



# 2006 Minerals Yearbook

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## MONGOLIA

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# THE MINERAL INDUSTRY OF MONGOLIA

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Mongolia's mineral resources were largely unexplored and unexploited. About 80 types of minerals were discovered in Mongolia, of which the most valuable were coal, copper, fluorspar, gold, iron, lead, molybdenum, silver, tungsten, uranium, and zinc. Mongolia's production of fluorspar ranked third in the world behind China and Mexico. The country's copper output was not ranked among the top 10 in the world; with the development of Oyu Tolgoi underway, however, Mongolia could be a significant copper supplier in the Asia and the Pacific region where demand for copper concentrates from China, India, and Japan was expected to increase in the future.

## Minerals in National Economy

Since the economic reform of the 1990s, the Mongolian Government has gradually privatized the mining sector. In 2006, the mining and quarrying sector accounted for 30% of the country's gross domestic product; the value of the sector's output accounted for 72% of the total value of industrial output. Mineral exploration was hampered by limited infrastructure, such as a shortage of roads and water resources, and severe weather in Mongolia. During the past several years, however, economic and governmental reforms have led to increased foreign investment in mineral exploration and exploitation in the country. Mining and oil exploration accounted for 61% of total foreign direct investment in 2005; this amount was expected to increase during the next several years. China was the leading foreign investor in Mongolia followed by Canada, the Republic of Korea, Japan, and the United States. The total labor force of the industrial sector decreased to 53,600 in 2006 from 59,341 in 2005, but employment in the mining and quarrying sector increased to 16,167 in 2006 from 14,503 in 2005 (Ministry of Industry and Trade of Mongolia, 2006, p. 11-13; National Statistical Office of Mongolia, 2006, p. 53, 71).

## Government Policies and Programs

The current mineral law was adopted in 1997 and amended in 2001 and 2006. The 2006 amended mineral law makes changes to the minerals royalty, license fees, license terms, and tax incentives for mining. The 2006 amended law includes the following specific changes:

- increases the minerals royalty to 5% from 2.5%;
- increases the amount of the license fee;
- reduces tax incentives for mining;
- changes the terms for exploration and mineral resource licenses;
- reduces the tax exemption to 100% for the first 2 years followed by a 50% exemption for the next 3 years. (Under the 2001 amended mineral law, companies received a 100% tax exemption for the first 5 years of operation followed by a 50% exemption for the next 5 years.);

- sets the duration of exploration licenses at 3 years with two possible extensions of 3 years each;
- sets the duration of mineral resources licenses at 20 years with the possibility of two 10-year extensions for a total of 40 years. (Under the 2001 amended law, mineral resource licenses were issued for 60 years with a possible extension of 40 years for a total of 100 years.); and
- provides for up to 50% Government ownership of "strategically significant" resources, which are defined to include coal, copper, gold, lead, silver, uranium, and zinc if the exploration is jointly funded by the State and private investors and up to 34% if the exploration funds are from foreign investors.

These amendments could provide more investment opportunity for local companies without discouraging foreign investment. They also could enhance the accountability of mining companies with respect to production activities and rehabilitation of the environment and could improve the relationship between the local government and mining entities (Open Society Forum, 2006).

The Mongolian Government was considering reexamining about 814 exploration and mineral licenses that were issued during the deliberation period for the newly amended law to determine if the licenses are in compliance with the new law.

In 2005, the Government submitted to the Parliament a bill that provides for a "windfall profit tax on some products"; the bill would establish export customs tariffs on some types of minerals. In May 2006, the Parliament approved a windfall profit tax on copper and gold exports that requires companies that export copper and gold to pay a tax at a rate of 68% when the copper price exceeds \$2,600 per metric ton and the gold price reaches \$500 per troy ounce on the London Metal Exchange. The windfall tax law was established to encourage companies to add value to copper concentrate, such as by smelting it, rather than exporting the raw material. The proceeds of the windfall tax would be deposited into the Mongolia Development Fund. A draft law on how to spend the Fund's money was under consideration by the Parliament. Local citizens petitioned the Constitution Court, arguing that the windfall profit tax imposed on mining companies violates the Constitution because the Government appointed the Mongol Bank to determine the tax rate. The Court decided, however, that the windfall tax does not breach the Constitution. In November 2006, a draft bill to increase the windfall tax on gold to \$650 from \$500 per troy ounce was submitted to the Parliament for discussion (Parliament of Mongolia, 2006; Open Society Forum, 2007b).

## Production

Mongolia's major important minerals production included coal, copper, fluorspar, gold, molybdenum, and zinc. Production of cement, coal, and petroleum was mostly for domestic

consumption by the construction and the utility industries. Owing to increased foreign direct investment, production of coal, gold, petroleum, and zinc had gradually increased during the past several years. With a new management team in place, production of crude steel from Darkham Metallurgy Plant increased during the past 3 years (table 1).

## Trade

In 2006, Mongolia's total trade increased by 34.2% to \$3.02 billion. Because of high global metal market prices, the value of exports increased by 43.6% to \$1.53 billion. Owing to increased demand for agricultural products and mineral fuels, the value of imports increased by 25.8% to \$1.49 billion. The value of metal and mineral exports accounted for about 75.7% of the country's total export value. Mongolia exported nearly all its output of concentrates of copper, molybdenum, and zinc to China and shipped fluorspar to, in descending order of amount shipped, Russia, the United States, Ukraine, and China. Gold was exported mainly to, in descending order of amount exported, Canada, the United States, the United Kingdom, and China. Petroleum and petroleum products remained the leading imported commodities followed by textiles and flour. Mineral exports from Mongolia were expected to increase during the next few years because of the expected increase in the output of copper, gold, and zinc when new mines are put into operation. China and Russia were Mongolia's two major trading partners. Mongolia's exports to China increased to 69.9% of Mongolia's total export value in 2006 from 48.3% in 2005, and exports to the United States decreased to 7.8% of Mongolia's total export value in 2006 from 14.3% in 2005. Russia remained the leading source of Mongolia's imports in 2006; it accounted for 36.6% of the total import value followed by China, with 27.5% (National Statistical Office of Mongolia, 2006, p. 53-61).

## Commodity Review

### Metals

**Copper.**—The leading mining operation in Mongolia (Erdenet Mining Corp.) was a Mongolia-Russia joint venture in which the State Property Committee of the Mongolian Government owned a 51% share and the Russian Government, a 49% share. Erdenet's mine output totaled more than 27 million metric tons per year (Mt/yr) of ore and resulted in the production of concentrates that contained more than 130,000 metric tons (t) of copper and 1,500 t of molybdenum. Because of a decline in the average copper ore grade, the output of copper in concentrates decreased but the output of molybdenum in concentrates increased owing to higher molybdenum content in the ore and a higher recovery rate. The metal content in copper concentrates and molybdenum concentrates was 23.25% and 46.50%, respectively. In 2006, Erdenet completed the expansion of its processing plant, in which the designed processing capacity increased to about 60 Mt. The "windfall tax" did not have much impact on Erdenet because Erdenet was a state-owned company. The company planned to build a copper smelter in 2007 (Erdenet Mining Corp., 2007; UB Post, 2007b).

Ivanhoe Mines Ltd. of Canada and Rio Tinto plc of the United Kingdom reached an agreement to form a strategic partnership to develop the Oyu Tolgoi copper-gold project, which is located in the South Gobi Region about 80 kilometers (km) north of the Chinese border. As part of the agreement, Rio Tinto agreed to acquire 19.9% of Ivanhoe's share in the Oyu Tolgoi project. The partners will jointly develop and operate the project. Rio Tinto made an immediate investment of \$303 million for 9.95% of the Ivanhoe shares; an investment of \$388 million for the second 9.95% share would be made at the conclusion of the joint ventures' long-term investment agreement with the Mongolian Government. Rio Tinto could exercise its right to acquire up to a 40% share in Ivanhoe, of which 33.35% (about \$1.5 billion) would be nontransferable, and a 6.65% stake in Ivanhoe through an open market transaction within the first 5 years (Ivanhoe Mines Ltd., 2006; Rio Tinto plc, 2006).

In accordance with 2006 amendments to the mineral law, which gives the Government the option to acquire interests in mineral deposits that are considered "strategic" because they could have an impact on Mongolia's national security and economic and social development, the Mongolian Government set up an inter-ministerial working group to negotiate with Ivanhoe on an investment contract for the Oyu Tolgoi copper-gold project that would include tax restructuring and infrastructure development. Ivanhoe had invested more than \$400 million in construction and prospecting work related to the development of the Oyu Tolgoi project. A draft agreement between the Government working group and Ivanhoe indicated that the Mongolian Government would have 34% of the Oyu Tolgoi project because the mineral prospecting work was carried out by Ivanhoe, and the Government would supply electricity for Oyu Tolgoi and would build a 150-kilowatt powerplant in the area. A toll road would be constructed from Oyu Tolgoi to the Chinese border; construction of an airport in the Oyu Tolgoi area was also under consideration. Ivanhoe would build a copper smelter within 10 years. Ivanhoe would be exempted from paying customs taxes on construction equipment and materials. If Ivanhoe were to incur losses, the Mongolian Government would allow the company to delay paying income taxes for a period of 2 years and would not impose deductions if the company transferred its revenues to its headquarters in Australia, Canada, and the United Kingdom. Ivanhoe agreed to sell 1,000 t of gold that it produced from Oyu Tolgoi to the Mongol Bank. Until the copper smelter is put into operation, the extracted copper will be exempted from the 68% windfall tax. If the company fails to put the smelter into operation in 2016, the company must pay all accrued exempted taxes. Under the agreement, gold would be exempted from the windfall tax and income taxes would be reduced by 10%. The agreement would be terminated if the company transfers its license to another company without notifying the Mongolian Government (Ivanhoe Mines Ltd., 2007; Open Society Forum, 2007a).

Erdenes Gold Inc. of Canada acquired two Mongolian exploration projects, which are located 460 km southwest of Ulaanbaatar, from Xstrata Copper of Australia (a subsidiary of Xstrata plc of the United Kingdom). Falconbridge Ltd. of Canada reported that a high potential for copper-gold mineralization was found in the area. The two properties,

Mogoit and Tsagaan Ovoo, are located about 30 km apart. Falconbridge completed mapping and sampling work in 2006. Erdene planned to further explore the areas in 2007 (Erdene Gold Inc., 2007).

Erdene continued to explore in the areas surrounding Erdenet Mining Corp.'s open pit mining site. Initial drilling results indicated significant copper mineralization from the southeast and northwest of the mine. Erdene expected that the Erdenet area had high potential copper resources at the near-surface and deep underneath. Erdene planned to continue mapping and sampling in the Tsagaan Chuluut area, which is located 4 km northwest of Erdenet's mine site, in 2007 (Erdene Gold Inc., 2006).

In 2006, Solomon Resources Ltd. of Canada continued its geologic exploration work on the Chandmani area, which is located within the Lake District of northwestern Mongolia, 140 km southwest of Khovd in Khovd Province. Significant copper-gold skarn mineralization was found in the prospect area. Solomon terminated its option agreement with Gallant Minerals Ltd. that had been signed in 2005. The option agreement included four projects in the Gobi region; the projects comprised nine mineral exploration and mining licenses that covered 31,258 hectares and that were highly prospective for porphyry copper-gold. Asia Gold Corp. continued its option agreement with Gallant (Asia Gold Corp., 2007; Solomon Resources Ltd., 2007a, b).

**Gold and Silver.**—Gold mining in Mongolia increased significantly during the past decade, and the number of companies engaged in gold mining increased in the 1990s to more than 100 and produced a total of more than 12 t of gold. Such gold mines as Borro, Bumbat, and Olon Ovoot were put into operation during the past several years. As a result, gold output increased sharply during the past 3 years. Domestic gold demand was mainly for jewelry. Boroo Gold Co., in which Centerra Gold Inc. of Canada had a 95% equity interest, was the leading gold producer and accounted for nearly 40% of Mongolia's total gold output. Centerra completed its feasibility study of its 100% equity Gatsuurt gold deposit, which is located 35 km from the Boroo mine. The probable reserves of the Gatsuurt deposit at the central and main zones were 38.1 t of gold. The company planned to transport oxide ore from Gatsuurt to the Boroo processing facility. Centerra's board of directors approved a \$20 million biooxidation treatment (heap leaching) plant at Boroo to process refractory ore. Construction of the 3-Mt/yr heap leach facility was scheduled to begin in early 2007 and was expected to be completed in mid-2007. About 20 t of contained gold would be processed during the projected 6-year operation of the facility (Centerra Gold Inc., 2007, p. 5-7).

In 2006, Mongolia's Mongolrostsvetmet Corp. and Polymetal of Russia signed an agreement to establish a 50-50 joint-venture company, Asgatpolymetal Limited Liability Company, to develop the Asgat silver-polymetallic deposit, which is located 180 km from the Ulgii, Bayan-Ulgii Province. The deposit, which was discovered in 1976, had resources with an average silver grade of 297 grams per metric ton and contained 4,970 t of silver. Under the joint-venture agreement, Polymetal would provide financing and management for developing the deposit, and Mongolrostsvetmet would provide material for

infrastructure construction in Mongolia. Mongolrostsvetmet was a state-owned company. Under the provision of Mongolia's law, the Government must be notified of and participate in discussions between the state-owned company and other companies. Mongolrostsvetmet did not inform the State Property Committee (which oversees state-owned companies) about the joint-venture agreement; and Mongolrostsvetmet did not pay Asgat's license fee in 2006. As a result, the State Property Committee cancelled the agreement signed between Mongolrostsvetmet and Polymetal. The Mongolian Government encouraged foreign investors to exploit mineral resources in Mongolia within the boundaries of Mongolia's laws and regulations (Polymetal, 2006; UB Post, 2007a).

### *Mineral Fuels*

**Coal.**—Mongolia has substantial coal resources. Coal production, which had been stable at about 5 million metric tons (Mt) during the past several years, increased to more than 8 Mt during the past 2 years. Coal resources in the Ulaannur Basin included the Baruun Naran, the Tavan Tolgoi, and the Ukhaa Khugag. QGX Ltd. of Canada, which held the Baruun Naran exploration license, discovered a total of 24 thick coal seams at the Baruun Naran coalfield. Exploration results estimated that the coalfield had coal resources of more than 252.9 Mt of coking and thermal coal (QGX Ltd., 2007). The Tavan Tolgoi deposit was located about 20 km to the northeast of Baruun Naran and Energoresource of Mongolia held the exploration license. The Tavan Tolgoi deposit was estimated to contain more than 6 billion metric tons of coking and thermal coal. Such companies as Bazovy Element and Severstal Group of Russia, Itochu Corp. and Mitsubishi Corp. of Japan, Peabody Energy Corp. of the United States, and Shenhua Corp. of China were interested in developing the deposit. Previous studies estimated that the initial investment needed to develop infrastructure from the mine site to the Chinese border could be more than \$1.5 billion. China's State Grid Corp. proposed to build three coal-fired powerplants in the Gobi area to supply electricity to China and southern Mongolia (UB Post, 2006).

### **Outlook**

The Mongolian Government plans to continue its economic reform in order to sustain its economic growth. The mining industry continues to be one of the country's main pillars of economic development. According to The Fraser Institute's 2006-07 mining company survey, since the introduction of the new mineral law and the windfall tax law, the attractiveness of mineral exploration in Mongolia has dropped significantly compared with that in other countries (Fraser Institute, The, 2007). The Government planned to modify the windfall tax and other regulations to encourage high mining output and attract more investment. The Government encourages companies to build smelting plants for copper, gold and zinc. During the next 10 years, production of mineral and metal is expected to grow because exploitation projects, such as copper and gold deposits (Oyu Tolgoi and Tsagaan Suvarga); gold deposits (Bayangol, Tavit and Toson); and coal deposits [Baruun Naran, Ovoot Tolgoi

(formerly Nariin Sukhait), and Tavan Tolgoi], will be put into operation. Mineral exports are a major source of Government revenue. Significant declines in prices of coal, copper, and gold in the world market would reduce the Government revenues and affect the Government's long-term development goal to improve the living standard of the Mongolian people.

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TABLE 1  
MONGOLIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2002	2003	2004	2005	2006
Cement, hydraulic thousand metric tons	148	162	62	112	141
Coal do.	5,307	5,666	6,794	8,256	7,885
Copper:					
Mine output, Cu content	131,705	130,270	130,000	126,547	129,693
Metal, refined	1,500	1,341	2,376	2,475	2,618
Fluorspar:					
Acid grade thousand metric tons	86	120	148	134	138
Submetallurgical and other grade do.	99	150	206	233	255
Total do.	185	270	354	367	393
Gold, mine output, Au content <sup>3</sup> kilograms	12,097	11,119	19,240	24,120	22,561
Gypsum <sup>e</sup> thousand metric tons	25	25	25	25	26
Iron ore:					
Gross weight do.	--	--	33	168	180
Iron content do.	--	--	21	109	116
Lime, hydrated and quicklime do.	42	42	30	81	60
Molybdenum, mine output, Mo content	1,590	1,793	1,141	1,188	1,404
Petroleum, crude thousand 42-gallon barrels	139	183	216	201	369
Salt, mine output	1,268	1,971	1,550	1,896	1,154
Silver, mine output, Ag content <sup>e, 4</sup> kilograms	27,000	27,000	28,000	28,000	28,000
Steel, crude	15,900	39,300	54,900	65,500	70,000
Tungsten, mine output, W content	35	40	77	54 <sup>r</sup>	85
Zinc, mine output, Zn content	--	--	--	11,400 <sup>r</sup>	54,850

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through July 2, 2007.

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

<sup>3</sup>Reported raw gold production but excludes gold contained in copper concentrate.

<sup>4</sup>Based on 55 grams per metric ton silver in copper concentrate.

Sources: National Statistical Office of Mongolia (Ulaanbaatar); Mongolian Statistical Yearbook 2001-2004; Mineral Resources Authority of Mongolia, Mining Office, Output of Mineral Commodities (Minerals Questionnaire 2001-2005).

TABLE 2  
MONGOLIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity <sup>c</sup>
Cement		Khutul Cement and Lime Factory	Darkhan-Uul Province, Darkhan	500
Coal		Government Coal Mining Enterprise	Baganuur mine, Tov Province	4,000
Do.		do.	Shivee Ovoo mine, Dundgovi (Middle Gobi) Province	2,000
Do.		Chinhua-Mak Nrlin Sukhait Co. (Sino-Mongolian joint venture)	Nariin Sukhait mine, Omnogovi (South Gobi) Province	3,000
Copper, Cu in concentrates		Erdenet Mining Corp. (Mongolia-Russia joint venture)	Bulgan Province, Erdenet	130
Gold	metric tons	Boroo Gold Company	Selenge Province, Bayangol	10
Do.		Altan Dornod Mongolia Co. Ltd.	Zaamar placer gold deposit along the Tuul river	3
Do.		Mongolrosvetmet Corp. (Mongolia-Russia joint venture)	do.	2
Fluorspar		do.	Bor-Undur mine in Darkhan, Khentii Province	300
Do.		do.	Urgen mine in Dornogobi Province	150
Do.		do.	Airag mine in Dornogobi Province	150
Molybdenum, Mo in concentrates	metric tons	Erdenet Mining Corp. (Mongolia-Russia joint venture)	Bulgan Province, Erdenet	2,000
Steel		Darkham Metallurgy Plant	Darkhan-Uul Province, Darkhan	100
Tungsten (WO <sub>3</sub> content)	metric tons	A state-owned company	Bayan-Ulgii Province, Hovd Gol area	100
Zinc, Zn in concentrates		Tsait Minerals Co. Ltd. (Sino-Mongolian joint venture)	Sukhbaatar Province, Sukhe Bator	70

<sup>c</sup>Estimated.