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2008 Minerals Yearbook

VIETNAM

U.S. Department of the Interior
U.S. Geological Survey

August 2010

The Mineral Industry of Vietnam

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Vietnam is endowed with a variety of mineral resources, and about 5,000 ore deposits had been discovered for approximately 70 types of minerals. In 2008, Vietnam produced about 1% of the world's barite, cement, and tin, and ranked seventh in the production of crude petroleum in the Asia and the Pacific region (U.S. Energy Information Administration, 2008; Carlin, 2010; Miller, 2010; van Oss, 2010). In addition, the country produced chromium ore, coal, copper, natural gas, lead, lime, salt, steel, and zirconium (table 1; Mining Journal, 2008).

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 2008 was estimated to be $1.3 billion (in 1994 constant dollars). This was equivalent to 4.3% of the country's total estimated gross domestic product of $30.28 billion (in constant 1994 dollars) (General Statistics Office of Vietnam, 2009a).

Government Policies and Programs

The mining industry in Vietnam is governed by the following three regulatory instruments: the Mineral Law (enacted in March 1996); Decree 68 (enacted in November 1996), which regulates the implementation of the Mineral Law; and Decision 325 of the Ministry of Industry and Trade (issued in February 1997), which covers administrative procedures concerning mineral activity licenses. Mining rights in the country are administered through a licensing system, which allows the Vietnamese Government to control access to mining and to define the terms under which mining may take place. The Mineral Law stipulates that all the mineral resources of Vietnam are owned by the people and are to be managed by the state. The Ministry of Industry and Trade oversees the country's mineral resources sector and manages all aspects of the mining industry; it is the only authority that issues mining licenses, which include licenses for prospecting, exploration, extraction, and processing. The Department of Geology and Minerals of Vietnam, which is under the Ministry of Natural Resources and Environment, assists in the management of the mineral resources of the country. Specific functions include assessing the mineral resources in Vietnam, discovering mineral deposits, establishing an updated geologic and mineral resources survey of the country, monitoring mineral activities, and protecting mineral resources (Burns and others, 1998, p. 1, 5, 25, 27; Department of Geology and Minerals of Vietnam, 2010).

In 2008, Vietnam's Ministry of Finance introduced a new decree (Decision 35/2008/QD-BTC) that dictates an increase in tariffs on mineral exports; the new tariffs went into effect on June 16, 2008. The purpose of the measure was to reduce exports of coal and crude oil in anticipation of the commissioning of Vietnam's first refinery, the Dung Quat plant, which would have the capacity to produce 140,000 barrels per day. The plant was set to start operations in February 2009. The trade between Vietnam and its international partners could be affected by the increase in tariffs given that Vietnam was a major supplier of coal to China and a major crude oil exporter to Southeast Asia. The increase in tariffs was also intended to regulate exports to ensure that the domestic demand for energy is met. The proposed tariff would be wide-ranging for fertilizers (up to 50%), crude oil and natural gas (up to 40%), minerals (up to 30%), and materials and semifinished products, which had been tax free (up to 20%). For example, the export tariff of zircon ore increased to 20% from 15%, and the tariff on zircon concentrate increased to 20% from 10% (Intellasia.net, 2008; Tran, 2008, p. 72).

In June 2008, the Ministry of Industry and Trade issued Circular 08, which established a ban on the export of titanium minerals, such as ilmenite, rutile, and zircon sand. Vietnam was a major supplier of titanium minerals to such countries as Brazil, Japan, Malaysia, the Republic of Korea, and the United States. Vietnam's leading ilmenite producer, Ha Tinh Mining and Trading Corp. (Mitraco), proposed an acceleration in the construction of a domestic titanium oxide processing plant, which had been delayed for several years owing to funding limitations. The proposed project consisted of a 30,000-metric-ton-per-year (t/yr)-capacity plant located in the Province of Ha Tinh about 370 kilometers (km) south of Hanoi. The estimated investment was $125 million. Mitraco had been mining in the Ha Tinh central coastal area since 1991 when it was established by the Vietnamese Government; the company had an annual processing rate of more than 100,000 t of ilmenite, 11,000 t of zircon, and 2,000 t of rutile. Most of the ilmenite produced in the country was exported to pigment producers in Japan, Malaysia, and the Republic of Korea (Tran, 2008, p. 73).

Production

Vietnam produced the following major mineral commodities: barite, chromite, coal, ilmenite, limestone, crude petroleum, phosphate rock, tin, and zinc. As for major processed minerals, Vietnam produced cement, refined copper, rolled steel, refined tin, and zinc. During 2008, mineral production increased mainly for phosphate rock (which increased by 37.8%), lime (16.8%), rutile (15.2%), natural gas (12.2%), crude steel (11.2%), and rolled steel (10%). Mineral commodities for which production decreased significantly were chromium ore (which decreased by 46.2%), mined copper (12%), barite (11.1%), and anthracite and crude petroleum (6.4% each) (table 1).

Structure of the Mineral Industry

The structure of Vietnam's mineral industry can be classified into the following three major categories: state-owned enterprises that produced, distributed, and traded mineral commodities; foreign companies that held a joint-venture

agreement with state-owned enterprises; and foreign companies that had been granted mineral exploration licenses. The major state-owned companies were Vietnam National Cement Corp. (VNCC), which managed all state-owned cement plants; Vietnam National Chemical Corp., which managed all state-owned fertilizer-related minerals mining and processing companies; Vietnam National Coal Corp. (VINACOAL), which managed all state-owned coal mining and processing companies; Vietnam National Minerals Corp. (VIMICO), which managed all state-owned nonferrous minerals mining and processing companies; Vietnam National Salt Corp., which managed all state-owned salt producing companies; and Vietnam Steel Corp. (VNSTEEL), which managed all state-owned iron ore mining and steelmaking companies (Vietnam Financial Review, 2009).

According to the Government of Vietnam statistics, the number of employees working in the mining and quarrying sector in 2008 was approximately 431,200, which accounted for about 1% of the total number of employed people in the country (44,915,800) (General Statistics Office of Vietnam, 2009b).

Mineral Trade

In 2008, total trade in Vietnam increased by about 28.8% to $143.4 billion from $111.3 billion in 2007. The total value of exports increased by approximately 29% to $62.7 billion from $48.6 billion in 2007. The total value of imports was $80.7 billion compared with $62.8 billion in 2007, which was an increase of about 28.5%. Exports of tin increased by 8.7% to 2,500 metric tons (t) in 2008 from 2,300 t in 2007; exports of coal decreased by 39.6% to 19.4 million metric tons (Mt) from 32.1 Mt, and exports of crude oil decreased by 8.2% to 101 million barrels (Mbbl) from 110 Mbbl. Imports of refined petroleum products decreased by 1.75% compared with imports in 2007, but imports of iron and steel increased by 1.82%. The import value of chemicals and plastics totaled $4.72 billion in 2008, which was an increase of 16.3% compared with $4.06 billion in 2007. In 2007 (the latest year for which data were available), the value of metal imports increased noticeably for aluminum to $660 million from $513 million in 2006, or by about 32%; copper, to almost $900 million from $767 million, or by about 17.1%; lead, to $148 million from $58 million, or by about 155%; and zinc, to $204 million from $144 million, or by about 42% (General Statistics Office of Vietnam, 2009c-f).

In 2008, Vietnam's main trading partners were Australia, China, Japan, the Republic of Korea, Singapore, Taiwan, Thailand, and the United States. In 2008, the leading importer of Vietnamese goods was the United States, which imported $11.9 billion, or about 18.9% of Vietnam's total exports followed by Japan with $8.54 billion, or 13.6% of total Vietnam's exports, and China with $4.54 billion or 7.2% of total Vietnam's exports. In 2008, imports to Vietnam were supplied mainly by China (19.4% of total imports valued at $15.6 billion), Singapore (11.6% of total imports valued at $9.4 billion), and Taiwan (10.4% of total imports valued at $8.4 billion).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Vietnam's bauxite resources consist of diaspore bauxite and gibbsite bauxite. Diaspore bauxite occurs in the northeastern part of the country in the Provinces of Cao Bang, Ha Giang, and Lang Son, where reserves were estimated to be 91 Mt of ore. As of 2008, 36 deposits and ore occurrences had been discovered in the Lang Son area. In December, the Vietnamese prime minister authorized the Province of Cao Bang to negotiate mining joint ventures with foreign partners to explore the districts of Phuc Hoa and Quang Yen. The agreement required Vietnam to be the majority stakeholder. Gibbsite bauxite was found mainly in the central highlands of the country in Thai Nguyen Province. Gibbsite reserves were estimated to be 5.4 billion metric tons (Gt) (Mining Journal, 2008; VietNamNet, 2008; Vietnam National Coal-Mineral Industries Group, 2009).

The Vietnam National Coal-Mineral Industries Group (VINACOMIN) was the Government entity that regulated such mineral industries as aluminum, coal, construction materials, metallic minerals, and power generation. VINACOMIN had several projects that it planned to implement after 2010, including the construction of three aluminum smelters—the Binh Thuan and the Quang Ninh aluminum smelters, which were expected to have a capacity of 300,000 t/yr each, and the Lam Dong aluminum smelter (Vietnam National Coal-Mineral Industries Group, 2009).

In late 2007, the Vietnamese consulting organization Institute of Mining-Metallurgical Science and Technology (IMMST) was assigned by the Ministry of Industry and Trade to develop a master plan for the use of bauxite from Thai Nguyen Province, which has large reserves of bauxite. The plan, which was approved by the prime minister of Vietnam in Decision 167/2007/QD-TTg of November 2007, proposed utilization of the bauxite resources to produce quality alumina that would be used for aluminum electrolysis. The IMMST estimated that alumina output would be 0.7 to 1 million metric tons per year (Mt/yr) by 2010, 6 to 8.5 Mt/yr by 2015, and 13 to 18 Mt/yr by 2025. The IMMST also proposed to continue exports of alumina until 2015, and thereafter to reduce the quantity of exports to help meet domestic demand. In 2008, VINACOMIN signed an agreement to sell to China's Yunnan Metallurgy Group between 600,000 and 900,000 t/yr of alumina products from VINACOMIN's facilities at the Lam Dong bauxite-aluminum complex and the Nhan Co. bauxite-alumina complex for a period of 30 years. VINACOMIN was the Government entity assigned to oversee the implementation of the bauxite project in Thai Nguyen (Ministry of Natural Resources and Environment, 2009).

In July 2008, VINACOMIN signed an engineering, procurement, and construction (EPC) contract with the Chinese company China Aluminum International Engineering Co. (Chalieco) to build a $460 million alumina plant in the central highlands of Vietnam to be completed in 2010. The plant, which was designed to have a capacity of 600,000 t/yr of alumina, was part of the Tan Rai bauxite and aluminum complex, which was

located 300 km northeast of Ho Chi Ming City in the Province of Lam Dong. The existing Tan Rai plant, which had been built in 2006, was originally proposed to be the country's first bauxite and alumina plant, but owing to financial limitations and frequent domestic power shortages, the project was completed as a bauxite-only plant (Thanhnien News, 2008a).

In August 2008, a cooperation agreement was signed between the aluminum producers Alcoa World Alumina and Chemicals (AWAC) (an affiliate of Alcoa Inc. of the United States) and VINACOMIN for the development of an alumina refinery with the capacity to produce 600,000 t/yr, which was proposed to be located in the central highlands of Dac Nong Province. The agreement provided for an annual royalty of 10% of the refinery's net profits to be paid to the Vietnamese Government. Alcoa and VINACOMIN also proposed a feasibility study for a separate project that included a metallurgical-grade alumina refinery project and a bauxite mine. Under the agreement, AWAC would have the right to purchase a 40% stake in a joint-stock company that owned the Nhan Co. bauxite mine and a 600,000-t/yr alumina refinery located in Lam Dong Province; VINACOMIN would hold a 51% share, and the remaining 9% shareholding would be held by the Vietnamese people. As part of the agreement, another feasibility study would be conducted by AWAC on the Gia Nghia bauxite mine and alumina refinery in Dac Nong Province, from which AWAC hoped to produce between 1 and 1.5 Mt/yr of alumina when in production (Thanhnien News, 2008d; Tran, 2008, p. 75).

By 2025, the Vietnamese Government planned to invest $15.6 billion to expand its bauxite and alumina industry. The investment would go towards the developing mines and refineries in the country (Thanhnien News, 2008a).

Gold.—In 2008, the deputy prime minister of Vietnam signed an agreement that authorized the reopening of six gold sites for mining. The mine sites are located in the Dai Loc and the Tay Giang districts, and consist of small reserves that, while not deemed to be suitable for large industrial-scale mining, were appropriate for artisanal mining (Thanhnien News, 2008b).

The Canada-based mining company Olympus Pacific Minerals Inc. owned two gold projects in Vietnam—the Bong Mieu and the Phuoc Son. In December 2008, Olympus concluded a 3-month trial test by treating the high-grade ore from the Phuoc Son property in the Bong Mieu gold plant. During 2008, the Bong Mieu plant was upgraded to improve its processing efficiency; as a result, the plant produced 348 kilograms (reported as 11,191 troy ounces) of gold in 2008. The ore from the Phuoc Son property was transported to the Bong Mieu upgraded facility; both properties were located near the port city of Da Nang in the central coastal region of the country. The Phuoc Son processing plant was expected to be commissioned in the near future (Olympus Pacific Minerals Inc., 2008, p. 3; 2009).

Iron and Steel.—Vietnam was estimated to have more than 200 iron ore deposits, located mainly in the northern Provinces of Cao Bang, Ha Giang, Ha Tinh, Thai Nguyen, and Yen Bai. The total estimated iron ore reserve in the mentioned areas was about 1,200 Mt in 13 deposits that were estimated to contain more than 1 Mt each (Mining Journal, 2008).

In 2007, the Indian company Tata Steel Group signed a memorandum of understanding with Vietnam Steel Corp. (VNSTEEL) for the construction of a steel mill in Vietnam. The memorandum was followed by a joint-venture agreement signed by Tata Steel, Vietnam Cement Industries (VICEM), and VNSTEEL to build the steel complex. Tata Steel was expected to hold a 65% stake in the joint venture. Tata Steel held a 30% interest in another project in Vietnam, the Thach Khe iron ore mine, which had a projected production capacity of 4.5 Mt/yr and was located 60 km from the steel plant (Vietnam Business Finance News, 2008b; Tata Steel Group, 2009, p. 57).

At the beginning of 2008, the Ministry of Planning and Investment of Vietnam reported a favorable feasibility study for the largest iron ore deposit in the country, the Thach Khe. As a result, the country estimated that an investment of $850 million would be necessary to build the infrastructure needed for the development of the deposit, which included a port. Stakeholders for the Thach Khe project included Tata Steel and VINACOMIN (30% each), VNSTEEL (20%), Song Da Corp. and the Bank for the Development of Vietnam (5% each), and Ha Tinh Mining and Trading Corp. (4%). VNSTEEL planned to have a mine output capacity of 10 Mt of ore to be used both domestically and for export (Ho Chi Minh City Department of Industry and Trade, 2008).

In September 2008, the Vietnam Shipbuilding Industry Group (VINASHIN) and Malaysia-based Lion Diversified Holding Berhard announced its intent to seek Government approval to build a 10-Mt/yr steel complex in Ninh Thuan Province at an estimated cost of $10 billion. The proposed complex, which would be fed by coal and iron ore, included a blast furnace, a 1,450-megawatt powerplant, and a seaport located in an area of 1,650 hectares. When the complex is operational, the production capacity was projected to be 4.5 Mt/yr of steel in the first stage (from 2008 to 2010) and 10 Mt/yr thereafter (Vietnam Business Finance News, 2008b).

The Government of Vietnam planned to import approximately 5 Mt/yr of steel in 2009 to meet domestic demand, which was projected to be 10.5 Mt and included the requirements of such industries as automakers and the construction industry. The Ministry of Industry and Trade projected that the demand for steel in 2009 would be 4.95 Mt when taking into account the demand of the construction sector and the export goals of the country (Thanhnien News, 2008e).

Nickel.—Canada-based Asian Mineral Resources Ltd. announced in September that it would place its Ban Phuc nickel and copper project on care-and-maintenance status beginning on October 1, 2008. Asian Mineral's decision was based on the export tariff increase established by the Government of Vietnam in June 2008, among other factors, such as the increase in the royalty rate, taxes, and the instability of worldwide metal prices (Marketwire.com, 2008).

Rare Earths.—Vietnam's rare-earth deposits, which are abundant in the northwestern part of the country, had great potential for development. Only small-scale exploitation of rare-earth resources had taken place in Vietnam in the past few years, however. Rare earths from Vietnam were used in the

construction and metallurgical industries, as well as for sintering of ceramics and enhancing the quality of glass (Industrial Minerals, 2008, p. 79).

Rare-earth deposits were first discovered in the northwest in Bac Bo in the middle and end of the 1950s. Subsequent exploration followed in the 1960s, mid-1970s, and between 1983 and 1985, which resulted in the discovery of deposits in five areas in northwestern Vietnam in Dong Pao, Muong Hum, north Nam Xe, south Nam Xe, and Yen Phu. Other regions with potential for the discovery of rare-earth deposits were the Provinces of Lai Chau, Lao Cai, and Yen Bai in northwestern Vietnam. Most exploration had been concentrated in Dong Pao and in north and south Nam Xe; ores from these areas are mostly composed of barite, bastnaesite, fluorspar, and strontianite. Exploration for other rare-earth elements in these areas was also being considered, especially exploration for ilmenite, monazite, niobium, rutile, strontium, titanium, uranium, and zircon. Placer deposits with large reserves of monazite had been discovered in the eastern coastal areas of Cat Khanh (approximately 24,000 t), My Tho (about 6,600 t), Quang Ngan (3,300 t), and Vinh My (2,000 t) (Industrial Minerals, 2008, p. 73, 77).

In 2008, ongoing exploration for rare earths was taking place in the Dong Pao, the north Nam Xe, and the south Nam Xe ore deposits, which are located in the Phong Tho District. The north Nam Xe ore deposit consists mainly of apatite, barite, fluorspar, magnetite, and pyrite. The ore was also estimated to contain reserves of uranium (76,000 t), thorium (59,000 t), and niobium (8,000 t). The south Nam Xe ore deposit consists mainly of occurrences of fluorspar, pyrite, thorium, and an estimated reserve of 320,000 t of uranium; 55,000 t of barite; more than 3,000 t of yttrium; and more than 2,000 t of strontium, among others. The Dong Pao deposit, which is located 40 km south of the Nam Xe deposits, was discovered in 1959; geologic studies in the 1960s resulted in the discovery of 60 ore bodies. The main occurrences in this deposit were barite and fluorspar, with rare-earth oxide content that varies from 0.5% to more than 10%. Studies also revealed the presence a variety of oxides, including beryllium, manganese, niobium, strontium, thorium, and uranium. Studies had revealed a reserve of 2.9 Mt of barite, and 1 Mt of fluorspar in the Dong Pao deposit (Industrial Minerals, 2008, p. 77, 79).

Titanium (Ilmenite).—In March 2009, United States-based petroleum company ATI Petroleum (a natural resources exploration group) was planning to increase the capacity of its mineral sand separation facility to 30,000 t/yr of ilmenite. ATI's ilmenite project was located in Ha Tinh Province, where the company had identified a reserve of 5.5 Mt. The company expected to convert the small-scale project into a larger processing facility by the end of 2009 by providing the capacity, manpower, and technology to be able to process ore from other mines (Industrial Minerals, 2009).

Tungsten.—In May 2008, Bayerische Hypo-Und Vereinsbank Bank of Germany and Fortis Bank of Belgium signed a joint-venture agreement with Nui Phao Mining Company Ltd. (Nuiphaovica) (a subsidiary of Tiberon Minerals Ltd. of Canada), and two Vietnamese partners (Thai Nguyen Minerals Co. and Thai Nguyen Export-Import Investment Co.). According to the agreement, the banks would provide a credit of $250 million to finance Vietnam's largest fluorspar and tungsten mining project, which was located in the Province of Thai Nguyen. Production was planned to commence in September 2010 (Vietnam Business Finance News, 2008a).

Industrial Minerals

Cement.—Vietnam expected to cease the importation of cement by 2010, provided production growth continued at its current trend. Vietnam produced about 40.05 Mt of cement in 2008; for the country to reach its goal, the country would need to boost production of cement by approximately 25% by 2010 (Vietnam National Cement Association, undated).

During the first 6 months of 2008, cement consumption in Vietnam reached 17.9 Mt, which was an increase of about 20% compared with the same period in the previous year, which was higher than the 10% to 14% increase that the Ministry of Construction had anticipated. In 2008, local cement prices increased by between 50% and 80% as the year progressed owing to cement shortages and increases in imported cement prices. To ease the situation, in May 2008, the Ministry of Finance released Decision No. 29/2008/QD-BTC, which waived the 40% tariffs imposed on imported clinker as a measure to alleviate the increase in cement prices (Vietnam Financial Review, 2008).

In November 2008, Viet Bac Mining Industry Co., which was a subsidiary of VINACOMIN, started the construction of the Quan Trieu cement plant in Thai Nguyen Province. The plant had an initial design capacity of more than 800,000 t/yr of cement at an investment cost of $77 million. Viet Bac expected the plant to be fully operational by 2010; the company expected to upgrade the facility's production capacity to 3 Mt/yr of cement in the future (Thanhnien News, 2008f).

Mineral Fuels

Coal.—In 2007, the volume of Vietnam's coal exports peaked at more than 32 Mt. During the past few years, the Ministry of Planning and Investment had been working on decreasing exports of coal because of the imminent exhaustion of reserves. The major mines were situated in Quang Ninh Province in the northeastern part of the country and contained coal reserves of 3.5 Gt at 300 meters (m) depth. Larger reserves of more than 200 Gt had been discovered at depths of more than 3,000 m. Based on the Ministry of Industry and Trade estimates, the domestic demand for electricity increased by about 20% annually, at which rate the country would need to start relying on coal imports by around year 2015 (Thanhnien News, 2008c).

Natural Gas and Petroleum.—In 2008, natural gas production in Vietnam increased by 12.2% to 7,944 million cubic meters from 7,080 million cubic meters in 2007. Production of crude petroleum decreased by 6.4% (table 1).

Vietnam's first refinery, the Dung Quat Oil Refinery, was scheduled to start operations in February 2009. The facility, which was located in central Quang Ngai Province, had been built at an estimated cost of $2.5 billion; the expected processing capacity was 6.5 Mt/yr of crude oil and petrochemical products.

The main investor in the Dung Quat refinery was state-owned Vietnam National Oil and Gas Group (PetroVietnam) (Alexander's Gas & Oil Connections, 2008e, f).

In May 2008, construction of a second oil refinery facility was started in the north-central coastal Province of Thanh Hoa about 180 km south of the capital Hanoi. The Nghi Son refinery was part of the Nghi Son Petrochemical Refinery Complex, which had an initial investment estimated to be $6.2 billion; it was scheduled to start operations in 2013 with a designed refinery capacity of 10 Mt/yr of crude oil. PetroVietnam (25.1%) was the state-owned investor for the Nghi Son refinery, along with partners Idemitsu Kosan of Japan and Kuwait Petroleum International (KPI) (35.1% each), and Mitsui Chemicals of Japan (4.7%). KPI was committed to supplying 100% of the crude oil to the refinery, which in turn would produce diesel, jet fuel, kerosene, liquefied petroleum gas, and petrol. When operating at full capacity, refinery No. 1 and refinery No. 2 would meet about 65% of the domestic demand for fuel and petroleum products (Alexander's Gas & Oil Connections, 2008d-f).

The Ministry of Planning and Investment announced in mid-2008 the construction of a petrochemical complex in the Long Son Island commune in the city of Vung Tau in the Province of Ba Ria-Vung Tau. The petrochemical complex project would include Vietnam's third oil refinery facility, the Long Song refinery. The refinery was designed to have a processing capacity of 10 Mt/yr of crude oil when operational in 2013 at a total investment cost of $10 billon (Alexander's Gas & Oil Connections, 2008e, f).

In May 2008, OAO Gazprom of Russia reached an agreement with PetroVietnam for further cooperation, which included geologic exploration and the development of four new blocks offshore Vietnam. Vietgazprom Joint Operating Co., which was a joint-venture company composed of Gazprom and PetroVietnam, was the company in charge of overseeing and operating the project. The parties also considered the establishment of a new joint venture, Gazpromviet, to promote the company's participation and cooperation in promising oil and gas projects in Russia and abroad. In August 2007, Gazprom acquired the right to explore and develop its first offshore gasfield in Vietnam. Test results showed the presence of gas in the Bao Wang (Gold Panther) area (Alexander's Gas & Oil Connections, 2008a, b).

In September 2008, PetroVietnam agreed with Petroleos de Venezuela (PdVSA) to import crude oil from the latter, and invest in the construction of a refinery in Vietnam to process PdVSA's crude. The agreement involved the creation of two joint companies; one for the transportation of the PdVSA's crude to Vietnam, and the other to jointly refine the fuel. In 2008, PetroVietnam also increased its presence in Venezuela by expanding its oil exploration activities in the Orinoco Basin in partnership with PdVSA (Alexander's Gas & Oil Connections, 2008c).

Outlook

Vietnam's mining sector is expected to be dominated by the bauxite, coal, and oil and gas industries for the next 2 to 3 years, mainly as a result of the many exploration projects that were started and the discoveries that were made in 2007 and 2008. Vietnam plans to commission three oil refineries between 2009 and 2013, which would allow the country to decrease its dependency on imports of petroleum products.

The Ministry of Finance's export tariff increase could affect Vietnam's mineral trade performance in the international market for the short run, but it is also likely to give the country the ability to control its exports and regulate the domestic market to meet domestic demand (Intellasia.net, 2008).

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TABLE 1
VIETNAM: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2004	2005	2006	2007	2008[e]
METALS						
Bauxite[e]		20,000	25,800	30,000	30,000	30,000
Chromium ore, gross weight		82,000	78,915 [r]	73,037 [r]	103,830 [r]	55,880 [3]
Copper:						
Mine output, Cu content		1,200	3,100 [r]	11,400 [r]	12,500 [r]	11,000
Metal, refined		--	--	4,800	11,000	2,000
Gold	kilograms	2,065	2,138	2,500 [e]	3,000 [e]	3,000
Iron and steel:						
Iron ore, Fe content[e]		495,000	504,700	510,000	530,000	530,000
Metal:						
Pig iron	thousand metric tons	187	202	583	790	800
Steel, crude	do.	689	890	1,869 [r]	2,024 [r]	2,250
Steel, rolled	do.	3,280	3,403	3,837 [r]	4,612 [r]	5,073 [3]
Lead, mine output, Pb content[e]		2,750	7,700 [r]	14,900 [r]	19,200 [r]	19,100
Manganese concentrate, gross weight[e]		15,000	18,000	20,000	20,000	20,000
Pyrite, gross weight[e]	thousand metric tons	450	500	500	500	500
Tin:						
Mine output, Sn content[e]		3,500	3,500	3,500	3,500	3,500
Metal, smelter		2,356	1,766	2,665 [r]	3,369 [r]	3,566 [3]
Titanium:						
Ilmenite concentrate, gross weight[e, 4]		550,000	523,000	605,000	550,000	550,000
Rutile, gross weight		465 [r]	405 [r]	437 [r]	574 [r]	661 [3]
Zinc:						
Mine output, Zn content[e]		45,000	48,000	45,000	46,000	45,000
Metal, powder		5,000	23,000	23,000 [e]	23,000 [e]	23,000
Zirconium, gross weight[e, 5]		39,400	32,500	26,100	22,000 [r]	22,000
INDUSTRIAL MINERALS						
Barite		101,040	116,000	90,000 [r]	90,000 [r]	80,000
Cement, hydraulic	thousand metric tons	26,153	30,808	32,690	37,102 [r]	40,047 [3]
Clays, kaolin[e]		650,000	650,000	650,000	650,000	650,000
Fluorspar[e]		4,000	4,000	4,000	4,000	4,000
Graphite[e]		2,000	2,000	2,000	2,000	2,000
Gypsum[e]	thousand metric tons	5,000	5,000	5,000	5,000	5,000
Lime	do.	1,464	1,737	1,592 [r]	1,438 [r]	1,679 [3]
Nitrogen, N content of ammonia		216,200	220,000	230,000	300,000	300,000
Phosphate rock:						
Gross weight	thousand metric tons	905	1,024 [r]	1,232 [r]	1,523 [r]	2,099 [3]
P_2O_5 content[e]	do.	272	320	365 [r]	390	400
Pyrophyllite[e]		30,000	30,000	30,000	30,000	30,000
Salt	thousand metric tons	906	898	842 [r]	857 [r]	847 [3]
Sand and gravel	do.	145,300	166,000	182,700	195,000	200,000
Silica sand[e]	do.	185	190	200	200	200
Stone, building stone	do.	143,359 [r]	184,174 [r]	208,343 [r]	241,379 [r]	264,176 [3]
Sulfur[e]		22,000	22,000	22,000	22,000	22,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite	thousand metric tons	27,349	34,093	38,778 [r]	42,483 [r]	39,777 [3]
Gas, natural, gross	million cubic meters	6,269 [r]	6,440 [r]	7,000 [r]	7,080 [r]	7,944 [3]
Petroleum, crude	thousand 42-gallon barrels	147,034 [r]	135,800 [r]	123,194 [r]	116,741 [r]	109,291 [3]

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through February 22, 2010.

[2]In addition to the commodities listed, antimony, bentonite, refractory clay, construction aggregates, gemstones, granite, lignite, marble, rare earths, silver, and tungsten were mined but not reported. Available information is inadequate to make reliable estimates of output.

[3]Reported figure.

[4]Estimated figures based on Vietnam's inferred exports of titanium ores to China, Japan, the Republic of Korea, Malaysia, and the United States.

[5]Estimated figures based on Vietnam inferred exports of zirconium ore to China.

TABLE 1—Continued
VIETNAM: PRODUCTION OF MINERAL COMMODITIES[1]

Sources: Vietnam's General Statistics Office, Statistical Yearbook, 2007; British Geological Survey, World Mineral Statistics, 2002-06; World Metal Statistics, April 2008; South East Asia Iron and Steel Institute, Crude Steel Production, Annual Statistics, 2001-05; The Barytes Association, World Barytes Production 2001-05; International Lead and Zinc Study Group, Lead and Zinc Statistics, Monthly Bulletin of the International Lead and Zinc Study Group, February 2007; Copper Bulletin of the International Copper Study Group, May 2008; U.S. Geological Survey, Minerals Questionnaire, 2004-07.

TABLE 2
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement	Chinfong Hai Phong Cement Corp. [Chingfong Group of Taiwan, 70%; Hai Phong Municipal Government, 15.56%; Vietnam National Cement Corp. (VNCC), 14.44%]	Min Duc near Hai Phong City	1,400
Do.	Morning Star Cement Ltd. [Holcim Group, 65%, and Vietnam National Cement Corp. (VNCC), 35%]	Hon Chong, Kien Giang Province	4,500
Do.	Nghi Son Cement Corp. [Taiheiyo Cement Corp., 45.5%; Mitsubishi Materials Corp. of Japan, 19.5%; Vietnam National Cement Corp. (VNCC), 35%]	Nghi Son, Thanh Hoa Province	2,150
Do.	Vietnam National Cement Corp. (VNCC) (100% state owned)	Bim Son, But Son, Da Nang, Ha Tien I, Ha Tien II, Hai Phong, Hai Van, Hoang Mai, Hoang Thach, and Tam Diep	18,000
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 in Quang Ninh Province	42,000
Copper:			
Concentrate, Cu content	Lao Cai Copper Complex [wholly owned subsidiary of Vietnam National Minerals Corp. (VIMICO)]	Sin Queyen, Lao Cai Province	11
Refined	Tang Loong Lao Cai Copper Smelting Enterprise [wholly owned subsidiary of Vietnam National Minerals Corp. (VIMICO)]	Tang Loong Long Commune, Bao Tang District, Lao Cai Province	11
Fertilizer:			
Nitrogen, ammonia	Vietnam National Chemical Corp. (VNCC) (state-owned, 100%) and Phy My Nitrogenous Fertilizer and Chemical Joint Stock Corp.	Ha Bac, northern Vietnam Phu My, Ba Ria-Vung Tau Province	375
Superphosphate	do.	Lam Thao, Phu Tho Province	800
Gas, natural million cubic meters per day	VietSovPetro (a joint venture of Vietnam Oil and Gas Corp. and Zarubeznheft), and the joint venture of PetroVietnam, BP p.l.c., Oil and Natural Gas Co., and ConocoPhilips Co.	Offshore Bach Ho oilfield, Rang Dong oilfield, and Lan Tay/Lan Do gasfields	20
Gold, gold content of mine output kilograms	Bong Mieu Gold Mining Company Ltd. (Bong Mieu Holdings Ltd., 80%; Mineral Development Co., 10%; Quang Nam Mineral Joint Stock Co., 10%)	Ho Gan open pit and Nui Kem underground mines	400

See footnote at end of table.

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

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Iron ore, gross weight	Thai Nguyen Iron and Steel Corp. [wholly owned subsidiary of Vietnam Steel Corp. (VNSTEEL)]	Trai Cau and Tein Bo in Thai Nguyen Province; Thach Khe in Ha Tinh Province	850
Petroleum, crude thousand 42-gallon barrels per day	VietSovPetro (a joint venture of Vietnam Oil and Gas Corp. and Zarubeznheft)	Offshore Bach Ho, Rong, Rang Dong, Ruby, Bunga Kekwa, Dai Hung, and SuTu Trang oilfields	320
Phosphate rock, gross weight	Vietnam Apatite Limited Co. (Vietnam National Chemical Corp., 100%)	Cam Duong and Tang Loong, Lao Cai Province	1,250
Salt	Vietnam National Salt Corp.	Nam Dinh, Nghe An, and Hai Tin Provinces	12,000
Steel, crude	Vietnam Steel Corp. (VNSTEEL)	Cai Lan, Thai Nguyen Province, and Phu My, Ba Ria-Vung Tau Province	2,000
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, Qui Nhon, and Binh Dinh Provinces	70
Do.	Ha Tinh Minerals and Trading Co.	Cam Hoa, Ky Annh-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 in Phu Yen Province; and Quang Ngan, Vinh My in Thua Thien-Hu Province	50
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.