitchitsu Mine, Chichibu, Saitama Prefecture	NA.
Do.	Nittetsu Mining Co. Ltd.	Facilities: Higashishikagoe Mine, Minamifurano, Hokkaido	420.
Do.	do.	Shiriya Mine, Aomori Prefecture	2,957.
Do.	do.	Tochigi Mine, Sano, Tochigi Prefecture	NA.
Do.	do.	Torigatayama Mine, Kochi Prefecture	10,898.
Do.	do.	Ikura Mine, Okayama Prefecture	725.
Do.	do.	Oita Mine, Oita Prefecture	2,288.
Do.	do.	Kagoshima Mine, Kirishima, Kagoshima Prefecture	NA.
Do.	Oita Taiheiyo Cement Co. Ltd. (Taiheiyo Cement Co. Ltd., 100%)	Shin-Tsukumi Mine, Tsukumi, Oita Prefecture	11,000.
Do.	Ryokolime Industry Co. Ltd. (Mitsubishi Materials Corp., 100%)	Une Mine, Yokoze, Saitama Prefecture	4,800.
Do.	Ryujin Mining Co. Ltd. (Taiheiyo Cement Co. Ltd., 100%)	Plant in Ofunato, Iwate Prefecture	2,300.
Do.	Ryuyo Kosan Co. Ltd. (Taiheiyo Cement Co. Ltd., 100%)	Shigeyasu Mine, Mine, Yamaguchi Prefecture	1,500.
Do.	Showa Sekizai Kogyosha K.K.	Kori Mine, Okutama, Tokyo	540.
Do.	Shuho Mining Co. Ltd. (Sumitomo Osaka Cement Co. Ltd., 100%)	Shuho Mine, Shuho, Yamaguchi Prefecture	8,500.
Do.	Sumitomo Osaka Cement Co. Ltd.	Facilities: Karazawa Mine, Sano, Tochigi Prefecture	3,000.
Do.	do.	Kokura Mine, Kitakyushu, Fukuoka Prefecture	900.
Do.	Taiheiyo Cement Co. Ltd.	Facilities: Garo Mine, Hokuto, Hokkaido	9,500.
Do.	do.	Tosayama Mine, Tosa, Kochi Prefecture	3,200.
Do.	Todaka Mining Co. Ltd.	Todaka Mine, Tsukumi, Oita Prefecture	12,000.
Do.	Tohoku Tekkosya Co. Ltd. (Ube Material Industries Ltd., 100%)	Matsukawa Mine, Ichinoseki, Iwate Prefecture	NA.
Do.	Tsuruga Cement Co. Ltd. (Taiheiyo Cement Co. Ltd., 100%)	Facilities: Ishiyama Mine, Ono, Gifu Prefecture	200.
Do.	do.	Tsuruga Mine, Tsuruga, Fukui Prefecture	NA.
Do.	Ube Industries Ltd.	Ube Isa Mine, Mine, Yamaguchi Prefecture	9,000.
Do.	Yoshizawa Lime Industry Co. Ltd.	Ohgano Mine, Sano, Tochigi Prefecture	2,300.
Manganese, electrolytic dioxide	Mitsui Mining and Smelting Co. Ltd.	Plant in Takehara, Hiroshima Prefecture	12.
Do.	Tosoh Corp.	Plant in Hyuga, Miyazaki Prefecture	34.

See footnotes at end of table.

TABLE 2—Continued
JAPAN: 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
Nickel:				
Ferronickel	metric tons	Hyuga Smelting Co. Ltd. [Sumitomo Metal Mining Co. Ltd. (SMM), 60%; Nippon Steel Stainless Steel Corp., 25%; Mitsui & Co. Ltd., 15%]	Plant in Hyuga, Miyazaki Prefecture	22,000.
Do.	do.	Nippon Yakin Kogyo Co. Ltd.	Oheyama plant, Miyazu, Kyoto Prefecture	12,720.
Do.	do.	Pacific Metals Co. Ltd.	Plant in Hachinohe, Aomori Prefecture	42,000.
Oxide	do.	Vale Japan Ltd. [Vale Canada Ltd., 87.2%, and Sumitomo Metal Mining Co. Ltd. (SMM), 12.8%]	Matsusaka plant, Matsusaka, Mie Prefecture	60,000.
Powder	do.	Toho Titanium Co. Ltd. (JX Nippon Mining & Metals Co. Ltd., 50.38%; Nippon Steel Co., 4.92%; Japan Trustee Services Bank Ltd., 1.27%; State Street Bank and Trust Co., 1.21%; Master Trust Bank of Japan Ltd., 1.06%)	Facilities: Chigasaki plant, Chigasaki, Kanagawa Prefecture	720.
Do.	do.	do.	Wakamatsu plant, Kitakyushu, Fukuoka Prefecture	360.
Refined	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Facilities: Nickel plant, Niihama, Ehime Prefecture	27,000.
Do.	do.	do.	Harima plant, Kako District, Hyogo Prefecture	49,000.
Do.	do.	Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	2,400.
Petroleum, refined	million 42-gallon barrels	Cosmo Oil Co. Ltd.	Facilities: Chiba refinery, Ichihara, Chiba Prefecture	65.
Do.	do.	do.	Sakai refinery, Sakai, Osaka Prefecture	37.
Do.	do.	do.	Yokkaichi refinery, Yokkaichi, Mie Prefecture	31.
Do.	do.	JXTG Nippon Oil & Energy Corp. (JXTG Holdings Inc., 100%)	Facilities: Chiba refinery, Ichihara, Chiba Prefecture	47.
Do.	do.	do.	Marifu refinery, Kuga District, Yamaguchi Prefecture	44.
Do.	do.	do.	Mizushima refinery, Kurashiki, Okayama Prefecture	117.
Do.	do.	do.	Negishi refinery, Yokohama, Kanazawa Prefecture	99.
Do.	do.	do.	Oita refinery, Oita, Oita Prefecture	47.
Do.	do.	do.	Sakai refinery, Sakai, Osaka Prefecture	49.
Do.	do.	do.	Sendai refinery, Sendai, Miyagi Prefecture	53.
Do.	do.	do.	Wakayama refinery, Arida, Wakayama Prefecture	47.
Do.	do.	Fuji Oil Co. Ltd.	Sodegaura refinery, Sodegaura, Chiba Prefecture	52.
Do.	do.	Idemitsu Kosan Co. Ltd.	Chiba refinery, Ichihara, Chiba Prefecture	69.
Do.	do.	Kashima Oil Co. Ltd. (JXTG Nippon Oil & Energy Corp., 72.2%; Mitsubishi Materials Corp. and JERA Co. Inc., 27.8%)	Kashima refinery, Kamisu, Ibaraki Prefecture	72.
Do.	do.	Osaka International Refining Co. Ltd. (JXTG Nippon Oil & Energy Corp., 51%, and PetroChina International Japan Co. Ltd., 49%)	Osaka refinery, Takaishi, Osaka Prefecture	42.
Do.	do.	Seibu Oil Co. Ltd.	Yamaguchi refinery, Sanyo-Onoda, Yamaguchi Prefecture	44.
Do.	do.	Showa Yokkaichi Sekiyu Co. Ltd. (Idemitsu Kosan Co. Ltd., 75%, and Mitsubishi Materials Corp., 25%)	Yokkaichi refinery, Yokkaichi, Mie Prefecture	93.
Do.	do.	Taiyo Oil Co. Ltd.	Shikoku refinery, Imabari, Ehime Prefecture	50.
Do.	do.	Toa Oil Co. Ltd. (Idemitsu Kosan Co. Ltd., 50.1%, and others, 49.9%)	Keihin refinery, Kawasaki, Kanazawa Prefecture	26.
Do.	do.	Tonen Chemical Corp. (JXTG Nippon Oil & Energy Corp., 100%)	Facilities: Aichi refinery, Chita, Aichi Prefecture	58.
Do.	do.	do.	Hokkaido refinery, Masago, Hokkaido	55.
Do.	do.	do.	Kawasaki refinery, Kawasaki, Kanazawa Prefecture	86.
Pyrophyllite		Ohira Co. Ltd.	Plant in Ohira, Okayama Prefecture	132.
Do.		Shokozan Mining Co. Ltd.	Plant in Yano-Shokozan, Hiroshima Prefecture	180.

See footnotes at end of table.

TABLE 2—Continued
JAPAN: 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
Selenium	metric tons	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	NA.
Do.	do.	Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	330.
Do.	do.	Mitsui Mining and Smelting Co. Ltd.	Plant in Takehara, Hiroshima Prefecture	NA.
Do.	do.	Nippon Rare Metal Inc.	Yokohama Head Office, Yokohama Prefecture; and Iwaki plant, Fukushima Prefecture	NA.
Do.	do.	Pan Pacific Copper Co. Ltd. (JX Nippon Mining & Metals Co. Ltd., 67.8%, and Mitsui Mining & Smelting Co. Ltd., 32.2%)	Plants in Saganoseki, Oita Prefecture; Tamano, Okayama Prefecture; and Hitachi, Ibaraki Prefecture	NA.
Do.	do.	Shinko Chemical Co. Ltd.	Amagasaki plant, Amagasaki, Hyogo Prefecture	80.
Do.	do.	Sumitomo Metal Mining Co. Ltd.	Toyo plant, Saijo, Ehime Prefecture	NA.
Silver:				
Mine, Ag content	kilograms	Sumitomo Metal Mining Co. Ltd. (SMM)	Hishikari Mine, Hishikari, Kagoshima Prefecture	1,500.
Refined	metric tons	Hachinohe Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 85.51%; Toyo Zinc Co. Ltd., 10.48%; Nisso Metallochemical Co. Ltd., 4.01%)	Smelter in Hachinohe, Aomori Prefecture	15,000.
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	850.
Do.	do.	Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	480.
Do.	do.	Toho Zinc Co. Ltd.	Chigirishima refinery, Toyoda, Hiroshima Prefecture	400.
Steel, raw		JFE Steel Corp. (JFE Holdings Inc., 100%)	Facilities:	
			East Japan Works:	
			Chiba, Chiba Prefecture; Nishinomiya, Hyogo Prefecture; Kawasaki, Kanagawa Prefecture	9,000.
Do.	do.		West Japan Works:	
			Kurashiki, Okayama Prefecture, and Fukuyama, Hiroshima Prefecture	23,000.
Do.		Kobe Steel Ltd.	Facilities:	
			Kakogawa Steel Works, Kakogawa, Hyogo Prefecture	6,800.
Do.		do.	Kobe Steel Works, Kobe, Hyogo Prefecture	1,400.
Do.		Nippon Steel Corp.	Facilities:	
			East Nippon Works:	
			Kashima area, Kashima, Ibaraki Prefecture	7,150.
Do.	do.		Kimitsu area, Kimitsu, Chiba Prefecture	9,070.
Do.	do.		Naoetsu area, Joetsu, Niigata Prefecture	NA.
Do.	do.		Kamaishi area, Kamaishi, Iwate Prefecture	NA.
Do.	do.		Nagoya Works, Tokai, Aichi Prefecture	6,460.
Do.	do.		Kansai Works:	
			Wakayama area, Wakayama, Wakayama Prefecture	4,160.
Do.	do.		Osaka area, Osaka, Osaka Prefecture	40.
Do.	do.		Amagasaki area, Amagasaki, Hyogo Prefecture	NA.
Do.	do.		Setouchi Works:	
			Hirohata area, Himeji, Hyogo Prefecture	630.
Do.	do.		Kure area, Hiroshima Prefecture	2,730.
Do.	do.		Sakai area, Osaka Prefecture; Toyo area; Ehime Prefecture; and Osaka area, Osaka Prefecture	NA.
Do.	do.		Kyushu Works:	
			Yawata area, Kitakyushu, Fukuoka Prefecture	4,790.
Do.	do.		Oita area, Oita, Oita Prefecture	9,820.
Do.	do.		Muroran Works, Muroran, Hokkaido	1,430.
Soda ash, synthetic		Tosoh Corp.	Facilities:	
			Nanyo Complex, Shunan, Yamaguchi Prefecture	1,125.
Do.	do.		Yokkaichi Complex, Yokkaichi, Mie Prefecture	NA.

See footnotes at end of table.

TABLE 2—Continued
 JAPAN: 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
Sulfuric acid		Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	265.
Do.		Mitsubishi Materials Corp.	Plant in Naoshima, Kagawa Prefecture	600.
Do.		Onahama Smelting and Refining Co. Ltd. (Mitsubishi Materials Corp., 55.714%; Dowa Metals & Mining Co. Ltd., 31.621%; Furukawa Metals & Resources Co. Ltd., 12.665%)	Onahama smelter and refinery, Iwaki, Fukushima Prefecture	660.
Do.		Pan Pacific Copper Co. Ltd. (JX Nippon Mining & Metals Co. Ltd., 67.8%, and Mitsui Mining & Smelting Co. Ltd., 32.2%)	Facilities: Plant in Saganoseki, Oita Prefecture	1,750.
Do.		do.	Plant in Hitachi, Ibaraki Prefecture	690.
Do.		Toho Zinc Co. Ltd.	Facilities: Annaka refinery, Annaka, Gunma Prefecture	NA.
Do.		do.	Chigirishima refinery, Toyoda, Hiroshima Prefecture	55.
Do.		do.	Onahama refinery, Iwaki, Fukushima Prefecture	NA.
Tantalum	metric tons	Global Advanced Metals Japan K.K.	Aizu plant, Aizu-Wakamatsu, Fukushima Prefecture	NA.
Do.	do.	H.C. Starck Ltd.	Mito plant, Hitachi-Omiya, Ibaraki Prefecture	NA.
Do.	do.	Japan New Metals Co. Ltd. (Mitsubishi Materials Corp., 100%)	Plant in Akita, Akita Prefecture	95.
Do.	do.	Mitsui Mining and Smelting Co. Ltd.	Plant in Omuta, Fukuoka Prefecture	NA.
Do.	do.	Taki Chemical Co. Ltd.	Plants in Kako, Hyogo Prefecture; Ichihara, Chiba Prefecture; and Kitakyushu, Fukuoka Prefecture	NA.
Tin, metal	do.	Kosaka Smelting and Refining Co. Ltd. (Dowa Metals & Mining Co. Ltd., 100%)	Refinery in Kosaka, Akita Prefecture	600.
Do.	do.	Mitsubishi Materials Corp.	Plant in Ikuno, Hyogo Prefecture	900.
Titanium:				
In sponge metal	do.	Osaka Titanium Technologies Co. Ltd. (Nippon Steel Co., 23.91%; Kobe Steel Ltd., 23.91%; Sumitomo Corp., 2.35%; Clearstream Banking S.A., 1.56%; Master Trust Bank of Japan, Ltd., 1.31%)	Amagasaki plant, Amagasaki, Hyogo Prefecture	40,000.
Do.	do.	Toho Titanium Co. Ltd. (JX Nippon Mining & Metals Co. Ltd., 50.38%; Nippon Steel Co., 4.92%; Japan Trustee Services Bank Ltd., 1.27%; State Street Bank and Trust Co., 1.21%; Master Trust Bank of Japan Ltd., 1.06%)	Wakamatsu plant, Kitakyushu, Fukuoka Prefecture; and Chigasaki plant, Chigasaki, Kanazawa Prefecture	25,200.
In dioxide	do.	Fuji Titanium Industry Co. Ltd. (Ishihara Sangyo Kaisha Ltd., 100%)	Kobe plant, Kobe, Hyogo Prefecture	17,400.
Do.	do.	Ishihara Sangyo Kaisha Ltd.	Yokkaichi plant, Yokkaichi, Mie Prefecture	155,000.
Do.	do.	Sakai Chemical Industries Co. Ltd.	Onahama plant, Iwaki, Fukushima Prefecture	60,000.
Do.	do.	Tayca Corp.	Okayama plant, Higashi Ward, Okayama Prefecture	60,000.
Do.	do.	Titan Kogyo Ltd.	Ube plant, Ube, Yamaguchi Prefecture	16,800.
Tungsten		A.L.M.T. Corp.	Plants in Sakata, Yamagata Prefecture; and Toyama, Toyama Prefecture	NA.
Do.		Japan New Metals Co. Ltd. (Mitsubishi Materials Corp., 100%)	Plant in Akita, Akita Prefecture	NA.
Zeolites		Nitto Funka Kogyo K.K.	Mines and factories in Iizaka, Fukushima Prefecture, and Shiroishi, Miyagi Prefecture; and factory in Adachi, Fukushima Prefecture	NA.

See footnotes at end of table.

TABLE 2—Continued
 JAPAN: 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
Zinc, refined	metric tons	Akita Zinc Co. Ltd. [Dowa Metals & Mining Co. Ltd., 86%, and Sumitomo Metal Mining Co. Ltd. (SMM), 14%]	Plant in Iijima, Akita Prefecture	200,400.
Do.	do.	Hachinohe Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 85.51%; Toyo Zinc Co. Ltd., 10.48%; Nisso Metallochemical Co. Ltd., 4.01%)	Smelter in Hachinohe, Aomori Prefecture	117,600.
Do.	do.	Hikoshima Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 100%)	Hikoshima smelter, Shimonoseki, Yamaguchi Prefecture	84,000.
Do.	do.	Kamioka Mining & Smelting Co. Ltd. (Mitsui Mining & Smelting Co. Ltd., 100%)	Plant in Hida, Gifu Prefecture	72,000.
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Harima plant, Kako, Hyogo Prefecture	90,000.
Do.	do.	Toho Zinc Co. Ltd.	Facilities: Annaka refinery, Annaka, Gunma Prefecture	140,000.
Do.	do.	do.	Onahama refinery, Iwaki, Fukushima Prefecture	88,000.

Do., do. Ditto. NA Not available.

TABLE 3
JAPAN: IMPORTS AND EXPORTS OF SELECTED MINERAL COMMODITIES IN 2019

Commodity	Import		Export	
	Quantity (metric tons)	Value ¹ (thousand dollars)	Quantity (metric tons)	Value ¹ (thousand dollars)
METALS				
Aluminum:				
Alumina	281,495	255,594	87,941	204,010
Bars and rods	31,148	207,513	16,403	110,028
Foil	60,356	334,145	66,079	562,050
Metal and alloys, unwrought	2,585,186	4,790,598	18,089	56,620
Plates, sheets and strip	142,510	574,567	179,902	711,136
Powder	4,178	24,778	840	4,391
Scrap	44,579	74,237	278,710	308,774
Tube and pipe	4,372	30,924	4,797	65,863
Wire	12,778	38,412	6,195	30,008
Antimony:				
Antimony oxides	3,528	21,328	1,204	11,892
Ore and concentrates	509	1,018	--	--
Unwrought	5,027	34,384	158	1,527
Bismuth, refinery	266	1,809	260	4,083
Cobalt:				
Hydroxides	439	12,433	--	--
Mattes, lump, powder	9,166	398,825	3,003	93,476
Oxides	458	15,433	NA	NA
Copper:				
Metal and alloys, unwrought	15,260	95,696	554,728	3,336,302
Ores and concentrates	4,787,924	8,192,579	--	--
Plates, sheets and strip	26,310	208,438	103,444	1,059,945
Powder	1,758	17,702	4,039	59,466
Scrap	227,601	1,196,295	317,813	953,701
Tube and pipe	21,322	168,192	14,303	127,863
Ferrous alloys:				
Ferrochromium	695,541	897,472	1,962	7,948
Ferromanganese	105,325	117,054	5,357	9,214
Ferromolybdenum	2,287	42,108	24	526
Ferronickel	28,463	98,993	190,276	349,780
Ferroniobium	7,785	183,785	5	188
Ferrosilicon	439,966	594,421	9,559	19,591
Ferrotungsten and ferrosilicotungsten	768	19,604	2	89
Ferrovandium	3,878	162,533	901	22,811
Silicochromium	4,454	8,589	--	--
Silicomanganese	280,055	293,932	51	126
Gold:				
Semimanufactures	2	59,503	27	1,054,136
Unwrought	2	64,310	119	5,352,647
Iron and steel:				
Bars and rods, hot rolled	381,709	263,896	1,421,134	1,138,033
Pig iron	164,505	69,066	43,849	19,079
Scrap	106,529	156,215	7,653,185	2,538,658
Shapes and sections	118,697	79,649	555,653	387,020
Tube and pipe	335,688	1,101,901	1,622,589	4,114,170
Wire	313,008	460,092	101,803	281,682
Lead, unwrought	44,850	95,807	25,867	52,259
Nickel:				
Ores and concentrates	3,844,477	219,149	--	--
Plates, sheets, strip, and foil	2,170	67,102	8,703	185,818
Powder	7,895	142,501	1,761	124,884
Scrap	13,003	124,881	7,482	47,530
Unwrought	47,177	654,896	20,223	281,401

See footnotes at end of table.

TABLE 3—Continued
JAPAN: IMPORTS AND EXPORTS OF SELECTED MINERAL COMMODITIES IN 2019

Commodity	Import		Export	
	Quantity (metric tons)	Value ¹ (thousand dollars)	Quantity (metric tons)	Value ¹ (thousand dollars)
METALS—Continued				
Platinum-group metals, metal:				
Palladium	54	2,518,973	17	411,692
Platinum	38	1,045,266	35	607,730
Selenium	4	70	603	13,746
Silver:				
Ores and concentrates	24,257	147,301	--	--
Powder	91	48,591	4,563	914,810
Semimanufactures	263	29,947	2,373	252,577
Unwrought	1,731	847,604	96	29,588
Tin:				
Scrap	46	460	198	994
Semimanufactures	337	7,580	655	21,815
Unwrought	24,596	482,585	977	19,797
Titanium:				
Ores and concentrates	414,080	302,993	--	--
Oxides	12,906	30,761	14,147	66,783
Scrap	1,568	8,806	8,234	30,834
Unwrought	181	6,704	33,979	311,828
Zinc:				
Ores and concentrates	833,480	742,695	--	--
Oxide and peroxide	9,367	25,165	2,614	20,229
Plates, sheets, strip and foil	884	4,018	20,884	52,169
Powder	307	1,529	2,652	10,032
Scrap	1,687	3,072	6,987	10,163
Unwrought	25,997	70,016	106,355	284,116
INDUSTRIAL MINERALS				
Arsenic	4	477	7	1,780
Cement and clinker	89,632	33,628	10,321,780	341,001
Clay, bentonite	131,547	36,020	6,777	5,754
Dolomite	2,447,450	95,957	4,528	636
Granite	6,075	2,731	30,052	12,015
Graphite, natural	58,981	102,659	925	8,526
Gypsum	2,656,130	99,106	1,914	2,628
Iodine	97	2,491	5,014	119,476
Limestone	574,359	41,841	5,430,164	57,197
Nitrogen, ammonia	234,865	70,637	2,686	6,623
Quartzite	93,001	12,942	716	764
Salt, unspecified	7,583,032	323,249	1,502	3,634
Sulfur	730	362	1,103,384	79,778
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite	5,694,820	846,802	92	12,199
Bituminous	172,012,380	21,632,812	3,865	136,554
Other, including briquets, ovoids, and similar solid fuels	8,500,644	728,355	2,278 ²	1,178 ²
Coke, semicoke	757,721	258,538	1,376,233	410,216
Natural gas	87,845,658	44,790,787	198,606	110,440
Petroleum:				
Crude	146,588,120	73,083,332	32,983	5,942,997
Refinery products	23,469,213	13,156,529	18,641,813	10,953,394

NA Not available. '-- Zero.

¹Values have been converted from Japanese yen (JPY) to U.S. dollars (US\$) at the annual average exchange rate of JPY109.008=\$1.00 for 2019.

²Source: Global Trade Tracker, August 2023. Based on reported imported quantities from countries worldwide.

Source: Ministry of Finance of Japan, Trade Statistics of Japan: Commodity by Country, 2019.