The mineral resources of North Korea

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President, Ph.D
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Mineral resources in N.Korea are widespread and various, are found in abundance in almost all parts of the country, especially Hamkyung Do and Jakang Do.

The most important mineral resources that N.Korea possesses include magnesite, zinc, iron, tungsten, graphite, anthracite, gold, barite, apatite, molybden.

The magnesite is mostly rich in N.Korea. Total resources of magnesite are 6 billion tons in 2009. N.Korea has the second highest magnesite reserves in world, after China. It is used to manufacture refractories.
## 1. North Korea mineral resources

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Grade</th>
<th>Unit</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>Metal content</td>
<td>ton</td>
<td>2,000</td>
</tr>
<tr>
<td>Copper</td>
<td>Metal content</td>
<td>Thousand ton</td>
<td>2,900</td>
</tr>
<tr>
<td>Zinc</td>
<td>Metal content</td>
<td>Thousand ton</td>
<td>21,100</td>
</tr>
<tr>
<td>Iron</td>
<td>Fe 50%</td>
<td>Million ton</td>
<td>5,000</td>
</tr>
<tr>
<td>Tungsten</td>
<td>WO$_3$ 65%</td>
<td>Thousand ton</td>
<td>246</td>
</tr>
<tr>
<td>Molybden</td>
<td>MoS$_2$ 90%</td>
<td>Thousand ton</td>
<td>54</td>
</tr>
<tr>
<td>Nickel</td>
<td>Metal content</td>
<td>Thousand ton</td>
<td>36</td>
</tr>
<tr>
<td>Manganese</td>
<td>Mn 40%</td>
<td>Thousand ton</td>
<td>300</td>
</tr>
</tbody>
</table>

Sources: USGS, KORES
1. North Korea mineral resources

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Grade</th>
<th>Unit</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphite</td>
<td>FC 100%</td>
<td>Thousand ton</td>
<td>2,000</td>
</tr>
<tr>
<td>Limestone</td>
<td>Ore content</td>
<td>Billion ton</td>
<td>100</td>
</tr>
<tr>
<td>Barite</td>
<td>Ore content</td>
<td>Thousand ton</td>
<td>2,100</td>
</tr>
<tr>
<td>Apatite</td>
<td>Ore content</td>
<td>Billion ton</td>
<td>0.15</td>
</tr>
<tr>
<td>Magnesite</td>
<td>MgO 45%</td>
<td>Billion ton</td>
<td>6</td>
</tr>
<tr>
<td>Anthracite</td>
<td>Coal content</td>
<td>Billion ton</td>
<td>4.5</td>
</tr>
</tbody>
</table>

*Sources: USGS, KORES*
2. North Korea mine production

N.Korea mines and mineral industries were owned and operated by the government.

Until 1990, Mine production were increased, but were decreased from 1990 to 2000 periods because of energy supply reduction, flood damage, and deterioration of mine machines, etc.
2. North Korea mine production

Since 2000, Iron and anthracite production were slightly increased.

In 1985, N.Korea mine production of anthracite totalled 37,500 kt. but, in 2009 decrease of 32% to 25,500 kt.

The iron ore were produced 9,800 kt in 1985, 49% less than in 2009(4,955 kt)
### 2. North Korea mine production

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Unit</th>
<th>‘04</th>
<th>‘05</th>
<th>‘06</th>
<th>‘07</th>
<th>‘08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracite</td>
<td>Thousand ton</td>
<td>22,800</td>
<td>23,500</td>
<td>23,000</td>
<td>24,100</td>
<td>25,060</td>
</tr>
<tr>
<td>Iron</td>
<td>Thousand ton</td>
<td>4,580</td>
<td>5,000</td>
<td>5,040</td>
<td>5,130</td>
<td>5,316</td>
</tr>
<tr>
<td>Magnesite</td>
<td>ton</td>
<td>60,000</td>
<td>40,000</td>
<td>60,000</td>
<td>55,000</td>
<td>150,000</td>
</tr>
<tr>
<td>Copper</td>
<td>ton</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
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<tr>
<td>Zinc</td>
<td>ton</td>
<td>62,000</td>
<td>67,000</td>
<td>67,000</td>
<td>70,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Gold</td>
<td>Kg</td>
<td>`2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
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<Sources: USGS, KORES>
## 2. North Korea mine production

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<th>Unit</th>
<th>‘04</th>
<th>‘05</th>
<th>‘06</th>
<th>‘07</th>
<th>‘08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver</td>
<td>ton</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Tungsten</td>
<td>ton</td>
<td>280</td>
<td>650</td>
<td>900</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>Lead</td>
<td>ton</td>
<td>13,000</td>
<td>13,000</td>
<td>13,000</td>
<td>13,000</td>
<td>13,000</td>
</tr>
<tr>
<td>Fluorspar</td>
<td>ton</td>
<td>12,000</td>
<td>12,500</td>
<td>12,500</td>
<td>12,500</td>
<td>12,500</td>
</tr>
<tr>
<td>Graphite</td>
<td>ton</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Apatite</td>
<td>ton</td>
<td>300,000</td>
<td>300,000</td>
<td>300,000</td>
<td>300,000</td>
<td>300,000</td>
</tr>
</tbody>
</table>

*Sources: USGS, KORES*
## 2. North Korea mine production

### N.Korea mineral export to China and S.Korea

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Magnesite</th>
<th>iron</th>
<th>Lead</th>
<th>Anthracite</th>
<th>Anthracite</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>26,299</td>
<td>1,348,717</td>
<td>42,006</td>
<td>3,741,267</td>
<td>235,976</td>
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<tr>
<td>2008</td>
<td>79,531</td>
<td>1,882,756</td>
<td>41,269</td>
<td>2,537,274</td>
<td>251,253</td>
</tr>
<tr>
<td>2009</td>
<td>58,251</td>
<td>897,418</td>
<td>32,108</td>
<td>2,972,187</td>
<td>467,962</td>
</tr>
</tbody>
</table>
3. The mines in North Korea
3. The mines in North Korea

3-1 Dae-Hyeung Magnesite mine

Location: Hamkyungnam-do, Dancheon, DaeHyeung-dong

History: Redevelopment in 1982

Reserves: 820 million tons

Ore Grade: MgO 46.77%, SiO₂ 0.73%, CaO 0.79%, R₂O₃ 0.67%
3. The mines in North Korea

Development profile

**Mining method**: Open pit and underground (in winter season)

**Mine production (capacity)**: 600,000 t/a
90% open pit, 10% underground.

**Mineral processing**: Crushing and screening
Throughput (capacity): 600,000 t/a
3. The mines in North Korea

**Production (In 2006)**

Produces about 360,000 tons of concentrate at a grade of MgO 46.77%

**Infrastructure**

Power station, 50MW, link to Hyeucheun hydroelectric power plant

Railroad, 98km from mine site to Kimcheck port

Kimcheck port, loading capacity about 800,000 tons
3. The mines in North Korea
3. The mines in North Korea
3. The mines in North Korea

3-2 Kyumduck Zinc mine

Location: Hamkyungnam-do, Dancheon, Kyumgol-dong

History: Development in 1932

Reserves: 266 million tons

Ore Grade: Zn 4.21%, Pb 0.88%

Mineral: Sphalerite
3. The mines in North Korea

Development profile

**Mining method** : Underground

**Mine production(capacity)** : 10 Mt/a, 70% shrinkage, 30% sub-level stoping

**Mineral processing** : Flotation, Throughput(capacity) : 10 Mt/a
3. The mines in North Korea

Production (In 2006)

Ore : 3.5 Mt/a
Concentrate : Zn 196,000 t/a (Zn 53%), Recovery 52%
    Pb 31,800 t/a (Pb 63%), Recovery 63%

Infrastructure

Power station, 50MW, link to Hyeuchchen hydroelectric power plant
Water supply : Bukdaechen
Railroad, 78km from mine site to Kimcheck port
Kimcheck port, loading capacity about 800,000 tons
3. The mines in North Korea
3. The mines in North Korea
3. The mines in North Korea
3-3 Musan Iron mine

**Location**: Hamkyungbuk-do, Musan-kun, chanrel district

**History**: Development in 1935

**Reserves**: 1.73 billion tons

**Ore Grade**: Fe 24%

**Mineral**: Magnetite
3. The mines in North Korea

Development profile

**Mining method**: Open pit

**Mine production (capacity)**: 10 Mt/a

**Mineral processing**: Magnetic separation (wet)
Throughput (capacity): 7.5 Mt/a
3. The mines in North Korea

Production (In 2006)

Ore: 5 Mt/a
Concentrate: Fe 2 Mt/a (Fe 65%), Recovery 79.5%

Infrastructure

Link to Seodusu hydroelectric power plant (60,000V power line)
Water supply: Duman river
Railroad, 150km from mine site to Chengjin port
4. Inter-Korea mining cooperation project

4-1. Project summary

Mine: Jengchun graphite mine

Location: Hwanghaenam-do, Yenan-kun Jengchunri
38km east of the city of Haeju(port)

Stake structure
N.Korea: MyengJi company 50%
S.Korea: KORES 50%
4. Inter-Korea mining cooperation project

Mine management: MyengJi company

Mining Licences: J/V

Transaction
J/V was made, and raised U$10.2 million
MyengJi and KORES were invested U$5.1 million, respectively.
History

In March 2002, MOU was signed between KORES and MyengJi company.

In May 2002, Mine survey was carried out. J/V company was created in July 2003 under an agreement entered into between KORES and MyengJi company.

In April 2007 Mine construction was completed.
4. Inter-Korea mining cooperation project

4-2 Mine Status

Reserves and Grade
Reserves: 6.25 million tons
Ore grade: FC 5.53%

The mining process are a conventional open pit operation.

Mine production (designed) capacity: 72,000 t/a
4. Inter-Korea mining cooperation project

Mineral processing method were conventional flotation and leaching process

Designed production was about 3,000t/a of concentrate at a grade of FC 98% graphite
4. Inter-Korea mining cooperation project

Production ('09)

Ore : 36,000 t/a
Concentrate : FC 90%, 1,500 t/a, Recovery 80%

Infrastructure

Link to east Pyengyang thermal power generation plant
Installed 110KV power station (transformer) in mine
Water supply : Gyuamho
Road, 46km from mine site to Haeju port
4. Inter-Korea mining cooperation project
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Thank You