



# 2009 Minerals Yearbook

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## MONGOLIA

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# THE MINERAL INDUSTRY OF MONGOLIA

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In 2009, Mongolia was the world's third ranked producer of fluorspar after China and Mexico, producing both acid and metallurgical grades. Mongolia produced far less fluorspar than China and Mexico, however, and its production accounted for about 5.5% of the world total. A major development in Mongolia's mining sector took place in October when, after 9 years of negotiations, Ivanhoe Mines Ltd. of Canada and Rio Tinto Ltd. of Australia signed a long-term investment agreement with the Mongolian Government to build and operate the Oyu Tolgoi copper and gold mining complex located in Omnogovi Province. Oyu Tolgoi is reported to be the largest known undeveloped copper and gold deposit in the world and was estimated to have total reserves and resources of 3.2 billion metric tons (Gt) of ore with 30.8 million metric tons (Mt) of contained copper and close to 1 million kilograms of contained gold (Ivanhoe Mines Ltd., 2009a; Rio Tinto Group, 2009; Miller, 2010).

That Mongolia has rich mineral deposits has been recognized for decades as a result of Russian exploration undertaken up until the 1990s. Mining is significant to Mongolia's economy, and minerals account for the majority of the country's exports. Substantial economic development would be needed for the country to pull itself out of its current fiscal crisis, however. Mongolian banks were carrying bad debt from low interest loans made to herders in the 1990s to expand their herds; most of those loan recipients were unable to sustain the expanded herds and were not able to pay back the loans. The present socioeconomic situation was aggravated by the worst winter weather in nearly 40 years, which is believed to have resulted in the deaths of at least 2 million head of livestock in a country in which the majority of the citizens were still trying to subsist by herding (Lim, 2009; Sayed, 2010).

## Minerals in the National Economy

Mongolia was heavily affected by the global economic recession of 2008-09, and economic growth in 2009 was estimated to have slowed to 2.7% compared with a growth rate of 8.9% in 2008. In 2009, the mining and quarrying sector accounted for 28% of the country's gross domestic product (GDP) compared with 27% in 2008. The value of the sector's output, however, accounted for 59% of the total value of industrial output compared with 55% in 2008. The value contribution to the GDP from the mining of coal and lignite and the extraction of peat increased by 20.4% in 2009 compared with that of 2008; the value from the extraction of crude petroleum and natural gas increased by 16.5%, that of the mining of metal ores increased by 11.1%, and that of other mining and quarrying decreased by 5.2% (National Statistical Office of Mongolia, 2009, p. 18, 22).

## Government Policies and Programs

The Minerals Law of Mongolia regulates the prospecting and exploration for and the mining of minerals within the country's territory. Other legislation related to minerals includes the Constitution of Mongolia, the Land Law, the Subsoil Law, the Environmental Protection Law, and the National Security Law. Mineral resources in Mongolia are the property of the state. The Government may participate up to 50% jointly with a private legal entity in the exploitation of a mineral deposit in which state-funded exploration was used to determine the proven reserves, and it may own up to 34% of the shares of the investment made by a license holder for a mineral deposit in which the proven reserves were determined using other funding. If a mining license holder undertakes to invest no less than \$50 million during the first 5 years of a mining project, the Government may establish an investment agreement with the mining license holder and the term of the agreement would be 15 years; if the investment is more than \$300 million, the term would be 30 years (Mongolian National Mining Association, 2010, p. 1-17).

In August, the Mongolian Parliament repealed the mining windfall profits tax that was passed in 2006. The windfall tax, which was created to increase public revenue during a period of high copper and gold prices, assessed a 68% tax on copper that traded above \$2,600 per metric ton and gold that traded above \$500 per 31 grams (reported as 1 troy ounce, and increased to \$850 per troy ounce in 2008). Also in 2006, to secure revenue from the Oyu Tolgoi project specifically, the Government passed a law that allowed the Government to earn at least 34% and as much as 50% of any prospect for which the exploration was funded by the Government. As a result of the Government increasing its share of earnings, numerous junior companies were forced to leave the country, as they could not continue to finance their projects. Negotiations concerning the development of Oyu Tolgoi had delayed the project for several years (Gold Report, The, 2009).

## Production

Coal production increased to about 13.2 Mt, or by 36% compared with that of 2008. The increased production was owing in part to increased sales and exports to China from South Gobi Energy Resources Ltd. of Canada's Ovoot Tolgoi Mine, which was commissioned in 2008. Gold production decreased by 35% to about 10,000 kilograms (kg) in 2009. The decrease was owing in part to shutdowns at Centerra Gold Inc. of Canada's Boroo gold mine, which were brought about by the Government's suspension of the mine's license because of issues regarding the state's alluvial reserves and because of a unionized employee work stoppage. Production of metallurgical and other grades of fluorspar increased by 57% to 344,000 metric tons (t). The increase was attributable to increased demand and exports

to China (table 1; South Gobi Energy Resources Ltd., 2010, p. 3, 38).

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

### Mineral Trade

In 2009, Mongolia's exports decreased by 30.2% to \$1.9 billion. Imports decreased by 34.3% to \$2.1 billion, which resulted in a trade deficit of \$228.7 million compared with a deficit of \$710.0 million in 2008. Mineral exports accounted for about 65% of all exports from Mongolia. Virtually all copper concentrate exports continued to be received by China. About 72% of molybdenum ores and concentrates was received by China, 25% was received by the Republic of Korea, and the rest was reported to be received by, in order of volume, Germany, Japan, and the United States. Russia received 66% of Mongolia's exported fluorospar ore and concentrate compared with 76% in 2008; in 2009, China received about 18%, the United States received about 13%, and the rest was received by other countries (National Statistical Office of Mongolia, 2009, p. 74-85).

### Commodity Review

#### Metals

**Copper.**—Among the copper projects that were scheduled to start up operations between 2010 and 2015 were Solartech International Holdings Ltd. of China's wholly owned Nergui copper, gold, and silver project and Ivanhoe Mines' Oyu Tolgoi project. Nergui was scheduled to start up in the fourth quarter of 2012 as an open pit mine, which was estimated to have total reserves and resources of about 118 Mt, including 1.4 Mt of contained copper and close to 70,000 kg of gold. A prefeasibility study completed in November 2009 outlined a mine capable of producing about 5,000 metric tons per year (t/yr) of copper with a possible expansion to 30,000 t/yr (Solartech International Holdings Ltd., 2009).

By the end of 2009, Ivanhoe Mines had completed 75% of the engineering for the concentrator plant and 50% for the required infrastructure at Oyu Tolgoi. In March 2010, Rio Tinto increased its share in Ivanhoe Mines to 22.4% as part of an agreement in which the financing would be used to secure long-lead-time equipment and for ongoing development at Oyu Tolgoi. Oyu Tolgoi was scheduled to start up in 2012 as an open pit and underground mine. In May 2010, Ivanhoe Mines released an updated integrated development plan for Oyu Tolgoi in which it anticipated processing an initial 36.5 million metric tons per year (Mt/yr) of ore and ramping up to 58 Mt/yr of ore during the fifth year of operation; this would result in annual production of 544,000 t/yr copper and about 20,000 kilograms per year (kg/yr) of gold for the first 10 years of the mine's 27-year life. Under the terms of the agreement, the Mongolian Government would acquire a 34% interest in Ivanhoe Mines Mongolia Inc., which was Oyu Tolgoi's license holder, and Ivanhoe Mines would retain a controlling 66%

interest in Oyu Tolgoi. Rio Tinto was to continue to hold a 9.9% share in Ivanhoe Mines but had an option to increase its share in the company to between 43% and 47% (Ivanhoe Mines Ltd., 2009a, b; Rio Tinto Group, 2010).

**Gold.**—In the second half of 2009, Centerra restarted exploration work at its Gatsurt gold project after 2 years of inactivity. In December, the company was notified that the environmental assessment that it had submitted had been approved by the Government. Centerra expected to begin production in the second half of 2010 as an open pit mine to produce about 34,000 kg of gold from 13.9 Mt of ore during an 8-year mine life. Production would be carried out in two phases. Mining of 3.6 Mt of oxide and transitional ore and stockpiling of any sulfide ore would be done in phase one. Phase two would consist of pit development to access 10.2 Mt of refractory ore (Centerra Gold Inc., 2010, p. 51-59).

In April 2010, North Asia Resources Holdings Ltd. of China acquired Dadizi Yuan, LLC, which was the owner of the Khar Yamaat and the Sharin Gol Soum alluvial gold deposits in northern Mongolia. The two deposits hosted about 3,000 kg of gold, and work was reportedly underway to begin trial production from the deposits late in 2010 (North Asia Resources Holdings Ltd., 2010).

Garrison International Ltd. of Canada's Tovshiir gold project was scheduled to start operations in the first quarter of 2011. Garrison had stockpiled 30,000 t of ore at Tovshiir for use in commissioning and production rampup at the plant. Garrison expected to commence mining from three shallow open pits by the end of 2010. Construction of the gravity leach plant was resumed; the plant was expected to produce between 550 and 650 kg/yr of gold from 500 metric tons per day of ore (Garrison International Ltd., 2010a, b).

#### Mineral Fuels and Related Materials

**Coal.**—Mongolia has about 200 coal deposits that are currently exploited as open pit mines. The country's still unexploited Tavan Tolgoi coal deposit contained a reported 6.5 Gt of coking coal. The Government had been seeking an investor to acquire a 49% share in the deposit, but the Government announced that the auction had been cancelled and that a plan would be submitted for approval by Parliament whereby the Government would retain its 10% ownership and would seek a global mining company to develop the project on a contract basis (Wills, 2010).

**Uranium.**—China National Nuclear Corp. International Ltd.'s (CNNC International's) wholly owned Gurvanbulag uranium project was expected to start production in 2012. In August, CNNC International completed its takeover of Western Prospector Group Ltd. of Canada. In January 2009, Western Prospector reported results from its positive definitive feasibility study for Gurvanbulag, which included proven and probable reserves estimates of 5.04 Mt grading 0.161% U<sub>3</sub>O<sub>8</sub>. In July, Western Prospector had received notice from the Mineral Resources Authority of Mongolia (MRAM) that all its uranium exploration licenses were suspended for 3 months owing to violation of various laws; however, by December, CNNC International announced that the MRAM had lifted the

suspension of its uranium exploration licenses at Gurvanbulag (Marketwire.com, 2009).

## Outlook

Mongolia possesses significant reserves of coal, copper, gold, tin, and uranium. The country's copper reserves at Oyu Tolgoi alone are second only to Chile's total copper reserves, and Mongolia's inferred uranium resources are expected to be second only to those of Australia. In addition to suffering the effects of the global economic downturn, Mongolia lacks the infrastructure needed to develop mineral deposits in the short term and has a high level of national debt and high unemployment. Several copper and gold projects are scheduled to come online by 2015; however, to provide short-term economic relief, any increases in revenue to the Government from minerals will likely come from the coal sector. Development of the Tavan Tolgoi deposit, however, could be stalled by the country's decision to seek a contract arrangement with a foreign investor. The Mongolian Government is at a point at which it is trying to protect itself from losses that could be incurred by creating investment policies that are excessively lucrative, but could bring rapid private sector foreign investment, while it evaluates how to move forward to develop a sustainable mining industry.

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2005	2006	2007	2008	2009
Cement, hydraulic thousand metric tons	112	141	180	270	235
Coal, unspecified do.	8,256	7,885	9,560	9,692	13,164
Copper:					
Mine output, Cu content	126,547	129,693	130,160	126,796	129,800
Metal, refined	2,475	2,618	3,007	2,587	2,470
Fluorspar:					
Acid grade thousand metric tons	134	138	131	116	115
Submetallurgical and other grade do.	233	255	250	219	344
Total do.	367	393	381	335	459
Gold, mine output, Au content <sup>3</sup> kilograms	24,120	22,561	17,473	15,184	9,803
Gypsum <sup>e</sup> thousand metric tons	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA
Iron ore:					
Gross weight do.	168	180	265	1,387	1,380
Iron content do.	109	116	170	888	883
Lime, hydrated and quicklime do.	81	60	43	55	43
Molybdenum, mine output, Mo content	1,188	1,404	1,978	1,780 <sup>r</sup>	2,140
Petroleum, crude thousand 42-gallon barrels	201	369	913	1,174	1,870
Salt, mine output	1,896	1,154	1,143	1,100 <sup>e,r</sup>	1,100 <sup>e</sup>
Silver, mine output, Ag content <sup>e,4</sup> kilograms	28,000	28,000	28,100	28,890 <sup>5</sup>	28,800
Steel, crude	65,500	70,000	80,400	81,400	80,000 <sup>e</sup>
Stone, crushed thousand metric tons	--	269	208	207 <sup>6</sup>	247
Tungsten, mine output, W content	54	85	245	142	39
Zinc, mine output, Zn content	11,400	54,850	77,350 <sup>r</sup>	143,600 <sup>r</sup>	156,500 <sup>e</sup>

<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. do. Ditto. NA Not available. -- Zero.

<sup>1</sup>Table includes data available through December 5, 2010.

<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 tons of silver in copper concentrate.

<sup>5</sup>Reported figure.

<sup>6</sup>Converted from cubic meters assuming a density of 2.0 metric tons per cubic meter.

Sources: Mineral Resources Authority of Mongolia (2005-2009).

TABLE 2  
MONGOLIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity <sup>e</sup>
Cement		Khutul Cement and Lime Factory	Darkhan, Darkhan-Uul Province	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 Nariin Sukhait Co. (Sino-Mongolian joint venture)	Nariin Sukhait Mine, Omnogovi [South Gobi] Province	3,000
Do.		SouthGobi Energy Resources Ltd. (Ivanhoe Mines Ltd., 80%)	Ovoot Tolgoi Mine, Omnogovi [South Gobi] Province	3,000
Copper, Cu in concentrates		Erdenet Mining Corp. (Mongolia-Russia joint venture)	Erdenet, Bulgan Province	130
Fluorspar		do.	Bor-Undur Mine, Darkhan, Khenti Province	300
Do.		do.	Urgen Mine, Dornogobi Province	150
Do.		do.	Airag Mine, Dornogobi Province	150
Gold	metric tons	Boroo Gold Co. (Centerra Gold, Inc., 100%)	Bayangol, Selenge Province	10
Do.		Altan Dornod Mongolia Co. Ltd.	Zaamar placer gold deposit along the Tuul River	3
Do.		Mongolrostsvetmet Corp. (Mongolia-Russia joint venture)	do.	2
Molybdenum, Mo in concentrates	metric tons	Erdenet Mining Corp. (Mongolia-Russia joint venture)	Erdenet, Bulgan Province	2,000
Steel		Darkham Metallurgy Plant	Darkhan, Darkhan-Uul Province	100
Tungsten (WO <sub>3</sub> content)	metric tons	A state-owned company	Hovd Gol area, Bayan-Ulgii Province	150
Zinc, Zn in concentrates		Tsait Minerals Co. Ltd. (Sino-Mongolian joint venture)	Sukhe Bator, Sukhbaatar Province	70

<sup>e</sup>Estimated. Do., do. Ditto.