

# Mines and Mineral Processing Facilities in the Vicinity of the March 11, 2011, Earthquake in Northern Honshu, Japan

## Mines and Mineral Processing Facilities in Northern Honshu, Japan

U.S. Geological Survey data indicate that the area affected by the March 11, 2011, magnitude 9.0 earthquake and associated tsunami is home to nine cement plants, eight iodine plants, four iron and steel plants, four limestone mines, three copper refineries, two gold refineries, two lead refineries, two zinc refineries, one titanium dioxide plant, and one titanium sponge processing facility (fig. 1, table 1). These facilities have the capacity to produce the following percentages of the world's nonfuel mineral production: 25 percent of iodine, 10 percent of titanium sponge (metal), 3 percent of refined zinc, 2.5 percent of refined copper, and 1.4 percent of steel. In addition, the nine cement plants contribute about one-third of Japan's cement annual production. The iodine is a byproduct from production of

natural gas at the Miniami Kanto gas field, east of Tokyo in Chiba Prefecture. Japan is the world's second leading (after Chile) producer of iodine, which is processed in seven nearby facilities.

## Requirements for Operation of the Mines and Mineral Processing Facilities

Maintaining or resuming operations at the facilities listed earlier in this report will depend not only on whether the facilities sustained damage from the earthquake and tsunami but also upon the condition of the surrounding infrastructure, including electric power and transportation systems (ports, railroads, and roads), necessary to obtain raw materials and to deliver finished products, as well as on reassembling the workforce that operates the facilities.

Mineral extraction and processing facilities are large consumers of

electricity. When operating at full capacity, these facilities consume about 2.5 percent of Japan's production of electricity. A number of the facilities, which were not damaged by the earthquake, have limited activity or ceased operation owing to restrictions on the use of electricity. Figures 2 and 3 show the effect of the earthquake on electrical power availability as indicated by lights observed in images produced by the Earth Observation Group of the National Oceanic and Atmospheric Administration on the nights of March 9 and 12.

Figure 1 shows the location of railroads and ports in the region. Popular media reports indicated damage to the ports at Hitachi, Ishinomaki, Kamaishi, Kashima, Kesenuma, Miyako, Ofunato, Onagawa, Sendai, Soma, and Shiogama. In addition, damage was sustained at the port of Hachinohe, which is north of the area shown on the map in figure 1.

**Table 1.** Mines and mineral processing facilities in northern Honshu, Japan.

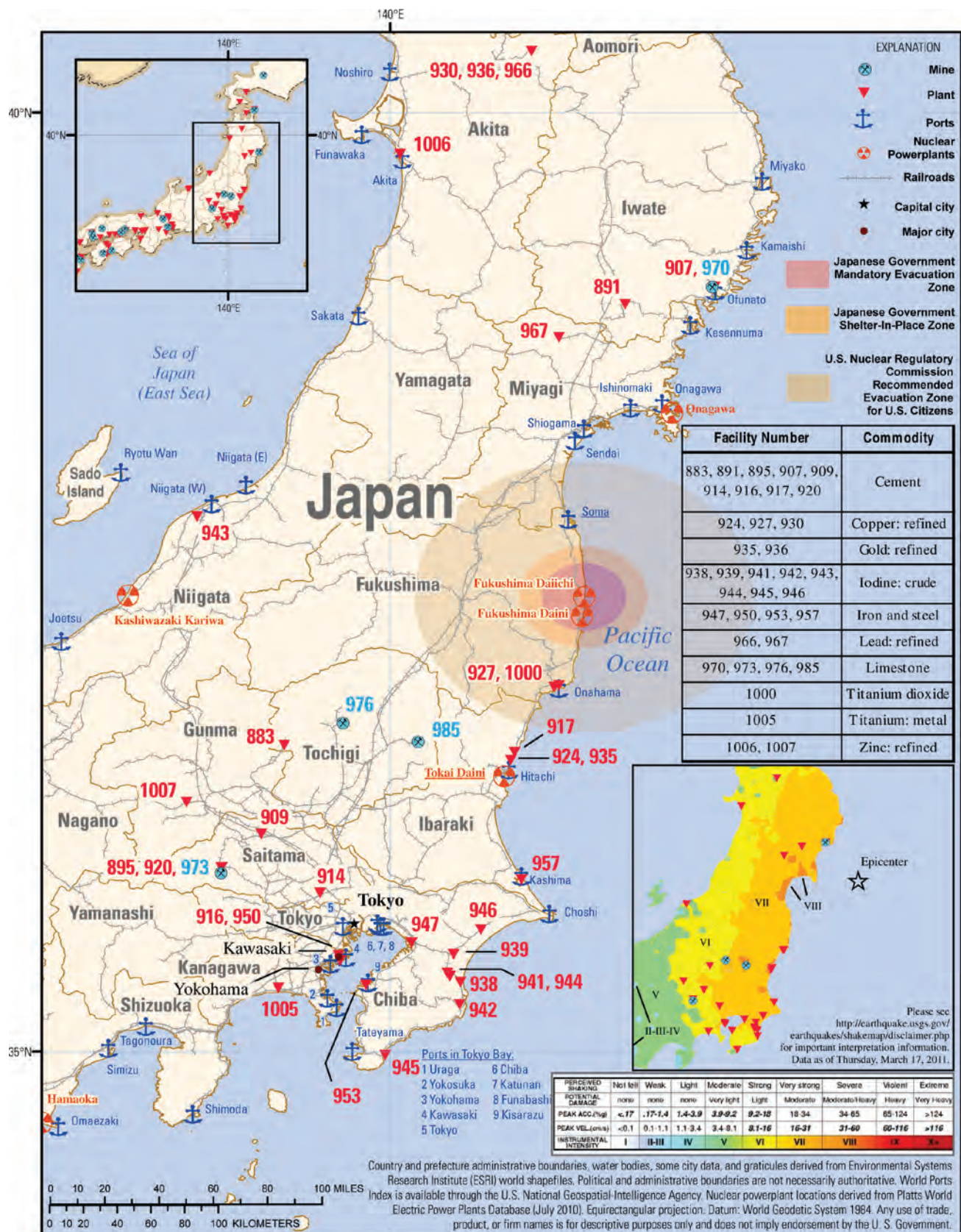
[NA, not available]

Facility no. (fig. 1)	Mineral commodity	Location	Facility type	Operating company	Principal owner
883	Cement	Asio, Tochigi Prefecture	Plant	Sumitomo Osaka Cement Co. Ltd.	NA
891	Cement	Higashiyama, Iwate Prefecture	Plant	Mitsubishi Materials Corp.	NA
895	Cement	Yokoze, Saitama Prefecture	Plant	Mitsubishi Materials Corp.	NA
907	Cement	Ofunato, Iwate Prefecture	Plant	Taiheiyo Cement Corp.	NA
909	Cement	Kumagaya, Saitama Prefecture	Plant	Taiheiyo Cement Corp.	NA
914	Cement	Saitama, Saitama Prefecture	Plant	Taiheiyo Cement Corp.	NA
916	Cement	Kawasaki, Kanagawa Prefecture	Plant	Daiichi Cement Co. Ltd.	NA
917	Cement	Hitachi, Ibaraki Prefecture	Plant	Hitachi Cement Co. Ltd.	NA
920	Cement	Chichibu, Saitama Prefecture	Plant	Taiheiyo Cement Corp.	NA
924	Copper, refined	Hitachi, Ibaraki Prefecture	Plant	Pan Pacific Copper Co. Ltd.	Nippon Mining and Metals Co. Ltd., 60%
927	Copper, refined	Onahama, Fukushima Prefecture	Plant	Onahama Smelting and Refining Co. Ltd.	Mitsubishi Materials Corp., 49.29%
930	Copper, refined	Kosaka, Akita Prefecture	Plant	Kosaka Smelting and Refining Co. Ltd.	Dowa Metals and Mining Co. Ltd., 100%

**Table 1.** Mines and mineral processing facilities in northern Honshu, Japan.—Continued

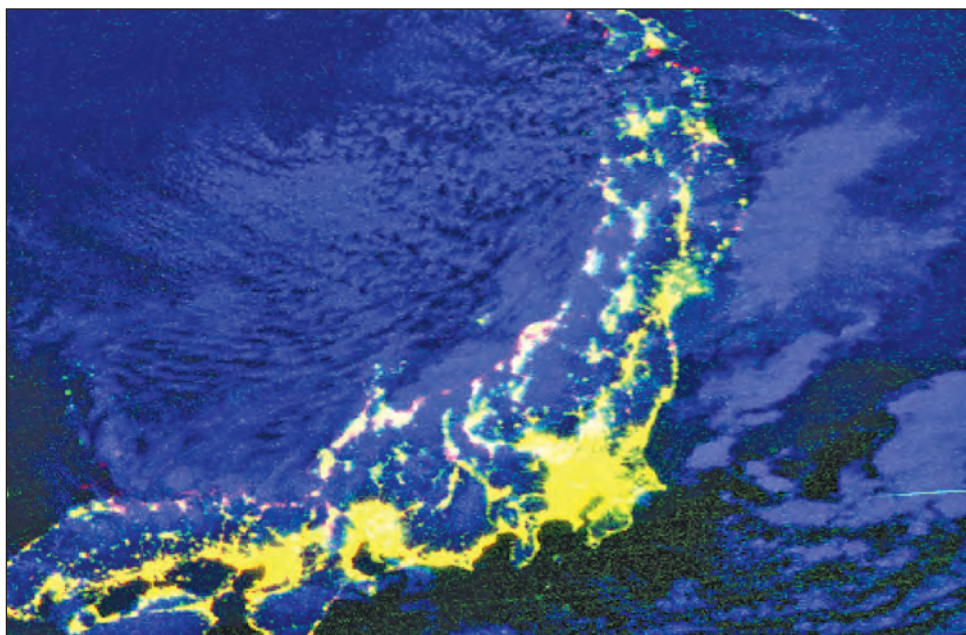
[NA, not available]

Facility no. (fig. 1)	Mineral commodity	Location	Facility type	Operating company	Principal owner
935	Gold, refined	Hitachi, Ibaraki Prefecture	Plant	Pan Pacific Copper Co. Ltd.	Nippon Mining and Metals Co. Ltd., 60%
936	Gold, refined	Kosaka, Akita Prefecture	Plant	Kosaka Smelting and Refining Co. Ltd.	Dowa Metals and Mining Co. Ltd., 100%
938	Iodine, crude	Ichinomiya, Chiba Prefecture	Plant	Ise Chemical Industries Co. Ltd.	Asahi Glass Co. Ltd., 52.4%
939	Iodine, crude	Oami-Shirasato, Chiba Prefecture	Plant	Ise Chemical Industries Co. Ltd.	Asahi Glass Co. Ltd., 52.4%
941	Iodine, crude	Chosei, Chiba Prefecture	Plant	Godo Shigen Sangyo Co. Ltd.	Kanto Natural Gas Development Co. Ltd., 11%
942	Iodine, crude	Isumi, Chiba Prefecture	Plant	Nippon Chemicals Co. Ltd.	Nippon Shokubai Co. Ltd., 17%
943	Iodine, crude	Kurosaki, Niigata Prefecture	Plant	Toho Earthtech, Inc.	Itochi Corp., 34.1%
944	Iodine, crude	Mobara, Chiba Prefecture	Plant	Kanto Natural Gas Development Co. Ltd.	Mitsui Chemicals, Inc., 21.9%
945	Iodine, crude	Shirako, Chiba Prefecture	Plant	Nihon Tennen Gas Co. Ltd.	Kanto Natural Gas Development Co. Ltd., 50%
946	Iodine, crude	Yokoshiba, Chiba Prefecture	Plant	Nihon Tennen Gas Co. Ltd.	Kanto Natural Gas Development Co. Ltd., 50%
947	Iron and steel, crude steel	Chiba, Chiba Prefecture	Plant	JFE Steel Corp.	JFE Holdings Inc., 100%
950	Iron and steel, crude steel	Kawasaki (Keihin), Kanagawa Prefecture	Plant	JFE Steel Corp.	JFE Holdings Inc., 100%
953	Iron and steel, crude steel	Kimitsu, Chiba Prefecture	Plant	Nippon Steel Corp.	NA
957	Iron and steel, crude steel	Kashima, Ibaraki Prefecture	Plant	Sumitomo Metal Industries, Ltd.	NA
966	Lead, refined	Kosaka, Akita Prefecture	Plant	Kosaka Smelting and Refining Co. Ltd.	Dowa Metals and Mining Co. Ltd., 100%
967	Lead, refined	Hosokura, Miyagi Prefecture	Plant	Hosokura Smelting and Refining Mining Co. Ltd.	Mitsubishi Materials Corp., 100%
970	Limestone	Ofunato, Iwate Prefecture	Mine	Taiheiyo Cement Co. Ltd.	NA
973	Limestone	Taiheiyo Buko, Saitama Prefecture	Mine	Taiheiyo Cement Co. Ltd.	NA
976	Limestone	Hanezuru, Tochigi Prefecture	Mine	Nittetsu Mining Co. Ltd.	NA
985	Limestone	Karasuyama, Tochigi Prefecture	Mine	Sumitomo-Osaka Cement Co. Ltd.	NA
1000	Titanium dioxide	Onahama, Fukushima Prefecture	Plant	Sakai Chemical Industries Co. Ltd.	NA
1005	Titanium, sponge metal	Chigasaki, Kanagawa Prefecture	Plant	Toho Titanium Co. Ltd.	Nippon Mining and Metals Co. Ltd., 47%
1006	Zinc, refined	Iijima, Akita Prefecture	Plant	Akita Zinc Co. Ltd.	Dowa Metals and Mining Co. Ltd., 81%
1007	Zinc, refined	Annaka, Gunma Prefecture	Plant	Toho Zinc Co. Ltd.	NA

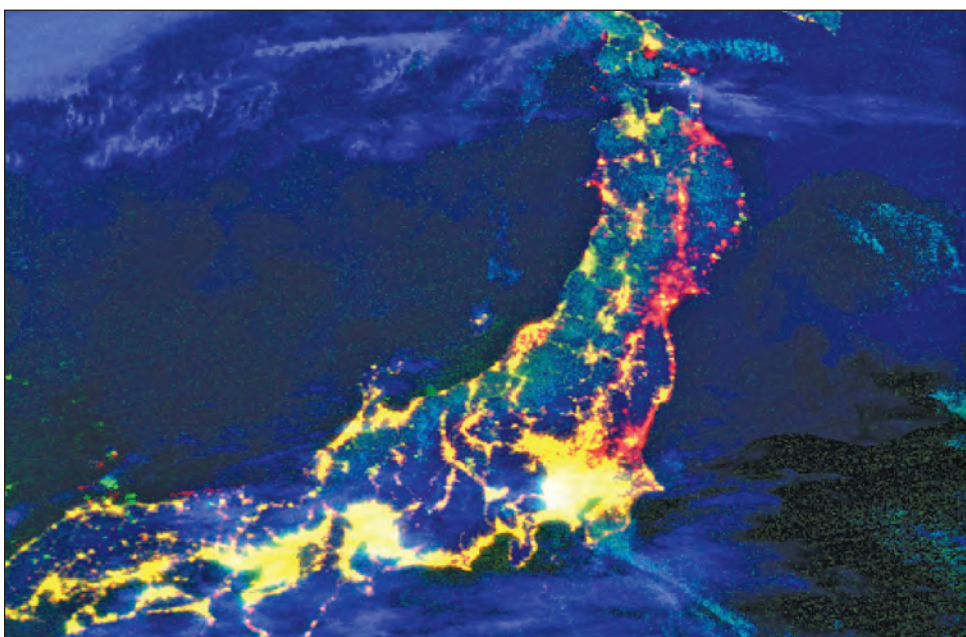


**Figure 1.** Map showing the location of mines and mineral facilities in Japan. Modified from Baker and others (2010).





**Figure 2.** Composite color image by the Earth Observation Group of the National Geophysical Center, National Oceanic and Atmospheric Administration from satellite data captured at 10:07 UTC on March 9, 2011, from U.S. Air Force Defense Meteorological Satellite Program satellite F-18. The yellow color on the map shows lights, magenta indicates lights obscured by clouds, light blue shows clouds, dark blue is the ocean, red indicates locations under a power outage, and green is lighting diffused by cloud cover.



**Figure 3.** Composite color image by the Earth Observation Group of the National Geophysical Center, National Oceanic and Atmospheric Administration from satellite data captured at 21:30 UTC on March 12, 2011 (one day after the earthquake), from U.S. Air Force Defense Meteorological Satellite Program satellite F-18. The yellow color on the map shows lights, magenta indicates lights obscured by clouds, light blue shows clouds, dark blue is the ocean, red indicates locations under a power outage, and green is lighting diffused by cloud cover.

## Conclusions

Understanding the long term effects of the March 11th earthquake and tsunami is only beginning. According to *The Economist* (2011), the economic impact of natural disasters is often short-lived; however, “earthquakes have small but consistently negative effects on economic growth” owing to destruction of factories, transportation infrastructure, and electrical systems. In the short-term, lost production of mineral commodities will likely be felt in Japan and beyond.

## References Cited

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- Economist*, The, 2011, The cost of calamity: *The Economist*, March 17, p. 86. (Accessed March 22, 2011, at <http://www.economist.com/node/18387016>.)

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