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Ministry of Employment and Investment
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By S.B. Butrenchuk, P.Geol., and K.D. Hancock, P.Geo.

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VICTORIA
BRITISH COLUMBIA
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CHAPTER 1

FORWARD

This report is a comprehensive collection of all known significant occurrences of barite in British Columbia reported before 1996 and includes adjunct information on most minor occurrences of barite where appropriate. Deposits have been grouped by genetic classification and sorted by geographic location from southern to northern British Columbia. The initial compilation of occurrences and field examination of many sites was done in 1989 by the senior author. Subsequent editorial changes, updates of existing descriptions and addition of new material were done by the junior author. The field examinations of selected barite deposits included mapping, sampling and lithogeochemical analyses. Associated research included trace element analysis for possible descriminant characteristics for occurrence classification with a view to aiding deposit evaluation. Additional work includes compilation of information from public and private sources for those deposits not examined in the field. The quality of these descriptions is subject to the source material and should be considered as a guide as any future work may change the current summaries.

Commercial production of barite in British Columbia dates back to 1940 with shipments having been recorded from ten deposits. Currently, significant barite production is limited to a single underground mine at Parson by Mountain Minerals Company Ltd. with some intermittent production from three other deposits. This report documents potential new sources of barite in shale and carbonate-hosted bedded deposits in north-eastern British Columbia, in rocks of Devonian to Lower Mississippian age. In south-eastern British Columbia vein and cavity-filling deposits in Proterozoic and Cambrian rocks represent another potential source. By-product barite may also be recovered from the mining and milling of volcanogenic massive sulphide deposits.

Barite ($BaSO_4$) is a chemically inert mineral with an ideal specific gravity of 4.5. Its major usage is as a weighting agent in drilling muds and markets are closely related to the oil and gas industry. Included in this report is background information on uses, markets and physical properties for barite and barite products.

INTRODUCTION

Barite ($BaSO_4$) is the most common ore mineral of barium. It occurs in a broad spectrum of mineral deposits varying from almost pure barite with associated minor elements in bedded and vein deposits to an accessory mineral in precious and base metal lode deposits. Alternate sources of barium, not usually found in commercial quantities, are witherite ($BaCO_3$) and barytocalcite ($CaBa(CO_3)_2$).

Commercial production of barite in British Columbia dates back to 1940 with shipments having been recorded from ten deposits. Most of this production has been consumed by the oil and gas industry in Alberta, Yukon and Northwest Territories. At present barite is produced by Mountain Minerals Company Ltd. from its deposit at Parson and intermittently from the Fireside deposit by International Barytex Resources Ltd.

Mountain Minerals Company Ltd. material is processed in Lethbridge, Alberta to be used equally for drilling mud and off-colour filler material. International Barytex Resources Ltd. material is processed for drilling mud use in the Northwest Territories and Yukon.

A number of undeveloped barite deposits are known in the province. They occur in a variety of geological environments ranging from fracture-controlled, replacement and manto deposits to shale and carbonate-hosted bedded deposits and volcanogenic deposits. Each deposit type has a unique mineralogy and chemistry. Areas with the best potential for economic barite production are located along the Rocky Mountain Trench in the northeastern and southeastern regions of the province.

Prior to this study, the data base and assessment of the resource availability of barite in British Columbia was fragmentary and incomplete. Previous work by Hora (1984a, b) and Richmond (1932) produced only a partial overview of the barite resource potential in the province. Two market studies by Nutter and Clancy (1982) and Harben (1987) are dated and some of their findings are no longer valid. This report provides a comprehensive inventory and genetic classification of barite deposits in British Columbia, however, descriptions of some occurrences are more detailed than others due to the uneven nature of the source material. The report assesses potential producers by deposit size and their ability to meet industrial and environmental specifications. It is intended to provide the necessary database required to identify potential replacement deposits for those operations with depleted reserves or reserves that are nearing depletion, and areas with potential for barite exploration.

PROPERTIES OF BARITE

Barite is a chemically inert mineral that consists of 58.8 per cent barium and 41.2 per cent sulphate and has an ideal specific gravity of 4.5. Its colour varies from white through shades of grey to black, depending upon impurities; its Mohs hardness is 2.5 to 3.5.

Barite occurs as vein filling, irregular masses, concretions, nodules and rosette-like aggregates, and also occurs as finely crystalline, massive to laminated beds. It is commonly associated with quartz, chert, jasperoid, calcite, dolomite, siderite, rhodochrosite, celestite, fluorite and sulphide minerals, especially lead and zinc and forms the gangue in many types of ore deposits.

GEOCHEMISTRY

Sixty-six selected samples, representing a variety of deposit types, were analyzed for their barium and trace element content. These analyses were performed by Bondar-Clegg Ltd. and by the British Columbia Ministry of Energy, Mines and Petroleum Resources laboratory. Analytical results are presented in individual occurrence descriptions.

In general, shale-hosted stratiform barite deposits are enriched in vanadium and depleted in strontium compared to other deposit types. Strontium tends to be enriched in the carbonate-hosted stratabound and fracture-controlled deposits. Cadmium content tends to

correlate well with sphalerite content. Arsenic values are generally low with the highest values, on average, being in volcanogenic deposits.

The majority of the samples have specific gravities in excess of 4.0 and therefore most would be suitable for drilling-mud applications. In most instances, trace element content is low enough for barite to be used for off-shore drilling. Those deposits with high mercury, cadmium or arsenic contents may have to be beneficiated to make them acceptable.

USES OF BARITE

The single most important use of barite is as a weighting agent for drilling muds in the oil and gas industry. This accounts for approximately 90 per cent of the barite produced. Barite is well suited for this purpose because it is soft, easy to handle, heavy, chemically inert, does not stain and is relatively inexpensive.

Barite is also the raw material for the manufacture of barium chemicals including barium carbonate, chloride, hydroxide, nitrate, oxide, peroxide and purified sulphate. There are estimated to be more than 2000 specific industrial uses for barium chemicals.

Barite also has applications in glass manufacture because of its ability to homogenize the melted material and give more brilliance and clarity to the finished product. It is used as a pigment, filler or extender, in its natural or bleached and purified forms, in many products including rubber, heavy paper, bristol board, brake linings, clutch facings, plastics and linoleum. Bleached barite is also used as an extender in white lead paint.

Some barite is used in cement manufacture and a mixture of rubber, asphalt and 10 per cent barite is used as paving material in parking lots, roads and airport runways. Barite is also used in the ceramics and pharmaceutical industries as well as in shields to protect from radiation exposure.

SPECIFICATIONS

Specifications for drilling mud sold in the United States are set by the American Petroleum Institute and internationally by the Oil Companies Materials Association. Specifications require that the barite have a barium sulphate content of 92 per cent, a specific gravity of 4.2 or higher and a maximum of 250 ppm of soluble alkaline-earth content (expressed as calcium). After grinding, 97 per cent of the material must be finer than 200 Tyler mesh (less than 75 microns) using wet screening, and at least 95 per cent must be finer than 325 mesh (less than 45 microns). Only a few per cent iron is permitted. The sulphide content must be known as under certain conditions hydrogen sulphide gas may be released (Garrett, 1987).

For off-shore drilling in Canada the trace element content of the barite is important. Certain toxic elements such as cadmium and mercury are permitted in only trace amounts. The federal government has not yet formulated specific regulations as to the content of toxic material in drilling mud, such regulations are expected to be forthcoming in the near future.

Chemical grade barite must contain greater than 94 per cent barium sulphate, equivalent to a specific gravity of 4.25. It must contain less than 1 per cent iron oxide (Fe_2O_3) and strontium carbonate ($SrCO_3$) and only a trace of fluorine. The material should be ground to between 4 and 20 mesh (5 to 0.5 millimetres). Most of this barite is used as a pigment in paint. Blanc fixe (precipitated barium sulphate) used in x-ray photography and for black-and-white photographic prints requires a barium sulphate content of 97.5 per cent and an iron oxide (Fe_2O_3) content of only 0.02 per cent. Sulphide and arsenic content must be less than 1 ppm. Ninety per cent of the material should have a particle size of less than 20 microns.

Barite used in the manufacture of glass must have a barium content of at least 96 to 98 per cent, less than 0.1 to 0.2 per cent iron oxide (Fe_2O_3) and only a trace of titanium oxide (TiO_2). Some specifications allow no more than 1.5 per cent silica (SiO_2) and 0.15 per cent alumina (Al_2O_3). The product must have a particle size of less than 850 microns with as little as 5 per cent exceeding 150 microns.

For fillers and extenders the product should be fine-grained, generally less than 325 mesh. Colour is also important, with pure white being the most desirable.

BENEFICIATION

The amount of beneficiation that may be required by barite ore depends upon the specifications of the product required and the quality of the ore itself. Gravity methods can be used to separate high specific gravity barite from contaminants with a lower specific gravity. This separation can be accomplished by the use of heavy-media drums or cones, mineral jigs and spiral classifiers. If the required size is coarser than 2 millimetres, heavy-media separation or mineral jigs may be suitable; for a product that requires a fine particle size spiral classifiers are more suitable. For very fine particle size (less than 75 microns) requirements, flotation methods are required. Typically barite is floated under slightly alkaline conditions. Final size specifications may be achieved by roller mill, paddle mill or other suitable means (Collings and Andrews, 1988). Results of beneficiation tests from various deposits in British Columbia are summarized in Appendix 1.

CLASSIFICATION OF BARITE DEPOSITS

This report classifies barite deposits into four geological types:

1. Bedded: shale and carbonate-hosted
2. Fracture-controlled, replacement and manto
3. Volcanogenic
4. Accessory barite

Figure 1 shows the location and classification of all known deposits in British Columbia.

Only the first three deposit types represent significant potential for commercial production. To date, all production in British Columbia has been from fracture-controlled, replacement and manto deposits.

BEDDED: SHALE AND CARBONATE-HOSTED

The most common bedded barite deposits are stratiform bodies associated with fine-grained clastic sedimentary rocks that are typically black and fetid. These deposits are widespread and may contain several million tonnes of barite. The barite was deposited at the same time as the surrounding host rocks.

Dawson (1985) identifies two types of shale-hosted barite deposits. The first occurs in white or buff baritic siltstone, siliceous argillite or laminated chert; the second in black shale or bedded chert with grey to black barite laminae or conformable nodule-bands. Both deposit types may contain up to 95 per cent barite, commonly associated with pyrite, marcasite, galena and sphalerite. Minor to trace constituents include quartz, chert, calcite, witherite, barytocalcite, dolomite, siderite and secondary iron oxides.

Bedded barite deposits may also occur in carbonate rocks but are uncommon in British Columbia, represented only by deposits near Muncho Lake and north of Cassiar.

FRACTURE-CONTROLLED, REPLACEMENT AND MANTO

This deposit type formed subsequent to the consolidation of the hostrock. It occupies voids that have resulted from solution of carbonate strata or by mechanical deformation. Shear and breccia zones along faults are common sites of depositon. These deposits, which have typically formed at low temperature and pressure, may be disseminated or massive and are generally irregular in outline. They are currently the main source of barite in Canada.

VOLCANOGENIC

Barite can occur in economic amounts in intermediate flows and pyroclastic rocks. These deposits are exhalative products of volcanic activity. Barite is present as massive lenses and beds or as gangue in sulphide ores. According to Dawson (1985), Kuroko-type volcanogenic deposits may contain beds of nearly pure massive barite adjacent to massive sulphide bodies as well as disseminated barite in the sulphide ore. Economic amounts of barite can be recovered directly or as a byproduct during the milling process of these deposits.

ACCESSORY BARITE

Barite occurs as an accessory or alteration mineral in many epithermal and mesothermal gold deposits. Minor to trace amounts are also present in many lead-silver veins throughout the province. While these deposit types do not represent possible economic sources of barite they illustrate the variety of geological environments in which barite may occur. Accessory barite has also been reported in carbonatite plugs and sills.

MARKETING

Demand for barite is largely dependent upon fluctuations in drilling activity in the oil and gas industry. The amount of barite consumed varies from well to well according to the depth of the hole and the geological formations, but averages approximately 1500 tonnes per 5000-metre hole (Collings and Andrews, 1988). Typical variations in consumption per well and prices in different areas of the western Canadian market are illustrated in Figure 2. All other uses account for only 10 per cent of consumption and represent a market that tends to be stable from year to year. Canadian barite production, trade and consumption in recent years is summarized in Table 1.

Internationally the barite market is controlled by a few large, vertically integrated companies. The three largest (all in the United States) are: Baroid Drilling Fluids, Inc., a Baroid Corporation company; Milpark Drilling Fluids, a Baker Hughes company; and M-I Drilling Fluids Co., a Dresser Haliburton company. Each of these companies owns and operates mines around the world.

Only three companies produce barite in Canada with Mountain Minerals Company being the largest supplier. In Ontario, Extender Minerals Ltd. mines and processes chemical and filler-grade material destined for industrial uses in eastern Canada. Mountain Minerals supplies virtually all of the drilling mud used in Canada and has recently begun supplying eastern Canada with filler and extender-grade barite. The third producer is Nystone Chemicals Ltd. which mines barite from a deposit at Brookfield, Nova Scotia. This barite is used primarily for pharmaceutical and manufacturing applications. In British Columbia there is also minor intermittent production by International Barytex Resources Ltd., from its Fireside deposit (Figure 1, No. 94).

Nutter and Clancy (1982) identified three market areas for drilling mud in Canada. These are: The western Canada sedimentary basin, the Beaufort Sea and offshore British Columbia. Their study suggested that the Beaufort Sea had a potential barite consumption estimated at 1.5 million tonnes for the period 1982 to 2002. They also concluded that offshore drilling would never be a significant market and that north-eastern British Columbia, Alberta and Saskatchewan would continue to be a major market for British Columbia producers. They further predicted that with growth in consumption of 5 to 10 per cent annually and domestic supply remaining constant there would be a shortfall of supply of between 25 000 and 183 000 tonnes by the year 2000. Since the time of this study the oil and gas industry has had some significant rises and falls in drilling activity and has significantly changed the outlook for barite demand.

Table 1: Canada's barite production and trade, 1985-1987, and consumption, 1983-1986.

	1985		1986		1987(p)	
	(tonnes)	($000)	(tonnes)	($000)	(tonnes)	($000)
Canadian Production (mine shipments) (Jan.-Sept.)	71 049	5 503	36 888	4 635	40 550	3 886
Imports						
United States	7 033	820	10 030	1 032	2 581	372
Ireland	8 011	381	-	-	-	-
Netherlands	489	170	489	185	692	190
Morocco	11 020	808	-	-	-	-
Other	34	13	7	1	-	-
TOTAL	26 587	2 192	10 526	1 218	3 273	562
Exports						
Madagascar	-	-	-	-	200	50
West Germany	-	-	na	1	-	-
United States	1 679	479	5 072	982	4 674	1 790
TOTAL	1 679	479	5 072	983	4 874	1 840
Apparent Consumption	95 957		42 342		38 949	

	1983	1984	1985	1986(p)
Consumption[1], *				
Well drilling (e)	60 000	64 000	51 000	15 000
Paint & varnish	1 484	1 449	1 526	1 298
Other[2]	4 200	6 119	6 758	6 403
TOTAL (e)	65 684	71 568	50 284	22 701

Sources: Energy, Mines and Resources Canada; Statistics Canada

1 Available data reported by consumers with estimates by Energy, Mines and Resources Canada; does not include inventory adjustments

2 Other includes plastics, bearing and brake linings, foundries, chemicals, explosives, glass and glass products, etc.

* Shaw and Boucher: Canadian Minerals Yearbook 1987

(p) = preliminary; (e) = estimated; - = nil; na = not available

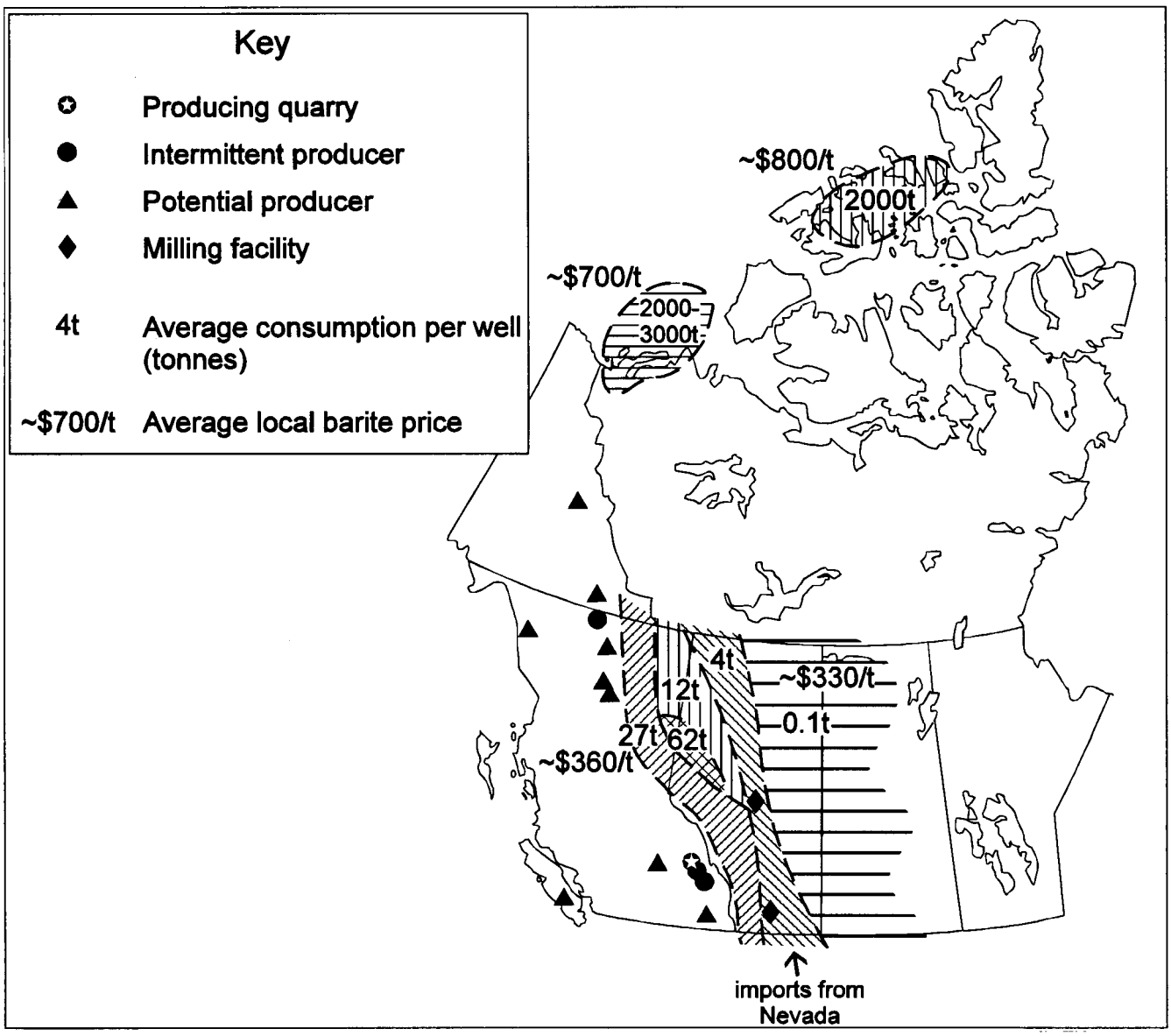

Figure 2: Milling facilities and markets for barite in Western Canada

Almost all of the barite currently produced for drilling mud is from a single mine at Parson (Figure 1, No. 84). These reserves are diminishing and new sources will have to be developed. Potential sources of new supply are development of new deposits in either Yukon or British Columbia, or increased imports (Figure 2). The large bedded barite deposits in north-eastern British Columbia are a potential resource. Recovery from tailings or by-product recovery from lead-zinc deposits such as the Westmin HW mine or the Cirque/Stronsay project could also be a source of additional supply.

The short-term outlook is for modest growth in other applications of barite. Filler and extender markets are expected to keep pace with automobile and construction growth at an annual rate of 2.5 to 3.5 per cent. Demand for pharmaceutical grade barite is expected to decline as conventional x-ray equipment is replaced by advanced CAT-scanning technology (Shaw and Boucher, 1987).

The price of barite is usually negotiated between producer and consumer. In recent years the price of drilling mud barite has been steadily declining. This trend may continue as increased production from China will tend to keep prices low. Prices for the chemical, filler and extender markets are expected to remain in the US$100 to $150 range.

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CHAPTER 2

BEDDED BARITE DEPOSITS

SHALE-HOSTED STRATIFORM DEPOSITS

Shale hosted bedded barite and barite-sulphide deposits, two notable examples of which are the Meggen and Rammelsberg deposits in Germany, are known worldwide. Miogeosynclinal strata of Middle Devonian to Mississippian age contain the majority of known deposits. In North America similar deposits can be traced from the Brooks Range in Alaska through Yukon and northern British Columbia into Nevada. Deposits of Late Devonian age are the most widespread and economically the most important.

DESCRIPTION OF OCCURRENCES - CENTRAL BRITISH COLUMBIA

Bow (184) MINFILE Number: 093H136
Latitude: 53°35'57" Longitude: 121°39'33" NTS: 93H12W

The Bow barite showing is 84 kilometres southeast of Prince George, on a tributary creek to Bowron River. The showings were recently discovered during prospecting work based on B.C. Ministry of Energy, Mines and Petroleum Resources regional geochemical survey data. The showings consist of several hand trenches and natural outcrops (John Nebocat, personal communication, 1993).

Host rocks are black shales of the Antler Formation in the upper Paleozoic to upper Triassic Slide Mountain Group (Campbell, 1967). Bedding is steep and strikes northwest with tops facing west (Dan Hora, personal communication, 1993). Mineralization consists of 5 metres of bedded barite that is overlain by 30 centimetres rusty barite, 20 centimetres of rusty, black, graphitic shale with small barite nodules and 15 centimetres of black, earthy shale. The massive barite rests on 30 centimetres of shale with limestone lenses and scattered barite nodules. Current work has not outlined the extent of mineralization.

Cunningham Creek (185) MINFILE Number: 093A158
Latitude: 52°55'30" Longitude: 121°19'57" NTS: 93A/14W

Barite showings are found on the western slopes of Roundtop Mountain and in Cunningham Creek, near Wells, 80 kilometres east of Quesnel. Outcrops are at the head of Trehouse Creek and 5 kilometres north in Cunningham Creek.

The local geology is complex, consisting of folded thrust panels adjacent to and including the Pleasant Valley Thrust. Host strata are black, graphitic phyllite, siltite and muddy conglomerate of the Hardscrabble Mountain succession. This succession is an upper Paleozoic member of the Snowshoe Group. Small amounts of carbonate and tuff are found at a few locations marginal to the succession but may be vestiges of other units in the Snowshoe Group (Struik, 1988).

The first exposures are in three exploration trenches at the head of Trehouse creek (Hodgson, 1978). The barite is 2.0 to 2.5 metres wide, thick bedded to massive, pale grey to cream coloured and trends approximately 150°/65° (Dan Hora, personal communication, 1993). Drilling by Riocanex, Ltd. in the late 1970's found small, structurally elongated barite nodules but failed to identify continuity of the massive barite bed (Hodgson, *ibid.*). The second exposures are in placer workings on Cunningham Creek about 5 kilometres northwest of Roundtop Mountain. The barite is 0.25 to 1.0 metres thick, laminated to thin bedded, siliceous and pale grey to cream coloured. Where exposed, the strata trend northwest and dip steeply.

Unnamed Occurrence

In 1996, Orion International Corporation reported a new discovery of bedded barite in Anarchist Group rocks near Rock Creek, between Bridesville and the U.S border

DESCRIPTION OF OCCURRENCES - NORTHERN BRITISH COLUMBIA

Shale-hosted barite and barite sulphide deposits occur in the Gataga and Akie river districts of the Kechika Trough in northeastern British Columbia. Deposits in the Gataga - Akie area have been studied by MacIntyre (1980, 1982) and McClay *et al.* (1988) and by several companies that have conducted exploration in the area. Deposits in the Midway-Cassiar area have been studied by Nelson *et al.* (1988a) and Nelson and Bradford (1987a, 1989a).

Within the Kechika Trough, baritic deposits occur along a 180-kilometre belt of black cherts, cherty mudstones, argillites, siliceous shales and siltstones of the Late Devonian Gunsteel Formation of the Earn Group (Figure 3). Much of the early exploration in the belt was financed by two joint ventures. The Gataga Joint Venture was formed in 1977 to explore for lead-zinc-barite deposits in the Gunsteel Formation within a 60 by 10 kilometre area north of Kwadacha Park. The companies involved included Welcome North Mines Ltd., Chevron Canada Limited, Getty Mining Pacific Limited and Aquitane Company of Canada Ltd. Also in 1977, Cyprus Anvil Mining Corporation and Hudson Bay Oil and Gas Company, Limited, in a 50/50 joint venture, were exploring the same stratigraphy south of the park and made a major discovery at the Cirque deposit in the Akie River district. Five mineralized intervals have been recognised within a 400-metre section of the Gunsteel Formation in the Gataga district, three of them containing significant accumulations of barite and barite-sulphide mineralization. Hostrocks are generally poorly exposed and baritic "kill zones", devoid of vegetation, are often the only surface expression of mineralization.

The Gataga succession (Figure 4) comprises basinal facies strata accumulated from Early Cambrian to Mississippian time. Stable sedimentation along the continental margin through Cambrian to Middle Devonian time was followed by rapid deposition of a westerly derived flysch sequence during the Late Devonian and Early Mississippian. Clastic sedimentation was restricted to a narrow trough bounded by areas of shallow-water carbonate build-up.

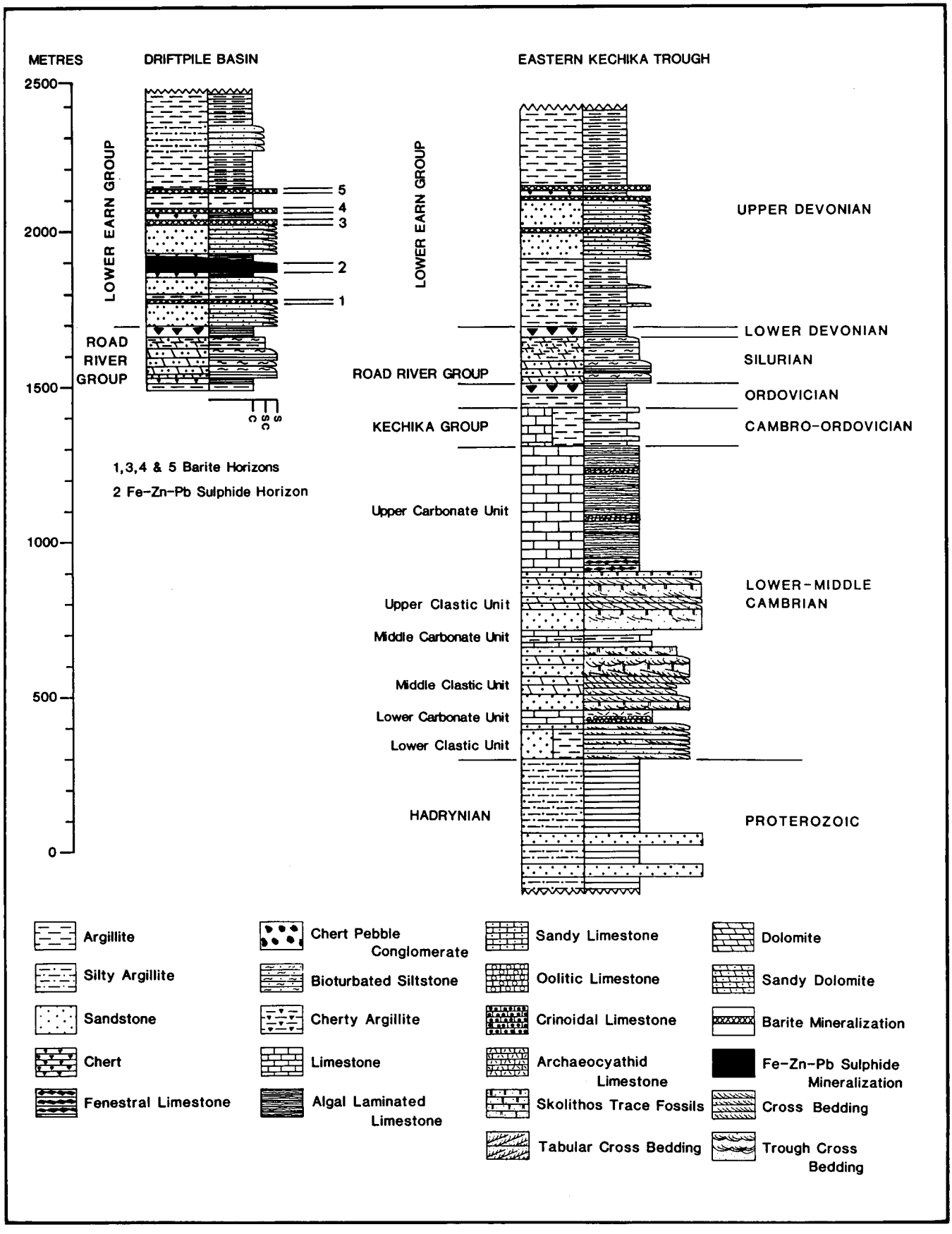


Figure 4: Summary stratigraphic columns showing the general stratigraphy of the eastern Kechika Trough and of the Driftpile "Basin".

The oldest rocks exposed are a thick succession of Hadrynian green slates, phyllites, brown sandstones, quartz-pebble grits and minor lenses of oolitic limestine, generally confined to the cores of anticlines. A sequence of Lower to Middle Cambrian quartzite, dolomitic grits, sandstones and shallow water carbonates, 1100 to 1200 metres thick, overlies the Hadrynian basement. The Middle Cambrian rocks are conformably overlain by the Upper Cambrian to Ordovician Kechika Group comprising 30 metres of orange-weathering, interbedded dolomite and dolomitic siltstone at the base, followed by 150 metres of calcareous phyllite intercalated with limestone. The overlying Road River Formation of Ordovician to Early Devonian age consists of a 30 to 60-metre basal section of recessive, graptolitic carbonaceous argillite followed by 130 to 170 metres of distinctive orange-weathering dolomitic siltstone. The base of the Middle to Upper Devonian Earn Group is characterized by lenses and tongues of thickly bedded chert-pebble conglomerate. These rocks are overlain by at least 400 metres of recessive, unlaminated to thinly laminated, silvery grey weathering black argillites, cherty argillites and cherts of the Gunsteel Formation, which hosts the barite and barite-lead-zinc occurrences.

The entire stratigraphic sequence is complexly deformed. A large thrust sheet of Kechika Group and older strata bounds the mineralized area to the west; to the east it is bounded by folded and faulted Lower to Middle Cambrian rocks. The stratiform baritic horizons are repeated by folding and faulting, resulting in a complex outcrop pattern.

Of the five mineralized horizons that have been identified in the Gunsteel Formation in the Gataga district (Figure 4), the lower three are the most persistent and host the thickest barite and barite-sulphide accumulations. Baritic beds are thicker, up to 50 centimetres, and more massive at the base of the mineralized intervals, becoming thinner and more laminated to blebby higher in the sequence. Barite varies from medium to coarse grained in massive beds, through laminated barite intercalated with thin-bedded argillite, to blebby and nodular in argillites and cherts.

One mineralized interval has been traced throughout the area covered by the Gataga Joint Venture; three distinct baritic facies occur along this horizon. The first is represented by flattened diagenetic nodules concentrated along laminae within specific beds. Baritic beds, 2 to 15 centimetres thick, are separated by 2 to 5 centimetres of pyritic, non-baritic shale with otherwise identical morphology. The size of the flattened nodules decreases upwards and the sequence is cyclic in character. Soft-sediment deformation features are common in the baritic shale (Carne, 1978).

The second facies comprises finely laminated, massive barite, greyish white to almost black in colour and varying from 1 to 10 metres thick. These beds have a lateral extent varying from a few metres to as much as a kilometre. The third facies, light greyish white barite interbedded with discrete pyrite laminae and thin beds of grey chert, is present peripheral to the Driftpile Creek barite-sulphide deposit.

Throughout the Gataga - Akie River belt, rocks underlying the baritic sequence are rhythmically bedded black cherts, cherty mudstones, argillites and siliceous argillites. Their thickness varies from 10 to 20 metres in the southern and eastern parts of the district where they underlie deposits of laminated nodular barite and massive barite barren of base metal sulphides (Kwadacha, Del, Gin), to relatively thick (100 to 200 metres) chert-rich

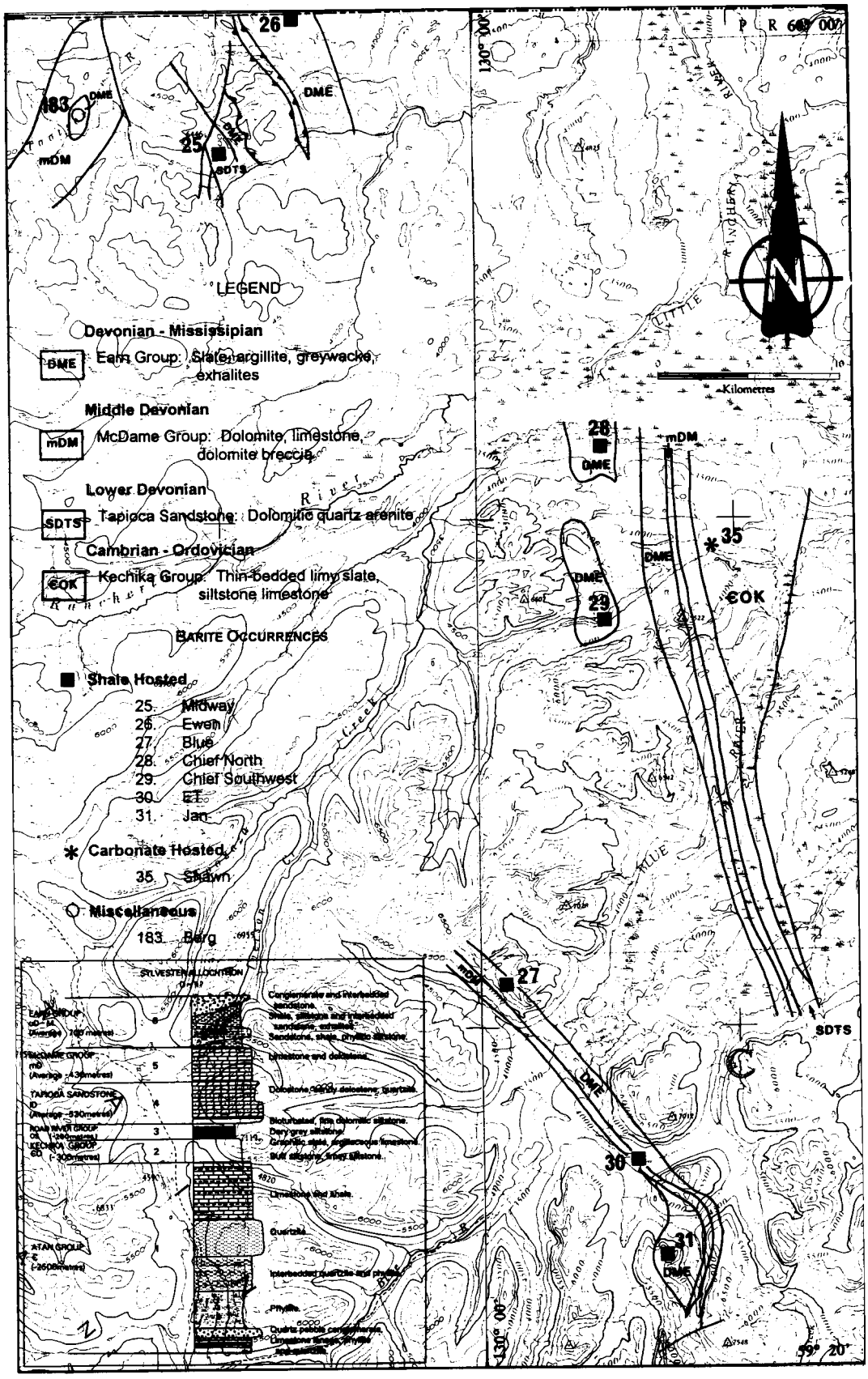


Figure 5: Location of barite occurrences in the Midway-Cassiar area, Northern British Columbia. (geology from Nelson and Bradford, 1987b; Nelson *et al.*, 1988b and Nelson and Bradford, 1989b)

sections farther to the north and west where they are the footwall to massive barite-pyrite-sphalerite-galena deposits as at Cirque, or laminated pyrite-sphalerite mineralization, with or without barite, as at the Bear and Driftpile Creek deposits.

There is an apparent deposit-scale zonation in the northern and central parts of the district. In the Cirque deposit, massive bedded barite grades westward into mixed barite and galena, mixed barite-pyrite-sphalerite-galena and finally into massive and laminated pyrite with local concentrations of sphalerite (MacIntyre, 1983b). At the Driftpile Creek, Bear and Cirque deposits there is a vertical zonation from barren barite at the base to interlaminated barite-sphalerite-galena and pyrite to massive and finely laminated pyrite with minor sphalerite.

MacIntyre (1983b) interprets these deposits as having formed by exhalation of heated metalliferous brines into a strongly reducing euxinic basin. Pyrite was precipitated near the exhalative vent in a third-order basin while barite was deposited in more oxygenated waters peripheral to the seafloor depression. The brines were probably slightly heated formation waters that escaped to the seafloor along growth faults. The deposits lie at the transition from a starved basin regime to a deeper, more normal environment with higher sedimentation rates. Dewatering of the basinal sediments may have generated the metal-rich fluids.

The Earn Group of Upper Devonian to Lower Mississippian age is also host to several barite-bearing exhalite deposits in the Midway-Cassiar area (Figure 5) and interpreted to be stratigraphically equivalent to the mineralized rocks in the Gataga area and at McMillan Pass in the Yukon. Near the Midway deposit the Earn Group is comprised of black slate, thin-bedded siltstone, sandstone, chert-pebble conglomerate with thin horizons of baritic, siliceous and sulphide-rich exhalites (Nelson and Bradford, 1987a). Underlying it unconformably are carbonates of the McDame Group. Two coarsening-upward sequences have been recognised within the Earn Group at Midway. Exhalative horizons occur in the lower part of the second fine-grained clasitc sequence. To the southeast, north of Cassiar, the Earn Group forms parts of several imbricate slices on the west limb of the McDame synclinorium (Nelson and Bradford, 1987a). Black, rusty-weathering, graphitic shale is the dominant lithology. Siliceous and baritic exhalites occur in two thrust panels north of the Cassiar mine. Black slates with nodular and lensoidal white barite are associated with the exhalite-bearing sections. To the north, in the Blue Dome area, the Earn Group is approximately 200 metres thick and comprises black argillite with minor siltstone and limestone. Exhalite horizons are common (Nelson *et al.*, 1988a).

The descriptions of the barite occurrences that follow are roughly organized from south to north, starting with deposits in the Akie River district south of Kwadacha Park, through deposits within the park, to the Gataga district and on northwards through Cassiar to the Yukon border. Most of the occurrences are hosted by the Devonian Gunsteel Formation or rocks believed to be correlative, with the notable exception of the Ern, CT and Sika occurrences in Road River rocks of Ordovician to Silurian age. Numbers in parentheses following occurrence names are referenced to Figures 1, 3 and 5.

DESCRIPTION OF OCCURRENCES - KECHIKA TROUGH

Cirque, Stronsay (1) MINFILE Number: 094F 008
Latitude: 57°30'30" Longitude: 125°07'54" NTS: 94F/06, 11

The Cirque barite-zinc-lead deposit is located between the Kwadacha and Akie rivers, 25 kilometres east of Mount Haworth (Figure 3). It was discovered in 1977 by Cyprus Anvil Mining Corporation and Hudson's Bay Oil and Gas Company, Limited. These companies subsequently completed extensive exploration of the deposit which is now owned by Curragh Resources. The Cirque deposit, now the Stronsay project, has been approved by the Mine Development Approval Process.

The deposit is a barite-sulphide lens, 1000 metres long, 300 metres wide and 2 to 60 metres thick. It contains drill-indicated reserves of 52 million tonnes grading 8 per cent zinc, 2 per cent lead and some silver credits for both the North and South Cirque deposits together with a substantial barite resource (Anonymous, 1992). The most recent plan was for the North Cirque deposit to be opened first and the South Cirque later. The following description of these deposits and their geological setting (Figure 6) is summarized from Jefferson *et al.* (1983) and Pigage (1983).

The deposits occur in a sequence of Ordovician to Mississippian fine-grained clastic rocks. Road River Formation graptolitic, calcareous black shales of early Ordovician to Silurian age are the oldest rocks present in the immediate vicinity of the deposits. These strata are overlain by the Devonian Earn Group which hosts the stratiform barite-sulphide mineralization. It is subdivided into three formations. Coarse clastic rocks belong to the Warneford Formation while fine clastics are assigned to the Akie and Gunsteel formations. These latter two formations are distinguished on the basis of colour, hardness and weathering characteristics.

The Gunsteel Formation is further divided into two facies. A siliceous facies consisting of ribbon-bedded, black porcellanite with thin carbonaceous shale partings locally contains one or more horizons of blebby to laminated barite with pyrite. The porcellanite beds are silicified, carbonaceous fine clastic rocks containing siltstone beds, 1 to 20 centimetres thick. Thick-bedded, black siliceous shale locally containing nodules or concretions of pyrite, calcite, chert or barite represents the second facies. Grey, slightly calcareous, graded quartzose siltstone laminae are common.

All nonsiliceous shales are included in the Akie Formation and are planar laminated, medium grey, soft and locally graphitic. Regionally the Akie Formation overlies the Gunsteel but locally these formations are intercalated, as at the Cirque deposit where Akie shales underlie the Gunsteel Formation.

The Warneford Formation is virtually absent in the immediate vicinity of the Cirque deposit. Where present, the dominant facies is grey to black shale characterized by intraformational breccia and lenses of discontinuous laminae of pyritic, quartzose siltstone. It commonly weathers a light blue-grey colour. Large lenses of coarse sandstone and chert-pebble conglomerate are present locally.

Structurally, the Cirque deposit occurs within an upright, southwest-dipping sequence of Earn strata that have been overthrust by a structurally complex panel of Road

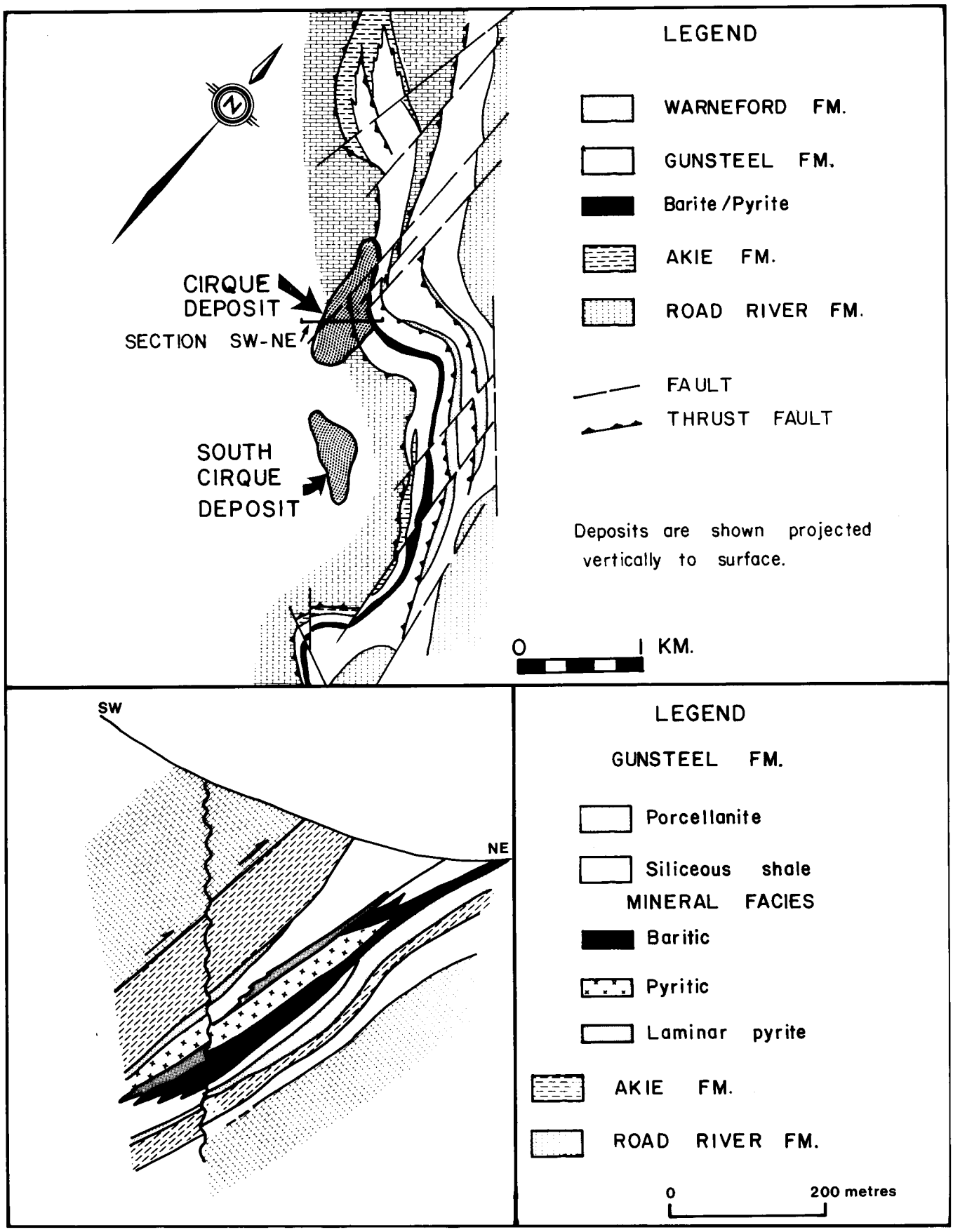


Figure 6: Simplified geology map and schematic vertical cross-section through the Cirque Deposit. (from Jefferson *et al.*, 1983)

River rocks (Figure 6). Small-scale folds with overturned southwest-dipping limbs occur locally within the Earn Group.

The Cirque deposit is a stratiform body consisting of bedded barite and sulphide facies ranging from 100 per cent barite to almost 100 per cent sulphides. Major minerals present, in decreasing order of abundance, are barite, pyrite, sphalerite and galena. Quartz, calcite and complex barium-calcium carbonates occur in minor amounts. Geochemical and x-ray analyses of three grab samples, by the authors, are presented in Table 2a.

Three distinct facies comprise the deposit; Table 2b lists average grades from drill core sample composites. The baritic facies consists of pale grey to white, diffusely laminated, fine to medium-grained barite with up to 40 per cent sulphides. The sulphides occur as discontinuous laminations, 1 to 5 millimetres thick, in which concentrations of framboidal pyrite are surrounded by a matrix of interlocking barite and sphalerite grains. Galena commonly occurs at grain boundaries and as fracture fillings in the barite. A subfacies comprises intraformational breccia in which barite is present in a shale and sulphide matrix.

The pyritic facies ranges from diffusely interbedded sulphides and barite to almost 100 per cent sulphides. The laminar facies consists of laminae of pyrite and black siliceous shale 1 to .5 millimetres thick generally occurring on the fringe of the deposit. The baritic facies tends to form a partial envelope around the pyritic facies.

The Cirque deposit is a potential producer of lead and zinc; barite could conceivably be recovered as a byproduct.

Fluke (3) MINFILE Number: 094F 009
Latitude: 57°25'00" Longitude: 124°54'00" NTS: 94F/07

The Fluke property is located in the valley of Silver Creek, a tributary of the Akie River, approximately 43 kilometres east of Fort Ware and 50 kilometres northwest of Sikanni Chief Lake (Figure 3). It was staked by Cyprus Anvil Mining Corporation and Hudson's Bay Oil and Gas Company, Limited in 1978 to cover a small stratiform pyrite-galena-sphalerite showing. Mineralization occurs in a northwest-trending, southwest-dipping succession of Gunsteel and Besa River shales. The succession is terminated to the southwest by steep imbricate thrust sheets of Silurian siltstone and Kechika Group limestone (Roberts, 1979c). Blebby barite is present in siliceous argillite southwest of the showing (MacIntyre, 1982a, b).

Elf (5) MINFILE Number: 094F 011
Latitude: 57°18'00" Longitude: 124°41'00" NTS: 94F/07

The Elf property is located on the south side of the Akie River approximately 35 kilometres northeast of Akie Mountain (Figure 3). It was staked in 1978 by Cyprus Anvil Mining Corporation and Hudson's Bay Oil and Gas Company, Limited to cover lead-zinc geochemical anomalies and a float occurrence of stratiform barite-lead-zinc mineralization. Subsequent work located a 4-metre interval with massive barite-galena- sphalerite mineralization interbedded with several black shale horizons within the Gunsteel Formation. Beds of dark grey, bedded barite are 10 to 20 centimetres thick and contain diffuse bands of galena (MacIntyre 1982a, b; Roberts, 1979a, b). Analyses of selected barite samples collected from this occurrence are summarized in Table 3.

Float boulders of white crystalline barite containing some galena and sphalerite occur downstream from the main showing but appear to be derived from a different locality.

Dog (6) MINFILE Number: 094F 012
Latitude: 57°22'00" Longitude: 124°51'00" NTS: 94F/07W

The Dog property is located 34 kilometres northeast of the confluence of Del Creek and the Finlay River (Figure 3). Layers of nodular barite are present in graphitic shales of the Gunsteel Formation.

Gnome (10) MINFILE Number: 094F 016
Latitude: 57°14'00" Longitude: 124°33'00" NTS: 94F/02, 07

The Gnome barite occurrence is located south of the Akie River, 28 kilometres west of Sikanni Chief Lake (Figure 3). It was staked by Cominco Ltd. in 1980 and subsequently explored by a program of geological mapping and soil geochemistry (Kuran, 1981).

The property is underlain by Cambrian to Mississippian rocks exposed in a series of northwest-trending folds that have been cut by normal faults and west dipping thrust faults.

Three barite bearing horizons occur in the Gunsteel Formation, which in this area consists primarily of shale with varying amounts of siliceous material, cherty horizons and siltstone of shallow water origin. The lower barite zone is 3.5 metres thick and consists of laminar to blebby barite. It is associated with a pyrite interval 10 metres thick. The upper two barite intervals are 2 to 9 metres thick and consist of blebby to laminated barite with minor amounts of pyrite.

Gin (11) MINFILE Number: 094F 017
Latitude: 57°11'00" Longitude: 124°30'00" NTS: 94F/01, 02

The Gin property, which is located 40 kilometres northeast of the north end of Williston Lake (Figure 3), was staked in 1979 by Cyprus Anvil Mining Corporation and

Table 2: Geochemical and x-ray analyses of barite grab samples (authors); b) Grades of mineral facies (Pigage, 1983), Cirque deposit.

a)

Field No.	Ba	S.G.	Cu	Pb	Zn	Hg	As	Sb	Cd	V	Sr
80-OM-1	56.75	4.4	3	5.59	412.00	0	22	5	17.5	12	20
80-OM-3	57.51	4.2	4	3561.00	493.00	0	5	5	12.3	2	27
SB89-21	57.26	4.8	7	2.21	0.11	1400	0	0	18.0	2	342

	XRD-Major	XRD-Minor	XRD-Trace
80-OM-1	Barite	galena	anglesite
80-OM-3	Barite	quartz	galena, anglesite
SB89-21	Barite	sphalerite, galena	

b)

Facies	Ba (%)	S.G.	Pb (%)	Zn (%)	Fe (%)	Ag (g/t)
Baritic	40.7	4.2 - 4.4	1.3	6.2	6.2	33
Pyritic	19.4	4.4 - 4.7	3.3	11.1	17.9	73
Laminar	2.0	2.7 - 3.1	0.6	4.0	--	24

Results are from an assay of three composite samples (blending of material from 29 drill intersections)

Table 3: Analyses of baritic samples, Elf property. (MacIntyre, 1980)

Sample Number	Ba %	Cu (ppm)	Pb %	Zn (ppm)	Ag (ppm)
Elf-1	51.5	35	3.0	37	15
Elf-2	30.1	88	32.0	1408	33
Elf-3	47.1	70	16.8	687	43
Elf-4	12.1	383	15.0	115	93

Elf-1: white crystalline barite with interstitial galena, float in creek

Elf-2,3: dark grey bedded barite with diffuse galena bands, from trenches

Elf-4: thin, very fine-grained band of galena and interstitial barite, from trenches

Table 4: Analyses of baritic samples, boundary of Kwadacha Park (Mount Alcock). (Carnes,1978)

Sample type	Ba %	Pb ppm	Zn ppm	Sr ppm	Mn ppm	Fe %
Bedded, black, fetid Barite	53.4	1	2	4800	2	0.05
Barite	30.6	1	60	3400	10	0.40
Barite	45.3	1	12	4400	5	0.20

Hudson's Bay Oil and Gas Company, Limited. These companies subsequently completed a program of geological mapping on the property (Hall, 1983).

The youngest rocks exposed on the property are finely laminated, soft and often rusty brown weathering shales of the Upper Devonian to Lower Mississippian Akie Formation. This unit is underlain by hard, siliceous, dark grey to black, silvery grey weathering shales of the Gunsteel Formation. Bedded barite mineralization occurs within this unit (Figure 7). Underlying the Gunsteel Formation is a thin unit of reefal limestone and orange to tan-weathering dolomitic siltstone of Silurian age.

Structure in the area is dominated by northwest-trending upright folds that preserve the Gunsteel Formation in the keels of synclines.

Nodular and laminar barite is exposed at an elevation of 2100 metres in the southwest corner of the Gin 1 claim. It occurs within finely laminated dark grey to black siliceous shale of the upper part of the Gunsteel Formation. Barite nodules 2 millimetres or less in diameter and slightly elongated lie parallel to bedding. They occur over a 0.5-metre interval and occupy approximately 1 per cent of the rock. Laminar barite at this locality is 0.5 centimetre thick.

A second barite occurrence is located across elevations ranging from 1840 to 1860 metres. Here the barite trends northwesterly with dips of 40° to the southwest. It occurs above a cherty unit and forms blocky outcrops over a strike length of approximately 100 metres. The barite is massive and 1 to 3 metres thick. Minor barite occurs along the same horizon 100 metres to the southeast where it is present as 1 to 2-millimetre sized nodules and discontinuous lenses over a thickness of a few centimetres.

Del (12) MINFILE Number: 094F 018
Latitude: 57°20'00" Longitude: 125°00'10" NTS: 94F/07

Cominco Ltd. staked the Del property and conducted geological and geochemical surveys in 1981. It is located between the Akie River and Del Creek, 55 kilometres west of Sikanni Chief Lake (Figure 3), is underlain by sedimentary rocks of Ordovician to Devonian age.

Shales and limestones of the Road River Formation are the oldest rocks exposed. They are unconformably overlain by 500 metres of rythmically bedded dolomite with varying amounts of siltstone, shale and quartzose sandstone of Silurian age. Early to Middle Devonian dolomite, limestone and bioclastic limestone overlie the Silurian unit.

These strata are in turn overlain by the Upper Devonian Gunsteel Formation consisting of black to blue-grey weathering silty shale, siliceous shale, chert and rusty weathering nodular to massive grey barite. Several barite beds, up to 2 metres thick, are present, as are float blocks of light cream to buff-grey barite derived from and unknown source (Pride, 1981a).

Pie (16) MINFILE Number: 094F 023
Latitude: 57°27'00" Longitude: 124°58'00" NTS: 94F/06, 07

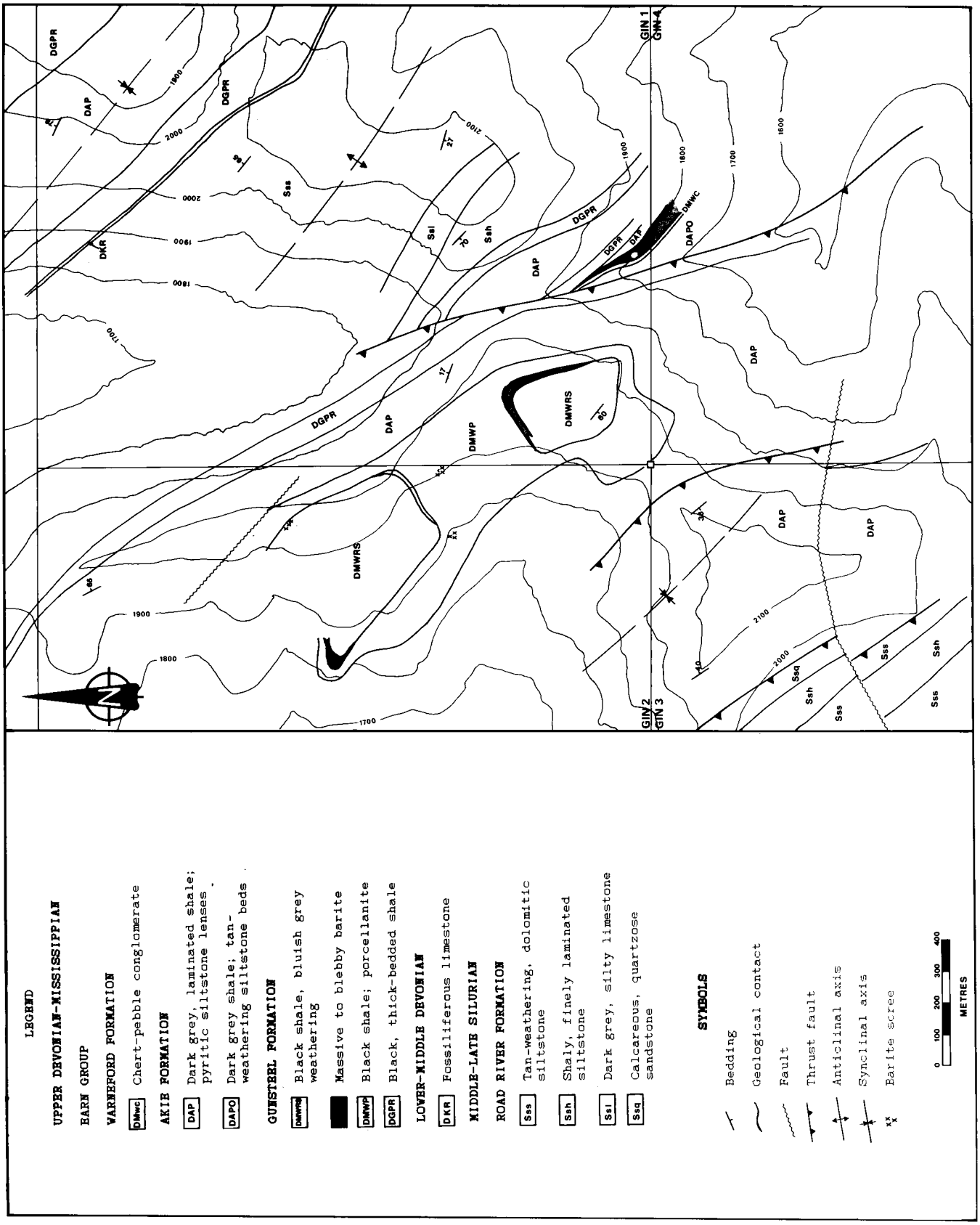


Figure 7: Geological setting of barite occurrences, GIN property. (modified from Hall, 1983)

The Pie property is located southeast of the Cirque deposit, 30 kilometres east of Fort Ware (Figure 3) at elevations ranging from 1100 to 2300 metres. It was staked in 1978 by Rio Tinto Canadian Exploration Limited to cover several beds containing nodular barite. Hostrocks consisting of black graphitic shales of Devonian age are exposed on the southwest limb of an anticline. Minor amounts of galena and sphalerite are associated with the barite (MacIntyre, 1982). A sample collected by the senior author yielded 55.31 per cent barium and negligible base metals values.

Yule (7) MINFILE Number: 094F 013
Latitude: 57°34'00" Longitude: 125°13'00" NTS: 94F/11

The property is located south of the Kwadacha River (Figure 3). Blebby barite with laminar pyrite is present in dark grey to black shale and fine-grained non-siliceous mudstone of the lower Gunsteel Formation. Strata in the area have been folded into a series of northwest-plunging, overturned isoclinal folds (Hodgson and Campbell, 1981).

Ern (2) MINFILE Number: 094F 001
Latitude: 57°06'00" Latitude: 124°33'00" NTS: 94F/02E

The Ern property is located at the headwaters of Pesika Creek, 30 kilometres southwest of Sikanni Chief Lake (Figure 3). It was staked in 1980 by Cominco Ltd. to cover two zones of stratiform barite-sphalerite-pyrite mineralization.

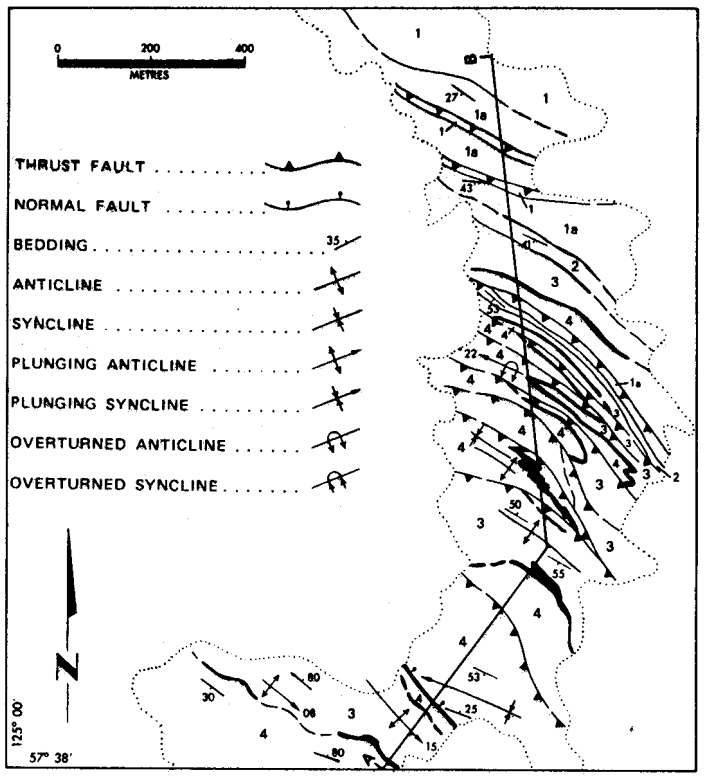
Regionally, the geology consists of a succession of Cambrian to Devonian shallow-water carbonates and fine-grained clastic rocks. The oldest rocks on the property are orange to grey-weathering thick-bedded siltstones and nodular limestones of the Kechika Formation. These strata are overlain by a sequence of limestone, limy mudstone, shale, siliceous shale and siltstone of the Silurian Road River Formation. This unit is characterized by rapid horizontal and vertical facies changes and includes laminated black chert and barite members (Pride, 1981b).

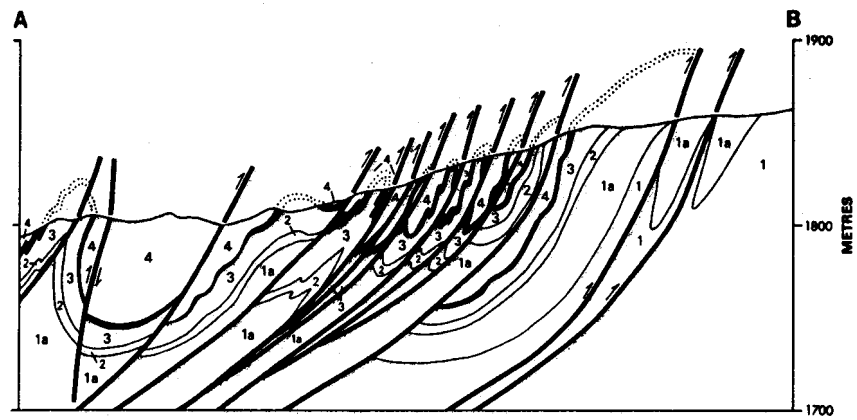
Pyrite, barite and sphalerite with minor galena occur over a stratigraphic thickness of 10 to 12 metres in the Road River Formation. The mineralized sequence includes a dolomite breccia 35 centimetres thick containing 8 per cent zinc.

CT (4) MINFILE Number: 094F 010
Latitude: 57°05'00" Longitude: 124°17'00" NTS: 94F/01W

The CT property, located on a tributary of the Ospika River 20 kilometres southwest of Sikanni Chief Lake (Figure 3), was staked by Cominco Ltd. in 1980 to cover a barite-sulphide horizon.

Volcanic flows, dolomite, graptolitic mudstone, limestone and dolomitic siltstone of the Upper Ordovician to Lower Silurian Road River Formation underlie the property. A barite-pyrite-sphalerite horizon 50 centimetres thick occurs within a pyritic mudstone and has a strike length of 2.5 kilometres. The barite is laminated and contains 25 to 35 per cent zinc (Mawer, 1983).





LEGEND

MIDDLE DEVONIAN – MISSISSIPPIAN

EARN GROUP

4 BLACK SILTY SHALE; MINOR LIMESTONE, CHERT (uDM_B)

MASSIVE LAMINATED BARITE

3 INTERBEDDED BLACK-BANDED CHERT, SILICEOUS ARGILLITE, AND BLACK CARBONACEOUS SHALE; MINOR LIMESTONE (mDM_G)

LOWER – MIDDLE DEVONIAN

2 THIN-BEDDED FOSSILIFEROUS LIMESTONE, CALCARENITE; MINOR SHALE, QUARTZ SANDSTONE, AND SILTSTONE (lmD_L)

SILURIAN – LOWER DEVONIAN

ROAD RIVER GROUP

1a PLATY BANDED SILTSTONE AND LAMINATED SILTY SHALE; MINOR LIMESTONE AND CHERT (SD_C)

1 MEDIUM TO THICK FLASER-BEDDED DOLOMITIC SILTSTONE; MINOR LIMESTONE (S_S)

Figure 8: Geology of the Kwadacha barite occurrence. (from MacIntyre, 1983)

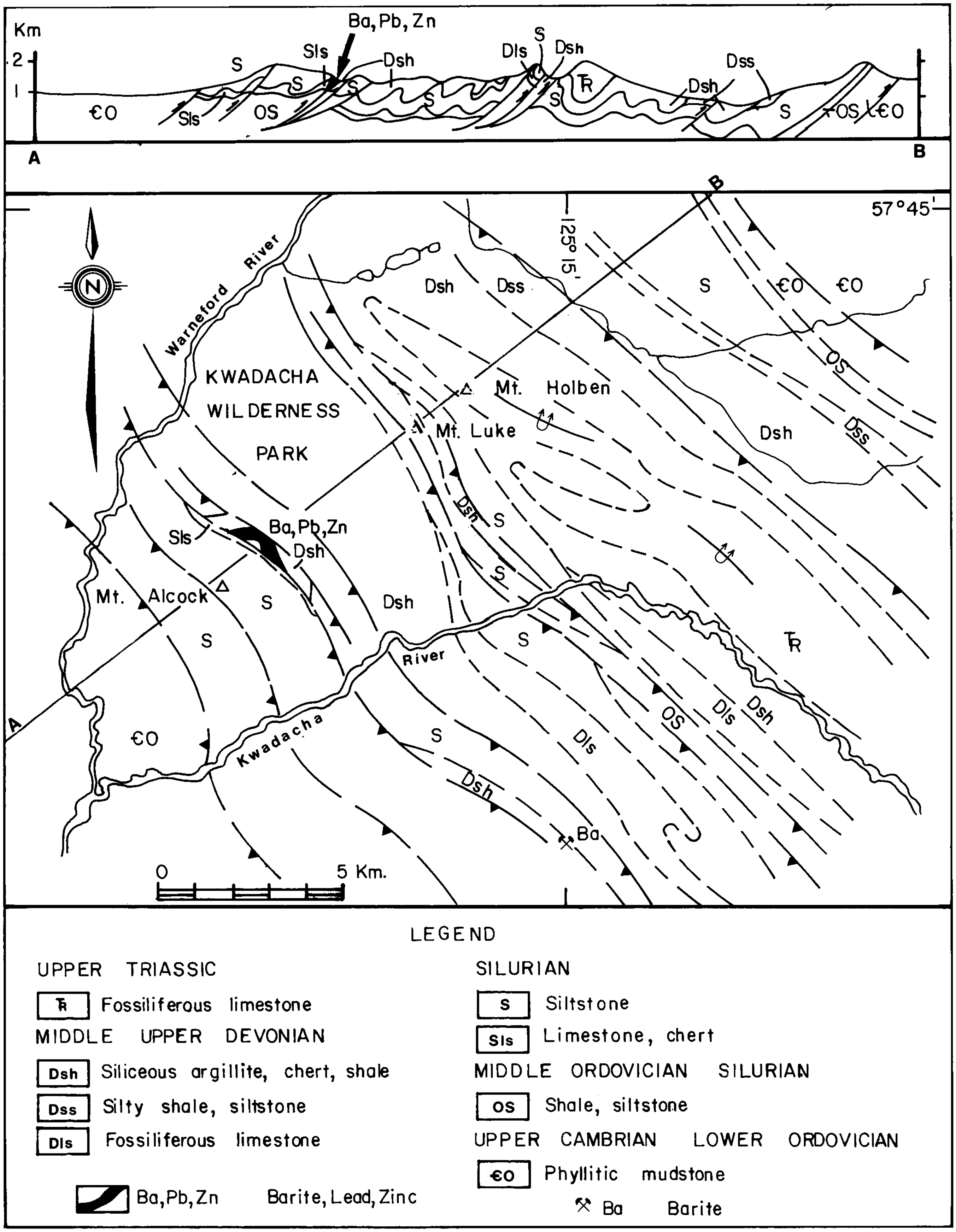


Figure 9: Geology in the area of the Mount Alcock barite-lead-zinc occurrence. (from MacIntyre, 1980b)

Sika (15) MINFILE Number: 094F 022
Latitude: 57°22'30" Longitude: 124°35'00" NTS: 94F/07

This deposit is located at the southern end of the Akie shale belt, east of the Elf barite occurrence (Figure 3) and was first described by Cecile and Norford (1979). A grey barite bed, 1 metre thick, occurs at the top of an Ordovician turbidite unit 110 metres thick. It is in turn overlain by black shales containing Middle to Late Ordovician graptolites. The barite horizon is exposed at several places and has a possible strike length of 7 kilometres. No sulphides occur with the barite.

Kwadacha (13) MINFILE Number: 094F 020
Latitude: 57°37'30" Longitude: 124°54'30" NTS: 94F/10W

The Kwadacha barite deposit is located immediately north of the confluence of the Kwadacha and North Kwadacha rivers within the Kwadacha Wilderness Park (Figure 3). It is repeatedly exposed in a zone of imbricate thrusting and complex folding along a north-trending ridge (Figure 8). Barite occurs near the top of a resistant unit of rhythmically bedded black chert, siliceous argillite, silty shale and minor limestone. The unit hosting the barite is overlain by a monotonous sequence of black shale and underlain by shallow-water, thin to medium-bedded fossiliferous limestones and calcarenites.

Two barite zones are present, separated by a 10 to 15-metre interval of black shale. The lower zone consists of several 10 to 15 centimetre thick intervals of laminated and nodular barite that occur in the upper 10 to 15 metres of the host. The upper zone is 1 to 10 metres thick and consists of massive, finely laminated barite with thin argillaceous partings. There is a colour gradation from light grey to white barite at the base to dark grey at the top, interpreted to be due to an increase in argillaceous material. A sample of siliceous baritic material taken by the senior author returned an analysis of 47.05 per cent barite and a specific gravity of 4.3. The high specific gravity is difficult to explain in the absence of significant base metal values.

Thin sections show the barite is well laminated and hosted by very thin bedded, fine-grained siltstone. It generally has a plumose or feathery texture but also occurs as rosettes or anhedral, irregular shaped grains that are slightly larger than the surrounding quartz grains. Grain size of the barite varies from 50 to 100 microns.

Discontinuous beds of discrete and coalescing barite nodules are present in black shales close to the base of the siliceous unit and overlying the upper massive barite zone (MacIntyre and Diakow, 1982).

Mount Alcock (9) MINFILE Number: 094F 015
Latitude: 57°41'00" Longitude: 125°24'00" NTS: 94F/11

Angular talus material of white to dark grey, bedded barite occurs on a ridge northeast of Mount Alcock in Kwadacha Wilderness Park (Figure 3). Stratiform barite-lead-zinc mineralization is contained within a fault bounded wedge of Gunsteel shale surrounded by Silurian siltstone (Figure 9). The baritic interval is approximately 25 to 30 metres thick and dips southwesterly at 45° to 75°. Within it a 2 to 3-metre zone contains fine diffuse bands of galena and sphalerite (MacIntyre, 1982). Selected samples assayed

49.3 to 51.8 per cent barium (MacIntyre, 1979). Analytical results for samples of baritic mineralization taken by the Gataga Joint Venture along the boundary of Kwadacha Park (Carne, 1978) are presented in Table 4.

North Kwad (14) MINFILE Number: 094F 021
Latitude: 57°46'00" Longitude: 125°33'00" NTS: 94F/12, 13

The North Kwad property, located 25 kilometres east of the Fox River and 10 kilometres northwest of the Warneford River (Figure 3) was staked by Cominco Ltd. in 1980 to cover showings of stratiform barite mineralization. A sedimentary succession ranging in age from Cambrian to Devonian underlies the property.

Barite lenses and baritic shale horizons occur within the Devonian Gunsteel Formation. Better showings are reported to occur north of the property (Waters, 1981). Geochemical response in the vicinity of the showings is greater than 5000 ppm barium.

Bear (17) MINFILE Number: 094F 024
Latitude: 57°58'00" Longitude: 125°48'00" NTS: 94F/13W

The Bear property, located 6 kilometres northwest of Gataga Lakes (Figure 3), was acquired by the Gataga Joint Venture in 1977. The joint venture subsequently completed a program of geological mapping in 1980 and diamond drilling in 1981.

Cambrian to Lower Mississippian sedimentary rocks are exposed in the area. Structure is dominated by northwest-trending, easterly directed thrust faulting. Pelitic rocks are complexly deformed in upright to slightly overturned isoclinal folds.

On the property the oldest rocks are calcareous black shales and mudstones of the Road River Formation. These are overlain by dolomitic and ankeritic siltstone, minor dolomite and cryptalgal, laminated silty limestone of Silurian age. Overlying Silurian rocks are massive to thick-bedded chert-pebble conglomerates of the Middle Devonian Besa River Formation. These conglomerates grade upwards into thick-bedded, gritty black mudstone and siltstone.

The youngest rocks exposed are the Upper Devonian Gunsteel Formation. The upper part of the formation consists of medium to thick-bedded siliceous and non-siliceous, carbonaceous black shale. This unit is underlain by cherty argillite and black chert which in turn is underlain by bedded barite and interbedded chert, cherty argillite, pyrite and nodular to blebby barite. Minor galena and sphalerite occur locally.

Bedded massive barite and pyrite was intersected in drill holes at six locations along a strike length of 1.5 kilometres. Intercepts of up to 9 metres of scattered nodular and blebby barite in stratiform concentrations were also obtained. Finely crystalline barite with sphalerite and galena across a thickness of 6.9 metres was cut by in two drill holes (Carne, 1981). The entire stratigraphic sequence is steeply dipping to near vertical (Figure 10). Analytical results for samples of barite mineralization taken by the Gataga Joint Venture (Carne, 1978) are presented in Table 5.

Driftpile Creek (D, P, Goof) (20) MINFILE Number: 094K 066
Latitude: 58°04'12" Longitude: 125°54'54" NTS: 94K/04W

Table 5: Analyses of baritic specimens, Bear property.
(Carne, 1978)

Sample Number	Ba (%)	Pb (ppm)	Zn (ppm)	Sr (ppm)	Mn (ppm)	Fe (%)	Type
862	53.7	770	10	1450	5	.10	I
863	52.5	1.01%	45	1550	5	.02	I
881	40.3	420	340	3350	10	.30	IV
882	44.3	1160	120	1200	5	3.75	I?

Type I: Bedded barite
Type IV: Quartz-barite veins and breccia fillings

Table 6: Analyses of baritic samples, Driftpile Creek property.
(6a: Carne, 1978; 6b: authors)

a)

Sample Number	Ba (%)	Pb (ppm)	Zn (ppm)	Sr (ppm)	Mn (ppm)	Fe (%)	Type
851	37.6	220	7600	2150	1120	0.85	II
867	49.1	7.60%	1.02%	1500	20	.60	Ia
868	31.6	1.49%	14.60%	700	120	2.10	Ia
869	50.8	6.69%	1680	1450	15	.65	Ia
870	35.1	11.90%	4.71%	1550	105	.45	Ia
871	51.5	11.40%	3.84%	2150	50	.95	Ia
876	49.5	5000	3.36%	1200	55	.10	Ia
877	0.7	3680	2640	500	690	10.00	IV
878	43.8	410	910	600	180	.20	Ia
879	50.2	360	400	1300	10	.15	Ia
880	39.4	250	195	110	20	.30	Ia
5529	53.8	4.86%	800	1400	5	.10	Ia
5530	30.7	4000	740	1000	5	.30	II
5531	44.1	12.00%	0.65%	1200	100	2.10	Ia
5532	40.9	10.80%	2.86%	2100	125	4.40	Ia
5533	40.5	10.80%	1.70%	1900	175	4.55	Ia

Type I: Bedded barite
Type Ia: Mineralized bedded barite
Type II: Blebby barite
Type IV: Quartz-barite veins and breccia fillings

b)

Sample Number	S.G.	Ba %	Sr ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	V ppm
79DP66E	4.6	47.29	21	11	13.30	2390	34	5	37.1	2
DP/31/843	2.8	0.14	120	26	465	6040	33	9	4.6	392
DP/81-43/97	3.5	31.30	37	15	35	1.40	12	5	20.8	195

Sample Number	XRD-Major	XRD-Minor	XRD-Trace
79DP66E	Barite	quartz, galena, pyrite	sphalerite, anglesite (?)
DP/31/843	Quartz	plagioclase, pyrite	sphalerite, potassic feldspar
DP/81-43/97	Barite, Quartz	muscovite, pyrite	sphalerite, dolomite

The Driftpile Creek property is located along Driftpile Creek approximately 22 kilometres from its confluence with the Kechika River (Figure 3). Mineral exploration in the area dates back to 1957. The property was staked in 1974 following the discovery of mineralized float by Canex Placer Limited which subsequently completed a program of geological mapping. In 1978 the property was optioned by the Gataga Joint Venture which completed further geological mapping, trenching and diamond drilling (Carne and Cathro, 1980; Cathro, 1982a).

The property is underlain by fine clastics of the Road River, Besa River and Gunsteel formations (Figure 11). Stratiform lead-zinc-barite mineralization occurs in four stratigraphic intervals in the lower part of the Gunsteel Formation.

The lowest mineralized horizon (Lh) consists of interbedded pyrite, siliceous shale and cherty black argillite (Figure 12). Pyrite beds are typically less than 0.5 centimetre thick and contain most of the lead and zinc sulphides. Within this unit some 1 to 2-metre intervals contain 50 per cent pyrite. Barite occurs throughout as stratiform concentrations of flattened nodules with a diameter of less than 3 millimetres. The unit has an average thickness of 9.5 metres. A zone of low-grade lead-zinc mineralization, 2 metres thick occurs 2 metres downsection from Unit Lh.

The middle horizon (Uh) has a strike length of over 1100 metres and has been traced to a vertical depth of 250 metres. Its thickness ranges from 14 to 37.5 metres and averages 25 metres. Bands of finely laminated pyrite and calcite with thin shale interbeds are separated by barren shale beds averaging 0.5 metre in thickness. Carbonate mineralogy in the upper part of the zone changes facies to barite from south to north, with a corresponding decrease in pyrite content.

The upper mineralized horizons (Th_1 and Th_2) are 115 to 140 metres above the middle horizon. Zone Th_1 consists of interlaminated pyrite, carbonate gangue, barite and shale. Barite is massive, grey and distinctly granular, some galena and sphalerite are present in the barite. High-grade baritic mineralization averages 12.58 per cent combined lead-zinc over a true thickness of 6.0 metres. Zone Th_2 is 20 metres stratigraphically above zone Th_1, and is very similar.

Analyses of surface samples reported by Carne (1978) are summarized in Table 6. Reserves on the property have been estimated at 225 000 tonnes grading 10 per cent lead-zinc and 8 per cent barium.

Saint, Roen (21) MINFILE Number: 094K 065
Latitude: 58°08'00" Longitude: 126°00'00" NTS: 94K/04 and 94L/01

The Saint property, also known as the Roen occurrence, located 8 kilometres northwest of Driftpile Creek (Figure 3), was staked in 1977. Three baritic shale horizons are present in cherty argillites of the Upper Devonian Gunsteel Formation (Carne, 1983).

Massive barite occurs in beds 1 to 12 centimetres thick over intervals of 3 to 6 metres (Figure 13). The barite mineralization grades upwards and laterally into silty banded shale containing blebby barite and to silty shale containing small barite nodules (Carne, 1979). Analyses reported by Carne (1978) are summarized in Table 7.

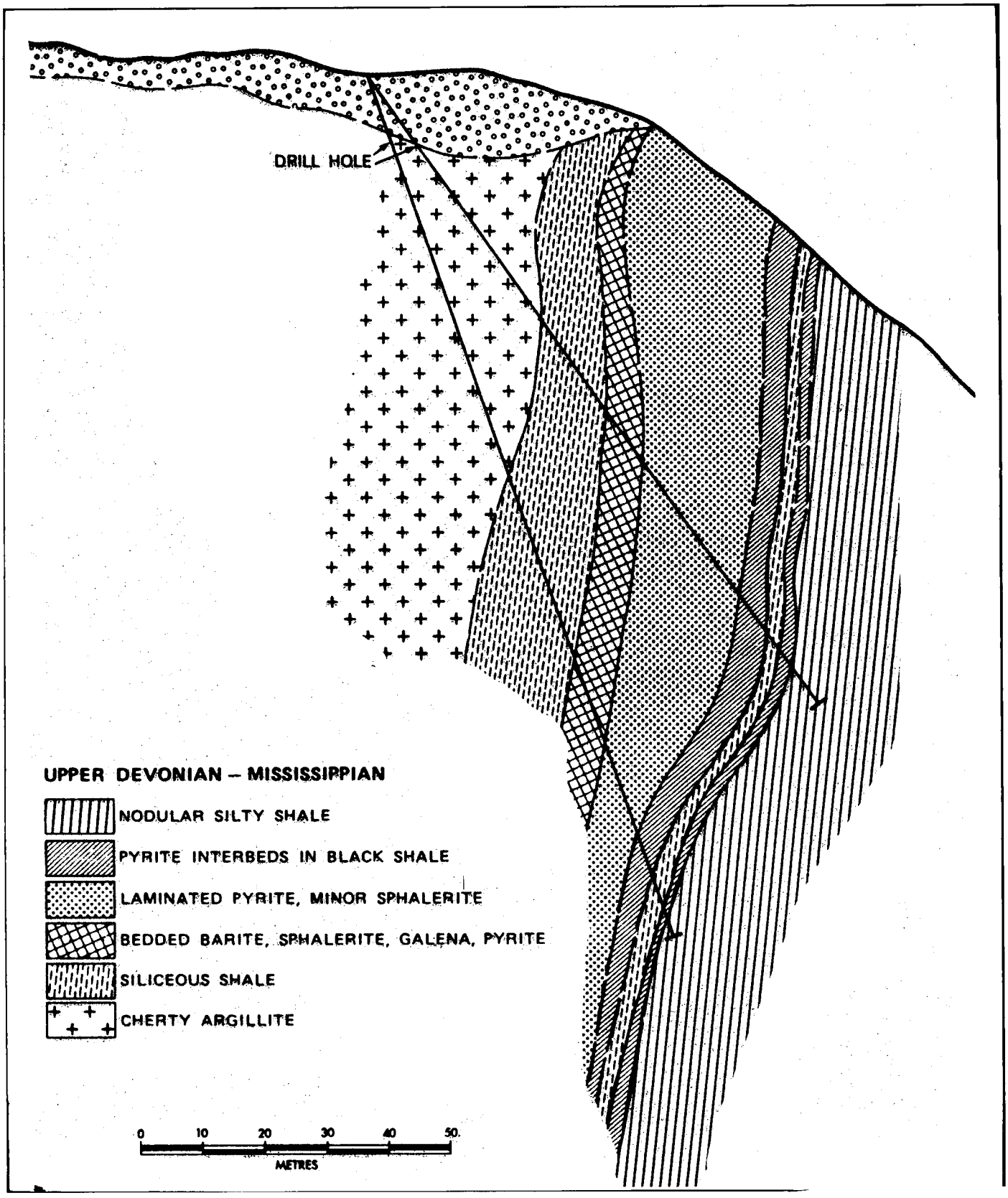


Figure 10: Drill section through the Bear deposit. (from MacIntyre, 1983)

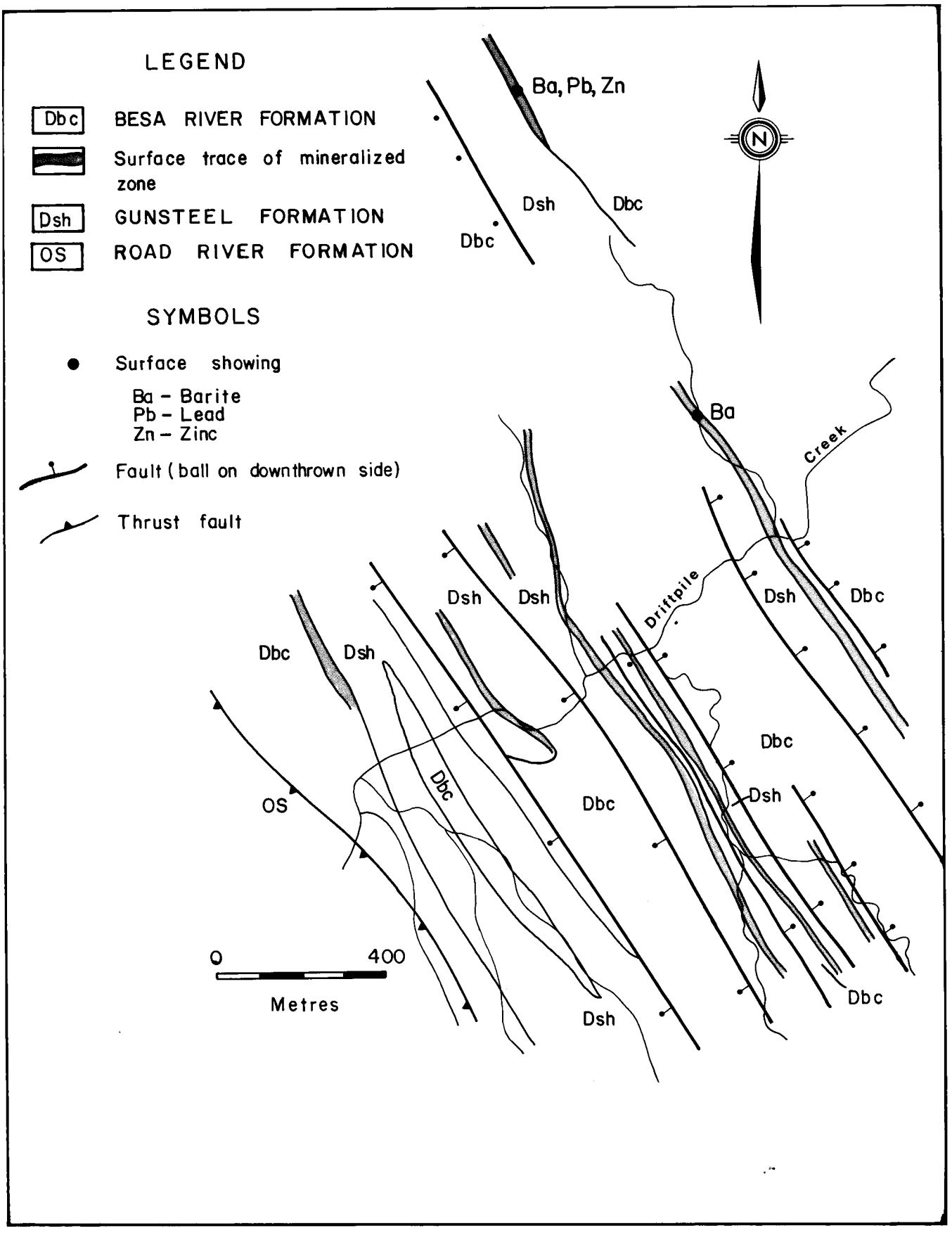


Figure 11: General geology of the Driftpile Creek property. (from MacIntyre, 1983)

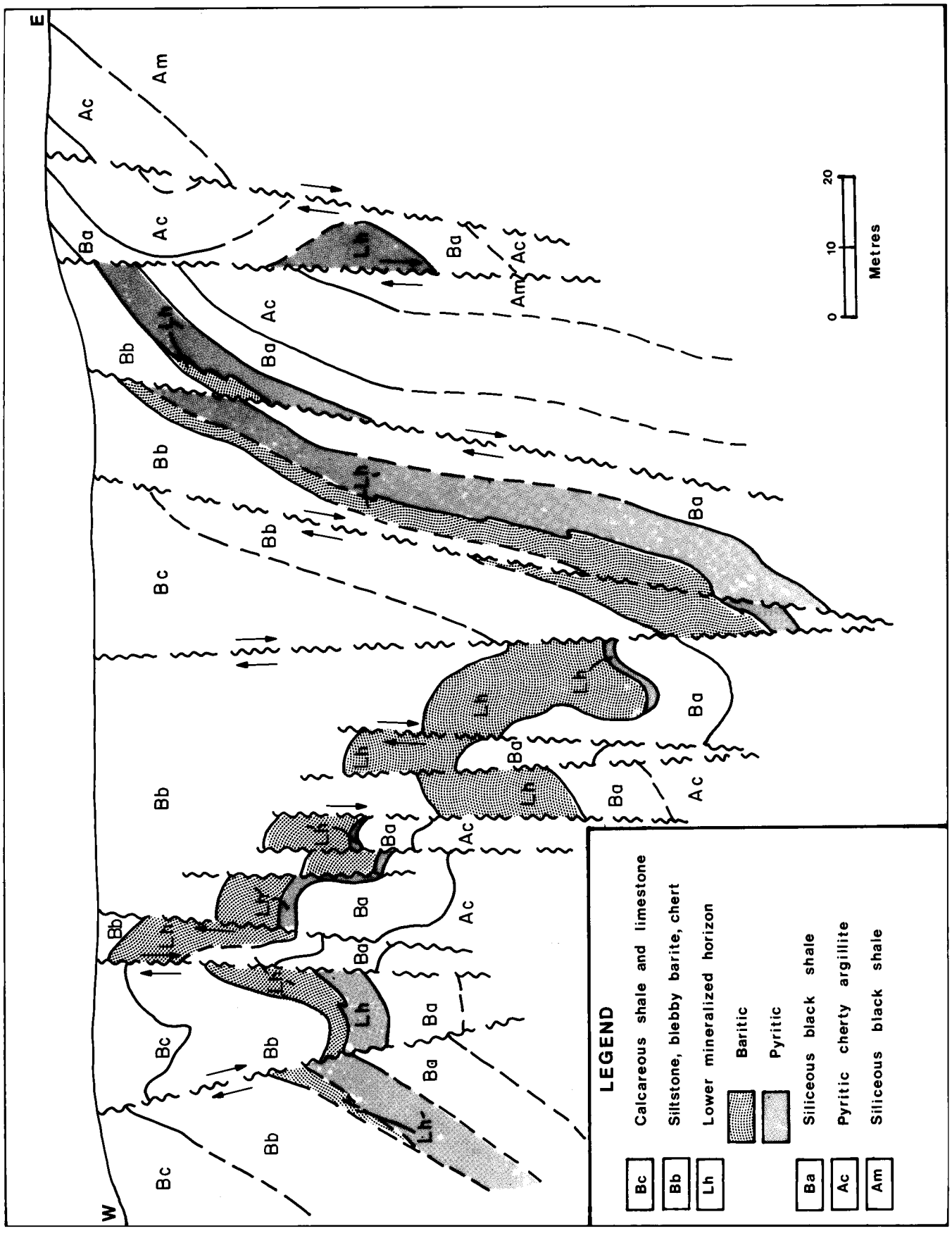


Figure 12: Schematic cross-section through the Driftpile Creek deposit. (from Carne and Cahtro, 1980)

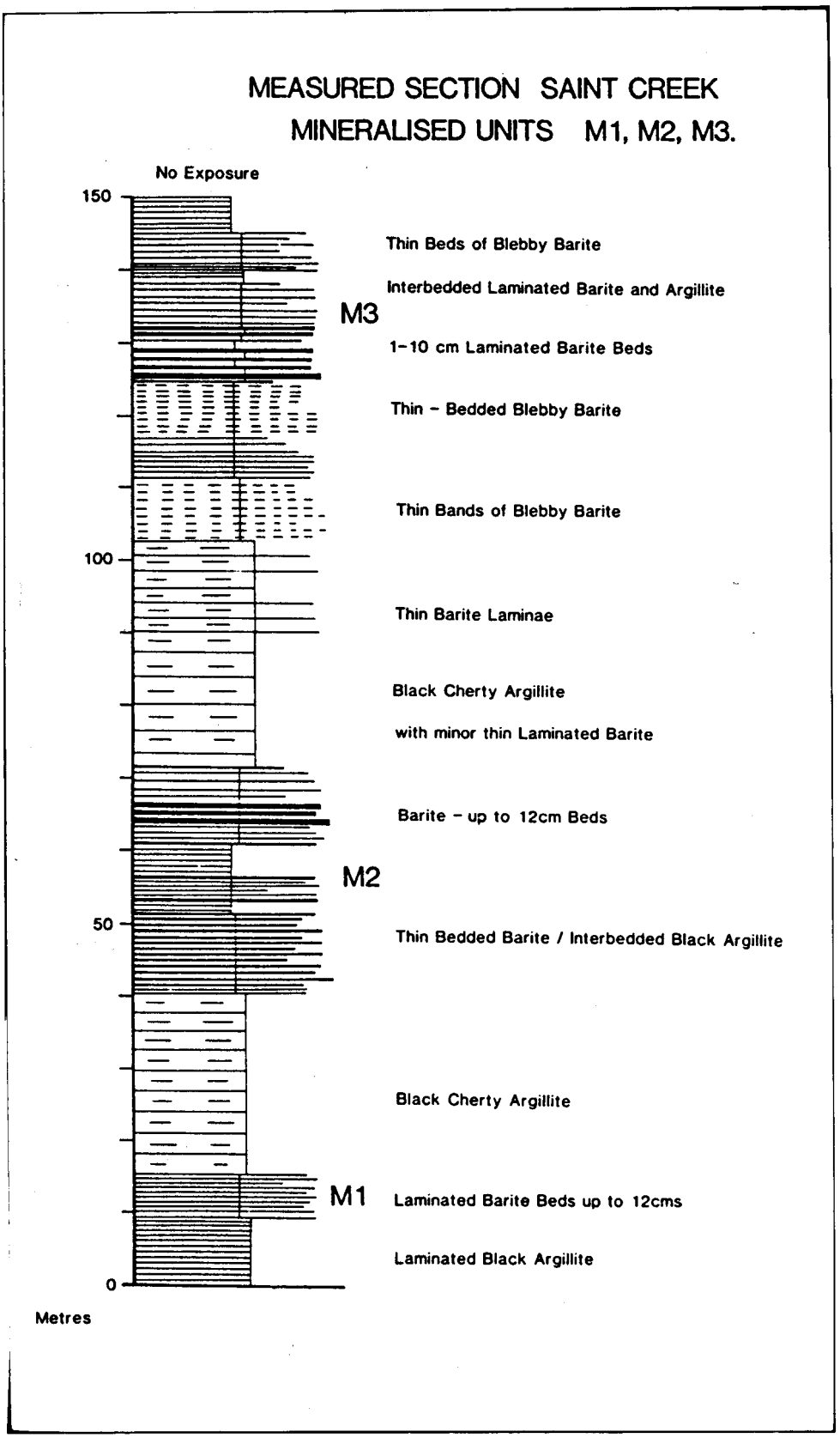


Figure 13: Measured section through the mineralized interval on Saint Creek. (from McClay *et al.*, 1988)

Table 7: Analyses of baritic samples, Saint property. (Carne, 1978)

Sample Number	Ba (%)	Pb (ppm)	Zn (ppm)	Sr (ppm)	Mn (ppm)	Fe (%)	Type
852	45.3	35	2040	950	125	.35	I
852	45.3	35	2040	950	125	.35	I
865	44.1	30	4300	2250	910	.15	I
874	36.2	375	200	1450	115	.75	I
884	18.4	1960	1080	1100	260	4.30	I
886	45.9	115	35	950	5	.50	I
888	46.1	25	60	1550	5	.50	I
890	49.3	1	178	3500	85	.55	I
891	48.6	66	590	2120	35	.35	I
892	48.6	66	950	1870	30	.20	I
893	52.5	4	42	1650	35	.10	I
894	31.8	32	52	1450	15	.60	I
895	40.1	198	132	1200	60	.45	I
899	26.0	24	285	2400	40	1.10	II
900	43.8	4	88	3350	10	.65	I
901	1.1	1	14	500	25	.70	IV
902	45.0	24	58	2400	2	.55	I
903	0.2	12	30	250	15	.70	IV
907	7.5	48	82	750	180	2.30	I
908	47.0	2	24	2150	60	.30	I
910	36.5	400	980	2850	145	.75	I
911	28.9	450	1200	2790	225	1.10	I

Type I: Bedded barite

Type II: Blebby barite

Type IV: Quartz-barite veins and breccia filling.

Table 8: Analyses of baritic samples, Bob property. (Carne, 1978)

Sample Number	Ba (%)	Pb (ppm)	Zn (ppm)	Sr (ppm)	Mn (ppm)	Fe (%)	Type
857	54.5	10	5	1200	10	.10	I
872	28.2	1080	880	2150	15	.20	II
873	21.0	370	155	950	25	.75	II

Type I: Bedded barite

Type II: Blebby barite

Bob (22) MINFILE Number: 094K 086
Latitude: 58°01'00" Longitude: 125°50'00" NTS: 94K/04W

The Bob property, located 12 kilometres northwest of Gataga Lakes (Figure 3) was staked by the Gataga Joint Venture in 1977. The claims are underlain by Cambrian to Lower Mississippian strata. A 5-metre interval of weakly mineralized blebby baritic and pyritic rock occurs within siliceous shale and pyritic cherty black argillite of the Devonian Gunsteel Formation (Cathro, 1982b). Analyses of surface samples reported by Carne (1978) are summarized in Table 8.

Rough (23) MINFILE Number: 094L 011
Latitude: 58°16'00" Longitude: 126°10'00" NTS: 94L/01, 08

The Rough property was first staked by Texasgulf Inc. to cover showings of zinc mineralization. Baritic horizons occurring in the Upper Devonian Gunsteel Formation are located at elevations of 800 to 2000 metres, 7.5 kilometres south of the Gataga River and 16 kilometres east of Mount New (Boronowski, 1982). Regionally, clastic and carbonate rocks of Cambrian to Mississippian age trend northwesterly and have been isoclinally folded and thrust faulted.

The barite-bearing horizons occur within black shale and cherty mudstone and contain barite nodules 1 centimetre long. Siliceous barite beds of unreported thickness or length may contain more than 20 per cent barium. Barite-bearing quartz veins are also present in Lower Devonian stratigraphy.

Barium values in the soils on this property ranged as high as 18 200 parts per million.

X (24) MINFILE Number: 094L 013
Latitude: 58°11'36" Longitude: 126°07'12" NTS: 94L/01E

Barite is interbedded with black graphitic shale at a locality 17 kilometres east of Bighorn Mountain, at the headwaters of the north fork of Braid Creek (Figure 3).

DESCRIPTION OF OCCURRENCES - MIDWAY-CASSIAR AREA

Midway (25) MINFILE Number: 104O 038
Latitude: 59°56'00" Longitude: 130°15'00" NTS: 104O/16

The Midway property of Regional Resources Ltd. is located approximately 85 kilometres west of Watson Lake, immediately south of the British Columbia-Yukon border (Figure 5). Hostrocks for mineralization on the property are black silty shales and siliceous argillites of the Earn Group (Sylvester Group) and limestone of the McDame Group (Figure 14).

Three types of mineralization, carbonate hosted, exhalite, and vein, are present. Only the exhalites which are restricted to a 60 to 110-metre interval at the base of a section containing siliceous argillites and local beds of calcarenite contain appreciable amounts of barite. Several exhalite horizons containing laminated barite and pyrite are

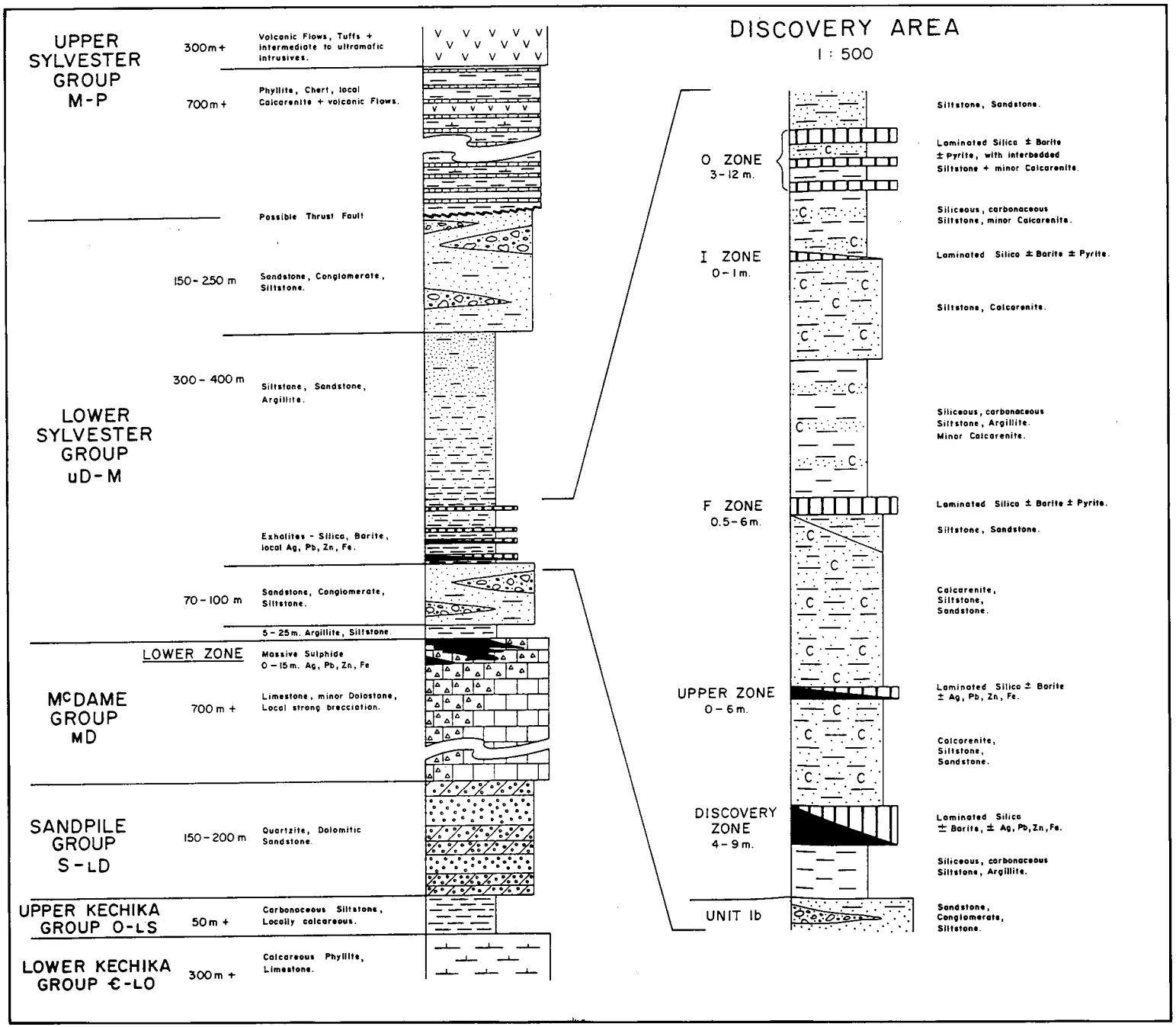


Figure 14: Generalized stratigraphy, Midway property. (from Cordilleran Engineering, 1983)

present. Two of them (Discovery and Upper) contain significant amounts of sphalerite and galena (Cordilleran Engineering, 1983). On surface the Discovery zone is 0.5 metre thick, increasing to 9 metres at depth. It consists of laminated pyrite, sphalerite and galena and grades laterally into siliceous exhalite with laminated and nodular barite and minor sulphides. Reserves in the Discovery Zone are estimated at 3.42 million tonnes grading 18.7 per cent lead-zinc and 370 grams per tonne (10.8 opt) silver (Stollery, 1985).

Two samples of barite with trace to minor quartz, taken by the author, returned analyses of 52.58 and 50.25 per cent barium with specific gravities of 4.0 and 3.2 respectively. A third sample with a specific gravity of 3.2 contained 24.22 per cent barium.

Ewen (26) MINFILE Number: 104O 050
Latitude: 59°59'30" Longitude: 130°11'30" NTS: 104O/16W

The Ewen barite deposit is located immediately south of the British Columbia-Yukon border near the Tootsee River. Bedded barite occurs in Devonian-Mississippian black argillites of the Earn Group (Figure 15). Exploration of the deposit has indicated a minimum length of 200 metres, a width of 70 metres and an average thickness of 7 metres. Preliminary estimates indicate reserves of 181 000 tonnes of high-quality barite. Analyses of core and chip samples returned values of nearly 90 per cent BaSO4 and specific gravities of approximately 4.2.

The barite is light grey to white and moderately to poorly laminated. Limestone nodules and limonite occur locally within it. The barite is underlain by a siliceous black argillite and locally by a siliceous exhalite bed 75 centimetres or less in thickness. The barite horizon is truncated to the north by a fault but is open to the southeast (Cordilleran Engineering, 1983; J.L. Nelson, personal communication, 1989).

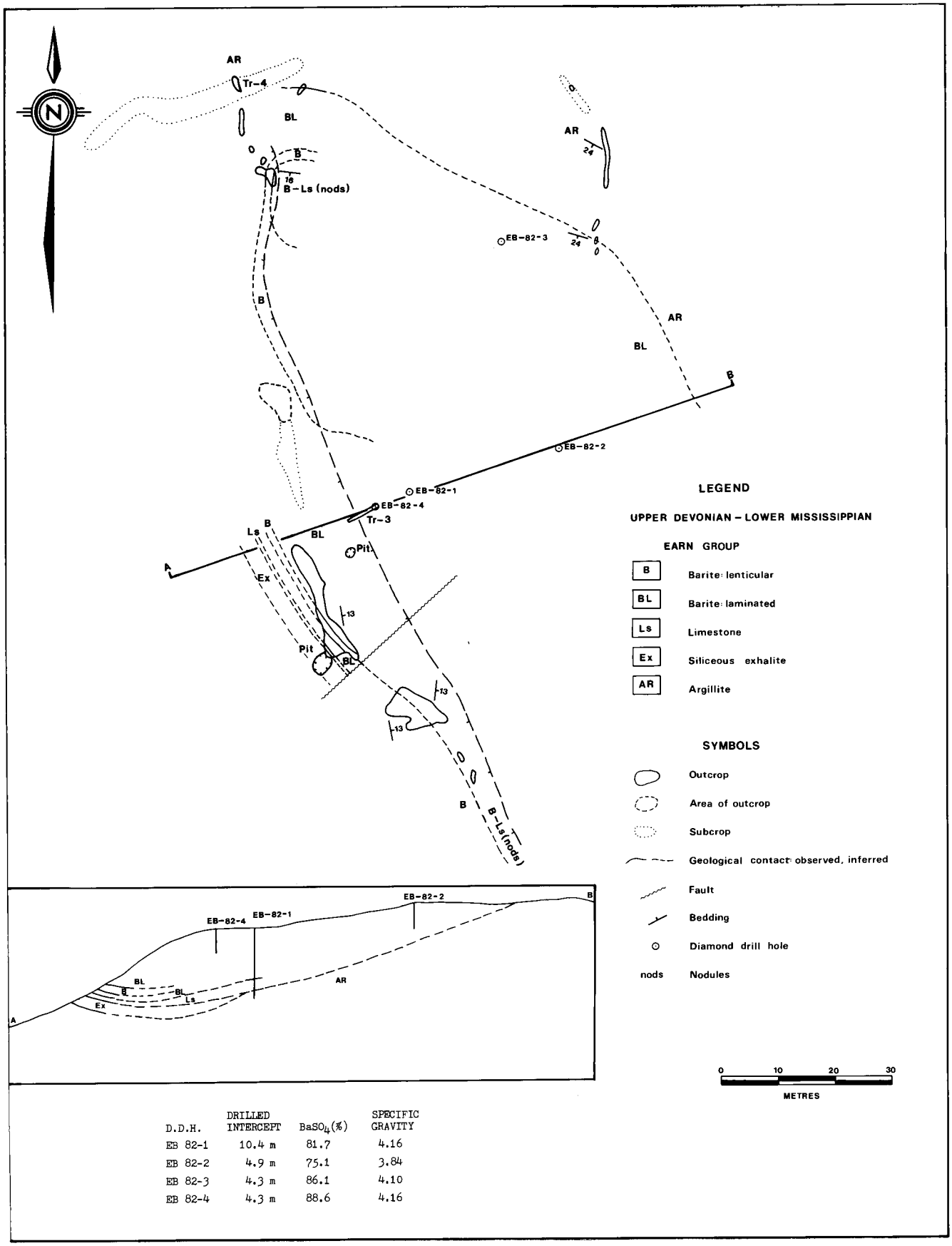
Mineralized specimens examined in thin section consist of an interlocking mosaic of very fine-grained barite. Locally there is a brecciated appearance to the rock where both anhedral and radiating clusters of barite are present. Surrounding the breccia fragments are sericite and clay material, possibly kaolin. In unbrecciated rock there is a distinct layering and no radiating barite is observed.

Another barite occurrence (Perry) is located along strike to the southeast. Bedded barite present in fine-grained Earn Group clastic rocks forms a synclinal keel that is cut off above by a shallow dipping thrust fault (Nelson and Bradford, 1987a).

Blue (27) MINFILE Number: 104P 104
Latitude: 59°31'07" Longitude: 129°58'25" NTS: 104O/09 and 104P/05, 12

The Blue property, located 29 kilometres north of Cassiar (Figure 5), was acquired by Regional Resources Ltd. in 1982 to cover stratiform barite-lead-zinc-silver mineralization. The company completed a program of geological mapping and soil geochemistry in 1982.

Rocks exposed on the property occur on the southwest limb of the McDame synclinorium. Paleozoic carbonates of the Cassiar platform are overlain by middle to late Paleozoic volcanic and sedimentary rocks of the Sylvester Group (Sanguinetti and Youngman, 1982a). More recent work by Nelson *et al.* (1988a) assigns these rocks to the



D.D.H.	DRILLED INTERCEPT	$BaSO_4$(%)	SPECIFIC GRAVITY
EB 82-1	10.4 m	81.7	4.16
EB 82-2	4.9 m	75.1	3.84
EB 82-3	4.3 m	86.1	4.10
EB 82-4	4.3 m	88.6	4.16

Figure 15: Geology of the Ewen barite occurrence. (modified from Cordilleran Engineering, 1983)

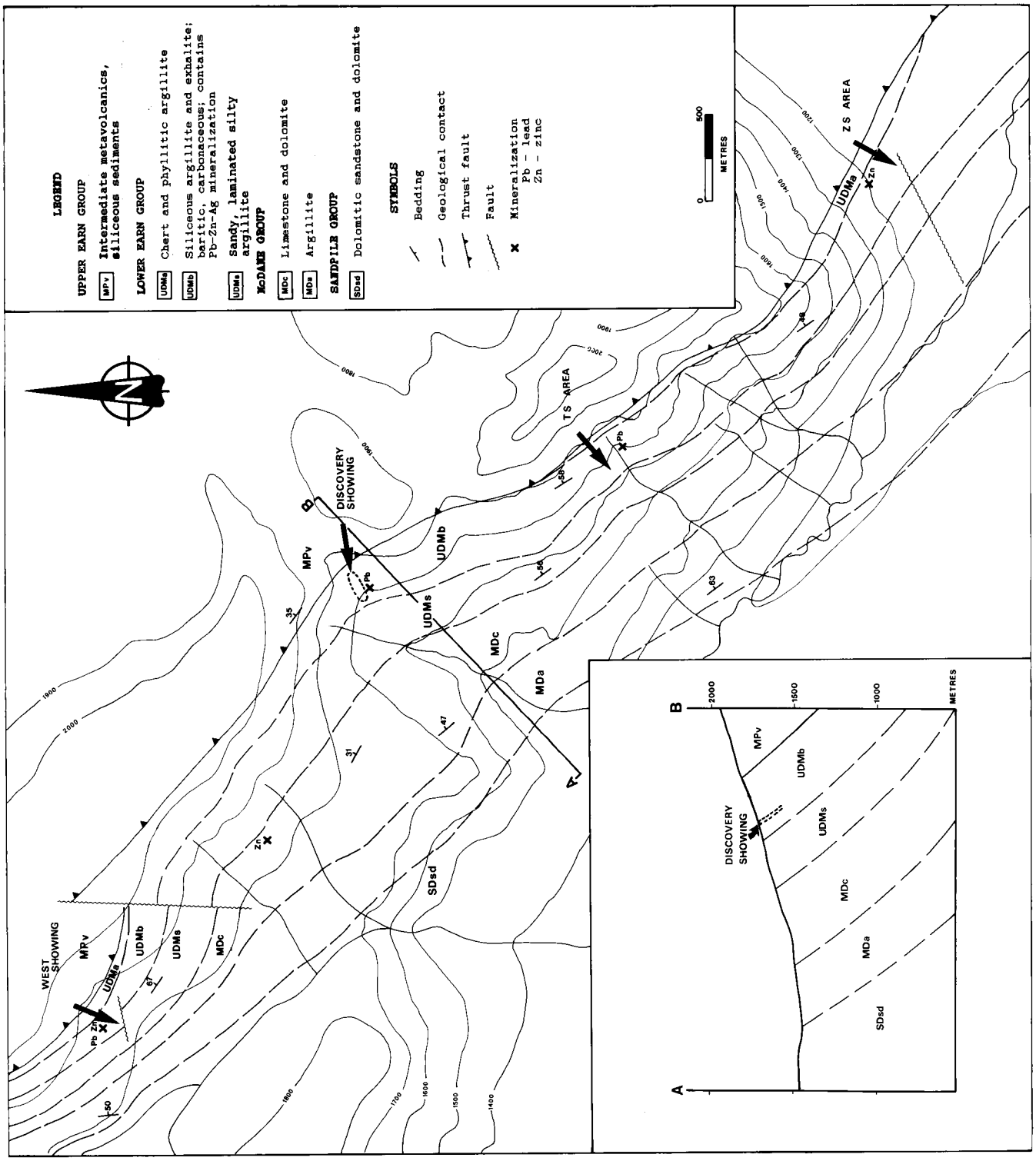


Figure 16: Geology of the Blue barite occurrence. (from Sanguinetti and Youngman, 1982a)

Upper Devonian through Lower Mississippian Earn Group. Four mineralized localities have been identified over a strike length of 7 kilometres within Middle Devonian carbonates of the McDame Group and clastic sediments of the Earn Group (Figure 16).

The McDame Group consists of a lower, light grey weathering, blocky dolostone overlain by a light grey, fetid, platy to blocky limestone. Interbeds of light grey to black quartzite up to 5 metres thick are common. Some black siliceous argillite to shale, with chert, sandstone and calcarenite beds, is also present.

Earn Group rocks consist of yellow-brown weathering, carbonaceous, pyritic, siliceous argillite with interbeds of chert, siliceous shale and black chert. Five siliceous exhalite units, 1 to 100 metres thick, have been identified. They contain abundant very fine grained, disseminated to laminar pyrite and barite with some disseminated to massive galena-sphalerite mineralization.

The most significant mineralization is found in the siliceous exhalite units. Some carbonate-hosted mineralization is present but not considered important.

At the Discovery showing partially oxidized, massive galena-sphalerite-barite mineralization returns barium assays of 1.42 to 6.48 per cent across widths of 1 to 2.2 metres. At the West showing, sphalerite is present within an 11-metre interval of pyritic, baritic, siliceous exhalite assaying 12 per cent barium across 3.6 metres. In the T.S. area, low-grade barite with disseminated galena occurs at two locations, 200 metres apart. Grades of 1.92 and 1.65 per cent barium have been obtained across widths of 2.1 and 1.45 metres respectively. Wispy-laminated galena occurs within a 1-metre exhalite interval in the Z.S. area.A grab sample yielded 3.4 per cent barium

Chief North (28) MINFILE Number: 104P 085
Latitude: 59°47'00" Longitude: 129°53'40" NTS: 104P/13W

The Chief North barite occurrence is located 20 kilometres south of the British Columbia-Yukon border and 2300 metres west of Alec Chief Lake (Figure 5). A 6-metre interval of clean, massive to poorly laminated barite is present in siliceous argillite of the Earn Group. Chip samples from this horizon averaged 91.16 per cent barite ($BaSO_4$) with a specific gravity of 4.14. The footwall of this unit comprises 4 to 7 metres of interbedded barite and siliceous argillite with abundant barite nodules followed by a second barite horizon. The baritic zone has been traced for 200 metres along an east-trending ridge. Four metres of bedded, laminated and nodular barite, in similar hostrocks, occurs 4.7 kilometres to the east (MINFILE Number: 104P 074) (Sanguinetti and Youngman, 1982c).

Chief Southwest (29) MINFILE Number: 104P 103
Latitude: 59°42'51" Longitude: 129°58'51" NTS: 104P/12W

The Chief Southwest barite occurrence is located approximately 25 kilometres south of the Yukon-British Columbia border, near Alec Chief Lake (Figure 5). A thin-bedded siliceous exhalite containing very fine-grained barite and pyrite occurs in argillites of the Earn Group (Sanguinetti and Youngman, 1982c).

Jan MINFILE Number: 104P 117
Latitude: 59°23'19" Longitude: 129°49'23" NTS: 104P/05

The Jan property, located 13 kilometres north of Cassiar at elevations of 1300 to 1900 metres, was staked in 1981 to cover the source of base metal stream sediment anomalies. The geological setting is similar to that of the Blue property (described above) to the north. A siliceous exhalite horizon, 1 to 10 metres thick and locally containing fine-grained disseminated to laminated pyrite and barite, occurs within black siliceous argillites of the Upper Devonian-Lower Mississippian Earn Group (Figure 17). Also present is lensoidal slump-brecciated to bedded barite that appears to be laterally equivalent to the exhalite. Grades of 25 and 26 per cent barium have been obtained from selected samples (Sanguinetti and Youngman, 1982b). Minor amounts of barite (0.18 per cent barium) are also present in McDame Group carbonates.

ET (30) MINFILE Number: 104P 116
Latitude: 59°26'47" Longitude: 129°51'09" NTS: 104P/05W

The ET barite occurrence is located 17 kilometres north of Cassiar and 4 kilometres north of the Jan barite occurrence (Figure 5). Thin-bedded grey barite is present in black slate, siltstone and porcellanite of the Earn Group.

CARBONATE-HOSTED STRATIFORM DEPOSITS

Stratiform barite deposits hosted by carbonate rocks are both uncommon and poorly understood. Dawson (1985) postulated that in certain carbonate rocks the barium content varies with the clay content suggesting that it may be adsorbed onto clay particles. Pore fluids or ground waters may have collected and transported barium to the depositional sites. The best example of this type of deposit is located in the Sulphur Creek area of northeastern British Columbia where the basal 15 metres of the Stone Formation consists of medium-bedded barite with minor dolomite. All of the known deposits in British Columbia are of Middle Devonian age.

Morrow *et al.*, (1976, 1978) studied sulphur isotope ratios in barite from the Sulphur Creek deposit and other occurrences in the area. They observed that some barite occurs as clasts in solution collapse breccia. The brecciation is believed to have occurred after and possibly during barite precipitation and before the final infilling by calcite. Results of the sulphur isotope studies suggest a single homogenous source for the sulphate. The mechanism proposed for the deposition of barite invokes mixing of fresh seawater and euxinic, barium-rich sea-water along the seawater edge of an aquifer, causing a reduction in the amount of barium that can be held in solution and precipitation of barite.

DESCRIPTION OF DEPOSITS

BV (32) MINFILE Number: 094N 002
Latitude: 59°03'30" Longitude: 125°42'18" NTS: 94N/04E

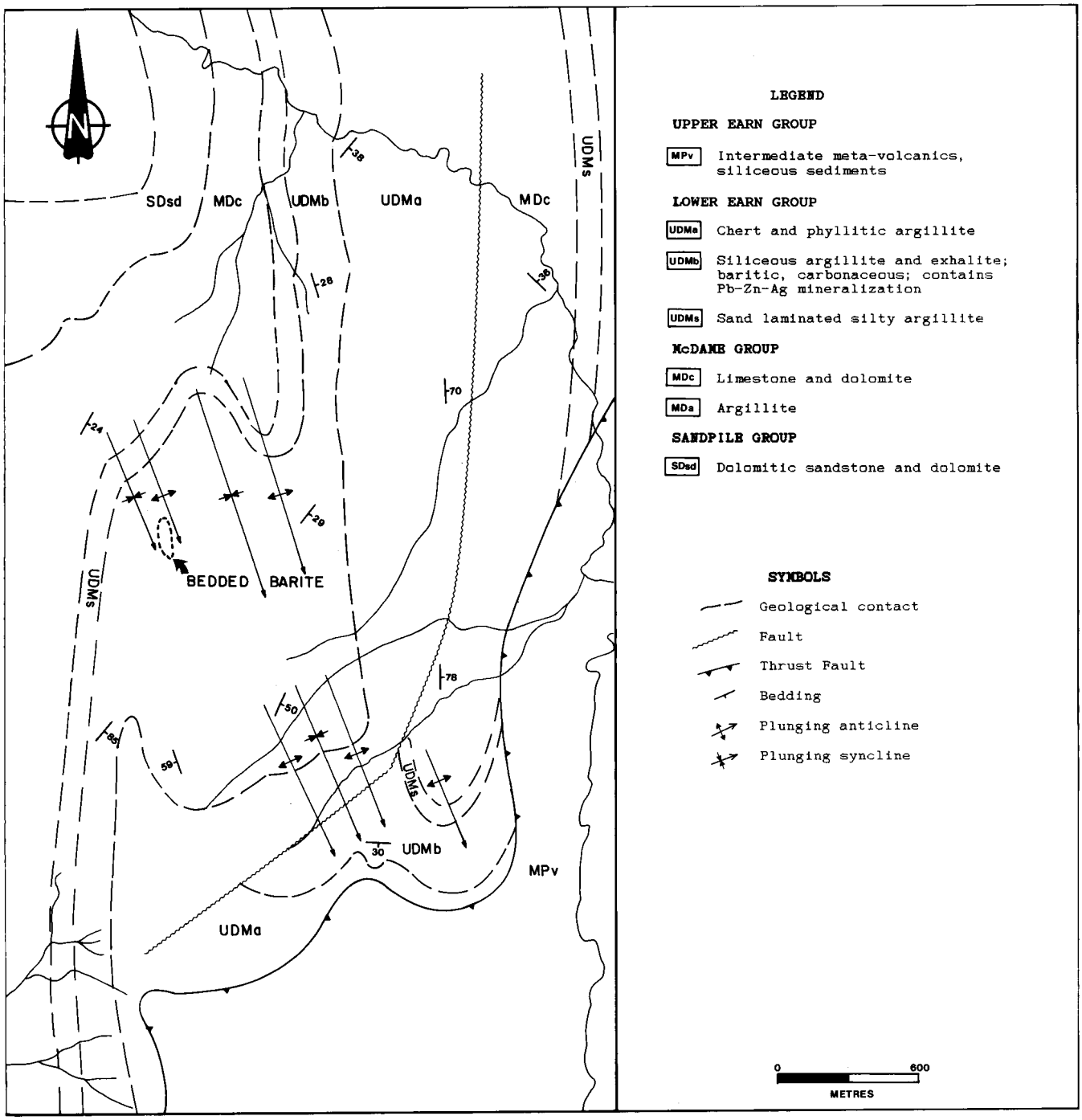


Figure 17: Geological setting of the Jan barite occurrence. (from Sanguinetti and Youngman, 1982b)

The BV barite deposit is located along McMeechan and Barite creeks approximately 6.4 kilometres east of Muncho Lake (Figure 18). The baritic zone in which the barite occurs has been traced for a length in excess of 4 kilometres and is up to 33 metres thick.

The area is underlain by dolomite of the Devonian Stone Formation. Stratigraphically below the Stone Formation are dolomitic sandstone and sandstone of the Wokkpash Formation.

Four styles of barite mineralization are present, but massive, white, coarsely crystalline material in beds up to 4.7 metres thick predominates. Dolomite breccias are locally present in the footwall. The specific gravity of the barite varies from 3.85 to 4.24 (Hlavay, 1970). Dawson (1968) reported a potential for 90 million tonnes grading 65 per cent $BaSO_4$ with at least part of the deposit being amenable to open-pit mining.

Mo (33) MINFILE Number: 094N 008
Latitude: 59°06'00" Longitude: 125°41'00" NTS: 94N/04E

The Mo barite deposit is located in a valley of tributary to Sulphur Creek, 5 kilometres northeast of Muncho Lake (Figure 18). The property was staked in 1978 by Siscoe Metals of Ontario Limited.

Regionally, Lower to Upper Devonian carbonate rocks occur in broad north-northwest-trending folds. On the property pale grey, fine to medium-grained crystalline dolomite of the Stone Formation is underlain by dolomitic sandstone and sandstone of the Wokkpash Formation. Barite is present in the Stone Formation as both bedded and breccia-filling varieties.

The barite zone is exposed over a strike length of 650 metres with thicknesses up to a maximum of 15 metres. It extends from the north side of Mo Creek to a point high on the south valley slope, striking north and dipping westerly at 30° to 60° (Figures 19 and 20).

The main zone of interest, faulted off at both ends, extends from the creek at an elevation of 1340 metres up the south side of the valley to an elevation of 1500 metres, a distance of 350 metres. It consists of a lower, bedded barite unit overlain by a barite breccia zone.

In the bedded zone, individual barite beds range from several centimetres to 2 metres thick, interbedded with barren dolomite. The barite is white and finely bedded. Coarse radiating crystals with interstitial secondary calcite and thin intercalations of very fine-grained, greenish calcareous mudstone are also present (Watson and Peto, 1979). Dolomite interbeds often contain veins of calcite and barite.

The barite breccia zone is more extensive and up to 75 metres thick. The breccia is chaotic, irregular in shape and consists of angular fragments and blocks of dolomite ranging in size from a few centimetres to over 2 metres. Barite and calcite comprise the matrix.

Preliminary reserve estimates, based on geological projections, are 2.85 million tonnes with 50.52 per cent $BaSO_4$ over the fill strike length and 3.4 million tonnes with

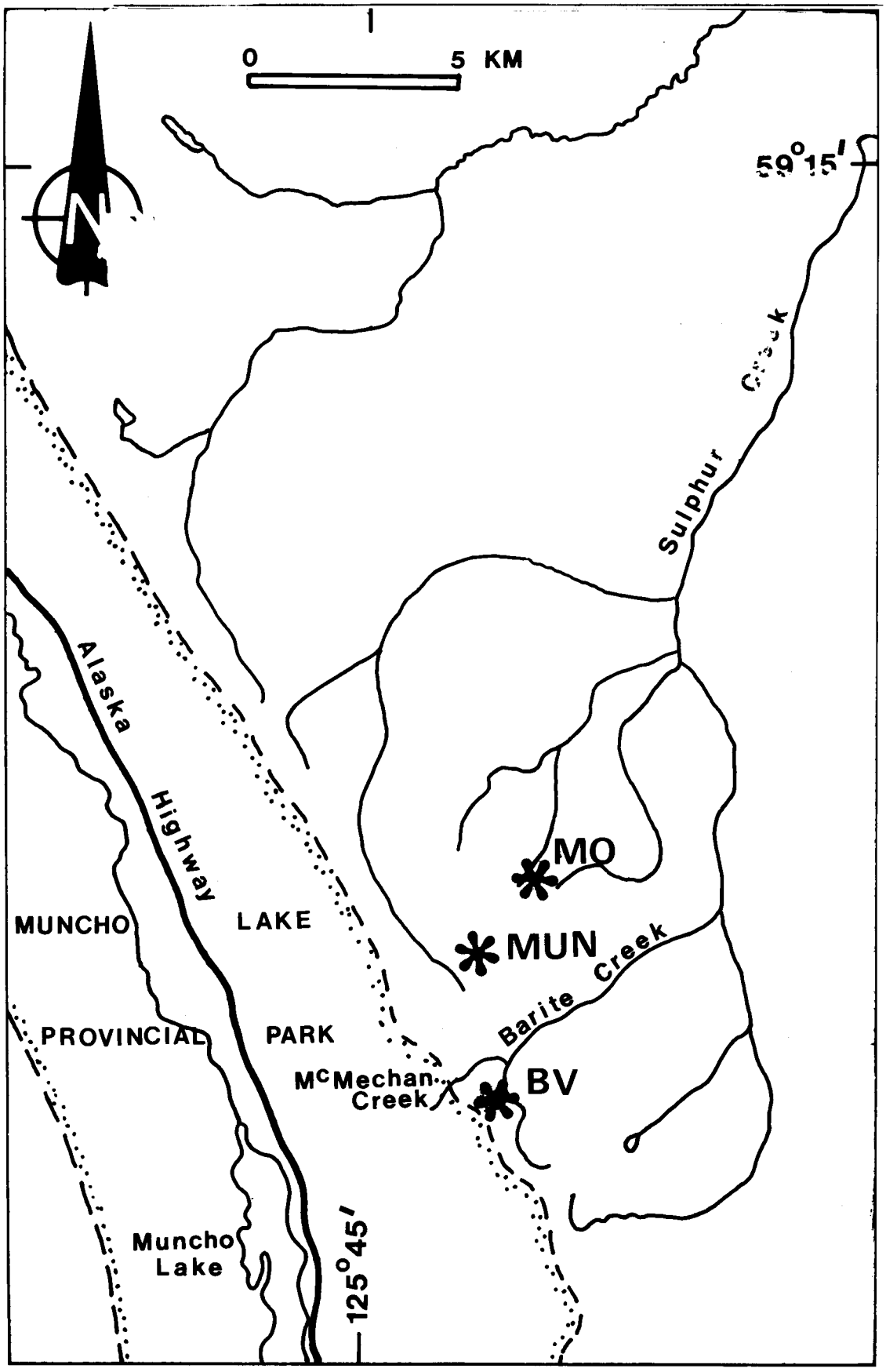


Figure 18: Location map for the BV, MUN and MO barite deposits.

34.7 per cent $BaSO_4$ at the northern, more accessible end of the deposit (Watson and Peto, 1979)

Mun (34) MINFILE Number: 094N 009
Latitude: 59°05'00" Longitude: 125°42'00" NTS: 94N/04E

The Mun barite deposit is located in the Sentinel Range, 2.8 kilometres southwest of the Mo deposit and 6 kilometres northeast of the northern end of Muncho Lake (Figure 18) at Kilometre 746 on the Alaska Highway. Access by road from the highway would require approximately 29 kilometres of new construction.

The regional geology is essentially the same as for the Mo claims and dominated by Silurian to Upper Devonian carbonate rocks exposed in broad, gently plunging folds cut by northerly trending faults.

The oldest rocks on the property are medium to dark grey, finely crystalline dolomites of the Muncho-McConnell Formation. They are overlain by red-brown and yellow sandstones and dolomitic sandstones of the Wokkpash Formation. The presence of red-beds, mud cracks and cross-bedding indicates deposition in a shallow-water environment with periods of emergence. Fine to medium crystalline, pale grey weathering dolomites and dolomite breccias of the Stone Formation unconformably overlie this unit and host bedded barite over thicknesses of 13 to 17 metres with grades of approximately 50 per cent BaSO4. The barite beds dip west at 60° and are poorly exposed. A sample from this occurrence contained 50.22 per cent $BaSO_4$ across a width of 12.95 metres.

Several barite occurrences are known in the northern part of the property. A thick zone of barite is exposed on the west side of the valley, 150 to 200 metres inside the north boundary of the Mun 1 claim. It crosses the ridge marking the boundary of Muncho Lake Park at an elevation of 2000 metres and extends down the mountain side for a distance of 300 metres before disappearing under talus. A section across this zone assayed 50.93 per cent BaSO4 over a width of 17.4 metres (Watson, 1979). A second, similar occurrence assayed 50.22 per cent $BaSO_4$ across 12.95 metres (Figures 19 and 20).

A third barite zone has been traced for a strike length of 350 metres. The barite is laminated and appears to follow a fault or fracture trend.

On the adjacent BV property to the southeast (Figure 18) a 32-metre zone of bedded barite occurs at the base of the Stone Formation. It is overlain by a thick dolomite-barite-calcite breccia zone.

Shawn (35) MINFILE Number: 104P 049
Latitude: 59°44'42" Longitude: 129°46'00" NTS: 104P/12, 13

The Shawn barite occurrence is located 50 kilometres north of Cassiar on a tributary of Alec Chief Creek (Figure 5). Dekalb Mining Corporation staked the property in 1981 and completed an extensive trenching program to delineate a conformable barite zone.

Nelson *et al.* (1988a) described this occurrence as hosted by Middle Devonian McDame Group platformal carbonates, 100 metres above the Tapioca sandstone contact.

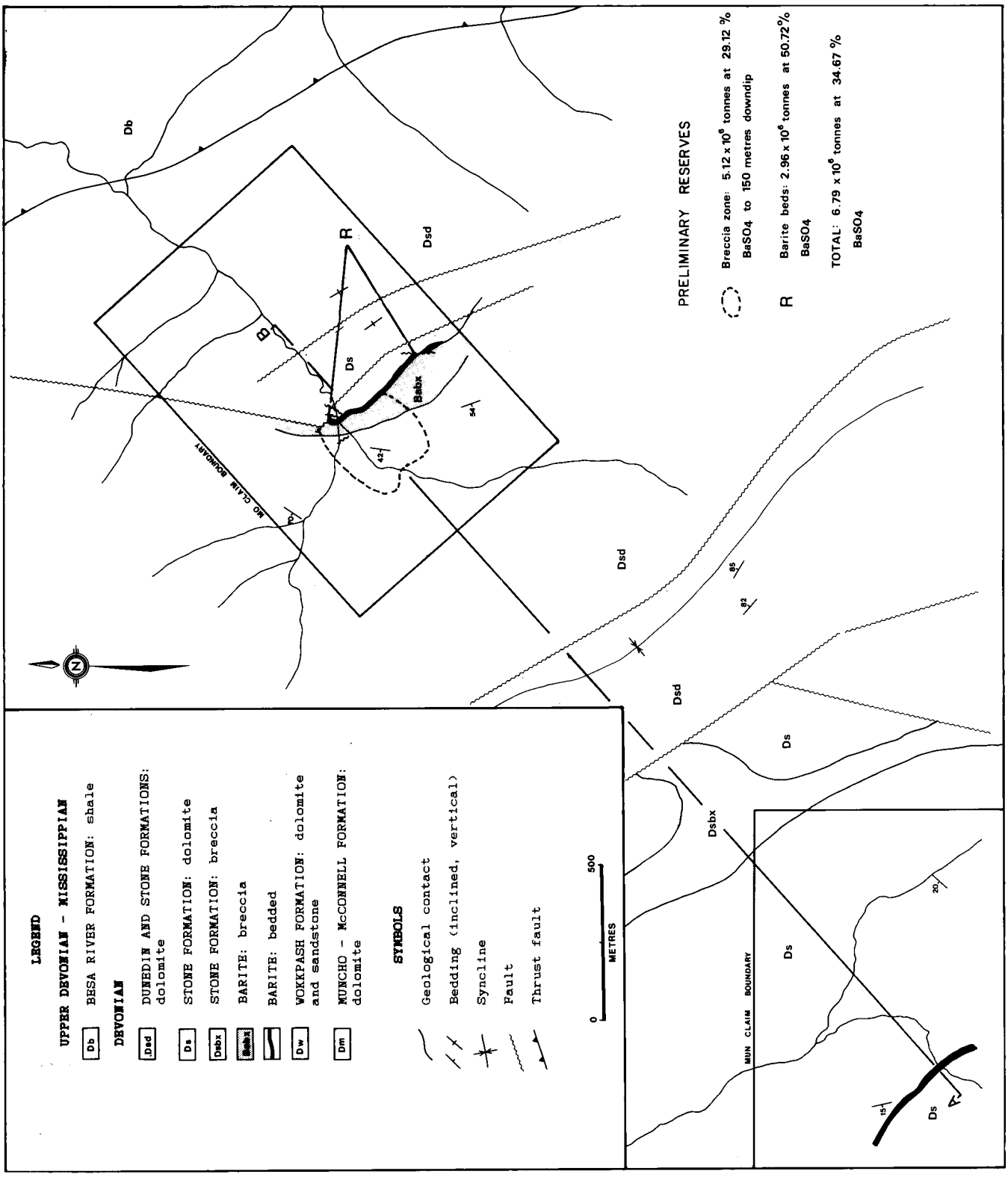


Figure 19: Geology of the MO and MUN properties. (from Watson and Peto, 1979)

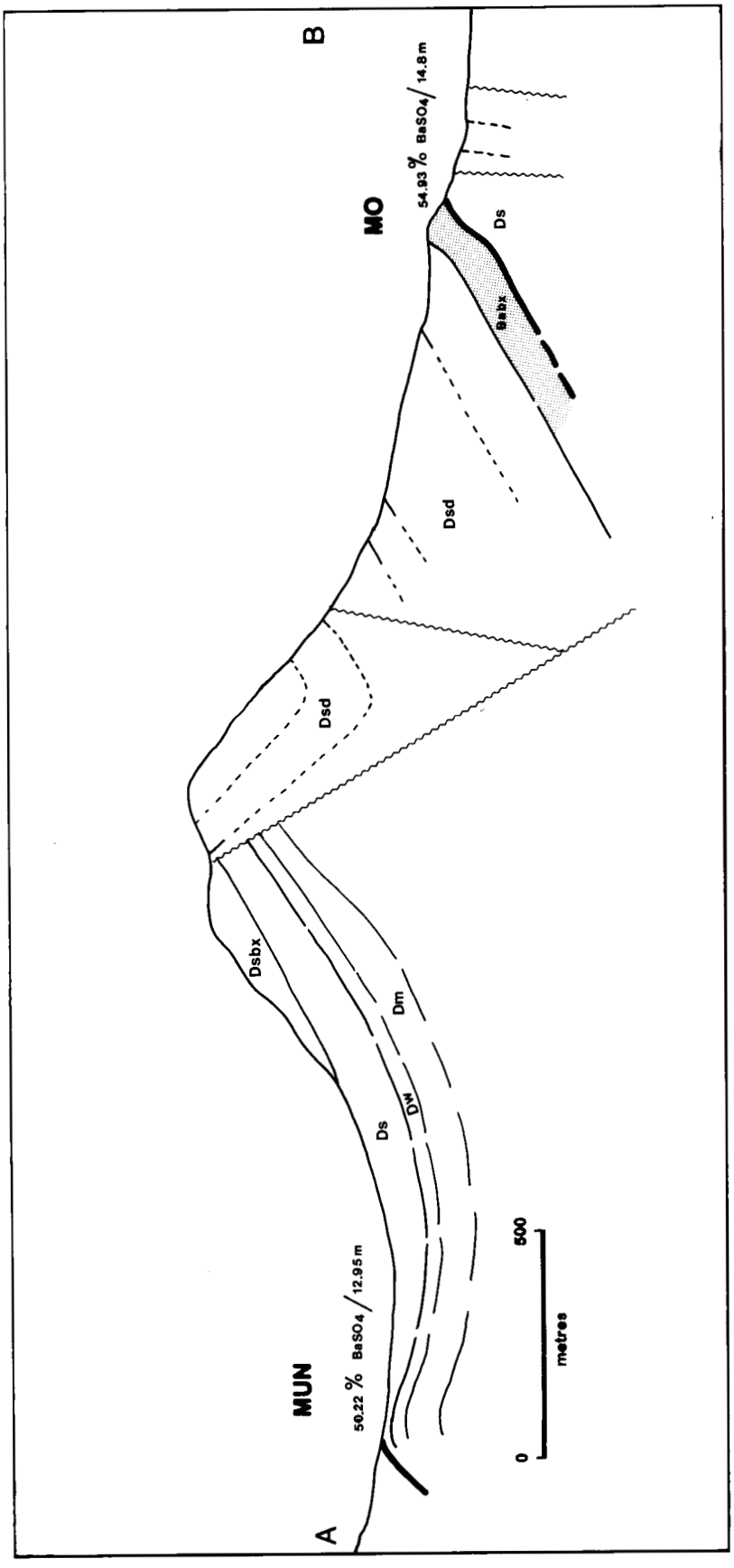


Figure 20: Schematic cross-section across the MO and MUN barite occurrences. (from Watson and Peto, 1979)

The barite is white and interbedded with dolomitic siltstones. Barite also occurs as crosscutting veins and as cement in McDame-Tapioca breccia. The barite is coarsely crystalline and contains minor amounts of carbonate along fractures and interstitial to the barite grains. Some bladed barite is also present. Nelson (unpublished fieldnotes, 1988) suggests a carbonate platform hydrothermal source for the barite.

Work by Dekalb Mining indicates that the barite zone is over 35 metres wide and consists of six barite-rich bands up to 5 metres wide. The zone has been traced over a strike length of 120 metres. Barite boulders were found 1 kilometre to the northeast. Bedding in the hostrocks strikes northerly and dips 70° to 75° west. Analytical results indicate a range of barium sulphate content ranging from 52 to 91.3 weight per cent and specific gravities in the range 3.39 to 4.27. A single high-grade sample contained 95.7 per cent BaSO4 and had a specific gravity of 4.41 (Thompson, 1982).

CHAPTER 3

FRACTURE-CONTROLLED, REPLACEMENT AND MANTO DEPOSITS

Barite deposits of the fracture-controlled, cavity-filling and replacement types have provided most of Canada's production to date and all of British Columbia's. Although individual deposits are small compared to bedded barite deposits, they are an important source of barite production.

Deposits in this class are epigenetic and have formed under low temperature and pressure conditions. They are typically irregular in shape and have sharp contacts with the hostrocks. Most of the barite is dense, grey to white and is often associated with other minerals including sulphides. Common accessory minerals include fluorite, calcite, siderite, witherite and dolomite. Barite may be the only mineral present or an accessory that is present in economically recoverable quantities.

In British Columbia stratabound replacement and manto deposits are almost wholly restricted to rocks of Proterozoic to Devonian age in the eastern Rocky Mountains. Discordant fracture-controlled deposits also occur in the Omineca Belt west of the Rocky Mountain Trench, in rocks of Proterozoic to Silurian age.

This report attempts to distinguish between stratabound replacement or manto occurrences and fracture-controlled deposits although some deposits show characteristics of both types. Deposits and occurrences classified as replacement or manto types are restricted to specific stratigraphic units whereas those described as fracture-controlled clearly crosscut stratigraphy. However, post-mineralization structures within replacement or manto deposits sometimes blur the distinction.

FRACTURE-CONTROLLED DEPOSITS

DESCRIPTION OF OCCURRENCES - SOUTHEASTERN BRITISH COLUMBIA

Dave (72) MINFILE Number: 082FNE138
Latitude: 49°30'00" Longitude: 116°40'00" NTS: 82F/07, 10

A barite vein is exposed 12 kilometres east of Kootenay Lake on the ridge separating La France and Lockhart creeks (Figure 1) and accessible by logging road up LaFrance Creek.

The property is underlain by fine-grained, buff-weathering, dolomite or dolomitic limestone of the Mount Nelson Formation underlain by shale, phyllitic shale and a buff dolomite. The contact between the lower dolomite and shale is marked by a breccia zone. Below the breccia there is a finely laminated dolomite or siliceous limestone 1 to 2 metres thick (Slingsby, 1980).

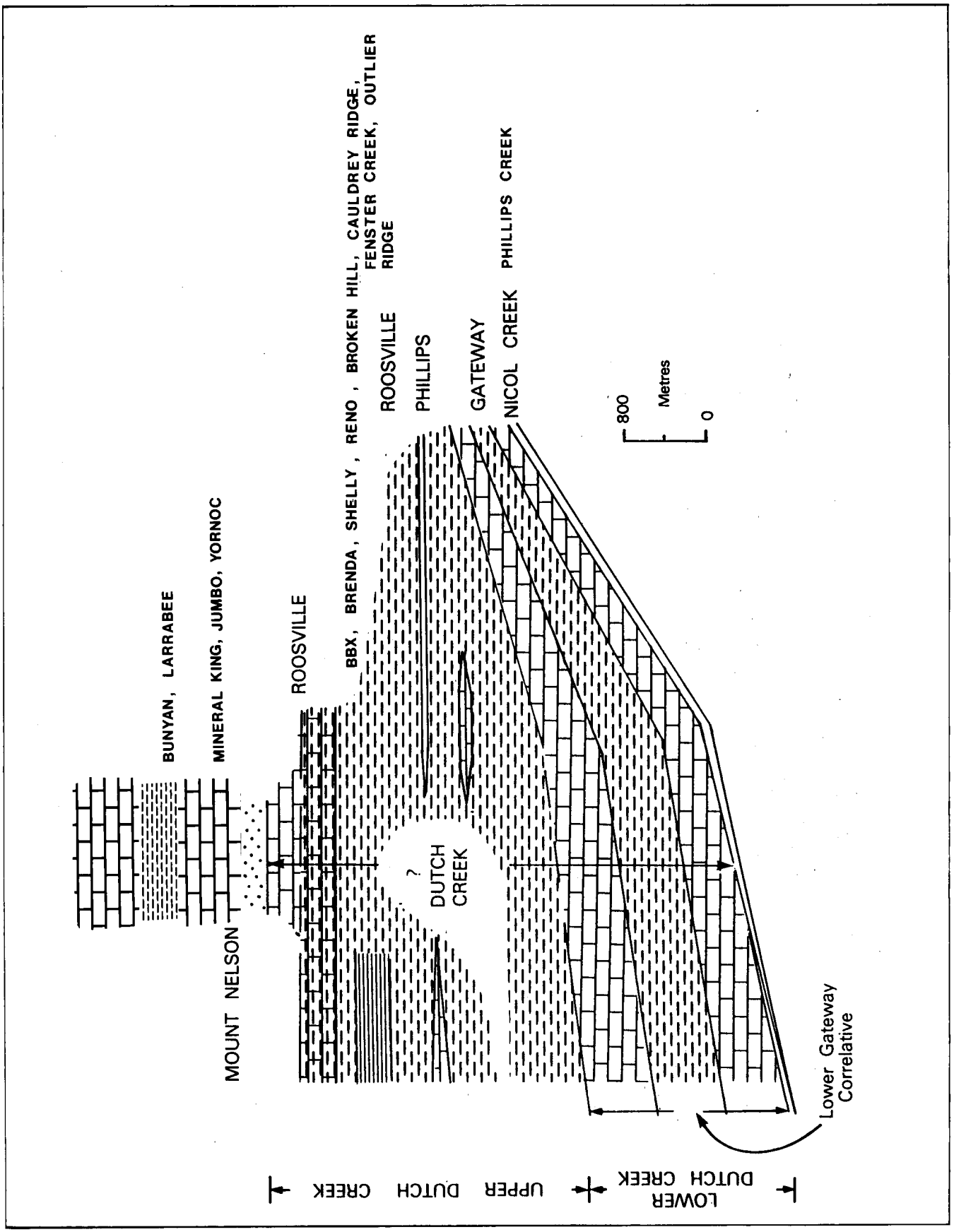


Figure 21: Stratigraphic correlation of barite occurrences in Proterozoic sediments, southeastern British Columbia. (geology modified from Carter and Höy, 1987)

The barite vein, 1.2 metres wide, cuts brecciated dolomite and limestone. The barite is massive to coarsely crystalline, slightly pyritic and contains traces of galena and sphalerite (Meade, 1978).

Phillips Creek (73) MINFILE Number: 082GSE001
Latitude: 49°01'30" Longitude: 114°59'45" NTS: 82G/02W

A barite vein, 0.15 to 1.50 metres wide, crosscuts amygdaloidal basalt of the Nicol Creek Formation north of Phillips Creek in the Flathead area south of Fernie (Figures 1, 21). The vein strikes easterly and has been traced over a length of 100 metres.

The barite is pure white and massive to coarsely crystalline. A sample taken by the senior author assayed 57.32 per cent barium, 2257 ppm strontium and negligible base metal values; the specific gravity is 4.5. In 1940, 7.2 tonnes of barite were shipped from this locality.

Fenster Creek (74) MINFILE Number: 082GSE002
Latitude: 49°09'00" Longitude: 114°53'20" NTS: 82G/02W

Quartz-calcite-barite veins in the Wigwam Range (Figures 1, 21) cut strata of the Rooseville Formation. The veins are steeply dipping and vary in thickness from a few centimetres to 1 metre.

Outlier Ridge (75) MINFILE Number: 082GSE003
Latitude: 49°06'40" Longitude: 114°51'10" NTS: 82G/02W

In the southwestern part of the MacDonald Range (Figures 1, 21), three quartz-calcite-barite veins cut strata of the Rooseville Formation in the hinge zone of the Wigwam anticline.

Cauldrey Ridge (76) MINFILE Number: 082GSE004
Latitude: 49°02'30" Longitude: 114°45'00" NTS: 82G/02W

A quartz-calcite-barite vein cuts strata of the Rooseville Formation near the top of a ridge in the southwestern part of the MacDonald Range (Figures 1, 21).

Chris (186) MINFILE Number: 082GNW088
Latitude: 49°50'01" Longitude: 115°52'10" NTS: 82G/13W

The Chris showings are located on the west side of Lost Dog Creek, about 8.5 kilometres northwest of Tata Creek (Figure 1). The showings are on a hill slope above Lost Dog Lake and access is by logging roads from Tata Creek. The Chris 1 through 4 claims were staked by G. Mason to cover barite showings.

Barite occurs as cement in brecciated argillaceous dolomite and limestone of the Helikian Kitchener Formation. Mineralization is restricted to a west trending crush zone. Four hand trenches were dug and two, about 3 metres apart, expose barite mineralization up to 50 centimetres wide. Two 1.2 metre diameter blocks of baritic dolomite, about 6 metres apart, were reported by Galeski and Mason (1981).

BBX (77) MINFILE Number: 082GNW052
Latitude: 49°49'20" Longitude: 115°52'40" NTS: 82G/13W

The BBX prospect is located on the west side of Sandown Creek, a tributary of the Skookumchuck River, 67.6 kilometres by road north of Kimberley and 15 kilometres northwest of Skookumchuck. It is accessible by a poorly maintained logging road.

Rocks in the area are mainly black and tan argillites and interbedded limestones of the Dutch Creek Formation (Figures 1, 21). All are highly sheared, and strike east-northeast with moderate dips to the northeast.

A vein, striking north-northwest and dipping steeply to the west, is exposed along the axis of an anticline. It consists of coarsely crystalline, relatively pure barite and trace amounts of malachite. It has a strike length of 180 metres, averages 1.1 metres wide and has been traced downdip for 10 to 40 metres. Reserves are estimated to be 55 000 tonnes grading 50.1 per cent barium with a specific gravity of 3.90 to 4.2 (Mason, 1978, 1980; Galeski and Mason, 1980). Included are proven reserves of 23 000 tonnes.

Brenda (78) MINFILE Number: 082GNW065
Latitude: 49°49'38" Longitude: 115°53'05" NTS: 82G/13W

The history of this property dates back to 1921 when the first claim was staked. During the period 1923 to 1925 an inclined shaft was sunk to a vertical depth of 39 metres and 900 tonnes of barite were produced by the Globe Mining Company. Mountain Minerals Company Ltd. optioned the property in 1978 and produced 3600 tonnes of barite. An additional 450 to 720 tonnes of barite containing tetrahedrite were stockpiled. Additional exploration was done in 1980.

The property is located south of the BBX prospect on Copper Creek, a small tributary of the Skookumchuck River (Figure 1). The principal workings are located along and near the bottom of a low narrow ridge which forms the east side of a narrow gulch.

A barite vein with minor amounts of siderite and lesser amounts of tetrahedrite outcrops over an area 8 by 35 metres and appears to be subconformable with a grey-green muscovite rich schist of the Dutch Creek Formation (Figures 21, 22). Locally it contains angular schist fragments. The barite is crackled, sheared and brecciated (Galeski and Mason, 1980 and Perston, 1979).

Reserves are estimated to be 38 000 tonnes grading 79.0 per cent barium sulphate with a specific gravity of 4.10. Analyses of selected samples of barite are summarized in Table 9.

Broken Hill (80) MINFILE Number: 082KSE005
Latitude: 50°26'00" Longitude: 116°29'00" NTS: 82K/08

The Broken Hill barite occurrence is located near the headwaters of Delphine Creek, south of Mount Farnham (Figures 21, 23). Barite in veins and stringers occurs in a limestone unit. A soil geochemical anomaly, measuring 180 metres by 30 metres, suggests a northerly trend to the mineralization. Assay results from samples collected on the

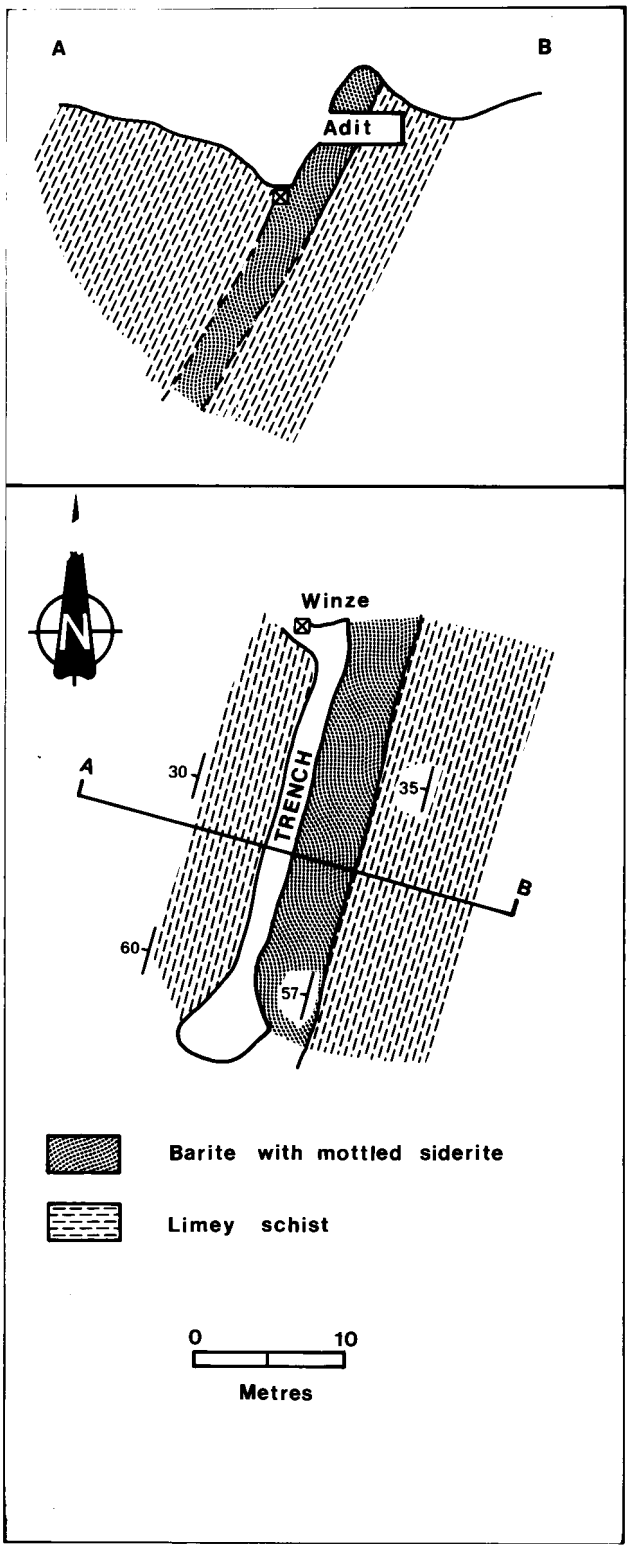


Figure 22: Sketch map showing generalized geology and old workings, Brenda barite occurrence. (Z. D. Hora, personal communication)

property indicate barite values of 9.48 to 97.9 per cent $BaSO_4$ with corresponding specific gravities of 2.99 to 4.42 (Kane, 1976).

Yornoc (37) MINFILE Number: 082KSE009
Latitude: 50°19'24" Longitude: 116°14'24" NTS: 82K/08E

The Yornoc barite occurrence is located near the head of Ben Abel Creek, 26 kilometres southwest of Invermere (Figures 21, 23). A small outcrop of barite containing minor amounts of galena occurs in argillaceous and schistose sedimentary rocks.

Shelly, Carole (81) MINFILE Number: 082KSE059
Latitude: 50°19'18" Longitude: 116°15'24" NTS: 82K/08W

Quartz-barite veins containing galena and sphalerite cut limy argillites of the Dutch Creek Formation at the headwaters of Mineral Creek, 26 kilometres southwest of Invermere (Figures 21, 23).

Jumbo (38) MINFILE Number: 082KSE043
Latitude: 50°22'30" Longitude: 116°25'30" NTS: 82K/8W

Barite and sulphides occur as bands, veinlets, blebs and disseminations in dolomitic limestone of the Mount Nelson Formation, on the north side of Jumbo Creek, 3 kilometres north of the Mineral King mine (Figures 21, 23). The geological setting is similar to the Mineral King (see Replacement and Manto Deposits below for description). Considerable silicification accompanies the mineralization which consists of galena, sphalerite, bournonite, barite, chalcopyrite and pyrite.

Structures in the area are steep, complex faults and related drag folds trending northerly from the Mineral King mine.

Larrabee (40) MINFILE Number: 082KSE052
Latitude: 50°28'18" Longitude: 116°06'36" NTS: 82K/08E

The Larrabee barite deposit is located on the south side of Toby Creek approximately 13 kilometres, by road, west of Invermere (Figure 23). In 1958, Larrabee Mining and Exploration Limited prepared the property for production and subsequently leased the claims to Baroid of Canada, Ltd. which produced 9 000 tonnes of barite during 1959 and 1960. The barite had a specific gravity of 4.06 to 4.41 and was shipped in its crude state to Onoway, Alberta. Allan Mining and Exploration Company took over operation of the property in 1962 and 1963 and shipped small quantities of barite to a plant in Lethbridge, Alberta. There was no further activity until 1989 when Mountain Minerals Company Limited produced a few hundred tonnes from the deposit.

The main zone from which all production has been derived consists of a faulted mass of barite that transects quartz-sericite phyllite of the Proterozoic Mount Nelson Formation (Figures 21, 24).The barite is 5 to 6 metres thick and has been traced along strike for 135 metres. Its footwall contact appears to be conformable with the surrounding phyllite while the hangingwall contact lies along a thrust fault. The barite is coarse-

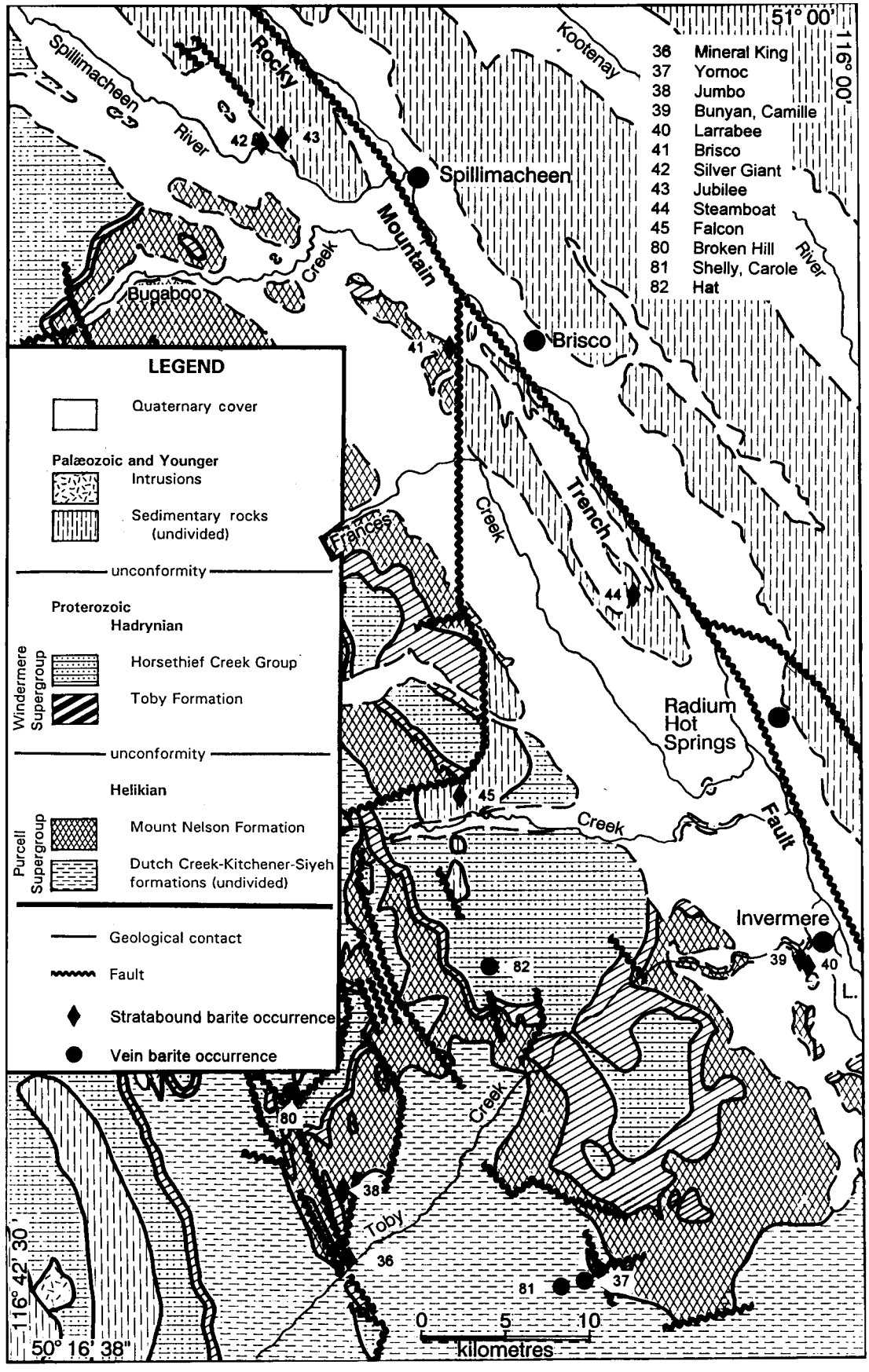


Figure 23: Barite occurrences in the Lardeau map area. (geology simplified from Reesor, 1973)

grained, massive to granular, cream to dirty white and shows some malachite staining. As much as 10 per cent carbonate, probably siderite, may be present locally. Two samples of barite taken by the senior author containing some quartz and traces of sulphide minerals, returned analyses of 55.09 and 56.11 per cent barium, 293 and 638 ppm copper and 1105 and 1215 ppm strontium. Both samples contain anomalous mercury (2900 and >5000 ppb) values. Specific gravities are 4.3 and 4.4.

Immediately above the main barite zones are thin seams, 1 to 2 metres thick, that appear to be conformable with the phyllite. These are described as "irregular veins of hard siliceous barite" in one report but only one seam was observed to have a crosscutting relationship. The seams are lensoidal and occur en echelon along strike. Barite is associated with malachite, azurite and siderite.

Bunyan (39) MINFILE Number: 082KSE046
Latitude: 50°28'00" Longitude: 116°06'12" NTS: 82K/08E

The Bunyan-Camille property has a history that dates back prior to 1920. It is located immediately south of the Larrabee quarry at the head of Goldie Creek, 8 kilometres southwest of Invermere (Figure 23). Several outcrops of copper-stained schist and barite occur on the shoulder of a bluff 100 metres above the benchlands of the Columbia River. In 1920, two railway cars of copper ore were shipped.

Phyllites of the Mount Nelson Formation underlie the area (Figure 21). Barite horizons are described as podiform lenses up to 5 metres wide but with limited strike length (Huss, 1982). These lenses are irregular in outline and generally parallel the regional structure. Chalcopyrite with lesser amounts of malachite and azurite are associated with the barite.

Two main areas of barite mineralization are known (Figure 25). On the boundary between the Bunyan and Camille claims three pits and a 5-metre adit have outlined a barite lens up to 1.5 metres thick. On the Bunyan-Pilgrim claim boundary there is a small open pit (Bunyan mine) from which 450 tonnes of barite were removed. An adit approximately 35 metres below the open pit intersected only phyllite.

The best potential for locating extensions or parallel barite deposits appears to be on the Camille claim. Only deposits of limited size can be expected.

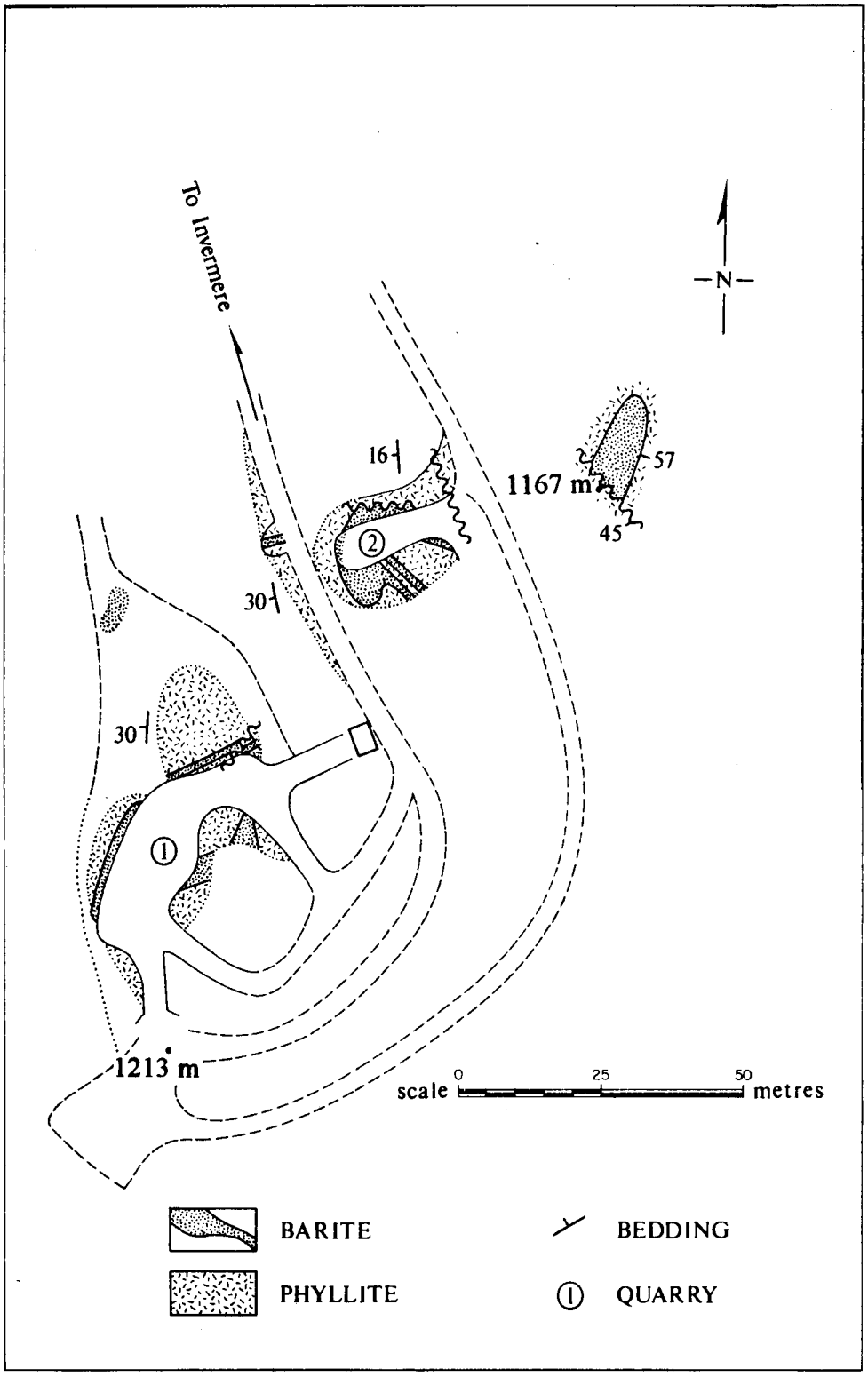


Figure 24: Geology of the Larrabee barite deposit. (from McCammon, 1971)

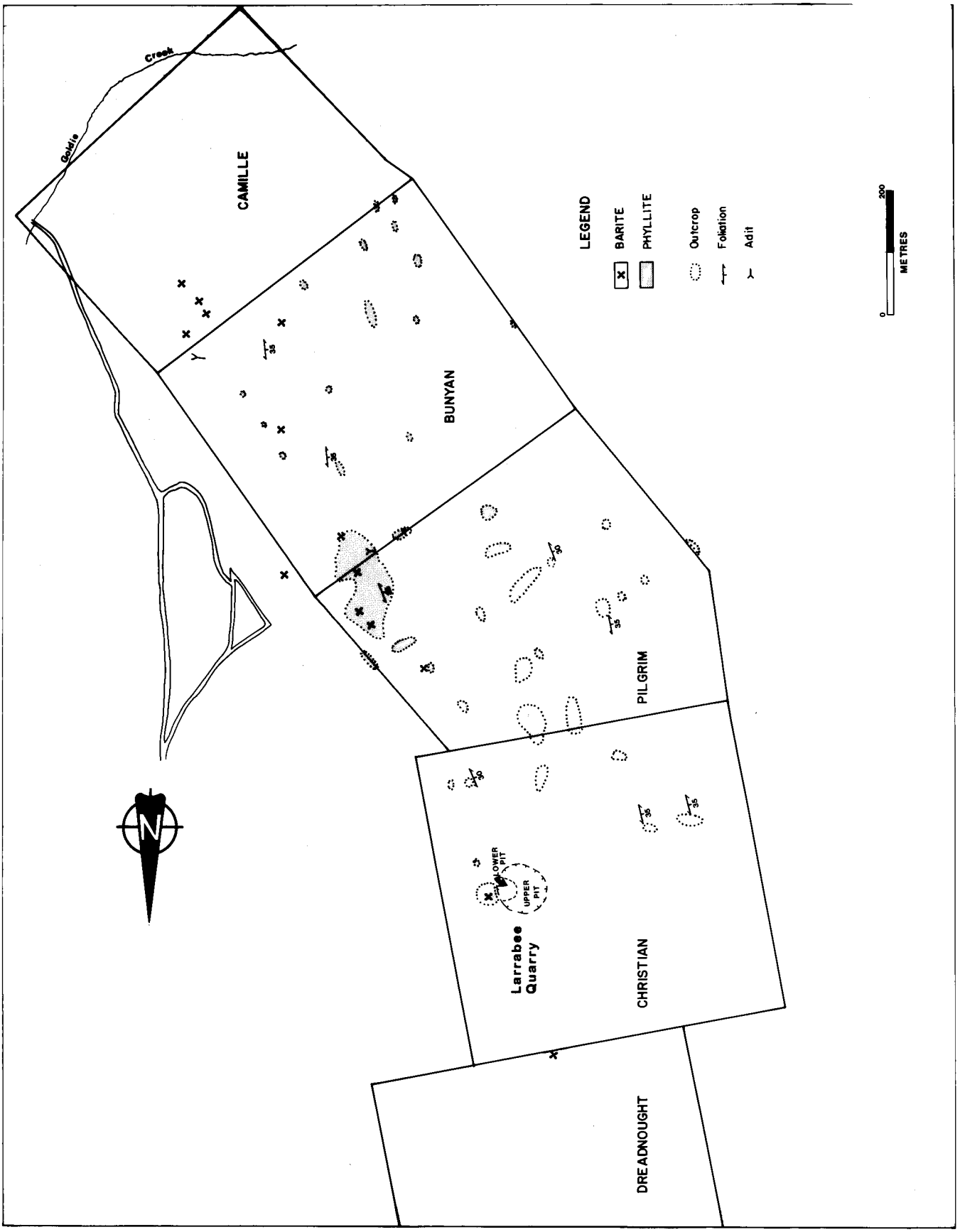


Figure 25: Geology in the area of the Bunyan and Larrabee barite occurrences. (from Huss, 1982)

Hat (82) MINFILE Number: 082KSE070
Latitude: 50°30'00" Longitude: 116°17'00" NTS: 82K/08W

A vein of relatively pure barite containing traces of tetrahedrite outcrops on the ridge between Bruce and Spring Creeks approximately 29 kilometres west of Invermere (Figure 23). The vein occupies a fault zone dipping 55° northeast that cuts argillites of the Proterozoic Horsethief Creek Group. It is 2.4 metres wide and has been traced along strike for 23 metres; it contains an estimated 5 400 tonnes of relatively high-grade barite to a depth of 24 metres (Mason, 1978b). Four samples collected from the showing contained 89.1 to 93.6 per cent barium sulphate with specific gravities ranging from 4.24 to 4.42. Very coarse-grained granular and bladed barite crystals are set in a fine-grained matrix of granular barite (125-200 micron size). Locally, blades of barite are veined by granular barite.

Surelock (187) MINFILE Number: 082KNE081
Latitude: 50°44'30" Longitude: 116°25'30" NTS: 82K/09W

The Surelock claims are located on the north side of Frances Creek, approximately 41 kilometres northwest of Invermere. The claims were staked in 1989 by A. Louie and optioned by Mountain Minerals Ltd. between 1990 and 1992.

Hostrocks are dolomite, argillaceous dolomite and minor shale of the Helikian Mount Nelson Formation. The dolomite weathers grey to cream or white, is grey to brown on fresh surface, fine grained and thin to medium bedded. The west side of the property is bounded by a fault that juxtaposes Toby Formation conglomerate against the Mount Nelson Formation.

Mineralized outcrops and "kill zones" are exposed over a length of 450 metres along a north-northwesterly trend up slope (Butrenchuk, 1990). Barite occurs as matrix in brecciated dolomite that is bounded by faults on the west and east sides. At a low outcrop, barite mineralization is at most 5 metres wide and less at higher outcrops. Also, barite occurs in stringers in some of the higher outcrops. The alignment of mineralized outcrops and association with faults implies that the barite is structurally controlled. Barite content varies from 5 to 90 per cent of the rock volume over widths of a few centimetres to 2 or 3 metres (Butrenchuk, 1992). The total amount of barite discovered to date is small.

Mountain Minerals Ltd. did geological mapping, geochemical sampling and trenching in 1990. In 1991, a 30.5 metre adit was driven on the largest outcrop on the lower slopes. Further diamond drilling, 11 holes for 304 metres, was done in 1992 to determine the down dip extent of mineralization and expand on the surface geological mapping. Initial geological reserve estimates are in the range of 30 000 to 50 000 tonnes of raw barite (Butrenchuk, unpublished fieldnotes). Following this work, Mountain Minerals Ltd. dropped its option.

Reno (83) MINFILE Number: 082KNW055
Latitude: 50°40'48" Longitude: 117°05'18" NTS: 82K/11E

A siliceous vein, 1.5 metres wide, containing pyrite and galena cuts brown-weathering quartzitic argillite on the south side of Hall Creek above Duck Lake. It contains a zone of massive grey barite 0.7 metre wide. (Figure 21)

Brisco (41) MINFILE Number: 082KNE013
Latitude: 50°49'54" Longitude: 116°19'36" NTS: 82K/16W

The Brisco barite deposit is located between the Templeton River and Dumbar Creek 4 kilometres west of Brisco (Figure 1). Access to the deposit is by road, a distance of 7 kilometres from Brisco. The property consists of 5 Crown-granted mineral claims with the main deposit and quarrying operations on the Salmon mineral claim (Figure 26).

The Brisco quarry was brought into production in 1952 by Mountain Minerals Limited and operated until 1980. Initial production was from an open pit and subsequently from underground operations. In excess of 133 000 tonnes of barite was produced during this time. A modest reserve of barite remains in place but is not economical at the present time.

The following summary of the deposit is taken from McCammon and Morgan (1958):

> *"Barite has been exposed across an average width of 25 feet [7.62 metres] for 780 feet [237.7 metres] along a northerly striking breccia zone [within dolomite of the Ordovician Beaverfoot Formation, Figure 21]. The west wallrock is highly fractured dark grey to black dolomite [that is commonly brecciated] with a few scattered lenses or horses of brown quartzite. Mountain leather is abundant as films on fracture surfaces and a few small barite veins are present. The east wallrock is light grey weathering buff to flesh-coloured dolomite [and limestone]. It is brecciated, and near the main barite body contains barite in the matrix. The orebody itself is brecciated. Much of the barite is white, but the white sections are irregularly shaped and are usually edged or cut by zones of variable width that consist of a fine-grained black matrix enclosing angular fragments of white barite a fraction of an inch to several inches in diameter. The black colour is due to carbon [graphite]".*

The barite pinches and swells both horizontally and vertically. To the north it appears to be cut-off by a fault and it pinches out to the south. White barite occurring as irregular masses forming the matrix around breccia fragments of light-coloured dolomite is exposed 760 metres north of the main body. A small amount of barite, present as irregular discontinuous masses in a zone of shearing occurs 550 metres to the south. Drilling in 1980 at the south end of the main ore zone intersected only a few stringers of barite. Drilling to the east and northeast of the main zone indicated a potential for 3000 tonnes of barite with a specific gravity of 4.27.

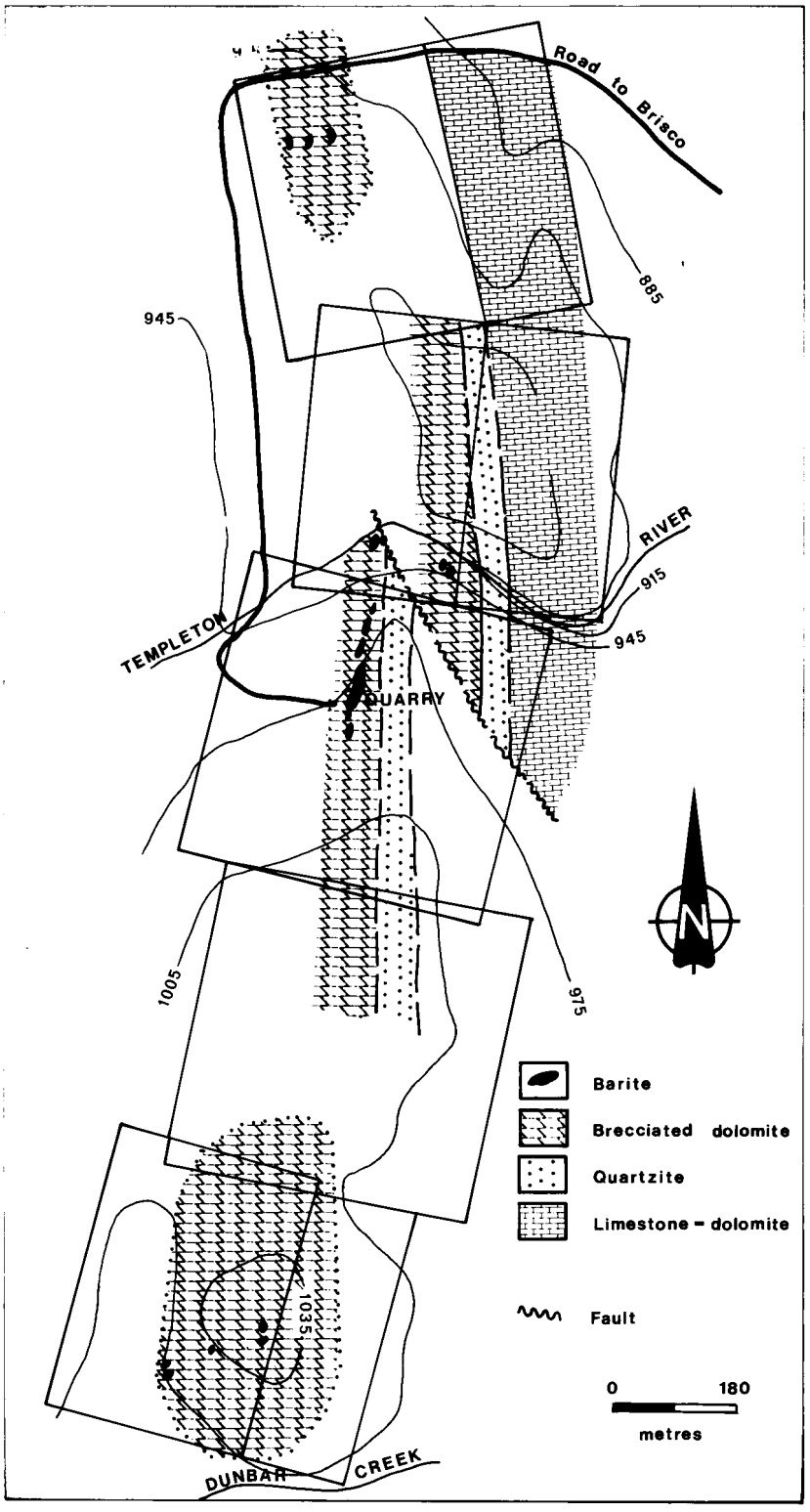


Figure 26: Geology of the Brisco barite deposit. (McCammon, 1952a)

This deposit was examined by the senior author in 1989. Old workings indicate that the barite ore bodies to the north are within a steeply dipping zone bounded to the east by a fault. The west contact appears to follow a bedding plane fault within the host dolomite. A single sample of barite ore, with a specific gravity of 5.3, contained 57.78 per cent barium, negligible base metals and only 873 ppm strontium.

Falcon (45) MINFILE Number: 082KNE076
Latitude: 50°35'00" Longitude: 116°20'00" NTS: 82K/09W

Minor barite showings occur in limy dolomite and dolomitic limestone of the Devonian Starbird Formation 1.5 kilometres north of Horsethief Creek and 3 kilometres southwest of Mount Forster at an elevation of 1830 metres (Figure 23). The rocks are sheared, faulted and brecciated and much of the barite appears to be fault controlled. None of the barite present is considered economic (Carter, 1983).

Lucky (Cameron) (46) MINFILE Number: 082JSW002
Latitude: 50°25'51" Longitude: 115°53'01" NTS: 82J/05W

The Lucky barite deposit is located 2 kilometres north of Madias Creek and 8 kilometres southeast of Windermere. Claims were first recorded in 1952 and the first exploration was done by Magnet Cove Barium Corporation in 1953 and 1954. Millwhite Mud Services completed a program of trenching in 1956. In 1961, Elkhorn Mining Company Limited opened a quarry and made a small shipment to a processing plant at Rosalind, Alberta. During 1984 and 1985, Bar-Well Resources Ltd. installed a processing plant, drove a ramp and mined out the original stockwork ore. They then drove an adit into the "marginal ore" and mined from there as well. The facilities have since been closed and the property has remained idle.

Irregular patches of barite occur in dolomite of the Cambrian Jubilee Formation. The dolomite is fine to medium-grained, light grey weathering and colour and vuggy. It is strongly jointed and some brecciation is evident in the vicinity of the quarry.

At the quarry, barite occurs as replacement patches in the dolomite, as infilling between angular dolomite fragments in breccia and as irregular, short veinlets. There are no large continuous masses of barite. Much of the barite is coarse grained with well-developed cleavage but it also occurs as a very fine grained granular matte. Poikilitic barite containing numerous carbonate grains was observed in thin section. Stringers of quartz accompany the barite and traces of galena and chalcopyrite are present. Patches of barite are also exposed 60 metres north and 30 metres south of the quarry (McCammon, 1970). A sample of barite ore taken by the senior author has a specific gravity of 4.9 and contains 56.64 per cent barium and 2285 ppm strontium; base metal values are negligible. A sample of low-grade material from the Cameron occurrence has a specific gravity of 3.4 and contains 19.26 per cent barium, 3628 per cent strontium and 255 ppm lead.

Stan, Mount Pedley (79) MINFILE Number: 082JSW015
Latitude: 50°24'45" Longitude: 115°54'20" NTS: 82J/05E

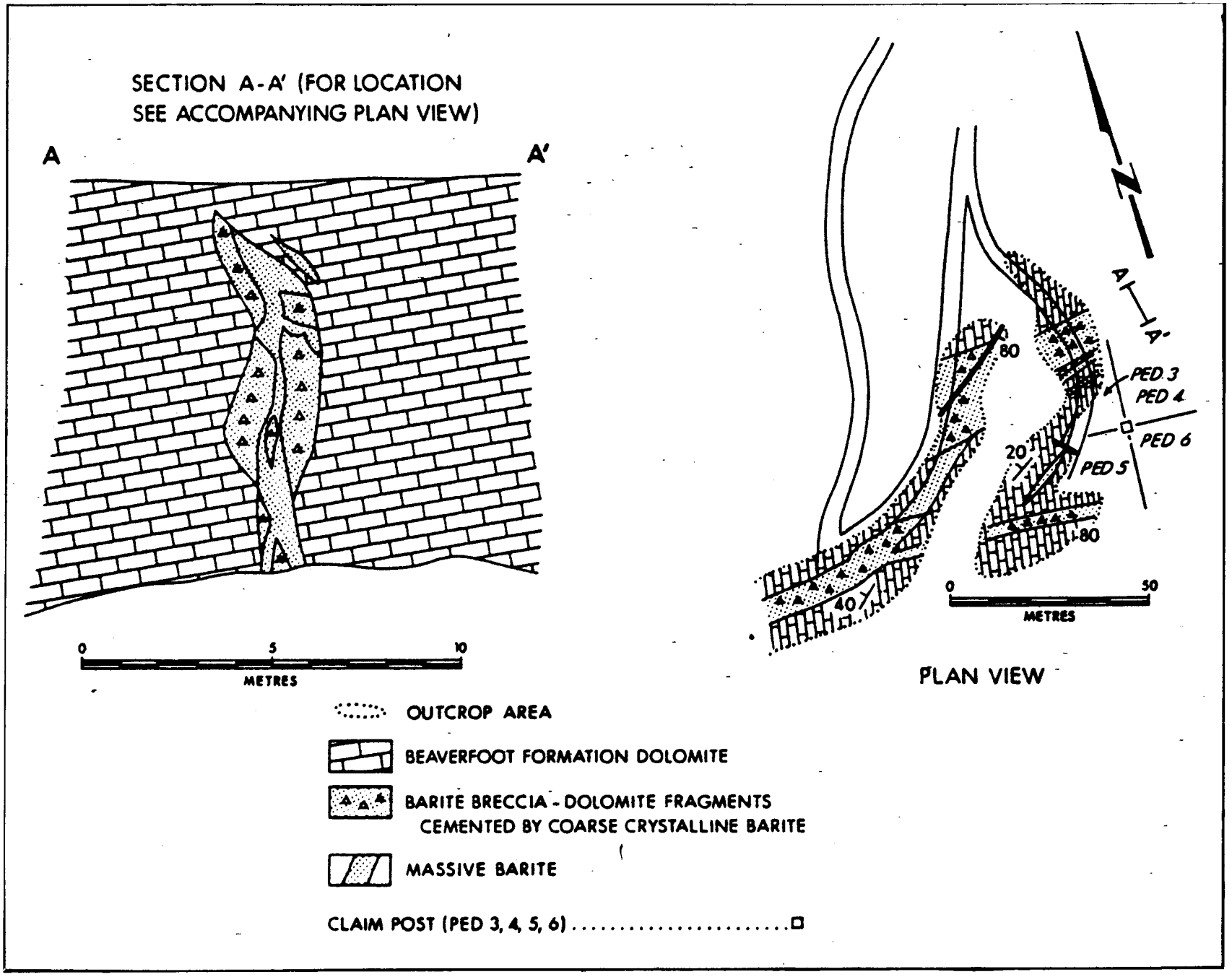


Figure 27: Geology of the Mount Pedley barite deposit. (Hora, 1984)

A barite deposit has been mined on a steep north-facing slope 3 kilometres northeast of Mount Pedley at an elevation of 1800 metres (Figure 1). The hostrocks are greyish-brown, massive and brittle dolomites of the Ordovician-Silurian Beaverfoot-Brisco Formation (Figure 27). These rocks strike east with gentle dips of 20° to 40° north. A barite-cemented dolomite breccia zone with many branches and off-shoots, strikes east with a steep dip to the north-northwest. The two main exposures are separated by a vertical distance of approxiamtely 100 metres. The barite is white, coarse grained and contains scattered grains of galena. Locally it is stained light brown by secondary iron oxide. A sample taken by the senior author has a specific gravity of 3.7, contains 32.79 per cent barium, 1.35 per cent lead and anomalous zinc and mercury.

Barwell Resources Ltd. of Calgary mined several thousand tonnes of barite ore from this locality in 1985. The barite was processed at its Windermere plant.

Pinto (188) MINFILE Number: 82JNW016
Latitude: 50°31'32" Longitude: 115°53'47" NTS: 82J/12W

The Pinto showings extend along a draw between the head of Burnais Creek and Shuswap Creek, 10 kilometres northeast of Windermere. The showings were staked by A. Louie to cover barite-fluorite mineralization.

Host rocks are thick-bedded, grey dolomites of the Ordovician-Silurian Beaverfoot Formation. Mineralization occurs in breccias within grey to greenish-grey dolonite. A combination of white dolomite, calcite, barite and purple fluorite infill the breccia. The minerals generally occur as subhedral to euhedral crystals 1 to 3 millimetres in diameter. Filled void space may comprise up to 50 per cent of the rock. Galena and hydrozincite are present in trace amounts.

Seven showings follow a north-northwest trend, parallel to bedding in the Beaverfoot Formation, along the base of Pinto mountain. The stratigraphy is normal to structurally inverted by backthrusting and folding associated with Laramide orogeny. Mineralization appears to be stratigraphically limited to the middle and lower Beaverfoot Formation. There is some suggestion from prospecting that the greatest amount of barite-fluorite mineralization occurs at the base of the Beaverfoot Formation where it is in contact with the underlying Mount Wilson quartzite (A. Louie, personal communication, 1993).

A sample provided to the EMPR by Mr. Louie contained 16.79 per cent barium, 2000 ppm strontium, 7 ppm Cu, 17 ppm Pb and 35 ppm Zn.

Parson (84) MINFILE Number: 082N 002
Latitude: 51°01'18" Longitude: 116°39'00" NTS: 82N/02E

The only current production of barite in British Columbia is from an underground mine located 9 kilometres by road west of Parson in the Rocky Mountain Trench (Figure 1), operated by Mountain Minerals Company Limited of Lethbridge. Production commenced in 1941 and, except for some short interruptions, has continued to the present. Initially, barite was quarried from three open pits (Figure 28) but in 1957 adits

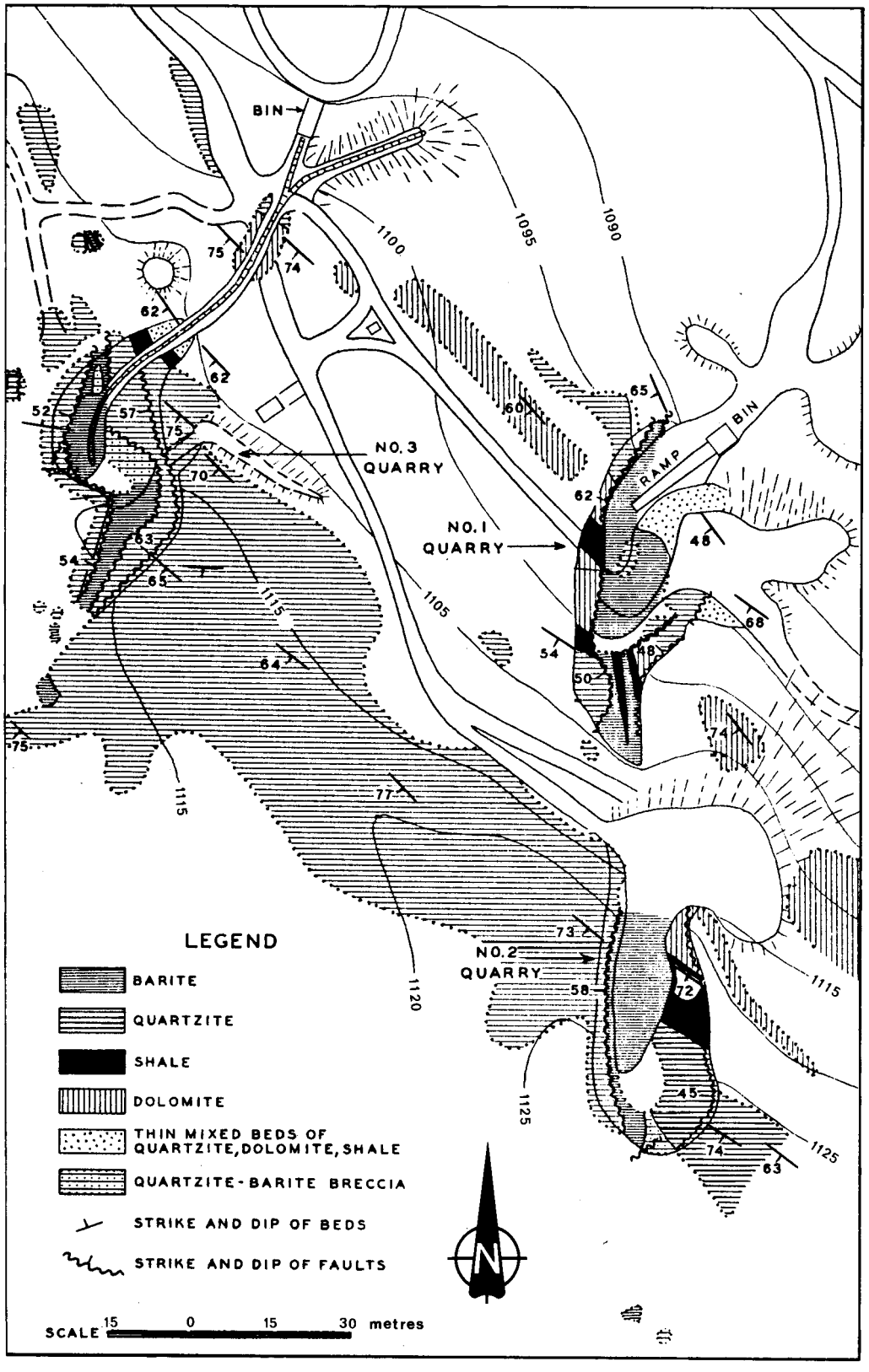


Figure 28: Geology of the Parson barite quarries. (McCammon, 1952b)

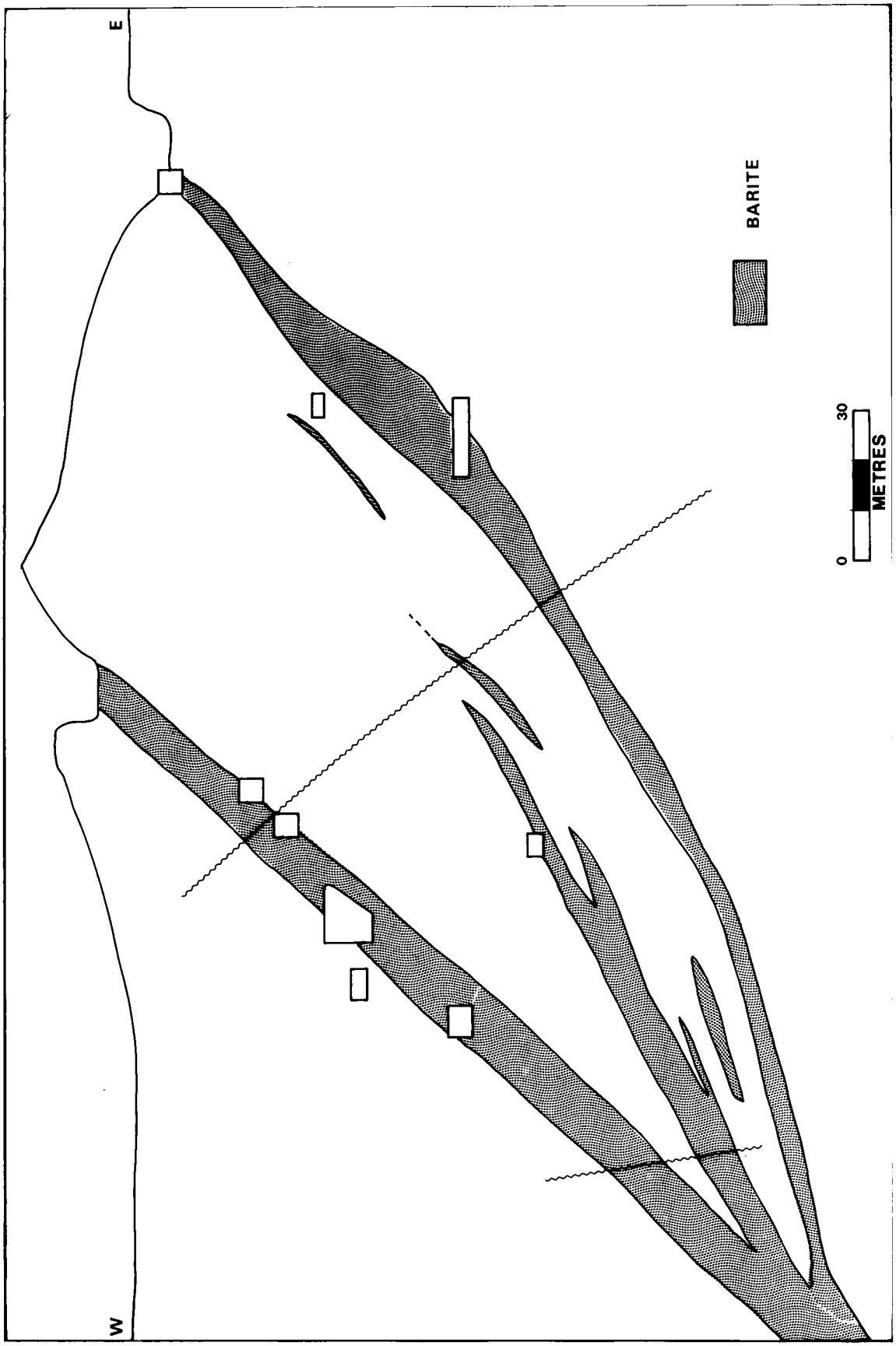


Figure 29: Schematic east-west cross-section through the Parson barite deposit. (Z. D. Hora, personal communication)

were driven into the deposit and all mining since that time has been from underground. In excess of 750 000 tonnes of barite has been produced.

Much of the mine area is covered by surficial deposits and good bedrock exposures are scarce, generally restricted to steep slopes and knolls. The mine sequence comprises a thick series of well-bedded coarse-grained quartzites, possibly of the Hamil Formation, underlain by 3 to 6 metres of slaty, dark grey shale which is in turn underlain by brown-weathering blue-grey, crystalline dolomite approximately 30 metres thick. These rocks in the area appear to be on the east limb of a major syncline. The regional strike is northwesterly with dips of 70° southwest. Locally the strike swings to north-northeast with dips of 50° to 75° southwest.

Barite occurs in two irregular fissure veins 90 to 100 metres apart. The veins strike 350° and dip to the west. Underground, down the dip, the veins coalesce into a major orebody (Figure 29). The barite is white to creamy white and coarsely crystalline. Minor to trace amounts of hematite, quartz, pyrite, chalcopyrite, siderite and calcite are associated with the barite which is often iron-stained. Two samples from ore piles yielded 49.35 and 52.38 per cent barium with low strontium and negilgible base metals values.

DESCRIPTION OF OCCURRENCES - EAST-CENTRAL BRITISH COLUMBIA

Joy (85) MINFILE Number: 093A 049
Latitude: 52°41'00" Longitude: 120°17'06" NTS: 93A/09W

Galena, sphalerite and minor chalcopyrite occur as blebs and disseminations in quartz-barite veins parallel to deformed limestone beds at a locality 8 kilometres northeast of the east arm of Quesnel Lake (Figure 1). Access to the property is by boat and helicopter from Likely.

Chalcopyrite (86) MINFILE Number: 093E 060
Latitude: 53°06'47" Longitude: 126°39'13" NTS: 93E/02E

A quartz-barite vein containing minor amounts of galena, pyrite and rare tetrahedrite, occurs in andesitic rocks on the eastern part of Tesla Mountain south of Tesla Lake at elevations between 1000 and 2000 metres (Figure 1). The vein has been traced over a length of 46 metres and is generally a metre or less thick.

Two-Bit Creek (87) MINFILE Number: 093H 064
Latitude: 53°12'54" Longitude: 121°37'54" NTS: 93H/04E

A vein of barite, 1 metre wide, is reported in volcanic rocks of the Mississippian Antler Formation (Industrial Mineral File).

Comin Thru Bear (47) MINFILE Number: 093A148
Latitude: 52°53'10" Longitude: 121°06'00" NTS: 93A/14E

Massive and disseminated barite occurs in the Lower Cambrian Mural Formation 43 kilometres northeast of Likely in the vicinity of Black Stuart Mountain (Figure 1). The property was staked in 1979 to cover an area of anomalous zinc in stream sediment

samples. During 1980 to 1981, a program of geochemical sampling, geological mapping and diamond drilling was completed by Teck Explorations Limited.

The area is underlain by limestone and lesser amounts of dolostone of the Mural Formation. This unit is overlain by slates of the Dome Creek Formation. A large, open, northwest-plunging syncline is the structure in the area. Rocks underlying the Mural Formation are more complexly deformed with refolded isoclinal folds (Lovang, 1980).

There are two barite showings. An upper zone, 10 to 15 centimetres thick occurs at the contact between dolomite and a grey limestone and consists of coarse-grained, bladed barite with interstitial galena. Laminae in the limestone follow irregularities in the barite suggesting that deposition of the limestone took place on top of the barite.

The second occurrence is a lobate zone approximately 8 metres wide and containing 90 per cent barite. It is exposed on the east limb of a small northerly plunging syncline. Fine-grained barite is interstitial to coarse, bladed crystals. Drilling on this zone obtained intercepts assaying 55.7 per cent barium across 4.5 metres and 37.3 per cent barium across 3.0 metres. These two intersections are separated by 0.6 metre of barren dolomite (Reed and Lovang, 1981).

WD (48) MINFILE Number: 093H 072
Latitude: 53°28'07" Longitude: 121°27'07" NTS: 93H/06W

The WD property is located in the Indianpoint Creek area north-northwest of Indian Lake in the northern Cariboo Mountains (Figure 1). Argillites of the Black Stuart Group underlie the western part of the property with limestone of the Mural Formation and interbedded shales and siltstones of the Dome Creek Formation outcropping to the east (Figure 30).

Three areas of anomalous lead, zinc and barium have been outlined by soil geochemical surveys. A breccia zone containing 1 to 4 per cent sphalerite with minor galena and barite disseminated in a matrix of fine-grained quartz is associated with the central anomaly. Black argillite and chert underlies the breccia zone. Testing of the other geochemical anomalies failed to located sulphide or barite mineralization (Westerman, 1982).

Belcourt (49) MINFILE Number: 093I 007
Latitude: 54°14'00" Longitude: 120°20'00" NTS: 93I/01, 08

Sphalerite and barite occur within the upper 50 metres of the Mississippian Rundle Group along a strike length of 1 kilometre, southeast of Monkman Pass and 150 kilometres south-southeast of Dawson Creek (Figure 1). The showings were discovered and staked in 1979 following a regional heavy mineral sampling program in 1978 by Esso Resources Canada Ltd.

In this area the Mount Rundle Group is divided into three formations. The lowermost is the Pekisko Formation comprising 73 metres of coarse-grained, fossiliferous limestone. It is overlain by 265 metres of coarse crystalline dolomite and micritic limestone

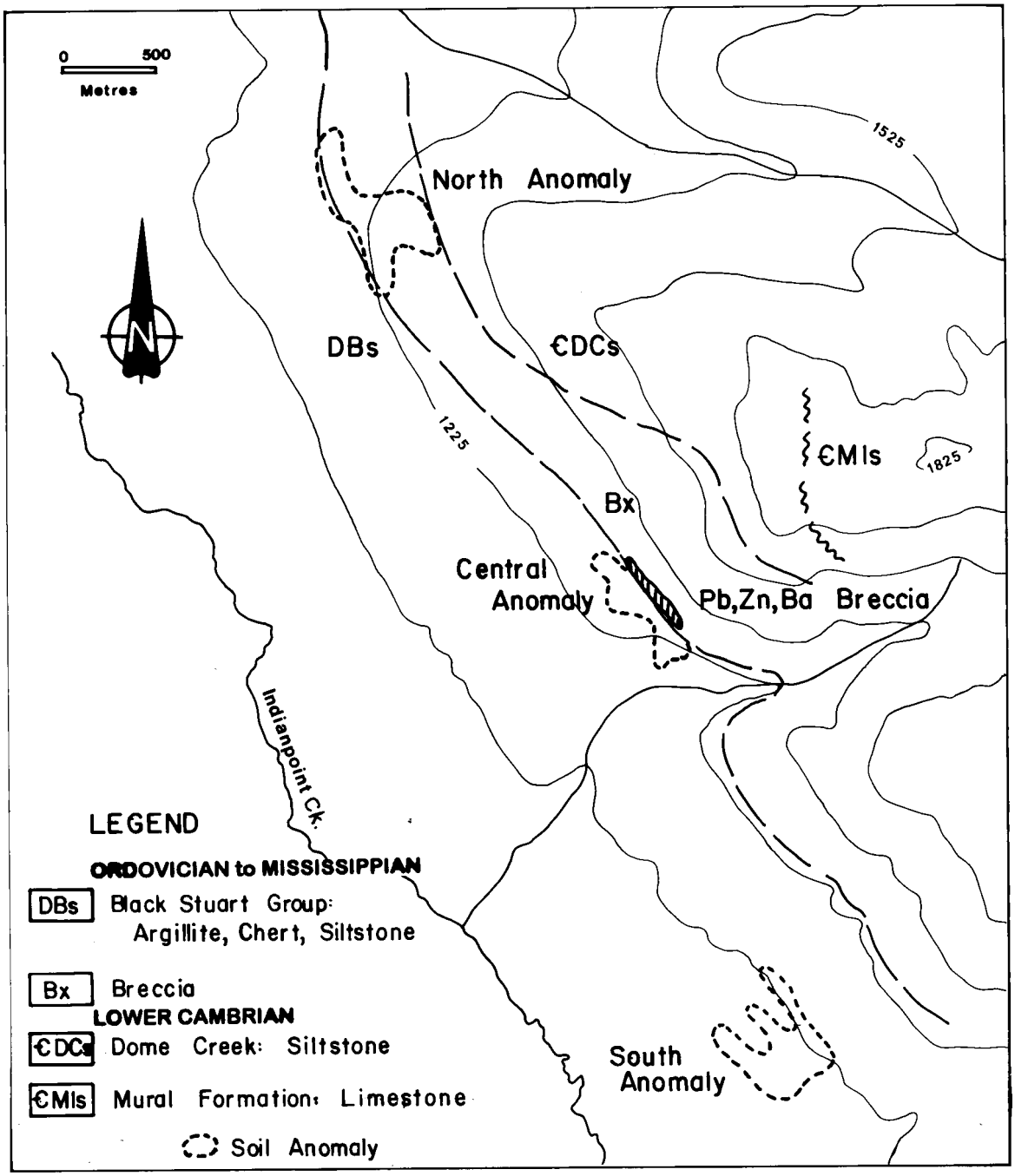


Figure 30: Geological setting of the WD lead-zinc-barite occurrence. (Westerman, 1982)

of the Shunda Formation. The youngest unit is the Debolt Formation consisting of 150 metres of predominantly finely crystalline dolomite. The Rundle Group is unconformably overlain by sandstone of the Permian Belcourt Formation.

Mineralization occurs in dolomitized, porous bioclastic units within 50 metres of the erosional contact with the overlying sandstone. It consists of fine to medium-grained, honey-yellow sphalerite in thin, compact layered aggregates or well-formed colloform masses. Coarse crystalline barite is locally present as irregular masses (Lenters, 1980).

The form of the mineralization suggests that it was deposited in solution channels or pipes related to paleokarsting.

Joker (88) MINFILE Number: 093L 013
Latitude: 54°31'39" Longitude: 126°08'17" NTS: 93L/09E

A barite vein 0.5 metre wide and sparsely mineralized with chalcopyrite occurs within Hazelton Group volcanic rocks along North Ailport Creek (Figure 1). Two small barite-calcite veins containing sparse chalcopyrite are also present in the area.

Apex (89) MINFILE Numbers: 093L 245 and 093L 247
Latitude: 54°25'00" Longitude: 126°25'00" NTS: 93L/08W

Barite veins occur in andesite of the Hazelton Group at a locality 14.5 kilometres east-northeast of Houston and 3.2 kilometres northeast of Aiken Creek (Figure 1).

DESCRIPTION OF OCCURRENCES - OMINECA RIVER AREA

Several stratabound lead-silver and zinc-lead deposits occur within carbonate strata of Lower Cambrian to Permian age, four of them within a narrow belt 15 kilometres long along the Osilinka River. Barite is associated with many of these deposits.

Omineca Queen (52) MINFILE Number: 093N 087
Latitude: 55°31'30" Longitude: 124°06'30" NTS: 93N/09E

The following description is précised from McCammon (1974).

The Omineca Queen claims, covering high-grade barite mineralization discovered in 1966, are located about 800 metres south of Manson Creek on a small tributary 3 kilometres east of the bridge carrying the Omineca Road across Manson Creek (Figure 31).

The property is heavily mantled with drift and the only exposures are the discovery outcrop in the creek and areas stripped by bulldozer. The barite is hosted by slates of the Pennsylvanian-Permian Cache Creek Group; schistose quartzite beds and some altered volcanic flows are also exposed nearby. Stripping has traced the barite zone 75 metres northeasterly to a small gully. West of the gully, fine-grained, dark barite, banded parallel to the foliation in the slates, is exposed in a single zone 4 to 7 metres wide. At the gully the barite is sheared and contorted, and appears to be offset a few metres southward.

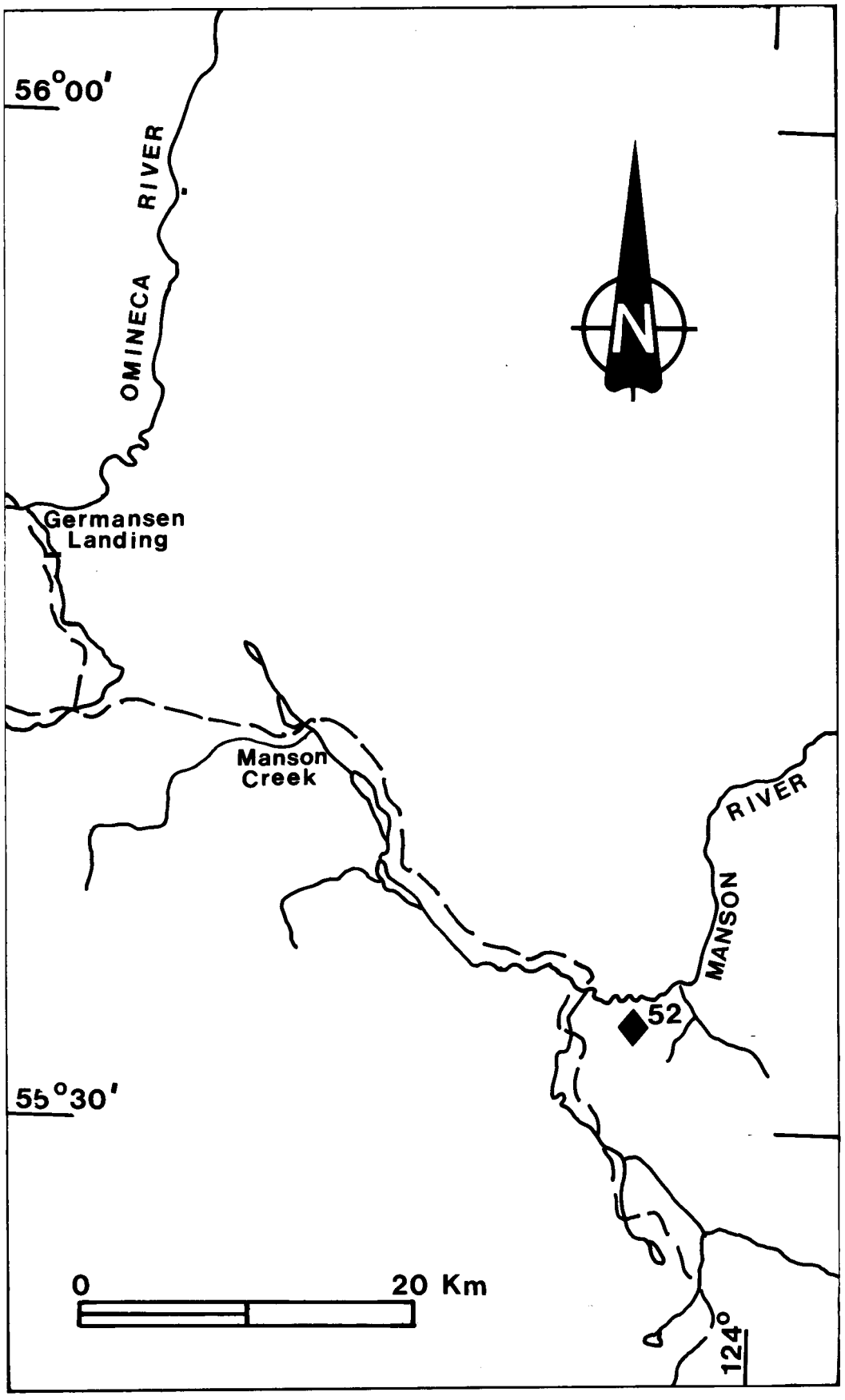


Figure 31: Location of the Omineca Queen barite occurrence.

Table 9: Analyses of samples, Brenda barite occurrence.

Sample Number	S.G.	$BaSO_4$ wt. %	Iron wt. %	SiO_2 wt. %
1	4.40	95.3	1.4	1.90
2	3.90	91.9	3.8	2.72
3	4.02	76.7	5.8	15.18
4	3.79	66.7	2.1	29.83
5	4.28	87.8	4.4	6.17
6	4.33	91.7	2.4	4.72
7	4.42	96.9	1.5	0.83
8	4.49	83.1	7.7	5.01
9	3.29	42.6	2.4	53.37
10	3.10	32.9	2.2	63.20
11	4.33	89.7	5.0	3.43
12	4.38	94.9	1.6	1.56

Table 10: Analyses of barite samples, Omineca Queen property. (McCammon, 1974)

Sample Number	Sample Interval (m)	BaO (%)	SO_3 (%)	Fe_2O_3 (%)	SiO_2 (%)	S.G.
1	7.0	54.09	27.8	0.26	8.29	4.42
2	6.5	62.79	33.8	0.29	2.15	4.42
3	4.0	63.16	33.5	0.29	1.87	4.50
4	3.0 + 5.0	63.15	33.5	0.23	1.60	4.54

Table 11: Analyses of barite samples, CTV occurrence. (Deighton, 1981)

Thickness (m)	Ba (%)	Zn (%)	Pb (%)	Ag (oz/T)
1	41.9	4.26	1.50	0.26
5	30.3	4.79	1.53	
7	17.5	6.41	0.25	

Stripping 120 metres southeast of the gully has exposed two barite zones; a band of barite 3 metres wide is separated from 5 metres of banded barite to the south by 3 metres of slate.

Thin sections of mineralized material consist of barite with variable and normally small amounts of quartz and a black opaque material. The texture is normally fine grained and equigranular with a few coarse-grained patches. The white barite is homogeneous but the banded variety has a fabric imparted by stretching and flattening of barite grains and concentration of quartz grains and the black mineral parallel to the foliation in the country rock.

McCammon theorizes that although the barite may represent a sedimentary deposit, it is more likely to have formed as a replacement of quartzite prior to the last deformation.

Analyses of four samples reported by McCammon are summarized in Table 10. Sample 1 was cut from wall to wall across 7 metres of barite directly above the discovery outcrop; Sample 2 was taken from a stripping 30 metres to the east; Sample 3 was cut across 4 metres of barite on the north wall of the zone exposed in the west side of the gully, the south wall is not exposed; and Sample 4 is a composite of the two barite zones southeast of the gully, with the 3 metres of slate omitted.

Sheila (53) MINFILE Number: 093N 172
Latitude: 55°55'12" Longitude: 124°42'24" NTS: 93N/05E

The Sheila occurrence is located 14 kilometres north of Germansen Landing and 5 kilometres northeast of Nina Lake (Figure 32). Dolomitic breccia of possible Lower to Middle Devonian age has barite cement containing sphalerite and minor galena.

Vernon (54) MINFILE Number: 093N 076
Latitude: 55°56'30" Longitude: 124°45'05" NTS: 93N/15W

The Vernon prospect is located 4.5 kilometres northwest of the Sheila occurrence at an elevation 1200 metres (Figure 32). Sphalerite and galena occur in limestone of the Permian Cache Creek Group. Minor quartz, calcite and barite are associated with the sulphides. Locally, sulphides with associated barite and calcite are present in a dolomitized limestone breccia.

Beveley (56) MINFILE Number: 094C 023
Latitude: 56°09'30" Longitude: 125°03'30" NTS: 94C/03E

The Beveley property is located near the top of a limestone ridge on the north side of the Osilinka River, about 5 kilometres east of its confluence with May (Tenakihi) Creek (Figure 32). The first claims were staked in 1946 to cover showings of galena discovered by Alexander Leggatt while prospecting on behalf of the Consolidated Mining and Smelting Company of Canada Limited (now Cominco Ltd.). Cominco explored the property for lead and zinc from 1947 to 1951, dtilling 12 holes, but allowed the claims to lapse in 1962. The property was restaked by a prospecting syndicate in which Mr. Leggatt

was a principal, and optioned to Donna Mines Ltd. in 1967. Over a two year period Donna Mines completed extensive trenching and drove a 300-metre adit on the E zone.

The above historical outline and the following geological description are summarized from a report by Garnett (1979) who spent four days investigating the property in the summer of 1979.

Hostrocks for the lead-zinc-barite mineralization are tightly folded Lower Cambrian white to grey dolomite, fine-grained grey to black limestone and brown ferrodolomite. Galena is the main sulphide mineral present and is invariably associated with barite, occurring as veinlets and disseminations in barite masses, cutting grey dolomite and as stockworks and fracture fillings in brecciated grey dolomite and ferrodolomite. In some cases veinlets roughly parallel compositional layering preserved in the barite. Sphalerite, difficult to recognize in the field, is present as small round blebs within the galena. Crosscutting calcite stringers are a common feature in all the trenches. There is a direct correlation between the intensity of dolomitization of the original limestone and the presence of sulphides and barite. Crosscutting relationships clearly indicate that dolomitization preceeded mineralization and resulted in increased porosity, creating a favourable host.

Systematic chip sampling by Garnett in trenches E3, E4, O7 and G1 (Figure 33) returned average atomic absorption analyses of 15.5, 30.1, 24.0 and 14.7 per cent $BaSO_4$ across 43.9, 19.2, 6.1 and 6.1 metres respectively. Base metal values are uniformly low in all samples, rarely exceeding 1.5 per cent combined lead-zinc. A grab sample of barite material collected by the senior author yielded 42.42 per cent barite with 564 ppm Sr, 83 ppm Pb and 3400 ppm Zn.

Weber (56) MINFILE Number: 094C 024
Latitude: 56°07'00" Longitude: 125°03'00" NTS: 94C/03E

Pyrite, galena, sphalerite and barite occur along a fault zone in dolomitized limestone of Lower to Middle Devonian age on the east side of Wasi Creek approximately 2.4 kilometres south of its confluence with the Osilinka River (Figure 32). The zone is 4.5 metres wide and has been traced over a length of 45 metres. A sample of well-mineralized material assayed 4.06 per cent barite, 10.24 per cent lead and silver (Roots, 1954).

Elizabeth, Molly, Gwynn (57) MINFILE Numbers: 094C 030, 031 and 032
Latitude: 56°08'00" Longitude: 124°55'00" NTS: 94C/02W

Several occurrences of galena and sphalerite with varying amounts of barite are located in an area 10 kilometres north-northeast of Wasi Lake, immediately south of the Osilinka River (Figure 32), at elevations ranging from 825 to 1700 metres. The showings were originally staked by Earnest and Gordon Davies and optioned to Northwest Explorations Limited in 1951. Canex Placer Limited (later Placer Development Ltd.) subsequently optioned the property and completed programs of soil geochemistry and geological mapping in 1966 to 1968 and in 1976 and 1980.

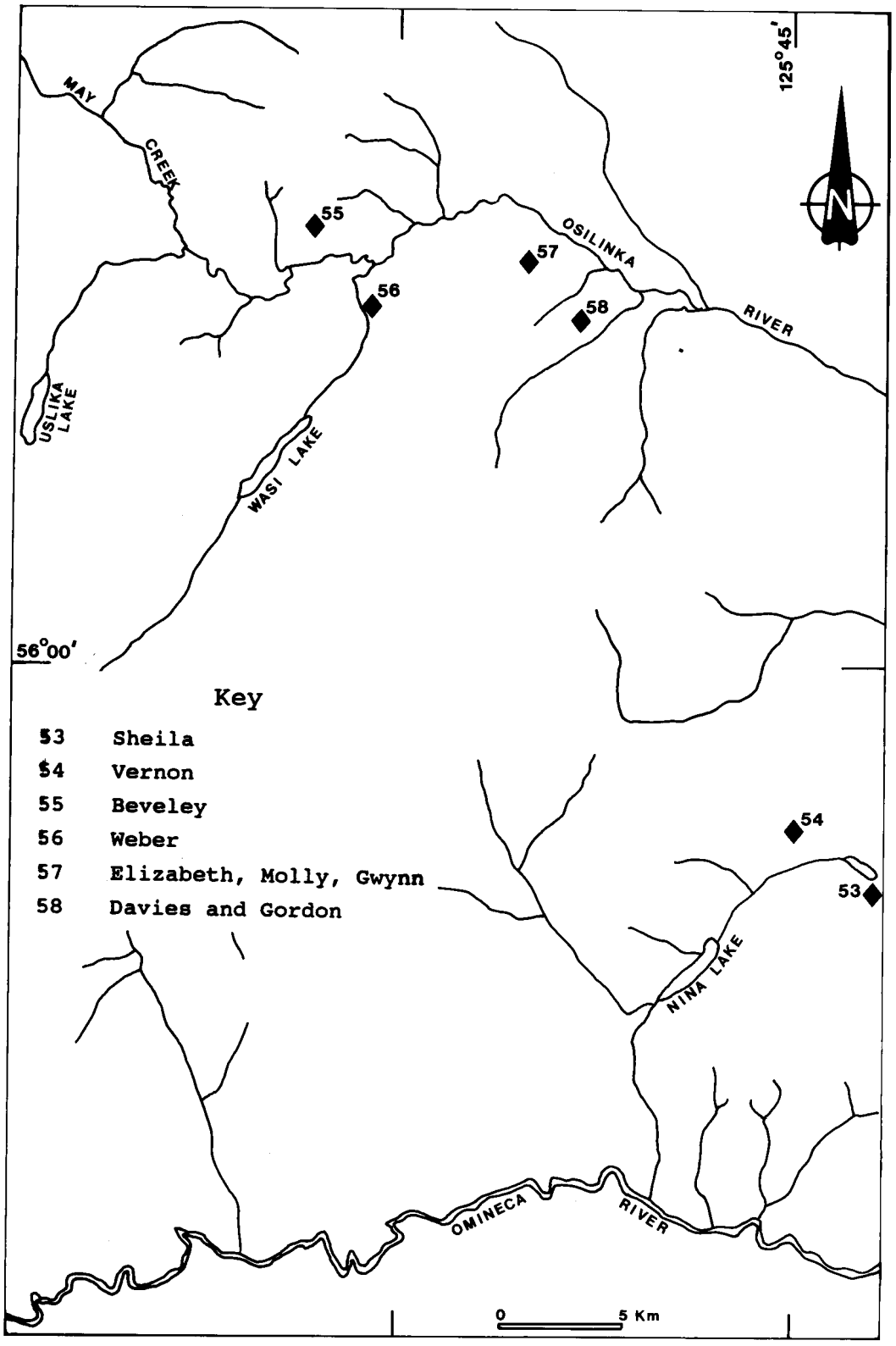


Figure 32: Barite occurrences in the Omineca River area.

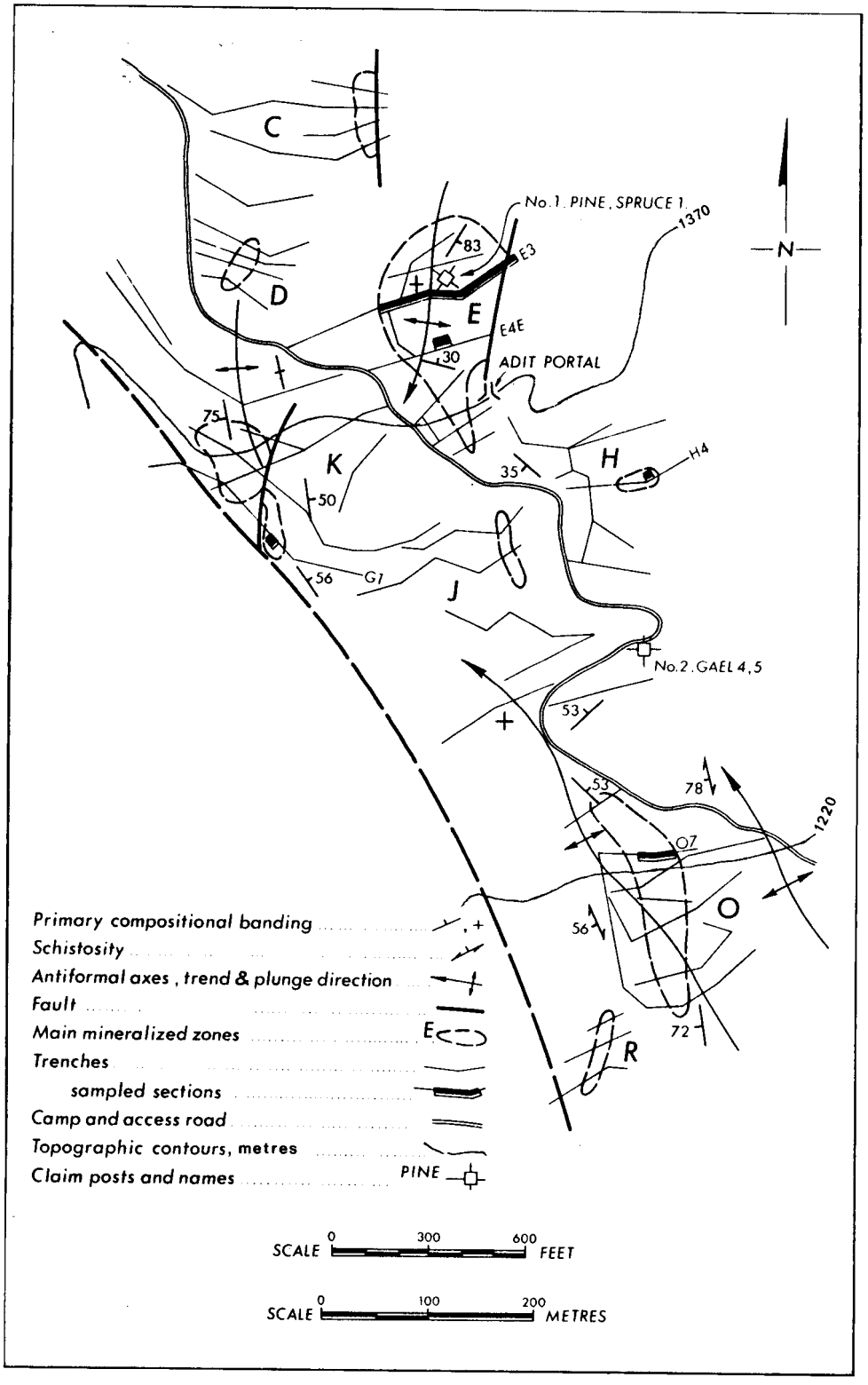


Figure 33: Sketch of the main mineralized zones, Beveley property. (Garnett, 1973)

A thick succession of Ordovician to Devonian carbonate rocks underlies the area. This sequence is thought to be in excess of 900 metres thick with the lower 300 metres consisting of crystalline limestone with interbedded argillaceous rocks and the upper 600 metres consisting of algal-laminated dolomite and dolomitic limestone. Deformation of these rocks resulted in crackle brecciation most strongly developed in dolomitic rocks. Locally, there has been some silica flooding of the breccia.

Mineralization consists of poddy and breccia-hosted galena and sphalerite with minor amounts of barite. Individual occurrences contain less that 4 per cent lead-zinc and have only small tonnage potential (Jenkins, 1980).

Davies and Gordon (58) MINFILE Number: 094C 033
Latitude: 56°08'00" Longitude: 124°56'00" NTS: 94C/02W

The Davies prospect is located 10 kilometres northeast of Wasi Lake and 1.25 kilometres south of the Osilinka River (Figure 32). Zinc-silver-lead-barite mineralization, with associated silicification, occurs in a dolomitic limestone of possible Permian age. Locally the rocks contain as much as 10.8 per cent barium. On the Gordon prospect sulphide mineralization hosted by a faulted and brecciated limestone has been exposed over an area measuring 30 by 15 metres. Barite, dolomite and calcite are also present in the breccia.

Mineralization is stratabound and occurs as infillings in porous dolomite, as blebs and replacements along bedding planes and as irregular bodies in open cavities.

Rain (59) MINFILE Number: 094C 074
Latitude: 56°30'00" Longitude: 125°35'00" NTS: 94C/12E

The Rain lead-zinc-barite occurrences are hosted by limestone of the Ingenika Group at a locality 13 kilometres northeast of Aiken Lake (Figure 34). Mineralization occurs at two locations as disseminations and layers within the enclosing rock. Some pyrite is also present. The zones are respectively 60 and 200 metres long and 30 and 10 metres wide. Grab samples from these occurrences assayed 14.5 to 48.5 per cent barite (Sonnendrucker, 1973).

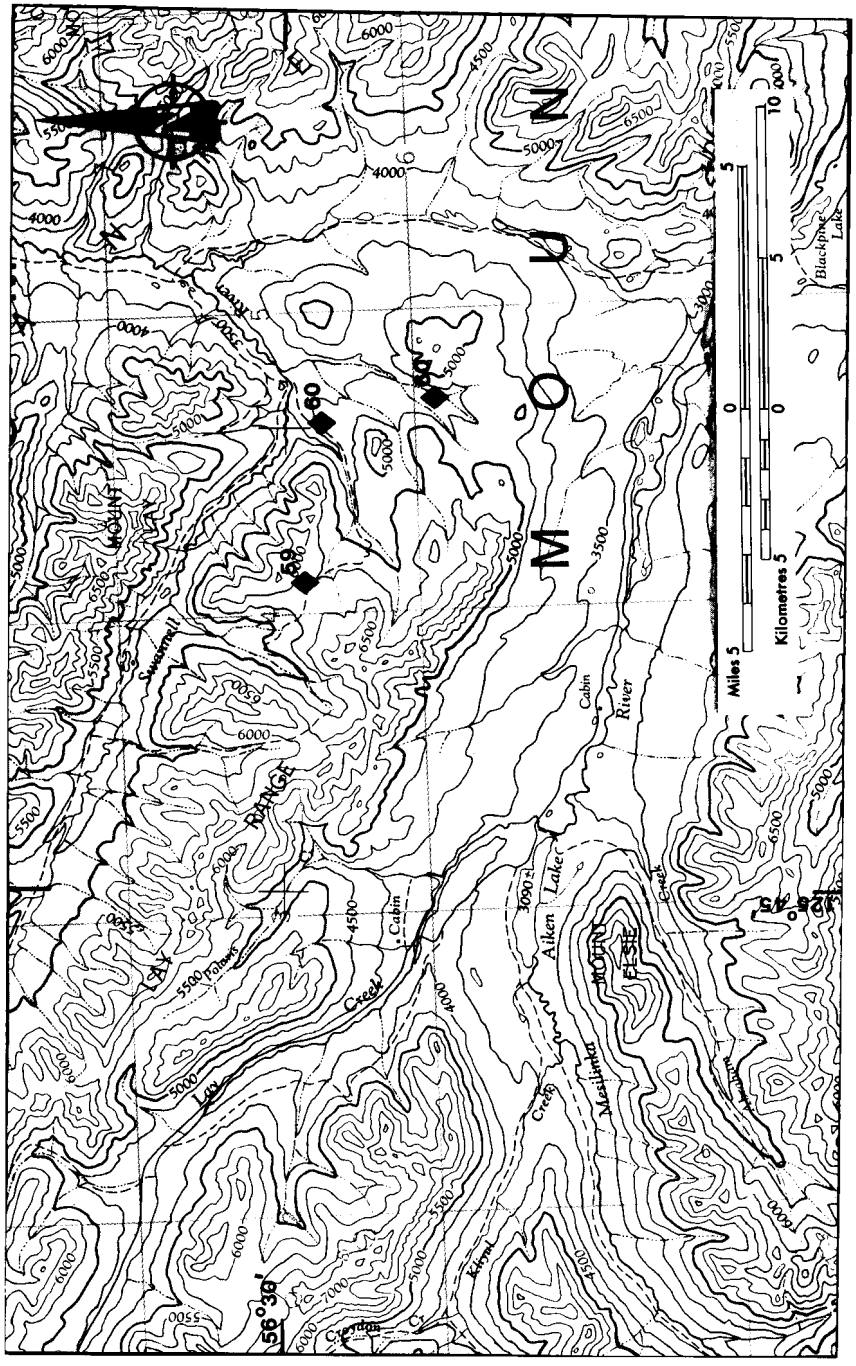


Figure 34: Location of the Rain and Burn barite occurrences.

Burn (60) MINFILE Numbers: 094C 082
Latitude: 56°27'00" Longitude: 125°28'00" NTS: 94C/05E

The Burn property is located 16 kilometres east-northeast of Aiken Lake and 5 kilometres south of the Swannell River (Figure 34). It is underlain by a clastic-carbonate assemblage of the Ingenika Group. Much of the carbonate succession consists of limestone. Dolomitic sections and breccia are present locally. Two zones of mineralization consist of galena and sphalerite restricted to the dolomitic sections. Barite is associated with the sulphides in minor amounts, generally less than 1.4 per cent. Locally, barite lenses are present in the black shale that overlies the carbonate sequence.

DESCRIPTION OF OCCURRENCES - NORTHEASTERN BRITISH COLUMBIA

Devonian carbonate rocks exposed in the northern Rocky Mountains are the platformal equivalents of the shale facies that is host to barite and barite-sulphide deposits in the Kechika Trough to the west (see Chapter 2). The carbonates host numerous barite and lead-zinc occurrences, the majority in the Middle Devonian Dunedin Formation.

RB (61) MINFILE Number: 094G 004
Latitute: 57°12'00" Longitude: 123°45'00" NTS: 94G/04

Several occurrences of veins and pods of calcite and barite are present in the Middle Devonian Dunedin limestone in the Mount Bertha area, 190 kilometres northwest of Fort St. John (Figure 35). Dimensions of individual pods at surface are as large as 75 by 30 metres. Individually these occurrences vary from sheet-like veins to irregular pods and pipe-like masses that may include large, displaced blocks of limestone. Minor amounts of galena and sphalerite are associated with the barite (Jones and Dujardin, 1972).

Tr1 (62) MINFILE Number: 094G 007
Latitude: 57°18'00" Longitude: 123°51'00" NTS: 94G/04, 05

Several barite occurrences are located east of Mount Helen, south of Redfern Lake (Figure 35). Breccia zones containing barite, sometimes with minor chalcopyrite, crosscut Dunedin limestone in the ridge north of Nordling Creek. South of Nordling Creek, a subconformable vein of barite, 0.3 to 0.6 metre wide is present in dark grey microcrystalline limestone. Some galena and sphalerite are present on the footwall.

On the north slope above Colledge Creek, vugs filled with barite are present in "zebra rock" in a dark grey, limy dolomite. Galena and sphalerite are associated with the barite. The barite zone is 1.5 to 2.0 metres wide and 10 metres long; it pinches out to the northwest and is faulted off to the southeast (Salat, 1973).

Egg (90) MINFILE Number: 094G 002
Latitude: 57°23'00" Longitude: 123°50'00" NTS: 94G/05W

Several barite veins cut Dunedin Formation limestone in the plateau area northeast of Redfern Lake (Figure 35). The largest of these veins is 4.3 metres wide and outcrops on the eastern edge of the plateau near the faulted contact between the Dunedin and Besa River formations.

Besa (64) MINFILE Number: 094G 019
Latitude: 57°22'00" Longitude: 123°48'00" NTS: 94G/05W

The Besa property, located 3 kilometres northeast of Redfern Lake (Figure 35) was staked in 1972 by Noranda Exploration Company Limited while exploring for lead and zinc. The property is underlain by north-striking, dark grey argillaceous limestone of the Dunedin Formation dipping gently east, overthrust by the Stone Formation to the west and thrust over Besa River shales to the east.

Barite float was found on the west side of the property. The source is believed to be narrow veins occurring upslope on Mount Redfern (Dirom *et al.*, 1972).

Redfern Lake (63) MINFILE Number: 094G 018
Latitude: 57°23'00" Longitude: 123°50'00" NTS: 94G/05W

A number of barite showings are known on the plateau immediately north of Redfern Lake (Figure 35). Rocks of Ordovician to Mississippian age underlie the region. The plateau area is entirely underlain by near flat-lying Dunedin Formation between a major high-angle fault to the west and a zone of drag folding on the eastern edge. The Dunedin strata are predominantly light grey weathering, medium to dark grey microcrystalline limestones with a thickness of approximately 300 metres.

Barite and barytocalcite occur as pods and breccia fillings in the limestone. Three barite veins are exposed on the rim of a draw at the southwest corner of the plateau. They are 0.7 to 1.7 metres thick and parallel to the bedding. Elsewhere the barite forms the matrix in limestone breccia and also occurs as fracture fillings in the limestone. Fluorite is occasionally associated with the barite (Hennessey, 1973).

Dodo, Hope, CBC (65) MINFILE Numbers: 094K 058, 063 and 064
Latitude: 58°19'00" Longitude: 124°19'54" NTS: 94K/07, 08

Several barite occurrences are hosted by Middle Devonian carbonates of the Dunedin Formation along a narrow belt extending from south of Tuchodi Lakes to Mount Mary Henry (Figure 1). Ecstall Mining Limited (a subsidiary of Texasgulf Inc.) staked almost the entire belt in 1972 to cover prospective stratigraphy extending northward from the Robb Lake lead-zinc district. Follow-up work consisted of geological mapping and soil geochemistry.

Four barite occurrences are located on the Dodo claims. Pods of barite and minor galena 5 to 10 centimetres wide extend over a strike length of 120 metres in Dunedin limestone, approximately 300 metres above its lower contact. A second showing, at the

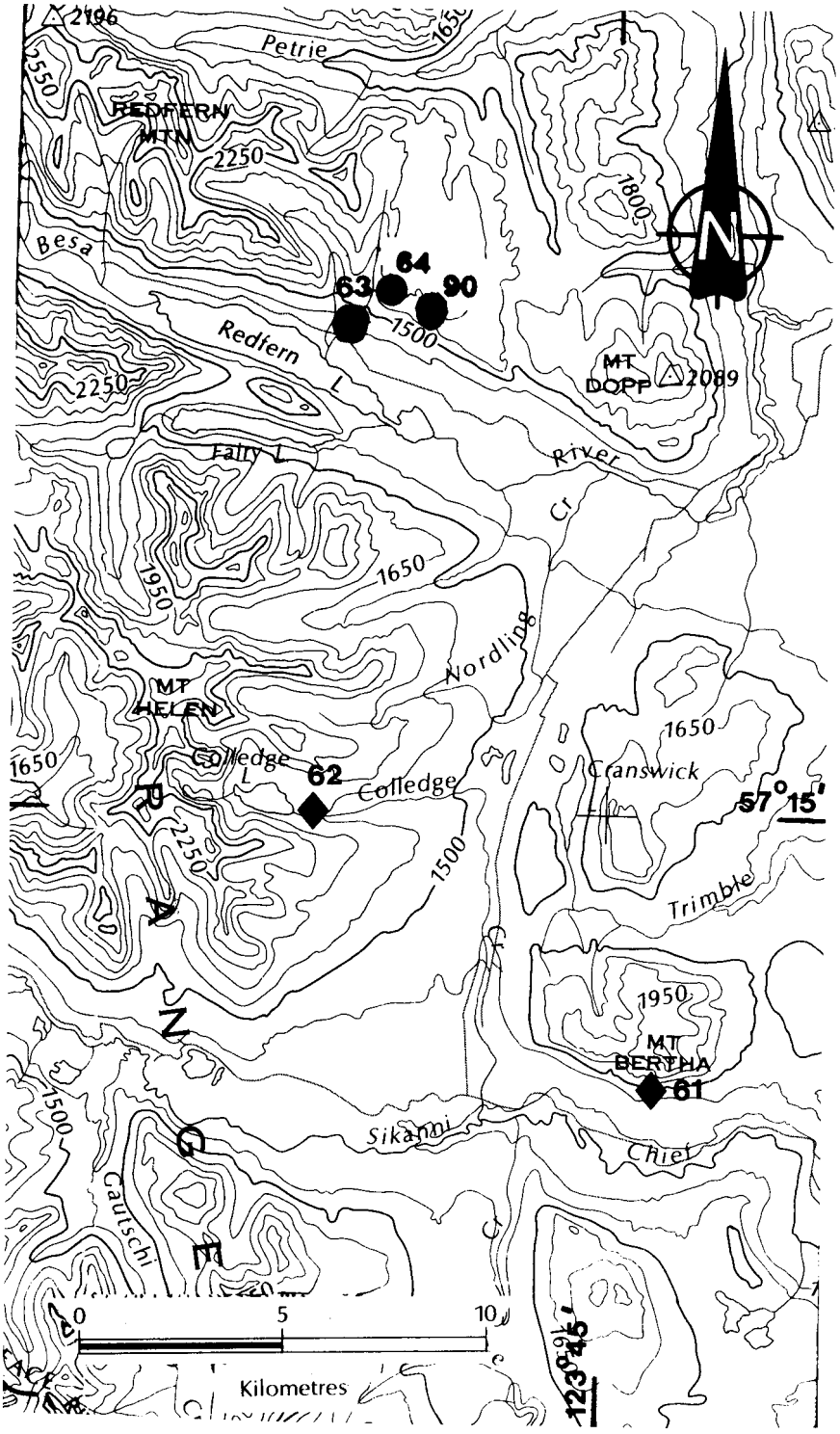


Figure 35: Location of barite occurrences in the Redfern Lake area.

same horizon, consists of a barite pod measuring 2.4 by 3 metres. Approximately 60 metres above the lower Dunedin contact there is lens of barite and minor galena measuring 6 by 15 metres. The limestone at this locality is highly fractured. The fourth occurrence is a barite pod measuring 0.7 by 1.2 metres.

On the Hope claims, a narrow, discontinuous (0.3 to 1.5 metres) barite-calcite-fluorite stringer zone with minor sphalerite occurs at the Dunedin-Stone contact. This zone exhibits little continuity and contains some sphalerite. Evidence of other zones is present in talus material; they are also thought to be small and discontinuous (Newell, 1972).

On the CBC claims a barite pod measuring 30 by 6 by 6 metres is hosted by thick-bedded, steeply dipping to vertical limestones of the Dunedin Formation. Some barite, galena and sphalerite were found in talus at two other localities on the property.

CTV (66) MINFILE Numbers: 094K 059, 060, 061 and 062
Latitude: 58°24'00" Longitude: 124°23'00" NTS: 94K/08

Massive barite occurs discontinuously along a 14 kilometre long belt 32 kilometres southwest of Summit Lake on the Alaska Highway. The property covers parts of the Henry Creek, Chiska River and Margison Creek drainages (Figure 36). It was originally staked in 1972 as the CTV claims by Ecstall Mining Limited and restaked as the Rep claims in 1980 by Utah Mines Ltd.

The area is underlain by a series of Lower to Middle Devonian carbonate rocks that are in turn overlain by shales of the Besa River Formation and younger carbonates. Lower and Middle Devonian carbonates represent a regressive sequence that culminated in semi-evaporitic conditions during deposition of the Stone Formation. This was followed by a period of transgression represented by the Dunedin Formation.

Mineralized showings are found over the entire length of the property in fetid Dunedin limestone and Stone dolomite. Barite zones consisting of sucrosic and sparry or dendritic barite are up to 20 metres thick and may represent a single horizon or several closely spaced parallel horizons. Minor amounts of galena and sphalerite are associated with the barite. The best assays reported by Deighton (1981) in Table 11.

Mile 397 (92) MINFILE Number: 094K 004
Latitude: 58°40'36" Longitude: 124°46'42" NTS: 94K/10W

McCammon (1960) describes an irregular vein-like mass of barite exposed in the north wall of a canyon 120 metres upstream from the culvert on the Alaska Highway midway between Mileposts 397 and 398 (Figure 1). The host rocks are thin-bedded, dark grey to black fetid limestones of probable Silurian age.

The barite mass extends the full height of the canyon wall, about 60 metres. At the creek it has a fairly regular, slickensided hangingwall striking 335° and dipping 60° west across the more gently dipping limestones. About half way up the canyon wall the dip flattens to almost parallel with bedding in the hostrocks. The footwall is very irregular with apophyses of barite extending into the country rock 25 metres or more. Wallrocks

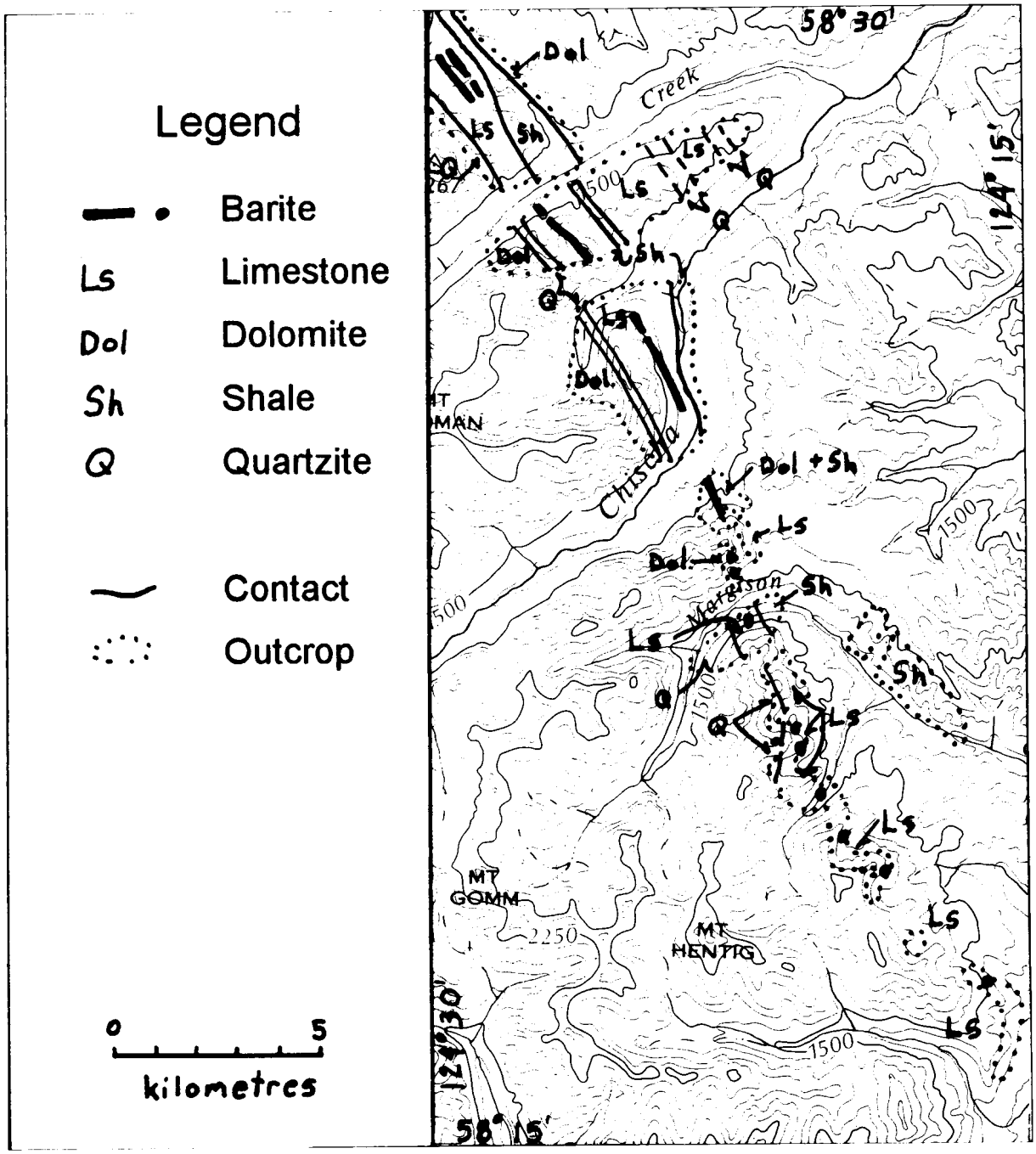


Figure 36 Geology of the CTV barite occurrences. (Deighton, 1981)

are brecciated, with inclusions of limestone in the barite and considerable replacement of limestone, especially along the footwall. At creek level the barite is 6 metres wide, thickening up to 30 metres near the change in dip of the hangingwall and thinning again to 20 metres at the canyon lip. The plan length of the exposure is approximately 60 metres. Physically the barite varies from massive to coarsely crystalline and, near the creek, it is so friable that it crumbles into sand. The chief visible impurities are limestone, coarsely crystalline calcite and a little purple fluorite. A barite sample collected by Z. D. Hora of the B. C. Geological Survey Branch yielded 57.95 per cent barium.

The barite zone does not extend southward across the creek; numerous small veinlets of barite and fluorite have been noted along strike to the northwest, 900 metres to the next creek, but no continuation of the main structure has been found. A few small barite-fluorite stringers are exposed in the south wall of the canyon, 30 metres upstream from the main showing, and a plug-like mass of barite, 7.5 metres in diameter, is exposed in the creek bed a further 120 metres upstream.

Nonda Creek (91) MINFILE Number: 094K 001
Latitude: 58°57'12" Longitude: 125°31'48" NTS: 94K/13E

Barite occurs in a vein, 8 to 16 metres wide on the west side of a ridge immediately north of Nonda Creek near mile 428 on the Alaska Highway (Figure 1). The vein has been traced for 460 metres between elevations 1920 and 2070 metres and is believed to be the surface expression of one of the many thrust faults in the area.

The barite is white, at least 92 per cent pure, low in minor elements and occurs in lenses 9 to 15 metres wide. It is estimated that 450 000 tonnes of barite may be present (Page, 1980). A barite sample collected by Z. D. Hora of the B. C. Geological Survey Branch yielded 58.43 per cent barium with negligible impurities.

Muncho Lake (93) MINFILE Number: 094K 038
Latitude: 58°56'18" Longitude: 125°45'30" NTS: 94K/13W

Veins of fluorite and barite are reported to be relatively common in limestone south and east of Muncho Lake (McCammon, 1960). Three samples collected by Z.D. Hora of the B. C. Geological Survey Branch yielded 53.00, 56.87 and 56.77 per cent Ba and had specific gravities of 4.1, 4.2 and 5.1 respectively. Little else is known about these occurrences.

Gem (67) MINFILE Number: 094M 002
Latitude: 59°26'54" Longitude: 126°05'06" NTS: 94M/08E

Showings of fluorite, witherite and minor barite mineralization are present along the disconformity between the Upper Devonian Besa River shales and the Middle Devonian Dunedin limestone at Liard Hot Springs (Figure 1). Mineralization consisting of nearly equal amounts of fluorite and witherite occurs as discontinuous and lensoid replacements of limestone over an area of 275 by 300 metres. Barite content varies from 5 to 28 per cent. A barite sample collected by Z. D. Hora of the B. C. Geological Survey Branch yielded 68.05 per cent barium, 2000 ppm Sr and low base metals values.

Denis (95) MINFILE Number: 094M 019
Latitude: 59°42'00" Longitude: 127°12'00" NTS: 94M/11E

Thin-bedded Cambrian siltstones are cut by several parallel veins of massive barite at a locality 1 kilometre north of the Alaska Highway at Mile 546 (Figure 37).

Fireside (94) MINFILE Number: 094M 003
Latitude: 59°46'00" Longitude: 127°12'00" NTS: 94M/14E

The Fireside property is located in a gently rolling upland area on the Liard Plain, 6.4 kilometres north of Milepost 547 on the Alaska Highway (Figure 37). Outcrop in the area is extremely sparse with the majority of exposures occurring in areas that have been stripped. Three areas of barite mineralization have been identified.

Dresser Industries Inc. began production from the Moose quarry in 1982 and produced 70 000 tonnes until 1986. A substantial barite reserve still exists in the Bear deposit.

The area is underlain by Cambrian and older shales and siltstones. This sequence is thinly bedded and gently folded in a series of northwest-trending anticlines and synclines (Cochrane, 1973b).

The main barite occurrence (Moose) is a steeply dipping vein system within in a north-trending braided fault zone (Figure 38). Barite pinches and swells along the structure and rarely exceeds 3.5 metres in width. Locally it appears concordant with the enclosing shales and siltstone. This zone has been mined over a length of 400 metres. The barite is white to creamy white, coarsely crystalline, commonly iron stained and locally banded. It crosscuts both the host lithologies and secondary sideritic dolomite. A sample collected by the senior author returned analyses of 58.26 per cent Ba with negligible base metals and only 1101 ppm strontium; the specific gravity was 4.2.

On the Bear zone barite is exposed along a length of 130 metres across a width of 20 metres. Two main barite veins are present. The south vein is 3 metres across and the north vein is 1 metre wide. The remainder of the zone consists of scattered lenses and pods of barite. In this area the barite trends northeasterly with steep to near vertical dips. The barite is white, coarsely crystalline and commonly iron stained. In thin section medium to coarse-grained subhedral barite is present with fine-grained sugary textured barite. Some of the barite is in the form of elongate crystals. A sample from this zone returned 57.04 per cent barium (S.G. = 4.3) again with very low base metals and only 769 ppm strontium. Host rocks are dark grey siltstones and shales as at the Moose deposit.

The Beaver zone is exposed over a length of 45 metres across a width of 4 metres. To the north the wallrocks are mafic-rich grits and to the south, dark grey shales and siltstones. The zone trends north-northeast with a vertical dip. A vein 1 metre wide parallels the main zone 10 metres to the north. At this locality the barite is coarsely crystalline, cream or white to very pale grey in colour with some limonitic staining. A sample contained 58.14 per cent barium (S.G. = 4.4) with lead, zinc and copper values less than 10 ppm and strontium at 815 ppm.

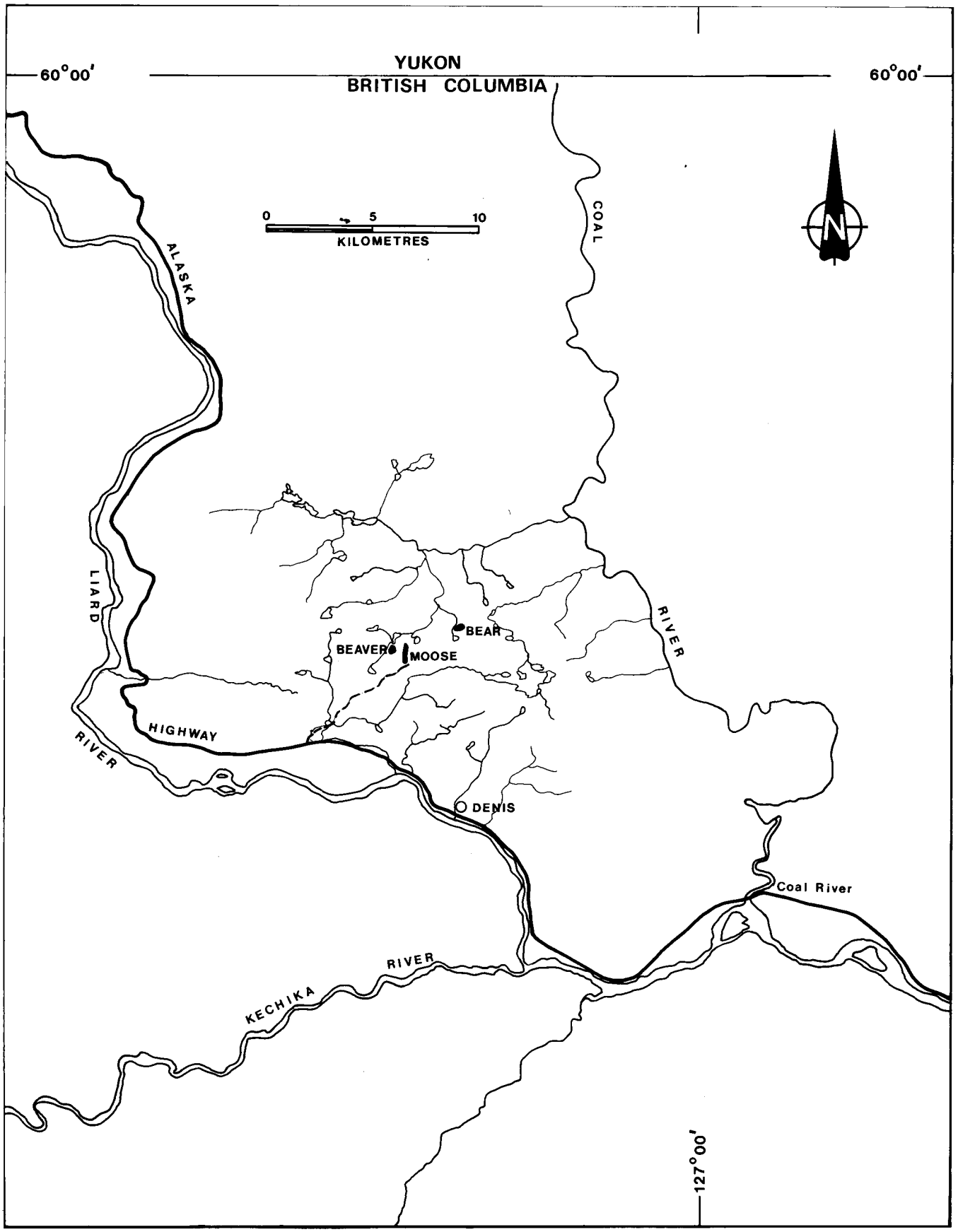


Figure 37: Location of the Fireside (Beaver, Moose, Bear) and Denis barite occurrences.

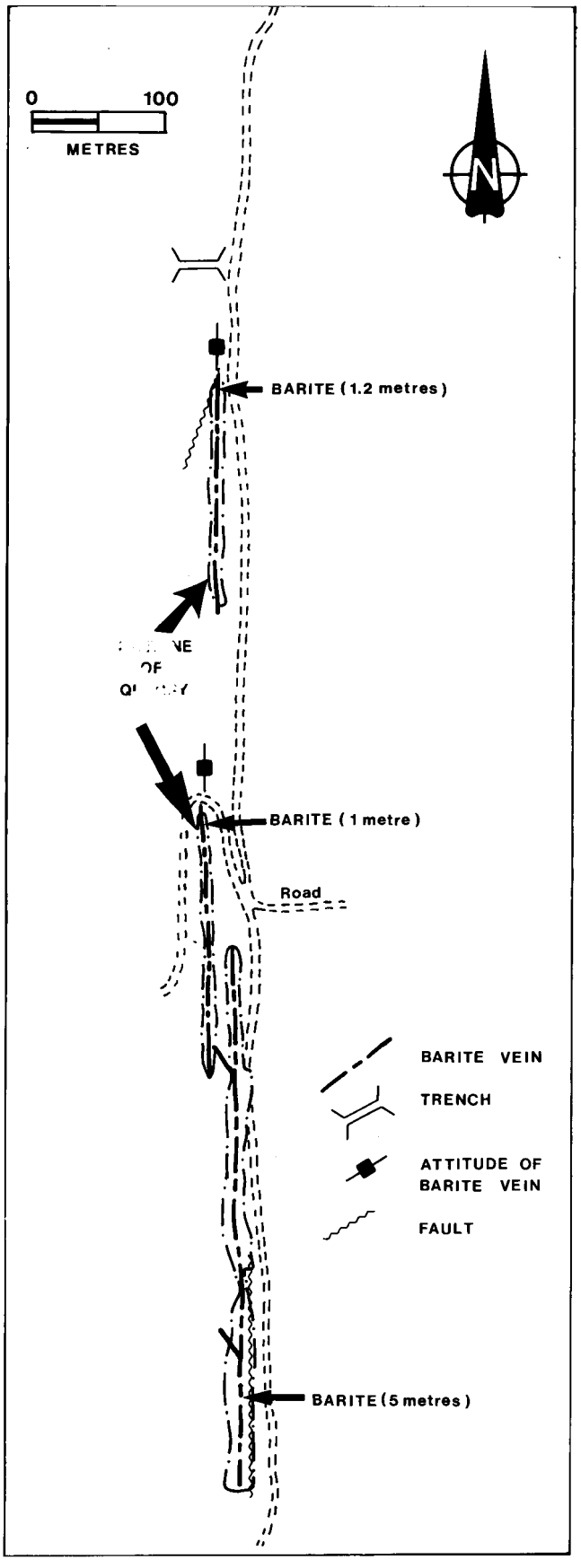


Figure 38: Outline of barite vein and quarry, Moose deposit, Fireside property.

Preproduction reserves on the Fireside property were estimated to be 343 000 tonnes with a specific gravity of 4.22 to 4.25 and a stripping ratio of 1.42 to 1. Reserves remaining are approximately 210 000 tonnes with a specific gravity of 4.25 in the Bear zone and 18 000 tonnes with a specific gravity of 4.25 in the Beaver zone (McLeish, 1981). Several samples of barite collected by Z. D. Hora of the B. C. Geological Survey Branch yielded values between 57 and 59 per cent barium. In 1996, Barytex Resources Ltd. filed a notice of work for mining 20 000 tonnes of barite from the Moose deposit.

Dan (68) MINFILE Numbers: 094N 004, 005 and 006
Latitude: 59°44'18" Longitude: 125°30'12" NTS: 94N/11, 12

Several fluorite-barite occurrences are present within the Dunedin Formation 48 kilometres northeast of Kilometre 798 on the Alaska Highway (Figure 1).

Here the Dunedin Formation comprises 260 metres of dark grey, fetid, argillaceous and siliceous limestone, overlain by 30 metres of dark grey limestone containing numerous chert lenses and nodules. Fluorite and barite occur as veins, bedded replacements and breccia fillings within a 23 metre interval near the upper chert-bearing horizon. Bedded replacements vary in thickness from a few centimetres to 1.5 metres. The largest of these zones measures 10 by 40 by 30 metres and consists of purple fluorite, barite, witherite and calcite.

Carlick (69) MINFILE Number: 104P 023
Latitude: 59°12'10" Longitude: 129°13'00" NTS: 104P/03E

A small barite-galena occurrence is exposed 3.2 kilometres north of McDame Post (Figure 1). It was staked in 1949 by Beal Carlick and restaked as the Bill group in the 1970s by Dresser Industries Inc.

The country rocks are limestone, dolomite, black cherty quartzite and argillaceous limestone of the Atan Group. The mineralized zone, consisting mainly of galena and coarse-grained barite is 180 metres long and subparallel to the enclosing bedrock. Minor amounts of pyrite, sphalerite, azurite and malachite are also present.

Atan (70) MINFILE Number: 104P 047
Latitude: 59°15'00" Longitude: 129°15'00" NTS: 104P/03E

Barite, together with galena and chalcopyrite, is exposed 2.4 kilometres east of McDame Post on the north side of Atan Lake. Claims were originally staked in 1967 by Tournigan Mining Explorations Ltd. which conducted an exploration program on the property culminating in a preliminary feasibility study (Wright Engineers, 1973). Subsequent exploration was undertaken by Amax Exploration Inc. in 1973 and by Imperial Oil Limited in 1976.

The property is underlain by limestone, dolomite and minor interbedded shale of the Lower Cambrian Atan Group on the west flank of an anticlinorium. Faulting, generally southwest orientated, is common in the area. The significant barite mineralization occurs as pods, lenses and stringers of pure barite in a narrow dolomite-limestone member that is locally oolitic and sometimes brecciated (Cochrane, 1973a).

In the north zone (Anomaly 3) pods and lenses of barite with some galena are exposed over an area measuring 150 by 300 metres west northwest of Atan Lake (Figure 39). An inventory of 5 to 10 million short tons of barite has been estimated on the basis of gravity survey results (Cochrane, 1973b). Assays of 99 per cent $BaSO_4$ have been obtained from this area.

Barite mineralization is exposed over an area 122 metres in diameter within Anomaly 1 south of Atan Lake (Mistry, 1972). Coincident induced polarization and gravity anomalies (Anomaly 3) north of the lake may also reflect barite-sulphide mineralization.

Vale (71) MINFILE Number: 104P 052
Latitude: 59°03'00" Longitude: 128°06'40" NTS: 104P/01E

Massive pyrite, marcasite, sphalerite, galena and barite occur in fracture fillings in sheared and Paleozoic brecciated dolomite, quartzite, slate and greenstone between Sandpile Lake and the head of Hidden Creek valley (Figure 1).

SF (96) MINFILE Number: 104G 035
Latitude: 57°42'42" Longitude: 130°17'15" NTS: 104G/09W

Veining and stockworks of barite cut conglomerate on the Klastine Plateau, 6.4 kilometres east of Nuttlude Lake (Figure 1). Minor amounts of galena, sphalerite, chalcopyrite and tetrahedrite are also present.

Lon (97) MINFILE Number: 104P 062
Latitude: 59°26'30" Longitude: 128°31'30" NTS: 104P/07E

Quartz-carbonate veins with variable amounts of barite, sphalerite, pyrite and galena occur in dolomites of the Sandpile Group at a locality 27 kilometres north of Looncry Lake, southeast and northwest of the big bend in the Red River (Figure 1).

Haines Road (98) Minfile Number: 114P 059
Latitude: 59°48'00" Longitude: 136°38'00" NTS: 114P/15E

Small veins of barite are reported a short distance west of Kilometre 124 of the Haines Road (Campell and Dodds, 1983).

REPLACEMENT AND MANTO DEPOSITS

A number of stratabound lead-zinc-barite deposits are known in the Purcell Anticlinorium of southeastern British Columbia (Figure 23). This broad north-plunging structure in rocks of Helikian to Hadrynian age occupies the region between the Rocky Mountain Trench and the Kootenay Arc. The majority of barite deposits in this region occur in the Proterozoic Mount Nelson Formation and underlying Dutch Creek Formation or its stratigraphic equivalents (Figure 23). The Middle to Upper Cambrian Jubilee Formation is also host to a number of barite occurrences.

The Mount Nelson Formation comprises a prominent basal quartzite overlain by a thick succession of dolomite and interlayered argillite. It is underlain by up to 1000 metres

of dark grey argillite and slate of the upper Dutch Creek Formation and is unconformably overlain by conglomerates of the Toby Formation. Baritic deposits present in the Mount Nelson Formation, such as the Mineral King orebody, appear to have been deformed together with the enclosing strata.

The Jubilee Formation consists of a thick succession of massive to thin-bedded dolomite and limestone. It overlies argillaceous dolomite and limestone, argillite and argillaceous quartzite of the Eager Formation and quartzite of the Cranbrook Formation. It is overlain by dark shale and argillaceous limestone of the McKay Group. During Jubilee time shallow-water platformal carbonates developed on the Purcell arch. This structure was intermittingly emergent during the early Paleozoic. In the vicinity of the lead-zinc-barite deposits the upper part of the formation comprises a carbonate shoal complex that developed west of a deeper-water shale basin (Höy, 1980). Breccia zones related to solution collapse in reefs appear to be the local ore control.

DESCRIPTION OF OCCURRENCES - SOUTHEASTERN BRITISH COLUMBIA

Mineral King (36) MINFILE Number: 082KSE001
Latitude: 50°20'30" Longitude: 116°25'42" NTS: 82K/08W

The Mineral King deposit is located 45 kilometres by road west of Invermere on the south side of the ridge between Jumbo and Toby creeks (Figure 23). Mineralization consisting of galena, sphalerite, pyrite and minor bournonite, in a gangue of dolomite, barite and quartz was discovered in 1898. The property was explored by surface trenches and two short adits between 1915 and 1922.

Base metal production began in 1954 and continued to 1967 during which time 200 000 tonnes grading 6 per cent zinc and 17.1 grams per tonne silver were produced. Production of barite by Sheep Creek Mines Limited began in 1959 and totalled 22 600 tonnes during the period 1959 to 1967. Mountain Minerals Company Limited assumed control of the mine in 1968 and began producing barite from the tailings pond, estimated to contain 254 000 tonnes of recoverable barite (Dawson, 1985). During the period 1971 to 1974, 44 000 tonnes of barite were produced from the tailings. Tailings recovery was completed in 1974 and the operation was closed. Calculations indicate that there are no barite tailings left (second author).

The Mineral King mine property is underlain by rocks of the Dutch Creek and Mountain Nelson formations of the Purcell Supergroup unconformably overlain by the Toby Formation. All are Proterozoic in age. All of the orebodies occur in the Mount Nelson Formation(Figures 21, 40). The basal unit of the Mount Nelson Formation consists of a white quartzite that is an excellent marker bed. Overlying the quartzite is a thick conformable sequence of very fine grained, buff to brown-weathering, grey dolomite with argillaceous interbeds. The dolomite is resistant and forms bluffs and high peaks.

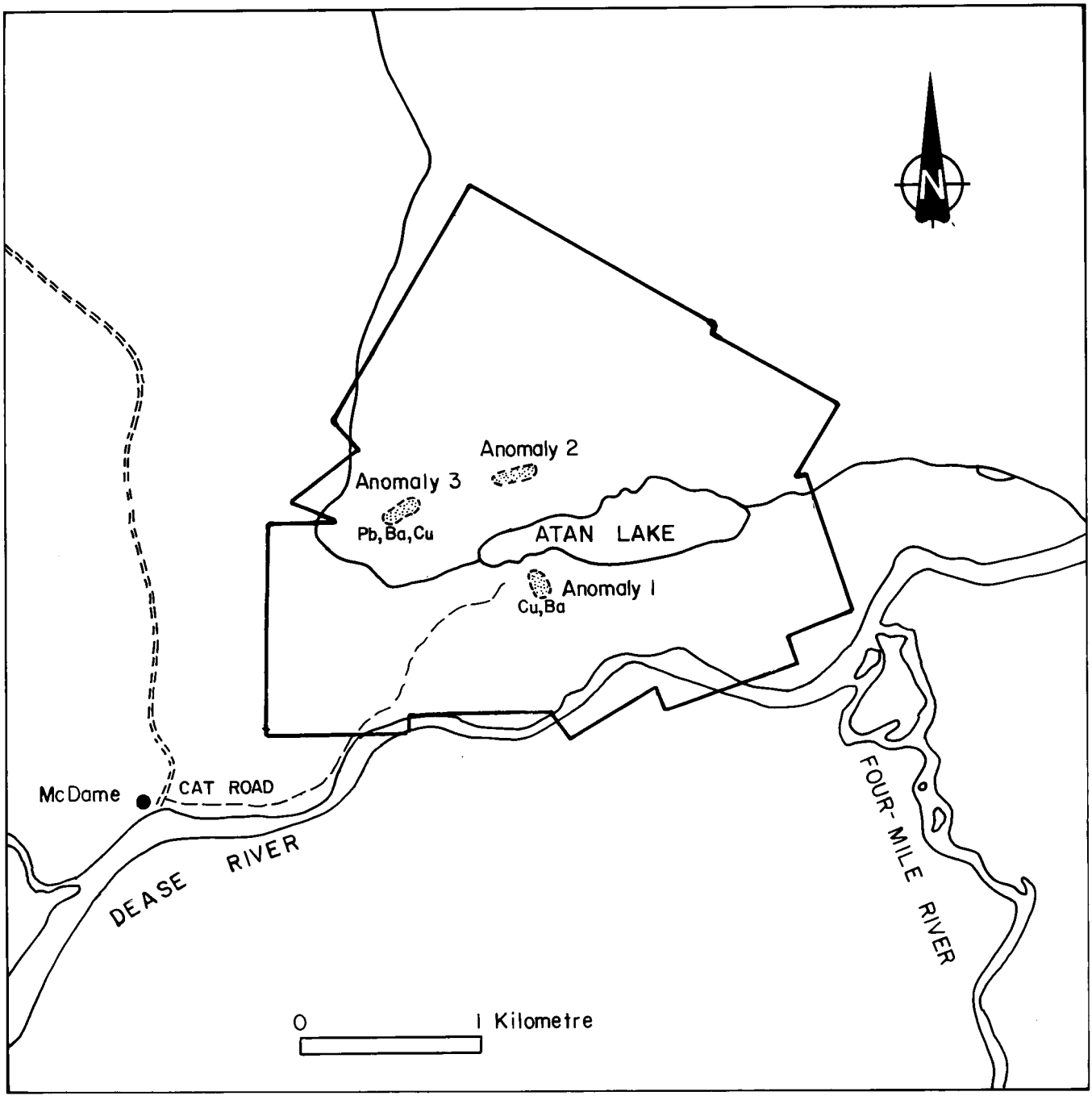


Figure 39: Location of barite occurrences on the Atan property.

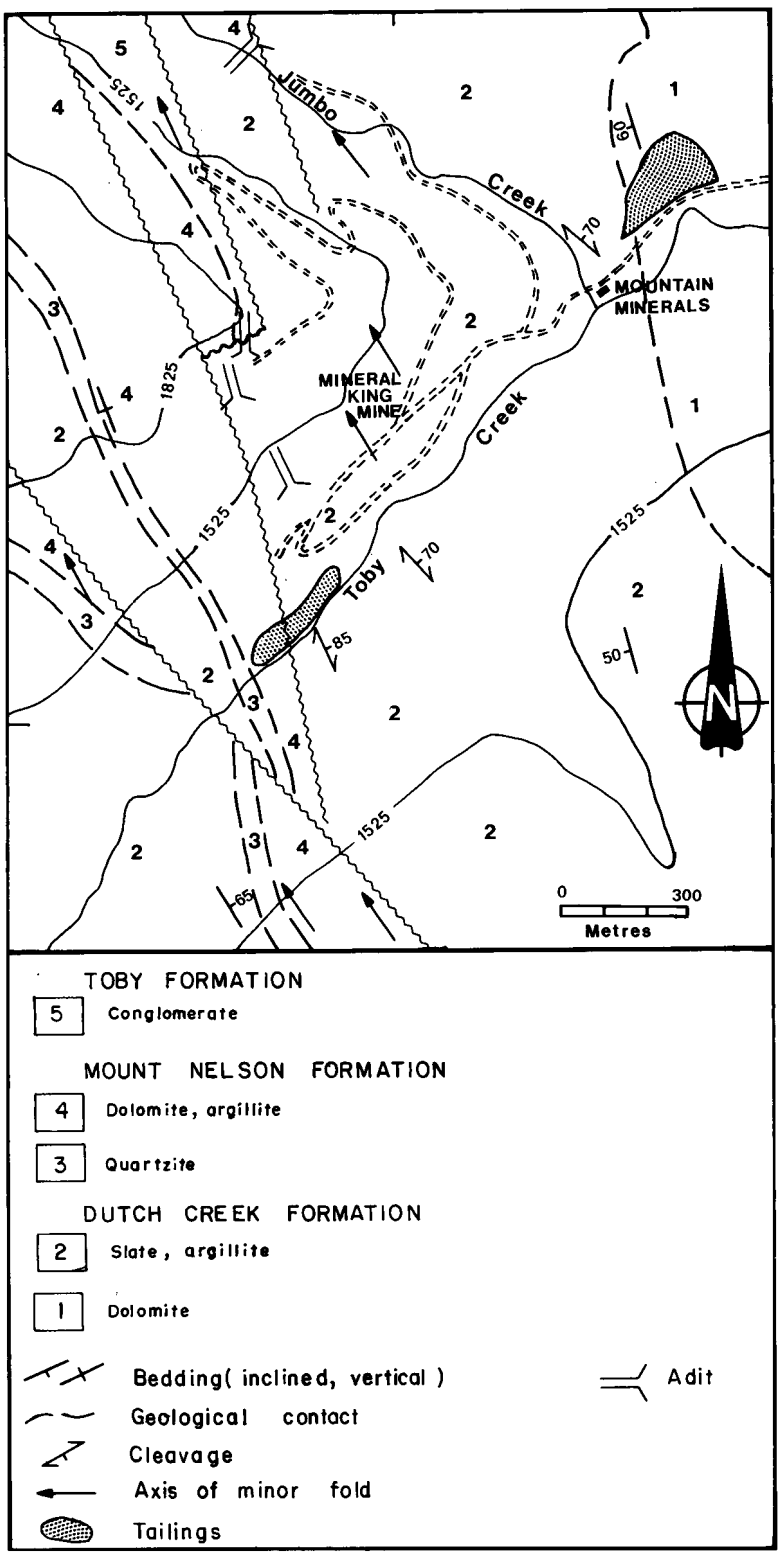


Figure 40: Geology in the vicinity of the Mineral King mine. (modified from Dawson, 1985)

Dark grey to black slate of the Dutch Creek Formation underlie the Mount Nelson quartzite. The overlying Toby conglomerate exposed north of the mine weathers light brown and is composed of clasts of white quartzite, grey dolomite and minor phyllite and argillite in a siliceous to micaceous matrix.

Gently northwest-plunging folds, transected by many faults affect all rocks in the area. At the Mineral King mine a belt of steeply dipping beds striking northwest separates two broad anticlines. Faulting is commonly steep dipping, normal and downthrown to the west; westerly dipping thrust faults are also present.

The orebodies are described by Fyles (1959) as replacements of dolomite by barite and sulphides. They plunged gently to the northwest, had a relatively shallow dip and appeared to conform to fold structures within the dolomite. In the lower part of the mine the orebodies followed north-striking, steeply dipping faults.

Barite was scattered irregularly throughout the orebodies. It was white, fine to medium grained and commonly had a sugary texture. Coarse-grained varieties occured locally. Barite ore shoots were irregular in shape with gentle northwest plunges and measured some 10 metres in section and 100 metres or more in length parallel to the plunge. Sulphides were more common at the margins of the orebodies than at the center. Some banding was present in the ore and in places there was replacement of folded banded rocks. Mining extended 1220 metres down plunge through a vertical interval of 455 metres. Geochemical analyses for a series of barite samples from the Mineral King mine are summarized in Table 12. A sample of tailings taken by the senior author returned an analysis of 47.61 per cent barium, 0.40 per cent zinc and high mercury (>5 ppm).

Silver Giant (42) MINFILE Number: 082KNE018
Latitude: 50°55'18" Longitude: 116°28'48" NTS: 82K/16W

The Silver Giant deposit is located on the west side of Jubilee Mountain approximately 11 kilometres by road west of Spillimacheen (Figure 23). It was discovered in 1883 and was a producer of lead and zinc in 1908, 1916 and from 1947 to 1957 under the ownership of Giant Mascot Mines Limited. In 1959 Baroid of Canada Limited entered into an agreement to produce barite from the property and bought the claims from Giant Mascot the following year. Production in excess of 239 000 tonnes of barite came from underground and open-pit operations and re-concentration of the mill tailings. Although continuous production ceased in 1976, there has been some minor intermittent production in more recent years.

Mineralization is hosted by limestone of the Cambrian Jubilee Formation (Figure 41) close to its contact with Cambro-Ordovician slates of the McKay Group (Dawson, 1985). The main ore zone occupies the nose of an overturned anticline. The structure has a limestone core surrounded by slate. A large regional thrust fault has been mapped 0.4 kilometre to the west and in the underground workings.

The various mineralized zones are barite-sulphide replacements (Dawson, 1985) with varying amounts of silica. They occur beneath the slate at its contact with the limestone along the nose and west limb of the fold. Some masses of clean barite also occur

Table 12: Analytical results - Mineral King mine.
(Z.D. Hora, 1993, personal communication)

Sample Number	S.G.	$BaSO_4$ wt. %	Fe_2O_3 wt. %	SiO_2 wt. %	CaO wt. %	MgO wt. %	Zn ppm	Pb ppm	Cu ppm	Cr ppm	Cd ppm	Hg ppm
13	4.20	84.69	3.44	5.83	2.63	0.83	0.48	0.16	52	3.4	23	3.6
14	4.23	85.63	3.71	5.41	1.96	0.55	0.37	0.16	56	3.7	21	2.4
15	4.22	84.53	2.97	5.82	2.43	0.80	0.45	0.15	53	5.6	21	2.6
16	4.24	85.33	3.19	5.48	2.04	0.50	0.41	0.07	55	3.5	19	2.3
17	4.27	85.70	3.47	5.19	2.17	0.83	0.41	0.15	67	2.0	20	3.9
18	4.26	85.81	3.09	5.08	2.32	0.60	0.40	0.17	52	2.0	19	2.8
19	4.24	85.22	2.66	6.23	2.76	0.71	0.36	0.12	52	3.4	17	2.2
20	4.24	85.79	2.71	6.29	2.34	0.48	0.35	0.08	52	4.2	19	6.0
21	4.23	85.05	3.10	6.16	2.15	0.73	0.39	0.13	54	1.8	21	5.5
22	4.24	85.53	3.17	6.00	2.29	0.46	0.40	0.08	50	1.9	19	4.8
23	4.26	85.77	2.89	5.73	2.56	0.66	0.44	0.07	50	2.0	23	1.7
24	4.16	83.40	3.59	7.17	2.56	0.65	0.46	0.17	63	1.0	17	2.4
25	4.21	83.44	3.37	6.72	3.12	0.78	0.44	0.10	50	2.2	16	3.3
26	4.21	84.80	2.67	6.20	1.96	0.50	0.46	0.12	48	2.2	14	2.0
27	4.23	85.94	3.04	6.22	1.93	0.66	0.34	0.10	47	1.8	10	7.1

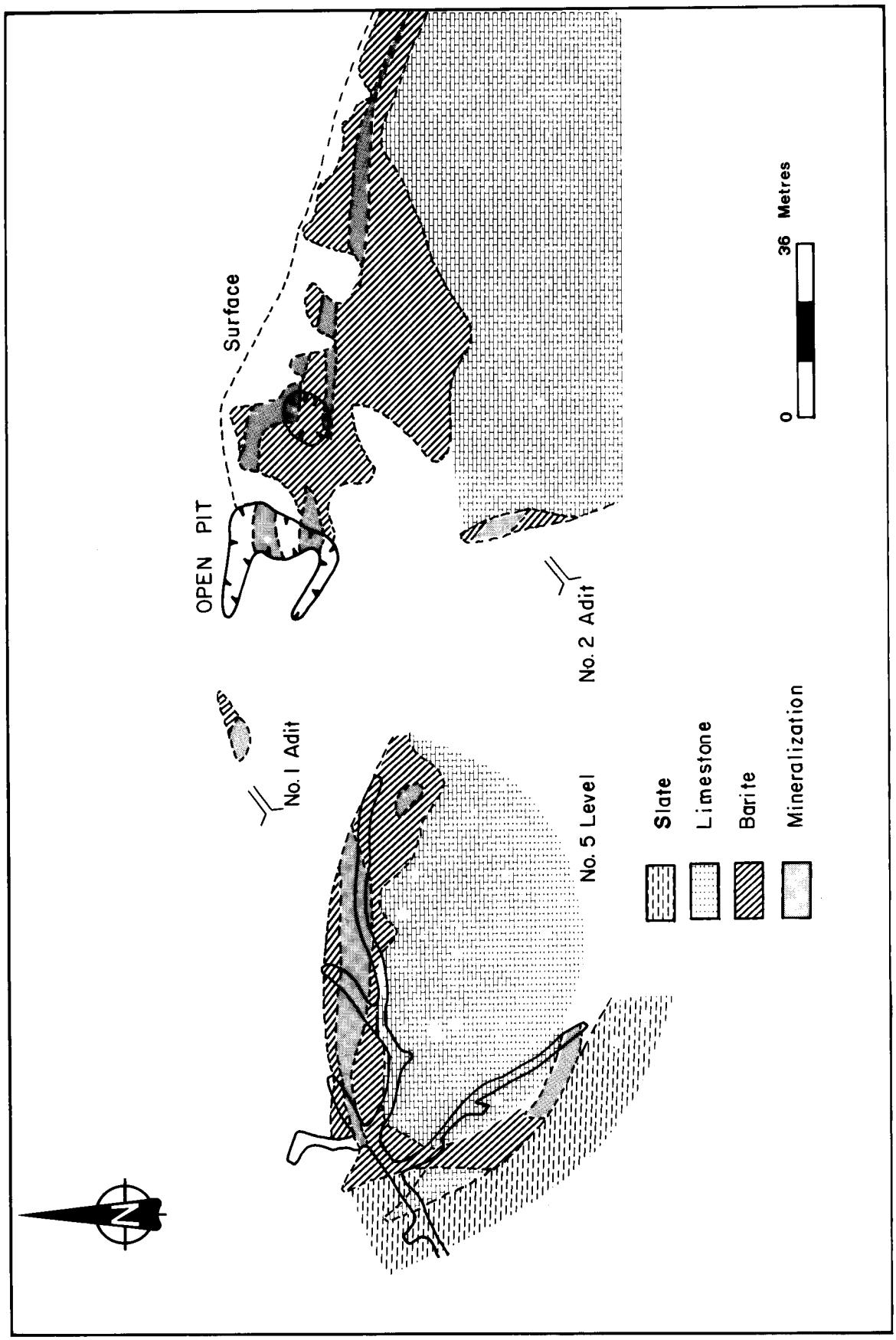


Figure 41: Geology of the Silver Giant lead-zinc-barite deposit. (from Hedley, 1949)

in the limestone beneath the contact. Dawson interprets these as the "roots" of the orebodies. Mineralogy consists of galena with lesser amounts of sphalerite, pyrite, chalcopyrite and bornite. The barite is most commonly white and varies from very fine grained (less than 25 microns) to coarse bladed crystal aggregates (2.5 millimetres in diameter). The fine-grained barite is either massive or foliated and commonly contains sulphides and argillaceous material. Fine and medium-grained carbonate occurs interstitial to the barite and some chert may also be present. Locally, there is a suggestion of brecciation. A sample of barite ore taken by the senior author has a specific gravity of 3.6 and contains 37.79 per cent barium, 4 ppm lead, 1215 ppm strontium and 1800 ppb mercury.

Jubilee Mountain (43) MINFILE Number: 082KNE079
Latitude: 50°56'00" Longitude: 116°27'25" NTS: 82K/16W

The Jubilee Mountain barite prospect is located 7.5 kilometres northwest of Spillmacheen and 1.5 kilometres east of the Silver Giant Mine (Figure 23). The two occurrences are on opposite limbs of a broad synclinorium and are geologically similar.

Galena, sphalerite and pyrite occur as disseminations, as irregular veins with barite, and with barite in vugs and cavities in massive to thin-bedded limestone of the Cambrian Jubilee Formation. Breccia zones with angular clasts of dense dolomite and limestone in a granular carbonate matrix contain disseminated sulphides and numerous barite and sulphide-filled vugs. Drilling in 1974 intersected grades of 12.16 and 16.92 per cent barium across widths of 18.6 and 10.7 metres respectively (Buckley, 1976). A few narrow barite veins cut the overlying slates of the McKay Group.

Buckley (1976) suggests that the brecciation and barite-sulphide mineralization may be related to collapse and solution cavities associated with karst development in a Middle Cambrian reef. Local sea-floor irregularities, possibly related to deep-seated fractures, are thought to have controlled the distribution of the reefs, collapse breccias and associated mineralization.

Steamboat (44) MINFILE Number: 082KNE065
Latitude: 50°41'36" Longitude: 116°11'24" NTS: 82K/09E

The Steamboat occurrence is located 5 kilometres west of Edgewater (Figure 23). Minor amounts of barite, galena, chalcopyrite, smithsonite and azurite with trace tetrahedrite occur along the west limb of a northerly plunging and steeply dipping syncline in dolomite of the Cambrian Jubilee Formation. Barite occurs as cavity filling in a dolomite breccia zone that may be up to 200 by 200 metres across as well as small pods and stringers. The east side of the barite zone appears to be bounded by a fault.

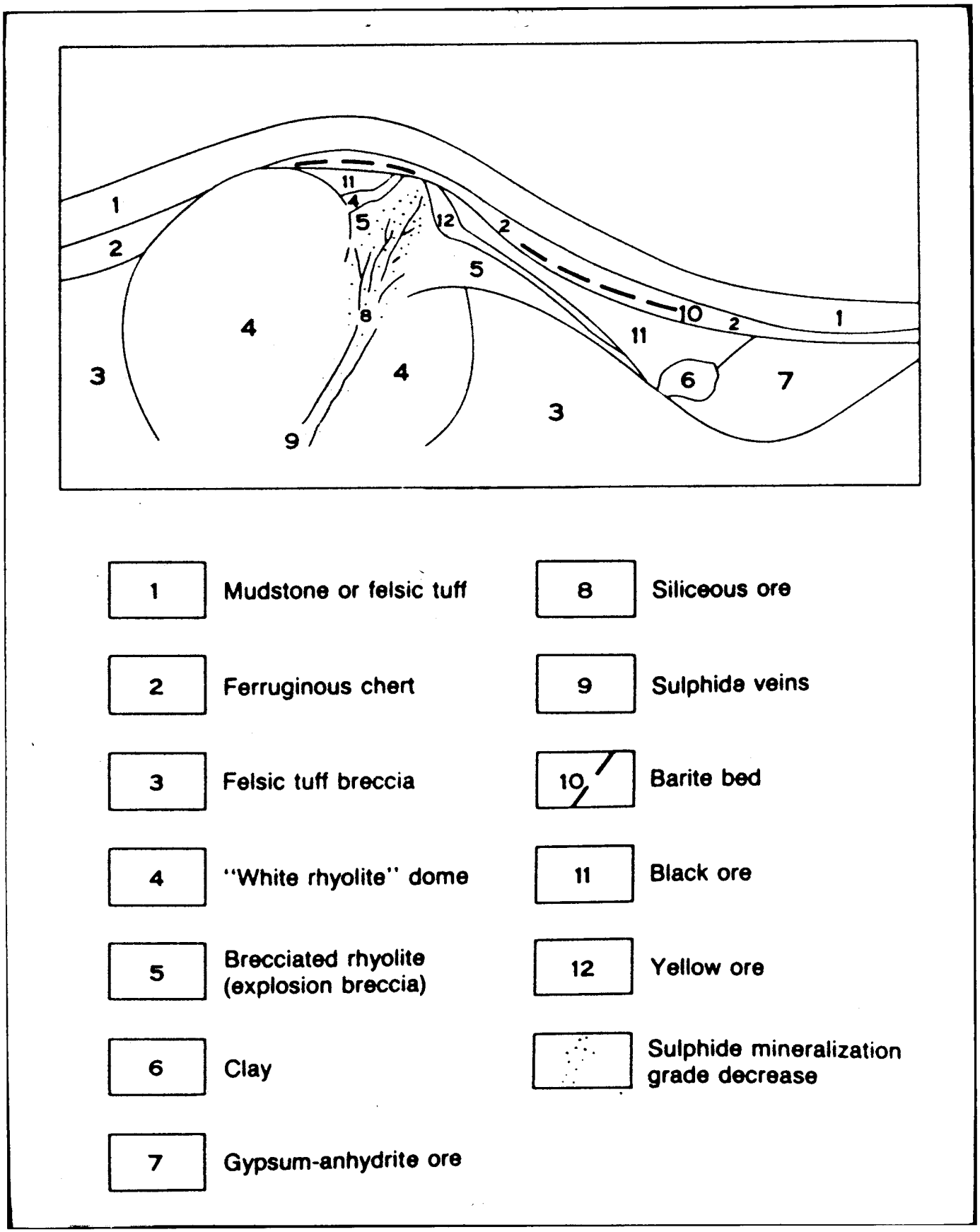


Figure 42: Schematic section of a typical Kuroko deposit. (Dawson, 1985)

CHAPTER 4

VOLCANOGENIC DEPOSITS

Beds of massive barite as well as disseminated barite may be associated with massive sulphide deposits in intermediate flows and pyroclastic rocks. The best documented occurrences of this type are the Kuroko deposits of Japan.

The following description is summarized from Dawson (1985). Kuroko deposits are lenticular and conformable with the surrounding rocks. They formed on lava domes on or near the base of volcanic cones in a submarine environment. These deposits are typically zoned from top to bottom as follows: massive ferruginous-manganiferous-siliceous mudstone, massive barite, sphalerite-galena-barite-pyrite, chalcopyrite and siliceous pyrite-chalcopyrite (Figure 42). Contacts between the sulphide and barite zones are generally sharp. Wallrocks are dacitic or rhyolitic lavas, pyroclastic rocks, volcanogenic sedimentary rocks and mudstones.

In British Columbia deposits of this type include the Myra Falls deposits on Vancouver Island and the Jane orebody at the Britannia mine. Elsewhere in the province volcanogenic barite deposits occur on the Adams Plateau northeast of Kamloops, in the Harrison Lake area east of Vancouver and in the north-central and northwestern regions of the province. The majority occur in the Insular, Intermontane and Coast tectonic belts.

DESCRIPTION OF OCCURRENCES - ADAMS PLATEAU

Rocks in the Adams Plateau area are primarily Paleozoic volcanic and sedimentary rocks of the Eagle Bay assemblage and Fennell Formation. These rocks have been intruded by Cretaceous granodiorite and quartz monzonite and by Early Tertiary quartz feldspar porphyry, basalt and lamprophyre dikes (Schiarizza and Preto, 1987).

The Eagle Bay assemblage comprises a lower sequence of quartzites and quartzose schists, mafic metavolcanic rocks and limestones; overlain by a succession of felsic metavolcanic rocks, intermediate and alkalic volcanic rocks and fine to coarse-grained metasedimentary rocks. The Fennell Formation is comprised of bedded chert, gabbro, diabase, pillowed and massive basalt, sandstone, rhyolite and intraformational conglomerate. These rocks accumulated in a deep oceanic basin (Schiarizza and Preto, *op. cit.*).

Polymetallic precious and base metal massive sulphide deposits occur within Devono-Mississippian felsic to intermediate volcanic rocks of the Eagle Bay Assemblage (Figure 43); barite is associated with some of these deposits.

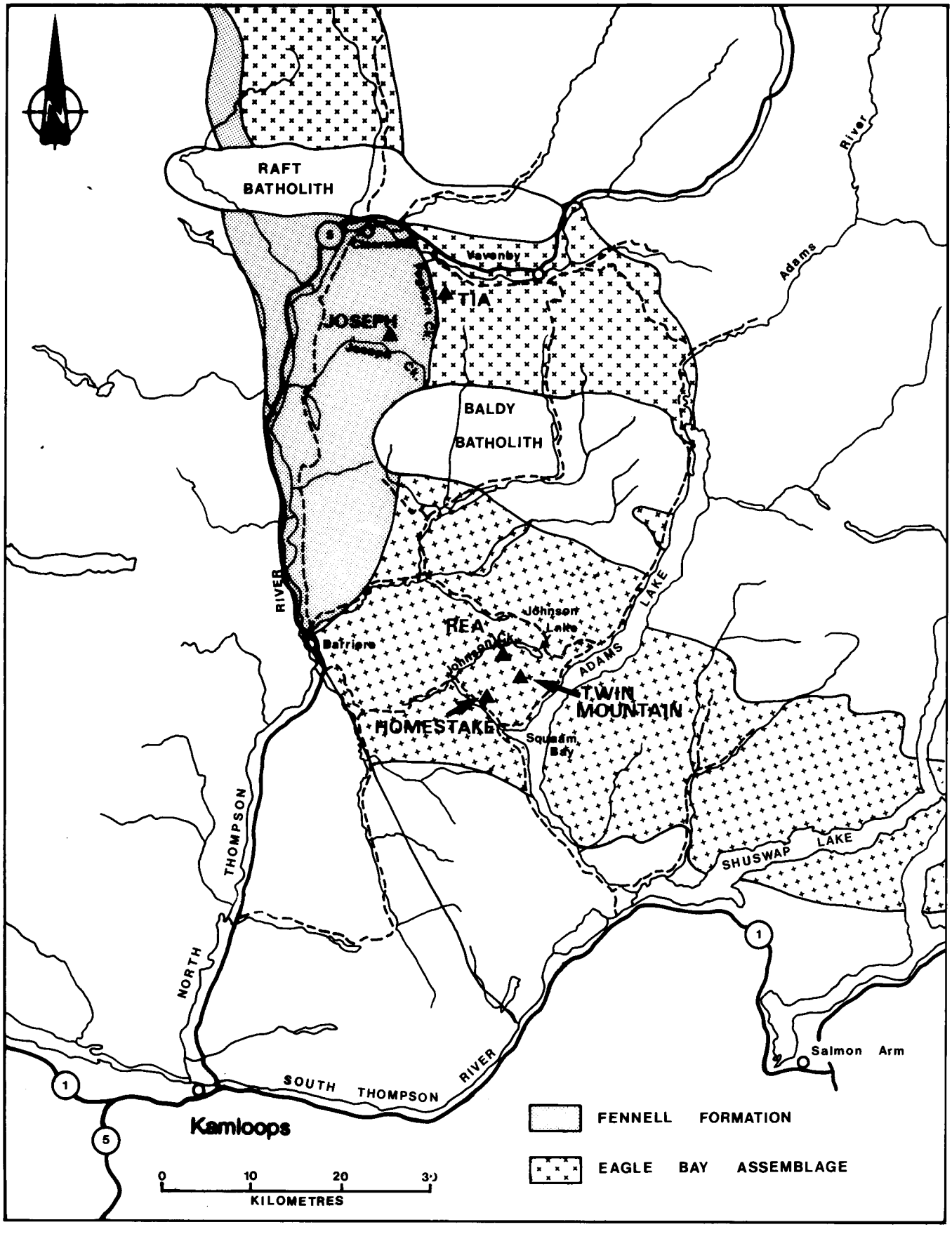


Figure 43: General geology and location of volcanogenic barite-bearing deposits in the Adams Lake area. (geology from Schiarizza and Preto, 1987)

Homestake (99) MINFILE Number: 082M 025
Latitude: 51°06'40" Longitude: 119°49'40" NTS: 82M/04W

The Homestake property is located approximately 5 kilometres from the head of Squaam Bay on Adams Lake, 48 kilometres northeast of Kamloops (Figure 43). Polymetallic mineralization was first discovered in 1893 along Falls Creek. There was some development on the property in 1895 when 18 tonnes of high-grade silver ore was mined. Work on the property has been sporadic since that time. Kamad Silver Co. Ltd. acquired the property in 1968. Reserves on the property are estimated to be approximately 1 million tonnes grading 200 grams per tonne silver, 2.5 per cent lead, 4.0 per cent zinc, 0.5 per cent copper and 28 per cent barite (Schiarizza and Preto, *op. cit.*).

The property is underlain by chlorite and quartz-talc-sericite schists of the Eagle Bay assemblage (Figure 44). All of the mine workings are contained within a 200-metre section of quartz-talc-sericite schist. The zone strikes east with a 20° north dip. Along Homestake Creek it is cut by numerous, low angle, easterly dipping thrust faults.

Mineralization occurs in two tabular zones separated by 4 to 5 metres of schist. The lower zone consists mainly of barite with thin sulphide laminae. It is one to several metres thick, 70 metres long, and comprised of several barite bands separated by schist. The upper zone is generally less than a metre thick and mainly comprised of sulphide minerals including tetrahedrite, galena, sphalerite, pyrite and chalcopyrite (Schiarizza and Preto, *op. cit.*; Dawson, 1985).

Barite occurs as anhedral to subhedral crystals approximately 500 microns in size with the occasional grains up to 2.5 millimetres. It is white and relatively pure, containing only very minor opaque minerals (probably sulphides). On surface the largest exposure of barite is a north-striking lens of massive barite grading 85 per cent $BaSO_4$ with 0.25 per cent copper, 0.65 per cent lead and 3.20 per cent zinc.

Twin Mountain (100) MINFILE Number: 082M 020
Latitude: 51°07'30" Longitude: 119°45'40" NTS: 82M/04W

The Twin Mountain occurrence is located 5 kilometres south of the west end of Johnson Lake (Figure 43). Sulphide-bearing quartz-carbonate-barite lenses concordant with foliation in the enclosing chlorite-sericite-quartz schists of the Eagle Bay assemblage. The zone is up to 10 metres wide and has been traced for 4 kilometres along strike. Individual lenses pinch and swell and rarely exceed a few metres in thickness. Sulphide mineralization within the lenses is erratic, ranging from sparse disseminations to massive pods of mainly galena and sphalerite. The occurrence was originally interpreted as a vein system but the presence of barite, together with the extensive conformable strike length suggests it may be the product of an exhalative system associated with Eagle Bay volcanic activity (Schiarizza and Preto, *op. cit.*).

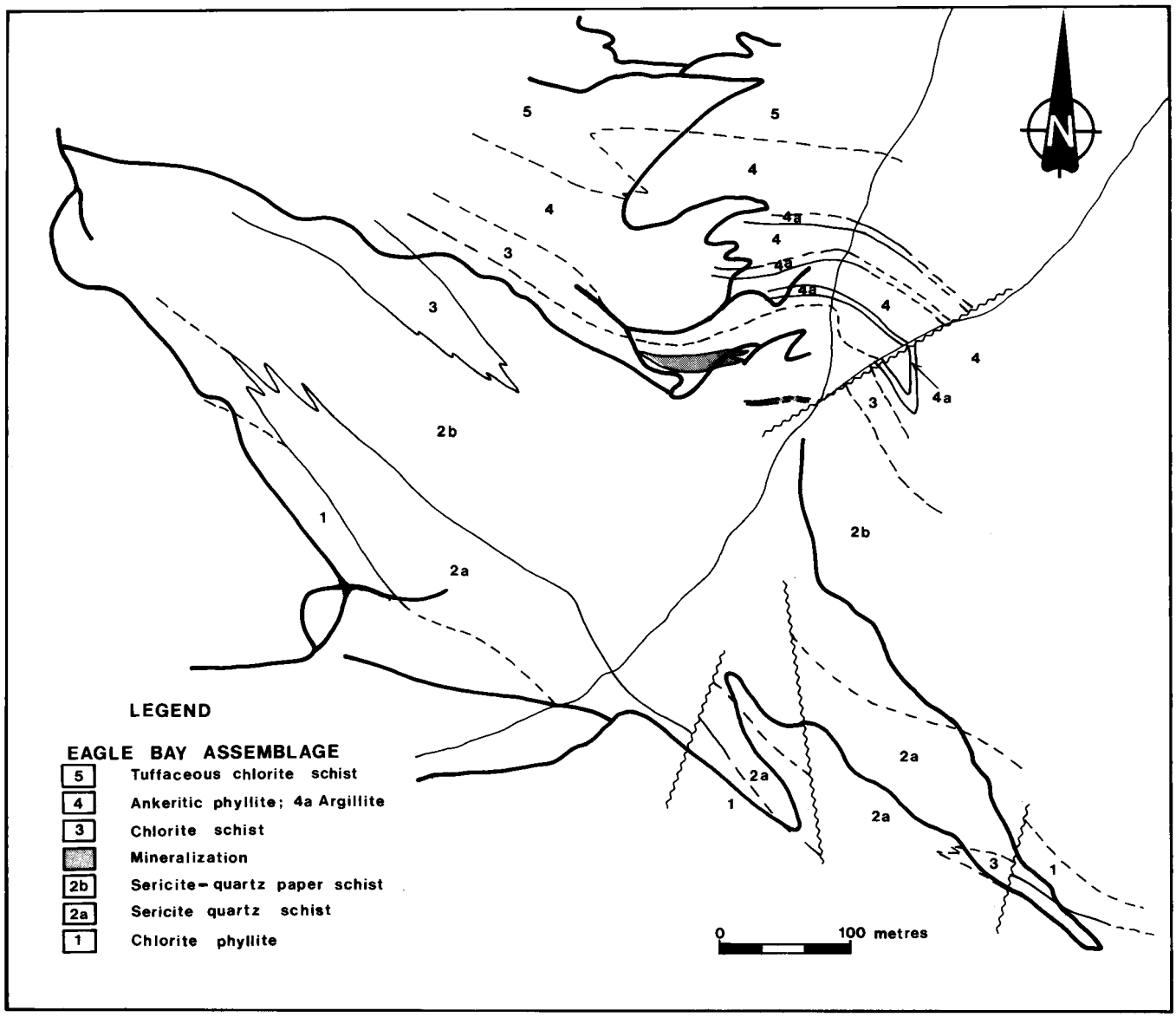


Figure 44: Geological setting of the Homestake property. (from Höy and Goutier, 1986)

Rea Gold, Samatosum Mine (101) MINFILE Number: 082M 191
Latitude: 51°08'50" Longitude: 119°49'10" NTS: 82M/04W

The Rea Gold barite-massive sulphide deposits are located southwest of Johnson Creek, approximately 3.5 kilometres southwest of Johnson Lake (Figure 43). Four zones of massive sulphide mineralization are known on the Rea Gold property. The L100 and L97 lenses were discovered by A. Hilton and R. Nichol in 1983. The property was then optioned to Rea Gold Corporation which, in turn, optioned a 70 per cent interest to Corporation Falconbridge Copper (now Minnova Inc.). The L98 lens, located approximately 100 metres north of the L97, and the "Silver Zone", 1000 metres farther to the north, were discovered late in 1985 (Höy, 1987). The "Silver Zone" now the Samatosum mine, was brought into production by Minnnova in 1989.

The original Discovery zone has been described by Höy and Goutier (1986), Höy (1987) and others. The massive sulphide lenses are hosted by a thick, overturned sequence of mafic meta-tuffs of the Eagle Bay assemblage. The southern lens (L97) is underlain by a strongly silicified stockwork feeder zone, now in the structural hangingwall, overprinted on the mafic tuffs and thin interbeds of more felsic tuffs and chert exhalite. The sulphides are capped by barite, in turn overlain by a thin, tuffaceous argillite (Figure 45). The barite is fine to coarse grained (0.25 to 3.0 mm) with both granular and bladed habits. Within the sulphide zone there is a weakly developed alignment of barite grains and blades parallel to the layering. The barite is grey to white or faintly banded with variable amounts of disseminated sulphides decreasing stratigraphically upwards. The L100 lens to the north has a more extensive silicified feeder zone but lacks the barite cap.

More recent exploration efforts have been focused on the L98 and Samatosum deposits, but no good geological descriptions were available to the writers. Start-up reserves in the Samatosum orebody were 670 000 tonnes grading 834 grams and 6.1 grams gold per tonne, 1 per cent copper, 3 per cent zinc and 1 per cent lead. The ore has a baritic gangue and although no quantitative information on the barite is available, and the writers are unaware of whether or not there are plans to use the tailings for backfill in underground mining, it seems likely that a small tonnage of baritic tailings may be accumulated over the projected life of the mine. Rea Gold Corporation is continuing exploration and evaluation of the Discovery zone and commercial orebodies may also be developed in this area. 1987 estimates of combined reserves in the L100 and L98 zones were 376 400 tonnes at an average grade of 6.1 grams gold and 69.2 grams silver per tonne, 2.2 per cent lead, 2.3 per cent zinc and 0.6 per cent copper. A sample taken by the senior author returned analyses of 54.87 per cent barium (S.G. = 4.6) with 1800 ppm zinc and 5200 ppm lead. Strontium is very low at 89 ppm, but arsenic and mercury are anomalous at 1557 ppm and greater than 5000 ppb, respectively.

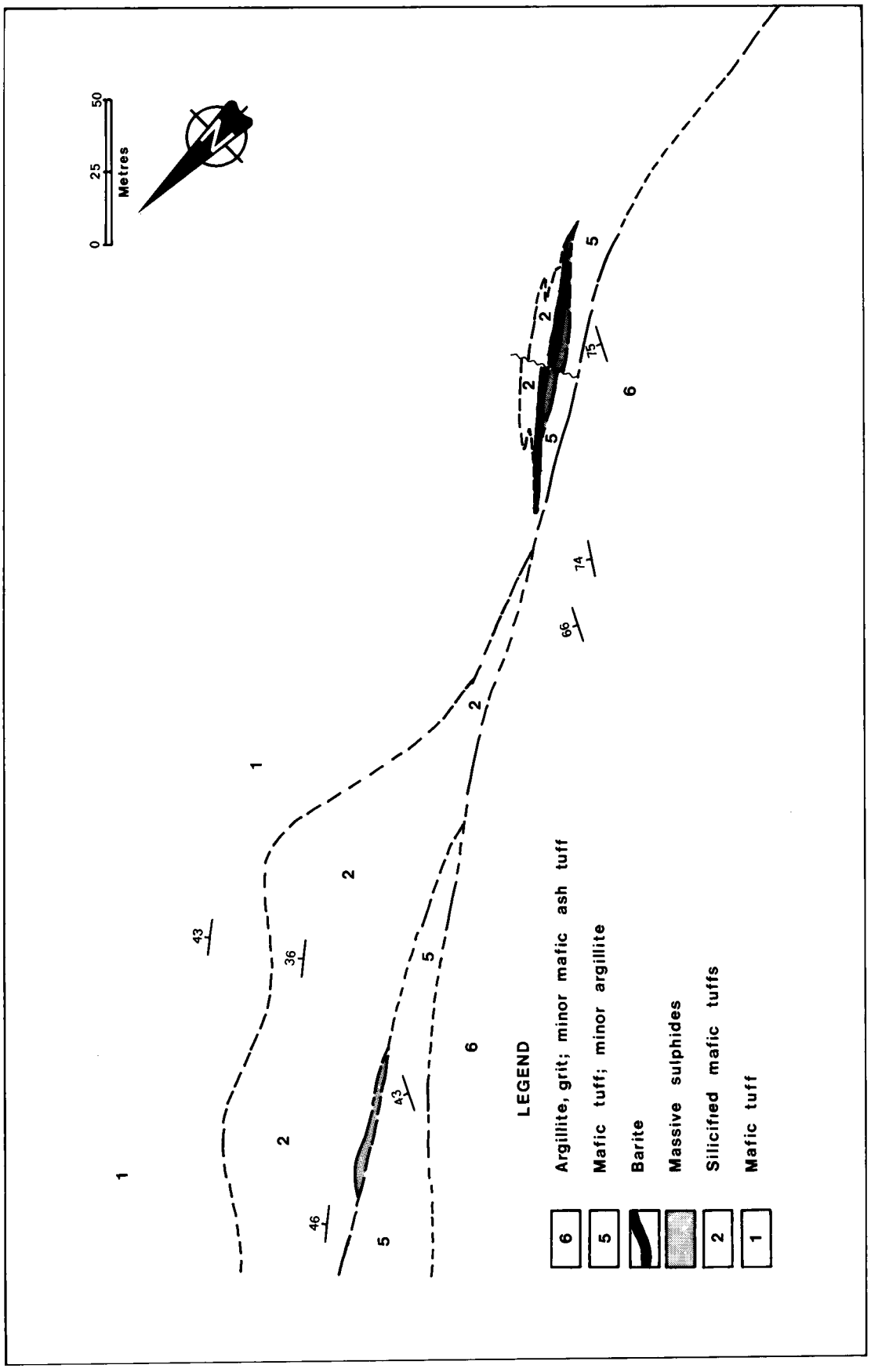


Figure 45: Geological setting of the Rea property. (from Höy and Goutier, 1986)

Joseph (102) MINFILE Number: 082M 194
Latitude: 51°32'05" Longitude: 119°59'30" NTS: 82M/12W

The Joseph property is located 100 kilometres north-northeast of Kamloops and 11 kilometres south of the village of Birch Island (Figure 43). The property is underlain by a sequence of argillite and chert with minor chert-pebble conglomerate contained within basalts of the Devono-Permian Fennell Formation. Some tuffaceous units are also present. Deformation in the area is intense.

Irregular quartz-carbonate veins with galena and pyrite appear to be stratabound. The best mineralized zone has a true width of 8 metres. Barite is present within some of the tuffaceous units in amounts of 5 to 10 per cent and is also associated with the sulphide mineralization in amounts of 2.93 to 11.5 per cent barium. Barite rich horizons on the property tend to be low in sulphide content (Marr, 1984).

TIA (103) MINFILE Number: 082M 239
Latitude: 51°33'35" Longitude: 119°51'00" NTS: 82M/12W

The TIA property is located 10 kilometres west-southwest of Vavenby, east of Foghorn Creek (Figure 43). It is underlain by metavolcanic and metasedimentary rocks of the Eagle Bay assemblage. Baritic beds containing disseminated sulphides occur in a sequence of chlorite-sericite schist, agglomerates and porphyritic flows.

DESCRIPTION OF OCCURRENCES - VANCOUVER ISLAND

Twin J (104) MINFILE Numbers: 092B 001
(Lenora, Tyee, Richard III) 092B 002, 003
Latitude: 48°53'00" Longitude: 123°45'00" NTS: 92B/13W

The Twin J property is located 10 kilometres by road northwest of Duncan, on the slopes of Mount Sicker (Figure 46). It is underlain by cherty tuffs, graphitic schists, sodic andesite, sodic rhyolite porphyry and sodic diorite of the middle to upper Paleozoic Sicker Group. A small gossan, exposed by a forest fire in 1987, proved to be the surface expression of the Lenora and Tyee orebodies, two east-trending massive sulphide lenses containing copper, zinc, minor lead and significant gold and silver values. During its long history the property has produced 270 000 tonnes of ore with base and precious metal grades typical of volcanogenic massive sulphide deposits. Production ended in 1951. Comprehensive descriptions are given by Stevenson (1945, 1948) and Sheppard (1966).

Barite-rich and quartz-rich ore forms lenticular bodies along two drag folds. The barite ore is a fine-grained mixture of pyrite, chalcopyrite, sphalerite and minor galena in a gangue of barite, quartz and calcite. It has a distinct banded appearance. The quartz-rich ore consists mainly of quartz and chalcopyrite. An appreciable tonnage of barite was indicated by early operators. The possibility of producing barite as a byproduct is mentioned in the 1947 Minister of Mines Annual Report. No production has ever been reported. The amount and quality of barite that may be available in the

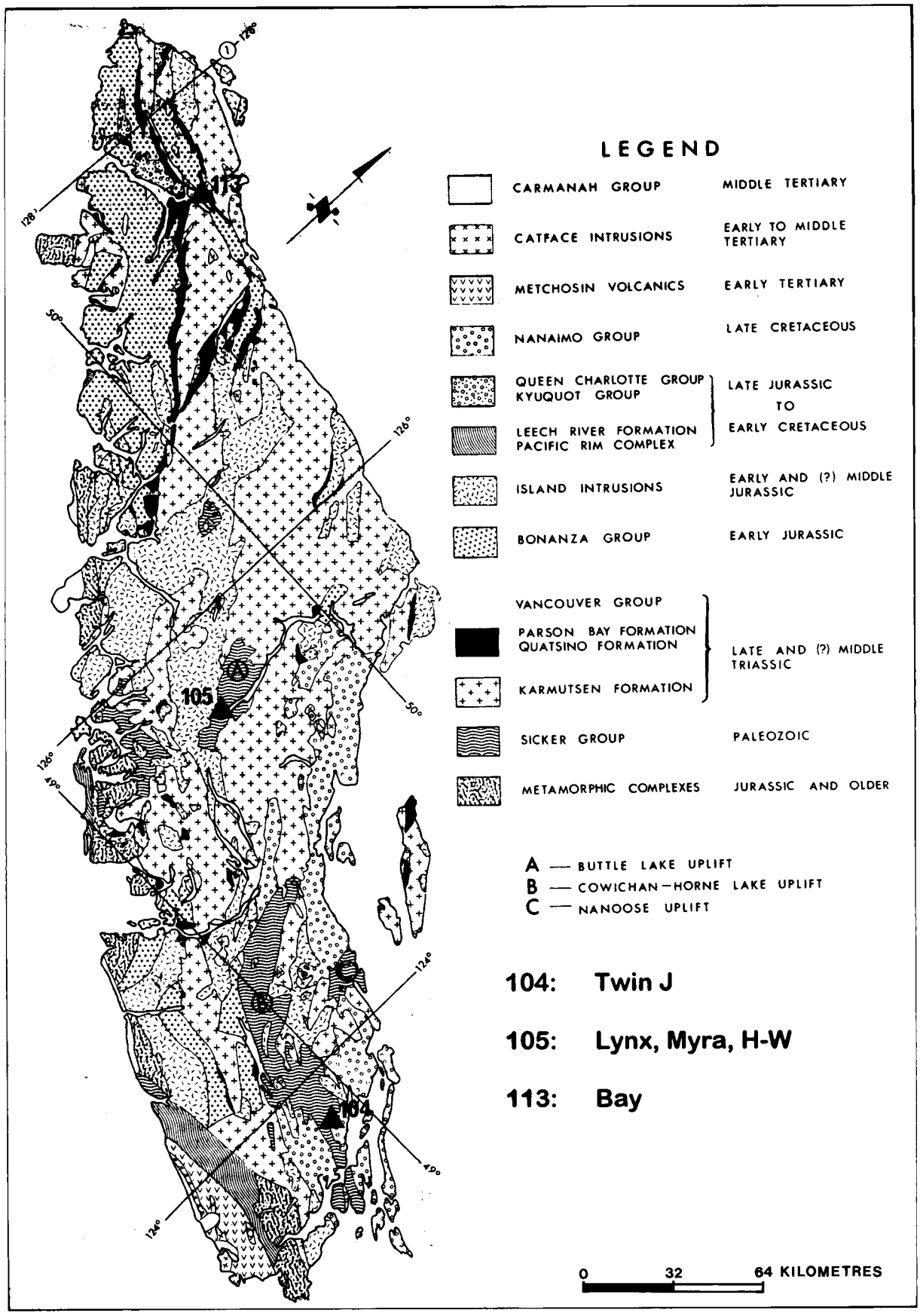


Figure 46: Location of barite occurrences on Vancouver Island. (geology from Muller, 1980)

tailings is unknown. Since the closure of the mine, the workings have become overgrown and access is difficult.

Lynx, Myra, H-W (105) MINFILE Numbers: 092F 071, 401
Latitude: 49°34'30" Longitude: 125°35'30" NTS: 92F/12E

The Buttle Lake deposits of Westmin Resources Limited are located at the southern end of Buttle Lake in central Vancouver Island (Figure 46). The property is accessible by 92 kilometres of paved road from Campbell River. Initial production was from the Lynx and Myra orebodies (Figure 47) from which in excess of 6 million tonnes of typical massive sulphide ore has been recovered. The Myra orebody is now mined out and reserves in the Lynx mine are down to 191 000 tonnes (January 1, 1990). More than 90 per cent of production is now from the H-W orebody, discovered in 1979, with current reserves of 10 million tonnes grading 2.1 grams gold, 30.4 grams silver per tonne, 2.0 per cent copper, 0.3 per cent lead and 3.5 per cent zinc after mining 4.3 million tonnes since 1985. Currently, two new zones, the Battle and Gap, are being developed. Substantial amounts of barite are associated with the ore.

These deposits occur within the Myra Formation of the Paleozoic Sicker Group, composed of volcanics and sedimentary rocks. The volcanic rocks range in composition from andesite to rhyolite. The mine sequence is approximately 450 metres thick and characterized by bedded, mixed volcaniclastics, volcanic flows and subordinate chemical sedimentary rocks. The sequence is dominantly mafic with rhyolite zones that host ore present throughout (Walker, 1983a).

The orebodies are folded and faulted lensoidal beds of massive pyrite, sphalerite, chalcopyrite, galena and barite. Composition varies between deposits and within individual orebodies. The HW orebody is zoned from massive pyrite in the centre to a sphalerite-barite rich marginal phase. Silver concentrations tend to be associated with the lead and barite-rich ores. Barite consists of very coarse-grained, sometimes bladed, crystals in a fine to medium-grained matrix of barite, feldspar, quartz and mica. To date, no barite has been produced for sale, but a small amount has been stockpiled over the years.

Bay (113) MINFILE Number: 092L 137
Latitude: 50°37'06" Longitude: 127°29'36" NTS: 92L/11W

The Bay property is located along the Alice Lake logging road north of Rupert Inlet near Port Hardy (Figure 46). Most of the property is underlain by pyroclastics, flows and sedimentary rocks of the lower section of the Bonanza Group. Minor barite is associated with lead-manganese-zinc mineralization in locally calcareous andesitic tuff, argillite, limestone and limestone breccia.

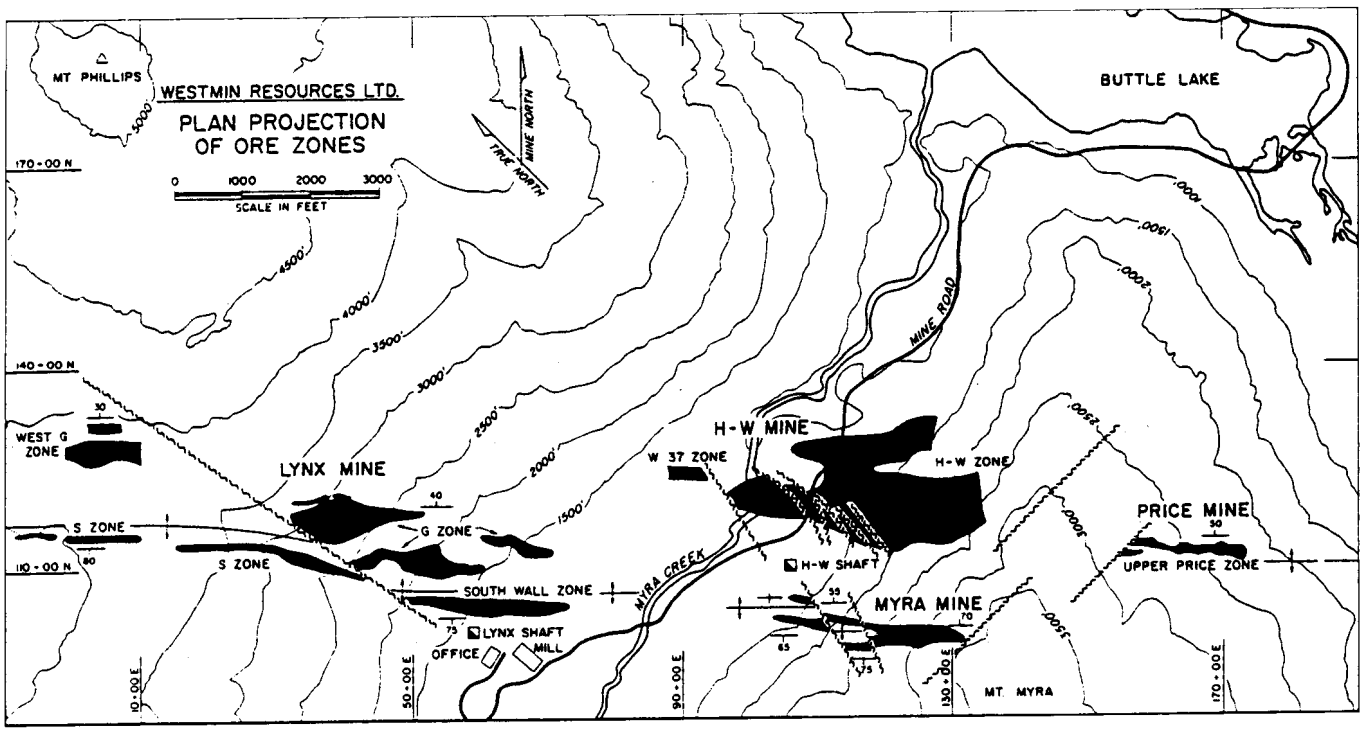


Figure 47: Plan of Ore Zones, Buttle Lake, Westmin Resources Limited. (Walker, 1983b)

Britannia Mine (106) MINFILE Number: 092GNW003
Latitude: 49°36'00" Longitude: 123°07'24" NTS: 92G/11E

The Britannia mine is located on the east side of Howe Sound 64 kilometres by road north of Vancouver (Figure 1). During the period 1905 to 1974 the mine produced in excess of 49.5 million tonnes grading 1.1 per cent copper and 0.65 per cent zinc.

The orebodies were distributed along a deformed belt in a pendant of volcanic rocks within the Coast plutonic complex and have been mined over a strike length of 4 kilometres. The volcanic rocks comprise a thick pile of andesitic to dacitic pyroclastic rocks with some flows; the geology is complex because of numerous facies changes and the lenticular nature of some of the units.

Massive sulphide and stringer deposits commonly occurred at the contact of a crystal-rich dacitic pyroclastic unit with overlying andesitic rocks. The orebodies were zoned from a high-grade chalcopyrite-rich core to a pyrite-rich periphery. Sphalerite is concentrated in the upper central parts of some orebodies. Silicate mineralogy grades from an inner quartz-sericite zone to an outer chlorite-epidote zone. Disseminated and bedded barite is present in sphalerite-rich ore and nearby zinc-rich sedimentary rocks (Payne *et al.*, 1980).

Only 20 per cent of Britannia production was from massive sulphide ore, the remainder from chalcopyrite-rich stringer orebodies. Barite was not an abundant gangue mineral but occurred as disseminations or interbeds in zinc ore and nearby zinc-rich sediments, most notably the Fairview Zinc and Jane deposits. Barite is also present in the matrix of a sulphide-clast volcanic breccia stratigraphically above the Bluff tuff-breccia (*i.e.* at or close to the ore horizon) exposed in a small outcrop in the Jane basin (Payne *et al.*, 1980).

Harrison (107) MINFILE Number: 092HSW013
Latitude: 49°19'00" Longitude: 121°56'30" NTS: 92H/05W

The Harrison property is located on the Chehalis River, 13 kilometres west of Harrison Hot Springs at an elevation of 300 metres (Figure 1). Massive sulphides consisting of an intermixture of sphalerite, chalcopyrite and galena in a pyrite and barite gangue occur in a lens within acid to intermediate volcanic rocks of the Jurassic Harrison Lake Formation.

Iam (108) MINFILE Number: 092HSW083
Latitude: 49°21'24" Longitude: 121°54'24" NTS: 92H/05W

Narrow stringers of sphalerite, minor chalcopyrite, galena and barite occur in dacitic to andesitic pyroclastic rocks of the Jurassic Harrison Lake Formation at a locality 11.3 kilometres northwest of Harrison Hot Springs (Figure 1). The geological setting suggests a volcanogenic association.

Bigfoot (109) MINFILE Number: 092HSW094
Latitude: 49°26'18" Longitude: 121°55'48" NTS: 92H/05W

The Bigfoot property is located 15 kilometres north of Harrison Hot Springs (Figure 1). Five narrow mineralized zones containing pyrite, sphalerite, pyrrhotite and some chalcopyrite with quartz and barite are exposed along logging roads. The mineralized area measures 600 by 100 metres in a silicified dacitic tuff (Noel, 1977).

Brett-Cloud (110) MINFILE Number: 092HSW133
Latitude: 49°23'30" Longitude: 121°52'30" NTS: 92H/05W

The Brett-Cloud property is located 16 kilometres north-northeast of Harrison Mills and 2 kilometres west of Harrison Lake (Figure 1). It covers a portion of a hilly plateau east of Mount Klaudt.

Acid to intermediate volcanic rocks of the Jurassic Harrison Lake Formation underlie most of the property. Numerous veins and shears containing chalcopyrite, sphalerite, galena, barite and quartz cut rhyolite and rhyodacite, possibly related to a domal structure. They are interpreted as represent the footwall stringer zone of a volcanogenic massive sulphide deposit. The geochemical response for barium ranges from 200 to 800 ppm in soil. Scattered high barium values occur throughout the area underlain by rhyolite and rhyodacite (Prise, 1982).

DESCRIPTION OF OCCURRENCES - CENTRAL BRITISH COLUMBIA

Nifty (114) MINFILE Number: 093D 006
Latitude: 52°34'52 Longitude: 126°24'56" NTS: 93D/09W

The Nifty barite occurrence is located along the Noosgulch River northeast of Bella Coola. Massive sulphides, massive barite and disseminated pyrite occur in acid volcanic rocks between two andesite units. The mineralized zone is exposed over a strike length of about 200 metres. Barite is associated with galena along an andesite dike and with pyrite in a coarse fragmental unit. Analyses of 39.72 and 31.49 per cent barium across widths of 3.2 and 3.0 metres respectively were obtained in trenches within the main mineralized area (Bailes, 1977). Jasper occurs in minor amounts with the barite.

Ascot (115) MINFILE Number: 093L 024
Latitude: 54°46'15" Longitude: 126°43'50" NTS: 93L/15W

Several small massive pyrite lenses with minor amounts of sphalerite, galena and barite are exposed between Mount McKendrick and Dome Mountain, east of Smithers. Hostrocks are limy silstones and felsic tuff of the Nilkitkwa Formation. Barite, sphalerite, chalcopyrite and arsenopyrite also occur at the fault contact between amygdaloidal flows and limy sedimentary rocks. These occurrences were discovered during exploration for volcanogenic massive sulphide deposits (MacIntyre *et al.*, 1987).

Barite (116) MINFILE Number: 103I 217
Latitude: 54°07'50" Longitude: 128°43'30" NTS: 103I/02E

Three polymetallic massive sulphide showings hosted by steeply dipping basaltic to rhyolitic flows and tuffs are located 15 kilometres northwest of Kitimat (Figure 1). Coarse pyroclastics are widespread in the southern part of the claim group and have been intruded by granite of Cretaceous to Tertiary age and metamorphosed to greenschist facies.

The Jeannette showing comprises lenses of siliceous, semimassive pyrite, chalcopyrite and pyrrhotite in a zone 3 metres wide and 25 metres long. At the Barite showing foliated, silicified and pyritized breccias and tuff contain barite with base metal sulphides carrying gold and silver. Blocks of float consisting of white to grey, dense to thinly laminated barite are also reported. A selected sample contained 37.7 per cent barium, equivalent to 64 per cent barite. The mineralized zone appears to be underlain by a quartz-eye rhyolite (Belik, 1987).

The Gold showing is located 600 metres south of the Barite showing. Mineralization is hosted by a highly silicified and pyritized felsic unit 12 metres thick. The lower section of this zone assayed 1.71 grams per tonne gold and 15.08 grams per tonne silver. Anomalous amounts of barite are also present.

DESCRIPTION OF OCCURRENCES - NORTHERN BRITISH COLUMBIA

In northern British Columbia barite is associated with volcanogenic massive sulphide mineralization in the Tulsequah mining camp in the Taku River district and in rocks of the Alexander terrane extending from the Alaska panhandle into the extreme northwest corner of the province. The Alexander terrane hosts major massive sulphide deposits at Greens Creek on Admiralty Island north of Juneau, Alaska, and at Windy Craggy in British Columbia. The Greens Creek deposit contains significant barite, Windy Craggy does not. A number of barite occurrences are documented in the Mount Henry Clay area, which straddles the Alaska boundary in the Tatshenshini River area, southwest of the Haines road. These include the Haines Barite deposit in Alaska, east of Mount Henry Clay, and the Boundary occurrence on the International Boundary between Herbert and Boundary glaciers. Haines Barite is a major deposit, tens of metres thick with a strike length in excess of 600 metres. A bulk sample assayed 76.4 per cent $BaSO_4$, 3.6 per cent zinc and 0.98 per cent copper (MacIntyre and Schroeter, 1985).

Stryker Resources Ltd. and Freeport Resources Inc. explored the Canadian side of the boundary in the mid-1980s and found several polymetallic sulphide showings, a few with associated barite. The area is underlain by Paleozoic sedimentary rocks and mafic to intermediate volcanic rocks of probable Triassic age (Figure 48). Mineralization, comprising thin bands and disseminations of pyrite, pyrrhotite, sphalerite, chalcopyrite, barite and minor galena, is typically stratiform and associated with volcanic rocks. The better documented occurrences are described briefly below.

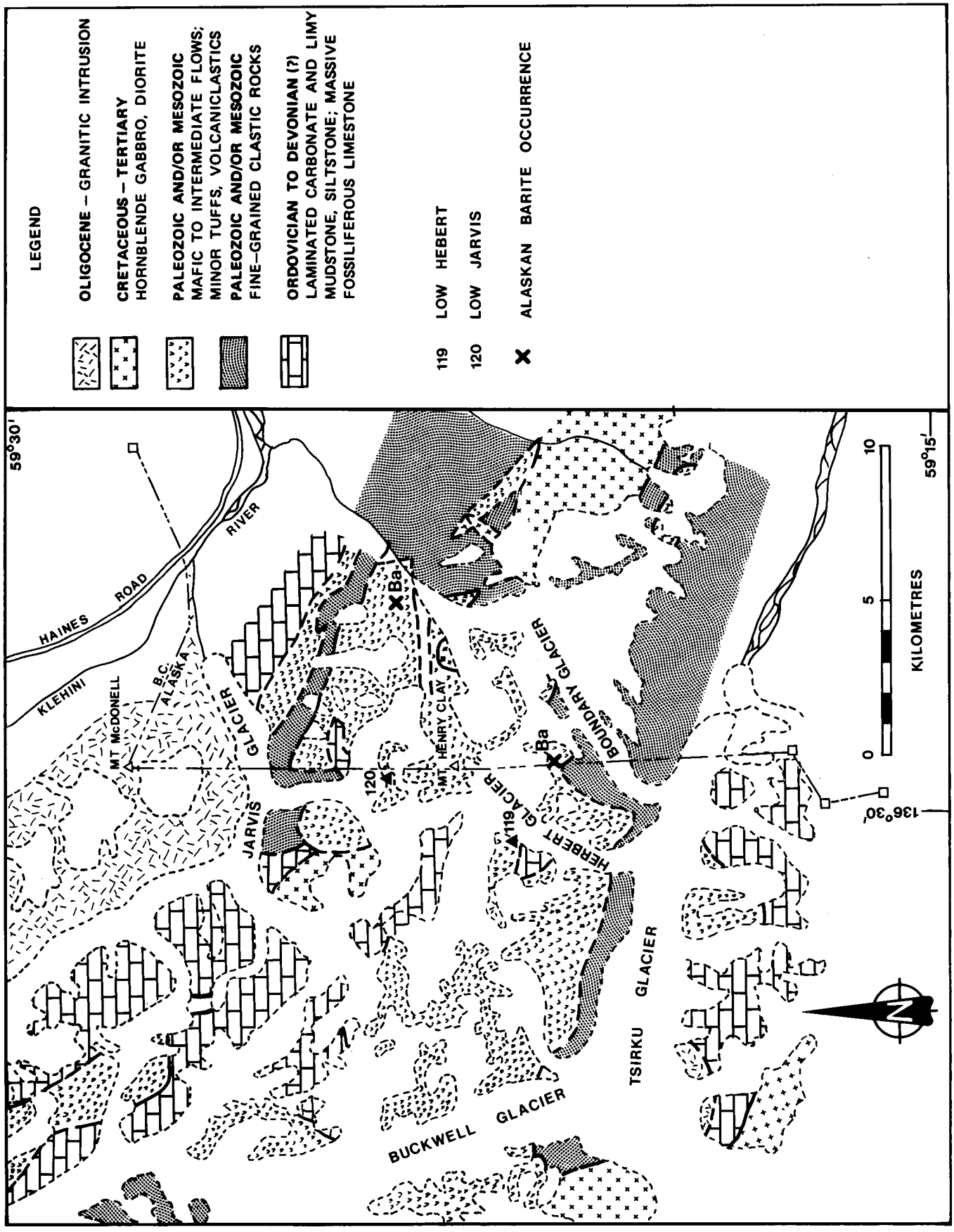


Figure 48: Location and geological setting of barite occurrences in the Mount Henry Clay area. (geology from Campbell and Dodds, 1983)

Low Herbert (119) MINFILE Number: 114P 064
Latitude: 59°20'50" Longitude: 136°30'00" NTS: 114P/07

A prominent gossan zone is exposed on the west side of Herbert Glacier approximately 4 kilometres from its mouth (Figure 48). The zone has a maximum thickness of 100 metres and has been traced along strike for 700 metres. Disseminated chalcopyrite, barite and galena are present in a grey, very siliceous and highly pyritic talc-sericite schist. The mineralized zone is interfingered with and overlain by pillow basalts (McDougall *et al.*, 1983).

Low Jarvis (120) MINFILE Number: 114P 071
Latitude: 59°24'10" Longitude: 136°28'50" NTS: 114P/07E

A northwest-dipping sequence of black shales and overlying volcanic agglomerate and massive andesite is exposed on the north slope of Mount Henry Clay (Figure 48). Thin bands of quartzite and shale are interbedded in the andesite (Schroeter and MacIntyre, 1986). Disseminated sphalerite and pyrite are present in a tuff unit 1.2 metres thick that has been exposed over a length of 20 metres. A massive sphalerite layer, 5 centimetres thick, overlying a 1.4-metre barite-rich bed has been traced along strike for several metres.

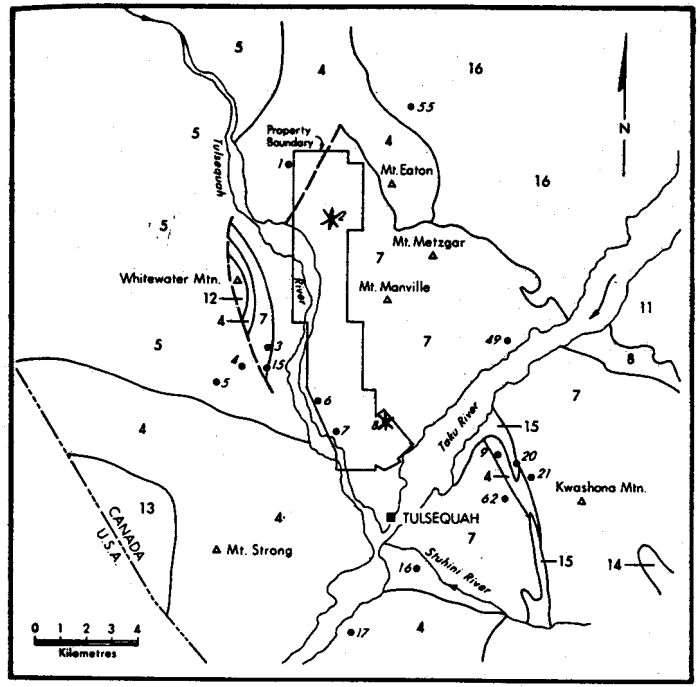
Basement (121) MINFILE Number: 114P 043
Latitude: 59°21'30" Longitude: 137°19'00" NTS: 114P/06W

The Basement polymetallic showing is located on a tributary of Basement Creek, 40 kilometres west of Mount Henry Clay (Figure 1). Disseminated sphalerite, pyrite, chalcopyrite and minor galena occur in a bedded barite and limestone unit within a sequence of intermediate to mafic volanic rocks. A chip sample across 6 metres contained 26 per cent barium.

Tulsequah (118) MINFILE Numbers: 104K 002, 008
Latitude: 58°44'30" Longitude: 133°35'20" NTS: 104K/12

The Tulsequah mining camp is 90 kilometres south of Atlin, on the Tulsequah River about 10 kilometres above its confluence with the Taku River (Figure 49). Discovered in 1923, the property was aquired by the Consolidated Mining and Smelting Company of Canada (now Cominco Ltd.) in 1946 and brought to production in 1951. Production continued until 1957 by which time almost a million tonnes of ore had been mined from the Tulsequah Chief and Big Bull deposits. In recent years Cominco Ltd. and Redfern Resources Ltd. have conducted extensive exploration on the property, including underground exploration in the Tulsequah Chief mine and have indicated new reserves at depth.

The Tulsequah orebodies are hosted by a northwest-striking sequence of volcanic and minor sedimentary rocks of the Upper Triassic Stuhini Group. Wallrocks are felsic pyroclastic rocks ranging from rhyolitic to dacitic tuffs (Figure 49). Structure

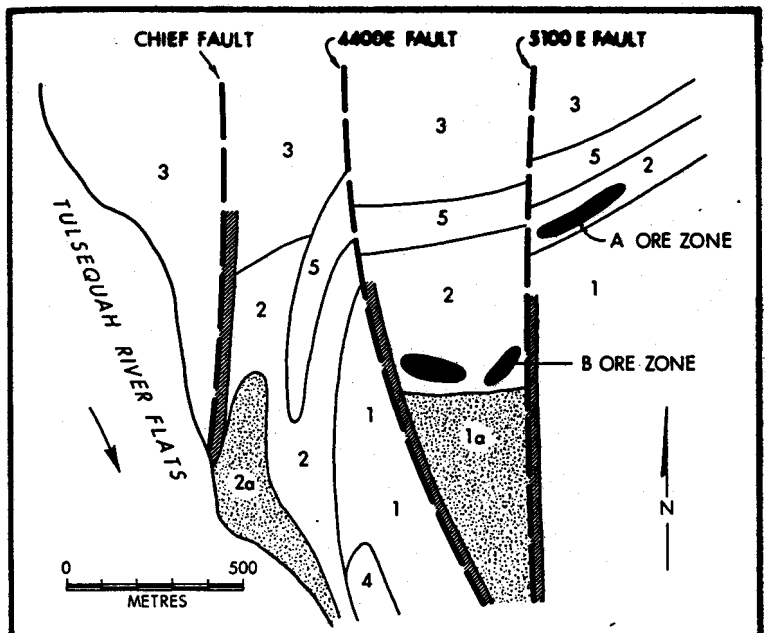


LEGEND

- 16, 15, 14 — LATE CRETACEOUS TO EARLY TERTIARY SLOKO GROUP INTERMEDIATE TO FELSIC PYROCLASTICS AND FLOWS
- 13 — PRE-UPPER CRETACEOUS CENTRAL PLUTONIC COMPLEX
- 12 — POST-MIDDLE JURASSIC TO CRETACEOUS INTRUSIONS
- 11 — COARSE SEDIMENTS OF LOWER JURASSIC LABERGE GROUP
- 8 — THICK-BEDDED SEDIMENTS OF KING SALMON FORMATION OF THE STUHINI GROUP
- 7 — UPPER TRIASSIC STUHINI GROUP VOLCANIC ROCKS
- 5 — PRE-UPPER TRIASSIC HIGH GRADE GNEISSIC ROCKS
- 4 — PRE-UPPER TRIASSIC FINE-GRAINED SEDIMENTS WITH MINOR GREENSTONE

MINERAL OCCURRENCES (104 K)

1	SPEC
*2	TULSEQUAH CHIEF *
3	POLARIS TAKU *
4	SILVER QUEEN
5	SILVER BIRD
6	POTLATCH
7	POTLATCH, BANKER
*8	MANVILLE, BIG BULL *
9	ERIKSEN, ASHBY
15	MARTHA, SINCLAIR
16	SURVEYOR
17	COUNCIL
20	MAIDAS
21	MOHAWK
49	YELLOW BLUFF
55	CANYON, BEAR
62	COFFMAN
*	Past producer



TERTIARY / CRETACEOUS

- FELSIC DYKES

PALEOZOIC / TRIASSIC (?)

- 5 — DIORITE / DIABASE DYKES OR SILLS
- 4 — DACITE PLUG
- 3 — ANDESITIC PYROCLASTICS AND SEDIMENTARY ROCKS
- 2 — DACITIC PYROCLASTIC ROCKS. 2a - ALTERED UNIT 2
- 1 — ANDESITIC FLOWS AND PYROCLASTIC ROCKS. 1a - ALTERED UNIT 1
- PREVIOUSLY MINED ORE BODIES

* Deposit described in this report

Figure 49: Location and geology of the Tulsequah Chief deposits. (Gunning, 1988)

in the area is complex with three periods of folding further complicated by later faulting and shearing.

The orebodies contain varying amounts of sphalerite, chalcopyrite, galena, barite, gypsum, gold and silver. Mineralization occurs both as stratiform lenses of massive fine-grained pyrite and chalcopyrite with minor galena and sphalerite and as semimassive bands, blebs and stringers of sphalerite, galena and pyrite with appreciable barite. The lenses are up to 10 metres thick and 170 metres long (Gunning, 1988).

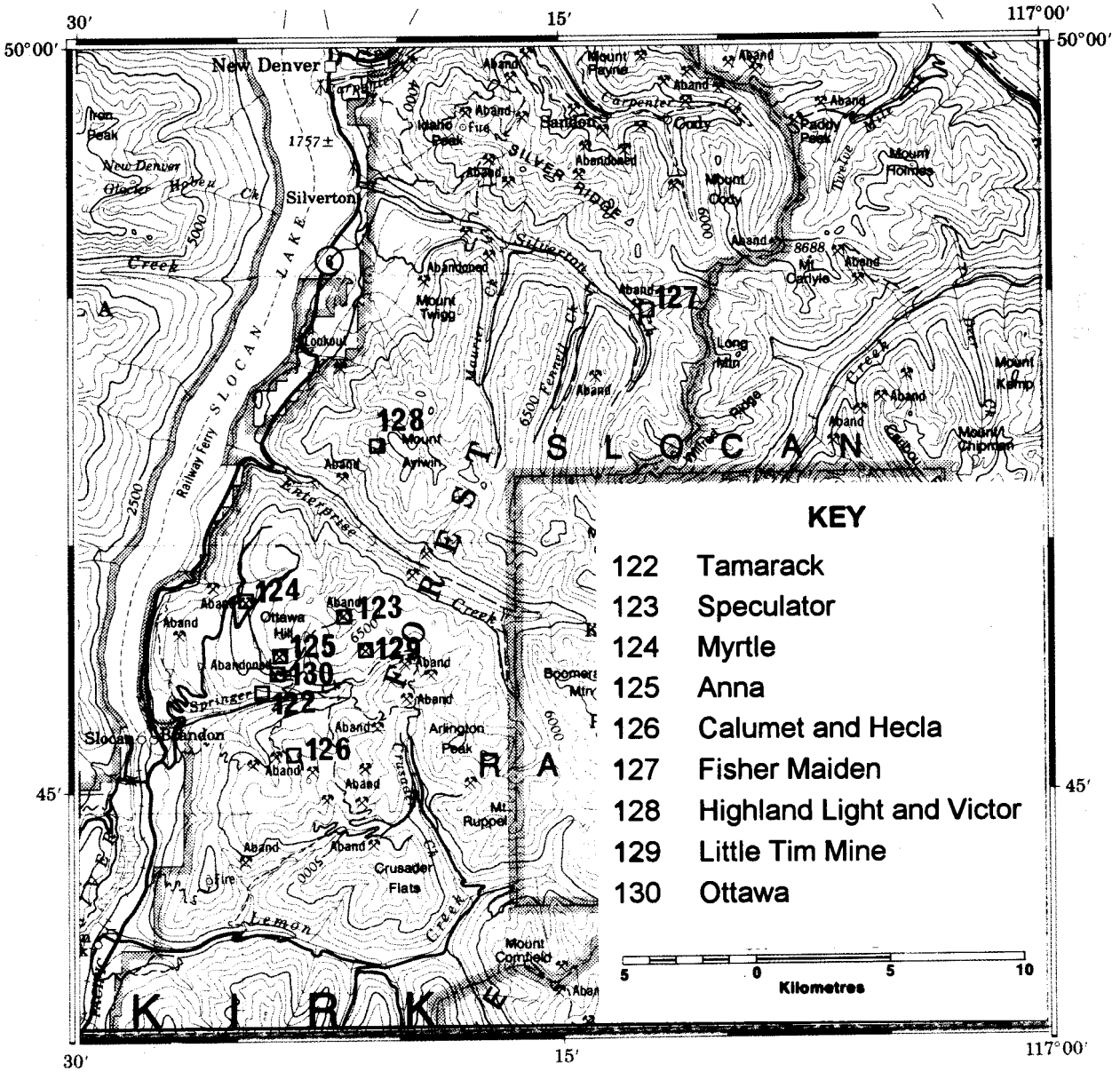


Figure 50: Barite occurrences in the Slocan Mining camp.

CHAPTER 5

MINOR OCCURRENCES OF BARITE IN BASE AND PRECIOUS METAL LODE DEPOSITS

Minor to trace amounts of barite are present in many base and precious metal lode deposits throughout the province. Although the barite is insufficient to be of economic significance brief descriptions are included here for completeness, and are listed by mining area or geographic district.

SLOCAN MINING CAMP

Veins in the Slocan area of southcentral British Columbia (Figure 50) have been explored and exploited for their silver content since before the turn of the century. Barite is a common, but minor gangue mineral in many of the deposits. It occurs as white to cream massive vein material, or more commonly, as coarsely crystalline masses in association with quartz and minor calcite.

The descriptions that follow are summarized primarily from Fyles and Hewlitt (1959).

Tamarack (122) MINFILE Number: 082FNW156
Latitude: 49°47'18" Longitude: 117°24'30" NTS: 82F/14W

The Tamarack property is located on the southern slope of Ottawa Hill above Springer Creek (Figure 50). It has a history of intermittent production from 1899 to 1907.

The property is underlain by porphyritic granite of the Nelson batholith that contains remnants of quartzite, phyllite, black schist and argillite of the Triassic Slocan Group. Varying amounts of galena, sphalerite, pyrite, chalcopyrite and tetrahedrite in a gangue of quartz with lesser calcite and barite form discontinuous veins, stringers and lens-like bodies within altered granite.

Speculator (123) MINFILE Number: 082FNW151
Latitude: 49°48'00" Longitude: 117°21'12" NTS: 82F/14W

The Speculator property is located 11.2 kilometres by road east-northeast of Slocan (Figure 50). It is a small bonanza type silver vein that produced a few tonnes of high-grade silver ore at the beginning of this century. Mineralization occurs in a series of parallel fissures striking north-northeast and dipping steeply to the east.

Myrtle (Alma) (124) MINFILE Number: 082FNW159
Latitude: 49°48'54" Longitude: 117°24'42" NTS: 82F/14W

The Myrtle property is located near the headwaters of Memphis Creek (Figure 50). Production has consisted of 1.8 tonnes of hand-sorted ore that contained more than 12 kilograms of silver and 13.5 tonnes grading almost 4400 grams silver per tonne.

Mineralization consisting of galena, sphalerite, tetrahedrite and native silver in a gangue of sheared and altered wall-rock with varying proportions of quartz, calcite and barite, occurs in a sheared and brecciated zone cutting granite of the Nelson batholith. This zone has been traced for 300 metres.

Anna (125) MINFILE Number: 082FNW154
Latitude: 49°47'36" Longitude: 117°23'12" NTS: 82F/14W

The Anna property is located on the northern slope of Springer Creek (Figure 50). The mine worked the high-grade bonanza type silver veins that had an average grade of 5150 grams per tonne silver over the life of the mine. The majority of the work was done between 1912 and 1928 when grades were as high as 9800 grams per tonne silver. Some minor mining and cleanup work was done in the early 1960's.

Two parallel veins transect coarse-grained porphyritic granite of the Nelson batholith. These veins are cut by a series of transverse and parallel mineralized fissures. Mineralization consists of native silver, stephanite, tetrahedrite, galena and sphalerite. Quartz is the dominant gangue mineral; some barite is also present.

Calumet and Hecla (126) MINFILE Number: 082FNW176
Latitude: 49°45'48" Longitude: 117°23'18" NTS: 82F/14W

The Calumet and Hecla property is located on the ridge east of Dayton Creek, 5 kilometres by road up Springer Creek from Slocan (Figure 50). It was first staked in 1895 and has no recorded production.

A vein containing galena, sphalerite and pyrite disseminated in a gangue of quartz and minor barite cuts quartzitic argillite and dark grey quarzite of the Slocan Group and Nelson granite.

Fisher Maiden (127) MINFILE Number: 082FNW079
Latitude: 49°54'36" Longitude: 117°12'54" NTS: 82F/14W

The Fisher Maiden property is located on the lower northern slope of Silverton Creek 12.9 kilometres from Silverton (Figure 50). It was staked in 1892 and recorded production of 572 tonnes of ore to 1910; 73 tonnes were mined in 1927.

Two subparallel veins 180 metres apart, occur along sheared and brecciated zones in coarse-grained porphyritic granite. The veins vary in thickness from a few centimetres up to 18 metres and can be traced along strike for 30 metres and to a depth of 50 metres. Ore minerals are sphalerite, argentite, ruby silver, native silver and galena. Quartz and calcite are the dominant gangue minerals. Barite, in minor amounts, is present in the southwesterly vein.

Highland Light and Victor (128) MINFILE Number: 082FNW075
Latitude: 49°52'00" Longitude: 117°21'30" NTS: 82F/14W

The Highland Light and Victor property is located on the divide north of Enterprise Creek and west of the headwaters of Beaverton Creek (Figure 50). Production

took place in 1904, 1906, and 1918 and aggregated 9.9 tonnes averaging 8850 grams per tonne silver.

The property is underlain by granitic rocks of the Nelson batholith and by a large remnant of sedimentary rocks. A narrow fault zone on the Highland Light claim cross-cuts quartzites and contains quartz and calcite with small pods of barite. No sulphide minerals other than minor pyrite are reported.

Little Tim Mine (129) MINFILE Number: 082FNW157
Latitude: 49°48'28" Longitude: 117°21'55" NTS: 82F/14W

The Little Tim mine is located at the head of Little Tim Creek, a tributary of Springer Creek (Figure 50). Its history dates back to before 1918 when 55 tonnes of high grade silver and lead were produced.

Two subparallel fissure veins, 90 metres apart, transect coarse-grained porphyritic granite of the Nelson batholith. Vein material consists primarily of quartz containing galena, sphalerite, pyrite and tetrahedrite. Some calcite and barite are also present.

Ottawa (130) MINFILE Number: 082FNW155
Latitude: 49°47'24" Longitude: 117°23'54" NTS: 82F/14W

The Ottawa property is located on the north side of Springer Creek, 9.7 kilometres by road from Slocan (Figure 50). It was staked in 1900 and brought to production in 1901. The mine was worked fairly steadily, though not continuously, from 1901 to 1984 with the latter years essentially cleanup from previous operations. Over 25 000 tonnes of ore averaging around 2260 grams per tonne silver, lead and zinc was extracted from bonanza-type silver veins.

A north-trending shear zone cutting the Nelson batholith granite hosts two well-defined subparallel veins that vary from 0.7 to 6.0 metres wide and carry argentite, native silver and tetrahedrite in a dominantly quartz gangue. Locally the gangue is comprised mainly of barite. These zones are generally associated with better grade ore.

DOME MOUNTAIN CAMP

Forks, Chance, Jane, Hawk (153) MINFILE Numbers: 093L 022, 278, 279 and 282
Latitude: 54°44'55" Longitude: 126°36'45" NTS: 93L/10E

The Dome Mountain camp, east of Smithers (Figure 1) is underlain by subaerial and submarine volcanic and volcaniclastic rocks of the Early to Middle Jurassic Telkwa and Nilkitkwa formations (MacIntyre, 1985). Mesothermal quartz veins varying from a few centimetres to 3 metres wide occur in layered and foliated tuffs of the Telkwa Formation. They carry varying amounts of gold, silver and base metal sulphides; minor amounts of barite are present in some of the veins and anomalous barium is present in altered wallrocks.

TOODOGGONE CAMP

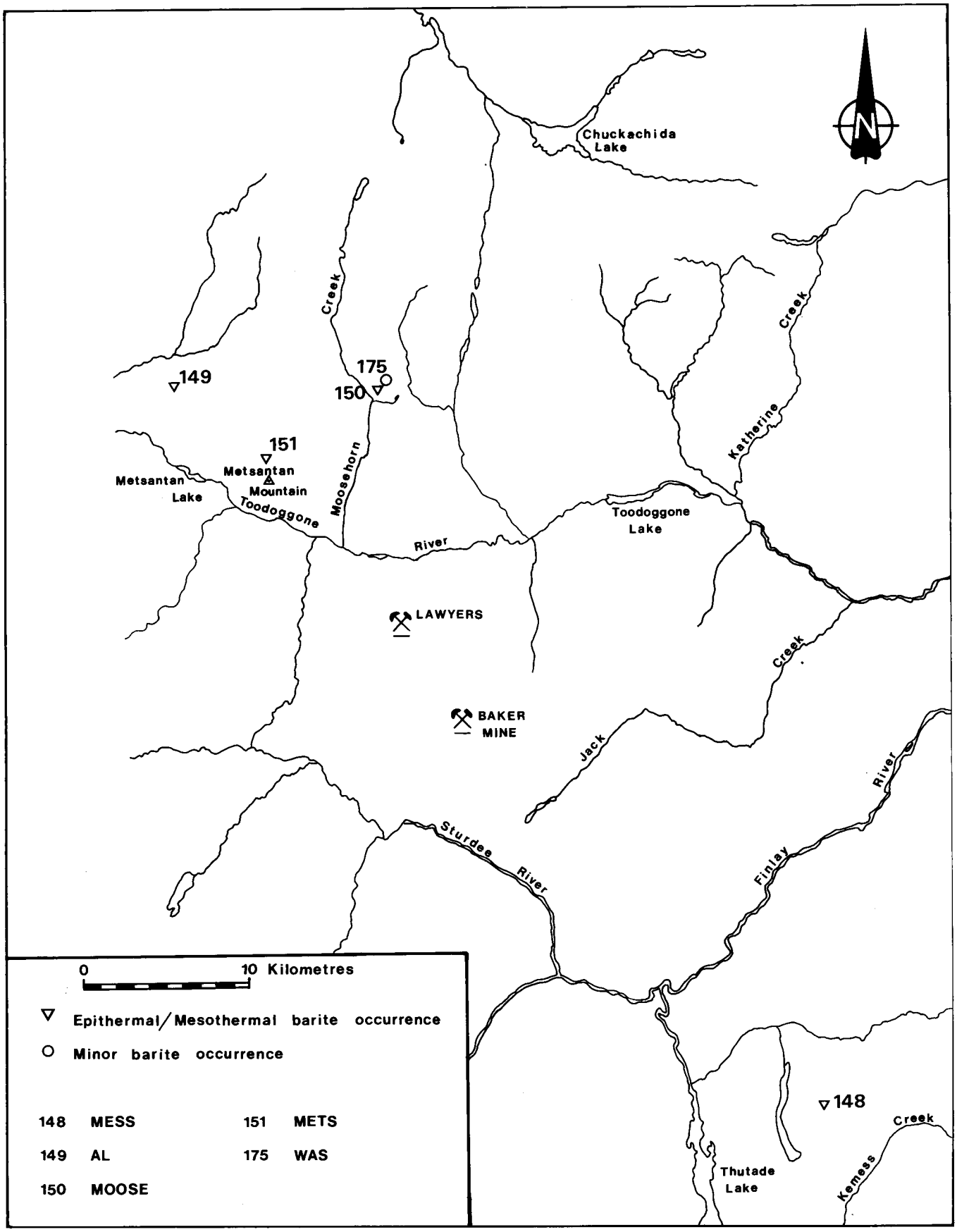


Figure 51: Location of barite occurrences in the Toodoggone camp.

Quartz, together with trace to minor amounts of barite, fluorite, adularia and calcite form the gangue in the sulphide zone of epithermal precious metal deposits (Hollister, 1985). Barite may be present in fractures and narrow veins or in alteration envelopes associated with these deposits. Deposits in the Toodoggone, Owen Lake and Stewart-Iskut River districts of British Columbia provide typical examples.

Mess (148) MINFILE Number: 094E 070
Latitude: 57°04'06" Longitude: 126°39'05" NTS: 94E/02E

The Mess property is located east of Thutade Lake near the headwaters of Kemess Creek (Figure 51). It is underlain by Upper Triassic volcanic and sedimentary rocks that are intruded by multiphase plutons to the northeast and southwest. Mineralization consists of disseminated to layered pyrite, galena, chalcopyrite and rare sphalerite in chlorite and epidote-altered Takla volcanics. Quartz-barite-calcite veins with cockscomb and banded textures occur in argillic alteration envelopes; some carry precious metal values. A barite-galena-tetrahedrite vein pinches and swells along a strike length of 12 metres. Its maximum width is 1 metre (Crawford, 1982).

Al (149) MINFILE Number: 094E 091
Latitude: 57°28'00" Longitude: 127°24'00" NTS: 94E/06W

The Al property is located east of Moosehorn Creek, directly north of Metsantan Lake (Figure 51). Underlying the property is a complex suite of subaerial andesitic, dacitic and trachytic tuffs, ash flow sheets and minor epiclastic rocks of the Toodoggone volcanics. Gold-silver mineralization occurs in silicified zones consisting of chalcedony cut by quartz-filled breccias and fractures. Complex sulphate combinations that include barite, gypsum and anhydrite often accompany the mineralization (Sutherland, 1982).

In the Thesis III area (Figure 52) gold is associated with replacement barite which averages 2 to 5 per cent. At the BV zone native gold is present in barite-filled fractures. Gold is also associated with quartz-barite altered rock at the Verrenass and Ghost zones. A sample of the altered rock contained 18.5 per cent barium (Schroeter *et al.*, 1986).

Moose (150) MINFILE Number: 094E 031
Latitude: 57°28'30" Longitude: 127°12'30" NTS: 94E/06

On the Moose property, located along Moosehorn Creek, (Figure 51) galena, sphalerite, pyrite, barite, hematite and chlorite occur in veins cutting altered hornblende-feldspar crystal and crystal lapilli tuffs (Schroeter *et al.*, *op. cit.*).

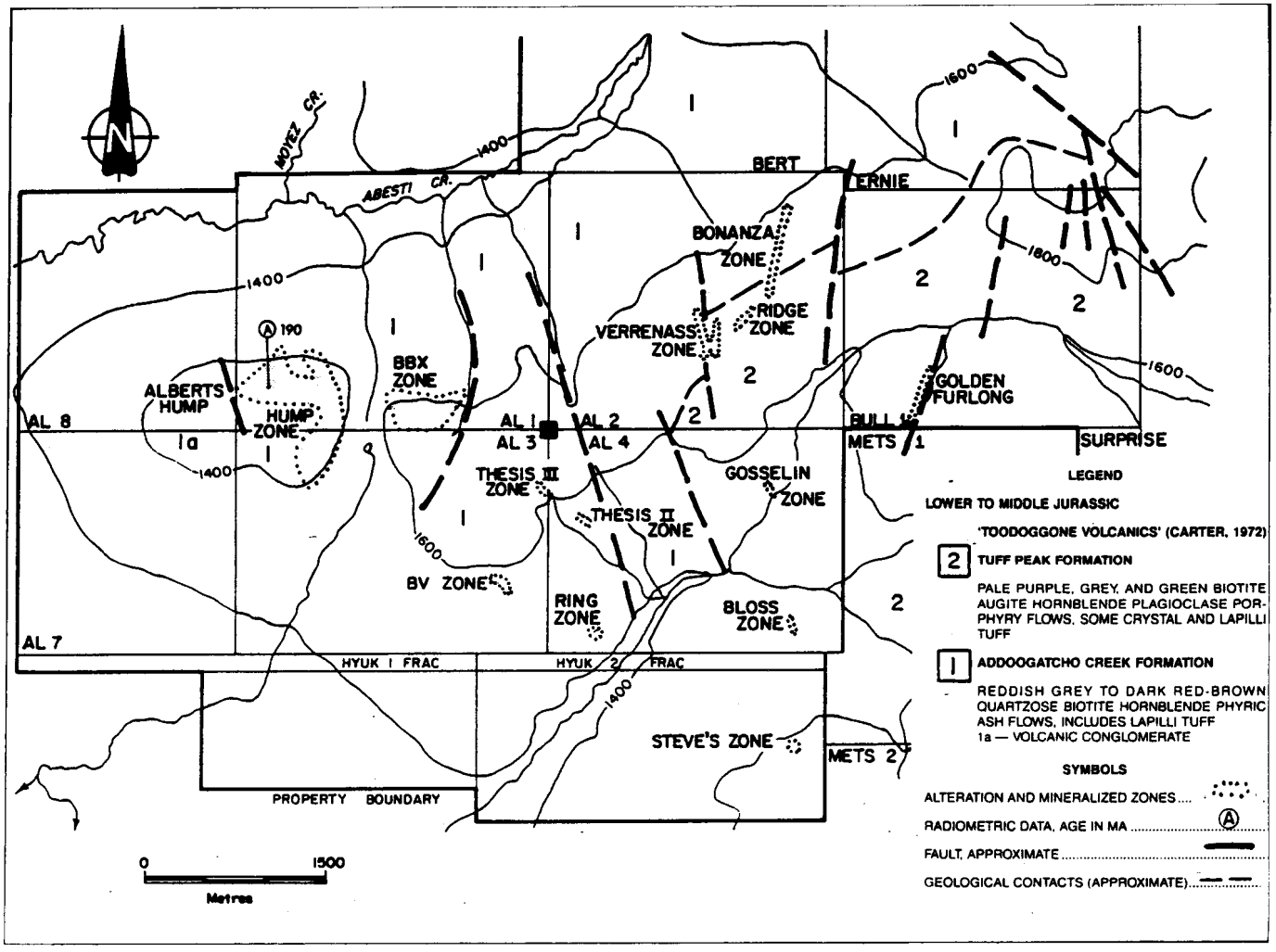


Figure 52: Geology of the Al property.(Schroeter *et al.*, 1986)

Mets (151) MINFILE Number: 094E 093
Latitude: 57°26'00" Longitude: 127°18'00" NTS: 94E/06

The Mets property is located immediately north of Metsantan Mountain (Figure 51). A quartz-barite breccia zone occurs in clay-altered andesite porphyries of the Toodoggone volcanic suite. Mineralization is dominantly quartz and barite (sometimes coarsely bladed) with minor galena, native gold and calcite. The zone has been traced along strike for 150 metres and to a depth of 90 metres across a true width of 5 to 10 metres (Schroeter and Lefebure, 1987).

Was (175) MINFILE Number: 094E 031
Latitude: 57°28'42" Longitude: 127°12'18" NTS: 94E/06E

A series of northwest-trending fracture or shear zones within andesite, tuffs and agglomerates contains galena, sphalerite and pyrite with quartz and minor amounts of barite. (Figure 51)

OWEN LAKE CAMP

Silver Queen (133) MINFILE Number: 093L 002
Latitude: 54°05'00" Longitude: 126°43'48" NTS: 93L/02E

Twenty-three epithermal veins cut Late Cretaceous volcanic rocks on the Silver Queen property east of Owen Lake (Figure 1). Sphalerite with pyrite, chalcopyrite and galena are the main sulphide minerals present. The gangue consists of cherty quartz, carbonate minerals and barite. In Vein No. 4 barite occurs locally as randomly orientated plates in vugs and pockets throughout the vein. Barium content varies from 0.01 to 4.66 per cent.

Cole (154) MINFILE Number: 093L 162
Latitude: 54°05'34" Longitude: 126°42'15" NTS 93L/02E

A series of subparallel vein filling shear zones occur in a microdiorite stock between George and Cole lakes east of the Silver Queen mine. The veins vary from stringers to 2 metres in width. Mineralization is of two types: chalcopyrite-sphalerite and sphalerite-galena. Gangue minerals are rhodochrosite, quartz, chalcedony and barite.

KITSAULT DISTRICT

Barite is present in minor quanitities in the gangue of silver-rich quartz-jasper sulphide veins and replacement deposits in the Kitsault district north of Alice Arm (Figure 1) including the Dolly Varden, Torbrit and Wolf mines. Host rocks are commonly volcanics and intercalated sediments of the Lower Jurassic Hazelton Group. Disseminated copper-gold prospects also carry barite (Dawson and Alldrick, 1986). Properties are located on Figure 53.

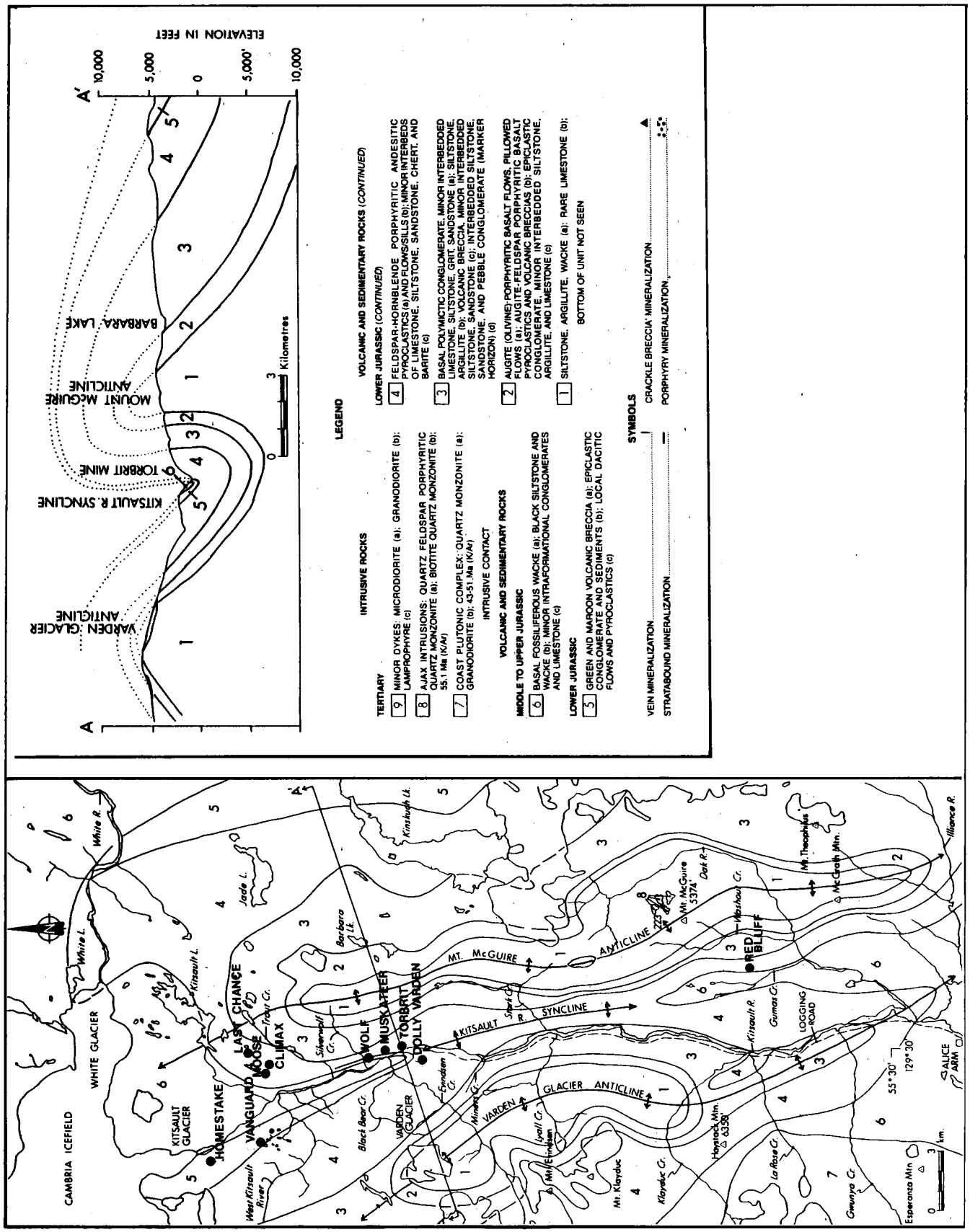


Figure 53: Location of barite-bearing occurrences in the Kitsault area. (modified from Dawson and Alldrick, 1986)

Dolly Varden MINFILE Number: 103P 188
Latitude: 55°40'55" Longitude: 129°30'32" NTS: 103P/12

The Dolly Varden mine, west of the Kitsault River produced in excess of 44 million grams of silver from approximately 37 000 tonnes of ore mined between 1919 and 1940. The ore minerals were tetrahedrite and native silver, with minor galena, sphalerite and chalcopyrite, in a gangue of quartz, carbonate, barite and pyrite filling an arcuate vein-like structure.

Torbrit Mine MINFILE Number: 103P 191
Latitude: 55°41'14" Longitude: 129°30'21" NTS: 103P/12

The Torbrit mine, on the east side of the Kitsault River, has produced over 68 million grams of silver from approximately 120 000 tonnes of ore. The ore shoots are described as "replacement deposits" in massive agglomerate and tuff, containing quartz, carbonate, barite, hematite, pyrite, galena, sphalerite, chalcopyrite, and native and ruby silver. The ore is banded subparallel to the walls and is clearly structurally controlled.

Wolf MINFILE Number: 103P 198
Latitude: 55°42'27" Longitude: 129°31'01" NTS: 103P/12

Three quartz-barite-jasper-pyrite replacement deposits are known on the Wolf property, north of the Torbrit mine. Individual deposits are 3 to 30 metres wide and follow steeply dipping shear and fracture zones in tuffs and agglomerates. The ore often has a brecciated texture with subrounded fragments of quartz in a matrix of fine-grained quartz, barite, jasper and carbonate. Pyrite is the most abundant sulphide mineral present, with minor amounts of galena, sphalerite, magnetite, hematite and silver-bearing minerals present.

Homestake MINFILE Number: 103P 216
Latitude: 55°45'32" Longitude: 129°35'15" NTS: 103P/13

The Homestake property, located west of Kitsault glacier at the northern end of the district, produced 8.8 tonnes of high-grade direct-shipping ore in 1939. Veins, pockets and lenses of quartz and carbonate with minor barite and sulphide minerals are localized in subparallel faults cutting altered feldspar porphyry and volcanic rocks. On the adjacent Gold Reef property, tetrahedrite is associated with barite in three siliceous replacement zones in massive and fragmental volcanic rocks.

Vanguard MINFILE Number: 103P 210
Latitude: 55°44'09" Longitude: 129°33'24" NTS: 103P/12

Several copper showings are exposed on the Vanguard property located on the west slope of Kitsault Valley, north of the west fork. Thin lenses of massive pyrite and chalcopyrite, with minor quartz and barite, are hosted in shear zones cutting strongly altered intrusives. Individual lenses extend for only a few metres before they pinch out or are cut off by cross-faults.

Moose, Climax, Last Chance MINFILE Number: 103P 008, 205 and 206
Latitude: 55°41'24" Longitude: 129°30'29" NTS: 103P 11, 12

The Moose, Climax and Last Chance prospects are located on the ridge between Trout Creek and the Kitsault River. All are characterized by narrow, fault-controlled, vein or replacement mineralization comprising valuable amounts of galena, sphalerite, tetrahedrite and other silver-bearing minerals in a quartz gangue with lesser and variable amounts of carbonate, barite, hematite, pyrite, marcasite and sometimes jasper.

Red Bluff MINFILE Number: 103P 162
Latitude: 55°34'16" Longituge: 129°26'16" NTS: 103P/11

The Red Bluff property, 8 kilometres east-northeast of Alice Arm, covers a breccia zone in interbedded tuffs and greywackes. The zone comprises barite, fragments of country rock and sporadic amounts of base metal sulphides.

STEWART CAMP

Barite is present in minor quantities in the gangue of many of the lead-zinc and copper deposits in the Stewart area (Figure 54). The majority of these deposits are hosted by tuffs and lava flows of the Hazelton Group.

At the Silbak-Premier mine mineralization in the Premier system consisted of extensive quartz veining containing a number of sulphide-rich ore shoots from which the main gold-silver production was derived. Gangue minerals included calcite, barite and minor adularia.

The Black Hill property on the east side of the south fork of Glacier Creek covers two veins containing sphalerite, galena, tetrahedrite and jamesonite in a gangue of quartz, calcite and barite. The veins are 30 centimetres wide and cut thin-bedded siltstones of the Middle Jurassic Salmon River Formation near the contact with an augite porphyry.

Other barite-bearing occurrences in the Stewart area are described below.

Lucky Jim (138) MINFILE Number: 104A 012
Latitude: 56°09'30" Longitude: 129°56'06" NTS: 104A/04W

A quartz-jasper-barite vein, 2 metres wide and sparsely mineralized with galena, chalcopyrite, bornite and tetrahedrite outcrops on the west side of American Creek (Figure 54).

Mountain Boy (139) MINFILE Number: 104A 013
Latitude: 56°08'30" Longitude: 129°55'36" NTS: 104A/04W

Two veins outcrop on the Mountain Boy property on American Creek, 22.5 kilometres north of Stewart (Figure 54). The lower vein is 7.6 metres wide and contains quartz, calcite, barite, sphalerite, galena, pyrite and chalcopyrite. The upper vein is 2.3 metres wide and contains quartz, jasper, barite and minor amounts of sulphides.

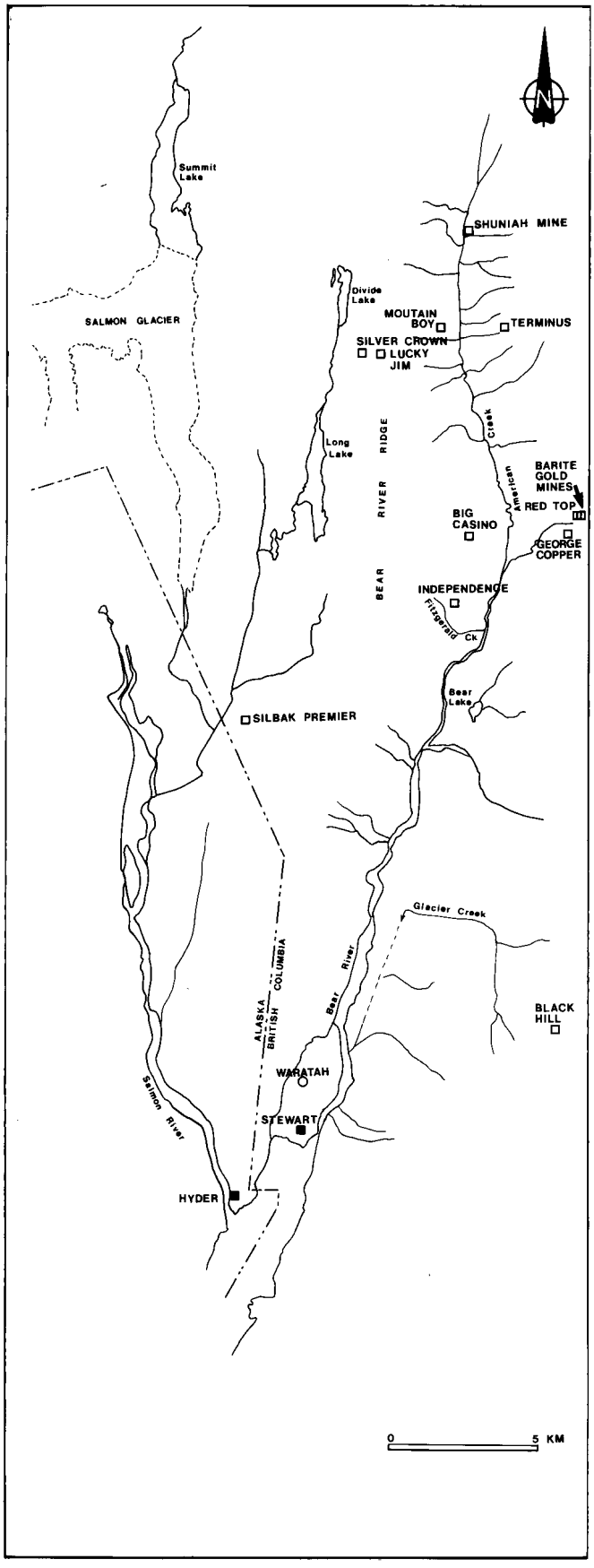


Figure 54: Barite-bearing occurrences in the Stewart camp.

Terminus (140) MINFILE Number: 104A 016
Latitude: 56°08'24" Longitude: 129°52'48" NTS: 104A/04W

The Terminus property is located on the east side of American Creek 5 kilometres above its mouth (Figure 54). The property is underlain by Hazelton Group flows and pyroclastic rocks intruded by numerous feldspar porphyry dikes. A quartz-sulphide vein, 60 centimetres wide and 30 metres long follows a shear zone that traverses one of these dikes. It contains galena, sphalerite, pryite and tetrahedrite in a quartz gangue. Paralleling this structure are two quartz-barite veins, 3 metres wide, that contain disseminated galena.

Barite Gold Mines (141) MINFILE Number: 104A 020
Latitude: 56°07'42" Longitude: 129°45'06" NTS: 104A/04W

A network of barite gash-veins forms a zone 10 metres wide cutting Hazelton volcanic rocks and contains traces of sulphide minerals. The showings are located on the north side of the Bear River in its head waters (Figure 54).

Red Top (142) MINFILE Number: 104A 021
Latitude: 56°07'42" Longitude: 129°45'06" NTS: 104A/04W

A small amount of development work has been done on veins on the north side of the Bear River (Figure 54). The area is underlain by Hazelton volcanic rocks. Galena, sphalerite, pyrite and minor chalcopyrite occur in a gangue of quartz, calcite, barite and jasper over a strike length of 240 metres across widths of 0.3 to 2.4 metres.

George Copper (143) MINFILE Number: 104A 029
Latitude: 56°06'12" Longitude: 129°45'54" NTS: 104A/04W

The George Copper property is located on a precipitous slope south of upper Bear River (Figure 54). Quartz-jasper-barite veins cut Hazelton volcanic rocks carrying chalcopyrite, pyrite, hematite, magnetite and arsenopyrite. Gold values range from trace to 8.6 grams per tonne. The longest vein has been traced over a strike length of 200 metres with an average width of 3 metres. Many of the veins have several branches that pinch out within a few tens of metres of the main structure.

Big Casino (144) MINFILE Number: 104A 034
Latitude: 56°05'54" Longitude: 129°54'06" NTS: 104A/04W

On the Big Casino property (Figure 54) several fissure veins and stringers containing quartz, barite and jasper with minor of pyrite and sphalerite and trace amounts of galena and chalcopyrite cut Hazelton volcanic rocks.

Independence (145) MINFILE Number: 104A 038
Latitude: 56°04'48" Longitude: 129°55'18" NTS: 104A/04W

Five veins parallel quartz diorite dikes along Fitzgerald Creek west of the Bear River (Figure 54). They contain sparsely disseminated galena, sphalerite and pyrite in a gangue of quartz, barite, jasper and calcite. Some gold and silver values have been obtained. The No. 1 vein, traced underground for 200 metres, is an irregular quartz-barite-jasper breccia zone that contains erratic pyrite, chalcopyrite, sphalerite mineralization and minor associated arsenopyrite and pyrrhotite.

Silver Crown (146) MINFILE Number: 104A 061
Latitude: 56°09'06" Longitude: 129°57'42" NTS: 104A/04W

The Silver Crown property is located on the upper west slope of Bear River between Long and Divide Lakes (Figure 54). It is underlain by siltstone, greywacke and minor intercalated limestone and chert-pebble conglomerate of the Middle Jurassic Bowser Group cut by number of veins, 15 to 18 centimetres wide and containing pyrite, galena, sphalerite, and chalcopyrite in a gangue of quartz, calcite, and barite.

Shuniah Mine (147) MINFILE Number: 104A 076
Latitude: 56°12'30" Longitude: 129°54'30" NTS: 104A/04W

A quartz-barite-jasper vein containing minor amounts of galena, chalcopyrite and bornite is located on the west side of American Creek, north of the Mountain Boy property (Figure 54).

ISKUT RIVER - SULPHURETS DISTRICT

Cumberland (155) MINFILE Number: 104B 011
Latitude: 56°29'20" Longitude: 130°28'53" NTS: 104B/08W

The Cumberland claim group, located on the slope of Mount Madge on the south side of Sulphurets Creek (Figure 1), was first staked in 1898. Argillite and andesitic tuffs and lavas of the Hazelton Group underlie the property and have been intruded by siliceous and lamprophyre dikes. Showings of two types are reported: sheared fissure veins contain quartz, calcite, barite, pyrite, galena, sphalerite, stibnite, tetrahedrite and argentite; and quartz replacement zones containing appreciable values in gold. The lowermost showing is described as a sheared and brecciated zone containing small and irregular lenses and stringers of quartz, barite and calcite, almost barren of sulphide mineralization.

Discovery, Sulphurets (156) MINFILE Number: 104B 022
Latitude: 56°28'10" Longitude: 130°10'53" NTS: 104B/08E

The Sulphurets property is located on Brucejack Peninsula on the west shore of Brucejack Lake at the headwaters of Sulphurets Creek (Figure 1). Crystal and lithic tuffs, minor chert, greywacke and limestone of the Lower Jurassic Hazelton Group underlie the property.

Barite veins were discovered in the area by two prospectors from Ketchikan, Alaska. They occur in the outflow area of the lake and consist of coarsely crystalline barite with minor quartz, carbonate and sulphides (Britton and Alldrick, 1988).

Northwest, McLymont (157) MINFILE Number: 104B 281
Latitude: 56°50'09" Longitude: 130°54'42" NTS: 104B/15W

Quartz-barite veins and quartz-pyrite-chalcopyrite pods and veins filling shear zones occur in a sequence of Permo-Triassic andesite flows and sedimentary rocks north of the Iskut River between Newmont Lake and the headwaters of the Verrett River. The volcanic sequence overlies Mississippian limestone and is intruded by Tertiary quartz-eye porphyry and quartz monzonite. The zone of barite veining measures 100 metres square. The andesite hostrocks are extensively bleached, silicified and sausseritized (Kowalchuk, 1982).

MISCELLANEOUS OCCURRENCES

Rock Candy (158) MINFILE Number: 082E 070
Latitude: 49°15'36" Longitude: 118°29'18" NTS: 82E/02W

Well-formed pale yellow transparent crystals of barite occur in very minor amounts with fluorite in numerous veins filling a series of near parallel fractures in syenite.

Silver Belle (159) MINFILE Number: 082FSW032
Latitude: 49°11'28" Longitude: 117°08'29" NTS: 82F/03E

Pyrite with some barite occurs in limestone of the Active Formation 1 metre from its contact with granodiorite.

Canada Belle (160) MINFILE Number: 082FSE054
Latitude: 49°01'36" Longitude: 116°54'36" NTS: 82F/02W

Veins, less than 1 metre wide and sparsely mineralized with barite, galena, sphalerite and pyrite, occur in dolomite on the west flank of North Star Mountain.

Rok, Cat (161) MINFILE Number: 082GSE037
Latitude: 49°13'25" Longitude: 114°42'48" NTS: 82G/02E

Fluorite and minor barite occur across a width of 3 metres in a contact zone of brecciated carbonate and syenite.

Howell (162) MINFILE Number: 082GSE048
Latitude: 49°13'00" Longitude: 114°41'00" NTS: 82G/02

Purple fluorite, galena, sphalerite, barite and minor chalcopyrite and chalcocite occur as fracture fillings in silicified zones within sedimentary rocks of Proterozoic to Mesozoic age.

Wolf, Cabin (166) MINFILE Numbers: 082GSE009, 010
Latitude: 49°00'45" Longitude: 114°58'49" NTS: 82G/02W

Quartz veins in stromatolitic dolomite of the Upper Sheppard Formation contain trace to minor amounts of chalcopyrite, barite, specular hematite and sphalerite.

Deep Purple (167) MINFILE Number: 082JSW018
Latitude: 50°12'05" Longitude: 115°07'35" NTS: 82J/03E

Fluorite with some barite occurs within breccia, and faults and fracture zones in platformal carbonates and evaporites of Devonian-Silurian age.

River Jordan (168) MINFILE Number: 082M 001
Latitude: 51°07'30" Longitude: 118°24'40" NTS: 82M/01W

Pods and lenses of barite occur in a massive sulphide deposit along the eastern margin of the Shuswap metamorphic complex.

Ruddock Creek (169) MINFILE Numbers: 082M 082, 083 and 084
Latitude: 51°46'35" Longitude: 118°54'10" NTS: 82M/15W

Minor to trace amounts of barite form part of the gangue in sulphide rich lenses and pods present within a sequence of metasedimentary rocks.

Mastodon North (170) MINFILE Number: 082M 195
Latitude: 51°15'00" Longitude: 118°07'10" NTS: 82M/01E

Irregular veinlets containing fluorite, white crystalline barite and quartz occur along a dolomite-phyllite contact.

Leadville (111) MINFILE Number: 092ISE052
Latitude: 50°02'16" Longitude: 120°45'48" NTS: 92I/02W

A galena-barite vein is exposed within a shear zone at the top of Iron Mountain, 8 kilometres south-southeast of Merritt (Figure 1). The vein is 2 metres wide and occurs at a rhyolite-sediment contact in Triassic Nicola Group rocks. Two other veins in the vicinity contain greater than 1 per cent barite.

Iron Mountain (112) MINFILE Number: 092ISE198
Latitude: 50°02'36" Longitude: 120°45'36" NTS: 92I/02W

A mineralized fissure zone, containing galena, sphalerite and pyrite with associated barite cuts Nicola volcanic rocks on Iron Mountain, south of Merritt (Figure 1). A shaft

was sunk on the property to a depth of 30 metres and some high-grade material mined. There is no information on the quality or quantity of the barite.

Samuel (171) MINFILE Number: 093E 104
Latitude: 53°29'49" Longitude: 127°17'29" NTS: 93E/06W

Minor amounts of barite were noted at one locality within a quartz-calcite-ankerite alteration zone containing disseminated and fracture fillings of galena, sphalerite, chalcopyrite and pyrite.

Golden Goose (172) MINFILE Number: 093E 107
Latitude: 53°40'35" Longitude: 127°28'44" NTS: 93E/11W

Disseminations and fracture fillings of galena, sphalerite, chalcopyrite and barite are present in an argillic and propylitic alteration zone in sedimentary rocks of the Skeena Group.

Barb (173) MINFILE Number: 093E 109
Latitude: 53°34'00" Longitude: 127°03'00" NTS: 93E/11E

A silicified and argillically altered tuff-breccia zone containing quartz and barite occurs within a sequence of volcanic and sedimentary rocks of the Jurassic Hazelton Group.

Mona (132) MINFILE Number: 093K 032
Latitude: 54°06'10" Longitude: 125°44'18" NTS: 93K/04E

An open cut above Deep Creek at a locality 16 kilometres south of Burns Lake has exposed a vein less than a metre wide and 3 metres long. The vein cuts andesite and contains galena and minor chalcopyrite in a gangue of barite, andesite and quartz.

Silver Island (131) MINFILE Number: 093K 025
Latitude: 54°27'17" Longitude: 125°24'22" NTS: 93K/06W

Two or more fissure veins cutting diorite and rhyolite on Silver Island in Babine Lake, contain tetrahedrite, argentite and native sulphur with minor amounts of galena, sphalerite and chalcopyrite in a gangue of calcite, barite, and quartz. The veins are only a few centimetres wide along lengths of 15 metres or less.

Bornite (152) MINFILE Number: 093L 012
Latitude: 54°29'40" Longitude: 126°25'27" NTS: 93L/08W

Barite occurs in small veins within Jurassic Hazelton Group volcanic rocks north of Sunset Lake, in the Smithers area of the province. Also present is a stratabound stockwork zone containing chalcopyrite and tetrahedrite in a gangue of quartz, calcite, barite and jasperoid.

Rainbow (174) MINFILE Number: 093L 132
Latitude: 54°53'10" Longitude: 126°57'50" NTS: 93L/15W

Barite veinlets crosscut volcanic rocks of the Hazelton Group at a locality on the east side of Driftwood Creek, 8 kilometres northeast of Smithers.

Lion (134) MINFILE Number: 093M 146
Latitude: 55°55'18" Longitude: 126°06'00" NTS: 93M/16E

Fractures in volcanic rocks contain barite 48 kilometres north of Takla Landing. Rocks in the area are predominantly andesites and cherty rhyolites.

Pacific Fort St. John (50) MINFILE Number: 094A 001
Latitude: 56°40'00" Longitude: 120°37'20" NTS: 94A/10E

Barite was identified in core from drillhole Pacific Fort St. John No. 44 north of Dawson Creek (Figure 1). It occurs in "veinlike structures" in Permo-Pennsylvanian dolomite, 10 metres below the base of the Triassic, at a depth of 1930 metres (Pugh, 1959).

Imperial Kahntah (51) MINFILE Number: 094I 001
Latitude: 58°16'10" Longitude: 120°51'30" NTS: 94I/07

Barite occurs in brecciated dolomite of Mississippian age 2.5 to 4 metres below the base of the Triassic at a depth of 596 metres southeast of Fort Nelson (Figure 1). Fractures up to 2.5 centimetres wide are filled with barite. Some barite is also present in pores and fractures in the dolomite to a depth of 597 metres. The barite has a specific gravity of 4.5 (Pugh, 1959).

Smith River (176) MINFILE Number: 094M 018
Latitude: 59°34'42" Longitude: 126°27'24" NTS: 94M/09W

Barite stringers are reported near the falls on Smith River.

Snow (177) MINFILE Number: 103G 029
Latitude: 53°13'30" Longitude: 131°49'40" NTS: 103G/04W

A barite vein with associated galena and sphalerite occurs in Yakoun volcanics.

T (163) MINFILE Number: 103I 091
Latitude: 54°27'00" Longitude: 128°02'15" NTS: 103I/05E

A northwest-striking shear zone contains visible barite, chalcopyrite, malachite and azurite over widths of a few centimetres to 1 metre.

Silver Bow (135) MINFILE Number: 103P 118
Latitude: 55°23'42" Longitude: 129°28'00" NTS: 103P/06W

Narrow quartz-carbonate-barite-sulphide veins following bedding plane shears are exposed in the southwest fork of Lime Creek at an elevation of 960 metres. Hostrocks are microgreywackes. Sulphide minerals include pyrite, pyrrhotite, sphalerite and galena and the veins carry some gold.

Waratah (178) MINFILE Number: 103O 009
Latitude: 55°58'00" Longitude: 130°00'42" NTS: 103O/16E

Veins of almost pure barite, a few centimetres wide, are reported in the vicinity of Mount Dolly.

Tami (164) MINFILE Number: 104B 116
Latitude: 56°35'05" Longitude: 130°52'47" NTS: 104B/10W

Variable amounts of chalcopyrite, pyrite and malachite with minor galena and barite are associated with a quartz stockwork in volcanic flows and pyroclastic rocks.

Josh (179) MINFILE Number: 104B 290
Latitude: 56°39'06" Longitude: 130°48'50" NTS: 104B/10W

Quartz-barite veinlets with associated pyrite cut syenodiorite on the east fork of Snippaker Creek, about 4 kilometres south of the Unuk River.

Cuba (180) MINFILE Number: 104B 334
Latitude: 56°52'20" Longitude: 130°51'29" NTS: 104B/15W

Massive to disseminated magnetite, barite, pyrite and chalcopyrite with some gold values are associated with a skarn within a sequence of carbonate and fine clastic sedimentary rocks.

Wolf (181) MINFILE Number: 104G 045
Latitude: 57°40'57" Longitude: 130°10'10" NTS: 104G/09E

Barite occurs in north-striking veinlets within a diorite on the southern margin of the Klastline Plateau.

Bam (182) MINFILE Number: 104G 110
Latitude: 57°10'49" Longitude: 130°52'30" NTS: 104G/02W

Barite stringers are present in granite west of More Creek.

Dalvenie (165) MINFILE Number: 104I 003
Latitude: 58°11'48" Longitude: 129°53'12" NTS: 104I/04W

Pyrite, chalcopyrite, arsenopyrite and bornite in a matrix of altered rock, quartz and some barite, occur in a north-northeast-trending shear zone on the flanks of Thenatlodi Mountain, 35.4 kilometres south of Dease Lake.

Drill Creek (117) MINFILE Number: 104K 018
Latitude: 58°32'16" Longitude: 132°47'15" NTS: 104K/10W

A rhyolite breccia zone exposed on a tributary of the Sutlahine River contains some quartz and barite.

Berg (183) MINFILE Number: 104O 015
Latitude: 59°57'40" Longitude: 130°23'30" NTS: 104O/16W

Oxidized lead-zinc-silver-barite mineralization is present in brecciated and silicified Earn Group shales and siltstones.

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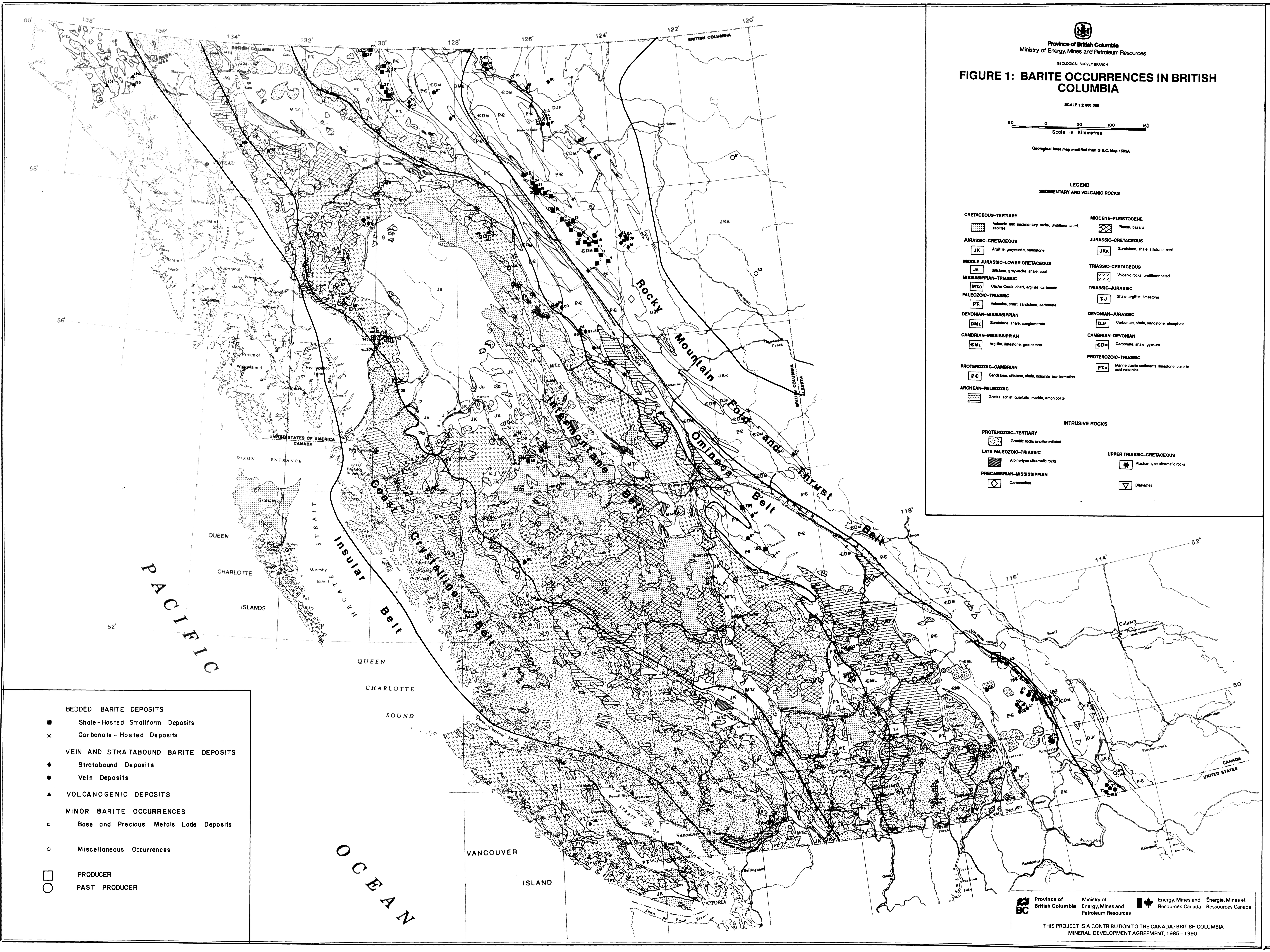
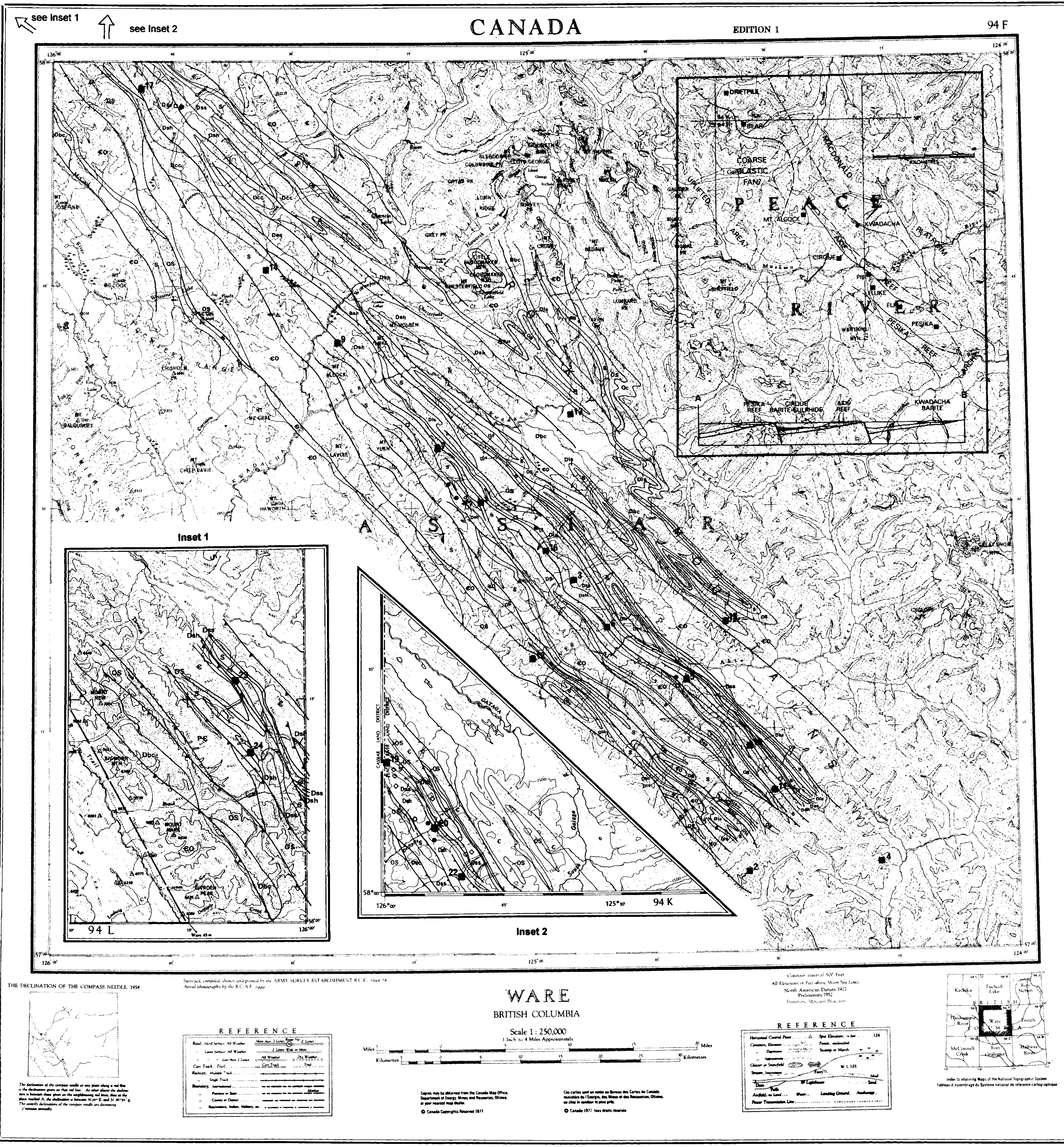


FIGURE 1: BARITE OCCURRENCES IN BRITISH COLUMBIA

OCCURRENCE	MINFILE NUMBER	NTS	LATITUDE	LONGITUDE	COMMODITIES
1. Cirque, Stronsay	094F 008	94F/6,11	57°30'30"	125°07'54"	Ba,Pb,Zn,Ag
2. Ern	094F 001	94F/2	57°06'00"	124°33'00"	Pb,Zn,Ba
3. Fluke	094F 009	94F/7	57°25'00"	124°54'00"	Pb,Zn,Ba
4. CT	094F 010	94F/1	57°05'00"	124°17'00"	Pb,Zn,Ba
5. Elf	094F 011	94F/7	57°18'00"	124°41'00"	Ba,Pb,Zn,Ag,Cu
6. Dog	094F 012	94F/7	57°22'00"	124°51'00"	Ba
7. Yule	094F 013	94F/11	57°34'00"	125°13'00"	Ba
9. Mount Alcock	094F 015	94F/11	57°41'00"	125°24'00"	Ba,Pb,Zn,Ag
10. Gnome	094F 016	94F/2,7	57°14'00"	124°33'00"	Ba
11. Gin	094F 017	94F/1,2	57°11'00"	124°30'00"	Ba
12. Del	094F 018	94F/7	57°20'00"	125°00'10"	Ba
13. Kwadacha	094F 020	94F/10	57°37'30"	124°54'30"	Ba
14. North Kwad	094F 021	94F/12,13	57°46'00"	125°33'00"	Ba
15. Sika	094F 022	94F/7	57°22'30"	124°35'00"	Ba
16. Pie	094F 023	94F/6,7	57°27'00"	124°58'00"	Ba,Pb,Zn
17. Bear	094F 024	94F/13	57°58'00"	125°48'00"	Ba,Pb,Zn
18. D	094K 066	94K/4	58°04'12"	125°54'54"	Zn,Pb,Ba
19. Roen	094K 068	94K/4	58°08'30"	125°59'00"	Ba
20. Driftpile Creek	094K 077	94K/4	58°04'00"	125°55'00"	Ba,Pb,Zn
21. Saint	094K 085	94K/4	58°08'00"	126°00'00"	Ba
22. Bob	094K 086	94K/4	58°01'00"	125°50'00"	Ba
23. Rough	094L 011	94L/1,8	58°16'00"	126°10'00"	Ba
24. X	094L 013	94L/1	58°11'36"	126°07'12"	Zn,Ba
25. Midway	104O 038	104O/16	59°56'00"	130°15'00"	Ba,Pb,Zn,Ag
26. Ewen	104O 050	104O/16	59°59'30"	130°11'30"	Ba
27. Blue	104P 104	104P/5,12	59°31'07"	129°58'25"	Ba,Pb,Zn
28. Chief North	104P 085	104P/13	59°47'00"	129°53'40"	Ba
29. Chief Southwest	104P 103	104P/12	59°42'51"	129°58'51"	Ba,Cu
30. ET	104P 116	104P/5	59°26'47"	129°51'09"	Ba
31. Jan	104P 117	104P/5	59°23'19"	129°49'23"	Ba,Ag,Cu,Pb,Zn
32. BV	094N 002	94N/4	59°03'30"	125°42'18"	Ba
33. Mo	094N 008	94N/4	59°06'00"	125°41'00"	Ba
34. Mun	094N 009	94N/4	59°05'00"	125°42'00"	Ba
35. Shawn	104P 043	104P/12,13	59°44'42"	129°46'00"	Ba,Cu
36. Mineral King	082KSE 001	82K/8	50°20'30"	116°25'42"	Pb,Zn,Ag,Cu,Ba
37. Yornoc	082KSE 009	82K/8	50°19'24"	116°14'24"	Ag,Pb,Zn,Ba
38. Jumbo	082KSE 043	82K/8	50°22'30"	116°25'30"	Ag,Pb,Zn,Ba
39. Bunyan	082KSE 046	82K/8	50°28'00"	116°06'12"	Au,Ag,Cu,Ba
40. Larrabee	082KSE 052	82K/8	50°28'18"	116°06'36"	Ba
41. Brisco	082KNE 013	82K/16	50°49'54"	116°19'36"	Ba
42. Silver Giant	082KNE 018	82K/16	50°55'18"	116°28'48"	Pb,Zn,Ag,Ba,Cu
43. Jubilee Mountain	082KNE 079	82K/16	50°56'00"	116°27'25"	Ba,Pb,Zn,Ag
44. Steamboat	082KNE 065	82K/9	50°41'36"	116°11'25"	Pb,Zn,Ag,Ba,Cu
45. Falcon	082KNE 076	82K/9	50°35'00"	116°20'00"	Ba
46. Lucky	082JSW 002	82J/5	50°25'51"	115°53'01"	Ba,Pb,Zn
47. Comin Thru Bear	093A 148	93A/14	52°53'10"	121°06'00"	Pb,Zn,Ag,Ba
48. WD	093J 072	92H/6	53°28'07"	121°27'07"	Zn,Pb,Ba
49. Belcourt	093I 007	93I/1,8	54°14'00"	120°20'00"	Zn,Ba
50. Pacific Fort St. John	094A 001	94A/10	56°40'00"	120°37'20"	Ba
51. Imperial Kahntah	094I 001	94H/7	58°16'10"	120°51'30"	Ba
52. Omineca Queen	093N 087	93N/9	55°31'30"	124°06'30"	Ba,Pb,Zn,Ag
53. Sheila	093N 172	93N/5	55°55'12"	124°42'24"	Pb,Zn,Ag,Ba
54. Vernon	093N 076	93N/15	55°56'30"	124°45'05"	Ba,Zn
55. Beveley	094C 023	94C/3	56°09'30"	125°03'30"	Ag,Pb,Zn,Ba,Cu
56. Weber	094C 024	94C/3	56°07'00"	125°03'00"	Pb,Zn,Ag,Ba
57. Elizabeth, Molly Gwynn	094C 030	94C/2	56°08'00"	124°55'00"	Zn,Pb,Ba,Ag
	094C 031				
	094C 032				
58. Davies and Gordon	094C 033	94C/2	56°08'00"	124°56'00"	Ag,Pb,Zn,Ba
59. Rain	094C 074	94C/12	56°30'00"	125°35'00"	Pb,Zn,Ag,Ba
60. Burn	094C 056	94C/5	56°27'00"	125°28'00"	Pb,Zn,Ag,Ba
	094C 082				
61. RB	094G 004	94G/4	57°12'00"	123°45'00"	Pb,Zn,Ba
62. Tri	094G 007	94G/4,5	57°18'00"	123°51'00"	Cu,Pb,Zn,Ba
63. Redfern Lake	094G 018	94G/5	57°23'00"	123°50'00"	Ba.Fl
64. Besa	094G 019	94G/5	57°22'00"	123°48'00"	Ba
65. Dodo, Hope, CBC	094K 058	94K/7,8	58°19'00"	124°19'54"	Ba,Zn,Pb
	094K 063				
	094K 064				
66. CTV	094K 059	94K/8	58°24'00"	124°23'00"	Pb,Zn,Ba
	094K 060				
	094K 061				
	094K 062				
67. Gem	094M 002	94M/8	59°26'54"	126°05'06"	Fl,Ba
68. Dan	094N 004	94N/11,12	59°44'18"	125°30'12"	Fl,Ba
	094N 005				
	094N 006				
69. Carlick	104P 023	104P/3	59°12'20"	129°13'00"	Ag,Pb,Zn,Ba
70. Atan	104P 047	104P/3	59°15'00"	129°15'00"	Ba,Pb,Zn,Cu,Ag
71. Vale	104P 052	104P/1	59°03'00"	128°06'40"	Zn,Pb,Ba
72. Dave	082FNE 138	82F/10	49°30'00"	116°40'00"	Ag,Pb,Zn,Ba,Fl
73. Phillips Creek	082GSE 001	82G/2	49°01'30"	114°59'45"	Ba
74. Fenster Creek	082GSE 002	82G/2	49°09'00"	114°53'20"	Ba
75. Outlier Ridge	082GSE 003	82G/2	49°06'40"	114°51'10"	Ba
76. Couldrey Ridge	082GSE 004	82G/4	49°02'30"	114°45'00"	Ba
77. BBX	082GNW 052	82G/13	49°49'20"	115°52'40"	Ba
78. Brenda	082GNW 065	82G/13	49°49'38"	115°58'05"	Cu,Au,Ag,Ba
79. Stan, Mount Pedley	082JSW 015	82J/5	50°24'45"	115°54'20"	Ba,Zn,Pb
80. Broken Hill	082KSE 005	82K/8	50°26'00"	116°29'00"	Ag,Cu,Pb,Ba
81. Shelly, Carole	082KSE 059	82K/8	50°19'18"	116°15'24"	Pb,Cu,Ba
82. Hat	082KSE 070	82K/8	50°30'00"	116°17'00"	Ba
83. Reno	082KNW 055	82K/11	50°40'48"	117°05'18"	Pb,Cu,Ba
84. Parson	082N 002	82N/2	51°01'18"	116°39'00"	Ba
85. Joy	093A 049	93A/9	52°41'00"	120°17'06"	Pb,Zn,Cu,Ba
86. Chalcopyrite	093E 060	93E/2	53°06'47"	126°39'13"	Cu,Pb,Ag,Ba
87. Two Bit Creek	093H 064	93H/4	53°12'54"	121°37'54"	Ba
88. Joker	093L 013	93L/9	54°31'39"	126°08'17"	Cu,Ba
89. Apex	093L 245	93L/8	54°25'00"	126°25'00"	Ag,Au,Cu,Pb,Zn
90. Egg	094G 002	94G/5	57°23'00"	123°50'00"	Zn,Pb,Ba,Fl
91. Nonda Creek	094L 001	94K/13	58°57'12"	125°31'48"	Ba
92. Mile 397	094K 004	94K/10	58°40'36"	124°46'42"	Ba,Fl
93. Muncho Lake	094K 038	94K/13	58°56'18"	125°45'30"	Fl,Ba
94. Fireside	094M 003	94M/14	59°46'00"	127°12'00"	Ba
95. Denis	094M 019	94M/11	59°42'00"	127°12'00"	Ba
96. SF	104G 035	104G/9	57°42'42"	130°17'15"	Ag,Au,Ba,Pb,Zn
97. Lon	104P 062	104P/7	59°26'30"	128°31'30"	Pb,Zn,Ba
98. Haines Road	114P 059	114P/15	59°48'00"	136°38'00"	Ba
99. Homestake	082M 025	82M/4	51°06'40"	119°49'40"	Ag,Pb,Zn,Cu,Ba
100. Twin Mountain	082M 020	82M/4	51°07'30"	119°45'40"	Pb,Zn,Ag,Cu,Ba,Au
101. Rea, Samatosum	082M 244	82M/4	51°08'50"	119°49'10"	Ag,Pb,Zn,Ba,Au
102. Joseph	082M 194	82M/12	51°32'05"	119°59'30"	Ag,Pb,Zn,Cu,Ba
103. Tia	082M 239	82M/12	51°33'35"	119°51'00"	Pb,Zn,Cu,Ag,Ba
104. Twin J	092B 001	92B/13	48°52'00"	123°45'00"	Cu,Au,Ag,Ba,Pb
	092B 002				
	092B 003				
105. Western Mines	092F 071	92F/12	49°34'30"	125°35'30"	Cu,Pb,Zn,Au,Ag,Ba
	092F 401				
106. Britannia Mine	092GNW 003	92G/11	49°36'00"	123°07'24"	Cu,Zn,Pb,Ag,Ba
107. Harrison	092HSW 013	92H/5	49°19'00"	121°56'30"	Cu,Au,Zn,Ag,Ba
108. Iam	092HSW 083	92H/5	49°21'24"	121°54'24"	Cu,Pb,Zn,Ba
109. Bigfoot	092HSW 094	92H/5	49°26'18"	121°55'48"	Cu,Ag,Pb,Zn,Ba
110. Brett-Cloud	092HSW 133	92H/5	49°23'30"	121°52'30"	Cu,Pb,Zn,Ba
111. Leadville	092ISE 052	92I/2	50°02'16"	120°45'48"	Pb,Zn,Ag,Cu,Ba
112. Iron Mountain	092ISE 198	92I/2	50°02'36"	120°45'36"	Ba
113. Bay	092L 137	92L/11	50°37'06"	127°29'36"	Mn,Pb,Zn,Ba
114. Nifty	093D 006	93D/9	52°34'52"	126°24'56"	Ag,Zn,Pb,Ba,Cu
115. Ascot	093L 024	93L/15	54°46'15"	126°43'50"	Zn,Pb,Ba,Cu,Au
116. Barite	103I 217	103I/2	54°07'50"	128°43'30"	Ba
117. Drill Creek	104K 018	104K/10	58°32'16"	132°47'15"	Cu,Pb,Ba,Pb
118. Tulsequah	104K 002	104K/12	58°44'30"	113°35'20"	Ag,Au,Cu,Pb,Zn,Ba
119. Low Herbert	114P 064	114P/7	59°20'50"	136°30'00"	Cu,Ag,Au,Zn,Ba,Pb
120. Low Jarvis	114P 071	114P/7	59°24'10"	136°28'50"	Cu,Zn,Ba
121. Basement	114P 043	114P/6	59°21'30"	137°19'00"	Ba,Ag,Cu,Pb,Zn,Au
122. Tamarack	082FNW 156	82F/14	49°47'18"	117°24'30"	Ag,Pb,Ba
123. Speculator	082FNW 151	82F/14	49°48'00"	117°21'12"	Pb,Ag,Au,Ba
124. Myrtle	082FNW 159	82F/14	49°48'54"	117°24'42"	Ag,Zn,Pb,Ba
125. Anna	082FNW 154	82F/14	49°47'36"	117°23'12"	Ag,Pb,Zn,Cu,Ba
126. Calumet and Hecla	082FNW 176	82F/14	49°45'48"	117°23'18"	Ag,Pb,Ba
127. Fisher Maiden	082FNW 079	82F/14	49°54'36"	117°12'54"	Ag,Pb,Zn,Au,Ba
128. Highland Light and Victor	082FNW 075	82F/14	49°52'00"	117°21'30"	Ag,Ba
129. Little Tim Mine	082FNW 157	82F/14	49°48'28"	117°21'55"	Ag,Pb,Zn,Ba,Cu
130. Ottawa	082FNW 155	82F/14	49°47'24"	117°23'54"	Ba,Zn,Au,Cu,Ag
131. Silver Island	093K 025	93K/6	54°27'17"	125°24'22"	Ag,Cu,Zn,Pb,Ba
132. Mona	093K 032	93K/4	54°06'10"	125°44'18"	Pb,Cu,Zn,Ag,Ba
133. Silver Queen	093L 002	93L/2	54°05'00"	126°43'48"	Zn,Ag,Au,Pb,Cu,Ba
134. Lion	093M 146	93M/16	55°55'18"	126°06'00"	Cu,Ba
135. Silver Bow	103P 118	103P/6	55°23'42"	129°28'00"	Ag,Ba
136. Kitsault Valley		103P/6,11,12	55°30'06"	129°31'00"	Ba,Pb,Ag
137. Stewart Area		103P/13	55°59'00"	130°00'00"	Ba,Au,Pb,Ag,Zn,Cu
138. Lucky Jim	104A 012	104A/4	56°09'30"	129°56'06"	Pb,Ag,Zn,Ba
139. Mountain Boy	104A 013	104A/4	56°08'30"	129°55'36"	Pb,Zn,Ag,Ba,Cu
140. Terminus	104A 016	104A/4	56°08'24"	129°52'48"	Ag,Pb,Zn,Ba,Au,Cu
141. Barite Gold Mines	104A 020	104A/4	56°07'42"	129°45'06"	Pb,Ag,Au,Ba
142. Red Top	104A 021	104A/4	56°07'42"	129°45'06"	Cu,Ag,Pb,Zn,Ba
143. George Copper	104A 029	104A/4	56°06'12"	129°45'54"	Cu,Au,Ba
144. Big Casino	104A 034	104A/4	56°05'54"	129°54'06"	Ag,Cu,Pb,Ba
145. Independence	104A 038	104A/4	56°04'48"	129°55'18"	Au,Ag,Pb,Zn,Ba
146. Silver Crown	104A 061	104A/4	56°09'06"	129°57'42"	Ag,Pb,Zn,Cu,Au,Ba
147. Shuniah Mine	104A 076	104A/4	56°12'30"	129°54'30"	Ba
148. Mess	094E 070	94E/2E	57°04'06"	126°39'05"	Ag,Pb,Cu,Ba
149. Al	094E 091	94E/6	57°28'00"	127°24'00"	Au,Ba
150. Moose	094E 031	94E/6	57°28'30"	127°12'30"	Pb,Zn,Ba,Au
151. Mets	094E 093	94E/6	57°26'00"	127°18'00"	Ba,Pb,Au
152. Bornite	093L 012	93L/8	54°29'40"	126°25'27"	Cu,Ag,Pb,Zn,Ba
153. Dome Mountain	093L 022	93L/10	54°44'55"	126°36'45"	Au,Ag,Pb,Zn,Ba
	093L 278				
	093L 279				
	093L 282				
154. Cole	093L 162	93L/2	54°05'34"	126°42'15"	Ag,Au,Pb,Zn,Cu,Ba
155. Cumberland	104B 011	104B/8	56°29'20"	130°28'53"	Au,Ag,Zn,Pb,Cu,Ba
156. Discovery	104B 022	104B/8	56°28'10"	130°10'53"	Au,Ag,Ba
157. Northwest	104B 281	104B/15	56°50'09"	130°54'42"	Au,Ag,Cu,Ba
158. Rock Candy	082ESE 070	82E/2	49°15'36"	118°29'18"	Fl,Ba
159. Silver Belle	082FSW 032	82F/3	49°11'28"	117°08'29"	Zn,Ba
160. Canada Belle	082FSE 054	82F/2	49°01'36"	116°54'36"	Ag,Pb,Zn,Ba
161. Rok, Cat	082GSE 037	82G/2	49°13'25"	114°42'48"	Fl,Pb,Zn,Au,Ba,Cu
162. Howell	082GSE 048	82G/2	49°13'00"	114°41'00"	Fl,Pb,Ag,Au,Ba
163. T	103I 091	103I/8	54°27'00"	128°02'15"	Cu,Ba
164. Tami	104B 116	104B/10	56°35'05"	130°52'47"	Au,Ag,Cu,Pb,Ba
165. Dalvenie	104I 003	104I/4	58°11'48"	129°53'12"	Cu,Au,Ag,Ba
166. Wolf, Cabin	082GSE 009	82G/2	49°00'45"	114°58'49"	Cu,Zn,Ba
	082GSE 010				
167. Deep Purple	082JSW 018	82J/3	50°12'05"	115°07'35"	Fl,Ba
168. River Jordan	082M 001	82M/1	51°07'30"	118°24'40"	Zn,Pb,Ag,Ba,Fl
169. Ruddock Creek	082M 082	82M/15	51°46'35"	118°54'10"	Zn,Pb,Ag,Fl,Ba
	082M 083				
	082M 084				
170. Mastodon North	082M 195	82M/1	51°15'00"	118°07'10"	Zn,Pb,Ag,Ba,Fl
171. Samuel	093E 104	93E/6	53°29'49"	127°17'29"	Pb,Zn,Cu,Ba
172. Golden Goose	093E 107	93E/10,7	53°40'35"	127°28'44"	Au,Ag,Pb,Zn,Ba
173. Barb	093E 109	93E/11	53°34'00"	127°03'00"	Au,Ag,Cu,Pb,Zn,Ba
174. Rainbow	093L 132	93L/15	54°53'10"	126°57'50"	Ag,Pb,Zn,Cu,Au,Ba
175. Was	094E 031	94E/6	57°28'42"	127°12'18"	Au,Ag,Pb,Zn,Ba
176. Smith River	094M 018	94M/9	59°34'42"	126°27'24"	Ba
177. Snow	103G 029	103G/4	53°13'30"	131°49'40"	Ba,Pb,Zn
178. Waratah	103O 009	103O/16	55°58'00"	130°00'42"	Ba
179. Josh	104B 290	104B/10	56°39'06"	130°48'50"	Mo,Cu,Ag,Ba
180. Cuba	104B 334	104B/15	56°52'20"	130°51'29"	Ag,Pb,Zn,Ba,Cu
181. Wolf	104G 045	104G/9	57°40'57"	130°10'10"	Cu,Au,Ba
182. Bam	104G 110	104G/2	57°10'49"	130°52'30"	Au,Ag,Bi,Sb,Ba
183. Berg	104O 015	104O/16	59°57'40"	130°23'30"	Ag,Pb,Zn,Ba
184 Bow	093H136	93H12W	53°35'57"	121°39'33"	Ba
185 Cunningham Creek	093A158	93A/14	52°55'30"	121°19'57"	Ba
186 Chris	082GNW088	82G/13	49°50'01"	115°52'10"	Ba
187 Surelock	082KNE081	82K/09	50°44'30"	116°25'30"	Ba
188 Pinto	082JNW016	82J/12	50°31'32"	115°53'47"	Ba



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

Figure 3: Barite Occurrences in the Gataga - Akie River District (94/F, K, L)

Geology compiled from Taylor and Stott (1973) and MacIntyre, 1982

LEGEND

UPPER TRIASSIC

- **Ŧr** Brown-weathering fossiliferous dolomitic siltstone, minor argillaceous limestone; basal unit of chert

MIDDLE/UPPER DEVONIAN

- **Dbc** BESA RIVER FORMATION: black clastics, undifferentiated
- **Dcc** WARNEFORD FORMATION: grey to brown-weathering sandstone, siltstone and polymictic pebble conglomerate; minor pelagic chert and shale
- **Dsh** GUNSTEEL FORMATION: blue-grey-weathering, black carbonaceous shale, silty shale, siliceous argillite locally with nodular and massive barite and laminated pyrite interbeds; minor chert, limestone, siltstone

LOWER/MIDDLE DEVONIAN

- **Dss** Grey to brown-weathering silty shale, siltstone, sandstone; minor siliceous argillite, limestone (basinal equivalent of unit Dls)
- **Dls** AKIE FORMATION: thick-bedded grey-weathering, fossiliferous limestone; limestone turbidites and debris flows with interbedded chert, quartz siltstone, calcareous siltstone, graptolitic shale, and black fetid limestone

SILURIAN

- **S** Brown to orange-weathering, laminated and flaser-bedded dolomitic siltstone; basal unit of grey blocky limestone, dolostone, and interbedded black chert and silty shale in Akie River area

MIDDLE ORDOVICIAN/SILURIAN

- **OS** ROAD RIVER FORMATION: black graptolitic shale; cream, brown, and grey-weathering, laminated calcareous siltstone and silty shale; basal unit of limestone turbidites and debris flows in Akie River area
- **Ov** Orange and green-weathering vitric, crystal and lapilli tuff, green microdioritic flows; locally interbedded with black graptolitic shale in Akie River area
- **Oc** SKOKI FORMATION: massive dolostone, debris flows

UPPER CAMBRIAN/LOWER ORDOVICIAN

- **€O** KECHIKA GROUP: light grey to cream-weathering, talcy, nodular phyllitic mudstone; argillaceous, wavy banded limestone; minor crystal tuff interbeds

LOWER/MIDDLE CAMBRIAN

- **€** Grey-weathering, thick-bedded, massive micritic limestone, quartzite; minor black shale, dolomitized breccia, and quartz pebble conglomerate

SYMBOLS

- Thrust fault
- Geological contact
- Nodular barite
- Massive bedded barite + Pb, Zn (Ag)

■ STRATIFORM BARITE OCCURRENCES

1	Cirque	13	Kwadacha
2	Ern	14	North Kwad
3	Fluke	15	Sika
4	CT	16	Pie
5	Elf	17	Bear
6	Dog	19	Roen, Saint
7	Yule	20	Driftpile Creek (D, P)
9	Mount Alcock	22	Bob
10	Gnome	23	Rough
11	Gin	24	X
12	Del		