

THE MINERAL INDUSTRY OF

MONGOLIA

By Pui-Kwan Tse

Mongolia is a landlocked country. Almost half of the population is engaged in agriculture, especially in herding. Urban populations are primarily in the capital, Ulaanbaatar; Darkhan, an industrial center in the north near Russia; and Erdenet, a copper mining center in the north. After the collapse of the communist system in Mongolia and subsequent economic reform in the late 1980s, Mongolia faced economic hardship in the early 1990s. In the past several years, except for 1998, Mongolian economic growth was slow but steady. The growth rate of the gross domestic product (GDP) was 4.0% in 1997, -3.5% in 1998, 3.2% in 1999, and about 3% in 2000 (National Statistical Office of Mongolia, 2001, p. 78).

Major sectors such as banking, cashmere processing, and copper mining remained state-owned. The Government was pursuing a program to strengthen law enforcement and to improve accountability. The primary goals were to stabilize the macroeconomic situation, to reduce government spending while improving service delivery, and to restructure the industrial sector by privatizing state-owned enterprises. The Parliament had approved the privatization guidelines for 2001 to 2004 that would be implemented beginning in 2001. In 2001, the Government planned to privatize 27 state-owned enterprises and to restructure 25 state-owned enterprises and organizations (U.S. Embassy, Ulaanbaatar, Mongolia, [undated], Privatization program for 2001, accessed September 10, 2001, at URL <http://us-mongolia.com/bizinv/climate2000.html>).

Mongolia has extensive and largely untapped natural resources. The Government adopted a number of long-term programs to explore for and develop metallic and nonmetallic minerals, such as coal, copper, fluorspar, gold, oil, and silver. The mining and quarrying sector accounted for 8.5% of the GDP. Foreign investment and participation in exploration, exploitation, and processing of minerals were encouraged. Current (2000) Mongolian mining and investment laws allow for foreign investment through the establishment of a fully foreign-owned entity or through the formation of a joint venture with local companies in Mongolia.

In 2000, Mongolia's total trade increased by 24% to \$1.08 billion. Exports rose to \$466.1 million, and imports increased to \$614.5 million. Value of mineral products accounted for 40.5% and 19.6% of total exports and imports, respectively. Mongolia exported nearly all its output of copper concentrates mainly to China and Russia and nearly all its fluorspar to Russia. Petroleum and its products remained the leading imported commodity, followed by cement and fertilizer. China and Russia were two major trading partners that accounted for more than 50% of total trade (National Statistical Office of Mongolia, 2001, p. 177).

Ivanhoe Mines Ltd. signed an agreement with BHP Ltd. that gave Ivanhoe the right to earn 100% interest in the Turquoise

Hill (Oyu Tolgoi) copper/gold project that BHP had discovered at Oyutolgoi in the southern Gobi area. The Turquoise Hill project covers an area of 1,120 square kilometers (km²). Ivanhoe could assume all rights to the project by spending a total of \$6 million on exploration during the next 7 years and by paying BHP \$5 million. BHP will have the right to repurchase 40% if the discovery has at least 250 million metric tons (Mt) of ore at a grade higher than 1% copper, which can be processed by using solvent extraction and electrowinning process. If the discovery has 300 Mt at a grade higher than 1% copper, BHP will have the right to buy back 60% of the project. If BHP exercises its rights, then it will pay Ivanhoe a cash sum of three times the total amount spent by Ivanhoe on the project to that date and will reimburse Ivanhoe the purchase payment. Ivanhoe and BHP will then form a joint venture to explore, develop, and operate a mine. If BHP does not exercise its buy back right, then it will retain a 2% net smelter return royalty on all future production. The initial drilling focused on the southern Oyu zone. Analysis of samples from exploratory drill holes indicated that the deposit has copper content that ranges from 0.2% to 1.6%. Gold grades ranged from 0.01 gram per metric ton (g/t) to 0.4 g/t. Ivanhoe estimated that the Oyu Tolgoi deposit has as much as 750 Mt of copper and gold resources (Metal Bulletin, 2000b; Asian Journal of Mining, 2001b).

Molopo Australia NL was evaluating the potential to develop the Tsagaan Suvraga porphyry copper deposit in the southwest of Sayanshand City in the northern part of the Ulaan-Uul structural-formational zone of the south Gobi mineral belt. The copper content in the mineral belt ranges from 0.3% to 1.0%, and the molybdenum content is as much as 0.1%. The 174-km² license area contains about 240 Mt of sulfide ore at a grade of 0.53% copper and 0.018% molybdenum. It also contains 10 Mt of oxide ore that has 0.42% copper. Molopo held 65% of the project with the balance retained by the Mongolian Government (Asian Journal of Mining, 2000).

Gold mining in Mongolia increased significantly in the past decade, and the number of companies engaged in gold mining grew to more than 100 that produced a total of more than 11 metric tons (t) of gold in 2000. Gold occurrences exist in veins and placers, with total reserves estimated to be 2,000 t gold in 17 regions. Major developed gold mining areas are in Naran, Tolgoi, and Zamar (Asian Journal of Mining, 2001a).

A bankable feasibility study on the Boroo project was completed. Reserves at Boroo were estimated to be 10.7 Mt at a grade of 3.34 g/t gold. The study was based on an operation that produced 4,250 kilogram per year of gold during the first 3 years at an operating cost of \$5.79 per gram (\$164 per ounce). The Boroo project, which is approximately 120 kilometers (km) north of Ulaanbaatar, was operated by Boroo Mongolian Mining Co., which was 85% owned by AGR Ltd. of United

Kingdom and 15% owned by Altai Trading Co. Ltd. of Mongolia. AGR has the right to acquire a further 10% interest from Altai for an issue of 8.5 million AGR shares. Engineering work for a construction program began in June 2000 with the initial design work for site foundations in preparation for the relocation of the Bullabulling Gold Plant from western Australia to Mongolia (Asian Journal of Mining, 2001a).

The Mongolian Government was looking for investors to develop the 500-Mt iron ore deposit about 150 km north of Darkhan City. The estimated cost to start up the iron ore mine was \$67 million. The Government planned to build a direct-reduced-iron plant near the mine site. The only steel producer in Mongolia Darkhan Metallurgical Works operated two electric-arc furnaces with a combined output capacity of 100,000 metric tons per year (t/yr). The company sourced all its scrap within Mongolia; because of a shortage of electricity and scrap, however, the plant produced less than half of its output capacity. The plant produced square and round billet and rebar up to diameter of 32 millimeters (Metal Bulletin, 2000a).

The construction of Tsaiminerals' Tumurtiin Ovoo Mine [jointly owned by China Nonferrous Metal Industry Foreign Engineering and Construction Co. (51%) and Mentalimpex of Mongolia (49%)], which is near the town of Sukhe Bator, was underway in 2000. After completion in 2004, the mine will produce 68,000 t/yr of zinc concentrates for 27 years. The Export and Import Bank of China provided a preferential loan of \$20.5 million for this project. Mine output will be exported mainly to China (Metal Bulletin, 2001).

References Cited

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———2001b, Turquoise Hill copper/gold system expand: Asian Journal of Mining, February-April, p. 40.
Metal Bulletin, 2000a, Mongolia mulls plan to develop iron ore reserves: Metal Bulletin, no. 8535, December 18, p. 24.
———2000b, BHP and Ivanhoe Mines sign prospecting agreement: Metal Bulletin, no. 8474, May 11, p. 4.
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National Statistical Office of Mongolia, 2001, Mongolian statistical yearbook: Ulaanbaatar, National Statistical Office of Mongolia, 271 p.

Major Source of Information

Mineral Resources Authority
State Property Building, Builders' Square 3
Ulaanbaatar 211 238, Mongolia
Fax: 976-11-310 370
URL: <http://www.mram.mn>
E-mail: mram@magicnet.mn

Major Publication

National Statistical Office of Mongolia, Ulaanbaatar:
Statistical Bulletin, monthly and Mongolian Statistical
Yearbook, annual.

TABLE 1
MONGOLIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1996	1997	1998	1999	2000
Cement, hydraulic thousand tons	106	112	109	104	92
Coal do.	5,111	4,924	5,057	4,952	5,000
Copper:					
Mine output, Cu content 3/	123,000 e/	124,400	125,400	126,700	125,227
Metal, refined	--	2,703	2,322	1,545	641
Fluorspar:					
Acid grade thousand tons	130	130	123	100 r/	111
Submetallurgical and other grade do.	37	41	46	55 r/	87
Total do.	167	171	169	155 r/	198
Gold, mine output, Au content 4/ kilograms	6,976	8,451	9,531	10,146 r/	11,485
Gypsum e/ thousand tons	25	25	10	25 r/	25
Lime, hydrated and quicklime do.	55	58	56	50	37
Molybdenum, mine output, Mo content e/	2,200	2,000	2,000	1,910 r/	1,335 3/
Petroleum, crude thousand 42-gallon barrels	--	--	50	72	65
Salt, mine output	696	1,354	1,400 e/	1,516 r/	1,293
Silver, mine output, Ag content e/ 5/ kilograms	19,300	22,800	19,700	19,900	25,000
Steel, crude	22,605	22,700	16,300	13,100	13,000
Tin, mine output, Sn content e/	18	10	40	--	--
Tungsten, mine output, W content e/	17	26	35	27 r/	52

e/ Estimated. r/ Revised. -- Zero.

1/ Table includes data available through August 30, 2001.

2/ In addition to the commodities listed, crude construction materials, such as sand and gravel; varieties of stone, such as limestone; and silica are produced, but available information is inadequate to make reliable estimates of output levels.

3/ Reported figure based on 27.5% Cu and 50% Mo content, on copper and molybdenum concentrates, respectively.

4/ Reported raw gold production but excluded gold contained in copper concentrate.

5/ Based on 55 grams of silver per metric ton of copper concentrate.

Sources: National Statistical Office of Mongolia (Ulaanbaatar). Mongolian Statistical Yearbook 1997-2000; Mineral Resources Authority of Mongolia, Mining Office, Output of Mineral Commodities (Minerals Questionnaire 1997-2000).