

## THE MINERAL INDUSTRY OF THE OTHER ASIA AND THE PACIFIC 1993 BURMA (MYANMAR)

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, manganese, 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 chromium, copper, manganese, 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, manganese, natural gas, nickel, crude petroleum, platinum-group metals, silver, and zinc. In the Central Government, the Ministry of Mines supervises two departments. The Planning and Inspection Department is responsible for drafting the mining legislation, including mining rights, mine safety and environmental protection regulations, and special mining laws; national mineral policy; and mine inspection. The Department of Geological Survey and Mineral Exploration is in charge of the geological mapping and minerals survey and exploration except petroleum and natural gas. Exploration of petroleum and natural gas is under the jurisdiction of the Ministry of Energy. Burma's mineral industry is composed of three State-owned metals mining enterprises, a State-owned jade and gemstones enterprise, a State-owned petroleum and gas enterprise, and many small-scale private and local enterprises. According to the Ministry of National Planning and Economic Development, the estimated employment in the mining sector was 83,000 in fiscal year 1993 or about 0.5 % of Burma's estimated total employment of 16.5 million. The total output of the mining sector, in 1986 constant producers' prices, was estimated at \$120 million or 1.2% of Burma's gross domestic product (GDP) (the total value of net output and services), which was estimated at \$10 billion for fiscal year 1993. 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 1988 no substantial foreign capital had been invested in the Burmese mining industry, especially in the non-fuel minerals sector. According to a local press report, 75 direct foreign investments were made in Burma with a total value of \$956.3 million since the Government began implementing the new investment law in 1988. Of this total, only nine investments were in the mining 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, because of increased contribution by the private sector, production of gemstones, gold, jade, tin, and tungsten reportedly showed some improvements in fiscal year 1993. Burma's mineral trade involved mainly exporting jade, gems, and some amounts of copper concentrate, chromite, manganese ores, tin and tungsten concentrates, and importing some amounts of ferrous and nonferrous metals and an increasing amount of crude petroleum. Burma holds a gem emporium at the Inya Lake Hotel in Yangon (Rangoon, the national capital) in February and October annually, mainly for selling and exporting jade, gems, and jewelry. A considerable amount of high-quality jade and gems reportedly are smuggled annually to China and Thailand. Burma, once a net exporter of crude oil, imported about 4,300 bbl/d of crude petroleum and refined petroleum products in 1993 to meet its domestic demand of about 23,000 bbl/d. Australia and Malaysia were two major suppliers of crude petroleum to Burma. Production of copper, lead, silver, and zinc was by the state-owned Mining Enterprise No. 1. Production of antimony, diamond, gold, platinum-group metals, tin, and tungsten was by the state-owned Mining Enterprise No. 2 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 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 Myanma Gems Enterprise and other private small-scale miners. Production of copper was from the Monywa Mine, about 100 km west of Mandalay. The designed capacity of the mine and mill is 2.4 Mint/a of ore and 60,000 mt/a of concentrate, respectively. The output of copper concentrate in the past 3 years had been below capacity owing to lack of spare parts and supplies. According to Burma's Department of Geological Survey and Mineral Exploration, the production of copper concentrate increased to 22,528 tons in fiscal year 1993 from 17,879 tons in fiscal year 1992. According to the Japanese trade statistics, exports of copper concentrate to Japan also rose from 16,671 tons in 1992 to 17,450 tons and were valued at \$2.5 million in 1993. Following a long negotiation, Mining enterprise No. 1 reportedly had reached an agreement in 1993 with the Vancouver-based Ivanhoe Capital Corp. to establish a joint-venture company, called Ivanhoe Myanma Holdings Ltd., to conduct feasibility study for developing a new mine and ore processing facilities for extracting copper and associated minerals at the Kysindaung-Letpadaung Taung porphyry copper deposit, about 11 km from the Monywa copper mine in central Burma. Ore reserves in the area were estimated at

180 Mint averaging 0.66 % copper. The feasibility study was scheduled to begin in 1994. Mine production of lead, nickel speiss, silver, and zinc was from the Bawdwin (open pit) and the Namtu (underground) mines in the Shan State of northern Burma. In fiscal year 1993, the mine output of silver and zinc increased, while the mine output of lead decreased. Mining Enterprise No. 1 also operated a concentrator at Bawdwin and a lead smelter at Namtu. Mining Enterprise No. 1 had 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 in fiscal year 1993 was estimated to be at the higher level than that of fiscal year 1992 because of the substantial contribution by the small scale miners from the private sector. In past years, several small placer gold mines reportedly were commissioned by the Mining Enterprise No. 2 at the Phayaung Taung in Patheingyi near Mandalay, at the Thayet Kkone in Pyin Odon, and at the Shwegyin and the Kyaukpahtoe, both in central Burma. However, the Kyaukpahtoe Mine, which was built with Yugoslavian financial and technical assistance, reportedly was still in the test stage. In 1993, the Government reportedly brought on-stream a small gold refinery at Kawlin, about 320 km north of Rangoon. Refined gold production targeted for fiscal year ending March 1994 was 260 kg. Potential areas for gold exploration in Burma, according to the Government and industry ~ are in the Kwinthong area, about 100 km north of Mandalay; the Phayaung Taung area, about 19 km north of Mandalay; the Mangin Taung area (formerly the Wuntho Range), about 250 km north of Mandalay; and many small placer deposits, 80 km from Leshio and about 300 km northeast of Mandalay. Despite low metal prices, production of tin and tungsten continued to increase in 1993 owing to the Government's all out efforts in promoting participation of the private sector in setting up joint venture firms with the Government. Most tin and tungsten were produced from the Mawchi Mine in the Kayah State. Other tin-producing areas include the Heinda, Hermingyi, and Kanbauk in the Tanintharyi mining district. The 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 October, the State-owned Mining Enterprise No. 2 signed a production sharing agreement with the Roong Siam Mining (Myanmar) of Thailand for tin exploration and exploitation off the Gulf of Martaban and the Tenasserim Coast. Roong Siam Mining was expected to conduct a 1-year exploration program in the area known to have deposits in the Heinze. Burma also produced some amounts of chromite, nickel speiss, and manganese dioxide. But information on the annual output and the producing areas of these minerals are unknown. However, according to the Japanese and Chinese trade statistics, chromite had been exported to Japan amounting to 10,477 tons in 1989 and 6,174 tons in 1992, while manganese ore had been exported to China amounting to 2,500 tons in 1990, 59,246 tons in 1991, and 236,229 tons in 1992. Burma produced a variety of industrial minerals in small quantities but significant amounts of precious and semiprecious stones. Production of industrial minerals, such as bauxite, 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. The Government through the Department of Geological Survey and Mineral Exploration reportedly was negotiating an agreement with the Stockdale Prospecting Ltd., a subsidiary of De Beers of Australia, to jointly explore for diamonds in the Mohauk area near Momeik in northeastern.

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, cement output declined to 400,400 tons in 1993 from 465,100 tons 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 Mogoke Stone Tract for mining rubies and sapphires and at the Jade Mines area for jade. In 1993, a new gemstone mining tract was opened to the private sector at the 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. One was held in February and another one in October. According to the Department of Geological Survey and Mineral Exploration, gem production continued to increase in 1993, especially for jade, which registered a tenfold increase in 1993. Production of crude petroleum and natural gas was by Myanmar Oil and Gas Enterprise (formerly Myanmar Oil Corp.). Production of oil and gas from seven oilfields and gas fields averaged 18,630 bbl/d of crude petroleum and 3.3 Mm<sup>3</sup>/d of natural gas, respectively, in 1993. According to the Ministry of Energy, natural gas production from the Aphyauk Gas field in the Ayerwaddy district will be doubled from the current level to 2.2 Mm<sup>3</sup>/d in the next few years to meet the fuel requirements of the powerplants in Ywama and Myanaung as well as the cement plants at Kyangin and Myaingga. Current production at 1.1 Mm<sup>3</sup>/d of natural gas from the Aphyauk Gas field was piped to Yangon's industrial area to fuel the Sittaung Paper Mill and the powerplants at Thaketa and Shwedaung.

Burma's major oilfields were at Ayadaw, Chauk/Lanywa, MaimHtaukshabin, Prome, Pyal, Shwepyitha, and Yenangyaung. By early 1993, all of the original 10 foreign oil companies except Amoco and Yukong Oil Co. of the Republic of Korea left Burma after their 3-year contracts expired. In July, Amoco signed a 1-year extension contract for onshore blocks RSF's 3 to 6 and EP-2 in the central basin. Amoco and Yukong also signed a contract merger agreement for onshore block B and C in northern Burma. Two other U.S. companies, Apache Corp. and Santa Fe Energy Resources, both reportedly had signed a production sharing contract with Myanmar Oil and Gas Enterprise in mid-1992. The Texaco-led consortium, which had discovered an offshore gas/condensate well, the Yetagun-1 in Block M-13 in 1992, announced in April a second successful gas/condensate well, the Yetagun East-i in the same block in Andaman Sea, about 420 km from Yangon and 150 km off the coast. The second wildcat, Yetagun East-i, flowed a combined rate of 1.78 Mm<sup>3</sup>/d of gas and 1,922 bbl/d of 53.5° API gravity condensate. After signing of a production-sharing contract with Myanmar Oil and Gas Enterprise in July 1992, Total Oil Co. of France was joined by Unocal of the United States for development of the Yadana gas well in the Andaman Sea, about 12 km off the coastal town of Bogale. The Yedagun-1 well at Yadana, which was discovered by Japan in the early 1980's, yielded 2 Mm<sup>3</sup>/d of natural gas. The Yedagun-2 well, about 192 km west of Myeik (Mergui), reportedly also hit oil and gas. According to preliminary tests, the well has a potential yield of 2,800 bbl/d of petroleum and 2.5 Mm<sup>3</sup>/d of natural gas. Thailand and Japan reportedly had expressed interested in purchasing natural gas from the Yadana Field. The State-owned Myanmar Petrochemical Enterprise operated two oil refineries, a 6,000-bbl/d capacity at Chauk and a 26,000-bbl/d capacity at Thanlyin. To meet the domestic demand for refined petroleum products, Burma reportedly imported considerable amounts of crude petroleum principally from Australia and Malaysia to supplement the domestic shortfall because of the low level of domestic output.

**TABLE 5**  
**BURMA: PRODUCTION OF MINERAL COMMODITIES**  
(Metric tons unless otherwise specified)

Commodities <sup>2</sup>	1989	1990	1991	1992	1993	Annual capacity (Jan 1, 1994)
<b>Metals</b>						
Chromium: Chromite, gross weight <sup>o</sup>	5,000	1,000	1,000	6,200	1,000	7,000
Copper:						
Mine output, Cu content	5,080	4,399	5,670	5,534	6,980	7,000
Matte, gross weight <sup>4</sup>	200	53	150	150	100	
Gold, mine output <sup>4</sup> Kilograms	126	150	130	140	200	250
Iron and steel: Pig iron	2,946	406	1,000	500	500	3,000
Lead:						
Mine output, Pb content	5,200	4,400	4,700	4,800	3,000	6,000
Metals:						
Refined	3,443	2,750	2,177	2,112	14,000	4,500
Antimonial lead (93% Pb)	300	88	100	100	80	
Manganese mine output, Mn content <sup>4</sup>	47	55	50	50	50	100
Nickel						
Mine output, Ni content <sup>4</sup>	20	50	20	20	20	50
Speiss, gross weight	184	163	50	100	50	
Silver, mine output kilograms	<u>5,910</u>	<u>5,816</u>	<u>5,256</u>	<u>4,790</u>	<u>5,000</u>	<u>10,000</u>
Tin, mine output, Sn content:						
Of tin concentrate	172	190	114	130	100	200
Of tin-tungsten concentrate	<u>329</u>	<u>463</u>	<u>404</u>	<u>580</u>	<u>400</u>	<u>600</u>
Total	501	653	518	710	500	800
Metal: Refined	171	275	157	189	150	300
Tungsten, mine output, W content:						
Of tungsten concentrate	8	9	5	25	20	30
Of tin-tungsten concentrate	<u>225</u>	<u>342</u>	<u>270</u>	<u>350</u>	<u>250</u>	<u>320</u>
Total	233	351	275	375	270	350
Zinc, mine output, Zn content	1,400	1,559	1,750	1,880	1,900	2,000
<b>INDUSTRIAL MINERALS</b>						
Barite <sup>3</sup>	11,278	9,468 <sup>1</sup>	11,339	13,589	10,000	15,000
Cement, hydraulic	394,000	420,000	435,189	465,125	400,391	500,000
Clays: <sup>3</sup>						
Ball clay	203	100	200	150	150	300
Bentonite	711	416	600	200	300	800
Fire clay <sup>4</sup>	3,150	1,404	2,540	2,500	2,500	3,500
Industrial white clay		779				
Feldspar <sup>5</sup>	4,257	2,476	2,500	2,600	2,600	5,000
Graphite <sup>3</sup>		45	36			
Gypsum <sup>3</sup>	31,534	32,952	33,630	36,070	35,000	37,000
Nitrogen: N content of fertilizer	120,00	77,400	111,000	130,000	130,000	130,000
Precious and semiprecious stones:						
Jade <sup>3</sup> kilograms	660,200	242,200	177,900	145,800	150,000	200,000
Salt, all types <sup>3</sup> thousand tons	262		260	260	260	270
Stone: <sup>3</sup>						
Dolomite	1,930	3,505	2,792	1,016	1,000	3,500
Limestone, crushed and broken - thousand tons	1,219	1,320	1,860	1,700	1,500	3,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal, lignite	37,594	30,815	56,690	56,000	56,000	60,000
Gas, natural:						
Gross <sup>4</sup>	1,133	1,015	934	1,133	1,200	1,200
Marketed <sup>3</sup>	1,088	993	817	1,015	1,140	1,150
Petroleum:						
Crude (gross wellhead) <sup>3</sup> thousand 42-gallon barrels	5,600	5,800	5,372	5,609	5,400	5,800
Refinery products do	3,287	3,200	3,800	3,500	3,000	4,000

<sup>o</sup>Estimated. <sup>1</sup>Preliminary. <sup>2</sup>Revised.

<sup>1</sup>Table includes data available through Mar, 15, 1994.

<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 ending Apr. 1 of that stated.

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

<sup>5</sup>Barite salt production (in metric ton), as reported by the Burmese Government was as follows: 1989-60,229, 1990-49,670, 1991-46,835, 1992-46,509, 1993-59,015