



2010 Minerals Yearbook

NORTH KOREA

THE MINERAL INDUSTRY OF NORTH KOREA

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Minerals mined in North Korea in 2010 included coal, gold, iron ore, limestone, magnesite, and zinc. Coal-fired powerplants were one of the country's main sources of commercial energy. Petroleum for domestic consumption came almost entirely from imports. The country exported minerals and metallurgical products and imported coking coal, petroleum, and machinery and mining equipment. The mined minerals and the mineral products were used primarily for domestic industrial and military purposes and also to earn foreign currency. North Korea exported magnesia clinker, which was used as a refractory material (U.S. Central Intelligence Agency, 2012).

North Korea has maintained membership in several multilateral organizations, including the United Nations (UN). Inter-Korean relations deteriorated after March 26, 2010, when North Korea was accused of attacking of the Republic of Korea's warship, the *Cheonan*, and only the Kaesong Industrial Complex remained operating as an economic link between North Korea and the Republic of Korea (U.S. Department of State, 2010).

Government Policies and Programs

On the last day of November 2009, North Korea launched a currency reform program, which includes implementing new laws to regulate the possession and use of foreign currencies. The new policies increased inflation, and led to increased incidences of confiscation of the operating capital of private traders and others working outside of state-controlled sectors of the economy (Noland, 2010; U.S. Department of State, 2010).

In 2010, the United Nations tightened sanctions to restrict North Korean exports and to further restrict the country's access to international credit. North Korea created its first State Development Bank to attract foreign funds to revive its economy. This Pyongyang-based bank was to invest in major projects and act as a commercial bank, and the Taepung International Investment Group (Taepung) would be responsible for attracting funds from overseas to the bank. North Korea's Second Economic Committee set up Taepung as a multilateral agency that was to be headquartered in Pyongyang and to have offices in mainland China and Hong Kong. Besides Taepung, the bank's Board of Directors was made up of members of the National Defense Commission, the Korea Asia-Pacific Peace Committee, the finance ministry, and two independent directors (Chosun Ilbo, The, 2010; Green, 2010).

Minerals in the National Economy

North Korea hosts deposits of various minerals, and its mineral sector was a significant component of the country's economy. Although the mineral industry's production capacity was limited by the county's restricted financial and technical resources, the mineral industry supported the country's military

expenses, as well as met its industrial requirements for raw materials. The North Korean Government controlled the Nation's economy, including mining activity and the financial market. The disproportionately large share of the gross domestic product that North Korea devoted to its military was a major factor in North Korea's poor economic performance, and in 2010, the country's efforts to control inflation were unsuccessful (U.S. Department of State, 2010).

Production

No reliable official reported data on the mineral production in North Korea were available, and the data in table 1 were estimated from several sources of trade data. Changes in iron ore production by the multiple small- and medium-scale Chinese-North Korean joint ventures were generally small and fluctuated according to the demand of the factories along the border of North Korea and the Chinese Provinces of Jilin and Liaoning. The majority of Chinese investors in North Korea were privately owned companies and enterprises owned by Provincial and local governments (Kim, 2011).

Some of North Korea's metal mines, including a number of copper and zinc mines, were damaged by flooding in recent years, including massive flooding in the summer of 2010. The country's new light-water reactor was expected to produce nuclear fuels.

Structure of the Mineral Industry

North Korea's mineral industry included a coal mining sector, a ferrous and nonferrous metals mining and processing sector, and an industrial minerals mining and processing sector. 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 being 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 (BBC News, 2011).

Mineral Trade

Table 3 shows export data from North Korea; the data were compiled using export receipt data. The table illustrates the

importance of China as a trade partner and the importance of North Korean coal and iron ore as sources of export earnings. The majority of North Korean trading companies were involved in the export of such minerals as coal and iron ore, and about 60% of North Korea's total exports consisted of minerals and mining products. The Government restructured the mineral export companies in 2009 to further control the country's abundant mineral resources; as a result, the time required for approval of mineral exports was lengthened (Radio Free Asia, 2009).

In 2010, North Korea established the first joint-venture company in its Rason free economic and trade zone, which is located at the border area of China, North Korea, and Russia. Through development of the free zone, North Korea was seeking increased foreign trade and investment, including by increasing tourism, exports, and the movement of international freight through the zone (UPI Asia.com, 2010).

North Korea's exports of sand to the Republic of Korea was an economic project between the two countries, and the Republic of Korea had brought more than 38 million metric tons (Mt) of sand from North Korea since 2004, mostly from Haeju in southwestern North Korea. In May, the Republic of Korea announced a suspension of the sand trade with North Korea and also closed its territorial waters to North Korean ships (Kim, 2011).

The overseas funds and financial resources of the North Korean firms Korea Mining Development Trading Corp., Korea Ryongbong General Corp., and Tanchon Commercial Bank were frozen under UN Security Council Resolutions 1718 and 1874 in 2009. These three firms were suspected of supporting development of North Korea's nuclear technology and missile technology, and they had already been under U.S. Government sanctions because of their suspected illicit trade with Iran, Yemen, and Pakistan (Chosun Ilbo, The, 2009).

In 2010, North Korea exported approximately 4 Mt of minerals to China, and this export volume was expected to triple in 2011. North Korea exported mainly anthracite coal to China (Yonhap News Agency, 2011).

Commodity Review

Metals

Nearly 10 Mt of coal, iron ore, magnesium, graphite, and zinc were produced and exported from North Korea in 2010 (tables 1, 3). Other metals produced included cadmium, copper, gold, lead, silver, and tungsten.

Copper.—Wanxiang Resources Co. Ltd. of China and the Ministry of Mining Industries of North Korea were setting up the Hyesan-China Joint Venture Mineral Co. The joint venture would operate the Hyesan copper mine, which is located in Yanggang Province (Xinhuanet.com, 2011).

Gold.—The Daebong Mine is one of North Korea's major gold mines and is located on the border of Gapsan and Woonheung in Yanggang Province. The Daebong Mine produced more than 150 kilograms (kg) (4,823 troy ounces) of gold annually. North Korea's State Development Bank tried to bring Chinese investment to the Daebong Mine by offering

mineral rights in exchange for capital investment in the mine (Lee, 2010).

Iron and Steel.—According to North Korea's Korean Central News Agency, the country updated its iron production infrastructure in 2010. The Songjin Steel Complex improved the "Korean-style" method, in which oxygen smelting and refining processes are streamlined, to manufacture steel. The Kim Chaek Iron and Steel Complex developed a noncoke ironmaking method and established a "high-speed reduction method" iron production system; it also developed a new curved-type strand-casting process. The Chollima Steel Works built the No. 1 and No. 2 ultra-high purity (UHP) electric arc furnaces (EAF), a multielement alloy steel production line, and high-quality fireproof material shop. The Posan Iron Works produced "Juche iron," which is produced using a noncoke, high-speed deoxidization process, to supply the Chollima Steel Works and also completed reconstruction of a revolving furnace and set up a 550-cubic-meter oxygen separator. North Korea expected to increase its iron and steel production, which relied on domestic deposits of iron ore and coal resources (People's Daily Online, 2010; Korean News, 2011).

Industrial Minerals

Magnesium Compounds.—North Korea's magnesite production increased in the Tanchon area, which included the Taehung Youth Hero Mine and the Yongyang Mine. According to Korean Central News Agency of North Korea, the Tanchon area has deposits of billions of metric tons of magnesite and has good mining conditions. The Taehung Youth Hero Mine, which was developed in the 1980s, was operating at full capacity (Korean News, 2010a, b).

The magnesite resources of North Korea were an extension of the magnesite-talc belt that originates in Haicheng, Liaoning Province, China, and includes an estimated 3,000 Mt of sparry magnesite. The challenges for North Korea's magnesite production included insufficient fuel and power supplies, inadequate transportation, and a lack of modern technology (Quintermina AG, 2009).

Mineral Fuels and Other Sources of Energy

Natural Gas and Petroleum.—Korex Ltd., which was a joint venture of Aminex PLC of Ireland and Chonsun Energy Pte. Ltd. of Singapore, signed a production-sharing contract (PSC) with Korea Oil Exploration Co. of North Korea to conduct oil exploration in the Sea of Japan. This PSC, which covered both deep and shallow water in an area of approximately 50,681 square kilometers, replaced an earlier PSC. Aminex was expecting to find a large oil-bearing structure (Aminex Plc, 2010).

Nuclear Energy.—The Washington, DC-based Institute for Science and International Security estimated that North Korea was constructing a 25- to 30-megawatt (MW)-capacity light-water reactor and the amount of low-enriched uranium needed for a 25- to 30-MW-capacity reactor could vary, depending on the design of the reactor and whether it would be optimized for electricity production or weapons-grade

plutonium production. The United States allowed North Korea to build two light-water reactors under the 1994 Agreed Framework meant to freeze North Korea's plutonium program. The deal collapsed in 2002, however, when the United States accused North Korea of running a secret uranium enrichment program—a process that would give the Government a second way to build nuclear bombs in addition to the plutonium program. Following 7 years of adamant denials, North Korea admitted in 2009 that it was in the final stages of uranium enrichment (Kim, 2010).

Outlook

The Government is expected to continue to encourage international investment in North Korea's mining sector because of the sector's significance to the country's current economy. The increasing international demand for minerals, especially from China and Russia, is likely to stimulate increased production of North Korea's minerals, such as coal, iron ore, magnesite, molybdenum, nickel, sand, and zinc. Mining-related infrastructure, such as highways, ports, and railways, is likely to be constructed or improved in the border areas to improve transportation and promote economic cooperation among China, North Korea, and Russia. North Korea's relationship and economic cooperation with the Republic of Korea is expected to begin to recover very slowly in the near future.

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TABLE 1
NORTH KOREA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	2006	2007	2008	2009	2010
METALS					
Cadmium metal, smelter	200	200	200	200	200
Copper:					
Mine output, Cu content	12,000	12,000	12,000	12,000	12,000
Metal, primary and secondary:					
Smelter	15,000	15,000	15,000	15,000	15,000
Refinery	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	5,040	5,130	5,316 ⁴	5,300	5,300
Fe content do.	1,400	1,400	1,488 ⁴	1,500	1,500
Metal:					
Pig iron do.	900	900	900	900	900
Ferroalloys, unspecified do.	10	10	10	10	10
Steel, crude do.	1,180	1,230	1,279 ⁴	1,300	1,300
Lead:					
Mine output, Pb content	13,000	13,000	13,000	13,000	13,000
Metal, primary and secondary:					
Smelter	13,000	13,000	13,000	13,000	13,000
Refinery	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	930 ^r	230 ^r	270 ^r	100 ^r	100
Zinc:					
Mine output, Zn content	67,000	70,000	70,000	70,000	70,000
Metal, primary and secondary	72,000	75,000	75,000	75,000	75,000
INDUSTRIAL MINERALS					
Cement, hydraulic thousand metric tons	6,160	6,130	6,415 ⁴	6,400	6,400
Fluorspar	12,500	12,500	12,500	12,500	12,500
Graphite	30,000	30,000	30,000	30,000	30,000
Magnesite:					
Crude	60,000	55,000	150,000	150,000	150,000
Magnesium compounds thousand metric tons	345	350	350	350	350
Nitrogen, N content of ammonia do.	100	100	100	100	100
Phosphate rock, P ₂ O ₅ equivalent	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
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand metric tons	23,000	24,100	25,060 ⁴	36,000 ^r	41,000
Coke do.	2,000	2,000	2,000	2,000	2,000

^rRevised. do. Ditto.

¹Estimated data are rounded to no more than three significant digits.

²Table includes data available through May 22, 2012.

³In 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.

⁴Reported figure.

TABLE 2
NORTH KOREA: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
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 Yongyang, Hamgyongnam Province; Paek Bai near Kim Chaeck, Hamgyongbuk Province	2,500
Magnesia clinker	Korea Magnesia Clinker Industry Group (KMCIG) and Quintermina AG	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	Songjin, North Hamgyong Province	1,500
Do.	Kangson Works	Kangson, Hwanhaebuk Province	960
Do.	Chollima Steel Works	Chollima District, Nampo city, 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

^cEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto.

TABLE 3
 SELECTED MINERAL EXPORTS FROM NORTH KOREA BASED UPON REVERSE TRADE REPORTS IN 2010¹

(Metric tons unless otherwise specified)

Commodity	Exports	Destination(s) ¹
Cement	82,200	Tanzania, Uganda
Coal	4,620,000	China
Copper, refined	1,000	Thailand, China, India
Gold kilograms	10	Singapore
Graphite	74,900	China, Germany
Iron ore	2,100,000	China
Lead, refined	123	do.
Magnesium	147,000	China, Netherlands, Germany
Zinc, refined	23,400	China, Sri Lanka

do. Ditto.

¹The countries are listed in order of the amount of exports received, from most to least.

Source: United Nations Statistics Division, Commodity Trade Statistics Database (COMTRADE), available at <http://comtrade.un.org/db/default.aspx>.