

2008 Minerals Yearbook

JAPAN

THE MINERAL INDUSTRY OF JAPAN

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Japan is an industrialized developed country whose free-market economy was the world's second largest after the United States. In 2008, the country's gross domestic product was valued at \$4.4 trillion based on purchasing power parity, which was an increase of 1.4% compared with that of 2007. Japan has few mineral resources, and it imported raw materials and energy for its industrial production and use. Indigenous deposits of gold, magnesium, and silver partially met domestic demand whereas all bauxite, coke, copper, and iron ore and other mineral commodities had to be imported. The country imported significant amounts of crude oil and natural gas. The metals and metal products industries, which dominated the mineral sector of Japan, were a major producer and a primary exporter to the world metals market (International Monetary Fund, 2009).

Minerals in the National Economy

Japan's industries relied on imported minerals for its economic growth and used a large amount of nonferrous metals. As a result, the country was one of the world's major importers and consumers of most mineral commodities. Japan also was one of the world's major producers and exporters of fabricated metal and mineral products.

Although the mineral industry played an important role in supplying the industrial raw materials to Japan's manufacturing and construction industries, the mining industry was the smallest sector of the country's industrial structure. Operating mines and employment in the mining industry have been in decline because of depleted ore reserves, high mining costs, and the availability of cheaper imports. The mineral processing industry was large and included processing of chemicals, fabricated metal products, industrial mineral products, iron and steel, nonferrous metals, petroleum, and petroleum products.

Government Policies and Programs

To secure a stable supply of oil and natural gas, nonferrous metals, and mineral resources, state-owned Japan Oil, Gas and Metals National Corp. (JOGMEC) signed a memorandum of understanding (MOU) with Vale S.A. of Brazil to enhance their mutual cooperation as strategic partners. The MOU focused on technology development for exploration in Africa of such mineral resources as coal, copper, diamond, iron ore, manganese, nickel, platinum-group metals, and zinc. Japanese techniques of remote sensing analysis would be used to improve basic geologic information in the Southern African Development Community region (International Mining, 2008b).

In 2008, the Government gave JOGMEC nearly 50% more money than it had in 2007 towards JOMEC's metals exploration budget of \$42 million to increase exploration expenditure in rare metals and uranium. The company engaged in joint-venture projects in which it provided exploration expertise and financing and acquired an equity stake that was transferred to a Japanese mining and metal company. In 2007 (the latest year for which data were available), JOGMEC had a combined total of 22 projects in the regions of Africa, Asia and the Pacific, Canada, and Latin America. In 2008, it provided \$4.5 million for 3 years to Southern Gold Ltd. of Australia to explore for copper and zinc in Cambodia, with an option to take a 51% stake in the Australian mining company. The company's bacteria-leaching processing technology, when it becomes feasible, could treat low-grade copper ore, so JOGMEC also began financing exploration for such deposits as well (Tradingmarkets.com, 2008a).

The Japanese Government decided to impose an antidumping duty on imports of electrolytic manganese dioxide (EMD) from Australia, China, South Africa, and Spain. The antidumping duty became effective on September 1, 2008, and was to last for a period of 5 years. The rates were 46.5% for imports of EMD from China; 29.3% (Australia); 14.5% (South Africa); and 14% (Spain). EMD is used in Japan mainly to manufacture dry-cell batteries (Ministry of Economy, Trade and Industry, 2008b).

A revision of the Building Standards Law designed to tighten building safety triggered a slump in demand for cement owing to delays in the issuance of building permits. Japan's cement industry consisted of 18 cement companies and 32 cement plants with a production capacity of 71 million metric tons per year (Mt/yr) of clinker cement. In 2008, cement production decreased by 7.2% to 62.8 million metric tons (Mt) (Japan Cement Association, 2008).

Production

Japan produced a variety of mined metals and industrial minerals in addition to its processed metal and mineral products, which included cement, fertilizers, and crude steel. The industrial minerals that were mined included dolomite, feldspar, fire clay, limestone, pyrophyllite, silica sand, and silica stones. Owing to strong domestic demand in 2008, output and imports of refined cadmium metal increased by 9.6% and 18.5%, respectively, compared with those of 2007. Gold mine production declined by 31% as did primary gold metal output. Production of titanium dioxide decreased by 8.4% in 2008; the decrease was attributable to increased substitution of imports in domestic consumption. The quarrying industry cut back production because of low demand for crushed stone. Hydraulic cement production decreased by 7.2% compared with that of 2007. Production of dolomite and limestone decreased by 7.8% and 5.5% whereas that of silica sand and silica stone decreased by 15.1% and 12.9%, respectively. Japan produced small amounts of crude petroleum and natural gas, production of which increased by 2.6% and 0.7%, respectively, in 2008. Sulfur output as a byproduct of oil refining increased by 3.5% (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 because the country consumes more minerals and metals than it produces. Sumitomo Metal Mining Co. Ltd. (SMM) continued to operate the Hishikari gold mine in Kagoshima Prefecture. Mining and quarrying of industrial minerals was still being done but at a lower level of production than in previous years. However, Japan had a world-class metallurgical industry for nonferrous metals. To secure mineral resources to meet domestic demand, the Government's mineral policies included promotion of overseas exploration and materials recycling, buildup of a stockpile of rare metals, and technological development of essential metals and minerals (table 2; Sumitomo Metal Mining Co. Ltd., 2009).

Mineral Trade

Japan exported 37.67 Mt of iron and steel products in 2008, which was an increase of 3.5% compared with exports in 2007. The Republic of Korea was the leading destination followed by China, Thailand, and Taiwan. The country imported 7.58 Mt of iron and steel products, which was a decrease of 8.4% compared with imports of 2007, and the leading country of origin was the Republic of Korea followed by China and Taiwan. Japan produced 247,000 metric tons (t) of ferronickel with 24% nickel content and exported 543 t to the United States. In 2008, Japan imported 100% of its copper concentrate requirement of 1.317 Mt, 99.8% of its lead concentrate requirement of 110,000 t, and 98.7% of zinc concentrate requirement of 620,000 t.

The country imported the majority of its copper concentrate from Chile (46.3%) followed by Peru (13.9%), Indonesia (13.5%), and Canada (10.3%). Imports of lead concentrates came mainly from Australia (46.2%), the United States (33%), and Bolivia (13.6%). Japan's requirement for zinc concentrate was met by imports mainly from Peru (30.4%), Australia (26.7%), Bolivia (14.6%), and the United States (13.4%).

In 2008, Japan's production and imports of refined lead increased by 2.5% whereas consumption and exports decreased by 4.5%, which resulted in a stock buildup of 55.6% during the year. For refined lead, the apparent consumption decreased to about 216,000 t and the reported consumption decreased to 211,000 t in 2008. Output of refined zinc increased by 3% and imports of refined zinc decreased by 14.8%, which resulted in a decrease in the total supply. Exports of refined zinc increased by 13.9% and reported consumption decreased by 7.7%, which resulted in a decrease in total demand. As a result, stocks at yearend increased by 15.2% (table 3; Japan Mining Industry Association, 2009).

Commodity Review

Metals

Cobalt.—SMM planned to increase production of cobalt by 80% in 2009 from the 2008 output of 1,071 t to meet growing

demand. The company's nickel refinery at Niihama in Ehime Prefecture would separate cobalt from intermediate nickel raw materials from Coral Bay Nickel Corp. in the Philippines and would have the capacity to produce 1,800 metric tons per year (t/yr) of cobalt. Cobalt was used primarily in lithium ion batteries. Global demand for cobalt was estimated to be between 55,000 and 60,000 t/yr and was growing at a rate of 5% to 10% per year. Japan was the leading consumer of cobalt and accounted for 25% of the world's total consumption (Tradingmarkets.com, 2008b).

Copper.—Japan produced 1.625 Mt of smelted copper and 1.540 Mt of refined copper in 2008 from imported copper concentrate (mainly from Canada, Chile, Indonesia, and Peru) and secondary materials. Of the smelted copper output, primary sources (concentrate and blister) accounted for 84% of the feedstock, and scrap accounted for 16%. Of the refined copper output, imported ore accounted for 86%; scrap, 7%; and other, 7%. The country imported 90,470 t of refined copper and exported 423,455 t. Refined copper was used in wire (61%), brass (36%), and other miscellaneous (2%) (Japan Mining Industry Association, 2009).

To secure stable and long-term supplies of copper concentrate, Mitsubishi Materials Corp. (MMC) and Copper Mountain Mining Corp. of Canada signed an MOU to redevelop the Similco copper mine near Princeton in the Province of British Columbia, Canada. The mine halted its production in 1996 and was to be restarted in the first quarter of 2011. MMC agreed to buy the newly issued shares of Similco Mines Ltd. to acquire a 25% equity interest and to arrange a \$250 million loan. In return, MMC would purchase all production of 150,000 t/yr of copper concentrate during the mine's life. MMC also was invested in Huckleberry copper mine in Canada (Mitsubishi Materials Corp., 2008).

Pan Pacific Copper Co., Ltd. conducted a prefeasibility study of the mining concession of the Caserones copper deposit in Chile. The result called for combined production of copper and molybdenum concentrates and refined copper through the solvent extraction-electrowinning process. The project was estimated to have 26 years of mine life and was projected to produce 150,000 t/yr of copper and 75,000 t/yr of molybdenum starting sometime in 2012 with an investment of \$1.7 billion. The copper concentrate would be shipped to Pan Pacific's smelters in Japan. The company also planned to conduct a prefeasibility study of the Quechua copper deposit in Peru (Pan Pacific Copper Co., Ltd., 2008).

Antofagasta plc of Chile agreed to sell a 30% interest in its Esperanza copper project and Tesoro copper mine in Chile to Marubeni Corp. for \$1.31 billion. Marubeni would be responsible for its share of the development costs for Esperanza in return for a certain annual quantity of concentrate to be shipped to Japan for processing. The deal was subject to receipt of environmental approvals and to Antofagasta acquiring the Tesoro North East deposit, which was needed to extend the life of the Tesoro Mine. Esperanza was designed to produce 700,000 t/yr of concentrate containing an estimated 195,000 t of copper, 7,100 kilograms (kg) of gold, and 47 t of silver. First production was expected in 2011. Tesoro produced 93,000 t of copper cathode in 2007 (Mining Journal, 2008a). Nippon Mining & Metals Co., Ltd. changed the name of its subsidiary Nikko Woojin Precision Manufacturing (Suzhou) Co., Ltd. in China to Nippon Mining & Metals (Suzhou) Co., Ltd. in January 2008. Nikko Woojin Precision Manufacturing (Suzhou) was established in 2003 as a joint venture with Woojin Precision Industry Co., Ltd. of the Republic of Korea. Nippon Mining & Metals (Suzhou) planned to start surface treatment operations, establish integrated rolling operations, and manufacture copper and copper alloy products in the field of precision fabrication (Nippon Mining & Metals Co., Ltd., 2008a).

Gold and Silver.—Japan produced 6,868 kg of mined gold in 2008, which was a 23% decrease from that produced in 2007. Refined gold output was 124,832 kg, a decrease of 20%, which was produced from imported ore (57%), scrap (14%), domestic ore (8%), and others (21%). The country produced 2,042,600 kg of primary refined silver, of which 58% came from imported ore, 13% from scrap, 0.6% from domestic ore, and 28% from other sources. Japan imported 2,098,400 kg of silver metal and exported 1,978,400 kg. Silver was used in photographic materials (37%), nitrate for other uses (12%), point connectors and extension materials (11% each), and other miscellaneous (29%) (Japan Mining Industry Association, 2009).

Mitsui Mining and Smelting Co., Ltd. planned to start production in 2011 of its new, less costly silver-based catalysts, which are coated with silver rather than the more-expensive platinum, for use in diesel particulate filters because they have comparable ability to remove soot from diesel exhausts and would cut metal costs by 90%. Oxidation catalysts, however, would continue to be platinum-based. The company's plan for silver and gold production was 213 t and 12.7 t, respectively, in fiscal year 2008-09 (Miningmx.com, 2008).

Iron Ore and Iron and Steel.—To secure a steady supply of iron ore from abroad, Japanese companies acquired stakes in joint ventures. Grange Resources Ltd. of Australia agreed to sell a 30% stake in the eastern extension of the Southdown magnetite deposit in Western Australia to Sojitz Resources and Technology Pty. Ltd. The eastern extension of the deposit was expected to supply iron ore for magnetite concentrate and pellet production. The sale agreement would increase Grange's royalty payment from Sojitz's 30% share of production (Asia Miner, The, 2008).

As iron ore prices rose in 2008, a number of Japanese steel companies, including JFE Steel Corp., Kobe Steel Ltd., Nisshin Steel Co. Ltd., and Sumitomo Metal Industries, Ltd. (Sumitomo Metals), negotiated agreements with Vale for a 65% increase in the contract price of iron ore fines. Earlier, Nippon Steel Corp. and Vale reached agreement on the contract prices for Carajas fines and Itabira fines. Japan relied on imports of iron ore to meet the requirements of its iron and steel industry (International Mining, 2008a).

A consortium consisting of Itochu Corp., Pohang Iron and Steel Co. Ltd. (POSCO), and five Japanese steel producers (JFE Steel, Kobe Steel, Nippon Steel, Nisshin Steel, and Sumitomo Metals) reached an agreement with Companhia Siderurgica Nacional of Brazil to acquire a 40% interest in its iron ore mining and sales subsidiary Nacional Minerios S.A. (NAMISA) for \$3.12 billion. NAMISA operated an iron ore project through its mines and beneficiation plants and planned to sell 18 Mt/yr of iron ore in 2009 and to increase sales to 38 Mt/yr through expansion. The five Japanese steel companies and POSCO were expected to enter into long-term iron ore purchase agreements with NAMISA (JFE Steel Corp., 2008a).

JFE Steel (40%) and Foulath of Bahrain (60%) signed an MOU to establish a \$700 million pelletizing plant in Oman that would produce iron ore pellets. JFE Steel would receive 3.5 Mt/yr on a long-term basis (25 years) out of a production capacity of 7 Mt/yr. The remaining 3.5 Mt/yr would be sold to direct-reduced iron and other blast furnace plants in the Middle East and Asia. The pelletizing plant was expected to be operational in 2011 (JFE Steel Corp., 2008b).

In 2008, Nippon Steel reported a 4-Mt decrease in steel production compared with the 33 Mt produced in 2007 owing to decreased demand from automobile makers. The company planned to suspend the operation of a blast furnace at its Oita plant in Oita Prefecture in February 2009 to perform maintenance and would restart operations there in May. ArcelorMittal, JFE Steel, and POSCO also planned to cut steel production (BBC News, 2009).

Sumitomo Metals started the brickwork building of its new No. 1 blast furnace at the Wakayama Steel Works to replace the No. 4 blast furnace. Furnace construction work began in November 2006 and cost \$450 million. The furnace had an inner volume of 3,700 cubic meters and a capacity of 7,500 metric tons per day; it was expected to be completed in July 2009 and to last 25 years. As a result, steel production at the Wakayama Works would be 4.5 Mt/yr. A new No. 2 blast furnace starting operation in October 2012 was planned to replace the No. 5 blast furnace. At that time, the production capacity at the works would be 5.2 Mt/yr of steel (Sumitomo Metal Industries, Ltd., 2008a).

The country produced 86.2 Mt of pig iron, which was slightly lower than the 86.8 Mt produced in 2007. Production of crude steel amounted to 118.7 Mt in 2008, which was a decrease of 1.2% from that of 2007. Japan was the second ranked producer of crude steel after China, and Japan's Nippon Steel was ranked second after ArcelorMittal in steel output in the world. The country's output of stainless steel was 3.210 Mt, of which 1.657 Mt was nickel-based and 1.553 Mt was chrome-based (World Steel Association, 2009).

Lead and Zinc.—In 2008, Japan's production of refined (primary and secondary, but not remelted) lead and refined zinc amounted to 224,900 t and 615,500 t, respectively. Of these amounts, Mitsui Mining and Smelting produced 59.6 t and 244.5 t, respectively. The country imported 110,000 t of lead in concentrate mainly from Australia, Bolivia, and the United States and 620,000 t of zinc in concentrate mainly from Australia, Bolivia, Peru, and the United States. Of the refined lead output, imported ore accounted for 47%; scrap, 36%; and other, 17%. Japan imported 25,500 t of refined lead and exported 26,200 t. Refined lead was used in batteries (90%), chemicals (3%), solder (2%), and other miscellaneous (3%). Production of remelted lead was 53,200 t. The country imported 1,500 t of remelted lead and exported 12,300 t. Remelted lead was used in batteries (77%) and recycling (19%). Of the refined zinc output, imported ore accounted for 82%; domestic ore, 1%; scrap, 0.3%; and other, 17%. The country imported 45,300 t of refined

zinc and exported 84,500 t. Refined zinc was used in galvanized sheet (46%), other galvanizing (19%), brass (13%), die casting alloy (11%), chemicals (7%), and other miscellaneous (3%). Production of remelted zinc was 31,900 t. Japan imported 865 t of remelted zinc and exported 19,500 t. Remelted zinc was used in chemicals (26%), galvanized sheet (24%), brass (23%), other galvanizing (15%), and other miscellaneous (8%) (Japan Mining Industry Association, 2009).

Lithium.—SMM decided to establish Sumiko Kunitomi Electronics Co., Ltd. to take charge of the manufacturing of electronics and advanced materials, that was currently being done by SMM's Kunitomi District Division in Iwanai, Hokkaido Prefecture. The spinoff would be effective in April 2009. The Kunitomi District Division served as a production base for crystal materials, such as lithium niobate, lithium tantalite, and yttrium aluminum garnet, and magnetic materials, such as samarium iron nitride (Sumitomo Metal Mining Co. Ltd., 2008b).

Nickel.—Japan's total nickel production was 154,100 t, excluding nickel in chemicals, of which refined nickel was 34,900 t and nickel in ferronickel and nickel oxide was 119,200 t. The country produced 2,333 t of nickel in chemicals. The country's output of refined nickel increased by 15% whereas that of nickel in ferronickel and nickel oxide decreased by 7% owing to reduced supply of nickel ore from Société Minière du Sud Pacifique of New Caledonia.

SMM planned to boost nickel production by 14% in fiscal year 2008-09 by operating its Niihama refinery at full capacity to reach 41,000 t/yr of nickel. The company also intended to double the production capacity at its Coral Bay unit on Palawan Island in the Philippines, which produced nickel-cobalt mixed sulfide that was shipped to the Niihama plant. The Niihama refinery was expected to be shut down for 4 days in May and November 2008 for maintenance (Mining Journal, 2008d).

SMM revised the cost of construction of the high-pressure acid leach (HPAL) plant No. 2 at its subsidiary Coral Bay Nickel Corp. in the Philippines. The initial cost was projected to be \$285 million but this amount was increased to \$307 million owing to changes in the specifications of some of the facilities. The production capacity for plants No. 1 and No. 2 combined was expected to be 22,000 t/yr of nickel. Production was expected to begin in April 2009 (Sumitomo Metal Mining Co. Ltd., 2008a).

Titanium.—Sumitomo Metals planned to spin off its titanium sheet and plate business to its subsidiary Sumitomo Metals (Naoetsu), Ltd. As a result, Sumitomo Metals would report a decrease in its capital. Sumitomo Metals (Naoetsu) would assume the assets and liabilities related to the titanium sheet and plate sales, as well as the existing contracts and technical services (Sumitomo Metal Industries, Ltd., 2008b).

Industrial Minerals

Limestone.—Japan was self-sufficient in limestone output and produced 156.8 Mt of limestone in 2008. Nittetsu Mining Co., Ltd.'s subsidiary Funao Mining Co., Ltd. was mainly responsible for the mining and sales of limestone in the country. The company's Torigatayama Quarry Complex in Kochi Prefecture was the leading limestone mine in Japan in terms of output. The company's output of limestone was 23 Mt/yr and was supplied to domestic cement and steel producers. A portion of the production was exported to Australia. The company also produced 5 Mt/yr of limestone aggregates for the construction industry (Nittetsu Mining Co., Ltd., 2008).

Zeolites.—Tosoh Corp. planned to double its zeolite production and to increase zirconia (zirconium dioxide) powder output by 50% with an investment of \$70.3 million. Plans called for construction of new plants for the production of high-silica synthetic zeolite and zirconia powder at its Yokkaichi Complex in Mie Prefecture. The project was expected to be completed in December 2008. High-silica synthetic zeolites were used as catalysts and absorbents in the petrochemical industry. Tosoh's other synthetic zeolite product was Zeolum, which was used as a molecular sieve for selective absorption in drying, purifying, and separating a variety of materials. The company's zirconia product line included powdered grade, compound, and machined component (Industrial Minerals, 2008).

Mineral Fuels and Related Materials

Coal.—Japan had produced limited amounts of coal since 2002, and some coal resources were being mined at several small mines in Hokkaido Prefecture. The country had to import steam coal for domestic use in cement and paper plants and for power generation, and coking coal for use by the steel industry. Coal accounted for 21% of the country's primary energy supply. Steam coal came from Australia, China, South Africa, and the United States, and coking coal was sourced from Australia, Canada, Russia, and the United States. Although Japan's coal reserves were estimated to be 360 Mt on Hokkaido and Kyushu Islands, they were too deep and costly to be mined (Methanetomarkets.org, 2009).

The Governments of Japan and Indonesia jointly inaugurated the upgraded brown coal project at the Satui coal mine in South Kalimantan Province in Indonesia. Low-rank coal with high moisture and low heat value was dewatered in oil so that it could be transformed into high-rank coal with a higher heat value of at least 6,500 kilocalories per kilogram of coal. In the future, operation data analysis and product evaluation tests using boilers would be performed with an aim at commercialization. Japan was considering importing this upgraded brown coal for its power sector (Ministry of Economy, Trade and Industry, 2008a).

Nippon Steel and Sumitomo Corp. raised their shares in Mitsui Mining Co. Ltd. from 12.9% each to 21.7% each in a bid to secure coking coal supplies. The deal would be worth \$125 million each. Nippon Steel had already purchased 1 Mt of coke from Mitsui Mining to be delivered in 2008 (Mining Journal, 2008c). Nippon Steel, Vale, and other partners of the Carborough Downs joint venture would invest in the expansion of the underground operation at the Carborough Downs coal mine, which is located 150 km southwest of Mackay in Queensland, Australia. The production rate of the mine was expected to be 3.7 Mt/yr after 2009. Nippon Steel already held a 5% interest in the mine. The Carborough Downs Mine would be Nippon Steel's first coking coal project and would involve the installation of a new coke oven that would use low-grade coal because of its improved operational technology (Nippon Steel Corp., 2008).

Natural Gas.—Tokyo Gas Co. planned to build a fourth liquefied natural gas regasification terminal at Hitachi in Ibaraki Prefecture with an investment of \$880 million. The receiving facilities included docks for tankers, storage tanks, and regasification equipment. The new terminal was scheduled to start operations in 2017. Tokyo Gas operated two terminals at Yokohama and one at Sodegauru in Chiba Prefecture. The company's industrial gas accounted for 40% of its gas sales and it supplied 50,000 t/yr of natural gas to Hitachi Ltd.'s powerplant in the region (Oil & Gas Journal, 2009).

Petroleum.—JOGMEC planned to sign an MOU with Petróleos de Venezuela S.A. to jointly explore for oil near the Orinoco River in Venezuela. The Orinoco extra-heavy oil deposits, which were tar-like and highly viscous, contained oil sands and oil shale. Japan was 90% dependent on the Middle East for its crude oil imports and was making efforts to strengthen its energy security through the diversification of crude oil suppliers, such as by investing in the unconventional oil deposits in Venezuela (Rigzone.com, 2008).

Nippon Oil Corp. agreed to merge with Nippon Mining Holdings Inc. to form a holding company that would engage in oil development and refining and mining operations for copper and other nonferrous metals. A final merger agreement would be signed by March 2009. The combined group was expected to rank among the world's 10 leading private-sector oil companies by revenue. Japan had 30% more refining capacity than it needed to satisfy domestic demand. As a result, the group's oil refining output would be reduced by 20%, or 400,000 barrels per day, in 2 years. The group would distribute one-third of Japan's petroleum products. The merger would allow the group to increase its investments in upstream oil and gas production and help it expand into the use of such alternative energy technologies as fuel cells and solar power (Financial Times, The, 2008).

Uranium.—Japan was looking for sources of uranium to meet its future requirements to generate nuclear energy. Marubeni Corp. signed a letter of intent with Khan Resources Inc. of Mongolia regarding exploration and mining of the Dornod uranium project in northeastern Mongolia. Marubeni would work to improve the mining investment climate in Mongolia, and Khan Resources would provide Marubeni with access to due diligence information on a confidential basis. Khan Resources had completed a prefeasibility study of its 69% owned project of Dornod. The Government of Mongolia might seek to increase its 21% interest in the project (Mining Journal, 2008b).

Recycling

To procure raw materials for recycling in Japan, Nippon Mining & Metals and its affiliated companies restructured and consolidated their operations in Taiwan in electronic materials and metal manufacturing and trading, and established Nikko Metals Taiwan Co. Ltd. to collect and pre-treat copper and precious metal-bearing scrap in Taiwan. Nippon Mining & Metals also was engaged in the expansion and development of its recycling and environmental services, including promotion of its Hitachi Metal Recycling Complex project. The first phase of construction was completed on schedule. The completed facility would recover nickel and tin (500 t/yr each), bismuth (200 t/yr), antimony (150 t/yr), and other metals from intermediate products generated during the smelting and refining process at the Saganoseki smelter and refinery, and recycled materials treated through the pyro-metallurgical process of Nikko Environmental Service. The second-phase facility would produce zinc (700 t/yr), indium (6 t/yr), and other metals, and the third-phase facility would recover copper (6,000 t/yr), precious metals [gold, 500 kilograms per year (kg/yr); silver, 50 t/yr; and platinum, 200 kg/yr], and others (Nippon Mining & Metals Co., Ltd., 2008b).

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. Its reserves of nonferrous metals, such as lead, silver, and zinc, are small with the exception of gold, deposits of which had been found and were being mined on a small scale in Kagoshima Prefecture on Kyushu Island. Japan's reserves of gas and oil are negligible (table 4).

Outlook

Japan is a resource-poor country and depends on mineral imports to supply its manufacturing industry. Japan is expected to remain an important player in international mining because of the investments its mining and trading companies are making to secure the importation of ores and concentrates for the smelting, refining, and fabricating industries; coal for powerplants; and end-use metals for the manufacturing industries.

Japan's mine production is expected to decrease in the next 2 to 3 years for some nonferrous metals owing to the depletion of ore reserves. Mine output of lead and zinc has ceased following the closure of the Toyoha Mine in 2006. Only gold and silver are being mined. In the aluminum industry, demand and exports for aluminum semifabricated products (rolled and extrusions) are expected to decrease owing to slumps in the automotive and construction sectors caused by the global recession. In the iron and steel industry, production of ferroalloys, pig iron, and steel is expected to remain at the same level of output because of the slightly weaker demand on the domestic market. Output of cement is expected to decline owing to the Government's cutback in spending for public works and the construction downturn.

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TABLE 1 JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity		2004	2005	2006	2007	2008
METALS						
Aluminum:						
Alumina ^e	thousand metric tons	380	350	330	300	320
Aluminum hydroxide ^e	do.	750	740	720	700	700
Metal:						
Primary:						
Regular grades	do.	6	7	7	6	7
High-purity	do.	55	45	50	51	51
Secondary ²	do.	1,015	1,039	1,070	1,100 °	1,100 °
Antimony:						
Oxide		8,716	7,792	7,778	7,939	6,954
Metal		222	253	275	270	325
Arsenic, trioxide ^e		40	40	40	40	40
Bismuth		522	463	425	408	410 e
Cadmium, refined		2,233	2,297	2,286	1,939	2,126
Chromium, metal ^e		1,600	700	700	500	600
Cobalt, metal		421	471	920	1,084	1,071
Copper, metal:						
Blister and anode:						
Primary		1,270,495	1,319,247	1,409,087	1,367,310	1,366,310
Secondary		194,927	198,516	219,203	245,208	259,060
Total		1,465,422	1,517,763	1,628,290	1,612,518	1,625,370
Refined:			, ,			
Primary		1,188,491	1,227,528	1,342,350	1,369,814	1,328,157
Secondary		191,653	167,756	189,705	207,004	211,681
Total		1,380,144	1,395,284	1,532,055	1,576,818	1,539,838
Gallium, metal:						
Primary ^e		9	10	8	8	7
Secondary		78	86	93	90 °	85 °
Germanium:						
Oxide ^e		50	50	50	50	50
Metal, polycrystal	kilograms	943	1,731	1,682	1,700 °	1,720 °
Gold:						
Mine output, Au content	do.	8,021	8,318	8,904	8,869	6,868
Metal:						
Primary	do.	136,616	146,182	144,164	117,529	81,399
Secondary ³	do.	23,183	23,710	23,952	38,331	43,433
Total	do.	159,799	169,892	168,116	155,860	124,832
Indium, metal ^e	do.	70,000	70,000	55,000 r	60,000 r	65,000
Iron and steel, metal:						
Pig iron	thousand metric tons	82,974	83,058	84,270	86,771	86,171
Electric-furnace ferroalloys:						
Ferrochrome		13,472	12,367	13,056	12,016	13,888
Ferromanganese		437,389	448,616	406,162	420,151	431,181
Ferronickel		374,213	391,074	335,884	351,503	301,361
Silicomanganese		73,041	94,725	59,424	52,901	58,884
Ferromolybdenum		3,323	4,019	4,229	4,573	4,554
Ferrovanadium		2,178	2,360	2,042	3,205	3,477
Unspecified		7,321	10,057	13,123	13,982	14,478
Total		910,937	963,218	833,920	858,331	827,823
Steel, crude	thousand metric tons	112,718	112,471	116,226	120,203	118,739
Semimanufactures, hot-rolled:						
Ordinary steels	do.	83,354	80,828	83,139	86,704	88,000 e
Special steels	do.	19,843	20,360	20,982	21,498	23,000 °

TABLE 1—Continued JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity		2004	2005	2006	2007	2008
METALS—Continued		2004	2005	2000	2007	2000
Lead:						
Mine output Ph content		5 512	3 437	777		
Metal refined:		5,512	5,457	,,,,		
Primary		94 272	106 638	108 271	104 527	107.005
		188.603	167,980	171 743	171 795	172 454
Total		282 875	274.618	280.014	276 322	279 459
Magnagium matal gagandani ^e		10,000	11,000	12 000	12 000	13,000
Maganasa avida ^e		45 680 ⁴	45 500	45 500	45,000	45,000
Molybdenum metal		812	45,500 901	1 253	1 172	1 241
Nickel metal:		012	<i>y</i> 01	1,200	1,172	1,211
Refined		32 729	29 399	29 254	30 402	34 861
Ni content of nickel oxide sinter		60,300	56 700	53,800	60 151 ^r	60,000 °
Ni content of ferronickel		73 655	76 390	66,058	68 346	59 259
Ni content of chemical		2 082	2 208	2 531	2 270	2 333
Total		168,766	164.697	151.643	161,169 r	156.000 °
Platinum-group metals: ^e				,		,
Palladium metal	kilograms	5.300	5.400	5.400	5.500 r	5.500
Platinum, metal	do	750	760	760	770 r	770
Rare-earth oxides ⁴		6.015	6.432	8.243	8.561	8.435
Selenium, metal		599	625	730	806	754
Silicon, multicrystalline		6,135	6,923	6,987	7,364	7,471
Silver:		- 3			- 3	.,
Mine output. Ag content	kilograms	75,689	54,098	11,463	5,300 r	5,000 e
Metal:	<u> </u>	i				,
Primary	do.	2,208,270	2,202,794	2,253,203	2,263,009	2,042,604
Secondary ³	do.	219,047	192,177	228,000	391,869	253,374
Total	do.	2,427,317	2,394,971	2,481,203	2,654,878	2,295,978
Tantalum, metal ^e		95	95	95	95	95
Tellurium, metal		33	34 r	35 r	41 ^r	40 e
Tin, metal, smelter		707	754	854	879	956
Titanium:						
Dioxide		253,364	259,015	239,916	245,976	225,228
Metal ^e		23,110 4	31,000	39,000	42,000	45,000
Tungsten, metal		4,166	4,056	3,566	3,813	3,446
Vanadium, metal ^{e, 5}		560 r	560 r	560 r	560 r	560
Zinc:						
Mine output, Zn content		47,781	41,452	7,169		
Oxide		75,813	74,843	77,234	77,102	77,000 °
Metal:						
Primary		534,830	536,768	504,532	501,135	509,717
Secondary, including remelted		132,417	138,453	148,715	137,560	122,859
Total		667,247	675,221	653,247	638,695	632,576
Zirconium, oxide ^e		9,800	10,000	10,800	11,000	11,000
INDUSTRIAL MINERALS						
Bromine ^e		20,000	20,000	20,000	20,000	20,000
Cement, hydraulic t	housand metric tons	67,376	69,629	69,942	67,685	62,810
Clays:						
Bentonite		455,282	421,629	425,000 °	430,000 °	435,000 °
Fire clay, crude ^e		470,000	460,000	460,000	450,000	450,000
Kaolin		11,553	10,500	10,500 °	11,000 °	11,000 °
Diatomite		126,225	130,005	130,000 °	120,000 °	115,000 °
Feldspar and related materials ^e		900,000	800,000	800,000	750,000	700,000
Gypsum t	housand metric tons	5,865	5,913	5,796	5,850	5,800 °
Ioaine		/,264	8,095	8,724	9,282	9,500 °
Lime, quicklime t	nousand metric tons	8,507	8,8/9	9,014	9,359	9,528

TABLE 1—Continued JAPAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity		2004	2005	2006	2007	2008
INDUSTRIAL MINERA	LS—Continued					
Nitrogen, N content of ammonia	thousand metric tons	1,101	1,083	1,091	1,114	1,110 e
Perlite ^e		240,000	240,000	240,000	230,000	230,000
Salt, all types ⁶	thousand metric tons	1,225	1,227	1,166	1,190 r	1,200 e
Silica:						
Sand	do.	4,705	4,549	4,593	4,314	3,664
Stone, quartzite	do.	12,218	12,600	12,936	12,258	10,682
Sodium compounds, n.e.s.: ⁷						
Soda ash ^e		400,000	400,000	400,000	400,000	400,000
Sulfate, anhydrous		130,107	138,000	138,000 °	140,000 e	140,000 e
Stone, crushed:						
Dolomite	thousand metric tons	3,726	3,534	3,695	3,655	3,370
Limestone	do.	161,858	165,240	166,621	165,982	156,813
Sulfur:						
Byproduct of metallurgy	do.	1,263	1,284	1,343	1,250 r	1,300 e
Byproduct of petroleum	do.	1,895	1,972	1,950	1,966	2,034
Talc and related materials:						
Talc		18,253	25,491	25,500 °	26,000 e	26,000 e
Pyrophyllite		405,222	351,111	350,000 °	345,000 °	350,000 e
Vermiculite ^e		6,000 r	6,000 r	6,000 r	6,000 r	6,000
MINERAL FUELS AND REL	ATED MATERIALS					
Carbon black	thousand metric tons	804	805	827	835	821
Coal bituminous ⁸	do.	1,339	1,114	1,341	1,340 °	1,300 °
Coke, including breeze, metallurgical	do.	38,314	38,095	38,543	38,707	38,568
Gas. natural:		,	,		,	,
Gross ⁹	million cubic meters	2,883	3,120	3,302	3,708	3,735
Marketed	do.	3,048	3,265	3,494	3,900 °	3,900 °
Petroleum		,	,	,	,	,
Crude	thousand 42-gallon barrels	5,247	5,772	5,643	6,041	6,200
Refinery products:		- , - ,	- , · ·	- ,	- 3 -	- ,
Gasoline:						
Aviation ^e	do	50	50	50	50	50
Other	do	366.662	368.102	364.070	365.000 °	360.000 °
Asphalt and bitumen	do	34.475	33.288	32,777	33.000 °	33.000 °
Distillate fuel oil	do	243.425	251.729	251.311	247.000 °	250.000 °
	do	64,846	69.946	76.390	80.000 °	82.000 °
Kerosene	do	167 348	177 091	167 779	175 000 °	170 000 °
Liquefied petroleum gas	do	50 881	56 352	55 696	57 000 °	58 000 °
Lubricants	do	16 561	16 580	16 706	16 500 °	17 000 °
Nanhtha	do	125 252	135 792	136 140	138 000 °	139,000 °
Paraffin wax	do	902	902	824	850 °	800 °
Petroleum coke	do	4 533	4 394	4 810	4 600 °	4 500 °
Pofingry fuel and logges ^{e, 10}	do.	150 000	150 000	150,000	150,000	150,000
Residual fuel oil	do.	406 901	400 936	373 047	350,000 °	330 000 °
Unfinished eile ^e	do.	50,000	50,000	50,000	50,000	50,000
Unimistica ons	do.	1 680 000	1 720 000	1 680 000	1 670 000	1 640 000
10(a)	d0.	1,000,000	1,720,000	1,000,000	1,070,000	1,040,000

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

¹Table includes data available through November 16, 2009.

²Includes alloyed and unalloyed ingot.

³Includes metal recovered from scrap and waste.

⁴Includes oxide of cerium, europium, gadolinium, lanthanum, neodymium, praseodymium, samarium, terbium, and yttrium.

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

⁶Reported figure for fiscal year, which began on April 1 and ended on March 31 of the following year.

⁷Not elswhere specified.

⁸All major coal mines had closed by January 2002, but eight smaller mines were still in operation in 2008.

⁹Includes output from gas wells and coal mines.

¹⁰May include some additional unfinished oils.

TABLE 2 JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

		Major operating companies		Annual
Commodity		and major equity owners	Location of main facilities	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, Apmori Prefecture;	13,467
			Higashiyama, Higashiiwai-gun, Iwate Prefecture;	
			Yokoze, Saitama Prefecture; Kurosaki, Kyushu,	
			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
Do.		Ryukyu Cement Co. Ltd.	Yabu, Nago, Okinawa Prefecture	722
Do.		Sumitomo Osaka Cement Co. Ltd.	Tamura, Fukushima Prefecture; Aso, Tochigi	14,402
			Prefecture; Motosu, Gifu Prefecture; Sakata,	
			Shiga Prefecture; Ako, Hyogo Prefecture; and	
			Susaki, Kochi Prefecture	
Do.		Taiheiyo Cement Corp.	Ofunato, Iwate Prefecture; Chichibu, Kumagaya,	28,800
			and Saitama, Saitama Prefecture; Fujiwara,	*
			Mie Prefecture; Saiki and Tsukumi, Oita	
			Prefecture; Kamiiso, Hokkaido Prefecture;	
			and Tosa. Kochi Prefecture	
Do.		Tokuvama Cement Co. Ltd.	Nanvo. 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 metr	ric 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	Onahama, Fukushima Prefecture	258,000
		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; and others, 2.91%)		
Do.	do.	Pan Pacific Copper Co., Ltd. (Nippon Mining &	Saganoseki, Oita Prefecture; Hitachi, Ibaraki	710,000
		Metals Co., Ltd., 66%, and Mitsui Mining and	Prefecture: and Tamano Okavama Prefecture ²	
		Smelting Co., Ltd., 34%)		
Do.	do.	Sumitomo Metal Mining Co. Ltd. (SMM)	Besshi/Toyo (Saijyo), Ehime Prefecture	410,000
Do.	do.	Kosaka Smelting and Refining Co. Ltd. (wholly	Kosaka. Akita Prefecture	72.000
		owned subsidiary of Dowa Mining Co. Ltd.)		. ,
Gold:				
In concentrate kild	ograms	Sumitomo Metal Mining Co. Ltd. (SMM)	Hishikari, Kagoshima Prefecture	9.000
Refined	do.	Kosaka Smelting and Refining Co. Ltd. (whollv	Kosaka, Akita Prefecture	24.000
		owned subsidiary of Dowa Mining Co. Ltd.)	,	,
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.	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 2008

(Thousand metric tons unless otherwise specified)

		Major operating companies		Annual
Com	modity	and major equity owners	Location of main facilities	capacity
Iodine, crude	metric tons	Ise Chemical Industries Co. Ltd. (Asahi Glass Co.	Oami-Shirasato, and Ichinomya, Chiba	3,600
		Ltd., 52.4%, and Mitsubishi Corp., 11.2%)	Prefecture; and Sadowara, Miyazaki Prefecture	
Do.	do.	Godo Shigen Sangyo Co. Ltd. (Kanto Natural Gas Development Co. Ltd., 11%, and Mitsui &	Chosei, Chiba Prefecture	2,400
		Co. Ltd., 10%)		
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, Otia Prefecture	12,000
Do.		Ube Kosan Co. Ltd.	Ube Isa, Yamaguchi Prefecture	9,000
Manganese, elec	etrolytic dioxide	Mitsui Mining and Smelting Co., Ltd.	Takehara, Hiroshima Prefecture	24
Do.		Tosoh Corp.	Hyuga, Miyazaki Prefecture	34
Nickel: In ferronicke	l metric tons	Hyuga Smelting Co. Ltd. [wholly owned subsidiary of Sumitomo Metal Mining Co. Ltd. (SMM)]	Hyuga, Miyazaki Prefecture	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

TABLE 2—Continued JAPAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

		Major operating companies		Annual
Com	modity	and major equity owners	Location of main facilities	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	Chiba, Chiba Prefecture; Kawasaki (Keihin), Kanagawa	33,835
		Holdings Inc.)	Prefecture; Nishinomiya, Hyogo Prefecture;	
			Handa Aichi Prefecture; Fukuyama, Hiroshima	
			Prefecture; and Kurashiki, Okayama Prefecture	
Do.		Kobe Steel Ltd.	Kakogawa and Kobe, Hyogo Prefecture	8,943
Do.		Nippon Steel Corp.	Oita, Oita Prefecture; Kawata, Fukuoka	33,199
			Prefecture; Kimitsu, Chiba Prefecture;	
			and Nagoya, Aichi Prefecture	
Do.		Sumitomo Metal Industries, Ltd.	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	
Titanium:				
In sponge me	etal	Sumitomo Titanium Corp. (Sumitomo Metal	Amagasaki, Hyogo Prefecture	24
		Industries, Ltd., 75.2%, and Kobe Steel Ltd., 24.8%)		
Do.		Toho Titanium Co. Ltd. (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%;	Iijima, Akita Prefecture	200,400
		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%; 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.	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.

¹Coal mining operations continued following the establishment of Kushiro Coal Mine Co. Ltd. in 2002.

²Saganoseki Smelter and Refinery and Hitachi Refinery [450,000 metric tons per year (t/yr)] and Tamano Smelter and Refinery (260,000 t/yr).

³Secondary lead smelter and refinery.

TABLE 3 JAPAN: SUPPLY AND DEMAND FOR SELECT NONFERROUS METALS

(Metric tons unless otherwise specified)

		Refined copper			Refined lead	
	2006	2007	2008	2006	2007	2008
Stocks at the beginning	97,672	102,807	101,931	9,554	17,562	14,224
Production	1,532,055	1,576,818	1,539,838	219,640	219,423	224,905
Imports	75,256	102,273	90,470	34,955	24,800	25,497
Total supply	1,704,983	1,781,898	1,732,239	264,149	261,786	264,626
Exports	319,815	428,079	423,455	4,404	19,147	26,246
Reported consumption	1,252,185	1,241,893	1,219,740	240,217	229,581	211,261
Total demand	1,572,000	1,669,972	1,643,195	244,621	248,728	237,507
Stocks at the end	102,807	101,931	124,379	17,562	14,224	22,134
Apparent consumption	1,282,361	1,251,888	1,184,405	242,183	228,414	216,246
		Refined zinc		S	ilver (kilograms)	
	2006	2007	2008	2006	2007	2008
Stocks at the beginning	106,402	93,878	82,069	843,152	1,190,744	881,919
Production	614,331	597,650	615,533	2,253,203	2,263,009	2,042,604
Remelting	NA	NA	NA	228,498	391,869	253,374
Imports	40,649	53,145	45,287	1,838,845	1,540,073	2,098,409
Total supply	761,382	744,673	742,889	5,163,698	5,385,695	5,276,306
Exports	73,369	74,187	84,505	1,605,384	2,205,575	1,978,353
Reported consumption	469,592	487,578	450,010	2,241,756	2,262,457	1,868,883
Total demand	542,961	561,765	534,515	3,847,140	4,468,032	3,847,236
Stocks at the end	93,878	82,069	94,521	1,190,744	881,919	959,905
Apparent consumption	594,135	588,417	563,863	2,367,570	2,298,201	2,338,048

NA Not applicable.

Source: Japan Mining Industry Association.

TABLE 4

JAPAN: RESERVES OF MAJOR MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Commodity		Exploitable reserves
Coal ²		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
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^eEstimated.

¹Reserves as of 2004.

²Recoverable reserves, including brown coal.

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