

# **THE MINERAL INDUSTRY OF BURMA**

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Burma has significant mineral wealth and the latent potential for its development. However, the production of most mineral commodities has decreased in recent years as a result of political strife and generally poor economic conditions. In the mining sector, deposits of copper, nickel, and various gemstones were being evaluated for exploitation. Since its formation as an independent republic in 1948, the country has experienced political dissent and upheaval. Subsequently, Burma became a socialist state in 1974. Since 1988, the country has been governed by a military junta - 19-member State Law and Order Restoration Council (SLORC). General elections were held in 1990 with the opposition party winning by a landslide. SLORC disregarded the election results, placed the opposition leader under house arrest, and continued its military rule of the country. Burma had introduced an open-door policy in 1988 to entice foreign investments for economic development. However, there is international concern about the post election action by SLORC as well as renewed scrutiny and suspicion of Burma's open-door economic policy. Lacking capital, technology, and outside assistance, there has been little growth or development in the country's mining and minerals processing sector.

## **GOVERNMENT POLICIES AND PROGRAMS**

Burma's economic open-door policy was introduced by SLORC in September 1988. Since that time, about 4,000 companies have registered with Government authorities. In July 1991, the Government announced restrictions for spending foreign exchange earnings by businesses. Under the ruling, companies could allocate only 90 % of profits toward exports, of which 20% must be spent on items stipulated by the Government. Moreover, companies were to be restricted to certain types of exports or to specific items.

## **PRODUCTION**

In terms of world significance, Burma's mine output of minerals is small in volume and limited in array. There is small mine output of metallic ores of chromium, copper, lead-zinc, and tin-tungsten. Mine production of industrial minerals includes small quantities of barite, various clays, dolomite and limestone, gemstones, graphite, gypsum, and soapstone. Output of mineral fuels includes limited amounts of lignite, oil, and natural gas. The decline in the value of the output of the mining sector was attributed to decreased production of natural gas, nickel speiss, tin concentrates, tungsten concentrates, mixed tin-tungsten-scheelite concentrate, and refined tin metal. Specifically, the decrease in the output of the mixed tin-tungsten-scheelite concentrate was a result of insufficient water supply as well as the lack of electrical power and spare parts for operating mining equipment.

## **TRADE**

Most of Burma's foreign trade is conducted on a barter basis and valued on an inflated currency exchange rate. In September 1991, the black-market exchange rate was Kyat 100 to US\$ 1. This compares with an official average rate of Kyat 6.25 to US\$1 in 1991. Based on this rate, total exports were valued at \$421 million and imports at \$649 million, a net trade deficit of \$228 million in 1991. Burma is an agrarian-based economy, and naturally its principal exports are agricultural products. The value of base metals and ores exported totaled only \$4.2 million in 1991. The most valuable mineral shipment is gemstones, which either are exported officially or are smuggled out of the country. Value data for these exports are not available. Imports are comprised of consumer and capital goods that are not manufactured locally.

## **STRUCTURE OF THE MINERAL INDUSTRY**

The Government controls all mineral exploration, extraction, regulation, and planning through the Ministry of Mines, which is comprised of six enterprises and two departments, all headquartered in Rangoon, the capital. Specifically, these are Mining Enterprise No. 1 - copper, lead, silver, and zinc; Mining Enterprise No. 2- gold, tin, and tungsten; Mining Enterprise No. 3- coal, industrial minerals, iron and steel, and nickel; Myanmar Gems Enterprise -precious and semiprecious gemstones; Myanmar Salt and Marine Enterprise -potash and salt; Myanmar Pearl Enterprise-pearls; Department of Geological Survey & Exploration; and the Department of Planning & Inspectorate-planning, licensing, and mine survey. Each enterprise is responsible for the development and production throughout Burma of the minerals and metals

for which it is assigned responsibility. Each receives a yearly operation budget from the central Government, and all revenues from production and sales go the Government. Individual enterprises have limited latitude in the administration of their operations. Moreover, the central Government sets policy and authorizes major decisions such as the approval of foreign participation as well as the approval of joint-venture partners.

## COMMODITY REVIEW

### Metals

*Antimony.*-Burma has several significant deposits of antimony. The largest mine is in the Thabyu locality south of Moulmein. However, this area is controlled by insurgents, and the status of mining activity is unknown. There is a small antimony concentrating plant at Kalaw, near Taunggyi; for treating ore received from various small-scale workings in the general area. Production data for antimony were not available.

*Copper.*-Burma's only copper mine and concentrator is in the Monywa District. The reserves at Monywa are estimated at 130 Mmt grading 0.75 % to 0.78 % copper. The designed capacity of ~ the operation was to process 8,000 mt/d of ore to yield 200 mt/d of concentrates, equivalent to 2.4 Mmt/a of ore and 60,000 mt/a of concentrate. However, the Monywa operation has continually ~ produced at a rate significantly below capacity. Concentrate output in 1991 was about 35,000 tons compared with 30,000 tons in the previous year. There is a copper deposit about 5 km from the Monywa Mine at Letpadaung, 80 km west of Mandalay. Estimated reserves of this deposit are 160 to 180 Mmt, grading 0.66% copper.

*Gold.*-There are widely distributed deposits of gold, mostly placer, throughout Burma. Exploitation is in the form of small operations. The Government was considering the development of four gold prospects as a means to obtain foreign exchange currency. The lode mineralizations included the Kyaukpahtoe deposit in Sagaing, the Phayaung Taung deposit in Patheingyi, and the Thayet Khone deposit in Pynmana. The fourth is a placer prospect at Shwegyin in the Pegu Division. Gold output has fluctuated annually. Production was 31 kilograms in 1988, 124 kilograms in 1989, 26 kilograms in 1990, and 145 kilograms in 1991.

*Iron and Steel* -Burma has a 40,000 mt/a direct-reduced iron operation and a 30,000-mt/a rolling mill at Anisakan. The old Ywama mill near Rangoon has melting and rolling facilities. The total national capacity for steel production is 30,000 mt/a of billets and 15,000 mt/a of scrap melting. In 1990, the production of steel billets was only 10,800 tons. In 1991 , the production of steel billets was 12,000 tons, a marginal increase. The major problems for the steel sector are inadequate transportation infrastructure and the lack of foreign exchange to purchase raw material consumables.

*Lead and Zinc.*-Production of lead and zinc is from the open pit mine at Bawdwin and the underground mine at Namtu in northern Shan State. Silver is a valuable co-product of these operations. The reserves at Bawdwin were estimated at 10 Mmt grading 5. 1 % lead, 4 % zinc, and 93 g/mt of silver. Tailings dumped on the riverbank were estimated to contain 3 % to 4 % lead, 2 % to 3 % zinc, and 85 g/mt of silver. The reserves at Namtu were estimated to contain 7.5% lead, 3.5% zinc, and 93 to 124 g/mt of silver. Furthermore, the stockpile of slag generated by the blast furnace at Bawdwin contains 2.5% lead, 17.2% zinc, and 591 g/mt of silver. It is believed that the reprocessing of this slag resulted in the peak output of 25,000 kilograms of silver in 1987.

*Nickel.*-Burma has been a very small producer of nickel, and output has decreased annually since 1990. Output is by the Bawdwin Mine in northern Shan State. There were recent finds of nickel occurrences at Dagaungtaung and Kalewa, the latter in a remote area. However, there has not been sufficient foreign interest in developing these deposits.

*Tin and Tungsten.*-The historical tin-tungsten producing area in the country is the Tennasserim Peninsula in southern Burma. The operations in the area produce a tin concentrate, a tungsten concentrate, a mixed tin-tungsten concentrate, and a mixed tin-tungsten scheelite concentrate. Mixed tin-tungsten concentrate is treated to produce a tin concentrate. This 65 % concentrate is upgraded to 67 % , which is used in the production of tin metal. In addition, a 65 % tungsten concentrate is generated that is upgraded to 67 % . Both the mixed tin-tungsten concentrate and the mixed tin-tungsten-scheelite concentrate are made available for export.

### Industrial Minerals

*Barite*- Mine output of barite is from workings near Maymyo and Kyaukse outside Mandalay and from Taunggyi, 150 km southeast of Mandalay in central Burma. Since 1988, annual production has been less than 15,000 mt/a. The low level of output reflects the decline in demand for barite as a drilling mud inasmuch as oil exploration in Burma has generally been disappointing.

*Cement*-Production of hydraulic cement by three plants was more than 435,000 tons in 1991. The gypsum requirement for cement manufacture was from the mine at Hsipaw, 160 km northeast of Mandalay. Gypsum output in 1991 was about 14,000 tons.

*Gemstones*-In March 1990, the Government abolished the State monopoly on mining gemstones. Subsequently, Myanma Gems Enterprise awarded 217 concessions for mining gemstones. By the summer of 1990, there were reportedly 159 private mines in operation. The premier mining area is Mogok located in northern Mandalay, which is described as the source of the world's best rubies and sapphires. There are eight State-run mining operations-seven for rubies and sapphires and one for peridot. Two of the ruby/sapphire operations are hard-rock tunnel mines. These and the peridot mines are worked ~ by blasting. The other State mines dump material into a wet pit, and the sludge is pumped onto separation screens for gem recovery. The ruby/sapphire sites are very rich and produce at least 20 gem varieties, including spinels and amethysts. Output of sapphire in the mines near Bo Ploi in Kanchanburi Province has been declining. Mining operations in this area are characterized as (1) using mechanized equipment, (2) individual diggings occasionally assisted with mechanized equipment, and (3) small operations using only hand tools for extraction. The larger operations were being forced to dig deeper for the gems, often below the water table. In 1991, Burma's mine production of jade was estimated at 101,600 kilograms and for gemstones at 716,500 carats. In 1991, Myanma Gem Emporium generated sales proceeds of \$11,490,000. Exports of gemstones in 1990 were valued at \$15,800,000. There is a long history in Burma of illegal gem mining and smuggling. In 1990, the Government recovered 30,729 carats of smuggled rubies and other gems that included the 496.5-carat SLORC ruby and a 4,230carat uncut sapphire. The Government opened private mining ventures as an attempt to increase control over national resources and to obtain additional revenue. However, it may not be able to control illegal mining and smuggling in the high-value gems trade.

## **Mineral Fuels**

*Lignite*-Coal resources thus far discovered in Burma are of relatively low thermal value, in the sub-bituminous or lignite category. The two principal workings are the underground Kalewa Mine in northwest Burma and the opencast mine at Namma, 50 km south of Lashio. The Kalewa output is used by the Bawdwin smelter and is also used for power generation and tobacco drying. The Namma lignite is used by the Anisakan iron and steel plant. Both operations were believed to be working at near capacity inasmuch as provisional data listed production of 56,000 mt in 1991, compared with 30,900 mt in 1990.

*Petroleum, Crude*-Output of crude oil in 1991 was 5,700,000 barrels, an increase of almost 8 % over the previous year. Production was from the onshore fields at Ayadaw, Chauk, Mann, Myanaung, Prome, Shwepyitha, and Yenangyaung. The Government's solution for the country's economic crisis was to invite foreign investment. During the past 3 years, about 40 foreign firms have invested around \$660 million in Burma with 10 oil companies accounting for approximately 65 % of the total. The main interest in onshore exploration is the crustal rift basin extending from the upper Chindwin River, in the Hukawng Valley of northern Burma, southward through west-central Burma past Mandalay to Moulmein at the beginning of the southern peninsula. Exploration has been difficult and was running behind schedule due to logistical problems as a result of lack of infrastructure and road access to concession areas. In addition, transportation of heavy equipment into the hinterland is by rivers and waterways, many times navigable only in the rainy seasons. Moreover, the rains resulted in waterlogged concession blocks adding more difficulties to the operators. The offshore blocks virtually line the entire coastline of Burma from the Bay of Bengal, around the Gulf of Martaban, to the Andaman Sea, with the principal area of interest in the mouth of the Irrawaddy Delta. Foreign operators include Petro-Canada; Amoco and Unocal of the United States; Idemitsu Oil of Japan; Yukong of the Republic of Korea; Kirkland Resources, Premier Oil and a joint venture between Croft Exploration and Clyde Petroleum of the United Kingdom; and Royal Dutch Shell and Broken Hill Pty. of Australia. However, enthusiasm on Burma's oil prospect has dimmed based on early disappointing drilling results.

*Natural Gas*-Production of natural gas has decreased and averaged about 950 Mm3 in 1990 and 1991. Because of the energy shortage in the country, little gas is believed to be flared. The principal producer is the Prome Gasfield, about 225 km north-northwest of Rangoon. Promising prospects for development in the country are gas occurrences at Martaban, Natmi, and Payagon.

**Reserves**

Data on Burma's mineral reserves are sparse and from various sources and times. Information may be outdated as well as not verified. Moreover, systematic future delineation may increase the country's resource of mineral wealth. One of Burma's prized natural resources is gemstones. These include amethyst, aquamarine, citrine, jadeite, peridot, ruby, sapphire, spinel, and zircon. However, meaningful reserve data are not available for these stones. (See table 3.)

**INFRASTRUCTURE**

Burma's road network, comprised of 3,200 km of hard-surface and 17,700 km of improved secondary roads, affords fair access to most of the country. In many areas, however, tracks or trails must be utilized for the final 10 to 60 km of travel to remote sites, as might be necessary for mineral exploration. The country has slightly more than 3,990 km of railroad, all Government-owned. There are 3,878 km of 1 .000-meter gauge and 1 13 km of narrow-gauge industrial lines. Only 362 km is double track. This provides access northward from Rangoon through Mandalay to Bawdwin, and also from Mandalay farther north to the Namponmao area, more than 1 ,000 km north of Rangoon. Not the least part of Burma's transportation system is 12,899 km of inland waterways, of which 3,200 km is navigable by commercial vessels. These navigable waters are utilized for moving crude petroleum to refineries and some of the resulting refinery products back to the originating area. There is 1 ,343 km of pipeline for crude petroleum and 330 km for natural gas. The present condition of the pipelines is unknown, and the structures may have deteriorated. The four major seaports are Rangoon, the capital; Bassein and Moulmein, more than 150 km west of Rangoon in the Irrawaddy Delta; and Sitwe, about 100 km south of the Bangladesh border. There are 79 usable airports; only three have runway lengths between 2,400 m and 3,659 m and 37 have runways 1,200 m to 2,439 m. The principal air facilities are at Rangoon; Meiktila in Mandalay State about 100 km south of the city of Madalay; and at Namponniau, about 10 km southwest of Myitkyina.

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- 1.Burma is divided into mutually exclusive States (Shan, Kayah, Kachin, and Kawthule), Districts (Sagaing, Arakan, Magwe, Mandalay, Irrawaddy, Pegu, Tenasserim), and one other entity, the Chin Special District States tend to be ethnically distinguishable whereas districts are not recognizably so.
  - 2.Far Eastern Economic Review (Hong Kong). Asia 1992 Yearbook, Dec. 1992, pp 89-93.
  - 3.Ministry of Planning and Finance(Rangoon). The Union of Myanmar, 1992, 315 pp.
  - 4.U.S. Embassy, Rangoon, Burma. State Dep. Telegram 00821, American Geologist Visits Fabled Mogok Ruby Mines, Feb. 15, 1991, 1 p.
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**OUTLOOK**

Since 1948, Burma has experienced political instability as a result of strife and changes in government philosophy. It is a poor country with a per capita GDP of only about \$400. Burma has not been able to achieve any substantial earnings for its major commodity exports, which are agricultural products. Lacking domestic investment resources and up-to-date technology and expertise, Burma cannot develop its indigenous mineral resources without foreign assistance. The country and its political factions must demonstrate stability and initiate economic reforms to inspire confidence on the part of international investors and foreign entrepreneurship. The extent of Burma's minerals wealth is largely unknown. Upgrading of the nation's existing operations and systematic exploration and development of new mineral deposits, especially oil and natural gas, will benefit Burma's economic development.

**OTHER SOURCES OF INFORMATION**

- Agencies  
Ministry of Mines

Kanbe Road, Yankin  
Rangoon 1108, Burma

Ministry of Energy  
Rangoon, Burma

Publications  
Ministry of Planning and Finance Central  
Statistical Organization, Rangoon, Selected  
Monthly Economic Indicators, Statistical  
Paper No. 3, bimonthly.

**TABLE 1**  
**BURMA: PRODUCTION OF MINERAL COMMODITIES<sup>2</sup>**

(Metric tons unless otherwise specified)						
Commodities <sup>2</sup>	1987	1988	1989	1990	1991	
<b>METALS</b>						
Chromium: Chromite, gross weight	1,000	5,000	5,000	1,000	1,000	
Copper						
Mine output, Cu content	10,600	4,700	5,080	r 4,400	5,670	
Matte, gross weight	234	224	200	T 108	150	
Gold, mine output kilograms	100	100	126	150	130	
Iron and steel: Pig iron	624	688	2,946	e 568	1,000	
Lead:						
Mine output, Pb content	4,600	6,000	5,200	4,400	4,700	
Metal:						
Refined	3,985	4,402	3,443	e 1,688	2,177	
Antimonial lead (18% to 20% Sb)	305	160	300	300	300	
Nickel						
Mine output, Ni content	20	26	20	23	20	
Speiss, gross weight	50	104	184	e 98	50	
Silver, mine output kilograms	26,096	9,207	6,843	r 4,386	4,791	
Tin, mine output, Sn content:						
Of tin concentrate	256	102	172	258	176	
Of tin-tungsten concentrate	683	427	329	443	430	
Total	939	529	501	701	606	
Metal: Refined	309	110	171	286	157	
Tungsten, mine output, W content:						
Of tungsten concentrate	25	14	8	13	7	
Of tin-tungsten concentrate	468	293	225	304	270	
Total	493	307	233	317	277	
Zinc, mine output, Zn content	2,561	1,600	1,400	3,462	2,766	
<b>INDUSTRIAL MINERALS</b>						
Barite	17,243	12,678	r 11,278	r 9,468	9,000	
Cement, hydraulic	389,605	348,981	394,000	330,115	435,189	
Clays:						
Ball clay	218	247	203	e 100	200	
Bentonite	297	418	711	416	600	
Fire Clay	2,193	3,473	3,150	p 1,404	2,540	
Industrial white clay		600		779		
Feldspar	5,260	4,938	4,257	2,476	2,500	
Graphite				45	36	
Gypsum	22,895	31,716	31,534	32,952	30,000	
Nitrogen: N content of fertilizer	117,501	112,178	120,000	125,000	130,000	
Precious and semiprecious stones: Jade kilograms	98,623	131,777	660,200	r 242,200	101,600	
Salt, all types thousand tons	257	246	262	r_	260	
Stone:						
Dolomite	4,612	938	1,930	3,980	2,000	
Limestone, crushed and broken thousand tons	1,321	1,118	1,219	r 1,320	1,860	
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal, lignite	39,344	30,258	37,594	30,815	56,690	
Gas, natural:						
Gross million cubic meters	1,188	1,108	1,133	1,034	950	
Marketed do	1,140	1,064	1,088	993	900	
Petroleum:						
Crude (gross wellhead) thousand 42-gallon barrels	6,200	4,800	5,600	4,745	5,700	
Refinery products do	3,849	3,137	3,287	3,200	3,800	

\*Estimated. P Preliminary. r Revised.

<sup>1</sup>Tables includes data available through Dec 22, 1992.

<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: 1987-57,847; 1988-59,768; 1989-60,229; 1990-49,670; 1991-41,560;

**TABLE 2**  
**BURMA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1991**

(Thousand metric tons unless otherwise specified)				
Commodity		Major operating comp	Location of main facilities	Annual capacity <sup>§</sup>
Cement		Ceramic Industries Corp.	Kyangin, southern outskirts of Mandalay	240
Do		China Hsin Cement Corp.	Pa-an, 160 km east of Rangoon (under repair)	240
Do		do.	Thayetmyo, 300 km north-northeast of Rangoon Irrawaddy River	200
Copper, in concentrate		Mining Enterprise No. 1	Monywa	12
Fertiliser, N content		Petrochemical Industries Corp.	Kyaw Zwa, 230 km north-northwest of Rangoon	91
Do		do.	Pagan, south Yenangyaung	31
Do		do.	Sale, 190 km southwest of Mandalay	31
Iron		Mining Enterprise No. 3	Anisakan, 15 km from Maymyo, 45 km east of Mandalay	40
Steel		do.	do	35
Lead, silver, and zinc ore		Mining Enterprise No. 1	Bawdwin	390
Lead and silver metal:				
Lead		do	do	10
Silver kilograms		do.	do	122,000
Petroleum, refined		Petrochemical Industries Corp.	Mann	25,000
Do		do.	Syriam, across river, east of Rangoon	26,000
Tin:				
Concentrate		Mining Enterprise No. 2	Heinda	1
Metal		do.	Syriam, across river, east of Rangoon	1
Tin and tungsten concentrate:				
Tin		do.	Heinze Basin	0.6
Do		do.	Tavoy	1
Do		do.	Tanasserin Division coastline (five miles under development)	0.9
Tungsten		do.	Heinze Basin	NA
Do		do.	Tavoy	1
Do		do.	Tanasserin Division coastline (five miles under development)	NA
Tungsten and tin concentrate:				
Tungsten		do.	Mawchi	0.2
Tin		do.	do.	NA

**TABLE 3**  
**BURMA: RESERVES OF MAJOR MINERAL COMMODITIES FOR 1991**

(Thousand metric tons unless otherwise specified)		
Commodity		Reserves
Copper		20,000
Lead, in ore		300
Lignite		30,000
Nickel, in ore		22,000
Natural gas million cubic meters		267,200
Petroleum, crude thousand barrels		51,300
Silver, in ore kilograms		750
Tin, in ore		20
Zinc, in ore		500