

# THE MINERAL INDUSTRY OF BURMA (MYANMAR)

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Burma, once an important producer and exporter of crude petroleum, lead, silver, and zinc in Asia during the 1950's, produced only modest amounts of metallic minerals, such as chromium, copper, gold, lead, silver, tin, tungsten, and zinc; industrial minerals, such as barite, clays, dolomite, feldspar, gypsum, limestone, precious stones, and salt; and mineral fuels, such as coal, natural gas, and crude petroleum. Most of the production was for its own consumption. However, most of the jade and precious stones production, such as diamond, rubies, sapphires, and other gems, and certain amounts of copper, tin, and zinc were exported. Burma, with only 57 % of its land geologically mapped, has potential for a wide variety of uncharted minerals. These minerals include antimony, chromium, copper, diamond, gems, gold, lead, natural gas, nickel, crude petroleum, platinum-group metals, silver, and zinc. Burma's mineral industry is composed of three State-owned metals mining enterprises, a State-owned petroleum and gas enterprise, and many small-scale private and local enterprises. The total work force of the mining sector was estimated at 83,000 or about 0.5% of Burma's labor force in 1992. According to the Burmese Ministry of National Planning and Economic Development, the total output of the mining sector, in 1986 constant producers' prices, was valued at \$76 million' or 0.89 % of Burma's gross domestic product (the total value of net output and services), which was valued at \$8.5 billion for fiscal year 1992. Of the total output of the mining sector, about 73% was produced by the State-owned enterprises, 26% by the private enterprises, and 1% by cooperatives. Minerals production in Burma had been declining since the 1960's. In 1989, the Government adopted an open-door policy and a liberal foreign investment law to encourage participation of foreign mining companies in exploration and development of Burma's mineral resources. According to the Burmese Department of Geological Survey and Mineral Exploration, since 1989 no substantial foreign capital had been invested in the Burmese mining industry, especially in the nonfuel minerals sector.

Burma's mining industry suffered a steady decline because no new mines were developed while many of the old mines were left to deteriorate without the much needed renovation in the past years. However, in fiscal year 1992, progress reportedly was made in production of gems, gold, tin, and tungsten because of the Government all-out efforts in encouraging small-scale mining by the private and joint government-private enterprises. Burma's mineral trade involved mainly exporting jade, gems, and certain amounts of base metals and importing certain amounts of ferrous and nonferrous metals and a modest amount of crude petroleum. Burma holds gem emporium annually in Yangon (Rangoon, the national capital), mainly for selling and exporting jade, gems, and jewelry. In fiscal year 1992, export earnings from jade and gems alone amounted to about \$23.5 million and accounted for more than 60% of Burma's minerals exports. Additionally, a considerable amount of high-quality jade and gems reportedly are smuggled annually to China and Thailand. Exports of copper concentrate in 1992 were estimated at \$3.5 million and accounted for 10% of total minerals exports. Burma, once a net exporter of crude oil, was importing about 3,200 bbl of crude petroleum annually to meet its domestic demand. Production of copper, lead, silver, and zinc was by the State-owned Mining Enterprise No. 1. Production of gold, tin, and tungsten was by the State-owned Mining Enterprise No. 2 and other smallscale private and joint government-private mining enterprises. Production of iron, nickel, steel, and other minerals, including industrial minerals, was by the State-owned Mining Enterprise No. 3 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 was produced from the Monywa Mine, about 100 km west of Mandalay. The designed capacity of the mine and mill is 2.4 Mmt/a of ore and 60,000 mt/a of concentrate, respectively. For fiscal year 1992, the output of copper concentrate from the mine was estimated at 15,000 tons compared with 18,300 tons in 1991. In past years, Burma has been exporting about 20,000 mt/a of copper concentrate, principally to Japan. In 1992, Mining Enterprise No. 1 was negotiating with Ivanhoe Capital Corp. of Canada to upgrade the Monywa Mine and to develop a new porphyry copper deposit at Letpadaung, about 11 km from the Monywa Mine. Ivanhoe Capital planned to conduct further exploration to ascertain ore reserves of the deposit. Ivanhoe Capital reportedly proposed to the Burmese Government to use solvent extraction and electrowinning for extracting copper instead of the conventional concentrating and smelting.

Mine production of lead, silver, and zinc was from the Bawdwin (open pit) and the Namtu (underground) mines in the Shan State of northern Burma. In 1992 fiscal year 1992, the mine output of lead and zinc increased considerably, while the mine output of silver decreased. Mining Enterprise No. 1 also operated a concentrator at Bawdwin and a lead smelter at Namtu. Mining Enterprise No. 1 reportedly reached an agreement with International Minerals Co. of Singapore to form a joint venture for extracting zinc from tailings at the Namtu silver mine. Gold production reportedly increased substantially

in 1992. Most of the increase in the 1992 gold production came from primary gold deposits, operated by the State-owned Mining Enterprise No. 2. These primary gold deposits were commissioned recently at the Phayaung Taung Mine in Patheingyi near Mandalay, at the Thayet Kkone Mine in Pinyin, and at the Shwegyin and the Kyaukpahto Mines, both in central Burma. However, the small-scale private miners operating in the northern and eastern parts of Burma contributed most to the country's total gold output. These private gold miners, according to the Department of Geological Survey and Mineral Exploration, must sell their gold to the Burmese Government. The Ministry of Trade, which maintains a gold purchasing committee at the township level, purchases gold from private gold miners. For the first time, in 1992, the Government reportedly invited private investors to participate in joint exploration and development of gold in the Lepyin Shweminbo and Kawin Thone Se regions. According to a model jointventure agreement, the private partner must process the gold to 22 karats with a quality guarantee and the proceeds from the sale of the gold would be distributed according to a 60:40 ratio between the private partner and the Government. Despite low metal prices, production of tin and tungsten rose considerably in 1992 owing to the Government's all-out efforts in promoting participation of the private sector in setting up joint-venture firms with the Government. A joint-venture agreement normally was based on a production-sharing contract having 65% private and 35 % Government ownership. Most tin and tungsten were produced from the Mawchi, Heinda, and Tavoy areas. In 1992, two joint-venture firms were established for mining tin and tungsten in the Pinyin east area of the central-eastern part and in the Dawei area. of the southern part of the country. Additionally, the State-owned Mining Enterprise No. 2 reached an agreement with China's Shweli Co. of Yunnan Province in November for joint exploration and development of a new tin mine in the Namkham area of the Shan State, about 300 km north of Mandalay, near the Sino-Burma border. The Stateowned Mining Enterprise No. 2 also operated a 1 ,000-mt/a tin smelter in Thanlyin, near Rangoon. Owing to lack of raw material, the smelter had been operated far below its capacity. Production of refined tin mainly for domestic consumption was estimated at 200 tons in 1992. According to Government statistics, Burma also produced certain amounts of chromite, nickel speiss, and manganese dioxide. However, the annual output was small, and the producing areas are unknown. Exploration for chromium and nickel continued at the Mwetaung area of the Chin State in northeastern Burma near the Indian border. Exploration was conducted with technical assistance provided by Germany under a 5-year agreement. Burma produced a variety of industrial minerals in small quantities but 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 for exports. Mining Enterprise No. 3, which had a joint venture with ECI of Singapore to produce bante powder for oil drilling, produced barite from the Kyaukse Mine, south of Mandalay; from the Heho Mine in Shan State; and from the Anisakan Mine near Maymyo. The joint-venture barite processing plant at Thazi, which began operation in 1991, is capable of producing 60,000 mt/a of barite powder. ECI reportedly planned to mine and process other industrial minerals, such as feldspar, manganese, and talc, in Burma. In 1992, Mining Enterprise No. 3 also signed a joint-venture agreement with Watana Co. of the United States to mine granite in Burma for export to Japan. As part of the rationalization of the State-owned industry, Mining Enterprise No. 3 took control of the Ywama Steel Mill from the Ministry of Industry. The State-owned Myanmar Ceramic Industries operated three cement plants. The Kyangin plant, near Mandalay, is capable of producing 270,000 mt/a of cement. The Pa-An plant, about 160 km east of Yangon, is capable of producing 280,000 mt/a. The Thayetmyo plant, 300 km northeast of Yangon, is capable of producing 270,000 mt/a. According to ~ Government statistics, Burma's cement output totaled 465,000 tons, or about 57 % of its installed capacity in 1992. A modest amount of portland cement had been imported to meet the cement shortage in some parts of the country. The State-owned Myanmar Gems Enterprise operated gem mines at the Mogok Stone Tract for mining rubies and sapphire, and at the Jade Mines area for jade. It also held the gems emporium twice per year. One was held in February and another one in October. According to the Department of Geological Survey and Mineral Exploration, gem production rose significantly in 1992, especially for diamond and jade. Participation of wealthy private enterprises in gem mining with Government support had resulted in a 127 % increase in diamond production and a 45 % increase in jade production in 1992. In the past years, there had been an active search for rubies and sapphires in northern Burma. As a result of intensive exploration, several new gemstone tracts had been found in northern Burma. The Pinyin and the Namsa deposits (the Nawarat Stone Tract), discovered near the Chinese border in the Shan State in 1990, began production of high-quality rubies and sapphires in 1991. In 1992, a new gemstone tract for rubies reportedly was discovered near Mongshu in the eastern part of the country and an occurrence of fine qualityjadeite also was discovered near Khami in the northwestern part of Burma. Production of crude petroleum and natural gas was by Myanmar Oil and Gas Enterprise (formerly Myanmar Oil Corp.). According to the Minister of Energy, Burma was unable to increase its output of crude petroleum and natural gas because it lacks experience and skilled technicians in oil and gas exploration and development. Production of oil and gas from seven oilfields and gas fields averaged 16,000 bbl/d of crude petroleum and 2.3 Mm<sup>3</sup> of natural gas, respectively, in 1992. Burma's top four oilfields were at Chauk/Lanywa,

Mann-Htaukshabin, Prome, and Yenangyaung. In 1989-90, the Government attracted 10 major foreign oil companies into Burma and signed production-sharing contracts with them to undertake a 3-year oil and gas exploration program. By the end of 1992, a total of 12 exploratory wells were drilled by foreign oil companies but only 1 well was successful. As a result, six foreign oil companies reportedly either had relinquished their concession acreage or announced plans to withdraw citing disappointing results and high exploration costs. These six major oil companies were Petro-Canada, Australia's Broken Hill Proprietary Ltd., Unocal, Amoco Corp., Shell Oil Co., and Yukong Oil Co. of the Republic of Korea. A consortium of Texaco Exploration Myanmar Inc. (50%) of the United States, Premier Petroleum Myanmar Ltd. (30%) of the United Kingdom, and Nippon Oil (Myanmar) Exploration Ltd. (20%) of Japan was the only successful foreign contractor, which discovered an offshore gas/condensate well in their ~ concession area block M-13. The consortium spudded the 1 Yetagun wildcat in 105 m of water in the southwestern corner of block M-13, off peninsular Myanmar in October. The wildcat well, which flowed at a combined rate of 2.1 Mm<sup>3</sup> of natural gas and 1,800 bbl/d of 47.5 deg; API condensate, was the first discovery in the Tenasserim shelf area. The consortium, which signed a production-sharing contract with Myanmar Oil and Gas Enterprise in 1990 for oil and gas exploration for blocks M13 and M-14, signed another production sharing contract for block M-12 adjacent to their blocks M-13 and M-14. In July, Total Oil Co. of France signed a production-sharing contract with the State-owned Myanmar Oil and Gas Enterprise for exploration and development of oil and ~ gas offshore blocks M-5 and M-6 in the Gulf of Mataban. The potential gas reserves in the concession, according to an industry estimate, were between 99 Mm<sup>3</sup> and 142 Mm<sup>3</sup>. Under the agreement, about 75% of the future natural gas output from the area would be marketed in Thailand. The contract also called for spudding the first test well using the Maersk Vanguard drilling platform for commercial production from the offshore area in the Gulf of Martaban (Mottama) in early 1993. The State-owned Myanmar Petrochemical Enterprise operated a small oil refinery at Chauk with a 6,000-bbl/d capacity and a larger one at Thanlyin with a 26,000-bbl/d capacity. To meet the domestic demand for refined petroleum products, Burma reportedly imported 3,150 bbl of crude petroleum in 1992.

\*\*Where necessary, values have been converted from Burmese Kyats (K) to U.S. dollars at the rate of Ks6.5=US\$1.00 in 1992. ' Ministry of National Planning and Economic Development. Review of the Financial, Economic and Social Conditions for 1993-94, p. 259.

U.S. Embassy, Rangoon, Burma. State Dep. Telegram 00969, Feb. 18, 1993,

Oil and Gas Journal. V. 90, No. 52, Dec. 28, 1992, p. 32.

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

(Metric tons unless otherwise specified)					
Commodities <sup>2</sup>	1988	1989	1990	1991	1992
<b>METALS</b>					
Chromium: Chromite, gross weight	5,000	5,000	1,000	1,000	6,200
Copper					
Mine output, Cu content	4,700	5,080	4,399	5,670	4,800
Matte, gross weight	224	200	53	150	150
Gold, mine output kilograms	100	126	150	130	140
Iron and steel: Pig iron	688	2,946	406	1,000	500
Lead:					
Mine output, Pb content	6,000	5,200	4,400	4,700	4,800
Metal:					
Refined	4,402	3,443	2,750	2,177	2,112
Antimonial lead (93% Pb)	160	300	88	100	100
Manganese mine output, Mn content	34	47	55	50	50
Nickel					
Mine output, Ni content	26	20	150	20	20
Speiss, gross weight	104	184	163	50	100
Silver, mine output kilograms	9,207	5,910	5,816	5,256	4,790
Tin, mine output, Sn content:					
Of tin concentrate	102	172	190	144	130
Of tin-tungsten concentrate	427	329	463	404	580
Total	529	501	653	518	710
Metal Refined:	110	171	275	157	189
Tungsten, mine output, W content:					
Of tungsten concentrate	14	8	19	15	25
Of tin-tungsten concentrate	293	225	342	270	350
Total	307	233	351	275	375
Zinc, mine output, Zn content	1,600	1,400	1,559	1,750	1,880
<b>INDUSTRIAL MINERALS</b>					
Barite	12,678	11,278	9,468	9,000	10,000
Cement, hydraulic	348,981	394,000	420,000	435,189	465,125
Clays:					
Ball clay	247	203	100	200	150
Bentonite	418	711	456	600	200
Fire Clay	3,473	3,150	1,404	2,540	2,500
Industrial white clay	600		729		
Feldspar	4,938	4,257	3,475	2,500	2,600
Graphite			45	46	
Gypsum	31,716	31,536	32,952	33,630	36,070
Nitrogen: N content of fertilizer	112,178	120,000	125,000	130,000	130,000
Precious and semiprecious stones: Jade kilograms	131,777	660,200	242,200	177,900	145,800
Salt, all types thousand tons	246	262		260	260
Stone:					
Dolomite	938	1,930	3,505	2,792	1,046
Limestone, crushed and broken thousand tons	1,118	1,219	1,320	1,560	1,700
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal, lignite	30,258	37,594	30,825	56,690	56,000
Gas, natural:					
Gross million cubic meters	1,108	1,133	1,015	934	1,000
Marketed do	1,064	1,088	993	817	950
Petroleum:					
Crude (gross wellhead) thousand 42-gallon barrels	4,800	5,600	5,800	5,372	5,800
Refinery products do	3,137	3,287	3,200	3,800	3,500

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Tables includes data available through Mar. 26, 1993.

<sup>2</sup>In addition to the commodities listed, pottery clay, common sand, glass sand, other varieties of crude construction stone, and other varieties of gemstones are produced, but available information is inadequate to make reliable estimates of output levels.

<sup>3</sup>Data are for fiscal years beginning Apr. 1 of that stated.

<sup>4</sup>Includes fireclay powder.

Brine salt production (in metric tons) as reported by the Burmese Government were as follows: 1988-59,768; 1989-60,229; 1990-49,670; 1991-46,835; 1992-43,488;