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**THE MINERAL INDUSTRIES OF**

**SOUTHEAST ASIA**

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centrating on developing deposits that were either all natural gas or have the highest proportion of gas to oil. The new Gannet-1 production, which has condensate but no crude, may help keep the gas-to-crude-oil proportion at a satisfactory level. Also, the Elf discovery could eventually help increase the gas-to-oil proportion.

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## BURMA<sup>5</sup>

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The Government's main objectives for the mining sector during the fifth 5-year plan were as follows: to expand mineral surveys and prospecting to increase production of crude oil, natural gas, and major raw materials for the development of heavy industry; to increase production and quality of concentrates that have the highest potential on the export market; to carry out research for the extraction of new minerals; and to emphasize those projects with the potential for the highest rate of return on investment. In addition, various incentives and amenities were to be provided workers with a view to enhancing mine productivity.<sup>6</sup> Toward the above goal, the Government of Burma's investment in the mining sector during fiscal year (FY) 1987<sup>7</sup> was \$82 million<sup>8</sup> or 6.7% of total public investment, substantially exceeding the originally planned allotment.

Approximately 30 minerals or mineral-related commodities were produced during 1988. The most important were barite, cement, copper concentrates, crude oil, gypsum, lead, natural gas, nitrogen fertilizer, silver, steel, and concentrates of tin, tungsten, and zinc. In value, crude oil was by far the most important followed by natural gas, copper concentrates, nitrogen fertilizer, and tin metal and concentrates. The longstanding policy of not importing crude oil was reversed during 1988. The shortage of foreign exchange was surpassed by the economic problems caused by the gradual but continued decline in domestic

crude oil production. None of the minerals was produced in large enough quantity to be a major factor in the world market. The usually important tin and tungsten output dropped after midyear, probably losing several places in the world output standing.

The mining industry employed about 91,000 (revised) persons during FY 1987. About 14,000 were employed by the cooperative and private sectors, the remaining were employed in State-owned mining operations. The mining sector accounted for 4.4% of total Government employees, while less than 0.1% of privately employed persons were in the mining category. Mining accounted for 1.5% of the value of the net output of goods and services at current prices. Net output value of the mining sector at constant 1969 prices was \$67.7 million during FY 1987, excluding mineral fuels. This represented a nominal decline from FY 1986 levels.

Considering the political and social setting of FY 1988, the output value of the mining sector was believed to have declined substantially by yearend. The already hard-pressed economy was handed a severe setback by political turmoil and labor unrest. By September, the 25-year reign of the Chairman of the Burma Socialist Programme Party had come to an end and a military government, which had seized control, declared a "Union of Burma" dropping the words "Socialist Republic" from the country's name. In an attempt to break its international isolation and encourage badly needed foreign exchange, the new Government announced it was abandoning old rigid economic policies and welcomed foreign investment. In a statement on October 31, the Trade Minister abrogated the old trade laws by saying that a market-oriented economy will be practiced and limited liability companies and joint ventures between local and foreign private firms or with foreign governments will be permitted. Some constraints, however, were announced later. The present State monopolies

TABLE 2

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	1984	1985	1986	1987	1988 <sup>P</sup>
<b>METALS</b>					
<b>Copper:</b>					
Mine output, Cu content	12,000	16,700	11,368	17,312	13,808
Matte, gross weight	173	173	144	234	<sup>e</sup> 200
Iron and steel: Pig iron	7,764	—	2,669	—	—
<b>Lead:</b>					
Mine output, Pb content	21,937	21,935	18,156	27,132	16,728
<b>Metal:</b>					
Refined	6,996	9,585	5,359	3,985	4,402
Antimonial lead (18% to 20% Sb)	254	<sup>e</sup> 300	299	305	153
<b>Nickel:</b>					
Mine output, Ni content <sup>e</sup>	20	20	20	20	26
Speiss, gross weight	80	80	86	<sup>e</sup> 80	104
Silver, mine output                      thousand troy ounces	455	568	527	839	311
<b>Tin, mine output, Sn content:</b>					
Of tin concentrate	745	622	600	256	102
Of tin-tungsten concentrate	1,283	1,129	895	683	427
<b>Total</b>	<b>2,028</b>	<b>1,751</b>	<b>1,495</b>	<b>839</b>	<b>529</b>
Metal: Refined	—	388	322	649	300
<b>Tungsten, mine output, W content:</b>					
Of tungsten concentrate	216	171	102	25	14
Of tin-tungsten concentrate	880	774	613	468	293
<b>Total</b>	<b>1,096</b>	<b>945</b>	<b>715</b>	<b>493</b>	<b>307</b>
Zinc, mine output, Zn content	5,320	4,353	4,643	2,561	2,743
<b>INDUSTRIAL MINERALS</b>					
Barite <sup>3</sup>	9,967	8,100	8,149	17,273	13,000
Cement, hydraulic	311,179	477,000	433,811	389,605	348,981
<b>Clays:<sup>3</sup></b>					
Ball clay	960	110	496	203	203
Bentonite	725	710	851	406	508
Fire clay <sup>4</sup>	1,220	1,370	2,040	1,422	2,845
Industrial white clay	357	610	203	610	610
Feldspar <sup>3</sup>	6,220	2,446	2,861	1,916	2,626
Graphite <sup>3</sup>	234	234	722	—	—
Gypsum <sup>3</sup>	27,580	38,594	38,889	23,135	31,675
Nitrogen: N content of ammonia <sup>5</sup>	56,916	125,795	133,130	117,501	<sup>e</sup> 125,000
Precious and semiprecious stones: Jadeite <sup>3</sup> kilograms	90,990	43,145	12,804	13,529	<sup>e</sup> 12,000
Salt <sup>6</sup> thousand tons	280	320	321	341	249
<b>Stone:<sup>3</sup></b>					
Dolomite	1,305	2,383	5,253	5,952	4,403
Limestone, crushed and broken                      thousand tons	1,210	1,541	1,329	1,411	785
Talc and related materials: Soapstone <sup>3</sup>	91	128	56	22	25

See footnotes at end of table.

TABLE 2—Continued

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	1984	1985	1986	1987	1988 <sup>P</sup>
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal, lignite	44,232	43,000	43,848	45,700	32,514
Gas, natural:					
Gross <sup>e</sup> million cubic feet	26,000	34,000	40,000	<sup>7</sup> 42,000	44,000
Marketed <sup>3</sup> do.	24,417	32,962	38,290	<sup>7</sup> 41,284	42,350
Petroleum:					
Crude (gross wellhead) <sup>3</sup> thousand 42-gallon barrels	11,200	10,253	10,103	6,351	4,612
Refinery products <sup>e</sup> do.	8,000	8,000	7,500	5,800	6,000

<sup>e</sup> Estimated. <sup>P</sup> Preliminary. <sup>r</sup> Revised.<sup>1</sup> Table includes data available through June 14, 1989.<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 gem stones 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 fire clay powder.<sup>5</sup> Computed at 46% of reported fertilizer production.<sup>6</sup> Brine salt production as reported by the Burmese Government was as follows: 1984—81,166; 1985—44,508; 1986—52,084; 1987—63,700 (revised); and 1988—66,460.<sup>7</sup> Reported figure.

were to be retained on some of the commodities of most interest to foreign investors including gem stones, natural gas, petroleum, and teak.

During the political upheaval, a number of important industries were closed by strikes and some were reportedly looted of equipment and supplies. The operating petroleum refineries were closed for a time as were some of the oil and natural gas production facilities. By yearend, the status of the mineral sector was far from clear. Very little information was available on industrial operations and mining in particular. Both the press and the Government were heavily preoccupied with the political situation and the worsening economic conditions.

**Production**

Mineral production suffered several setbacks during the year. Petroleum output continued to decline early in the year, and then came almost to a complete halt for several weeks during the height of the political and labor problems. Monthly figures through October reflected a sharp decline in lead, tin, tungsten, and zinc production. No pro-

duction was reported for tin, tungsten, or silver in July and August and only nominal production of mixed tin-tungsten and zinc concentrates during the remainder of the year.

**Trade**

In FY 1987, the major mineral exports were concentrates of copper, tin, tungsten, and zinc; a modest amount of refined copper, lead, silver, and tin; and various colored gem stones. According to a Government publication, the provisional value of mineral and gem stones exports totaled \$35.7 million.<sup>9</sup> The 24th Gem and Pearl Emporium (1987) accounted for \$6.4 million of that total, a decrease of more than \$1 million from the 1986 level. Burma began the export of high-grade chromite during 1988.

**Commodity Review**

**Metals.—Chromite.**—Burma was to begin the export of metallurgical-grade chromite in September with a 5,000-ton shipment to a Japanese company. The shipment was delayed, however, until

January 1989 because of the political turmoil. Ore specification was to be: 48% Cr<sub>2</sub>O<sub>3</sub>, Fe-Cr ratio of 1:3, and size range of 25 to 150 millimeters. The shipment was believed to represent the annual production from a recently opened mine.<sup>10</sup>

**Gold.**—In conjunction with the Burmese Ministry of Mines, the Yugoslavian Invest-Import Co. of Belgrade reportedly began construction of a gold mine near Kyauk Pahtoe (also spelled Chaukpatto) in Kawlin Township 200 kilometers north of Mandalay. Under the contract, the Yugoslav company was to develop a 450,000-ton-per-year open pit, an ore flotation plant, and refining facilities. The \$50 million cost was to be repaid by exports of nonferrous metal concentrates over a 6-year period. Most of the mining, concentration, and electrical equipment will be supplied by Yugoslav companies.<sup>11</sup>

The smelter and refinery, however, was to be designed and constructed by Davy McKee (Stockton) Ltd. under a separate contract with the Invest-Import Co. The plant was to treat 4,500 tons per year of

high-grade gold-bearing pyrite concentrate to produce 3 to 4 tons of refined gold per year.<sup>12</sup>

**Mineral Fuels.**—The production of crude oil has been declining gradually during the last decade from more than 11 million barrels in 1979 to about 6.3 million barrels in 1987. The problem was serious enough to cause a definite hardship on the already strained Burmese economy. By midyear, however, the political disruptions in the Capital and major urban centers began to exacerbate the petroleum supply problem. It was reported over the Burmese radio that the operating oil refineries had closed down, and many of the oilfield workers had also left their jobs. The disturbance in the production routine was likely to extend well beyond the settlement of the political problems. A State-run newspaper, *The Guardian*, stated that machinery, parts, and lubricants reportedly had been looted and sold from the Syriam refinery near Rangoon. Maintenance of industrial equipment has been a serious problem for years in Burma. These reports, if true, could mean that serious delays will be encountered in reestablishing the normal refinery output at Syriam. The Mann refinery reportedly resumed production in late October.

The Government policy had not permitted imports of crude oil for many years. The economic impact of the shortages finally became so severe during FY 1988 that the policy was rescinded and the Petroleum Industries Corp. was permitted to purchase

114,000 tons of crude oil from Australia using funds from an International Development Association loan.<sup>13</sup>

Following years of stability, official prices of petroleum products were raised four times from September through yearend. The Government ration of 26 gallons of gasoline per month, per car, was reduced in October to 16 gallons at more than triple the former price. During the June–December period, black market prices for gasoline went from \$5.30 to over \$12.46 per gallon in the Rangoon area and more than \$18.69 in Mandalay and outlying areas.

In an effort to increase crude oil production, the Asian Development Bank was to provide a technical assistance grant to finance a 7-month study to rehabilitate and further develop two of the major oilfields in Central Burma. It was hoped by the Government that updating present facilities and further development would increase production by 1.5 million barrels per year.<sup>14</sup>

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## CAMBODIA<sup>15</sup>

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Events in Cambodia were dominated by the continuing political and military problems, which have plagued the country for the last two decades. The politically divergent Khmer People's National Liberation Front, National United Front for an Independent, Neutral, Peaceful and Cooperative Cambodia, and the Communist Party of Kampuchea (Khmer Rouge) were nominally united against Vietnamese troops who have