

INDUSTRIAL MINERALS IN BRITISH COLUMBIA REVIEW AND OPPORTUNITIES

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INTRODUCTION

Industrial minerals are an increasingly significant component of international trade and British Columbia is strategically located on the west coast of North America (Figure 1).



Figure 1. Strategic geographic location of British Columbia in western North America with access to Pacific Rim countries.

British Columbia has a well-developed infrastructure in the southern, highly populated third of the province, several deep-water ports, and a well-maintained highway system that permits efficient long distance trucking. Rail links British Columbia industrial centres to terminal points across the continent. The province has attractive energy costs and untapped mineral resources.

The value of solid mineral production for 2003 is estimated at \$2.9 billion (Figure 2). Officially, industrial minerals and construction materials account for \$578 million of this total; however, this value would be substantially higher if the value-added aspect of the industry was fully taken into account.

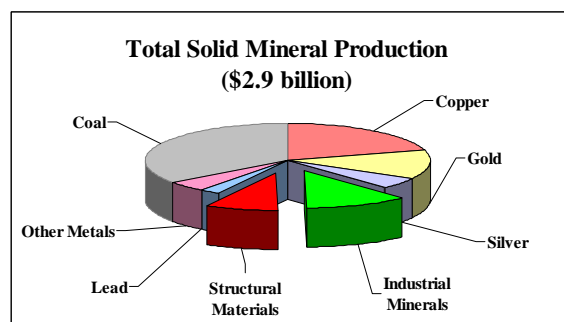


Figure 2. Estimated solid mineral production in British Columbia for the year 2003.

The forecast value of structural materials (including construction aggregates) is approximately \$238 million, while the value for traditional industrial minerals estimated by Natural Resources of Canada reached \$340 million. Our own preliminary estimates suggest that the value of industrial mineral production could be substantially higher than this figure.

Sales of sulphur declined to an estimated 770 000 tonnes; however, this decline may have been offset by higher sulphur prices. Most of the sulphur in British Columbia is derived as a byproduct of oil and gas processing. Further reductions in sulphur sales are anticipated in the coming years, if the trend of disposing of sour gas into depleted oil and gas reservoirs continues.

Overall exploration expenditures in British Columbia reached \$55 million in 2003, up 25% to 38% from 2002. Overall exploration drilling in 2003 was estimated at 300 000 metres, whereas drilling for industrial minerals was estimated at 10 800 metres, about the same as for 2002.

MAJOR TRENDS AND POTENTIAL

Aggregate

In recent years, the most significant industrial minerals trend in British Columbia has been an increasing

export of crushed stone and natural aggregate to urban centres along the west coast of the United States and higher sales within British Columbia's Lower Mainland. These markets are becoming very competitive as industry identifies new potential for development. A good example of this is the \$100-million construction aggregate complex and ship-loading facility planned for development near Port Alberni. The project has been granted an Environmental Assessment Certificate. This project, a joint venture between Eagle Rock Materials Ltd., the Hupacasath First Nation, the Ucluelet First Nation, and Polaris Minerals Corporation, will have a capacity of 6 million tonnes per year. In 2001, a basalt quarry and related roofing-granule plant was built in the Ashcroft area. In 2003, the plant operated at 50% of its designed capacity of 500 000 tonnes but production will increase proportionally as the market grows.

Cement Industry

An increase in the use of natural pozzolans and lightweight aggregates in the cement industry is expected. The use of natural pozzolans and fly ash reduces energy consumption and greenhouse gas emissions. Most of the major cement-producing companies are conducting research to find out how highly reactive pozzolan may, in some cases, replace as much as 60% of Portland cement and result in concrete with good set times and early strength. Pozzolan deposits, which are located in southern and central British Columbia (near major population centres), may benefit from increased interest from cement companies. Deposits of specialty, natural and lightweight aggregates, such as pumice, may also benefit.

Niche Markets

Niche markets, such as medical clay, jade, flagstone, tufa and other landscaping materials, have been expanding. They continue to provide opportunities for smaller-scale operators.

Green Minerals

Over the next few years, new opportunities will arise in the field of "green" minerals. Green minerals are those that can be used in environmental clean-up, agriculture, waste disposal, and for other environmental applications. Agricultural markets for zeolites appear to be improving. Absorbent minerals may be in higher demand because the moratorium on new salmon-farm developments in the province has been lifted. British Columbia has a number of well-documented bentonite deposits. Depending on test

results, some of these deposits could supply material for linings and barriers in waste disposal applications, clay tile manufacturing, and possibly drill-mud applications. For example, depending on the design specifications, some of British Columbia's bentonite could be used at the future Ashcroft Ranch Landfill solid waste project that is currently in the planning stage. This landfill will serve the Greater Vancouver Regional District.

Offshore

Should an offshore oil and gas industry become a reality, opportunities may expand for minerals used in drilling fluids and other related products. New markets may also develop for heavy aggregate along the coast. Magnetite and olivine are commonly used as ballast materials on ocean drilling platforms.

Coal-Related Opportunities

Over the long term, the market for magnetite used in coal washing may also indirectly benefit from the Kyoto agreement; it is environmentally friendly and reusable. We expect that a future trend may develop where coal is processed near mine sites (ground, cleaned and slurried), then piped to a power station where it could be de-watered and used. Increased processing of Canada's coal will make the process more efficient and reduce CO₂ emissions.

Gemstones

Highly publicized announcements of emerald and blue gem-quality beryl discoveries in the Yukon resulted in a Canada-wide coloured gemstone fever. British Columbia has good exploration potential for beryl gemstones, and more specifically, for emerald and aquamarine deposits.

Diamond exploration in British Columbia is in its infancy. Recent geological research suggests that northeastern and southeastern British Columbia is underlain by old crystalline basement similar to diamond-bearing regions in the Northwest Territories and Alberta. Unlike the Northwest Territories, most of eastern British Columbia was not staked or explored for diamonds. Recent findings of diamonds in ultra-high pressure metamorphic rocks also suggest that diamonds may be found west of the Rocky Mountain Trench. For more information on the subject, please consult: <http://www.em.gov.bc.ca/DL/GSBPubs/GeoFile/GF2004-3/DiamondsinBC.pdf>.

At - Aggregate
Ba - Barite
Bn - Bentonite
Cc - Ca-carbonate
Ch - Chrysotile
Cr - Crushed stone
Do - Dolomite

Ds - Dimension stone
Fc - Fireclay
Fr - Fuller's earth
Fs - Flagstone
Gy - Gypsum

Jd - Jade
Ls - Limestone
Ma - Magnetite
Mt - Magnesite
Pu - Pumice
Rg - Roofing Granules
S - Sulphur

Sa - Sulphuric Acid
Sg - Slag
Sh - Shale
Si - Silica
Sl - Slate
Tu - Tufa
Ze - Zeolite



Figure 3. Selected Industrial Mineral Mines and Quarries in British Columbia.

PRODUCTION AND EXPLORATION REVIEW

The most economically significant industrial minerals produced in British Columbia are magnesite, white calcium carbonate, limestone, silica, dimension stone, gypsum, sulphur, construction aggregate, and crushed rock. 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 3) and at least 20 major sites where upgrading of industrial minerals into value-added products takes place; this excludes aggregate operations listed by the British Columbia Aggregate Producers Association. Most of these operations are concentrated close to existing infrastructure and markets (Figure 4).

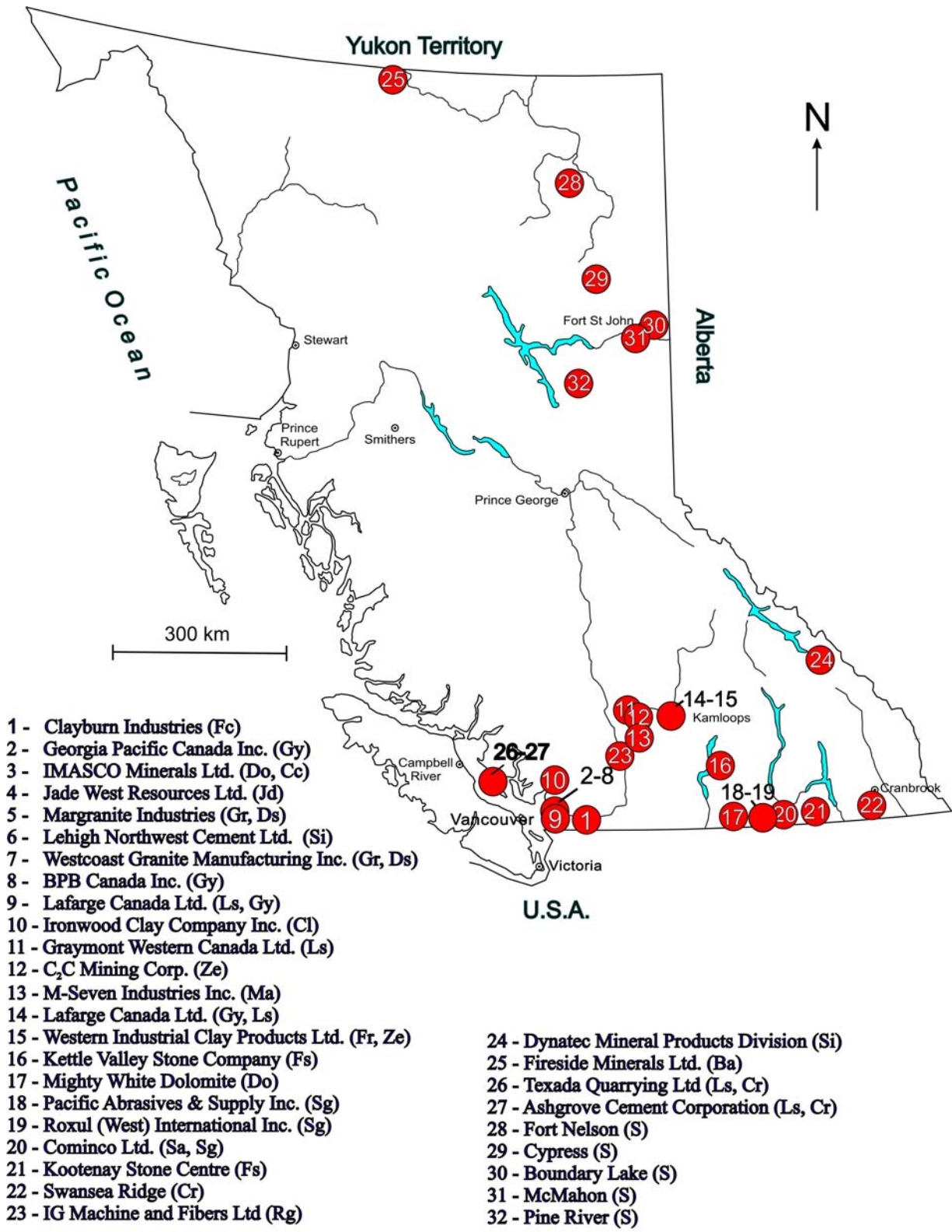


Figure 4. Industrial Mineral Processing Plants in British Columbia (same abbreviations as Figure 3).

GYPSUM

BPB Canada Inc. (formerly BPBP Westroc Inc.) production for 2003 is estimated at 500 000 tonnes of gypsum from its Elkhorn quarries near Windermere.

During the last several years, the company drilled 98 holes, which outlined a resource of 16.7 million tonnes of gypsum on its Koot property, northeast of Canal Flats. However, new reserves found at Elkhorn West will delay the need to develop the Koot deposit. In 2003, Georgia Pacific Canada Inc. produced approximately 175 000 tonnes of gypsum from its Four J quarry near Canal Flats, and about 100 000 tonnes were shipped to its wallboard plant near Edmonton, Alberta. Both BPB Inc. and Georgia Pacific operate wallboard plants in the Vancouver area. Lafarge Canada Inc. mines a small quantity of gypsum from its Falkland pit (approximately 6000 tonnes) for its Kamloops cement plant; if needed, it supplements it with gypsum supplied by BPB Canada Inc..

MAGNESITE

Baymag Inc. produces magnesite at Mount Brussilof at a rate of about 200 000 tonnes/year. The company has two plants in Exshaw, Alberta. The first is a converted limekiln producing sintered magnesia; the second houses a 50 000-tonne capacity, multiple hearth furnace, a vertical-kiln dedicated to producing specialty calcined MgO, and an electrofusing installation. Although calcined magnesia is the main product, a portion of production is further processed to high-quality fused magnesia for export. The company also sells crushed white magnesite for landscaping.

SILICA

In 2003, the Dynatec Mineral Products Division (Mountain Minerals) of Dynatec Corporation extracted approximately 85 000 tonnes of silica from its Moberly mine, and shipped it mainly to Lavington, British Columbia. In the past, it also shipped lump silica to Springfield, Oregon and other destinations; however, these shipments have stopped since American silicon and ferrosilicon production collapsed.

During 2003, Lehigh Northwest Cement Limited (formerly Tilbury Cement Ltd.) mined 49 000 tonnes of geyserite from its quarry at Monteith Bay on western Vancouver Island to supply its cement plant in Delta. Electra Gold Ltd. and Homegold Resources Ltd. mined 30 000 tonnes of geyserite (silica material and minor clay) from their Apple Bay deposit on Vancouver Island;

this material was successfully tested at the Ashgrove Cement plant in Washington State.

LIMESTONE

The largest limestone production centre in the province is Texada Island with two quarries, Gillies Bay (Texada Quarrying Ltd) and Blubber Bay (Ashgrove Cement Corporation). They traditionally ship 5 to 6 million tonnes annually to customers in British Columbia, Washington, Oregon and California, for cement, chemical and more recently, agricultural use. In 2003, 3.25 million tonnes of limestone and 750 000 tonnes of aggregate were shipped from Gillies Bay, where limestone production capacity is over 5 million tonnes a year and aggregate (crushed rock) capacity is approximately 1.5 million tonnes. Depending on customer demand, aggregate may be sourced from newly quarried granitic rock, stockpiled granite, limestone or a combination of these products.

Ashgrove upgraded its crushing plant in 2002. In 2003, approximately 4 million tonnes of rock were mined and more than 2 million tonnes of limestone were shipped from Blubber Bay. Aggregate production was about 400 000 tonnes. Depending on its ability to win future contracts in California, the company is considering building a \$10-million ship-loading facility on Texada Island. A joint venture of Lehigh Northwest Cement Limited and Chemical Company of Canada Limited conducted exploration drilling and trenching on the Lehigh Central Texada project.

In addition to pulp mills, which normally produce lime internally, three cement plants and two lime plants in British Columbia process limestone. Graymont Western Canada Inc.'s Pavilion Lake limestone quarry and lime plant near Cache Creek has a production capacity of about 190 000 tonnes of lime annually. In 2003, Lafarge Canada Inc.'s Kamloops cement plant operated at less than 50% of rated capacity and in 2004, they expect to operate at full capacity. Lafarge's plant in Richmond, and Lehigh Northwest Cement Limited's plants in Delta, are state-of-the-art operations. The Richmond plant has the capacity to produce one million tonnes of cement annually. Pacific Lime Products Ltd. at Giscome, near Prince George, sells small quantities of limestone to pulp mills in the region. Three thousand tonnes of limestone for environmental and agricultural applications was quarried near Kelowna by Western Canada Limestone Ltd.

White Calcium Carbonate

White, high-calcium carbonate was produced by Texada Quarrying Ltd. from its Gillies Bay quarry on Texada Island, by IMASCO Minerals Ltd. from its Benson Lake quarry on Vancouver Island and, if needed, its Lost Creek quarry near Salmo. This carbonate has a

variety of uses, including paper, paint and plastic filler. Imperial Limestone quarried a small quantity (less than 10 000 tonnes) of white calcium carbonate from its deposit on Texada Island. There were no sales.

Dolomite

Dolomite is quarried by IMASCO Minerals Ltd. at its Crawford Bay mine on Kootenay Lake (Figure 5) and by Mighty White Dolomite Ltd. near Rock Creek.

Dolomite is used for soil conditioning; to produce white ornamental aggregate, stucco and roofing; as fine aggregate; and in synthetic marble products. In 2003 Ashgrove Cement started mining dolomite from Pit 7 adjacent to Pit 6, their limestone quarry on Texada Island.



Figure 5. IMASCO Minerals Ltd. Crawford Bay dolomite mine.

AGGREGATE AND CRUSHED STONE

Grassroots exploration for traditional construction materials continues to expand along the British Columbia coast. Shipments of crushed stone from Texada Island and other coastal sources are making significant inroads into the Vancouver, Seattle, San Diego, San Francisco and Los Angeles markets. Texada Island limestone producers have already started to exploit this opportunity (see under limestone). Texada Island producers are well established, and crushed rock is a natural byproduct of

their limestone operations. Natural aggregate is the focus of similar market demands. Lehigh Northwest Materials Limited shipped approximately 1 million tonnes of aggregate from its facility at Sechelt to the San Francisco Bay area in 2003.

Polaris Minerals Corporation, one of the key partners in Eagle Rock Materials Ltd., is participating in the development of an aggregate operation near Port Alberni. Qualark Resources Inc. The Yale First Nation has proposed a 12 million tonne-per-year aggregate operation, in conjunction with placer gold washing, at its Hillsbar quarry near Yale. Polaris Minerals Corp. and the Kwakwaka'wakw First Nation propose to quarry material from its Orca Sand and Gravel operation near Port McNeil. Other companies are working on similar ventures, including Southern Pacific Development Corp.'s project near Port Renfrew on southwestern Vancouver Island.

Approximately 210 000 tonnes of railroad ballast was produced in 2003 from British Columbia Railway's Ahbau basalt quarry, northeast of Quesnel. Canadian Pacific Railway's Giscome basalt quarry, northeast of Prince George, was inactive. The existing inventory of crushed ballast material at the site was sufficient to address the company's maintenance requirements in the region.

Canadian National Railways, however, also operated at least six other railroad ballast operations in British Columbia: McAbee (near Ashcroft), Boulder (near Clearwater), Taverne (near Tete-Jaune), Pacific (east of Terrace) and Kwinitsa (Mile 40 on the Skeena River). Canadian Pacific Railway mined, crushed and shipped railroad ballast from its Swansea Ridge gabbro quarry south of Cranbrook. No information is available about Canadian Pacific's Wallachin quarry.

Exploration for aggregate to support the expanding infrastructure of the oil and gas sector in northeast British Columbia is ongoing. One major producer, Teko pit, southwest of Taylor near Fort St. John, was a major aggregate-crushing operation in 2003.

ROOFING GRANULES

IG Machine and Fibers Ltd., a subsidiary of IKO Industries Ltd., and operates an Ashcroft basalt quarry and roofing-granule plant. In 2003, the plant was producing six distinct colours, and operated at about 50% of its rated capacity of 500 000 tonnes of granules per year. Basalt is quarried, crushed, sized and coloured on site, prior to shipping to IKO Industries shingle plants in Sumas, Washington, Calgary, Winnipeg and Chicago.

INDUSTRIAL CLAY AND SHALE/SANDSTONE

Clayburn Industries Ltd. of Abbotsford processes fireclay from Sumas Mountain into a variety of refractory bricks and castable products that are exported worldwide. Sumas Clay Products Ltd. also manufactures small quantities of flue-line pipe and ornamental and facing bricks from its plant near Abbotsford. Clayburn, Lafarge Canada Inc. and Lehigh Northwest Cement Ltd. can produce around 500 000 tonnes of shale and sandstone from their Sumas shale quarry. Clayburn is developing new lightweight aggregate with good insulation properties based on this material. Exploration for alumina-rich materials increased due to difficulties that were encountered to access resources from the Sumas quarry in early 2003. As a result, the Lang Bay deposit, Klinker from the Hat Creek area, and a new occurrence discovered by Quinsam Coal are receiving attention. Pacific Bentonite Ltd. mined and shipped about 3000 tonnes of Hat Creek burnt shale. Lafarge is testing the Hat Creek shale as a potential source of alumina for cement manufacturing.

MEDICAL CLAYS

Ironwood Clay Company Inc. is the largest producer of cosmetic/medical clay in British Columbia. It mines seasonally from the De Cosmos Lagoon on Hunter Island, west of Bella Coola.

Similar material from at least one other British Columbia locality, Carrie Cove in the Comox Valley, also reached market. It is currently sold by Carrie Cove Cosmetics for medicinal and cosmetic applications. It is also expected that Glacial Marine Clay Inc. will be producing clay for specialized hydroponics applications. Mr. Robert Davie has an undeveloped clay deposit on King Island. The market for cosmetic/medical clay is limited; however, the processed product may retail at about \$100/kilogram. The market for specialized hydroponics clays is larger and product specifications are less stringent. Such material may retail at about \$20/kilogram.

DIATOMITE, ZEOLITE AND BENTONITE

Western Industrial Clay Products Ltd. produces domestic and industrial absorbents (Figure 6), principally from its Red Lake fuller's earth deposit near Kamloops. In the Princeton area, the company also is mining bentonite from the Bud property. The company secured a contract to sell humic acid (a leonardite derivative) to a major retail chain and is looking for an optimum humic acid extraction method. The leonardite is found between

the diatomite horizons at Red Lake. There are a number of known bentonite deposits in British Columbia.

Dynatec Corporation continues to report increasing annual sales of zeolite from the Ranchlands Z-1 quarry near Cache Creek. The company drew from existing stockpiles during 2003, so mining was very limited. Near Princeton, progress was made to bring the Zeo (Bromley Vale) zeolite project into production. Zeo-Tech Enviro Corp. obtained a contract to supply 30 000 tonnes in late 2003, and has formed a partnership with C2C Zeolite Corp. to build a micronizing plant. The new company, United Zeolite Products Ltd., will be a jointly owned operating company. A 5-year supply agreement has been signed with Haliburton Energy Services Inc. to deliver a specialty zeolite for use in a new lightweight oil and gas well cementing system.

Although Canmark International Resources Inc. is attempting to develop a market in the Lower Mainland for zeolite from its Sunday Creek deposit near Princeton; the mine remained inactive during 2003.

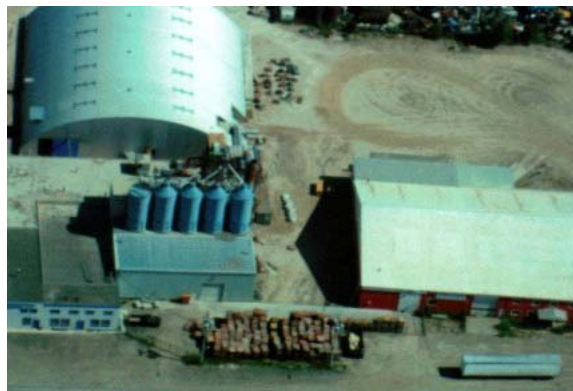


Figure 6. Western Industrial Clay Products Ltd. Processing Plant in Kamloops (aerial view).

DIMENSION STONE



Figure 7. Nipple Mountain Flagstone Quarry, Kettle Valley Stone Company.

Westcoast Granite Manufacturing Inc. in Delta, Margranite Industries in Surrey, and Matrix Marble

Corporation in Duncan operate stone-processing plants. Garibaldi Granite Group Inc., which was located in Squamish, declared bankruptcy. Margranite processes imported stone, and nine local granite varieties from at least three quarries located in the East Anderson River, Beaverdell and Skagit Valley areas. Huckleberry Stone Supply Ltd. of Burnaby and Mountain High Properties Ltd. of Pemberton produced basalt from small quarries in the Whistler area. In 2003, Matrix Marble Ltd. concentrated on processing imported and domestic materials at its plant near Duncan, but also extracted marble from its quarry near Cowichan Lake.

Hardy Island Granite Quarries Ltd. extracted about 3500 tonnes of stone this year, and the product was sold through Bedrock Granite Sales in Coquitlam, British Columbia. In 2003, Quadra Stone Ltd. produced a small tonnage of "Cascade Coral" blocks from its new Fox Island quarry. Near Kelowna, the Kettle Valley Stone Company produced flagstone, ashlar, thin veneer and landscape rock products from several quarries. The most popular product was dacite ash (Mountain Ash) from its Nipple Mountain quarry (Figure 7). Kettle Valley purchased a new automated saw that should help increase production.

Revelstoke Flagstone Quarries, Kootenay Stone Centre, and other small operators in the West Kootenays quarried flagstone. Small flagstone quarries were also opened in the North Thompson and Golden areas. Rocky Mountain Tufa produced about 2500 tonnes of material, mainly for landscaping applications. In 2003, Golden Rock Products Inc. secured a number of tufa, travertine, and limestone occurrences along the Rocky Mountain Trench in southeast British Columbia. The company plans to market products from these occurrences to Alberta.

CHRYBOTILE

Cassiar Resources Inc. (CRI) sold its mining property located in Cassiar, British Columbia, to Cassiar Jade Contracting Inc. (CJC) of Watson Lake, Yukon. The assets transferred include all mining titles, the remaining infrastructure and chattels on the property, and an environmental reclamation bond posted with the regulators. CJC agreed to perform the remaining reclamation work and assumed all liabilities related to the property. CRI has an option to reacquire the Cassiar property if a major commercial opportunity should arise. CRI changed its name to Troutline Investments Inc..

JADE

Jade West Resources Ltd. and its affiliated company, Polar Gemstones Ltd., are the province's main nephrite producers. In 2003, they produced about 200 tonnes of nephrite from the Kutcho Creek, Cassiar and Serpentine Lake areas in northwestern British Columbia. Jade West

also operates a jade processing facility in south Surrey. Jedway Enterprises Limited extracted small quantities of nephrite from its Kutcho Creek and Polar sites. Cassiar Mountain Jade, with outlets in Jade City and Quesnel, produced approximately 20 tonnes of raw material from its Princess property. Cassiar Jade Contracting Inc., who bought chrysotile-related assets from Cassiar Resources Inc., continues to recover nephrite from mine dumps near Cassiar.

PUMICE, TEPHRA AND LAVA ROCK

Canada Pumice Corporation produced about 20 000 cubic metres of tephra from its Nazko quarry, west of Quesnel. The material is used for landscaping, sporting facilities, growing and filtration media, and lightweight aggregate applications. In March 2004, Crystal Graphite Corporation signed an agreement in principle to acquire 100% of shares of Canada Pumice Corporation. Great Pacific Pumice Ltd. (Figure 8) is shipping a variety of pumice-based products from its Pum property on Mount Meager, north of Pemberton. Production in 2003 was estimated at 7000 cubic metres, and material from this deposit was successfully tested by two major cement-producing companies as a pozzolanic additive. Garibaldi Aggregates Ltd. also initiated production of pumice from the Mount Meager area.

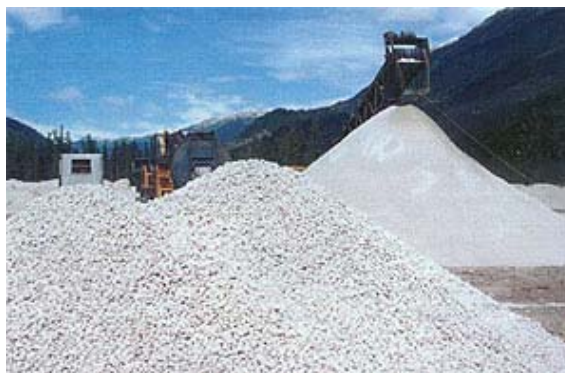


Figure 8. Processing Pumice, Great Pacific Pumice Ltd., near Mt. Meager.

MINERAL WOOL

Roxul (West) International Inc. made new investments in plant improvements at their insulation/mineral wool manufacturing plant in Grand Forks. From 1999 to 2001 Roxul invested \$25 million in the project and a further \$4 million in 2002. The company continues to improve its competitive position. The plant's main source of raw material was the Winner diorite quarry in the Greenwood mining camp, 4 kilometres south of the former Phoenix mine. In 2003, approximately 50 000 tonnes of diorite were mined and crushed. Material from Winner quarry is supplemented by

talus material from Cannon Creek. During the last few years, slag was recovered from Roxul's operation in Greenwood; however, this year the company reverted to Pacific Abrasives & Supply Inc., its original supplier in Grand Forks.

SLAG

Pacific Abrasives & Supply Inc. is producing and processing slag from Grand Forks dumps, mainly for sandblasting at major shipyards, and for roofing granules. Some slag was also shipped from Anyox by Tru-Grit as abrasive for cement industry applications, mainly in the Vancouver area, as roofing granules, and for other abrasive applications. Teck Cominco Ltd. is also a major slag producer at its Trail smelter. It markets slag mainly for cement production and abrasive applications. For the last few years, slag has also been recovered in the Greenwood area, mainly as one of the raw materials for the production of mineral wool by Roxul (West) International Inc. in Grand Forks. In 2003, MRI Americas purchased slag from Greenwood and trucked it to Mission, where it was put on barges and transported to Texada Island. From there it was shipped to Poland. An initial shipment of 25 000 tonnes was extracted in October 2003, however, conflicting information exists as to the intended use of shipped material.

MAGNETITE

Craigmont Mines Ltd. typically produces between 60 000 and 70 000 tonnes of magnetite annually for industrial applications by processing the Craigmont mine tailings; however, in 2003 the production was reduced to 45 000 tonnes. The company is supplying most coal mines in western Canada with heavy media material for their wash plants. Quinsam Coal optioned the Iron Mike and Iron Ross magnetite occurrences, which are approximately 6 kilometres south of Sayward. Benson Magnetics Ltd. continues to investigate the feasibility of installing a 25 000 tonne-per-year plant near Benson Lake, on Northern Vancouver Island. Current trends in clean coal processing may lead to development of additional magnetite resources in British Columbia.

GRAPHITE

In 2002, Crystal Graphite Corp. released new resource calculations for its Black Crystal graphite deposit in the Slocan Valley. The weathered zone has 648 000 tonnes containing 1.82% "fixed carbon" in measured and indicated resources, and 516 000 tonnes of inferred resources containing 1.69% fixed carbon. The underlying unweathered zone has indicated resources of 4 763 000 tonnes containing 1.21% fixed carbon, and 4 591 000 tonnes of inferred resources containing 1.24% fixed carbon. In 2002, the company also received a

mining permit to process flake graphite to a maximum feed rate of 250 000 tonnes per year. In February 2003, the company announced that its processing plant was ready for continuous operation, and is now planning upgrades to enhance productivity. The company planned to mine an additional 2500 tonnes of graphitic material plant feed during October 2003.

SULPHUR

Duke Energy Corporation, Petro-Canada Inc. and Anadarko Canada are major sulphur producers. Sulphur is a byproduct of natural gas processing at a number of plants in the northeastern region of the province. A rough estimate of production for 2003 is 770 000 tonnes. Liquefied SO₂ and sulphuric acid are also produced at Cominco's smelter in Trail mostly for internal use. Sulphur prices are increasing due to greater Chinese demand. All of British Columbia's sulphur production in 2003 was sold on contracts, so none was available for sale on the spot market.

HIGH TECH MINERALS

Commerce Resources Corporation continued to evaluate its Fir carbonatite deposit near Blue River in 2003. Newly released resource estimates for the Fir are 5.6 million tonnes of indicated and 6.7 million tonnes of inferred resources, both grading 203.1 g/t of tantalum pentoxide and 1047 g/t of niobium pentoxide. The Fir ferrocolumbite- and pyrochlore-bearing carbonatite is apparently nearly flat lying, and has been outlined over an area of 425 by 325 metres.

The company also announced completion of two preliminary cost assessments for processing and beneficiation of these tantalum and niobium enriched carbonatites. A bulk sample of approximately 800 kilograms, comprised of core from a number of diamond-drill intercepts, was used in a small-scale metal recovery test. It indicated recoveries for tantalum and niobium in the range of 83 to 91%. Gravity testwork was also carried out. Other metallurgical testing is ongoing. The focus of the 2003 exploration program was to define the extent of mineralization in the Upper Fir carbonatite zone that may be an offset of the Fir deposit. According to the company, average concentrations for all the 2003 samples from the Upper Fir carbonatite are 267 g/t Ta₂O₅ and 3746 g/t Nb₂O₅.

GEMSTONES

Okanagan Opal Inc. mined a small quantity of precious opal in 2003 from its Klinker deposit near Vernon. Follow-up prospecting and excavating also were conducted on the Northern Lights precious opal occurrence in the Whitesail Range, south of Houston.

During 2003, the Schaefer family continued to extract precious opal by hand from its Firestorm property, west of Burns Lake. Cream Minerals Ltd. discovered ice blue to deep greenish-blue beryl crystals (aquamarine) on its Kootenay Gemstone property (formerly Bayonne Aquamarine), located near Salmo. The beryl occurs in pegmatites and quartz veins. Most of the mineralization appears along a favourable contact between pegmatitic dikes and sedimentary rocks. Eagle Plains Resources Ltd. discovered gem-quality aquamarine associated with pegmatites on its Blue Hammer property in the Doctor Creek area, 45 kilometres northwest of Cranbrook.

BARITE

Tiger Ridge Resources Ltd. continued underground development and bulk sampling of two adits on its barite project at Jubilee Mountain, west of Spillimacheen.

In 2003, barite production by Fireside Minerals Ltd. from its Fireside quarry east of Watson Lake amounted to 10 000 tonnes, and some 12 000 to 15 000 tonnes of rock was mined from the Bear Pit. In northern British Columbia, the high-grade Nonda and lower grade BV barite deposits are being investigated by Mr. Horst Klassen.

WOLLASTONITE/GARNET

In 2003, RossWoll Industries Inc., a private company formed by Grid Capital Corporation, purchased a wollastonite deposit located near Rossland from Mr. Klassen. This material could be potentially used as flux at Teck Cominco's smelter in Trail.

PERLITE

In September 2003, BBF Resources Inc. took a 180-tonne bulk sample of perlite from the Frenier deposit, which is located west of Clinton. The material was trucked to Abbotsford for processing and test marketing for horticultural use. At this time, a number of prospectors are exploring for perlite deposits closer to Vancouver, where there is a good potential for a perlite expander installation.