

Industrial Mineral Endowment and Development Opportunities

Northeast-Central British Columbia

Bob Lane, Ken MacDonald and Brian McGrath
Mines Branch, Ministry of Energy of Mines, Prince George

INTRODUCTION

The industrial mineral endowment of northeast-central British Columbia is rich, varied and relatively untapped. There are 390 industrial mineral occurrences recorded in the Ministry of Energy and Mines electronic database (MINFILE) located within the administrative boundary of the region. A review of these occurrences, with respect to physiography, tectonic terrane, deposit type, character and resource potential is presented below.

Selected commodities of interest include sand and gravel, diatomite, limestone, clay and shale, REE, volcanic material, silica, barite, dimension stone, and jade. Broad glaciated areas of central BC make sand and gravel (aggregate), the most economically important commodity in the region. Primary sources include terraces along the Nechako and Fraser rivers, major meltwater channels, raised shorelines of former glacial lakes and, to a lesser extent, esker systems. Sand and gravel although sometimes considered an industrial mineral commodity, generally has a structural end use and, therefore, is not discussed further.

The region is serviced by a well-developed network of road and rail. The city of Prince George, central to the region, is the transportation hub for the northern two-thirds of the province. Major transport routes radiate east to markets in Alberta, south through the province to markets in the Lower Mainland and the USA, and west to the port of Prince Rupert (Figure 1). Other routes extend northward and access resource-rich areas. Most industrial mineral development is proximal to transportation corridors, including highways 16 and 97, and a large number of logging arteries that span the region.

Summaries of selected mineral commodities highlight the economic significance of past producers and introduce the importance of potential deposits. MINFILE reference numbers follow deposit names where applicable.

REGIONAL GEOLOGIC SETTING

The Canadian Cordillera can be divided into five, orogen-parallel belts of continental and oceanic affinities. Three of the belts, Foreland, Omineca and Intermontane, trend north-westerly across northeast-central BC (Figure 1). The Foreland Belt is comprised of folded and thrust sedimentary rocks derived from the North American craton. The Omineca Belt is made up of complexly deformed and metamorphosed sedimentary, volcanic and granitic rocks of the pericratonic Kootenay (Barkerville and Cariboo subterranean) and Cassiar terranes, and the oceanic Slide Mountain terrane. The Intermontane Belt is an amalgamation of two major island arc assemblages, the Quesnel and Stikine terranes, that sandwich the accretionary (or subduction) complex of the Cache Creek terrane. The Overlap Assemblage, a package of younger sedimentary and volcanic rocks, was emplaced across all major terranes. Some industrial mineral commodities are restricted to, or concentrated in, particular terranes. The variability of depositional environments has resulted in a diverse number of industrial mineral commodities, many of which are underexplored.

DIATOMITE

There are ten recorded diatomite occurrences, including four past producers: Crownite (093B 023), Buck Ridge (093B 042), Quesnel (093B 059) and Big Bend (093G 039), concentrated mainly in the Quesnel area. The occurrences are mainly stratiform lacustrine deposits that formed within Tertiary volcanic and sedimentary rocks that crop out along a 40 km belt that parallels the Fraser River from Big Bend (12 km north of Quesnel) to Alexandria. The diatomite ranges in colour from white to grey to buff and consists almost exclusively of various sizes of *Melosira granulata* diatoms, usually very small, with variable amounts of clay, silt and volcanic ash.

Diatomite at the Crownite deposit, 3 km southwest of Quesnel, occurs in beds up to about 31 m thick with interbeds of clay, silt and ash. Recorded production is 22,074 tonnes. Proven and probable reserves are a conservative 750,000 tonnes. The Buck Ridge deposit is located on the west side of the Fraser River, 27 kilometres south of Quesnel. It encompasses a number of separate diatomite showings that crop out over a distance of about 6 kilometres along the west bank of the Fraser River. At the Quesnel occurrence, 2 km north of Buck Ridge, recorded diatomite production for 1987-93 totaled 15.2 tonnes. The Big Bend deposit is located along the east side of the Fraser River, 13 km north of Quesnel. Three major exposures of diatomite occur close to water level at the downstream end of the big bend. Diatomite was mined in limited batches and periodically shipped to Vancouver. A 3 to 6 metre bed of white stoneware clay underlies the diatomite.

The Upper Blackwater area, of the southern Nechako Plateau, is also prospective for diatomite, but few industrial mineral occurrences are reported. The Tsacha showing (093F 041) occurs within volcanic and intercalated sedimentary rocks of the Eocene Ootsa Lake Group. Accumulations of diatomite and pumice may represent rocks preserved in a fault depression. Another diatomite locality of note is reported near Chilako (MINFILE 093G 034) on the Canadian National Railway.

LIMESTONE

A total of 52 limestone occurrences, including 2 producers and 5 developed prospects, are recorded for the region in the database. The occurrences are mainly stratiform deposits in the Ancestral North American, Cariboo and Cache Creek terranes of the Foreland, Omineca, and Intermontane Belts, respectively. Variable uses, locations, deposit types and characteristics coupled with present and future infrastructure make limestone a key future asset.

The Giscome limestone quarry (093J 025) is located 90 km northeast of Prince George near BC Rail facilities. Dark grey fossiliferous limestone of the Mississippian to Triassic Slide Mountain Group crops out over a 100 m by 200 m area and grades 98% CaCO₃. Intermittent quarrying since 1990 has produced calcium-rich limestone primarily for Interior pulp mills.

The Dahl Lake quarry (093G 032), 35 km southwest of Prince George, occurs in Upper Permian fossiliferous limestone of the Carboniferous to Jurassic Cache Creek Complex (Group). Since 1968, a total of about 550,000 tonnes of limestone has been extracted for local pulp mills and recently 20,000 tonnes of decorative aggregate was processed from waste rock.

CLAY and SHALE

A total of 22 clay and shale occurrences of primarily stratiform fireclay deposits are recorded in Quesnel Terrane rocks or in Cache Creek Terrane overlap assemblages. Kaolinitic claystones are the weathered products of crystalline feldspar-rich rocks deposited in low-energy, freshwater basins. Kaolin clay is mainly used in the paper industry, although ceramic and refractory clays have specific end uses.

There are 4 reported stratiform deposit-type occurrences in terranes of the Foreland Belt. The most prospective areas are Upper Cretaceous to Eocene sedimentary basins along the Fraser River from Williams Lake to Prince George. Bentonite, or montmorillonite clay forms when volcanic ash is deposited in low-energy shallow marine or lacustrine environments in continental, continental platform or island arc settings. Bentonite has a wide variety of applications and end uses, including foundry sands, drilling mud and absorbents.

The Burnt Shale deposit (093B 047), near Quesnel has seen limited quarrying and is thought to have originally been a clay that was baked. The material is predominantly pale beige, hard, vitreous to porcelaneous, and is regarded as a pozzolan.

The Giscome Rapids deposit (093J 020) is located on the west bank of the Fraser River. The deposit has a variety of clay-types in a thick Tertiary bed exposed for about 800 m. Development work in the 1940's included the extraction of 18 tonnes of clay.

A showing of bentonitic clay occurs near Bednesti (093G 033) adjacent to CNR rail facilities. The showing consists of cream to grey bentonite of unknown age exposed in 3 to 4 m thick exposures along cut-slopes.

RARE EARTH and HIGH-TECH ELEMENTS

Rare-earth elements (REE) and yttrium are associated with carbonatites and alkaline rocks in the Foreland and Omineca Belts in northeast-central BC. The presence of several very notable occurrences makes the region highly prospective.

The Aley property (094B 027), located 140 km north-northwest of Mackenzie, has an extensive exploration history. A Mississippian alkaline-carbonatite complex intrudes miogeoclinal rocks of the Foreland Belt. Exploration identified possible open-pit niobium-bearing zones that grade from 0.66 to 0.75% Nb.

The Mount Bisson alkaline complex is situated 64 km northwest of the town of Mackenzie. Light REE are enriched in allanite pegmatites and syenite dykes within the Wolverine metamorphic suite belonging to the Omineca crystalline Belt.

A group of REE-enriched carbonatites occur in the Monashee Mountains north of Blue River. The Howard Creek (083D 023 and 043), Paradise (083D 006 and 022) and Verity (083D 005) prospects occur as sills that intrude mainly amphibolite-grade rocks of the Hadrynian Horsethief Creek Group.

Carbonatite-syenite complexes and volatile-rich granites are also good exploration targets for many high tech metals and non-metals (Table 2). Regionally, these rocks occur in two areas along the western edge of the Foreland Belt and east of the Rocky Mountain Trench. Specialty metals, such as gallium and germanium are extremely anomalous in carbonate-hosted lead-zinc deposits such as Cay (094G 017) in the Robb Lake Belt.

VOLCANIC MATERIAL

Pleistocene lava, associated tuffs and breccia overlie till in the south-central part of the region. Tephra is mined seasonally from the Nazko lava rock quarry (093B 060), 90 km west of Quesnel, by Canada Pumice Corporation. Each year they produce between 15,000 and 25,000 m³ of scoriaceous lava for the agricultural, horticultural, landscaping and lightweight aggregate sectors.

Perlite and volcanic glass occurrences outcrop primarily in the central BC region known as the Nechako Plateau. This low-lying area is underlain by Eocene Ootsa Lake rhyolitic and dacitic flows, tuffs and breccias, with lesser andesites, basalts and conglomerates. Several recorded occurrences in the region include: Uncha Lake (093F 026), Ootsa Lake (093F 028) and Cheslatta Lake (093F 028). All perlite now being used in BC is imported from the USA, but ongoing development of resource roads may contribute to discoveries of economic perlite deposits in the Nechako Plateau.

SILICA

Hardrock silica occurrences in BC are divided into three deposit types: quartzite, vein and pegmatite. Quartzite has good economic silica potential with the Lower Silurian Nonda quartzite being the best source in the region. This unit occurs east of the Rocky Mountain Trench in rocks of the Ancestral North American terrane.

The Longworth prospect (093H 038), 80 km east of Prince George, is hosted by a folded sequence of sedimentary and volcanic rock. The quartzite is essentially the Lower Silurian equivalent to the Nonda Formation and is fine-grained, massive and well-sorted. During 1985, a property evaluation produced 28 samples grading 98.84% - 99.80% SiO₂.

The Win quartzite occurrence (093O 014) at Mount Chingee is hosted by Lower Cambrian Gog Group or Upper Proterozoic Misinchinka Group. The unit contains a drill inferred reserve of 4.5 million tonnes grading 98.03% SiO₂. The An quartzite prospect (093O 013) near Mount Kinney, further to the southeast, occurs in equivalent strata. Limited drilling suggests that there is potential for a large tonnage of high grade silica.

Alroy is an early stage quartzite prospect located 160 km east of Prince George. Several prominent exposures of quartzite, probably of Cambrian Yanks Peak Formation, crop out in the Fraser River valley immediately north of Highway 16.

BARITE

Barite occurrences, including 3 developed prospects, are found principally in rocks of the Ancestral North American terrane. Occurrences are mainly stratiform or stratabound having either a carbonate or sediment host. Barite is widely used as oil-drilling mud and filler for paper and cloth.

The BV prospect (94N 002) is a large carbonate-hosted, high grade stratiform deposit in the Sentinel Range near Muncho Lake on the Alaska Highway. The region is underlain by Proterozoic to Middle Devonian sedimentary rocks belonging to Ancestral North America. The basal barite deposit is hosted in the Stone Formation. An inferred resource estimate totals 100 million tonnes grading 65% BaSO₄.

The Nonda Creek developed prospect (094K 001) is situated 14 km east-northeast of the settlement of Muncho Lake. It may represent hydrothermal vein replacement in carbonates of the Middle Devonian

Dunedin Formation. The upper section of the deposit, measuring 120 m long, 45 m wide and 30 m thick, contains an estimated 450,000 tonnes grading 92% barite.

DIMENSION STONE

Although only seven dimension stone occurrences are recorded in northeast-central BC, the development potential is good especially in the eastern region where quartzite and marble are prevalent. Stone from several granite, marble, slate and quartzite prospects have physical characteristics comparable to material mined in southern BC.

The Wishaw quartzite prospect (093H 131) near McGregor is underlain by 300-350m of pale grey, beige, pink and maroon quartzite beds from the Mahto Formation. The unit displays intricate cross-bedded, banded and swirled patterns making it desirable for dimension stone.

The Dome Creek slate prospect (093H 028) straddles highway 16 and occurs in Hadrynian Yankee Belle Formation of the Cariboo Group. The slate is marketable because of its green color, good cleavage and strength properties. The near surface deposit covers an area approximately 3 km² with depth estimates between 500 and 750 metres.

Marble was briefly quarried at Maeford Lake (093A 081) located 100 km east-southeast of Quesnel. The area is underlain by continental margin sediments of the Cunningham Formation of the Cariboo Group. During 1990, about 150 tonnes of the medium grained milky white marble was extracted and sold locally as dimension stone.

The Aspen claims (093O 049), located west of Mackenzie, cover pale pink, coarse-grained granite of an Early Tertiary pluton. This is one of a number of small post-accretionary plutons that make for attractive targets in the Omineca Belt.

JADE (and other semi-precious commodities)

The region has demonstrated potential for jade, semi-precious gemstones and ornamental silica, such as opal, jasper, agate, and rhodonite. In addition, favourable areas for soapstone exist southwest of Hixon, at the Trust prospect, and near Fort St. James in the Stuart Lake - Trembleur Lake and Fleming areas.

Jade deposits are hosted by metamorphosed, mafic and ultramafic rocks associated with ancient volcanic arcs. There are two types of jade, jadeitite¹ and nephrite² but all of the known jade deposits in BC are of the nephrite variety. However, high-pressure blueschist and eclogite-grade metamorphic rocks that are favourable for jadeitite formation, outcrop in the Pinchi Lake area. There are seven recorded nephrite occurrences in the region, located mainly in the Mount Ogden and Mount Sidney Williams areas.

The Ogden Mountain (093N 165) occurrence is approximately 40 km north-northeast of Takla Landing. Variably metamorphosed sedimentary and volcanic rocks of the Carboniferous to Jurassic Cache Creek Group are intruded by sill-like serpentinite bodies of Mississippian to Triassic Oceanic Ultramafites. Total production of nephrite up to 1992 is about 1441 tonnes; estimated reserves are 472 tonnes.

The Genesis deposit (093K 005) is located on O'Ne-ell Creek. The pre-Upper Triassic ultramafic Trembleur Intrusions are of probable ophiolitic affinity and are related to the Cache Creek Group. The jade deposit occurs at the contact between serpentinite and a quartz monzonite intrusion. A total of 34.2 tonnes were mined in 1968. Present data suggests that about 2800 tonnes of nephrite jade and tremolite remain.

Common opal and agate occur in Triassic and younger volcanic sequences in the northern Chilcotin and southern Nechako Plateau areas. Precious opal is typically associated with Miocene volcanic sequences where porous, pyroclastic or lacustrine rocks are interbedded with lava flows.

¹ Jadeitite is a rock that consists essentially of the mineral jadeite, a sodium-rich, high-pressure pyroxene.

² Nephrite consists of prismatic to acicular amphiboles of the tremolite-actinolite series that form bundles of randomly oriented and interlocking crystals.

MISCELLANEOUS MINERALS

Other industrial mineral commodities that warrant further investigation include asbestos, magnesite, graphite, phosphate, fluorite, gypsum, and mica.

Eight ultramafic-hosted asbestos and two magnesite showings are hosted in Cache Creek Group rocks. Crystalline flake graphite showings are recorded from highly metamorphosed Cassiar terrane rocks. Phosphate occurrences are stratabound, upwelling-type deposits in miogeoclinal rocks of the Ancestral North American terrane.

Fluorite occurs mainly as stratabound carbonate-hosted deposits within the Ancestral North American rocks of the Foreland Belt. The Eaglet developed prospect (093A 046) is located near Quesnel Lake. Mineralization is contained in quartz-feldspar-mica gneiss of the Hadrynian-Paleozoic Snowshoe Group of the Barkerville terrane. The mineralized zone measures 1500 m by 900 m and has indicated probable reserves of 24 million tonnes grading 11.5% CaF₂.

The Forgetmenot gypsum prospect (083E 001), near McBride, is hosted in Ancestral North American rocks. Gypsum is intercalated with dolomite and minor limestone in the Upper Triassic Starlight Evaporite member of the Whitehorse Formation. The tabular gypsum body measures 100 m by 500 m by up to 26 m thick. The deposit has probable drill indicated reserves of 2.3 million tonnes, within a geological resource of 25-30 million tonnes, grading 75-90% gypsum.

Mica (muscovite) occurrences are principally hosted in pegmatite veins in Cassiar or Kootenay terrane rocks. However, two former producers are recorded from kyanite-sillimanite schists of the Upper Proterozoic Windermere Supergroup of the Cariboo terrane. The Canoe North Mica deposit near Valemount (083D 012), is on the northwestern margin of the Shuswap Metamorphic Complex and is underlain by pelitic schists of the Hadrynian Lower Kaza Group. A total of 225 tonnes of mica product was produced in 1960-61. An estimated reserve of 2.29 million tonnes grading 60.5% mica remains.

SUMMARY

It has been demonstrated that at present the region has several industrial mineral occurrences in a wide range of deposit types and geologic settings. The region is widely blanketed by Quaternary sediments that mask the majority of rocks. Although a hindrance to some, it may be argued that this reflects the existing potential for new discoveries. With renewed exploration resolve and technological advances coupled with the areas diverse infrastructure network more discoveries and producing operations are anticipated.

Distribution of Select Industrial Mineral Occurrences in Northeast-Central BC

COMMODITY	STATUS & NUMBER OF OCCURRENCES		DEPOSIT TYPE	DEPOSIT CHARACTER	TECTONIC BELT	TERRANE
Asbestos	Showing	10	Ultramafic-host. Asbestos - 10	Vein - 9 Stockwork - 1	Intermontane - 9 Omineca - 1	Cache Creek - 8 Barkerville - 1 Slide Mtn. - 1
Barite	Developed Prospect Prospect Showing	3 5 40	Sediment-hosted - 13 Carbonate.-hosted - 12 Other/Unknown - 10 Sedex Zn-Pb-Ag - 8 Vein - 5	Stratiform - 23 Stratabound - 11 Vein - 7 Massive - 5 Other - 2	Foreland - 43 Omineca - 4 Intermontane - 1	Ancestral NA - 43 Barkerville - 2 Cariboo - 1 Cassiar - 1 Slide Mtn. - 1
Bentonite	Showing	4	Unknown - 4	Stratiform - 4	Foreland - 3 Omineca - 1	Ancestral NA - 2 Overlap Assemblage - 1 Slide Mtn. - 1
Building Stone Dimension Stone Granite/Marble Slate	Developed Prospect Prospect Past Producer Showing	2 1 2 2	Sandstone - 2 Marble - 2 Granite - 1 Flagstone - 1 Unknown - 1	Massive - 4 Stratiform - 3	Omineca - 3 Foreland - 2 Intermontane - 1 Unknown - 1	Ancestral NA - 2 Cache Creek - 1 Cassiar - 1 Cariboo - 1 Other - 2
Clay Shale	Prospect Past Producer Showing	1 4 17	Fireclay - 18 Expanding Clay - 1 Unknown - 3	Stratiform - 21 Unknown - 1	Intermontane - 17 Foreland - 5	Overlap Assemblage - 8 Quesnel - 7 Ancestral NA - 4 Other - 3
Diatomite	Past Producer Showing	4 6	Lacustrine - 7 Volcanic Ash - 1 Unknown - 2	Stratiform - 8 Stratabound - 2	Intermontane - 10	Overlap Assemblage - 5 Cache Creek - 4 Stikine - 1
Dolomite	Past Producer Showing	1 3	Dolomite - 2 Limestone - 2	Stratiform - 4	Foreland - 3 Omineca - 1	Ancestral NA - 4
Fluorite	Developed Prospect Prospect Showing	1 6 12	Carbonate-hosted - 16 Barite-fluorite vein - 2 Unknown - 1	Stratabound - 10 Vein - 4 Stratiform - 3 Other - 2	Foreland - 19	Ancestral NA - 19
Graphite	Showing	4	Crystalline Flake - 2 Unknown - 2	Disseminated - 2 Other - 2	Omineca - 3 Intermontane - 1	Cassiar - 2 Other - 2
Gypsum	Developed Prospect Showing	1 1	Bedded - 2	Layered - 1 Unknown - 1	Foreland - 1 Intermontane - 1	Ancestral NA - 1 Quesnel - 1
Jade/Nephrite	Past Producer Showing	6 1	Jade - 7	Podiform - 3 Massive - 2 Unconsolidated - 2	Intermontane - 7	Cache Creek - 4 Plutonic Rocks - 3
Kyanite	Showing	3	Kyanite-Sillimanite Schists - 3	Layered - 3	Omineca - 2 Foreland - 1	Ancestral NA - 3
Limestone	Producer Developed Prospect Prospect Past Producer Showing	2 5 6 10 29	Limestone - 52	Stratiform - 47 Stratabound - 4 Massive - 1	Omineca - 25 Intermontane - 17 Foreland - 10	Ancestral NA - 17 Cache Creek - 13 Cariboo - 10 Slide Mtn. - 6 Cassiar - 3 Quesnel - 3
Magnesite	Showing	3	Umafic-host Talc-Magnesite - 2 Unknown - 1	Stratiform - 1 Stratabound - 1 Vein - 1	Intermontane - 2 Foreland - 1	Cache Creek - 2 Ancestral NA - 1
Magnetite	Prospect Showing	1 1	Magmatic Oxide - 1 Unknown - 1	Massive - 2	Foreland - 1 Intermontane - 1	Ancestral NA - 1 Quesnel - 1
Manganese	Showing	7	Mn Vein / Replacements - 3 Unknown - 4	Vein - 2 Layered - 1 Unknown - 4	Intermontane - 6 Omineca - 1	Cache Creek - 5 Cariboo - 1 Stikine - 1
Mica	Past Producer Showing	3 13	Pegmatite - 10 Kyanite-Sillimanite Schists - 2 Unknown/Other - 4	Vein - 6 Concordant - 3 Massive - 3 Unknown - 4	Omineca - 14 Foreland - 1 Intermontane - 1	Cassiar - 9 Kootenay - 5 Other - 2
Perlite	Showing	1	Volcanic Glass	Stratabound	Intermontane	Overlap Assemblage
Phosphate	Prospect Showing	1 17	Upwelling-type - 17 Unknown - 1	Stratabound - 18	Foreland - 18	Ancestral NA - 18
Silica	Developed Prospect Prospect Past Producer Showing	2 1 1 6	Silica Sandstone - 4 Silica Veins - 3 Other - 3	Stratiform - 5 Vein - 4 Other - 1	Foreland - 4 Intermontane - 4 Omineca - 2	Ancestral NA - 4 Barkerville - 3 Other - 3
Sulphur	Showing	4	Gypsum-hosted - 4	Stratiform - 2 Massive - 2	Foreland - 4	Ancestral NA - 4
Talc	Developed Prospect Showing	1 2	Umafic-host Talc-Magnesite - 2 Other - 1	Massive - 2 Vein - 1	Intermontane - 3	Other - 3
Travertine	Past Producer Showing	1 1	Unknown - 2	Massive - 2	Foreland - 2	Ancestral NA - 2
Vermiculite	Prospect	2	Vermiculite - 2	Disseminated - 2	Intermontane - 2	Stikine - 2

TABLE 2: Select Specialty Mineral Occurrences in Northeast-Central BC

MINFILE	NAME	STATUS	COMMODITY	DEPOSIT TYPE	CHARACTER	TECTONIC BELT	TERRANE
094B 027	ALEY	Developed Prospect	Nb, Pp, Rs	Carbonatite-hosted	Disseminated	Foreland	Ancestral NA
094B 028	ALEY DYKES	Showing	Rs, Ce, Nd, La, Th, Sr	Carbonatite-hosted	Disseminated	Foreland	Ancestral NA
093J 014	PRINCE	Showing	Nb, Rs, La, Ce, Pp	Carbonatite-hosted	Disseminated	Foreland	Plutonic Rocks
093N 012	LONNIE	Developed Prospect	Nb, Zr, Ti, Ur, Th, Rs	Carbonatite-hosted	Podiform	Omineca	Cassiar
093N 174	VIRGIL	Prospect	Nb, Zr, Ti, Ur, La, Nd	Carbonatite-hosted	Podiform	Omineca	Cassiar
083D 023	HOWARD CK. SYENITE	Showing	Ns, Sx, Nb, Ta, Ur	Carbonatite-hosted	Stratiform	Omineca	Kootenay
083D 043	HOWARD CK. CARBONATITE	Showing	Sr, Ph, Pp, Ta, La, Ce	Carbonatite-hosted	Stratiform	Omineca	Kootenay
094D 114	MCCONNELL BERYL	Showing	Be	REE pegmatite	Concordant	Intermontane	Quesnel
093O 021	LAURA	Showing	Th, Rs, La, Ce, Pr, Nd	REE pegmatite	Disseminated	Omineca	Ancestral NA
093N 201	WILL	Showing	Th, La, Ce, Nd, Yr, Ta	REE pegmatite	Layered	Omineca	Cassiar
093O 041	URSA	Showing	Th, Rs, La, Ce, Pr, Nd	REE pegmatite	Disseminated	Omineca	Cassiar
094M 022	LIARD HOTSPRINGS	Showing	Rd, Rn, Hs	Travertine	Unconsolidated	Foreland	Ancestral NA
094N 001	WISHING WELL	Showing	Rd, Ra, Ur, Rn, Hs	Travertine	Unconsolidated	Foreland	Ancestral NA
094E 038	TOR	Showing	Hf	Unknown	Disseminated	Omineca	Cassiar

TABLE 1: NE-BC INDUSTRIAL MINERAL INVENTORY

MINFILE #	MINFILE Name	Status	Commodity 1	Commodity 2	Commodity 3	Commodity 4	Commodity 5	Commodity 6	Deposit Type	Deposit Character	Deposit Class	Deposit Class	Tectonic Belt	Terrane
094K 001	NONDA CREEK	Developed Prospect	Barite						Vein barite	Vein	Hydrothermal	Replacement	Foreland	Ancestral North America
094N 002	MO	Developed Prospect	Barite						Carbonate-hosted barite	Stratabound	Hydrothermal	Replacement	Foreland	Ancestral North America
094N 003	MO	Developed Prospect	Barite						Carbonate-hosted barite	Stratabound	Hydrothermal	Replacement	Foreland	Ancestral North America
093H 131	WISHAW	Developed Prospect	Building Stone	Dimension Stone					Dimension stone - sandstone	Stratiform	Sedimentary	Metamorphic	Foreland	Ancestral North America
093B 042	BUCK RIDGE	Developed Prospect	Diatomite	Building Stone					Lacustrine diatomite	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093H 005	SHABETIE LAKE	Developed Prospect	Fluorite						Silica sandstone	Stratiform	Sedimentary	Metamorphic	Foreland	Overlap Assemblage
093A 046	EAGLET	Developed Prospect	Fluorite						Barite-fluorite veins	Vein	Hydrothermal	Epigenetic	Omica	Barkeville
083E 001	FORGETMENOT	Developed Prospect	Gypsum						Bedded gypsum	Layered	Evaporite	Sedimentary	Foreland	Ancestral North America
093G 068	VANDERHOOF LIMESTONE	Developed Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093J 019	TACHEEDA LAKE'S LIMESTONE	Developed Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093O 047	SPARKY	Developed Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Slide Mountain
093O 048	LST	Developed Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Omica	Slide Mountain
094C 093	ADJUNT PALSSON	Developed Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093N 012	LONNIE	Developed Prospect	Niobium	Zirconium	Titanium	Uranium	Thorium	Rare Earths	Carbonatite-hosted deposits	Podiform	Magmatic	Hydrothermal	Foreland	Cassiar
094B 027	ALEY	Developed Prospect	Niobium						Carbonatite-hosted deposits	Disseminated	Magmatic	Hydrothermal	Foreland	Ancestral North America
093A 134	HORSEFLY	Developed Prospect	Silica	Volcanic Ash					Volcanic ash - pumice	Stratiform	Volcanogenic	Industrial Mineral	Foreland	Overlap Assemblage
093O 014	WIN	Developed Prospect	Silica						Silica sandstone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093A 013	SOVEREIGN CREEK	Developed Prospect	Talc	Nickel	Silver	Zinc	Gold		Ultramafic-hosted talc-magnetite	Massive	Hydrothermal	Replacement	Foreland	Ancestral North America
093J 016	MILE 72	Past Producer	Aggregate	Limestone					Limestone	Stratiform	Sedimentary	Evaporite	Omica	Ancestral North America
093B 038	LAYERS	Past Producer	Building Stone	Aggregate					Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093B 043	LOT 385	Past Producer	Building Stone	Aggregate					Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093G 035	PRINCE GEORGE	Past Producer	Clay						Freclay	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093J 020	GISCOMBE RAPIDS	Past Producer	Clay	Kaolinite					Freclay	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093H 028	LOT 908	Past Producer	Diatomite						Lacustrine diatomite	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093B 059	QUESNEL	Past Producer	Diatomite						Lacustrine diatomite	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093O 039	BIG BEND (L.6182)	Past Producer	Diatomite	Clay					Lacustrine diatomite	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
083D 031	GRANT BROOK	Past Producer	Diatomite	Dimension Stone					Dolomite	Stratiform	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093K 035	GAKESIS	Past Producer	Jade	Nephrite					Jade	Unconsolidated	Placer	Metamorphic	Foreland	Overlap Assemblage
093N 064	VITAL	Past Producer	Jade/Nephrite	Gemstones					Jade	Unconsolidated	Placer	Metamorphic	Foreland	Overlap Assemblage
093N 156	JADE AND OGDEN CREEKS	Past Producer	Jade/Nephrite	Gemstones					Jade	Unconsolidated	Placer	Metamorphic	Foreland	Overlap Assemblage
093N 157	LEE	Past Producer	Jade/Nephrite	Gemstones					Jade	Unconsolidated	Placer	Metamorphic	Foreland	Overlap Assemblage
093N 165	OGDEN MOUNTAIN	Past Producer	Jade/Nephrite	Gemstones					Jade	Unconsolidated	Placer	Metamorphic	Foreland	Overlap Assemblage
093N 222	FRAN 3	Past Producer	Jade						Jade	Unconsolidated	Placer	Metamorphic	Foreland	Overlap Assemblage
093G 042	BEVERLY	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Evaporite	Foreland	Overlap Assemblage
093H 040	PTARMIGAN CREEK QUARRY	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093O 030	PURDEN	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Slide Mountain
093O 006	HANSARD	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Evaporite	Foreland	Ancestral North America
093J 015	REDOCKY CREEK	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093K 023	FORT ST. JAMES NORTH	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Evaporite	Foreland	Overlap Assemblage
093K 085	NECOSLIE RIVER LIMESTONE	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Evaporite	Foreland	Overlap Assemblage
093K 092	FORT ST. JAMES SOUTH	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Evaporite	Foreland	Overlap Assemblage
093O 039	MCKENZIE LIMESTONE	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Slide Mountain
093P 023	PRINCE LIME & MARBLE	Past Producer	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093A 081	MAEFORD LAKE	Past Producer	Marble	Dimension Stone	Building Stone				Dimension stone - marble	Massive	Sedimentary	Metamorphic	Omica	Cariboo
083D 012	CANOE NORTH MICA	Past Producer	Mica						Kyanite-sillimanite schists	Concordant	Metamorphic	Industrial Mineral	Omica	Kootenay
084C 035	CANOE SOUTH MICA	Past Producer	Mica						Kyanite-sillimanite schists	Concordant	Metamorphic	Industrial Mineral	Omica	Kootenay
084C 034	FAMILY FARM	Past Producer	Mica	Gemstones					Muscovite pegmatite	Concordant	Metamorphic	Industrial Mineral	Omica	Kootenay
093B 047	BURNT SHALE	Past Producer	Shale						Shale	Unconsolidated	Sedimentary	Synthetic	Foreland	Overlap Assemblage
083D 016	VALEMONT	Past Producer	Silica						Sand and Gravel	Unconsolidated	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093H 029	HUDSON HOPE	Past Producer	Travertine						Travertine	Unconsolidated	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093B 060	NAZKO	Producer	Aggregate	Pumice					Aggregate	Massive	Volcanogenic	Industrial Mineral	Foreland	Overlap Assemblage
093G 032	DAHL LAKE	Producer	Aggregate	Aggregate					Limestone	Stratabound	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093J 025	GISCOMBE	Producer	Limestone						Limestone	Massive	Sedimentary	Industrial Mineral	Omica	Slide Mountain
093A 025	CONINGHAM CREEK BARITE	Prospect	Barite						Limestone	Massive	Sedimentary	Industrial Mineral	Omica	Slide Mountain
093A 159	VIC BARITE	Prospect	Barite						Limestone	Massive	Sedimentary	Industrial Mineral	Omica	Barkeville
093H 136	BOW BARITE	Prospect	Barite						Limestone	Massive	Sedimentary	Industrial Mineral	Omica	Slide Mountain
093N 087	OMINECA QUEEN	Prospect	Barite	Silver	Lead	Zinc			Sediment-hosted barite	Stratiform	Sedimentary	Evaporite	Foreland	Cassiar
094N 008	FRASER LAKE	Prospect	Clay						Carbonate-hosted barite	Stratabound	Hydrothermal	Replacement	Foreland	Ancestral North America
094N 002	GEM	Prospect	Fluorite	Barite	Strontium				Freclay	Stratabound	Replacement	Hydrothermal	Foreland	Ancestral North America
094M 008	14M FLUORITE	Prospect	Fluorite	Barite					Carbonate-hosted fluor spar	Stratabound	Replacement	Hydrothermal	Foreland	Ancestral North America
094M 010	TEE	Prospect	Fluorite	Barite					Carbonate-hosted fluor spar	Stratabound	Replacement	Hydrothermal	Foreland	Ancestral North America
094M 004	DAN 32	Prospect	Fluorite	Barite					Carbonate-hosted fluor spar	Stratabound	Replacement	Hydrothermal	Foreland	Ancestral North America
094M 005	DAN 6	Prospect	Fluorite	Barite					Carbonate-hosted fluor spar	Stratabound	Replacement	Hydrothermal	Foreland	Ancestral North America
094M 007	DAN 45	Prospect	Fluorite	Barite					Carbonate-hosted fluor spar	Stratabound	Replacement	Hydrothermal	Foreland	Ancestral North America
093H 073	BOWRON RIVER	Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Omica	Cariboo
093K 051	JOHN	Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093K 057	THUR	Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093N 217	OKI	Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093O 040	CHIN	Prospect	Limestone						Limestone	Stratiform	Sedimentary	Industrial Mineral	Omica	Ancestral North America
093O 028	BEARPAW RIDGE	Prospect	Magnetite	Titanium	Iron				Magnetic Fe-Ti-V oxide deposits	Massive	Magmatic	Industrial Mineral	Foreland	Ancestral North America
094C 035	WEST MICA MOUNTAIN	Prospect	Mica	Gemstones					Muscovite pegmatite	Concordant	Metamorphic	Industrial Mineral	Omica	Kootenay
093N 174	WIRCAL	Prospect	Niobium	Zirconium	Titanium	Uranium	Lanthanum	Neodymium	Carbonatite-hosted deposits	Podiform	Magmatic	Industrial Mineral	Omica	Cassiar
093O 008	WAPITI	Prospect	Phosphate						Uppelling-type phosphate	Stratabound	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093H 038	LONGWORTH	Prospect	Silica						Silica sandstone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Ancestral North America
093H 028	DOMIE CREEK	Prospect	Flagstone	Dimension Stone	Flagstone				Flagstone	Stratiform	Sedimentary	Industrial Mineral	Foreland	Overlap Assemblage
093K 100	JOSEPH LAKE	Prospect	Vermiculite						Vermiculite deposits	Disseminated	Magmatic	Synthetic	Foreland	Overlap Assemblage
093K 101	SOWICHA CREEK VERMICULITE	Prospect	Vermiculite						Vermiculite deposits	Disseminated	Magmatic	Synthetic	Foreland	Overlap Assemblage
093A 138	OCHILTREE	Showing	Asbestos						Ultramafic-hosted asbestos	Vein	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093A 139	CONTIANE CREEK	Showing	Asbestos						Ultramafic-hosted asbestos	Vein	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093B 024	DRD	Showing	Asbestos						Ultramafic-hosted asbestos	Stockwork	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093G 002	RAY	Showing	Asbestos	Nickel					Ultramafic-hosted asbestos	Vein	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093G 012	TELEGRAPH RANGE	Showing	Asbestos						Ultramafic-hosted asbestos	Vein	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093G 016	BALDY HUGHES	Showing	Asbestos						Ultramafic-hosted asbestos	Vein	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093G 018	SINKUT MOUNTAIN	Showing	Asbestos						Ultramafic-hosted asbestos	Vein	Hydrothermal	Epigenetic	Foreland	Overlap Assemblage
093K 043	MT. SIDNEY WILLIAMS	Showing	Asbestos	Gold	Silver	Chromium			Ultramafic-hosted asbestos	Vein	Replacement	Porphyry	Foreland	Overlap Assemblage
094K 068	VAN DE CAR ASBESTOS	Showing	Asbestos	Nickel					Ultramafic-hosted asbestos	Vein	Replacement	Porphyry	Foreland	Overlap Assemblage
093N 115	GERMANSEN RIVER	Showing	Asbestos	Gold					Ultramafic-hosted asbestos	Vein	Epigenetic	Hydrothermal	Foreland	Slide Mountain
093H 064	TWO-BIT CREEK	Showing	Barite						Vein barite	Vein	Epigenetic	Industrial Mineral	Omica	Cariboo
093J 024	NORTH RIDGE	Showing	Barite						Vein barite	Vein	Replacement	Hydrothermal	Foreland	Ancestral North America
093J 025	LARIUS LAKE BARITE	Showing	Barite						Vein barite	Vein	Replacement	Hydrothermal	Foreland	Ancestral North America
094A 001	PACIFIC FT ST JOHN NO.44 WELL	Showing	Barite						Vein barite	Vein	Industrial Mineral	Hydrothermal	Foreland	Ancestral North America
094F 013	YULE	Showing	Barite						Stratiform	Sedimentary	Exhalative	Foreland	Ancestral North America	
094F 016	GNOME	Showing	Barite						Stratiform	Sedimentary	Exhalative	Foreland	Ancestral North America	
094F 017	GIN	Showing	Barite						Stratiform	Sedimentary	Exhalative	Foreland	Ancestral North America	
094F 018	DEL	Showing	Barite						Sediment-hosted barite	Stratiform	Sedimentary	Exhalative	Foreland	Ancestral North America
094F 020	KWADACHA	Showing	Barite						Sediment-hosted barite	Stratiform	Sedimentary	Exhalative	Foreland	Ancestral North America
094F 021	NORTH KWADACHA													