



2007 Minerals Yearbook

NORTH KOREA [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF NORTH KOREA

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North Korea's identified mineral resources were apatite (phosphate rock), barite, coal, copper, feldspar, fluorspar, gold, graphite, iron ore, kaolin, lead, limestone, magnesite, molybdenum, salt, silica, silver, tungsten, and zinc. Reserves of coal, iron ore, limestone, and magnesite were large relative to other mineral resources in the country. North Korea, however, has little reserves of crude petroleum and no known reserves of natural gas (U.S. Library of Congress, 2005; Korea Resources Corporation, 2007).

North Korea was an important producer of coal, iron ore, magnesite, and zinc in the Asia and the Pacific region. North Korea ranked third in production of magnesite in the world. Its value-added product—magnesia clinker, which is used as refractory material—was marketed worldwide (Kramer, 2008).

High-level talks between North Korea and the Republic of Korea had been halted following North Korea's missile test in July 2006. The two Koreas, however, opened working-level talks on light industry and mineral resources in June 2007. According to the Ministry of Unification of the Republic of Korea, an agreement was reached to swap \$80 million worth of raw materials (for making clothes, shoes, and soap) for rights to develop mineral resources in North Korea. Under the agreement, in exchange for the first shipment of 500 metric tons (t) of polyester to North Korea, the Republic of Korea planned to conduct a joint study with North Korea between June 25 and July 6, 2007, on minerals in the North Korea Gumdeok (Komdok) Mine (for zinc), and the Ryongyang Mine and the Daehung Mine (for magnesite). The joint study team consisted of 15 members each from North Korea and the Republic of Korea (Associated Press, The, 2007).

In the October 2007 summit, North Korea and the Republic of Korea agreed to move toward ending more than 50 years of military hostility and aiming for a durable peace on the Korean Peninsula. This landmark agreement, titled "Declaration on the development of inter-Korea relations, peace and prosperity," called for the two Koreas to create a peace zone around their volatile western sea border area called the North Limited Line to avoid accidental clashes. In the "special peace zone" to be established under the agreement, fishermen from both sides can work together. Under the peace zone project, the two sides would jointly develop North Korea's southwest port city of Haeju and its surrounding border area as a special economic zone. Haeju is located 57 kilometers from the Kaesong Industrial Complex, where more than 15,000 North Korean workers worked at 22 plants established by companies from the Republic of Korea. According to the Ministry of Finance of the Republic of Korea, the issue of possible joint oilfield development in North Korea was discussed in the October 2007 summit. Further talks on the oil development issue may continue at the proposed joint committee for inter-Korea Economic Cooperation (Dawn.com, 2007; UPI Asia Online, 2007b).

In December 2007, North Korea reportedly proposed to expand discussion on the joint development of its natural

resources with the Republic of Korea. According to the Ministry of Unification of the Republic of Korea, at the 3-day economic talks held in early December 2007, North Korea proposed to establish an additional working-level subcommittee for cooperation on resource development. The Republic of Korea expressed interest in the possibility of the two sides jointly exploring an unpublished rare oilfield off North Korea's west coast and called for the discussion of such development in the talks, but North Korea reportedly declined (Yonhap News Agency, 2007).

Minerals in the National Economy

In 2007, the North Korean economy continued to face desperate economic conditions. According to a report released by the Bank of Korea in June 2008, North Korea suffered its second year of economic contraction (negative economic growth). The North Korean economy as measured by the real gross domestic product (GDP) decreased by 2.3% in 2007 following a decline of 1.1% in 2006. The larger decline in the 2007 GDP reportedly was owing mainly to decreased agricultural output resulting from bad weather conditions and flooding. According to the Bank of Korea's 2008 report on North Korea's GDP growth by industry, the agricultural, forestry, and fisheries sector, which accounted for 21.2% of the GDP in 2007, contracted by 9.4%. The mining sector, which accounted for 11.4% of the GDP, however, grew by 0.7% in 2007, down from an increase of 1.9% in 2006. The smaller growth in 2007 was owing to a decline in the production of coal and nonmetallic minerals that offset increases in the production of metallic minerals (Bank of Korea, 2008, p. 2-3).

Production

North Korea's major mineral production included coal, copper, graphite, iron ore, lead, limestone, magnesite, salt, tungsten, and zinc. Production of processed minerals included cadmium, cement, coke, refined copper, ferroalloys, refined lead, magnesia clinker, nitrogen fertilizer materials, pig iron, crude steel, and refined zinc (table 1). In 2007, most of the country's major metallic minerals mines and processing plants, except some iron and steel plants, had either exceeded or met target production owing to improved equipment and technology. Coal and nonmetallic mineral production declined because of a shortage of spare parts, electricity, and a lack of capital for equipment and facilities modernization (Bank of Korea, 2008, p. 5-6).

Most of the country's mineral production was for consumption by the domestic industries. North Korea exported cement, coal, gold, graphite, iron ore, crude magnesite, magnesia clinker, pig iron, salt, steel products, and zinc to earn hard currency to pay for the country's large imports of chemical fertilizers and crude petroleum. Coal, iron ore, and crude magnesite were exported mainly to China; gold, mainly

to Thailand; zinc and base metals, principally to China and the Republic of Korea. Crude petroleum and fertilizers were imported mainly from China. Magnesia clinker was exported mainly to Japan and other countries worldwide.

Structure of the Mineral Industry

North Korea's mineral industry comprised a medium-sized coal mining sector, a medium-sized industrial mineral and processing sector, and a relatively large ferrous and nonferrous metals 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. In the past 4 years, China, the Republic of Korea, and other countries had participated in joint ventures in North Korea for the development and operation of coal, copper, gold, graphite, iron ore, magnesite, molybdenum, and lead and zinc mines in North Korea.

In 2007, North Korea's coal production capacity was estimated to be 25 million metric tons per year (Mt/yr). The production capacity of cement was estimated to be 7 Mt/yr; iron ore, 5.5 Mt/yr; crude steel, 2 Mt/yr; magnesite, 1.5 Mt/yr; and zinc (metal content), about 80,000 metric tons per year (t/yr). Production facilities for many of the major minerals and metals were mostly outdated and in need of upgrading or renovation. In the past 3 years, China and the Republic of Korea had agreed to participate in various joint ventures with North Korea's mining establishments to improve operations and increase productivity in the production of coal, copper, graphite, iron, magnesia clinker, molybdenum, and zinc metal.

Commodity Review

Metals

Copper.—According to reports by The Chosun Ilbo (The Chosun Daily), Seoul's largest newspaper, and a trade journal in the United States, Hebei-based Luanhe Industrial Group and another unnamed Chinese privately owned company took a 51% controlling interest in Hyesan Youth Copper Mine in Yanggang Province, North Korea. Luanhe Industrial Group reportedly has the right to develop the mine for 15 years (Chosun Ilbo, The, 2007; Metals Insider, 2007).

According to a report by Daily NK in North Korea, in early November 2007, most of the underground tunnel of Hyesan Youth Copper Mine in Yanggang Province was facing severe difficulties because the mine was filled with floodwater. The mine began to flood in 2006 when the nearby Samsu Hydroelectric Power Station started filling up the Samsu dam. As a result, the copper mine was unable to operate properly. The Hyesan Mine reportedly produced about 80% of North Korea's copper and had been expected to continue operating for the next 40 years. The local press also reported that the attempt to acquire a 51% stake in the Hyesan Mine by the Chinese Luanhe Industrial Group in 2006 was unsuccessful owing to opposition from North Korea's second Economic Commission, which manages North Korea's military economy (Daily NK, 2007).

Iron and Steel.—Chosun Ilbo reported in April 2007 that North Korea sold a 50-year development claim to the Musan iron mine to Tonghua Iron and Steel Group. According to another Chinese industry's source, Energy Daily reported that Chinese investors, which included the Tonghua Iron and Steel Group, bought a 50-year mining right to the Musan iron mine in North Korea for \$909 million. Earlier in November 2006, however, an unnamed Chinese source reported through Asian Survey that the Musan iron mine development project was canceled by officials in North Korea, who were embarrassed by publicity over the deal because it highlighted the degree of foreign investment, which North Korea would prefer to be handled quietly (Asian Survey, 2006; Chosun Ilbo, The, 2007; Energy Daily, 2007).

In October 2007, Tangshan Iron and Steel Group of China reportedly signed a letter of intent with North Korea's Foreign Economy Bureau for building a joint-venture steel plant with the capacity to produce 1.5 Mt/yr of steel in the Kim Chaek Industrial Park in North Hamgyong Province (Hamgyongbuk-Do) along the North Korean northeastern coast. The iron ore for the plant would be supplied from nearby mines and the plant's steel products would be distributed in North Korea's domestic market. Tangshan Iron and Steel and its North Korean partner for the joint-venture steel project continued to negotiate the allocation of equity interest and product structure of the steel plant. According to a report by China Metals in November 2007, the planned joint-venture project also included building a coal-fired power plant (China Metals, 2007; China Mining Association, 2007).

Zinc.—Zinc was produced mainly from the Komdok Mine near Tancheon in South Hamgyong Province (Hamgyongnam Do). Zinc production reportedly increased considerably in 2007 owing to renovation of the Tancheon zinc refinery in 2005 and completion of two new shafts at the Komdok Mining Complex, which boosted the mine productivity in 2007 (Korea Resources Corporation, 2007, p. 142).

Zinc exports from North Korea to the Republic of Korea in 2007 was reportedly double that of 2006. Zinc metal was used by North Korea for repayment of a light industries raw material loan, by agreement reached between the two Koreas in June 2007. According to the Ministry of Unification of the Republic of Korea, the first repayment of zinc, amounting to 498 t, arrived at Inchoeon Port on December 14, 2007, and the second repayment of 500 t of zinc lumps was scheduled to arrive at the same port on January 4, 2008 (Ministry of Unification of the Republic of Korea, 2008; Washington Post, The, 2008).

Industrial Minerals

Cement.—Sanwong (Samgwong) Cement, which operated a cement complex with a capacity of 2.5 Mt/yr in Sanwong (Samgwong), Kangwon Province, was acquired by Cairo-based Orascom Construction Industries (OCI) of Egypt for one-half of its equity interest. In July 2007, OCI signed an agreement with North Korean state-owned Pyongyang Myongdang Trading Corporation to acquire a 50% interest in Sanwong Cement for \$115 million. Sanwong Cement reportedly would use part of the proceeds to modernize, rehabilitate, and upgrade the

plant's capacity to 3 Mt/yr and part of the proceeds to invest in ready-mix concrete and distribution activities. The \$115 million agreement also covered operations of gypsum and limestone quarrying and coal mining, a dedicated hydroelectric power station, and a company-owned railway connecting the plant to the national railway and to Nampo Port, which were related to the manufacturing of cement and cement export (Orascom Construction Industries, 2007).

Graphite.—Graphite was produced mainly from the Yongho Mine and the Jeongchon Mine. Both mines are located in the Yon-an area of South Hwanghae Province (Hwanghaenam Do). The Jeongchon Mine, which was the first inter-Korean development project, was completed in April 2006. According to Korea Resources Corporation, the Jeongchon graphite mine was a joint venture of Myongji Corporation of North Korea and Korea Resources Corporation of the Republic of Korea (50% each). The total development cost was about \$10.2 million. Ore reserves at the mine were estimated to be 6.25 Mt. The mine was shut down during the test run in 2006 owing to problems with electricity and water. The test run was expected to resume in 2007 (Reuters, 2007).

Magnesite.—As part of the agreement on inter-Korean cooperation on light industry and mineral resources, the Republic of Korea was to send 500 t of polyester fiber from Incheon Port in the South to Nampo Port in the North on June 27, 2007, and from July 10 to 14, 2007, to send a 10-member team of technicians to offer technical support to North Korea's light industry factories. In return, North Korea agreed to provide the Republic of Korea with data on minerals in the Gumdeok (Komdok) zinc mine on June 12, and the two Koreas were to conduct a joint study on minerals in the Gumdeok (Komdok) zinc mine from June 25 to July 6, 2007. The 30-member joint study team would consist of 15 members from each side (according to an unofficial translation of a joint press statement by the second working-level consultation on the inter-Korean cooperation on the light industry and mineral resources, May 2, 2007).

Mineral Fuels

Coal.—According to a report published by Korea Resources Corporation, coal reserves in North Korea were estimated to be 20.5 billion metric tons (Gt), of which 4.5 Gt were anthracite and 16 Gt were mostly brown coal. Major anthracite coal resources are located mainly in the Provinces of North Pyongan (Pyonganbuk Do) and South Pyongan (Pyongannam Do). Major brown coalfields were the Anju Field in South Pyongan Province (Pyongannam Do) and the North Field in North Hamgyong Province (Hamgyongbuk Do) (Korea Resources Corporation, 2007, p. 6-8).

According to the Bank of Korea, North Korea's overall coal production decreased by 2.4% to 24.1 Mt in 2007 from 24.7 Mt in 2006 owing to a lack of electricity and a shortage of spare parts. To improve performance of the mining sector, including the coal mining and metal industries, the North Korean Government had decided to increase its 2008 budget allocations for energy, coal, and metal industries as well as the railway sector by 49.8% from that of 2007 (Bank of Korea, 2007, p. 5; 2008, p. 5; Institute for Far Eastern Studies, 2008).

Crude Petroleum.—In early 2007, North Korea and China reportedly agreed to jointly exploit an offshore oilfield that lies between North Korea and China. According to a Chinese oil industry's source, new oil reserves had been discovered in Bohai Bay between the countries' territorial waters, and the oil reserves were estimated to be between 5 billion and 40 billion barrels. In 1997, the North Korean Government reportedly announced that it had discovered oil reserves of about 5 billion to 40 billion barrels in the offshore area (UPI Asia Online, 2007a).

Outlook

For the next 3 to 4 years, the North Korean mining sector is likely to continue to be dominated by the production of coal, iron ore, limestone, magnesite, and zinc. Because of the continuing strong demand for minerals by China, its investments in North Korea's mining sector are expected to continue to increase beyond its current investments in coal, copper, gold, iron ore, and molybdenum into other mineral commodities, such as nickel, crude petroleum, steel, and zinc. North Korea's economy is expected to recover slowly but its real GDP is expected to grow at less than 1% during the next 2 years.

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

(Metric tons unless otherwise specified)

Commodity ³	2003	2004	2005	2006	2007
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:					
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
Iron and steel:					
Iron ore and concentrate, marketable:					
Gross weight thousand metric tons	4,430	4,580	5,000	5,040 ^f	5,130
Fe content do.	1,260	1,300	1,400	1,400	1,400
Metal:					
Pig iron do.	900	900	900	900	900
Ferroalloys, unspecified do.	10	10	10	10	10
Steel, crude do.	1,090	1,070	1,070	1,180 ^f	1,230
Lead:					
Mine output, Pb content	12,000	13,000	13,000	13,000	13,000
Metal:					
Smelter, primary and secondary	12,000	13,000	13,000	13,000	13,000
Refinery, primary and secondary	7,000	9,000	9,000	9,000	9,000
Silver, mine output, Ag content	20	20	20	20	20
Tungsten, mine output, W content	600	600	600	600	600
Zinc:					
Mine output, Zn content	60,000	62,000	67,000	67,000	70,000
Metal, primary and secondary	65,000	67,000	72,000	72,000	75,000
INDUSTRIAL MINERALS					
Cement, hydraulic thousand metric tons	5,540	5,630	5,700	6,160 ^f	6,130
Fluorspar	12,000	12,000	12,500	12,500	12,500
Graphite	25,000	30,000	30,000	30,000	30,000
Magnesium:					
Magnesite, crude thousand metric tons	1,200	1,000	1,000	1,000	1,000
Magnesium compounds do.	288	300	346	345	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
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite thousand metric tons	16,000	16,300	16,500	17,200 ^f	17,100
Lignite do.	6,300	6,500	7,000	7,500	7,000
Total do.	22,300	22,800	23,500	24,700 ^f	24,100
Coke do.	2,000	2,000	2,000	2,000	2,000

^fRevised. Do., do. Ditto. -- Zero.

¹Estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through June 30, 2008.

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 outputs.

TABLE 2
NORTH KOREA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(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 (50% owned by Orascom Construction Industries of Egypt)	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, all in Pyongannam Province	9,500
Do.	Saebiyol Coal Mining Complex	Saebyo, Hamgyongbuk Province	6,000
Copper, mine output, Cu content	Hyesan Youth Copper Mine (51% owned by Luanhe Industrial Group and another unnamed Chinese Co.)	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 North Korean Government	Yeongchon, Yonan County, South Hwanghae Province	3
Iron ore, concentrate, gross weight	Ministry of Metal and Machines Industry, 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 Tancheon, Hamgyongnam Province	20
Refined	do.	Munpyong, Kangwon Province	32
Magnesite, concentrate, gross weight	Korea Magnesia Clinker Industry Group	Dae Hung and Ryong Yang, Hamgyongnam Province; Paek Bai near Kim Chaek, Hamgyongbuk Province	2,500
Magnesia clinker	do.	Tancheon and Dae Hung, Hamgyongnam Province; Song Jin, Hamgyongbuk Province	1,150
Steel, crude	Ministry of Metal and Machines Industry:		
Do.	Kim Chaek Iron Works	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 Tancheon and Sankok near Kowon, Hamgyongnam Province; Nakyong, Hwanhaenam Province	80
Refined	do.	Munpyong, Kangwon Province; Tancheon, Hamgyongnam Province	100

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