THE MINERAL INDUSTRY OF

VIETNAM

By John C. Wu

Vietnam's mineral resources remained largely unexploited. In the past 10 years, previously identified mineral resources of bauxite, coal, copper, natural gas, gemstones, gold, iron ore, lead, limestone, manganese, nickel, crude petroleum, titanium, and zinc had been evaluated and further explored by foreign companies from Australia, Canada, Belgium, France, Indonesia, Japan, the Republic of Korea, Malaysia, New Zealand, Thailand, the United Kingdom, and the United States to reassess their economic value. Among those recently investigated minerals, bauxite, chromite, coal, natural gas, gemstones, gold, iron ore, limestone, crude petroleum, tin, titanium, and zinc were believed to have good potential for the discovery of new deposits or the extension of their reserves. No significant discovery of sizable nonferrous metal deposits has been made.

Minerals exploration activity had been high between 1988 and 1997. The activity, however, had slowed down considerably in 1998 and 1999 because of the impact of the 1997 Southeast Asia financial crisis, the lack of exploration capital, and low metals prices in the world market. Some foreign companies that explore for gold and nonferrous metals suspended their activities in 1999, while some other foreign companies were still waiting for the Government to approve their applications for exploration licenses.

The mining industry, which was dominated by the production of coal and crude petroleum, was an important sector of the Vietnamese economy. According to the latest Government statistics, the output of the mining industry contributed 6.2% to the country's gross domestic product, which was estimated to be \$26 billion (General Statistical Office, 1999, p. 26). Export earnings of coal and crude petroleum accounted for more than 14% of the total merchandise exports, which were estimated to be \$9.4 billion. Imports of refined petroleum products, iron and steel products, and fertilizers accounted for 21% of the total merchandise imports, which were estimated to be \$8.7 billion (International Monetary Fund, 1999, p. 5, 30-31).

Government Activities

On November 6, the Government was to begin collecting a bond from any company that proposed to mine in Vietnam; the bond would cover the expected cost of protecting the environment from the proposed mining operation. Under the new rule, a one-time payment would be required for an operation with less than 3 years of mining life, and installments could be made for an operation with more than 3 years of mining life (Mining Journal, 1999b).

The mineral industry comprised the following state-owned companies: Vietnam National Minerals Corp. (VNMC), Vietnam National Chemical Corp. (VinaChem), Vietnam National Gem and Gold Corp. (VNGGC), Vietnam National Cement Corp. (VNCC), Vietnam National Coal Corp.

(Vinacoal), Vietnam Steel Corp. (VSC), and Vietnam Oil and Gas Corp. (PetroVietnam). It also included several joint ventures of state-owned and foreign mining and mineral-processing companies, many small-scale local-government-owned mining companies, joint ventures of local government and private mining companies, and local private miners.

Among the state-owned companies, VNMC controlled 17 companies that were engaged in mining-related activities, such as geologic surveying, exploration, mine development, mineral production, ore processing, metal smelting, and mineral trade. The major VNMC-affiliated companies, in order of importance. were Thai Nguyen Nonferrous Metal Co. (chromite, lead, tin, tungsten, and zinc producer) in Phu Xa District, Bac Thai Province: Cao Bang Nonferrous Metal Co. (iron ore and tin producer) in Nguyen Binh District, Cao Bang Province; Nghe Tinh Nonferrous Metal Co. (tin producer) in Quy Hop District, Nghe An Province; Rare Earth Co. (rare earths producer) in Dong Da District, Hanoi; Mineral Development Co. (marble producer) in Hoan Kiem District, Hanoi; Mineral Development Co. No. 3 (iron ore and pyrite producer) in Ba Vi District, Ha Tay Province; Mineral Development Co. No. 4 (ilmenite and zircon producer) in Vinh City, Nghe An Province; Mineral Development Co. No. 5 (fluorspar, construction aggregates, and ilmenite producer) in Tuy Hoa District, Phu Yen Province; Mineral Development Co. No. 6 (construction aggregates and ilmenite producer) in District 10, Ho Chi Minh City; and Geological & Mineral Mining Enterprise 304 (iron ore and pyrite producer) in Duyen Hai Quarter, Lao Cai Provincial Town.

In 1999, production of metallic minerals included chromite, copper, gold, lead, pyrite, tin, zinc, and zirconium. Production of industrial minerals included refractory clay, construction aggregates, fluorspar, gemstones, ilmenite, kaolin, limestone, phosphate rock (apatite), salt, and silica sand. Production of mineral fuels included coal, natural gas, and crude petroleum. Production of processed mineral products included cement, fertilizer materials, refined gold, steel, and refined tin (table 1). Most mineral production was processed and consumed domestically. Most copper concentrate, chromite, fluorspar, ilmenite, crude petroleum and condensate, zinc concentrate, and zirconium production and some kaolin, coal, granite, salt, silica sand, and refined tin production, however, were exported.

In July, the Ministry of Planning and Investment recommended that the Government allow VNMC and Aluminium Pechiney of France to conduct a joint exploration for bauxite deposits in Dac Lac and Lam Dong Provinces (Thoi Bao Tai Chinh Vietnam, July 8, 1999, Bauxite exploitation project, accessed October 4, 1999, at URL http://www.mekongresearch.com/august1999energy.htm). In early 1999, the two companies signed an agreement to conduct prefeasibility studies to develop a 1-million-metric-ton-per-year

(Mt/yr) alumina refinery in Lam Dong Province of the South Trung Bo region. The project site covers an area of 100 square kilometers. The proven reserves of bauxite in the area were estimated to be 300 million metric tons (Mt). The prefeasibility studies reportedly would include sections on environmental impact and infrastructure. The studies were expected to cost \$4 million, of which about \$1 million would be contributed by the Government (Metal Bulletin, 1999c).

Commodity Review

Cement.—Production of cement increased by more than 30% to about 12.3 Mt in 1999 because of increased demand by the construction industry for upgrading the country's infrastructure, such as highways, bridges, and other public works projects, and for new office building and residential housing projects. Domestic demand for cement was estimated to be 12 Mt in

As a result of increased foreign investment in the past 4 years, the cement industry's capacity expanded by more than 60%. VNCC's affiliated cement companies—Cong Ty Xi Mang Bim Son, Cong Ty Xi Mang But Son, Cong Ty Xi Mang Ha Tien 1, Cong Ty Xi Mang Ha Tien 2, Cong Ty Xi Mang Hai Phong, and Cong Ty Xi Mang Hong Thach—had 8 Mt/yr capacity; Chinfong Hai Phong Cement Corp., 1.4 Mt/yr; Morning Star Cement Ltd., 1.4 Mt/yr; and Nghi Son Cement Corp., 2.2 Mt/yr (International Cement Review, 1998).

In 1999, VNCC's six affiliated cement companies produced a total of about 7 Mt. Chinfong Hai Phong Cement Corp. at Minh Duc near Hai Phong City, which was a joint venture of VNCC (14.44%), the Hai Phong municipal government (15.56%), and Chingfong Global Corp. of Taiwan (70%) and had a capacity of 4,000 metric tons per day (t/d) of clinker, produced about 1.4 Mt of cement. Morning Star Cement Ltd. at Hon Chong in Kien Giang Province, which was a joint venture of VNCC's Ha Tien-2 Cement Co. (35%) and Holderbank Financiere Glaris of Switzerland (65%) and had a capacity of 4,000 t/d of clinker, also produced about 1.4 Mt of cement. Several small-scale local cement producers in various parts of the country produced a combined total of about 2.5 Mt. Nghi Son Cement Corp., which was a joint-venture company of VNCC (35%) and NM Cement Ltd. (65%) and had a capacity of 5,800 t/d of clinker, was expected to come on-stream by the end of 1999; NM Cement was a Japanese consortium of Taiheiyo Cement Corp. and Mitsubishi Materials Corp. (Journal of the Mining and Materials Processing Institute of Japan, 1999).

In 1999, a new cement plant with a capacity of 1.43 Mt/yr was under construction in Quang Ninh, which is about 180 km east of Hanoi near the coast. The new cement plant was a joint venture of Ssanyong Cement Industrial Corp. (35%), Korea Heavy Industries & Construction Corp. (HANJUNG) (30%) of the Republic of Korea, and Quang Ninh Construction Co. No. 2 and Vietnam National Coal Corp. (17.5% each). Under the agreement, Ssangyong was to provide engineering and management, and HANJUNG was to supply equipment and technology for the new cement plant (Trade Tower, May 22, 1998, Ssangyong Cement, HANJUNG join in Vietnam, accessed February 9, 1999, at URL http://www.kita.or.kr/tradetower/9606_6.htm).

In May, VNCC awarded a \$50 million contract to Ishikawajima-Harima Heavy Industries Co. of Japan to upgrade

Bim Son's cement plant in Thanh Hoa Province, which is about 150 km south of Hanoi. The contract called for converting the existing wet process to dry process, increasing the capacity to 1.2 Mt/yr, and installing a dust filter to reduce air pollution. Ishikawajima-Harima was responsible for providing supplies and overseeing engineering of the cement plant. The Export-Import Bank of Japan and two other banks from Germany and the Netherlands were to extend a combined \$38 million loan to VNCC, and the Vietnamese Government was to provide loan guarantees (Nikkei Weekly, 1999).

Chromite.—Thai Nguyen Nonferrous Metal Co. (TNNMC) and other small-scale mining companies mined chemical- and refractory-grade chromite from the alluvial deposits in the northeastern foothill of Nui Nua Mountain in Thanh Hoa Province. According to the General Statistical Office (1999, p. 214), between 1997 and 1998, annual output of chromite was between 51,000 and 54,100 metric tons (t), of which about 58% was produced by non-state-owned companies. Chromite concentrate produced by TNNMC contained 46% Cr₂O₃ with no more than 27% Fe₂O₃, 5% SiO₂, and 0.4% H₂O. Most of the chromite concentrate was exported to China.

Coal.—Coal production dropped by more than 20% in 1999 owing to a drastic production cutback in the second half of 1999. Vinacoal was forced to cut coal output to reduce the coal stockpiles of about 4 Mt in mid-1999 (Financial Times, 1999). According to Vinacoal's projection, its coal stockpile would be reduced to about 1.2 Mt by the end of 1999 (Reuters Limited, 2000). The weaker domestic demand and lower exports to Japan were the two major factors for the substantial build up of coal stockpiles during the first half of 1999.

According to Vinacoal, coal was produced from 29 operating coal mines in 1999. Among the operating coal mines, 6 were large-scale open pit mines that produced between 800,000 t and 2.5 Mt each, 5 were large-scale underground mines that produced between 200,000 t and 1 Mt each, and 18 were mostly small-scale open pit and underground mines. In 1999, about 60% to 70% of the coal was produced from open pit mines, and the remainder, from underground mines. Production of anthracite, which was concentrated in Quang Ninh Province, was mainly from the Cam Pha, Coc Sau, Hong Gai, Mao Khe, Mong Duong, and Uong Bi areas. Production of brown coal was mainly from two open pit mines in the northern delta area.

In 1999, domestic demand for coal totaled about 5 Mt, and exports totaled 3.3 Mt. According to Vinacoal (oral comm., 1999), coal was consumed in the domestic market by the utilities industry (50%), the chemical and fertilizer industries (15%), the paper industry (10%), the cement industry (10%), and households and other users (15%). Vietnamese coal, mainly anthracite, was exported to Japan and other Asian and European countries. Coal exports to Japan, which accounted for 40% of the total, declined substantially because of reduced demand for anthracite by the iron and steel industry in 1999.

To cope with the problems of falling exports and increasing production costs, Vinacoal began reorganizing its overly bureaucratic administration, cutting miners' wages by as much as 50%, and laying off short-time contract workers (Mining Magazine, 1999). In its energy sector report on Vietnam, the World Bank criticized the low (subsidized) prices paid by the

state-owned Electricity Corp. of Vietnam for coal and Vinacoal's high production costs. The World Bank also called for reorganization of Vinacoal (Financial Times, 1999).

Gold and Gemstones.—Gold was produced mainly by VNGGC with an output of about 1 metric ton per year (t/yr) (Mining Journal, 1999a). A joint venture of TNNMC and the Russian Geology Federation had been producing about 500 grams per day in Bac Kan (Bac Thai) Province. Many small-scale miners and illegal individual miners produced an unknown amount of gold each year at the placer deposits along the Bac Giang, Ca, Da, Gam, Hien, Hinh, Lo, Long Dai, and Ma Rivers, and more recently in the mountainous district of Na Ri in Bac Kan Province and in Phuoc Son District in western Quang Nam Province. The identified gold deposits reportedly were at Napai and Paclang in the northern region of the country; Camtam, Langmo, and Langneo in the central region; and Bonmieu and Tranang in the southern region (Nguyen, 1997, p. 12).

VNGGC was established in October 1995 by the Government to conduct geologic investigations, exploration, mining, processing, and trading of gemstones, gold, and other minerals associated with gemstones and gold and to provide a point of contact for foreign companies interested in forming joint ventures with the Government to explore and mine gemstones and gold in Vietnam. The foreign companies, which formed joint ventures with VNGGC to conduct gold exploration, were Bureau de Recherches Geologiques Minieres (formerly La Sources) and Hindustan Zinc Ltd. in the Cao Bang area; Iddison Vietnam Group Ltd. in the Lang Son area; Ivanhoe Mines Ltd. (formerly Indo-China Goldfields Ltd.) in the Quang Nam DN area; Kim Resources N.L. in the Lam Dong area; Mindex ASA in the Binh Dinh, Dac Lac, and Phu Yen areas; Newcrest Mining Ltd. in the Thanh Hoa area; and Normandy Anglo-Asian Pty. Ltd. in the Lai Chau area (Truong and Nguyen, 1997). Other foreign companies with exploration licenses to explore for gold and nonferrous metals in Vietnam were Golden Tiger Resources N.L. in the Khau Au area of Bac Can Province: Mindex ASA in the Ban Don and the Tien Tuan areas of the southern part of central Vietnam; New Vietnam Mining Corp., which was a joint venture of Ivanhoe Mines Ltd. (50%), Olympus Pacific Minerals Inc. (42.5%), and Iddison Holdings Ltd. (7.5%), in the Phuoc Son area of Quang Nam Province; Palmer Resources Ltd., through it subsidiary Canexco Ltd., in the Bien Dong, the Cam Son, and the Lang Cha areas of Bac Giang Province: and Tiberon Minerals Ltd. in the Nui Phao area in northern Vietnam. In 1999, Tiberon Minerals reported the discovery of gold mineralization in its Nui Phao exploration license area (Asian Journal of Mining, 1999).

Ilmenite and zircon were produced mainly by Bimal Minerals Co. Ltd. (BMCL) from the Cat Khanh Mine and were processed at the plant at Qui Nhon in Binh Dinh Province. BMCL was a joint venture of Binh Dinh Minerals Co. (40%) and Malaysia Mining Corp. and Syarikat Pendorong Sdn. Bhd. (combined 60%), which were two Malaysian companies. Other producers of ilmenite and zircon were the Institute of Industrial Chemistry, Meteco-Ha Tinh Mining Co., Phu Yen Titanium Minerals Factory, and other provincial mining companies at Cam Hoa, Ky Anh-Cam Xuyen, Ky Khan, and Ky Nink in Hatinh Province; at Quang Ngan and Vinh My in Thua Thien-Hu Province; at Vinh City in Nghe An Province; and at Dong Xuan

in Phu Yen Province. Vietnam's reserves of titanium minerals were estimated to be 11 Mt (Industrial Minerals, 1996). According to VNMC, the specifications of its ilmenite was 51% to 54% $\rm TiO_2$, and of its zircon silicate, 62% to 65% $\rm ZrO_2$. In 1999, exports of ilmenite were about 91,000 t, and of zirconium ore and concentrate, about 300 t. Most of ilmenite and zircon were exported to Japan.

Production of gemstones was from Lam Dong, Nghe An, Thai Nguyen, and Yen Bai Provinces. VNGGC operated gemstone mines in Thai Nguyen and Yen Bai Provinces. Gemstones produced from these areas were mainly ruby and sapphire. Two newly developed ruby mines were at the Tan Huong and Truc Lau areas in Yen Bai Province. VNGGC continued its gemstone prospecting at the Khe Ngang area in Nghe An Province.

Natural Gas and Oil.—Production of crude petroleum and condensate from five offshore oilfields increased to about 288,700 barrels per day (bbl/d) in 1999 from 245,745 bbl/d in 1998. These oilfields were the Bach Ho [White Tiger], the Dai Hung [Big Bear], the Hong Ngoc [Ruby], the Rang Dong [Dawn], and the Rong [Dragon] (World Oil, 2000); all were in the Cuu Long Basin except the Dai Hung, which was in the Nam [South] Con Son Basin. The output from the Bach Ho and the Rong oilfields accounted for about 80% of Vietnam's crude petroleum production; the Rang Dong, 8%; and the Hong Ngoc and the Dai Hung, 6% each. All the crude petroleum production was exported mainly to Japan and the United States.

The Bach Ho and the Rong oilfields were owned and operated by VietSovPetro (VSP), which was a joint venture of PetroVietnam and Zarubeznheft, which was a Russian oil company. VSP produced about 3.2 million cubic meters per day of associated gas from the Bach Ho Oilfield to fuel the Phu My and the Ba Ria electric powerplants in Ba Ria-Vung Tau Province. The Rang Dong Oilfield was owned and operated by Japan Vietnam Petroleum Corp., which was a consortium of Japan National Oil Corp. (49.3%), Mitsubishi Oil Co. (46.9%), Mitsubishi Corp. (3.5%), and Mitsubishi Petroleum Development Co. (0.3%). The Hong Ngoc Oilfield was owned and operated by a joint venture of Malaysia's Petronas Carigali Sdn. Bhd. (46%), Canada's International Petroleum Development Ltd. (26%), Sweden's Sands Petroleum (15.5%), and PetroVietnam (12.5%). The Dai Hung Oilfield was owned and operated by a joint venture of Malaysia's Petronas Carigali Sdn. Bhd. (63.75%), PetroVietnam (15%), France's Total (10.625%), and a Japanese consortium (10.625%) that was led by Japan National Oil Corp. and Sumitomo Corp.

After 4 years of on-and-off negotiations, in April, PetroVietnam signed three memoranda of understanding (MOU) for development of the Lan Do and Lan Tay gasfields in the South China Sea with its foreign partners. The MOU included terms of gas production, sales, and pricing for offshore Block 06/01 in the Nam Con Son Basin, gas transport via the Nam Con Son pipeline and power generation, and Government guarantees on fiscal and legal stability. After the final agreement is signed, the gas development project will be jointly owned by ONGC-Videsh Ltd. of India (45%), BP Amoco PLC of the United Kingdom (26.67%), PetroVietnam (15%), and Dennorske Stats Oljeselskap AS of Norway (13.3%). The gasfields in Block 06/01, which were discovered in 1992, have estimated gas

reserves of 58 billion cubic meters (Journal of Commerce, 1999).

In the past 3 years, other important gas discoveries have included Block 52/97 and Block B in the northern part of the Malay Basin by Unocal Corp. of the United States, Block 46 in the Vietnamese section of the Gulf of Thailand by PetroFina S.A. of Belgium, and Block D 14-STL-1x in the Red River Delta Province of Thai Binh by Anzoil Pty. Ltd. of Australia.

Phosphate.—Production of phosphate rock by VinaChem was west of the Red River in the Lao Cai area in the northern part of Lao Cai Province. Proven reserves of apatite in the area were estimated to be 505 Mt, of which about 26 Mt was classified being high-grade and containing between 36% and 41% P_2O_5 (Lee, 1998, p. 2). Most of the high-grade apatite produced from the area was shipped to the Lam Thao fertilizer plant in Phu Tho Province for production of superphosphate. The low-grade apatite was shipped to other fertilizer plants in various parts of the country. The annual phosphate fertilizer production reportedly was about 795,000 t (Industrial Minerals, 1996).

VinaChem submitted a feasibility study to the Government for construction of the country's first diammonium phosphate (DAP) plant at Dien Cong Port. Tomen Corp. of Japan, which was VinaChem's partner, reportedly had begun a feasibility study in November 1998. The proposed 330,000-t/yr plant was expected to cost about \$240 million. The DAP plant would use locally produced phosphate rock, but the plant's requirements for ammonia and sulfur would be satisfied by imports (Phosphorus & Potassium, 1998b). Japan Vietnam Fertilizer Corp., which was a joint venture of Nissho Iwai Corp. (60.4%) and Central Glass Co. Ltd. (9.6%) of Japan, and Southern Fertilizer Co. of Vietnam (30%), began operation of a 350,000t/vr nitrogen-phosphorous-potassium (NPK) plant at Long Thanh in December 1998. Construction of the \$40 million NPK plant 70 kilometers (km) from Ho Chi Minh City began in 1997 and was completed in November 1998 (Phosphorous & Potassium, 1998a). BACONO, which was a Vietnamese-French joint-venture company, began operation of its second-line NPK production in July 1999 and raised the annual production capacity of its NPK plant at Phu My by 200,000 t/yr to 350,000 t/yr (Saigon Times Weekly, July 24, 1999, New NPK production line to start, accessed October 1, 1999, at URL http://www.meckongresearch.com/august1999energy.htm).

Steel.—Production of crude steel using locally produced iron ore was estimated to be 300,000 t in 1999, compared with 306,000 t in 1998. Crude steel production for the first three quarters of 1999 totaled 234,000 t (South East Asia Iron and Steel Institute, December 31, 1999, SEAISI regional steel statistics—Quarterly, accessed July 19, 2000, via URL http://www.seaisi.org/resource_regional.asp).

The steel industry comprised VSC, several VSC-controlled steel producers, several joint-venture steel producers, and other small steel producers. According to the report submitted by VSC to the South East Asian Iron and Steel Institute, the country's rolling mill capacity had risen to 1.6 Mt/yr in 1996 because of increased foreign investment. As a result of the continued growth in small steel mills during the past 3 years, the country's rolling mill capacity increased to about 2 Mt/yr in 1999. Vietnam's rolled steel production in 1998 was 1.14 Mt,

of which 464,269 t was produced by VSC; 578,513 t, by joint-venture steel companies; and 96,992 t, by other small steel companies. In 1998, the total demand for rolled steel was1.96 Mt, of which 820,000 t was imported steel. According to VSC, the 1999 planned rolled steel production was 1.35 Mt, of which 490,000 t was to be produced by VSC; 630,000 t, by joint-venture companies; and 230,000 t, by other companies. The 1999 total demand for rolled steel was estimated to be 2.1 Mt, of which 750,000 t was to be met by imports (Metal Bulletin, 1999b).

In the past 3 years, American Steel Corp., which was a consortium led by Craft Corp. of the United States, had spent \$3 million conducting feasibility studies on building a 1.2-Mt direct-reduced-iron (DRI) plant at Ba Ria in Vung Tau Province. The latest \$1.2 million marketing and engineering feasibility study was completed by Enron Corp., Midrex Corp., and Raytheon Co. of the United States in August 1999. In 1999, a project appraisal was to be carried out by the U.S. Government's Overseas Private Investment Corp. (OPIC). In June 1998, Craft Corp. had applied to OPIC to secure a \$150 million loan. According to the project plan, two-thirds of the \$310 million project would be funded by debts and one-third by equity. Under a joint-venture agreement to be signed in January 2000, VSC would take 30% interest in equity, Craft and Raytheon would take 5% to 10%, and Midrex and Japanese major trading and steel companies would take the remaining 60% to 65%. Construction of the DRI plant was planned to start in October 2000 (Metal Bulletin, 1999a).

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no. 1, January, p. 66-67.

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TABLE 1 VIETNAM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1995	1996	1997	1998	1999 e/
Cement, hydraulic	thousand tons	5,828 r/	6,585 r/	8,019 r/	9,390 r/	12,300
Chromium ore, gross weight		25,000 r/	37,000 r/	51,000 r/	54,000 r/	55,000
Clays, kaolin e/		1,000	1,000	1,100	1,100	1,100
Coal, anthracite	thousand tons	8,350 r/	9,823 r/	11,388 r/	10,708 r/	8,500
Fluorspar e/		2,000	2,000	2,000	3,000	3,000
Gas, natural, gross	million cubic meters	711	830	705	1,000 r/	1,150
Gold	kilograms	72	1,000 e/	1,000 e/	1,500 r/e/	1,500
Ilmenite, gross weight e/		50,000	50,000	50,000	80,000	91,000
Lead, mine output, Pb content e/		1,000	1,000	1,000	1,000	1,000
Lime	thousand tons	1,041	992	1,069	1,124	1,200
Nitrogen, N content of ammonia		54,000	54,000	54,000	32,900	33,000
Petroleum, crude	thousand 42-gallon barrels	64,605	63,510	71,457 r/	89,696 r/	105,400
Phosphate rock:						
Gross weight	thousand tons	592 r/	613 r/	581 r/	576 r/	580
P2O5 content	do.	178 r/	184 r/	174 r/	173 r/	174
Pyrite, gross weight e/	do.	151 3/	150	150	150	150
Pyrophyllite e/		20,000	20,000	20,000	20,000	20,000
Salt	thousand tons	689 r/	709 r/	743 r/	717 r/	720
Silica sand e/	do.	15,400 3/	16,000	20,000	50,000	60,000
Sulfur		21,000	22,000	22,000		-
Stone, building stone	thousand tons	27,700 r/	32,400 r/	41,200 r/	45,300 r/	52,000
Steel, crude	do.	271	311	314	306 r/	300
Steel, rolled	do.	450	900	1,050	1,150	1,350
Tin:						
Mine output, Sn content e/		4,500	4,500	4,800 r/	4,500 r/	4,500
Metal, smelter		2,400	2,300	2,400	2,400	2,400
Tungsten, mine output, W content e/		50	130	210	r/	
Zinc, mine output, Zn content e/		14,000	16,000	16,000 r/	19,000 r/	24,000
Zirconium, gross weight e/		400	500	800	600	300

e/ Estimated. r/ Revised. -- Zero.

Sources: Vietnam's General Statistical Office, Statistical Yearbook, 1998; British Geological Survey, World Mineral Statistics, 1992-98; World Metal Statistics, May 2000; and South East Asia Iron and Steel Institute, Crude Steel production Statistics, 1996-98.

^{1/} Table includes data available through July 28, 2000.

^{2/} In addition to the commodities listed, barite, bauxite, benonite, refractory clay, construction aggregates, copper, granite, graphite, iron ore, marble, gemstones, and rare earths were mined, but not reported. Available information is inadequate to make reliable estimates of output levels.

^{3/} Reported figure.