

# THE MINERAL INDUSTRY OF

# BHUTAN

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The mineral resources of Bhutan include beryl, coal, copper, dolomite, graphite, gypsum, iron, lead, limestone, marble, mica, precious stones, pyrite, quartzite, silver, slate, talc, tin, tungsten, and zinc. Among these mineral resources, only coal and a variety of industrial minerals were produced in 1997.

Bhutan's mineral-resources information was sparse, largely because much of the country is extremely mountainous and lacks roads. Systematic exploration and geologic mapping in Bhutan by the Division of Geology and Mines of the Ministry of Trade and Industry, assisted by the Geological Survey of India, were still at an early stage. The Himalayas are known, however, to include thick sequences of carbonate rocks, and mineral reserves of dolomite, limestone, and quartzite are considered to be quite large. According to an estimate by the United Nations (1991), reserves of dolomite and limestone were about 13.4 billion metric tons and 121.2 million metric tons, respectively.

The annual growth of Bhutan's economy had been at about 5% during the first half of 1990's. Bhutan's economy, as measured by the real gross domestic product (GDP), was estimated to have grown by 6% in 1997 owing mainly to increased production of cement, fruits, and hydroelectric power (Far Eastern Economic Review, 1998, p.84). According to the Government, the output of hydroelectric power alone contributed about 8% to Bhutan's GDP. Exports of hydroelectric power, cement, and fruits accounted for 25%, 10%, and 7%, respectively, of total export earnings.

In 1997, the minerals production of Bhutan included coal, dolomite, gypsum, limestone, marble, quartzite, sand and gravel, slate, and talc. (*See table 1.*) For exports, Bhutan also processed some of its industrial minerals into value-added mineral products, such as calcium carbide, cement, and ferrosilicon. Most dolomite, gypsum, and limestone were mined for the manufacture of calcium carbide and cement. Quartzite was mined for the production of ferrosilicon and microsilica. Most of the calcium carbide and cement production was for export, mainly to India, and most of the ferrosilicon production was exported, mainly to India and Japan.

According to the Division of Geology and Mines, most industrial minerals mining was by privately owned companies operating in the southern part of the country. Mining of dolomite was by Chundu Enterprise at Khagrikhola and Pugli and Bhutan Mining Enterprise at Pugli, all in the Samchi District of southwestern Bhutan; by Tashi Commercial Corp. (TCC) at Kalesore and Singye Dolomite Industries at Duarpani in the Samdrup-Mongar and the Shemgang Districts of southeastern Bhutan. Mining of gypsum was by the state-owned Shumar Gypsum at Khothakpa near Pemagatsel in southeastern Bhutan. Mining of marble was by Bhutan Marble and Minerals at Gidakhom in the Thimphu Valley. Mining of slate was by the state-owned Sha Slate Mine at Sha Bhel. Mining of talc was by Penden Cement Authority at Kalapani. Mining of coal was by Penden Drukpa Coal Mines, a joint venture of the Government and

a local private company, at Bangtar, Chenangri, and Deothang in southeastern Bhutan (Togashi, 1995).

Quartzite mining for ferrosilicon production was by Bhutan Ferro Alloys Ltd. (BFAL) at Tintali, Dendup Enterprise at Suktikhola, and Bhutan Stone and Minerals Exporting Co. at Kamji. All quartzite mining was in southeastern Bhutan. BFAL also operated a 18,000-metric-ton-per-year (t/yr) ferrosilicon plant with Norway's Elkem technology at Pasakha, near Phunchholing, about 180 kilometers south of Thimphu, the national capital. The plant began commercial operation in 1995. The plant's products included silica fume (microsilica) and ferrosilicon which contains 75% silicon. BFAL is owned by Tashi Group and local members of the public (55%), Bhutan's Ministry of Trade and Industry (25%), Marubeni Corp. of Japan (12%), and the Japan International Development Organization (8%) (Metal Bulletin, 1996).

Chemical-grade limestone mining for calcium carbide production was by Bhutan Carbide and Chemicals Ltd. (BCCL) at Haurie Khola and Rongri in southwestern Bhutan. BCCL operated a 22,000-t/yr calcium carbide plant at Pasakha adjacent to BFAL's ferrosilicon plant, the plant began commercial operation in 1988. BCCL is owned by public shareholders (44%), the Ministry of Trade and Industry (36%), and TCC (20%). Limestone mining for cement production was by the state-owned Penden Cement Authority at Pugli and Namgyel Cement at Kalesore, both of which are in the Samchi District of southwestern Bhutan and Lhaki Cement at Titi and Yangzom Cement at Duarpani, both of which are in the southwestern Bhutan.

Bhutan's cement industry, which comprised of two state-owned companies and two privately owned small cement works located in southwestern Bhutan, had a combined annual capacity of 182,000 metric tons. The state-owned Penden Cement Authority operated a 100,000-t/yr plant at Pugli and a 35,000-t/yr plant at Gomtu under the name of Lhaki Cement. The two privately owned cement companies were Namgyel Cement, operating a 35,000-t/yr plant at Pasakha, and Yangzom Cement, operating a 12,000-t/yr plant at Samchi. Construction of a 500-metric-ton-per-day cement plant at Nanglam in southeastern Bhutan by a private company from India was expected to be completed in 1998. To increase cement exports to India, a private Indian company was to provide financial and technical assistance to Bhutan for building a large cement plant with a capacity of 500,000 t/yr at Dumsang.

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**Major Source of Information**

TABLE 1  
BHUTAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1993	1994	1995	1996 e/	1997 e/
Cement	107,810	120,000 e/	140,000 e/	160,000	160,000
Coal	56,000	63,912	71,112	68,000 r/	70,000
Dolomite	206,000	212,629	249,253	260,000	250,000
Ferrosilicon e/	--	2,000	12,000	13,000	13,000
Gypsum	20,000 e/	45,097	52,102	55,000	50,000
Limestone	190,000	232,317	266,591	275,000	270,000
Marble	square meters	3,825	2,841	3,946	4,000
Quartzite	--	15,647	49,900	50,200 r/	50,000
Slate	square meters	--	1,030	8,560	9,000
Talc	--	169	3,332	3,500	3,000

e/ Estimated. r/ Revised.

1/ Table includes data available through March 18, 1998.

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.