

## THE MINERAL INDUSTRY OF

# VIETNAM

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The Socialist Republic of Vietnam has had a centrally planned economy since 1976, when the former northern and southern areas partitioned in 1954 by the Geneva accords were officially reunited. Its economy has been one of devastation since 1945, when Japan's World War II occupation ended and the country first proclaimed its independence. The Government's policy of "doi moi," or economic renovation and liberalization, was initiated in 1986 to introduce to the country a free market without ejecting the authoritarian Communist Government. The Government encouraged private enterprise and trade to stimulate the transition from a centrally planned to a market economy. The economy in 1994, continuing its recent tendency for expansion under doi moi, recorded an increase in its gross domestic product (GDP) of 8.8% compared with that of 1993.<sup>2</sup>

The economy basically was agrarian, accounting for approximately one-half of the country's GDP, estimated at about \$15 billion,<sup>3</sup> and employing 65% to 70% of the labor force of about 33 million. Rice cultivation again predominated in 1994. Exports of crude oil accounted for approximately 40% of the country's estimated \$3.2 billion in export earnings in 1994. Coal also remained an important mineral export. Inflation was estimated to have remained under 10% for the second consecutive year, after having exceeded rates as high as 80% at the beginning of the decade.

The U.S. Government ended on February 3, 1994, its economic sanctions against Vietnam that had automatically become effective on April 30, 1975, when the Government of the former Republic of Vietnam (South Vietnam) capitulated to the forces of the Peoples Army of Vietnam (North Vietnam), resulting in the reunification of the country.

Although the U.S. Government previously had authorized in 1992 and 1993 U.S. corporations to open offices in Vietnam; negotiate and sign joint-venture contracts with the Vietnamese; bid on large infrastructure projects being underwritten by the World Bank, the Asian Development Bank, and the International Monetary Fund; and participate in other advance activity heralding normal business endeavors, U.S. firms had been barred from selling any of their products or from conducting any financial transactions in the country until the lifting of the 19-year-long embargo.<sup>4</sup>

Vietnam is rich in numerous minerals, including bauxite, chromite, coal, copper, gold, iron ore, lead, manganese, petroleum, phosphate rock, tin, tungsten, and zinc. With the exception of petroleum, the mineral resources are

predominantly in the northern region of the country. The major petroleum fields occur on the wide continental shelf off the southern coast in the South China Sea.

Despite the Government's policy of doi moi, the mineral resources in Vietnam remained under state ownership and, with the exception of the petroleum sector, all mines and mineral processing plants were owned and operated solely by the Government. Petroleum exploration, development, and production-sharing projects were joint ventures between the Vietnam Petroleum and Fuel Gas Corp. (Petro Vietnam), the state oil company, and foreign companies. In addition, some mining, primarily for gold, was done by individuals. The state-owned National Gold, Silver, and Precious Metals Corp. in Hanoi refined all the gold mined in the country.

A \$1.6-million joint venture between the Russian Geology Federation and Thai Nguyen Color Metal Co. commenced in February production of gold at its operation in Bac Thai Province, northern Vietnam. A joint venture between India's Hindustan Zinc Ltd. and France's Bureau de Recherches Géologiques et Minières was developing the Pac Lang gold deposits 330 kilometers (km) north of Hanoi.<sup>5</sup>

The Australian firms Auridiam Consolidated NL, with a 40% interest and manager, and North Star Resources NL, 40%, completed the second year of their 3-year exploration program on the Sin Quyen copper-gold project in Lao Cai Province, northern Vietnam. The Government held the remaining 20% interest through its Vietnam Rare and Precious Metals Corp., a semiprivate company within the Ministry of Heavy Industry. The joint venture held the exploration license for an area encompassing 235 square kilometers, but the primary objective in 1994 was to delineate by diamond drilling the resources of the Sin Quyen ore body. At a cutoff of 0.5% copper, the resource was estimated to be 52.8 million metric tons (Mmt) grading 0.91% copper. Some metallurgical test work also was done.<sup>6</sup>

The consortium comprised of the United Kingdom-based Lonrho PLC and the German firms Krupp-Hoesch and Rheinbraun planned to continue for a 2d year their agreement with the Vietnamese Government, through the Vietnamese Steel Corp., to explore and develop the Thach Khe iron ore deposit on the coast in Ha Tinh Province, 350 km south of Hanoi. The consortium was to continue their detailed feasibility study for the development of a proposed 10-million-metric-ton-per-year (Mmt/a) open pit mine to commence by 2000, if warranted.<sup>7</sup> Since the domestic steel industry presently cannot consume more iron ore, all of the

ore initially would be exported. The natural ore has an iron content of 62% and would not need concentration. About 6 Mmt of the annual output would be pelletized for use by direct-reduced ironmakers; the rest would be shipped as fines and lump ore.<sup>8</sup>

Leader Resources NL of Australia continued its base metal exploration program in Bac Thai Province, which included the Cho Dien zinc deposits previously delineated by the French colonial Government in the early part of the century and the Na Tum zinc-lead prospect, about 150 km and 135 km north of Hanoi, respectively. Padaeng Industry Co. Ltd. of Bangkok, Thailand, also was interested in developing the resources for its zinc smelter.

Fertilizer and Basic Chemical Products Corp. (FERCHEMCO), the State-owned fertilizer company, planned to form a joint venture with All Ocean International (AOI) of the United States to build a 150,000-mt/a diammonium phosphate fertilizer plant in Quang Ninh Province in the north of the country bordering China. The plant was to be sited along the coast so that sulfur and ammonia feedstocks could be readily received from overseas sources. All of the required phosphate rock, however, was to be obtained from domestic sources. The joint venture initially was to be owned by FERCHEMCO, 40%, and AOI, 60%, but the Vietnamese company's share was to increase incrementally as the project progressed. The plant was scheduled to come on-stream in 1997.<sup>9</sup>

Australia's Portman Mining Ltd. received a Foreign Investment License to develop a silica sand deposit at Nam O and explore further a silica sand deposit at Thang Binh, both in Quang Nam-Da Nang Province, central Vietnam. The Nam O deposit, with about 10 Mmt of silica sand, is adjacent to Da Nang Bay, 14 km north of Da Nang, the provincial capital. The Thang Binh deposit is approximately 40 km south of Da Nang. A Ministry of Heavy Industry mining company and a Da Nang Provincial government mining company together held a 30% interest in the joint-venture project. Portman's initial production rate was targeted at 500,000 mt/a.<sup>10</sup>

Vietnam has a variety of coals, ranking from lignite to anthracite. Coal production was through a State-owned monopoly until 1989, when the various entities were partly incorporated into four companies operating under the control of the Ministry of Energy. The Vietnam Coal Corp. (VCC) was established in August 1994 with the intention of restructuring and increasing the competitiveness of the industry.<sup>11</sup>

Anthracite has been for many years the chief mineral commodity produced in Vietnam. The principal anthracite mines are in Quang Ninh Province, near Haiphong in the north. Output was from both opencast and underground mines produced by three VCC subsidiary companies whose names correspond to the coalfields, or basins, where the mines are located, namely, Cam Pha Coal Co., Hon Gai Coal Co., and Uong Bi Coal Co. About 80% of output was from the surface mines. Although the aggregate design capacity was about 11 Mmt/a, the industry remained constrained by

frequent failure of equipment and shortages with supplies, so that existing mines continued to operate at less than 60% of capacity.

Bituminous and subanthracite coal was mined in Bac Thai Province, northeast of Haiphong, and in Quang Nam Province, near Da Nang in central Vietnam. Some was of coking quality, but its end use was not known. Lignite was mined at Na Duong in Lang Son Province, north-northeast of Hanoi, for use in the cement industry. Production of these coals accounted for less than 400,000 mt/a. The state-owned Vietnam National Coal Import-Export and Materials Supply Corp. was responsible for all coal exports.

The country's oil industry emerged when the South Vietnamese Government opened in 1973 the first oil and gas exploration concessions to foreign investors. Exploration drilling in 1974 by Mobil Oil Corp. of the U.S. discovered the offshore Bach Ho, or White Tiger, Oilfield in the Cuu Long basin in the South China Sea. However, changing political factors soon forced the abandonment of the field. Upon reunification of the country in 1975, the Government declared all exploration rights awarded under the previous regime to be illegal and invalid. No exploration was conducted until 1979 when Canadian and European companies acquired exploration concessions. However, they had no commercial success.

In June 1981, the Governments of Vietnam and the former Soviet Union established the Vietnam-Soviet Oil and Gas Joint Enterprise (Vietsovpetro), a joint-venture company, to explore for and produce oil and gas. Vietsovpetro appraised Mobil's Bach Ho discovery, reportedly proving reserves in excess of 200 million barrels (Mbbbl) of oil, and also discovered the satellite Rong (Dragon) Oilfield within the basin. Production began from Bach Ho in 1986, remaining the country's sole producer until this year. The Rong Oilfield was under development in 1994, with production scheduled to commence in 1995.

Vietsovpetro drilled in 1981 its only exploration well in the Nam Con Son basin, farther offshore and to the southeast of the Cuu Long basin, at the site of an earlier, unproductive well drilled by Mobil. The Dai Hung-1 well was the discovery well for the Dai Hung (Big Bear) Oilfield, which in October 1994 became Vietnam's second producing oilfield. The producing consortium consisted of oil companies from Australia (BHP Petroleum International Pty. Ltd., the operator with a 43.75% interest); Malaysia (Petrolia Nasional Bhd.), 20%; France (Total Exploration Production, 10.625%); and Japan (Sumitomo Corp., 10.625%), as well as Petro Vietnam (15%).<sup>12</sup>

Following the Government's withdrawal of military forces from Cambodia and establishment of an open-door policy to attract foreign investment under its doi moi initiative, a number of non-U.S. foreign companies returned to the area during 1988-91, but, generally, all of their exploration-drilling programs were insignificant.

The Government conducted in 1992 two exploration license-bidding rounds following the relinquishment late in 1991 by Vietsovpetro of much of its exploration holdings in

the Nam Con Son basin. Companies from Australia, France, India, Indonesia, Japan, Korea, and Malaysia then became active in oil exploration concessions awarded by the Government. U.S. companies began farming into exploration concessions since the lifting of the trade embargo.<sup>13</sup>

Vietnam had one oil refinery, Saigon Petro, operated by Petro Vietnam, in Ho Chi Minh City, formerly known as Saigon. Its capacity was 40,000 barrels per day (bbl/d). Petro Vietnam, Total of France, and Chinese interests were constructing a 130,000-bbl/d refinery at Vung Tau in Ba Ria-Vung Tau Province on the coast southeast of Ho Chi Minh City. Its scheduled completion date was 1998.<sup>14</sup>

Petro Vietnam completed in November a \$50 million, 125-km pipeline from the Bach Ho Oilfield to the coastal resort town of Vung Tau, Ba Ria-Vung Tau Province. The pipeline was to transport associated gas produced at Bach Ho, previously flared on-site, for sale on the domestic market. About 107 km of the line was offshore.<sup>15</sup>

Essential elements of the transportation infrastructure of Vietnam consist of about 85,000 km of roads, including 9,400 km bituminous, 48,700 km gravel or improved earth, and 26,900 km unimproved earth. The length of navigable inland waterways totals about 17,700 km, with more than 5,100 km navigable at all times by vessels up to 1.8-meter (m) draft. The rail system consists of about 3,050 km of track, including about 2,455 km of 1.000-m narrow gauge, 150 km of 1.435-m standard gauge, 230 km of dual gauge having three rails, and 225 km of unserviceable track. There are 50 principal airports with permanent-surface runways out of a total of 100 that are considered usable in the country. International shipping ports include Da Nang, Haiphong, and Ho Chi Minh City. The merchant marine fleet includes eight petroleum-oils-lubricants tankers and three bulk ore freighters. There is about 150 km of pipeline for refined oil products. Vietnam had an electric power generating capacity of 3,300 megawatts and produced power at the approximate level of 130 kilowatt-hours per capita, or about 9 million megawatt-hours total production in 1992.<sup>16</sup>

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<sup>1</sup>Text prepared June 1995.

<sup>2</sup>International Bulk Journal (London). V. 15, No. 4, Apr. 1995, p. 47.

<sup>3</sup>Where necessary, the Vietnamese dong (D) has been converted into U.S. dollars at the rate of D11,100=US\$1.00, the approximate rate at yearend 1994.

<sup>4</sup>Indochina Chronology (Berkeley, California). V. XIII, No. 1, Jan.-Mar. 1994, p. 16.

<sup>5</sup>Mining Annual Review 1995. Vietnam. Mining Journal (London), in press.

<sup>6</sup>Mining Magazine (London). V. 172, No. 2, Feb. 1995, p. 128.

<sup>7</sup>Engineering and Mining Journal (London). V. 196, No. 2, Feb. 1995, p. 15.

<sup>8</sup>Metal Bulletin (London). No. 7932, Nov. 21, 1994, p. 20.

<sup>9</sup>Industrial Minerals (London). No. 328, Jan. 1995, p. 23.

<sup>10</sup>Portman Mining Ltd. 1994 Company Annual Report, p. 16.

<sup>11</sup>IEA Coal Research, London, UK. Asian Coal Prospects to 2010, Mar 1995, p. 41.

<sup>12</sup>South-East Asia Mining Letter (Hong Kong). V. 5, No. 24, Dec. 22, 1993, p. 8.

<sup>13</sup>Petroleum Economist Ltd., London, UK. Asian Energy Yearbook 1995, pp. 72-77.

<sup>14</sup>Oil and Gas Journal (Tulsa, Oklahoma). V. 93, No. 13, Mar. 27, 1995, p. 21.

<sup>15</sup>\_\_\_\_\_. V. 92, No. 48, Nov. 28, 1994, p. 25.

<sup>16</sup>U.S. Central Intelligence Agency, Washington, DC. The World Factbook 1994, p. 427.

## Major Sources of Information

Geological Survey of Vietnam  
Hanoi, Vietnam

General Department of Chemicals  
Hanoi, Vietnam

Ministry of Construction  
Hanoi, Vietnam

Ministry of Energy  
Hanoi, Vietnam

Ministry of Heavy Industry  
Hanoi, Vietnam

Ministry of Power and Coal  
Hanoi, Vietnam

Ministry of Science, Technology, and Environment  
Hanoi, Vietnam

TABLE 1  
VIETNAM: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/	1990	1991	1992	1993	1994	
Bauxite, gross weight	6,500	6,000	6,000	6,000	6,500	
Cement, hydraulic	thousand tons	2,500	3,000	5,000 r/	6,500 r/	7,200
Clays, kaolin	750	800	800	800	1,000	
Coal, anthracite 4/	thousand tons	4,020	5,000	5,470	6,000	6,100
Gold	kilograms	1,200	1,300	10,000	10,000	10,000
Gypsum	25,000	30,000	30,000	30,000	30,000	
Nitrogen, N content of ammonia	36,000	30,000	45,200	51,700 4/	53,000	
Petroleum, crude 4/	thousand 42-gallon barrels	18,600 r/	29,200 r/	40,500 r/	44,900 r/	51,100
Phosphate rock:						
Gross weight 4/	thousand tons	274	275 r/	290 r/	362 r/	470
P2O5 content	do.	88 r/	88 r/	93 r/	116 r/	144 4/
Salt	do.	340	350	350	350	375
Steel, crude 4/	do.	102	183 r/	219 r/	270 r/	300
Tin:						
Mine output, Sn content	850	800	3,400	3,500	4,000	
Metal, smelter	1,800	1,700	2,400	2,500	2,500	
Zinc:						
Mine output, Zn content	10,000	15,000	15,000	15,000	15,000	
Metal, smelter, primary	10,000	10,000	10,000	10,000	10,000	

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits.

2/ Table includes data available through June 6, 1995.

3/ In addition to the information listed, iron ore was mined in the past and pig iron was produced at industrial facilities, but the status of these industries under prevailing conditions was not sufficiently clear to allow formulation of reliable estimates of output levels. Similarly, data on output of crude construction materials are not available, and no basis is available to make reliable estimates of output level.

4/ Reported figure.