

Review of Industrial Minerals in British Columbia, Canada - 2006 Simandl, G.J., Irvine, M.L, Grieve, D., Lane R., Wojdak, P., Madu, B., Northcote, B. and Schroeter, T.

British Columbia Ministry of Energy, Mines and Petroleum Resources

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SUMMARY

Industrial Minerals are an increasingly significant component of international trade and British Columbia is strategically located on the west coast of North America to access many of these markets (Figure 1). It has a well-developed transportation and industrial infrastructure in the southern third of the province, deep-water ports and a well maintained all-weather highway system. Rail lines link British Columbia's industrial centers to terminals across Canada and United States. Nonmetals are not affected by economic cycles to the same extend as metals (Figure 2). Over the last fifteen years this sector offered a steady growth and its value has doubled. During this period most nonmetals have became international travelers.

British Columbia's construction aggregate and industrial mineral production for 2006 is estimated at \$676 million (Figure 3). Cement is projected to account for \$324 million, sand and aggregate for \$192 million and stone for \$78 million. The projected value of all other industrial minerals combined is \$82 million, with sulphur being the major component.



Figure 2. Nonmetals, coal and metal production in Canada (Source: Natural Resources Canada). The value of nonmetals has more than doubled from 1991-

The most economically significant industrial minerals accounting for the \$82 M in figure 3 are: magnesite, white calcium carbonate, limestone (Figure 4), silica, dimension stone, gypsum and sulphur. Commodities produced in lesser quantities include jade (nephrite), magnetite, dolomite, barite, volcanic cinder, pumice, flagstone, clay, tufa, fuller's earth and zeolites.

There are more than 40 mines or quarries (Figure 5) and at least 20 major plant sites where upgrading of industrial minerals into value-added products takes place (Figure 6). Industrial minerals are essential for the chemical, electronic, glass, pulp and paper and refractory industries, environmental rehabilitation, soil conditioning and insulation manufacturing (Figure 7).





Figure 1. Strategic geographic location of British Columbia in respect to US Pacific Northwest and Asian countries.



Figure 3. Projected values of cement products, natural aggregate, stone and other industrial mineral production in British Columbia for 2006.



Figure 4. The 4000 tonne/hour single quadrant shiploader of Texada Quarrying Ltd. Texada Island is the major centre for limestone/crushed stone production in North America (Photo by B. Clague).



Figure. 5 Selected industrial mineral mines in British Columbia.

EXPLORATION POTENTIAL

British Columbia has a large untapped industrial mineral resource base. It has an excellent geological potential to host over 40 industrial mineral commodities and there are over 2400 industrial mineral occurrences located in MINFILE, an interactive computerized database

(www.em.gov.bc.ca/Mining/Geolsurv/Minfile/). The British Columbia Ministry of Energy, Mines and Petroleum Resources website also contains selected technical papers describing specific industrial mineral deposits <<u>http://www.em.gov.bc.ca/mining/Geolsurv/IndustrialMinerals/default.htm</u>>. Deposit models for selected industrial mineral and gemstone deposits specific to British Columbia are provided at: http://www.em.gov.bc.ca/mining/Geolsurv/Publications/OpenFiles/OF1999-10/toc.htm These models can be applied in industrial mineral exploration world wide.

SELECTED HIGHLIGHTS

Cement is a major building block of the economy (Figure 3). The Lafarge Canada Inc. and the Lehigh Northwest Cement Limited plants are state-of-the-art operations, located south of Vancouver, in Richmond and Delta respectively. Both have a production capacities of 1.15 million tonnes of cement per year. The Lafarge's cement plant in Kamloops produced about 220 000 tonnes of cement. The Lehigh plant production is shared equally between consumers in British Columbia and in US Pacific Northwest. It is possible that Lafarge and/or Lehigh Cement will increase their cement production capacity or that another major cement-producer will established itself in the Province. Alternatively, future increases in local demand for cement will have to be satisfied by imports, most likely from Asia. Examples of raw material producers for the cement industry are shown in figures 8 and 9.



Figure 6. Selected industrial mineral processing plants in British Columbia.



Figure 7. Rock wool plant, Roxul (West) International Inc. in Grand Forks. This is an excellent local example of value-added processin



Figure 8. Apple Bay geyserite mine (silica material with minor clay), Electra Gold Ltd., Vancouver Island. Product sold to cement industry.



Aspiring aggregate producers along the coast of British Columbia place high level bets on their ability to carve substantial portions of the California aggregate market (Figure 10). Main stream dimension stone producers (Figure 11) and processors based in British Columbia are facing stiff competition from Chinese stone imports; however, niche markets (Figure 12) appear to be affected to lesser extend by imports. The nephrite market is brisk (Figure 13). China syndrome may open development opportunities for a variety of industrial minerals that are known to occur in British Columbia such as barite and fluorite. Minerals that are used in environmental applications include zeolites, benthonite, perlite, vermiculite (Figure 14), limestone, dolomite and magnesite.



Figure 9. Alumina-rich rock mined by Pacific Bentonite Inc. In the Hat Creek area. This material is used in cement manufacturing, land scaping, baseball diamond construction and other applications.



Figure 11. Hardy Island Granodiorite - blocks ready for shipping to Bedrock Granite Sales and Stone Veneers processing plant in Coquitlam.



Figure 13. The president of Jade West Resources Ltd., Kirk Makepeace, displaying a spectacular nephrite boulder with estimated value of approximately one million dollars.



Figure 10. Orca sand and gravel quarry, on the east coast of Vancouver Island, is a joint venture between Polaris Minerals Corporation and the Namgis First Nation.



Figure 12. Golden Rock Product Ltd. producing attractive flagstone from the Upper Aldridge Formation near Kimberley.



Figure 14. Expanded vermiculite (field test). Potentially significant occurrence was discovered during the exploration for Nb and Ta on the Upper Fir deposit, Blue River area.