

THE MINERAL INDUSTRY OF

BURMA (MYANMAR)

By John C. Wu¹

Burma (Myanmar) has potential for development of a large variety of minerals, including antimony, coal, chromium, copper, diamond, gems, gold, iron, jade, lead, manganese, natural gas, nickel, crude petroleum, platinum-group metals, silver, and zinc. In 1994, Burma produced only modest amounts of ores and concentrates of chromium, copper, gold, lead, manganese, nickel, silver, tin, tungsten, and zinc; the industrial minerals barite, clays, dolomite, feldspar, gypsum, limestone, precious and semiprecious stones, and salt; and the mineral fuels coal, natural gas, and crude petroleum. A portion of the production was consumed domestically. However, most of the production of ores and concentrates of chromium, copper, manganese, tungsten, and zinc, jade, diamond, rubies, sapphires, and other gems; and unknown amounts of refined lead and tin were exported principally to the Asian market.

To implement its new mineral policy to expand the mining industry for meeting domestic requirements and to increase export, the Government, through its the State Law and Order Restoration Council, enacted the Myanmar Mining Law on September 6, 1994. The Upper Myanmar Ruby Regulation of 1887, the Mines Acts of 1923, and the Union of Myanmar Mines and Mineral Act of 1961 were repealed on the same date. The mining law allowed prospecting, exploration, and granting of mining permits. It also provided more comprehensive fiscal incentives to mining projects and allowed the Ministry of Mines to offer more reasonable terms to investors.² To safeguard its environment, the Ministry of Foreign Affairs was drafting a new environmental law with the assistance of the United Nations Development Program.

The Ministry of Mines supervised the Departments of Planning and Work Inspection (DPWI) and Geological Survey and Mineral Exploration (DGSM). DPWI was responsible for drafting the mining legislation and mine inspection. DGSM was in charge of the geological mapping and minerals survey and exploration, except for petroleum and natural gas. Exploration of petroleum and natural gas was under the jurisdiction of the Ministry of Energy.

The mineral industry was comprised of three state-owned metals mining enterprises, a state-owned gems enterprise, a state-owned oil and gas enterprise, several Government and private joint-venture companies, and many small-scale private and local enterprises. According to an estimate by the Ministry of Mines, the total work force in the mining sector was about 83,000, of which about 21,000 were in metallic mining. The total output of the mining sector, in

1986 constant producers' prices, was estimated at \$11 million,³ or about 1% of Burma's gross domestic product (GDP), which was estimated at \$11.6 billion in 1994.

In November 1988, the Government adopted an open-door policy, enacted a Foreign Investment Law, and formed an Investment Commission to attract foreign companies to participate in joint exploration and development of mineral resources in Burma. According to the Ministry of National Planning and Economic Development, as of June 15, 1994, a total of 100 foreign investment projects amounting to \$1.23 billion had been approved by the Government. Of this total, 20 projects, valued at \$381.1 million, were in the oil and gas sector; and 11 projects, valued at \$163.5 million, were in the mining sector.⁴

Burma's mineral trade was involved mainly in exporting gems, jade, ore and concentrates of copper, chromium, manganese, tin, tungsten, and zinc. Exports of gems, jade, and jewelry were through the gem emporium held at the Inya Lake Hotel in Yangon (Rangoon, the national capital) twice a year, while exports of nonferrous minerals were sold by auction to the highest bidder from trading companies three to four times a year. As a result, statistics on mineral exports by destination were not available. Burma, once a net exporter of crude oil, was importing an increasing volume of crude petroleum and refined petroleum products to meet the growing domestic demand for gasoline and distillate fuel oil. Burma also was importing increasing quantities of base metals and cement, as domestic demand for these materials grew in 1993 and 1994.

Production of copper, lead, silver, and zinc was by the state-owned No. 1 Mining Enterprise. Production of antimony, diamond, gold, platinum-group metals, tin, and tungsten was by the state-owned No. 2 Mining Enterprise and other small-scale private and joint government-private mining enterprises. Production of chromite, coal, iron, manganese, nickel, steel, and industrial minerals was by the state-owned No. 3 Mining Enterprise and other small-scale private and joint government-private mining enterprises. Production of jade and gems was by the state-owned Myanmar Gems Enterprise and other private small-scale miners.

Copper production from the Monywa area, about 110 kilometers (km) west of Mandalay, increased substantially in 1994 because of increased milling productivity using domestically produced spare parts. Because of lack of spare parts and supplies from the former Yugoslavia, actual

milling capacity was rated at 40,000 metric tons per year (mt/a), compared with the designed capacity of 65,000 mt/a. Copper ore was mined from an open pit mine at the Sabetaung deposit on the western bank of Chindwin River, about 11 km west of Monywa in Salingyi Township, Sagaing Division (State). According to the No. 1 Mining Enterprise, the metal content of copper and gold in copper concentrate was about 19.2% and 1.5 grams per metric ton (g/mt), respectively. Most exports of copper concentrate went to Japan in 1994. According to Japanese trade statistics, Japan imported from Burma 24,768 metric tons (mt) of copper concentrate, valued at \$6.2 million in 1994.

To develop the copper resource in the Monywa area, Ivanhoe Myanmar Holdings Ltd, a joint-venture company established by Ivanhoe Capital of Canada and the Government in 1994, was conducting further exploration and a 2-year feasibility study to develop a new mine in the area to produce refined copper using a solvent extraction-electrowinning plant. According to the Ministry of Mines, ore reserves in the area, including the Sabetaung, Sabetaung South, and Kysisintaung deposits, were 130 million metric tons (Mmt) averaging 0.77% copper. Additionally, ore reserves at the Letpadung Taung deposit on the west bank of Chindwin River, about 3 km west of Monywa along the Monywa-Yinmabin highway, recently had been estimated about 180 Mmt grading 0.66% copper.⁵

Mine production of lead, silver, and zinc mostly was from both an open pit and an underground operation at the Bawdwin Mine in Shan State of northern Burma. In 1994, mine output of lead, silver and zinc increased from that of 1993. According to the Ministry of Mines, ore reserves for the underground mine at Bawdwin were estimated at 5 Mmt averaging 7.46% lead, 3.17% zinc, 0.14% copper, and 4.58 g/t of silver. Ore reserves for the open pit mine at Bawdwin were estimated at 9 Mmt averaging 5.17% lead and 4.00% zinc. The less-known Bawsaing Mine, near Kalaw in the Kayah State, and the Yadanatheingi Mine, near Kyaukme in Shan State, produced small quantities of lead sulfate and lead carbonate concentrates; and the Lonchain Mine, near Kyaukme in Shan State, produced a small quantity of zinc carbonate.

No. 1 Mining Enterprise also operated two concentrators at Bawdwin, a lead-silver smelter at Namtu, and two hydroelectric powerplants with a combined capacity of 13 megawatts at Mansam and at Kongyang, about 45 km southeast of Namtu. According to the Ministry of Mines, about 3 Mmt of smelter slag had been accumulated at the Namtu Smelter site. The smelter slag contained about 20% zinc oxide and 13 g/t of silver. At the Mile 32 old mill site, 1.2 Mmt of mill tailings were reported. The mill tailings contained about 3.08% lead, 2.91% zinc oxide, 0.73% copper, and 93.3 g/mt of silver.

According to the Ministry of Mines, gold mining was conducted at the Thayet Kkone in Pysinmana, at the Shwegyin in Pegu Township, at the Phayaung Taung in Patheingyi Township, and at the Kyaukpahtoe in Kawlin Township. The Kyaukpahtoe Mines, a new joint-venture operation of the

State-owned No. 2 Mining Enterprise and a local entrepreneur, began gold production in 1994 with carbon-in-pulp recovery technology using cyanide and equipment imported from Australia.

To open its gold and copper resources to the Western mining community, the Government invited bids to explore for both metals in Upper and Central Burma. The Department of Geological Survey and Mineral Exploration of the Ministry of Mines offered 16 blocks, about 1,400 square kilometers (km²) each, to interested parties in October 1994. Some of the general terms and conditions were: (1) permits for prospecting, exploration, and feasibility study were set at 1 year for each stage, but the exploration period could be extended for up to 2 years; (2) at the end of the first year of exploration, 50% of the concession area had to be relinquished; (3) the basic rent was \$40.23 per km² for the first year, \$160.93 per km² for the second year, and \$362.09 per km² for the third year, and (4) if found economically feasible, an agreement between the Government and a foreign company would be signed on a joint-venture, production-sharing or profit-sharing basis.⁶

The 16 blocks areas were: Block 1—Indawgyi area, west of Lonton in Kachin State; Blocks 2 and 3—Wuntho Massif area, west of Katha in Sagaing Division; Blocks 4 and 5—Wuntho Massif area, near Kawlin in Sagaing Division; Block 6—Monywa-Kani area, north of Monywa in Sagaing Division; Block 7—Monywa-Salingyi area, south of Monywa in Sagaing Division; Block 8—Papa area, east of Papa in Mandalay Division; Block 9—Pysinmana area, north of Pysinmana in Mandalay Division; Blocks 10 and 11—Mandalay-Kyaukse area, east of Kyaukse in Mandalay Division; Blocks 12 and 13—Kwinthones area south of Thabekyin in Mandalay Division; Block 14—Thabekyin area, east of Thabekyin in Mandalay Division; and Blocks 15 and 16—Mabein area, north of Mogok in Shan State.

Production of tin and tungsten continued a 1993 upward trend and reached the highest level in 7 years, owing to increased output from the Government and private joint-venture enterprises. Most of tin and tungsten were produced from the Mawchi Mine in Kayah State, at the Heinda open pit mine in Tavoy Township, the Theindaw area of Tenasserim (Tanintharyi) Division, and a joint-venture project of the No. 2 Mining Enterprise and Shweli Mining Corp of China in Namhkam Township, northern Shan State. According to the Ministry of Mines, considerable amounts of gem-quality diamond had been recovered at the tin concentrator of the Theindaw Mine in the Tenasserim Division of southern Burma in the past 3 years.

Burma produced small amounts of nickel speiss (matte), and manganese dioxide. Production of the matte was from the Namtu smelting and refining facilities, while production of high-grade manganese oxide was from a small-scale mining operation in the Kyauk Pa Taung area, northwest of Mandalay. In July 1994, a production-sharing contract was signed between the State-owned No. 3 Mining Enterprise (30%) and Yangon-based Science and Technology Advisory Group (STAG) Ltd. (70%) to mine chromite at Tagaung

Tabekyin Township, about 320 km north of Mandalay. In 1994, a feasibility study to mine 5,000 mt/a of ore from the deposit had been started by the joint-venture firm.⁷

Burma also produced a variety of industrial minerals in small quantities and significant amounts of precious and semiprecious stones. Production of industrial minerals, such as barite, bentonite, clays, dolomite, feldspar, gypsum, limestone, and salt, was for domestic consumption. Production of precious stones and semiprecious stones, such as diamond, jade, rubies, sapphires, and other gems, was exported.

The State-owned Myanmar Ceramic Industries operated three cement plants. Cement plant No. 1, with a work force of 998 at Thayet in Magway Division, had an installed capacity of 240,000 mt/a, but the actual operating capacity was downgraded to 125,000 mt/a. The plant produced 110,000 mt/a of cement in 1993. Cement plant No. 2, with a work force of 1,252 in Kyangin Township of Ayeyarwaddy Division in Lower Burma, had an annual rated capacity of 375,600 mt/a, but produced only 214,000 mt in 1993. Cement plant No. 3, with a work force of 696 at Hpa-an Township of Kayin State, had an installed capacity of 240,000 mt/a, but the actual operating capacity was scaled down to 192,000 mt/a. The plant produced 82,000 mt of cement in 1993.⁸

Cement production was estimated at 453,000 mt in 1994, about 13% higher than that of 1993, because of stronger demand for cement resulting from increased construction activity in the Rangoon and Mandalay areas. To meet the growing demand, Burma imported more than \$15 million worth of cement in 1994. The import duty on cement was 10%.

The state-owned Myanmar Gems Enterprise operated gem mines for rubies and sapphires at the Mogok Stone Tract, and at the Jade Mines area for jade. A new gemstone mining tract was opened in 1993 to the private sector at Mongshu in eastern Burma, along with two additional new gemstone mining tracts at Pyinlon and Namas in northern Burma, near the Chinese border. Some good-quality rubies and sapphires reportedly had been found in these areas. Jade mining at Nathmaw and Manshibon in northwestern Burma, where high-quality jade was found, also was opened to the private sector. Myanmar Gems Enterprise held the gems emporium twice per year, in February and October. According to the Department of Geological Survey and Mineral Exploration, gem production continued to increase in 1994.

Production of crude petroleum and natural gas was by the State-owned Myanmar Oil and Gas Enterprise (MOGE). In 1994, production of oil and gas from five major oilfields and six major gasfields averaged 16,000 barrels per day (bbl/d) of crude petroleum and 3.5 million cubic meters per day (Mm³/d) of natural gas, respectively. According to MOGE, Burma's five major oilfields were at Chauk, Mann-Minbu, Htaukshabin, Kanni, and Yenangyaung; and six major gasfields were at Aphyauk, Payagon, Shwepyitha, Pyay (Promé), Chauk, and Ayadaw.

According to the Ministry of Energy, natural gas

production from the Aphyauk Gasfield, near Taikkyi Township in the lower delta of Ayeyarwady Division, would be increased to 2.3 Mm³/d in the next 2 years. In 1994, more than 1.1 Mm³/d of natural gas produced from the Aphyauk Gasfield was piped to Yangon and Pyay for power generation at Thaketa, near Yangon, and at Shwedaung, near Pyay, as well as for industrial use at the Sittaung Paper Mill in Yangon. Upon completion of a new pipeline network in the lower delta of Ayeyarwady Division in 1996, additional natural gas to be produced from the Aphyauk Gasfield would be piped to two powerplants at Ywama and Myanaung, a cement plant at Kyangin, and a methanol plant at Seiktha.⁹ In 1994, domestic natural gas was consumed 55% by utilities, 23% by petrochemical, and 22% by industry.

Amoco Myanmar Petroleum (AMP), a subsidiary of U.S. oil giant Amoco, ended its exploration contract in July 1994. AMP, which signed a 1-year extension contract in July 1993, failed to make a significant oil discovery in Burma. Amoco, which signed a contract with the Government in 1989, was the last of the original 10 foreign companies to quit exploration of oil and gas in Burma. Apache Corp. and Santa Fe Energy Resources of Myanmar Ltd., the two American companies, which signed production sharing contracts with Myanmar Oil and Gas Enterprise in July 1992, were still exploring oil and gas in their onshore concession areas in 1994.

A Texaco-led consortium, which had discovered two offshore gas/condensate wells at the Yetagun-1 in Block M-13 in 1992 and at the Yetagun East-1 in the same block in the Andaman Sea in 1993, continued its oil exploration in Blocks M-12, M-13, and M-14, offshore the Tenasserim coast. The consortium was owned by Texaco Exploration Myanmar (50%), by Premier Petroleum Myanmar Ltd. (30%), and by Nippon Oil (Myanmar) Exploration Ltd. (20%). In September, the Texaco-led consortium began negotiations with the Petroleum Authority of Thailand (PAT) for long-term sales to Thailand of natural gas at the rate of 5.66 Mm³/d from two successful wells in Block M-13.¹⁰ Gas reserves at the two wells were estimated at 42.5 billion m³.

In September 1994, Total Oil Co. of France, in partnership with Unocoal Oil Co. of the United States, signed a long-term sales contract with PAT for delivery of natural gas from its offshore Yandana Gasfield at the rate of 14.87 Mm³/d, about 80% of the projected output, to a powerplant at Ratcha Nauri in Thailand beginning in 1998. Gas reserves in the Yandana Gasfield were estimated at 164 billion m³.

¹Text prepared June 1995.

²Ministry of Mines (Yangon). Activities and Investment Opportunities in the Mining Sector. Nov. 30, 1993, p. 2.

³Where necessary, values have been converted from Burmese Kyats (K) to U.S. dollars at the rate of Ks6=US\$1.00 in 1994.

⁴Ministry of National Planning and Economic Development (Yangon). Economic Development of Myanmar, June 1994, p. 32.

⁵Work cited in footnote 2, pp. 7-8.

⁶Myanmar Business (Manila). "The Gold Rush Is On." V. 1, No. 8, Nov. 2, 1994, p. 1.

⁷U.S. Embassy, Rangoon, Burma. State Dep. Telegram 004934, Oct. 14, 1994, p. 1.

⁸Myanmar Business (Manila). "Focus on Myanmar Ceramic Industries." V. 2, No. 2, Feb. 1, 1995, pp. 4-5.

⁹The New Light of Burma (Yangon). "Natural Gas Production Reportedly

to Double." Jan. 12, 1994, p. 12.

¹⁰Bangkok Post (Bangkok). "Texaco Begins Deal to Sell Natural Gas to Thailand." Sept. 14, 1994, p. 1.

TABLE 1
BURMA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/	1990	1991	1992	1993	1994 e/
METALS					
Chromium: Chromite, gross weight e/	1,000	1,000	6,200	1000	1000
Copper:					
Mine output, Cu content	4,630 r/	4,590 r/	3,730 r/	3580 r/	5800
Matte, gross weight	52 r/	73 r/	45 r/	42 r/	50
Gold, mine output e/ kilograms	43 r/	51 r/	48 r/	63 r/	70
Iron and steel:					
Pig iron	2,950 r/	568 r/	1,410 r/	1500 r/	1500
Steel, crude e/	25,000	25,000	15,000	25000	25000
Lead					
Mine output, Pb content e/	2,700 r/	2,750 r/	2,800 r/	2200 r/	2300
Metal:					
Refined	1,690 r/	2,180	2,120 r/	1560 r/	1450
Antimonial lead (93% Pb)	88	108 r/	71 r/	38 r/	40
Manganese mine output, Mn content e/	65 r/	78 r/	49 r/	43 r/	40
Nickel					
Mine output, Ni content e/	42 r/	15 r/	9 r/	67 r/	50
Speiss (matte), gross weight	160 r/	59 r/	35 r/	259 r/	200
Silver, mine output kilograms	6,130 r/	5,260	4,790	2400 r/	4200
Tin, mine output, Sn content:					
Of tin concentrate	207 r/	130 r/	214 r/	314 r/	350
Of tin-tungsten concentrate	389 r/	308 r/	435 r/	375 r/	400
Total	596 r/	438 r/	649 r/	689 r/	750
Metal: refined	275	157	189	170	200
Tungsten, mine output, W content:					
Of tungsten concentrate	9	6 r/	35 r/	70 r/	80
Of tin-tungsten concentrate	434 r/	350 r/	496 r/	454 r/	500
Total	443 r/	356 r/	531 r/	524 r/	580
Zinc, mine output, Zn content	1,580 r/	996 r/	1,080 r/	850 r/	1800
INDUSTRIAL MINERALS					
Barite	9,470	11,300	13,600	15600	16000
Cement, hydraulic	414,000 r/	435,000	465,000	401000 r/	453000
Clays:					
Ball clay	100	200	230 r/	255 r/	270
Bentonite	416	684 r/	693 r/	200 r/	300
Fire clay	4,310 r/	1,360 r/	1,500 r/	2150 r/	2300
Industrial white clay	779	--	--	500 r/	500
Feldspar	2,560 r/	3,740 r/	1,620 r/	6290 r/	4000
Graphite	45	36	--	--	--
Gypsum	33,000 r/	33,600 r/	30,900 r/	27800 r/	32000
Nitrogen: N content of fertilizer	77,400 r/	111,000 r/	130,000	130000 e/	130000
Precious and semiprecious stones:					
Jade kilograms	576,000 r/	150,000 r/	163,000 r/	224000 r/	250000
Diamond carats	95	111	252	169	200
Rubies, sapphires, spinel do.	298,000	225,000	243,000	255000	260000
Salt 4/ e/ thousand tons	--	260	260	260	260
Stone:					
Dolomite	3,110 r/	2,860 r/	2,100 r/	1250 r/	1500
Limestone, crushed and broken thousand tons	1,700 r/	1,910 r/	2,080 r/	2130 r/	2300
MINERAL FUELS AND RELATED MATERIALS					
Coal, lignite	30800	36300 r/	33600 r/	31700 r/	32000
Gas, natural:					
Gross e/ million cubic meters	1020	936 r/	913 r/	1050 r/	1310
Marketed	993	916 r/	894 r/	1030 r/	1280
Petroleum:					
Crude thousand 42-gallon barrels	5,370 r/	4,890 r/	5,500 r/	5210 r/	5800
Refinery products do.	3,850 r/	4,250 r/	4,400 r/	4520 r/	4500

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

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

3/ In addition to the commodities listed, pottery clay, silica sand, construction aggregate, and varieties of gemstones are produced, but available information is inadequate to make reliable estimates of output levels.

4/ Brine salt production (in metric tons) reported by the Burmese Government, was as follows: 1990--49,670; 1991--46,835; 1992--46,509; 1993--58,915; and 1994--58,000 e/.

Source: Ministry of Mines and Central Statistical Organization (Yangon), Statistical Yearbook 1993, pp. 116-119.