



# 2009 Minerals Yearbook

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## NORTH KOREA

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# THE MINERAL INDUSTRY OF NORTH KOREA

By Lin Shi

Among North Korea's identified mineral resources, deposits of coal, iron ore, limestone, and magnesite were larger than those of the other mineral commodities. Coal-fired and hydroelectric powerplants were North Korea's predominant domestic sources of commercial energy, and about 6% of primary energy consumption was from imported crude oil. The mined minerals and the mineral products were used primarily for domestic industrial and military purposes and to earn foreign currencies. The country lacked economic resources of petroleum (U.S. Library of Congress, 2007, p. 9-10).

On December 1, 2008, North Korea had restricted access to the Kaesong Industrial Zone (KIZ)—a region where some value-added mineral processing and mineral commodity trading took place—and demanded that most of the Republic of Korea employees working there leave. The KIZ project was one of the major joint economic projects between the Republic of Korea and North Korea. The project was intended to combine the Republic's capital and technology with North Korea's land and labor to bring economic benefits to both. The total value of inter-Korean trade was about \$11 billion from 1998 to 2008. Strained inter-Korean relations and the economic recession, however, reduced the trade to \$5.35 million between January and May 2009, which was a 27.1% decrease from its value of \$7.34 million for the same period in 2008. As of the end of June, the 109 factories operating in the KIZ were employing 40,000 workers from North Korea and 1,000 workers from the Republic of Korea (Foreign & Commonwealth Office, 2010; Ministry of Unification, 2010a, b).

## Minerals in the National Economy

North Korea hosts sizable deposits of various minerals, and its mineral sector was one of the important components of the country's economy. Although the sector's production capacity was limited by its restricted financial and technical resources, the sector supported the country's military expenses, industrial requirements for raw materials, and human consumption of those materials. According to the Bank of Korea, North Korea's gross domestic product (GDP) growth rate decreased by 0.9% in 2009, which represented a negative economic growth for the year; the decrease was owing to decreases in production in the agricultural and manufacturing sectors, which were caused by the severe cold weather; a lack of supplies of manufacturing raw materials, including needed mineral commodities; insufficient electricity; and monetary constraints (InstaForex Companies Group, 2010).

## Production

Compared with that of 2008, the value of mining production in 2009 decreased by 0.9%. Production of metallic minerals also decreased; however, production of coal and nonmetallic minerals increased. The value of output in the manufacturing

sector decreased by 3%; the value of the utility sector's (including electricity, gas, and water) production remained unchanged, and the value of output in the construction sector increased by 0.8% (InstaForex Companies Group, 2010).

From April 20 to September 16, North Korea launched the "150-Day Battle" to boost the nation's economy, and production in the metal industries was reported to have increased by several times compared with the same period in previous years. Energy producers reportedly generated several hundred million kilowatt-hours of electricity, coal production was reported to have increased by 150%, and the production of cement and other construction materials was reported to have increased by 140%. It was rumored, however, that many construction projects were suspended during the Battle owing to lack of construction materials, and many factory workers were idled. Additional "battles" were initiated after the 150-Day Battle, which indicated that the Government's goal was not met directly during the initial 150 days (Institute for Far Eastern Studies, 2009).

## Structure of the Mineral Industry

North Korea's mineral industry comprised a coal mining sector, an industrial mineral mining and processing sector, and a ferrous and nonferrous metals mining and processing sector. As shown in table 2, most of the large-scale mining and mineral-processing enterprises in North Korea were owned and operated by the central Government. Provincial and local governments owned and operated various small- and medium-scale mining and mineral processing facilities. China, Egypt, the Republic of Korea, and other countries participated in joint ventures with North Korea for the development and operation of cement, coal, copper, gold, graphite, iron ore, lead and zinc, magnesite, and molybdenum production facilities in North Korea. The country's nuclear energy industry was the subject of major international political discord because of suspicions that the production was used to produce nuclear weapons. Disclosures about North Korea's nuclear weapons program raised international protests and have delayed the development of nuclear energy within the country (U.S. Library of Congress, 2007, p. 9-10).

## Mineral Trade

In 2009, China remained North Korea's leading trading partner; total trade between the two countries was valued at \$2.67 billion, followed by the Republic of Korea (\$1.68 billion), Brazil (\$221 million), and other traditional Asian trading partners, including Singapore. North Korea's trade with Thailand has decreased in recent years (Asia Times, 2010).

More than 58% of North Korea's total exports consisted of minerals and mining products, and the majority of North Korean trading companies were involved in the export of such minerals

as coal and iron ore. In 2009, the Government authorities were restructuring the mineral export companies to further control the country's abundant mineral resources, and the time required for approval of mineral exports was lengthened (Radio Free Asia, 2009).

The only official North Korean trade organization, the Korean Friendship Association (KFA), had trading offices in China, Indonesia, and Russia that exported mineral commodities, such as coal, sand, and steel products. The exports went through Chinese ports, and the export earnings helped pay for North Korea's large imports of chemical fertilizers and petroleum from China (Korean Friendship Association, 2009).

North Korea was still limiting foreign investment in its mining sector, and the North Koreans were limited in terms of who could trade with foreigners. China has made large numbers of investments inside North Korea, and it was the leading market for North Korean exports.

## Commodity Review

### Metals

**Copper.**—Korea Mining Development Trading Corp. (KOMID) and a Chinese firm entered into a joint-development agreement to develop a copper mine at the estimated 400,000-metric-ton (t) copper deposit in Hyesan. They hired Chinese NHI Shenyang Mining Machinery to build the facilities for the mine. On April 13, 2009, the United Nations (UN) Security Council condemned North Korea's rocket launch of April 5, demanding an end to further launches and calling for expanded sanctions against North Korea; as a result, KOMID was blacklisted. Because the Chinese Government agreed to the UN sanctions, the construction of facilities for the Hyesan copper mine was halted at a late stage. Copper production at the mine had originally been scheduled to start in September 2009 (Choson Ilbo, 2009).

**Iron and Steel.**—According to the Ministry of Unification, North Korean steel production doubled in May because of the use of a manufacturing process that uses domestically mined anthracite rather than expensive imported coke (Institute for Far Eastern Studies, 2009). In 2007, the Government of North Korea had granted development rights for the Musan iron ore mine to China's Tonghua Iron & Steel Group for a period of 50 years. In 2009, the Government terminated that agreement without offering any reason. Under the previous agreement, Tonghua had reportedly agreed to invest about \$1 billion in the mine and had also planned to produce 10 million metric tons per year (Mt/yr) of iron ore. Of the total investment, about \$240 million was for building roads and railways from Musan to Tonghua. The Musan Mine was located close to the border with China (Economic Times of India, 2010).

**Magnesium Compounds.**—Quintermina AG of Switzerland was marketing North Korea's magnesite to foreign customers. Headquartered in Switzerland, Quintermina was a joint venture between RHI AG, Vienna (51%) and Goldenboat Holding AG (49%). Quintermina exported dead-burned magnesia and caustic calcined magnesia from North Korea to European customers (Quintermina AG, 2009).

The magnesite resources of North Korea were an extension of the magnesite-talc belt that originated in Haicheng, Liaoning Province, China, and included estimated resources of 3,000 million metric tons (Mt) of sparry magnesia. The magnesite ore was mined by Korea Magnesia Clinker Industry Group (KMCIG) from one open pit (Daehung) and two underground mines (Pyong Yang and Paek Bai), which had a combined dead-burned magnesia capacity of 1.2 Mt/yr. Challenges related to North Korea magnesite production included a lack of fuel and power supplies, inadequate transportation, and a lack of modern technology (Quintermina AG, 2009).

### Industrial Minerals

**Sand and Gravel.**—The volume of inter-Korean trade in sand had rapidly increased in 2007 and 2008. In 2009, the Government of the Republic of Korea tightened rules on imports of sand from North Korea because North Korean sand had been rumored to be linked to the country's military. These concerns, especially after the military launched a long-range rocket in April, prompted Seoul to ban local sand importers from traveling to North Korea. North Korea had exported \$73.35 million worth of sand to the Republic of Korea in 2008, and the Government was trying to compensate for the Republic of Korea's decision to stop the imports by seeking alternative sand markets in Russia (Yonhap News Agency, 2009). In an effort to retain trade with the Republic of Korea, the Government offered to provide sand to companies in the Republic of Korea in exchange for other building materials and fuel (Oliver and Jung-a, 2010). Specifically, the Government offered to exchange sand, resource licenses, and long-term rental income in return for concrete, fuel, and steel. Because of the UN sanctions, North Korea was facing a financial crisis, and the Government asked China and the Republic of Korea to invest \$320 million in a construction project in Pyongyang. The Government was also seeking 219,990 barrels (30,000 t) of diesel and gasoline, 300,000 t of cement, and 50,000 t of steel bars from foreign sources (Sangim Han, 2010).

### Mineral Fuels

**Coal.**—Anthracite exports to China from North Korea increased in 2009 and reached a record of about 646,000 t in June. North Korea was China's second ranked anthracite supplier; the sales increased by 111% to 2.36 Mt in the first half of the year. Although some of the additional coal was used by domestic smelters and steel mills, coal shortages continued, and many of North Korea's thermal powerplants remained inoperative. As a result, about two-thirds of the nation's industrial capacity remained unproductive (Hornby, 2009).

### Outlook

The UN sanctions continued to put pressure on the North Korean Government as access to finance remained limited, resulting in fuel and food shortages. The nation is expected to aggressively seek to attract foreign capital and to develop mines and sell minerals.

North Korea and its bordering countries of China, the Republic of Korea, and Russia are planning to build a cross-border railway link between Rajin in North Korea and the Chinese border city of Hunchun, and to rebuild a railway line between Rajin and Russia's border town of Khasan. The Republic of Korea would help develop the Rajin-Khasan railway and Rajin Port, from which goods could be delivered to Europe (Jong-Heon, 2009).

North Korea's stated goal is to become a "strong and powerful nation" by 2012, and to resolve the nuclear stalemate. To accomplish these goals North Korea is developing new mines and improving existing mines (Musan, Taehung Youth Hero, Komdok Minging Complex, and Ryongyang) and steel mills (steel factories and refineries) and developing the free trade zone.

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TABLE 1  
NORTH KOREA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity <sup>3</sup>		2005	2006	2007	2008	2009 <sup>c</sup>
<b>METALS</b>						
Cadmium metal, smelter		200	200	200	200	200
Copper:						
Mine output, Cu content		12,000	12,000	12,000	12,000	12,000
Metal:						
Smelter, primary and secondary		15,000	15,000	15,000	15,000	15,000
Refinery, primary and secondary		15,000	15,000	15,000	15,000	15,000
Gold, mine output, Au content	kilograms	2,000	2,000	2,000	2,000	2,000
Iron and steel:						
Iron ore and concentrate, marketable:						
Gross weight	thousand metric tons	5,000	5,040	5,130	5,316 <sup>4</sup>	5,300
Fe content	do.	1,400	1,400	1,400	1,488 <sup>4</sup>	1,500
Metal:						
Pig iron	do.	900	900	900	900	900
Ferroalloys, unspecified	do.	10	10	10	10	10
Steel, crude	do.	1,070	1,180	1,230	1,279 <sup>4</sup>	1,300
Lead:						
Mine output, Pb content		13,000	13,000	13,000	13,000	13,000
Metal:						
Smelter, primary and secondary		13,000	13,000	13,000	13,000	13,000
Refinery, primary and secondary		9,000	9,000	9,000	9,000	9,000
Silver, mine output, Ag content		20	20	20	20	20
Tungsten, mine output, W content		650	900	250	350	350
Zinc:						
Mine output, Zn content		67,000	67,000	70,000	70,000	70,000
Metal, primary and secondary		72,000	72,000	75,000	75,000	75,000
<b>INDUSTRIAL MINERALS</b>						
Cement, hydraulic	thousand metric tons	5,700	6,160	6,130	6,415 <sup>4</sup>	6,400
Fluorspar		12,500	12,500	12,500	12,500	12,500
Graphite		30,000	30,000	30,000	30,000	30,000
Magnesium:						
Magnesite, crude		40,000	60,000	55,000	150,000	150,000
Magnesium compounds	thousand metric tons	346	345	350	350	350
Nitrogen, N content of ammonia	do.	100	100	100	100	100
Phosphate rock		300,000	300,000	300,000	300,000	300,000
Salt, all types		500,000	500,000	500,000	500,000	500,000
Sulfur	thousand metric tons	42	42	42	42	42
Talc, soapstone, pyrophyllite		50,000	50,000	50,000	50,000	50,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal:	thousand metric tons	23,500	23,000	24,100	25,060 <sup>4</sup>	25,000
Coke	do.	2,000	2,000	2,000	2,000	2,000

<sup>1</sup>Revised. do. Ditto.

<sup>1</sup>Estimated data are rounded to no more than three significant digits.

<sup>2</sup>Table includes data available through June 30, 2010.

<sup>3</sup>In addition to the commodities listed, crude construction materials, such as sand and gravel and other varieties of stone, and refined petroleum products and rare earths presumably are produced, but available information is inadequate to make reliable estimates of output.

<sup>4</sup>Reported figure.

TABLE 2  
NORTH KOREA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity <sup>c</sup>
Cement	Sunchon Cement Complex	Sunchon, Pyongannam Province	3,000
Do.	Samgwong Cement Complex (Orascom Construction Industries of Egypt, 50%)	Samgwong, Kangwon Province	2,500
Do.	Gomusan Cement Factory	Cheongjin, Hamgyongbuk Province	2,000
Do.	Cheonnaeri Cement Factory	Cheonae, Hamgyongnam Province	1,000
Coal	Anju Coal Mining Complex and Sunchon Coal Mining Complex	Anju, Kaechon, Pukchang, Sunchon, and Tokechon, South Pyongan (Pyongannam) Province; and North Pyongan (Pyonganbuk) Province	9,500
Do.	Saebyo Coal Mining Complex and Northern Coal Mine Enterprise	Saebyo, North Hamgyong (Hamgyongbuk) Province	6,000
Copper, mine output, Cu content	Hyesan Youth Copper Mine (51% owned by Luanhe Industrial Group and another unnamed Chinese company)	Hyesan, Yanggang Province	13
Gold, mine output, Au content	kilograms Gumsan (Kumsan) Joint Venture Co.	Sierra near Changjin northwest of Hamgyongbuk Province	530
Graphite	Yeongchon Graphite Mine (Joint venture of Korea Resources Corp. and Government of North Korea)	Yeongchon, Yonan County, South Hwanghae Province	3
Iron ore, concentrate, gross weight	Ministry of Metal and Machinery, Department of Mines, Musan Iron Ore Mine Complex	Near the town of Musan, Hamgyongbuk Province	10,000
Do.	Unryul Mine	Unryul, Hwanghaenam Province	1,000
Lead:			
In concentrate	Korea Zinc Industrial Group	Komdok, near Tanchon, Hamgyongnam Province	20
Refined	do.	Munpyong, Kangwon Province	32
Magnesite, concentrate, gross weight	Korea Magnesia Clinker Industry Group (KMCIG)	Daehung and Ryong Yang, Hamgyongnam Province; Paek Bai near Kim Chaek, Hamgyongbuk Province	2,500
Magnesia clinker	Korea Magnesia Clinker Industry Group (KMCIG), Quintermina AG, Switzerland	Danchon and Daehung, Hamgyongnam Province; Song Jin, Hamgyongbuk Province	1,200
Steel, crude			
Do.	Kim Chaek Iron and Steel Complex (Ministry of Metal and Machinery)	Chongjin, Hamgyongbuk Province	2,400
Do.	Hwanghae (Hwanghai) Iron Works	Songnim, Hamgyongbuk Province	1,500
Do.	Kangson Works	Kangson, Hwanhaebuk Province	960
Do.	Chullima Steel Works	Nampo, Pyungnam Province	760
Zinc:			
In concentrate	Korea Zinc Industrial Group	Komdok near Tanchon and Sankok near Kowon, Hamgyongnam Province; Nakyong, Hwanhaenam Province	80
Refined	do.	Munpyong, Kangwon Province; Tanchon, Hamgyongnam Province	100

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto.