



# 2009 Minerals Yearbook

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## VIETNAM

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# THE MINERAL INDUSTRY OF VIETNAM

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In 2009, Vietnam produced about 1.7%, 1.3%, and 1% of the world's cement, barite, and tin, respectively, and the country ranked sixth in the production of crude petroleum in the Asia and the Pacific region (U.S. Energy Information Administration, 2009; 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).

## 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 2009 stayed at the previous year's level of an estimated \$1.3 billion<sup>1</sup> (in 1994 constant dollars). This was equivalent to 4.4% of the country's total estimated gross domestic product (GDP) of \$29.54 billion (in constant 1994 dollars) (General Statistics Office of Vietnam, 2009b).

## Government Policies and Programs

The mining industry in Vietnam is governed by the following three regulatory instruments: the Mineral Law (enacted in March 1996), which stipulates that all the mineral resources of the country are owned by the people and are to be managed by the state; Decree No. 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 Government to control access to mining and to define the terms under which mining may take place. 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).

Effective on January 19, 2009, the Government imposed a tax increase on the production of various mineral fuels, which included doubling the tariff on coal and increasing the tariff on

crude oil by 2%. The tax on anthracite coal mined underground increased to 4% from 2%, and that on coal mined from opencast mines increased to 6% from 3%. The tax on crude oil production of up to 20,000 barrels per day (bbl/d) ranged from 6% to 8%, and that on the production of 20,000 to 50,000 bbl/d was 8% to 10%, which was equivalent to an increase of 2% on the previous rates. According to the Government, the new tax rates were calculated and applied based on the value of the commodity output at commercial prices (Minh and Raybould, 2009). On November 3, 2009, the Government issued Decree No. 100, which imposes a surcharge on the profits from oil exported from the country; the surcharge applies mainly when prices increase. The surcharge was put in place to be the Government's mechanism for earning a share in the profits that are gained when the price of oil increases. These fees are applicable only to petroleum contracts that started after January 1, 2010 (Foster and Lawson, 2010).

On September 15, 2009, Vietnam's Ministry of Finance issued Circular 184, which replaces Circular 20 of March 16, 2005, and increases the mining license fees as follows: (1) the fee for a new prospecting license is doubled to \$114 from \$57 per license; (2) the fee for a new exploration license is increased to \$228 from \$114 each for exploration areas measuring less than 100 hectares (ha), to \$572 each for areas measuring between 100 ha and 50,000 ha, and to \$858 each for areas greater than 50,000 ha; (3) the fee for a mining license varies from \$57 to \$5,718, depending on the type of mined mineral and the expected mining capacity (the rate was fixed at \$228 per license under Circular 20); (4) the fee for a processing license is increased to \$572 from \$114 per license; and (5) the fee for a mineral salvage exploitation license is increased to \$286 from \$29 per license (Foster and Lawson, 2010).

Vietnam's Ministry of Finance and the Ministry of Natural Resources and Environment issued joint Circular 186 on September 28, 2009, which included guidance for calculating the appropriate fees for the use of Government data and information for mineral prospecting and exploration activities. The Government intended to charge for the gathering and the use of information for mining activities; no further details on the rates were available, however. On October 12, 2009, the Government issued Decree No. 82, which specifies the environmental protection fee that is applied to entities that exploit coal gas and other unspecified minerals. This decree amends Decree No. 63 of May 13, 2008, which specifies the environmental protection fee that applies to entities that exploit such minerals as apatite, crude oil, coal, feldspar, gravel, ilmenite, metal minerals, mineral water, natural gas, sand, and stone (Foster and Lawson, 2010).

On November 5, 2009, the Government issued Decree No. 101/2009/ND-CP (Decree No. 101), which authorizes the startup of a pilot program to establish, organize, operate, and manage a Government economic group. The group's responsibilities include concentrating funds to bring

<sup>1</sup>Where necessary, values have been converted from Vietnam dong (D) to U.S. dollars (US\$) at the rate of D17,490=US\$1.00 for 2009 and D16,179=US\$1.00 for 2008.

together members of large-size companies from key industries to find ways to accelerate international economic integration; enhance management effectiveness and supervision of national capital and assets invested in enterprises managed by the group; and analyze possible options to improve laws and policies related to business groups (Dan and Nguyen, 2010).

On November 25, 2009, the National Assembly of Vietnam (the country's highest Government organization) passed Resolution No. 41, which authorizes the construction of two nuclear powerplants, to be located in Ninh Thuan Province in south-central Vietnam. The two powerplants would have a combined capacity of 4,000 megawatts at a cost of \$11 billion. Resolution No. 41 calls for construction of the first plant to start in 2014 and the first turbine to commence operations in 2020; construction of the second plant was to follow sometime thereafter. On December 3, 2009, the International Atomic Energy Agency (IAEA) announced its plans to send two integrated nuclear infrastructure review missions to assess the country's preparedness to initiate a nuclear power program. The missions were to be in conjunction with Vietnam's Atomic Energy Commission and other agencies, and would include evaluation of the country's ability to plan and maintain a nuclear power program and an analysis of the country's safety regulations (Foster and Lawson, 2010).

## Production

Vietnam produced such mineral commodities as barite, chromite, coal, ilmenite, crude petroleum, phosphate rock, tin, and zinc. As for major processed minerals, Vietnam produced cement, refined copper, rolled steel, refined tin, and zinc. During 2009, mineral production increased mainly for refined copper (production of which increased by 172.7%), cement (19.7%), crude steel (11.1%), anthracite (9.9%), crude petroleum (9.4%), and natural gas (6.8%). Mineral commodities for which production decreased significantly were zirconium (production of which decreased by 68.2%), lead (45.8%), chromium ore (33.6%), tin metal (15%), and barite (12.5%) (table 1).

## Structure of the Mineral Industry

The structure of Vietnam's mineral industry can be classified into 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., which manages all state-owned cement plants; Vietnam National Chemical Corp., which manages all state-owned fertilizer-related minerals mining and processing companies; Vietnam National Coal Corp. (VINACOAL), which manages all state-owned coal mining and processing companies; Vietnam National Minerals Corp. (VIMICO), which manages all state-owned nonferrous minerals mining and processing companies; Vietnam National Salt Corp., which manages all state-owned salt producing companies; and Vietnam National Steel Corp. (VNSTEEL), which manages all state-owned iron ore mining and steelmaking

companies. The state-owned holding company Vietnam National Coal-Mineral Industries Group (VINACOMIN) was created in 2005 and at the time VIMICO and VINACOAL were wholly owned subsidiaries of VINACOMIN. In the oil and gas sector, PetroVietnam Oil and Gas Group was the Government entity responsible for implementing oil and gas activities according to the country's Petroleum Law, signing contracts with counterparts from the private sector, and managing exploration and production activities. Table 2 is a list of the country's major mineral industry facilities (Vietnam Financial Review, 2009b; PetroVietnam Oil and Gas Group, 2010).

According to the General Statistics Office of Vietnam, the number of employees working in the mining and quarrying sector in 2009 was approximately 475,000, which accounted for about 1% of the total number of employed people in the country (47,743,600). In 2009, investments in the mining and quarrying sector accounted for about \$1.48 billion (in 1994 constant dollars), which represented about 7% of the total investments in the country (General Statistics Office of Vietnam, 2009a, c).

## Mineral Trade

In 2009, total trade in Vietnam decreased by approximately 11.4% to \$127 billion from \$143.4 billion in 2008. The total value of exports in 2009 was \$57.1 billion compared with \$62.7 billion in 2008, which represented a decrease of about 8.9%. Exports of coal increased by about 29% to approximately 25 million metric tons (Mt) from 19.4 Mt in 2008; exports of crude oil decreased by 2.8% to 98.3 million barrels (Mbbbl) from 101.1 Mbbbl mainly owing to the commissioning of the Dung Quat refinery, which was the country's first refinery. In 2009, the total value of imports decreased by 13.3% to \$69.95 billion from \$80.7 billion in 2008. Imports of fertilizers and of iron and steel increased by 48.5% and 15.2% respectively, compared with that of 2008, and imports of refined petroleum products decreased by 1.96% compared with that of 2008. In 2008 (the latest year for which data were available), the value of aluminum imports increased to \$734.6 million from \$659.6 million in 2007, or by 11.4%; on the other hand, decreases were reported for copper, to about \$838 million from \$899 million, or by 6.8%; lead, to \$141.1 million from \$147.5 million, or by about 4.3%; and zinc, to \$116.3 million from \$203.8 million, or by about 42.9% (General Statistics Office of Vietnam, 2009d-g).

Vietnam's main trading partners in 2009 were Australia, China, Japan, the Republic of Korea, Singapore, Taiwan, Thailand, and the United States. The leading importer of Vietnamese goods was the United States, which imported \$11.4 billion, or about 20% of Vietnam's total exports, followed by Japan, which imported \$6.3 billion, or 11% of Vietnam's total exports, and China, which imported \$4.9 billion, or 8.6% of Vietnam's total exports. Vietnamese imports came mainly from China (which supplied 23.5% of total imports valued at \$16.4 billion), Japan (10.7% of total imports valued at \$7.5 billion), and the Republic of Korea (10% of total imports valued at nearly \$7 billion) (General Statistics Office of Vietnam, 2009d, e).

## Commodity Review

### Metals

**Bauxite and Alumina and Aluminum.**—In late 2007, the Institute of Mining-Metallurgical Science and Technology (IMMST) (a Vietnamese consulting organization) was assigned by the Ministry of Industry and Trade to develop a master plan for the use of bauxite from the 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 1, 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 China's Yunnan Metallurgy Group between 600,000 and 900,000 metric tons per year (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 Province (Ministry of Natural Resources and Environment, 2009).

On December 21, 2009, Atlantic Ltd. of Australia announced that it had signed a memorandum of understanding with Vietnam Natural Resources and Environment Corp. (a state-owned corporation under the Ministry of Natural Resources and Environment) to develop a 25-Mt/yr bauxite mine, a port, and a rail system in the central highlands of the country. The rail system would be used to transport material from the mine to the port through the Provinces of Dak Nong and Lam Dong. Atlantic and Vietnam Natural Resources and Environment Corp. agreed to collaborate on the completion of a feasibility study before finalizing their joint-venture agreement. Atlantic's part of the agreement includes undertaking exploratory work and providing the funding for the project. As of the end of 2009, the project was still awaiting Government approval (Vietnam Business Finance News, 2009a; Atlantic Ltd., 2010).

**Gold.**—The Canada-based mining company Olympus Pacific Minerals Inc. owned two gold projects in Quang Nam Province in central Vietnam—the Bong Mieu gold project (80% interest) and the Phuoc Son gold project (85% interest). The Bong Mieu gold project included the Bong Mieu central gold mine, which started production in 2006; the Bong Mieu underground mine, which was placed in commercial production in 2009; and the Bong Mieu East deposit, which was still being explored. 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 while upgrading the plant. During the second quarter of 2009, the plant upgrades were completed and the plant was commissioned. The Phuoc Son gold project included the underground Dak Sa gold mine, which came into commercial production in October 2009 (Olympus Pacific Minerals Inc., 2009, p. 6, 13, 17).

In November 2009, the State Bank of Vietnam announced that it had eased the ban on gold imports that it had imposed in June 2008. The Government agreed to allow unlimited imports of gold by a handful of companies for an unspecified period of time for the purpose of stabilizing the domestic market (Reuters.com, 2009).

**Iron and Steel.**—During 2009, various foreign companies in conjunction with each company's Vietnamese-owned counterparts started or continued plans to expand the country's iron and steel industry. In May 2009, Sumitomo Metal Industries, Ltd. (Sumitomo Metals) of Japan announced that it had obtained approval for the investment of \$1.15 billion from the Government of Vietnam. In early 2008, Sumitomo Metals and China Steel Corp. of Taiwan requested a joint approval to invest in a steel sheet project located in the My Xuan A2 Industrial Zone in Ba Ria Vung Tau Province. China Steel Sumikin Vietnam Joint Stock Co. (CSVC) (in which China Steel held a 51% interest; Sumitomo Metals, 30%; Sumitomo Corp., 5%; and others, 14%) was formed in May. The project had the capacity to produce 1.5 Mt/yr of a full line of high-grade steel sheet products for automobiles for domestic use and for export (Sumitomo Metal Industries, Ltd., 2009).

Vietnam's largest-capacity privately owned cold-rolled steel plant, Hoa Sen, announced in August that it was undertaking an expansion project that would increase its galvanizing capacity to 470,000 t/yr from 100,000 t/yr and its color-coating capacity to 150,000 t/yr from 120,000 t/yr to meet market demand. The project, which was expected to be commissioned during the first half of 2010, was part of a new steel mill located in Ba Ria-Vung Tau Province (Metal Bulletin, 2009).

In September, Formosa Plastic Group (FPG) of Taiwan announced to the Government of Vietnam its commitment to build a deep-sea port in Ha Tinh Province near the Vung Ang Economic Zone at a cost of \$1.2 billion. The sea port was to be built by FPG's subsidiary Formosa Heavy Industry Corp. The company also committed \$19.2 billion to be invested in an oil refinery, a steel manufacturing unit, and a petrochemical complex in the same economic zone. In 2009, the company received the Government's approval to build the oil refinery and the petrochemical complex; meanwhile, the planned 2-Mt/yr stainless steel mill project was in the pre-construction stages. By the end of 2009, FPG was waiting for the Government to make the proposed 2,000-ha area available for the construction of the mill. FPG planned to invest an initial \$8 million for the first phase of the construction of the steel mill, which was scheduled to begin in February 2010. The first two blast furnaces were scheduled to be commissioned in 2013 (Alibaba.com, 2009; Allbusiness.com, 2009; Steelguru.com, 2009a).

In October 2009, POSCO of the Republic of Korea announced the commissioning of its cold-rolled steel mill located in the Phu My Industrial zone near Ho Chi Minh City. The plant, which cost \$528 million to build, had a combined capacity of 1.2 Mt/yr distributed as follows: 700,000 t/yr of cold-rolled steel products for use in automobiles and motorcycles and 500,000 t/yr of cold-rolled hard steel products for use as construction material. The company planned for the construction of the second stage of the project, which would include a 3-Mt/yr hot-rolled steel mill, to be finished by 2012 (Korea Herald, The, 2009).

Another steel project in the country that was expected to come onstream in the near future included the Pomina Steel plant, which, in conjunction with Pomina Steel Joint Stock Co., the Vietnam Bank of Industry & Trade, and the European equipment provider Concast, signed a contract in September 2009 to build a steel ingot plant in Ho Chi Minh City. The Pomina Steel joint venture planned to start construction in October 2009 in the Phu My Industrial Zone, and the plant was expected to be commissioned by 2012. The project included a plant to produce 1 Mt/yr of steel ingot, a rolling mill with a capacity of 500,000 t/yr, and a sea port. The Song Da steel mill, which was owned by Song Da Steel Joint Stock Co. (a subsidiary of Song Da Corp.), planned to commission the mill in early 2010. The Song Da steel mill, which is located in the Nam Cau Ken Industrial Zone in Hai Phong City, had the capacity to produce between 400,000 and 500,000 t/yr of steel billet (Steelguru.com, 2009b, c).

**Titanium (Ilmenite).**—In March 2009, the 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 is located in Ha Tinh Province, where the company had identified a reserve of 5.5 Mt of ilmenite. 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, 2009a).

In July 2009, the Government of Vietnam announced the decision to temporarily lift the ban on the export of titanium and zirconium ore and concentrates that it had imposed in December 2008. The lift was valid from the second half of 2009 until the end of 2010; however, the export tax of 20%, which was established in June 2008, remained unchanged. The decision was part of a Government strategy to boost the domestic mining industry. Vietnam supplied processed titanium minerals to Japan, Malaysia, the Republic of Korea, and the United States (Industrial Minerals, 2009b).

In July 2009, Vietnam's largest-capacity titanium factory, which was located in Binh Dinh Province, was commissioned. The plant had the capacity to produce 24,000 t/yr of titanium slag and 12,000 t/yr of steel in the initial phase; in phase 2, the company planned to add three additional furnaces for a total production capacity of 36,000 t/yr of titanium slag and 18,000 t/yr of steel. The plant was built by Saigon Quynhon Mining Corp., which was a subsidiary of Saigon Invest Group (Vietnamnet.vn, 2009).

### **Industrial Minerals**

**Cement.**—FLSmidth Corp. announced in October 2009 the inauguration of its cement grinding plant in Ha Long Bay in the Province of Quang Ninh. FLSmidth and the state-owned Ha Long Cement Joint Stock Co. had signed a contract in 2005 for the construction of the Ha Long cement plant, which included a 5,500-metric-ton-per-day cement plant, a cement grinding installation, and a separate packaging plant in Ho Chi Minh City. Also in October 2009, the Dien Bien Cement Joint Stock Co. started production at the Dien Bien cement plant located in the Sam Mun commune in Dien Bien District, Dien Bien Province;

the facility had the capacity to produce 370,000 t/yr of cement (Cemweek.com, 2009; Nhandan.org, 2009).

The construction of the Kien Giang cement plant, which was located in Kien Giang Province, started in April. The plant's capacity was estimated to be 1.26 Mt/yr of clinker and 600,000 t/yr of cement (Cementchina.net, 2009).

### **Mineral Fuels**

**Coal.**—In May, VINACOMIN announced plans to mine the country's largest coal deposit, the Red River Delta Coal Basin, which covers an area of 3,500 square kilometers and is located in the northern Provinces of Hai Duong, Hai Phong, Hung Yen, Nam Dinh, and Thai Binh. VINACOMIN, which was a major coal supplier to China and Japan, stated that the development of the Red River Delta Coal Basin was through joint ventures with (undisclosed) foreign partners. During the first half of 2009, the Ministry of Industry and Trade and VINACOMIN worked on a feasibility study for the proposed project, which needed to be submitted to the Government as a requirement for the necessary permits (Vietnam Business Finance News, 2009b).

**Natural Gas and Petroleum.**—In 2009, natural gas production in Vietnam increased by 6.8% to 8,010 million cubic meters from 7,499 million cubic meters in 2008. Production of crude petroleum increased by 9.4% (table 1).

In February, Vietnam's first domestically built refinery, the Dung Quat plant, was commissioned; the plant was designed to have a processing capacity of 6.5 Mt/yr. The refinery produced liquefied petroleum gas (LPG) and related products during its first year of operation and was scheduled to meet about 30% to 40% of the country's demand. During 2009, PetroVietnam was also building a second refinery, the Nghi Son Refinery, which was projected to cost about \$3 billion and would have an estimated capacity of 7 Mt/yr (Vietnam Financial Review, 2009a).

In June, the natural gas pipeline from the offshore Su Tu Vang oilfield on Block 15-1 started operations and supplied natural gas to the nearby electric plants and industrial parks. PetroVietnam reported that the pipeline's initial capacity was 500,000 cubic meters per day of gas and would be increased to 3 million cubic meters per day once it is connected to the nearby fields of Su Tu Den and Su Tu Trang (Oil & Gas Journal, 2009).

### **Outlook**

Vietnam's mining sector is expected to be dominated by the bauxite, coal, and oil and gas industries for the coming years, mainly as a result of the many exploration projects that began and the discoveries that were made in recent years. Vietnam commissioned its first oil refinery in 2009 and planned to commission two more between 2010 and 2013, which would allow the country to decrease its dependency on imports of petroleum products.

Cement production will most likely increase as a result of new plants being commissioned in the country and planned plants to be commissioned in the near future. As in the case of petroleum, these new plants will decrease the country's dependency on imports and will most likely increase its capability to export to neighboring countries.

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TABLE 1  
VIETNAM: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2005	2006	2007	2008	2009 <sup>e</sup>
METALS					
Bauxite <sup>e</sup>	25,800	60,000 <sup>r</sup>	80,000 <sup>r</sup>	80,000 <sup>r</sup>	80,000
Chromium ore, gross weight	78,915	73,037	103,830	55,880	37,105 <sup>3</sup>
Copper:					
Mine output, Cu content	3,100	11,400	12,500	11,000	12,000
Metal, refined	--	4,800	11,000	2,200 <sup>r</sup>	6,000
Gold <sup>e</sup> kilograms	2,138 <sup>3</sup>	2,500	3,000	3,000	3,000
Iron and steel:					
Iron ore, Fe content <sup>e</sup>	504,700 <sup>3</sup>	510,000	530,000	530,000	530,000
Metal:					
Pig iron thousand metric tons	202	583	790	800 <sup>e</sup>	800
Steel, crude do.	890	1,869	2,024	2,250 <sup>e</sup>	2,500
Steel, rolled do.	3,403	3,837	4,612	5,001 <sup>r</sup>	5,252 <sup>3</sup>
Lead, mine output, Pb content <sup>e</sup>	7,700	14,900	19,200	14,200 <sup>r</sup>	7,700
Manganese concentrate, gross weight <sup>e</sup>	18,000	20,000	20,000	20,000	20,000
Pyrite, gross weight <sup>e</sup> thousand metric tons	500	500	500	500	500
Tin:					
Mine output, Sn content <sup>e</sup>	5,400 <sup>r</sup>	5,400 <sup>r</sup>	5,400 <sup>r</sup>	5,400 <sup>r</sup>	5,400
Metal, smelter	1,766	2,665	3,369	3,583 <sup>r</sup>	3,046 <sup>3</sup>
Titanium:					
Ilmenite concentrate, gross weight <sup>4</sup>	522,800 <sup>r</sup>	604,700 <sup>r</sup>	643,400 <sup>r</sup>	692,700 <sup>r</sup>	686,800 <sup>3</sup>
Rutile, gross weight	405	437	574	681	620
Zinc: <sup>e</sup>					
Mine output, Zn content	48,000	45,000	45,600 <sup>r</sup>	45,600 <sup>r</sup>	45,600
Metal, powder	23,000 <sup>3</sup>	23,000	23,000	23,000	23,000
Zirconium, gross weight <sup>e,5</sup>	32,500	26,100	22,000	22,000	7,000
INDUSTRIAL MINERALS					
Barite	116,000	90,000	90,000	80,000	70,000
Cement, hydraulic thousand metric tons	30,808	32,690	37,102	40,009 <sup>r</sup>	47,900
Clays, kaolin <sup>e</sup>	650,000	650,000	650,000	650,000	650,000
Fluorspar <sup>e</sup>	4,000	4,000	4,000	4,000	4,000
Graphite <sup>e</sup>	2,000	2,000	2,000	2,000	2,000
Gypsum <sup>e</sup> thousand metric tons	5,000	5,000	5,000	5,000	5,000
Lime do.	1,737	1,592	1,438	1,619 <sup>r</sup>	1,538 <sup>3</sup>
Nitrogen, N content of ammonia	220,000	230,000	300,000	300,000	300,000
Phosphate rock:					
Gross weight thousand metric tons	1,024	1,232	1,523	2,101 <sup>r</sup>	1,896 <sup>3</sup>
P <sub>2</sub> O <sub>5</sub> content <sup>e</sup> do.	310 <sup>r</sup>	370 <sup>r</sup>	460 <sup>r</sup>	630 <sup>r</sup>	570
Pyrophyllite <sup>e</sup>	30,000	30,000	30,000	30,000	30,000
Salt thousand metric tons	898	842	857	717 <sup>r</sup>	718
Sand and gravel do.	166,000	182,700	195,000	200,000	200,000
Silica sand <sup>e</sup> do.	190	200	200	200	200
Stone, building stone do.	184,174	208,343	241,379	317,429 <sup>r</sup>	351,237 <sup>3</sup>
Sulfur <sup>e</sup>	22,000	22,000	22,000	22,000	22,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand metric tons	34,093	38,778	42,483	39,777	43,715 <sup>3</sup>
Gas, natural, gross million cubic meters	6,440	7,000	7,080	7,499 <sup>r</sup>	8,010
Petroleum, crude thousand 42-gallon barrels	135,800	123,194	116,741	109,291 <sup>3</sup>	119,528 <sup>3</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>r</sup>Revised. do. Ditto.

<sup>1</sup>Table includes data available through November 10, 2010.

<sup>2</sup>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.

<sup>3</sup>Reported figure.

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

<sup>5</sup>Estimated figures based on Vietnam inferred exports of zirconium ore to China.

TABLE 1—Continued  
VIETNAM: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

Sources: Vietnam's General Statistics Office, 2009; World Steel Association—Steel Statistical Yearbook, 2008; World Metal Statistics, December 2009; South East Asia Iron and Steel Institute, Crude Steel Production, Annual Statistics, 2009; The Barytes Association, World Barytes Production 2000-10; 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, 2009; International Chromium Development Association—Statistical Bulletin—2010 Edition; U.S. Geological Survey, Minerals Questionnaire, 2004-07.

TABLE 2  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(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., 14.44%]	Min Duc near Hai Phong City	1,400
Do.		Morning Star Cement Ltd. [Holcim Group, 65%, and Vietnam National Cement Corp., 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., 35%]	Nghi Son, Thanh Hoa Province	2,150
Do.		Vietnam National Cement Corp. (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
<b>Copper:</b>				
Concentrate, Cu content		Lao Cai Copper Complex [wholly owned subsidiary of state-owned Vietnam National Minerals Corp. (VIMICO)]	Sin Queyen, Lao Cai Province	11
Refined		Tang Loong Lao Cai Copper Smelting Enterprise [wholly owned subsidiary of state-owned Vietnam National Minerals Corp. (VIMICO)]	Tang Loong Long Commune, Bao Tang District, Lao Cai Province	11
<b>Fertilizer:</b>				
Nitrogen, ammonia		Vietnam National Chemical Corp. (100% state owned) 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 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/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%)	Quang Nam Province Ho Gan open pit and Nui Kem underground mines	400
Iron ore, gross weight		Thai Nguyen Iron and Steel Corp. [wholly owned subsidiary of Vietnam National Steel Corp. (VNSTEEL)]	Trai Cau and Tein Bo in Thai Nguyen Province; Thach Khe in Ha Tinh Province	850

See footnotes at end of table.



TABLE 2—Continued  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum, crude thousand 42-gallon barrels per day	VietSovPetro (a joint venture of Vietnam Oil and Gas Corp. and Joint Stock Company Zarubezhneft)	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 National Steel Corp. (VNSTEEL)	Cai Lan, Thai Nguyen Province, and Phu My, Ba Ria-Vung Tau Province	2,000
<b>Tin:</b>			
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 state-owned 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
<b>Zinc:</b>			
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.			