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The Mineral Industry of Japan

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Japan's reserves of iodine are the greatest of any country in the world, and its production of iodine was second to that of Chile in 2014. Japan has one of the world's leading mineral processing sectors, and in 2014, the country maintained a reliance on imported mineral commodities to supply its manufacturing sector. In 2014, Japan was the world's second-ranked producer of steel after China, but Japan's production accounted for 6.7% of world production whereas China's production accounted for 50.1% of the total. Japan was the world's third-ranked cadmium metal producer, accounting for 8.2% of total production; China and the Republic of Korea produced 33% and 18%, respectively, of the total. Japan was also the world's third-ranked producer of indium metal, accounting for 8.5% of total production, after China and the Republic of Korea, which accounted for 54.5% and 17.8%, respectively, of the total (World Steel Association 2015a, b; Schnebele, 2016; Tolcin, 2016a, b).

Minerals in the National Economy

Japan's nominal gross domestic product (GDP) decreased by 6.5% to $4.6 trillion in 2014, which was the world's third-ranked GDP after the United States ($17.4 trillion) and China ($10.4 trillion). The year-over-year percentage change in Japan's GDP was not more than 2.4% in any year from 1994 through 2013, with the exception of 2010 when the GDP decreased by 6.0% compared with that of 2009. Japan's mining sector had not accounted for more than 0.2% of the GDP during any year from 1994 through 2013 (the last year for which data were available). The manufacturing sector accounted for between 18% and 22% of GDP during the same period. The combined value contributed to the GDP from the production of coal, iron, fabricated metal products, nonferrous metals, nonmetallic mineral products, petroleum, and steel accounted for between 4% and 5% of the GDP from 1994 through 2013. The value of the production of these same commodity groups accounted for between 22% and 28% of the total value of manufacturing each year between 1994 and 2013 (Japan Statistics Bureau, 2015a, b; World Bank, The, 2015).

Government Policies and Programs

Japan's Mining Act of 1950 (Law number 289 of 1950), replaced the Mining Act (Law number 45 of 1905) and the Placer Act (Law number 13 of 1909). In 1950, the Government of Japan approved the Commodity Exchange Act (Law number 239), which allowed for the establishment of commodities exchanges and the trading of commodities, including minerals. In 1967, the Japan Petroleum Development Corporation (JPDC) was created to fund and promote exploration and development of foreign crude petroleum resources (Ministry of Economy, Trade and Industry, 2006; Japan Oil, Gas and Metals National Corp., 2015a).

In 1963, the Metallic Minerals Exploration Financing Agency (MMEF) of Japan was created to strengthen the competitiveness of Japan's metal mining industry and to secure a stable, economical supply of metals. The MMEF's primary role was to provide loans necessary for the exploration of metallic minerals. In 1973, the Government expanded and reorganized the MMEF by creating the Metal Mining Agency of Japan (MMAJ). The MMAJ replaced the MMEF and was given responsibility for all mining related policies. That same year, an act that implemented special measures for pollution caused by the metal mining industry, Law number 26, was passed in order to address mine pollution from suspended or abandoned mines and other mineral facilities. In 2004, Japan National Oil Company (JNOC) and MMAJ were merged to establish the Japan Oil, Gas and Metals National Corporation (JOGMEC), which integrated the responsibilities formerly handled by the JNOC and MMAJ (Kikkawa, 2013). The Agency for Natural Resources and Energy, a part of the Ministry of Economy, Trade and Industry (METI), is responsible for formulating Japan's mineral policies, which are implemented by JOGMEC. 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).

In 2012, to stimulate domestic natural resource development, 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 without reviewing the financial and technical capabilities of the applicants, and there were few or no restrictions on the methods of exploration that were allowed. As a result, many applications were submitted to gain the rights to a property, but never proceeded with development. By 2010, the Japanese Government had granted 8,179 exploration licenses for mining areas, of which 1,558 or about 19% had been developed to the production stage (Kikkawa, 2013).

The 2012 amendments to the Act defined two classes of minerals (Specified minerals and Nonspecified minerals) and two different application processes for mining rights to each class of minerals. Specified minerals are defined as those that the Government of Japan designated as particularly important to the national economy (including crude petroleum and natural gas). Nonspecified minerals seem to include all minerals that are not defined as Specified minerals. The first-to-file system will still apply for Nonspecified minerals, but applicants for both types of minerals will have to demonstrate financial solvency and technical capabilities to carry out development of a site (Clifford Chance LLC, 2012).

Production

In 2014, production of primary aluminum increased by 58% to 45,853 metric tons (t) compared with that of 2013. The average of annual primary aluminum production in Japan from

2000 through 2014 was about 42,000 t. Production lows in 2012 and 2013 of about 26,000 t and 29,000 t, respectively, were primarily owing to the effects of the 2011 Tohoku earthquake that damaged infrastructure and eliminated readily available sources of power for aluminum manufacturing. Antimony metal production decreased by 32% in 2014 compared with that of 2013 to 94 t. Production of antimony metal in Japan has been decreasing for decades as the production increased in countries that produced the metal from domestic or imported ore. In 2014, there was a 21% increase in the production of refined nickel and a 33% increase in the production of refined cobalt. These increases were a result of the processing of stockpiled ore that was acquired from Indonesia (Japan's main supplier) prior to a ban on exporting unprocessed ores, which was fully implemented in 2014. Production of almost all petroleum refinery products has decreased steadily in recent years owing primarily to a Government regulation enacted in 2010 that requires Japanese petroleum refineries to upgrade their heavy oil cracking units or reduce their crude distillation unit capacities. (table 1).

Structure of the Mineral Industry

In 2014, Japan's mineral sector was made up of the nonferrous metals industries, nonmetals (industrial minerals) industries, and quarrying (construction materials) industries. The mining of coal and nonferrous metals was a small industry in Japan, but the industrial mineral production and processing of ferrous and nonferrous metals were large industries. Only a few metal mines were still in operation in Japan, including the Hishikari gold mine in Kagoshima Prefecture. The country's mineral industry was primarily owned and operated by private companies (table 2).

In 2012, the latest year for which data were available, there were 1,825 direct mining enterprises in Japan, including 1,533 quarries (gravel, sand, and stone), 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, 40 enterprises involved in the mining of other minerals, and another 86 enterprises engaged in the administrative or ancillary economic activities related to direct mining enterprises. Mining enterprises employed 21,427 people in their operations of those mining enterprises (Japan Statistics Bureau, 2015b).

Mineral Trade

In 2014, the value of Japan's exports decreased by 3.5% to $694 billion and that of imports decreased by 2.6% to $817 billion for a trade deficit of $123 billion. Japan is the world's 5th largest consumer of electricity. Until 2011, nuclear powerplants produced about one-third of Japan's total power supply. In 2011, however, in the aftermath of the Tohoku earthquake and the subsequent meltdowns at the Fukushima nuclear facility, all 50 nuclear powerplants were gradually shut down. Fossil fuel imports have increased continually since that time and have resulted in Japan becoming a net importing country in terms of the value of total trade for the first time in decades (Organisation for Economic Co-operation and Development, 2014, p. 6; Japan External Trade Organization, 2015a).

The United States was Japan's leading export market in 2014, accounting for 18.6% of the value earned from exports, followed by China, which accounted for 18.3%. Other leading recipients of Japan's exports in order of value, included the Republic of Korea, Taiwan, Hong Kong, Thailand, Singapore, Vietnam, Indonesia, and Malaysia, the combined value of which accounted for another 39% of the total value of Japan's exports. Japan's leading import partner was China, which accounted for 22.3% of the value of Japan's imports. Other leading suppliers to Japan were, in order of value, the United States, Australia, Saudi Arabia, the United Arab Emirates, Qatar, the Republic of Korea, Malaysia, Indonesia, Russia, Taiwan, Germany, and Thailand, and the combined value of Japan's imports from these countries accounted for another 20.7% of the total (Japan External Trade Organization, 2015a).

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 4.9% in 2014 to $90 billion and accounted for 13% of commodity exports in 2014. By value, iron and steel products were the leading exported manufactured goods. The value of iron and steel exports decreased by 3.8% in 2014 to $37 billion compared with that of 2013 and accounted for 5.4% of all commodity exports. The value of exported nonferrous metals, manufactured metal products, and nonmetallic mineral products decreased in 2014 by 5.8%, 3.9%, and 8.2%, respectively, and the combined total of these goods accounted for 4.8% of all exported commodities. Mineral fuels were Japan's leading import commodity in 2014, accounting for 32.3% of the value of all imported goods. The value of Japan's imported mineral fuels in 2014 decreased by 7.1% to $264 billion owing, in part, to decreased global prices for petroleum products but also owing to decreased demand within some prefectures of the country (Japan External Trade Organization, 2015a).

Commodity Review

Metals

Aluminum.—The Japanese aluminum industry mainly consists of rolling, extrusion, and diecasting companies that manufacture products for construction, packaging, and transportation. In 2012, the last year for which data were available, there were 51 aluminum companies in Japan with 69 plants, which employed 13,000 employees (Japan Aluminium Association, 2013, p. 1).

Japan is Asia's leading importer of aluminum and the quarterly prices that Japan agrees to pay for primary aluminum metal imports set the benchmark for the region. In September 2014, some but not all Japanese consumers agreed to pay Rio Tinto Ltd. $420 per ton for metal that would be shipped in the October quarter. The agreed-upon price was between $15 and $40 per ton less than offers from Alcoa Inc., BHP Billiton Ltd., and United Company RUSAL Plc, but an increase of about 4% compared with the July 2014 quarter and between 8% and 12% compared with the April 2014 quarter (Obayashi, 2014).

In 2014, Japan produced 45,853 t of primary aluminum, 142,512 t of unalloyed secondary aluminum ingot, and 11,783 t of aluminum powder. Production of aluminum mill products included 1.2 Mt of flat rolled products and 820,100 t of extruded products. Japan's imports of aluminum waste and scrap in 2014 increased by 37% to 75,900 t. Japan's imports of unwrought aluminum included 1.7 Mt of unalloyed aluminum and 1.1 Mt of alloyed aluminum, which were increases of 15.8% and 11.0%, respectively, compared with 2013. A total of 122,900 t of wrought aluminum products were imported, which was an increase of 8.6% compared with 2013, including 61,700 t of plates, sheets, and strips; 18,200 t of bars, rods, and profiles; 2,500 t of pipes and tubes; and 35,500 t of foil (Japan Aluminium Association, 2015).

Japan's domestic demand for aluminum increased by 4.1% compared with 2013 to 4.1 Mt. In terms of end use, demand was led by the transportation industry, which accounted for 40.2% of the total. The building and construction industries accounted for 13.5% of the total. Production of fabricated metal products and demand from the food industry accounted for 11.7% and 10.7%, respectively, of the total. The electrical appliance and communication machinery industries accounted for 3% of demand, 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, 2015).

Antimony.—In 2014, Japan produced 94 t of antimony metal, which was a 32.4% decrease compared with 2013. Japan had a history of mining stibnite veins until the mid-1950s, but as reserves dwindled and less expensive imports became available, Japanese companies have produced antimony metal and derivative chemicals from imported materials (Clarke, 2012; Japan Mining Industry Association, 2015, p. 4).

Japan imports high-purity antimony lump and powder, antimony trioxide, and antimony trisulfide. In 2013 (the latest year for which data were available), Japan imported a total of 9,295 t of antimony compounds, of which antimony lump and powder accounted for 57.9%; antimony trioxide, 38.5%; and antimony sulfide, 3.6%. The total of antimony compounds imported by Japan had decreased almost every year since at least 2004 when the total import amount was 14,977 t. In 2010, however, the total tonnage of antimony imports increased by 67% compared with that of 2009 (Japan Oil, Gas and Metals National Corp., 2014a).

Cadmium.—Cadmium metal production is a byproduct of zinc processing and the amount of cadmium produced in Japan had remained relatively constant since at least 2000 as there was no refinery capacity expansion and little variation in the amount of zinc metal that was produced. The average annual production total from 2000 through 2014 was 2,127 t, and the maximum and minimum production totals were 2,509 t and 1,755 t, respectively. In 2010 (the last year for which industrial end use data were available), Japan's total cadmium metal supply, from domestic production, imports, and any stocks from the previous year, was 5,497 t. About 82% of domestic consumption of cadmium metal was accounted for by the production of batteries; 1% was consumed in the production of alloys, pigments, plated products, and other unspecified uses, and 7% was exported, leaving the remainder of the supply as ending stocks (Japan Oil, Gas and Metals National Corp., 2012).

Copper.—Production of copper from domestic ore had not contributed to Japan's supply of refined copper since 2007, when the last reported production volume of domestic ore was 100 t. Refined copper production from imported ore remained relatively constant in recent years despite shocks to the economy and infrastructure, including recession and natural disaster. The average of Japan's annual refined copper production from imported ore in 2004 through 2014 was 1.3 Mt with a maximum production volume in 2014 of 1.5 Mt and a minimum in 2011 of 1.1 Mt. Japan's copper production from imported ore during the same period accounted for between 82% and 88% of the country's total supply and the rest was produced from imported scrap or unclassified materials (Japan Oil, Gas and Metals National Corp., 2014b, p. 3; Japan Mining Industry Association, 2015, p. 11).

The average of Japan's total annual refined copper supply from 2004 through 2014 (including that produced from imported ore, scrap, unclassified materials, and imports of refined copper) was 1.7 Mt, with a maximum of 1.8 Mt in 2003 and a minimum of 1.6 Mt in 2007. The average of Japan's total annual refined copper consumption from 2004 through 2014 (including that consumed by the production of electric wire, unclassified copper products, other unclassified uses, and exports of refined copper) was 1.5 Mt with a maximum of 1.6 Mt in 2007 and a minimum of 1.4 Mt in 2000. In 2014, Japan's stocks of copper ore at the beginning of the year decreased by 41% to 86,805 t, which was the lowest amount of any year since at least 2004. Total consumption in 2014 did not decrease, yet production of primary refined copper decreased by 8% compared with that of 2013 (table 1; Japan Oil, Gas and Metals National Corp., 2014b, p. 3; Japan Mining Industry Association, 2015, p. 11).

Iron and Steel.—In 2014, pig iron production remained nearly constant, increasing by just 0.03% compared with 2013 to 83.9 Mt. Of that amount, 99.6% was used for steelmaking processes and the rest was used for foundry applications. Crude steel production also remained nearly unchanged (increased by 0.06% compared with that of 2013 to about 111 Mt). Of that amount, 77.2% was classified as ordinary steel and the rest was specialty steel. A total of 97.9 Mt of hot-rolled products was produced in 2014, which was an increase of 1% compared with that of 2013, and production of finished products increased by 1.2% to 95.3 Mt (table 1; Japan Iron and Steel Federation, 2015).

From 2004 through 2013 (the last year for which industrial demand data were available) Japan's supply of iron and steel (from the production of ordinary and special steels, steel casting and forging, pig iron casting, and imports of the same) exceeded demand (from manufacturing and exports) every year since at least 2004. Between 2004 and 2013, domestic demand decreased for many industries, including automobile manufacturing, construction, container production, business and household equipment, electrical machinery, industrial machinery, railway vehicle production, and shipbuilding (Japan Oil, Gas and Metals National Corp., 2014c, p. 231).

Lead.—Japan's production of primary refined lead was wholly from imported ore. Primary lead production volumes varied little in Japan since at least 2004, with the exception of recession years including 2004, when Japan was emerging from a decade of deflation and decreased real GDP growth; in 2009 after the global economic recession; and again in 2012 and 2013 owing to domestic disruption caused by the Tohoku earthquake in 2011. The average volume of Japan's annual primary lead production from 2004 through 2014 was 99,200 t with a maximum production volume in 2008 of 100,700 t and a minimum in 2004 of 89,000 t (Japan Mining Industry Association, 2015, p. 11; Japan Oil, Gas and Metals National Corp., 2015b).

In 2014, Japan's total supply of refined lead was 260,228 t. Domestically produced primary lead from imported ore accounted for 34% of the total supply. Another 27% of the lead supply was produced from imported scrap, 17% was produced from other unspecified sources, 12% was accounted for by stocks that were available at the beginning of the year, and 10% was accounted for by imports of refined lead. The total supply of refined lead exceeded total demand each year from 2011 through 2014 by between 3,000 t (2011) and 37,000 t (2014). In 2014, Japan's total consumption of refined lead was 222,948 t, 85.7% of which was consumed in the production of batteries; 4.8%, lead pipes and sheets; 2.2%, the chemical industry; and 0.5%, solder. The remainder was consumed in other unspecified processes (Japan Mining Industry Association, 2015, p. 11; Japan Oil, Gas and Metals National Corp., 2015b).

Zinc.—Production of zinc metal from domestic ore had not contributed to Japan's supply of refined zinc since 2008 when the last reported production amount of domestic ore was 6,800 t. The average tonnage of Japan's annual zinc metal production from 2004 through 2014 (including that produced from domestic and (or) imported ore, scrap, and other unclassified materials) was 591,000 t with a maximum production volume in 2005 of 638,400 t and a minimum in 2009 of 540,600 t (Japan Oil, Gas and Metals National Corp., 2014d; Japan Mining Industry Association, 2015, p. 12).

In 2014, Japan's total supply of refined zinc was 677,593 t. Domestically produced primary zinc metal from imported ore accounted for 67.7% of the total supply. Another 16.8% of the supply was produced from imported scrap, 10.2% was accounted for by stocks at the beginning of the year, 3.8% was accounted for by imports of refined lead, and the remainder was from other unclassified materials. Total supply of refined lead exceeded total demand each year from at least 2004 through 2014 by between 54,000 t (2007) and 207,500 t (2014). In 2014, Japan's total consumption of refined zinc was 470,121 t, 40.6% of which was consumed in the production of galvanized sheets and 13.4% of which was consumed in other galvanizing processes. Another 10.8% was consumed in the production of brass; 8.4%, in diecasting processes; 6.5%, by the chemical industry; 2.4%, in other unspecified processes, and 0.4%, in the production of rolled zinc. The remainder was exported (table 3; Japan Oil, Gas and Metals National Corp., 2014d; Japan Mining Industry Association, 2015, p. 12).

Mineral Fuels and Related Materials

Petroleum and Petroleum Refinery Products.—Japan is the world's leading liquefied natural gas (LNG) importing country and the third leading net importer of crude petroleum and refinery products. It is the third leading petroleum consumer in the world after the United States and China. Petroleum refinery capacity and throughput in Japan decreased almost every year since at least 2003. In 2014, the value of Japan's crude petroleum imports accounted for 16.2% of imported goods. Imports of LNG accounted for 9.1% of the total, petroleum refinery products and petroleum ether combined accounted for 5.5%, and imports of liquefied petroleum gas accounted for 1.3% of the value of imported goods (BP p.l.c., 2015, p. 16).

Outlook

To maintain its position as a globally competitive mineral processing nation, Japan plans to continue to secure and diversify its long-term supply of raw material through foreign direct investment (FDI), particularly in the Western Hemisphere, Oceania, and increasingly in Africa. The value of Japan's outward FDI in mining increased in most years from 2005 through 2013 (the latest year for which calendar year data were available), during which time FDI in mining accounted for between 8% and 17% of the total outward FDI, and it is expected to increase at least modestly through 2017 in line with projected increases in the country's GDP. Japan maintains its long-term supply of metals, petroleum, and liquefied petroleum gas through Government-owned, domestically stored stockpiles; through exploration and development both domestically and internationally, and increasingly through recycling of domestic metal waste (World Bank, The, 2015; Japan External Trade Organization, 2015b).

Beginning in 2017, the Government of Japan plans to conduct deep-sea test mining of minerals at the Izena sea hole, which is located about 100 kilometers northwest of Okinawa Island at a depth of 1,600 meters. Test mining at the site in 2012 led to the discovery of confirmed mineral deposits containing gold, silver, and zinc. Mineral deposits were also found offshore of Kumejima Island near Okinawa and Hachijojima Island near Tokyo. The Government expects to mine about 100 metric tons per day of earth materials for 2 to 4 weeks at the Izena location (Papua New Guinea Mine Watch, 2015).

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TABLE 1
JAPAN: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2010	2011	2012	2013	2014
METALS						
Aluminum:						
Metal:						
Primary		48,820 r	43,324 r	25,774 r	29,070 r	45,853
Secondary[3]		128,278 r	141,789 r	137,304 r	143,281 r	142,512
Powder	kilograms	13,041	12,882	10,785	11,409	11,783
Antimony:						
Oxide		6,661 r	4,965 r	4,634 r	4,498 r	4,500 e
Metal		304	435	143	139	94
Cadmium, refined		2,053	1,755	1,855	1,826	1,829
Cobalt, metal		1,935	2,007	2,542	2,747	3,654
Copper, metal:						
Blister and anode:						
Primary		1,382,655	1,168,284	1,304,916	1,249,332	1,290,640
Secondary		260,245	269,748	303,900	313,636	310,029
Total		1,642,900	1,438,032	1,608,816	1,562,968	1,600,669
Refined:						
Primary		1,333,787	1,094,999	1,270,914	1,210,242 r	1,108,626
Secondary		214,901	233,289	245,440	257,900	257,583
Total		1,548,688	1,328,288	1,516,354	1,468,142	1,366,209
Gold:						
Mine output, Au content	kilograms	8,544	7,922	7,233	7,411	7,115
Metal:						
Primary	do.	98,398	95,549	74,735	63,070	64,810
Secondary	do.	37,413	36,288	29,544	30,699	30,390
Total	do.	135,811	131,837	104,279	93,769	95,200
Iron and steel, metal:						
Pig iron	thousand metric tons	82,283	81,028	81,405	83,849	83,872
Electric-furnace ferroalloys:						
Ferrochrome		16,208	17,217	19,392	21,671	22,000 e
Ferromanganese		453,265	456,798	436,171	460,936	463,345
Ferronickel		348,420	279,944	371,913	402,768	379,291
Silicomanganese		49,865	49,798	52,287	24,741	40,000 e
Ferromolybdenum		4,615	5,167	4,616	4,550	4,500 e
Ferrovanadium		4,190	3,980	4,403	4,433	4,400 e
Unspecified		16,374	20,913	19,364	19,394	19,300 e
Total		892,937	833,817	908,416	938,493	932,836
Steel, crude	thousand metric tons	109,599	107,601	107,232	110,595	110,666
Semimanufactures, hot-rolled:						
Ordinary steels	do.	75,000 e, r	74,492 r	74,911 r	77,006 r	76,968 r
Special steels	do.	20,000 e, r	20,340 r	19,896 r	19,960 r	20,914 r
Lead, metal, refined:						
Primary		101,610	100,058	91,037	92,227	97,303
Secondary		114,218 r	114,986 r	117,957 r	115,888 r	115,370
Total		215,828 r	215,044 r	208,994 r	208,115	212,673
Molybdenum, metal		1,154	1,234	1,013	1,000 e	1,000 e
Nickel metal:						
Refined		40,228	41,290	41,944	46,405	56,129
Ni content of nickel oxide sinter		59,011	50,437	52,000 e	53,000 e	53,000 e
Ni content of ferronickel		64,349	62,773	73,248	80,554	80,000 e
Ni content of chemical		2,497	2,383	2,362	2,500 e	2,500 e
Total[e]		166,000	157,000	170,000	182,000	192,000
Platinum-group metals:						
Palladium, metal	kilograms	6,107	7,534	8,052	6,239	6,969
Platinum, metal	do.	1,331	1,765	1,735	1,963	1,724

See footnotes at end of table.

TABLE 1—Continued
JAPAN: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2010	2011	2012	2013	2014
METALS—Continued						
Silicon, multicrystalline		11,500 r, e	12,133	10,964	8,000 r	7,263
Silver:						
Mine output, Ag content	kilograms	1,200 e	4,486	3,577	3,644	3,541
Metal:						
Primary	do.	1,898,208	1,724,218	1,764,533	1,731,478	1,791,816
Secondary	do.	313,931	325,373	348,620	346,296	227,983
Total	do.	2,212,139	2,049,591	2,113,153	2,077,774	2,019,799
Tin, metal, smelter		841	947	1,133	1,786	1,746
Titanium, dioxide		207,561	214,417	185,320	173,904	170,000 e
Tungsten, metal		3,361	3,299	3,025	3,000 e	3,000
Zinc:						
Oxide		72,000 e	66,325	58,896	57,840	58,000 e
Metal:						
Primary		470,057	444,446	459,322	470,573 r	458,481
Secondary		103,951	100,228	111,990	117,606 r	124,540
Total		574,008 r	544,674 r	571,312 r	588,031 r	583,021
INDUSTRIAL MINERALS						
Cement:						
Ordinary portland cement	thousand metric tons	35,000 e	35,593	37,657	39,335	40,022
Portland blast furnace cement	do.	11,000 e	11,290	12,164	13,493	12,410
Other cement	do.	900 e	961	1,032	1,088	1,415
Total	do.	46,900 e	47,844 r	50,853 r	53,916 r	53,847
Clinker		48,000 e	47,730	49,969	51,585	52,169
Gypsum	thousand metric tons	4,868 r	4,770 r	5,002 r	4,771 r	4,674
Iodine		9,216	9,277	9,315	9,334	9,814
Lime:						
Quicklime	thousand metric tons	8,547	8,005	7,581	7,619	7,911
Slaked lime	do.	1,400 e	1,420	1,370	1,434	1,401
Nitrogen, N content of ammonia	do.	968 r	995 r	867 r	828 r	787
Salt (unspecified)	thousand metric tons	1,138 r	1,153 r	1,077 r	1,052 r	1,000 e
Silica:						
Sand	do.	3,078	3,003	2,877	2,856	2,932
Stone, quartzite	do.	9,159	9,543	9,306	9,290	9,496
Soda ash		359,000 r	373,000 r	344,000 r	361,000 r	350,000
Stone, crushed:						
Dolomite	thousand metric tons	3,438	3,492	3,361	3,493	3,446
Limestone	do.	133,974	134,176	140,038	148,066	148,008
Sulfur, byproduct of petroleum	do.	1,892	1,755	1,747	1,779	1,751
MINERAL FUELS AND RELATED MATERIALS						
Asphalt	thousand metric tons	4,528	3,997	4,088	3,637	3,428
Carbon black	do.	653 r	681	638	609 r	600 e
Coal, bituminous[e]	do.	1,000	1,270 r	1,320 r	1,200	1,200
Coke, metallurgical	do.	37,447	35,379	34,743	35,154	34,163
Coke, from petroleum refinery		1,114	1,252	964	979	1,099
Gas, natural, gross	million cubic meters	3,396	3,298	3,276	2,995	2,882
Petroleum:						
Crude	42-gallon barrels	5,491,000	5,235,000	4,994,000 r	4,322,000 r	4,051,000
Refinery products:						
Gasoline	do.	370,013 r	345,056 r	337,578 r	341,720 r	336,757
Naphtha	do.	130,779 r	118,884 r	119,039 r	128,706	114,473
Distillate fuel oil	do.	251,470 r	249,904 r	272,907 r	237,207	218,212
Jet fuel	do.	88,359 r	81,198 r	83,154 r	92,518	96,095
Kerosene	do.	123,751 r	122,032 r	118,114 r	113,551	105,865

See footnotes at end of table.

TABLE 1—Continued
JAPAN: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2010	2011	2012	2013	2014
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum—Continued:						
Refinery products—Continued:						
Gas oil	do.	269,620	253,696	242,735	266,666	257,738
Fuel oil A	do.	102,824	97,328	95,767	90,647	85,414
Fuel oil B and C	do.	148,646	152,577	177,140	146,560	132,868
Liquefied petroleum gas	do.	28,340 r	26,489 r	26,191 r	28,536	27,485
Lubricants	do.	15,960 r	16,216 r	14,966 r	15,173	15,380
Paraffin, wax	do.	501 r	500 r	423 r	440	382
Total	do.	1,530,263	1,463,880	1,488,014	1,461,724	1,390,669

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.
[1]Table includes data available through July 22, 2015.
[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, and vanadium as a byproduct of metallurgy were produced, but available information is inadequate to make reliable estimates of output.
[3]Unalloyed ingot.

TABLE 2
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	metric tons	Nippon Light Metal Holdings Co., Ltd.	Shizuoka, Shizuoka Prefecture	7,000
Cement		Aso Cement Co., Ltd.	Tagawa and Kanda, Fukuoka Prefecture	2,400
Do.		Daiichi Cement Co., Ltd.	Kawasaki, Kanagawa Prefecture	1,169
Do.		Denki Kagaku K.K.	Omi, Niigata Prefecture	2,762
Do.		Hachinohe Cement Co., Ltd.	Hachinohe, Aomori Prefecture	1,533
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	13,467
Do.		Mitsui Mining Co. Ltd.	Togawa, Fukuoka Prefecture	2,075
Do.		Myojo Cement Co., Ltd.	Itoigawa, Niigata Prefecture	2,482
Do.		Nippon Steel Chemical Co., Ltd.	Tobata, Kitakyushu, Fukuoka Prefecture	855
Do.		Nittetsu Cement Co., Ltd.	Muroran, Hokkaido Prefecture	1,589
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	14,402
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	5,936
Do.		Tosoh Corp.	Shin Nanyo, Yamaguchi Prefecture	2,869
Do.		Tsuruga Cement Co. Ltd.	Tsuruga, Fukui Prefecture	1,710
Do.		Ube Industries Ltd.	Ube and Isa, Yamaguchi Prefecture, and Kanda, Fukuoka Prefecture	10,736
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.	Oosaka, Oosaka Prefecture	NA

See footnotes at end of table.

TABLE 2—Continued
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014

(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
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
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

See footnotes at end of table.

TABLE 2—Continued
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum, refinery	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
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
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	33,835
Do.		Kobe Steel Ltd.	Kakogawa and Kobe, Hyogo Prefecture	8,943
Do.		Nippon Steel & Sumitomo Metal Corp.	Oita, Oita Prefecture; Kawata, Fukuoka Prefecture; Kimitsu, Chiba Prefecture; and Nagoya, Aichi Prefecture	33,199
Do.		do.	Kashima, Ibaraki Prefecture; Kokura, Fukuoka Prefecture; and Wakayama, Wakayama Prefecture	12,820
Do.		Nisshin Steel Co. Ltd.	Kuri, Hiroshima Prefecture; Osaka City; Shunan, Yamaguchi Prefecture; and Toyo, Ehime Prefecture	4,000
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 Kaishia 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%; Mitsubushi 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		
	2012	2013	2014	2012	2013	2014
Stocks at the beginning of the year	124,578	145,938	86,805	15,168	19,558	30,708
Production	1,516,354	1,468,142	1,554,224	208,994	208,115	212,673
Imports	35,876	41,426	68,804	28,869	23,883	26,907
Total supply	1,676,808	1,655,506	1,709,833	253,031	251,556	270,288
Exports	545,908	572,140	505,950	20,708 [r]	8,621	5,708
Reported consumption	948,687 [r]	911,601	974,591	204,908 [r]	209,488	217,240
Total demand	1,494,595 [r]	1,483,741	1,480,541	225,616 [r]	218,109	222,948
Stocks at the end	145,938 [r]	103,379	131,497	19,558 [r]	30,708	35,086
Apparent consumption	984,962	979,987	1,072,386	212,765 [r]	212,227	219,494
	Refined zinc			Silver (kilograms)		
	2012	2013	2014	2012	2013	2014
Stocks at the beginning of the year	92,265	72,891	68,932	999,120	1,037,918	964,069
Production	571,312	587,291	583,021	1,764,533	1,731,478	1,791,816
Remelting	NA	NA	NA	348,620	267,977	227,983
Imports	23,960	21,816	25,640	1,698,639	1,778,354	1,693,036
Total supply	687,537	681,998	677,593	4,810,912	4,815,727	4,676,904
Exports	135,560	115,383	82,206	3,493,979 [r]	3,601,010	3,740,987
Reported consumption	356,811 [r]	383,614	387,915	1,089,298 [r]	1,048,790	1,044,530
Total demand	492,371 [r]	499,007	470,121	4,583,277 [r]	4,649,800	4,785,517
Stocks at the end	72,891 [r]	68,932	97,907	1,037,918	964,059	908,614
Apparent consumption	479,086 [r]	497,683	503,480	279,015 [r]	250,658	27,303

[r]Revised. NA Not applicable.

Source: Japan Mining Industry Association, 2015.

TABLE 4
JAPAN: RESERVES OF MAJOR MINERAL COMMODITIES IN 2014

(Thousand metric tons unless otherwise specified)

Commodity		Exploitable reserves
Coal[1]		347,000 [r]
Dolomite		900,000 [r, e]
Gold ore, Au content[2]	kilograms	150,000 [r]
Iodine		5,000 [e]
Limestone		40,000,000 [r, e]
Pyrophyllite		60,000 [r, e]
Silica sand		74,000 [r, e]
Silica stone, white		450,000 [r, e]

[e]Estimated. [r]Revised.

[1]Proved reserves of anthracite, bituminous, lignite, and subbituminous.

[2]Proven and probable reserves at Hishikari gold mine as of 2012. (Source: Sumitomo Metal Mining Co., Ltd., 2012, 30th Anniverary of Hishikari Mine and achievement of cumulative production of 200 tons of gold: Tokyo, Japan, Sumitomo Metal Mining Co., Ltd., November 12, 1 p.