



2011 Minerals Yearbook

JAPAN

THE MINERAL INDUSTRY OF JAPAN

By Chin S. Kuo

A great earthquake and tsunami struck eastern Japan on March 11. The hardest hit areas were the Prefectures of Fukushima, Iwate, and Miyagi. The disaster caused 15,848 known fatalities and 6,011 injuries and left 3,305 people missing. It also completely destroyed 128,582 houses and partially destroyed 243,914 houses. The Government estimated the cost of the losses, including disaster relief and reconstruction, to be up to \$309 billion. In the nonferrous metals industry, operations were temporarily shut down owing to power failure, gas and water cutoffs, and damage to plants and equipment. Operations at the copper, lead, and zinc refineries were halted but were restarted between April and July. Operations at major production centers for electronic materials and rare metals were either restored to full operation or partly restarted by the end of August. The steel industry and a leading refractory producer were also affected. The shutdown of several calcium carbonate plants and the operations of quartz plants affected the country's paper and glass industries. An oil refinery in Chiba Prefecture and another in Sendai were set ablaze by the quake, and the liquefied natural gas (LNG) import terminal in Sendai also was damaged. As a result of the disaster, the Government closed 17 nuclear powerplants that had a combined capacity of 9,700 megawatts (MW) and paid the powerplant operators for the shutdowns under the Act on Compensation for Nuclear Damages (Y. Kita, Director, Rare Metals Stockpile, Japan Oil, Gas and Metals National Corp., written commun., February 29, 2012).

Japan was a producer and consumer of nonferrous metals. The country imported ores and concentrates to produce copper, lead, nickel, and zinc. It also imported intermediate products and refined them into other metals, such as molybdenum, tin, and tungsten. Copper concentrate, iron ore, and rare-earth elements (REE) were the most valuable mineral commodity imports for Japan. The country remained the world's second ranked producer of steel after China.

Minerals in the National Economy

Japan was the world's third ranked economy after the United States and China. In 2011, Japan's gross domestic product based on purchasing power parity was \$4.497 trillion, which was a decrease of 0.7% from that of 2010 owing to the effects of the earthquake and tsunami. The mineral industry played an important role in supplying industrial raw materials from domestic sources and imports to Japan's manufacturing and construction industries. The mineral processing industry in particular was large and included the processing of chemicals, fabricated metal products, industrial mineral products, iron and steel, nonferrous metals, and petroleum products (U.S. Central Intelligence Agency, 2012).

Government Policies and Programs

To compete with China, the Government was looking to invest billions of dollars in projects in South Africa in the areas of strategic minerals, rare earths, and infrastructure and to buy stakes in these projects either through Japan Oil, Gas, and Metals National Corp. (JOGMEC) directly or through Japanese mining and trading companies to which JOGMEC provided loans. Japan was participating in manganese and platinum projects in South Africa and a uranium project in Namibia. China had already spent billions of dollars on projects in Africa trying to secure the mineral resources it needed (Mineweb.com, 2011a).

Production

Japan's output of nonferrous metals, such as high-purity aluminum, cadmium, total smelted copper, total refined copper, and nickel in ferronickel, decreased by more than 10% owing to the effects of the March 2011 earthquake and tsunami. Production of total lead and total zinc also decreased by 7% and 5.2%, respectively. Output of silver and gold decreased by 7.4% and 2.9%, respectively, but production of platinum and palladium increased by 32.6% and 23.4%, respectively. In the iron and steel sector, Japan's production of ferroalloys, crude steel, and pig iron decreased slightly by 6.6%, 1.8%, and 1.5%, respectively, compared with the output in 2010. In the energy sector, production of carbon black, coke, crude petroleum, and natural gas also decreased slightly by 6.6%, 5.5%, 4.7%, and 2.9%, respectively; the decreases in output of the latter two were owing to depleted reserves. Output of some metals, such as secondary aluminum, antimony metal, cobalt, molybdenum, tin, and titanium dioxide, showed increases of various magnitudes. In the industrial minerals sector, production of sulfur from petroleum refining and quicklime decreased by 7.2% and 6.3%, respectively (table 1).

Structure of the Mineral Industry

Japan's mineral industry is characterized by small-scale, low-tonnage mining operations and high-value-added mineral and metal processing and manufacturing activities. Its mining industry is not significant to the economy, and the country consumes more minerals and metals from imports than it produces. In 2011, mining and quarrying of industrial minerals, including dolomite, iodine, limestone, pyrophyllite, silica sand, and silica stone, was still being done but at a lower level of production than in previous years. 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. Mining and mineral-processing businesses were owned and operated by private companies (table 2).

Mineral Trade

Japan imported raw materials and energy for its industrial production and use. Imported mineral commodities were mostly bauxite, coke, copper concentrate, and iron ore, whereas imported energy included coal, LNG, and petroleum. In 2011, Japan imported about 1.15 million metric tons (Mt) of copper, 423,000 metric tons (t) of zinc, and 96,000 t of lead, all in concentrates. The country imported 127,000 t of refined copper and exported 437,000 t. Japan imported 78,000 t of refined zinc and 22,000 t of refined lead and exported 95,000 t and 33,000 t, respectively. The country also imported 1,929,000 kilograms (kg) of silver and exported 2,834,000 kg. Japan imported a total of 315,000 kg of cadmium metal mainly from China and the Republic of Korea and exported a total of 895,000 kg of cadmium metal to China (69%), India (20%), Belgium (9%), and Brazil (2%) (Japan Mining Industry Association, 2012, p. 5, 10, 11–13, 28).

Commodity Review

Metals

Aluminum and Bauxite and Alumina.—In 2011, Japan produced 142,000 t of secondary aluminum, which was an increase of 12.7% compared with that of 2010, and 47,000 t of primary aluminum. The country exported 290,000 t of rolled aluminum products and 13,500 t of unwrought aluminum and imported 2.69 Mt of unwrought aluminum, 60,500 t of aluminum waste and scrap, and 116,900 t of rolled aluminum products. Demand for aluminum decreased by 2.2% to 3.85 Mt, of which transportation accounted for 38%; building and construction, 14%; fabricated metal, 13%; food, 11%; and other uses, 11% (Japan Aluminum Association, 2012).

By building a new production line to meet increasing demand, Sumitomo Chemical Co. Ltd. planned to expand the production capacity of high-purity alumina at its Ehime plant to 3,200 metric tons per year (t/yr) from 2,000 t/yr in April 2012. High-purity alumina was used in fillers for magnetic media, in composite resins, and in ceramic parts and substrates in electronics and semiconductors. Demand for high-purity alumina was expected to increase, and the company was considering building another production line in 2013 (Hodge, 2011).

Cadmium.—At the beginning of 2011, Japan had stocks of 262 t of cadmium metal. With production of 1,755 t and imports of 315 t, the country's supplies increased to 2,332 t. With an apparent consumption of 1,155 t and exports of 895 t for a total demand of 2,050 t, Japan's stocks increased to 282 t at the end of 2011 (Japan Mining Industry Association, 2012, p. 29).

Copper.—The country produced about 1.17 Mt of anode and blister copper from primary sources and 270,000 t from scrap. It also produced about 1.33 Mt of refined copper primarily from imported ore (82%), scrap (8.7%), and other sources (8.9%). Consumption of refined copper was reported to be about 1.06 Mt. Refined copper was used in the manufacturing of wire (63%), brass (36%), and miscellaneous products (1%), such as copper alloy and copper alloy casting (table 3; Japan Mining Industry Association, 2012, p. 11).

The earthquake caused Pan Pacific Copper Co., Ltd. to halt operations at its Hitachi copper refinery, which had a capacity of 130,000 t/yr of copper. Mitsubishi Materials Corp. also halted production at its 300,000-t/yr Onahama copper smelter owing to power outages. The disruption caused by logistical and infrastructure damage was likely to take some time to fix. Sumitomo Metal Mining Co. Ltd. (SMM) did not have a copper smelter in the region hit by the earthquake and produced the planned 404,000 t of copper in 2011 (Reuters, 2011a).

Gold and Silver.—In 2011, Japan produced about 132,000 kg of gold from imported ore, other sources, scrap, and domestic ore, which accounted for 68%, 16%, 11%, and 4% of the source material, respectively. The country also produced about 1,724,000 kg of silver from imported ore, other sources, scrap, and domestic ore, which accounted for 59%, 23%, 17%, and 0.4% of the source material, respectively. Silver was used for miscellaneous applications (44%), in photographic materials (28%), in extension materials (11%), in point connectors (7%), as a nitrate for other uses (5%), and for silver solder (5%) (table 3; Japan Mining Industry Association, 2012, p. 10).

Iron and Steel.—After the massive earthquake and tsunami, JFE Steel Corp. halted production at its 10-million-metric-ton-per-year (Mt/yr) Higashi Nihon steel plant near Tokyo and two of its three minimills, one in Sendai in Miyagi Prefecture and the other at Kamisu in Ibaraki Prefecture, which had also been crippled. Nippon Steel Corp. suspended operations at two small steel plants—the Kamaishi plant in Iwate Prefecture for steel products and the Tokyo plant for seamless steel. The Kamaishi plant had the capacity to produce 60,000 metric tons per month (t/mo) of wire rods used in tires and bridges. Tokyo Iron and Steel Co. Ltd. halted operations at its Oyama plant in Tochigi Prefecture and Hachinohe plant in Aomori Prefecture. Both had produced high-strength steel bars. Sumitomo Metal Industries Ltd. (Sumitomo Metals) also suspended production at its 8.3-Mt/yr-capacity Kashima steel plant in Ibaraki Prefecture because the blast furnaces, converter, and hot-rolling equipment had been damaged. The Kashima plant produced about one-half of Sumitomo Metals' crude steel output. Overall, a total of 15 to 18 Mt/yr of steel production capacity was affected to some extent. Owing to global overcapacity of steel, the reduction in output in Japan had limited effect on the world steel prices. Japan was the world's second ranked steel producer after China (Mineweb.com, 2011b).

Nippon Steel and Sumitomo Metals settled on a merger ratio as the two prepared to combine their operations to create the world's second ranked steelmaker after ArcelorMittal of Luxembourg. The transaction would be worth about \$22.45 billion. The new company would be called Nippon Steel & Sumitomo Metal Corp. and would have a production capacity of between 60 and 70 Mt/yr of crude steel. The planned merger was scheduled for October 2012. The merger would give the company a foothold in the pipe sector in addition to the high-end flat-steel sector (Mineweb.com, 2011c).

To improve operational efficiency, JFE Steel planned to integrate its group of companies Daiwa Steel Corp., JFE Bars & Shapes Corp., Tohoku Steel Corp., and Toyohira Steel Corp. in April 2012. The four steelmakers had a combined capacity of 3.8 Mt/yr of crude steel and operated electric arc furnaces (EAFs)

to produce construction-grade steel. Tohoku Steel's Sendai plant stopped production after the earthquake and was not to be restarted. JFE Bars & Shapes restarted its Sendai operation to produce specialty steel in August (Reuters, 2011b).

Shinkansai Steel Co. Ltd. decided to close one of the two rolling mills at its Hoshida plant in Osaka to cut fixed costs and increase operational efficiency. The company produced 13,000 t/mo of round rebars and flats. The closure accounted for 30% of the company's production capacity (Yieh Corp., 2011a).

In October, Nippon Steel and Kobe Steel Co. Ltd. launched the operation of a new plant under the joint-venture company Nittetsu Shinko Metal Refining Co. Ltd. to recycle steel mill dust to produce direct-reduced iron. The new plant was intended to alleviate the price volatility of iron-making materials (Yieh Corp., 2011b).

Chuo Denki Kogyo Co. Ltd., which was a major ferroalloy producer in Japan, restarted one of its EAFs at Kashima in Ibaraki Prefecture and expected to restart its other EAF in late March for the production of ferromanganese or silicomanganese, depending on the supply of raw materials. The company produced high-carbon ferromanganese, which is added to steel to give it strength and toughness (Metal Bulletin, 2011).

Lead.—Japan produced a total of 248,600 t of lead in 2011. Of this amount, 215,000 t was refined lead made from 100,000 t of primary ore (which included imported ore and domestic ore) and 115,000 t of scrap and material from other sources. The remaining 33,600 t was remelted lead. Consumption of refined lead was reported to be 190,000 t. Refined lead was used in batteries (92%), other miscellaneous applications (3%), chemicals (2%), and solder (1%) (table 3; Japan Mining Industry Association, 2012, p. 12, 14).

Nickel.—Japan produced 41,290 t of refined nickel and 113,210 t of nickel in ferronickel and nickel oxide for a total of 154,500 t of nickel. The country also produced 2,383 t of nickel chemicals. At the end of 2011, stocks of refined nickel, which totaled 2,927 t, and those of ferronickel, which totaled 4,004 t, remained with the producers (Japan Mining Industry Association, 2012, p. 4, 7).

Pacific Metals Co. restarted operations of its 44,000-t/yr Hachinohe nickel plant in June after the plant was submerged by the tsunami in March. The company was partially owned by Nippon Steel and Sumikin Stainless Steel Corp. These two companies' stainless steel production was partly shifted to the Hikari plant in western Japan because of damage to their Kashima plant (Reuters, 2011c).

Titanium.—Sakai Chemical Industry Co. Ltd.'s Onahama titanium dioxide plant (the Yumoto works and the Otsurugi works) in Fukushima Prefecture was damaged by the earthquake. Before the earthquake, the company had produced a total of 39,300 t/yr of titanium dioxide from the two works. The company also operated a 30,000-t/yr titanium sulfate plant on the west coast of Honshu Island (TZ Minerals International Pty. Ltd., 2011).

Toho Titanium Co. Ltd. planned to expand the capacity to produce titanium sponge at its Wakamatsu plant to 15,600 t/yr from 12,000 t/yr to meet the growing demand. Construction would start in February and was expected to be completed in April 2012. The company's other titanium sponge plant

at Chigasaki had a production capacity of 13,200 t/yr (Toho Titanium Co. Ltd., 2011).

Zinc.—The country produced a total of about 578,800 t of zinc. Of this amount, 544,700 t was refined zinc made from 444,400 t of primarily imported ore (81%) and 100,200 t of other sources (18%) and scrap (0.3%). The remaining 34,200 t was remelted zinc. Consumption of refined zinc was reported to be 350,000 t. Refined zinc was used mainly in galvanized sheet (49%), other types of galvanized products (15%), brass (15%), die-casting alloy (7%), chemicals (9%), and miscellaneous uses (4%) (table 3; Japan Mining Industry Association, 2012, p. 13, 16).

Mitsui Mining and Smelting Co. Ltd. planned to increase zinc production at two plants in western Japan after operations at its Hachinohe zinc smelter were halted owing to the earthquake. Toho Zinc Co. Ltd. halted operations at its 110,000-t/yr Annaka zinc smelter and its Onahama plant, which was used to process zinc for smelting. The Annaka plant operated at 30% capacity when the Onahama plant opened in June (Reuters, 2011d).

Industrial Minerals

Cement.—Japan's cement production capacity amounted to 61.5 Mt/yr from 18 producers operating 21 integrated cement plants. Taiheiyo Cement Corp. was the leading producer with a capacity of 28.8 Mt/yr, followed by Sumitomo Osaka Cement Co. Ltd., Mitsubishi Materials, and Ube Industries Ltd. The earthquake affected cement plants with a combined capacity of 7 Mt/yr in the disaster-struck region. Plant closures reduced the listed capacity by 5 Mt/yr. Severe damage was reported at Hachinohe Cement Co., Ltd.'s plant in Hachinohe, Aomori Prefecture; Hitachi Cement Co. Ltd.'s plant in Hitachi, Ibaraki Prefecture; Taiheiyo Cement's plant in Ofunato, Iwate Prefecture; and Mitsubishi Materials' plant in Higashiyama, Iwate Prefecture. Reconstruction demand for cement was estimated to be 10 Mt during 5 years (Kerton, 2011).

In June, Sumitomo Osaka Cement restarted operation of its cement plant at Sano in Tochigi Prefecture, which had been suspended because radioactive cesium was found in sewage sludge used to make the cement. Radioactive cesium had been released from the crippled Fukushima Daiichi nuclear powerplant, and the company decided not to use sludge from sewage treatment plants in Fukushima Prefecture (Nikkei.com, 2011).

Sumitomo Osaka Cement also planned to restructure its production and distribution operations. One (having a capacity of 400,000 t/yr) of the two kiln lines at the Sano plant would be shut down. The reduced output at Sano would allow the company to increase the utilization rates at two other cement plants: one in Kochi Prefecture and the other in Hyogo Prefecture. As a result, the company's overall utilization rate was expected to be more than 90% of its total capacity of 9 Mt/yr (International Cement Research, 2011).

Graphite.—Showa Denko planned to increase the production capacity of 'structure-controlled micro graphite' anode material used in lithium-ion batteries to 1,000 metric tons per day (t/d) at its plant in Omachi, Nagano Prefecture, by the middle of 2012. Also by then, the company would add a new production line to double its capacity of anode and cathode additive 'vapor-grown

carbon fiber' to 200 t/d at its Kawasaki plant in Kanagawa Prefecture. The expansions were owing to growing demand for lithium-ion batteries by the automotive industry and for storage batteries in household applications (Watts, 2011c).

Iodine.—Japan had 5 Mt of iodine reserves, which were extracted from brines of the Minami Kanto natural gas field in Chiba Prefecture. Major producers in the iodine industry included Godo Shigen Sangyo Co. and ISE Chemicals Corp. Japan was the world's second ranked producer after Chile, and its total estimated production capacity was 10,700 t/yr. Operations were disrupted for at least 3 months after the earthquake (Watts, 2011a).

Limestone.—Fimatec Ltd.'s 60,000-t/yr calcium carbonate plant at Soma in Fukushima Prefecture was flooded by the tsunami. Its joint-venture 96,000-t/yr plant with Nippon Paper at Ishinomaki in Miyagi Prefecture was closed. Imerys SA of France's 60,000-t/yr plant also at Ishinomaki was damaged. The paper industry used ground and precipitated calcium carbonate as fillers and coatings to improve the qualities of paper (Industrial Minerals, 2011).

Lithium.—Mitsubishi was looking to develop a lithium project in Chile. Currently (2011), the company bought lithium from Sociedad Quimica y Minera of Chile, which extracted lithium solutions from the Salar de Atacama in Chile. Mitsubishi intended to manufacture 20,000 units of electric vehicles in 2011, and the lithium-ion battery packs would require 299 t of lithium carbonate equivalent. The company also signed an offtake agreement with Lithium Americas of Canada, which was building a 40,000-t/yr lithium carbonate production facility in the Salar de Cauchari in Argentina in 2012 (Elliott and Watts, 2011).

Rare Earths.—Japan was the world's leading importer of rare earths and was actively seeking supply sources other than China. Japanese traders Toyota Tsusho and Sojitz and Lavreco of Vietnam planned to develop the Dong Pao rare-earths project in Lai Chau Province, Vietnam, and to start producing 3,000 t/yr of rare-earth oxide (REO) by 2013. Production was expected to increase to 6,000 t/yr of REO later in the project. Toyota Tsusho and magnet group Shin-Etsu were building a rare earths processing plant in the State of Orissa in India in a joint venture with Indian Rare Earths Ltd. The plant was expected to produce 3,000 to 4,000 t/yr of REO in 2013. Sojitz and Lyons Corp. of Australia had reached a deal for the latter's processing plant in Malaysia to supply 8,500 t/yr of REO to Japan during a 10-year period (Watts and others, 2011).

Molycorp Inc. (30%) of the United States formed a joint-venture company with Daido Steel Co. Ltd. (35.5%) and Mitsubishi Corp. (34.5%) to build a 500-t/yr rare-earth (neodymium-iron-boron) sintered magnets plant at Nakatsugawa in Gifu Prefecture by January 2013. The joint venture was formed to make use of Molycorp's raw materials from its Mountain Pass Mine in California, Daido Steel's magnet technologies, and Mitsubishi's marketing and sales networks (Watts, 2011b).

Mineral Fuels

Natural Gas.—Owing to the shutdown of most of its nuclear powerplants following the earthquake and tsunami, Japan was

required to import 3 to 5 more LNG cargoes (64,000 t each) per month to make up for the power-generation loss. There were no reports of LNG terminals being damaged, except for Cosmo Oil's terminal at the Port of Chiba. The closest terminal to the earthquake's epicenter was Shin-Minato, which had a small capacity of 800,000 t/yr. Utilization of gas-fired power-generating capacity increased where there had been no damage to regasification terminals or gas-fired powerplants. Imports of LNG were expected to increase in the long term in Japan. Coal-generated power also might temporarily substitute for nuclear power. Nuclear power had accounted for 30% of Japan's electricity needs before the earthquake (Petroleum Economist, 2011).

Petroleum.—Six Japanese oil refineries halted operations after the earthquake, suspending a combined refining capacity of 1.4 million barrels per day. JX Nippon Oil and Energy Corp. shut down its 145,000-barrel-per-day (bbl/d) Sendai refinery and its 252,200-bbl/d Kashima refinery, and Cosmo Oil shut down its 220,000-bbl/d Chiba refinery. The shutdown of refineries was expected to tighten the supply of petroleum products in Asia as the region's refineries entered the spring maintenance programs. The spread of products by the cracking process started to show an apparent shift. The increase in demand for low-sulfur fuel oil for power generation was expected owing to the closure of the nuclear powerplants. Some refineries planned to increase their refining capacity to make up for the loss—the Nansei Sekiyu Nishihara refinery, by 11,000 bbl/d; the Okayama and Oita refineries, by 30,000 bbl/d each; and the Mizushima refinery, by 19,800 bbl/d. Imports of low-sulfur crudes was another option. Replacing the lost nuclear power-generating capacity would require the equivalent of 204,000 bbl/d of oil (Oil & Gas Journal, 2011).

Reserves and Resources

Japan has large reserves of industrial minerals, including dolomite, iodine, limestone, pyrophyllite, silica sand, and silica stones. Limestone is the most abundant indigenous mineral resource. The country's reserves of nonferrous metals, such as lead, silver, and zinc, are small, with the exception of gold; 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. Japan's reserves of gas and oil are negligible (table 4).

Outlook

The effect of the 2011 earthquake and tsunami on the mineral industry is expected to be short lived. Production capacity of steel in the country may be affected for 1 to 2 years; however, owing to the global overcapacity of steel, the reduction in output in Japan could stabilize the world steel prices. The reconstruction of earthquake-devastated areas is expected to increase the demand for building steel in the near term and will result in decreased steel exports. Although there appears to be spare production capacity in the cement industry, getting it back into operation and resuming the normal flows of raw materials and cement delivery will not be easy during the Government's reconstruction period. Imports of cement to supplement the

production shortage may be an option. Japan is expected to diversify its supply sources of rare earths from such countries as Australia, India, the United States, and Vietnam. In the energy sector, consumption of coal, LNG, and various types of oil may increase as backup powerplants that burn fossil fuels will try to compensate for the loss of some nuclear power capacity. Imports of LNG are expected to increase in the long term in Japan.

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TABLE 1
JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010	2011	
METALS						
Aluminum:						
Alumina ^c	thousand metric tons	300	320	310	300	280
Aluminum hydroxide ^c	do.	700	700	710	700	690
Metal:						
Primary:						
Regular grades	do.	6	7	6 ^e	5 ^e	4 ^e
High-purity	do.	51	52	33	49	43
Secondary ²	do.	153	149	111	126	142
Antimony:						
Oxide		7,939	6,954	4,884	6,846	7,000 ^e
Metal		270	325	239	304	435
Arsenic, trioxide ^c		40	40	40	40	40
Bismuth		408	480	423	454	460 ^e
Cadmium, refined		1,939	2,126	1,824	2,053 ^r	1,755
Chromium, metal ^c		500	600	650	700	800
Cobalt, metal		1,084	1,071	1,332	1,935	2,007
Copper, metal:						
Blister and anode:						
Primary		1,367,310	1,366,310	1,297,943	1,382,655	1,168,284
Secondary		245,208	259,060	243,859	260,245	269,748
Total		1,612,518	1,625,370	1,541,802	1,642,900	1,438,032
Refined:						
Primary		1,369,814	1,328,157	1,238,012	1,333,787	1,094,360
Secondary		207,004	211,681	201,831	214,901	233,238
Total		1,576,818	1,539,838	1,439,843	1,548,688	1,327,598
Gallium, metal: ^c						
Primary		8	7	7	6	6
Secondary		90	85	80	78	75
Germanium: ^c						
Oxide		50	50	50	50	50
Metal, polycrystal	kilograms	1,700	1,720	1,730	1,750	1,760
Gold:						
Mine output, Au content	do.	8,869	6,868	7,708	8,544	8,691
Metal:						
Primary	do.	117,529	81,399	89,281	98,398	95,549
Secondary ³	do.	38,331	43,433	43,979	37,413	36,288
Total	do.	155,860	124,832	133,260	135,811	131,837
Indium, metal ^c	do.	60,000	65,000	67,000	69,000	70,000
Iron and steel, metal:						
Pig iron	thousand metric tons	86,771	86,171	66,943	82,283	81,028
Electric-furnace ferroalloys:						
Ferrochrome		12,016	13,888	7,698	16,208	17,217
Ferromanganese		420,151	431,181	361,375	453,265	456,798
Ferronickel		351,503	301,361	284,884	348,420	279,944
Silicomanganese		52,901	58,884	49,205	49,865	49,798
Ferromolybdenum		4,573	4,554	3,598	4,615	5,167
Ferrovandium		3,205	3,477	2,560	4,190	3,980
Unspecified		13,982	14,478	12,957	16,374	20,913
Total		858,331	827,823	722,277	892,937	833,817
Steel, crude	thousand metric tons	120,203	118,739	87,534	109,599	107,601
Semimanufactures, hot-rolled: ^c						
Ordinary steels	do.	86,704 ⁴	84,000	68,000	67,000	65,000
Special steels	do.	21,498 ⁴	21,000	16,000	15,000	15,000

See footnotes at end of table.

TABLE 1—Continued
JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010	2011
METALS—Continued					
Lead, metal, refined:					
Primary	104,527	107,005	96,794	101,610	100,078
Secondary, including remelted	171,795	172,454	150,871	165,613	148,524
Total	276,322	279,459	247,665	267,223	248,602
Magnesium, metal, secondary ^c	12,000	13,000	13,000	14,000	14,000
Manganese, oxide ^c	45,000	45,000	44,000	43,000	43,000
Molybdenum, metal	1,172	1,217	695	1,154	1,234
Nickel metal:					
Refined	30,402	34,861	29,351	40,228	41,290
Ni content of nickel oxide sinter ^c	60,151 ⁴	60,000	58,000	59,000	60,000
Ni content of ferronickel	68,346	59,259	54,491	64,349	53,210
Ni content of chemical	2,270	2,333	1,669	2,497	2,383
Total ^c	161,169 ⁴	156,000	144,000	166,000	157,000
Platinum-group metals:					
Palladium, metal kilograms	6,505	7,526	6,675	6,107	7,534
Platinum, metal do.	1,000	1,442	1,417	1,331	1,765
Selenium, metal	806	754	709	754	750 ^e
Silicon, multicrystalline	7,364	7,471	8,633	8,700 ^e	12,133
Silver:					
Mine output, Ag content kilograms	5,300	2,043	1,500 ^e	1,200 ^e	4,486
Metal:					
Primary do.	2,263,009	2,042,604	1,865,936	1,898,208	1,724,218
Secondary ³ do.	391,869	253,374	326,487	313,931	325,373
Total do.	2,654,878	2,295,978	2,192,423	2,212,139	2,049,591
Tantalum, metal ^c	95	95	95	95	95
Tellurium, metal ^c	41 ⁴	40	38	35	36
Tin, metal, smelter	879	956	757	841	947
Titanium:					
Dioxide	245,976	225,228	161,928	207,561	214,417
Metal ^c	42,000	45,000	35,000	38,000	40,000
Tungsten, metal	3,813	3,446	1,400	3,361	3,299
Vanadium, metal ^{5,6}	560	560	560	560	560
Zinc:					
Oxide ^c	77,102 ⁴	77,000	75,000	72,000	70,000
Metal:					
Primary	495,632	502,910	435,905	470,057	444,446
Secondary, including remelted	143,063	147,957	136,844	140,597	134,401
Total	638,695	650,867	572,749	610,654	578,847
Zirconium, oxide ^c	11,000	11,000	12,000	13,000	13,000
INDUSTRIAL MINERALS					
Bromine ^c	20,000	20,000	20,000	20,000	20,000
Cement, hydraulic thousand metric tons	67,685	62,810	54,800	51,526	51,291
Clays: ^c					
Bentonite	430,000	435,000	432,000	430,000	425,000
Fire clay, crude	450,000	450,000	440,000	440,000	430,000
Kaolin	11,000	11,000	12,000	12,000	13,000
Diatomite ^c	120,000	115,000	110,000	110,000	100,000
Feldspar and related materials ^c	750,000	700,000	700,000	650,000	650,000
Gypsum ^c thousand metric tons	5,850 ³	5,800	5,750	5,700	5,600

See footnotes at end of table.

TABLE 1—Continued
JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010	2011	
INDUSTRIAL MINERALS—Continued						
Iodine	9,282	9,500 ^e	8,232	9,216	9,277	
Lime, quicklime	thousand metric tons	9,359	9,528	6,746	8,547	8,005
Nitrogen, N content of ammonia	do.	1,114	1,244	1,021	1,178	1,211
Perlite ^e	230,000	230,000	220,000	210,000	200,000	
Rare-earth oxides ⁵	8,561	8,435	5,121	10,699	10,700 ^e	
Salt, all types ^e	thousand metric tons	1,190 ⁴	1,200	1,200	1,122 ^{r,4}	978 ⁴
Silica:						
Sand	do.	4,314	3,664	2,856	3,078	3,003
Stone, quartzite	do.	12,258	10,682	9,189	9,159	9,543
Sodium compounds, n.e.s.: ^{e,7}						
Soda ash	400,000	400,000	400,000	400,000	400,000	
Sulfate, anhydrous	140,000	140,000	142,000	142,000	145,000	
Stone, crushed:						
Dolomite	thousand metric tons	3,655	3,370	3,122	3,438	3,492
Limestone	do.	165,982	156,813	132,350	133,974	134,176
Sulfur:						
Byproduct of metallurgy ^e	do.	1,250 ⁴	1,300	1,350	1,400	1,450
Byproduct of petroleum	do.	1,966	2,034	1,864	1,892	1,755
Talc and related materials: ^e						
Talc	26,000	26,000	25,000	24,000	24,000	
Pyrophyllite	345,000	350,000	340,000	340,000	350,000	
Vermiculite ^e	6,000	6,000	6,000	6,000	6,000	
MINERAL FUELS AND RELATED MATERIALS						
Carbon black	thousand metric tons	835	821	575	729	681
Coal, bituminous ^{e,8}	do.	1,340	1,300	1,100	1,000	900
Coke, including breeze, metallurgical	do.	38,707	38,568	32,587	37,447	35,379
Gas, natural:						
Gross ⁹	million cubic meters	3,708	3,735	3,539	3,396	3,298
Marketed ^e	do.	3,900	3,900	3,700	3,600	3,500
Petroleum:						
Crude	thousand 42-gallon barrels	6,041	6,200	5,795	5,491	5,235
Refinery products: ^e						
Gasoline:						
Aviation	do.	50	50	50	50	50
Other	do.	365,000	360,000	362,000	360,000	355,000
Asphalt and bitumen	do.	33,000	33,000	32,000	31,000	30,000
Distillate fuel oil	do.	247,000	250,000	245,000	242,000	240,000
Jet fuel	do.	80,000	82,000	78,000	76,000	75,000
Kerosene	do.	175,000	170,000	165,000	166,000	165,000
Liquefied petroleum gas	do.	57,000	58,000	56,000	55,000	55,000
Lubricants	do.	16,500	17,000	16,000	14,000	15,000
Naphtha	do.	138,000	139,000	136,000	135,000	130,000
Paraffin, wax	do.	850	800	800	750	750
Petroleum coke	do.	4,600	4,500	4,400	4,300	4,200
Refinery fuel and losses ¹⁰	do.	150,000	150,000	150,000	150,000	150,000
Residual fuel oil	do.	350,000	330,000	300,000	320,000	350,000
Unfinished oils	do.	50,000	50,000	50,000	50,000	50,000
Total	do.	1,670,000	1,640,000	1,600,000	1,600,000	1,620,000

^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 November 7, 2012.

²Includes alloyed and unalloyed aluminum ingot.

³Includes gold metal recovered from scrap and waste.

⁴Reported figure.

⁵Includes oxide of cerium, europium, gadolinium, lanthanum, neodymium, praseodymium, samarium, terbium, and yttrium.

TABLE 1—Continued
JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

⁶Represents metal content of vanadium pentoxide recovered from petroleum residues, ashes, and spent catalysts.

⁷Not elsewhere specified.

⁸All major coal mines had closed by January 2002, but eight smaller mines were still in operation in 2011.

⁹Includes output from gas wells and coal mines.

¹⁰May include some additional unfinished oils.

TABLE 2
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aso Cement Co., Ltd.	Tagawa and Kanda, Fukuoka Prefecture	2,400
Do.		Daiichi Cement Co., Ltd.	Kawasaki, Kanagawa Prefecture	1,169
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.		Ryukyu Cement Co. Ltd.	Yabu, Nago, Okinawa Prefecture	722
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
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., 49.29%; Dowa Mining Co. Ltd., 31.15%; Furukawa Co. Ltd., 8.31%; Furukawa Electric Co. Ltd. and Mitsubishi Cable Industries Ltd., 4.17% each; others, 2.91%)	Onahama, Fukushima Prefecture	300,000
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 ²	710,000
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Besshi/Toyo (Saijyo), Ehime Prefecture	410,000
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

See footnotes at end of table.

TABLE 2—Continued
JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(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 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, Oita 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 2011

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
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 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 Corp.	Oita, Oita Prefecture; Kawata, Fukuoka Prefecture; Kimitsu, Chiba Prefecture; and Nagoya, Aichi Prefecture	33,199
Do.		Sumitomo Metal Industries, Ltd.	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%; Mitsubishi Materials Corp., 5%]	Iijima, Akita Prefecture	200,400
Do.	do.	Hachinohe Smelting Co. Ltd. (Mitsui Mining and Smelting Co. Ltd., 57.7%; JX Nippon Mining & Metals Co., Ltd., 27.8%; Toho Zinc Co. Ltd. and Nisso Smelting Co. Ltd., 14.5%)	Hachinohe, Aomori Prefecture	117,600
Do.	do.	Hikoshima Smelting Co. Ltd.	Hikoshima, Yamaguchi Prefecture	84,000
Do.	do.	Kamioka Mining and Smelting Co. Ltd.	Kamioka, Gifu Prefecture	72,000
Do.	do.	Toho Zinc Co. Ltd.	Annaka, Gunma Prefecture	139,200
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Harima, Hyogo Prefecture	90,000

Do., do. Ditto. NA Not available.

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		
	2009	2010	2011	2009	2010	2011
Stocks at the beginning of the year	124,379	104,409	110,279	22,134	17,303	16,521
Production	1,439,843	1,548,688	1,327,598	192,196	215,828	215,050
Imports	42,256	45,912	126,569	9,144	11,126	22,049
Total supply	1,606,478	1,699,009	1,564,446	223,474	244,257	253,620
Exports	626,685	528,384	437,247	55,521	40,461	33,367
Reported consumption	907,929	1,104,614	1,056,792	159,093	192,685	190,058
Total demand	1,534,614	1,632,998	1,494,039	214,614	233,146	223,425
Stocks at the end	104,409	110,279	121,041	17,303	16,521	15,168
Apparent consumption	875,384	1,060,346	1,006,158	150,650	187,275	205,085
	Refined zinc			Silver (kilograms)		
	2009	2010	2011	2009	2010	2011
Stocks at the beginning of the year	94,521	73,600	65,555	959,905	872,325	1,062,722
Production	540,604	574,008	544,676	1,865,936	1,898,208	1,724,218
Remelting	NA	NA	NA	326,487	313,931	325,373
Imports	27,533	31,855	77,881	1,343,705	2,087,621	1,929,204
Total supply	662,658	679,463	688,112	4,496,033	5,172,085	5,041,517
Exports	155,985	97,745	95,278	1,696,462	2,733,284	2,833,596
Reported consumption	318,922	388,692	349,567	1,392,946	1,854,798	1,631,894
Total demand	474,907	486,437	444,845	3,089,408	4,588,082	4,465,490
Stocks at the end	73,600	65,555	91,658	872,325	1,062,722	998,062
Apparent consumption	433,073	516,163	501,176	1,927,246	1,376,079	1,209,859

NA Not applicable.

Source: Japan Mining Industry Association.

TABLE 4
JAPAN: RESERVES OF MAJOR MINERAL COMMODITIES IN 2011

(Thousand metric tons unless otherwise specified)

Commodity	Exploitable reserves
Coal ¹	773,000
Dolomite	913,000
Gold ore, Au content	kilograms 159,000
Iodine	5,000 ^e
Limestone	40,400,000
Pyrophyllite	59,700
Silica sand	73,600
Silica stone, white	462,000

^eEstimated.

¹Recoverable reserves, including brown coal.

Source: Natural Resources and Fuel Department, Agency of Natural Resource and Energy.