THE MINERAL INDUSTRY OF FINLAND

By Harold R. Newman

Finland, which was a member country of the European Union (EU), has a long tradition of mining activity, and Finnish metallurgical technology and manufacturing of mining equipment was well known throughout the international mining community. Finland’s location in the middle of the Fennoscanadian Shield gives it excellent potential for the occurrence of a variety of minerals. Exploitation of metallic minerals, including chromite, cobalt, copper, nickel, and zinc, and of industrial minerals, including apatite, carbonates, and talc, provided a base for the country’s mineral industry (United Nations, 2010).

The revised Mining Act, which became effective on July 1, 2011, promotes mining but also takes into account environmental issues and the rights of citizens, landowners, and municipalities to influence decisionmaking. Under the revised Mining Act, the right to exploit a deposit is based on a mining permit and the review of permits is more comprehensive than under the original Mining Act. The mining operator’s termination and after-care obligations are also more extensive, and the mining operator is required to provide a security deposit for the purpose of fulfilling after-care obligations. The Finnish Safety and Chemical Agency is the new mining authority under the revised Mining Act (Ministry of Employment and the Economy, 2011).

Minerals in the National Economy

The mineral industry was very important to the country’s economy and played an increased role in 2010, both domestically and internationally. The Government offered the mineral industry a favorable investment and operating environment. Finland is located close to major markets and had processing facilities for several minerals. Also, new mineral discoveries were likely as many deposits had not yet been aggressively explored as of yearend 2010 (Altona Mining Ltd., 2010).

Finland’s diverse mineral resources represented a significant part of the Finnish national wealth and were expected to continue to be economically significant in the future. In 2010, the Government published a new strategy that included proposals for developing the mineral sector, including increased emphasis on the mineral sector, securing the supply of raw materials, reducing the environmental impact of the mineral sector, increasing the mineral industry’s productivity, and strengthening the sector’s research and development capabilities and expertise (Invest in Finland, 2010a).

The volume of mineral commodity sales in 2010 nearly doubled compared with that of 2009. In 2010, gross sales reached about €808 million (about $1 billion) compared with the 2009 gross sales of about €481 million (about $613 million). The value of ongoing mining investment for 2010–12 was expected to be more than €960 million (about $1.2 billion). The area of valid mining claims quadrupled from September 2009 to September 2010, which was the latest period for which data were available (Invest in Finland, 2010b).

Production

Activities of the mineral industry of Finland in 2010 were concentrated on the production of base metals, gold, industrial minerals, and platinum-group metals (PGMs). The production of mineral commodities continued to be significant in terms of volume and contribution to the country’s economy. Finland was the leading talc producer in Europe and the fifth ranked talc producer in the world (Virta, 2011). Data on mineral production are in table 1.

Structure of the Mineral Industry

Finland’s mineral resource companies were mostly privately owned. The Government held an equity position in some of the major mineral commodity producers, such as Kemira Oyj, Outokumpu Oyj, and Rautaruukki Oy. The mineral industry operated on a free market basis. The companies’ major facilities and their annual capacities are listed in table 2.

Commodity Review

Metals

Chromium.—Outokumpu reported that the estimated mineral resources at its Kemi Mine were significantly greater than that estimated previously. Previous estimates had indicated that, at 2010 mining volumes, the mineral resources would last for about 70 years. Based on 2010 information, the mineral resources were projected to last for more than 100 years, even if the annual mining production rate is doubled. The Kemi Mine was the only chromite mine in the EU; it was discovered in 1959, and production started in 1968. The Kemi Mine produced chromite concentrates that were used in Outokumpu’s ferrochrome smelter at Tornio. The chromite ore graded an average of 28.6% chromium oxide (Cr₂O₃) and consisted of a chromite ore layer that was about a 2.5 kilometers (km) deep (Good News from Finland, 2010).

Copper.—Boliden Harjavalta AB’s complex consisted of two plants—the copper smelter in Harjavalta, which produced copper anodes, and the copper refinery at Pori, where copper anodes were refined into copper cathodes. The smelter had the capacity to produce 210,000 metric tons per year (t/yr) of copper, which was cast into copper anodes. Sulfur was recovered as a byproduct. The copper anodes were then shipped to the Pori refinery where the anodes were refined into copper cathodes. The capacity of the refinery was 155,000 t/yr. The

1Where necessary, values have been converted from euro area euros (€) to U.S. dollars (US$) at an average rate of €1.00=US$1.27.
refinery also produced gold and silver as byproducts (Boliden Harjavaltta AB, 2010).

Gold.—Dragon Mining Ltd. of Australia’s Orivesi Mine is located 80 km northeast of the Vammala Production Center within the Tampere Schist Belt. Two vertical pipe-like lode systems, Kutema and Sarvisuo, occur in strongly deformed, andalusite-rich, silicified zones. Two diamond drilling programs were completed above and adjacent to the Sarvisuo lode. A 10-hole drilling campaign provided evidence of the existence of a new mineralized pipe or pipe clusters. The intercepts confirmed that the Sarvisuo system could extend at widths and grades that were potentially amenable to underground mining. Further drilling would be required to better define the extent and geometry of the identified mineralization prior to mining (Dragon Mining Ltd., 2011).

Dragon Mining was engaged in other gold exploration, development, and mining projects, which included the Jokisivu Mine. At yearend, construction of the decline for underground development was initiated at the Kujankallio deposit at Jokisivu. The decline, which would provide mine access, was located at the eastern end of the Kujankallio Mine’s open pit. In 2010, an infill drilling program was underway at Kujankallio to improve the categories of resources and to allow for more detailed mine planning. Exploration and further internal studies were underway to determine the viability of a development that would encompass the Arpola deposit, which was located 200 meters (m) to the east (Dragon Mining Ltd., 2010).

Nickel.—Belvedere Resources Ltd. of Canada announced the restart of its Hitura Mine. Nickel concentrate was produced ahead of the scheduled restart of the mine, and the mill and mine were ramping up to full production in 2011. The full production rate of about 45,000 metric tons per month of ore was scheduled to be achieved in 2011. The operation was scheduled to produce about 2,100 t/yr of nickel in concentrate starting in 2011 (Belvedere Resources Ltd., 2010).

Talvivaara Mining Co. plc’s nickel project, which was the world’s first bioheapleach project for nickel, was centered on two polymetallic deposits—the Kolmisoppi and the Kuusilampi; the deposits were located about 30 km southwest of Sortkamo, in eastern Finland. The deposits form one of the largest known nickel sulfide resources in Europe. The Talvivaara ore bodies are located within the Kainuu Schist Zone, which is a north–south-trending schist belt that extends from Rautavaara in the south to Pudasjarva in the north, and consists of a series of metasediments of greenschist to upper amphibolite facies belonging to the Karelia Supergroup. The open pit mine was also expected to produce cobalt, copper, and zinc as byproducts (Talvivaara Mining Co. plc, 2010).

Platinum-Group Metals.—Most of Finland’s known deposits of platinum-group metals (PGM) are located in the northern part of the country in a belt crossing east of Tornio to Narakavanka. Another belt containing layered intrusions runs from northwestern Finland, southeast through Lapland by way of Akanvaara, and on into Russia. Forty-three areas that could possibly contain undiscovered deposits of PGMs have been identified in Finland (Invest in Finland, 2010c).

Industrial Minerals

Rare Earths.—Ascan Metals Ltd. of Canada’s Vammala project was a rare-earth element (REE) zone with enrichment of cerium, lanthanum, and neodymium, which made up 80% to 90% of the deposit. The balance consisted mainly of praseodymium and samarium. The project was mined by Outokumpu as a mixed open pit and underground operation from 1959 to 1972. REE mineralization occurs within a north–south-trending skarn zone, which is composed of apatite, barite, coarse-grained calcite, diopside, feldspar, and galena. The drill-defined and mined ore body was about 20-m thick, trended across a strike length of more than 300 m, and extended from the surface to a vertical depth of 175 m. The extent of the mineralization continued along strike and at a depth that was unknown at yearend 2010 (Ascan Metals Ltd., 2010).

Wollastonite.—Nordkalk Corp., which was the only European producer of wollastonite in 2010, announced that it had launched a new generation of high-aspect ratio wollastonite fillers. The name of the new product was Norwoll wollastonite, and it was designed for thermoplastic and thermoset applications. Wollastonite (CaSiO₃) is a calcium metasilicate with the theoretical composition of 48.3% calcium oxide and 51.7% silicon dioxide; it is used mainly in the production of abrasive material, ceramics, coatings, elastomers, metallurgy, and plastics (Nordkalk Corp., 2010).

Mineral Fuels and Related Materials

Natural Gas and Petroleum.—Royal Dutch Shell plc of the Netherlands announced that it was selling the majority of its refining and marketing business in Finland to Keele Oy. The businesses included 225 service stations as well as the bulk fuels and the commercial road transport businesses. Not included were the aviation and liquefied petroleum gas businesses. Shell announced that the transaction was consistent with its strategy to reduce its refining capacity by 15% and to reduce its marketing footprint (Royal Dutch Shell plc, 2010).

Uranium.—Mawson Resources Ltd. of Canada announced a National Instrument (NI) 43-101 estimated inferred mineral resource of 2 Mt of uranium ore with an average grade of 0.074% uranium oxide (U₃O₈) at its Nuottijarvi uranium deposit in central Finland, which was one of the country’s largest known uranium deposits. The mineralized body is about 40-m thick, extends from the surface to a vertical depth of 80 m, trends across a strike length of more than 400 m, and remains open along strike and at depth. The U₃O₈ occurs as uraninite associated with fluorapatite within a 40-m-wide mineralized breccia hosted by a carbonate-apatite horizon at the contact between quartzite and graphite-bearing phyllite (Mawson Resources Ltd., 2010).

Talvivaara Mining considered modifying its nickel extraction process at its nickel mine near Sortkamo in order to recover uranium as a byproduct. Talvivaara Mining reported that during the bioheapleaching recovery, small concentrations of uranium leached into the process solution. Talvivaara was investigating the potential to modify its production process so that the uranium contained in the solution could be utilized as
uranium oxide (yellow cake). The cost to modify the extraction process was estimated to be €30 million ($38.1 million) with a production cost of about €2 million ($2.5 million) per year. Uranium output would be about 350 t/yr and could make the country almost self-sufficient with respect to uranium. Finland did not produce any uranium in 2010 and imported all its nuclear fuel requirements for its four operating nuclear power reactors (World Nuclear News, 2010).

Outlook

Finland has a long mining history and a traditional focus on primary resources, which is expected to continue. Exploration, particularly for gold, is expected to continue at a strong pace. The operating environment for mining companies in Finland is generally favorable for exploration and mining and is expected to remain so. The country's mining laws and legislation will continue to encourage exploration and development. In addition, the country has a well-developed infrastructure that will continue to benefit exploration and exploitation activities. There is a significant potential for the occurrence of various mineral commodities as the Geological Survey of Finland continues to identify metallic and industrial mineral deposits and compile geoscience data.

References Cited


### TABLE 1
FINLAND: PRODUCTION OF MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>Aluminum, metal, secondary</td>
<td>metric tons</td>
<td>35,773</td>
<td>44,223</td>
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<td>17,885</td>
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<td>Chrome:</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Cr₂O₃ content</td>
<td></td>
<td>549</td>
<td>556</td>
<td>614</td>
<td>247</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lump ore</td>
<td></td>
<td>80</td>
<td>80</td>
<td>85</td>
<td>80</td>
</tr>
<tr>
<td>Foundry sand</td>
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<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
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<td></td>
<td>85</td>
<td>85</td>
<td>90</td>
<td>85</td>
</tr>
<tr>
<td>Cobalt, refined</td>
<td>metric tons</td>
<td>5,903</td>
<td>5,862</td>
<td>6,301</td>
<td>4,665</td>
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<tr>
<td>Copper:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrate, gross weight</td>
<td>do.</td>
<td>44,663</td>
<td>47,798</td>
<td>47,077</td>
<td>49,730</td>
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<td>Mine output, Cu content</td>
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<td>13,000</td>
<td>13,600</td>
<td>13,000</td>
<td>14,600</td>
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<td>Metal:</td>
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<td></td>
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<td>Smelter</td>
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<td>192,235</td>
<td>149,206</td>
<td>174,354</td>
<td>139,710</td>
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<td>Refined</td>
<td>do.</td>
<td>136,674</td>
<td>109,837</td>
<td>137,953</td>
<td>105,549</td>
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<td>Gold, metal, mine output</td>
<td>kilograms</td>
<td>5,292</td>
<td>4,621</td>
<td>4,148</td>
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<td>Iron and steel, metal:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pig iron</td>
<td>metric tons</td>
<td>3,158</td>
<td>2,915</td>
<td>2,943</td>
<td>2,042</td>
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<td>Ferroalloys, ferrochromium</td>
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<td>243</td>
<td>242</td>
<td>234</td>
<td>123</td>
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<td>Steel, crude</td>
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<td>5,052</td>
<td>4,431</td>
<td>4,418</td>
<td>3,078</td>
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<tr>
<td>Mercury</td>
<td>kilograms</td>
<td>22,879</td>
<td>45,195</td>
<td>33,120</td>
<td>6,210</td>
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<td>Nickel:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mine output, Ni content</td>
<td>metric tons</td>
<td>2,985</td>
<td>3,465</td>
<td>4,303</td>
<td>4,400</td>
</tr>
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<td>Metal, electrolytic</td>
<td>do.</td>
<td>47,469</td>
<td>54,964</td>
<td>51,936</td>
<td>40,800</td>
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<tr>
<td>Platinum</td>
<td>kilograms</td>
<td>711</td>
<td>461</td>
<td>214</td>
<td>265</td>
</tr>
<tr>
<td>Selenium, metal</td>
<td>do.</td>
<td>70,458</td>
<td>52,459</td>
<td>58,069</td>
<td>66,028</td>
</tr>
<tr>
<td>Silver, metal</td>
<td>do.</td>
<td>38,428</td>
<td>33,447</td>
<td>59,375</td>
<td>60,019</td>
</tr>
<tr>
<td>Zinc:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mine output, Zn content</td>
<td>metric tons</td>
<td>66,109</td>
<td>72,118</td>
<td>51,900</td>
<td>56,415</td>
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<tr>
<td>Metal</td>
<td>do.</td>
<td>282,238</td>
<td>305,543</td>
<td>297,722</td>
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<td>INDUSTRIAL MINERALS</td>
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<td>Cement, hydraulic</td>
<td></td>
<td>1,685</td>
<td>1,743</td>
<td>1,633</td>
<td>1,052</td>
</tr>
<tr>
<td>Feldspar</td>
<td>metric tons</td>
<td>43,187</td>
<td>48,890</td>
<td>45,250</td>
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<tr>
<td>Lime</td>
<td></td>
<td>502</td>
<td>517</td>
<td>482</td>
<td>410</td>
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<tr>
<td>Mica</td>
<td>metric tons</td>
<td>8,097</td>
<td>11,449</td>
<td>10,706</td>
<td>10,000</td>
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<tr>
<td>Biotite</td>
<td></td>
<td>63</td>
<td>58</td>
<td>57</td>
<td>60</td>
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<td>Nitrogen, N content of ammonia</td>
<td>metric tons</td>
<td>91,356</td>
<td>100,623</td>
<td>73,868</td>
<td>68,379</td>
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<td>Phosphate rock apatite concentrate:</td>
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<td></td>
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</tr>
<tr>
<td>Gross weight</td>
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<td>860</td>
<td>780</td>
<td>660</td>
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<tr>
<td>P₂O₅ content</td>
<td></td>
<td>325</td>
<td>325</td>
<td>NA</td>
<td>234</td>
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<tr>
<td>Pyrite, gross weight</td>
<td></td>
<td>495</td>
<td>509</td>
<td>510</td>
<td>679</td>
</tr>
<tr>
<td>Sodium sulfate</td>
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<td>27</td>
<td>20</td>
<td>22</td>
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</tr>
<tr>
<td>Stone, crushed:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limestone and dolomite:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For cement manufacture</td>
<td></td>
<td>1,569</td>
<td>1,764</td>
<td>1,807</td>
<td>1,800</td>
</tr>
<tr>
<td>For agriculture</td>
<td></td>
<td>657</td>
<td>547</td>
<td>647</td>
<td>640</td>
</tr>
<tr>
<td>For lime manufacture</td>
<td></td>
<td>328</td>
<td>310</td>
<td>317</td>
<td>325</td>
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<tr>
<td>Fine powders</td>
<td></td>
<td>625</td>
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<td>650</td>
<td>650</td>
</tr>
<tr>
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<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3,161</td>
<td>3,247</td>
<td>3,422</td>
<td>3,420</td>
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<tr>
<td>Quartz silica sand</td>
<td></td>
<td>3,003</td>
<td>2,958</td>
<td>3,160</td>
<td>2,241</td>
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See footnotes at end of table.
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<tr>
<th>Commodity</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S content of pyrite</td>
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<td>326</td>
<td>226</td>
<td>154</td>
<td>150</td>
</tr>
<tr>
<td>Byproduct:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metallurgy</td>
<td>326</td>
<td>331</td>
<td>331</td>
<td>274</td>
<td>275</td>
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<tr>
<td>Petroleum</td>
<td>70</td>
<td>125</td>
<td>117</td>
<td>127</td>
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<tr>
<td>Total</td>
<td>396</td>
<td>456</td>
<td>448</td>
<td>401</td>
<td>400</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>971</td>
<td>904</td>
<td>956</td>
<td>851</td>
<td>850</td>
</tr>
<tr>
<td>Talc</td>
<td>559</td>
<td>536</td>
<td>528</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Wollastonite</td>
<td>16,200</td>
<td>16,364</td>
<td>15,600</td>
<td>16,000</td>
<td>16,000</td>
</tr>
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</table>

**MINERAL FUELS AND RELATED MATERIALS**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For fuel use</td>
<td>6,919</td>
<td>8,671</td>
<td>6,933</td>
<td>5,576</td>
<td>4,032</td>
</tr>
<tr>
<td>For agriculture and other uses</td>
<td>896</td>
<td>1,145</td>
<td>1,552</td>
<td>876</td>
<td>768</td>
</tr>
<tr>
<td>Petroleum refinery products thousand 42-gallon barrels</td>
<td>79,835</td>
<td>89,130</td>
<td>95,325</td>
<td>95,000</td>
<td>95,000</td>
</tr>
</tbody>
</table>

1 Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. 2 Revised. Ditto. NA Not available.

1 Table includes data available through December 31, 2011.

2 In addition to the commodities listed, granite and soapstone were produced, but available information is inadequate to make reliable estimates of output.

3 Reported figure.
## TABLE 2
FINLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Thousand metric tons unless otherwise specified)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>Kemira Oyj (Government, 98%)</td>
<td>Plant at Oulu</td>
<td>75</td>
</tr>
<tr>
<td>Apatite</td>
<td>Kemira Agro Oyj (Government, 98%)</td>
<td>Mine and plant at Siilinjarvi</td>
<td>8,000</td>
</tr>
<tr>
<td>Cadmium, metal</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Smelter at Kokkola</td>
<td>1</td>
</tr>
<tr>
<td>Cement</td>
<td>Fincement Oy (Irish Cement Ltd., 100%)</td>
<td>Plants at Lappeenranta and Parainen</td>
<td>1,020</td>
</tr>
<tr>
<td>Chromite</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Mine at Kemi</td>
<td>1,000</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Norilsk Nickel Harjavalta (OJSC MMC Norilsk Nickel, 100%)</td>
<td>Plant at Kokkola</td>
<td>NA</td>
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<tr>
<td>Copper:</td>
<td>Ore, Cu content</td>
<td>Inmet Mining Corp.</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td>Boliden Harjavalta AB (Boliden AB, 100%)</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Smelter at Harjavalta</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Refinery at Pori</td>
<td>210</td>
</tr>
<tr>
<td>Feldspar</td>
<td>SP Minerals Oy (Partek Corp., 50.1%, and SCR-Silbeco SA, 49.9%)</td>
<td>Mine and plant at Kernio</td>
<td>50</td>
</tr>
<tr>
<td>Ferrochrome</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Smelter at Tornio</td>
<td>250</td>
</tr>
<tr>
<td>Gold:</td>
<td>Ore, Au content</td>
<td>Dragon Mining Ltd.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Metric tons</td>
<td>Mine at Orivesi</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Scamining Corp.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Pahatavaara Mine near Sodankyla</td>
<td>1,500</td>
</tr>
<tr>
<td>Limestone</td>
<td>Nordkalk Corp. (Rettig Group, 100%)</td>
<td>Mines at Lappeenranta, Pargas, and Parainen</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td>Smelter at Pori</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Metric tons</td>
<td>Do. inmet Mining Corp.</td>
<td>4</td>
</tr>
<tr>
<td>Limestone</td>
<td>Do.</td>
<td>Rauma-Repola Oy</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Mine at Tornio</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Belvedere Resources Ltd.</td>
<td>3</td>
</tr>
<tr>
<td>Mercury</td>
<td>Ore, Ni content</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Smelter at Kokkola</td>
</tr>
<tr>
<td></td>
<td>Metric tons</td>
<td>Mine at Siilinjarvi</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td>Norilsk Nickel Finland (OJSC MMC Norilsk Nickel, 100%)</td>
<td>Smelter at Harjavalta</td>
</tr>
<tr>
<td></td>
<td>Metric tons</td>
<td>Do. inmet Mining Corp.</td>
<td>5</td>
</tr>
<tr>
<td>Petroleum products</td>
<td>Thousand barrels per day</td>
<td>Neste Olj Oyj, 50%, and Government, 50%</td>
<td>Plants at Naantali and Porvoo</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Do. inmet Mining Corp.</td>
<td>5</td>
</tr>
<tr>
<td>Phosphate-apatite</td>
<td>Kemira Oyj (Government, 98%)</td>
<td>Mine at Siilinjarvi</td>
<td>700</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Mine at Pysalasi</td>
</tr>
<tr>
<td>Quartz and quartzite</td>
<td>SP Minerals Oy (Partek Corp., 50.1%, and SCR-Silbeco SA, 49.9%)</td>
<td>Mines at Kernio and Nilsiapia</td>
<td>250</td>
</tr>
<tr>
<td>Selenium</td>
<td>Metric tons</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Smelter at Pori</td>
</tr>
<tr>
<td>Silver</td>
<td>Metric tons</td>
<td>Do. inmet Mining Corp.</td>
<td>30</td>
</tr>
<tr>
<td>Steel:</td>
<td>Crude</td>
<td>Rautaruukki Oy (Government, 41.8%)</td>
<td>Plants at Halikko, Hameenlinna, Kankaanpaa, and Raahen</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Fundia AB (Norsk Jenverk AS of Norway, 50%, and Rautaruukki, 50%)</td>
<td>Plants at Aimmeftors, Dalasraku, and Koverchar</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>Ovako Oy (SKF, 50%; Wartsila, 25%; Fiskas, 20%)</td>
<td>Plant at Inatra</td>
</tr>
<tr>
<td>Stainless</td>
<td>AvestaPolarit</td>
<td>Plant at Tornio</td>
<td>550</td>
</tr>
<tr>
<td>Talc</td>
<td>Mondo Minerals Oy (BHP Billiton, 50%, and Plüss-Staufar AG, 50%)</td>
<td>Mines at Lahnasliampi, Lipsavaara, and Horsmanaho</td>
<td>500</td>
</tr>
<tr>
<td>Wollastonite</td>
<td>Nordkalk Corp. (Rettig Group, 100%)</td>
<td>Mine and plant at Lappeenranta</td>
<td>40</td>
</tr>
<tr>
<td>Zinc:</td>
<td>Ore, Zn content</td>
<td>Inmet Mining Corp.</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td>Outokumpu Oyj (Government, 40%, and private investors, 12.3%)</td>
<td>Smelter at Kokkola</td>
</tr>
<tr>
<td></td>
<td>Do., do. Dito. NA</td>
<td>NA</td>
<td>15.6</td>
</tr>
</tbody>
</table>

15.6 U.S. GEOLOGICAL SURVEY MINERALS YEARBOOK—2010