

2013 Minerals Yearbook

JAPAN [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF JAPAN

By Susan Wacaster

The mineral sector in Japan is dominated by the metals and metal products industry, which includes the fabrication of iron and steel products and the processing and production of nonferrous metals. In 2013, Japan remained the world's secondranked producer of steel after China and the second-ranked producer of iodine after Chile. Domestic production of gold, magnesium, and silver partially satisfied domestic demand, but the raw material requirements for the country's manufacturing sector were met through imports of ores and concentrates. Japan also imported intermediate products and refined them into such metals as molybdenum, tin, and tungsten. The country also imported most of its crude oil and natural gas, including liquefied natural gas (LNG).

Minerals in the National Economy

Japan's nominal gross domestic product (GDP) was \$4.9 trillion in 2013, which was the world's third-ranked GDP after the United States (\$16.8 trillion) and China (\$9.2 trillion). The manufacturing sector accounted for 26.3% of the GDP in 2013. The value of iron and steel manufacturing accounted for 1.3% of the GDP and that of coal and petroleum products combined accounted for 1.0% of the total. Total exports were valued at \$679.7 billion, of which iron and steel products accounted for 5.4%. The country's total imports were valued at \$800.4 billion, of which petroleum accounted for 17.5%; LNG, 8.7%; and petroleum refinery products, 3.4% (Government of Japan, Cabinet Office, 2015; Ministry of International Affairs and Communications Statistics Bureau, 2015; World Bank, The, 2015).

Government Policies and Programs

The focus of Japan's resource development policy was to secure stable overseas sources of oil, gas, and mineral resources for the country's manufacturing sector. The Government stockpiled gallium and indium in addition to seven minor metals (chromium, cobalt, manganese, molybdenum, nickel, tungsten, and vanadium) for the needs of its high-tech industry. Owing to increased competition from manufacturing sectors in countries with emerging economies, the Government of Japan released an action plan in 2010 for domestic manufacturing industries that includes development and strengthening of industries that produce high-performance products, such as aircraft, carbon fiber, chemicals, robots, and vehicles (Ministry of Economy, Trade and Industry, 2010; Kuo, 2013).

In 2012, in order to stimulate domestic natural resource development, the Government of Japan amended the country's Mining Act (the Act) for the first time since 1950. Revisions to the Act strengthen the regulatory powers of the Ministry of Economy, Trade and Industry (METI) in terms of granting mining rights. Prior to the revisions, applicants were granted mining rights on a first-come-first-served basis without review of the financial and technical capabilities of the applicant, and there were few or no restrictions on the methods of exploration that were allowed. As a result of that system, many applications were submitted for the purpose of holding the rights to a property but did not necessarily result in project development, as mining rights were valid for up to 20 years. The amendments to the Act define two classes of minerals-specified minerals and nonspecified minerals-and outline different application processes for obtaining mining rights for each class of minerals. Specified minerals are defined as those mineral commodities (including crude petroleum and natural gas) that the Government of Japan designates as particularly important to the national economy. Nonspecified minerals include all mineral commodities that are not defined as specified minerals. The first-to-file system still applies for nonspecified minerals, but applicants for both types of minerals must demonstrate financial solvency and that they have the technical capability to carry out development of a site (Clifford Chance LLP, 2012).

Production

Production of regular-grade aluminum and alumina decreased by 40% and 29%, respectively, in 2013 compared with that of 2012; production of primary gold decreased by 16%, whereas that of secondary gold increased by 4%. Production of other nonferrous mineral commodities decreased, including silicon, palladium, and primary gallium, which decreased by 27%, 23%, and 13%, respectively. Production of high-purity aluminum increased by 12% compared with that of 2012, and tin metal production increased by 58%. In the iron and steel sector, Japan's production of crude steel and pig iron increased by 3% each, and that of nickel content of ferronickel, by 10% (table 1).

Structure of the Mineral Industry

Japan's mineral industry was characterized by small-scale, low-tonnage mining operations and high-value-added mineral and metal processing and manufacturing activities. The country's mining industry was not significant to the economy, and the country consumed more minerals and metals from imports than it produced. In 2013, mining and quarrying of industrial minerals, including dolomite, iodine, limestone, pyrophyllite, silica sand, and silica stone, remained relatively stable, but operating mines and employment in the mining industry had been in decline because of depleted ore reserves, high mining costs, and the availability of cheaper imports. Japan had, however, a world-class metallurgical industry for nonferrous metals. The mining and mineral-processing businesses were owned and operated by private companies (table 2).

Mineral Trade

Japan imported raw materials and mineral fuels for its industrial production and use. These imported mineral commodities were mostly bauxite, coal, coke, copper concentrate, iron ore, LNG, and petroleum. In 2013, Japan imported about 1.3 million metric tons (Mt) of copper, 471,998 metric tons (t) of zinc, and 90,352 t of lead, all in concentrates. The country imported 41,426 t of refined copper and exported 572,140 t. Japan imported 21,816 t of refined zinc and 23,883 t of refined lead and exported 115,383 t and 8,621 t, respectively. The country also imported 1,778,354 kilograms (kg) of silver and exported 3,801,020 kg. Japan imported a total of 100,019 kg of cadmium metal entirely from the Republic of Korea and exported a total of 882,959 kg of cadmium metal to India (48%), China (36%), and Belgium (16%) (Japan Mining Industry Association, 2015, p. 5, 10–13, 28).

Commodity Review

Metals

Aluminum and Bauxite and Alumina.—In 2013, Japan produced 3,100 t of primary aluminum. Domestic consumption of aluminum decreased by 0.3% to 3.9 Mt, of which the transportation sector accounted for 40.9%; building and construction, 14.1%; fabricated metal, 11.8%; food packaging, 11.0%; and other uses, 22.2% (Japan Aluminum Association, 2015, p. 6).

Antimony.—In 2013, 139 t of antimony was produced in Japan compared with 143 t in 2012. 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 material (Clarke, 2012; Japan Mining Industry Association, 2015, p. 4).

Cadmium.—At the end of 2013, Japan had stocks of 235 t of cadmium metal. With production of 1,826 t and imports of 100 t, the country's supplies decreased to 2,223 t compared with 2,348 t in 2012. With an apparent consumption of 1,105 t and exports of 883 t for a total quantity used and exported of 1,988 t, Japan's stocks decreased to 235 t at the end of 2013 (Japan Mining Industry Association, 2015, p. 30).

Copper.—Japan produced about 1.3 Mt of anode and blister copper from primary sources and 313,636 t from scrap. It also produced about 1.5 Mt of refined copper primarily from imported ore (82.4%) and scrap (11.7%) and other sources (5.9%). Consumption of refined copper was reported to be 911,601 t. Refined copper was used in the manufacturing of wire (61.0%), brass (36.9%), and miscellaneous products (2.1%) (table 3; Japan Mining Industry Association, 2015, p. 11).

Gold and Silver.—In 2013, Japan produced 93,769 kg of gold from imported ore, scrap, other sources, and domestic ore, which accounted for an estimated 65%, 15%, 15%, and 5% of the source material, respectively. The country also produced about 2,100 t of silver from imported ore, scrap, domestic ore, and other sources, which accounted for 58.8%, 20.4%, 0.3%, and 20.4% of the source material, respectively. Silver was

used in photographic materials (36.2%), in extension materials (11.6%), in point connectors (8.8%), as a nitrate for other uses (8.4%), for silver solder (4.7%), and for other (unspecified) miscellaneous applications (30.4%) (table 3; Japan Mining Industry Association, 2015, p. 10).

Iron and Steel.—In 2013, Japan's crude steel production increased by 3.1% to 110.6 Mt, which kept pace with the 3.2% increase in global steel demand, and was the greatest amount of crude steel produced in the country since 2008. Japan's increased production was owing to increased housing construction and continued redevelopment of areas affected by the 2011 Tohoku earthquake and tsunami (Obayashi, 2013; Ernst & Young Global Ltd., 2014).

Lead.—Japan's total supply of lead in 2013 was 251,556 t. Of that amount, 208,115 t was refined lead, which was made from 92,227 t of lead content in primary ore and from 115,888 t of scrap and material from other sources. The remainder of the total lead supply (43,441 t) was remelted lead. Consumption of refined lead was reported to be 209,488 t. Refined lead was used in batteries (86.6%), pipe and sheet (5.0%), chemicals (1.9%), solder (0.5%), and other miscellaneous applications (3.6%) (table 3; Japan Mining Industry Association, 2015, p. 12, 14).

Zinc.—Japan's total supply of zinc in 2013 was 618,998 t. Of that amount, 587,291 t was refined zinc made up of 470,573 t of zinc contained in primarily imported ore (76.0%), 112,386 t of zinc from other sources (18.2%), and 4,332 t of zinc from scrap (0.7%). The remainder (31,707 t) was remelted zinc. Consumption of refined zinc was reported to be 383,614 t. Refined zinc was used mainly in galvanized sheet (50.1%), other types of galvanized products (15.0%), brass (12.9%), die-casting alloy (11.2%), chemicals (7.3%), and miscellaneous uses (3.5%) (table 3; Japan Mining Industry Association, 2015, p. 13, 15).

Mineral Fuels

Petroleum and Petroleum Refinery Products.—In 2013, Japan produced about 5.8 million barrels of crude petroleum and imported \$186.4 billion of petroleum and petroleum products, which accounted for about 99.7% of the country's demand. Total fuel demand in Japan had been declining since 2000 owing to official policies aimed at reducing the country's reliance on petroleum imports, including the development of nuclear energy sources and a ban on the construction of heavy-fuel-fired powerplants. In the aftermath of the Tohoku earthquake of March 11, 2011, when electric and gas utilities were debilitated in some areas, petroleum products were used to power emergency operations. Delivery of sufficient crude petroleum and refinery products, however, was impossible not only because of damaged infrastructure in the disaster areas but also because many petroleum terminals outside the affected areas had inadequate inventories. As a result, the Government and the petroleum industry began to focus on increasing the country's domestic supply of petroleum and petroleum products. The Government and the petroleum industry also promoted the use of low-sulfur kerosene for heating; developed standalone oil-fueled water-heating systems, and recommended that public buildings use oil-based heating equipment. Japan

had 23 active petroleum refineries, which were owned by 16 companies with a combined distillation capacity of about 3.9 million barrels per day (Mbbl/d). JX Nippon Oil & Energy Corp. owned five refineries with a combined capacity of about 1.1 Mbbl/d, or 26.8% of the country's total refinery capacity (Petroleum Association of Japan, 2014, p. 7, 69–70).

Reserves and Resources

Japan has large reserves of industrial minerals, including dolomite, iodine, limestone, pyrophyllite, silica sand, and silica stone. Limestone is the most abundant indigenous mineral resource. The country's reserves of nonferrous metals, such as lead, silver, and zinc, are small; gold deposits had been found and were being mined on a small scale in Kagoshima Prefecture on Kyushu Island. The country's coal reserves were reaching depletion.

Outlook

Because of an expected ban on exports of unprocessed nickel from Indonesia, which supplies Japan with about 40% of its ferronickel imports, Japanese smelting companies are expected to begin sourcing their raw material supplies from other low-cost producers in Asia, including companies in New Caledonia and the Philippines. In the energy sector, Japan is expected to remain dependent on imports. At yearend 2013, Japanese gas and oil companies had more than 140 development projects in Africa, Asia, Australia, Europe, North America, South America, and the countries of the Middle East. Commercial production from about 70 of those projects accounted for about 22% of Japan's domestic demand for crude petroleum and natural gas. Crude steel production is expected to decrease slightly in 2014 owing to decreased domestic demand, and the value of Japan's steel exports was expected to remain steady (Petroleum Association of Japan, 2014, p. 25).

References Cited

- Clarke, Gerry, 2012, Antimony (trioxide) on the watch list: Industrial Minerals, no. 540, September, p. 53.
- Clifford Chance LLP, 2012, New mining law for Japan: Clifford Chance LLP. (Accessed June 12, 2014, at http://www.cliffordchance.com/contact.html.)
- Ernst & Young Global Ltd., 2014, Global steel 2014: Ernst & Young Global Ltd., 41 p. (Accessed March 31, 2015, at http://www.ey.com/Publication/ vwLUAssets/EY - Global steel 2014/\$FILE/EY-Global-steel-2014.pdf.)
- Government of Japan, Cabinet Office, 2015, Gross domestic product account production and expenditure approach: Government of Japan, Cabinet Office. (Accessed March 4, 2015, at http://www.esri.cao.go.jp/en/sna/data/kakuhou/ files/2013/27annual_report_e.html.)
- Japan Aluminum Association, 2015, Aluminum statistics: Tokyo, Japan, Japan Aluminum Association, February 15, 6 p.
- Japan Mining Industry Association, 2015, Monthly statistics: Tokyo, Japan, Japan Mining Industry Association, March 4, 31 p.
- Kuo, C.S., 2013, The mineral industry of Japan, *in* Area reports— International—Asia and the Pacific: U.S. Geological Survey Minerals Yearbook 2012, v. III, p. 13.1–13.4.
- Ministry of Economy, Trade and Industry, 2010, Japan's manufacturing industry: Ministry of Economy, Trade and Industry, July, 16 p. (Accessed February 14, 2015, at http://www.meti.go.jp/english/policy/mono_info_ service/overall/overview.pdf.)
- Ministry of Internal Affairs and Communications Statistics Bureau, 2015, Foreign trade, balance of payments and international cooperation (15-1–15-9), chap. 15 *of* Japan statistical yearbook 2015: Ministry of Internal Affairs and Communications Statistics Bureau, 25 p. (Accessed February 17, 2015, at http://www.stat.go.jp/english/data/nenkan/1431-15.htm.)
- Obayashi, Yuka, 2013, UPDATE—Japan's 2013 crude steel output could hit 5-year high—METI: Thomson Reuters, October 1. (Accessed March 17, 2015, at http://www.reuters.com/article/2013/10/01/japan-steelidUSL4N0HR1I420131001.)
- Petroleum Association of Japan, 2014, Petroleum industry in Japan 2014: Petroleum Association of Japan, September, 71 p. (Accessed April 1, 2015, at http://www.paj.gr.jp/english/data/paj2014.pdf.)
- World Bank, The, 2015, GDP ranking: The World Bank. (Accessed February 17, 2015, at http://data.worldbank.org/data-catalog/GDP-ranking-table.)

TABLE 1 JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity		2009	2010	2011	2012	2013
METALS						
Aluminum:						
Alumina	thousand metric tons	550 ^r	550 ^r	500 r	350 ^r	250
Aluminum hydroxide ^e	do.	710	700	690	650	600
Metal:						
Primary:						
Regular grades ^e	do.	6	5	4	5	3 2
High-purity	do.	33	49	43	26	29
Secondary ³	do.	111	126	142	137	140 °
Antimony:					168	
Oxide		4,884	6,846	9,500 ^{e, r}	3,000 ^{e, r}	3,000
Metal		239	304	435	143	139
Arsenic, trioxide ^e		40	40	45	45	45
Bismuth ^e		423 ²	454 ²	460	470	500
Cadmium, refined		1,824	2,053	1,755	1,855	1,826
Chromium, metal ^e		650	700	800	750	750
Cobalt, metal		1,332	1,935	2,007	2,542	2,747
Copper, metal:		1,552	1,755	2,007	2,012	2,717
Blister and anode:						
Primary		1,297,943	1,382,655	1,168,284	1,304,916	1,249,332
Secondary		243,859	260,245	269,748	303,900	313,636
Total		1,541,802	1,642,900	1,438,032	1,608,816	1,562,968
Refined:		1,5 11,002	1,012,700	1,150,052	1,000,010	1,502,900
Primary		1,238,012	1,333,787	1,094,999	1,270,914	1,210,200
Secondary		201,831	214,901	233,289	245,440	257,900
Total		1,439,843	1,548,688	1,328,288	1,516,354	1,468,100
Gallium, metal: ^e		1,459,045	1,040,000	1,520,200	1,510,554	1,400,100
		7	5 ^r	5 ^r	8 ^r	7
Primary		80	75 r	75	85 r	80
Secondary		80	/5	/5	85	80
Germanium: ^e		50	4.5	50	50	50
Oxide		50	45	50	50	50
Metal, polycrystal	kilograms	1,730	1,750	1,760	1,780	1,800
Gold:		7 700	0.544	7.022	7 000	7 41 1
Mine output, Au content	do.	7,708	8,544	7,922	7,233	7,411
Metal:		00.001	00.200	05 540	74 72 5	(2.070
Primary	do.	89,281	98,398	95,549	74,735	63,070
Secondary ⁴	do.	43,979	37,413	36,288	29,544	30,699
Total	do.	133,260	135,811	131,837	104,279	93,769
Indium, metal ^e	do.	67,000	69,000	70,000	71,000	70,000
Iron and steel, metal:						
Pig iron	thousand metric tons	66,943	82,283	81,028	81,405	83,849
Electric-furnace ferroalloys:						
Ferrochrome		7,698	16,208	17,217	19,392	21,671
Ferromanganese		361,375	453,265	456,798	436,171	460,936
Ferronickel		284,884	348,420	279,944	371,913	402,768
Ferromolybdenum		3,598	4,615	5,167	4,616	4,550
Ferrovanadium		2,560	4,190	3,980	4,403	4,433
Silicomanganese		49,205	49,865	49,798	52,287	24,741
Unspecified		12,957	16,374	20,913	19,364	19,394
Total		722,277	892,937	833,817	908,416	938,493
Steel, crude	thousand metric tons	87,534	109,599	107,601	107,232	110,595
Semimanufactures, hot-rolled: ^e						
Ordinary steels	do.	68,000	67,000	65,000	66,000	77,006
Special steels	do.	16,000	15,000	15,000	16,000	19,960
See footnotes at end of table.	u0.	10,000	13,000	15,000	10,000	19,

TABLE 1—Continued JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

METALS—Continued Lead, metal, refined: Primary 96,794 Secondary 150,900 Total 247,694 Magnesium, metal, secondary ^c 13,000 Magnesium, metal, secondary ^c 44,000 Molybdenum, metal 695 Nickel metal: 29,351 Ni content of nickel oxide sinter 58,808 Ni content of chemical 16,669 Total 44,000 Platinum-group metals: 144,000 Platinum, metal do. Silicon, multicrystalline 8,633 Silver: 8,633 Silver: 31,800 Mine output, Ag content kilograms Mine output, Ag content kilograms Mine output, Ag content 1,865,936 Secondary ^d do. Total do. Timary do. Dioxide 161,922 Mine output, Ag content 435,000 Total do. Silver: 757 Dioxide	101,610 165,600 ^r 267,210 ^r 14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754 8,700 ^e	100,058 ^r 152,500 ^r 252,558 ^r 14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 ^e	91,037 r 167,500 r 258,537 r 15,000 40,000 1,013 41,944 52,000 c 73,248 2,362 170,000 8,052	92,227 159,600 251,827 15,000 40,000 1,000 42,000 53,000 80,554 2,500 178,000
Primary $96,794$ Secondary $150,900$ Total $247,694$ Magnesium, metal, secondary ^e $13,000$ Manganese, oxide ⁶ $44,000$ Molybdenum, metal 695 Nickel metal: $29,351$ Ni content of nickel oxide sinter $58,808$ Ni content of ferronickel $54,491$ Ni content of chemical $1,665$ Total ⁶ $144,000$ Platinum-group metals: 705 Platinum, metal $do.$ Silicon, multicrystalline $8,633$ Silver: 705 Mine output, Ag contentkilogramsMetal: 95 Total $do.$ 11m, metal 95 Silcon, multicrystalline 95 Silver: 95 Mine output, Ag content $kilograms$ Metal: 95 Total $do.$ 2,192,423 757 Titanium: 95 Ticlumi, metal 757 Titanium: 95 Dioxide $16,928$ Metal ⁶ 560 Zinc: $75,000$ Mitel: $75,000$ Metal: $75,000$ Metal $75,000$ Metal $104,699$ Total $20,000$ Condary $104,699$ </td <td>165,600 r 267,210 r 14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754</td> <td>152,500 r 252,558 r 14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °</td> <td>167,500 r 258,537 r 15,000 40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000</td> <td>159,600 251,827 15,000 40,000 1,000 42,000 53,000 80,554 2,500</td>	165,600 r 267,210 r 14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	152,500 r 252,558 r 14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	167,500 r 258,537 r 15,000 40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000	159,600 251,827 15,000 40,000 1,000 42,000 53,000 80,554 2,500
Secondary150,900Total247,694Magnesium, metal, secondary°13,000Molybdenum, metal695Nickel metal:29,351Refined29,351Ni content of nickel oxide sinter58,806Ni content of ferronickel54,491Ni content of chemical144,000Paladium, metaldo.Paladium, metal667Platinum-group metals:6673Platinum, metaldo.Silicon, multicrystalline8,633Silver:1,500Mine output, Ag contentkilogramsMetal:95Primarydo.1,865,936326,487Totaldo.2,192,423755Titanium, metal757Titanium, metal757Titanium, metal750Oxide75,000Metal*95Cinc:75,000Metal*95Total20,000Charles, metal104,695Total20,000Current, hydraulic104,695Total20,000Current, hydraulic104,695Total20,000Charles, e20,000Corrent, hydraulic54,800	165,600 r 267,210 r 14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	152,500 r 252,558 r 14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	167,500 r 258,537 r 15,000 40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000	159,600 251,827 15,000 40,000 1,000 42,000 53,000 80,554 2,500
Total247,694Magnesium, metal, secondary°13,000Manganese, oxide°44,000Molybdenum, metal692Nickel metal:29,351Refined29,351Ni content of nickel oxide sinter58,808Ni content of ferronickel54,491Ni content of chemical1,665Total°144,000Platinum, group metals:6,673Palladium, metaldo.Silicon, multicrystalline8,633Silver:0Mine output, Ag contentkilogramsMetal:95Primarydo.Metal:95Totaldo.Total0Jantalum, metal49Tin, metal, smelter757Titanium:95Dioxide14,400Vanadium, metal49Tin, metal, smelter757Titanium:0Dioxide1,400Vanadium, metal1,400Vanadium, metal1,400Vanadium, metal45Titanium:0Dioxide1,400Vanadium, metal1,400Vanadium, metal435,000Total20,000Carce:75,000Metal:95Primary435,905Secondary104,695Total540,604Zirconium, oxide ⁶ 12,000INDUSTRIAL MINERALS540,604Bromine ⁶ 20,000Clays. ⁶ 20,000	267,210 ^r 14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	252,558 r 14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	258,537 r 15,000 40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000	251,827 15,000 40,000 1,000 42,000 53,000 80,554 2,500
Magnesium, metal, secondary13,000Manganese, oxide44,000Molybdenum, metal695Nickel metal:29,351Refined29,351Ni content of nickel oxide sinter58,806Ni content of ferronickel54,491Ni content of chemical1,665Total*144,000Platinum-group metals:9Palladium, metaldo.Silicon, multicrystalline8,633Silver:0Mine output, Ag contentkilogramsMetal:95Totaldo.22,9231,865,936Secondary4326,487Totaldo.21,92423326,487Totaldo.22,192,42316,928Mine output, Ag content445Tin, metal, smelter757Titanium:95Dioxide16,928Metal*14,000Tuagsten, metal14,000Vanadium, metal*5560Zine:75,000Oxide75,000Metal:95Primary435,905Secondary104,695Total540,604Zine:75,000Metal:91Primary435,905Secondary104,695Total540,604Zinc:20,000Condury, oxide*12,000INDUSTRIAL MINERALS540,604Bromine*20,000Chenent, hydraulicthousand metric tonsClays.*1400 </td <td>14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754</td> <td>14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °</td> <td>15,000 40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000</td> <td>15,000 40,000 1,000 42,000 53,000 80,554 2,500</td>	14,000 43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	14,000 43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	15,000 40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000	15,000 40,000 1,000 42,000 53,000 80,554 2,500
Interpretation44,000Manganese, oxide*44,000Molybdenum, metal693Nickel metal:29,351Ni content of nickel oxide sinter54,808Ni content of chemical1,669Total*144,000Platinum-group metals:144,000Platinum, metalkilogramsPlatinum, metal6,673Silicon, multicrystalline8,633Silver:1,8165,936Mine output, Ag contentkilogramsMine output, Ag content1,865,936Secondary4do.326,487293Totaldo.2110001,865,936Secondary435,000Tin, metal445Tin, metal445Total1,400Vanadium, metal*55Zitanium:161,928Metal*75,000Metal*1430,000Total1400Vanadium, metal*5560Zinc:75,000Oxide161,928Metal*140,000Primary435,905Secondary104,695Total540,604Zirconium, oxide*12,000INDUSTRIAL MINERALS20,000Bromine*20,000Cenent, hydraulicthousand metric tonsS4,800Clays.*	43,000 1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	43,000 1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	40,000 1,013 41,944 52,000 ° 73,248 2,362 170,000	40,000 1,000 ° 42,000 ° 53,000 ° 80,554 2,500 °
Molybdenum, metal699Nickel metal:29,351Ni content of nickel oxide sinter58,808Ni content of chemical1,669Total*144,000Platinum-group metals:144,000Platinum, metalkilogramsPalladium, metal0,14,17Selenium, metal8,633Silver:1,500Mine output, Ag contentkilogramsMetal:0,000Primarydo, 1,865,936Secondary ⁴ do, 326,487Totaldo, 326,487Totaldo, 326,487Totaldo, 326,487Totaldo, 326,487Total161,928Metal:95Tellurium, metal45Dioxide161,928Metal*35,000Tungsten, metal1,400Vanadium, metal*5560Zinc:75,000Oxide75,000Metal:95Total435,905Secondary104,695Total540,604Zirconium, oxide*12,000INDUSTRIAL MINERALS540,604Bromine*20,000Cenent, hydraulicthousand metric tonsSolapsi*1	1,154 40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	1,234 41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	1,013 41,944 52,000 ° 73,248 2,362 170,000	1,000 ° 42,000 ° 53,000 ° 80,554 2,500 °
Molybdenum, metal699Nickel metal:29,351Ni content of nickel oxide sinter58,808Ni content of chemical1,669Total*144,000Platinum-group metals:144,000Platinum, metalkilogramsPalladium, metal0,14,17Selenium, metal8,633Silver:1,500Mine output, Ag contentkilogramsMetal:0,000Primarydo, 1,865,936Secondary ⁴ do, 326,487Totaldo, 326,487Totaldo, 326,487Totaldo, 326,487Totaldo, 326,487Total161,928Metal:95Tellurium, metal45Dioxide161,928Metal*35,000Tungsten, metal1,400Vanadium, metal*5560Zinc:75,000Oxide75,000Metal:95Total435,905Secondary104,695Total540,604Zirconium, oxide*12,000INDUSTRIAL MINERALS540,604Bromine*20,000Cenent, hydraulicthousand metric tonsSolapsi*1	40,228 59,011 64,349 2,497 166,000 6,107 1,331 754	41,290 50,437 62,773 2,383 157,000 7,534 1,765 750 °	41,944 52,000 ° 73,248 2,362 170,000	42,000 ° 53,000 ° 80,554 2,500 °
Refined29,351Ni content of nickel oxide sinter58,808Ni content of ferronickel54,491Ni content of chemical1,665Total°1,44,000Platinum-group metals:6,675Palladium, metaldo.Silicon, multicrystalline8,633Silver:1,865,936Mine output, Ag contentkilogramsMetal:0.Primarydo.Stantal326,487Totaldo.2,192,423326,487Totaldo.2,192,423326,487Totaldo.2,192,423757Titanium:95Dioxide161,928Metal°35,000Tugsten, metal1,400Vanadium, metal°.5560Zine:0Oxide75,000Metal:435,905Secondary435,905Secondary104,699Total20,000Muges104,699Total20,000Ninde Condary12,000Ninde Condary12,000Ninde Condary12,000Ninde Condary12,000Ninde Condary20,000Cenent, hydraulicthousand metric tonsClays.°54,800	59,011 64,349 2,497 166,000 6,107 1,331 754	50,437 62,773 2,383 157,000 7,534 1,765 750 °	52,000 ° 73,248 2,362 170,000	53,000 e 80,554 2,500 e
Ni content of nickel oxide sinter58,808Ni content of ferronickel54,491Ni content of chemical1,665Total*144,000Platinum-group metals:6,675Palladium, metaldo.Selenium, metaldo.Silicon, multicrystalline8,633Silver:1,865,936Mine output, Ag contentkilogramsMetal:0.Primarydo.Statam326,487Totaldo.2,192,423Tantalum, metal495Titanium:757Dioxide161,928Metal*757Dioxide161,928Metal*1,400Vanadium, metal*560Zinc:25,000Oxide75,000Metal:435,905Secondary140,604Zinc:20,000Ninger, metal12,000Ninger, metal*435,905Secondary104,699Total20,000Metal*20,000Ninger20,000Circonium, oxide*20,000Cement, hydraulicthousand metric tonsStates**20,000Cement, hydraulicthousand metric tonsStates**54,800	59,011 64,349 2,497 166,000 6,107 1,331 754	50,437 62,773 2,383 157,000 7,534 1,765 750 °	52,000 ° 73,248 2,362 170,000	53,000 e 80,554 2,500 e
Ni content of ferronickel $54,491$ Ni content of chemical $1,669$ Total°144,000Platinum-group metals: $0.$ Paltinum, metal $0.$ Selenium, metal $0.$ Silicon, multicrystalline $8,633$ Silver: $0.$ Mine output, Ag contentkilogramsMetal: $0.$ Primary $0.$ Secondary ⁴ $0.$ Total $0.$ Tantalum, metal 49 Titanium: $0.$ Dioxide $161,928$ Metal? 95 Titanium: $0.$ Dioxide $161,928$ Metal? 757 Titanium: $0.$ Dioxide $161,928$ Metal? $0.$ Total $0.$ Total $0.$ Secondary ⁴ $0.$ Total $0.$ Metal° $75,000$ Metal° $75,000$ Metal° $75,000$ Metal: $75,000$ Metal: $75,000$ Metal: $75,000$ Metal: $0.$ Dioxide $104,695$ Total $20,000$ Circonium, oxide° $12,000$ INDUSTRIAL MINERALS $12,000$ Bromine° $20,000$ Cement, hydraulicthousand metric tonsClays.° $54,800$	64,349 2,497 166,000 6,107 1,331 754	62,773 2,383 157,000 7,534 1,765 750 °	73,248 2,362 170,000	80,554 2,500 e
Ni content of chemical1,669Total°144,000Platinum-group metals: $(0, 1,417)$ Palladium, metal $(0, 1,417)$ Selenium, metal $(0, 1,417)$ Selenium, metal $(0, 1,417)$ Silicon, multicrystalline $(8,633)$ Silver: $(0, 1,417)$ Mine output, Ag contentkilogramsMite output, Ag contentkilogramsMetal: $(0, 2,192,423)$ Primary $(0, 326,487)$ Total $(0, 326,487)$ Dioxide $(161,9228)$ Metal° $(161,9228)$ Metal° $(161,9228)$ Oxide $(161,9228)$ Metal° $(14,900)$ Vanadium, metal° $(14,900)$ Vanadium, metal° $(14,900)$ Primary $(14,690)$ Secondary $(14,690)$ Total $(14,690)$ Zirconium, oxide° $(12,000)$ NDUSTRIAL MINERALS $(14,690)$ Bromine° $(20,000)$	2,497 166,000 6,107 1,331 754	2,383 157,000 7,534 1,765 750 °	2,362 170,000	2,500 ^e
Total*144,000Platinum-group metals:6,675Platinum, metaldo.Selenium, metaldo.Silicon, multicrystalline8,633Silver:705Mine output, Ag contentkilogramsMetal:1,865,936Primarydo.Secondary4do.2,192,423Totaldo.2,192,423Tantalum, metal45Tin, metal, smelter757Titanium:161,928Dioxide161,928Metal*35,000Tungsten, metal45Oxide75,000Metal:435,905Primary445,905Secondary4104,695Titanium:104,695Dioxide12,000Tungsten, metal435,905Secondary104,695Secondary12,000Metal:20,000Primary20,000Cement, hydraulicthousand metric tonsClays.*54,800	166,000 6,107 1,331 754	157,000 7,534 1,765 750 °	170,000	
Platinum-group metals:kilogramsPalladium, metalkilogramsPlatinum, metaldo.Silicon, multicrystalline $8,633$ Silver: 705 Mine output, Ag contentkilogramsMetal: $1,865,936$ Primarydo.Secondary ⁴ do.Totaldo.Zilanum, metal 95 Tellurium, metal 95 Titanium: 95 Dioxide $1,865,936$ Titanium: 95 Titanium: 95 Dioxide $1,865,936$ Metal* 95 Titanium: 95 Titanium: 95 Dioxide $161,928$ Metal* 757 Titanium: 757 Dioxide $161,928$ Metal* 75000 Tungsten, metal $435,900$ Tungsten, metal* $435,900$ Total $240,604$ Zirconium, oxide* $12,000$ INDUSTRIAL MINERALS $20,000$ Bromine* $20,000$ Cement, hydraulicthousand metric tonsClays.* $54,800$	6,107 1,331 754	7,534 1,765 750 °		178 000
Palladium, metal kilograms 6,675 Platinum, metal do. 1,417 Selenium, metal 709 Silicon, multicrystalline 8,633 Silver: 1,865,936 Mine output, Ag content kilograms Mine output, Ag content kilograms Metal: 0. Primary do. Secondary ⁴ do. Total do. Tantalum, metal ⁶ 95 Tellurium, metal 449 Tin, metal, smelter 757 Titanium: 0 Dioxide 161,928 Metal ^e 35,000 Tungsten, metal 435,900 Vanadium, metal ^{e, 5} 560 Zinc: 0 Oxide 75,000 Metal: 75,000 Primary 435,905 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Cement, hydrau	1,331 754	1,765 750 °	8.052	1,0,000
Platinum, metal do. 1,417 Selenium, metal 705 Silicon, multicrystalline 8,633 Silver: 8 Mine output, Ag content kilograms Metal: 1,865,936 Secondary ⁴ do. Total do. Tantalum, metal ⁶ 96 Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 0 Dioxide 161,928 Metal: 35,000 Tungsten, metal 445 Oxide 75,000 Metal: 35,000 Tungsten, metal 1,400 Vanadium, metal ^{6, 5} 560 Zine: 0 Oxide 75,000 Metal: 435,905 Secondary 104,695 Secondary 104,695 Secondary 12,000 INDUSTRIAL MINERALS 20,000 Bromine ⁶ 20,000 Clays: ⁶ 54,800	1,331 754	1,765 750 °	8.052	
Selenium, metal 700 Silicon, multicrystalline 8,633 Silver: 1,865,936 Metal: 1,865,936 Primary do. Secondary ⁴ do. Total do. Tantalum, metal ⁶ 995 Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 0 Dioxide 161,928 Metal: 35,000 Tungsten, metal 14,400 Vanadium, metal ^{6,5} 560 Zinc: 0 Oxide 75,000 Metal: 14,400 Vanadium, metal ^{6,5} 560 Zinc: 0 Oxide 75,000 Metal: 1,400 Vanadium, metal ^{6,5} 560 Zinc: 20,000 Metal: 104,699 Total 540,604 Zirconium, oxide ⁶ 12,000 INDUSTRIAL MINERALS 20,000 Remine ⁶ 20,000	754	750 ^e	· · ·	6,239
Silicon, multicrystalline8,633Silver:			1,735	1,963
Silver: $1,500$ Mine output, Ag contentkilogramsMetal: $1,865,936$ Primarydo.Secondary ⁴ do.Totaldo.2,192,423Tantalum, metal ^e 95Tellurium, metal449Tin, metal, smelter757Titanium:161,928Dioxide161,928Metal ^e 35,000Tungsten, metal1,400Vanadium, metal ^{e, 5} 560Zinc:75,000Metal:95Primary435,905Secondary104,699Total540,604Zirconium, oxide ^e 12,000INDUSTRIAL MINERALS20,000Bromine ^e 20,000Clays: ^e 54,800	8 700 °		755 °	750 °
Mine output, Ag content kilograms 1,500 Metal: 1,865,936 326,487 Primary do. 326,487 Total do. 2,192,423 Tantalum, metal ^e 95 Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 0 1,400 Dioxide 161,928 Metal* 35,000 Tungsten, metal 1,400 Vanadium, metal*.5 560 Zinc: 0 Oxide 75,000 Metal: 104,699 Primary 435,905 Secondary 104,699 Total 24,000 INDUSTRIAL MINERALS 20,000 Bromine ^e 20,000 Clays: ^e 54,800	0,700	12,133	10,964	8,001
Metal: Description Description Primary do. 1,865,936 Secondary ⁴ do. 326,487 Total do. 2,192,423 Tantalum, metal ^e 95 95 Tellurium, metal 449 95 Tellurium, metal 45 95 Titanium: 757 757 Dioxide 161,928 35,000 Tungsten, metal 1,400 1,400 Vanadium, metal ^{e, 5} 560 560 Zinc: 0xide 75,000 Metal: 95 540,604 Primary 435,905 104,699 Secondary 104,699 540,604 Zirconium, oxide ^e 12,000 12,000 INDUSTRIAL MINERALS 20,000 54,800 Bromine ^e 20,000 54,800				
Primary do. 1,865,936 Secondary ⁴ do. 326,487 Total do. 2,192,423 Tantalum, metal ⁶ 95 Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 161,928 Metal ^e 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Oxide 75,000 Metal: 75,000 Primary 435,905 Secondary 104,699 Total 240,000 INDUSTRIAL MINERALS 20,000 Bromine ^e 20,000 Clays: ^e 54,800	1,200 °	4,486	3,577	3,644
Secondary ⁴ do. 326,487 Total do. 2,192,423 Tantalum, metal ^e 95 Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 0 Dioxide 161,928 Metal ^e 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Metal: 75,000 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Clays: ^e				
Total do. 2,192,423 Tantalum, metal ^e 95 Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 161,928 Metal ^e 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e,5} 560 Zinc: 560 Oxide 75,000 Metal: 75,000 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Bromine ^e 20,000 Clays: ^e 54,800	1,898,208	1,724,218	1,764,533	1,731,478
Tantalum, metal95Tellurium, metal49Tin, metal, smelter757Titanium:161,928Metale35,000Tungsten, metal1,400Vanadium, metal ^{e, 5} 560Zinc:75,000Metal:75,000Metal:104,699Total540,604Zirconium, oxide ^e 12,000INDUSTRIAL MINERALS20,000Bromine ^e 20,000Clays: ^e 54,800	313,931	325,373	348,620	346,296
Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 161,928 Metale 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Oxide 75,000 Metal: 75,000 Primary 435,905 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 NDUSTRIAL MINERALS 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800	2,212,139	2,049,591	2,113,153	2,077,774
Tellurium, metal 49 Tin, metal, smelter 757 Titanium: 161,928 Metale 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Oxide 75,000 Metal: 75,000 Primary 435,905 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 NDUSTRIAL MINERALS 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800	95	100	98	100
Titanium: 161,928 Metal ^e 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Metal: 75,000 Primary 435,905 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 NDUSTRIAL MINERALS 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800	47	40	45 ^e	45 e
Dioxide 161,928 Metal ^e 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Metal: 75,000 Metal: 104,699 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800	841	947	1,133	1,786
Metal ^e 35,000 Tungsten, metal 1,400 Vanadium, metal ^{e, 5} 560 Zinc: 75,000 Metal: 75,000 Metal: 104,699 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800				
Tungsten, metal1,400Vanadium, metal ^{e, 5} 560Zinc:75,000Oxide75,000Metal:435,905Secondary104,699Total540,604Zirconium, oxide ^e 12,000INDUSTRIAL MINERALS20,000Bromine ^e 20,000Cement, hydraulicthousand metric tonsClays: ^e 54,800	207,561	214,417	185,320	173,904
Vanadium, metal*.5560Zinc:75,000Oxide75,000Metal:435,905Secondary104,699Total540,604Zirconium, oxide°12,000INDUSTRIAL MINERALS20,000Bromine°20,000Cement, hydraulicthousand metric tonsClays:°54,800	38,000	40,000	38,000	35,000
Zinc: 75,000 Metal: 75,000 Primary 435,905 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Bromine ^e 20,000 Clays: ^e 54,800	3,361	3,299	3,025	3,000 e
Oxide75,000Metal:435,905Primary435,905Secondary104,699Total540,604Zirconium, oxide ^e 12,000INDUSTRIAL MINERALS20,000Bromine ^e 20,000Cement, hydraulicthousand metric tonsClays: ^e 54,800	560	560	580	600
Metal: 435,905 Primary 435,905 Secondary 104,699 Total 540,604 Zirconium, oxide ^e 12,000 INDUSTRIAL MINERALS 20,000 Bromine ^e 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800				
Primary435,905Secondary104,699Total540,604Zirconium, oxide°12,000INDUSTRIAL MINERALS20,000Bromine°20,000Cement, hydraulicthousand metric tonsClays:°54,800	72,000 °	66,325	58,896	57,840
Secondary104,699Total540,604Zirconium, oxide°12,000INDUSTRIAL MINERALS20,000Bromine°20,000Cement, hydraulicthousand metric tonsClays:°54,800				
Total540,604Zirconium, oxide°12,000INDUSTRIAL MINERALS20,000Bromine°20,000Cement, hydraulicthousand metric tonsClays:°54,800	470.077	444,446	459,322	469,833
Zirconium, oxide° 12,000 INDUSTRIAL MINERALS 20,000 Bromine° 20,000 Cement, hydraulic thousand metric tons Clays:° 54,800	470,057	100,228	111,990	117,458
INDUSTRIAL MINERALS 20,000 Bromine ^e 20,000 Cement, hydraulic thousand metric tons Clays: ^e 54,800	470,057 103,951	544,674	571,312	587,291
Bromine°20,000Cement, hydraulicthousand metric tonsClays:°54,800	,	13,000	14,000	14,000
Cement, hydraulic thousand metric tons 54,800 Clays: ^e 54,800	103,951			
Clays: ^e	103,951 574,008	25,000	30,000	30,000
·	103,951 574,008	51,291	54,737	57,962
	103,951 574,008 13,000	-		
Bentonite 432,000	103,951 574,008 13,000 25,000		420,000	420,000
Fire clay, crude 440,000	103,951 574,008 13,000 25,000	425,000	430,000	341,445
Kaolin 12,000	103,951 574,008 13,000 25,000 51,526	425,000 430,000	13,000	13,000
Diatomite ^e 110,000	103,951 574,008 13,000 25,000 51,526 430,000 440,000	430,000	-)	100,000
Feldspar and related materials ^e 115,000	103,951 574,008 13,000 25,000 51,526 430,000 440,000 12,000	430,000 13,000	100,000	100,000
Gypsum ^e thousand metric tons 5,750	103,951 574,008 13,000 25,000 51,526 430,000 440,000	430,000	100,000 100,000	

TABLE 1—Continued JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commod	5	2009	2010	2011	2012	2013
INDUSTRIAL MINERA	LS—Continued					
Iodine	<u> </u>	8,232	9,216	9,277	9,315	9,334
Lime, quicklime	thousand metric tons	6,746	8,547	8,005	7,581	7,619
Nitrogen, N content of ammonia	do.	1,021	1,178	1,211	1,055	1,007
Perlite ^e		220,000	210,000	200,000	200,000	200,000
Rare-earth oxides ⁶		5,121	10,699	10,700 ^e	10,800 e	10,000
Salt, all types	thousand metric tons	1,200 e	1,122	978	925	1,000
Silica:						
Sand	do.	2,856	3,078	3,003	2,877	2,856
Stone, quartzite	do.	9,189	9,159	9,543	9,306	9,290
Sodium compounds, n.e.s.: ^{e, 7}						
Soda ash		400,000	410,000	430,000	450,000	450,000
Sulfate, anhydrous		142,000	142,000	145,000	147,000	145,000
Stone, crushed:						
Dolomite	thousand metric tons	3,122	3,438	3,492	3,361	3,493
Limestone	do.	132,350	133,974	134,176	140,038	148,066
Sulfur:						
Byproduct of metallurgy ^e	do.	1,350	1,400	1,450	1,500	1,500
Byproduct of petroleum	do.	1,864	1,892	1,755	1,747	1,779
Talc and related materials: ^e						
Talc		25,000	24,000	24,000	25,000	25,000
Pyrophyllite		340,000	340,000	350,000	340,000	340,000
Vermiculite ^e	6,000	6,000	6,200	6,200	6,200	
MINERAL FUELS AND REL	ATED MATERIALS					
Carbon black	thousand metric tons	575	729	681	638	650
Coal, bituminous ^e	do.	1,100	1,000	900	700	800
Coke, including breeze, metallurgical	do.	32,587	37,447	35,379	34,743	35,154
Gas, natural, gross	million cubic meters	3,539	3,396	3,298	3,276	2,995
Petroleum:						
Crude	thousand 42-gallon barrels	5,795	5,491	5,235	5,600 ^r	5,763
Refinery products: ^e						
Gasoline:						
Aviation	do.	50	50	50	60	60
Other	do.	362,000	360,000	355,000	350,000	350,000
Asphalt and bitumen	do.	32,000	31,000	30,000	30,000	30,000
Distillate fuel oil	do.	245,000	242,000	240,000	240,000	237,207
Jet fuel	do.	78,000	76,000	75,000	80,000	92,518
Kerosene	do.	165,000	166,000	165,000	165,000	113,551
Liquefied petroleum gas	do.	56,000	55,000	55,000	60,000	28,536
						15,173
Lubricants	do.	16,000	14,000	15,000	15,000	
Naphtha	do.	136,000	135,000	130,000	135,000	128,706
Paraffin, wax	do.	800	750	750	750	440
Petroleum coke	do.	4,400	4,300	4,200	4,200	6,157
Refinery fuel and losses	do.	150,000	150,000	150,000	160,000	160,000
Residual fuel oil	do.	300,000	320,000	350,000	355,000	266,666
Unfinished oils	do.	50,000	50,000	50,000	55,000	50,000
Total	do.	1,600,000	1,600,000	1,620,000	1,650,000	1,480,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. do. Ditto.

¹Table includes data available through April 3, 2015.

²Reported figure.

³Includes alloyed and unalloyed aluminum ingot.

⁴Includes metal recovered from scrap and waste.

⁵Represents metal content of vanadium pentoxide recovered from petroleum residues, ashes, and spent catalysts.

⁶Includes oxide of cerium, europium, gadolinium, lanthanum, neodymium, praseodymium, samarium, terbium, and yttrium.

⁷Not elsewhere specified.

TABLE 2 JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Com	nodity	Major operating companies	Location of main facilities	Annual
Aluminum	metric tons	and major equity owners Nippon Light Metal Holdings Co., Ltd.	Location of main facilities Shizuoka, Shizuoka Prefecture	capacity 7,000
Cement	metric tons	Aso Cement Co., Ltd.	Tagawa and Kanda, Fukuoka Prefecture	2,400
Do.		Daiichi Cement Co., Ltd.	Kawasaki, Kanagawa Prefecture	2,400
 		Denki Kagaku K.K.	Omi, Niigata Prefecture	2,762
 		Hachinohe Cement Co., Ltd.	Hachinohe, Aomori Prefecture	1,533
 		Hitachi Cement Co., Ltd.	Hitachi, Ibaraki Prefecture	941
 		Mitsubishi Materials Corp.	Higashidori, Shimokita-gun, Apmori Prefecture;	13,467
D0.		Mitsubisiii Materiais Corp.	Higashiyama, Higashiiwai-gun, Iwate Prefecture; Yokoze, Saitama Prefecture; Kurosaki, Kyushu,	15,407
			and Higashitani, Fukuoka Prefecture	
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
 		Ryukyu Cement Co. Ltd.	Yabu, Nago, Okinawa Prefecture	722
 		Sumitomo Osaka Cement Co. Ltd.	Tamura, Fukushima Prefecture; Aso, Tochigi	14,402
D0.		Sumono Osaka Cement Co. Etd.	Prefecture; Motosu, Gifu Prefecture; Sakata,	14,402
			Shiga Prefecture; Ako, Hyogo Prefecture; and	
			Susaki, Kochi Prefecture	
Do.		Taiheiyo Cement Corp.	Ofunato, Iwate Prefecture; Kumagaya	28,800
D0.		rameryo cement corp.	and Saitama, Saitama Prefecture; Fujiwara,	20,000
			Mie Prefecture; Tsukumi, Oita	
			, , ,	
			Prefecture; and Kamiiso, Hokkaido Prefecture	5.026
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,	10,736
			Fukuoka Prefecture	
Coal		Kushiro Coal Mine Co. Ltd. ¹	Kushiro, Hokkaido Prefecture	750
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 &	Saganoseki, Oita Prefecture; Hitachi, Ibaraki	710,000
20.	u 0.	Metals Co., Ltd., 66%, and Mitsui Mining and	Prefecture; and Tamano, Okayama Prefecture ²	, 10,000
			Freiecture, and Famano, Okayama Freiecture	
Do.	do.	Smelting Co., Ltd., 34% Kosaka Smelting and Refining Co. Ltd. (wholly owned subsidiary of Dowa Mining Co. Ltd.)	Kosaka, Akita Prefecture	72,000
Gold:		ender brookaning of Dona Hinning Co. Elas)		
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

TABLE 2—Continued JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

C	adity	Major operating companies	Location of main facilities	Annual
Comm	5	and major equity owners	Location of main facilities	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. Ni		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 ³	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 ³	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, electro	lytic 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
	do.	Tokyo Nickel Co. Ltd.	Matsuzaka, Mie Prefecture	60,000
In oxide	u0.	Tokyo Niekel Co. Ltd.	Whatsuzaka, when refecture	,

TABLE 2—Continued JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Comm	adita	Major operating companies		Annual
Comm Petroleum refinery	-	and major equity owners JX Nippon Oil & Energy Corp.	Location of main facilities Mizushima, Marifu, Oita, Sendai, and Negishi	capacity 1,058
i eutoieuni iennery	42-gallon barrels		refineries	1,000
Pyrophyllite		Goto Kozan Co. Ltd.	Goto, Nagasaki Prefecture	204
Do.		Ohira Kozan Co. Ltd.	Ohira, Okayama Prefecture	132
Do.		Sankin Kogyo Co. Ltd.	Otsue, Hiroshima Prefecture	72
Do.		Shinagawa Shirenga Co. Ltd.	Mitsuishi, Okayama Prefecture	180
Do.		Shokozan Kogyosho Co. Ltd.	Yano-Shokozan, Hiroshima Prefecture	180
Do.		Showa Kogyo Co. Ltd.	Showa-Shokozan, Hiroshima Prefecture	60
Steel, crude		JFE Steel Corp. (wholly owned subsidiary of JFE	Chiba, Chiba Prefecture; Kawasaki (Keihin), Kanagawa	33,835
Steel, eruue		Holdings Inc.)	Prefecture; Nishinomiya, Hyogo Prefecture;	55,055
		Totalings inc.)	Handa, Aichi Prefecture; Fukuyama, Hiroshima	
			Prefecture; and Kurashiki, Okayama Prefecture	
Do.		Kobe Steel Ltd.	Kakogawa and Kobe, Hyogo Prefecture	8,943
Do.		Nippon Steel & Sumitomo Metal Corp.	Oita, Oita Prefecture; Kawata, Fukuoka	33,199
			Prefecture; Kimitsu, Chiba Prefecture;	
			and Nagoya, Aichi Prefecture	
Do.		do.	Kashima, Ibaraki Prefecture; Kokura,	12,820
			Fukuoka Prefecture; and Wakayama,	
			Wakayama Prefecture	
Do.		Nisshin Steel Co. Ltd.	Kuri, Hiroshima Prefecture; Osaka City; Shunan,	4,000
			Yamaguchi Prefecture; and Toyo, Ehime Prefecture	
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:		<u> </u>	÷ '	
In sponge metal		Sumitomo Titanium Corp. (Sumitomo Metal	Amagasaki, Hyogo Prefecture	24
1 0		Industries, Ltd., 75.2%, and Kobe Steel Ltd., 24.8%)		
Do.		Toho Titanium Co. Ltd. (JX Nippon Mining &	Chigasaki, Kanagawa Prefecture	15
		Metals Co., Ltd., 47%; Mitsui & Co. Ltd., 20%;		
		others, 33%)		
In dioxide	metric tons	Fuji Titanium Industry Co. Ltd. (Ishihara Sangyo	Kobe, Hyogo Prefecture	17,400
		Kaishia Ltd., 24.8%, and others, 75.2%)		
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%;	lijima, Akita Prefecture	200,400
		JX Nippon Mining & Metals Co., Ltd., 24%;		
		Sumitomo Metal Mining Co. Ltd. (SMM), 14%;		
		Mitsubushi Materials Corp., 5%]		
Do.	do.	Hachinohe Smelting Co. Ltd. (Mitsui Mining	Hachinohe, Aomori Prefecture	117,600
		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%)		
Do.	do.	Hikoshima Smelting Co. Ltd.	Hikoshima, Yamaguchi Prefecture	84,000
	do.	Kamioka Mining and Smelting Co. Ltd.	Kamioka, Gifu Prefecture	72,000
Do.				,
Do. Do.	do.	Toho Zinc Co. Ltd.	Annaka, Gunma Prefecture	139,200

Do., do. Ditto. NA Not available.

¹Coal mining operations continued, but output has been in decline.

²Saganoseki Smelter and Refinery and Hitachi Refinery (Nikko Smelting & Refining Co. Ltd.) [450,000 metric tons per year (t/yr)] and Tamano Smelter

and Refinery (Hibi Kyoto Smelting Co. Ltd.) (260,000 t/yr).

³Secondary lead smelter and refinery.

TABLE 3 JAPAN: SUPPLY AND DEMAND FOR SELECTED NONFERROUS METALS

(Metric tons unless otherwise specified)

	Refined copper			Refined lead	
2011	2012	2013	2011	2012	2013
110,279	124,578	145,938	16,521	15,168	19,558
1,328,288	1,516,354	1,468,100	215,064	208,994	208,115
126,569	35,876	41,426	22,049	28,869	23,883
1,565,136	1,676,808	1,655,464	253,634	253,031	251,556
437,247	545,908	572,140	33,367	20,708 ^r	8,621
1,058,646	948,687 ^r	911,601	191,801	204,908 ^r	209,488
1,495,893	1,494,595 ^r	1,483,741	225,168	225,616 ^r	218,109
124,578	145,938 ^r	103,379	15,168	19,558 ^r	30,708
1,003,311	984,962	979,945	205,099	212,765 ^r	212,227
	Refined zinc		S		-
2011	2012	2013	2011	2012	2013
65,555	92,265	72,891	1,062,722	999,120	1,037,918
544,674	571,312	587,291	1,724,218	1,764,533	1,731,478
NA	NA	NA	325,373	348,620	267,977
77,881	23,960	21,816	1,929,204	1,698,639	1,778,354
688,110	687,537	681,998	5,041,517	4,810,912	4,815,727
95,278	135,560	115,383	2,837,596	3,493,979 ^r	3,601,010
351,848	356,811 ^r	383,614	1,737,564	1,089,298 ^r	1,048,790
447,126	492,371 ^r	499,007	4,575,160	4,583,277 ^r	4,649,800
92,265	72,891 ^r	68,932	999,120	1,037,918	964,059
500,567	479,086 ^r	497,683	1,204,801	279,015 ^r	250,658
	110,279 1,328,288 126,569 1,565,136 437,247 1,058,646 1,495,893 124,578 1,003,311 2011 65,555 544,674 NA 77,881 688,110 95,278 351,848 447,126 92,265	2011 2012 110,279 124,578 1,328,288 1,516,354 126,569 35,876 1,565,136 1,676,808 437,247 545,908 1,058,646 948,687 r 1,495,893 1,494,595 r 124,578 145,938 r 1,003,311 984,962 Refined zine 2011 2012 65,555 92,265 544,674 571,312 NA NA 77,881 23,960 688,110 687,537 95,278 135,560 351,848 356,811 r 447,126 492,371 r 92,265 72,891 r	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

^rRevised. NA Not applicable.

¹Apparent consumption is total supply less exports and stocks at yearend.

Source: Japan Mining Industry Association, 2015.