



# 2012 Minerals Yearbook

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## MONGOLIA

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# THE MINERAL INDUSTRY OF MONGOLIA

By Susan Wacaster

Mongolia has large proven reserves of coal, copper, and fluorspar. Mineral deposits with copper, gold, molybdenum, tin, and tungsten are common in Mongolia. The central region of Mongolia is characterized by basins and complex folded geologic structures where mineralized zones are frequently encountered. As of 2008, it was estimated that about 30% of all the near-surface territory of Mongolia hosted granitoids, most of which have greisens and vein mineralization associated with calc-alkaline magmas (Gotovsuren and others, 2012).

Turquoise Hill Resources Ltd. of Canada's Oyu Tolgoi Mine, which is part of one of the world's largest known porphyry deposit systems in terms of reserves and resources, has total estimated copper reserves of 13.1 million metric tons (Mt) and about 1 million kilograms (kg) of gold. Estimated resources (including indicated and inferred resources) accounted for about another 14 Mt of copper and more than 400,000 kg of gold. The primary hypogene mineralization within the porphyry is chalcopyrite, and it contains lesser amounts of bornite and magnetite; the secondary supergene mineralization is dominantly chalcocite (Ivanhoe Mines Ltd., 2012b, p. 13).

The Oyu Tolgoi Mine was in the preproduction stage in 2012, and Turquoise Hill Resources began ramping up for commercial operation of the mine in the first half of 2013. The value derived from Oyu Tolgoi alone was expected to account for one-third of Mongolia's gross domestic product (GDP) by 2020. Mongolia's year-on-year real GDP growth rate was estimated to have decreased in 2012 relative to that of 2011, but direct investment in mining, primarily at the Oyu Tolgoi project, resulted in Mongolia having had the fastest growing GDP in the world in 2011 at 17.5% compared with just 6.4% in 2010 and -1.3% in 2009 (Commonwealth of Australia, 2011, p. 93–94).

## Minerals in the National Economy

According to the National Statistical Office of Mongolia, preliminary estimates of the 2012 GDP (at current prices) indicated a year-on-year increase of 25.8% compared with that of 2011, or a 12.3% increase at constant prices (with a base year 2005). The economy grew at a slightly slower rate than had been predicted by economic analysts as a result of decreased demand from China, which was Mongolia's primary trade partner. Mongolia's fiscal deficit for 2012 had increased to 8.4% of its GDP in 2012 (World Bank, The, 2013, p. 3; Xinhuanet.com, 2013).

Mongolia's mining and quarrying sector was the primary contributor to the country's economy. In 2012, the output from the mining and quarrying sector accounted for 18.6% of the GDP compared with 21% in 2011. Economic growth in Mongolia in 2012 was also supported by a 21.3% increase in the value of output from the agricultural sector, an 11.4% increase in the output value of the transportation sector, and a 9.2% increase in the output value of the sector composed of retail and wholesale trade and repair of motor vehicles and motorcycles

compared with the output values in 2011 (National Statistical Office of Mongolia, 2013, p. 20–21, 61).

Economic growth in Mongolia, however, outpaced the production capacity of the economy. Major infrastructure projects were proposed for the following sectors: construction and urban development; fuel and energy; industrial manufacturing; mining, metallurgical, and chemical industries; and roads and transportation. Financing for the infrastructure projects were to be sourced, in part, from Mongolia's international debt instrument, the Chinggis bonds, which were initially offered at the end of 2012. The initial offering raised \$1.5 billion for the Government. Had a larger supply of bonds been available, the Government could potentially have raised as much as \$15 billion, as the demand for the bonds was reportedly 10 times greater than the available supply in the first offering (World Bank, The, 2013, p. 3).

## Government Policies and Programs

Mineral resources in Mongolia are the property of the state. The Minerals Law of Mongolia regulates the prospecting and exploration for and mining of minerals within the country's territory. Numerous other laws, guidelines, and procedures govern prospecting, exploration, and mining of minerals, including the Constitution of Mongolia, the Environmental Protection Law, the Land Law, the National Security Law, the Subsoil Law, and the Water and Forest Law, among others (Mineral Resources Authority of Mongolia, 2011).

Mineral deposits are grouped into one of three classifications in Mongolia—strategic, common, and conventional. A strategic deposit is one with the potential to affect the national security and economic and social development of the country at the national and regional levels; a deposit also is considered strategic if it accounts for, or has the potential to account for, greater than 5% of the total GDP in a given year. Examples of strategic deposits in Mongolia include coal and copper deposits. Common minerals are those minerals whose concentrations are abundant in sediments and rocks and that might be used as construction material; an example is iron ore. Conventional minerals are those minerals that are not of strategic importance and are not classifiable as common minerals (Ernst & Young Global Ltd., 2012, p. 9).

The 15 deposits that the Government of Mongolia has classified as being of strategic importance include deposits of coal, copper, gold, phosphorite, silver, and zinc. If the Government funds the exploration work that determines proven reserves at a strategic deposit, the Government may claim up to 50% ownership in a joint venture formed to exploit the mineral deposit. If proven reserves in a strategic deposit have been determined through private funding sources, however, the Government may own only up to 34% of the shares of the investment made by the license holder (Ernst & Young Global Ltd., 2012, p. 9).

In 2011, Mongolia implemented the Fiscal Stability Law, which establishes fiscal policies designed to shield the economy from mining sector-related booms and busts. In December 2011, the country also passed the Integrated Budget Law, which defines the country's entire budget process and contains measures to support fiscal sustainability, and, in particular, the successful implementation of the Fiscal Stability Law (World Bank, The, 2013, p. 25).

On May 17, 2012, a law titled The Regulation of Foreign Investment in Business Entities Operating in Sectors of Strategic Importance (BESI) was introduced by the Mongolian Parliament. The law applies to businesses of strategic importance (primarily companies operating in the banking and finance, media and telecommunications, and mining sectors). The law requires Government approval for (a) transactions that involve the acquisition of, or the right to acquire, 33% or more of the shares of a BESI; (b) transactions that involve a foreign investor that has the right (as a result of a proposed acquisition in a BESI, irrespective of the percentage of equity interest) to appoint the executive management or a majority of the board, to veto decisions of the executive management or board of directors, or to determine or implement management decisions and (or) operations; and (c) transactions (as a result of a proposed acquisition involving a foreign investor, irrespective of the percentage of equity interest) that may potentially give rise to a monopoly over mineral products on international or domestic commodity markets, that may directly or indirectly influence the market price of mineral products exported from Mongolia, or that may result in a potential reduction in the shareholding interest of a foreign investor (Ernst & Young Global Ltd., 2012, p. 20).

## Production

In 2012, cement production decreased by 17.8% compared with that of 2011, and coal production decreased by 7.7%. The gross weight of iron ore production and the iron content contained in iron ore increased by 33.2% and 33.4%, respectively. Production of crushed stone increased by 148%; lime, by 51.1%; petroleum, 42.6%; zinc content of mine output, 13.8%; crude steel, 13.5%; and salt, 12.7% (table 1; National Statistical Office of Mongolia, 2013, p. 131–132).

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities. Most of the producing mining companies in Mongolia have mixed ownership between private international companies and the Mongolian Government or are primarily state owned, but there are also some that are wholly owned by foreign investors.

In 2012, a reported 61,661 people were employed by the country's industrial division compared with 57,506 in 2011. The industrial division included the mining and quarrying sector (which includes petroleum extraction), the manufacturing sector (which includes the production of unspecified nonmetallic mineral products, base metals, and fabricated metal products except machinery), and the power and water supply sector. The mining and quarrying sector employed 19,217 people in 2012 compared with 17,209 in 2011. Of this amount, 8,268 were

engaged in the mining of metal ores compared with 8,320 in 2011; 8,138 were engaged in the mining of coal and lignite and the extraction of peat compared with 5,887 in 2011; 1,963 were engaged in other unspecified mining and quarrying compared with 1,839 in 2011; and 848 were engaged in the extraction of crude petroleum compared with 1,163 in 2011 (National Statistical Office of Mongolia, 2013, p. 30, 107).

In 2012, a total of 430 active and 261 inactive mining and (or) quarrying establishments were registered with the Government compared with 383 and 130 establishments, respectively, in 2011. Fifty-seven of the establishments were reported not to have started activities compared with 41 in 2011; 177 had temporarily stopped activities compared with 41 in 2011, and 10 had permanently stopped activities compared with 3 in 2011; the status of the remaining 17 inactive establishments was reported as unknown. Of the 430 active establishments, about 60% were reported to have 1 to 9 employees, 13% had 10 to 19 employees, 10% had 20 to 49 employees, and about 16% had 50 or more employees (National Statistical Office of Mongolia, 2013, p. 107).

## Mineral Trade

In 2012, Mongolia had trade relations with 146 nations. China received virtually the total volume of exported coal, copper concentrate, iron ore, and zinc ores and concentrate. China was also the leading recipient of Mongolian exports in terms of value, accounting for about \$4.06 billion compared with \$4.4 billion in 2011, or 92.5% of the total value in 2012. China was followed by Canada and Russia, which accounted for \$117 million and \$79.6 million, respectively, or, when combined, about 4.5% of the total. The country had a trade deficit in 2012 of about \$2.3 billion compared with \$1.8 billion in 2011 (National Statistical Office of Mongolia, 2013, p. 93–95).

The value of industrial output in 2012, increased owing primarily to increases of between 0.1% and 42.6% in the value of exports of mine and quarry products, including concentrates and (or) ores of copper, fluorspar, gold, iron, petroleum, and zinc. The value of exported (unspecified) mineral products decreased by 9.06% to \$3.9 billion from \$4.3 billion in 2011 (National Statistical Office of Mongolia, 2013, p. 23–25; 93–95).

A total of 20.9 Mt of coal valued at \$1.9 billion was exported in 2012 compared with 21.3 Mt valued at \$2.3 billion in 2011. Of the coal exported in 2012, 98.9% was bituminous coal, which accounted for 98.2% of the total value. The volume of Mongolian copper exports remained practically unchanged in 2012, but their value decreased by 13.4% to \$839 million as 574,500 metric tons (t) of copper concentrate was exported compared with 575,900 t valued at \$969 million in 2011.

Other notable mineral exports in 2012 included 2.1 Mt of refined copper and copper alloys valued at \$16.6 million compared with 2.4 Mt valued at \$21 million in 2011; 428,900 t of fluorspar valued at \$102.5 million compared with 407,100 t valued at \$95.5 million in 2011; 2,800 kg of gold valued at \$122 million compared with 2,600 kg valued at \$109.8 million in 2011; and 4,300 t of molybdenum ore and concentrate valued at \$38.2 million compared with 4,200 t valued at \$46.7 million in 2011 (National Statistical Office of Mongolia, 2013, p. 76–97).

In 2012, China received 80.4% of Mongolia's molybdenum exports and the Republic of Korea received 17.4%, whereas in 2011 China received 40.6% and the Republic of Korea received 55.4%. Mexico received the remainder in both years. In 2012, Russia received 60.8% of Mongolia's fluor spar exports compared with 69.3% in 2011; China received 36.7% compared with 28%; Ukraine received 1.2% compared with 2.0%; and the Republic of Korea received 0.3% compared with 0.2% (National Statistical Office of Mongolia, 2013, p. 93–95).

## Commodity Review

### Metals

**Copper and Gold.**—The Oyu Tolgoi copper and gold mine is located in the Southern Gobi region and, in 2012, continued to be developed by Turquoise Hill Resources as the operation reached preproduction stage. The mine is based on a series of porphyry deposits containing copper, gold, silver, and lesser amounts of molybdenum that stretch for 26 kilometers (km) from the Hugo North deposit in the north through the adjacent Hugo South deposit, down to the Southern Oyu deposit and the Heruga deposits. Oyu Tolgoi was the country's flagship strategic deposit, and it was also ranked among the top three copper and gold mines in the world in terms of total reserves. The concentrator at the mine was commissioned in 2012. Development at the mine, however, had been mired in delays in recent years as the project moved towards commercial production from an original startup date of early 2009 (Ivanhoe Mines Ltd., 2012b, p. 20).

The Oyu Tolgoi mining district was initially explored by a joint Mongolian and Russian team that conducted a regional geochemical survey when the central deposit was first identified as a molybdenum anomaly. The team found evidence of alteration and copper mineralization in 1983. BHP Billiton Group (BHP) (then BHP Minerals) conducted exploration on the central and southern deposits between 1997 and 1999 but discontinued exploration owing to cutbacks in the company's exploration budget (Turquoise Hill Resources Ltd., 2013).

In May 2000, Ivanhoe Mines Ltd. (Ivanhoe) of Canada agreed to acquire the project from BHP by investing \$6 million in exploration in 7 years and by paying BHP \$5 million in cash. BHP retained the right to back in or to retain a 2% net smelter return (NSR). By February 2002, having closed a private placement of \$15 million, Ivanhoe had doubled its landholdings to a total of 33,600 square kilometers (km<sup>2</sup>) through the acquisition of mineral licenses. Ivanhoe earned 100% interest in the Oyu Tolgoi project after completing a \$3 million phase 1 exploration program and paying BHP \$5 million. By May 2002, the inferred resource estimate was 821 Mt grading 0.52 gram per metric ton (g/t) gold and 0.38% copper (Ivanhoe Mines Ltd., 2001; 2002a–c; 2003c, p. 9).

In June 2002, BHP's back-in rights to Turquoise Hill expired, leaving it with only the 2% NSR option. BHP's back-in rights to Turquoise Hill would have been exercisable, however, if 250 Mt of supergene copper mineralization grading at least 1% copper, or 300 Mt of hypogene mineralization grading at least 1% copper, had been identified by June 7. Ivanhoe completed more than 50,000 m of drilling at Turquoise Hill in 2002, but it

was not until November that drilling revealed mineralization in excess of 1% copper. By April 2002, the indicated and inferred resources for all four deposits at Oyu Tolgoi were estimated to be 1.55 billion metric tons (Gt) grading 1.02% copper and 0.34 g/t gold. In December, Ivanhoe reported that the Mineral Resources Authority of Mongolia (MRAM) had issued four mining licenses to the company for Oyu Tolgoi, which covered a total of 238 km<sup>2</sup>. In late September 2005, Ivanhoe estimated that it would cost \$1.2 billion to develop the mine and that the mine could produce more than 450,000 metric tons per year (t/yr) of copper and greater than 10,000 kilograms per year (kg/yr) of gold during a 40-year mine life; production was expected by early 2009 (Ivanhoe Mines Ltd., 2003a, b; 2005, p. 1; Turquoise Hill Resources Ltd., 2013).

In January 2006, Ivanhoe upgraded the southern Oyu open pit resources to proven and probable reserves totaling 930 Mt grading 0.5% copper and 0.36 g/t gold. Development drilling was ongoing to upgrade the Hugo Dummett inferred resource to measured and indicated. In April, about 100 citizens of Mongolia staged a sit-in protest regarding Ivanhoe's mining contract, demanding that the Government of Mongolia retain 51% ownership of the Oyu Tolgoi Mine instead of Ivanhoe owning the mine outright (as was the case at the time). In July 2006, the Mongolian Parliament approved the revised Minerals Law, which gave the Parliament the authority to acquire interests in mineral deposits classified as strategic (Ivanhoe Mines Ltd., 2006a, c; Pravda.ru, 2006).

In early September 2006, the Government established a working group to negotiate with Ivanhoe on a formal 30-year investment agreement that would confirm the tax, fiscal, and legal framework for the development of Oyu Tolgoi, but in mid-September, it was reported that the Government would seek to become a partner in Oyu Tolgoi in order to acquire up to a 34% share as a result of the recent legal changes. On October 18, 2006, Rio Tinto plc (Rio Tinto) agreed to acquire a 19.9% interest in Ivanhoe and Oyu Tolgoi for \$691 million. The companies would jointly develop the project. Under the agreement, Rio Tinto could increase its holding in Ivanhoe to 33.35% for a total of \$1.5 billion, and could eventually acquire up to 40% of the company (Ivanhoe Mines Ltd. 2006b, d).

As of 2009, the Mongolian Parliament had authorized the Government of Mongolia to conclude the Oyu Tolgoi investment agreement with Ivanhoe and Rio Tinto. During the intervening years, the companies had advanced the planning for the project's development, including capital estimates, procurement, design of the underground shaft, and other construction activities, and increased the project's mineral resource estimate, but projected startup of the mine was delayed. Under the investment agreement, the Government would become a partner in the development of the project and acquire a 34% interest in the Ivanhoe subsidiary OT LLC, which held the Oyu Tolgoi mining licenses. The Government's interest was to be held through the state-owned sovereign wealth resources company Erdenes MGL LLC, and Ivanhoe would own a 66% indirect interest in OT LLC (Ivanhoe Mines Ltd., 2012b, p. 2).

Ivanhoe and the Government agreed that because of the extent of the mineral discoveries and the potential for additional discoveries, the approved investment agreement should conform



with the provision of Mongolia's Minerals Law, which, at that time, specified that certain deposits of strategic importance qualify for 30 years of stabilized tax rates and regulatory provisions, with an option of extending the term of the investment agreement for an additional 20 years. Major taxes and rates that were to be stabilized for the life of the agreement included the corporate income tax, customs duty, excise tax, exploration and mining licenses, and immovable property and (or) real estate tax, royalties, and value-added tax.

In May 2010, Ivanhoe released an updated integrated development plan for Oyu Tolgoi and forecast annual production of 544,000 t/yr of copper and greater than 20,000 kg/yr of gold for the first 10 years of operation. The mine life was then estimated to be 27 years based only on reserves or 59 years based on reserves and an upgrade of the inferred resources. In June, Rio Tinto confirmed that it would increase its ownership in Ivanhoe to 29.6% by acquiring 46 million shares at a cost of \$393 million, and full-scale construction was commenced at Oyu Tolgoi. Rio Tinto increased its stake in Ivanhoe to 34.9% in September 2010 (Ivanhoe Mines, Ltd., 2010a; 2010b, p. 1–5; Politics.co.uk, 2010).

In December 2010, as part of a new financial agreement between Ivanhoe and Rio Tinto, Rio Tinto would manage the Oyu Tolgoi project with the aim of bringing it online in late 2012. The companies continued to work on completing a project financing package for Oyu Tolgoi of up to \$3.6 billion. By mid-December, Rio Tinto reported a total capital cost projection of \$5.9 billion for phase 1 of the project. The revised agreement, which was signed by Ivanhoe and Rio Tinto in December, established that Rio Tinto would manage the core operations and that Ivanhoe would manage the exploration activities in the noncore area (defined as the area beyond a 200-m buffer from resources defined within the investment agreement as core operations) (Rio Tinto plc., 2010a, b; 2011a, p. 10; Ivanhoe Mines Ltd., 2012b, p. 2, 4).

In March 2011, Rio Tinto agreed to purchase 15 million shares in Ivanhoe for \$232.4 million. The financing provided by Rio Tinto was being used for ongoing development at Oyu Tolgoi and to secure long-lead-time equipment. The same month, Ivanhoe reported that Oyu Tolgoi was expected to produce an average of greater than 93,000 kg/yr of silver during its first 10 years of commercial production. Rio Tinto increased its stake in Ivanhoe to 48.5% in August. Ivanhoe reported that Oyu Tolgoi's phase 1 mine was on track to begin initial production from the open pit in late 2012 and to ramp up to commercial production in the first half of 2013 (Business-Mongolia.com, 2010; Ivanhoe Mines, Ltd., 2011; Rio Tinto plc, 2011b, c).

In late September 2011, media reports quoted a Minister of the MRAM as indicating that Ivanhoe and Rio Tinto would receive a letter from the Government asking the companies to consider entering into discussions regarding a change to the investment agreement that would increase the Government's share in Oyu Tolgoi to 50% by purchasing an additional 16% at fair market value at some future point, after Ivanhoe and Rio Tinto recouped their capital investments in the project. Ivanhoe stated that the existing investment agreement for the Oyu Tolgoi project was a legally binding contract and that the company would not agree to the Government's plans to increase

its interest in the project. In October 2011, Ivanhoe and Rio Tinto advised the Mongolian Government that they would not renegotiate the terms of the Oyu Tolgoi investment agreement. The companies had also written to the members of Mongolia's National Security Council requesting assistance to ensure the Government's full and immediate support for the agreement. Later reports in January 2012 indicated that the Government might suspend development of the Oyu Tolgoi deposit (as well as the Tavan Tolgoi coal project) until the summer of 2012 to avoid political and economic problems associated with the projects, as the country was scheduled to have Parliamentary elections in June (Kosich, 2007; French and Ferreira-Marques, 2012; Ivanhoe Mines Ltd., 2012a).

In March 2012, Ivanhoe completed an integrated development and operations plan for commercial production, which was to begin in the 4th quarter of 2012 with the ore sourced mainly from the Southern Oyu open pit. Underground infrastructure and mine development would continue for the Hugo North underground block cave deposit. Stockpiling would allow the higher grade ore from Hugo North to displace the open pit ore gradually as the underground production ramped up to 85,000 metric tons per day (t/d). The production rate following the phase 2 expansion would be 58 Mt/yr, and production was projected to total 11.3 Mt of copper and nearly 386,000 kg of gold during 27 years of mine life (Ivanhoe Mines Ltd., 2012b, p. 398).

As of September 2012, initial production from the open pit operation was expected to begin in late 2012. Commercial production was anticipated to start in the first half of 2013, with full production, including underground mining, set to begin in 2018. The company was completing a feasibility study for the underground portion of the project. Completion of the underground project would boost mill capacity to 160,000 t/d from 100,000 t/d.

In October 2012, Ivanhoe rejected another request from the Government of Mongolia to renegotiate the Oyu Tolgoi investment agreement. In November 2012, Turquoise Hill Resources announced that it had signed a power purchase agreement with the Inner Mongolia Power Corp. to supply power to the Oyu Tolgoi Mine. In December 2012, the Oyu Tolgoi concentrator was commissioned. The company expected to process the first ore through the concentrator by yearend, followed by concentrate production 1 month later and commercial production in another 3 to 5 months (Turquoise Hill Resources, 2012a, b).

### *Mineral Fuels and Related Materials*

**Coal.**—In 2012, coal production accounted for about 30% of the mineral sector's contribution to the GDP; 75% of the extracted coal was exported. The predominant type of coal in Mongolia is lignite, which is found in the eastern and middle portions of the country. Bituminous coal is found in southern and western Mongolia, and subbituminous coal is found in the central and northern regions. Mongolian coal ranges in age from late Carboniferous to Early Cretaceous. Late Carboniferous coal is found in the west whereas Middle Jurassic coal is found throughout the country, and late Permian to Early Cretaceous

coal is found in the central, eastern, and northern portions of Mongolia (Erdenetsogt and others, 2009; National Statistical Office of Mongolia, 2013, p. 61).

Mongolia has at least 200 coal deposits and occurrences and perhaps as many as 300. The combined estimated resources at 26 of the known deposits account for about 12.9 billion metric tons (Gt) of coal. Another of the country's coal deposits is the unexploited Tavan Tolgoi coal deposit. This deposit alone contains a reported 6.4 Mt of coking coal resources and is classified as a strategic mineral deposit (Coal Mongolia, 2012, p. 21–23).

Reports released in 2011, indicated that an initial public offering (IPO) for Tavan Tolgoi would take place by yearend 2011 or in early 2012. The state-owned mining company Erdenes Tavan Tolgoi Co. had sought to secure investors for infrastructure development for the proposed project, including the coal handling and processing plants, transport facilities, and water supply. China's Shenhua Group Corp. had won a 40% stake to develop the project before the Government of Mongolia suspended the sale and decided to retain ownership of 50% of the project. As a result, the West Tsankhi area of the Tavan Tolgoi deposit had been at the center of protracted negotiations between the Government and companies that included Peabody Energy Corp. of the United States, OAO Russian Railways of Russia, and Shenhua Group. Reviews of the agreement that would have given Shenhua a 40% share, Peabody a 24% share, and Russian Railways a 36% share led to controversy within the country, with politicians calling for the Government to develop the coalfield itself, as well as among companies from other countries, including Japan and the Republic of Korea, that were interested in developing the project. As of yearend 2012, the Government indicated that a decision on the granting of rights to develop Tavan Tolgoi's western block would not be made before 2013 (Thomson Reuters, 2010; Asia Miner, The, 2012).

## Outlook

In its April 2013 Mongolia Economic Update, the World Bank reported that it had revised downward its estimate of the growth of Mongolia's GDP for 2013 to 13% based on negative export growth, decreased foreign direct investment inflows to Mongolia, and a sluggish first-quarter economic recovery in China. Uncertainty about the success of, or any potential delays or disruptions in, the rampup of production at the Oyu Tolgoi Mine could have a large adverse impact on Mongolia's economic outlook (World Bank, The, 2013, p. 3).

Public investment projects that were planned to be funded using proceeds from the Chinggis bonds were another source of uncertainty with respect to the country's economic growth. These large-scale projects would require significant time for planning and feasibility assessment and the likelihood that significant upfront investment using the bond proceeds seems small. It was thought that any large extra public investment expenditure using the proceeds from the Chinggis bonds could add to inflationary pressure and stifle private investment, thereby limiting growth (World Bank, The, 2013, p. 3).

In February 2013, talks were expected to take place between Rio Tinto and the Mongolian Government to resolve concerns that spending at Oyu Tolgoi was ballooning and that the country

was not benefiting sufficiently from the development of the project. The cost of developing the Oyu Tolgoi Mine had increased to \$6.6 billion, and the Government sought to exercise increased control.

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2008	2009	2010	2011	2012
Cement, hydraulic	270	235	323	426	350
Coal, unspecified	9,692	13,164	25,246	30,940	28,561
Copper:					
Mine output, Cu content	126,796	129,800	124,985	121,590	121,660
Metal, refined	2,587	2,470	2,746	2,390	2,282
Fluorspar:					
Acid grade	116	115	141	116	116
Submetallurgical and other grade	219	344	259	232	230
Total	335	459	400	348 <sup>r</sup>	346
Gold, mine output, Au content	15,184	9,803	6,037	5,703	5,995
Iron ore:					
Gross weight	1,387	1,380	3,203	5,678	7,561
Iron content	800 <sup>r</sup>	800 <sup>r</sup>	1,900 <sup>r</sup>	3,400 <sup>r</sup>	4,537
Lime, hydrated and quicklime	55	43	50	45	68
Molybdenum, mine output, Mo content	1,780	2,140	2,198	1,960	1,904
Petroleum, crude	1,174	1,870	2,181	2,549	3,636
Salt, mine output	1,176	1,402	1,861	2,183	2,461
Silver, mine output, Ag content	28,890	29,321	28,710	28,254	27,982
Steel, crude	81,400	50,100	64,200	60,000	68,100
Stone, crushed	103	123	101	94	233
Tungsten, mine output, W content	142	39	20	20	20
Zinc, mine output, Zn content	143,600	141,500	112,600	104,700	119,100

<sup>r</sup>Revised. do. Ditto.

<sup>1</sup>Table includes data available through November 20, 2013.

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

TABLE 2  
MONGOLIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities <sup>1</sup>	Annual capacity <sup>c</sup>
Calcium oxide	Qinhua MAK Naryn Sukhait LLC (Mongolia-China joint venture)	316 km from Ulaanbaatar at the Olon Ovoot station of the Trans Mongolian Railway	50
Cement	Khutul Cement and Lime Factory	Darhan, Darhan-Uul Aymag	500
Coal	Baganuur Joint Stock Co. (Government, 51%, and public, 49%)	Baganuur Mine, Tov Aymag	3,000
Do.	Government, 95%, and public, 10%	Shivee Ovoo Mine, Dornogovi and Govisumber Aymag, 20 km from Choir City	2,000
Do.	SouthGobi Energy Resources Ltd. (Turquoise Hill Resources Ltd., 57.6%)	Ovoot Tolgoi Mine, Omnogovi [South Gobi] Aymag	4,600
Do.	do.	Tsagaan Tolgoi, Dornogovi Aymag, 95 km north of the Chinese border	3,000
Do.	Mongolian Mining Corp., 100%	Ukhaa Khudag Mine, Omnogovi Aymag, 61 km east of Dalanzadgad	8,600
Do.	MAK Mongolyn Alt Group, 100%	Naryn Sukhait mines, Gurvantes Soum, Omnogovi Aymag	3,000
Do.	Guilford Coal Ltd., 100%	South Gobi Mine, Omnogovi Aymag, 50 km east of Naryn Sukhait	3,000
Do.	Mongolian Mining Corp., 100%	Baruun Naran Mine, Omnogovi Aymag, 61 km east of Dalanzadgad	3,000
Copper, Cu in concentrates	Samsung Corp., 51%, and Erdenet Mining Corp. (Mongolia-Russia joint venture), 49%	Erdenet Ovoo open pit mine and processing plant, Bulgan Aymag, 180 km east of Darkhan city	140
Do.	Turquoise Hill Resources Ltd., 66%, and Government, 34%	Oyu Tolgoi Mine, Omnogovi Aymag, 80 km north of the Chinese border	420
Do.	Mongolyn Alt Corp., 100%	Tsagaan Suvarga Mine, Omnogovi Aymag, 560 km southeast of Ulaanbaatar	70
Copper, Cu in cathodes	Erdenet Mining Corp. (Mongolia-Russia joint venture), 51%, and Strand Holdings Ltd., 49%	Erdmin solvent extraction-electrowinning plant	3
Fluorspar	Mongolrostsvetmet LLC	Bor-Undur Mine and processing plant, Hentiy Aymag, 310 km southeast of Ulaanbaatar; 2 underground and 3 open pit mines	450 <sup>2</sup>
Do.	do.	Urgen Mine, Dornogovi Aymag, 535 km from Ulaanbaatar	100 <sup>2</sup>
Gold, Au in concentrates	Zinjin Mining Group Co. Ltd., 70%	Nari Tolgoi gold mine, Jierigron Sumu, Tov Aymag	90 <sup>2</sup>
Do.	North Asia Resources Holdings Ltd.	Khar Yamaat placer mine, 180 km north of Ulaanbaatar	NA
Do.	Mongolian Resource Corp. Ltd., 90%	Blue Eyes Mine, Bornuur Soum, Tov Aymag	36 <sup>2</sup>
Do.	thousand cubic meters Mongolrostsvetmet LLC	Zaamar placer gold operation, Tov Aymag, 240 km southwest of Ulaanbaatar	300
Do.	do. do.	Zeregtsee placer mine, 240 km southwest of Ulaanbaatar	500
Do.	Turquoise Hill Resources Ltd., 66%, and Government, 34%	Omnogovi Aymag, 80 km north of the Chinese border	420
Iron, Fe, in concentrates	Lung Ming Mining Co. Ltd., 66.7%, and China Investment Corp., 33.3%	Eruu Gol Mine	2,500
Lead	Shandong Xianglong Co Ltd	Tsav Mine, Dornod Aymag Ulaanbaatar	117 <sup>2</sup>
Limestone	MAK Mongolyn Alt Group, 100%	14 km from the Olon Ovoot station of the Trans Mongolia railway	NA
Molybdenum	Erdenet Mining Corp. (Mongolia-Russia joint venture) (Mongolia-Russia joint venture)	Erdenet Ovoo open pit mine and processing plant, Bulgan Aymag, 180 km east of Darkhan city	3,000
Do.	Turquoise Hill Resources Ltd., 66%, and Government, 34%	Omnogovi Aymag, 80 km north of the Chinese border	NA

See footnotes at end of table



TABLE 2—Continued  
MONGOLIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities <sup>1</sup>	Annual capacity <sup>2</sup>
Silver	Turquoise Hill Resources Ltd., 66%, and Government, 34%		Omnogovi Aymag, 80 km north of the Chinese border	93
Steel	Darkham metallurgy plant		Darhan, Darhan-Uul Aymag	100
Tungsten	Samsung Corp., 51%, and Erdenet Mining Corp. (Mongolia-Russia joint venture), 49%		Erdenet Ovoo open pit mine and processing plant, Bulgan Aymag, 180 km east of Darkhan city	140
Zinc	Tsairt Minerals Co. Ltd. (China-Mongolia joint venture)		Sukhe Bator, Suhbaatar Aymag	70
Do.	Shandong Xianglong Co. Ltd.		Tsav Mine, Dornod Aymag Ulaanbaatar	117 <sup>2</sup>
Do.	metric tons	China Nonferrous Metals Group, 51%, and Government, 49%	Tumurtiin Ovoo Mine, Suhbaatar, 180 km southwest of Choibalsan	34,000

<sup>2</sup>Estimated. Do., do. Ditto. NA Not available.

<sup>1</sup>Abbreviations used for units of measure in this table include the following: km—kilometer.

<sup>2</sup>Mill capacity.