



2013 Minerals Yearbook

VIETNAM [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF VIETNAM

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In 2013, Vietnam ranked seventh in the production of crude petroleum in the Asia and Pacific region. Vietnam also produced 1.8%, 1.4%, and 0.9% of the world's tin, cement, and barite, respectively (U.S. Energy Information Administration, 2014; Anderson, 2015; McRae, 2015; van Oss, 2015). Other minerals produced in the country included chromium ore, coal, natural gas, lead, phosphate rock, salt, and zirconium. As for major processed minerals, Vietnam produced refined copper, rolled steel, refined tin, and zinc (table 1).

In recent years, Vietnam has been investing in the renewable energy industry, mainly as an alternative to reduce dependence on fossil fuels. In December 2012, Vietnam commissioned the largest hydropower plant built in the country. The Son La Hydropower Plant, which was located in Son La Province, was built at an estimated cost of \$3.2 billion, and had a generating capacity of 2.4 gigawatts (GW). The country expected to increase the percentage of electricity generated from renewable resources to 4.5% of total electricity production by 2020 and 6% by 2030, from an estimated 2% produced in 2010. The country planned to increase the total capacity for wind-generated electricity to 1 GW by 2020 and 6.2 GW by 2030, and for biomass power and power generated at sugar plants to 500 megawatts (MW) by 2020 and 2 GW by 2030 (Webb, 2013).

Minerals in the National Economy

According to the General Statistics Office of Vietnam, the output value of the mining and quarrying sector (which included mineral fuels and nonfuel minerals) in 2012 (the latest year for which data were available) increased by about 3.5% to an estimated \$11.2 billion¹ (in 2010 constant dollars) from \$10.8 billion in 2011. In 2012, the mining and quarrying sector made up 9.6% of the country's total estimated gross domestic product of \$116.6 billion (in 2010 constant dollars) (General Statistics Office of Vietnam, 2012b).

Government Policies and Programs

During 2012 and 2013, the Government of Vietnam continued with the creation and approval of decrees in support of the implementation of the 2010 Mineral Law in order to attract international interest in the country's potential for mining coal and nonfuel minerals. On November 28, 2013, the Government of Vietnam approved Decree 203/2013/ND-CP, which regulates the method for calculating the fees due before the granting of mineral mining rights (that is, the fees are based on the estimated value of the reserves within the licensed zone), the method used for the collection of the fees,

¹Where necessary, values have been converted from Vietnam dong (VND) to U.S. dollars (US\$) at an average rate of VND20,878=US\$1.00 for 2013 and VND20,693=US\$1.00 for 2012.

and the management and uses of the fees. The Decree, which was to take effect starting on January 20, 2014, was to replace Article 42 of the Government Decree 15/2012/ND-CP of March 9, 2012. The fees associated with the granting of mining rights for construction materials was 5%; peat, 4%; limestone, refractory clay, serpentine, and white sand, 3%; and gemstones and unspecified metal minerals, 2% (Vietnam Law and Legal Forum, 2013; Mai Counsel Law Firm, 2014).

On January 9, 2012, the Government issued Directive 02/CT-TTg (Directive 02), which provided for a specific licensing process for mineral ores, such as apatite, bauxite, cement, chromite, coal, copper, gold, lead, manganese, rare earths, and zinc. Under Directive 02, licenses for new exploration and mining of bauxite and alumina-related products will not be granted until the Tan Rai and Nhan Co Mines, which are located in the Provinces of Lam Dong and Dak Nong, respectively, are commissioned and operational. Exploration licenses for coal and minerals related to the manufacturing of cement will continue to be granted provided they conform to the country's mineral law. Directive 02 also prohibits the issuance of new licenses for the mining of placer gold; it bans the exportation of unprocessed titanium ore starting on July 1, 2012; it establishes that all mining projects must be appraised by the Appraisal Council of the Ministry of Industry and Trade, the Ministry of Construction, and the provincial or municipal committee (Mayer Brown JSM, 2012).

On December 21, 2012, the Ministry of Industry and Trade released Circular No. 41/2012/TT-BCT (Circular 41), which went into effect on February 4, 2013, and provided the guidelines for the export of minerals. The circular included a list of minerals allowed for exportation, the specific quality of the material (percentage of contained mineral), and the conditions for which the minerals could be exported. The goods included metallic and industrial minerals. The circular does not regulate the exportation of coal, natural gas, petroleum, minerals used as construction materials, and minerals used as raw materials for the production of cement. Circular 41 specifies that mineral exports must comply with certain conditions, such as that minerals must be in a processed state (to encourage domestic processing of ore) and listed as allowed for export, they must reach the minimum percentage of mineral content in the ore, and the material must have been mined legally in mines with valid licenses or imported lawfully. The Heavy Industry Department of the Ministry of Industry and Trade (MIT) was the designated entity responsible for the coordination and logistics of mineral exports and the entity responsible for overseeing its compliance (General Department of Vietnam Customs, 2013).

Production

Most of data compiled in table 1 are considered estimates mainly because the latest data available are from 2012. However, mineral production increased for bauxite (by about

150%) mainly owing to the start of the trial production period at the Tan Rai alumina and bauxite complex (details are discussed in the “Commodity Review” section). Production decreased for manganese (by 38%), monazite (52%), titanium (47%), and zirconium (51%). Data on mineral production are in table 1.

Structure of the Mineral Industry

Investments in the mining and quarrying sector for 2012 (latest year for which data were available) accounted for approximately \$2.6 billion (in 2010 constant prices), which represented about 6.9% of the total investments in the country (General Statistics Office of Vietnam, 2012a). Table 2 is a list of major mineral industry facilities, whose ownership is dominated by Government-owned enterprises.

Mineral Trade

During 2013, the Trans-Pacific Partnership (TPP) agreement was being negotiated among 12 countries—Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States, and Vietnam. The TPP agreement is a proposal to form a regional free trade agreement (FTA) among the member countries that might be of economic importance given the relevance of trade between the Asia and the Pacific region and the world (Williams, 2013).

The trade data reported compare 2011 and 2012 because they were the latest years for which trade data were available from the General Statistics Office of Vietnam. In 2012, Vietnam’s total trade increased by about 12% to \$228.3 billion from \$203.7 billion in 2011. The total value of exports for 2012 was about \$114.5 billion compared with about \$97 billion in 2011 (an increase of 18%). In 2012, the total value of imports increased by about 6.6% to \$113.8 billion from \$106.7 billion in 2011. Vietnam’s main trading partners in 2012 were Australia, Burma, China, Germany, Hong Kong, India, Japan, the Republic of Korea, Malaysia, Taiwan, Thailand, and the United States. The United States was Vietnam’s leading export partner, followed by Japan and China. Vietnam’s imports came mainly from China, Hong Kong, and India (General Statistics Office of Vietnam, 2012c).

Commodity Review

Metals

Aluminum and Bauxite and Alumina.— In February, Vietnam National Coal and Mineral Industries Group (VINACOMIN) announced the suspension of the construction of the Ke Ga Deepwater Port, which was to be located in Binh Thuan Province. The decision was made after reevaluation of the project revealed that it would not be cost effective based on distance, transportation costs, port capacity, and other factors. The port was originally designed to transport alumina from the Tan Rai and Nhan Co alumina plants. To save investment costs, VINACOMIN was considering a new location in Vinh Tan Port, which is located 120 kilometers (km) from Binh Thuan Province and was expected to be commissioned in 2014 (Businessstimes.com.vn, 2013).

By yearend 2012, VINACOMIN announced that the Tan Rai alumina and bauxite complex had successfully carried out the trial production of aluminum products. In addition, the Government had been investing in infrastructure upgrades, such as roads, to connect the Tan Rai plant to highways and ports to facilitate the transportation of alumina for export. In October 2013, VINACOMIN announced the commissioning of the Tan Rai alumina plant, which is located in the Bao Lam District in Lam Dong Province in the country’s Central Highlands. Construction of the project began in 2008 with a capital investment of \$700 million; the designed production capacity of the plant would be 650,000 metric tons per year (t/yr) of alumina when operating at full capacity (Vietnam National Coal-Mineral Industries Holding Co. Ltd., 2012a–c; 2013a, b).

In Dak Nong Province, VINACOMIN was also building the Nhan Co bauxite mining and refinery complex, which is expected to start operations in 2014, at a cost of \$665 million. Initial output was projected at 300,000 t/yr alumina, reaching full capacity of 650,000 t/yr of alumina by 2016. The project would include an alumina refinery and a bauxite ore processing plant. With the commissioning of the Tan Rai and Nhan Co projects, the country was expected to produce about 1.3 million metric tons per year (Mt/yr) of alumina at full capacity, from which between 600,000 t/yr and 900,000 t/yr would be sold to the Yunnan Metallurgical Group of China in a 30-year purchase agreement (Thomson Reuters, 2012; Vietnam National Coal-Mineral Industries Holding Co. Ltd., 2012a, c).

During 2013, VINACOMIN evaluated the economic effectiveness of the Tan Rai and Nhan Co projects. In March, VINACOMIN acknowledged that performance at the Tan Rai plant had been below initial expectations. Factors contributing to the poor effectiveness of the plant were the increase in the total capital invested, the high prices of raw materials, and the decrease in the price of alumina. VINACOMIN planned to run the projects at low capacity until 2015 for continuing trials and analysis. The Government also decided to delay the construction of four additional bauxite plants until after 2020, depending on market conditions and the performance of the Tan Rai and Nhan Co projects (Thanhnieenews.com, 2013b; Vietnam Investment Review, 2013b).

Fluorspar and Tungsten.—In 2013, Masan Group of Vietnam announced the commissioning of the country’s first minerals processing plant and mine with a capacity to process 3.5 Mt/yr of ore. The facility produced bismuth, copper, fluorspar, and tungsten. Nui Phao Mine, which is located in Thai Nguyen Province in northeast Vietnam, had an estimated resource of 8.5 Mt of fluorspar. The Nui Phao deposit had an estimated ore reserve of 52.5 million metric tons (Mt) with an average grade of 0.21% tungsten trioxide. On July 29, Nui Phao Mining Co. Ltd. (NPM), a subsidiary of Masan Group, entered into a joint-venture agreement with H.C. Starck GmbH of Germany to establish Nui Phao-H.C. Starck Tungsten Chemical Manufacturing LLC, which was created for the manufacturing of nonferrous metals and precious metals. The joint-venture company, in which NPM had a 51% stake, was scheduled to be established officially in January 2014 (Masan Group, 2013, p. 30–31, 141, 144, 146).

On April 11, Hazelwood Resources Ltd. of Australia announced that the ATC Ferrotungsten project in Vietnam was commissioned, and total production for 2013 was 511 metric tons (t) of ferrotungsten. The company claimed that the ATC plant was considered the largest ferrotungsten plant, in terms of capacity, to be built outside of China. The plant has a designed capacity of 4,000 t/yr of ferrotungsten alloy (Hazelwood Resources Ltd., 2013a, b).

Gold.—In July, Besra Gold Inc. of Canada announced in a press release a dispute with the General Department of Vietnam Customs over two tax claim cases that involved two of Besra's operating companies, the Bong Mieu Gold Mining Co. (BMGMC) and the Phuoc Son Gold Co. (PSGC). Vietnam Customs claimed that, during 2011 and 2012, gold exported by both companies did not comply with the country's gold exportation requirements, alleging that several shipments did not meet the 99.99% gold purity standard and, therefore, were subject to a 10% tax. Based on Vietnam's gold exportation regulation, no export duties are charged if the goods comply with the requirements. Vietnam Customs assessed BMGMC and PSGC approximately \$12 million in export duties. Besra disputed the charges, arguing that the gold in the disputed shipments was refined in the country to 99.99% purity. In September, Vietnam Customs announced the suspension of the export tax assessments pending the resolution of the dispute (Besra Gold Inc., 2013c, d).

Besra Gold owns an interest in several gold projects in Quang Nam Province, which is located in the Central Highlands of Vietnam; the most prominent are the Bong Mieu Mine and the Phuoc Son Mine. During 2013, Besra's processing plants in the country were performing at recovery rates of 92% to 95% at the Phuoc Son Mine and at 88% to 89% at the Bong Mieu Mine. For the fiscal year ending on June 30, 2013, the combined properties produced 1,872 kilograms (kg) of gold (reported as 60,187 ounces). Projected production in 2014 was expected to be 2,000 to 2,200 kg of gold. On November 18, Besra announced the temporary halt of its operations at Bong Mieu owing to several landslides and road closures on the road leading to the mining facility that were associated with the heavy rains of typhoon Nari (October 15), tropical storm Haiyan (November 10), and tropical depression Podul (November 15) (Besra Gold Inc., 2013a; 2013 b, p. 6, 8, 10; Jackson, 2013).

The Bong Mieu gold project consisted of the Ho Gan open pit mine, which was depleted and ceased operations in April 2012, and the underground deposits, which closed in August 2012 owing to low grades of ore. In addition, the Bong Mieu hosted the Nui Kem underground mine and the Ho Ray-Thac Trang deposit, which is currently undergoing a feasibility analysis. The Phuoc Son gold project consisted of the Bai Dat and the Bai Go underground mines, which are hosted under the Dak Sa Shear Zone. Besra Gold also had interests in the Tien Thuan gold project, which is located 50 km west of the city of Qui Nhon in Binh Dinh Province; no additional information was available (Besra Gold Inc., 2013b, p. 10).

Nickel.—On January 4, Asian Mineral Resources Ltd. (AMR) of Canada welcomed the release of Circular 41 by the Ministry of Industry and Trade, which allows the export of nickel concentrate at 9.5% of nickel. According to AMR, the

circular stipulated that AMR's subsidiary Ban Phuc Nickel Mines LLC (BPNM) would hold a permit that allowed it to export nickel concentrates for the life of the project. Previously, BPNM held a license to export nickel concentrate until yearend 2015. Effective on January 1, 2013, the export tariff for nickel matte was 5%; meanwhile, the existing export tariff for nickel concentrates remained at 20%. During 2012, a study was conducted at the Ban Phuc nickel project to determine the feasibility of adding a smelter, which according to AMR could potentially produce a high-value mixed metal matte containing 36% nickel, 14% copper, and 1% cobalt. Results indicated the project was viable and would have an estimated cost of \$24 million. During the first half of 2013, AMR focused on the construction of the nickel concentrate operation, which was expected to be commissioned in mid-2013 (Asian Mineral Resources Ltd., 2013c, d).

In February, AMR updated its mineral resources estimates for the Ban Phuc nickel project, which is located approximately 160 km west of Hanoi in Son La Province, to 1.7 Mt of measured and indicated mineral resources from 1.2 Mt at a grade of 2.7% nickel and 1.2% copper. In July, AMR announced that preliminary production at the Ban Phuc nickel project had begun and that the company expected to produce 6,600 t/yr of nickel, 3,300 t/yr of copper, and 200 t/yr of cobalt concentrate at full capacity. Commercial production started on November 1 (Asian Mineral Resources Ltd., 2013a, b).

Industrial Minerals

Cement.—In January, PT Semen Indonesia (Persero) Tbk (formerly PT Semen Gresik Tbk of Indonesia) officially acquired a 70% stake in Thang Long Cement JSC's cement plant in Quang Ninh Province. The plant had a production capacity of 2.3 Mt/yr; surplus cement from the plant was exported to Bangladesh, Myanmar, and several countries in Africa (Cemnet.com, 2012; International Cement Review, 2013).

In April 2013, the Government approved a proposal from the Vietnam Building Material Association to cancel nine cement plant projects and delayed several other projects until 2015. The decision was made based on the industry's projection of a surplus of 25 Mt of cement by 2015. However, the Government authorized the construction of the Xuan Thanh 2 cement plant, which is located in the Ha Nam Province and is expected to start operations in 2015 (GlobalCement.com, 2013).

Rare Earths.—During 2013, officials from the Governments of Vietnam and Japan continued the dialog to advance implementation of a cooperative agreement between the countries to develop the rare-earth industry in Vietnam. An initial agreement was signed at the end of 2011 for the exploration, mining, processing, and research of rare earths in Vietnam. In mid-2012, Vietnam inaugurated a center for rare-earth research and technology in the capital city of Hanoi. The establishment of the center, which focused on the study of rare-earth ore processing and its application in high-technology industries, was part of the initial cooperative agreement between the countries (China.org.cn, 2013).

Mineral Fuels

On June 21, the Governments of China and Vietnam extended an agreement for the joint exploration of oil and gas in the Gulf of Tonkin, Vietnam. The agreement, which was originally signed in 2006, was extended until 2016, and involved the expansion of the exploration area to 1,574 square miles from 595 square miles. The exploration has been handled by China National Offshore Oil Corp. (CNOOC) and Vietnam Oil & Gas Group (PetroVietnam); no reserves have been identified despite analyses being performed, including three-dimensional seismic surveys and drilling (Muoi, 2013).

Petroleum.—In October, PetroVietnam announced the start of the construction of Vietnam's second refinery, the Nghi Son refinery. The facility, which had a designed production capacity of 200,000 barrels per day (bbl/d), was developed by Kuwait Petroleum International Corp. of Kuwait (35.1%), Idemitsu Kosan Group of Japan (35.1%), PetroVietnam (25.1%), and Mitsui Chemicals of Japan (4.7%). Once commissioned and operating at full capacity, the Nghi Son refinery would more than double the country's refining capacity to 300,000 bbl/d. The refinery was expected to meet at least 40% of the country's estimated demand for petroleum products by 2017. The plant, to be located in Thanh Hoa Province, would have an annual refining capacity of 70 million barrels of crude oil (reported as 10 Mt) when the first phase is completed and would increase to 140 million barrels of crude oil (reported as 20 Mt) when the second phase is finalized. The investment in the project was estimated to be \$9 billion. During 2013, the demand for oil products was estimated at 17 Mt, of which about 60% was met through imports (EnerData.net, 2013; Tuoitrenews.vn, 2013).

During 2013, Dung Quat oil refinery, Vietnam's sole operating refinery, was being expanded to increase refining capacity to 200,000 bbl/d from 130,000 bbl/d. The project was expected to be commissioned by 2015. By the end of 2013, Gazprom Neft and PetroVietnam signed an agreement in which Gazprom proposed acquiring a stake in the Dung Quat oil refinery. Gazprom planned to acquire a 49% share in the Binh Son Refining and Petrochemical Co., which manages and controls the refinery. In 2013, PetroVietnam also announced plans to build the Long Son refinery, a 200,000-bbl/d oil refinery in Ba Ria-Vung Tau Province to be commissioned by 2018 (EnerData.net, 2013; Gazprom NEFT, 2013; Thanhniennews.com, 2013a).

Outlook

During 2013, the Vietnamese Government continued to create and approve decisions and decrees in support of the implementation of the 2010 Mineral Law in order to attract international interest in the country's potential for mineral production. In recent years, Vietnam has experienced an increase in international companies investing in mining projects in sectors such as bauxite, cement, copper, and gold. Robust trading with neighboring countries that included high-value exports and continued foreign direct investments (FDI) inflows have benefited Vietnam and increased trade within the Southeast Asia region. Future growth prospects depend on continued

economic stability, structural reforms, and updates in policy measures.

In the near future, increases in the production of bauxite, bismuth, cement, cobalt, copper, fluor spar, gold, nickel, and tungsten and its byproducts are expected as projects that were under development in 2012 and 2013 come online in 2014 and 2015. Vietnam continued to increase its access to natural gas and oil supplies, both domestic and foreign, to help meet the country's increasing energy demands.

By 2015, Vietnam expected to increase its FDI in Cambodia to \$3.2 billion, thereby increasing the total estimated trade between the countries to \$5 billion, compared with \$3.3 billion in 2012 (Vietnam Investment Review, 2013a).

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TABLE 1
VIETNAM: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

| Commodity ² | 2009 | 2010 | 2011 | 2012 | 2013 ^P | |
|--|----------------------------|----------------------|--------------------|--------------------|----------------------|---------------------|
| METALS | | | | | | |
| Antimony ore, Sb content | 664 | 608 | 714 | 755 | 800 | |
| Bauxite ^c | 80,000 | 80,000 | 100,000 | 100,000 | 250,000 | |
| Chromium ore, gross weight ^c | 37,105 ³ | 40,000 | 40,000 | 40,000 | 40,000 ^c | |
| Copper: | | | | | | |
| Concentrate, gross weight | 51,741 | 49,038 | 47,552 | 45,065 | 45,000 | |
| Concentrate, Cu content ^c | 11,300 ³ | 11,300 | 11,300 | 11,300 | 12,000 | |
| Metal, refinery ^c | 6,000 | 8,000 | 8,000 | 8,000 | 8,000 | |
| Gold, mine output, Au content ^c | kilograms | 3,000 | 3,500 | 3,500 | 3,500 ^c | |
| Iron and steel: | | | | | | |
| Iron ore: | | | | | | |
| Gross weight | 3,593,396 | 3,720,943 | 4,474,151 | 2,870,000 | 2,830,000 | |
| Fe content | 1,904,500 | 1,972,100 | 2,371,300 | 1,523,100 | 1,500,000 | |
| Metal: | | | | | | |
| Steel, crude | thousand metric tons | 1,702 ^{r,3} | 2,906 ^r | 2,931 | 2,992 ^r | 3,000 |
| Steel, rolled | do. | 7,498 ^r | 8,415 ^r | 8,085 | 7,640 | 7,500 |
| Lead, mine output, Pb content ^c | | 7,700 | 6,500 ^r | 6,400 | 6,300 | 6,000 |
| Manganese: ^c | | | | | | |
| Gross weight | 92,200 ³ | 82,700 | 64,600 | 15,800 | 9,700 | |
| Mn content (43%) | 39,600 ³ | 35,600 | 27,800 | 6,800 | 4,200 | |
| Monazite, concentrate, REO content | -- | 309 | 361 | 369 | 178 ³ | |
| Tin: | | | | | | |
| Mine output, Sn content ^c | 5,400 | 5,400 | 5,400 | 5,400 | 5,400 ^c | |
| Metal, smelter | 2,747 | 3,042 | 3,900 | 4,000 ^c | 4,000 ^c | |
| Titanium concentrate, gross weight ⁴ | 698,700 | 912,000 | 840,600 | 1,143,800 | 605,000 ³ | |
| Tungsten: | | | | | | |
| Mine output, W content | 725 | 1,150 | 1,635 | 1,050 | 1,100 | |
| Ferrotungsten, gross weight, shipped ⁵ | -- | -- | -- | -- | 511 | |
| Zinc: ^c | | | | | | |
| Mine output, Zn content | 38,000 | 36,000 | 34,000 | 25,000 | 25,000 | |
| Slab | 17,000 | 16,000 | 16,000 | 18,000 | 18,000 | |
| Zirconium, gross weight ⁶ | 6,800 | 6,900 | 14,000 | 15,600 | 7,600 ³ | |
| INDUSTRIAL MINERALS | | | | | | |
| Barite ^c | 75,000 ³ | 85,000 | 85,000 | 85,000 | 85,000 ^c | |
| Cement, hydraulic | thousand metric tons | 48,810 | 55,801 | 58,271 | 55,531 | 58,000 ^c |
| Lime | do. | 1,584 | 1,454 | 1,500 ^c | 1,500 ^c | 1,500 ^c |
| Phosphate rock: | | | | | | |
| Gross weight | do. | 2,047 | 2,325 | 2,395 | 2,365 | 2,400 |
| P ₂ O ₅ content ^c | do. | 614 | 680 | 720 | 710 | 720 |
| Salt | do. | 679 | 975 | 862 | 1,178 | 1,200 |
| Sand and gravel, and silica sand | do. | 123,000 | 110,300 | 101,295 | 90,354 | 90,000 |
| Stone, crushed | do. | 355,932 | 381,828 | 404,421 | 352,823 | 350,000 |
| MINERAL FUELS AND RELATED MATERIALS | | | | | | |
| Coal, anthracite | do. | 44,078 | 44,835 | 46,611 | 42,383 | 45,000 |
| Gas, natural, gross | million cubic meters | 8,010 | 9,402 | 8,480 | 9,403 | 9,400 |
| Petroleum, crude | thousand 42-gallon barrels | 119,968 | 110,098 | 111,351 | 122,747 | 123,000 |

^cEstimated; estimated data are rounded to no more than three significant digits. ^PPreliminary. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through July 11, 2014.

²In addition to the commodities listed, bentonite, refractory clay, construction aggregates, gemstones, granite, graphite, gypsum, kaolin clay, lignite, marble, nitrogen, pig iron, pyrite, pyrophyllite, rare earths, silver, and sulfur were produced but not reported. Available information is inadequate to make reliable estimates of output.

³Reported figure.

⁴Estimated based on Vietnam's estimated exports of titanium ore to China, Japan, the Republic of Korea, Malaysia, and the United States.

⁵Reported as tons of ferrotungsten shipped by Hazelwood Resources Ltd., which operates one of two ferrotungsten plants in Vietnam.

⁶Estimated based on Vietnam's estimated exports of zirconium ore to China.

TABLE 1—Continued
VIETNAM: PRODUCTION OF MINERAL COMMODITIES¹

Sources: Vietnam's General Statistics Office, Statistical Yearbook, 2009–12; World Metal Statistics, December 2009; South East Asia Iron and Steel Institute, Crude Steel Production, Annual Statistics, 2009–11; The Barytes Association, World Barytes Production, 2008–10; Copper Bulletin of the International Copper Study Group, 2012; International Chromium Development Association, Development Association, Statistical Bulletin, 2010–11; International Tungsten Industry Association, 2008–12; United Nations Comtrade Database for for years 2009–13.

TABLE 2
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|-----------|---|--|-----------------|
| Alumina | Vietnam National Coal and Mineral Industries Group (VINACOMIN) | Tan Rai alumina complex, Lam Dong Province | 600. |
| Barite | NA | Ao Sen deposit, Son Duong District, Tuyen Quang Province | 80. |
| Bauxite | Vietnam National Coal and Mineral Industries Group (VINACOMIN) | Tan Rai plant, Bao Lam District, Lam Dong District | 650. |
| do. | do. | Nhan Co Mine, Dak Nong Province | NA. |
| Bismuth | Masan Group Corp. | Nui Phao Mine, Thai Nguyen Province | 2. |
| Cement | An Giang Cement Co. | An Giang cement plant, An Giang Province | 400. |
| Do. | Binh Phuoc Cement Co. | Binh Phuoc cement plant, Binh Phuoc Province | 2,000. |
| Do. | Building Materials Corp. No. 1 | Fico Tay Ninh cement plant, Tan Chau District, Tay Ninh Province | 2,000. |
| Do. | Cement X18 Factory Co. | Cement X18 plant, Lang Son Province | 100. |
| Do. | Chin Fon Cement Co. | Chin Fon cement plant, Ha Giang Province | 1,400. |
| Do. | Chinfong Hai Phong Cement Corp. [Chingfong Group of Taiwan, 70%; Hai Phong Municipal Government, 15.56%; Vietnam National Cement Corp. (VICEM), 14.44%] | Min Duc cement near Hai Phong City | 1,400. |
| Do. | Cong Thanh Cement Joint Stock Co. | Cong Thanh cement plant, Thanh Hoa Province | 1,000. |
| Do. | Cao Ngan Cement Co. | Cao Ngan cement plant, Thai Nguyen Province | 600. |
| Do. | Dong Banh Cement Co. | Dong Banh cement plant, Lang Son Province | 1,000. |
| Do. | Dong Son Cement Co. | Dong Son cement plant, Thai Nguyen Province | 1,500. |
| Do. | Dong Thanh Cement Co. | Dong Thanh cement plant, Dong Nai Province | 1,000. |
| Do. | Ha Long Cement Co. | Ha Long cement plant, Ho Chi Minh City | 2,000. |
| Do. | Ha Tien Kien Giang Cement Co. | Ha Tien Kien Giang cement plant, Binh Duong Province | 200. |
| Do. | Lafarge (Vietnam) Cement | Cement grinding station, Dong Nai Province | 500. |
| Do. | La Hien Cement Co. | La Hien cement plant, Thain Nguyen Province | 600. |
| Do. | Langbang Cement Co. | Langbang cement plant, Quang Ninh Province | 1,500. |
| Do. | Luckvaxi Cement Co. | Luckvaxi cement plant, Thien Hue Province | 1,200. |
| Do. | Luck's Group (Vietnam Holdings) Co. Ltd. | Kim Dinh cement plant and Ninh Thuan grinding plant, Thua Thien-Hue Province | 2,800. |
| Do. | Lucky Group Ltd. and Phuc Son Cement Corp. | Phuc Son cement plant, Hai Duong Province | 4,000. |
| Do. | Mai Son Cement Co. | Mai Son cement plant, Son La Province | 1,200. |
| Do. | Midland Construction Corp. (COSEVCO) | Song Gianh cement plant, Quang Binh Province | 1,400. |

See footnotes at end of table.

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

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|-------------------------|--|--|-----------------|
| Cement—Continued | Morning Star Cement Ltd. [Holcim Group, 65%, and Vietnam National Cement Corp. (VICEM), 35%] | Cat Lai grinding plant, Hiep Phuoc grinding plant, Thi Vai grinding plant, Hon Chong, Kien Giang Province | 4,700. |
| Do. | Nghi Son Cement Corp. [Taiheiyō Cement Corp., 45.5%; Mitsubishi Materials Corp. of Japan, 19.5%; Vietnam National Cement Corp. (VICEM), 35%] | Nghi Son cement plant, Thanh Hoa Province | 4,300. |
| Do. | Quang Ninh Cement and Construction Joint Stock Co. | Quang Ninh cement plant, Ha Long, Quang Ninh Province | 1,200. |
| Do. | Quan Trieu Cement Joint Stock Co. (Viet Bac Mining Industry Corp. and VINACOMIN) | Quan Trieu cement plant, Thai Nguyen Province | 820. |
| Do. | ROLI-Quang Tri Cement Co. | ROLI-Quang cement plant, Quang Tri Province | 600. |
| Do. | Song Thao Cement Co. | Song Thao cement plant, Phu Tho Province | 1,000. |
| Do. | Thai Nguyen Cement Co. | Thai Nguyen cement plant, Thai Nguyen Province | 1,400. |
| Do. | PT Semen Indonesia (Persero) Tbk, 70% | Thang Long cement plant, Quang Ninh Province | 2,300. |
| Do. | Tuyen Quang Cement Group 1 | Tuyen Quang cement plant, Tuyen Quang Province | 600. |
| Do. | Vietnam Construction and Import-Export Joint Stock Corp. (VINACONEX) | Cam Pha cement grinding plant, Phu Tau Province | 2,300. |
| Do. | do. | Luongson cement plant, Hoa Binh Province | 1,200. |
| Do. | do. | Yen Bai cement plant, Yen Bai Province | 200. |
| Do. | Vietnam National Cement Corp. (VICEM) (100% state-owned) | Bim Son cement, Thanh Hoa Province | 3,800. |
| Do. | do. | But Son cement, Ha Nam Province | 1,600. |
| Do. | do. | Hai Phong cement, Ha Giang | 1,700. |
| Do. | do. | Ha Tien I, Ho Chi Minh City | 1,500. |
| Do. | do. | Ha Tien II, Kien Giang Province | 1,200. |
| Do. | do. | Hai Van cement, Da Nang City | 600. |
| Do. | do. | Hoang Mai cement, Nghe An Province | 1,400. |
| Do. | do. | Hoang Thach cement, Hai Duong Province | 2,300. |
| Do. | do. | Tam Diep cement, Ninh Binh Province | 1,400. |
| Do. | Vietnam Industrial Construction Corp. (VINAINCON) | Quang Son cement factory, Quang Son Commune, Dong Hy District, Thai Nguyen Province | 1,500. |
| Chromite, gross weight | Thai Nguyen Nonferrous Metal Co. [wholly owned subsidiary of state-owned Vietnam National Minerals Corp. (VIMICO)] | Nui Nua, Thanh Hoa Province | 10. |
| Coal, anthracite | Vietnam National Coal Corp. (VINACOAL) (100% state-owned) | Cam Pha, Cao Son, Coc Sau, Vang Danh, Dong Trieu, Ha Lam, Ha Tu, Hong Gai, Khe Cham, Mao Khe, Mong Duong, Deo Nai, Cua Ong, Uong Bi, Quang Ninh Province | 42,000. |
| Copper: | | | |
| Concentrate, Cu content | Asian Mineral Resources (90% owned through subsidiary Ban Phuc Nickel Mines LLC) | Ban Phuc nickel project, Son La Province | 3. |
| Do. | Lao Cai Copper Complex [wholly owned subsidiary of Vietnam National Minerals Corp. (VIMICO)] | Sin Quyen, Lao Cai Province | 11. |

See footnotes at end of table.

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

(Thousand metric tons unless otherwise specified)

| Commodity | | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|-----------------------------------|------------------------------------|--|--|-----------------|
| Copper—Continued: | | | | |
| Concentrate, Cu content—Continued | | Masan Group Corp. | Nui Phao Mine, Thai Nguyen Province | 7. |
| Ore | | Sin Quyen Copper Co. [operated by Vietnam National Coal and Mineral Industries Group (VINACOMIN)] | Sin Quyen Mine, Bat Xat District, Lao Cai Province | 1,200. |
| Refined | | Tang Loong Lao Cai Copper Smelting Enterprise [wholly owned subsidiary of Vietnam National Coal and Mineral Industries Group (VINACOMIN)] | Tang Loong Long Commune, Bao Tang District, Lao Cai Province | 10. |
| Fertilizer: | | | | |
| Nitrogen, ammonia | | Vietnam National Chemical Corp. (VNCC) (100% state owned), and Phy My Nitrogenous Fertilizer and Chemical Joint Stock Corp. | Ha Bac, northern Vietnam, and Phu My, Ba Ria-Vung Tau Province | 375. |
| Superphosphate | | do. | Lam Thao, Phu Tho Province | 800. |
| Fluorspar | | Masan Group Corp. | Nui Phao Mine, Thai Nguyen Province | 210. |
| Gas, natural | million cubic meters per day | VietSovPetro (a joint venture of Vietnam Oil and Gas Corp. and Zarubezhneft), and the joint venture of PetroVietnam, BP p.l.c., Oil and Natural Gas Co., and ConocoPhillips Co. | Offshore Bach Ho oilfield, Rang Dong oilfield, and Lan Tay and Lan Do gasfields | 20. |
| Do. | | Vietnam Oil and Gas Group (PetroVietnam); operated by Cuu Long Joint Operating Co. | Su Tu Trang offshore field (Block 15.1), Cuu Long Basin | NA. |
| Gold, gold content of mine output | kilograms | Bong Mieu Gold Mining Company Ltd. (Besra Gold Inc., 80%; Mineral Development Co., 10%; Quang Nam Mineral Joint Stock Co., 10%) | Bong Mieu Mine and Nui Kem underground mines, Quang Nam Province ¹ | 400. |
| Do. | | Besra Gold Inc. (85%) | Bai Dat and Bai Go deposit within the Phuoc Son gold property, Quang Nam Province | NA. |
| Iron ore, gross weight | | Thai Nguyen Iron and Steel Corp. [wholly owned subsidiary of Vietnam National Steel Corp. (VNSTEEL)] | Trai Cau and Tein Bo, Thai Nguyen Province; Thach Khe, Ha Tinh Province | 850. |
| Nickel | | Asian Mineral Resources (90% owned through subsidiary Ban Phuc Nickel Mines LLC) | Ban Phuc nickel sulfide deposit, Son La Province | 7. |
| Petroleum: | | | | |
| Crude | thousand 42-gallon barrels per day | VietSovPetro (a joint venture of Vietnam Oil and Gas Corp. and Zarubezhneft) | Offshore Bach Ho, Rong, Rang Dong, Ruby, Bunga Kekwa, Dai Hung, and SuTu Trang oilfields | 320. |
| Refined | thousand 42-gallon barrels | Vietnam Oil and Gas Group (PetroVietnam) (50%), ConocoPhillips (23.25%), Korea National Oil Corp. (14.25%), SK Innovation (9%), Geopetrol SA (3.5%). Operated by Binh Son Refining and Petrochemical Co. | Dung Quat refinery, Quang Ngai Province | 47,600. |
| Phosphate rock, gross weight | | Vietnam Apatite Limited Co. [Vietnam National Chemical Corp. (VNCC), 100%] | Cam Duong and Tang Loong, Lao Cai Province | 1,250. |
| Rare earths | | Lai Chau-Vietnam National Minerals Corp. (VIMICO) Rare Earth Joint Stock Co. and the Japanese Dong Pao Rare Earth Development Co. | Dong Pao Rare Earth Mine, Tam Duong District, Lai Chau Province | NA. |
| Salt | | Vietnam National Salt Corp. | Nam Dinh, Nghe An, and Hai Tin Provinces | 1,200. |
| Steel: | | | | |
| Crude | | Vietnam National Steel Corp. (VNSTEEL) | Cai Lan, Thai Nguyen Province, and Phu My, Ba Ria-Vung Tau Province | 2,000. |
| Products | | Shengli (Vietnam) Special Steel Co. Ltd., established by Shengli Group Corp., and Guangdong Metals and Minerals Import & Export Corp. | Cau Nghin Industry billets plant, Quynh Phu, Thai Binh Province | 500. |

See footnotes at end of table.

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

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|------------------------------------|--|---|-----------------------------|
| Steel:—Continued | | | |
| Products—Continued | Shengli (Vietnam) Special Steel Co. Ltd., established by Shengli Group Corp., and Guangdong Metals and Minerals Import & Export Corp. | Bar and wire rod plant, Quynh Phu, Thai Binh Province | 600. |
| Rolled | Lotus Group | Cold-rolled steel plant in Phu My Industrial Park, Ba Ria-Vung Tau Province | 1,000. |
| Do. | POSCO-Vietnam, 100% owned by POSCO Group | POSCO Special Steel, Phu My Industrial Park, Ba Ria-Vung Tau Province | 700. cold-rolled steel. |
| Do. | do. | do. | 3,000. hot-rolled steel. |
| Do. | Vietnam Shipbuilding Industry Group (VINASHIN) | Cai Lan steel plate hot-rolling plant, Ha Long City, Quang Ninh Province | 1,000. |
| Do. | Viet Steel Corp. | Bar mill, Ba Ria-Vung Tau Province | 450. |
| Tin: | | | |
| Concentrate, Sn content | Cao Bang Nonferrous Metal Co. and Nghe Tinh Nonferrous Metal Co. [wholly owned subsidiaries of state-owned Vietnam National Minerals Corp. (VIMICO)] | Pia Oac, Cao Bang Province; Quy Hop, Nghe An Province; and Tam Dao, Tuyen Quang Province | 4. |
| Refined | Thai Nguyen Nonferrous Metal Co. | Thai Nguyen, Bac Thai Province | 2. |
| Titanium, ilmenite | Bimal Minerals Co. Ltd. (Malaysia Mining Corp. and Syarikat Pendorong Sdn. Bhd., 60%, and Binh Dinh Minerals Co., 40%) | Cat Khanh Mine, Qui Nhon, Binh Dinh Province | 70. |
| Do. | Ha Tinh Minerals and Trading Co. | Cam Hoa, Ky Anhh-Cam, Xuyen, Ky Khan, and Ky Ninh, Ha Tinh Province | 450. |
| Do. | Mineral Development Co. No. 4 and No. 5 [wholly owned subsidiaries of Vietnam National Minerals Corp. (VIMICO)] | Vinh City, Nghe An Province; Tuy Hoa, Dong Xuan, Phu Yen Province; and Quang Ngan, Vinh My, Thua Thien-Hue Province | 50. |
| Tungsten, concentrates | Masan Group Corp. | Nui Phao Mine, Thai Nguyen Province | 4. |
| Do. | Vietnam Youngsun Tungsten Industry Co. | Thienke tungsten mine, Tuyen Quang Province | 2. |
| Do. | do. | Philieng tungsten mine, Lam Dong Province | 1. |
| Tungsten, ferrotungsten, W content | do. | Quang Ninh plant, Halong, Quang Ninh Province | 3. |
| Do. | Hazelwood Resources Ltd. | ATC Ferrotungsten project, Hai Phong City | 4. |
| Zinc: | | | |
| Concentrate, Zn content | Thai Nguyen Nonferrous Metal Co. [wholly owned subsidiary of state-owned Vietnam National Minerals Corp. (VIMICO)] | Cho Dien, Bac Can Province | 50. |
| Refined | The Ta Pan Zinc-Lead Plant (a Chinese private firm, 70.2%, and Ha Giang Mineral Exploiting and Engineering Co., 29.8%) | Lung Vay, Bac Me District, Ha Giang Province | 6. |
| Do. | Thai Nguyen Zinc Refinery [wholly owned subsidiary of state-owned Vietnam National Minerals Corp. (VIMICO)] | Thai Nguyen City, Thai Nguyen Province | 10. |

Do., do. Ditto. NA Not available.

¹Facilities in Bong Mieu were not in operation as of the end of 2013.