Ministry of Energy, Mines and
Petroleum Resources
Hon. Jack Davis, Minister

MINERAL RESOURCES DIVISION
Geological Survey Branch

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

By Larry D. Jones

A contribution to the Canada/British Columbia Mineral Development Agreement, 1985-1990

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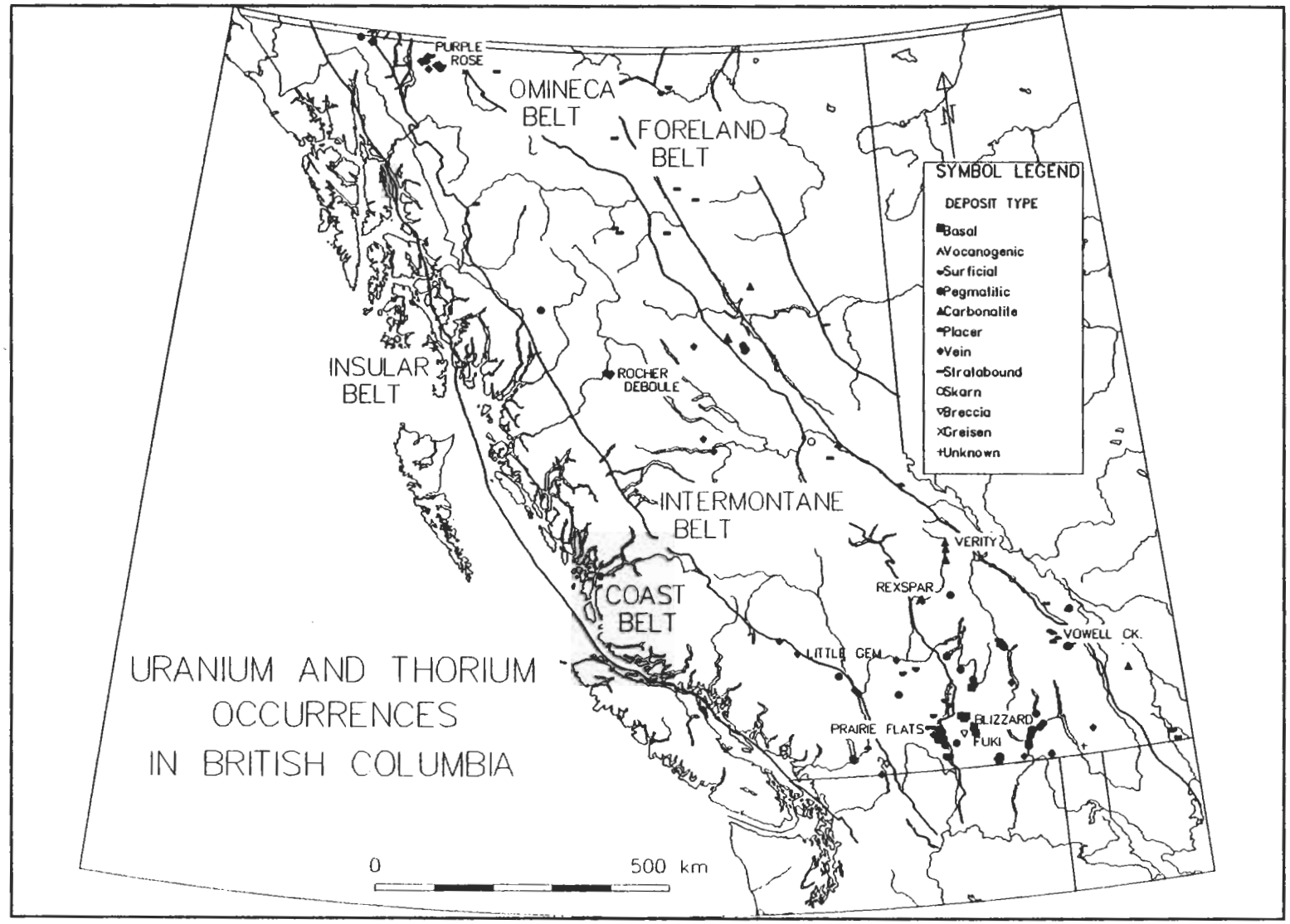
VICTORIA
BRITISH COLUMBIA
CANADA
October 1990

SUMMARY

The geological diversity of British Columbia provides a wide variety of settings for the occurrence of uranium and thorium. The Victoria deposit, a gold-silver-cobalt-molybdenum occurrence south of Hazelton, contains uraninite erratically distributed in narrow veins in granodiorite. The Little Gem deposit, located near Gold Bridge, contains uranium, gold and cobalt in veins within granodiorite. The Verity prospect, near Lampriere, contains uranium-bearing pyroclore in carbonatite. Uranium and thorium occur in amphibolite at the Husselbee showing, located on the west side of Atlin Lake. To the east, north of Surprise Lake, metazeunerite occurs in shears within quartz monzonite at the Purple Rose showing. The Rexspar uranium deposit is in volcanic rocks north of Kamloops. The Vowell and Malloy creek placers of the Bugaboo area contain uranium and thorium minerals in stream gravels produced from erosion of quartz monzonite rocks. The Blizzard, Cup Lake, Hydraulic Lake, Haynes Lake, Fuki and other stratabound, basal uranium occurrences lie in fossil stream-channel sandstones and conglomerates in the Okanagan Highland and are between 1 and 4 million years of age. Even younger deposits, which are still forming today, include the many surficial uranium-enriched post-glacial organic-rich basins located along the west side of Okanagan Lake. They include the Prairie Flats, Covert Basin, Sinking Pond and North Wow Flat occurrences.

Of the 182 known uranium and thorium occurrences in British Columbia, only a few have the grade and tonnage to have economic potential. These include the Rexspar deposit, some of the stratabound, basal deposits and possibly the placer and surficial deposits. Total in situ uranium in British Columbia is estimated at over 7400 tonnes of uranium. However, due to the availability of high-grade large-tonnage deposits elsewhere in the World and Canada, such as those in northern Saskatchewan, uranium production from deposits in British Columbia may not be economically feasible in the foreseeable future.

The main purpose of this report is to document the known uranium and thorium occurrences. The information may be useful to geological researchers and explorers, land use planners and environmental health planners.


PURPLE ROSE
OMINECA BELT
FORELAND BELT
INSULAR BELT
ROCHER DEBOULE
INTERMONTANE BELT
COAST BELT
VERITY
REXSPAR
VOWELL CK.
LITTLE GEM
PRAIRIE FLATS
BLIZZARD
FUKI
N
SYMBOL LEGEND
DEPOSIT TYPE
Basal
Volcanogenic
Surficial
Pegmatitic
Carbonatite
Placer
Vein
Stratabound
Skarn
Breccia
Greisen
Unknown
URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA
0
500 km

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INTRODUCTION

PURPOSE AND SCOPE

The purpose of this Open File is to document uranium and thorium occurrences in British Columbia. A total of 182 occurrences, listed in Appendices 1 to 3, were compiled in the current MINFILE format. Of these, 64 are presented by type of deposit with a summary of location, geology and references. All of the occurrences are numbered in order of significance within each deposit category and are plotted on the accompanying map (Figure 20, in pocket). The complete MINFILE information on all of the occurrences is available in ASCII format on the accompanying diskette. The compilation was prepared from available file sources and with limited field examination. Corrections to the data or new occurrence information would therefore be gratefully received by the B.C. Ministry of Energy, Mines and Petroleum Resources, Geological Survey Branch.

Uranium and thorium occurrences are defined as sites with radioactive minerals and/or natural enrichment of radioactive elements with radioactivity significantly above background levels (generally over five times local background by a scintillometer) or with uranium or thorium values above 500 ppm. Lesser values have also been documented for geological interest.

MINERALOGY

Radioactive minerals commonly contain uranium or thorium as the principal radioactive constituents, although, small amounts of daughter elements, such as radon or radium, are also present. About 20 different uranium and thorium minerals occur in British Columbia. The primary (uranous state) minerals include uraninite (and its variety pitchblende), brannerite, ningyoite, coffinite, thorite and uranothorite. The secondary (uranyl state) or supergene minerals include autunite, zeunerite, metazeunerite, torbernite, sabugalite, thucholite, carnotite, kasolite, uranophane, saleeite and phosphuranylite. Complex multiple oxides of niobium, tantalum and titanium commonly contain uranium and thorium. These are occasionally referred to as radioactive niobate-tantalates and include fergusonite, pyrochlore, euxenite and samarskite. Many accessory minerals, such as apatite, fluorapatite, zircon, sphene, allanite, monazite, rutile, ilmenite and titanite, carry uranium and thorium as minor constituents. These accessories sometimes account for the major portion of the contained uranium.

DETECTION OF RADIOACTIVITY

Radioactivity is generally detected in the field by instruments such as Geiger-Muller counters, scintillometers and gamma-ray spectrometers. These use gamma emissions from the decay process of the naturally occurring radiogenic isotopes. When all decay products are in secular equilibrium, the dominant contributor to the gamma spectrum from the uranium-238 chain is bismuth-214, which exhibits an energy of 1.76 million electron volts (MeV). The commonly used scintillometer uses a NaI(Tl) detector and ratemeter to measure the amount of radioactivity, which is expressed in counts per minute or counts per second. A gamma-ray spectrometer, which measures peaks in the gamma spectra of uranium, thorium and potassium, can be used to determine equivalent assays of these elements assuming that bismuth-214 is in secular equilibrium. Analyses of uranium content by radioactive detectors are usually expressed in per cent equivalent uranium. Radon gas is usually measured in picocuries which is a unit of radioactivity equal to 0.037 disintegration per second.

Uranium and thorium content are also determined by fluorescence, spectrographic, chemical and neutron activation methods. The resulting assays are generally expressed in per cent uranium and thorium, or their oxides. Uranium (U) and uranium oxide (U_3O_8) are also expressed as parts per million (ppm), pounds per ton and kilograms per tonne. Conversions for these are shown in Table 1.

Table 1: CONVERSIONS FOR URANIUM AND URANIUM OXIDE VALUES

Unit & Commodity	Conversion Values		
weight % U:	**1.0**	0.8480	0.0424
ppm U:	10,000	8480.0	424.0
lb/ton U:	20	16.96	0.848
kg/tonne U:	10	8.48	0.424
% U_3O_8:	1.1792	**1.0**	0.05
lb/ton U_3O_8:	23.5840	20.0	**1.0**
kg/tonne U_3O_8:	11.792	10.0	0.5

PROPERTIES OF RADIOACTIVE ELEMENTS

Three significant naturally occurring radioactive elements are potassium, thorium and uranium, in order of crustal abundance. All isotopes of an element have the same atomic number and nuclear charge but differ in having slightly different atomic weights or mass numbers. Of the natural isotopes of potassium, only potassium-40 (0.119 per cent natural abundance) is radioactive. The natural isotopes of thorium and uranium are all radioactive; the most abundant and significant are thorium-232 (almost 100 per cent natural abundance), uranium-234 (0.0058 per cent natural abundance), uranium-235 (0.71 per cent natural abundance) and uranium-238 (99.23 per cent natural abundance). Radioactive elements emit one or more of alpha, beta and gamma rays, transforming them into new elements having different chemical and physical properties. During alpha decay an atom with a very large unstable nucleus reduces its mass towards a smaller, more stable mass. When the neutron/proton ratio of a radioactive isotope is too high for stability, beta decay occurs. After undergoing alpha or beta decay an atom may be left with excess energy, thus causing emission of gamma rays. Half-life is a measure of the rate of decay of radioactive isotopes. It is the time required for decay of half of the initial atoms of a given amount of radioactive isotope, which are often called radionuclides.

URANIUM

Uranium, the heaviest of the naturally occurring radioactive elements, is a mixture of three isotopes, uranium-234, uranium-235 and uranium-238, which are nearly always present in a constant proportion. Uranium-235 and uranium-238 are parent isotopes for the separate radioactive decay series which produce a series of unstable isotopes called daughter elements and yield the stable isotopes of radiogenic lead-207 and lead-206, respectively. The ratio of uranium-238 to uranium-235 equals 137.5. The third commonly occurring isotope of uranium, uranium-234, is an intermediate daughter in the radioactive decay series of uranium-238. See Table 2A for the disintegration series of uranium-238.

Uranium never occurs naturally as the native element because it reacts readily with nonmetallic elements and water, commonly to form oxides. Uranium occurs naturally in the oxidation states U(IV), U(V) and U(VI). Uranium-bearing ions tend to combine with soluble oxygen-bearing ions to form soluble complexes. The uranous ion (U^{+4}) generally forms hydroxide complexes, and the oxidized uranyl ion (UO_2^{+2}) tends to form strong complexes with several anions, which are common in surface and ground waters.

THORIUM

Naturally occurring thorium has two isotopes. Thorium-232 is the parent radionuclide of a long decay series terminating with lead-208. Thorium-230, which is generally present in minerals containing uranium, is the decay product of uranium-234, an intermediate in the decay of uranium-238. It forms compounds with sulphur, nitrogen, carbon, boron, silicon and the halogens. It also forms intermetallic compounds with many metallic elements. See Table 2B for the disintegration series of thorium-232.

Table 2A and B: DISINTEGRATION SERIES OF URANIUM-238 AND THORIUM-232

A Decay Products	Half Life	B Decay Products	Half Life
Uranium-238	4.51×10^9 years	Thorium-232	1.4×10^{10} years
Thorium-234	24.10 days	Radium-228	5.8 years
Protactinium-234	1.14 minutes	Actinium	6.1 hours
Uranium-234	2.48×10^5 years	Thorium-228	1.9 years
Thorium-230	7.52×10^4 years	Radium-224	3.6 days
Radium-226	1.62×10^3 years	Radon-220	54 seconds
Radon-222	3.82 days	Polonium-216	0.16 seconds
Polonium-218	3.05 minutes	Lead-212	10.6 hours
Lead-214	26.8 minutes	Bismuth-212	1 hour
Bismuth-214	19.7 minutes	Thallium-208	3.1 minutes
Polonium-214	1.5×10^{-4} seconds	Polonium-212	3×10^{-7} seconds
Lead-210	22 years	Lead-208	stable
Bismuth-210	5.02 days		
Polonium-210	138 days		
Lead-206	stable		

RADIOACTIVE EQUILIBRIUM AND CHEMICAL BEHAVIOUR

Radioactive equilibrium of uranium and thorium occurs when their daughter elements disintegrate at the same rate at which they are being formed. Disequilibrium may be caused by selective leaching of daughter elements or by loss of daughter elements in the form of radioactive gases, such as radon. Thorium-bearing compounds are rarely out of equilibrium, as thorium series members have relatively short half-lives and recover their equilibrium quickly.

Uranium and thorium are chemically similar at high temperatures, which explains why they tend to occur together in igneous rocks and hydrothermal deposits. In the surficial environment, however, uranium is chemically more mobile due to its strongly divalent behaviour (as opposed to the strongly monovalent behaviour of thorium) which allows for partitioning of the elements through redox reactions. Uranium also has a stronger affinity to carbon.

The average abundance of uranium in the earth's crust is between 2 and 4 parts per million (ppm), however, different rock types can contain much higher concentrations, to the point of forming an economic deposit. The thorium/uranium ratio in the earth's crust is between 3 and 4. Table 3 shows the average content of uranium and thorium in common rocks.

Table 3: AVERAGE URANIUM AND THORIUM CONTENTS IN ROCKS

Rock Type	Uranium (ppm)	Thorium (ppm)
Granite, rhyolite	3.0-4.7	12
Diorite, andesite	1.8-3.5	5
Gabbro, basalt	0.5-1.5	3
Syenite, alkali granites	up to 100	up to 100
Limestone, dolomite	1.3-2.5	1
Sandstone, conglomerate	0.5-2.5	5
Shale, argillite	1.2-4.1	12
Phosphorites	up to 300	up to 12
Quartzite	1.5	5
Schists	2	6-10
Amphibolites	0.3	2
Gneisses	0.6-3.8	10
Pegmatites	3.2-6.9	up to 200

USES AND PROCESSING

In the early part of this century, aside from very minor uses as a pigment and chemical reagent, uranium was in economic demand mostly for its strongly radioactive daughter element, radium, used for medical and industrial purposes.

When a uranium-235 atom is struck by a low-energy neutron, it undergoes fission and produces new neutrons which, in turn, may become projectiles that strike other uranium-235 atoms, thus setting off a chain reaction. Since 1942, the demand for fissionable materials resulted in widespread exploration for uranium for military requirements and as a fuel in nuclear reactors. These reactors are used for research, production of radioactive isotopes and power generation.

Before uranium is used in a nuclear reactor, it is refined and purified. The uranium ore is crushed and ground to a fine powder, which is added to acid to dissolve the uranium. The uranium is then absorbed in ion exchange columns and alkali is added to precipitate uranium oxide (U_3O_8), known as "yellowcake". This is then converted to uranium dioxide (UO_2), a fine black powder, which is compacted and fired at high temperatures to form hard ceramic pellets. The pellets are sealed into metallic tubes, which are assembled into bundles for use in heavy-water reactors (for example, the Canadian Candu reactor). For all light-water reactors, such as those used in the United States, further processing is required to increase the uranium-235/uranium-238 ratio.

Presently, thorium is of minor economic interest. The metal is used in magnesium alloys and thorium oxide is used in incandescent gas mantles, such as those in the common Coleman lantern. Research has been conducted on the breeding of thorium-232 to make fissionable uranium-233 for use in nuclear reactors.

RESOURCES

Canadian production of uranium in 1988 was 13 233 000 kilograms, all from Saskatchewan and Ontario. The market value was 1.108 billion dollars.

Table 4: URANIUM RESOURCES IN BRITISH COLUMBIA

DEPOSIT NAME (MINFILE #)	MILLION TONNES	GRADE (% U)	TONNES URANIUM
DEPOSIT TYPE			
BASAL TYPE			
Blizzard (082ENE046)	2.208	0.1819	4016
Cup Lake (082ENE041)	2.250	0.0373	839
Hydraulic Lake (082ENW053)	2.056	0.0310	637
Haynes Lake (082ENW051)	>2.000	>0.017	>340
Fuki (082ENE015)	>0.500	0.025	>125
VOLCANOGENIC TYPE			
Rexspar (082M021)	1.114	0.0656	731
SURFICIAL TYPE			
Prairie Flats (082ENW073)			178
Covert Basin (082ESW164)			23
Sinking Pond (082ESW174)			23
North Wow Flat (082ESW177)			12
PLACER TYPE			
Vowell Creek (082KNE007)			276
Malloy Creek (082KNE008)			182
Total			>7382

Uranium resources in British Columbia (see Table 2) are estimated at over 7 382 000 kilograms of uranium. Basal-type deposits, such as the Blizzard deposit in the East Okanagan, account for nearly 6 000 000 kilograms of uranium. The volcanogenic Rexspar deposit has defined reserves of 731 000 kilograms of uranium. Reserves identified in the young surficial uranium deposits of the southern Okanagan total 236 000 kilograms of uranium, although it is probable a great deal more of this type exists. The Bugaboo placer deposits contain uranium, thorium and niobium minerals in black sand; uranium reserves are estimated at 458 000 kilograms.

HISTORY

The earliest interest in radioactivity in British Columbia was in 1914, when the federal government offered cash bonusesfor discoveries of commercial quantities of radioactive minerals to locate radium. The rewards were unclaimed and the offer was withdrawn in 1938. In 1932, an electroscopic survey, which measures radioactivity, was carried out on the Radium property (MINFILE 092K052) on Quadra Island. Carnotite was identified in seams in volcanic rocks and assayed up to 24.5 per cent uranium. Little exploration for radioactive minerals was carried out until the late 1940s. The Rexspar deposit (082M021) at Birch Island, first explored for fluorite in 1920, was investigated for uranium mineralization in 1949. By 1977, 1.114 million tonnes of reserves were indicated at a grade of 0.068 per cent uranium, with an appreciable content of rare-earth elements.

During the late 1940s to mid 1950s, many properties, previously considered as precious and base metal prospects, were explored for radioactive minerals. The Victoria (093M072), a gold-silver-cobalt-molybdenum property south of Hazelton, contains uraninite erratically distributed in narrow veins in granodiorite of the Rocher Déboulé stock. The Little Gem property (092JNE068) contains uranium, gold and cobalt in veins within granodiorite. The Verity property (083D005) near Lampriere contains uranium-bearing pyrochlore in carbonatite. Radioactive minerals occur in amphibolite on the Husselbee property (104N001), located on the west side of Atlin Lake. To the east, north of Surprise Lake, metazeunerite occurs in shears in granite rocks on the Purple Rose property (104N005). In 1955, radioactive secondary hydrous aluminum phosphate minerals were found in rhyolite dikes cutting quartz monzonite on the Nithi Mountain property (093F012), south of Fraser Lake. The Vowell and Malloy Creek properties (082KNE007,8), near Spillamacheen, contain Recent placer uraninite and pyrochlore, which were tested in 1954. In 1956, 11 312 kilograms of concentrates were produced, having an average grade of 2.5 per cent niobium, 0.76 per cent uranium and 1.3 per cent thorium oxide.

In the late 1960s, uranium minerals were found in pegmatite within gneiss on the Mota property (082FSW212), located near China Creek. In 1968, Japanese geologists, while conducting a car-borne scintillometer survey, discovered autunite (Fuki deposit-082ENE015) in a Miocene paleochannel beneath a basalt cap in the upper Kettle River watershed. This led to discovery of the Blizzard deposit (082ENE046) and several others, which are referred to as Tertiary basal-type deposits.

From 1975 to 1978, a jointly funded Federal-Provincial Uranium Reconnaissance Program (URP), conducted by the Geological Survey of Canada and the British Columbia Ministry of Energy, Mines and Petroleum Resources, investigated the uranium potential of the Cordillera. This program consisted of regional stream water and sediment geochemical surveys, with detailed follow-up studies, including geochemical surveys, geological mapping and uranium resource evaluation and appraisal. Various surveys were completed on map sheets 82E, L and M and 104N, O and P.

In 1979, post-glacial uranium deposits were discovered in soil in the semi-arid Okanagan Valley. These 'young' uranium accumulations are associated with stagnant or saline waters trapped in hydraulically closed basins. Prairie Flats (082ENW073), located within the Summerland town limits, is one such fluviatile deposit. It contains about 178 tonnes of uranium, and since the glacial retreat, uranium has accumulated at an estimated rate of 23 kilograms per year.

Also in 1979, an inquiry by Dr. D.V. Bates and others was made into the adequacy of existing measures to provide protection to workers and the general public in all aspects of uranium mining in British Columbia. This resulted in a three-volume report entitled "Royal Commission of Inquiry on Health and Environmental Protection into Uranium Mining", with a summary of recommendations.

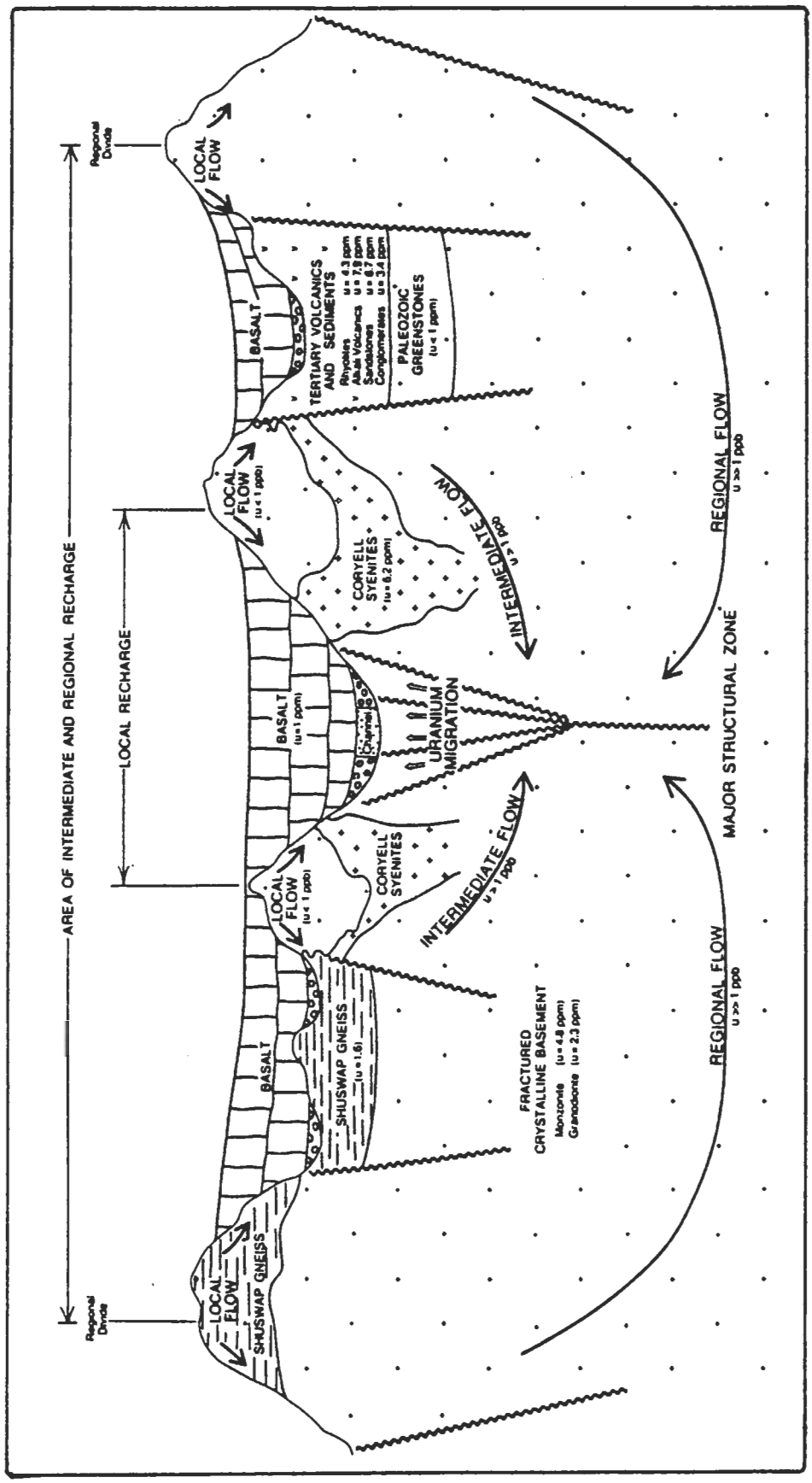


Figure 1: Model of formation for basal-type uranium deposits in South-central British Columbia (from Boyle, 1982b)

In February, 1980, the provincial government imposed a seven-year moratorium on uranium exploration and development in British Columbia. The moratorium expired on February 28, 1987 and new regulations were established by the provincial government; safeguards on exploration, recommended in 1980 by the Bates inquiry, were put in place. The regulations require that proposals to explore for uranium or thorium or for exploration in certain designated areas must be filed with the Chief Inspector of Mines. Significant uranium or thorium levels must be reported whenever found. This level is defined as 0.05 per cent or more of uranium and 0.15 per cent or more thorium, over a sample length of one metre or more. Consult the regulations (Health, Safety and Reclamation Code for Mines in British Columbia, June 1990) for complete details.

DEPOSIT TYPES AND PROPERTY DESCRIPTIONS

The following list of uranium and thorium occurrences in British Columbia is compiled by deposit types, in order of their importance. The types are defined by a combination of dominant geologic characteristics, such as host rock and structural setting and processes of formation. They include basal, volcanogenic, surficial, pegmatitic, carbonatite, placer, vein, stratabound, skarn and breccia types.

The distribution of deposit types in British Columbia shows basal and surficial deposits confined to the Okanagan area; a clustering of pegmatitic deposits fringing the Shuswap metamorphic complex; carbonatite and placer deposits on either side of the Rocky Mountain Trench; and a broad distribution of vein and stratabound deposits.

BASAL DEPOSITS

The basal uranium deposits are a special type of stratabound or stratiform deposit (see also Stratabound section). They occur within structurally-controlled, upper Miocene paleochannel sediments and overlie the Okanagan Highlands intrusive complex, which consists of quartz monzonite, granodiorite, porphyritic granite and pegmatites of Lower Cretaceous to Eocene age together with Coryell syenite and Princeton Group volcanics of Eocene age. The deposits are generally capped by Pliocene plateau basalt (Boyle, 1982b).

The mineralized basal sediments comprise unconsolidated, interbedded conglomerates, arkosic sandstones, siltstones and mudstones. Organic material is abundant in several of the beds. Uranium minerals occur as uranous phosphate (ningyoite) or uranyl phosphates (saleeite, autunite) coating clastic grains and filling voids. Associated minerals include pyrite, marcasite and limonite. These deposits are believed to have formed by the infiltration of deep-seated uraniferous groundwaters into organic- and iron sulphide-rich Miocene fluvial sediments. Mineralization likely formed after a period of extensional tectonism, leading to groundwater leaching of the basement, which resulted in an ore-forming hydrologic regime (see Figure 1). The maximum period of formation is estimated to be between 1 and 4 million years (Boyle, 1982b).

The East Okanagan area of south-central British Columbia contains five significant basal type uranium deposits: the Blizzard, Cup Lake, Hydraulic Lake, Haynes Lake and Fuki (see Figures 2 and 3). In the West Okanagan area, the basal part of the Eocene Marron Group contains three radioactive occurrences, the Brent Lake, Skaha Reservation and Farleigh Lake showings.

Close-spaced drilling on the Blizzard, the south half of the Hydraulic Lake and parts of the Cup Lake deposits has delineated measured reserves of uranium (see Table 2). Widely-spaced drilling on the other basal deposits has provided only inferred or probable resources.

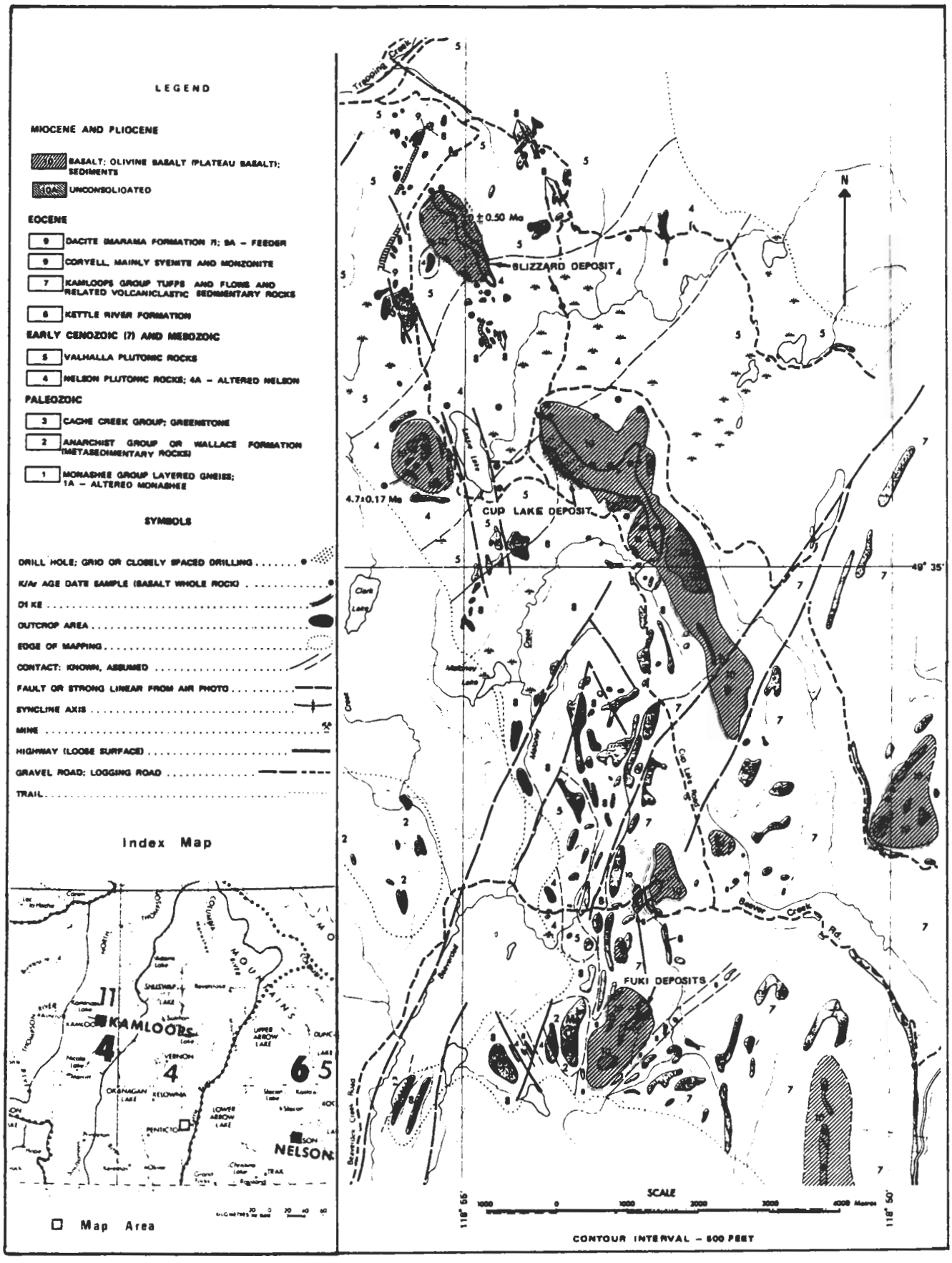


Figure 2: Geological setting of Blizzard, Cup Lake and Fuki deposits (from Sutherland Brown et al., 1979)

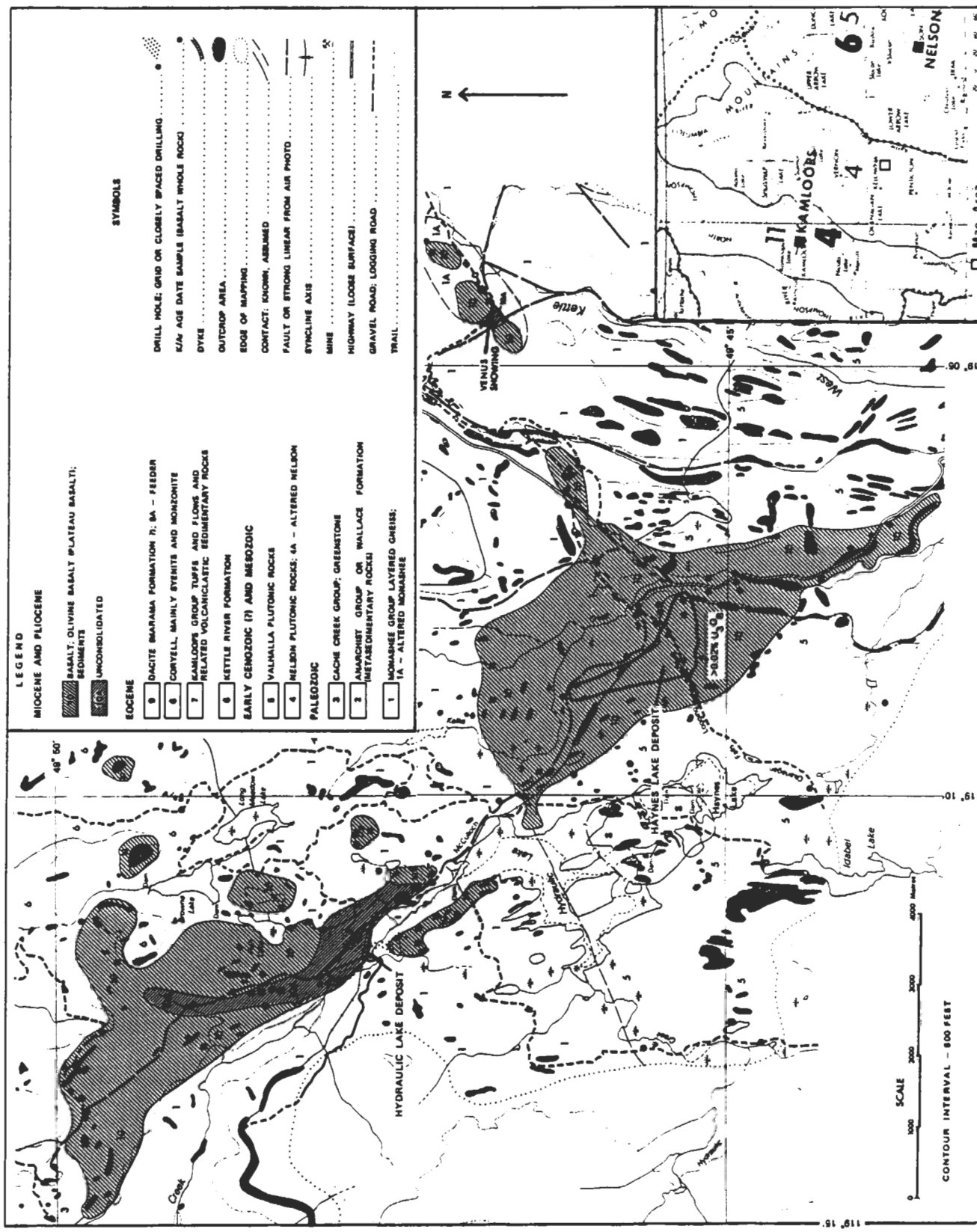


Figure 3: Geological setting of Hydraulic Lake and Haynes Lake deposits (from Sutherland Brown et al., 1979)

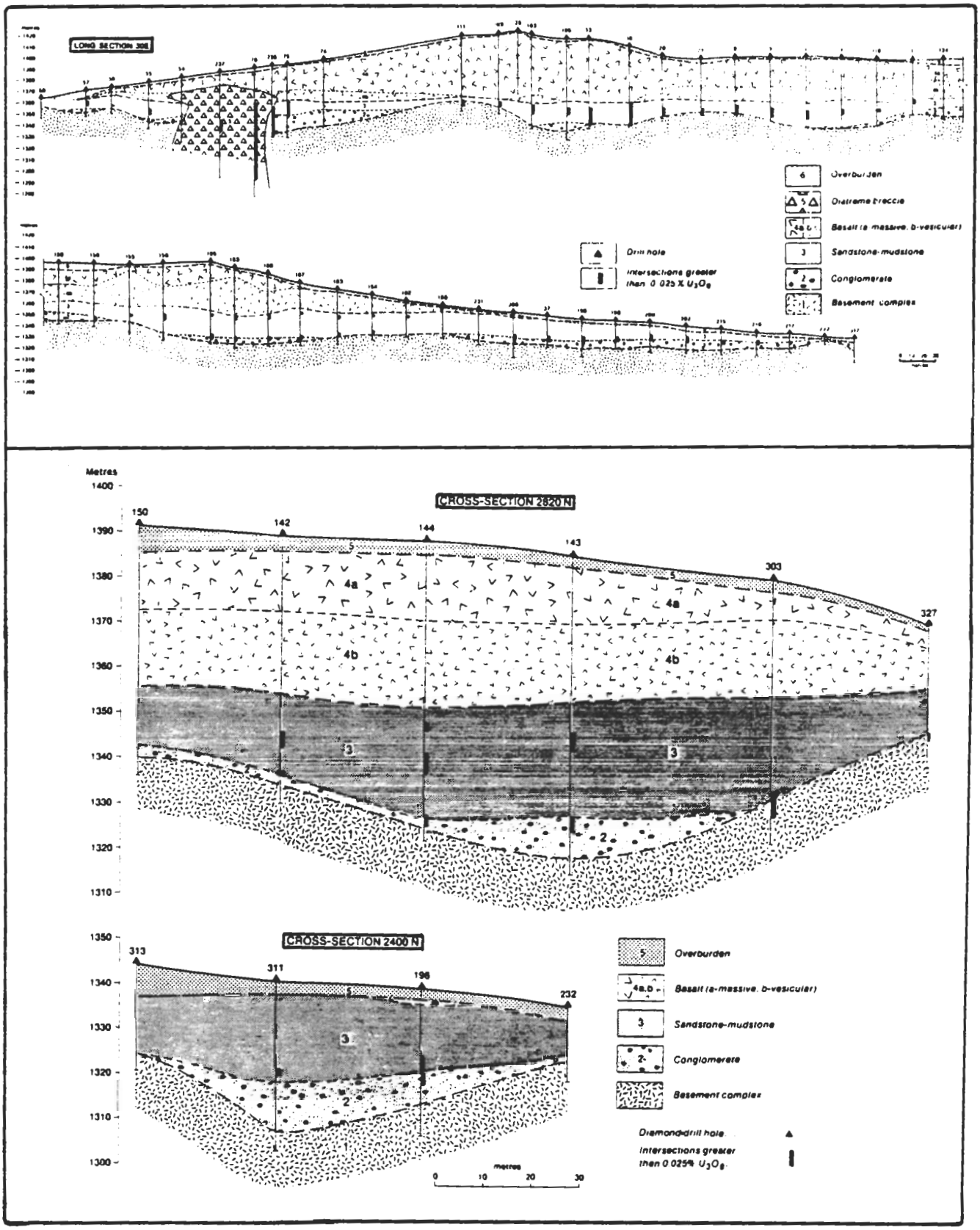


Figure 4: Cross-sections of the Blizzard deposit (from Boyle, 1982b; after Norcen Energy Resources Limited, 1979)

BLIZZARD DEPOSIT

Alias:	Beverly	Map Number:	1
Deposit type:	Basal	Commodity:	U
MINFILE Number:	082ENE046	NTS:	082E10W
Lat.-Long.:	49 37' 30"-118 55' 00"	Elevation:	1380 m

The Blizzard deposit occurs at a drainage divide along a sinuous paleochannel, which plunges 1.5 degrees to the southeast in the south part and plunges to the north in the north part. Mineralization has been traced over a 1600-metre length, with widths from 60 to 265 metres and true thickness from 1 to 24 metres. Depth of the deposit is from 2 to 90 metres below surface and, except for the southern end of the deposit, it is covered by plateau basalt, which has a maximum thickness of 74 metres. The largest proportion of the uranium is concentrated in two ore zones, one in mudstone-sandstone beds and the other in sandstones immediately overlying basal conglomerate. At the northern end of the deposit, it occurs within basal conglomerates and along the basalt-sandstone contact. The basement rocks to the fluvial sediments are mainly Valhalla and Nelson intrusive rocks (Figure 2).

Uranium mineralogy is represented by the uranyl and uranous phosphate minerals saleeite, ningyoite and autunite. Minor concentrations of pitchblende apparently pseudomorphically replaces ningyoite. Saleeite and ningyoite commonly cement carbonaceous quartzose-feldspathic sediments, whereas, ningyoite is the only ore mineral present in mudstone or at limonitized sandstone-mudstone interfaces. Autunite is confined to fractures in the basal sedimentary members and the northern part of the basement complex. Other minerals include pyrite, which increases to the south within the deposit, marcasite, gypsum, rozenite and jarosite.

At the north end of the deposit, a 30 by 80 metre breccia pipe intrudes the sediments and was likely the vent for an early flow, which was then weathered and partly eroded by a later flow. This breccia has a fine-grained basalt and minor sand matrix containing abundant fragments and larger blocks of sedimentary material and intrusive basement rocks. Oxidation of the breccia pipe decreases with depth until, in the deepest part, there are only green basalt/diabase fragments in a pale green aphanite. Radioactivity also decreases with depth. The top of the pipe shows intense argillic and chloritic alteration. Ningyoite is the main uranium mineral present (Figure 4).

In summary, the Blizzard deposit is a hydrogenic paleochannel deposit. Uranium was leached from surrounding felsic intrusive and extrusive rocks and transported by ground waters into a structurally controlled paleochannel. The ground waters were rapidly acidified and uranium minerals were precipitated within the Miocene sandstones and carbonaceous mudstones. The deposit was preserved by the overlying basalts and glaciolacustrine sediments (Figure 1).

The ore reserves of the Blizzard deposit are estimated to be 2 208 000 tonnes grading 0.182 per cent uranium, with a cut-off grade of 0.021 per cent uranium over a one metre interval (Sawyer, 1979).

Reference numbers: 17, 28, 30, 31, 32, 34, 135, 176, 177, 191, 196, 197.

CUP LAKE DEPOSIT

Alias:	Donen	Map Number:	2
Deposit type:	Basal	Commodities:	U
MINFILE Number:	082ENE041	NTS:	082E10W
Lat.-Long.:	49 35' 40"-118 54' 00"	Elevation:	1345 m

The Cup Lake deposit occurs within a northwest-trending paleochannel overlying Valhalla, Nelson and Coryell intrusives. The fluvial sediments, up to 20 metres thick, include tuff or ash fall, with occasional lacustrine sediments overlying conglomerates. These are capped by a 5000 by 800 metre area of basalt, up to 60 metres thick. The northern part of the mineralized zone measures about 1500 by 500 metres and the southern part, which is 700 metres to the southeast, measures about 1500 by 150 metres (see Figure 2). The northern part averages 0.042 per cent uranium and 1.8 metres thick and the southern part averages 0.024 per cent uranium and 0.7 metres thick. The total deposit averages 1.57 metres thick and contains reserves of about 2.25 million tonnes with an average grade of 0.037 per cent uranium, to yield 839 620 kilograms of uranium (Nicoll, 1980).

Uranium minerals, probably saleeite and autunite, occur as films on pebbles and in the matrix of unconsolidated or loosely consolidated conglomerate, carbonaceous mudstone and sandstone, and also in the base of the overlying basalt and in the regolith of the basement rocks.

Reference numbers: 17, 28, 30, 32, 142, 177, 191.

Hydraulic Lake Deposit

Alias:	Tyee, Kettle	Map Number:	3
Deposit type:	Basal	Commodities:	U
MINFILE Number:	082ENW053	NTS:	082E14E
Lat.-Long.:	49 47' 45"-119 23' 05"	Elevation:	1250 m

The Hydraulic Lake deposit occupies the northern part of a southeast-trending, structurally-controlled paleochannel, which overlies metamorphic rocks of the Paleozoic Monashee Group. The Miocene paleochannel varies in width from 100 to 200 metres and is mineralized for a length of approximately 1000 metres, although ore-grade material is confined to a length of 500 to 600 metres. The average thickness of the deposit is 50 metres. The paleohydrologic gradient from northwest to southeast is about 2 per cent. The Miocene-Pliocene plateau basalt formerly covering the deposit has largely been stripped off as a result of uplift and glaciation and the deposit is now covered by relatively impermeable beds of varved glacial clays and till (Figure 3).

Conglomerate blankets the basement complex and also comprises thick units throughout the sedimentary sequence. Interbedded within the conglomerate units are much thinner horizons of fine to coarse-grained sandstone and minor mudstone. Fragments of slightly decomposed and carbonized wood, and other forms of vegetal material, are abundantly scattered throughout the sediments. Organic material within iron sulphide rich zones of the deposit has been broken down to form humic acids, which have precipitated together with uranium in voids within the conglomerate (Boyle, 1986).

Although marcasite is scattered throughout the mineralized paleochannel, there are two zones, corresponding to two small depressions in the basement complex, where the mineral is in sufficient quantity to cement the conglomerate. The only identified uranium-bearing mineral is ningyoite. It occurs mainly as star-shaped concretions and accretionary masses surrounding clasts and marcasite grains in carbonaceous rich voids. The uranium content of the sediments gradually increases with depth, the basal conglomerate often containing more than 0.1 per cent uranium.

Ore reserves in the southern part of the deposit are estimated at 2 055 700 tonnes averaging 0.031 per cent uranium, to give 637 000 kilograms of uranium. Reserves in the northern part are estimated, from wide-spaced drilling, at over 1 000 000 tonnes of 0.02 per cent uranium (Sutherland Brown et al., 1979).

Reference numbers: 17, 30, 31, 32, 41, 43, 96, 141, 177, 191, 195.

Haynes Lake Deposit

Alias:	Kallis Creek, PB	Map Number:	4
Deposit type:	Basal	Commodities:	U
MINFILE Number:	082ENW051	NTS:	082E14E
Lat.-Long.:	49 45' 20"-119 07' 35"	Elevation:	1200 m

The Haynes Lake deposit occurs in paleochannel sediments just south of, and down gradient from, the junction of two major paleovalley structures. The sediments, which are mainly conglomerate and coaly sandstone, are capped by an average of 75 metres of basalt (Figure 3).

The uranium mineral, believed to be ningyoite, is commonly associated with iron sulphides, probably marcasite (Sawyer et al, 1981). The mineralized area measures about 2000 by 700 metres. Ore estimates are in excess of 2 million tonnes grading slightly over 0.017 per cent uranium (Sutherland Brown et al., 1979).

Reference numbers: 30, 32, 96, 177, 191.

FUKI DEPOSITS

Alias:	Collier	Map Number:	5
Deposit type:	Basal	Commodities:	U
MINFILE Number:	082ENE015	NTS:	082E10W
Lat.-Long.:	49 32' 30"-118 53' 00"	Elevation:	1160 m

The Fuki deposits occur within a northeast-trending paleochannel overlying biotite andesites and trachytes of the Eocene Penticton Group. Mineralization is traced for about 600 metres in length, 150 metres in width and up to 3 metres in thickness. Depth of the deposit is from 0 to 50 metres below surface. The discovery outcrop measured 10 by 3 metres and assayed 0.10 per cent uranium across 1.5 metres (McCammon, 1970a). Massive basalt and basaltic tuff up to 45 metres thick, overlie fluvial and lacustrine sediments. Extensive areas of Coryell and Valhalla intrusive rocks, considered to be the main sources of uranium mineralization, occur topographically above and to the north of the deposit (Figure 2).

Secondary uranium mineralization is largely concentrated in the basal conglomerate and occurs as films on pebbles and in the matrix of loosely consolidated conglomerates and carbonaceous sediments. Autunite is the only uranium mineral identified. The Fuki deposits are estimated to contain more than 500 000 tonnes grading 0.025 per cent uranium (Boyle, 1982b).

Reference numbers: 17, 28, 30, 31, 32, 40, 64, 103, 125, 142, 164, 177, 191.

BRENT LAKE SHOWING

Alias:	Clark	Map Number:	6
Deposit type:	Basal/Surficial	Commodities:	U
MINFILE Number:	082ESW139	NTS:	082E05W
Lat.-Long.:	49 29' 20"-119 46' 00"	Elevation:	840 m

The area south of Brent Lake is underlain by a Jurassic-Cretaceous granitic complex that is partly covered by Tertiary volcanic and sedimentary rocks. The Kettle River Formation, consisting of conglomerate, arkose and rhyolite tuff, is overlain by the Springbrook Formation, which is succeeded by the Marron Group and Marama Formation.

Five small patches of strongly radioactive (to 9000 counts per second) coal occur within conglomerate and greywacke, probably of the Marron Group. Selected grab samples assayed up to 1.5 per cent uranium. The coal is a low-grade lignite. It is not developed in seams but only as isolated patches within the matrix of the clastic beds. The uranium in the coal probably resulted from the adsorption or local reduction of uranium in groundwater by organic material.

About 300 metres to the northwest, a 10-metre zone of radioactive soil (300 counts per second) overlying green pebbly sandstone occurs along the same horizon as the radioactive coal. To the southeast, the Brent Flats and Brent Swamp form an organic trap system with enriched uranium covering a 49 200 square metre area. Up to 0.04 per cent uranium occurs over a thickness of 0.5 metres. (Culbert, 1979b).

Reference numbers: 56, 114.

SKAHA RESERVATION SHOWING

Alias:		Map Number:	7
Deposit type:	Basal	Commodities:	Th, U
MINFILE Number:	082ESW176	NTS:	082E05E
Lat.-Long.:	49 27' 00"-119 38' 30"	Elevation:	870 m

The area is underlain by Eocene volcanics of the Marron Group. The major radioactive unit comprises pink grits, tuffs and volcanic sandstones of the Yellow Lake Formation of the Marron Group. Analyses of these rocks average 65 parts per million uranium and range to more than 300 parts per million thorium (Culbert, 1978a). The most radioactive rocks have locally undergone some zoisite-fluorite alteration and lesser quartz-carbonate and sericite alteration. The radioactive pink grit unit occurs as a northwest-trending, discontinuous band, 4.5 kilometres long. The beds are about 10 to 25 metres thick and contain carbonaceous organic trash.

Mildly radioactive surficial occurrences have been noted along the northwest shoreline of Skaha Lake (B.N. Church, 1989, pers. comm.).

Reference numbers: 47, 51, 53.

FARLEIGH LAKE SHOWING

Alias:	Clark, Astro	Map Number:	11
Deposit type:	Basal	Commodities:	Th, U
MINFILE Number:	082ESW154	NTS:	082E05W
Lat.-Long.:	49 27' 45"-119 45' 20"	Elevation:	840 m

The Farleigh Lake area is underlain by a Jurassic-Cretaceous granitic complex that is partly covered by Tertiary volcanic and sedimentary rocks. The Kettle River Formation, consisting of conglomerate, arkose and rhyolite tuff, is disconformably overlain by purple and grey volcanics, wackes and siltstones of the Yellow Lake Formation of the Marron Group. These units are overlain by trachytes of the Nimpit Lake member of the Marron Group and dacite lavas and feeder dikes of the Marama Formation. Block faulting occurs in the area and the northwest-trending Marron Valley fault lies to the east of Farleigh Lake.

Radioactivity is associated with a pink grit unit, which occurs within wacke-shale lenses, intercalated in the lower part of the Yellow Lake alkaline volcanic assemblage. The well-layered grit unit is best exposed at the northwest end of Farleigh Lake, where it is 30 metres thick. The unit appears to be a channel deposit of reworked alkaline ash and ash-flow material. A drill hole 200 metres west of this exposure intersected 3.8 metres of the grit unit. A 2.3-metre sample assayed 0.003 per cent uranium and 0.013 per cent thorium, within which is a 0.6 metre coal seam which assayed 0.065 per cent uranium and 0.0185 per cent thorium (Salazar, 1978). The unit shows limonite-calcite alteration.

Reference numbers: 46, 47, 50, 174.

VOLCANOGENIC DEPOSITS

Three volcanogenic (Descarreaux, 1986) uranium-bearing zones, known as the Rexspar deposits, are located near Birch Island in central British Columbia. They lie conformable to the schistosity in the upper part of a trachyte unit (Eagle Bay assemblage), within altered mica, pyrite and fluorite-rich zones. The principal radioactive minerals are uraninite, uranothorite, torbernite, metatorbernite, thorianite and thorite. Uranium and thorium also occur in monazite and niobian-ilmenorutile. The geological setting and mineralogy suggest that the deposits were formed by deuteric, volatile-rich fluids during a late stage in the formation of the trachytic unit.

The Riddle Creek showing, located 20 kilometres west of the south end of Okanagan Lake, occurs near an Eocene volcanic centre. This showing is described under vein deposits. The Husselbee showing, located near Atlin, occurs in metavolcanics and is described under skarn deposits.

REXSPAR DEPOSIT

Alias:	Birch Island	Map Number:	13
Deposit type:	Volcanogenic	Commodities:	U, Th, fluorite, Ce, La
MINFILE Number:	082M 021	NTS:	082M12W
Lat.-Long.:	51 33' 40"-119 54' 40"	Elevation:	1200 m

The area is underlain by northeast-striking, moderately northwest-dipping felsic to intermediate metavolcanics and minor interlayered metasediments of the Devonian to Mississippian part of the Eagle Bay assemblage. The rocks hosting the uranium deposits consist of a deformed and metamorphosed pile of alkali feldspar porphyry, porphyry breccia, lithic tuff and breccia of trachytic composition, with occasional pyritic schist of rhyolitic composition. Rocks of this "trachyte" unit are light grey in colour and stained rusty brown or yellow due to widespread pyrite. They may be massive, brecciated, or markedly schistose and lineated. Fractured and sheared crystals of potash feldspar and albitic plagioclase and rock chips of trachytic composition occur in a fine-grained groundmass of feldspar and sericite. The trachyte unit, which is 15 to 120 metres thick, is apparently a mixture of intrusive porphyry and its extrusive equivalent tuffs and tuff breccias. It is probably related to a Middle Devonian volcanic centre or vent.

The above unit is structurally underlain by quartz-sericite schist, chlorite schist and dacitic to andesitic volcanic breccia, with interlayers of grey phyllite, slate, chert and sericitic quartzite (Figure 5). The prominent schistosity, which parallels the compositional layering and was probably produced during the first deformational phase, is deformed by tight, recumbent, east-trending second-phase folds. These are refolded by upright third-phase, northerly to northeasterly trending structures. Subsequent kink folds and prominent, north-trending tension fractures are commonly followed by post tectonic felsic and mafic dikes of Cretaceous or later age. High-angle, northerly trending faults control the distribution of the trachyte unit.

Uranium and thorium mineralization occur exclusively in the trachyte, mainly in the dark-coloured, upper part of the unit, which shows extensive replacement by silver-grey fluorphlogopite and pyrite, with lesser fluorite and calcite. The replacement zones, a few centimetres to several metres in width, generally occur as coarse-grained segregations, which show conformable and crosscutting relationships and deformation similar to the surrounding rocks. The best grade material occurs in a series of discontinuous, conformable tabular masses or lenses, generally less than 20 metres thick and up to 140 metres long. The principal radioactive minerals include uraninite, uranothorite, torbernite, metatorbernite, thorianite and uranian thorite. They occur as tiny discrete grains within fluorphlogopite flakes, and cause pleochloric halos, or are scattered in the pyrite-fluorphlogopite matrix. Uranium and thorium also occur in monazite and niobium-ilmenorutile. Rare earths, mainly cerium and lanthanum, occur in bastnaesite and monazite. Other minerals include celestite, galena, sphalerite, chalcopyrite, molybdenite, scheelite, siderite, dolomite, barite and quartz.

The geological setting and mineralogy suggest that the mineralized zones were formed by deuteric, volatile-rich fluids during a late stage in the formation of the trachyte unit. The thorium enrichment and widespread rare earths associated with the uranium support a primary rather than a secondary origin for the uranium. A potassium-argon age of 236 8 Ma for fluorphlogopite from one of the mineralized zones (Morton et al., 1978), is considered a minimum age and used cautiously because of some analytical problems. This Permo-Triassic date suggests the mineralization is syngenetic and not related to the nearby Cretaceous Baldy Batholith.

Three main tabular zones of radioactive mineralization occur parallel to the surfaces of the alkali feldspar porphyry and have irregular terminations above and below. The BD or Black Diamond Zone is a flat-dipping lens with a strike length of 140 metres, dip-slope length of 90 metres and an average thickness of 15 metres. A 1.8-metre sample across part of the zone assayed 0.09 per cent uranium, 0.14 per cent thorium oxide, 0.025 per cent niobium and trace yttrium and lanthanum (McCammon, 1955a). The zone lies along the upper surface of the porphyry and the radioactivity appears to be mainly associated with uranothorite, associated with rutile.

The A Zone, 600 metres east-northeast of the BD Zone, is a shallow-dipping (12) irregular lens averaging 15 metres thick and has been traced along strike for about 60 metres. It pinches out 60 metres downdip, where it appears to occur at a lower horizon in the porphyry mass. A 1.8-metre sample across the zone assayed 0.07 per cent uranium, 0.06 per cent thorium oxide, 0.015 per cent niobium and trace yttrium, lanthanum and cerium (McCammon, 1955a). The principal radioactive mineral is uraninite associated with rutile.

The B Zone, 360 metres north-northeast of the BD Zone, averages 8 metres wide, has a strike length of about 60 metres and a dip-slope length of about 75 metres.

Reserves for the three zones outlined by polygons within a proposed open pit, as defined by a cut-off grade of 0.021 per cent uranium, are 1 114 385 tonnes grading 0.066 per cent uranium with an overall stripping ratio of 12:1 (B.C. Ministry of Energy, Mines and Petroleum Resources, Property File, Report by Kilborn Engineering, 1977). The mineralized zones also grade 5 to 10 per cent fluorite. Smaller zones include the F Zone, 450 metres to the west of the BD Zone, the H Zone, 600 metres to the north-northeast and the G Zone (082M022), 1420 metres to the northeast.

The main zones of uranium mineralization lie 500 metres to the south and west on the Fluorite Zone (SPAR - 082M007). This zone has an estimated 1 441 820 tonnes grading 23.46 per cent CaF_2 and contains no uranium reserves.

Reference numbers: 22, 62, 99, 100, 108, 110, 120, 123, 132, 133, 140, 153, 155, 156, 157, 179, 191.

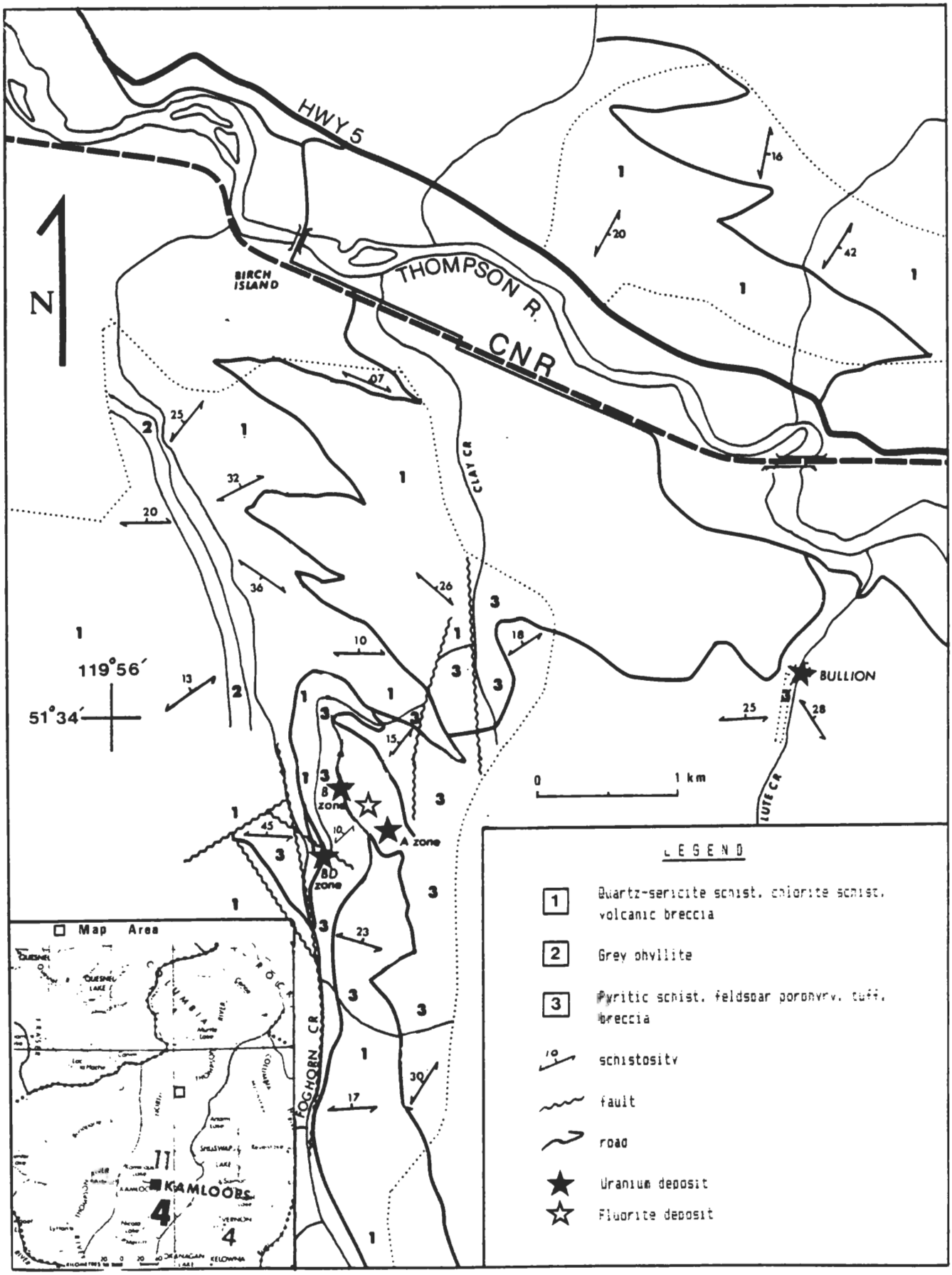


Figure 5: Geology of Rexspar deposit area (from Preto, 1978b)

SURFICIAL DEPOSITS

Uranium deposits occur in postglacial surficial material west of the Osoyoos-Okanagan trend (Figure 6). These 'young' deposits, which have not yet developed enough daughter elements to give a conventional radiometric response, were discovered through geochemical investigation of uranium-bearing springs and alkaline lakes. The deposits occur as concentrations (up to 3000 parts per million), within a few metres of the surface, formed by interaction of uranium-bearing groundwater with various components of soils or sediments. The uranium accumulates by two separate processes: 1) evaporation of the alkaline waters and 2) adsorption from these waters onto clays and organic matter.

To date, no uranium minerals have been recognized and it appears that this loosely bound uranium is associated with clays, organic material (may be in precipitated humic acids as well as in organic trash) and perhaps with limonite and phosphatic minerals. Molybdenum is commonly associated with the uranium and enrichment of selenium and vanadium occurs in some deposits. The apparent ages vary from 1900 years to 18 000 years.

These surficial type deposits may be separated into several subclasses, based primarily on the specific environment of deposition, such as closed basin oxidizing, valley-fill collector basin and flood-plain oxbow (Levinson et al., 1984). The fluviatile class includes the Prairie Flats and Covert Basin deposits. The lacustrine-playa class includes the Sinking Pond and Flats, North Wow Flat and the Stinkhole deposits. The Agur and Bald showings occur in a postglacial lake and a uraniferous bog, respectively.

Another area of surficial showings, which also shows uranium daughter-product disequilibrium, is along the Trout Lake graben, 55 kilometres east of Atlin, in northern British Columbia. A major fault forms the west side of the graben, in a large intrusion of alaskitic quartz monzonite. Radioactive springs with high radon gas values(up to 82 856 picocuries per litre) and sediments and organic material with high uranium(up to 0.18 per cent) and thorium(up to 0.08 per cent) occur along the main fault line. The Atlin area showings include the Mir 3 or Radon Cirque, described in the vein section, and the Mir 7 or Delta Pool, described in this section.

PRAIRIE FLATS DEPOSIT

Alias:	Dale Meadows	Map Number:	17
Deposit type:	Surficial	Commodities:	U
MINFILE Number:	082ENW073	NTS:	082E12E
Lat.-Long.:	49 35' 30"-119 42' 20"	Elevation:	500 m

The area is underlain by Eocene clastic sediments, ash flows and alkaline lavas of the White Lake Formation and Marron Group. Prairie Flats is a postglacial fluviatile deposit where uranium occurs in a collector basin composed of organic-rich valley fill deposited by Prairie Creek. Upwelling of groundwater into organic-rich soils, topographic control and concentration of uranium by evaporitic discharge and ion adsorption-reduction are the principal depositional controls.

Uranium inventory to a depth of approximately 2 metres is about 178 tonnes of contained uranium. It is estimated, that since the glacial retreat, uranium has accumulated at a rate of about 23 kilograms per year (Levinson et al., 1984).

Reference numbers: 48, 56, 118.

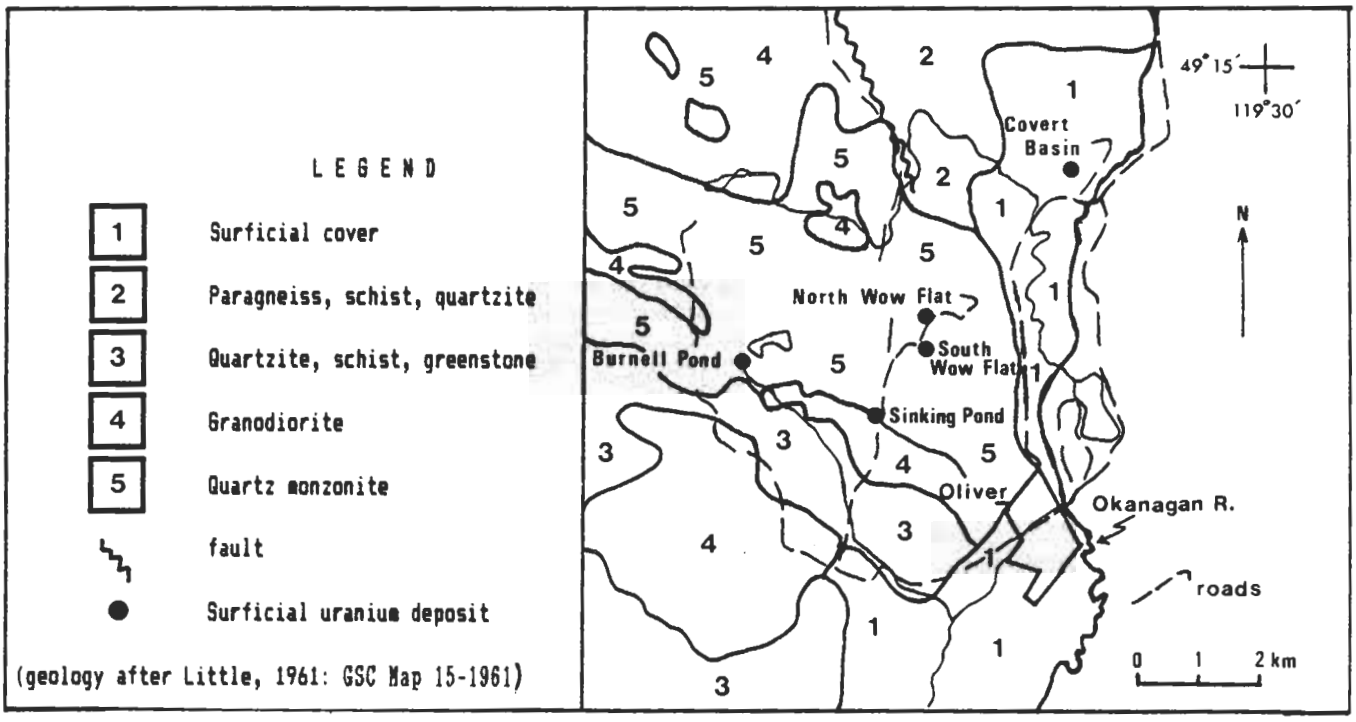


Figure 6: Surficial deposits near Oliver

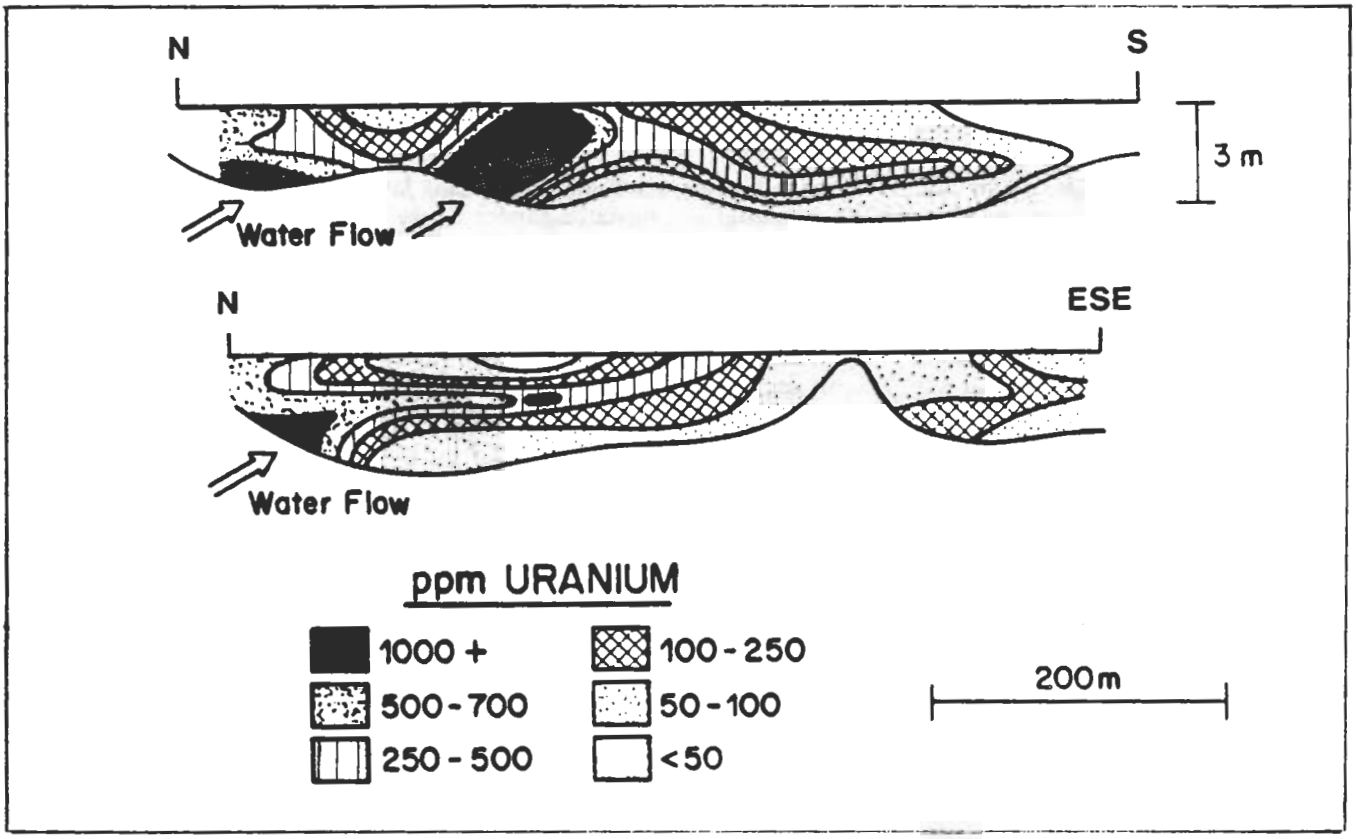


Figure 7: Covert Basin deposit; Cross-sections (from Levinson et al., 1984)

COVERT BASIN DEPOSIT

Alias:	Hunter	Map Number:	18
Deposit type:	Surficial	Commodities:	U
MINFILE Number:	082ESW164	NTS:	082E04E
Lat.-Long.:	49 14' 10"-119 32' 45"	Elevation:	320 m

The area is underlain principally by three distinct phases of medium-grained intrusive rocks of the Jurassic Oliver plutonic complex. These are, from oldest to youngest, biotite-hornblende quartz monzonite, porphyritic biotite quartz monzonite, and muscovite-garnet quartz monzonite Additional phases include diorite and fine-grained dikes and pods of quartz monzonite. Upper Proterozoic metamorphic rocks of the Shuswap metamorphic complex lie to the northeast (Figure 6).

The Covert Basin prospect is a fluviatile type of surficial uranium deposit. It occurs in an ancient meander(oxbow), which is now a valley margin-swamp, on the flood plain of the Okanagan River where it has eroded into a glacial terrace. Uraniferous groundwaters are infiltrating from side drainages into the porous terrace. Here the uranium is adsorbed and probably reduced in peat layers within sand and clays. The deposit contains about 23 tonnes of uranium (Levinson et al., 1984) (Figure 7).

The uranium-enriched area covers 72 000 square metres and a 1.6 metre thick layer averages 0.018 per cent uranium, with a 0.5 metre thickness assaying 0.05 percent uranium (Culbert, 1979b).

Reference numbers: 56, 118.

SINKING POND AND FLATS DEPOSITS

Alias:	SYN	Map Number:	19
Deposit type:	Surficial	Commodities:	U
MINFILE Number:	082ESW174	NTS:	082E04E
Lat.-Long.:	49 11' 50"-119 35' 20"	Elevation:	500 m

The bedrock geology is similar to the Covert Basin area. The Sinking Pond and Flats occurrences are postglacial, lacustrine-playa, closed-basin types of deposits. The Sinking Flats is about 250 metres long, 60 metres wide and averages 3 metres thick. It averages 0.028 per cent uranium and contains about 13 500 kilograms of uranium (Leighton, 1979b). The Sinking Pond, 500 metres to the south, measures 130 by 80 by 6 metres. It averages 0.017 per cent uranium and contains about 9500 kilograms of uranium (Leighton, 1979b). The underlying rocks are likely sources of labile uranium with possible contributions from mineralized fault zones.

Reference numbers: 56, 113.

NORTH WOW FLAT DEPOSIT

Alias:	RKL	Map Number:	20
Deposit type:	Surficial	Commodities:	U
MINFILE Number:	082ESW177	NTS:	082E04E
Lat.-Long.:	49 12' 45"-119 34' 30"	Elevation:	500 m

The bedrock geology is similar to the Covert Basin area. The Wow Lakes lie along a north-northeast trending linear which separates muscovite-garnet quartz monzonite to the east and porphyritic biotite quartz monzonite to the west.

The North Wow Flat is a postglacial, lacustrine-playa, closed-basin type of deposit which is forming within a few metres of the surface by enrichment of uranium (up to 0.02 per cent uranium) and other elements by evaporative pumping. The uranium is concentrated within grey and white clays, as a salt from oxidizing groundwaters in an arid environment. No uranium minerals have been recognized. The underlying rocks are sources of labile uranium with possible contributions from mineralized fault zones. The North Wow Flat deposit contains about 12 tonnes of uranium (Levinson et al., 1984).

Reference numbers: 18, 56, 112, 118.

THE STINKHOLE PROSPECT

Alias:	Faulder	Map Number:	21
Deposit type:	Surficial	Commodities:	U
MINFILE Number:	082ENW067	NTS:	082E12E
Lat.-Long.:	49 37' 50"-119 44' 20"	Elevation:	780 m

The area is underlain by granitic rocks of the Middle Jurassic Okanagan batholith. These vary from diorite to granodiorite, but are typically quartz diorite. The Stinkhole is a north-trending, postglacial, lacustrine-playa closed basin containing muds enriched in uranium. The deposit measures 500 by 100 metres and is up to 8 metres thick. An 8-metre auger sample assayed 0.022 per cent uranium and another 2-metre sample assayed 0.058 per cent uranium (Culbert and Leighton, 1977).

Reference numbers: 56, 58.

AGUR SHOWING

Alias:		Map Number:	22
Deposit type:	Surficial	Commodities:	U, Mo
MINFILE Number:	082ENW070	NTS:	082E12W
Lat.-Long.:	49 33' 45"-119 47' 30"	Elevation:	910 m

The area is underlain by homogeneous equigranular coarse-grained biotite hornblende granodiorite of the Okanagan batholith, which is cut by 3 to 12 metres wide fine-grained aplite dikes.

A postglacial lake soil sample assayed 0.152 per cent uranium (Culbert, 1978b). The uranium is not accompanied by abnormal amounts of thorium and, although the secondary uranium is far from being in equilibrium with its daughter products (19 per cent), the radium levels tend to be above those usually associated with uranium resulting from alkaline water transport of uranium alone. A large discrepancy between radium and lead-214 content suggests the sedimentary uranium is in an adsorbed or surficial form with a high radon escape ratio.

About 800 metres to the east, traces of molybdenite occur as fine blebs and streaks in an east trending aplite dike. It is associated with coarse-grained, quartz-rich laminae.

Reference numbers: 54, 56.

BALD SHOWING

Alias:		Map Number:	23
Deposit type:	Surficial	Commodities:	U
MINFILE Number:	082LSW082	NTS:	082L04E
Lat.-Long.:	50 03' 55"-119 31' 40"	Elevation:	950 m

The area is underlain by quartz monzonite, granodiorite, potassium feldspar porphyry and diorite of the Jurassic Nelson and Valhalla intrusions. These rock are unconformably overlain to the west by porphyritic andesite of the Eocene Kamloops Group.

A uraniferous bog overlies the quartz monzonite. A few pits were dug along a 600-metre, northerly trend to investigate the content of the bog and distribution of the uranium. Bog pit #3, dug to a 2-metre depth, contains homogenous black organic muck with cedar wood-fibre roots, underlain by sand, organic material and sticky clay. A 1.4-metre sample of the organic material assayed 0.035 per cent uranium; this includes a 0.3-metre sample running 0.125 per cent uranium (Robertson, 1979).

Reference numbers: 166.

MIR 7 SHOWING

Alias:	Delta Pool, Graben	Map Number:	24
Deposit type:	Surficial/Vein	Commodities:	U, Cu, Pb, Zn, Ag
MINFILE Number:	104N 112	NTS:	104N10W
Lat.-Long.:	59 38' 20"-132 49' 30"	Elevation:	1030 m

The area is underlain by alaskitic quartz monzonite of the Cretaceous to Tertiary Surprise Lake batholith, which is commonly cut by aplitic and pegmatitic phases. The 'Trout Lake graben' trends northerly across the area. The Graben area contains several radioactive springs and pools with high radon values. A sample from the Delta pool analysed 82 856 picocuries per litre radon gas. A nearby soil sample assayed 0.11 per cent uranium, 0.62 per cent copper, 0.54 per cent lead and 15.8 grams per tonne silver (Leighton and Culbert, 1978); (Figure 8).

A drill hole in the area encountered a 2-metre radioactive zone with sericite, chlorite, pyrite and chalcopyrite. A 60-centimetre sample assayed 0.008 per cent uranium and a 1-metre sample assayed 0.005 per cent uranium, 4.8 grams per tonne silver and 0.15 per cent copper (Kerr, 1978). Minor galena and sphalerite were also noted. Propylitic alteration of the quartz monzonite is recognized by the presence of montmorillonite, chlorite, sericite, quartz and stilbite.

Postmagmatic processes removed orthomagmatic uranium and concentrated it within altered zones in the intrusion. A leachable uranium component is evidenced by the high concentrations of uranium in stream water and sediments (Ballantyne and Littlejohn, 1982); (Figure 9).

Reference numbers: 15, 60, 102, 116, 178, 199.

PEGMATITIC OCCURRENCES

Pegmatites containing uranium and thorium occur mainly in the southern Omineca Belt around the fringes of the Shuswap metamorphic complex. These deposits are generally formed during high-grade metamorphism and are usually associated with anatectic silicate melts. The pegmatites occur in gneisses, schists, granites, granodiorites, quartz monzonites and syenites. Radioactive minerals include uraninite, uranothorite and uranium secondaries and the accessories monazite, allanite, sphene and ilmenite.

The Grand Forks - Nelson area contains the largest concentration of radioactive pegmatite occurrences in British Columbia. These include the SD 7, Try Again, Mota, Crystal and Crescent showings. Pegmatite showings in other areas include the Cran showings southeast of Revelstoke, the Bearcub showing east of Vernon, the Bow southeast of Golden, the Laura showing east of Manson River and a showing east of Stewart.

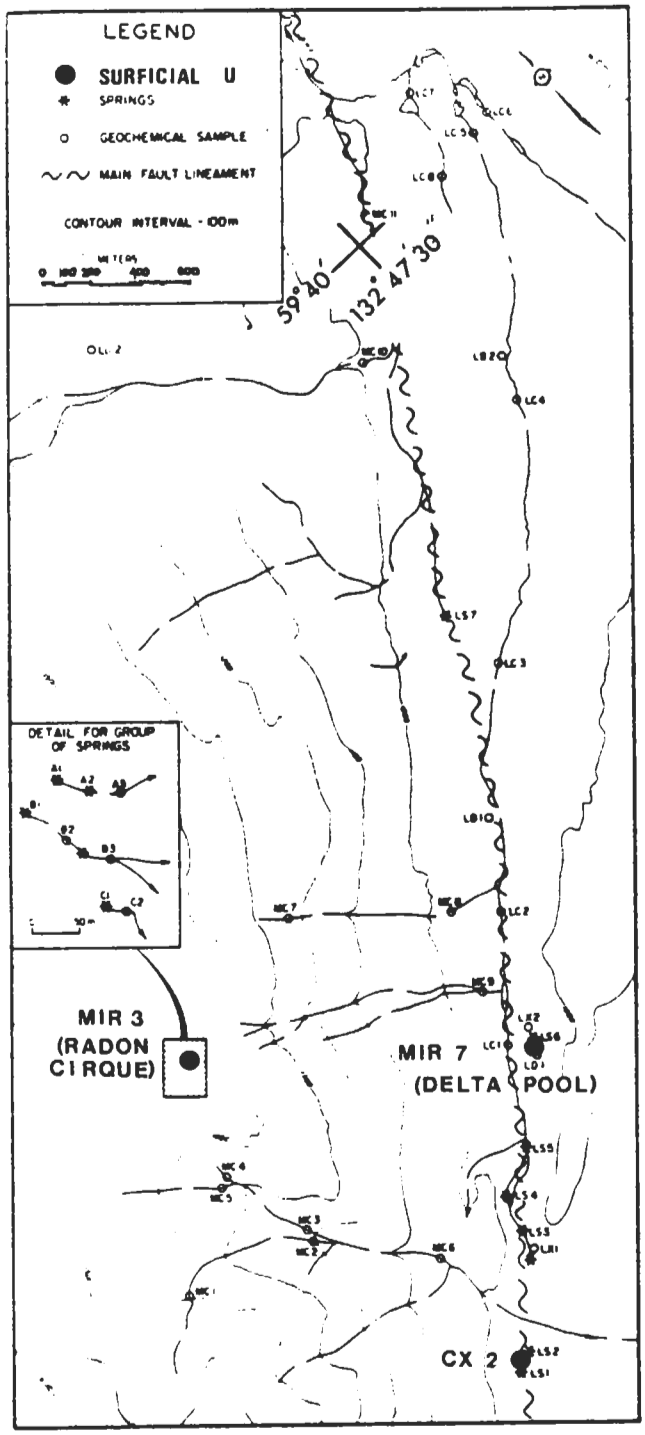
SD 7 SHOWING

Alias:	Radar	Map Number:	54
Deposit type:	Pegmatite	Commodities:	U
MINFILE Number:	082ESE142	NTS:	082E01W
Lat.-Long.:	49 07' 20"-118 23' 25"	Elevation:	1200 m

The area is underlain by the Upper Proterozoic Grand Forks Gneiss, a raised fault block of high-grade metamorphic rocks of the Shushwap metamorphic complex. The rocks consist of biotite, amphibole and pyroxene schists and gneisses, interlayered with pegmatite and leucogranite, with minor quartzites and calcareous rocks. They are cut by north-trending quartz monzonite stocks and dikes and small stocks of biotite hornblende diorite and quartz diorite with minor amphibolite and pyroxenite. Regional foliation of the gneisses strikes northwest and dips 20 to 50 southwest.

Principal hostrocks for the uranium mineralization are quartz-rich pegmatites, which are interlayered with the biotite gneisses and schists. Uraninite is associated with biotite clots in the pegmatite and biotite gneiss. Distribution of the uranium is erratic within the pegmatites, which seldom exceed 2.0 metres in thickness. The radioactive area measures about 40 by 40 metres. A grab sample assayed 0.44 per cent uranium (Kermeen, 1971) and a drill hole intersected 0.034 per cent uranium over 2.7 metres (Quadros, 1979).

Reference numbers: 92, 101, 126, 159.



Sample no.	Soil or sediment site description	Th (ppm)	U (ppm)	Ra-226 (ppm-equiv.)
A-1	Spring			
	Organic sediment	580	660	95
	Inorganic sediment	454	392	137
	Organic bank	426	727	195
	Aquatic moss	776	1220	381
A-2	Secondary spring	476	420	519
A-3	Aquatic moss	312	1722	309
B-1	Spring, sediment	272	210	303
	Bank sample	268	311	251
B-2	Organic sediment	244	115	203
	Inorganic sediment	113	134	107
	Bank sample	302	273	251
B-3	Inorganic sediment	156	151	208
	Bank sample	245	243	264
C-1	Spring, sediment	664	1215	336
	Bank sample	363	1265	301
C-2	Aquatic moss	812	1160	370
LC-1	Creek sediments	35	96	16
LC-2		72	165	27
LB-1	Creek bank	29	233	32
LC-3	Creek sediments	51	346	42
LC-4		74	335	47
LB-2	Creek bank	58	573	50
LC-5	Creek sediment	54	362	35
LC-6	Creek from east	84	506	67
LC-7		75	336	51
LC-8	Minor creek sed.	37	126	28
LD-1	Soil from draw	467	1320	380
LD-2	- Wet soil	393	997	198
LS-1	Springs on fault	114	1506	130
LS-2		163	1400	102
LS-3		125	668	62
LX-1	- Wet soil	28	1295	44
LS-4	Lake by springs	117	798	83
LS-5	Seepage area	136	1106	69
LS-6	Spring and pool	431	1800	120
LX-2	- Wet soil	128	738	97
LS-7	Spring and pool	84	674	147
MC-1	Mountainside creeks	140	114	60
MC-2		178	604	91
MC-3		163	692	75
MC-4		104	436	50
MC-5		99	445	26
MC-6		75	339	37
MC-7		107	216	71
MC-8		51	196	25
MC-9		135	260	42
MC-10	Major creek	38	43	26
MC-11		83	114	32

Figure 8: Surficial uranium in the Trout Lake graben, Atlin area (from Culbert and Leighton, 1981)

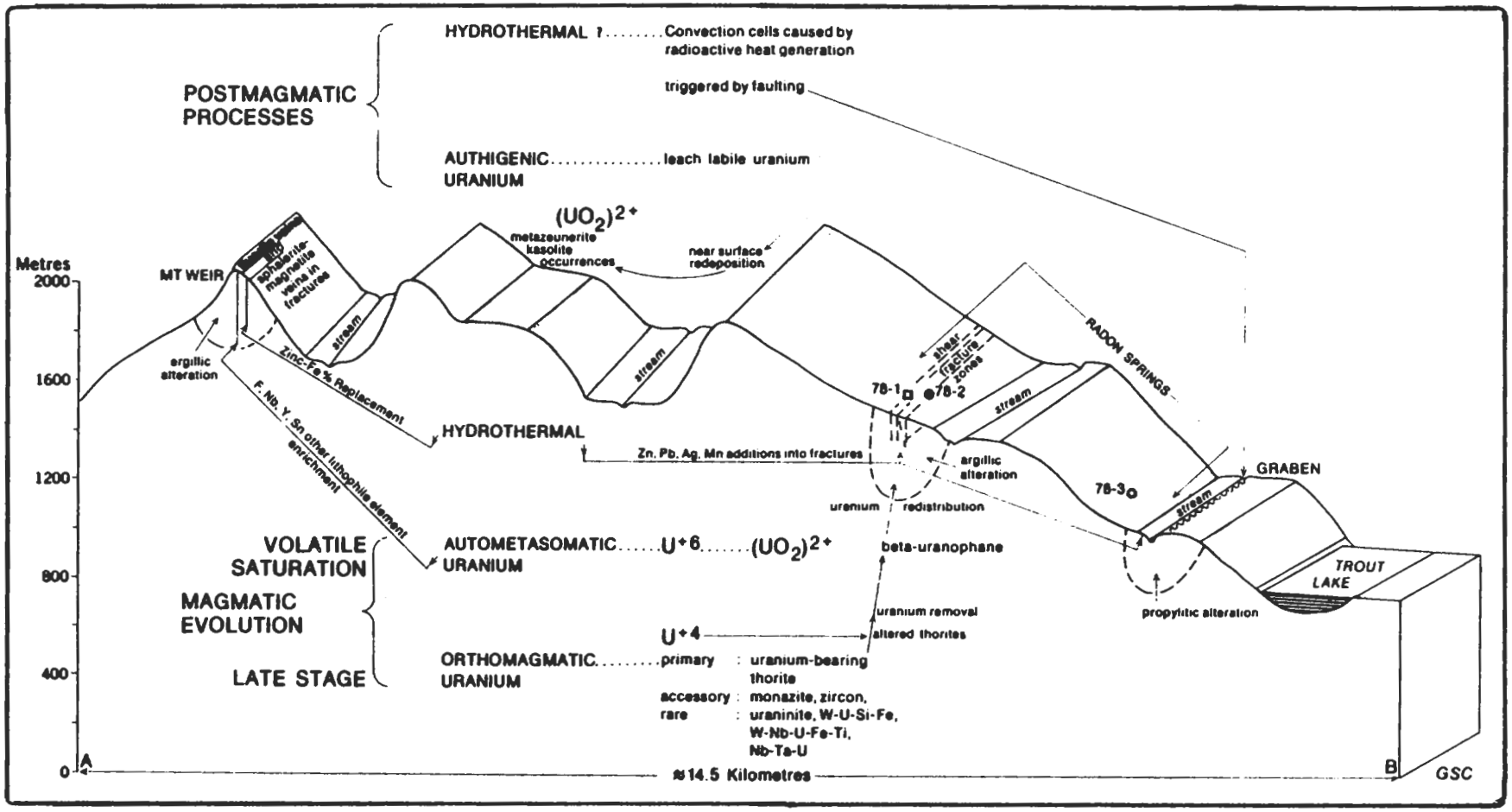


Figure 9: Genetic model of mineralization within the Surprise Lake batholith between Weir Mountain and Trout Lake, Atlin area (from Ballantyne and Littlejohn, 1982)

TRY AGAIN SHOWING

Alias:	Lemon Creek	Map Number:	55
Deposit type:	Pegmatite	Commodities:	U
MINFILE Number:	082FNW192	NTS:	082F11W
Lat.-Long.:	49 42' 00"-117 26' 00"	Elevation:	670 m

A quartz-pegmatite within granite of the Jurassic/Cretaceous Nelson intrusions contains disseminated allanite and possibly fergusonite. A selected sample assayed 0.043 per cent uranium (Peck, 1956b).

Reference numbers: 149.

MOTA SHOWING

Alias:	China Creek, U3, Genelle	Map Number:	56
Deposit type:	Pegmatite	Commodities:	U, Th
MINFILE Number:	082FSW212	NTS:	082F04E
Lat.-Long.:	49 14' 00"-117 42' 00"	Elevation:	756 m

Coarse-grained feldspar and quartz are the dominant minerals in layered, shallow-dipping pegmatoid horizons of the Castlegar gneiss complex, which may be a metamorphic equivalent of the Pennsylvanian Mount Roberts Formation. Euhedral and subhedral grains of pitchblende, up to 1 millimetre across, occur in the pegmatites. The best assay result was about 0.02 per cent uranium across a thickness of 45 centimetres. Several radioactive occurrences lie to the west of this showing.

Reference numbers: 73, 117, 172, 182.

CRESCENT SHOWING

Alias:	Lucky Boy	Map Number:	57
Deposit type:	Pegmatite	Commodities:	Nb, Ta, U, Th, Ti, Y
MINFILE Number:	082FSW272	NTS:	082F05E
Lat.-Long.:	49 27' 35"-117 35' 30"	Elevation:	780 m

Gneiss and augen gneiss of the Castlegar gneiss complex, of unknown age, are intruded by a Middle Eocene Coryell syenite stock. Greisen and pegmatite zones occur in a cupola of the syenite. Two of the larger quartzose pegmatite-greisen zones, 300 metres apart, measure 20 by 30 metres and 8 by 30 metres. They consist predominantly of coarse-grained feldspar with minor quartz and muscovite and contain niobium-tantalum oxide minerals. The black radioactive minerals are likely samarskite and ilmenorutile or niobium rutile, which occur as disseminations in reddish feldspar and in patches up to 5 centimetres across. A sample of samarskite assayed 5.8 per cent uranium, 2.5 per cent thorium, 25.7 per cent niobium and 9.8 per cent tantalum (Eastwood, 1957). A more recently collected grab sample assayed 1.25 per cent Nb_2O_5 and 0.14 per cent Ta_2O_5 (Graf, 1985).

The niobium-tantalum minerals are believed to have formed from magmatic fluid during a process of differentiation and concentration of metal-rich volatile phases in the roof of the intrusive body (Graf, 1985).

Reference numbers: 66, 79.

CRAN 2 SHOWING

Alias:		Map Number:	58
Deposit type:	Pegmatite	Commodities:	U
MINFILE Number:	082LNE033	NTS:	082L16E
Lat.-Long.:	50 46' 50"-118 02' 20"	Elevation:	790 m

Fine to medium-grained quartz-feldspar pegmatites are interlayered with biotite-quartz-feldspar gneiss of the Shuswap metamorphic complex. Foliation of the gneiss strikes 80 to 100 and dips 10 to 30 north. Some of the pegmatites crosscut the gneiss as dikes and sills, however, the largest pegmatites are conformable lenses with thicknesses to 5 metres and strike lengths to 70 metres.

Radioactivity is associated with the granitic pegmatites, with anomalous zones up to several metres long and a few centimetres wide. Mineralization consists of uraninite which is associated with a biotite clot in a pegmatite 8 centimetres wide . A sample across the 8 centimetres assayed 0.350 per cent uranium (Hughes and Walker, 1978).

Reference numbers: 94.

BEARCUB SHOWING

Alias:	Spar	Map Number:	59
Deposit type:	Pegmatite	Commodities:	Feldspar, U, Th, rare earths
MINFILE Number:	082LSE015	NTS:	082L02W
Lat.-Long.:	50 14' 46"-118 48' 33"	Elevation:	854 m

A 1.25 by 2.65 kilometre stock of pegmatite intrudes quartz-mica schist of the Monashee complex and is bounded on the south and west by Tertiary Kamloops Group volcanic rocks, and on the north and east by granitic rocks of the Shuswap metamorphic complex.

The principal pegmatite body outcrops in an area 1.5 kilometres by 0.75 kilometres. The pegmatite consists of feldspar, quartz, muscovite, biotite and garnet. Feldspar content varies inversely with quartz in distinct zones. A feldspar-rich core zone is flanked by feldspar-poor zones rich in quartz.

A trench 5.5 metres long exposed monazite erratically dispersed along a lens of fine-grained, granular, dark, smokey quartz 0.6 metre wide. A chip sample along the length of the trench gave the following chemical compositions: 0.069 per cent thorium oxide, 0.037 per cent uranium, 0.25 per cent yttrium, 0.03 per cent ytterbium, 0.044 per cent lanthanum, 0.07 per cent cerium, 0.046 per cent neodymium, 0.027 per cent erbium, 0.021 per cent gadolinium and 0.003 per cent thulium (McCammon, 1971). Grab samples returned values up to 0.20 per cent uranium and a 0.8-metre chip sample assayed 0.13 per cent uranium (Glass, 1971). The ratio of thorium to uranium ranged from 6:1 to 12:1. Fluorescent secondary uranium minerals occur within the radioactive zones.

Reference numbers: 76, 127.

BOW SHOWING

Alias:	Demon, Moose Creek	Map Number:	60
Deposit type:	Pegmatite	Commodities:	Ti, Th, Nb, rare earths, U, Fe
MINFILE Number:	082N 027	NTS:	082N01W
Lat.-Long.:	51 11' 40"-116 21' 00"	Elevation:	2380 m

Nepheline syenite of the Devonian Ice River complex intrude limestone, quartzite and shale of the Upper Cambrian Ottertail Formation. The intrusive rocks are mainly jacupirangite, which is a nepheline-bearing clinopyroxenite, with a rim of ijolite-urtite. Irregular pegmatitic dikes and lenses occur in all rocks. Pegmatite minerals include calcite, biotite, pyroxene, magnetite-ilmenite and schorlomite, with minor pyrite, pyrrhotite, nephelite and accessories.

Titanium-iron mineralization, mainly as sphene, occurs in quartzite, pegmatite and intrusive rocks. Assays range to 13.2 per cent TiO_2 and 20.6 per cent iron (Gallant, 1971). Knopite, a cerium-bearing perovskite, occurs in a pegmatite dike. Sodalite is present as veins in the intrusive. Analysis for niobium returned 0.67 per cent Cb_2O_5 (Gallant, 1971). Twelve hundred metres to the south of this sample is a radioactive northeast-trending shear zone with values to 0.019 per cent uranium. Other commodities include thorium (up to 0.077 per cent ThO_2 over 3 metres) and traces of rare earths, chiefly lanthanum and ytterbium (McCammon, 1955b).

Ilmenite and magnetite-bearing gravels and sands occupy the valley along Moose Creek. Samples from a 10 by 300 metre area returned assays up to 8.2 per cent TiO_2.

Reference numbers: 69, 71, 75, 124.

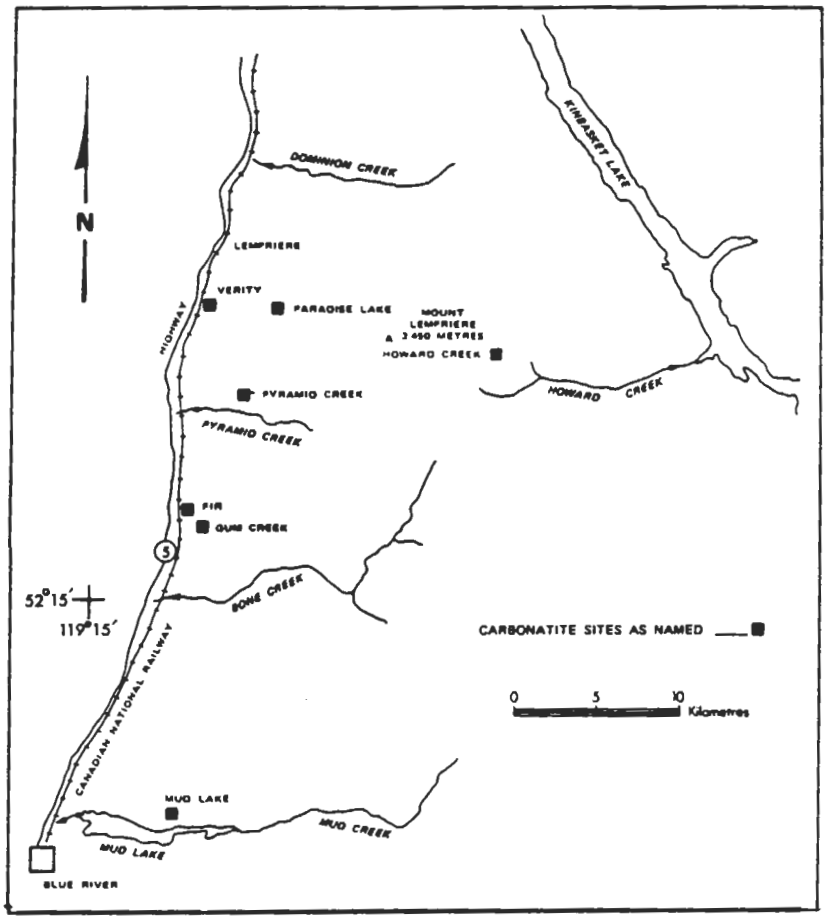


Figure 10: Blue River carbonatites (from White, 1985)

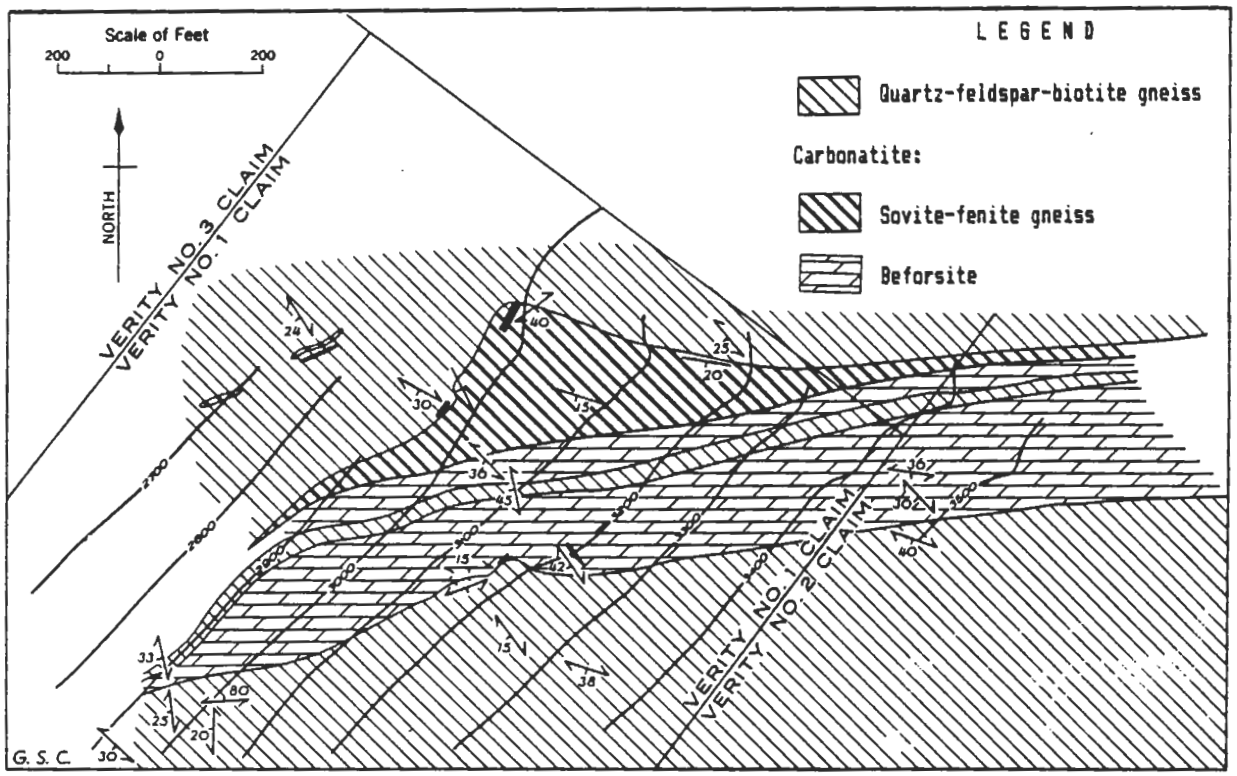


Figure 11: Geology of the Verity deposit (from Rowe, 1958 and Aaquist, 1982b)

LAURA SHOWING

Alias:	Laura No. 2	Map Number:	61
Deposit type:	Pegmatite	Commodities:	Th, rare earths
MINFILE Number:	093O 021	NTS:	093O12W
Lat.-Long.:	55 31' 19"-123 56' 21"	Elevation:	1585 m

Upper Proterozoic Ingenika Group rocks, consisting of siliciclastic sediments and minor carbonates are highly metamorphosed and subsequently intruded by granodioritic bodies and associated pegmatites which are possibly early Cretaceous. The metamorphic rocks (Wolverine complex) consist of amphibolite and calcsilicate gneiss, schists, micaceous quartzite and crystalline limestone. Metasomatism of the Wolverine amphibolite gneisses resulted in a secondary alkalic overprinting, possibly related to a deep-seated intrusion.

The Laura showing occurs within a 110 by 60 metre zone of alkalic alteration. Monzonite (Mount Bisson intrusions) outcrops to the south. Biotite amphibolite appears to be altered to banded aegirine-augite alkali-feldspar syenite. Within the alteration zone are various pegmatites containing allanite, nepheline, monazite, quartz, magnetite and feldspar. The allanite pegmatites are up to 30 metres long and 4 metres wide. A sample of allanite pegmatite assayed 0.11 per cent thorium, 2.24 per cent lanthanum, 2.53 per cent cerium, 0.13 per cent praseodymium, 0.58 per cent neodymium and 0.5 per cent samarium. (Halleran, 1988).

Reference numbers: 82, 83.

STEWART SHOWING

Alias:		Map Number:	62
Deposit type:	Pegmatite	Commodities:	U, Th
MINFILE Number:	104A 096	NTS:	104A04E
Lat.-Long.:	56 06' 00"-129 31' 00"	Elevation:	760 m

An early Tertiary quartz monzonite pluton cuts Jurassic to Cretaceous Hazelton Group sediments. The pluton contains radioactive coarse quartz-feldspar-muscovite-biotite pegmatite phases, with pyrite, uraninite and cyrtolite. A selected sample assayed 0.1 per cent uranium and 0.02 per cent thorium (Bell and Jones, 1979).

Reference numbers: 23.

CARBONATITES

Carbonatites are ultramafic igneous rocks composed of more than 50 per cent carbonate minerals. In British Columbia they occur in a broad belt along the Rocky Mountain Trench. Two localities containing significant radioactivity include the Verity prospect, north of Blue River and the Lonnie prospect, near Manson Creek. On the Verity prospect, carbonatite layers were intruded into sediments as sill-like bodies prior to deformation and metamorphism to upper amphibolite grade (Figures 10 and 11). Carbonatite on the Lonnie prospect occurs with syenite and monzonite within metasediments (Figure 12). Minerals include pyrochlore and columbite with values in niobium, tantalum, rare earths, uranium and thorium.

VERITY PROSPECT

Alias:	Lempriere	Map Number:	92
Deposit type:	Carbonatite	Commodities:	Nb, Ta, U, rare earths
MINFILE Number:	083D 005	NTS:	083D06E
Lat.-Long.:	52 23' 55"-119 09' 25"	Elevation:	870 m

Carbonatite, consisting of beforsite and sovite, occurs as sills within quartz-hornblende-mica schist of the semipelite-amphibolite division of the Hadrynian Horsethief Creek Group. The beforsite and sovite-fenite gneiss are generally separate units, but they locally intrude each other (Figure 11). A tectonic breccia, showing hairline fractures, is common in the beforsite. A banded texture caused by layering of the accessory minerals apatite, amphibole, olivine, magnetite, vermiculite, biotite, pyrite, pyrrhotite, pyrochlore, columbite and zircon, is common in the sovite unit and less developed in the beforsite unit.

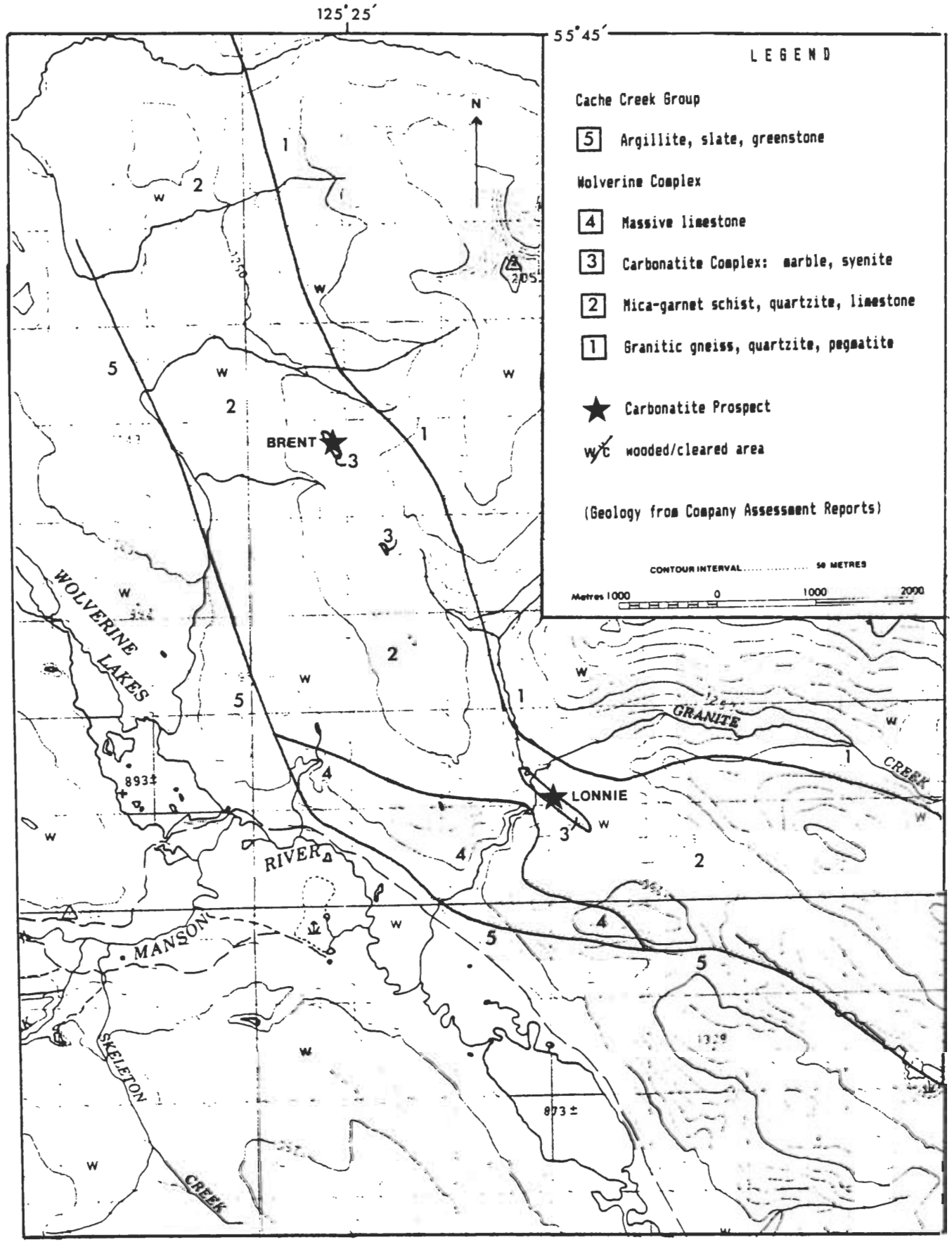


Figure 12: Geology of Lonnie Carbonatite area

The pyrochlore and columbite crystals occur as octahedrons up to 3 centimetres in diameter. The major elements in pyrochlore are sodium, tantalum, niobium, calcium and locally minor uranium. The major elements in columbite are niobium and iron. A 1.1-metre sample, taken in 1952, assayed 0.6 per cent Nb_2O_5, 0.095 per cent uranium and 4.85 P_2O_5 (McCammon, 1953). The beforsite on the Verity claim is the best mineralized unit, itself being mineralogically stratified. The Verity carbonatite is up to 30 metres thick and can be traced from the Specimen pit up the hillside for 800 metres to the east-northeast. It likely continues to the Paradise carbonatite (083D006), 4500 metres to the east-northeast.

The Verity carbonatite has indicated reserves of 2 million tonnes of 0.118 per cent Nb_2O_5 and 0.020 per cent Ta_2O_5 (Aaquist, 1982a). Rare earths occur in the carbonatite as indicated by assays of a sample with the following values: 0.165 per cent cerium, 0.10 per cent neodymium, 0.065 per cent lanthanum and 0.022 per cent uranium.

Reference numbers: 1, 2, 5, 122, 137, 150, 151, 168, 202.

LONNIE PROSPECT

Alias:	Granite Creek	Map Number:	93
Deposit type:	Carbonatite	Commodities:	Nb, zircon, Ti, U Th
MINFILE Number:	093N 012	NTS:	093N09W
Lat.-Long.:	55 40' 47"-124 22' 54"	Elevation:	1140 m

A conformable medium-grained carbonatite complex intrudes metasediments of the Upper Proterozoic Wolverine complex (Ingenika Group). The metasediments include quartz-hornblende gneiss, quartzite and garnet-biotite-muscovite schist (Figure 12). Both the carbonatite complex and the country rocks have been metamorphosed to amphibolite grade. The northern contact of the complex is mylonitized.

The Lonnie carbonatite complex consists of discontinuous lenses of syenite, monzonite and sovite. The syenite, composed of oligoclase, microcline and up to 25 per cent calcite, contains the accessory minerals muscovite, zircon, ilmenorutile and columbite ($(Fe,Mn)(Nb,Ta)_2O_6$). Two varieties of carbonatite are present. The aegirine sovite contains calcite, microcline, perthite and aegirine and the accessory minerals apatite and uranium-bearing pyrochlore ($(Ca,Na,Y;Ce,Th,U,Ti)\ (Nb,Ta)_2O_6(O,F,OH)$). The biotite sovite contains calcite, biotite and accessory plagioclase, microcline, apatite, zircon, columbite, ilmenorutile and ilmenite. Pods of fenitized country rock occur within the complex and the country rock is typically fenitized for tens of metres away from the contacts.

The carbonatite zone measures 500 by 50 metres, along a 120 strike and 60 southwest dip. Surface sampling indicates a grade of 0.21 per cent Nb_2O_5 for 500 metres and diamond drilling indicates similar grades for Nb_2O_5 and zirconium values of 0.45 per cent (Taylor, 1982). Uranium assays are low. A recent spectrometer survey of the area revealed thorium as the radioactive element (F. Ferri, 1990, pers. comm.).

Reference numbers: 81, 88, 146, 150, 151, 192.

PLACER DEPOSITS

The largest radioactive placer deposits in British Columbia occur southeast of Golden, along Malloy, Vowell, Bugaboo and Forster creeks (Figure 13). The Cretaceous Bugaboo and Horsethief batholiths intrude Hadrynian Windermere sediments of the Horsethief Creek Group and Helikian Purcell sediments, respectively. The east part of the Bugaboo intrusion consists of medium-grained leucocratic-quartz monzonite to coarse-grained biotite quartz monzonite. The Horsethief intrusion is zoned from fine-grained/medium-grained granodiorite to coarse-grained quartz monzonite.

Black-sand placer concentrations containing thorium, uranium and niobium-bearing minerals occur in the outwash gravels from glacier action on the batholiths. Minerals include uraninite, allanite, rutile, titano-columbite, euxenite-polycrase, pyrochlore, monazite, uranothorite, magnetite, ilmenite, apatite, andalusite, zircon, epidote, fluorite, garnet, hematite, pyrite, lepidocrocite, sphene, cassiterite and molybdenite.

The only uranium and thorium known to be exported from British Columbia was from placers on Malloy and Vowell creeks.

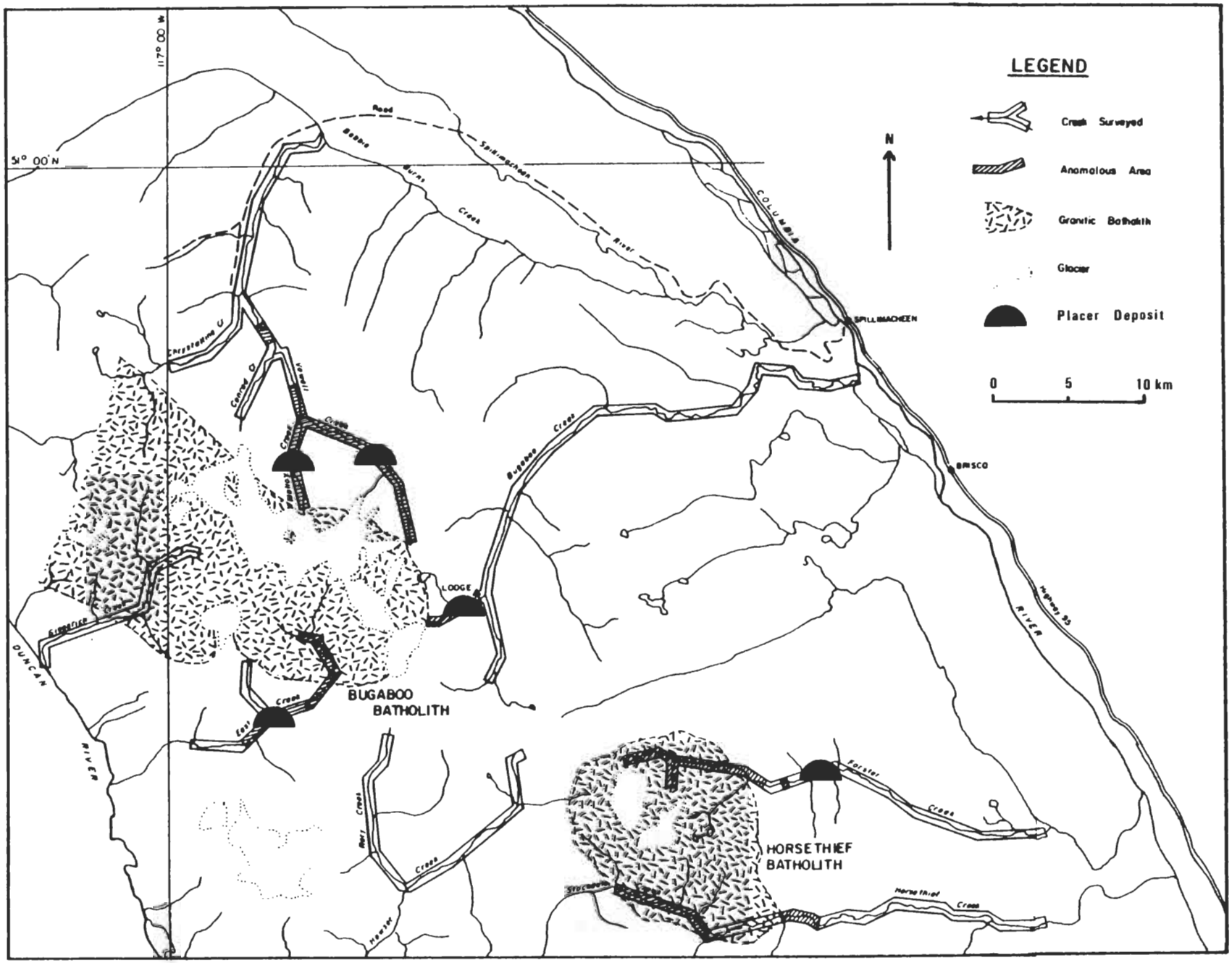


Figure 13: Placer deposits in the Bugaboo area (from Saunders, 1974)

MALLOY CREEK PROSPECT

Alias:		Map Number:	99
Deposit type:	Placer	Commodities:	U, Nb, Th, rare earths
MINFILE Number:	082KNE008	NTS:	082K15W
Lat.-Long.:	50 52' 20"-116 52' 50"	Elevation:	1550 m

The Malloy Creek deposit is about 2500 metres long and 300 metres average width. In 1969, J.M. Black calculated reserves of 9 330 000 cubic metres of gravel grading 19.6 grams per cubic metre uranium, 97.85 grams per cubic metre Nb_2O_5, 68.8 grams per cubic metre thorium oxide, 8 kilograms per cubic metre magnetite and 0.59 kilograms per cubic metre ilmenite (Saunders, 1974). A 1.2-metre sample assayed 0.1 per cent uranium, 0.47 per cent titanium, 0.34 per cent zirconium, 0.19 per cent thorium, 0.035 per cent vanadium, 0.13 per cent columbium, 0.025 per cent cerium and 0.038 yttrium.

Reference numbers: 109, 168, 175.

VOWELL CREEK PROSPECT

Alias:		Map Number:	100
Deposit type:	Placer	Commodities:	U, Nb, Th, rare earths
MINFILE Number:	082KNE007	NTS:	082K15W
Lat.-Long.:	50 50' 00"-116 48' 00"	Elevation:	1630 m

The Vowell Creek deposit is about 720 metres long and averages 250 metres wide. In 1969, J.M. Black calculated reserves of 9 748 000 cubic metres grading 19.1 grams per cubic metre uranium, 148.25 grams per cubic metre Nb_2O_5(columbium pentoxide), 33.2 grams per cubic metre thorium oxide, 5.93 kilograms per cubic metre magnetite and 1.78 kilograms per cubic metre ilmenite (Saunders, 1974). Work in 1979 increased calculated reserves to 15 292 000 cubic metres of placer gravels grading 18.1 grams per cubic metre uranium and 196.28 grams per cubic metre Nb_2O_5 (Northern Miner, October 25, 1979). Manganese was also reported to occur.

Reference numbers: 95, 109, 168, 175.

UPPER BUGABOO PROSPECT

Alias:	Bugaboo	Map Number:	101
Deposit type:	Placer	Commodities:	U, Nb, Th, rare earths
MINFILE Number:	082KNE023	NTS:	082K10E
Lat.-Long.:	50 44' 50"-116 43' 00"	Elevation:	1490 m

The Upper Bugaboo placer deposit measures 1170 by 170 by 5 metres and contains approximately 1,000,000 cubic metres of gravel. A sample assayed 0.18 per cent uranium (Lang, 1952). In 1955, 11,309 kilograms of concentrate were produced from 5520 cubic metres of gravel (Merrett, 1957).

Reference numbers: 108, 109, 136, 163, 168.

FORSTER SHOWING

Alias:		Map Number:	102
Deposit type:	Placer	Commodities:	U, Nb, rare earths, Th
MINFILE Number:	082KNE005	NTS:	082K09E
Lat.-Long.:	50 39' 00"-116 23' 30"	Elevation:	1420 m

Placer concentrations occur intermittently along Forster Creek and its tributaries for 12 kilometres. A heavy mineral fraction from the upper part of the creek assayed 0.11 per cent uranium.

Reference numbers: 109, 163, 168.

VEIN OCCURRENCES

Veins are the most common and varied type of radioactive occurrence in British Columbia. They have predominant structural control, often occupying faults, fractures and shears in a variety of hostrocks. Mineralogy and chemistry of the veins may be simple, with uranium predominantly as uraninite and secondaries, or complex, with minerals such as zeunerite, kasolite and sulphides.

In the Atlin area, quartz monzonite and alaskite of the Surprise Lake batholith contain radioactivity associated with mineralized shear zones. The uranium minerals zeunerite, kasolite and autunite occur with copper, silver, tungsten, lead and zinc minerals. Examples of showings with this complex mineralogy are Purple Rose, Fisher, Dixie, Cy 4, Mir 3 and IRA, which lie east of Atlin, and Net 3, which lies west of Bennet Lake. The Mir 3 showing is in the area of several radioactive springs (Figure 9) and the Net 3 showing is also near a radioactive spring with high silver and uranium organic-sediment values.

In the Rocher Déboulé area near Hazelton, uraninite, associated with gold, silver, cobalt-nickel sulpharsenides, molybdenum and tungsten. occurs in vein-shears within granodiorite of the Rocher Déboulé stock. These past-producers of gold, silver, copper and tungsten include the Red Rose, Victoria and Rocher Déboulé prospects.

The Little Gem, located near Gold Bridge, is a uranium-gold-cobalt vein in a shear zone within granodiorite. The Nithi Mountain showing, located near Fraser Lake, contains the uranium minerals, autunite, torbernite and sabugalite, which occur in fractures along a rhyolite porphyry dike within quartz monzonite. The Novelty, located in the Rossland area, is a gold-molybdenite-cobalt occurrence with minor uraninite, occurring in fractures within hornfels breccia of the Rossland Group.

A variety of plutonics, volcanics and sediments are host to other vein showings. Examples of these include Smoke, Rosyd, Radium, Stan, Contact Lake and Riddle Creek.

PURPLE ROSE SHOWING

Alias:	Cracker Creek	Map Number:	110
Deposit type:	Vein	Commodities:	U, Cu, Ag, Th, fluorite
MINFILE Number:	104N 005	NTS:	104N11W
Lat.-Long.:	59 43' 20"-133 18' 55"	Elevation:	1820 m

Quartz monzonite and alaskite of the Cretaceous to Tertiary Surprise Lake batholith intrude the Permian Cache Creek Group comprising argillite, quartzite and limestone and the Atlin intrusions consisting of basic rocks, enclosed in ultramafic masses of serpentinized peridotite.

A northwest-trending shear zone within the alaskite, near its contact with the sediments, contains intermittent mineralization along a possible 500 metre length. Minerals include zeunerite, autunite, arsenopyrite, tetrahedrite, pyrite, galena and minor fluorite. A sample of kaolinized alaskite from the original trench assayed 0.075 per cent uranium and 0.011 per cent thorium oxide and two samples from the west part of the shear assayed 1.06 per cent copper, and 0.050 per cent uranium and 0.042 per cent thorium oxide, respectively (Holland, 1956d). A magnetite-grossular skarn, one metre wide with azurite, malachite and possible scheelite, occurs near the shear zone.

Reference numbers: 26, 45, 90.

FISHER SHOWING

Alias:		Map Number:	111
Deposit type:	Vein	Commodities:	U, Cu, W
MINFILE Number:	104N 084	NTS:	104N11W
Lat.-Long.:	59 42' 30"-133 26' 20"	Elevation:	1890 m

Quartz monzonite and alaskite of the Cretaceous to Tertiary Surprise Lake batholith intrude the Permian Cache Creek Group comprising argillite, quartzite and limestone and the Atlin intrusions consisting of basic rocks enclosed in ultramafic masses of serpentinized peridote. Granitic rocks of the Coast intrusions lie to the northeast.

Two northeast-striking mineralized shear zones cut the kaolinized alaskite. Minerals include arsenopyrite, wolframite, pyrite, tetrahedrite and zeunerite. A selected sample assayed 0.064 per cent uranium and 0.66 per cent copper (Holland, 1956b).

Reference numbers: 90.

DIXIE SHOWING

Alias:	Mont	Map Number:	112
Deposit type:	Vein	Commodities:	U, Cu, fluorine
MINFILE Number:	104N 086	NTS:	104N11E
Lat.-Long.:	59 36' 05"-133 11' 15"	Elevation:	1800 m

Alaskite and quartz monzonite of the Cretaceous to Tertiary Surprise Lake batholith intrudes Permian Cache Creek Group sediments consisting of argillite, limestone and chert. Near the contact the alaskites are sheared and altered to albite, clay and sericite. The sample of altered alaskite, containing up to 15 per cent topaz, assayed nearly 2 per cent fluorine; however no fluorite was noted in thin section (Bilquist and Culbert, 1977a).

A radioactive zone 30 metres wide in the alaskite contains vugs and fractures with zeunerite, arsenopyrite and minor chalcopyrite (Figure 14). A grab sample assayed 0.105 per cent uranium, 0.76 per cent arsenic and 0.03 per cent copper (Bilquist and Culbert, 1977a).

Reference numbers: 25.

CY 4 SHOWING

Alias:	Weir Mt., WHI	Map Number:	113
Deposit type:	Vein	Commodities:	U, Zn, Pb
MINFILE Number:	104N 087	NTS:	104N10W
Lat.-Long.:	59 39' 45"-132 59' 20"	Elevation:	1860 m

Mount Weir lies within the Surprise Lake batholith, a lobe of the Coast plutonic complex. The batholith consists of several phases of alaskite, quartz monzonite and granite. (See Figure 9).

In Zone A, tension fractures filled with smoky quartz veins carrying galena, sphalerite, magnetite, fluorite and hematite occur in coarse-grained alaskite. A grab sample from a quartz vein 20 centimetres wide and 40 centimetres long assayed 0.15 per cent uranium, 0.11 per cent lead and 4.0 per cent zinc (Morra, 1978).

In Zone C, about 300 metres to the south, a yellow-orange coloured zone of supergene alteration, exposed over an area 10 by 40 metres, contains kasolite, wulfenite, metazeunerite and vandendriesscheite. The mineralization likely leached from the strongly fractured alaskite (see Figure 9).

Reference numbers: 15, 24, 139, 178, 198.

MIR 3 SHOWING

Alias:	Radon Cirque	Map Number:	114
Deposit type:	Vein/Surficial	Commodities:	Ag, Pb, Zn, U, Th
MINFILE Number:	104N 113	NTS:	104N10W
Lat.-Long.:	59 39' 00"-132 50' 00"	Elevation:	1470 m

The area is underlain by alaskitic quartz monzonite of the Cretaceous to Tertiary Surprise Lake batholith. The rocks are commonly interlayered with aplitic and pegmatitic phases. To the east, the 'Trout Lake graben', a northerly trending feature, brings roof rocks to the valley bottom. Argillic alteration of the quartz monzonite is associated with fractures; minerals include kaolinite, sericite, montmorillonite and quartz.

A test pit in the Radon Cirque area uncovered galena, sphalerite and minor chalcopyrite in veins within alaskite. Associated with the altered area are magnetite, hematite, pyrargyrite, fluorite and secondary manganese and uranium minerals. Beta-uranophane occurs as bright yellow prismatic crystals on fracture planes, interstitially to quartz grains and feldspar, in small maiarolitic cavities and within argillized feldspars.

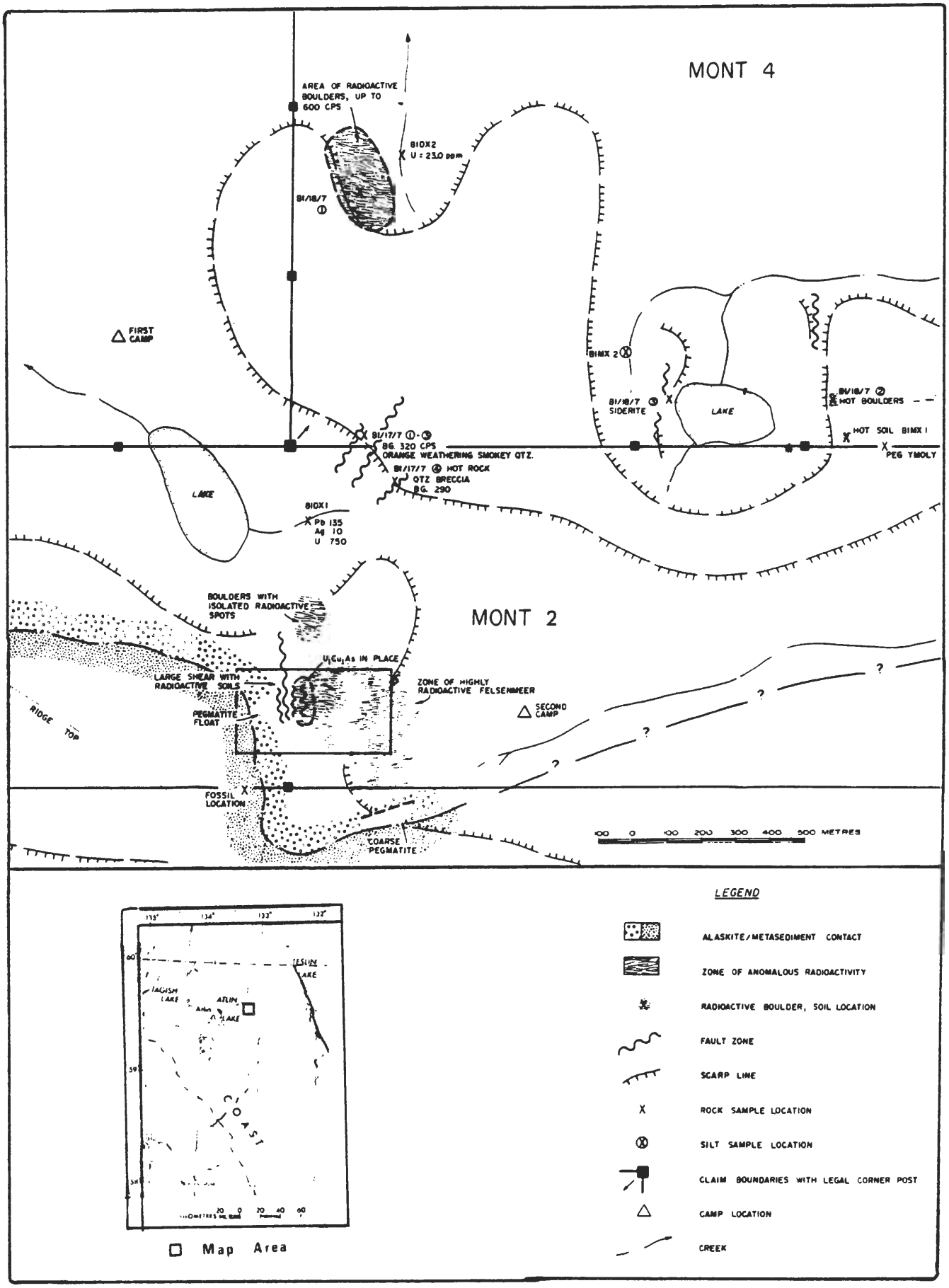


Figure 14: Geological setting of the Dixie vein occurrence (from Bilquist and Culbert, 1977a)

Analyses of thorites from different parts of the intrusion suggest that uranium leached from this mineral was probably the main source of uranium for the autometasomatic beta-uranophane (Ballantyne and Littlejohn, 1982).

A grab sample from the trench assayed 12.3 per cent lead, 3.1 per cent zinc, 531.4 grams per tonne silver and 0.055 per cent uranium (Leighton and Culbert, 1978). Subsequent drilling intersected 0.016 per cent uranium over 1.2 metres (Kerr, 1978); (see also Figure 9).

Several springs in the area are high in radon. One sample measured 64 189 picocuries per litre radon. Soil samples in the area assayed up to 0.12 per cent uranium and aquatic moss samples assayed up to 0.17 per cent uranium and 0.08 per cent thorium (Culbert and Leighton, 1981).

Reference numbers: 15, 60, 102, 116, 178.

IRA SHOWING

Alias:		Map Number:	115
Deposit type:	Vein	Commodities:	U
MINFILE Number:	104N 110	NTS:	104N14W
Lat.-Long.:	59 47' 30"-133 15' 20"	Elevation:	1480 m

The area is underlain by alaskite of the Cretaceous to Tertiary Surprise Lake batholith, cut by a few late porphyry and basaltic dikes. Weak to strong gossans are present locally. Structurally controlled mineralization, consisting of uranium, fluorite and sulphide minerals, is associated with a gossan within the alaskite. Rock samples from test pits returned assays up to 0.04 per cent uranium (Leighton and Culbert, 1977).

Reference numbers: 115.

NET 3 SHOWING

Alias:	AG Gully	Map Number:	116
Deposit type:	Vein/Surficial	Commodities:	Ag, U, Th, Mo, W
MINFILE Number:	104M 059	NTS:	104M15W
Lat.-Long.:	59 55' 00"-134 58' 40"	Elevation:	1370 m

The area is underlain by garnet biotite quartz monzonite and porphyritic biotite quartz monzonite of the Coast plutonic complex.

A radioactive zone is associated with an oxidized fracture zone 1 to 2 metres wide and 6 metres long within biotite-muscovite-garnet quartz monzonite, near its contact with the porphyritic pluton. The rock is strongly altered to a soft, readily decomposed mixture of saussurite and manganese oxide. A sample of the zone assayed 65 grams per tonne silver (Culbert, 1979a).

Fifty metres to the south, organic sediment associated with a uranium-rich spring contains strongly anomalous silver and uranium. Assays were up to 0.46 per cent uranium and 243 grams per tonne silver (Culbert, 1979a). A heavy mineral sample taken lower in elevation contained visible silver, molybdenite and scheelite grains in the heavy nonmagnetic fraction. This fraction contained 0.25 per cent uranium and 0.17 per cent thorium (Culbert, 1979a).

Reference numbers: 55.

VICTORIA DEPOSIT

Alias:	Hazelton View	Map Number:	117
Deposit type:	Vein	Commodities:	Au, Co, U, Mo, Cu
MINFILE Number:	093M 072	NTS:	093M04E
Lat.-Long.:	55 10' 20"-127 39' 00"	Elevation:	1680 m

Hornfelsic greywackes and siltstones of the Upper Jurassic Bowser Lake Group are intruded by the Late Cretaceous Rocher Déboulé porphyritic granodiorite stock of the Bulkley plutonic suite. The stock is cut by vein-dike systems which follow east-trending shears (Figure 15).

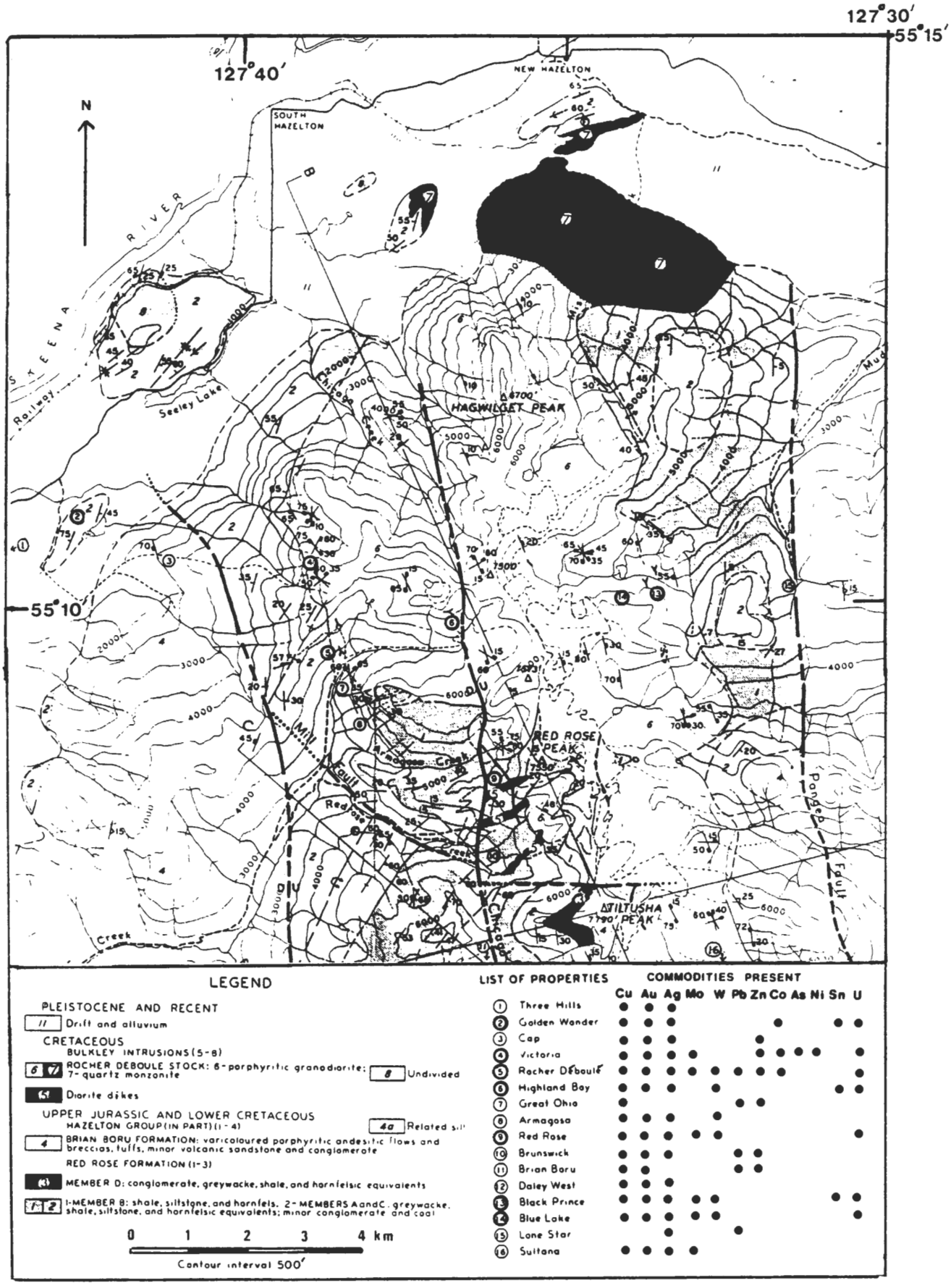


Figure 15: Geology of the Rocher Déboulé area (from Sutherland Brown, 1960)

The Victoria deposit consists of three parallel shear veins , 200 to 300 metres apart, which strike 085 and dip 60 north, and a small cross-vein which strikes north and dips 50 east.

The No. 1 vein follows a dark grey, fine-grained diorite dike that averages 0.5 metre wide, is up to 450 metres along strike and extends to at least 300 metres vertical depth. It is open to the east and at depth. The No. 2 vein follows a feldspar porphyry dike that is 10 metres wide and up to 800 metres long. The No. 3 vein is at least 720 metres long and is intersected by a cross-vein containing galena, sphalerite, tetrahedrite, arsenopyrite, safflorite and pyrite. The vein material consists of an assemblage of gold-bearing cobalt-nickel sulpharsenides with minor molybdenite in a gangue of actinolite with glassy quartz and feldspar. Additional minerals include uraninite, apatite, sphene, allanite, erythrite, cobaltite and possibly autunite.

A 10-centimetre sample taken in 1940 assayed 270 grams per tonne gold, 37.7 grams per tonne silver, 5.9 per cent cobalt, 0.81 per cent molybdenum, 2.8 per cent nickel and 0.64 per cent equivalent uranium (Sutherland Brown, 1955). Samples taken in 1950 on the No. 1 and No. 2 veins assayed 47.3 grams per tonne gold, 0.90 per cent cobalt and 0.16 per cent equivalent uranium across 0.85 metre, and 143.3 grams per tonne gold, 2.05 per cent cobalt and 0.59 per cent equivalent uranium from a veinlet sample (Lang, 1952). A 1983 sample on the No. 2 vein assayed 23.32 grams per tonne gold and 62.8 grams per tonne arsenic over 0.5 metre. Block sampling of the No. 1 vein in 1980 indicated reserves of 2045 tonnes grading 25.3 grams per tonne gold, 0.584 per cent cobalt and 0.058 per cent molybdenum.

Reference numbers: 27, 105, 107, 185, 187, 188, 189.

Red Rose Deposit

Alias:		Map Number:	118
Deposit type:	Vein	Commodities:	W, Cu, Mo, Au, Ag, U
MINFILE Number:	093M 067	NTS:	093M04E
Lat.-Long.:	55 08' 20"-127 36' 00"	Elevation:	1800 m

Siltstone and argillite of the Upper Jurassic Bowser Lake Group are intruded by the Late Cretaceous Rocher Déboulé granodiorite stock of the Bulkley plutonic suite. The sediments are hornfelsed by the stock and are intruded by northeast-trending diorite dikes which are older than the stock (Figure 15). Bedding in the sediments strikes 015 and dips 30 to 50 west. The west-dipping Chicago Creek normal fault cuts all rocks and has a dip-slip of 600 to 900 metres.

The shear occupied by the Red Rose vein is a weak fault striking 145 and dipping 65 west, mainly in a diorite dike. The vein measures 1.2 to 2.8 metres wide, 60 to 120 metres along strike, and at least 335 metres down dip. It is pegmatitic and contains mainly quartz with lesser amounts of feldspar, biotite, hornblende, ankerite, tourmaline, apatite, scheelite, ferberite, chalcopyrite, pyrrhotite, molybdenite and uraninite. Extensive lenses of chalcopyrite occur in the hangingwall shear. The largest concentrations of radioactive material are erratically distributed with molybdenite in the wallrock.

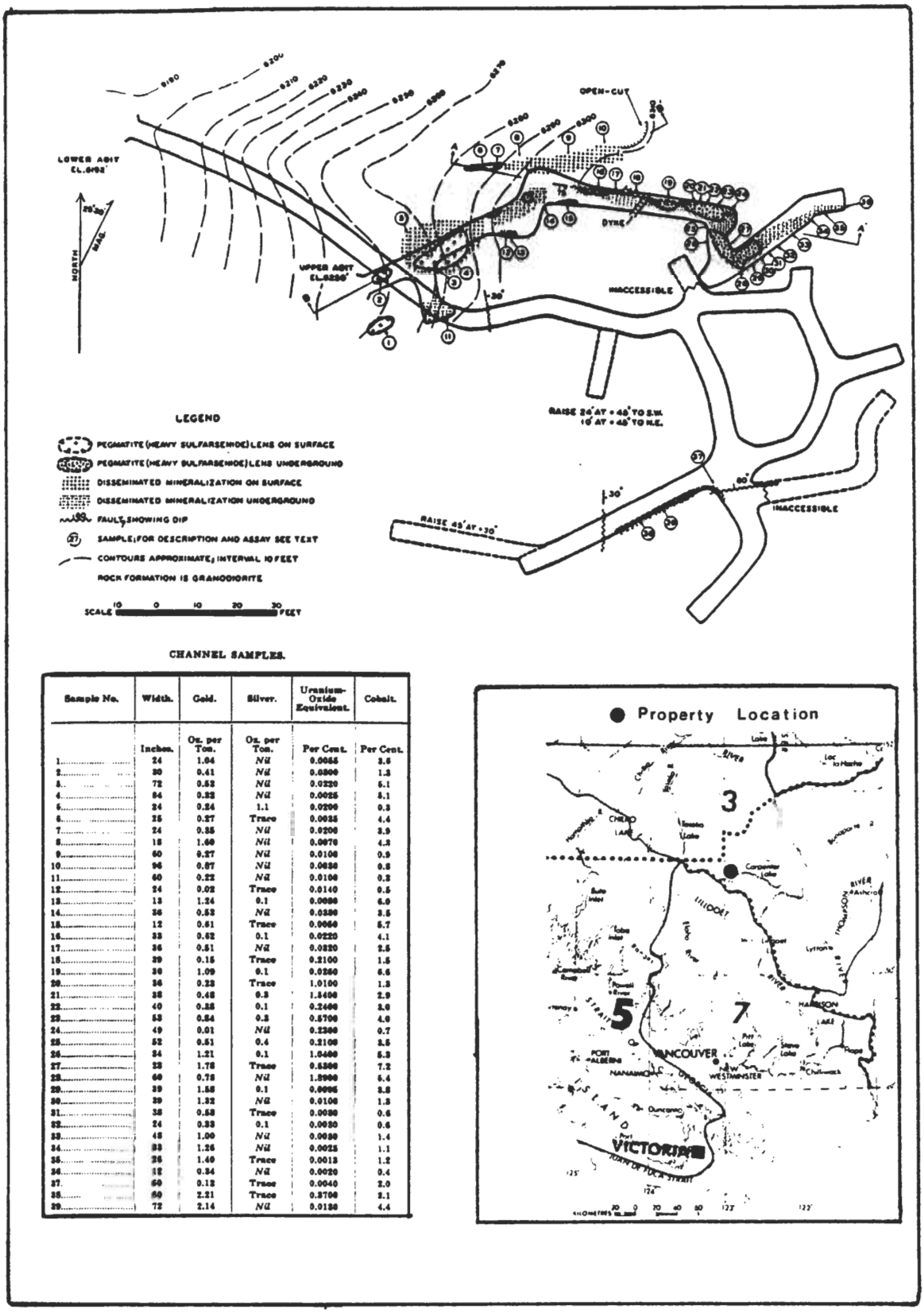
The vein has been mined above the 1100 level. Little is known below this level. There is probably 13 600 tonnes of ore of average grade above the 1100 level (Sutherland Brown, 1955). Grades are estimated at 1.5 per cent WO_3 and 0.3 per cent copper. A 75-centimetre sample taken in 1914 assayed 28.8 grams per tonne gold, 110 grams per tonne silver and 3.9 per cent copper. A radioactive sample from the mine assayed 0.35 per cent equivalent uranium (Lang, 1952).

Reference numbers: 105, 107, 187, 189, 190.

Rocher Deboule Deposit

Alias:	Juniper	Map Number:	119
Deposit type:	Vein	Commodities:	Cu, Au, Ag, U, Co
MINFILE Number:	093M 071	NTS:	093M04E
Lat.-Long.:	55 09' 35"-127 38' 30"	Elevation:	1450 m

Hornfelsic greywackes and siltstones of the Upper Jurassic Bowser Lake Group are intruded by the Late Cretaceous Rocher Déboulé porphyritic granodiorite stock of the Bulkley plutonic suite. Dikes cutting the stock consist of fine-grained quartz monzonite, fine-grained diorite and porphyritic andesite (Figure 15).



CHANNEL SAMPLES.

Sample No.	Width.	Gold.	Silver.	Uranium-Oxide Equivalent.	Cobalt.
	Inches.	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.
1	24	1.04	Nil	0.0065	3.6
2	30	0.41	Nil	0.0300	1.3
3	72	0.52	Nil	0.0220	5.1
4	84	0.32	Nil	0.0025	5.1
5	24	0.54	1.1	0.0290	0.3
6	25	0.27	Trace	0.0035	4.4
7	24	0.35	Nil	0.0200	3.9
8	18	1.60	Nil	0.0970	4.3
9	60	0.27	Nil	0.0100	0.9
10	96	0.07	Nil	0.0030	0.5
11	60	0.22	Nil	0.0100	0.2
12	24	0.02	Trace	0.0140	0.5
13	13	1.24	0.1	0.0080	6.9
14	36	0.52	Nil	0.0280	3.5
15	12	0.61	Trace	0.0060	5.7
16	33	0.62	0.1	0.0220	4.1
17	36	0.51	Nil	0.0220	2.5
18	29	0.15	Trace	0.2100	1.5
19	30	1.09	0.1	0.0260	6.6
20	36	0.23	Trace	1.0100	1.3
21	38	0.48	0.3	1.5400	2.9
22	40	0.35	0.1	0.2400	2.0
23	53	0.54	0.3	0.5700	4.0
24	49	0.01	Nil	0.2300	0.7
25	52	0.51	0.4	0.2100	2.5
26	54	1.21	0.1	1.0400	5.3
27	23	1.78	Trace	0.5300	7.2
28	60	0.78	Nil	1.5900	5.4
29	39	1.58	0.1	0.0095	5.8
30	39	1.32	Nil	0.0100	1.3
31	38	0.58	Trace	0.0030	0.6
32	24	0.33	0.1	0.0050	0.6
33	48	1.00	Nil	0.0030	1.4
34	33	1.26	Nil	0.0025	1.1
35	26	1.40	Trace	0.0013	1.2
36	12	0.34	Nil	0.0020	0.4
37	60	0.12	Trace	0.0040	2.0
38	60	2.21	Trace	0.3700	2.1
39	72	2.14	Nil	0.0130	4.4

Figure 16: Geology and sampling of Little Gem deposit (from Stevenson, 1948)

The orebodies occur over a 750-metre width, within five parallel shear veins which generally strike 075 and dip 35 to 65 north. The veins are 0.5 to 2.4 metres wide and up to 700 metres long.

Three distinct stages of mineralization are apparent. The first stage is pegmatitic and includes hornblende, quartz, feldspar, apatite, magnetite, scheelite, molybdenite and uraninite. The second and main stage includes chalcopyrite, glassy quartz, arsenopyrite, cobaltite, safflorite, glaucodot and pyrrhotite. The third stage includes milky quartz, siderite, calcite, tetrahedrite, sphalerite, galena, pyrite and possibly chalcocite. Secondary minerals include malachite, erythrite and limonite.

In 1951, the indicated ore reserve on No. 2 vein was estimated at 170 000 tonnes, grading 4.1 per cent copper, 13.7 per cent grams per tonne gold and 137.1 grams per tonne silver. Samples of the No. 2 vein assayed 80.9 grams per tonne gold, 0.37 per cent copper, 0.38 per cent WO_3 and 2.30 per cent cobalt over 36 centimetres, and 1.20 per cent copper, 0.23 per cent molybdenum, 2.02 per cent lead and 2.36 per cent zinc over 91 centimetres. A radioactive sample over 38 centimetres assayed 0.019 per cent equivalent uranium (Kindle, 1954). A sample taken in 1949 assayed 0.21 per cent equivalent uranium (Lang, 1952).

Reference numbers: 85, 105, 108.

Little Gem Deposit

Alias:	Gem, Northern Gem	Map Number:	120
Deposit type:	Vein	Commodities:	Co, Au, U, Mo
MINFILE Number:	092JNE068	NTS:	092J15W
Lat.-Long.:	50 53' 45"-122 57' 20"	Elevation:	1890 m

The showings lie within a granodiorite lobe near the margin of the Coast plutonic complex. A broad, east-trending and steeply south-dipping fault zone, containing a mineralized vein, cuts the granodiorite near the contact with ultramafic rocks and units of the Bridge River metamorphic complex. Shears in the zone contain two parallel ore shoots ranging in width from a few centimetres to a few metres. Irregular lenses of almost solid sulphides contain cobalt and gold values associated with danaite, loellingite, safflorite, arsenopyrite and minor scheelite and molybdenum. Uranium, in the form of uraninite, occurs in the gangue along with coarse-grained allanite, apatite, feldspar, quartz, chlorite, sericite, calcite, erythrite and limonite. Surrounding the ore, strongly bleached and sericitized granodiorite containing disseminated sulphides, residual quartz, feldspar and kaolin, grades into unaltered granodiorite. The coarse crystalline nature of the sulpharsenic minerals and the intergrowth of the ore with relatively fresh granodiorite suggests a common magmatic origin. It has also been described as a pegmatite and as a high-temperature replacement vein.

Two adits follow the ore shoots. The upper adit, sampled over 36 metres and 90 centimetres width, assayed 26.2 grams per tonne gold, 0.39 per cent uranium and 3.1 per cent cobalt, and the lower adit, sampled over 1.8 metres, assayed 54.8 grams per tonne gold, 0.3 per cent uranium and 3.2 per cent cobalt (Rutherford, 1952); (Figure 16). Reserves of 18 140 tonnes are calculated grading 22.64 grams per tonne gold and 3.0 per cent cobalt 0.2 per cent uranium (The Canadian Mines Handbook 1974-75, p. 251).

Reference numbers: 6, 7, 107, 170, 184, 186, 188.

Nithi Mountain Showing

Alias:	Abe, Molly	Map Number:	121
Deposit type:	Vein	Commodities:	Mo, U
MINFILE Number:	093F 012	NTS:	093F15W
Lat.-Long.:	53 59' 02"-124 51' 41"	Elevation:	1250 m

The area is underlain by a batholith composed of numerous individual plutons of the Mesozoic Topley plutonic suite. These intrusives range in composition from diorite to alaskite, but are predominantly quartz monzonite and granodiorite. Nithi quartz monzonite hosts quartz-molybdenite veins up to about one metre wide. In the same area, a northerly striking, westerly dipping rhyolite porphyry dike hosts secondary uranium minerals consisting of autunite, torbernite and sabugalite. Molybdenite mineralization up to a few centimetres in width occurs within the quartz monzonite, along the east side of the dike, in a fracture trending 065 . Argillic alteration is intense and there is also minor K-feldspar alteration present.

Uranium mineralization occurs along the western edge of the rhyolite porphyry dike for 70 metres. A sample of the dike assayed 0.14 per cent uranium (Holland, 1956b). This dike is probably coeval with Ootsa volcanics.

Reference numbers: 88, 138.

NOVELTY DEPOSIT

Alias:	Giant-Coxey	Map Number:	122
Deposit type:	Vein	Commodities:	Au, Mo, Co, U, Bi, Ag
MINFILE Number:	082FSW107	NTS:	082F04W
Lat.-Long.:	49 05' 06"-117 49' 30"	Elevation:	1370 m

The Red Mountain mine area is largely underlain by sediments and volcanics of the Lower Jurassic Rossland Group and sediments of the Carboniferous Mount Roberts Formation. These are folded, faulted and variably metamorphosed and intruded by the Rossland monzonite, the Trail granodiorite pluton and the Coryell syenite. The Rossland Group rocks consist of grey siltstone and argillite, which are locally metamorphosed to hornfels and brecciated. A set of faults trends 160 and are downthrown on the west.

Molybdenite, usually without other sulphides, occurs in randomly oriented fractures in all types of hornfels breccia and in granodiorite breccia. Commonly, it lies along the margins of breccia blocks and locally is concentrated at junctions between the blocks. Pyrrhotite, and locally pyrite, are disseminated in hornfels and also occur in fractures and as massive lenses between breccia fragments. Its distribution seems to be independent of the distribution of molybdenite. In the Novelty pit, fractures in siliceous hornfels contain arsenopyrite, cobalt minerals, bismuthinite and uraninite (Thorpe, 1967).

Undiluted drill-indicated reserves on the Novelty Main Zone were reported as 77 000 tonnes grading 5.14 grams per tonne gold, 0.380 per cent molybdenite and 0.126 per cent cobalt. Grab samples of molybdenite from the Giant-Coxey area assayed 0.02 to 0.20 per cent uranium (Lang, 1952).

Reference numbers: 68, 74, 108, 194.

SMOKE SHOWING

Alias:		Map Number:	123
Deposit type:	Vein	Commodities:	U
MINFILE Number:	093N 175	NTS:	093N11W
Lat.-Long.:	55 35' 00"-125 19' 00"	Elevation:	1340 m

The property lies 5 kilometres east of the Pinchi fault zone, within the Juro-Cretaceous Hogem batholith, which is composed chiefly of granodiorite and granite. A plug of alaskite, about 300 metres in diameter, intrudes granite. Uranium mineralization occurs locally in the alaskite in narrow quartz veinlets and stringers in widely spaced fractures. Samples taken in 1969 assayed 0.06 and 0.12 per cent uranium. Samples of the alaskite assayed 0.003 to 0.010 per cent uranium (Adamson, 1975).

Reference numbers: 4.

ROSYD SHOWING

Alias:	Botanie	Map Number:	124
Deposit type:	Vein	Commodities:	U
MINFILE Number:	092ISW091	NTS:	092I05E
Lat.-Long.:	50 15' 00"-121 34' 00"	Elevation:	150 m

The area is underlain by acidic intrusives of the Mount Lytton batholith and volcanics, shales and limestones of the Cretaceous Spences Bridge Group. Major faults lie along the Fraser River. A sheared zone, striking 130 and dipping 75 southwest, cuts a pendant of altered limestone within granodiorite. Radioactive stringers with ankerite and hematite cut the limestone. A sample assayed 0.052 per cent uranium (Holland, 1956e).

Reference numbers: 91.

RADIUM SHOWING

Alias:	Senator, Quadra	Map Number:	125
Deposit type:	Vein/volcanogenic	Commodities:	V, U, Cu
MINFILE Number:	092K 052	NTS:	092K03W
Lat.-Long.:	50 07' 00"-125 16' 00"	Elevation:	120 m

The area is underlain by andesite and basalt rocks of the Upper Triassic Karmutsen Formation. The flow rocks are commonly amygdaloidal and dip gently south and southwest about 15 . The amygdules are filled with chlorite, quartz, calcite and amphibole. Flows of amygdaloidal augite andesite contain disseminated chalcocite and a thin band of black siliceous rock with vanadium. Carnotite was reported occurring in fractures within the volcanics. A sample of carnotite taken in 1932 analyzed 24.5 per cent uranium and 21.1 per cent vanadium oxide (Ellsworth, 1932).

Reference numbers: 52, 69, 70, 180.

STAN SHOWING

Alias:	Annette 55	Map Number:	126
Deposit type:	Vein	Commodities:	U, Mo, W
MINFILE Number:	082KNE040	NTS:	082K10E
Lat.-Long.:	50 38' 15"-116 31' 15"	Elevation:	2300 m

The Cretaceous Horsethief batholith intrudes Helikian Purcell sediments. The intrusion is zoned from fine-grained/medium-grained granodiorite to coarse-grained quartz monzonite. Radioactivity is associated with fractures in the quartz monzonite. A sample of a quartz-muscovite vein 1 centimetre wide assayed 1.7 per cent uranium, 0.01 per cent molybdenum and 0.01 per cent tungsten. Disseminated uraninite is likely the radioactive mineral (Wright, 1978). The Horsethief batholith commonly has areas of anomalous uranium, molybdenum and tungsten. Black-sand placer concentrates in outwash gravels around the batholith contain radioactive and rare-earth minerals.

Reference numbers: 204.

CONTACT LAKE SHOWING

Alias:	Oli, Cornerpost Pool	Map Number:	127
Deposit type:	Vein/Surficial	Commodities:	U, Th
MINFILE Number:	082ESW141	NTS:	082E04E
Lat.-Long.:	49 11' 10"-119 34' 40"	Elevation:	530 m

The area is underlain principally by three distinct phases of medium-grained intrusive rocks of the Jurassic Oliver plutonic complex. These are, from oldest to youngest, biotite-hornblende quartz monzonite, porphyritic biotite quartz monzonite and muscovite-garnet quartz monzonite. Additional phases include diorite and fine-grained dikes and pods of quartz monzonite. To the south the pluton cuts Kobau metasedimentary rocks of probable Carboniferous age. These rocks largely consist of massive and laminated quartzite and minor limestone. Bedding and regional foliation parallel the northwest-trending contact with biotite-hornblende quartz monzonite.

Irregular zones of radioactivity occur in the limestone near the contact. Scintillometer readings are up to 700 counts per second (background 70 counts per second); a sample returned an assay of 0.01 per cent uranium (Beaty and Culbert, 1978). Several irregular masses of fine-grained quartz monzonite occur in the metasediments along a northwest trend for about 1.5 kilometres. Thin sections of the rock show many minute subhedral inclusions of zircon (thorite) in biotite, which form pleochroic halos due to radioactive emanations. Scintillometer readings are up to 750 counts per second and sampling returned assays up to 0.05 per cent thorium and 0.01 per cent uranium (Beaty and Culbert, 1978).

Contact Lake, overlying the metasediments, contains postglacial uranium accumulations within the lacustrine deposits. Geochemical soil sampling returned values to 0.01 per cent uranium.

Reference numbers: 18.

RIDDLE CREEK SHOWING

Alias:	Agur-Ash	Map Number:	128
Deposit type:	Vein/volcanogenic	Commodities:	U, Th
MINFILE Number:	082ENW071	NTS:	082E12W
Lat.-Long.:	49 32' 40"-119 52' 00"	Elevation:	1400 m

A 5 by 2 kilometre radioactive area coincides with an Eocene volcanic centre. The principal radioactive rocks include trachytes and mafic phonolites of the Marron Group and consanguineous syenite of the Coryell suite. North of the radioactive area, polymictic conglomerates and andesite, which overlie granitic phases of the Okanagan batholith, occur at the base of the Tertiary section.

The most radioactive rocks are thick (150 to 200 metres) trachyte lava flows. Assays obtained are up to 0.12 per cent uranium and 0.038 per cent thorium (Culbert, 1978a). Pervasive hydrothermal alteration of the trachyte and vent breccia has produced cream and white kaolinized rocks with variable radioactive response. The syenites, which lie to the west of the trachyte, average 0.006 per cent uranium and 0.032 per cent thorium. Radioactive elements are concentrates on manganese pitch and dendritic growths on numerous small cracks. Overlying the western contact of the trachyte flow with the syenite intrusion are surficial deposits of uraniferous sediments. A sediment sample assayed 0.06 per cent uranium (Culbert, 1978a).

Reference numbers: 49, 51, 53, 54, 200.

STRATABOUND OCCURRENCES

The stratabound type deposits are localized within sedimentary or volcanic units and are concordant with bedding. Mineralization is controlled by permeability and adsorptive and reducing agents, such as humic and carbonaceous matter. Some of the showings (Hel, Lad and PBE 18) could also be classified as basal-type deposits.

Upper Cretaceous continental successor basins in or adjacent to the Intermontane Belt contain sediments which are favourable hosts for uranium concentrations. The Hel showing on Mount Helveker contains the uranium minerals saleeite and torbernite, which occur in clays, limonite, organic trash and opal in small lenses in a fluvial sandstone-conglomerate sequence containing a few thin beds of felsic ash. This unit is overlain conformably by felsic porphyritic flows, agglomerates and ash of the Sloko Group (Figure 17). Diagenetic alteration probably freed the uranium from the more impermeable layers and refixed it in adjacent layers having slightly higher permeability and organic matter. The Edozadelly Mtn. showing, located on the Spatsizi Plateau, contains moderately radioactive units of fine tuffaceous siltstone in the upper half of the Sustut Group.

In northeastern British Columbia, carbonates, shales and phosphorite were deposited at the edge of a subtidal carbonate platform and shelf. At the Grey Peak showing a high uranium value is associated with phosphorite, which occurs as large black nodules scattered in banded limestone of the Ordovician Kechika Group. At the Spa showing, located near the Gataga River, a uraniferous, zinc-rich gossan overlies a Devonian carbonaceous shale unit.

Other stratabound deposits occur in a variety of sediments of various ages in the Foreland and Omineca belts. The Lad showing, located in the Bowron River valley, contains thucolite in Tertiary shale and coal. The Karen showing, south of Revelstoke, occurs in schist of the Shuswap metamorphic complex and contains thorium, uranium and rare earths. In the Purcell Supergroup, in the extreme southeast corner of the Province, are radioactive, copper-rich quartzites, which are traceable for several hundred metres. Examples of these showings are the Lin 21 and the Commerce.

HEL SHOWING

Alias:		Map Number:	151
Deposit type:	Stratabound/basal	Commodities:	U
MINFILE Number:	104G 109	NTS:	104G11W
Lat.-Long.:	57 38' 53"-131 27' 47"	Elevation:	1750 m

Cretaceous Sustut Group clastic sediments overlie both the Bowser assemblage and Upper Triassic volcanics and are overlain by trachytic and rhyolitic flows and pyroclastic rocks of the Sloko Group. The Sustut sediments comprise about 300 metres of poorly consolidated green-grey, pebbly, feldspathic and quartzose arenites, subordinate pebble and cobble conglomerates and minor coal seams (Figure 17).

Uranium occurs as saleeite and torbernite within the upper conglomerate unit, over several metres along strike, in a zone up to 30 centimetres thick. Mineralization is also associated with interlayered oxidized sandy layers and organic material. A trench sample assayed 0.397 per cent uranium (Salat and Noakes, 1979). A bulk sample over a 2-metre strike length and 20 centimetres thickness assayed 0.084 per cent uranium (Bell, 1982). The uranium was probably derived from overlying felsic volcanics, transported by downward percolating groundwaters and fixed by organic material.

Reference numbers: 20, 21, 173.

EDOZADELLY MTN. SHOWING

Alias:		Map Number:	152
Deposit type:	Stratabound	Commodities:	U
MINFILE Number:	094E 097	NTS:	094E05E
Lat.-Long.:	57 22' 10"-127 30' 00"	Elevation:	1580 m

Upper Cretaceous continental clastic sediments of the Sustut Group are subdivided into the Tango Creek and overlying Brothers Peak Formations. The lower Lasuli member of the Brothers Peak Formation comprises coarse, grey, polymictic conglomerate and arenites, interbedded with grey, green and rarely varicoloured ash tuffs and tuffaceous mudstones and siltstones (Figure 18). The tuff units are radioactive with some zones, 2 to 10 centimetres thick, containing over 0.01 per cent uranium over 500 metres strike length (Bell, 1981).

The most radioactive phases of the tuff units are altered to a bright red colour, contain coaly fragments and are within sequences containing white, coalescent spherules of analcime (zeolites). A sample of the tuff contains about 0.038 per cent uranium over a 2-centimetre layer. Uranium mineralization is likely early diagenetic, but essentially syngenetic within water-laid tuffs.

Reference numbers: 20, 162.

GREY PEAK SHOWING

Alias:	Kechika	Map Number:	153
Deposit type:	Stratabound	Commodities:	phosphate, U
MINFILE Number:	094F 019	NTS:	094F14E
Lat.-Long.:	57 48' 00"-125 12' 30"	Elevation:	1950 m

Phosphorite bands are scattered through 120 metres of section in the upper banded limestones of the Lower Ordovician Kechika Group. They occur as thin (1 to 5 centimetres) sea-floor pavements with up to 25 per cent fluorapatite. A phosphorite sample with 8 per cent fluorapatite assayed 0.022 per cent uranium (Cecile and Norford, 1979).

Reference numbers: 23, 37.

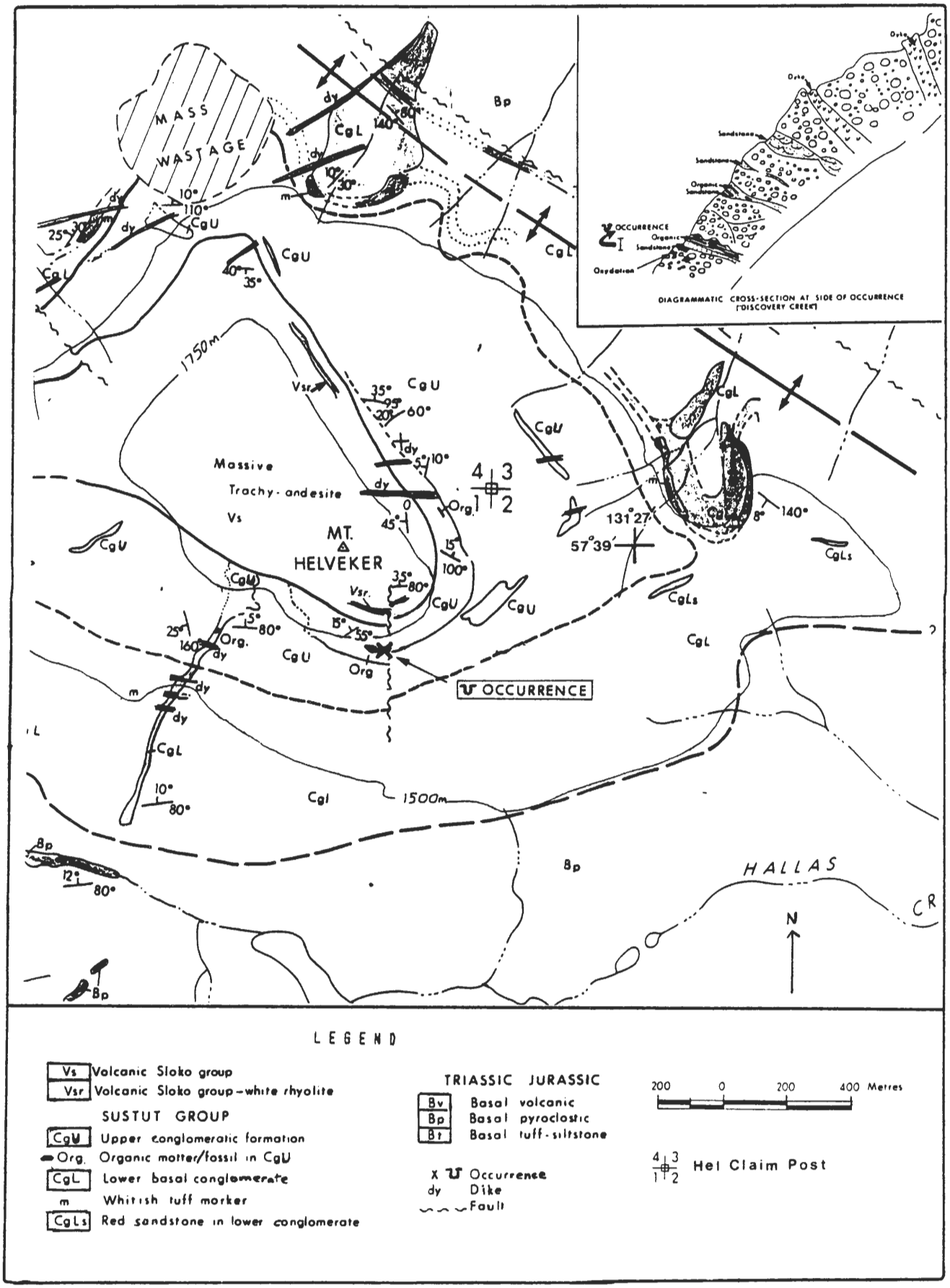


Figure 17: Geological setting of Hel occurrence (from Salat and Noakes, 1979)

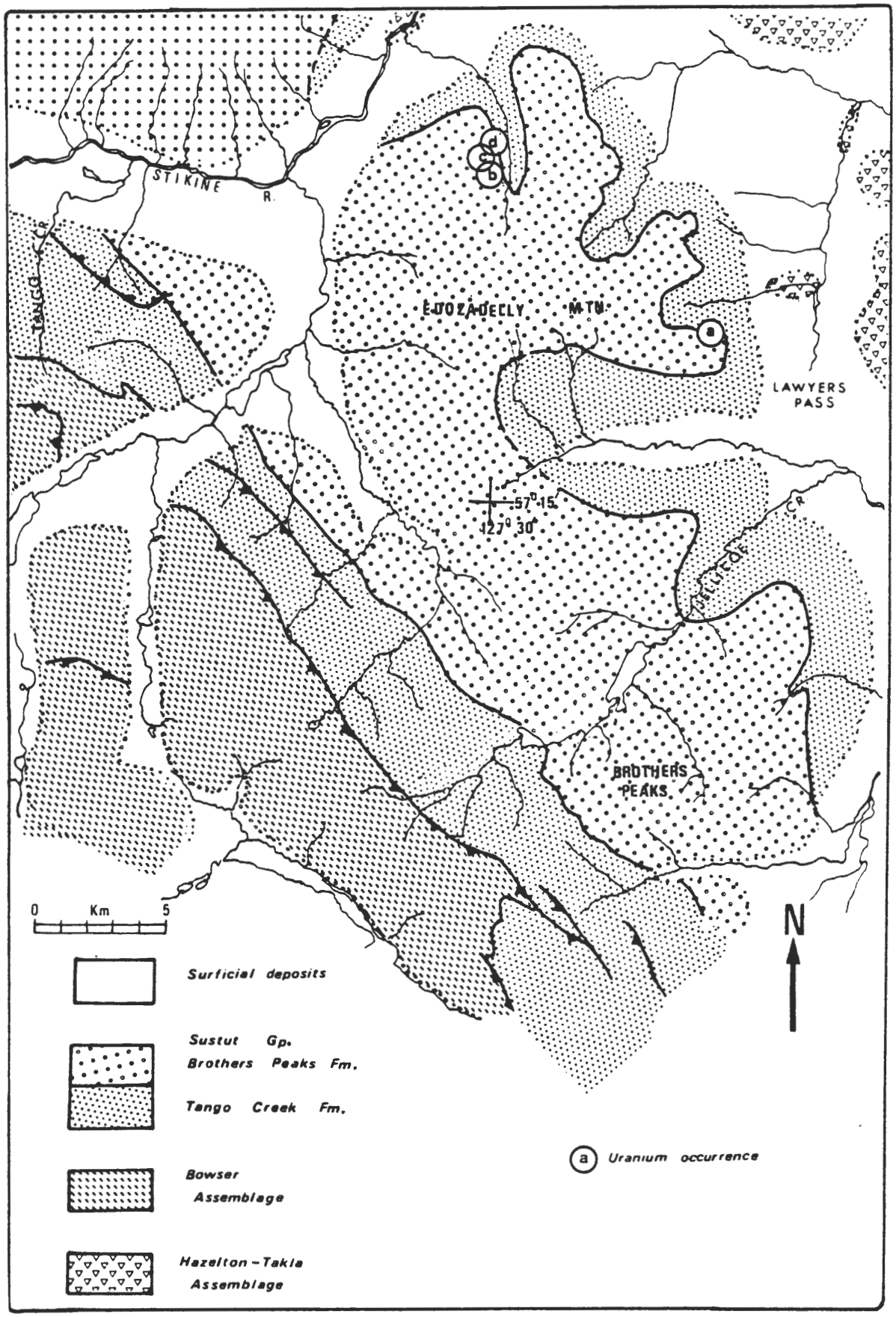


Figure 18: Geology of Edozadelly Mountain area (from Bell, 1981)

SPA SHOWING

Alias:	Stag, Red	Map Number:	154
Deposit type:	Stratabound	Commodities:	Zn, barite, V, Ag, U, Fe
MINFILE Number:	094F 003	NTS:	094F13E
Lat.-Long.:	57 57' 45"-125 44' 00"	Elevation:	1300 m

The area is underlain by black shales and fine-grained clastic sediments of the Devonian lower Earn Group. A westerly dipping thrust fault appears to emanate springs which create hematite sinters and limonitic gossans. The gossan forms a coating up to 6 metres thick, over a 350 by 100 metre northwest trend, with smaller patches nearby. Hydrozincite and melanterite occur on fractures within the underlying shale. A black carbonate layer within the shale hosts stratiform barite and disseminated sulvanite ($3Cu_2S{\cdot}V_2S_5$).

The gossan has a high iron (over 10 per cent) and zinc (up to 3 per cent) content. It also contains up to 0.01 per cent copper, 0.01 per cent nickel, 100 grams per tonne silver, 0.008 per cent uranium and 0.02 per cent vanadium (Rose, 1973).

Reference numbers: 65, 167.

LAD SHOWING

Alias:	UG, Bowron River	Map Number:	155
Deposit type:	Stratabound/basal	Commodities:	coal, U, Ge, Mo, V
MINFILE Number:	093H 036	NTS:	093H13W
Lat.-Long.:	53 48' 21"-121 52' 40"	Elevation:	762 m

Mid-Tertiary coal measures occur within a sequence of conglomerate, sandstone and shale 600 metres thick which trends northwest for about 24 kilometres along the Bowron River valley. The coal measures strike 140 and dip 20 to 60 northeast. The basin is bordered by tuffs, breccia, greenstone and minor chert and limestone of the Mississippian Slide Mountain Group.

Radioactive conglomerate and greenstone were intersected over 50 metres in drill holes. The radioactivity occurs beneath the main coal seams, in the basal rock in contact with the Slide Mountain rocks. Thucolite, which is a hydrocarbon with uranium, and germanium were also identified in shale and coal. A seam sample from a section along the river near the old mine site to the north assayed 0.008 per cent equivalent uranium. The ash from the sample assayed 0.058 per cent molybdenum and 0.108 per cent vanadium (Cameron and Birmingham, 1970). A sample assayed 186 grams per tonne germanium (McKechnie, 1971).

Reference numbers: 19, 36, 98, 131.

KAREN SHOWING

Alias:	Arcl	Map Number:	156
Deposit type:	Stratabound	Commodities:	Th, Ce, rare earths, U
MINFILE Number:	082LNE037	NTS:	082L16E
Lat.-Long.:	50 50' 30"-118 06' 00"	Elevation:	550 m

The area is underlain by quartz biotite schist and quartz muscovite schist of the Shuswap metamorphic complex. The strata strike northwest and dip moderately to the northeast.

Radioactivity is associated with a narrow zone of weathered muscovite schist flanked by quartzite. A chip sample assayed 0.06 per cent thorium oxide, 0.004 per cent uranium, 0.36 per cent lanthanum, 0.815 per cent cerium, 0.08 per cent praseodymium, 0.38 per cent neodymium, 0.05 per cent samarium and 0.05 per cent gadolinium (Allen, 1979). Probable mineralogy is monazite, allanite and euxenite (Horne, 1983).

Reference numbers: 8, 93.

LIN 21 SHOWINGS

Alias:		Map Number:	157
Deposit type:	Stratabound	Commodities:	Cu, Ag, U, Mo
MINFILE Number:	082GSE049	NTS:	082G01W
Lat.-Long.:	49 02' 30"-114 16' 25"	Elevation:	2318 m

Mineralization consists of fine disseminations and blebs (1 to 3 millimetres) of copper sulphides confined to quartzite beds of the upper Grinnell Formation (Figure 19). Where there is enrichment of copper sulphides, radiometric surveys indicate anomalous radioactivity, likely from uranium enrichment.

Stratabound covellite, bornite and chalcocite occur at several quartzite horizons in the Grinnell Formation of the Purcell Supergroup (Belt Supergroup in U.S.A.). The best mineralized beds, which are in the upper Grinnell Formation, are traceable intermittantly for several thousand metres and contain up to 10 per cent sulphides over several centimetres. Malachite is widespread at surface and to a depth of about 1 metre. The thickness of the mineralized horizons rarely exceeds 1 metre. Radiometric prospecting indicates anomalous readings in the range of 10 000 to 23 000 counts per minute, coincidental with areas of stronger sulphide enrichment. Background is about 2500 counts per minute with a McPhar TV-1A spectrometer. Trace amounts of molybdenum are also associated with the zones.

Reference numbers: 78, 129.

COMMERCE SHOWINGS

Alias:		Map Number:	158
Deposit type:	Stratabound	Commodities:	U, Cu, Ag, Mo
MINFILE Number:	082GSE065	NTS:	082G01W
Lat.-Long.:	49 10' 20"-114 23' 50"	Elevation:	1920 m

The Grinnell Formation of the Purcell Supergroup is host to stratabound disseminated copper, silver and uranium mineralization. The Grinnell Formation consists mainly of red and green argillite, interbedded with quartzitic sandstone and fine-grained red sandstone (Figure 19).

Anomalous radioactivity occurs throughout the Grinnell Formation, with the highest values (200 to 450 counts per second by a BGS-1S scintillometer, with background 60 counts per second) associated with copper and silver mineralization. A chip sample assayed 0.063 per cent uranium, 136.4 grams per tonne silver and 0.7 per cent copper (Goble, 1977). A chip sample 1300 metres to the east, assayed 1.09 per cent uranium and 0.158 MoS_2 (Goble, 1977) and a sample 1400 metres to the west assayed 0.05 per cent uranium. Another showing occurs 4 kilometres to the south-southeast.

Reference numbers: 77.

PBE 18 SHOWING

Alias:	U2	Map Number:	159
Deposit type:	Stratabound/basal	Commodities:	U, W
MINFILE Number:	082ESE219	NTS:	082E01W
Lat.-Long.:	49 05' 10"-118 26' 50"	Elevation:	770 m

A unit consisting of sharpstone conglomerate, siltstone and limestone of the Triassic Brooklyn Formation is overlain by Tertiary andesites (Marron Formation, Penticton Group). These are cut by syenite and monzonite (Coryell Intrusions) and are sheared parallel to the northerly trending Granby River fault, which lies to the east.

A rusty zone in the sharpstone conglomerate 7 metres long is radioactive. Uranophane is likely the uranium mineral present. A grab sample assayed 0.049 per cent uranium (Meyers, 1977). About 250 metres to the southwest, a quartz vein in syenite assayed 11.4 per cent WO_3 (Kermeen, 1971).

Reference numbers: 92, 101, 136.

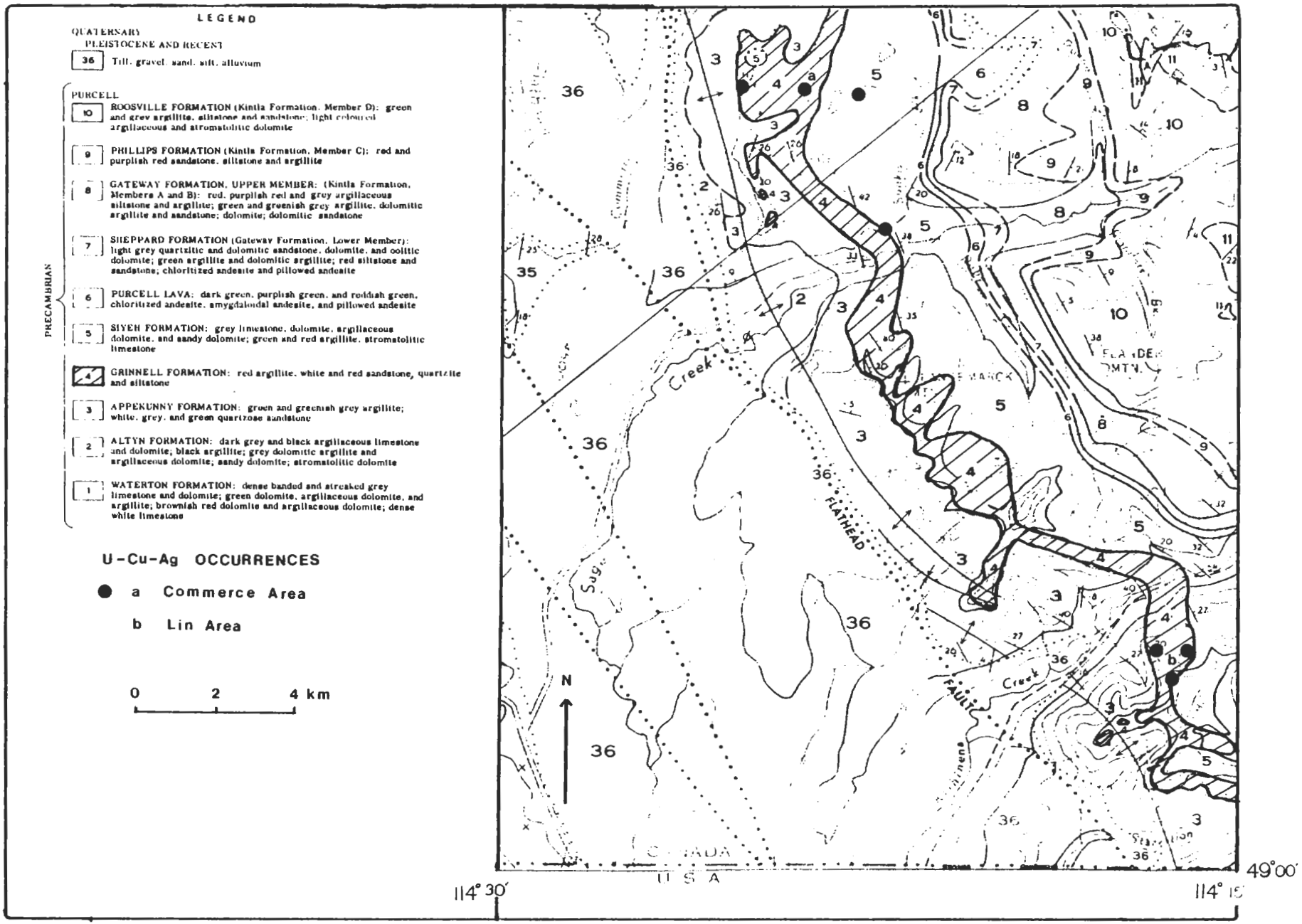


Figure 19: Geological setting of Commerce and Lin stratabound occurrences (geology from R.A. Price, 1962 - GSC Map 35-1961)

SKARN OCCURRENCES

Skarn or contact metamorphic deposits, which occur in calcareous rocks marginal to intrusions with a high radioactive background, include the Husselbee showing in the Atlin area and the Molly, a past molybdenum producer, located south of Salmo. Genesis of these deposits was likely magmatic-hydrothermal with subsequent supergene redistribution.

HUSSELBEE SHOWING

Alias:	Beaver, Deep Bay	Map Number:	174
Deposit type:	Skarn/Volcanogenic	Commodities:	U, Th, fluorite, Pb, Mo
MINFILE Number:	104N 001	NTS:	104N12W
Lat.-Long.:	59 42' 20"-133 51' 30"	Elevation:	730 m

Amphibolite, quartzite and carbonates of the Permian Cache Creek Group lie adjacent to granodiorite and granite of the Fourth of July Creek batholith. The amphibolite, likely derived from metamorphism of calcareous volcanic agglomerate, is radioactive and contains disseminated uraninite, fluorite, pyrite, galena and irregular areas of red jasper. A sample from the top of Discovery Hill assayed 0.012 per cent uranium and 0.16 per cent thorium oxide and a sample 380 metres to the west assayed 0.059 per cent uranium and 0.17 per cent thorium. Another sample from the area assayed 0.14 per cent uranium and 0.04 per cent thorium oxide (Holland, 1954).

Calcite and dolomite veins cut the amphibolite and contain disseminated molybdenite, pyrite and minor chalcopyrite. Samples assayed up to 0.11 per cent molybdenite (Anuik, 1970).

Reference numbers: 9, 86.

MOLLY DEPOSIT

Alias:	(L. 14232)	Map Number:	175
Deposit type:	Skarn	Commodities:	Mo, W, U
MINFILE Number:	082FSW021	NTS:	082F03E
Lat.-Long.:	49 05' 00"-117 11' 40"	Elevation:	1250 m

The Molly deposit is hosted by granites of the Cretaceous Lost Creek stock, which are intruded into a sequence of argillites and limy argillites of the Ordovician Active Formation. The granite is quartz rich and appears to have an upper fine-grained, aplitic capping zone 2 metres thick. This aplite is sparsely impregnated with molybdenum. The molybdenum ore occurs below this capping within a zone 3 metres thick containing numerous joints parallel to the intrusive contact. The best mineralization is within this sheeted zone where the intrusive contact dips at low angles and/or where there are prominent fractures intersecting the sheeting. Molybdenite occurs as selvages on the joint planes or disseminations between the joints. The more massive granite below the sheeted zone is host to very little molybdenite. Tungsten, as scheelite, occurs locally disseminated in small skarn zones.

It is estimated that the Molly mine produced about 155 tonnes of ore which carried 3.5 to 5.88 per cent MoS_2 (10 800 kilograms MoS_2). Minor pyrite, pyrrhotite and uraninite are also associated with the deposit. A sample assayed 0.13 equivalent uranium (Lang, 1952).

Reference numbers: 108, 109.

BRECCIA DEPOSITS

Two breccia-type deposits in British Columbia are the Carmi Moly deposit, located 30 kilometres east of Penticton, and the Giant Copper deposit, located southeast of Hope. The Carmi Moly is a molybdenum-porphyry-breccia deposit, likely evolved by explosive venting of an underlying stock. The Giant Copper is mainly a copper-molybdenum-silver deposit, which lies in a pipe-like breccia zone within argillite. The Blizzard deposit (082ENE046) also hosts uranium in a breccia pipe.

CARMI MOLY DEPOSIT

Alias:	Doe, Ivy	Map Number:	177
Deposit type:	Breccia	Commodities:	Mo, U, Au, Ag, Cu
MINFILE Number:	082ENW036	NTS:	082E11E
Lat.-Long.:	49 31' 05"-119 10' 00"	Elevation:	1220 m

The area is underlain by Jurassic Nelson plutonic rocks and a partially unroofed Cretaceous Valhalla stock. The Nelson rocks are medium-grained foliated biotite granodiorites, cut by smaller bodies of related quartz diorite and quartz monzonite. The Valhalla intrusion is a leucocratic muscovite-biotite quartz monzonite with several late-stage derivatives, including feldspar porphyry dikes and the cement of the mineralized breccia zones.

Two mineralized breccia zones, the E and Lake zones, are localized within thin fault-dissected Nelson granodiorites. In the central part of the E Zone breccia, the matrix is granodiorite intermixed with pegmatite, quartz, aplite, muscovite and biotite. Molybdenite occurs as rosettes within fragments, as thin lamellae on fragment/matrix boundaries and as discrete flakes within the matrix. Where alteration within the breccia zone is intense, a greisen zone, consisting of quartz, muscovite, fluorite, sericite, epidote, chlorite and molybdenite, developed mainly in the Valhalla rocks.

Pyrite, magnetite, chalcopyrite and minor bornite occur as fracture fillings, blebs and disseminations within the mineralized zones. Associated uranium mineralization, represented by brannerite, is sporadically disseminated in the granodiorite, accompanied by purple fluorite. A drill hole intersected 0.038 per cent uranium and 0.336 per cent MoS_2 over 10.7 metres (Rich, 1974). The E Zone breccia is characterized by a series of flat-lying to gently dipping tabular breccia bodies along a 110 strike, over a length of 1800 metres and width up to 500 metres.

The Lake Zone is about 750 metres west of the E Zone. It dips steeply north, strikes 110 and is about 600 metres long, up to 150 metres wide and extends up to 400 metres depth. The matrix for the breccia consists of quartz monzonite intermixed with pegmatite, abundant quartz and aplite. Within the porphyry, quartz-sericite alteration zones form along incipient fractures. These zones average 15 centimetres wide and sometimes are up to 6 metres wide. Disseminated molybdenite occurs within the sericitized rock. At depth, about 5.5 million tonnes of 0.36 per cent MoS_2 occurs over an average 9-metre width on the Lake Zone. Total drill-indicated reserves in both zones are estimated to be 36 284 000 tonnes averaging 0.11 per cent MoS_2.

Reference numbers: 39, 111, 119, 145, 165.

GIANT COPPER DEPOSIT

Alias:	A.M. Breccia, Canam	Map Number:	178
Deposit type:	Breccia	Commodities:	Cu, Mo, Ag, Au, U
MINFILE Number:	092HSW001	NTS:	092H03E
Lat.-Long.:	49 09' 50"-121 01' 25"	Elevation:	1800 m

Argillite, siltstone and quartzite of the Jurassic Dewdney Creek Formation (Ladner Group) are intruded by the Invermay quartz diorite stock. The northwest-trending Hozameen fault separates them from sediments of the Paleozoic Hozameen Group to the west. Mineralization occurs in a pipe-like zone of brecciated siliceous sediments of the Dewdney Creek Formation. The zone measures 550 by 300 by 220 metres and comprises siliceous fragments in a grey matrix.

The A.M. deposit, in the northwest tip of the breccia-pipe, is crescentic in plan and plunges vertically. Pyrrhotite, chalcopyrite and less pyrite occur as pockets in the matrix adjacent to fragments and subordinately as veinlets cutting both matrix and fragments. Other minerals include arsenopyrite, molybdenite, magnetite, galena, sphalerite, uraninite, monazite and scheelite. The uraninite is spatially associated with the molybdenite. The breccia matrix is composed of calcite, quartz, chlorite, carbonate, alkali feldspar, white mica and kaolin. Tourmaline occurs in fractures, fragments and the matrix.

Reserves are 2.5 million tonnes grading 1.35 per cent copper, 0.58 grams per tonne gold, 24.7 grams per tonne silver and 0.03 per cent molybdenum. A 1.5-metre sample from an adit taken in 1954 assayed 0.92 per cent copper, 17.14 grams per tonne silver, trace gold, 0.144 per cent molybdenum and 0.044 per cent equivalent uranium (Bacon, 1955). In 1988, Bethlehem Resources Corporation conducted exploration and re-assaying of drill core. From a total of 2715 samples, the mean value of uranium was 1.02 ppm, with the highest being 176 ppm (0.0176 per cent) uranium (McAndless, 1990, pers. comm.).

Reference numbers: 11, 63, 67, 80, 201, 203.

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APPENDIX 1

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

Sorted by **DEPOSIT TYPE** and **MAP NUMBER**, with MINFILE Number, Name, Host Rock, Minerals, and Age

MAP NO[1]	MINFILE NUMBER	NAMES	DEPOSIT TYPE	HOST ROCK	SIGNIFICANT MINERALS			AGE
1	082ENE046	BLIZZARD, BEVERLY	Basal	Sandstone/Congl.	saleeite	ningyoite	autunite	Tertiary
2	082ENE041	CUP LAKE, DONEN	Basal	Congl./Mudstone	saleeite	autunite	pyrite	Tertiary
3	082ENW053	HYDRAULIC L., TYEE	Basal	Congl./Sandst.	ningyoite	marcasite		Tertiary
4	082ENW051	HAYNES LAKE, PB	Basal	Congl./Sandst.	ningyoite	marcasite		Tertiary
5	082ENE015	FUKI	Basal	Congl./Sandst.	autunite	pyrite		Tertiary
6	082ESW139	BRENT LAKE, CLARK	Basal	Coal	unknown			Tertiary
7	082ESW176	SKAHA RESERVATION	Basal	Grit	unknown			Tertiary
8	082ENE047	LASSIE, DONEN 361	Basal	Basalt/Congl.	unknown			Tertiary
9	082ENE030	COLLIER, DONEN	Basal	Congl./Sandst.	unknown			Tertiary
10	082ENW052	VENUS, PB	Basal	Congl./Sandst.	unknown			Tertiary
11	082ESW154	FARLEIGH LAKE	Basal	Pink grit	unknown			Tertiary
12	082LSE005	VAL, VIDLER	Basal	Conglomerate	unknown			Tertiary
13	082M 021	REXSPAR	Volcanogenic	Trachyte	uraninite	uranothorite	torbernite	Mississippian
14	082M 022	G ZONE	Volcanogenic	Trachyte	uraninite	uranothorite	molybdenite	Mississippian
15	082M 034	BULLION	Volcanogenic	Trachyte	uraninite	uranothorite	pyrite	Mississippian
16	082M 043	FOGHORN CREEK	Volcanogenic	Trachyte	molybdenite	galena	fluorite	Mississippian
17	082ENW073	PRAIRIE FLATS	Surficial	Soil	unknown			Quaternary
18	082ESW164	COVERT BASIN	Surficial	Peat	unknown			Quaternary
19	082ESW174	SINKING POND, SYN	Surficial	Clay	unknown			Quaternary
20	082ESW177	NORTH WOW FLAT	Surficial	Sediments	unknown			Quaternary
21	082ENW067	THE STINKHOLE	Surficial	Mud	unknown			Quaternary
22	082ENW070	AGUR	Surficial	Soil	unknown	molybdenite		Quaternary
23	082LSW082	BALD	Surficial	Bog	unknown			Quaternary
24	104N 112	MIR 7, DELTA POOL	Surfic./Vein	Soil	unknown			Quaternary
25	082ENW068	FAULDER 3	Surficial	Soil	unknown			Quaternary
26	082ENW069	JOHNSON'S SLOUGH	Surficial	Soil	unknown			Quaternary
27	082ENW072	DEMUTH	Surficial	Soil	unknown			Quaternary
28	082ENW074	IGNIMBRITE LAKE	Surficial	Soil	unknown			Quaternary
29	082ENW075	WESTBENCH	Surficial	Soil	unknown			Quaternary
30	082ENW076	ENEAS, FAULDER	Surficial	Soil	unknown			Quaternary
31	082ENW077	CONTACT POOL	Surficial	Soil	unknown			Quaternary
32	082ENW078	THREE PEAK BASIN	Surficial	Soil	unknown			Quaternary
33	082ENW079	BALD HILLS	Surficial	Soil	unknown			Quaternary
34	082ENW080	MEADOW RIDGE	Surficial	Soil	unknown			Quaternary
35	082ENW081	TREPANIER	Surficial	Soil	unknown			Quaternary
36	082ENW082	WINN	Surficial	Soil	unknown			Quaternary
37	082ESW178	SOUTH WOW LAKE	Surficial	Clay	unknown			Quaternary
38	082ESW179	BURNELL POND	Surficial	Clay	unknown			Quaternary
39	082ESW181	POWERLINE	Surficial	Soil	unknown			Quaternary
40	082ESW182	HEART	Surficial	Soil	unknown			Quaternary
41	082ESW183	PURPLE	Surficial	Soil	unknown			Quaternary
42	082ESW184	POLVO	Surficial	Soil	unknown			Quaternary
43	082ESW185	RANCH LAKE	Surficial	Soil	unknown			Quaternary
44	082ESW186	MEYERS SWAMP	Surficial	Soil	unknown			Quaternary
45	082ESW187	KALEDEN	Surficial	Soil	unknown			Quaternary
46	082ESW188	NKWALA CASES	Surficial	Soil	unknown			Quaternary
47	092INE169	VICARS PASS	Surficial	Soil	unknown			Quaternary
48	092INE168	RUB	Surficial	Soil	unknown			Quaternary
49	094M 022	LIARD HOTSPRINGS	Surficial	Tufa	radon gas			Quaternary
50	094N 001	WISHING WELL	Surficial	Tufa	radon gas			Quaternary
51	104N 111	CX 2	Surficial	Soil	unknown			Quaternary
52	104N 114	CX	Surficial	Soil	unknown			Quaternary
53	104N 115	TUPA	Surficial	Soil	unknown			Quaternary
54	082ESE142	SD 7, RADAR	Pegmatite	Gneiss	uraninite	uranophane	autunite	Proterozoic
55	082FNW192	TRY AGAIN	Pegmatite	Granite	allanite	fergusonite		Jurassic
56	082FSW212	MOTA, CHINA CREEK	Pegmatite	Gneiss	uraninite	pitchblende	autunite	Unknown
57	082FSW272	CRESCENT	Pegmatite	Syenite	samarskite	rutile	ilmenite	Eocene
58	082LNE033	CRAN 2	Pegmatite	Gneiss	uraninite			Proterozoic
59	082LSE015	BEARCUB, SPAR	Pegmatite	Gneiss	feldspar	monazite		Proterozoic
60	082N 027	BOW, DEMON	Pegmatite	Nepheline Syenite	sphene	ilmenite	titanite	Cambrian
61	093O 021	LAURA	Pegmatite	Alkalic altered gneiss	allanite	monazite		Proterozoic
62	104A 096	STEWART	Pegmatite	Quartz monzonite	uraninite	cyrtolite		Tertiary

APPENDIX 1 (cont.)

MAP NO[1]	MINFILE NUMBER	NAMES	DEPOSIT TYPE	HOST ROCK	SIGNIFICANT MINERALS			AGE
63	082ESE143	SD 18 AND 20	Pegmatite	Gneiss	uraninite	uranophane	autunite	Proterozoic
64	082ESE144	SD 37	Pegmatite	Gneiss	uraninite			Proterozoic
65	082ESE145	SD 41	Pegmatite	Gneiss	uraninite			Proterozoic
66	082ESE195	SD 8	Pegmatite	Gneiss	uraninite			Proterozoic
67	082ESE205	KIWI, RADAR 3	Pegmatite	Gneiss	uraninite	uranophane	autunite	Proterozoic
68	082ESE220	HO 16	Pegmatite	Gneiss	uraninite			Proterozoic
69	082ESW189	ALLANDALE LAKE	Pegmatite	Syenite	betafite	cyrtolite	brannerite	Tertiary
70	082FNW244	CRYSTAL	Pegmatite	Granite	euxenite	magnetite	quartz	Jurassic
71	082FSW252	ROMA	Pegmatite	Schist	uraninite	uranothorite	autunite	Unknown
72	082FSW270	LUCKY-BILL-TAG	Pegmatite	Granite	uraninite			Jurassic
73	082FSW271	GIBSON CREEK	Pegmatite	Granite	uraninite			Jurassic
74	082FSW273	U3O8, CHINA CREEK	Pegmatite	Schist	uraninite	uranothorite	autunite	Unknown
75	082FSW275	JACKASS	Pegmatite	Granite	uraninite			Cretaceous
76	082KSW109	STA-TITE	Pegmatite	Gneiss	unknown			Proterozoic
77	082LNE020	CRAN 3	Pegmatite	Granite	uraninite	autunite		Proterozoic
78	082LNE034	CRAN 4	Pegmatite	Gneiss	uraninite	autunite		Proterozoic
79	082LNE036	CAMERON-JENKINS 1	Pegmatite	Schist	unknown			Paleozoic
80	082LNW062	JEN JEN	Pegmatite	Granodiorite	unknown			Cretaceous
81	082LSE019	SH, AS	Pegmatite	Schist	uraninite			Ordovician
82	082LSW064	BRETT-BIRD	Pegmatite	Schist	uraninite	muscovite		Ordovician
83	082M 231	HARBOUR	Pegmatite	Gneiss	unknown			Proterozoic
84	092HSW110	BEE, BELL	Pegmatite	Granodiorite	uraninite	phosphuranylite	chalcopyrite	Tertiary
85	092ISE124	COPPERADO-A6	Pegmatite	Granodiorite	allanite			Triassic
86	092JNE055	INDEX, MOLY	Pegmatite	Granodiorite	uraninite	molybdenite		Tertiary
87	093D 012	PROMISE WELL	Pegmatite	Skarn	unknown	magnetite	chalcopyrite	Paleozoic
88	093N 201	WILL	Pegmatite	Alkalic altered gneiss	monazite			Proterozoic
89	093O 041	URSA	Pegmatite	Gneiss	monazite			Proterozoic
90	104M 058	NET 6	Pegmatite	Quartz monzonite	unknown			Cretaceous
91	104M 060	JONES	Pegmatite	Quartz monzonite	unknown			Cretaceous
92	083D 005	VERITY, LEMPRIERE	Carbonatite	Schist	pyroclore	columbite	apatite	Hadrynian
93	093N 012	LONNIE, GRANIT CR	Carbonatite	Sovite	pyroclore	zircon	columbite	Proterozoic
94	082JSW018	ROCK CANYON CR	Carbonatite	Dolomite	fluorite	barite	bastnaesite	Devonian
95	083D 036	BONE CR, GUM CR	Carbonatite	Schist	pyroclore	columbite	apatite	Hadrynian
96	083D 037	AEG, MUD LAKE	Carbonatite	Schist	pyroclore			Hadrynian
97	093N 174	VIRGIL, BRENT	Carbonatite	Sovite	pyroclore	zircon	columbite	Proterozoic
98	094B 028	ALEY DYKES	Carbonatite	Dolomite	bastnaesite	barite		Mississippian
99	082KNE008	MALLOY CREEK	Placer	Gravel	uraninite	uranothorite	pyrochlore	Quaternary
100	082KNE007	VOWELL CREEK	Placer	Gravel	allanite	pyroclore	uraninite	Quaternary
101	082KNE023	UPPER BUGABOO	Placer	Gravel	uraninite	uranothorite	monazite	Quaternary
102	082KNE005	FORSTER	Placer	Gravel	uraninite	uranothorite	pyrochlore	Quaternary
103	082KNE006	EAST CREEK	Placer	Gravel	uraninite	uranothorite	monazite	Quaternary
104	082M 077	TRIDENT CR	Placer	Gravel	pyroclore	nepheline	sodalite	Quaternary
105	092HSW141	HOPE	Placer	Sand	unknown			Quaternary
106	092ISW092	LYTTON BAR	Placer	Sand	uraninite			Quaternary
107	093H 015	GOLD-THORIUM	Placer	Sand	unknown			Quaternary
108	093H 022	MCBRIDE	Placer	Sand	unknown			Quaternary
109	104N 061	RU	Placer	Gravel	unknown			Quaternary
110	104N 005	PURPLE ROSE	Vein	Alaskite	zeunerite	autunite	arsenopyrite	Cretaceous
111	104N 084	FISHER	Vein	Alaskite	zeunerite	wolframite	arsenopyrite	Cretaceous
112	104N 086	DIXIE, MONT	Vein	Alaskite	zeunerite	arsenopyrite	chalcopyrite	Cretaceous
113	104N 087	CY 4, WEIR MTN	Vein	Alaskite	kasolite	galena	sphalerite	Cretaceous
114	104N 113	MIR 3,RADON CIRQ.	Vein/Surfic.	Alaskite	beta-uranophane		galena	Cretaceous
115	104N 110	IRA	Vein	Alaskite	unknown			Cretaceous
116	104M 059	NET 3	Vein/Surfic.	Quartz monzonite	unknown			Cretaceous
117	093M 072	VICTORIA	Vein	Granodiorite	uraninite	autunite	allanite	Cretaceous
118	093M 067	RED ROSE	Vein	Granodiorite	uraninite	scheelite	ferberite	Cretaceous
119	093M 071	ROCHER DEBOULE	Vein	Granodiorite	uraninite	chalcopyrite	arsenopyrite	Cretaceous
120	092JNE068	LITTLE GEM, GEM	Vein	Granodiorite	uraninite	allanite	danaite	Eocene
121	093F 012	NITHI MT., ABE	Vein	Rhyolite	autunite	torbernite	sabugalite	Mesozoic
122	082FSW107	NOVELTY, GIANT	Vein	Hornfels	uraninite	molybdenite	arsenopyrite	Jurassic
123	093N 175	SMOKE	Vein	Alaskite	uraninite			Cretaceous
124	092ISW091	ROSYD, BOTANIE	Vein	Limestone	unknown			Cretaceous

APPENDIX 1 (cont.)

MAP NO[1]	MINFILE NUMBER	NAMES	DEPOSIT TYPE	HOST ROCK	SIGNIFICANT MINERALS			AGE
125	092K 052	RADIUM, SENATOR	Vein	Andesite	carnotite	chalcocite		Triassic
126	082KNE040	STAN, ANNETTE 55	Vein	Quartz monzonite	uraninite			Cretaceous
127	082ESW141	CONTACT LAKE, OLI	Vein/Surfic.	Quartz monzonite	unknown	thorite	zircon	Mesozoic
128	082ENW071	RIDDLE CREEK	Vein/Volc.	Trachyte/Syenite	unknown			Tertiary
129	082ESE218	PBE 14	Vein?	Syenite	uranophane			Cretaceous
130	082FSE003	CARIBOO	Vein	Schist	unknown	galena	sphalerite	Helikian
131	082FSW280	M.U.T.	Vein	Argillite	autunite	uranophane	molybdenite	Unknown
132	082KNE066	SLIDE, ICE 9	Vein	Quartz monzonite	uraninite	pyrochlore	euxenite	Cretaceous
133	092HSW030	INTERNATIONAL	Vein	Andesite	carnotite	galena	chalcopyrite	Cretaceous
134	092INE024	COPPER KING	Vein	Diorite	pitchblende	chalcopyrite	bornite	Jurassic
135	092ISW068	RAD	Vein	Shale	uraninite			Cretaceous
136	092ISW072	ORLEAN	Vein	Slate	metazeunerite			Cretaceous
137	092O 001	MOHAWK	Vein	Granodiorite	unknown	chalcopyrite	molybdenite	Cretaceous
138	093K 082	LOON	Vein	Rhyolite	unknown			Tertiary
139	093M 056	BLUE LAKE, CRO	Vein	Granodiorite	uraninite	ferberite	scheelite	Cretaceous
140	093M 057	BLACK PRINCE	Vein	Granodiorite	uraninite	ferberite	scheelite	Cretaceous
141	093M 070	HIGHLAND BOY	Vein	Granodiorite	uraninite	chalcopyrite	scheelite	Cretaceous
142	093M 074	GOLDEN WONDER	Vein	Argillite	uraninite	chalcopyrite	arsenopyrite	Jurassic
143	104N 006	BLACK DIAMOND	Vein	Alaskite	zeunerite			Cretaceous
144	104N 085	SNOWBIRD, MIR 8	Vein	Alaskite	kasolite	zeunerite		Cretaceous
145	104N 088	IRA 5	Vein	Alaskite	kasolite	fluorite		Cretaceous
146	104N 093	WMC	Vein	Alaskite	zeunerite			Cretaceous
147	104N 106	PATO 1	Vein	Alaskite	zeunerite			Cretaceous
148	104N 107	MISTAKE	Vein	Alaskite	zeunerite	arsenopyrite	galena	Cretaceous
149	104N 108	D&D, DAVE	Vein	Alaskite	kasolite			Cretaceous
150	104N 109	IRA 6	Vein	Alaskite	zeunerite			Cretaceous
151	104G 109	HEL	Stratabound	Conglomerate	saleeite	torbernite		Cretaceous
152	094E 097	EDOZADELLY MTN	Stratabound	Tuff	unknown	zeolite		Tertiary
153	094F 019	GREY PEAK, KECHIKA	Stratabound	Phosphate	fluorapatite			Ordovician
154	094F 003	SPA, STAG, RED	Stratabound	Shale	sulvanite	sphalerite	barite	Devonian
155	093H 036	LAD, UG, BOWRON R.	Stratabound	Shale/Coal	thucholite	coal		Tertiary
156	082LNE037	KAREN, ARCL	Stratabound	Schist	monazite	allanite	euxenite	Proterozoic
157	082GSE049	LIN 21	Stratabound	Quartzite	unknown	covellite	bornite	Helikian
158	082GSE065	COMMERCE	Stratabound	Quartzite	unknown	chalcopyrite		Helikian
159	082ESE219	PBE 18, U2	Stratabound	Conglomerate	uranophane			Jurassic
160	082GSE008	LIN 22	Stratabound	Quartzite	unknown	covellite	chalcocite	Helikian
161	082GSE011	LIN 20	Stratabound	Quartzite	unknown	covellite	bornite	Helikian
162	082GSE039	COMMERCE ZONE H	Stratabound	Quartzite	unknown	chalcopyrite		Helikian
163	082GSE040	COMMERCE ZONE D	Stratabound	Quartzite	unknown	chalcopyrite		Helikian
164	082GSE041	COMMERCE 3	Stratabound	Quartzite	unknown	chalcopyrite		Helikian
165	082GSE042	COMMERCE 4	Stratabound	Quartzite	unknown	chalcopyrite		Helikian
166	082LNE035	CAMERON-JENKINS 2	Stratabound	Gneiss	unknown			Paleozoic
167	082LNE038	MULVEHILL	Stratabound	Quartzite	unknown	rare earths		Paleozoic
168	082N 028	WATERLOO, COLTI	Stratabound	Limestone	unknown	sphalerite	galena	Cambrian
169	082N 044	KING DAVID	Stratabound	Shale	unknown	marcasite	pyrite	Ordovician
170	094E 038	TOR	Stratabound	Limestone	zircon	pyrite		Cambrian
171	094E 098	LAWYERS PASS	Stratabound	Tuff	unknown		zeolite	Tertiary
172	094L 017	REE	Stratabound	Syenite	phosphate	monazite		Paleozoic
173	104O 051	SHAR 6	Stratabound	Shale	unknown			Cambrian
174	104N 001	HUSSELBEE, BEAVER	Skarn	Amphibolite	uraninite	fluorite	galena	Permian
175	082FSW021	MOLLY	Skarn	Granite	uraninite	scheelite	molybdenite	Cretaceous
176	093J 001	SAMSON, GISCOME	Skarn	Gneiss	pyroclore	sphalerite	galena	Mississippian
177	082ENW036	CARMI MOLY, DOE	Breccia	Granodiorite	brannerite	fluorite	molybdenite	Eocene
178	092HSW001	GIANT COPPER, A.M.	Breccia	Argillite	uraninite	monazite	chalcopyrite	Jurassic
179	082ESW175	GYPO GREISEN	Greisen	Quartz monzonite	unknown			Jurassic
180	082FSE079	LUCKY	Unknown	Argillite	thorite			Helikian
181	082LNW063	SYPHON	Unknown	Granodiorite	unknown			Cretaceous
182	082LSW092	MARY ELLEN	Unknown	Quartz diorite	unknown			Jurassic

APPENDIX 2

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

Sorted by **MINFILE NUMBER**, with Map No., Name, Status, NTS, Mining Division, Latitude & Longitude, Commodity, and Assay

MINFILE NUMBER	MAP NO.	NAMES	STATUS[2]	NTS	MINING DIVISION	LATITUDE-LONGITUDE	ELEMENT OR[3] COMMODITY	RESERVES[4] OR ASSAY
082ENE015	5	FUKI	D	082E10W	Greenwood	49 32 30-118 53 00	U	0.5Mt 0.025%U
082ENE030	9	COLLIER, DONEN	S	082E10W	Greenwood	49 31 30-118 53 00	U	0.017%U/0.4m
082ENE041	2	CUP LAKE, DONEN	D	082E10W	Greenwood	49 35 40-118 54 00	U	2Mt 0.037%U
082ENE046	1	BLIZZARD, BEVERLY	D	082E10W	Greenwood	49 37 30-118 55 00	U	2Mt 0.18%U
082ENE047	8	LASSIE, DONEN 361	S	082E10W	Greenwood	49 35 55-118 55 30	U	0.03%eqU
082ENW036	177	CARMI MOLY, DOE	D	082E11E	Greenwood	49 31 05-119 10 00	Mo U Au Ag Cu	0.038%U/11m
082ENW051	4	HAYNES LAKE, PB	D	082E14E	Greenwood	49 45 20-119 07 35	U	1Mt 0.017%U
082ENW052	10	VENUS, PB,	S	082E14E	Greenwood	49 46 50-119 04 30	U	Radiometric
082ENW053	3	HYDRAULIC LK, TYEE	D	082E14E	Greenwood	49 47 45-119 23 05	U	2Mt 0.03%U
082ENW067	21	THE STINKHOLE	P	082E12E	Osoyoos	49 37 50-119 44 20	U	0.058%U/2m
082ENW068	25	FAULDER 3	S	082E12W	Osoyoos	49 38 57-119 45 25	U	0.015%U
082ENW069	26	JOHNSON'S SLOUGH	S	082E12W	Osoyoos	49 39 10-119 48 00	U	0.03%U
082ENW070	22	AGUR	S	082E12W	Osoyoos	49 33 45-119 47 30	U Mo	0.152%U
082ENW071	128	RIDDLE CREEK	S	082E12W	Osoyoos	49 32 40-119 52 00	U Th	0.04%Th
082ENW072	27	DEMUTH	S	082E12W	Osoyoos	49 41 00-119 59 20	U	0.093%U
082ENW073	17	PRAIRIE FLATS	D	082E12E	Osoyoos	49 35 30-119 42 20	U	178T U
082ENW074	28	IGNIMBRITE LAKE	S	082E12E	Osoyoos	49 37 45-119 41 05	U	0.016%U
082ENW075	29	WESTBENCH	S	082E12E	Osoyoos	49 30 40-119 38 30	U	0.03%U/0.5m
082ENW076	30	ENEAS	S	082E12E	Osoyoos	49 39 50-119 44 20	U	0.023%U/0.5m
082ENW077	31	CONTACT POOL	S	082E12E	Osoyoos	49 37 00-119 42 45	U	0.052%U/0.5m
082ENW078	32	THREE PEAK BASIN	S	082E12W	Osoyoos	49 39 50-119 45 40	U	0.06%U/0.5m
082ENW079	33	BALD HILLS	S	082E12W	Osoyoos	49 40 30-119 52 00	U	0.015%U/0.5m
082ENW080	34	MEADOW RIDGE	S	082E12W	Osoyoos	49 38 25-119 45 40	U	0.08%U/0.5m
082ENW081	35	TREPANIER	S	082E13W	Osoyoos	49 51 00-119 49 50	U	0.022%U/0.5m
082ENW082	36	WINN	S	082E14W	Osoyoos	49 59 45-119 25 00	U	0.012%U/0.5m
082ESE142	54	SD 7, RADAR	S	082E01W	Greenwood	49 07 20-118 23 25	U	0.033%U/2.7
082ESE143	63	SD 18 AND 20	S	082E01W	Greenwood	49 07 10-118 23 50	U	0.025%U/4.6m
082ESE144	64	SD 37	S	082E01W	Greenwood	49 06 30-118 23 05	U	Radiometric
082ESE145	65	SD 41	S	082E01W	Greenwood	49 05 55-118 23 00	U	Radiometric
082ESE195	66	SD 8	S	082E01W	Greenwood	49 07 20-118 23 00	U	Radiometric
082ESE205	67	KIWI, RADAR 3	S	082E01W	Greenwood	49 07 25-118 24 20	U	0.03%U/4m
082ESE218	129	PBE 14	S	082E01W	Greenwood	49 05 55-118 26 55	U	Mineral
082ESE219	159	PBE 18, U2	S	082E01W	Greenwood	49 05 10-118 26 50	U W	0.04%U
082ESE220	68	HO 16	S	082E01W	Greenwood	49 03 10-118 25 00	U	Mineral
082ESW139	6	BRENT LAKE, CLARK	S	082E05W	Osoyoos	49 29 20-119 46 00	U	1.5%U
082ESW141	127	CONTACT LAKE, OLI	S	082E04E	Osoyoos	49 11 10-119 34 40	U Th	0.05%Th
082ESW154	11	FARLEIGH LAKE	S	082E05W	Osoyoos	49 27 45-119 45 20	Th U	0.02%Th
082ESW164	18	COVERT BASIN	D	082E04E	Osoyoos	49 14 10-119 32 45	U	23T U
082ESW174	19	SINKING POND, SYN	D	082E04E	Osoyoos	49 11 50-119 35 20	U	23T U
082ESW175	179	GYPO GREISEN	S	082E04E	Osoyoos	49 11 50-119 33 30	Th U	Radiometric
082ESW176	7	SKAHA RESERVATION	S	082E05E	Osoyoos	49 27 00-119 38 30	Th U	0.03%Th
082ESW177	20	NORTH WOW FLAT	D	082E04E	Osoyoos	49 12 45-119 34 30	U	12T U
082ESW178	37	SOUTH WOW LAKE	P	082E04E	Osoyoos	49 12 30-119 34 35	U	0.08%U/0.5m
082ESW179	38	BURNELL POND	P	082E04E	Osoyoos	49 12 20-119 37 00	U	0.03%U/4m
082ESW181	39	POWERLINE	S	082E04E	Osoyoos	49 14 05-119 35 59	U	0.02%U/0.5m
082ESW182	40	HEART	S	082E04E	Osoyoos	49 13 00-119 34 55	U	0.084%U/0.5m
082ESW183	41	PURPLE	S	082E04E	Osoyoos	49 13 15-119 34 30	U	0.05%U/0.5m
082ESW184	42	POLVO	S	082E04E	Osoyoos	49 13 00-119 35 00	U	0.06%U/0.5m
082ESW185	43	RANCH LAKE	S	082E04E	Osoyoos	49 13 24-119 34 55	U	0.03%U/0.5m
082ESW186	44	MEYERS SWAMP	S	082E04E	Osoyoos	49 14 10-119 35 00	U	0.055%U/1.5m
082ESW187	45	KALEDEN	S	082E05E	Osoyoos	49 22 45-119 37 30	U	0.015%U/0.5m
082ESW188	46	NKWALA CASES	S	082E05E	Osoyoos	49 29 20-119 40 40	U	0.027%U/0.5m
082ESW189	69	ALLENDALE LAKE	S	082E06W	Osoyoos	49 23 35-119 21 03	U	Mineral
082FNW192	55	TRY AGAIN	S	082F11W	Slocan	49 42 00-117 26 00	U	0.043%U
082FNW244	70	CRYSTAL	S	082F11W	Nelson	49 33 00-117 18 30	Sl U	Mineral
082FSE003	130	CARIBOO	S	082F08E	Fort Steele	49 22 50-116 10 15	Pb Zn W U Ag	0.03%eqU
082FSE079	180	LUCKY	S	082F01W	Nelson	49 07 30-116 26 30	Th	Mineral
082FSW021	175	MOLLY	S	082F03E	Nelson	49 05 00-117 11 40	Mo W U	0.13% eqU
082FSW107	122	NOVELTY, GIANT	S	082F04W	Trail Creek	49 05 00-117 49 10	Au Mo Co U Bi Ag	0.20%U
082FSW212	56	MOTA, CHINA CREEK	S	082F04E	Trail Creek	49 14 00-117 42 00	U Th	0.02%U
082FSW252	71	ROMA	S	082F05E	Trail Creek	49 15 59-117 40 20	U Th	Radiometric
082FSW270	72	LUCKY-BILL-TAG	S	082F06W	Nelson	49 29 40-117 23 20	U	Mineral

APPENDIX 2 (cont.)

MINFILE NUMBER	MAP NO.	NAMES	STATUS[2]	NTS	MINING DIVISION	LATITUDE-LONGITUDE	ELEMENT OR[3] COMMODITY	RESERVES[4] OR ASSAY
082FSW271	73	GIBSON CREEK	S	082F05E	Nelson	49 22 50-117 38 10	U Th	0.09%U/0.6m
082FSW272	57	CRESCENT, LUCKY BOY	S	082F05E	Nelson	49 27 35-117 35 30	Nb Ta U Th Ti Y	5.8%U
082FSW273	74	U3O8, CHINA CREEK	S	082F04E	Trail Creek	49 14 10-117 41 30	U Th	0.015%U
082FSW275	75	JACKASS	S	082F06E	Nelson	49 28 05-117 33 10	U	Mineral
082FSW280	131	M.U.T.	S	082F03E	Nelson	49 04 35-117 11 22	Mo W U	0.002%U
082GSE008	160	LIN 22	S	082G01W	Fort Steele	49 02 29-114 16 25	Cu Ag U	Radiometric
082GSE011	161	LIN 20	S	082G01W	Fort Steele	49 02 50-114 16 00	Cu Ag U Mo	Radiometric
082GSE039	162	COMMERCE ZONE H	S	082G01W	Fort Steele	49 10 14-114 23 18	Cu Ag Au Mo U	Radiometric
082GSE040	163	COMMERCE ZONE D	S	082G01W	Fort Steele	49 09 37-114 24 02	Cu Ag Au Mo U	Radiometric
082GSE041	164	COMMERCE 3	S	082G01W	Fort Steele	49 10 23-114 20 42	Cu Ag Au Mo U	Radiometric
082GSE042	165	COMMERCE 4	S	082G01W	Fort Steele	49 10 35-114 21 05	Cu Ag Au Mo U	Radiometric
082GSE049	157	LIN 21	S	082G01W	Fort Steele	49 02 30-114 16 25	Cu Ag U Mo	Radiometric
082GSE065	158	COMMERCE	S	082G01W	Fort Steele	49 10 20-114 23 50	U Cu Ag Mo	0.06%U
082JSW018	94	ROCK CANYON CREEK	S	082J03E	Golden	50 13 00-115 08 40	FL Ba RE Th PP	0.075%Th
082KNE005	102	FORSTER	S	082K09E	Golden	50 39 00-116 23 30	U Nb RE Th	0.11%U
082KNE006	103	EAST CREEK	S	082K10W	Slocan	50 42 30-116 50 20	U Nb Th RE	Minerals
082KNE007	100	VOWELL CREEK	P	082K15W	Golden	50 50 00-116 48 00	U Nb Th RE	22g/m3 U
082KNE008	99	MALLOY CREEK	P	082K15W	Golden	50 52 20-116 52 50	U Nb Th RE	23g/m3 U
082KNE023	101	UPPER BUGABOO	P	082K10E	Golden	50 44 50-116 43 00	U Nb Th RE	0.18%U
082KNE040	126	STAN, ANNETTE 55	S	082K10E	Golden	50 38 15-116 31 15	U Mo W	1.7%U
082KNE066	132	SLIDE, ICE 9	S	082K09W	Golden	50 37 40-116 27 50	U Nb Th RE V	0.022%U
082KSW109	76	STA-TITE	S	082K04E	Slocan	50 12 20-117 55 40	U Th	0.008%U
082LNE020	77	CRAN 3	S	082L16E	Revelstoke	50 45 35-118 01 45	U	0.08%U
082LNE033	58	CRAN 2	S	082L16E	Revelstoke	50 46 50-118 02 20	U	0.3%U/8cm
082LNE034	78	CRAN 4	S	082L09E	Revelstoke	50 44 15-118 00 20	U	0.03%U/5m
082LNE035	166	CAMERON-JENKINS #2	S	082L16E	Revelstoke	50 46 20-118 06 20	Th U	NA
082LNE036	79	CAMERON-JENKINS #1	S	082L16E	Revelstoke	50 47 40-118 04 30	Th U	NA
082LNE037	156	KAREN, ARCL	S	082L16E	Revelstoke	50 50 30-118 06 00	Th Ce RE U	0.06%Th
082LNE038	167	MULVEHILL	S	082L16E	Revelstoke	50 51 20-118 07 20	Th Sl	Radiometric
082LNW062	80	JEN JEN	S	082L11W	Kamloops	50 41 35-119 24 00	U	Radiometric
082LNW063	181	SYPHON	S	082L11W	Kamloops	50 43 20-119 23 05	U	Geochemical
082LSE005	12	VAL, VIDLER	S	082L02W	Vernon	51 11 55-118 53 30	U	Radiometric
082LSE015	59	BEARCUB, SPAR	P	082L02W	Vernon	50 14 46-118 48 33	FD U Th RE	0.037%U
082LSE019	81	SH, AS	S	082L07W	Vernon	50 19 00-118 50 10	U	Mineral
082LSW064	82	BRETT-BIRD	S	082L06E	Vernon	50 28 45-119 06 20	MI U	Mineral
082LSW082	23	BALD	S	082L04E	Vernon	50 03 55-119 31 40	U	0.13%U/.3m
082LSW092	182	MARY ELLEN	S	082L03W	Vernon	50 08 00 119 26 30	Th U	NA
082M 021	13	REXSPAR	D	082M12W	Kamloops	51 33 40-119 54 40	U Th FL Ce La	1Mt 0.065%U
082M 022	14	G ZONE	S	082M12W	Kamloops	51 34 20-119 53 50	Mo U Th FL	0.012%U/18m
082M 034	15	BULLION	S	082M12W	Kamloops	51 34 30-119 51 35	U Th	0.03%U/1.5m
082M 043	16	FOGHORN CREEK MOLY	S	082M12W	Kamloops	51 33 30-119 54 50	Mo Pb FL U	0.02%U/3.5m
082M 077	104	TRIDENT CR	S	082M16E	Golden	51 57 00-118 03 40	Nb U Th	Mineral
082M 231	83	HARBOUR	S	082M11E	Kamloops	51 36 00-119 09 40	U	0.014%U
082N 027	60	BOW, DEMON	S	082N01W	Golden	51 11 40-116 21 00	Ti Th Nb RE U Fe	0.02%U
082N 028	168	WATERLOO, COLTI	S	082N01W	Golden	51 10 00-116 22 55	Ag Pb Zn Cu U	0.06%U
082N 044	169	KING DAVID	S	082N07W	Golden	51 18 10-116 53 10	Ge U ZR Pt	0.03%U
083D 005	92	VERITY, LEMPRIERE	P	083D06E	Kamloops	52 23 55-119 09 25	Nb Ta U RE	0.095%U/1.1m
083D 036	95	BONE CR, GUM CR	S	083D06E	Kamloops	52 17 55-119 09 55	Nb Ta U PP	0.02%U
083D 037	96	AEG, MUD LAKE	S	083D03E	Kamloops	52 08 00-119 11 00	Nb U	0.012%U
092HSW001	178	GIANT COPPER, A.M.	S	092H03E	New West.	49 09 50-121 01 25	Cu Mo Ag Au U	0.052%eqU
092HSW030	133	INTERNATIONAL	S	092H03E	New West.	49 00 30-121 08 30	Pb Cu Au Ag U	Mineral
092HSW110	84	BEE, BELL	S	092H05W	New West.	49 16 40-121 47 40	U Cu Co	0.017%U/2m
092HSW141	105	HOPE	S	092H06W	New West.	49 24 00-121 26 00	U	0.2%eqU
092INE024	134	COPPER KING	S	092I10E	Kamloops	50 42 30-120 36 10	Cu Au Ag U Fe	Mineral
092INE168	48	RUB	S	092I09E	Kamloops	50 34 25-120 08 40	U	0.014%U/0.5m
092INE169	47	VICARS PASS	S	092I09W	Kamloops	50 31 35-120 28 30	U	0.022%U/0.5m
092ISE124	85	COPPERADO-A6	S	092I02E	Nicola	50 11 50-120 36 00	U	0.002%eqU
092ISW068	135	RAD	S	092I05E	Kamloops	50 15 35-121 33 45	U	0.038%U
092ISW072	136	ORLEAN	S	092I05E	Kamloops	50 18 40-121 38 30	U Cu	0.0045%eqU
092ISW091	124	ROSYD, BOTANIE	S	092I05E	Kamloops	50 15 00-121 34 00	U	0.053%U
092ISW092	106	LYTTON BAR	S	092I05E	Kamloops	50 15 00-121 35 40	U	Mineral
092JNE055	86	INDEX, MOLY	S	092J09E	Lillooet	50 31 35-122 00 10	Mo Au U	0.007%eqU

APPENDIX 2 (cont.)

MINFILE NUMBER	MAP NO.	NAMES	STATUS[2]	NTS	MINING DIVISION	LATITUDE-LONGITUDE	ELEMENT OR[3] COMMODITY	RESERVES[4] OR ASSAY
092JNE068	120	LITTLE GEM, GEM	P	092J15W	Lillooet	50 53 45-122 57 20	Co Au U Mo	0.39%U/36m
092K 052	125	RADIUM, SENATOR	S	092K03W	Nanaimo	50 07 00-125 16 00	V U Cu	24.5%U
092O 001	137	MOHAWK	S	092O03W	Clinton	51 05 45-123 23 20	Cu Au Ag Mo U	0.016%eqU
093D 012	87	PROMISE WELL	S	093D04E	Skeena	52 06 22-127 44 51	Fe Cu U	0.007%eqU
093F 012	121	NITHI MT, ABE, MOLLY	S	093F15W	Omineca	53 59 02-124 51 41	Mo U	0.14%U
093H 015	107	GOLD-THORIUM	S	093H13E	Cariboo	53 57 20-121 39 00	Th U	Radiometric
093H 022	108	MCBRIDE	S	093H08E	Cariboo	53 17 50-120 07 40	Th	Radiometric
093H 036	155	LAD, UG, BOWRON R.	S	093H13W	Cariboo	53 48 21-121 52 40	CL U Ge Mo V	0.009%eqU
093J 001	176	SAMSON, GISCOME	S	093J01W	Cariboo	54 04 17-122 19 44	Zn Pb Ag Nb U	8%Nb
093K 082	138	LOON	S	093K03E	Omineca	54 10 20-125 07 20	U Au	0.0025%U
093M 056	139	BLUE LAKE	S	093M04E	Omineca	55 10 00-127 34 00	W Cu Mo U Ag	0.004%eqU
093M 057	140	BLACK PRINCE	S	093M04E	Omineca	55 10 15-127 33 30	W Cu Mo Sn U Ag	0.039%eqU
093M 067	118	RED ROSE	S	093M04E	Omineca	55 08 20-127 36 00	W Cu Mo Au Ag U	0.41%eqU
093M 070	141	HIGHLAND BOY	S	093M04E	Omineca	55 09 50-127 36 50	Cu W U Sn Ag Au	0.015%eqU
093M 071	119	ROCHER DEBOULE	S	093M04E	Omineca	55 09 35-127 38 30	Cu Au Ag U Co	0.21%eqU
093M 072	117	VICTORIA	S	093M04E	Omineca	55 10 20-127 39 00	Au Co U Mo Cu	0.16%eqU/0.9m
093M 074	142	GOLDEN WONDER	S	093M04E	Omineca	55 10 30-127 42 55	Cu Ag Au Sn U	0.08%eqU
093N 012	93	LONNIE, GRANITE CR	P	093N09W	Omineca	55 40 47-124 22 54	Nb ZR Ti U Th	Mineral
093N 174	97	VIRGIL, BRENT	S	093N09W	Omineca	55 42 40-124 25 05	Nb ZR Ti U RE	Mineral
093N 175	123	SMOKE	S	093N11W	Omineca	55 35 00-125 19 00	U	0.12%U
093N 201	88	WILL	S	093N09E	Omineca	55 34 26-124 00 17	Th RE	0.13%Th
093O 021	61	LAURA	S	093O12W	Omineca	55 31 19-123 56 21	Th RE	0.305%Th
093O 041	89	URSA	S	093O05W	Omineca	55 29 49-123 57 45	Th RE	0.25%Th
094B 028	98	ALEY DYKES	S	094B05E	Omineca	56 27 58-123 44 51	RE Th Sr Ba	0.084%Th
094E 038	170	TOR	S	094E08E	Omineca	57 18 00-126 01 30	Hf	Radiometric
094E 097	152	EDOZADELLY MTN	S	094E05E	Liard	57 22 10-127 30 00	U	0.038%U
094E 098	171	LAWYERS PASS	S	094E06W	Omineca	57 18 30-127 22 00	U	0.038%U
094F 003	154	SPA, STAG, RED	S	094F13E	Liard	57 57 45-125 44 00	Zn Ba V Ag U Fe	0.008%U
094F 019	153	GREY PEAK, KECHIKA	S	094F14E	Omineca	57 48 00-125 12 30	PP U	0.02%U
094L 017	172	REE	S	094L12W	Liard	58 43 35-127 32 42	Y RE PP Th	0.3%Th
094M 022	49	LIARD HOTSPRINGS	S	094M08E	Liard	59 25 40-126 10 00	Rn HS	Radiometric
094N 001	50	WISHING WELL	S	094N12W	Liard	59 30 40-125 57 00	Rn HS U	Radiometric
104A 096	62	STEWART	S	104A04E	Skeena	56 06 00-129 31 00	U Th	0.1%U
104G 109	151	HEL	S	104G11W	Liard	57 38 53-131 27 47	U	0.084%U/2m
104M 058	90	NET 6	S	104M15W	Atlin	59 54 50-134 56 30	U Th	0.034%U
104M 059	116	NET 3	S	104M15W	Atlin	59 55 00-134 58 40	Ag U Th Mo W	Radiometric
104M 060	91	JONES	S	104M14W	Atlin	59 58 00-135 19 20	U Th	0.027%U
104N 001	174	HUSSELBEE, BEAVER	S	104N12W	Atlin	59 42 20-133 51 30	U Th FL Pb Mo	0.12%U
104N 005	110	PURPLE ROSE	S	104N11W	Atlin	59 43 20-133 18 55	U Cu Ag Th FL	0.075%U
104N 006	143	BLACK DIAMOND	S	104N11W	Atlin	59 41 49-133 24 13	W Au Cu Mo U	Mineral
104N 061	109	RU	S	104N11W	Atlin	59 40 10-133 20 00	U	0.02%U
104N 084	111	FISHER	S	104N11W	Atlin	59 42 30-133 26 20	U Cu W	0.064%U
104N 085	144	SNOWBIRD, MIR 8	S	104N10W	Atlin	59 41 05-132 53 00	U Pb	0.384%U
104N 086	112	DIXIE, MONT	S	104N11E	Atlin	59 36 05-133 11 15	U Cu FL	0.105%U
104N 087	113	CY 4, WEIR MTN	S	104N10W	Atlin	59 39 45-132 59 20	U Zn Pb	0.15%U
104N 088	145	IRA 5	S	104N14W	Atlin	59 46 50-133 16 00	U Cu FL As	0.005%U
104N 093	146	WMC	S	104N11W	Atlin	59 42 50-133 16 00	U	Mineral
104N 106	147	PATO 1	S	104N11W	Atlin	59 43 50-133 18 50	U Cu As	0.09%U
104N 107	148	MISTAKE	S	104N11W	Atlin	59 44 50-133 18 00	Ag U Au Pb	0.04%U
104N 108	149	D&D, DAVE	S	104N14W	Atlin	59 45 45-133 16 20	U	0.003%U
104N 109	150	IRA 6	S	104N14W	Atlin	59 46 00-133 16 00	U	Mineral
104N 110	115	IRA	S	104N14W	Atlin	59 47 30-133 15 20	U	0.04%U
104N 111	51	CX 2	S	104N10W	Atlin	59 37 50-132 50 00	U	0.048%U
104N 112	24	MIR 7, DELTA POOL	S	104N10W	Atlin	59 38 20-132 49 30	U Cu Pb Zn Ag	0.11%U
104N 113	114	MIR 3, RADON CIRQUE	S	104N10W	Atlin	59 39 00-132 50 00	Ag Pb Zn U Th	0.055%U
104N 114	52	CX	S	104N10W	Atlin	59 41 00-132 47 00	U	0.14%U
104N 115	53	TUPA	S	104N14E	Atlin	59 49 10-133 08 20	U	0.15%U
104O 051	173	SHAR 6	S	104O11W	Atlin	59 39 00-131 08 00	U Cu FL	0.009%U

APPENDIX 3

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

Sorted by **NAME**, with Map No., NTS, Geology, and References

NAMES	MAP NO.	NTS	GEOLOGY	REFERENCES[5]
AEG, MUD L.	96	083D03E	Carbonatite within gneiss contains pyrochlore.	BCAS 7783
AGUR	22	082E12W	Uraniferous soils occur in a postglacial lake.	BCAS 6768
ALEY DYKES	98	094B05E	Rare earths and thorium occur in barite-rich carbonatite dikes.	BCOF 1987-17;BCFW 1986-283
ALLENDALE	69	082E06W	Betafite and cyrtolite occur in pegmatite within syenite.	GSC P 77-1-31
BALD	23	082L04E	A uraniferous organic bog overlies quartz monzonite.	BCAS 7973
BALD HILLS	33	082E12W	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
BEARCUB, SPAR	59	082L02W	Radioactive minerals and rare earths occur in pegmatite within gneiss.	BCGM 1971-431;BCAS 3434
BEE, BELL	84	092H05W	Disseminated uraninite occurs in pegmatite within granodiorite.	BCAS 6790
BLACK DIAMOND	143	104N11W	Zeunerite occurs in veins within quartz monzonite.	BCPM 52
BLACK PRINCE	140	093M04E	Mineralized vein-shears occur in porphyritic granodiorite.	GSC MEM 223R-30
BLIZZARD	1	082E10W	Sedimentary paleochannel deposit, capped by basalt, overlies granite.	BCPR 1979-6;CMJ Apr.1979
BLUE LAKE	139	093M04E	Mineralized veins occur in Rocher Déboulé porphyritic granodiorite.	GSC MEM 223R-32;BCBL 43
BONE CR	95	083D06E	Carbonatite in gneiss contains uranium and niobium minerals.	BCAS 9566,10274,11130
BOW, DEMON	60	082N01W	Pegmatite in nepheline syenite contains uranium, niobium, rare earths.	BCAR 1954-150;BCAS 3389
BRENT LAKE	6	082E05W	Radioactive coal patches in conglomerate and greywacke.	BCAS 7851
BRETT-BIRD	82	082L06E	Uraninite is disseminated in mica-pegmatite within schist.	BCAR 1950-226;GSC EG 16
BULLION	15	082M12W	Radioactive minerals occur in trachyte within metavolcanics.	BCAS 7503;BCAR 1968-164
BURNELL POND	38	082E04E	Postglacial lacustrine-playa, closed basin with uranium-enriched clays.	BCAS 7398
CAMERON-JEN 1	79	082L16E	Stratiform thorium and uranium apparently occur in gneiss.	GSC OF 658
CAMERON-JEN 2	166	082L16E	Uranium and thorium apparently occur in pegmatites within schist.	GSC OF 658
CARIBOO	130	082F08E	Quartz veins cut schist, contain Pb-Zn-W minerals and are radioactive.	BCGM 1969-347
CARMI MOLY	177	082E11E	Brannerite disseminated in granodiorite. Molybdenite in brecciated zones.	BCAS 5203;BCGL 1975-37
COLLIER	9	082E10W	Miocene sediment paleochannel, capped by basalt, overlies intrusives.	BCAS 8105
COMMERCE	158	082G01W	Uranium and copper minerals occur in argillite, quartzite and sandstone.	BCAS 6398
COMMERCE 3	164	082G01W	Uranium and copper minerals occur in argillite, quartzite and sandstone.	BCAS 4535, 6398
COMMERCE 4	165	082G01W	Uranium and copper minerals occur in argillite, quartzite and sandstone.	BCAS 4535, 6398
COMMERCE D	163	082G01W	Uranium and copper minerals occur in argillite, quartzite and sandstone.	BCAS 4535, 6398
COMMERCE H	162	082G01W	Uranium and copper minerals occur in argillite, quartzite and sandstone.	BCAS 4535, 6398
CONTACT LAKE	127	082E04E	Radioactive quartz monzonite in metaseds. Uranium-rich surface soils.	BCAS 6949, RCUM
CONTACT POOL	31	082E12E	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
COPPER KING	134	092I10E	A shear zone within diorite contains pitchblende and chalcopyrite.	BCPM 22, #40
COPPERADO-A6	85	092I02E	Radioactive allanite occurs in pegmatite within granodiorite.	BCAR 1949-120
COVERT BASIN	18	082E04E	Fluviatile surficial deposit in peaty layers within sand and clay.	CJES 1984-559 V.21
CRAN 2	58	082L16E	Uraninite associated with biotite occurs in pegmatite within gneiss.	BCAS 6816
CRAN 3	77	082L16E	Radioactive minerals are disseminated in pegmatite within granite.	BCAS 6816
CRAN 4	78	082L09E	Radioactive minerals occur in pegmatite with gneiss.	BCAS 6816
CRESCENT	57	082F05E	Pegmatite-greisen in syenite contain dissem. black radioactive minerals.	BCAR 1956-77;BCAS 14652
CRYSTAL	70	082F11W	Pegmatite in granite has a quartz core and feldspar rim with euxenite.	BCAR 1964-206;BCAS 8121
CUP LAKE	2	082E10W	Structure-controlled paleochannel, capped by basalt, overlies intrusives.	BCAS 8105;BCPR 1979-6
CX	52	104N10W	Radioactive organic-rich lacustrine sediments overlie quartz monzonite.	BCAS 6448
CX 2	51	104N10W	Radioactive organic-rich lacustrine sediments overlie quartz monzonite.	BCAS 6448
CY 4, WEIR MT	113	104N10W	Mineralized quartz veins occur in alaskite of the Surprise Lake batholith.	BCAS 6898;BCFW 1978-106
DEMUTH	27	082E12W	Uraniferous soils in a 1000 by 500 metre area.	BCAS 7301
DIXIE, MONT	112	104N11E	Zeunerite in fractures occurs in alaskite of the Surprise Lake batholith.	BCAS 6467
D&D, DAVE	149	104N14W	Kasolite in a quartz vein occurs in Surprise Lake alaskite.	BCAS 7456
EAST CREEK	103	082K10W	Placers contain uranium and niobium minerals from Bugaboo batholith.	GSC MEM 369-92,117
EDOZADELLY MT	152	094E05E	Zeolitic and red altered tuff of the Brothers Peak Fm. is radioactive.	GSC P 81-1A p241
ENEAS	30	082E12E	Uranium enrichment occurs in surficial soils along a valley.	GSC OF 551, RCUM
FARLEIGH LAKE	11	082E05W	Radioactive pink grit in wacke-shale lenses in lower sequence of volcanic.	BCAS 7185;BCFW 1983-15
FAULDER 3	25	082E12W	Uraniferous sediments in lakes.	BCAS 6575
FISHER	111	104N11W	Mineralized shear zones occur in kaolinized alaskite.	BCAR 1955-7
FOGHORN CR	16	082M12W	Radioactive minerals occur in trachyte within metavolcanics.	BCAS 4957
FORSTER	102	082K09E	Placers with uranium and niobium minerals from Horsethief batholith.	GSC MEM 369;GSC EG16R,18
FUKI	5	082E10W	Miocene paleochannel, capped by basalt, overlies andesite and trachyte.	BCAS 8105;BCPR 1979-6
G ZONE	14	082M12W	Uranium occurs with moly and fluorite in trachyte within metavolcanics.	BCPF Pisani, 1970
GIANT COPPER	178	092H03E	A mineralized body occurs in a pipe-like zone of brecciated sediments.	BCAR 1949-210;1954-152
GIBSON CREEK	73	082F05E	Pegmatite in granite contains disseminated uraninite.	BCAR 1955-50
GOLDEN WOND	142	093M04E	A mineralized shear zone occurs in black argillite.	GSC MEM 223R-44
GOLD-THORIUM	107	093H13E	Placer black-sand is radioactive, likely attributable to thorium.	GSC EG 16-45;BCPM 22
GREY PEAK	153	094F14E	Phosphorite with uranium occurs in banded limestone.	GSC P 79-1A p219
GYPO GREISEN	179	082E04E	Radioactive greisen in footwall of quartz vein in quartz monzonite.	BCAS 6949;BCFW 1983-246
HARBOUR	83	082M11E	Radioactive minerals occur in pegmatite with gneiss.	BCAS 7688

APPENDIX 3 (cont.)

NAMES	MAP NO.	NTS	GEOLOGY	REFERENCES[5]
HAYNES LAKE	4	082E14E	Paleochannel sediments, capped by basalt, overlie gneiss and intrusive.	BCAS 4629;BCGL 1977-12
HEART	40	082E04E	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
HEL	151	104G11W	Uranium minerals occur in conglomerate and sandy & organic material.	BCAS 7708;GSC P82-1A-438
HIGHLAND BOY	141	093M04E	Mineralized veins occur in Rocher Déboulé porphyritic granodiorite.	GSC MEM 223R-47
HO 16	68	082E01W	Uraninite occurs in pegmatites within interlayered gneisses.	BCAS 3172
HOPE	105	092H06W	Radioactive black-sand occurs near Hope.	GSC EG 16-45
HUSSELBEE	174	104N12W	Disseminated uraninite occurs in amphibolite.	BCAS 2786;BCAR 1953-79
HYDRAULIC LK	3	082E14E	Conglomerate paleochannel overlies layered gneisses and intrusives.	EG 1982;BCPR 1979-6
IGNIMBRITE LK	28	082E12E	Surficial uraniferous layered brine.	BCAS 6575
INDEX	86	092J09E	Molybdenite and minor uraninite occur in shears in granodiorite.	BCAR 1949-113
INTERNATIONAL	133	092H03E	Carnotite occurs with sulphides in a vein within andesite.	BCAR 1938-F22
IRA	115	104N10W	Structure controlled minerals in skarn occur in Surprise Lake alaskite.	BCAS 6426
IRA 5	145	104N14W	Kasolite in quartz veins occurs in alaskite of the Surprise Lake batholith.	BCAS 7598
IRA 6	150	104N14W	Zeunerite occurs in alaskite of the Surprise Lake batholith.	BCAS 6885
JACKASS	75	082F06E	Dissem. uraninite assoc. with biotite occurs in pegmatite within granite.	BCAS 7132;BCPF:Addie1977
JEN JEN	80	082L11W	Radioactivity along granodiorite/schist contact, cut by pegmatite.	BCAS 6982
JOHNSON'S SL.	26	082E12W	A slough contains uraniferous marshes with anomalous soils.	BCAS 6575
JONES	91	104M14W	Radioactive pegmatite occurs in quartz monzonite.	BCAS 7321
KALEDEN	45	082E05E	Uranium enrichment occurs in organic-rich surficial soils.	GSC OF 551, RCUM
KAREN, ARCL	156	082L16E	Radioactive weathered muscovite schist zone with Th, U and rare earths.	BCAS 7232,11697
KING DAVID	169	082N07W	Carbonaceous shale with pyrite and marcasite contain uranium values.	BCAS 184;BCAR 1958-72
KIWI, RADAR	67	082E01W	Uraninite occurs with biotite in pegmatite and secondaries in fractures.	BCAS 6449,7621
LAD, UG	155	093H13W	Radioactivity occurs in coal, shale, conglomerate and greenstone.	BCAS 4438;BCAR 1960-238
LASSIE, DONEN	8	082E10W	Radioactivity in capping basalt overlying metamorphic and igneous rocks.	BCAS 5982
LAURA	61	093O12W	Rare earths and thorium occur in pegmatite, within altered alkalic gneiss.	BCAS 17872; BCFW 1989-300
LAWYERS PASS	171	094E06W	Zeolitic and red altered tuff of the Brothers Peak Fm. is radioactive.	GSC P 81-1A p241
LIARD HOTSPRG	49	094M08E	Radioactive water and tufa likely contain radon gas.	BCPM 22, #61
LIN 20	161	082G01W	Radioactivity occurs with copper minerals within argillite and quartzite.	BCAS 6521,7678
LIN 21	157	082G01W	Radioactivity occurs with copper minerals within argillite and quartzite.	BCAS 7678
LIN 22	160	082G01W	Radioactivity occurs with copper minerals within quartzite and argillite.	BCAS 7678
LITTLE GEM	120	092J15W	Uranium-gold-cobalt minerals occur in a vein-shear within granodiorite.	BCAR 1948-112; GSC EG 16
LONNIE	93	093N09W	A carbonatite-syenite complex contains niobium and uranium minerals.	BCAS 10729;BCAR 1955-29
LOON	138	093K03E	Secondary uranium occurs in shears within silicified & brecciated rhyolite.	BCAS 7289
LUCKY	180	082F01W	Thorite is reported to occur in metasediments.	GSC EG 16,1962-234
LUCKY-BILL-TAG	72	082F06W	Pegmatite within granite contains uraninite.	GSC EG 16,1962-234
LYTTON BAR	106	092I05E	Radioactive black-sands occur along the west side of the Fraser River.	BCAR 1948-180
MALLOY CREEK	99	082K15W	Placers contain uranium and niobium minerals from Bugaboo batholith.	GSC EG 16R-198;BCPF
MARY ELLEN	182	082L03W	Unavailable.	GSC OF Map 637
MEADOW RIDGE	34	082E12W	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
MEYERS SWAMP	44	082E04E	Uranium enrichment occurs in surficial soils overlying sands.	GSC OF 551, RCUM
MCBRIDE	108	093H08E	Placer sand is radioactive, probably due to thorium.	GSC EG 16R-235:BCPM 22
MIR 3	114	104N10W	Autunite in veins occurs in alaskite of the Surprise Lake Batholith.	BCAS 6776;BCFW 1978-106
MIR 7	24	104N10W	Uranium values occur in alaskite. Radioactive springs are nearby.	BCAS 6905;BCFW 1978-106
MISTAKE	148	104N11W	Mineralized veins occur shear zones within alaskite.	BCAS 7480
MOHAWK	137	092O03W	Quartz veins with rutile, fluorapatite and powellite occur in granodiorite.	GSC EG 16-44 EG 16
MOLLY	175	082F03E	Uraninite disseminated within granite near skarn.	GSC EG 16,1952-45
MOTA	56	082F04E	Disseminated radioactive minerals in pegmatite within gneiss.	BCAS 6006;BCAR 1968-239
MULVEHILL	167	082L16E	Radiometric zone(500m) in quartzitic schist/conglomerate.	BCIM File:Hanna,1981
M.U.T.	131	082F03E	Autunite or uranophane occur in fractures within argillites.	BCAS 7041;BCEX 1978-49
NET 3	116	104M15W	Radioactive fractures occur in quartz monzonite. Soil assay - 0.46% U.	BCAS 7417
NET 6	90	104M15W	Radioactive aplite and pegmatite dikes occur in quartz monzonite.	BCAS 6882
NITHI MT, ABE	121	093F15W	Uranium minerals occur in fractures along a dike within quartz monzonite.	BCAR 1955-28;BCAS 10314
NKWALA CASES	46	082E05E	Uranium enrichment occurs in surficial soils along a 3 km trend.	GSC OF 551, RCUM
NORTH WOW	20	082E04E	Postglacial lacustrine-playa closed basin with uranium-rich clay deposit.	CJES 1984-559 V.21
NOVELTY	122	082F04W	Fractures in siliceous hornfels contain uraninite.	BCBL 74-49
ORLEAN	136	092I05E	Metazeunerite occurs in fractures within black slate.	BCAR 1955-33
PATO 1	147	104N11W	A shear zone within alaskite contains zeunerite.	BCAS 6469
PBE 14	129	082E01W	Uranophane is reported to occur in syenite.	BCAS 3172
PBE 18, U2	159	082E01W	Radioactive rusty zone in sharpstone conglomerate contains uranophane.	BCAS 3172,6695
POLVO	42	082E04E	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
POWERLINE	39	082E04E	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
PRAIRIE FLATS	17	082E12E	Postglacial fluviatile collector basin with uraniferous organic-rich fill	CJES 1984-559 V.21

APPENDIX 3 (cont.)

NAMES	MAP NO.	NTS	GEOLOGY	REFERENCES[5]
PROMISE WELL	87	093D04E	Radioactive pegmatite intrudes mineralized skarn.	BCAR 1953-166
PURPLE	41	082E04E	A uranium-enriched layer is overlain by a hard gypsum layer.	GSC OF 551, RCUM
PURPLE ROSE	110	104N11W	A shear zone in alaskite contains uranium minerals in veins.	BCAS 6469;BCAR 1955-7
RAD	135	092I05E	Radioactive shears occur within shale.	BCAS 6118;GCNL #107,1976
RADIUM	125	092K03W	Carnotite occurs in fractures within amygdaloidal augite andesite.	GSC EG 11-139;BCPF 16
RANCH LAKE	43	082E04E	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
RED ROSE	118	093M04E	Mineralized vein-shears occur in Rocher Déboulé granodiorite.	GSC MEM 223R-55;EG 16-42
REE	172	094L12W	Rare earths and thorium occur in apatite-rich sheared syenite.	BCAR 16420;BCFW 1988-417
REXSPAR	13	082M12W	Stratabound uranium in trachyte assoc. with fluorphlogopite replacement.	BCGL 1977;MJ Oct3/75
RIDDLE CREEK	128	082E12W	Radioactive trachytic flows and radioactive veins in syenite.	BCAS 6750;BCFW 1981-17
ROCHER DEBOU	119	093M04E	Mineralized vein-shears cut Rocher Déboulé porphyritic granodiorite.	GSC MEM 223R-57;EG 16-42
ROCK CANYON	94	082J03E	Altered carbonate rocks with fluorite contain rare earths and thorium.	BCAS 14677;BCFW 1988-473
ROMA	71	082F05E	Disseminated uraninite occurs in pegmatite within Castlegar gneiss.	BCAS 6623;BCEX 1978-54
ROSYD	124	092I05E	Radioactive stringers occur in a shear zone within limestones.	BCAR 1955-34
RU	109	104N11W	Radioactive paleochannel gravels overlie alaskite and underlie basalt.	BCAS 6923
RUB	48	092I09W	Uranium enrichment occurs in organic-rich surficial soils.	GSC OF 551, RCUM
SAMSON	176	093J01W	Pyroclore and sphalerite occur in skarn within gneiss.	BCAS 4907
SD 18 AND 20	63	082E01W	Uraninite occurs with biotite in pegmatite and secondaries in fractures.	BCAS 3172,7621
SD 37	64	082E01W	Uraninite is associated with pegmatite in biotite gneisses.	BCAS 3172
SD 41	65	082E01W	Uraninite is associated with biotite clots in pegmatite in biotite gneiss.	BCAS 3172
SD 7, RADAR	54	082E01W	Uraninite occurs with biotite in pegmatite and secondaries in fractures.	BCAS 3172,7621;BCGM 1970
SD 8	66	082E01W	Uraninite is associated with biotite clots in pegmatite in biotite gneiss.	BCAS 3172,5585
SH, AS	81	082L07W	Uraninite occurs in pegmatite within schist and gneiss.	BCGM 73-101
SHAR 6	173	104O11W	Radioactive graphic shale up to 3.5 m wide is enclosed within quartzite.	BCAS 8271
SINKING POND	19	082E04E	Postglacial lacustrine-playa closed basin with uraniferous clay deposits.	BCAS 7670
SKAHA RES.	7	082E05E	Radioactive pink grit unit in the lower part of a volcanic sequence.	BCAS 6750;BCFW 1978-12
SLIDE	132	082K09W	Uranium occurs in veins within quartz monzonite of the Horsethief bath.	BCEX 1976-49;BCAS 4614
SMOKE	123	093N11W	Alaskite intruding granite contains veins with uranium values.	BCAS 5372
SNOWBIRD	144	104N10W	Uranium minerals occur in alaskite of the Surprise Lake batholith.	BCAS 6509;BCFW 1978-106
SOUTH WOW LK	37	082E04E	Postglacial, lacustrine-playa, closed basin with uranium rich clays.	BCAS 6360,6949
SPA, STAG	154	094F13E	Radioactive gossan overlies shale.	GSC EG 27-49
STAN	126	082K10E	Uranium occurs in veins within quartz monzonite of the Horsethief bath.	BCAS 7048
STA-TITE	76	082K04E	Uranium and thorium occur in pegmatite within schist and gneiss.	BCAR 1954-142
STEWART	62	104A04E	Uraninite and cyrtolite occur in muscovite-biotite pegmatite.	GSC P 79-1A p397
SYPHON	181	082L11W	Uranium occurs in granodiorite which intrudes metamorphic rocks.	BCAS 7319
THE STINKHOLE	21	082E12E	Postglacial, lacustrine-playa closed basin with muds enriched in uranium.	BCAS 6575
THREE PK BASN	32	082E12W	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
TREPANIER	35	082E13W	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
TOR	170	094E08E	Radioactive silicified limestone contains pyrite and zircon.	BCAS 218
TRIDENT CR	104	082M16E	Placer U, Th and Nb are probably derived from nepheline syenite.	BCAR 1959-104;BCPF
TRY AGAIN	55	082F11W	Quartz-pegmatite within granite contains dissem. allanite and fergusonite.	BCAR 1955-65
TUPA	53	104N14E	Radioactive soils overlie alaskite of the Surprise Lake batholith.	BCAS 6908
U3O8	74	082F04E	Disseminated uraninite occurs in pegmatite within Castlegar gneiss.	BCAS 6006;BCEX 1976-35
UPPER BUGABO	101	082K10E	Placers contain uranium and niobium minerals from Bugaboo batholith.	GSC EG 16R-198;EG 18-28
URSA	89	093O05W	Rare earths and thorium occur in mylonitized, gneissic pegmatite.	BCAS 16781; BCFW 1989-302
VAL	12	082L02W	A 2.5 km radiometric zone occurs in sediments of the Kamloops Group.	BCAR 1968-222;BCAS 7276
VENUS	10	082E14E	Conglomerate paleochannel, capped by basalt, overlies basement rocks.	BCAS 5582
VERITY	92	083D06E	Carbonatite in gneiss contains dissem. uranium and niobium minerals.	BCAS 10274;BCAR 1952-115
VICARS PASS	47	092I09E	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
VICTORIA	117	093M04E	A vein-dyke-shear system cuts Rocher Déboulé porphyritic granodiorite.	GSC MEM 223R-84;EG 16-42
VIRGIL, BRENT	97	093N09W	A carbonatite-syenite complex contains uranium and niobium minerals.	BCAS 10729;BCGM 1974-278
VOWELL CREEK	100	082K15W	Placers contain uranium and niobium minerals from Bugaboo batholith.	GSC EG 16R-198;BCPF
WATERLOO	168	082N01W	A massive sulphide zone in limestone contains uranium values.	BCAS 3433;GSC MEM 55-225
WESTBENCH	29	082E12W	Uranium enrichment occurs in surficial soils.	GSC OF 551, RCUM
WILL	88	093N09E	Rare earths and thorium occur in altered alkalic gneiss.	BCAS 17872; BCFW 1989-301
WINN	36	082E14W	Uranium enrichment occurs in surficial lake sediments.	GSC OF 551, RCUM
WISHING WELL	50	094N12W	Calcareous tufa likely contains radon gas.	BCPM 22, #62
WMC	146	104N11W	Zeunerite occurs in pyritic and clay-altered alaskite.	BCAS 7479

APPENDIX 4

NOTES AND CODES FOR APPENDICES 1, 2 AND 3.

1 MAP NUMBER:

Deposit Number on Uranium and Thorium Occurrences of British Columbia, 1:2,000,000.

2 STATUS:

S	Showing	**P**	Prospect	**D**	Deposit

3 ELEMENT OR COMMODITY:

Chemical formulas of elements plus the following:

CL	Coal	**PP**	Phosphate
FD	Feldspar	**RE**	Rare Earths
FL	Fluorite	**SI**	Silica
HS	Hotspring	**ZR**	Zircon
MI	Mica		

4 RESERVES OR ASSAY:

Assay values are generally selected, grab or mineral samples if no sample interval is indicated.

Mt	Metric tonnes	**m**	Metres
T	Tons	**U**	Uranium
g	Grams	**eq**	Equivalent (radiometric)

5 REFERENCES:

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

BCAR	Minister of Mines Annual Report (1874-1968)
BCAS	Assessment Report
BCBL	Bulletin
BCEX	Exploration in British Columbia (1975-)
BCFW	Geological Fieldwork
BCGL	Geology in British Columbia
BCGM	Geology, Exploration and Mining in British Columbia (1969-1974)
BCIM	Industrial Minerals File
BCPF	Property File
BCPM	Preliminary Map
RCUM	Royal Commission on Uranium Mining

Geological Survey of Canada

GSC EG	Economic Geology Report
GSC MEM	Memoir
GSC OF	Open File
GSC P	Paper

Periodicals

CJES	Canadian Journal of Earth Sciences
CMJ	Canadian Mining Journal
EG	Economic Geology
GCNL	George Cross News Letter
MJ	Mining Journal

APPENDIX 5

MINFILE - URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

The accompanying 5¼" floppy diskette contains the complete MINFILE database, in standard ASCII format, on the 182 uranium and thorium occurrences in British Columbia. The files consist of 29 related files and 12 comment or text files. The entities set contains 28 files of all MINFILE codes and their descriptions. A data dictionary file, which details the file definitions, and a readme file, which provides further information, are also included. The data and entities may be used with MINFILE/pc, a menu-driven program for the IBM/PC-compatible computer.

MINFILE/pc is a modular-based system with subsystems consisting of search, report and utility modules, and a soon to be released data entry system. The strength of the MINFILE/pc system is its ability to efficiently and easily search, sort and manipulate the data entered into the various information fields. These include location, tectonic belt, commodity, mineralogy, hostrock name and age, deposit type, lithology, production, and reserves. An expanded geological description in text form is in the "capsule geology" and information sources are included in the "bibliography".

Searches are conducted through twelve simple, user-friendly search screens. Query results can be saved for future reference, manipulated for reports or plotted using computer-aided mapping systems. MINFILE information can also be integrated with conventional geographic information systems. Reports include two tabular reports sorted by name and commodity, a capsule geology and bibliography report, a master report which provides the complete data on each occurrence, and a production report.

A new Data Entry module has been integrated into the MINFILE/pc Search and Report system. It allows users to enter or alter mineral occurrence data in the MINFILE database. The module boasts a user-friendly interface with pull-down menus, pop-up windows, and non-ambiguous error messages. Using pop-up windows one may browse, append, revise, delete, move, and insert data on fields containing multiple entries, otherwise the screen displays only the first-ranked item in the multiple field list. A highly efficient test searching system, using a software 'engine' from Proximity Technology Inc., allows automatic input of codes to the database. The MINFILE/pc Data Entry program, Version 3.00, is still in development and is expected to be available for release in late 1990.

The MINFILE/pc Search and Report program requires an IBM-compatible microcomputer with 640 kilobytes of RAM, a hard-disk drive with sufficient storage capacity for acquired data, a 5¼ inch floppy-disk drive, and MS-DOS Version 3.21 or higher. A guide to operations diskette, which is included with the program, contains an installation utility, a user manual and a data dictionary. MINFILE/pc, Version 2.13 is available free of charge from:

MINFILE
Geological Survey Branch
247 -541 Superior Street
Victoria, B.C., V8V 1X4

Contacts:
Larry Jones (604) 356-2825
Cindy McPeek (604) 356-2826

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

MINFILE NUMBER	NAME	COMMODITIES	STATUS	NTS MAP	LATITUDE	LONGITUDE	ZONE	UTM NORTHING	UTM EASTING
082ENE015	FUKI	UR	DEPR	082E10W	49 32 30	118 53 00	11	5489158	363747
082ENE030	COLLIER	UR	SHOW	082E10W	49 31 30	118 53 00	11	5487305	363701
082ENE041	CUP LAKE	UR	DEPR	082E10W	49 35 40	118 54 00	11	5495055	362690
082ENE046	BLIZZARD	UR	DEPR	082E10W	49 37 30	118 55 00	11	5498483	361572
082ENE047	LASSIE	UR	SHOW	082E10W	49 35 55	118 55 30	11	5495564	360895
082ENW036	CARMI MOLY	MO UR AU AG CU	DEPR	082E11E	49 31 05	119 10 00	11	5487085	343175
082ENW051	HAYNES LAKE	UR	DEPR	082E14E	49 45 20	119 07 35	11	5513403	346837
082ENW052	VENUS	UR	SHOW	082E14E	49 46 50	119 04 30	11	5516079	350615
082ENW053	HYDRAULIC LAKE	UR	DEPR	082E14E	49 47 45	119 11 50	11	5518028	341866
082ENW067	THE STINKHOLE	UR	PROS	082E12E	49 37 50	119 44 20	11	5500939	302217
082ENW068	FAULDER 3	UR	SHOW	082E12W	49 38 57	119 45 25	11	5503055	300989
082ENW069	JOHNSON'S SLOUGH	UR	SHOW	082E12W	49 39 10	119 48 00	11	5503572	297897
082ENW070	AGUR	UR MO	SHOW	082E12W	49 33 45	119 47 30	11	5493514	298125
082ENW071	RIDDLE CREEK	UR TH	SHOW	082E12W	49 32 40	119 52 00	11	5491711	292626
082ENW072	DEMUTH	UR	SHOW	082E12W	49 41 00	119 59 20	11	5507493	284400
082ENW073	PRAIRIE FLATS	UR	DEPR	082E12E	49 35 30	119 42 20	11	5496529	304468
082ENW074	IGNIMBRITE LAKE	UR	SHOW	082E12E	49 37 45	119 41 05	11	5500643	306122
082ENW075	WESTBENCH	UR	SHOW	082E12E	49 30 40	119 38 30	11	5487410	308770
082ENW076	ENEAS	UR	SHOW	082E12E	49 39 50	119 44 20	11	5504644	302352
082ENW077	CONTACT POOL	UR	SHOW	082E12E	49 37 00	119 42 45	11	5499326	304067
082ENW078	THREE PEAK BASIN	UR	SHOW	082E12W	49 39 50	119 45 40	11	5504703	300749
082ENW079	BALD HILLS	UR	SHOW	082E12W	49 40 30	119 52 00	11	5506223	293179
082ENW080	MEADOW RIDGE	UR	SHOW	082E12W	49 38 25	119 45 40	11	5502078	300652
082ENW081	TREPANIER	UR	SHOW	082E13W	49 51 00	119 49 50	11	5525577	296519
082ENW082	WINN	UR	SHOW	082E14W	49 59 30	119 25 00	11	5540284	326777
082ESE142	SD 7	UR	SHOW	082E01W	49 07 20	118 23 25	11	5441754	398558
082ESE143	SD 18 AND 20	UR	SHOW	082E01W	49 07 10	118 23 50	11	5441454	398046
082ESE144	SD 37	UR	SHOW	082E01W	49 06 30	118 23 05	11	5440203	398935
082ESE145	SD 41	UR	SHOW	082E01W	49 05 55	118 23 00	11	5439120	399017
082ESE195	SD 8	UR	SHOW	082E01W	49 07 20	118 23 00	11	5441745	399065
082ESE205	KIWI	UR	SHOW	082E01W	49 07 25	118 24 20	11	5441929	397446
082ESE218	PBE 14	UR	SHOW	082E01W	49 05 55	118 26 55	11	5439209	394252
082ESE219	PBE 18	UR MO	SHOW	082E01W	49 05 10	118 26 50	11	5437818	394327
082ESE220	HO 16	UR	SHOW	082E01W	49 03 10	118 25 00	11	5434070	396489
082ESW139	BRENT LAKE	UR	SHOW	082E05W	49 29 20	119 46 00	11	5485265	299632
082ESW141	CONTACT LAKE	UR TH	SHOW	082E04E	49 11 10	119 34 40	11	5451125	312161
082ESW154	FARLEIGH LAKE	TH UR	SHOW	082E05W	49 27 45	119 45 20	11	5482303	300329
082ESW164	COVERT BASIN	UR	DEPR	082E04E	49 14 10	119 32 45	11	5456604	314676
082ESW174	SINKING POND AND FLATS	UR	DEPR	082E04E	49 11 50	119 35 20	11	5452387	311394
082ESW175	GYPO GREISEN	TH UR	SHOW	082E04E	49 11 50	119 33 30	11	5452312	313619
082ESW176	SKAHA RESERVATION	TH UR	SHOW	082E05E	49 27 00	119 38 30	11	5480618	308532
082ESW177	NORTH WOW FLAT	UR	DEPR	082E04E	49 12 45	119 34 30	11	5454051	312463
082ESW178	SOUTH WOW LAKE	UR	PROS	082E04E	49 12 30	119 34 35	11	5453591	312346
082ESW179	BURNELL POND	UR	PROS	082E04E	49 12 20	119 37 00	11	5453383	309402
082ESW181	POWERLINE	UR	SHOW	082E04E	49 14 05	119 35 59	11	5456583	310748
082ESW182	HEART	UR	SHOW	082E04E	49 13 00	119 34 55	11	5454531	311973
082ESW183	PURPLE	UR	SHOW	082E04E	49 13 15	119 34 30	11	5454977	312495
082ESW184	POLVO	UR	SHOW	082E04E	49 13 00	119 35 00	11	5454535	311872
082ESW185	RANCH LAKE	UR	SHOW	082E04E	49 13 24	119 34 55	11	5455272	311999
082ESW186	MEYERS SWAMP	UR	SHOW	082E04E	49 14 10	119 35 00	11	5456696	311946
082ESW187	KALEDEN	UR	SHOW	082E05E	49 22 30	119 37 30	11	5472239	309450
082ESW188	NKWALA CASES	UR	SHOW	082E05E	49 29 20	119 40 40	11	5485033	306069
082ESW189	ALLENDALE LAKE	UR	SHOW	082E06W	49 23 35	119 21 03	11	5473589	329412
082FNW192	TRY AGAIN	UR	SHOW	082F11W	49 42 00	117 26 00	11	5505147	468750
082FNW244	CRYSTAL	SI UR	SHOW	082F11W	49 33 00	117 18 30	11	5488426	477696
082FSE003	CARIBOO	PB ZN MO UR AG	SHOW	082F08E	49 22 50	116 10 15	11	5469873	560185
082FSE079	LUCKY	TH	SHOW	082F01W	49 07 30	116 26 30	11	5441282	540736
082FSW021	MOLLY (L.14232)	MO MO UR	PAPR	082F03E	49 05 00	117 11 40	11	5436518	485801
082FSW107	NOVELTY (L.958)	AU MO CO UR BI AG	DEPR	082F04W	49 05 06	117 49 30	11	5437013	439758
082FSW212	MOTA	UR TH	SHOW	082F04E	49 14 00	117 42 10	11	5453413	448836
082FSW252	ROMA	UR TH	SHOW	082F05E	49 16 30	117 41 30	11	5458038	449687
082FSW270	LUCKY-BILL-TAG	UR	SHOW	082F06W	49 29 40	117 23 20	11	5482276	471837

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

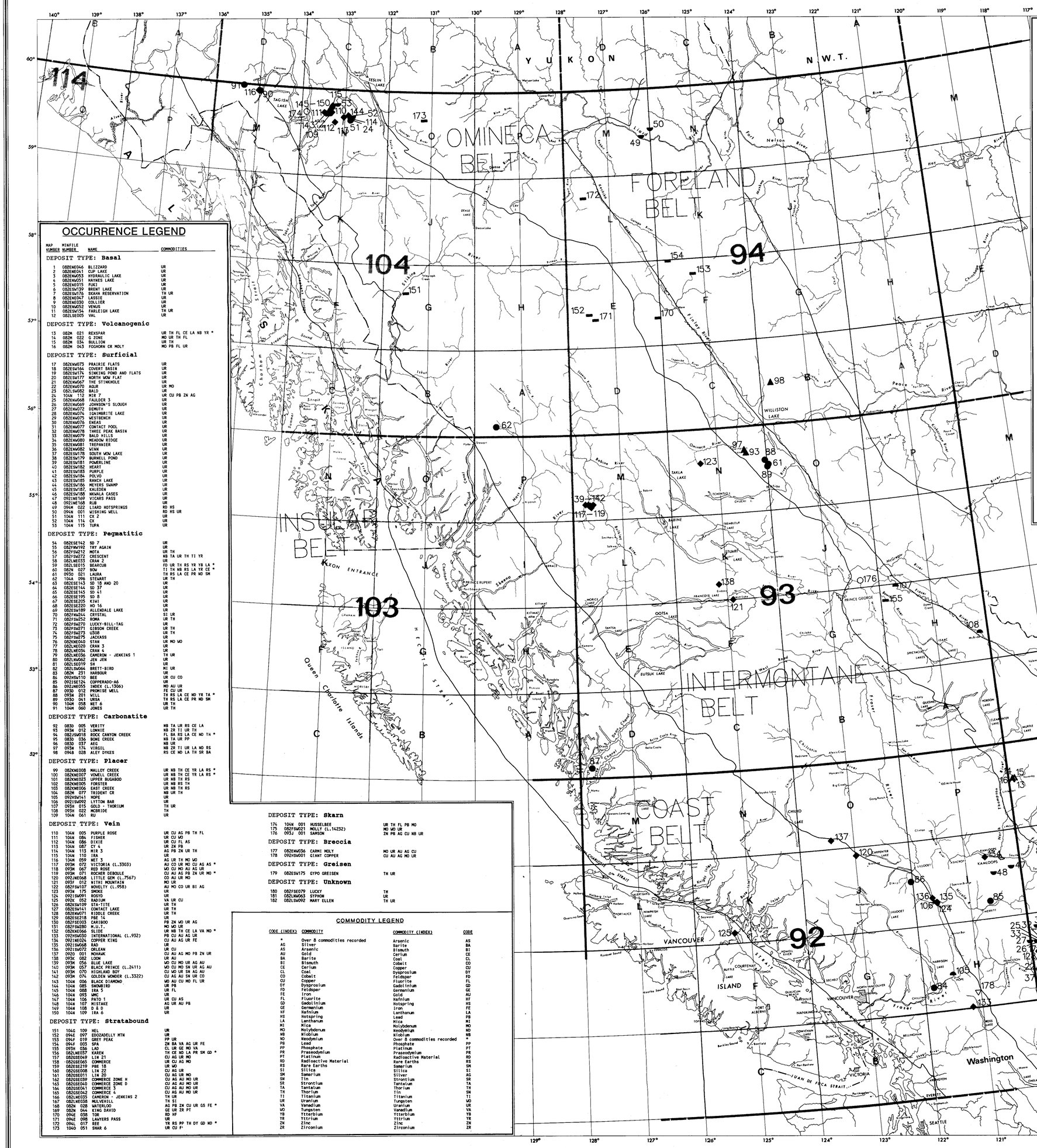
MINFILE NUMBER	NAME	COMMODITIES	STATUS	NTS MAP	LATITUDE	LONGITUDE	ZONE	UTM NORTHING	UTM EASTING
082FSW271	GIBSON CREEK	UR TH	SHOW	082F05E	49 22 50	117 38 10	11	5469737	453827
082FSW272	CRESCENT	NB TA UR TH TI YR	SHOW	082F05E	49 27 35	117 35 30	11	5478512	457122
082FSW273	U308	UR TH	SHOW	082F04E	49 14 10	117 41 30	11	5453714	449647
082FSW275	JACKASS	UR	SHOW	082F05W	49 28 05	117 33 10	11	5479417	459947
082FSW280	M.U.T.	MO WO UR	SHOW	082F03E	49 04 35	117 11 42	11	5435746	485758
082GSE008	LIN 22	CU AG UR	SHOW	082G01W	49 02 29	114 16 25	11	5435418	699245
082GSE011	LIN 20	CU AG UR MO	SHOW	082G01W	49 02 50	114 16 00	11	5436085	699729
082GSE039	COMMERCE ZONE H	CU AG AU MO UR	SHOW	082G01W	49 10 14	114 23 18	11	5449480	690367
082GSE040	COMMERCE ZONE D	CU AG AU MO UR	SHOW	082G01W	49 09 37	114 24 02	11	5448307	689515
082GSE041	COMMERCE 3	CU AG AU MO UR	SHOW	082G01W	49 10 23	114 20 42	11	5449868	693515
082GSE042	COMMERCE 4	CU AG AU MO UR	SHOW	082G01W	49 10 35	114 21 05	11	5450222	693037
082GSE049	LIN 21	CU AG UR MO	SHOW	082G01W	49 02 30	114 16 25	11	5435449	699244
082GSE065	COMMERCE	UR CU AG MO	SHOW	082G01W	49 10 20	114 23 50	11	5449643	689713
082JSW018	ROCK CANYON CREEK	FL BA RS LA CE ND TH *	PROS	082J03E	50 13 00	115 08 40	11	5564150	632384
082KNE005	FORSTER	UR NB RS TH	SHOW	082K09E	50 39 00	116 23 30	11	5610862	543008
082KNE006	EAST CREEK	UR NB TH RS	SHOW	082K10W	50 42 30	116 50 20	11	5617184	511376
082KNE007	VOWELL CREEK	UR NB TH CE YR LA RS *	PROS	082K15W	50 50 00	116 48 00	11	5631091	514084
082KNE008	MALLOY CREEK	UR NB TH CE YR LA RS *	PROS	082K15W	50 52 20	116 52 50	11	5635403	508404
082KNE023	UPPER BUGABOO	UR NB TH RS	PROS	082K10E	50 44 50	116 43 00	11	5621535	519989
082KNE040	STAN	UR MO WO	SHOW	082K10E	50 38 15	116 31 15	11	5609405	533885
082KNE066	SLIDE	UR NB TH CE LA VA MO *	SHOW	082K09W	50 37 40	116 27 50	11	5608352	537920
082KSW109	STA-TITE	UR TH	SHOW	082K04E	50 12 20	117 55 40	11	5561678	433791
082LNE020	CRAN 3	UR	SHOW	082L16E	50 45 35	118 01 45	11	5623391	427409
082LNE033	CRAN 2	UR	SHOW	082L16E	50 46 50	118 02 20	11	5625718	426756
082LNE034	CRAN 4	UR	SHOW	082L09E	50 44 15	118 00 20	11	5620897	429041
082LNE035	CAMERON - JENKINS 2	TH UR	SHOW	082L16E	50 46 20	118 06 20	11	5624859	422042
082LNE036	CAMERON - JENKINS 1	TH UR	SHOW	082L16E	50 47 40	118 04 30	11	5627298	424233
082LNE037	KAREN	TH CE ND LA PR SM GD *	SHOW	082L16E	50 50 30	118 06 25	11	5632583	422060
082LNE038	MULVEHILL	TH SI	SHOW	082L16E	50 51 20	118 07 20	11	5634143	421008
082LNW062	JEN JEN	UR	SHOW	082L11W	50 41 35	119 24 00	11	5618221	330488
082LNW063	SYPHON	UR	SHOW	082L11W	50 43 20	119 23 05	11	5621429	331671
082LSE005	VAL	UR	SHOW	082L02W	50 11 55	118 53 30	11	5562207	364989
082LSE015	BEARCUB	FD UR TH RS YR YB LA *	DEPR	082L02W	50 14 46	118 48 33	11	5567330	371000
082LSE019	SH	UR	SHOW	082L07W	50 19 00	118 50 10	11	5575233	369277
082LSW064	BRETT-BIRD	MI UR	SHOW	082L06E	50 28 45	119 06 20	11	5593807	350607
082LSW082	BALD	UR	SHOW	082L04E	50 03 55	119 31 40	11	5548730	319091
082LSW092	MARY ELLEN	TH UR	SHOW	082L03W	50 08 00	119 26 30	11	5556091	325500
082M 021	REXSPAR	UR TH FL CE LA NB YR *	DEPR	082M12W	51 33 40	119 54 40	11	5716023	298215
082M 022	G ZONE	MO UR TH FL	SHOW	082M12W	51 34 20	119 53 50	11	5717221	299226
082M 034	BULLION	UR TH	SHOW	082M12W	51 34 30	119 51 35	11	5717427	301836
082M 043	FOGHORN CR MOLY	MO PB FL UR	SHOW	082M12W	51 33 30	119 54 50	11	5715722	298010
082M 077	TRIDENT CR	NB UR TH	SHOW	082M16E	51 57 00	118 03 40	11	5755790	427071
082M 231	HARBOUR	UR	SHOW	082M11E	51 36 00	119 09 40	11	5718544	350322
082N 027	BOW	TI TH NB RS LA YR CE *	SHOW	082N01W	51 11 40	116 21 00	11	5671430	545420
082N 028	WATERLOO	AG PB ZN CU UR GS FE *	SHOW	082N01W	51 10 00	116 22 55	11	5668322	543214
082N 044	KING DAVID	GE UR ZR PT	SHOW	082N07W	51 18 10	116 53 10	11	5683283	507939
083D 005	VERITY	NB TA UR RS CE LA	PROS	083D06E	52 23 55	119 09 25	11	5807345	353247
083D 036	BONE CREEK	NB TA UR PP	SHOW	083D06E	52 17 55	119 09 55	11	5796241	352347
083D 037	AEG	NB UR	SHOW	083D03E	52 08 00	119 11 00	11	5777898	350562
092HSW001	GIANT COPPER	CU AU AG MO UR	DEPR	092H03E	49 09 50	121 01 25	10	5447336	644083
092HSW030	INTERNATIONAL (L.932)	PB CU AU AG UR	SHOW	092H03E	49 00 30	121 08 30	10	5429826	635901
092HSW110	BEE	UR CU CO	SHOW	092H05W	49 16 40	121 47 40	10	5458815	587687
092HSW141	HOPE	UR	SHOW	092H06W	49 24 00	121 26 00	10	5472884	613671
092INE024	COPPER KING	CU AU AG UR FE	PAPR	092I10E	50 42 30	120 36 10	10	5619913	669260
092INE168	RUB	UR	SHOW	092I09W	50 31 35	120 28 30	10	5599985	678970
092INE169	VICARS PASS	UR	SHOW	092I09E	50 34 25	120 08 40	10	5606085	702194
092ISE124	COPPERADO-A6	UR	SHOW	092I02E	50 11 50	120 36 00	10	5563097	671292
092ISW068	RAD	UR	SHOW	092I05E	50 15 35	121 33 45	10	5568278	602466
092ISW072	ORLEAN	UR CU	SHOW	092I05E	50 18 40	121 38 30	10	5573885	596719
092ISW091	ROSYD	UR	SHOW	092I05E	50 15 00	121 34 00	10	5567191	602190
092ISW092	LYTTON BAR	UR	SHOW	092I05E	50 15 00	121 35 40	10	5567153	600210
092JNE055	INDEX (L.1306)	MO AU UR	PROS	092J09E	50 31 35	122 00 10	10	5597415	570686

URANIUM AND THORIUM OCCURRENCES IN BRITISH COLUMBIA

MINFILE NUMBER	NAME	COMMODITIES	STATUS	NTS MAP	LATITUDE	LONGITUDE	ZONE	UTM NORTHING	UTM EASTING
092JNE068	LITTLE GEM (L.7567)	CO AU UR MO	PROS	092J15W	50 53 45	122 57 20	10	5638023	503125
092K 052	RADIUM	VA UR CU	SHOW	092K03W	50 07 00	125 16 00	10	5553843	337950
092O 001	MOHAWK	CU AU AG MO PB ZN UR	PROS	092O03W	51 05 45	123 23 20	10	5660335	472767
093D 012	PROMISE WELL	FE CU UR	SHOW	093D04E	52 06 22	127 44 51	09	5773362	585782
093F 012	NITHI MOUNTAIN	MO UR	SHOW	093F15W	53 59 02	124 51 41	10	5983116	377942
093H 015	GOLD - THORIUM	TH UR	SHOW	093H13E	53 57 20	121 39 00	10	5979204	588586
093H 022	MCBRIDE	TH	SHOW	093H08E	53 17 50	120 07 40	10	5908965	691413
093H 036	LAD	CL UR GE MO VA	SHOW	093H13W	53 48 21	121 52 40	10	5962286	573904
093J 001	SAMSON	ZN PB AG CU NB UR	SHOW	093J01W	54 04 17	122 19 44	10	5991456	543916
093K 082	LOON	UR AU	SHOW	093K03E	54 10 20	125 07 20	10	6004547	361469
093M 056	BLUE LAKE	WO CU MO UR AG AU	SHOW	093M04E	55 10 00	127 34 00	09	6114060	591307
093M 057	BLACK PRINCE (L.2411)	WO CU MO SN UR AG AU	SHOW	093M04E	55 10 15	127 33 30	09	6114535	591829
093M 067	RED ROSE	WO CU MO AU AG UR	PAPR	093M04E	55 08 20	127 36 00	09	6110926	589246
093M 070	HIGHLAND BOY	CU WO UR SN AG AU	PAPR	093M04E	55 09 50	127 36 50	09	6113690	588305
093M 071	ROCHER DEBOULE	CU AU AG PB ZN UR MO *	PAPR	093M04E	55 09 35	127 38 30	09	6113192	586545
093M 072	VICTORIA (L.3303)	AU CO UR MO CU AG AS *	PAPR	093M04E	55 10 20	127 39 00	09	6114572	585987
093M 074	GOLDEN WONDER (L.3322)	CU AG AU SN UR CO	SHOW	093M04E	55 10 30	127 42 55	09	6114803	581824
093N 012	LONNIE	NB ZR TI UR TH	PROS	093N09W	55 40 47	124 22 54	10	6171075	413125
093N 174	VIRGIL	NB ZR TI UR LA ND RS	SHOW	093N09W	55 42 51	124 24 48	10	6174950	411200
093N 175	SMOKE	UR	SHOW	093N11W	55 35 00	125 19 00	10	6161928	353973
093N 201	WILL	TH RS LA CE ND YR TA *	SHOW	093N09E	55 34 26	124 00 17	10	6158900	436649
093O 021	LAURA	TH RS LA CE PR ND SM	SHOW	093O12W	55 31 19	123 56 21	10	6153061	440704
093O 041	URSA	TH RS LA CE PR ND SM	SHOW	093O05W	55 29 49	123 57 45	10	6150300	439200
094B 028	ALEY DYKES	RS CE ND LA TH SR BA	SHOW	094B05E	56 27 58	123 44 51	10	6258000	453940
094E 038	TOR	RD HF	SHOW	094E08E	57 18 00	126 01 30	09	6354486	679241
094E 097	EDOZADELLY MTN	UR	SHOW	094E05E	57 22 10	127 30 00	09	6359294	590216
094E 098	LAWYERS PASS	UR	SHOW	094E06W	57 18 30	127 22 00	09	6352677	598397
094F 003	SPA	ZN BA VA AG UR FE	SHOW	094F13E	57 57 45	125 44 00	10	6427595	338286
094F 019	GREY PEAK	PP UR	SHOW	094F14E	57 48 00	125 12 00	10	6408357	369244
094L 017	REE	YR RS PP TH DY GD ND *	SHOW	094L12W	58 43 35	127 32 42	09	6510300	584250
094M 022	LIARD HOTSPRINGS	RD HS	SHOW	094M08E	59 25 40	126 10 00	09	6590901	660732
094N 001	WISHING WELL	RD HS UR	SHOW	094N12W	59 30 40	125 57 00	10	6600463	333063
104A 096	STEWART	UR TH	SHOW	104A04E	56 06 00	129 31 00	09	6217115	467858
104G 109	HEL	UR	SHOW	104G11W	57 38 53	131 27 47	09	6392000	353000
104M 058	NET 6	UR TH	SHOW	104M15W	59 54 50	134 56 30	08	6641615	503262
104M 059	NET 3	AG UR TH MO WO	SHOW	104M15W	59 55 00	134 58 40	08	6641924	501242
104M 060	JONES	UR TH	SHOW	104M14W	59 58 00	135 19 20	08	6647536	482008
104N 001	HUSSELBEE	UR TH FL PB MO	SHOW	104N12W	59 42 30	133 51 00	08	6619283	564708
104N 005	PURPLE ROSE	UR CU AG PB TH FL	SHOW	104N11W	59 43 20	133 18 55	08	6621472	594753
104N 006	BLACK DIAMOND	WO AU CU MO FL UR	PAPR	104N11W	59 41 49	133 24 13	08	6618530	589850
104N 061	RU	UR	SHOW	104N11W	59 40 10	133 20 00	08	6615570	593885
104N 084	FISHER	UR CU WO	SHOW	104N11W	59 42 30	133 26 20	08	6619755	587838
104N 085	SNOWBIRD	UR PB	SHOW	104N10W	59 41 05	132 53 00	08	6617993	619175
104N 086	DIXIE	UR CU FL AS	SHOW	104N11E	59 36 05	133 11 15	08	6608208	602306
104N 087	CY 4	UR ZN PB	SHOW	104N10W	59 39 45	132 59 20	08	6615334	613308
104N 088	IRA 5	UR FL	SHOW	104N14W	59 46 50	133 16 00	08	6628037	597317
104N 093	WMC	UR	SHOW	104N11W	59 42 50	133 16 00	08	6620614	597511
104N 106	PATO 1	UR CU AS	SHOW	104N11W	59 43 50	133 18 50	08	6622402	594808
104N 107	MISTAKE	AG UR AU PB	SHOW	104N11W	59 44 50	133 18 00	08	6624277	595541
104N 108	D & D	UR	SHOW	104N14W	59 45 45	133 16 20	08	6626019	597057
104N 109	IRA 6	UR	SHOW	104N14W	59 46 00	133 16 00	08	6626491	597357
104N 110	IRA	UR	SHOW	104N14W	59 47 30	133 15 20	08	6629291	597908
104N 111	CX 2	UR	SHOW	104N10W	59 37 50	132 50 00	08	6612054	622187
104N 112	MIR 7	UR CU PB ZN AG	SHOW	104N10W	59 38 20	132 49 30	08	6612997	622626
104N 113	MIR 3	AG PB ZN UR TH	SHOW	104N10W	59 39 00	132 50 00	08	6614219	622116
104N 114	CX	UR	SHOW	104N10W	59 41 00	132 47 00	08	6618022	624809
104N 115	TUPA	UR	SHOW	104N14E	59 49 10	133 08 20	08	6632561	604368
104O 051	SHAR 6	UR CU FL	SHOW	104O11W	59 39 00	131 08 00	09	6614158	379761

See Figure 20 for commodity codes.

Total number of occurrences: 182



OCCURRENCE LEGEND

MAP NUMBER	MINFILE NUMBER	NAME	COMMODITIES
DEPOSIT TYPE: Basal			
1	082ENE046	BLIZZARD	UR
2	082ENE041	CUP LAKE	UR
3	082ENW053	HYDRAULIC LAKE	UR
4	082ENW051	HAYNES LAKE	UR
5	082ENE015	FUKI	UR
6	082ESW139	BRENT LAKE	UR
7	082ESW176	SKAHA RESERVATION	TH UR
8	082ENE047	LASSIE	UR
9	082ENE030	COLLIER	UR
10	082ENW052	VENUS	UR
11	082ESW154	FARLEIGH LAKE	TH UR
12	082LSE005	VAL	UR
DEPOSIT TYPE: Volcanogenic			
13	082M 021	REXSPAR	UR TH FL CE LA NB YR *
14	082M 022	G ZONE	MO UR TH FL
15	082M 034	BULLION	UR TH
16	082M 043	FOGHORN CR MOLY	MO PB FL UR
DEPOSIT TYPE: Surficial			
17	082ENW073	PRAIRIE FLATS	UR
18	082ESW164	COVERT BASIN	UR
19	082ESW174	SINKING POND AND FLATS	UR
20	082ESW177	NORTH WOW FLAT	UR
21	082ENW057	THE STINKHOLE	UR
22	082ENW070	AGUR	UR MO
23	082LSW082	BALD	UR
24	104W 112	MIR 7	UR CU PB ZN AG
25	082ENW068	FAULDER 3	UR
26	082ENW069	JOHNSON'S SLOUGH	UR
27	082ENW072	DEMUTH	UR
28	082ENW074	IGNIMBRITE LAKE	UR
29	082ENW075	WESTBENCH	UR
30	082ENW076	ENEAS	UR
31	082ENW077	CONTACT POOL	UR
32	082ENW078	THREE PEAK BASIN	UR
33	082ENW079	BALD HILLS	UR
34	082ENW080	MEADOW RIDGE	UR
35	082ENW081	TREPANIER	UR
36	082ENW082	WINN	UR
37	082ESW178	SOUTH WOW LAKE	UR
38	082ESW179	BURNELL POND	UR
39	082ESW181	POWERLINE	UR
40	082ESW182	HEART	UR
41	082ESW183	PURPLE	UR
42	082ESW184	POLVO	UR
43	082ESW185	RANCH LAKE	UR
44	082ESW186	MEYERS SWAMP	UR
45	082ESW187	KALEDEN	UR
46	082ESW188	NKWALA CASES	UR
47	092INE169	VICARS PASS	UR
48	092INE168	RUB	UR
49	094M 022	LIARD HOTSPRINGS	RD HS
50	094M 001	WISHING WELL	RD HS UR
51	104N 111	CK 2	UR
52	104N 114	CK	UR
53	104N 115	TUPA	UR
DEPOSIT TYPE: Pegmatitic			
54	082ESE142	SD 7	UR
55	082FNW192	TRY AGAIN	UR
56	082FSW212	MOTA	UR TH
57	082FSW272	CRESCENT	NB TA UR TH TI YR
58	082LNE033	CRAN 2	UR
59	082LSE015	BEARCUB	FD UR TH RS YR YB LA *
60	082N 027	BOW	TI TH NB RS LA YR CE *
61	093O 021	LAURA	TH RS LA CE PR ND SM
62	104A 096	STEWART	UR TH
63	082ESE143	SD 15 AND 20	UR
64	082ESE144	SD 37	UR
65	082ESE145	SD 41	UR
66	082ESE195	SD 8	UR
67	082ESE205	KIWI	UR
68	082ESE220	MO 16	UR
69	082ESW189	ALLENDALE LAKE	UR
70	082FNW244	CRYSTAL	SI UR
71	082FSW252	ROMA	UR TH
72	082FSW270	LUCKY-BILL-TAG	UR
73	082FSW271	GIBSON CREEK	UR TH
74	082FSW273	U308	UR TH
75	082FSW275	JACKASS	UR
76	082KNE040	STAN	UR MO WO
77	082LNE020	CRAN 3	UR
78	082LNE034	CRAN 4	UR
79	082LNE036	CAMERON - JENKINS 1	TH UR
80	082LNW062	JEN JEN	UR
81	082LSE019	SH	UR
82	082LSW064	BRETT-BIRD	MI UR
83	082M 251	HARBOUR	UR
84	092HSW110	BEE	UR CU CO
85	092ISE124	COPPERADO-A6	UR
86	092INE055	INDEX (L.1306)	MO AU UR
87	093O 012	PROMISE WELL	FE CU UR
88	093O 201	WILL	TH RS LA CE MO YR TA *
89	093O 061	URSA	TH RS LA CE PR ND SM
90	104M 088	WET 6	UR TH
91	104M 060	JONES	UR TH
DEPOSIT TYPE: Carbonatite			
92	083O 005	VERITY	NB TA UR RS CE LA
93	093N 012	LOWKEE	NB ZR TI UR TH
94	082JSW018	ROCK CANYON CREEK	FL BA RS LA CE ND TH *
95	083O 036	BOWE CREEK	NB TA UR PP
96	083O 037	AEG	NB UR
97	093N 174	VIRGIL	NB ZR TI UR LA ND RG
98	094B 028	ALEY DYKES	RS CE MO LA TH SR BA
DEPOSIT TYPE: Placer			
99	082KNE008	MALLOY CREEK	UR NB TH CE YR LA RS *
100	082KNE007	VOWELL CREEK	UR NB TH CE YR LA RS *
101	082KNE023	UPPER BUSABOO	UR NB TH RS
102	082KNE005	FORSTER	UR NB RS TH
103	082KNE006	EAST CREEK	UR NB TH RS
104	082N 077	TRIDENT CR	NB UR TH
105	092HSW141	HOPE	UR
106	092ISW092	LYTTON BAR	UR
107	093H 015	GOLD - THORIUM	TH UR
108	093N 022	MCBRIDE	TH
109	104N 061	RU	UR
DEPOSIT TYPE: Vein			
110	104N 005	PURPLE ROSE	UR CU AG PB TH FL
111	104N 084	FISHER	UR CU MO
112	104N 086	DIXIE	UR CU FL AS
113	104N 087	CY 4	UR ZN PB
114	104N 113	MIR 3	AG PB ZN UR TH
115	104N 110	IRA	UR
116	104N 059	WET 3	AU UR TH MO WO
117	093M 072	VICTORIA (L.3303)	AU CO UR MO CU AG AS *
118	093M 067	RED ROSE	WO CU MO AU AS UR
119	093M 071	ROCHER DEBOULE	CU AU AG PB ZN UR MO *
120	092JNE068	LITTLE GEM (L.7567)	CO AU UR MO
121	093F 012	NITHI MOUNTAIN	MO UR
122	082FSW107	NOVELTY (L.958)	AU MO CO UR BI AG
123	093N 175	SMOKE	UR
124	092ISW091	ROSYD	UR
125	092K 052	RADIUM	VA UR CU
126	082KSW109	STA-TITE	UR TH
127	082ESW141	CONTACT LAKE	UR TH
128	082ENW071	RIDDLE CREEK	UR TH
129	082ESE218	PBE 16	UR
130	082FSE003	CARIBOO	PB ZN MO UR AG
131	082FSW280	M.U.T.	MO WO UR
132	082KNE066	SLIDE	UR NB TH CE LA VA MO *
133	092ISW030	INTERNATIONAL (L.932)	PB CU AU AG UR
134	092INE024	COPPER KING	CU AU AG UR FE
135	092ISW068	RAD	UR
136	092ISW072	ORLEAN	UR CU
137	092O 001	MOHAWK	CU AU AG MO PB ZN UR
138	093K 082	LOON	UR AU
139	093M 056	BLUE LAKE	WO CU MO UR AG AU
140	093M 057	BLACK PRINCE (L.2411)	WO CU MO SN UR AG AU
141	093M 070	HIGHLAND BOY	CU WO UR SN AG AU
142	093M 074	GOLDEN WONDER (L.3322)	CU AG AU SN UR CO
143	104N 006	BLACK DIAMOND	WO AU CU MO FL UR
144	104N 085	SNOWBIRD	UR PB
145	104N 088	IRA 5	UR FL
146	104N 093	WMC	UR
147	104N 106	PATO 1	UR CU AS
148	104N 107	MISTAKE	AG UR AU PB
149	104N 108	D & D	UR
150	104N 109	IRA 6	UR
DEPOSIT TYPE: Stratabound			
151	104G 109	HEL	UR
152	094E 097	EDOZADELLY MTN	UR
153	094F 019	GREY PEAK	VA UR
154	094F 003	SPA	ZN BA VA AG UR FE
155	093N 036	LAD	CL UR GE MO VA
156	082LNE037	KAREN	TH CE ND LA PR SM GD *
157	082GSE049	LIN 21	CU AG UR MO
158	082GSE065	COMMERCE	UR CU AG MO
159	082GSE219	PBE 18	UR WO
160	082GSE008	LIN 22	CU AG UR
161	082GSE011	LIN 20	CU AG UR MO
162	082GSE039	COMMERCE ZONE H	CU AG AU MO UR
163	082GSE040	COMMERCE ZONE D	CU AG AU MO UR
164	082GSE041	COMMERCE 3	CU AG AU MO UR
165	082GSE042	COMMERCE 4	CU AG AU MO UR
166	082LNE035	CAMERON - JENKINS 2	TH UR
167	082LNE038	MULVENILL	TH SI
168	082N 028	WATERLOO	AG PB ZN CU UR GS FE *
169	082N 044	KING DAVID	GE UR ZR PT
170	094E 038	TOR	RD HF
171	094E 098	LAWYERS PASS	UR
172	094L 017	BEE	YR RS PP TH DY GD MO *
173	1040 051	SMAR 6	UR CU F'
DEPOSIT TYPE: Skarn			
174	104N 001	HUSSELBEE	UR TH FL PB MO
175	082FSW021	MOLLY (L.14232)	MO WO UR
176	093J 001	SAMSON	ZN PB AG CU NB UR
DEPOSIT TYPE: Breccia			
177	082ENW036	CARMI MOLY	MO UR AU AG CU
178	092HSW001	GIANT COPPER	CU AU AG MO UR
DEPOSIT TYPE: Greisen			
179	082ESW175	GYPO GREISEN	TH UR
DEPOSIT TYPE: Unknown			
180	082FSE079	LUCKY	TH
181	082LNW063	SYPHON	UR
182	082LSW092	MARY ELLEN	TH UR

COMMODITY LEGEND

CODE (INDEX)	COMMODITY	COMMODITY (INDEX)	CODE
*	Over 8 commodities recorded	Arsenic	AS
AG	Silver	Barite	BA
AS	Arsenic	Bismuth	BI
AU	Gold	Cerium	CE
BA	Barite	Coal	CL
BI	Bismuth	Cobalt	CO
CE	Cerium	Copper	CU
CL	Coal	Dysprosium	DY
CO	Cobalt	Feldspar	FD
CU	Copper	Fluorite	FL
DY	Dysprosium	Gadolinium	GD
FD	Feldspar	Germanium	GE
FE	Iron	Gold	AU
FL	Fluorite	Hafnium	HF
GD	Gadolinium	Hotspring	HS
GE	Germanium	Iron	FE
HF	Hafnium	Lanthanum	LA
HS	Hotspring	Lead	PB
LA	Lanthanum	Mica	MI
MI	Mica	Molybdenum	MO
MO	Molybdenum	Neodymium	ND
NB	Niobium	Niobium	NB
ND	Neodymium	Over 8 commodities recorded	*
PB	Lead	Phosphate	PP
PP	Phosphate	Platinum	PT
PR	Praseodymium	Praseodymium	PR
PT	Platinum	Radioactive Material	RD
RD	Radioactive Material	Rare Earths	RS
RS	Rare Earths	Samarium	SM
SI	Silica	Silica	SI
SM	Samarium	Silver	AG
SN	Tin	Strontium	SR
SR	Strontium	Tantalum	TA
TA	Tantalum	Thorium	TH
TH	Thorium	Tin	SN
TI	Titanium	Titanium	TI
UR	Uranium	Tungsten	WO
VA	Vanadium	Uranium	UR
WO	Tungsten	Vanadium	VA
YB	Ytterbium	Ytterbium	YB
YR	Yttrium	Yttrium	YR
ZN	Zinc	Zinc	ZN
ZR	Zirconium	Zirconium	ZR

Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources
GEOLOGICAL SURVEY BRANCH

FIGURE 20

Uranium and Thorium Occurrences in British Columbia

SCALE 1: 2 000 000

KILOMETRES 50 0 50 100 150 200 KILOMETRES

To accompany Open File 1990-32
By Larry D. Jones

SYMBOL LEGEND

DEPOSIT TYPE

- Basal
- Volcanogenic
- Surficial
- Pegmatitic
- Carbonatite
- Placer
- Vein
- Stratabound
- Skarn
- Breccia
- Greisen
- Unknown

Province of British Columbia Ministry of Energy, Mines and Petroleum Resources
Energy, Mines and Resources Canada Énergie, Mines et Ressources Canada

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