The Mineral Industry of Vietnam

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Vietnam, which is located north of the Gulf of Thailand, est of the Gulf of Tonkin and the South China Sea, east of Cambodia and Laos, and south of China in Southeast Asia, was a low-income developing country. Its per capita gross domestic product (GDP) and GDP based on purchasing power parity were estimated to be $2,570 and $211 billion, respectively, in 2004. Vietnam's total area is about 329,600 square kilometers (km^2). It had a population of about 82.7 million in 2004 (International Monetary Fund, 2005§[1]; U.S. Central Intelligence Agency, 2005§).

According to the Department of Geology and Minerals of Vietnam, the identified mineral resources were barite, bauxite, carbonate rocks (limestone and marble), chromium, coal, copper, natural gas, gemstones (ruby and sapphire), gold, graphite, iron ore, lead, manganese, nickel, crude petroleum, phosphate rock (apatite), rare earths, silica sand, tin, titanium (ilmenite and rutile), tungsten, zinc, and zirconium (Le, Van De, 1996; Lai Hong Thanh, 2002§; Truong Duc Chinh, 2002§). Vietnam was one of the world's leading producers of anthracite coal and one of the region's leading producers of ilmenite and phosphate rock. In 2004, Vietnam ranked sixth in production of crude petroleum in the Asia and the Pacific region (Oil & Gas Journal, 2004).

With the exception of carbonate rocks, coal, and hydrocarbons, most mineral resources were largely unexploited owing to Vietnam's outdated mining equipment and technology, poor infrastructure, and uncompetitive Government policy to attract foreign investors in mining. Several foreign companies from Australia, Canada, and China, however, which began their mineral exploration projects in Vietnam in the early 1990s, had discovered some economic resources of bauxite, copper, fluorspar, gold, nickel, and tungsten during the past 2 years. These foreign companies, which continued and intensified their exploration activities in 2004 by conducting feasibility studies for the development of those mineral resources, were expected to move into the production phase by 2008 or 2009.

In 2004, Vietnam's economy as measured by real GDP grew by 7.7% compared with 7.3% in 2003. The higher economic growth in 2004 was the result of a 12.9% increase in private consumption and a 24.6% increase in total investment. On the supply side, the industry sector, which included construction, manufacturing, mining, and utilities, grew by 10.2% compared with 9.6% in 2003. The country's inflation rate, however, was 7.7% compared with 3.2% in 2003 (Asian Development Bank, 2005§; Vietnam Panorama, 2005§).

The output of the mining and quarrying sector contributed 6.1% to Vietnam's GDP in 2003 (the last year for which data were available). In 2003, the output value of the mining and quarrying sector at 1994 constant prices was estimated to be $1.32 billion, and Vietnam's GDP at 1994 constant prices was estimated to be $21.66 billion (Asian Development Bank, 2004§).

Despite a 29% growth in exports owing to an increase in export earnings of crude petroleum and coal, Vietnam incurred a merchandise trade deficit of about $5.8 billion because of the large imports of fertilizers, refined petroleum products, and steel. The country's imports and exports were estimated to be $31.8 billion and $26 billion, respectively, in 2004. In minerals trade, Vietnam was a net importer of minerals owing to its large import bills for refined petroleum products ($3.6 billion), crude steel and steel products ($2.5 billion), and manufactured fertilizers ($870 million). Vietnam's major exports of mineral commodities were crude petroleum, which was valued at $5.7 billion, and coal, valued at $319 million in 2004 (Vietpartners.com, 2005a§).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—To develop the bauxite resources in Vietnam, BHP Billiton Aluminium of Australia reportedly established a representative office in Hanoi to manage the assessment of a $1.6 billion bauxite mine and aluminum refinery project in the Dak Nong District in the Central Highlands Province of Dak Lak. The proposed $1.6 billion project would include the development of a bauxite mine, transportation infrastructure, and an aluminum refinery. Earlier in September 2003, BHP Billiton Aluminium submitted a proposal to the Ministry of Industry and offered to cover all expenses for conducting the comprehensive studies on bauxite reserves in the Central Highlands where bauxite resources were estimated to be the world's second largest and accounted for 16.5% of the world's total (Vietnam News, The, 2004a§).

Chromium.—Production of chrome ore was estimated to have continued its upward trend. The sharply higher estimated production of chrome ore in 2003-04 was based on increased exports to China, which imported 143,520 metric tons (t) of chrome ore from Vietnam in 2003 and 194,910 t in 2004 (Tex Report, The, 2005). In 2002, the Government announced a list of industrial projects that would require foreign investment; these included a mining project to develop a mine and a processing plant in Thanh Hoa Province to produce 250,000 metric tons per year (t/yr) of chrome ore either by joint venture or by a 100% foreign-owned company. No new chrome mine development, however, was reported in 2003 or 2004. A placer deposit, which is situated in a shallow layer covered by thin soil burden near Nui Mua Mountain, is located about 20 kilometers (km) from Than Hao City in Thanh Hao Province. Ore reserves

[1]References that include a section mark (§) are found in the Internet References Cited section.

at this deposit were estimated to contain about 20.8 million metric tons (Mt) of Cr_2O_3 (Trong Duc Chinh, 2002§).

Copper.—In February, the Government reportedly allowed China Nonferrous Metal Industry Engineering and Construction Co. Ltd. and the state-owned Vietnam Industrial Construction Corp. to form a consortium to build the country's first copper mine and smelter complex. The state-owned Vietnam National Minerals Corp. (VIMICO), which was the investor in the complex, began ground work on the site of a $65 million copper mine and smelter complex at Sin Queyen in the Province of Lao Cai in September 2003. The construction work reportedly was scheduled for completion in late 2004, and a test run was to be held during the first quarter of 2005. Operations would begin in the second quarter of 2005. The mining and milling complex would have a capacity to mine and process from 1.1 to 1.2 million metric tons per year (Mt/yr) of ore to produce 42,000 t/yr of copper concentrate with an average metal content of 25% copper, 110,000 t/yr of iron ore concentrate, and about 20,000 t/yr of sulfur as coproducts. The smelter and refinery would have the capacity to produce 10,500 t/yr of refined copper. The smelter and refinery byproducts would include 340 kilograms per year (kg/yr) of gold, 145 kg/yr of silver, and 40,000 t/yr of sulfuric acid. The complex was expected to operate for about 40 years at planned ore output of 1.2 Mt/yr with estimated ore resources of 50 Mt. According to VIMICO, the project would be financed by more than $40 million in soft loans from the Export-Import Bank of China. VIMICO would provide the remaining $12 million (Vietnamtrade.org, 2003§; Yahoo.com, 2004§).

Gold.—In 2004, gold exploration was mainly by Olympus Pacific Minerals Inc. of Canada at Bong Mieu and Phuoc Son in Quang Nam Province. Other foreign companies, such as Archipelago Resources PLC of the United Kingdom in Cam Thuy-Ba Thuoc District, Kim Binh Zinc Co. Ltd. of China in Lang San Commune of Na Ri District, and Anh Kim Joint Venture Co. of Malaysia in Ea Ba Commune of Phu Yen Province reportedly were actively exploring for gold in 2004.

Olympus Pacific Minerals, which acquired the Bong Mieu gold property in 1997, began field work on the property during the second half of 2003. The Bong Mieu property, which covers about 30 km^2, is located about 80 km south of Danang in Quang Nam Province in central Vietnam. The property has three gold deposits at Ho Gan, Ho Ray, and Nui Kem. The Bong Mieu gold property was 80% owned by Olympus Pacific Minerals Inc. and 20% owned by the company's Vietnamese partners. In July, Olympus Pacific Minerals retained Micon International Ltd. to conduct a scoping study to develop an open pit mine at the Ho Gan deposit. Micon International was to conduct prefeasibility and feasibility studies for the development of Bai Dat and Bai Go underground deposits of the Phuoc Son Project (Olympus Pacific Minerals Inc., 2004c§).

In November, Olympus Pacific Minerals announced the results of the positive independent prefeasibility study completed by Micon International for the Ho Gan open pit. According to Olympus Pacific Minerals, a detailed environmental impact statement (EIA) was completed by Kingett Mitchell Ltd. of New Zealand, and a mining license for the Ho Gan deposit was issued. The project was expected to start production during the second quarter of 2005. The initial mining operations for the first 7 months would be at a rate of 500 metric tons per day (t/d) of ore; after that, it would increase to 800 t/d. As of November 2004, the estimated ore reserves for the Ho Gan deposit included 189,200 t of proven reserves at a grade of 2.74 grams per metric ton (g/t) gold and 668,800 t of probable reserves at a grade of 2.32 g/t gold (Olympus Pacific Minerals Inc., 2004b§, d§)

The Phuoc Son gold property, which covers about 70 km^2, is located 90 km southwest of Danang in Quang Nam Province. The project area has more than 30 gold prospects; of these prospects, the Dak Sa and the Northern sectors are the most advanced. The Phuoc Son gold project was 85% owned by Olympus Pacific Minerals and 15% owned by Mien Trung Industrial Company, which was controlled by the local Provincial Government. In July, Micon International was retained by Olympus Pacific Minerals to conduct studies at Dak Sa to determine the feasibility of developing an underground mine with pilot-scale gold production from the Bai Bat and the Bai Go deposits. According to Olympus Pacific Minerals, the EIA report for the Dak Sa underground mine had been approved by the Ministry of Resources and Environment in December. The approval of the EIA was a precondition for approval of a mining license application in Vietnam. As of January 2004, measured and indicated mineral resource estimates for the Bai Dat and the Bai Go deposits totaled 318,000 t at a grade of 14.32 g/t gold (Olympus Pacific Minerals Inc, 2004a§).

Iron and Steel.—Iron ore was produced from the Trai Cau Mine in the Province of Bac Tai, the Na Lung Mine in the Province of Cao Bang, and the Thach Khe Mine in the Province of Nghe Tinh. Iron ore production increased gradually from 300,000 t in 2000 to 430,000 t in 2002 and reached 540,000 t in 2003. Iron ore production in 2004 was estimated to be 650,000 t. In 2003, about 200,000 t was exported to China, and the remainder was consumed by state-owned Thai Nguyen Iron and Steel Co. and other domestic pig iron producers. To meet the raw material requirement of the expanding crude steel production capacity of Thai Nguyen Iron and Steel, the Government planned to expand the capacity of the Thach Khe Mine, which contains more than 500 Mt of proven reserves at a grade of between 60% and 65% iron (United Nations Conference on Trade and Development, 2004; Intellasia.com, 2004§).

During 2004, state-owned Vietnam Steel Corp. (VSC) was in talks with Kunming Iron and Steel Group Co. of Yunnan Province in China to develop jointly the Quy Xa iron ore deposit in Lao Cai Province; the deposit is located about 340 km northwest of Hanoi. According to an onsite study completed by Kunming Iron and Steel, the Quy Xa deposit contains about 120 Mt of ore reserves with a typical iron content of between 30% and 50%. An agreement was expected to be signed by early 2005. According to company officials, Kunming Iron and Steel was expected to provide capital, technology, and equipment for mine development. Most of the iron ore production would be exported to Kunming Iron and Steel. The total capital was estimated to be in the range of $50 million, and construction was scheduled to start in the second half of 2005 (Huaye Iron & Steel Group, 2004§).

Vietnam's steel industry continued to have an imbalance between upstream (production of crude steel) and downstream

(rolled steels) in 2004. Domestic crude steel production was by three subsidiaries of VSC (Danang Steel Company, Southern Steel Co., and Thai Nguyen Iron and Steel) and a private billet producer (Hoa Phat Company). Hoa Phat Steel began its crude steel (billet) plant with a 200,000-t/yr capacity at the Pho Noi Industrial Park in Hung Yen Province in July 2004 (VietnamNet Bridge, 2004b§).

To meet the domestic requirements for crude steel (in the form of billet or ingots) in 2004, Vietnam imported 2.3 Mt of crude steel (billet) valued at $870 million (Vietpartners.com, 2005b§).

To reduce the country's reliance on imports of crude steel, VSC planned a $3.5 billion project to develop the Thack Khe iron ore mine and an integrated steel complex in Ha Tinh Province. The Thack Khe iron ore deposit, which is located about 300 km south of Hanoi, contains 544 Mt of ore reserves. Sun Steel Corp. was expected to provide $80 million for the development of the iron ore mine. The complex was slated to have a capacity of 4.5 Mt/yr of crude steel, 4 Mt/yr of hot-rolling capacity, and 800,000 t/yr of cold-rolling capacity. According to the Ministry of Industry, the project's prefeasibility study was awaiting approval by the Prime Minister and the National Assembly in November 2004 (Southeast Asia Iron and Steel Institute, 2004a§, b§).

In May 2004, Sun Steel Corp. reportedly started the three-stage construction of a new steel billet plant in Nhon Trach District, Dong Nai Province; it is located about 32 km northeast of Ho Chi Ming City. The first stage of construction, which was expected to be completed in mid-2006, involved installation of a 1,000-cubic-meter furnace with a 1-Mt/yr-capacity billet plant, which would use scrap as its raw material. The project would increase the plant capacity to 2 Mt/yr after the second-stage construction is completed in 2007 and to 3 Mt/yr after the third-stage construction is completed in 2008 (South East Asia Iron and Steel Institute, 2004b§-d§).

To lower the prices of steel products in the local markets, the Ministry of Finance reduced its import tariffs on steel products to 10% from between 15% and 20%, and on steel ingot, to 5% from between 5% and 10% in August 2004 (U.S.-ASEAN Business Council, 2004§).

Nickel.—Through its wholly owned subsidiary AMR Nickel Ltd., Asian Mineral Resources Ltd. (AMR) of New Zealand continued to explore for copper and nickel in its 70% owned Ban Phuc Nickel property in the 150-km^2 Ta Khoa concession, which is located about 180 km west of Hanoi in the Province of Son La. Phase I of the feasibility study was begun, and exploration for copper and nickel continued in the concession area in 2004. The feasibility study was expected to be completed by mid-2005.

During 2004, AMR completed the drilling of 73 holes for a total of 13,661 meters in a program designed to explore resource extensions and infill the main Ban Phuc nickel deposit. The 2004 drilling program confirmed the grade and width of the massive sulfide mineralization and allowed a much more accurate estimation of recoverable resources (Asian Mineral Resources Ltd., 2005b§).

The revised resources estimate at the Ban Phuc deposit included indicated resources of 10.86 Mt at grades of 0.82% nickel, 0.16% copper, and 0.02% cobalt; and inferred resources of 6.33 Mt at grades of 0.58% nickel, 0.05% copper, and 0.01% cobalt. Total massive nickel-copper sulfide resource estimates included indicated resources of 1.31 Mt at grades of 2.56% nickel, 1.06% copper, and 0.09% cobalt; and inferred resources of 200,000 t at grades of 2.62% nickel, 1.25% copper, and 0.09% cobalt (Asian Mineral Resources Ltd., 2005a§).

In 2004, AMR signed a memorandum of understanding (MOU) with state-owned Mineral Development Co. Ltd. to acquire an additional 20% interest in the Ban Phuc project. The remaining 10% interest was held by Son La Engineering and Construction Co. Ltd., which was owned by the Son La Provincial Government (Mining Journal, 2004).

Tungsten.—In 2004, Tiberon Minerals Ltd. of Canada continued to explore for tungsten, fluorite, and associated bismuth, copper, and gold at the Nui Phao polymetallic property, which is located about 80 km north of Hanoi in Thai Nguyen Province.

In February, the Government, through the Ministry of Planning and Investment, granted an investment license to Nui Phao Mining Joint Venture Co. Ltd. (NPMJVC) for the Nui Phao project. NPMJVC was owned by Tiberon Minerals (70%), and Thai Nguyen Export-Import Investment Co. and Thai Nguyen Minerals Company (15% each).

The key provisions of the license include the following:

- An initial 30-year term with the provision for a 20-year extension;
- Exclusive right to mine and explore in a 54.66 km^2 area that covers the Nui Phao deposit, the renewed Nui Phao exploration license area, and the Cu Van exploration area;
- A favorable corporate tax rate and other incentives. Under the existing Foreign Investment Law, NPMJVC will receive a 3-year corporate tax holiday after achieving profitability followed by an 8-year period in which the corporate tax rate would be reduced by 50%. The corporate tax rate without any incentives would be 15% during the first 12-year period; thereafter, the rate would be 28% before any tax incentives;
- The royalty rates would be 5% for tungsten, 3% for bismuth and copper, and 2% for gold and fluorspar.

NPMJVC reportedly was in the process of applying for a mining license to develop the Nui Phao deposit (Tiberon Minerals Ltd., 2004e§).

In March, Tiberon Minerals acquired an additional 7.5% interest in the Nui Phao project for about $3.1 million from Thai Nguyen Export-Import Investment and increased its total interest in the project to 77.5%; Thai Nguyen Export-Import Investment reduced its interest to 7.5% from 15%. According to the President of Tiberon Minerals, of the total $3.1 million purchase price, $2.6 million would be contributed directly to the Nui Phao project in accordance with the project development and construction schedule (Tiberon Minerals Ltd., 2004d§).

In April, Tiberon Minerals announced that it had appointed the Aker Kvaerner E&C Division of Aker Kvaerner Canada, Inc. as the lead engineering consultant on the Nui Phao bankable feasibility study. Tiberon Minerals anticipated that the feasibility study could be completed by yearend 2004. In August, Tiberon Minerals signed a Mandate Letter that appointed Fortis Bank S.A./N.V. and WestLB AG to act as exclusive structuring banks and lead arrangers for

the $100 million debt financing of the Nui Phao project. In November, Tiberon Minerals signed an MOU with Sidech S.A. of Belgium for purchase of all Nui Phao's bismuth output (approximately 1,000 t/yr) for the first 5 years of production (Tiberon Minerals Ltd, 2004a§-c§).

Industrial Minerals

Cement.—Cement production continued the 2003 upward trend because of the continued growth in the domestic demand for cement. In 2004, cement production increased by 8.8% to 25.3 Mt, and cement consumption increased by 10% to 25.8 t. To meet the growing demand and to stabilize the domestic cement market, Vietnam's cement industry imported 3.9 Mt of clinker and 2.3 Mt of cement in 2004. According to an estimate by the Government, Vietnam's demand for cement will reach 28.4 Mt in 2005, 46.8 Mt in 2010, 62.5 Mt by 2015, and 70 Mt by 2020 (Vietpartners.com, 2004c§, g§).

In 2004, state-owned Vietnam National Cement Corp. (VNCC) warned that the industry might face a cement shortage of up to 6.5 Mt in 2005, which was based on the estimated demand of 29.1 Mt and projections that the cement production in 2005 might drop to about 22.6 Mt. During the past 2 years, cement demand had increased by 4.5 Mt/yr because of the rapid urbanization, while production capacity increased by only 2.5 Mt/yr. To meet the demand for cement projected for 2005, the Ministry of Construction urged the industry to draft a plan to import more clinker and speed up the pace of construction on cement projects (Vietpartners.com, 2004b§).

In 2004, VNCC's 10 new cement projects with a combined total capacity of 17.2 Mt/yr were behind schedule; some of the projects were 3 years behind schedule because of financial and site-clearance problems. By yearend 2004, VNCC brought onstream the 1.4 Mt/yr-capacity Tam Diep cement plant in the Province of Ninh Binh. VNCC had to speed up construction of the Hai Phong Cement plant, which had been scheduled to be completed by 2005. Two cement projects were behind schedule because of redesigns and increased costs of building materials at the cement plant. Seven other cement projects started in 2004 by VNCC included the expansion projects at its Binh Phouc, But Son, Ha Tie II-2, and Hoang Thach plants and three clinker-grinding plants in Ho Chi Minh City, Khanh Hoa, and Long An (Vietnameconomy.com, 2004a§).

Other projects initiated in 2004 included the $74 million 910,000-t/yr cement plant in the Province of Yen Bai by the Yen Bai Cement Joint Stock Company (YCJC); the $64 million 910,000-t/yr Hung Vuong plant in Thanh Ba District in the Province of Phu Tho by the joint venture of Housing and Urban Development Corp., Phu Tho Cement Company, and Vietnam Machinery Installation Corp.; the $162 million project to double the 1.4-Mt cement plant near Hai Phong by Hai Phong Chinfon Cement Company; and the $249 million project to raise the capacity to 4.3 Mt/yr from 2.15 Mt/yr by Nghi Son Cement Corp. (Vietnameconomy.com, 2004b§;Vietpartners.com, 2004d§-f§).

In October, Lafarge SA announced that it planned to invest $30 million to build a 500,000 t/yr cement grinding plant, which is located 20 km southeast of Ho Chi Minh City in the Province of Dong Nai. The investment was to be made by the DonaFrance joint venture, in which Lafarge owned 70% interest. The plant was scheduled for completion in late 2005 (MEi Online, 2004§).

Graphite.—In January, an MOU was signed by the Quang Ngai Provincial Government and Nobel Oil Company of Russia for the development of a graphite mine in the Son Tinh District of Quang Ngai Province. Immediately after the agreement was signed, an investment license for graphite production was issued to the joint venture. According to the agreement, the joint venture would have a capital cost of $3.3 million, and the mine capacity would be 5,000 t/yr of graphite. According to the Provincial Government, graphite resources in the Province were estimated to be 4 Mt, of which about 2.5 Mt was exploitable (Quang Ngai, 2004§; Vietnam News, The, 2004c§).

Mineral Fuels

Coal.—The Vietnamese coal industry had a very successful year in 2004 owing to increased domestic demand and higher exports. Coal production reached a record level of about 26 Mt in 2004 compared with 19.6 Mt in 2003. In 2004, coal exports rose to 11.6 Mt from 7.2 Mt in 2003 and export prices were between 20% and 50% higher than those of 2003 (Vietnameconomy.com, 2005a§, b§; Vietnam-ustrade.org, 2005§).

Increased domestic demand for coal in 2004 was mainly the result of increased demand for the generation of electricity and the manufacture of fertilizer and cement. The Ministry of Industry forecasted that the domestic demand for coal in 2005 will reach to between 12 and 13.5 Mt, of which about 5.5 Mt will be for power generation; 2.5 Mt, for cement production; and 700,000 to 800,000 t, for fertilizer production. The coal industry was expected to produce between 27 and 29 Mt in 2005 (Vietnameconomy.com, 2005b§; Vietnamtradepoint.com, 2005§).

Vietnam National Coal Corp. (Vinacoal) controlled most of the mining, distribution, and export of coal. Most of the coal produced in Vietnam was anthracite mainly from Quang Ninh Province in northeastern Vietnam. In 2004, the Coc Sau Mine, which was the leading coal mine, produced about 2.4 Mt and the Cua Ong Mine, which was the leading coal preparation plant that used Australian equipment, produced about 4.4 Mt of clean coal. According to Vinacoal, in addition to the exisiting coal preparation plants, three new coal preparation plants will be built in Khe Cham, Lap My, and Uong Bi Districts in Quang Ninh Province (Vietnameconomy.com, 2005a§).

Other major coal mines were in the Cam Pha, the Cao Son, the Deo Nai, the Dong Trieu, the Ha Tu, the Hon Gai, the Mao Khe, and the Mong Duong Districts. Coal preparation plants were at Nam Cau Tran in Ha Long City and Vang Danh in Uong Bi District. Production of brown coal was mainly from the Na Duong Mine, which is located in the Province of Lang Son. In March 2003, a significant coal bed was discovered in the Red River Delta region in the northern part of the country. Vinacoal planned to use the reserve for thermal powerplants. In October 2004, Vinacoal reportedly was in talks with Fujan Province Coal Industry Corp. of China to develop jointly the Bac Coc Sau Mine in Quang Ninh Province (U.S. Energy Information Administration, 2005§).

In 2004, Vietnam's coal exports totaled 11.6 Mt at prices that ranged from $26 to $30 per metric ton and were estimated to be

about $340 million. These exports went mainly to China, Japan, the Republic of Korea, Thailand, and Western European countries (VietnamNet Bridge, 2004a§).

Natural Gas and Petroleum.—Natural gas was produced by VietSovPetro (a joint venture of Vietnam Oil and Gas Corp. and Zarubeznheft of Russia) from the small onshore Tien Hai C Gasfield in the Hanoi Trough (part of the Song Hong Basin). Associated gas was produced by VietSovPetro from the larger offshore Bach Ho (White Tiger) and Rang Dong (Dawn) oilfields, which are located in the Cuu Long Basin. A consortium led by BP p.l.c. of the United Kingdom produced associated gas from the offshore Lan-Tay gasfield in the Nan Con Son Basin. In 2004, natural gas production increased by 81.2% to 6.25 billion cubic meters and averaged about 17.12 million cubic meters per day (Vietpartners.com, 2005b§).

In the domestic market, natural gas was consumed as fuel by powerplants and as raw materials by a nitrogen fertilizer plant in the Phu My Industrial Zone in the Province of Ba Ria-Vung Tau; the remainder was consumed as raw material by the liquefied petroleum gas (LPG) and condensate processing plants at Dinh Co for the production of LPG and gasoline in Vung Tau in the Province of Ba Ria-Vung Tau.

BP p.l.c. and its partners, ConocoPhillips Company of the United States and Oil and Gas Company of India, were expected to increase their annual gas deliveries to another partner (Petro-Vietnam) to 2.65 billion cubic meters per year or 7.26 million cubic meters per day in 2004 from 1 billion cubic meters per year or 2.73 cubic meters per day, in 2003. In November 2002, BP, ConocoPhilips, and Oil and Gas Company began their gas deliveries from the Lan Do and the Lan Tay gasfields in Nam Con Son Basin to PetroVietnam for power generation and nitrogen fertilizer production via a 399-km pipeline to Phu My Industrial Zone. BP, which had invested about $800 million in the $1.3 billion Nam Con Son Project, planned to produce 3 billion cubic meters of natural gas between 2005 and 2007 and 7 billion cubic meters per year of natural gas after the Hai Thach and the Lan Do gasfields become operational in 2007. The pipeline had the capacity to deliver up to 7 billion cubic meters per year of natural gas (Vietnam News, The, 2004b§; Vietpartners.com, 2004a§, 2005a§).

Crude petroleum was produced by PetroVietnam in joint venture with partners from Canada, France, Japan, Malaysia, Russia, Sweden, and the United States. According to the General Statistical Office, Vietnam produced 20.17 Mt, or an average of 391,400 barrels per day (bbl/d), of crude petroleum in 2004. It exported virtually all of its crude petroleum output and earned $5.6 billion of foreign currency in 2004 (Vietpartners.com, 2005a§).

In 2004, crude petroleum was produced from seven offshore oilfields in three basins—the Bach Ho, the Rang Dong, the Rong, the Ruby, and the Su Tu Dean in the Cuu Long Basin; the Bunga Kekwa in the Malay-Tho Chu Basin, which is located off the southern coast of Vietnam between Vietnam and Malaysia; and the Dai Hung in the Nam Con Son Basin. The output from the Bunga Kekwa was shared equally by Malaysia and Vietnam. Several large oilfields and gasfields in the Cuu Long Basin were brought onstream in early 2004 by ConocoPhillips and Canada's Talisman Energy Inc. These fields included the Su Tu Den (Black Lion) at the rate of 85,000 bbl/d and the Bunga Kekwa in Blocks PM-3 CAA and 46-Cai Nuoc at the rate of 60,000 bbl/d (Thanh Nien News, 2004§).

Korea National Oil Corp. (KNOC), which announced the discovery of oil and gas in Block 11-2 field in the Nam Con Son Basin in late 2003, began construction of oil and gas production facilities off the coast of southern Vietnam in 2004. According to KNOC, the area contains recoverable reserves of about 34 billion cubic meters of natural gas and 38 million barrels of condensate. The construction of the offshore oil and gas production facilities, which was started in March 2004 with an estimate cost of $300 million, was scheduled for a test run in mid-2005 before commercial operation was to begin in November 2005 (Petroleum Economist, 2004).

Outlook

For the next 4 to 5 years, the country's mining sector will continue to be dominated by the coal and oil and gas industries. In the energy sector, the coal and oil and gas industries were expected to increase their capacity in the next 2 to 4 years. The mining sector also is expected to expand. Exploitation of such minerals as bauxite, copper, fluorspar, gold, iron ore, tungsten, and zinc is expected to add new capacity to the mining sector following the completion of joint-venture development projects with companies from Australia, Canada, and China. Development of new capacity for the production of copper, gold, and zinc is expected to be completed between 2005 and 2006. Development of new capacity for the production of fluorspar, iron ore, nickel, and tungsten could be completed by 2007, but new capacity of bauxite may take longer. The existing capacity for production of cement is expected to be expanded by more than 17 Mt/yr in the next 3 to 5 years to meet the growing demand for cement as a result of Vietnam's rapid urbanization.

Vietnam's economy is expected to continue to grow at a slightly slower pace than that of 2004 in the next 2 years. According to a forecast by the International Monetary Fund, Vietnam's GDP is projected to grow by 7.2% in 2005 and by 7.0% in 2006 (International Monetary Fund, 2005§).

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Major Publication

General Statistics Office, Hanoi, Vietnam: Statistical Yearbook, annual.

TABLE 1
VIETNAM: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2000	2001	2002	2003	2004[e]
Barite[e]		52,500	71,100	60,300	81,500	101,000 [3]
Cement, hydraulic	thousand metric tons	13,298	16,073	21,121 [r]	23,282	25,320 [3]
Chromium ore, gross weight		76,300	70,300	80,000 [r, e]	120,000 [r, e]	150,000
Clays, kaolin[e]		520,000	600,000	600,000	650,000	650,000
Coal, anthracite	thousand metric tons	11,609	13,397	16,347	19,590 [r]	26,820 [3]
Copper concentrate, gross weight[e]		2,400 [r]	1,600 [r]	1,100 [r]	1,200 [r]	1,500
Fluorspar[e]		3,000	3,000	3,000	3,000	3,000
Gas, natural, gross	million cubic meters	1,598	1,724	2,260	3,450	6,250 [3]
Gold[e]	kilograms	3,000	3,000	2,000	2,000	2,000
Iron ore[e]		300,000	400,000	430,000	540,000	650,000
Ilmenite, gross weight[e]		174,000	180,000	180,000	200,000	200,000
Lead, mine output, Pb content[e]		1,200	900	1,100	1,100	1,100
Lime	thousand metric tons	1,156	1,351	1,426	1,450 [e]	1,500
Manganese concentrate, gross weight[e]		65,000	67,000	68,000	68,000	70,000
Nitrogen, N content of ammonia		41,900	52,600	58,400	79,700	216,200 [3]
Petroleum, crude	thousand 42-gallon barrels	115,373	119,212	117,753	125,281	142,844 [3]
Phosphate rock:						
Gross weight	thousand metric tons	785	677	680	823 [r]	800
P_2O_5 content	do.	236	204	204	247 [r]	240
Pyrite, gross weight[e]	do.	200	300	400	450	450
Pyrophyllite[e]		30,000	30,000	30,000	30,000	30,000
Sand and gravel	thousand metric tons	83,200	92,200	95,000	98,000 [e]	98,000
Salt	do.	590	669	1,089 [r]	1,275 [r, e]	1,300
Silica sand[e]	do.	60,000	62,000	62,000	63,000	63,000
Steel:						
Crude	do.	306	319	409	544	658 [3]
Rolled	do.	1,583	1,914	2,503 [r]	2,682	2,950 [3]
Stone, building stone	do.	57,600	80,400	83,700	85,000 [e]	90,000
Sulfur[e]		22,000	22,000	22,000	22,000	22,000
Tin:[e]						
Mine output, Sn content		1,800 [r]	1,700 [r]	1,700 [r]	2,100 [r]	3,500
Metal, smelter		1,800	1,700 [r]	1,700 [r]	2,100 [r]	3,500
Zinc, mine output, Zn content[e]		12,500	32,000 [r]	42,000 [r]	45,000 [r]	40,000
Zirconium, gross weight[e]		7,000 [r]	8,000 [r]	11,000 [r]	13,000 [r]	13,000

[e]Estimated; estimated data are rounded to no more than three significant digits. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 24, 2005.

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

[3]Reported figure.

Sources: Vietnam's General Statistics Office, Statistical Yearbook, 2002; British Geological Survey, World Mineral Statistics, 1999-2003; World Metal Statistics, May 2005; South East Asia Iron and Steel Institute, Crude Steel Production, Annual Statistics, 1994-2003; U.S. Geological Survey Minerals Questionnaire, 2000; The Barytes Association, World Barytes Production 2000-04; International Lead and Zinc Study Group, Lead and Zinc Statistics, Monthly Bulletin of the International Lead and Zinc Study Group, May 2005.

TABLE 2
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2004

(Thousand metric tons unless otherwise specified)

Commodity	Major operation 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 of Switzerland, 65%, and Vietnam National Cement Corp.—Ha Tien I, 35%)	Hon Chong, Kien Giang Province	2,300
Do.	Nghi Son Cement Corp. (Taiheiyo Cement Corp. and Mitsubishi Materials Corp. of Japan, 65%, and 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 Tein II, Hai Phong, Hai Van, Hoang Mai, Hoang Thach, and Tam Diep	13,500
Chromite	Thai Nguyen Nonferrous Metal Co. (wholly owned subsidiary of state-owned Vietnam National Minerals Corp.)	Nui Nua, Thanh Hoa Province	200
Coal, anthracite	Vietnam National Coal Corp. (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, Cua Ong, Uong Bi in Quang Ninh Province	26,000
Fertilizer:			
Apatite	Vietnam National Chemical Corp. (100% state-owned)	Lao Cai, Lao Cai Province	700
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, a Russian oil company), and a joint venture of PetroVietnam, BP p.l.c. of the United Kingdom, Oil and Natural Gas Co. of India, and ConocoPhiliips Co. of the United States	Offshore Bach Ho Oilfield, Rang Dong Oilfield, and Lan-Tay Do Gasfield	17
Iron ore	Vietnam Steel Corp.	Trai Cau, Bac Tai Province; Na Lung, Cao Bang Province; and Thack Khe, Nghe Tin Province	700
Nitrogen, ammonia	Vietnam National Chemical Corp.	Ha Bac, northern Vietnam Phu My, Ba Ria-Vung Tau Province	375
Petroleum, crude thousand 42-gallon barrels per day	VietSovPetro	Offshore Bach Ho, Rong, Rang Dong, Ruby, Bunga Kekwa, Dai Hung, and SuTu Trang Oilfields	390
Salt	Vietnam National Salt Corp.	Nam Dinh, Nghe An, and Hai Tin Provinces	850
Steel, crude	Vietnam Steel Corp.	Cai Lan, Thai Nguyen Province, and Phu My, Ba Ria-Vung Tau Province	700
Tin:			
Concentrate	Cao Bang Nonferrous Metal Co. and Nghe Tinh Nonferrous Metal Co. (wholly owned subsidiaries of state-owned Vietnam National Minerals Corp.)	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	4
Titanium, ilmenite	Bimal Minerals Co. Ltd. (Binh Dinh Minerals Co., 40%, and Malaysia Mining Corp. and Syarikat Pendorong Sdn. Bhd., 60%)	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	130
Do.	Mineral Development Co. No. 4 and No. 5 (wholly owned subsidiaries of Vietnam National Minerals Corp.)	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	Thai Nguyen Nonferrous Metal Co. (wholly owned subsidiary of Vietnam National Minerals Corp.)	Cho Dien, Bac Can Province	45