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The Mineral Industry of Japan

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Japan's mineral industry was dominated by the metals and mineral-processing sectors. Japan had one of the world's leading mineral-processing sectors but few domestic mineral reserves, and in 2015, the country continued to rely heavily on mineral commodity imports to supply its manufacturing sector. Metallic ores and concentrates that were imported by Japan included copper, gold, iron ore, lead, nickel, platinum-group metals, silver, tin, and zinc. Japan also imported cadmium metal, refined lead, and refined zinc. In 2015, Japan remained the world's second-ranked producer of steel behind China. Japan's steel production accounted for about 6.5% of world steel production, and China's accounted for 50% of world production. Japan was the world's third-ranked cadmium metal producer, accounting for 8.4% of world production; China and the Republic of Korea, which were the first- and second-ranked producers in the world, accounted for 33% and 18% of the total, respectively. Japan was also the world's third-ranked producer of indium (tied with Canada), accounting for about 9% of world production. Japan had the largest reserves of iodine in the world at 5 million metric tons (Mt), and its production of iodine remained second only to Chile in 2015 (World Steel Association, 2016; Schnebele, 2016; Tolcin, 2017a, b).

Minerals in the National Economy

Japan's nominal gross domestic product (GDP) decreased by 9.6% to $4.4 trillion in 2015. Japan's GDP ranked third in the world after that of the United States and China. The mining industry played only a minor role in Japan's economy, accounting for less than 0.1% of the GDP in 2014, whereas the manufacturing sector accounted for about 18.5% of the GDP. In the same year, 19,894 people were engaged in mining and the quarrying of stone and gravel at 1,980 operations. Outward foreign direct investment (OFDI) in mining accounted for 6.9% of Japan's total OFDI, and OFDI in metal manufacturing accounted for 1.9% (Japan Statistics Bureau, 2017b, p. 30–32; World Bank, The, 2017).

Government Policies and Programs

The Agency for Natural Resources and Energy 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), which was formed in 2004 through the merger of Japan National Oil Co. and Metal Mining Agency of Japan, is charged with implementing the policies set by the METI. The objective of the country's overall mineral policy is to secure a stable supply of mineral resources and mineral fuels from abroad for the country to sustain continuous economic growth (Kikkawa, 2013, p. 34–35; Japan Oil, Gas and Metals National Corp., 2016).

Japan's Mining Act (law No. 289) of 1950 replaced the Mining Act (law No. 45) of 1905 and the Placer Act (law No. 13) of 1909. In 1950, the Government of Japan approved the Commodity Exchange Act (law No. 239), which allowed for the establishment of commodities exchanges and the trading of commodities, including minerals. In 1973, an act that implemented special measures for pollution caused by the metal mining industry (law No. 26) was passed to address mine pollution from suspended or abandoned mines and other mineral facilities. Upon its formation in 2004, JOGMEC was charged with securing a stable supply of natural resources for Japan, as well as implementing pollution control measures related to mines. As of 2012, these natural resources included coal, geothermal energy, metallic minerals, natural gas, and petroleum (Ministry of Economy, Trade and Industry, 2006; Japan Oil, Gas and Metals National Corp., 2016).

In 2012, the Government of Japan amended the country's Mining Act to strengthen the regulatory powers of the METI in terms of granting mining rights. Prior to the 2012 revisions, applicants were granted mining rights on a first-come-first-served basis. The amendments defined the following two classes of minerals: specified minerals and nonspecified minerals. Specified minerals are defined as those that the Government of Japan designates as particularly important to the national economy, which includes natural gas and petroleum. Areas either containing or likely to contain specified minerals can be deemed a "specified area" by the METI. Under the amendments, the METI accepts applications from interested developers for specified areas for a period of no shorter than 6 months, after which time the METI selects what it deems to be the most suited developer for the area. Nonspecified minerals include all minerals not listed as a specified mineral. The original first-come-first-served system still applies for nonspecified minerals; however, under the amendments, applicants for both types of minerals must demonstrate financial solvency and the technical capability to carry out development of the site (Clifford Chance LLC, 2012; Kikkawa, 2013, p. 1).

Production

The production of antimony metal continued its decline, decreasing by 84% to 15 metric tons (t) in 2015. Antimony metal production had decreased every year since 2011, when production was 435 t. Molybdenum metal production decreased by 19%. Production of refined nickel increased by 14% in 2015, and production of refined cobalt increased by 17%. Production of mined gold increased by 8% [to 7,700 kilograms (kg)], and that of mined silver increased by 30% (to 4,616 kg). Production of primary refined gold increased by 27% (to 82 t), whereas that of primary refined silver increased by only 4% (to 1,096 t). Multicrystalline silicon production increased by 22%, or by 8,855 t, but remained below the high of 12,133 t in 2011. The production of crude petroleum and natural gas decreased by 7% and 5%, respectively, in 2015. The production of almost all petroleum refinery products remained at about the same levels

as in 2014, with the exception of distillate fuel oil and kerosene, both of which decreased by about 8%, and naphtha, which increased by about 6%. The production of bituminous coal decreased by 17% (table 1).

Structure of the Mineral Industry

Japan's mineral industry was made up of the nonferrous metals industries, the nonmetals (industrial minerals) industries, and the quarrying (construction materials) industries. The mining of coal and nonferrous metals was a small industry in Japan, but industrial mineral production and the processing of ferrous and nonferrous metals were large industries. Only a few metal mines were still in operation in Japan in 2015, including the Hishikari gold mine in Kagoshima Prefecture. The country's mineral industry was owned and operated primarily by private companies. In 2012, there were 1,533 quarries (gravel, sand, and stone) operating in Japan, 197 mines producing minerals for the ceramics industry, 41 enterprises that were affiliated with natural gas and crude petroleum production, 14 enterprises engaged in both coal and lignite mining and metal mining, and 40 enterprises involved in the mining of other minerals. In addition, 86 enterprises were engaged in the administrative or ancillary economic activities directly related to mining (table 2; Japan Statistics Bureau, 2017a).

Mineral Trade

In 2015, the value of Japan's total exports decreased by 20% to $625 billion, and imports decreased by 21% to $648 billion. The United States was the leading recipient of Japanese exports in 2015, accounting for 21.4% of Japan's exports. The value of Japan's commodity exports continued to be led by transportation equipment (including motor vehicles, motor vehicle parts, and ships), followed by machinery and manufactured goods. Japan's exports of manufactured goods decreased by 15.3% to $76 billion and accounted for 10.3% of commodity exports. By value, iron and steel products were the leading exported manufactured goods. The value of iron and steel exports in 2015 decreased by 19.3% to $30 billion and accounted for 4.9% of all commodity exports. The value of exported nonferrous metals, nonmetallic mineral products, and manufactured metal products decreased by 14.8%, 11.7%, and 10.5%, respectively. China supplied 21.7% of Japan's imports, making China Japan's leading import partner. Mineral fuels were Japan's leading import commodity in 2015 and accounted for 23.3% of the value of all imported goods. The value of Japan's imported mineral fuels decreased by 42.9% to $151 billion owing in part to decreased global prices for petroleum as well as decreasing domestic consumption of petroleum (Japan External Trade Organization, 2016; Petroleum Association of Japan, 2016a, p. 8; 2016b).

Commodity Review

Metals

Aluminum.—The Japanese aluminum industry consisted mainly of rolling, extrusion, and die-casting companies that manufactured products for construction, packaging, and transportation. Production of aluminum mill products included flat-rolled products, which in 2015 increased by 3.2% to 1.26 Mt, and extruded products, which decreased by 7.7% to 757,100 t. Japan's imports of aluminum waste and scrap decreased by 11.6% to 67,100 t. Japan's imports of unwrought aluminum included 1.46 Mt of unalloyed aluminum and 1.07 Mt of alloyed aluminum, which were decreases of 14.1% and 4.9%, respectively, compared with imports of those commodities in 2014. A total of 136,200 t of wrought aluminum products was imported, which was an increase of 10.9% compared with the imports in 2014, including 65,900 t of plates, sheets, and strips; 39,400 t of foil; 23,300 t of bars, rods, and profiles; and 2,700 t of tubes and pipes. In 2015, Japan exported a total of 335,700 t of wrought aluminum products, which included 246,500 t of plates, sheets, and strips; 52,800 t of foil; 18,400 t of bars, rods, and, profiles; 10,600 t of wire; and 7,400 t of tubes and pipes. Japan exported 18,900 t of unwrought aluminum (both alloyed and not alloyed) in 2015 (Japan Aluminium Association, 2016, p. 1, 5).

Japan's domestic consumption and export of aluminum decreased by 0.5% to 4.06 Mt. In terms of end use, the transportation industry accounted for 40.2% of the total domestic consumption and export of aluminum. The building and construction industries accounted for 12.2% of the total. Production of fabricated metal products and consumption by the food industry accounted for 11.8% and 11.1% of the total, respectively. The electrical appliance and communication machinery industries accounted for 2.9%, the industrial machinery industry accounted for 2.3%, and the electrical conductor and chemical industries each accounted for less than 1% of the total. Other unspecified uses and exports accounted for the remainder of the total (Japan Aluminium Association, 2016).

Antimony.—Production of antimony metal in Japan in 2015 decreased to 15 t, or by 84%. Japan had no domestic production of antimony ore owing to the lack of exploitable reserves and therefore relied on imports to meet domestic demand. Imports of antimony ore increased to 17 t, or by 89%. Japan also imported 5,138 t of antimony lump and powder; 3,785 t of antimony oxides, of which 97% was antimony trioxide; and 422 t antimony trisulfide. In total, imports of these materials decreased by 15% in 2015 (Japan Oil, Gas and Metals National Corp., 2017, p. 227).

Cadmium.—Cadmium was produced as a byproduct of zinc processing. In 2015, Japan produced 1,959 t of cadmium (an increase of about 7% compared with that of 2014), exported about 1,100 t (an increase of 28%), and imported about 40 t (a decrease of about 34%). Japan's apparent consumption of cadmium was 890 t, which was a decrease of 12%. Stocks of cadmium totaled 257 t at the beginning of 2015 and 266 t at the end of the year. (Japan Mining Industry Association, 2017, p. 28).

Copper.—Japan did not produce copper ore and therefore relied on imports of copper ore and concentrate to supply its copper refining industry. Pan Pacific Copper Co. Ltd., which was a joint venture of JX Nippon Mining & Metals Co. Ltd. and Mitsubishi Materials Corp., operated three copper refineries in Saganoseki, Oita Prefecture, Hitachi, Ibaraki Prefecture, and Tamano, Okayama Prefecture. The combined capacity of these refineries was 710,000 metric tons per year (t/yr) of

refined copper. In 2015, Japan imported about 1.2 Mt of copper ore and concentrate (Cu content), 3,800 t of copper matte, and 3,200 t of blister copper. Japan imported copper ore primarily from Canada, Chile, Indonesia, and Peru. Apparent consumption of electrolytic copper decreased to 915,000 t, or by about 6%, in 2015 and exports increased to 541,000 t, or by 7%. Stocks of electrolytic copper were 51% higher at the beginning of 2015 than at the beginning of 2014 (table 3; Japan Oil, Gas and Metals National Corp., 2017, p. 2–7).

Iron and Steel.—Japan was the second-ranked producer of crude steel in the world behind China. Japan did not produce iron ore and therefore relied on imports to supply its steel industry. Japan imported 82.5 Mt of iron ore in 2015, which was a 4.0% decrease compared with that of 2014. In 2015, pig iron production decreased to 81.0 Mt, or by 3.4% compared with that of 2014. The vast majority of the pig iron (99.6%) went towards the steelmaking process, and the remainder was used for foundry applications. The leading steel producers in Japan were Nippon Steel & Sumitomo Metal Corp., which had a production capacity of 46.0 million metric tons per year (Mt/yr), and JFE Steel Corp. (a subsidiary of JFE Holdings Inc.), which had a production capacity of 33.8 Mt/yr. Crude steel production also decreased by 5.0% to about 105 Mt. Of that amount, 77.7% was classified as ordinary steel and the rest was specialty steel (table 1; World Steel Association, 2016, p. 1–2; Japan Oil, Gas and Metals National Corp., 2017, p. 239).

In 2015, Japan's consumption of steel decreased by 6% to 54 Mt. Domestic demand decreased among many industries, including automobile manufacturing, construction, container production, business and household equipment, electrical machinery, industrial machinery, railway vehicle production, and shipbuilding. Japan exported 36 Mt of steel in 2015, which was a 1% increase compared with that of 2014 (Japan Oil, Gas and Metals National Corp., 2017, p. 236).

Lead.—Japan's production of primary refined lead was wholly from imported ore. Toho Zinc Co. Ltd. operated the Chigirishima refinery in Hiroshima Prefecture, which had a lead refining capacity of 120,000 t/yr. Primary lead production decreased to 85,655 t in 2015, or by 1.1% compared with that of 2014. Production of primary lead had decreased by an average of 3.3% per year for the past 5 years. Japan's total domestic consumption and exports of refined lead was 217,612 t in 2015, of which 87% was consumed in the production of batteries; 4.5%, in the production of lead pipes and sheets; 2.3%, by the chemical industry; and 0.5%, in the production of solder. Miscellaneous uses, which included antifriction metal, cable sheathing, plating, and tubes, accounted for 3.3% of total domestic consumption and export. Exports of refined lead accounted for the remaining 2.5% and totaled 5,392 t in 2015. Stocks of refined lead totaled 35,086 t at the beginning of 2015 and totaled 30,947 t at the end of the year (table 3; Japan Mining Industry Association, 2017, p. 12; Japan Oil, Gas and Metals National Corp., 2017, p. 19).

Zinc.—Japan did not produce zinc ore in 2015; the country had relied solely on imports of raw material since 2008 to supply its zinc refining industry. In 2015, Canada was the leading source of Japan's zinc ore imports, accounting for 450,000 t, or 25% of the country's total zinc ore imports, followed by Bolivia and Peru, 23% each; the United States, 19%; and Mexico, 7.3%. Akita Smelting Co. Ltd., which was a joint venture of Dowa Mining Co. Ltd., JX Nippon Mining & Metals, Sumitomo Metal Mining Co. Ltd., and Mitsubishi Materials, operated a zinc refinery in Iijima, Akita, which had a production capacity of 200,400 t/yr and was Japan's largest zinc refinery in terms of output. Japan produced 457,786 t of primary zinc from imported ores in 2015, which was a 1% decrease compared with that of 2014, and 108,833 t of secondary zinc, which was a 13% decrease compared with that of 2014 (Japan Mining Industry Association, 2017, p. 13; Japan Oil, Gas and Metals National Corp., 2017, p. 33–34).

In 2015, total domestic consumption and export of refined zinc increased by 4.6% to 476,567 t. Of the total consumption and export of refined zinc, 36% was consumed in the production of galvanized sheets and 12% was consumed in other galvanizing processes. Another 10% was consumed in the production of brass; 9%, in diecasting processes; 6%, by the chemical industry; 2%, by miscellaneous sources; and less than 1%, in the production of rolled zinc. Exports of refined zinc accounted for the remaining 25% (table 3; Japan Mining Industry Association, 2017, p. 13).

Mineral Fuels and Related Materials

Petroleum and Petroleum Refinery Products.—In fiscal year 2014 (April 1, 2014, through March 31, 2015), Japan imported $141 billion worth of petroleum and petroleum products. Imports accounted for 99.7% of Japan's supply of crude petroleum. As of June 2015, 23 petroleum refineries were active in the country and had a total combined capacity of 3.9 million barrels per day. Domestic production of petroleum products accounted for 83.5% of Japan's supply, and imports accounted for the remaining 16.5%. In terms of volume, Japan's consumption of petroleum products had declined steadily since 2000. Between fiscal year 2000 and fiscal year 2014, consumption of petroleum products decreased by 22.5%. The declining demand for petroleum products was attributed to oil use reduction policies adopted following the two oil crises of the 1970s. These policies included enhancing the production of nuclear energy, banning the construction of new heavy-fuel powerplants, and passing policies preferential to the use of liquefied natural gas (LNG). Another factor attributed to declining demand was the falling birthrate, aging population, and decreased automobile use by young adults in urban areas (Petroleum Association of Japan, 2016a, p. 7–8, 69–70).

Outlook

Owing to Japan's lack of mineral reserves, the country requires a secure and long-term supply of raw materials to remain a competitive mineral-processing nation. OFDI towards mining is expected to increase at least modestly through 2017 in line with projected increases in the country's GDP. In 2015, OFDI to Australia and Mexico increased notably. During the past 5 years, OFDI to Africa had nearly doubled and is likely to continue to increase in the next several years. Production of metals is likely to remain relatively stable owing to Japan's long-term supply of metals sourced from Government-owned,

domestically stored stockpiles, exploration and development of international resources, and increasing recycling of domestic scrap. Japan's consumption of petroleum products will continue to decline in the coming years owing to its aging population, declining birth rate, and Government policies that favor alternative sources of fuel (Japan External Trade Organization, 2017a, b).

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TABLE 1
JAPAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2011	2012	2013	2014	2015
METALS						
Aluminum:						
Metal:						
Primary		43,324	25,774	29,070	45,853	--
Secondary[3]		141,789	137,304	143,281	142,512	148,524
Powder	kilograms	12,882	10,785	11,409	11,783	11,648
Antimony:						
Oxide		4,965	4,634	4,498	4,500 e	--
Metal		435	143	139	94	15
Cadmium, refined		1,755	1,855	1,826	1,829	1,959
Cobalt, metal		2,007	2,542	2,747	3,654	4,259
Copper, metal:						
Blister and anode:						
Primary		1,168,284	1,304,916	1,249,332	1,290,640	1,175,101
Secondary		269,748	303,900	313,636	310,029	296,486
Total		1,438,032	1,608,816	1,562,968	1,600,669	1,471,587
Refined:						
Primary		1,094,999	1,270,914	1,210,242	1,296,641 r	1,243,072
Secondary		233,289	245,440	257,900	257,583	240,059
Total		1,328,288	1,516,354	1,468,142	1,554,224 r	1,483,131
Gold:						
Mine output, Au content	kilograms	7,922	7,233	7,411	7,115	7,700
Metal:						
Primary	do.	95,549	74,735	63,070	64,810	82,029
Secondary	do.	36,288	29,544	30,699	30,390	31,717
Total	do.	131,837	104,279	93,769	95,200	113,746
Iron and steel, metal:						
Pig iron	thousand metric tons	81,028	81,405	83,849	83,872	81,011
Electric-furnace ferroalloys:						
Ferrochrome		17,217	19,392	21,671	NA r	NA
Ferromanganese		456,798	436,171	460,936	463,345	465,952
Ferronickel		279,944	371,913	402,768	379,291	396,969
Silicomanganese		49,798	52,287	24,741	NA r	NA
Ferromolybdenum		5,167	4,616	4,550	NA r	NA
Ferrovanadium		3,980	4,403	4,433	NA r	NA
Other ferroalloys[4]		20,913	19,364	19,394	79,912 r	73,651
Total		833,817	908,146 r	938,493	922,548 r	936,572
Steel, crude	thousand metric tons	107,601	107,232	110,595	110,666	105,134
Semimanufactures, hot-rolled:						
Ordinary steels	do.	74,492	74,911	77,006	76,968	81,152
Special steels	do.	20,340	19,896	19,960	20,914	21,706
Lead, metal, refined:						
Primary		100,058	91,037	92,227	87,303 r	85,655
Secondary		114,986	117,957	115,888	115,370	108,736
Total		215,044	208,994	208,115	202,673 r	194,391
Molybdenum, metal		1,234	1,013	829 r	1,020 r	824
Nickel metal:						
Refined		41,290	41,944	46,405	56,129	64,068
Ni content of nickel oxide sinter		50,437	51,999 r	48,873 r	45,907 r	48,197
Ni content of ferronickel		62,773	73,248	80,554	70,070 r	74,224
Ni content of chemical		2,383	2,362	2,191 r	5,673 r	6,147
Total		156,883	169,553	178,023	177,779	192,636
Platinum-group metals:						
Palladium, metal	kilograms	7,534	8,052	6,239	6,969	7,073
Platinum, metal	do.	1,765	1,735	1,963	1,724	1,864
Silicon, multicrystalline		12,133	10,964	8,000	7,263	8,855

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity[2]		2011	2012	2013	2014	2015
METALS—Continued						
Silver:						
Mine output, Ag content	kilograms	4,486	3,577	3,644	3,541	4,616
Metal:						
Primary	do.	1,724,218	1,764,533	1,023,887 r	1,050,373 r	1,096,213
Secondary	do.	325,373	348,620	707,591 r	741,443 r	786,632
Total	do.	2,049,591	2,113,153	1,731,478 r	1,791,816 r	1,882,845
Tin, metal		1,116 r	1,133	1,786	1,746	1,688
Titanium, dioxide		214,417	185,320	173,904	177,569 r	174,770
Tungsten, metal		3,299	2,748 r	3,459 r	3,459 r	3,154
Zinc:						
Oxide		66,325	58,896	57,840	60,920 r	59,224
Metal:						
Primary		444,446	459,322	470,573	458,481	457,786
Secondary		100,228	111,990	116,718 r	124,540	108,833
Total		544,674	571,312	587,291 r	583,021	566,619
INDUSTRIAL MINERALS						
Cement:						
Hydraulic	thousand metric tons	51,291	54,737	57,962	57,913	54,827
Clinker	do.	47,730	49,969	51,585	52,169	50,471
Gypsum	do.	4,770	5,002	4,771	4,674	4,670
Iodine		9,277	9,315	9,334	9,814	10,610
Lime:						
Quicklime	thousand metric tons	8,005	7,581	7,619	7,911	7,336
Slaked lime	do.	1,420	1,370	1,434	1,401	1,378
Nitrogen, N content of ammonia	do.	995	867	828	787	790
Salt (unspecified)	do.	978 r	925 r	929 r	928 r	938
Silica sand	do.	3,003	2,877	2,856	2,932	2,845
Soda ash		373,000	344,000	361,000	341,000 r	232,000
Stone, crushed:						
Dolomite	thousand metric tons	3,492	3,361	3,493	3,446	3,366
Limestone	do.	134,176	140,038	148,066	148,088 r	142,916
Quartzite	do.	9,543	9,306	9,291 r	9,496	8,988
Sulfur, byproduct of petroleum	do.	1,755	1,747	1,779	1,751	1,733
MINERAL FUELS AND RELATED MATERIALS						
Coal, bituminous[e]	thousand metric tons	1,270	1,320	1,200	1,200	1,000
Coke:						
Metallurgical	do.	35,379	34,743	35,154	34,163	32,402
From petroleum refinery	do.	1,252	964	979	1,100 r	1,213
Natural gas, gross	million cubic meters	3,298	3,276	2,995	2,882	2,734
Petroleum:						
Crude	thousand 42-gallon barrels	5,235	4,994	4,322	4,051	3,751
Liquefied petroleum gas	thousand metric tons	4,211	4,163	4,536	4,369	4,374
Refinery products:						
Distillate fuel oil	thousand 42-gallon barrels	249,900	272,900	237,200	218,200	199,700
Gas oil	do.	253,700	242,700	266,700	257,700	264,600
Gasoline	do.	345,100	337,600	341,700	336,800	341,900
Jet fuel	do.	81,200	83,200	92,500	96,100	100,300
Kerosene	do.	122,000	118,100	113,600	105,900	97,700
Naphtha	do.	118,900	119,000	128,700	114,500	120,800
Total	do.	1,170,800	1,173,500	1,180,400	1,129,200	1,125,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. NA Not available. -- Zero.

[1]Table includes data available through October 22, 2016.

[2]In addition to the commodities listed, alumina, aluminum hydroxide, arsenic, bismuth, bromine, chromium, clays, gallium, germanium, manganese, pyrophyllite, rare-earth oxides, selenium, tantalum, tellurium, titanium sponge, and vanadium as a byproduct of metallurgy were produced, but available information was inadequate to make reliable estimates of output.

[3]Unalloyed ingot.

[4]For the years 2014 and 2015, other ferroalloys included ferrochromium, ferromolybdenum, ferrosilicon, ferrotungsten, and ferrovanadium.

TABLE 2
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aso Cement Co., Ltd.	Tagawa and Kanda, Fukuoka Prefecture	2,400
Do.		Daiichi Cement Co., Ltd.	Kawasaki, Kanagawa Prefecture	1,170
Do.		Denki Kagaku K.K.	Omi, Niigata Prefecture	2,760
Do.		Hachinohe Cement Co., Ltd.	Hachinohe, Aomori Prefecture	1,530
Do.		Hitachi Cement Co., Ltd.	Hitachi, Ibaraki Prefecture	941
Do.		Mitsubishi Materials Corp.	Higashidori, Shimokita-gun, Aomori Prefecture; Higashiyama, Higashiiwai-gun, Iwate Prefecture; Yokoze, Saitama Prefecture; Kurosaki, Kyushu, and Higashitani, Fukuoka Prefecture	13,500
Do.		Mitsui Mining Co. Ltd.	Tagawa, Fukuoka Prefecture	2,080
Do.		Myojo Cement Co., Ltd.	Itoigawa, Niigata Prefecture	2,480
Do.		Nippon Steel Chemical Co., Ltd.	Tobata, Kitakyushu, Fukuoka Prefecture	860
Do.		Nittetsu Cement Co., Ltd.	Muroran, Hokkaido Prefecture	1,590
Do.		Sumitomo Osaka Cement Co. Ltd.	Tamura, Fukushima Prefecture; Aso, Tochigi Prefecture; Motosu, Gifu Prefecture; Sakata, Shiga Prefecture; Ako, Hyogo Prefecture; and Susaki, Kochi Prefecture	14,400
Do.		Taiheiyo Cement Corp.	Ofunato, Iwate Prefecture; Kumagaya and Saitama, Saitama Prefecture; Fujiwara, Mie Prefecture; Tsukumi, Oita Prefecture; and Kamiiso, Hokkaido Prefecture	28,800
Do.		Tokuyama Cement Co. Ltd.	Nanyo, Yamaguchi Prefecture	5,940
Do.		Tosoh Corp.	Shin Nanyo, Yamaguchi Prefecture	2,870
Do.		Tsuruga Cement Co. Ltd.	Tsuruga, Fukui Prefecture	1,710
Do.		Ube Industries Ltd.	Ube and Isa, Yamaguchi Prefecture, and Kanda, Fukuoka Prefecture	10,700
Cobalt, refined	metric tons	Sumitomo Metal Mining Co. Ltd. (SMM)	Niihama, Ehime Prefecture	1,000
Copper, refined	do.	Mitsubishi Materials Corp.	Naoshima, Kagawa Prefecture	225,600
Do.	do.	Onahama Smelting and Refining Co. Ltd. (Mitsubishi Materials Corp., 50.45%; Dowa Mining Co. Ltd., 32.13%; Furukawa Co. Ltd., 7.98%; Furukawa Electric Co. Ltd. and Mitsubishi Cable Industries Ltd., 4.29% each; others, 0.85%)	Onahama, Fukushima Prefecture	250,000
Do.	do.	Pan Pacific Copper Co., Ltd. (JX Nippon Mining & Metals Co., Ltd., 66%, and Mitsui Mining and Smelting Co., Ltd., 34%)	Saganoseki, Oita Prefecture; Hitachi, Ibaraki Prefecture; and Tamano, Okayama Prefecture	710,000
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (wholly owned subsidiary of Dowa Mining Co. Ltd.)	Kosaka, Akita Prefecture	72,000
Gold:				
In concentrate	kilograms	Sumitomo Metal Mining Co. Ltd. (SMM)	Hishikari, Kagoshima Prefecture	9,000
Refined	do.	Kosaka Smelting and Refining Co. Ltd. (wholly owned subsidiary of Dowa Mining Co. Ltd.)	Kosaka, Akita Prefecture	24,000
Do.	do.	Mitsui Mining and Smelting Co., Ltd.	Takehara, Hiroshima Prefecture	22,000
Do.	do.	Mitsubishi Materials Corp.	Naoshima, Kagawa Prefecture	60,000
Do.	do.	JX Nippon Mining & Metals Co., Ltd.	Hitachi, Ibaraki Prefecture	30,000
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Niihama, Ehime Prefecture	36,000
Indium, metal		Dowa Metals and Mining Co.	Iijima, Akita Prefecture	NA
Do.		Mitsui Mining and Smelting Co.	Takehara, Hiroshima Prefecture	NA
Do.		Sumitomo Mining Co.	Harima, Hyogo Prefecture	NA
Do.		JX Nippon Mining Metals Co.	Isohara, Ibaraki Prefecture	NA
Do.		Materials Eco-Refining Co.	Onahama, Fukushima Prefecture	NA
Do.		Nippon Rare Metal Inc.	Yokohama, Kanagawa Prefecture	NA
Do.		Shinko Chemical Co.	Amagasaki, Hyogo Prefecture	NA
Do.		Kisan Kinzoku Chemicals Co.	Osaka, Osaka Prefecture	NA

See footnotes at end of table.

TABLE 2—Continued
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Iodine, crude	metric tons	Ise Chemical Industries Co. Ltd. (Asahi Glass Co. Ltd., 52.4%, and Mitsubishi Corp., 11.2%)	Oami-Shirasato and Ichinomya, Chiba Prefecture; and Sadowara, Miyazaki Prefecture	3,600
Do.	do.	Godo Shigen Sangyo Co. Ltd. (Kanto Natural Gas Development Co. Ltd., 11%, and Mitsui & Co. Ltd., 10%)	Chosei, Chiba Prefecture	2,400
Do.	do.	Kanto Natural Gas Development Co. Ltd. (Mitsui Chemicals, Inc., 21.9%, and Godo Shigen Sangyo Co. Ltd., 14.3%)	Mobara, Chiba Prefecture	1,200
Do.	do.	Nihon Tennen Gas Co. Ltd. (Kanto Natural Gas Development Co. Ltd., 50%, and Tomen Corp., 41%)	Shirako and Yokoshiba, Chiba Prefecture	1,200
Do.	do.	Toho Earthtech, Inc. (Itochi Corp., 34.1%; Mitsubishi Gas Chemical Co. Ltd., 32.2%; Nippon Light Metal Co. Ltd., 31.1%)	Kurosaki, Niigata Prefecture	720
Do.	do.	Nippon Chemicals Co. Ltd. (Nippon Shokubai Co. Ltd., 17%; Takeda Chemical Industries Ltd., 16.4%; Chugai Boyeki Co. Ltd., 13.6%)	Isumi, Chiba Prefecture	720
Lead, refined	do.	Kamioka Mining and Smelting Co. Ltd.	Kamioka, Gifu Prefecture	33,600
Do.	do.	Mitsui Mining and Smelting Co., Ltd.	Takehara, Hiroshima Prefecture	43,800
Do.	do.	Toho Zinc Co. Ltd.	Chigirishima, Hiroshima Prefecture	120,000
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Harima, Hyogo Prefecture	30,000
Do.	do.	Kosaka Smelting and Refining Co. Ltd.	Kosaka, Akita Prefecture	25,200
Do.	do.	Hosokura Smelting and Refining Mining Co. Ltd. (wholly owned subsidiary of Mitsubishi Materials Corp.)	Hosokura, Miyagi Prefecture	22,200
Manganese, electrolytic dioxide		Mitsui Mining and Smelting Co., Ltd.	Takehara, Hiroshima Prefecture	24
Do.		Tosoh Corp.	Hyuga, Miyazaki Prefecture	34
Nickel:				
In ferronickel	metric tons	Hyuga Smelting Co. Ltd. [wholly owned subsidiary of Sumitomo Metal Mining Co. Ltd. (SMM)]	do.	22,000
Do.	do.	Yakin Oheyama Co. Ltd.	Oheyama, Kyoto Prefecture	12,720
Do.	do.	Pacific Metals Co. Ltd.	Hachinohe, Aomori Prefecture	40,800
In oxide	do.	Tokyo Nickel Co. Ltd.	Matsuzaka, Mie Prefecture	60,000
Refined	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Niihama, Ehime Prefecture	36,000
Petroleum, refinery products	million 42-gallon barrels	JX Nippon Oil & Energy Corp.	Mizushima, Marifu, Nishihara, Oita, Osaka, and Negishi refineries	465
Do.	do.	Cosmo Oil Co. Ltd.	Chiba, Sakai, and Yokkaichi refineries	165
Do.	do.	Idemitsu Kosan Co., Ltd.	Aichi, Chiba, and Idemitsu refineries	195
Do.	do.	Taiyo Oil Co. Ltd.	Shikoku refinery	43
Do.	do.	Showa Yokkaichi Sekiyu Co., Ltd.	Yokkaichi refinery	93
Do.	do.	TonenGeneral Sekiyu K.K.	Kawasaki, Sakai, and Wakayama refineries	199
Do.	do.	Toa Oil Co. Ltd.	Keihin refinery	26
Do.	do.	Fuji Oil Co. Ltd.	Sodegaura refinery	52
Do.	do.	Kyokuto Sekiyu Co. Ltd.	Chiba refinery	55
Do.	do.	Kashima Oil Co. Ltd.	Kashima refinery	92
Do.	do.	Seibu Oil Co. Ltd	Yamaguchi refinery	44
Do.	do.	Nansei Sekiyu K.K. (Petroleo Brasileiro S.A., 100%)	Okinawa refinery	36
Pyrophyllite		Ohira Kozan Co. Ltd.	Ohira, Okayama Prefecture	132
Do.		Shinagawa Shirenga Co. Ltd.	Mitsuishi, Okayama Prefecture	180
Do.		Shokozan Kogyosho Co. Ltd.	Yano-Shokozan, Hiroshima Prefecture	180

See footnotes at end of table.

TABLE 2—Continued
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Steel, crude		JFE Steel Corp. (wholly owned subsidiary of JFE Holdings Inc.)	Chiba, Chiba Prefecture; Kawasaki (Keihin), Kanagawa Prefecture; Nishinomiya, Hyogo Prefecture; Handa, Aichi Prefecture; Fukuyama, Hiroshima Prefecture; and Kurashiki, Okayama Prefecture	33,800
Do.		Kobe Steel Ltd.	Kakogawa and Kobe, Hyogo Prefecture	8,900
Do.		Nippon Steel & Sumitomo Metal Corp.	Oita, Oita Prefecture; Kawata, Fukuoka Prefecture; Kimitsu, Chiba Prefecture; and Nagoya, Aichi Prefecture	33,200
Do.		do.	Kashima, Ibaraki Prefecture; Kokura, Fukuoka Prefecture; and Wakayama, Wakayama Prefecture	12,800
Do.		Nisshin Steel Co. Ltd.	Kuri, Hiroshima Prefecture; Osaka City; Shunan, Yamaguchi Prefecture; and Toyo, Ehime Prefecture	4,000
Stone, limestone		Mitsubishi Materials Corp.	Higashitani, Fukuoka Prefecture	10,000
Do.		Nittetsu Mining Co., Ltd.	Torigatayama, Kochi Prefecture; Oita, Oita Prefecture; and Shiriya, Aomori Prefecture	23,000
Do.		Sumikin Mining Co., Ltd.	Hachinohe Sekkai, Aomori Prefecture	5,500
Do.		Sumitomo Osaka Cement Co. Ltd.	Ibuku, Shiga Prefecture, and Karazawa, Tochigi Prefecture	4,000
Do.		Shuho Mining Co., Ltd.	Sumitomo Cement Shuho, Yamaguchi Prefecture	8,200
Do.		Taiheiyo Cement Co. Ltd.	Ofunato, Iwate Prefecture; Ganji and Tsukumi, Oita Prefecture; Garo, Hokkaido Prefecture; Kawara, Fukuoka Prefecture; Tosayama, Kochi Prefecture; Taiheiyo Buko, Saitama Prefecture; and Shigeyasu, Yamaguchi Prefecture	46,000
Do.		Todaka Mining Co. Ltd.	Todaka-Tsukumi, Otia Prefecture	12,000
Do.		Ube Kosan Co. Ltd.	Ube Isa, Yamaguchi Prefecture	9,000
Tantalum	metric tons	Japan New Metals Co. Ltd.	Akita, Akita Prefecture	95
Do.	do.	Mitsui Mining and Smelting Co. Ltd.	Miyama, Fukuoka Prefecture	NA
Titanium:				
In sponge metal		Sumitomo Titanium Corp. (Sumitomo Metal Industries, Ltd., 75.2%, and Kobe Steel Ltd., 24.8%)	Amagasaki, Hyogo Prefecture	24
Do.		Toho Titanium Co. Ltd. (JX Nippon Mining & Metals Co., Ltd., 47%; Mitsui & Co. Ltd., 20%; others, 33%)	Chigasaki, Kanagawa Prefecture	15
In dioxide	metric tons	Fuji Titanium Industry Co. Ltd. (Ishihara Sangyo Kaisha Ltd., 24.8%, and others, 75.2%)	Kobe, Hyogo Prefecture	17,400
Do.	do.	Ishihara Sangyo Kaisha Ltd.	Yokkaichi, Mie Prefecture	154,800
Do.	do.	Sakai Chemical Industries Co. Ltd.	Onahama, Fukushima Prefecture	60,000
Do.	do.	Tayca Corp.	Saidaiji, Okayama Prefecture	60,000
Do.	do.	Titan Kogyo Kabushiki Kaisha	Ube, Yamaguchi Prefecture	16,800
Zinc, refined	do.	Akita Smelting Co. Ltd. [Dowa Mining Co. Ltd., 57%; JX Nippon Mining & Metals Co., Ltd., 24%; Sumitomo Metal Mining Co. Ltd. (SMM), 14%; Mitsubishi Materials Corp., 5%]	Iijima, Akita Prefecture	200,400
Do.	do.	Hachinohe Smelting Co. Ltd. (Mitsui Mining and Smelting Co. Ltd., 57.7%; JX Nippon Mining & Metals Co., Ltd., 27.8%; Toho Zinc Co. Ltd. and Nisso Smelting Co. Ltd., 14.5%)	Hachinohe, Aomori Prefecture	117,600
Do.	do.	Hikoshima Smelting Co. Ltd.	Hikoshima, Yamaguchi Prefecture	84,000
Do.	do.	Kamioka Mining and Smelting Co. Ltd.	Kamioka, Gifu Prefecture	72,000
Do.	do.	Toho Zinc Co. Ltd.	Annaka, Gunma Prefecture	139,200
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Harima, Hyogo Prefecture	90,000

Do., do. Ditto. NA Not available.

TABLE 3
JAPAN: SUPPLY AND DEMAND FOR SELECTED NONFERROUS METALS

(Metric tons unless otherwise specified)

	Refined copper			Refined lead		
	2013	2014	2015	2013	2014	2015
Stocks at the beginning of the year	145,938	86,805	131,497	19,558	30,708	35,086
Production	1,468,142	1,554,224	1,483,131	208,115	202,673 r	194,391
Imports	41,426	68,804	37,901	23,883	26,849	34,120
Total supply	1,655,301 r	1,709,833	1,652,529	251,556	260,230 r	263,597
Exports	572,140	505,950	540,561	8,621	5,708	5,392
Reported consumption	911,601	974,591	914,679	209,488	218,498 r	217,990
Total demand	1,483,741	1,480,541	1,455,240	218,109	224,206 r	223,382
Stocks at the end	86,805 r	131,497	114,517	30,708	35,086	30,947
Apparent consumption	996,365 r	1,072,386	997,451	212,227	219,436 r	227,258
	Refined zinc			Silver (kilograms)		
	2013	2014	2015	2013	2014	2015
Stocks at the beginning of the year	72,891	68,932	91,923	1,037,918	964,069	909,373
Production	587,291	583,021	566,619	1,731,478	1,791,816	1,882,845
Remelting	NA	NA	NA	267,977	227,983	221,197
Imports	21,816	25,640	28,948	1,778,354	1,693,036	1,629,595
Total supply	681,998	677,593	687,040	4,815,727	4,676,904	4,643,010
Exports	115,383	82,206	120,831	3,601,020 r	3,740,987	4,050,374
Reported consumption	383,614	388,701 r	371,535	1,040,576 r	1,044,679 r	992,103
Total demand	499,007	470,907 r	492,366	4,641,596 r	4,785,666 r	5,042,477
Stocks at the end	68,932	91,923 r	87,146	964,069 r	909,373 r	733,421
Apparent consumption	479,086	503,464 r	479,063	250,638 r	26,549 r	140,785

rRevised. NA Not applicable.

Source: Japan Mining Industry Association, 2016.