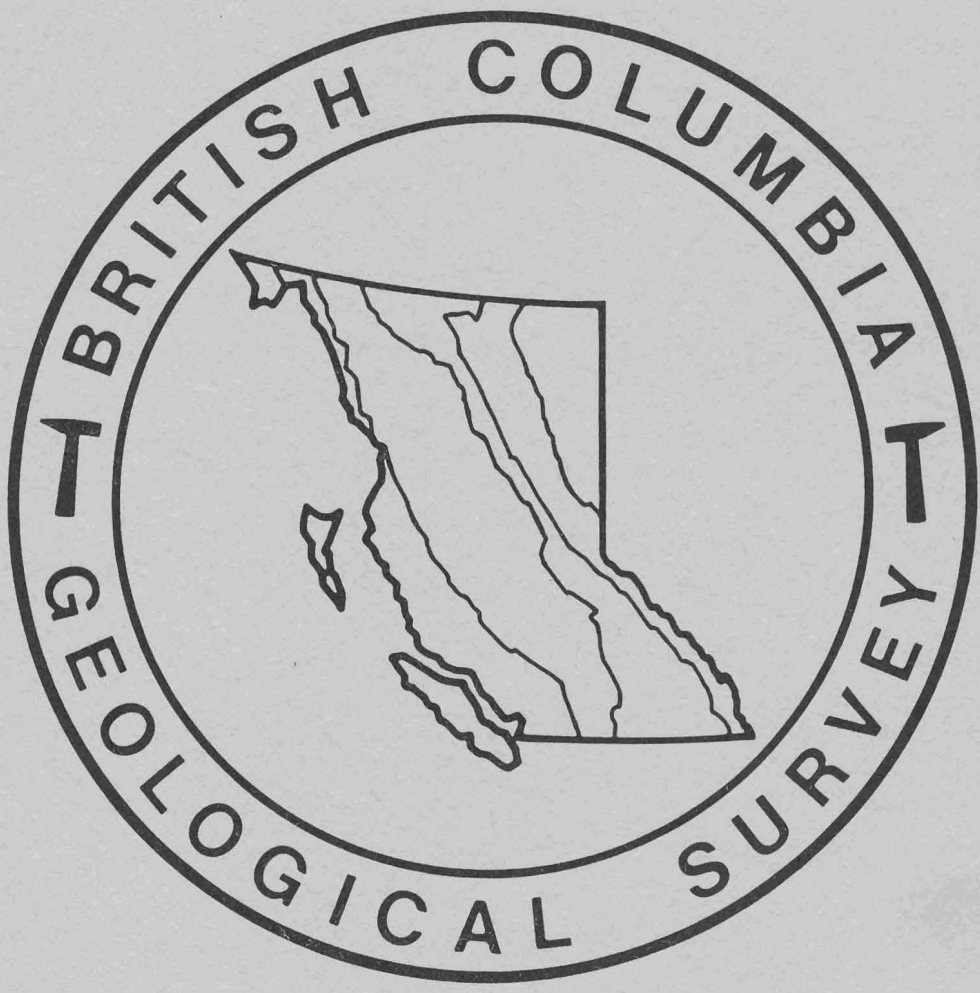
Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

INDUSTRIAL MINERALS IN BRITISH COLUMBIA



INFORMATION CIRCULAR 1989-2

GEOLOGICAL SURVEY BRANCH
INDUSTRIAL MINERALS PROGRAMS
1985-1988

INTRODUCTION

British Columbia is well endowed with a variety of industrial minerals. The annual value of their production, together with structural materials, varies between 10 and 15 per cent of the combined value of minerals, coal, petroleum and natural gas, and has been steadily increasing since 1960 (Figure 1). In 1986 there was reported production of 13 industrial mineral commodities with a total value of $132 million; structural materials produced accounted for an additional $235 million. The inventory of industrial mineral resources in British Columbia is the responsibility of the Industrial Minerals Subsection of the Geological Survey Branch. This unit also monitors industry activity and provides assistance to the general public.

This subsection is headed by Z.D. Hora, Industrial Minerals Specialist. G.V. White is a geologist on staff and three contract geologists, S.B. Butrenchuk, P.B. Read and J. Pell have been carrying out specific studies for the past three years. In addition, other branch staff and contractors are seconded to complete short-term commodity studies from time to time.

During the period 1985-1988 many of the programs undertaken by the Industrial Minerals Subsection were funded under the Canada/British Columbia Mineral Development Agreement (MDA). These programs varied in scope from literature research and compilation to detailed site specific studies and regional investigations in the field. Increasing support of Geological Survey Branch activities by the Provincial government during the past few years has, in turn, led to increasing support for new industrial minerals projects.

The Industrial Minerals Subsection participates with the Mineral Policy Branch, and other agencies, in commodity market research. Similarly, cooperative or contracted analytical and metallurgical testing projects are carried out with CANMET, Geological Survey of Canada, universities, private laboratories and the Branch's own laboratory. In addition, the subsection maintains both commodity and property files and contributes to MINFILE, the Branch's computerized mineral inventory database.

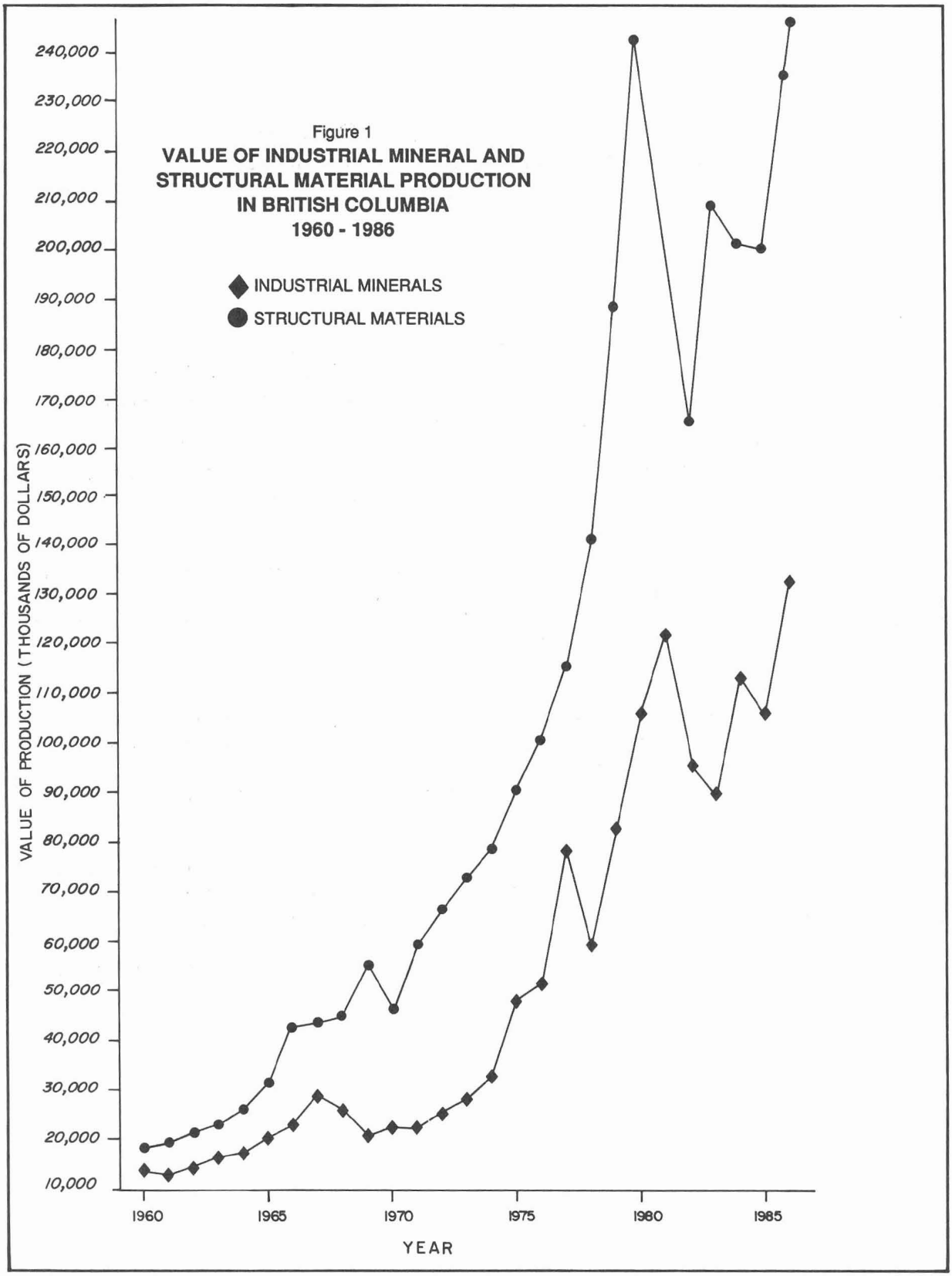


Figure 1
VALUE OF INDUSTRIAL MINERAL AND STRUCTURAL MATERIAL PRODUCTION IN BRITISH COLUMBIA 1960 - 1986
INDUSTRIAL MINERALS
STRUCTURAL MATERIALS
VALUE OF PRODUCTION (THOUSANDS OF DOLLARS)
240,000
230,000
220,000
210,000
200,000
190,000
180,000
170,000
160,000
150,000
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
1960
1965
1970
1975
1980
1985
YEAR

MAJOR PROJECTS

INDUSTRIAL MINERAL MAP
(S.B. BUTRENCHUK, Z.D. HORA, G.V. WHITE,
K.D. HANCOCK, M.E. MACLEAN)

During 1987 staff of the Industrial Minerals Subsection compiled a map of industrial mineral occurrences in British Columbia. This 1:2 000 000-scale map was published in early 1988 as Open File 1988-13. Significant occurrences of 40 different commodities are represented on the map, including areas with potential for off-shore titanium placer deposits. Thirty industrial mineral producers and 79 past producers are also shown. Deposits and occurrences are plotted on a geological base modified from the Geological Survey of Canada's geological map of the Canadian Cordillera.

CARBONATITES IN BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(J. PELL)

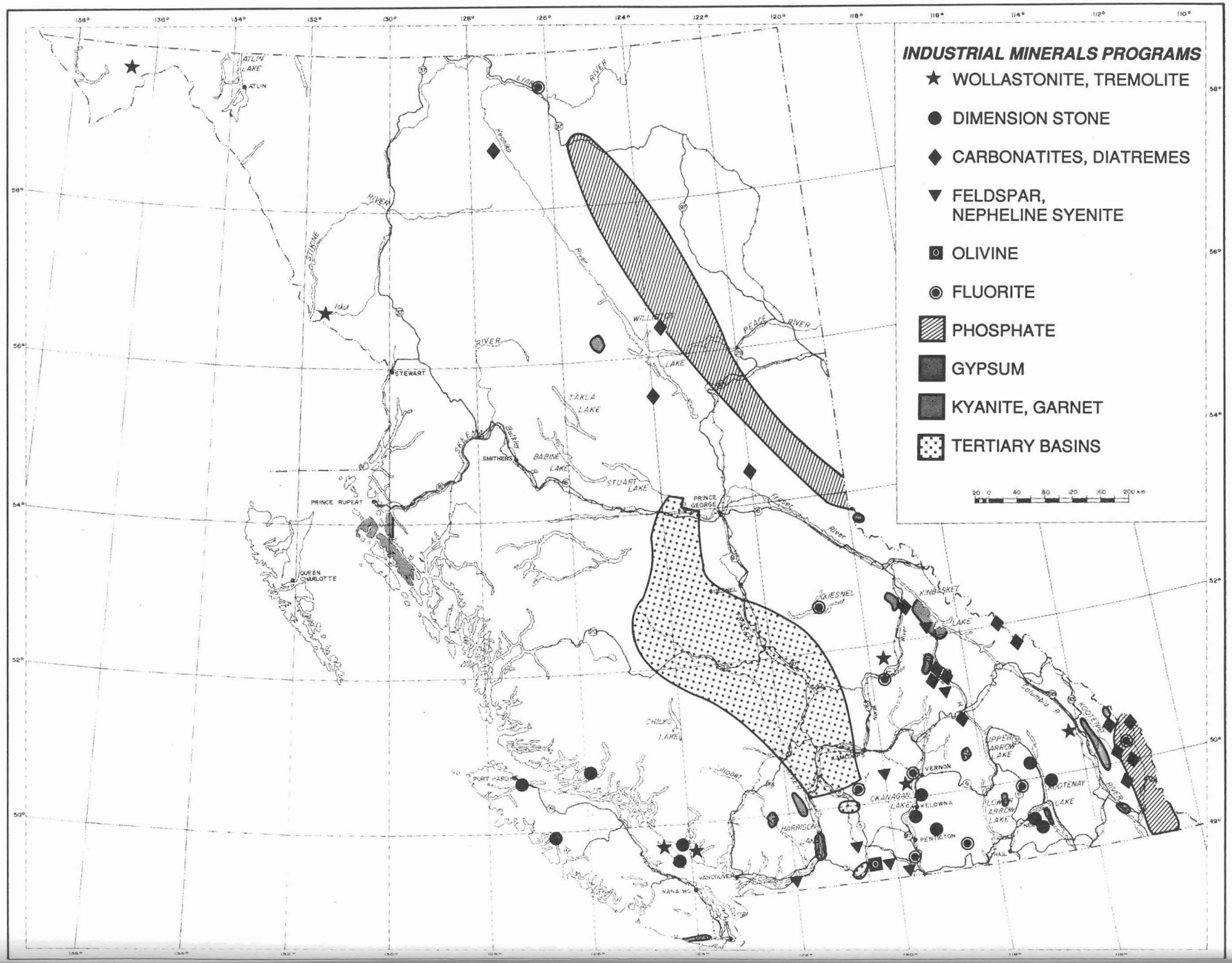
A four-year study of carbonatites in British Columbia important for their niobium, tantalum, rare earth element, yttrium, zirconium, vermiculite and phosphate potential, has been completed. These rocks occur in a broad belt parallel to and including the Rocky Mountain Trench. Carbonatites of two ages are recognized, Hadrynian (770 Ma) and Devono-Mississippian (350 Ma). Both intrusive and extrusive carbonatites of Hadrynian age occur, with the intrusive bodies commonly associated with nepheline syenites. Younger carbonatites are all intrusive and many are associated with alkaline syenites.

Many of the carbonatites are small sill-like bodies which have been complexly deformed and have limited economic potential due to their size. A number of large bodies are known, including the Mount Grace carbonatite tuff, which is traceable for more than 60 kilometres, the Ice River syenite complex, the Aley carbonatite complex, and the Kechika yttrium and rare-earth prospect.

Economically significant occurrences include: the Aley carbonatite which contains grades between 2/3 and 3/4 per cent Nb_2O_5; the Rock Canyon Creek (Deep Purple) showing, in which a mineralized zone over 1 kilometre long contains abundant fluorite and locally 1 to 2 per cent total rare-earth oxides; the Kechika yttrium and rare-earth property, which contains alkaline rocks outcropping along a 20-kilometre belt and which locally contain up to 0.90 per cent Y_2O_3 and abundant rare-earths; and, the Wicheeda Lake carbonatite which has anomalous niobium and rare-earth values.

GARNET AND KYANITE IN BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(J. PELL)

Garnet, kyanite, sillimanite and andalusite are minerals found in contact with amphibolite facies regional metamorphic rocks. In British Columbia such metamorphic rocks are confined to two main belts; the eastern Omineca Belt and the western Coast Belt where they are accompanied by granitic plutons. Within these belts, pelitic metasedimentary rocks containing small percentages (less than 5 per cent) of these minerals are extremely abundant. Rocks containing significant concentrations of these minerals, however, are considerably less common. A number of areas do contain kyanite-group minerals and garnet in potentially economic concentrations, that is, greater than 10 to 15 per cent kyanite group minerals or greater than 25 per cent garnet. These mineralized areas are associated with core gneisses in the Shuswap and Monashee complexes, southern


INDUSTRIAL MINERALS PROGRAMS
WOLLASTONITE, TREMOLITE
DIMENSION STONE
CARBONATITES, DIATREMES
FELDSPAR, NEPHELINE SYENITE
OLIVINE
FLUORITE
PHOSPHATE
GYPSUM
KYANITE, GARNET
TERTIARY BASINS
ATLIN LAKE
ATLIN
STEWART
SMITHERS
PRINCE RUPERT
QUEEN CHARLOTTE
PRINCE GEORGE
QUESNEL
VERNON
KELOWNA
PENTICTON
VANCOUVER
NANAIMO
PEACE RIVER
STUART LAKE
TAKLA LAKE
BABINE LAKE
KINBASKET LAKE
KOOTENAY LAKE
UPPER ARROW LAKE
LOWER ARROW LAKE
OKANAGAN LAKE
CHILKO LAKE
HARRISON LAKE
PORT HARDY

and central British Columbia, in the Aiken Lake area of northern British Columbia, associated with roof pendants in the Coast Mountain batholiths near Yale and in the Prince Rupert area.

Areas enriched in these minerals should also have good potential for garnet and kyanite placers. Secondary deposits could be economic with considerably lower concentrations of the desired mineral species; as little as a few per cent may be all that is necessary, as opposed to 10 to 15 per cent kyanite or 25 to 40 per cent garnet in bedrock sources. Garnet-rich placers were recently reported by a prospector from the Revelstoke area.

These minerals have potential industrial applications, garnet predominantly as an abrasive and kyanite in refractories. Currently there is no production of these commodities in the Province of British Columbia, or elsewhere in Canada. Potential sources of kyanite and garnet are summarized in Open File 1988-26.

FLUORITE IN BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(J. PELL)

Fluorite has commercial importance, largely in the metallurgical and chemical industries, while fluorine is a useful pathfinder element for a wide range of deposit types. Fluorspar mineralization in British Columbia occurs in a wide range of geological environments, tectonic settings and ages.

Five significant fluorspar prospects are known. The Rock Candy showing, a vein deposit of probable late Tertiary age associated with the Coryell intrusions, is in the southern Omineca Belt and has a production history. The Deep Purple prospect on Rock Canyon Creek, in the Foreland Belt, southern British Columbia, is a metasomatic replacement deposit interpreted to be related to a carbonatite-alkaline system. Mineralization at Deep Purple is probably Devono-Mississippian to Early Mississippian in age. The Rexspar deposit, which is located along the western margin of the Omineca Belt, south-central British Columbia, comprises separate zones of fluorspar and uranium mineralization of volcanogenic origin, related to alkaline tuffs. Mineralization at Rexspar is considered to be syngenetic with host rocks that are Devono-Mississippian. The Eaglet fluorspar property consists of veins and replacements of possible Cretaceous age, in the Quesnel Lake gneiss, at the western margin of the Omineca Belt in south-central British Columbia. The Foreland Belt of northern British Columbia contains the carbonate-hosted Liard Hot Springs fluorspar showings.

Numerous other showings occur throughout the province, but the major occurrences are confined to the Omineca and Foreland belts, which suggests that these areas are most favourable for exploration. Other deposits with abundant fluorspar are reported from the Atlin area in the Coast Belt; this area also warrants exploration attention. The Rexspar property appears to have the best immediate potential of the known fluorspar deposits. It is well located, close to road and rail and to the necessary infrastructure, has well-developed access and has significant proven reserves of minable grades near surface.

PHOSPHATE DEPOSITS IN BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(S.B. BUTRENCHUK)

Extensive sedimentary phosphate deposits occur at a number of stratigraphic horizons in the Rocky Mountains of British Columbia. These include the Cambrian Kechika Formation, the Mississippian Exshaw Formation, the Triassic Sulphur Mountain and Toad formations, the Permian

Ishbel Group and stratigraphic equivalents, and the Jurassic Fernie Formation. Only those deposits present in the Sulphur Mountain Formation, Ishbel Group and Fernie Formation are of significance.

Phosphate within the Sulphur Mountain Formation is restricted to the basal Whistler member. It is typically pelletal and ranges in thickness from 1 to 3 metres. Phosphate grade ranges from 6.0 to 28.0 per cent P_2O_5. In the Ishbel Group phosphate horizons are typically nodular although pelletal and conglomeratic varieties are also present. They range from 1 to 22 metres in thickness and the grades range from 2 to 29 per cent P_2O_5.

The most prominent phosphate deposits are at the base of the Fernie Formation where a phosphorite bed averaging 1.5 metres thick and grading 15 to 20 per cent P_2O_5 is present. This bed can be traced along strike for approximately 300 kilometres in southeastern British Columbia.

This study has been completed and preparation of the final report is in progress.

Gypsum Deposits in British Columbia
(S.B. Butrenchuk)

Gypsum ranks third in value of production behind asbestos and sulphur among industrial minerals produced in British Columbia. Production of gypsum comes primarily from two quarries located in the Stanford Range in southeastern British Columbia.

Gypsum deposits are known in four areas: extensive deposits occur in the Devonian Burnais Formation in the Stanford Range; in stratigraphically equivalent rocks in the Joffre Creek and Cranbrook areas; in the northeast, gypsum is present at a locality near the headwaters of Forgetmenot Creek along the Alberta boundary, where several beds of gypsum occur in the Triassic Starlight Evaporite member of the Whitehorse Formation.

A gypsum deposit occurring within or possibly intruding strata of Early Permian to Late Triassic age is located in the O'Connor River area in the northwest corner of the province. Elsewhere in the province gypsum was produced from the Falkland area for many years. Although some gypsum still remains most of the deeper part of the deposit consists of anhydrite.

This is a one year project scheduled for completion in March, 1989.

Magnesite in British Columbia
(MDA Funded Project)
(D.B. Grant)

Magnesite occurrences are common throughout British Columbia. The Mount Brussilof deposit, containing greater than 40 million tonnes, is associated with the carbonates of the Cathedral Formation and is reputed to be the largest and purest crystalline magnesite deposit in the western world. Magnesite has also been documented in the Proterozoic carbonates of the Mount Nelson Formation in southeastern British Columbia and in the Helikian Chischa Formation in northeastern British Columbia. Sedimentary quartzite-hosted magnesite is reported from the Cranbrook Formation. Similar quartzite stratigraphy occurs parallel to the Cambrian carbonate belt throughout eastern British Columbia. Impure magnesite, formed as an alteration product of Pennsylvanian to Triassic ultramafic rocks, is common throughout the Intermontane Belt.

A report on this project is available as Open File 1987-13.

TERTIARY VOLCANOSEDIMENTARY BASINS
(MDA FUNDED PROJECT)
(P.B. READ)

Tertiary volcanosedimentary basins cover large areas of British Columbia. They are known to contain a limited number of widely distributed occurrences of clays, zeolites, pozzolans, diatomite and other industrial minerals such as beryllium and germanium.

This three-year regional assessment is designed to locate favourable stratigraphic intervals or geological environments for these minerals. In 1986 detailed investigation, of the stratigraphy and geological setting of occurrences, started near Princeton. The Cache Creek, Merritt Basin, Quilchena Outlier, Gang Ranch and Deadman River areas were studied during 1987 and 1988.

Several zeolite and bentonite occurrences were located in the vicinity of Princeton. Also, bentonite rich zones, up to 8 metres thick, occur in the Quilchena and Guichon valleys. Occurrences of bentonite, zeolite, volcanic glass and perlite have been located along the Fraser River fault between the Stein River and Gang Ranch.

Four Open File reports covering this work have been published. These are Open Files 1987-19, 1988-15, 1988-29 and 1988-30.

TALC AND PYROPHYLLITE DEPOSITS IN BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(M.E. MACLEAN)

Talc occurs in association with both magnesium carbonate rocks and altered ultrabasic rocks, both of which are common throughout British Columbia. Several favourable hosts were identified in this study. Pyrophyllite is a relatively rare mineral found in association with altered acid volcanic rocks. Talc is not currently produced in the province, although the mineral is consumed in significant amounts by the pulp and paper industry. Demand is met by imports, mostly from Montana. Several geologically favourable areas in British Columbia offer potential for high quality talc which meets pulp and paper industry specifications. Talc and pyrophyllite are also used in ceramics and refractories, and pyrophyllite may substitute for talc in some pulp and paper applications.

This report is available as Open file 1988-19.

SAND AND GRAVEL STUDY 1985
TRANSPORTATION CORRIDORS AND POPULATED AREAS
(Z.D. Hora)

This report, which is a follow-up of an earlier 1980 study of aggregate supply-demand and availability of producers for the Fraser lowland and Greater Vancouver area, reviews aggregate resources in the British Columbia interior. It discusses production centres, supply and demand problems, market areas, distribution patterns, and the availability and potential of the sand and gravel resources in five major regions: the Thompson and Okanagan basins, the Columbia-Kootenay basin, the Central Interior plateau, the Peace River area and the Skeena and Kitimat valleys. The report is available as Open File 1988-27.

PEATLAND INVENTORY OF BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(D.E. MAYNARD)

Information regarding the distribution and quality of the peat resources in British Columbia has been compiled from a large number of published and unpublished reports prepared mostly as a part of soil studies, landform or surficial geology maps. In total, seventy-three of the eighty-four map sheets covering British Columbia at a scale of 1:250 000 contain information on peat deposits and are included as part of the final report. Three regions of the province are identified by the peatland inventory having high potential for peat resources: central and north coast, Central Interior plateau and northeastern Great plains. This study identifies peatland locations and provides a valuable starting point for assessing development potential. The compiled data will allow industry users to assess the development potential of peatland areas with respect to accessibility, and proximity to transportation routes and potential markets.

Potential for horticulture peat has been identified in the northeastern and northwestern parts of the province. Fuel peat has potential in all three regions. In situ, agricultural use of peatlands is proposed for the northeast as well as the Central Interior plateau.

This report is available as Open File 1988-33.

ASSESSMENT OF BRITISH COLUMBIA SULPHUR POTENTIAL
(J. THOMPSON)

Native sulphur occurrences associated with gypsum and anhydrite evaporite deposits have, over the years, been recorded in drill hole logs by the oil and gas industry. The 1987 project reviewed 600 drill hole logs which contained evidence of intersections of Devonian Muskeg Formation evaporite and adjacent Slave Point Formation reef facies. In total, five major (intersections of up to 20 feet of solid sulphur) and twenty-two minor sulphur showings were documented. Native sulphur was also identified in association with Triassic evaporites, but no systematic survey of drilling in this environment has been undertaken.

Available information indicates a potential for Frasch sulphur deposits in the northeastern part of British Columbia.

SILICA OCCURRENCES IN BRITISH COLUMBIA
(MDA FUNDED PROJECT)
(G. FOYE)

Hardrock silica occurrences in British Columbia are divided into three deposits types: quartzites, vein and pegmatites. Quartzites represent the most important potential for economic silica in the province. The most significant sources are the Mount Wilson Formation and Nonda Quartzite. These quartzite units occur in the Rocky Mountains east of the Rocky Mountain Trench. Potential sources of silica also occur in the Quartzite Range Formation. Vein occurrences are present in the south-central and east-central part of the province, while pegmatite deposits are restricted to the Okanagan and West Kootenay regions.

There are currently two producers of silica, both of which are producing from the Mount Wilson quartzite near Golden. There has also been past production from a pegmatite quartz stock near the town of Oliver. Silica produced is primarily used for ferrosilicon, glass sand, sand-blasting, foundry sand, filter media sand and occasionally as a smelter flux

This report is available as Open File 1987-15.

Feldspar and Nepheline Syenite in British Columbia
(G.V. White)

In 1987 a study of feldspar and nepheline syenite occurrences in British Columbia was undertaken. Nine sites with varying geological environment were studied in detail. Field studies were subsequently followed by mineral processing tests at CANMET laboratories of Energy, Mines and Resources Canada, in Ottawa. Results of this study indicate that four of the sites are capable of producing feldspathic products which meet commercial specifications for use in glass/ceramic manufacturing.

Feldspathic sand from Scuzzy Creek is more apt for glass applications while pegmatites from Lumby and Hellroaring Creek and nepheline syenite from Trident Mountain could be used for both glass and ceramic applications. Preliminary results are published in Geological Fieldwork 1988, Paper 1989-1.

Wollastonite Occurrences in British Columbia
(G.V. White)

Although wollastonite is often present in skarn deposits throughout British Columbia there has been no record of production in the province. In 1988 an investigation of wollastonite deposits was undertaken. This project, consisting of geological mapping and sampling, identified five sites with good potential to contain mineable reserves of wollastonite. A deposit near Sechelt, which has probable reserves of 291,000 tonnes, appears to offer the best potential for production in the near future. Other occurrences with potential include the Little Billy Mine, Fintry Point and Horsethief Creek deposits and the Silence Lake Mine. Samples from each of these localities are presently being tested by CANMET in Ottawa. These tests will determine recovery, brightness, aspect ratio (the ratio between length of the crystal and its width), loss on ignition values, iron content and other chemical and petrographic parameters important for industrial applications.

Results for this study are scheduled for release as an Open File in 1990.

Olivine in the Tulameen Ultramafic Complex
(MDA Funded Project)
(G.V. White)

Olivine used in British Columbia and western Canada is currently imported from Washington State. In 1986 a study of the Tulameen ultramafic complex in south-central British Columbia was undertaken to determine if the dunite component of the complex would be suitable for refractory and foundry sand applications. Within the complex three zones containing fresh dunite were identified by the study. Subsequent testing by CANMET of a 300-kilogram sample collected from one of these zones indicated that unserpentinized Tulameen dunite has potential as a foundry sand. Preliminary results of this study have been published in Geological Fieldwork 1986 and 1987. The final report is in preparation.

DIMENSION STONE - OPPORTUNITIES FOR DEVELOPMENT
(MDA FUNDED PROJECT)
(G.V. WHITE)

At the turn of the century, British Columbia produced a wide variety of quality dimension stone for domestic and foreign markets. The industry flourished until the 1930s when many of the quarries closed. Today, most dimension stone used in the province is imported and only minor amounts are supplied from local sources near Beaverdell and on Jervis and Knight Inlets.

The use of dimension stone as a crushed aggregate and as decorative panels is increasing worldwide. A high percentage of the market is supplied by Italy, Spain, and Portugal in Europe, and from Taiwan, South Africa and Brazil. There is an excellent opportunity to increase the use of British Columbia stone, both domestically and as an export product to the U.S. and Pacific Rim countries. The construction of a first class finishing plant, "CANROC" located in Delta, British Columbia, the only processing plant west of the Mississippi River, enhances the viability of developing quarries in the province.

Recent evaluation of past producing quarries has identified eleven sites with good potential to produce quality dimension stone for exterior use. In addition, a few quarries have stone with excellent potential for interior or ornamental use.. A set of polished, honed and flamed samples from each of the abandoned quarries is now available for viewing. Sites with potential for dimension stone are identified in Information Circular 1988-6.

MAGNETITE SOURCE POTENTIAL
(KIRK D. HANCOCK)

Magnetite is an important industrial mineral, used as a heavy medium in coal preparation plants. It is currently produced in British Columbia, from a stockpile with limited reserves, at the now-closed Craigmont Mine near Merritt. All production is used in coal processing plants in western Canada and Centralia, Washington and, as the stockpile reserves are limited, a new source will be required in the near future. The present market volume is in excess of 50 000 tonnes per year.

This study documents all major magnetite occurrences in British Columbia, both hardrock and tailings. Each listed occurrence has a concise geological description and a short history. The deposit information has been grouped by genetic type and geographic location. Skarn deposits provide the best potential source of magnetite. Tailings from some base metal operations may also represent a significant source of magnetite.

Product specifications for its application are outlined and potential markets and alternative sources of supply are briefly discussed. Included are 47 page-sized geological and locational maps as well as a map of B.C. at approximately 1:2 000 000 scale identifying all deposits. The information is published as Open File 1988-28.

OTHER STUDIES

The Geological Survey Branch has and is providing support for university research on the following theses:

(1) Comparative Mineralogy of Three Ultramafic Breccia Diatremes in S.E. British Columbia - Cross, Blackfoot and HP, by Olga J. Ijewliw, Queen's University (in progress).

(2) The Aley Carbonatite Complex, Northern Rocky Mountains, British Columbia (94B/5), by Urs K. Mader, The University of British Columbia; (completed).

(3) Horticultural Applications of Princeton Zeolites and Fernie Basin Phosphates, by Virginia Marcille, University of Guelph; (in progress).

(4) Structure, Stratigraphy and Alteration of Cretaceous and Tertiary Strata in the Gang Ranch Area, Southern British Columbia, by K. Green, University of Calgary; (in progress).

MARKET STUDIES

The following market studies sponsored under the Canada/British Columbia Mineral Development Agreement (MDA) have been completed:

(1) McVey, H.: A Study of Markets for British Columbia's Nepheline Syenite and Feldspathic Minerals, MDA Report 4, British Columbia Energy, Mines and Petroleum Resources, 92 pages.

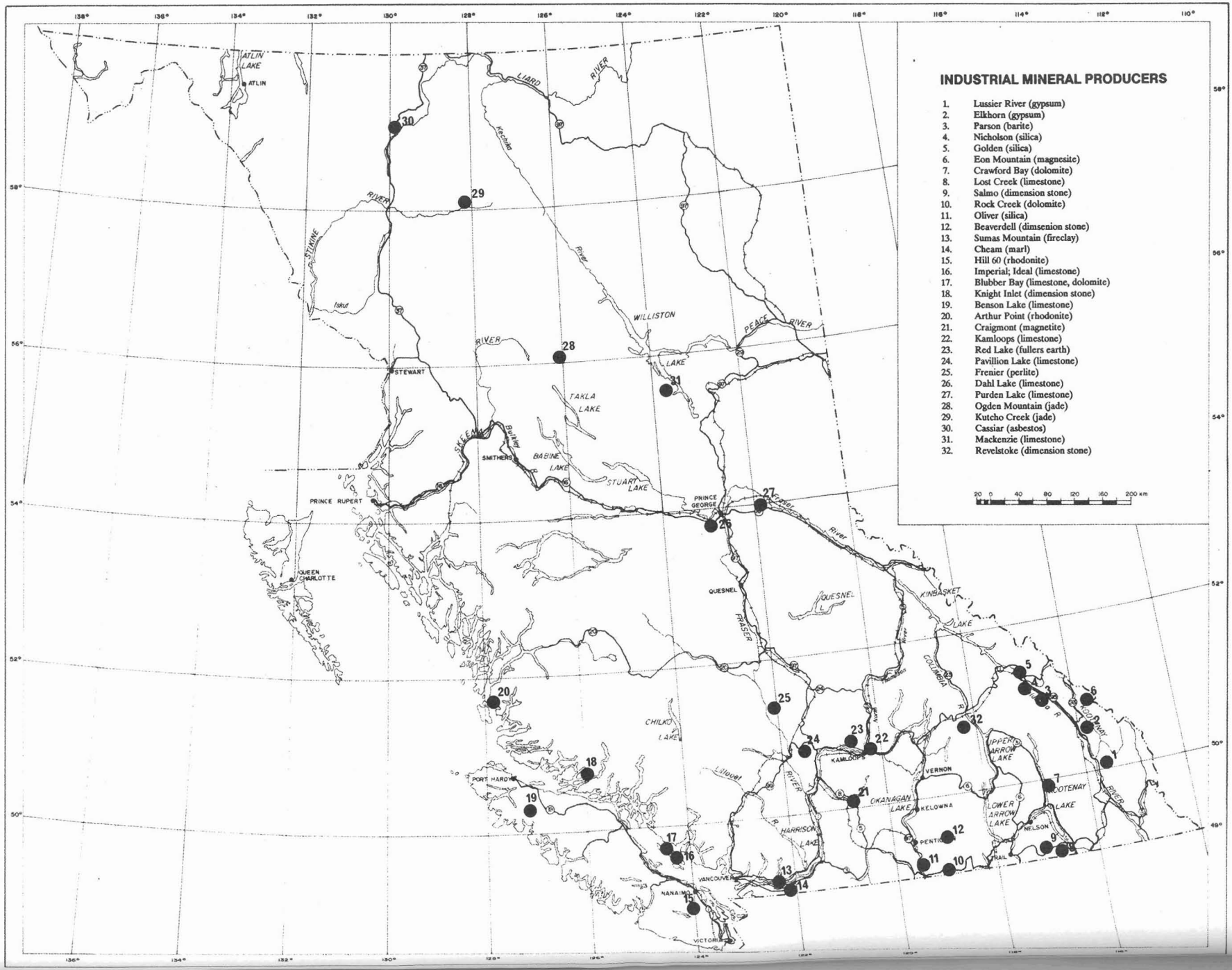
(2) Queenstake Resources Ltd.: Marketing Study of British Columbia's Gypsum in the Pacific Rim Area of North America, 200 pages.

These reports are available from:

Island Blue Print Co. Ltd.
905 Fort Street
Victoria, British Columbia
V8V 3K3
Telephone (604) 385-9786

FUTURE PROJECTS

In 1989, in addition to the programs presently in progress or recently completed, studies are proposed for perlite, pozzolans, vermiculite, limestone, dolomite, barite, magnesite and volatile rich "specialty" granites. The industrial mineral map of British Columbia will be updated to include genetic types for the various commodities as well as an indication of the size potential for the occurrences.


INDUSTRIAL MINERAL PRODUCERS
1. Lussier River (gypsum)
2. Elkhorn (gypsum)
3. Parson (barite)
4. Nicholson (silica)
5. Golden (silica)
6. Eon Mountain (magnesite)
7. Crawford Bay (dolomite)
8. Lost Creek (limestone)
9. Salmo (dimension stone)
10. Rock Creek (dolomite)
11. Oliver (silica)
12. Beaverdell (dimsenion stone)
13. Sumas Mountain (fireclay)
14. Cheam (marl)
15. Hill 60 (rhodonite)
16. Imperial; Ideal (limestone)
17. Blubber Bay (limestone, dolomite)
18. Knight Inlet (dimension stone)
19. Benson Lake (limestone)
20. Arthur Point (rhodonite)
21. Craigmont (magnetite)
22. Kamloops (limestone)
23. Red Lake (fullers earth)
24. Pavillion Lake (limestone)
25. Frenier (perlite)
26. Dahl Lake (limestone)
27. Purden Lake (limestone)
28. Ogden Mountain (jade)
29. Kutcho Creek (jade)
30. Cassiar (asbestos)
31. Mackenzie (limestone)
32. Revelstoke (dimension stone)
20 0 40 80 120 160 200 km
ATLIN LAKE
ATLIN
LIARD RIVER
KECHIKA
STIKINE RIVER
Iskut
WILLISTON LAKE
PEACE RIVER
STEWART
TAKLA LAKE
SKEENA
BABINE LAKE
SMITHERS
STUART LAKE
PRINCE RUPERT
PRINCE GEORGE
QUEEN CHARLOTTE
QUESNEL
QUESNEL L.
FRASER
KINBASKET LAKE
COLUMBIA
CHILKO LAKE
KAMLOOPS
VERNON
UPPER ARROW LAKE
OKANAGAN LAKE
KELOWNA
LOWER ARROW LAKE
KOOTENAY LAKE
NELSON
PENTICTON
TRAIL
PORT HARDY
HARRISON LAKE
VANCOUVER
NANAIMO
VICTORIA

RECENT PUBLICATIONS

Butrenchuk, S.B.: Phosphate in Southeastern British Columbia (82G and 93J), Open File 1987-16, 103 pages.

Butrenchuk, S.B., Hora, Z.D., White, G.V, Hancock, K.D., MacLean, M.E.: Industrial Mineral Occurrences in British Columbia, Open File 1988-13.

Foye, G.: Silica Occurrences in British Columbia, Open File 1987-15, 55 pages.

Grant, B.: Magnesite, Brucite and Hydromagnesite Occurrences in British Columbia, Open File 1987-13, 80 pages.

Hancock, K.D.: Magnetite Occurrences in British Columbia, Open File 1988-28, 153 pages.

Hora, Z.D.: Sand and Gravel Study 1985, Transportation Corridors and Populated Areas, Open File 1988-27, 41 pages.

MacLean, M.E.: Talc and Pyrophyllite in British Columbia, Open File 1988-19, 108 pages.

Maynard, D.E.: Peatland Inventory of British Columbia, Open File 1988-33, in press.

Pell, J.: Alkaline Ultrabasic Rocks in British Columbia: Carbonatites, Nepheline Syenites, Kimberlites, Ultramafic Lamprophyres and Related rocks, Open File 1987-17, 109 pages.

Pell, J.: The Industrial Mineral Potential of Kyanite and Garnet in British Columbia, Open File 1988-26, 43 pages.

Read, P.B.: Tertiary Stratigraphy and Industrial Minerals, Princeton and Tulameen Basins, British Columbia (92H/2,7,8,9,10), Open File 1987-19, 1 map with notes.

Read, P.B.: Tertiary Stratigraphy and Industrial Minerals, Merritt Basin, British Columbia, Open File 1988-15, 2 maps with accompanying notes.

Read, P.B.: Tertiary Stratigraphy and Industrial Minerals: Fraser River, Lytton to Gang Ranch, British Columbia, Open File 1988-29, 1:50 000 maps with notes.

Read P.B.: Tertiary Stratigraphy and Industrial Minerals, Cache Creek (92I/14), British Columbia, Open File 1988-30, 1:50 000 map with notes.

White, G.V. and Hora, Z.D.: Dimension Stone in British Columbia, Information Circular 1988-6, 32 pages.

In addition, several talks have been presented by the Industrial Minerals Subsection. Copies of Preprints for the following can be obtained through the Geological Survey Branch:

(1) Butrenchuk, S.B.: Petrology and Geochemistry of Phosphate Deposits in British Columbia, CIM Annual Convention, Edmonton, Alberta, May, 1988.

(2) Hancock, K.D.: Magnetite Source Potential for the Coal Processing Industry in British Columbia, District 6 CIM Meeting, Fernie, B.C., September, 1988.

(3) Hora, Z.D.: Industrial Minerals in British Columbia - Opportunities and Markets, District 6 CIM Meeting, Fernie, B.C., September, 1988.

(4) Hora, Z.D.: Industrial Minerals in British Columbia - New Developments, New Discoveries and New Opportunities, CIM Annual Convention, Edmonton, Alberta, May, 1988.

(5) Hora, Z.D.: Dimension Stone in British Columbia, CIM Annual General Meeting, Toronto, Ontario, May, 1987.

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INFORMATION SOURCES

For copies of the **Open File** Reports, please contact:

Maps B.C.
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Articles on various commodities also appear in Geological Fieldwork 1986, 1987 and 1988 and Exploration in British Columbia 1985, 1986, 1987 and 1988. Copies of these **Papers** may be obtained from:

Crown Publications Inc.
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Additional information on the industrial mineral resources of British Columbia may be obtained from:

Industrial Minerals Subsection
Geological Survey Branch
Ministry of Energy, Mines and Petroleum Resources
300-756 Fort Street
Victoria, B.C.
V8V 1X4

Or contact:

Danny Hora (Subsection Head) (604) 356-2846
Gary White (604) 356-2845
Steve Butrenchuk (604) 356-2847
FAX (604) 356-8153