

## THE MINERAL INDUSTRY OF

# BHUTAN

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The Kingdom of Bhutan, a landlocked mountainous country with a land area slightly larger than Switzerland, is situated on the southeast slope of the Himalayas, bordered on the north and east by Tibet in China and on the south and west by the Assam-Bengal Plain in India. More than one-half of Bhutan is covered with forests.

The mineral resources of Bhutan include beryl, coal, copper, dolomite, graphite, gypsum, iron, lead, limestone, marble, mica, pyrite, quartzite, slate, silver, talc, tin, tungsten, and zinc. Currently, dolomite, gypsum, limestone, quartzite, sand and gravel, and slate were being mined for the manufacture of ferrosilicon and microsilica, calcium carbide, cement and construction materials. Small quantities of coal, copper, graphite, iron, and silver have been mined in past years.

Bhutan's mining sector, composed of several small-scale mining firms with leases from the Government for mining mainly industrial minerals, is the smallest sector of the economy. According to Bhutan's Central Statistical Office, the estimated value of the mining industry output in 1994 was \$2.8 million,<sup>2</sup> accounting for 1.1% of Bhutan's gross domestic product, estimated at \$251 million in 1994. The Royal Government of Bhutan (RGOB) recently drafted a Mines and Minerals Management Act. However, Bhutan has no legal provision to grant mineral rights to foreign investors for exploration and development of mineral resources.

Limestone, produced from the Khanku deposit in the Paro district and the Penden deposit in the Samchi district, both in western Bhutan, was mostly used in the manufacture of cement. The cement plant at Gomptu, about 50 kilometers (km) south of Thimphu, the national capital, is owned and operated by Penden Cement Authority Ltd. An expansion program was undertaken in 1994 by Penden Cement to raise its capacity to 800 metric tons per day (mt/d) from 300 mt/d. Limestone produced from the Hauri Khola, Purbia Khola, Kaleshwar, and Mirchang deposits was used in the manufacture of calcium carbide. The 22,000 metric tons per annum (mt/a) calcium carbide plant at Pasakha, near Phunchholing in southern Bhutan, was operated by Bhutan Carbide & Chemicals Ltd. (BCCL), owned 36% by RGOB, 20% by Thimphu-based Tashi Commercial Corp. (TCC), and 44% by public shareholders.

Bhutan Ferro Alloys Ltd. (BFAL) completed construction of its 15,000 mt/a ferroalloy plant using Norway's ELKEM technology at Pasakha, near Phunchholing in southwestern

Bhutan. The \$26 million plant began production of ferrosilicon in 1994.<sup>3</sup> Raw materials were supplied from a quartzite mine in the Samchi region, about 200 km west of the plant site. BFAL is owned 25% by RGOB, 20% each by BCCL and TCC, 12% by Tokyo-based Marubeni Corp., 8% by Japan International Development Organization, and 15% by public shareholders.

According to the latest available information from Bhutan's Central Statistical Office, the country's major exported mineral commodities in 1993 were calcium carbide, cement, and dolomite. Calcium carbide and cement was exported mostly to India, while dolomite was sold principally to Bangladesh. Export earnings from calcium carbide were \$12 million, accounting for 17.6% of total exports, and from cement, \$4 million, or 6.1% of total exports. Export earnings from dolomite were \$180,000. Bhutan's major imported mineral commodities were gasoline and diesel oil, valued at \$5 million, accounting for 24% of total imports in 1993. Bhutan also imported 4,890 mt of salt in 1993 to meet domestic requirements. India was the dominant supplier of these import mineral commodities.

Reserves of most of Bhutan's minerals were unknown, largely owing to the difficulty of access to much of the country because of its extremely mountainous terrain and lack of roads. Systematic exploration and geologic mapping in Bhutan by the Department of Mining and Geology of the RGOB, assisted by the Geological Survey of India, are still at an early stage. Geologic mapping at a scale of 1:50,000 covers only 35% of the country. However, the Himalayas are known to include thick sequences of carbonate rocks and its mineral reserves of dolomite, limestone, and quartzite are considered to be large. Reserves of quartzite recently have been estimated at 5.5 million metric tons (Mmt) in the Samchi mining district of western Bhutan.

Bhutan has 2,165 km of roads, of which 418 km are paved; 1,285 km unpaved gravel; and 462 km unimproved. The country has two airports, but no rail network. Domestic telephone service is very poor and international telephone and telegraph service is linked by land through India. Bhutan's main power source was from its 325-megawatt (MW) Chukha hydroelectric power station on the Wangchu River in southwestern Bhutan. The power station not only provided electricity to central and southern Bhutan, but also sold a substantial part of the output to India. With two additional small powerplants, Bhutan's total installed

capacity was 344 MW in 1994.

In 1994, the RGOB began construction of two mid-sized hydropower stations with financial and technical assistance from Austria and India. The Basachu power station will have a capacity of 61 MW; the first stage of the plant, with a capacity of 22.2 MW will be built in the Sankosh basin and is scheduled for completion in 1997. The 60-MW capacity Kurichu power station having an initial capacity of 45 MW is being built near Mongar in eastern Bhutan, and is scheduled for completion in 1999.

Bhutan's economy is one of the least developed in the world and is largely dependent on foreign financial and technical aid from India, Japan, and international organizations. Cooperation between Bhutan and India in the

power sector is expected to continue, and India will remain a major trade partner. Bhutan's economic development will require upgrading of its infrastructure, such as highway network improvement and expansion, telecommunication modernization, and hydroelectric power generation capacity expansion. Further mineral exploration is a prerequisite to growth in Bhutan's small mining sector.

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<sup>1</sup>Text prepared Mar. 1995.

<sup>2</sup>Where appropriate, values have been converted from Bhutanese ngultrum (Nu) to U.S. dollars at the rate of Nu30.5=US\$1.00 in 1993 and Nu31.4=US\$1.00 in 1994.

<sup>3</sup>Handelsman, S., The Prospects and Requirements for Increasing Private Sector Investments in the Mineral Sector of the Countries of the South Asian Association for Regional Cooperation. Dec. 1994, p. 8.

TABLE 1  
BHUTAN: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

( Metric tons unless otherwise specified)

Commodity 2/	1990	1991	1992	1993	1994
Cement	153,000	153,000	127,000	130,000	140,000
Dolomite	100,000	90,000	90,000	90,000	95,000
Gypsum	22,000	22,000	20,000	20,000	20,000
Limestone	220,000	220,000	190,000	198,000	200,000

1/ Table includes data available through Mar. 17, 1995.

2/ In addition to the commodities listed, crude construction materials, such as sand and gravel and a variety of stone, presumably are produced, but information is inadequate to make reliable estimates of output levels.

