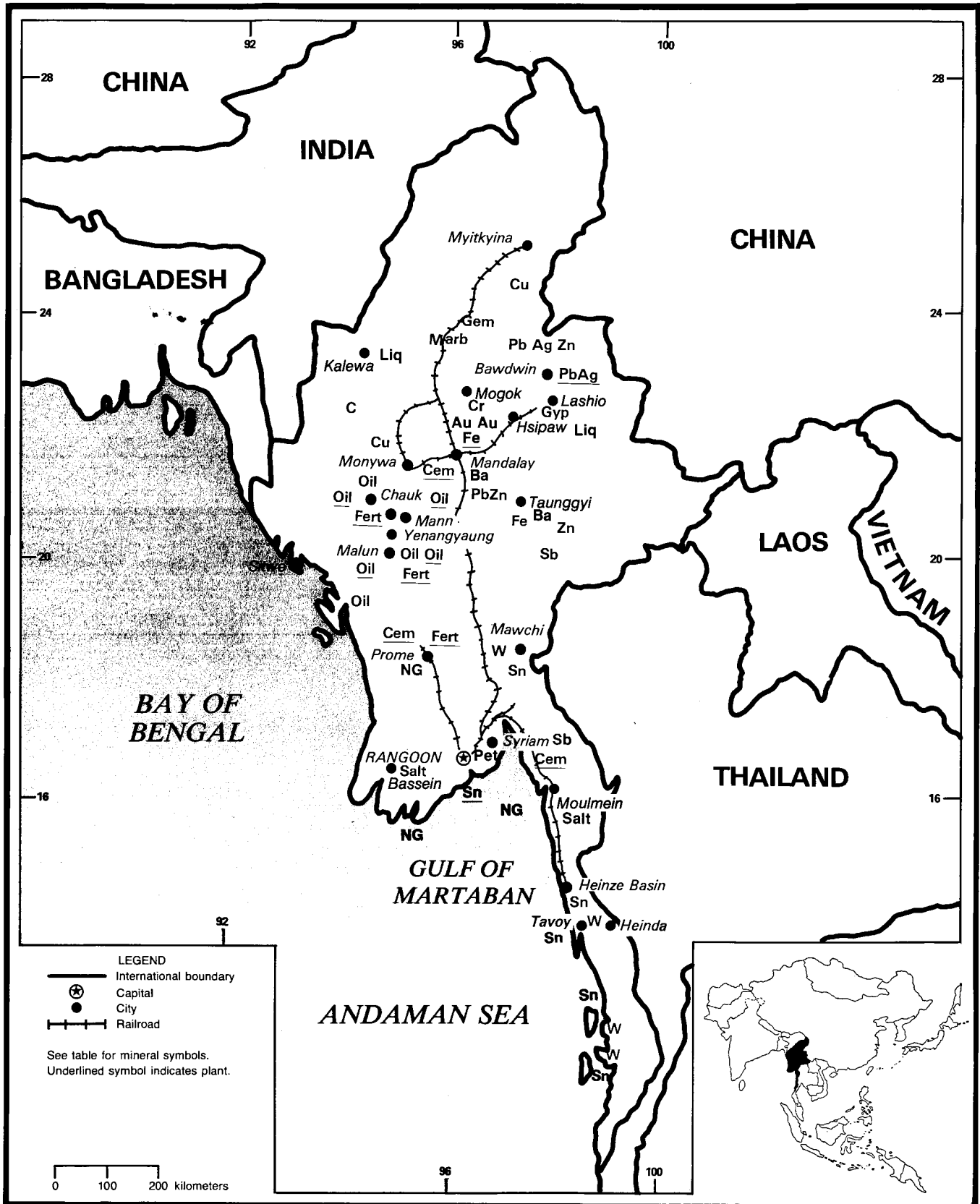


BURMA

AREA 678,600 km²

POPULATION 40 million



BURMA

By David B. Doan

Amidst growing political and social turmoil in many parts of the country, Burma's various mineral industries shrank, weakened or, in some cases, even disappeared as investment capital, technical expertise, equipment replacement, and labor availability all became increasingly scarce.

After years of self-imposed isolation from the mainstream of international investment, development, and trade, Burma's centrally planned economy unraveled to the point of crisis in 1987 when the Government repudiated and demonetized all banknotes over 15 kyat, nominally about \$2.34. The real or black-market rate was about \$0.30 to \$0.35, however, and the citizens of Burma found their savings destroyed.

This was the final event in General Ne Win's "Burmese Way To Socialism," begun in 1962, which turned a comparatively rich nation into one of the world's poorest. Amidst intense civil unrest and brutal suppression of demonstrations, Ne Win stepped down in July 1988. By September of that year, after chaos and bloodshed, General Saw Maung emerged as the leader of a military junta that established itself as the Government of Burma.

With an economy in shambles, a 30% inflation rate, a foreign debt of \$5.3 billion, and a debt-service ratio of nearly 100%, the various ethnic areas such as the Shan State¹ of eastern Burma and the Kachin State of northern Burma took issue with the junta's attempts to govern and began to behave independently. Karen rebels, for example, announced the prohibition of mining or logging by the Government in Rangoon or its contractors in Karen territory. A provisional alliance of several ethnic and territorial groups has joined forces, such as they are, to resist the Rangoon junta.

Meanwhile the Government, after an-

nouncing that democratic elections were to be held in May 1990, had not only detained and imprisoned prominent opposition leaders and supporters, but so proscribed the conditions of the election as to probably throw the results into limbo.

The single factor for potential redemption of the country was finally invoked by the junta in 1989, more or less as a last-ditch attempt to retain power by abruptly abandoning its isolationist policies. With little or no idea as to how business actually works, the leaders of the junta were reported as believing Burma to be rich on the basis of its natural resources. This belief was without regard to the fact that in the ground such resources produce no wealth, no capital flow, and no prosperity.²

GOVERNMENT POLICIES AND PROGRAMS

In the light of the conspicuous failure of previous isolationist and statist policies, the Government decided to invite foreign capital, technology, and expertise to come to Burma and develop its mineral resources, both on-shore and offshore. The new foreign-investment law is worded to permit enterprises with between 35% and 100% foreign ownership, income-tax holidays of at least 3 years, accelerated depreciation, relief from customs duties and other internal taxes, credit foreign-country research and development expenses, and the repatriation of profits in hard currency.

As a practical matter, foreign investments were to be approved by the new Burmese Foreign Investment Commission, which was given wide latitude in arbitrating questions and disputes and extending discretionary benefits. Many operational, technical, and legal details

were not yet addressed by the new law, but it was a major step in the direction of a market economy and a business environment that the other nations of the world could understand.³

PRODUCTION

Over the longer term, Burma's production of mineral commodities has declined to a point at which, in 1988, it was believed to have reached between 10% and 20% of pre-World War II output. In spite of adequate mineral reserves and plentiful labor, the problem involved overall deterioration of the country's infrastructure and facilities required to mine, process, refine, and transport mineral products. Lack of up-to-date technology, a shortage of fuels, and an increasing problem of foreign exchange have progressively crippled Burma's mineral industry. A point was reached at which it was likely that final collapse could be avoided only by abandoning its characteristic xenophobia and opening the country to foreign capital, technology, and exploration in the form of joint venturing with selected non-Burmese companies or other entities.

TRADE

Notwithstanding the fact that trade data concerning Burma have traditionally been elusive, they are virtually nonexistent for mineral commodities in 1989. For years Burma exported crude oil and varying quantities of refinery products. In 1988, with crude production at less than one-half of internal demand, no petroleum or refinery products were sold outside the country. Normally Burma has been a significant

TABLE 1
BURMA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	1985	1986	1987	1988 ^p	1989 ^e
METALS					
Chromium: Chromite, gross weight	—	—	1,000	5,000	5,000
Copper:					
Mine output, Cu content	16,700	11,368	17,312	13,808	5,000
Matte, gross weight	173	144	234	^e 200	100
Iron and steel: Pig iron	—	2,669	—	—	—
Lead:					
Mine output, Pb content	21,935	18,156	27,132	16,728	12,000
Metal:					
Refined	9,585	5,359	3,985	4,402	3,500
Antimonial lead (18% to 20% Sb)	^e 300	299	305	153	100
Nickel:					
Mine output, Ni content ^c	20	20	20	26	25
Speiss, gross weight	^r 54	^r 47	50	104	100
Silver, mine output kilograms	<u>17,667</u>	<u>16,392</u>	<u>26,096</u>	<u>9,207</u>	<u>7,500</u>
Tin, mine output, Sn content:					
Of tin concentrate	622	600	256	102	80
Of tin-tungsten concentrate	1,129	895	683	427	320
Total	<u>1,751</u>	<u>1,495</u>	<u>939</u>	<u>529</u>	<u>400</u>
Metal: Refined	<u>388</u>	<u>322</u>	<u>649</u>	<u>300</u>	<u>300</u>
Tungsten, mine output, W content:					
Of tungsten concentrate	171	102	25	14	10
Of tin-tungsten concentrate	774	613	468	293	200
Total	<u>945</u>	<u>715</u>	<u>493</u>	<u>307</u>	<u>300</u>
Zinc, mine output, Zn content	4,353	4,643	2,561	2,743	2,000
INDUSTRIAL MINERALS					
Barite ³	8,100	8,149	17,273	13,000	20,000
Cement, hydraulic	477,000	433,811	389,605	348,981	300,000
Clays: ³					
Ball clay	110	496	203	203	150
Bentonite	710	851	406	508	400
Fire clay ⁴	1,370	2,040	1,422	2,845	1,500
Industrial white clay	610	203	610	610	500
Feldspar ³	2,446	2,861	1,916	2,626	2,500
Graphite ³	234	722	—	—	—
Gypsum ³	38,594	38,889	23,135	31,675	32,000
Nitrogen: N content of ammonia ⁵	125,795	133,130	117,501	112,178	120,000
Precious and semiprecious stones:					
Jadeite ³ kilograms	43,145	12,804	13,529	^e 12,000	12,000
Salt ⁶ thousand tons	320	321	341	249	250
Stone: ³					
Dolomite	2,383	5,253	5,952	4,403	4,000
Limestone, crushed and broken thousand tons	1,541	1,329	1,411	785	500
Talc and related materials: Soapstone ³	128	56	22	25	20
MINERAL FUELS AND RELATED MATERIALS					
Coal, lignite	43,000	43,848	45,700	32,514	35,000

See footnotes at end of table.

TABLE 1—Continued
BURMA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	1985	1986	1987	1988 ^p	1989 ^c
MINERAL FUELS AND RELATED MATERIALS—Continued					
Gas, natural:					
Gross ^c million cubic meters	963	1,133	⁷ 1,190	^r 907	1,034
Marketed ³ do.	934	1,085	^c 1,133	^c 873	995
Petroleum:					
Crude (gross wellhead) ³ thousand 42-gallon barrels	10,253	10,103	6,351	4,612	4,300
Refinery products ^{c 3} do.	8,000	7,500	5,800	⁷ 4,305	5,000

^c Estimated. ^p Preliminary. ^r Revised.

¹ Table includes data available through May 3, 1990.

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

³ Data are for fiscal years beginning Apr. 1 of that stated.

⁴ Includes fireclay powder.

⁵ Computed at 46% of reported fertilizer production.

⁶ Brine salt production (in metric tons) as reported by the Burmese Government was as follows: 1985—44,508; 1986—52,084; 1987—63,700; 1988—66,460; and 1989—65,000 (estimated).

⁷ Reported figure.

producer and exporter of gem stones, tin, and tungsten, but it is probable that in 1989 most of the traffic in gem stones and jade was by smuggling them out of the country and, thus, without benefit to the Government. By this means, insurgent groups have raised capital to finance weapons and operations against the central Government. Tin, likewise, was believed to have been smuggled into Thailand and other neighboring countries. Otherwise, it is known from Japanese sources that the latter country was able to import 10,477 tons of chromite, worth approximately \$1.99 million, from Burma during the year.

Critically short of foreign-exchange credits, Burma exported what it could, but its trade situation had declined from previous years. In 1988, the total value of mineral commodities exported was estimated at about \$20 million. In 1989, this value was believed to have been significantly less.⁴

STRUCTURE OF THE MINERAL INDUSTRY

The Government controls all mineral exploration, extraction, regulation, and planning through the Ministry of Mines, which includes six enterprises and two departments, all headquartered in Rangoon. Specifically, as listed by the Gov-

ernment, they are Mining Enterprise No. 1 (ME1)—lead, zinc, silver, copper; Mining Enterprise No. 2 (ME2)—tin, tungsten, gold; Mining Enterprise No. 3 (ME3)—iron, steel, coal, nickel, industrial minerals; Myanma Gems Enterprise—precious and semiprecious gem stones, jade; Myanma Salt and Marine Enterprise—salt, potash; Myanma Pearl Enterprise—pearls; Department of Geological Survey & Exploration (DGSE); and Department of Planning & Inspectorate—planning, mine survey, licensing.

Each of the various enterprises is responsible for the development of its respective minerals throughout Burma. Each receives a yearly operating budget from the central Government, and all revenues from production revert to the latter. Individual enterprises have some latitude in administration of their own operations, but the central Government sets policy and authorizes major decisions such as the approval of foreign participation and joint-venture partners.

COMMODITY REVIEW

Metals

Antimony.—Although Burma has several significant deposits of antimony, the largest mine is controlled by insurgents in the Thabyu locality south

of Moulmein. All production was diverted to Thailand, and production data were not available. The existing (1988) Government had built a small antimony concentrating plant at Kalaw, near Taunggyi, for treating ore received from various small-scale workings in the general area. Ore grade in these deposits runs about 20% to 25% antimony sulfide, Sb₂S₃.⁵

Chromite.—During exploration for nickel, a foreign (West German) team discovered a small chromite deposit at Dagaung, just north of Mogok.⁶ Production was roughly 6,000 tons in 1988 and was expected to continue at that volume for the ensuing 2 years, at least. Grading 48% Cr₂O₃ with a chromium-iron ratio of 1:3 and sized between 1 and 6 inches, the entire output was exported to Japan.

Copper.—Burma's only copper mine and concentration plant, built with Yugoslavian assistance in the Monywa District in the 1980's, has continually produced at a rate significantly below capacity. It was intended to process 8,000 tons per day of ore to yield 200 tons per day of concentrates, equal to 2.4 million tons per year of ore and 60,000 metric tons per year (mt/yr) of concentrates. Actual production for the 3-year period from 1985 to 1986 through 1987-88 approximated 1.42 million tons per year of ore to yield about

TABLE 2
BURMA: STRUCTURE OF THE MINERAL INDUSTRY

(Thousand metric tons per year unless otherwise specified)

Commodity	Major operating companies (ownership)	Location of main facilities	Capacity
Cement	Ceramic Industries Corp. China Hsin Cement Corp. (Government, 100%)	Kyangin, southern outskirts of Mandalay	240.
Do.	do.	Pa-an, 160 kilometers east of Rangoon (under repair)	240.
Do.	do.	Thayetmyo, 300 kilometers north- northeast of Rangoon on Irrawaddy River	200.
Copper, in concentrate	Mining Enterprise No. 1 (Government, 100%)	Monywa	12.
Fertilizer, N content	Petrochemical Industries Corp. (Government, 100%)	Kyaw Zwa, 230 kilometers north- northwest of Rangoon	91.
Do.	do.	Pagan, south of Yenangyuang	31.
Do.	do.	Sale, 190 kilometers southwest of Mandalay	31.
Iron and steel	Mining Enterprise No. 3 (Government, 100%)	Anisakan, 15 kilometers from Maymyo, 45 kilometers east of Mandalay	40.
Lead, silver, and zinc ore	Mining Enterprise No. 1 (Government, 100%)	Bawdwin	390.
Lead and silver metal	do.	do.	10 lead.
Do.	do.	do.	121,775 ^{e 1} silver.
Petroleum, refined	Petrochemical Industries Corp. (Government, 100%)	Mann	225,000. ²
Do.	do.	Syriam, across river east of Rangoon	226,000. ²
Tin	Mining Enterprise No. 2 (Government, 100%)	Heinda	1 concentrate.
Do.	do.	Syriam, across river east of Rangoon	1 metal.
Tin and tungsten concentrate	do.	Heinze Basin	0.6 tin.
Do.	do.	Tavoy	1 tin.
Do.	do.	Tenasserin Division coastline (5 mines under development)	0.9 tin.
Do.	do.	Heinze Basin	NA (tungsten).
Do.	do.	Tavoy	1 tungsten.
Do.	do.	Tenasserin Division coastline (5 mines under development)	NA (tungsten).
Tungsten and tin concentrate	do.	Mawchi	0.2 tungsten.
Do.	do.	do.	NA (tin).

^e Estimated. NA Not available.

¹ Kilograms.

² Barrels per day.

40,000 mt/yr of copper concentrates. Preliminary information for the year 1988-89 shows that although ore production increased to 1.75 million metric tons (MMmt), the resulting concentrates decreased to about 24,700 tons. It was not known if the ore quality diminished, problems developed in the concentration process, or whether lack of availability of skilled labor played a role. Normally the concentrate specifications were as follows: copper 19% to 22%, sulfur 40.6%, iron 32%, water 6% to 8%, silver 23.4 grams per dry metric ton, and gold 0.9 to

2.2 grams per dry metric ton. Reserves at Monywa were projected at 130 MMmt grading 0.75% to 0.78% copper.

About 5 kilometers (km) from the Monywa Mine a second reserve, estimated at 160 MMmt grading 0.66% copper, was identified at Letpadaung, 80 km west of Mandalay. In return for rights to handle and export the entire production of the Monywa and Letpadaung deposits, the Republic of Korea trading company, Daewoo, agreed to furnish \$20 million in mining, support, and processing equipment. Sup-

port was to include training in a mining, exploration, and technical assistance program aimed at improving the quality and volume of Monywa concentrates as well as the development of the Letpadaung site. The district is supported by a main rail line to Mandalay and Rangoon.⁷

Gold.—Although widely distributed deposits of gold, mostly placer, have been known in Burma virtually throughout historical times, exploitation has taken the form of small oper-

ations mainly stimulated by the need for gold leaf in temples or pagodas as distinguished from monetization requirements. In the past few years, official interest has grown to a point at which efforts were planned and undertaken for systematic development, particularly of "hard-rock" or lode deposits requiring organized exploration and extraction. With an eye toward gold exports and foreign-exchange credits, the Government initiated four separate projects aimed at major production. After a feasibility study assisted by Australia, development was begun of the Kyaukpahtoe gold mine in Sagaing Division with technical help from Yugoslavia. With a projected startup of actual extraction in March 1990, the Government aimed at production of 2 mt/yr year of gold from Kyaukpahtoe alone.

Three other gold pilot projects were offered to foreign coventurers. Two involved lode mineralization at Phayaung Taung deposit in Patheingyi Township, about 35 km north-northeast of Mandalay, and Thayet Khone deposit in Pyinmana Township, about 40 km northwest of Mandalay. Elsewhere, in Pegu Division at Shwegyin (location uncertain but thought to be less than 160 km north-northwest of Rangoon), a placer prospect was offered. Several foreign companies expressed interest in joint-venture or production-sharing arrangements. Many other prospects, perhaps as many as 300, were known along a geological zone trending northward through Sagaing Division into North Burma. Although only a few prospects were being worked, the Government had 2,000 technical personnel involved in gold exploration. Gold production in 1988-89 was reported at 124 kilograms, up sixfold over that of the previous year and presumed to be headed even higher.⁸

Iron and Steel.—The lack of coking coal had discouraged smelting of ore from Burma's extensive iron deposits until 1981, when direct-reduced iron (DRI) was invoked and a 20,000-mt/yr sponge-iron plant was constructed at Anisakan, a few km east of Mandalay. By 1983, the capacity was expanded to 40,000 mt/yr. The DRI furnaces produced sponge that was separated magnetically and then fed to two electric arc furnaces for production of either pig iron or steel. By continuous casting,

the Anisakan plant could produce 30,000 mt/yr of steel billets for the Ywama rolling mill and 5,000 mt/yr of steel balls for grinding copper and lead-zinc ores. The Anisakan plant also had a 10-ton rolling mill capable of producing up to 12.5-millimeter reinforcing bars at 30,000-mt/yr capacity.

Since 1957, the Ywama mill, near Rangoon, processed World War II steel scrap. Having both melting and rolling facilities, Ywama switched to the consumption of imported steel billets when the supply of scrap ran out. In the early 1980's, Ywama began consuming domestic billets from the Anisakan works.

Total capacity for steel production was thus 30,000 mt/yr of billets and 15,000 mt/yr of scrap melting. Total rolling mill capacity was 80,000 mt/yr. Although Burmese officials claimed operations were at 80% of capacity, Government statistics showed only 10,000 tons of billets and 2,000 tons of grinding balls produced for the year 1988. Problems included transportation of coal and, increasingly, a lack of foreign exchange for purchase of the 15% (or so) of consumables required from outside the country. In that demand for steel was at least twice the current production, construction in general was severely hampered.⁹

Lead, Zinc, and Silver.—Before World War II, the lead-silver deposits of Bawdwin and adjacent Namtu, in the northern part of the Shan State, were considered the richest in the world. Together with less extensive zinc deposits, these ores have enabled an open pit mining operation at Bawdwin for the past 80 years. Nationalization from British interests in 1965 put everything in the hands of the Burmese.

A concentrator and lead smelter were built at nearby Namtu during the 1930's that in 1989 were not much changed from their original configuration. A concentrator of comparatively modern design was built at Bawdwin in 1981, but with no process-control equipment. The lack of such equipment has led to a variety of metallurgical problems in treating the highly oxidized ores. Australian Government help was forthcoming for the installation of in-stream analyzers and other equipment as a step toward increasing recovery rates. However, a plan by the Burmese Government to double the

capacity of the concentrator would have required technical and financial support that was not available. A lack of spare parts has impaired Namtu and Bawdwin production to such a degree that it was reported to be 10% of pre-World War II output and about 60% of present capacity of 10,000 tons of concentrates per year. Although the Namtu and Bawdwin operations each employs about 3,000 workers, those that left were not being replaced so as to avoid layoffs. Despite the large work forces, high fuel costs, and rising costs of other local inputs to the overall mining and concentrating efforts, one Burmese official described the operation as not profitable but useful in creating foreign-exchange credits. Even the exports were essentially unprofitable, however, because of the overvalued Burmese exchange rate. A move toward increased open pit mining was invoked as a cost-reduction measure.

At the Namtu underground mine, the reserves were stipulated at 3.5 MMmt grading 7.5% lead, 3.5% zinc, and approximately 93 to 124 grams per metric ton (g/mt) of silver. The open pit mine at Bawdwin had an estimated 10 MMmt grading 5.1% lead, 4% zinc, and 93 g/mt of silver. Further reserves comprised roughly 2.6 MMmt of slag extracted since 1911 from the Bawdwin blast furnace and containing 17.2% zinc, 2.5% lead, and 591 g/mt of silver. Tailings dumped along a riverbank were estimated to contain 3% to 4% lead, 2% to 3% zinc, and 85 g/mt of silver.

The Government sought foreign participation in the recovery of these metals but, for reasons of health, rejected a German suggestion to use cyanide leaching. Other approaches were being entertained.¹⁰

Nickel.—Although Burma has been a very small producer of nickel, on the order of 100 mt/yr or less, two new deposits were discovered that may signal improvement provided the development capability could be organized, particularly in terms of capital. One of the newly found deposits was at Dag-aungtaung, of uncertain location but probably 50 km or less north of Mogok, comprising 40 MMmt grading approximately 2% nickel in lateritic material. The other deposit was found near Kalewa with an estimated 80 MMmt grading 1.2% to 2% nickel combined with sili-

cates. Although this second deposit was in a remote area, it was known that coal for power and limestone for flux to produce ferronickel occur in the vicinity. The Government asked the United Nations Development Program to study the feasibility of extraction and processing of the Kalewa deposit and sought foreign participation in project development.¹¹

Tin.—Further to the Government's intention to seek interest from foreign entities in tin extraction, one Malaysian and three Thai companies met a deadline in September 1989 for consideration as production-sharing contractors to the State's ME2 to work tin deposits in certain offshore areas. Tentatively, the Government's contract called for a 3-month geological exploration program culminating in a technical report by the contractor with the decision as to whether to proceed to a 3-year development and production program. Tin concentrates recovered from any programs that were to go forward would be shared between the contractor (60%) and ME2 (40%) after deduction of a 10% royalty. During the life of the contract, the contractor would be exempt from most ordinary taxes and duties payable to Burma.

The ME2 managing director also indicated official interest in opening inland areas to tin mining by foreign companies through proposals by the latter rather than formal open bidding. Foreign investors would be required to have a Burmese partner, but variously structured joint ventures were open to negotiation.¹²

Industrial Minerals

Barite.—In spite of official statements that barite production amounted to 60,000 mt/yr at some time in the past, recent years have seen only a small proportion of that great an output. Generally ranging from 8,100 to about 17,300 mt/yr, such lowered production may reflect a decline in demand of barite for oil-drilling mud as well as social disruption in the country itself. In any case, 1989 production, at midyear, was thought to be at approximately the 20,000-mt/yr level from workings near Maymyo and Kyaukse, outside of the town of Mandalay, and Taunggyi, 150 km to the southeast, all in central Burma. The renewed interest

in oil exploration in Burma might be expected to increase barite demand and, hence, production.

Cement and Gypsum.—Burma's three plants have a combined capacity of 4,000 tons per day of hydraulic cement. Gypsum requirements for these plants total at least 30,000 and as much as 40,000 mt/yr; production at midyear was thought to be at roughly the 32,000-mt/yr level, all of this from the mine at Hsipaw, 160 km northeast of Mandalay.¹³

Mineral Fuels

Lignite.—Coal deposits thus far discovered in Burma are of relatively low thermal value in the subbituminous or lignite category. In northwest Burma, the Kalewa Mine, including 1- to 3-meter (m) seams dipping steeply at 45°, was thought to include reserves of about 87 MMmt. This underground mine was producing at the rate of only 20,000 mt/yr with 500 workers, but in September of 1989 its operations were described as stagnant. Its noncoking coal had been used for power generation, tobacco drying, and for the Bawdwin lead-zinc smelter. The country's other mine is at Namma, 50 km south of Lashio, where its flat-lying seams are amenable to opencast mining. Production has been less than 40,000 mt/yr although utilizing 50 workers and mechanized equipment. Namma lignite is used in the Anisakan iron and steel plant, but reserves have dwindled to about 1.8 MMmt. Officials believe that exploration will locate other coals in the general area.¹⁴

Petroleum, Crude.—By early 1989, Burma's petroleum industry had nearly disintegrated after the collapse of agreements with the Japanese National Oil Co. to, among other projects, bring natural gas on-stream from the Bay of Bengal. The 1988 September Coup likewise discouraged pending agreements with China for exploration in the Irrawaddy Valley, discussions with Malaysia and Indonesia for other development programs, and both United Nations and Asian Development Bank projects for enhanced recovery in central Burma's Mann and Htaukshabin fields. After months of prodemocracy strikes and a lack of crude feedstock for operation, the Mann oil refinery

was able to resume production. But with a domestic demand of 35,000 barrels per day of crude and production of probably less than 15,000 barrels per day, the country was far from satisfying its needs.¹⁵

Recognizing its position, the country abruptly departed from years of tradition and decided to negotiate with foreign companies interested in exploration onshore, an area previously denied to any but domestic and Government-operated programs. Nearly 40 foreign companies responded to Burma's announcement that rather than issue tenders it would entertain proposals for exploration drilling that specified location and amount of capital investment as well as suggested coventure agreements.¹⁶

By the end of the year, agreements had been signed by Myanma (Burma) Oil and Gas Enterprise (MOGE) with (1) Yu Kong Ltd. of the Republic of Korea to explore and produce petroleum in onshore block C in the Chindwin basin about 970 km north of Rangoon, (2) Dutch Shell Exploration BV for a joint venture in onshore block G (location not specified), (3) BHP of Australia in onshore block H (location not specified), (4) Amoco in onshore block B of the northern Chindwin basin, and (5) Britain's Clyde and Croft for onshore block 1 in the Irrawaddy Valley. Other signed agreements involved Japan's Idemitsu, Petro-Canada, and Unocal. Agreement was expected with Kirkland of Britain, thus totaling nine by December.¹⁷ The chief source of exploration interest is a major 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.

Evidently encouraged by the response to onshore concessions, MOGE then invited tenders for 37 offshore concession areas in October to discover that several companies were interested, particularly those already having rigs in the Gulf of Thailand. The offshore blocks virtually lined the entire coastline of Burma.¹⁸

Natural Gas.—Despite the 1988 decrease in natural gas production to roughly 87.7 million cubic feet per day, it was anticipated that 1989 production would rise to exceed 100 million cubic feet per day. Prome gasfield, about 225 km north-northwest of Rangoon, has

been the principal producer in Burma, delivering approximately 22.8 million cubic feet per day.¹⁹

Reserves

Data on mineral reserves are from local sources at various times and are not uniformly current. Moreover, some reserves may increase manyfold in the next few years as exploration, assisted by foreign capital and expertise, concentrates on new target areas.

INFRASTRUCTURE

Burma's road network, comprising 3,200 km of hard-surface and 18,000 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 4,300 km of meter-gauge railroad providing 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 the 3,200 km or so of inland waterways maintained for large commercial vessels. These navigable waters are utilized for moving petro-

leum crude to refineries and the resulting refinery products back into the hinterland. Some crude is moved by pipeline, but their present condition is not known.

Major seaports are Rangoon; Bassein, more than 150 km west of Rangoon in the Irrawaddy Delta; and Sitwe, roughly 100 km south of the Bangladesh border. The principal air facilities are at Rangoon; Meiktila in Mandalay State, about 100 km south of the town of Mandalay; and at Namponmau, about 10 km southwest of Myitkyina.

Burma was negotiating with the World Bank for support of infrastructure rehabilitation and upgrading, including a high earth-filled dam, canals, and irrigation distribution systems. Significantly, the plans involved inland-waterway improvement, upgrading of locomotives and railway cars, improved maintenance of trucks and buses, and also water supply, sewerage, and road facilities in Rangoon and as many as 40 other towns. Projects were being reappraised in October 1989 by the Bank in view of the current country situation.²⁰

OUTLOOK

Centrally planned economies do not work very well because the decision-making is concentrated in the hands of the few rather than allowed to be exercised by the many, the latter qualified by the fact that they will bet their own capital on the success of a venture. The Burmese Government has no previous experience and no record of accomplishment in dealing with foreign investors, which injects a factor of uncertainty into negotiations.

Foreign capital investment in mineral exploration and development entails major costs and long payback periods, requiring a stable and predictable economic and political environment. This situation has not yet been obtained in Burma, and there is the categorical question of how long any government will or can endure. Unrealistic exchange rates combined with an inconvertible currency do not attract even short-term projects. Arbitration procedures suitable to independent capital sources are yet to be promulgated.

Otherwise, the Burmese as a nation are poor, and the present Government is essentially "broke" to put it in colloquial

terms. There are no domestic financial resources, let alone technology and expertise, to develop the resources with which this country has been endowed. The door that has been opened to the world cannot now be closed if Burma is to survive as a viable economy and as a nation. Problems undoubtedly remain, but the first and most important step has been taken. It is not straining the point to predict that this could be one of Asia's richest mineral economies, benefiting from petroleum, coal, base metals, and precious metals, if the means of development can be arranged on mutually agreeable terms.

¹Burma is divided into mutually exclusive States (Shan, Kayah, Kachin, and Kawthule), Districts (Sagaing, Arakan, Magwe, Mandalay, Irrawaddy, Pegu, Tenasserim), and one other, the Chin Special District. States tend to be ethnically distinguished whereas districts are not recognizably so.

²White, H. E. The Junta Struggles to Lift Burma's Economy, *The Asian Wall Street Journal*, June 13, 1989, pp. 1 and 14.

³U.S. Embassy, Rangoon, Burma. State Dep. Telegram 01564, Mar. 20, 1989, p. 1.

⁴U.S. Embassy, Rangoon, Burma. State Dep. Telegram 05910, Oct. 24, 1989, p. 1.

⁵Page 8 of source cited in footnote 3.

⁶Source cited in footnote 4.

⁷Page 4 of source cited in footnote 3.

⁸Page 5 of source cited in footnote 3.

⁹Page 6 of source cited in footnote 3.

¹⁰Page 3 of source cited in footnote 3.

¹¹Page 6 of source cited in footnote 3.

¹²U.S. Embassy, Rangoon, Burma. State Dep. Telegram 05732, Oct. 13, 1989, p. 1.

¹³Source cited in footnote 4.

¹⁴Source cited in footnote 8.

¹⁵*Petroleum News*, V. 19, No. 11 & 12, Jan./Feb. 1989, p. 22.

¹⁶*The Wall Street Journal*, June 20, 1989, p. A8.

¹⁷Khin Maung Thwin. Foreign Broadcast Information Service, East Asia 89-225, Nov. 24, 1989, p. 32.

¹⁸U.S. Embassy, Rangoon, Burma. State Dep. Telegram 05954, Oct. 25, 1989, p. 1.

¹⁹World Oil. International Highlights, Burma. Aug. 1989, p. 123.

²⁰World Bank. Monthly Operational Summary. Oct. 16, 1989, p. 53.

OTHER SOURCES OF INFORMATION

Agency

Ministry of Mines
Kanbe Road, Yankin
Rangoon 1108, Burma

Publications

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

TABLE 3

BURMA: ESTIMATED MAJOR MINERAL RESERVES

(Thousand metric tons unless otherwise noted)

Copper, in concentrate		20,000
Gem stones: ¹		
Jadeite	kilograms	NA
Lead, in ore		300
Lignite		30,000
Nickel, in ore		22,000
Petroleum, crude		
	thousand barrels	51,300
Petroleum, natural gas		
	million cubic meters	267,215
Silver, in ore	kilograms	750
Tin, in ore		20
Tungsten, in ore		NA
Zinc, in ore		500

NA Not available.

¹Other gem stones include amethyst, aquamarine, citrine, peridot, ruby, sapphire, spinel, and zircon. Meaningful reserve figures are not available for these stones.