MINERAL POTENTIAL INVESTIGATIONS IN THE BABINE MOUNTAINS RECREATION AREA (PARTS OF 93L/14E, 15W AND 93M/2W)

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KEYWORDS: Regional geology, mineral potential, Babine Mountains Recreation Area, porphyry, veins, silver, gold, copper, molybdenum.

INTRODUCTION

The Babine Mountains Recreation Area encompasses approximately 32 400 hectares of alpine and subalpine terrain within the central Babine Range east of Smithers, in west-central British Columbia. At the request of the Ministry of Environment, Lands and Parks, a mineral potential study of the region was conducted in accordance with Section 19 of the *Mineral Tenure Act* during late July and early August, 1991. The geoscience information collected will be used to guide government land-use decisions regarding conversion of the recreation area to Class "A" park status. The final results of the study will be released as a Ministry of Energy, Mines and Petroleum Resources, Geological Survey Branch report early in 1992.

The program was designed to augment geological mapping and metallogenic studies in the area, conducted by MacIntyre *et al.* (1987) and MacIntyre and Desjardins (1988a, b, unpublished data). Their database and geological map were the starting points for the project. Geological mapping of the northern part of the Babine Mountains Recreation Area, which was not included in the previous investigation, was also completed, including a small region northwest of Harold Price Creek. Regionally extensive belts of pyritic and limonite-stained altered rocks were examined and sampled. Rocks with anomalous precious metal concentrations, identified by previous studies (MacIntyre and Desjardins, 1988b), were re-examined and sampled. Field studies also included examination of selected metallic mineral prospects and deposits and general prospecting in areas of favourable geology. During the program three previously undocumented polymetallic vein occurrences were found: these are informally referred to as the "Silver King Lake", "Rhyolite" and "Little Joe Lake South" showings. These new showings were mapped in detail and sampled.

Consulting geochemist John Gravel collected stream-sediment and water samples from 39 sites to supplement the existing Regional Geochemical Survey (RGS) database for the area. The methods used to collect and analyze the samples were in accordance with standards set by the RGS program. The results of this survey will be included in the final report.

GEOLOGY OF THE BABINE MOUNTAINS RECREATION AREA

The Babine Mountains Recreation Area covers the central part of the Babine Range within the Skeena Mountains. This region is part of the Stikine Terrane; exposed lithologies include: subaerial to submarine calcalkaline volcanic, volcaniclastic and sedimentary rocks of the Lower to Middle Jurassic Hazelton Group; sedimentary rocks of the Middle to Upper Jurassic Bowser Lake Group and Lower Cretaceous Skeena Group; and calcalkaline continental volcanic-arc rocks of the Upper Cretaceous Kasalka Group. Upper Cretaceous to Lower Tertiary volcaniclastic rocks occur sporadically throughout the area. Intermediate to felsic dikes and stocks are Late Cretaceous to Early Tertiary in age (Figure 1-8-1). More detailed subdivisions and descriptions of rock units are oulined by MacIntyre and Desjardins (1988a).

The structural setting of the Babine Range is similar to that of the basin-and-range physiographic province of the southwest United States: the range is dominated by a series of northwest-trending tilted horsts and grabens. Skeena Group and Kasalka Group rocks are preserved in graben structures that are underlain by thick successions of Hazelton Group and Bowser Lake Group(?) strata. The rocks are generally folded: fold axes trend and plunge moderately to the southeast (MacIntyre *et al.*, 1987). Folds are less common in the northern part of the range where the structural style is dominated by southwest-dipping fault blocks.

Regional extension is thought to have developed during the Late Cretaceous, with associated extensive volcanism and stratovolcano development. Compression during Tertiary time caused reverse movement along older high-angle normal faults and resulted in upward thrusting and folding of subsided fault blocks. Major east to northeast-trending faults, also probably of Tertiary age, truncate and offset the dominant northwest-trending structural fabric of the range.

GEOLOGICAL MAPPING OF THE NORTHERN PART OF THE RECREATION AREA

Geological mapping of the northern part of the recreation area, (part of NTS 93M/2W) not previously mapped by the British Columbia Geological Survey Branch was completed (Figure 1-8-1). Rocks in this area are porphyritic andesite flows with interbedded epiclastic and tuffaceous sedimentary rocks of the Upper Cretaceous Kasalka Group. Minor pyritic and limonite-stained altered rocks contain small quartz-ankerite veins, but no other metallic minerals.

In addition, a small region northwest of Harold Price Creek (part of NTS 93M/3E) and outside the recreation area was examined and mapped. This area is underlain by massive augite-porphyritic basalt flows that are correlated with the Lower Cretaceous Rocky Ridge formation. The rocks show no indications of alteration and no quartz veins were seen; the region is therefore considered to be of low mineral-resource potential.

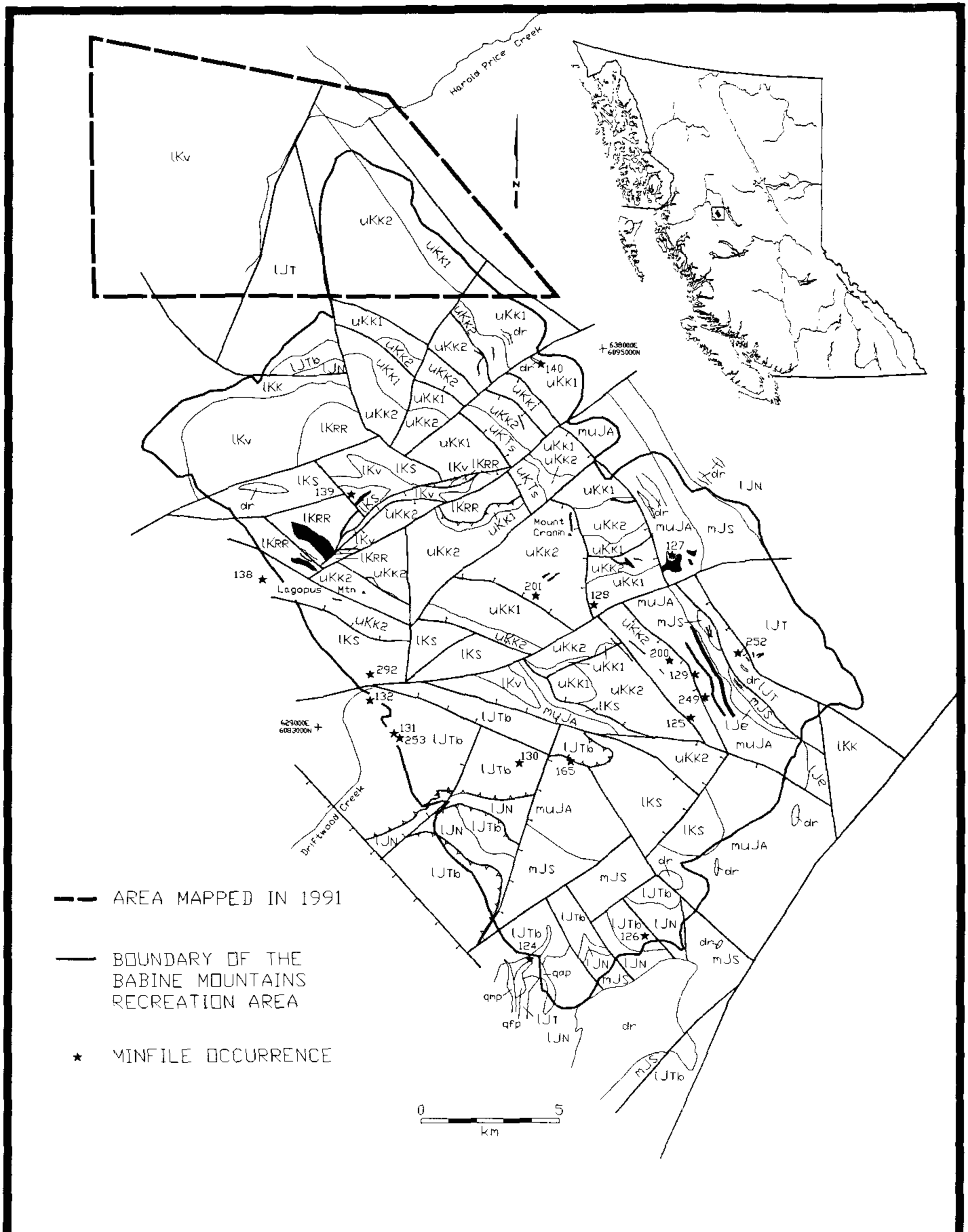

Figure 1-8-1. Simplified geology of the Babine Mountains Recreation Area (parts of 93L/14E,15W and 93M/2W) and the distribution of mineral occurrences (MINFILE numbers are preceeded by 093L-).

KNOWN MINERAL RESOURCES

MINERAL DEPOSIT TYPES

Mineral deposits and prospects within and adjacent to the Babine Mountains Recreation Area (Figures 1-8-1 and 2) are divided into three distinct groups (Table 1-8-1): silver-rich polymetallic veins, basalt-hosted copper-silver veins and porphyry copper-molybdenum (±gold) deposits associated with quartz diorite and quartz feldpsar porphyry intrusions.

Historically the area is known as a silver camp, with lesser lead, zinc and copper production; ancillary gold and cadmium were also recovered as byproducts (Table 1-8-2). Most of the metals have come from high-grade polymetallic veins at the Cronin mine, mainly during the period 1951 to 1974. Potentially economic ore reserves that remain at the Cronin mine were recently outlined by Southern Gold Resources Limited (Table 1-8-1; Quin, 198?). Less extensive polymetallic deposits and basalt-hosted copper-silver veins supported small-scale mining operations between 1917 and 1940; access trails to many of these prospects are now used as mountain bike and hiking trails.

THE BIG ONION PROSPECT

The Big Onion prospect, a low-grade large-tonnage calc-alkaline porphyry copper-molybdenum deposit on the south side of Astlais Mountain, is the most promising mineral property presently being explored within the bounds of the recreation area. The area was initially staked as the Cimbria group in 1918 and has subsequently received attention from many individuals and exploration groups. Efforts by Canadian Superior Exploration Limited during the middle 1970s,

TABLE 1-8-1
KNOWN METALLIC MINERAL OCCURRENCES WITHIN THE BABINE MOUNTAINS RECREATION AREA

MINFILE No. (093L)	Property Name	Deposit Type	Commodities	Property Status
124	Big Onion	porphyry Cu-Mo	Cu,Mo,[Au]	developed prospect[1]
125	Silver Pick	polymetallic vein	Ag,[Au],Cu,Zn;Pb	past producer
126	Mert	porphyry Cu-Mo	Cu,Mo,[Ag]	showing
127	Cronin	polymetallic vein	Ag,[Au],Pb,Zn;Cd,Cu	past producer[2]
128	Hyland Basin	polymetallic vein	Ag,[Au],Pb;ZN	past producer
129	Lorraine	polymetallic vein	Ag,Pb;Zn,Cu	past producer
130	Jud	basalt-hosted copper-silver vein	Cu,Ag	showing
131	Drift	basalt-hosted copper-silver vein	Cu,Ag;Pb	past producer
132	Driftwood	basalt-hosted copper-silver vein	Ag,[Au],Cu,Pb,Zn	past producer
138	AG	polymetallic vein	Ag,Pb;Zn	showing
139	Reiseter Creek	polymetallic vein	Cu,Pb;Zn	showing
140	Debenture	polymetallic vein	Ag,Pb,Zn	prospect
165	Shamrock	basalt-hosted copper-silver vein	Ag,Cu	showing
200	Silver Saddle	polymetallic vein	Ag,Au,Pb;Cu	showing
201	Silver King mine	polymetallic vein	Ag,[Au],Pb;Zn,Cu	past producer
249	Native	polymetallic vein	Ag,Pb,Zn	showing
252	Fisher	porphyry Cu	Cu	showing
253	Home	basalt-hosted copper-silver vein	Ag;Cu,Pb,Zn	showing
292	Viking	pyrite veinlets	[Ag,Au]	showing

[1] Reserves of 80 to 100 Mt with an approximate grade of 0.42% Cu, 0.02% MoS2, plus minor Au.
[2] Reserves of 47 kt with an approximate grade of 428 g/t Ag, 1.7 g/t Au, 0.16% Cu, 8.0% Pb, 8.0% Zn.

TABLE 1-8-2
HISTORICAL METAL PRODUCTION WITHIN THE BABINE MOUNTAINS RECREATION AREA

MINFILE No. (093L)	Property Name	Gold (grams)	Silver (grams)	Copper (kg)	Lead (kg)	Zinc (kg)	Cadmium (kg)
125	Silver Pick	466	209 230	886	420	836	
127	Cronin	8 772	8 169 918	10 394	1 367 178	1 517 881	18 012
128	Hyland Basin	342	84 880		3 396	397	
129	Lorraine		19 448		3 175		
131	Drift		132 779	4 711			
132	Driftwood	93	21 928	109	327	245	
201	Silver King mine	62	41 865	107	3 490	348	
	Total	**9 735**	**8 680 048**	**16 207**	**1 377 986**	**1 519 707**	**18 012**

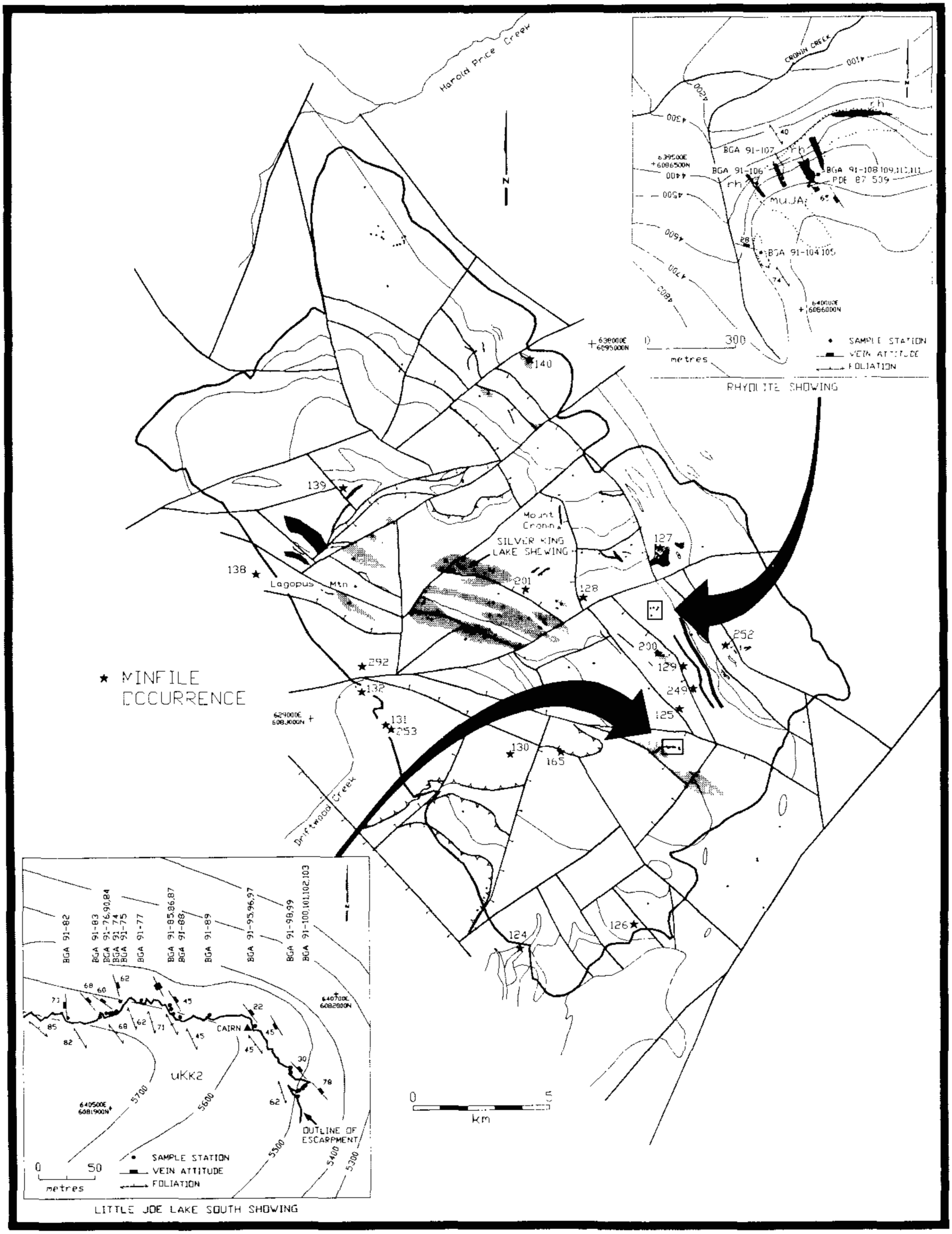

Figure 1-8-2. Distribution of lithogeochemical sample stations (represented by dots) and location of mineral occurrences; shaded areas represent pyritic and limonite-stained rocks. Insets are geological sketch maps of the "Rhyolite" and "Little Joe Lake South" showings with locations of sample stations; assays of samples collected at the showings are presented on Tables 1-8-3 and 4. The "Silver King Lake" showing is at the centre of the map area.

LEGEND

SEDIMENTARY AND VOLCANIC ROCKS

UPPER CRETACEOUS AND LOWER TERTIARY

uKTs	*tuffaceous sandstone*

UPPER CRETACEOUS

KASALKA GROUP

uKK2	*hornblende-feldspar-phyric flows and breccias*
uKK1	*lahars, lapilli tuffs and conglomerate; epiclastic rocks*

LOWER CRETACEOUS

SKEENA GROUP

lKS	*undifferentiated Skeena Group*
lKRR	*Red Rose formation: shale, orange-weathering siltstone well-bedded micaceous wacke and conglomerate*
lKv	*Rocky Ridge formation: green and maroon phyllitic tuff, minor augite-phyric basalt flows; phyllite*
lKK	*Kitsuns Creek formation: quartz-chert-pebble conglomerate, sandstone and shale*

MIDDLE TO UPPER JURASSIC

BOWSER LAKE GROUP

muJA	*Ashman Formation: argillite; sandstone and siltstone*

LOWER TO MIDDLE JURASSIC

HAZELTON GROUP

mJS	*Smithers Formation: fossiliferous feldspathic sandstone, greywacke and siltstone*
lJe	*Eagle Peak formation: red tuffs and basalt flows*
lJN	*Nilkitkwa Formation: conglomerate, siltstone and shale*
lJT	*Telkwa Formation: dacitic to basaltic flows and pyroclastic rocks*
lJTb	*amygdaloidal basalt flows*

INTRUSIVE ROCKS

LATE CRETACEOUS TO EARLY TERTIARY

(black)	*rhyolite intrusions*
qmp	*quartz monzonite porphyry*
dr	*diorite*
qfp	*quartz feldspar porphyry*
qdp	*quartz diorite porphyry*

and most recently by Varitech Resources Limited, have quantified reserves of copper and molybdenum (Table 1-8-1). Early in 1991 Varitech signed an option agreement whereby it can earn a 100 per cent interest in the property by spending $4 million on exploration over a 4-year period. Planned exploration during the first 2 years will include a diamond-drilling program designed to reconfirm grades previously outlined by the Canadian Superior percussion-drilling program, and expand reserves. Varitech plans to "twin" previous percussion-holes by drilling parallel diamond-drill holes with a larger diameter and to a greater depth than before. It has been suggested that the percussion-drilling program yielded lower-than-actual grades due to poor recovery from the fractured and altered hostrocks and an apparent concentration of metallic minerals, specifically bornite, at the bottom of the percussion-drill holes due to inadequate flushing after drilling each sample interval (J. Baker, personal communication, 1991).

POTENTIAL FOR UNDISCOVERED RESOURCES

The field-based component of this study gathered information to help assess the potential for undiscovered mineral resources within the recreation area. Although the region has been extensively prospected and explored during the past 90 years, there is still the possibility that some mineral wealth has gone undetected during that time. The goal here is to identify areas with significant mineral potential to ensure that the region is thoroughly tested before it is considered for reclassification as park land with no mineral exploration allowed.

The methods used to identify areas of interest included lithogeochemical sampling of alteration zones, and delineation and prospecting of regions deemed favourable for mineral deposits. Analysis of stream sediments is also a part of this evaluation, the results of which will form part of the final report.

A total of 244 rock samples was collected from the area during previous (MacIntyre and Desjardins 1988a,b) and present studies. Of these, 113 were taken from regionally extensive pyritic and limonite-stained altered rocks that form spectacular red-brown gossans across the central part of the area (Figure 1-8-2). These zones are essentially bleached sericitic schists and phyllites derived from volcanic and sedimentary rocks of the Upper Cretaceous Kasalka Group. The rocks contain abundant disseminated pyrite, some of which has altered to limonite. The rocks also exhibit breccia textures and are locally veined by quartz or quartz and epidote. The alteration zones, which are a few hundred metres wide, are semicontinuous for several kilometres along a west-northwest strike. They are coincident with shear zones of probable post-Late Cretaceous age that are truncated by northeast-trending Tertiary faults (Figure 1-8-2).

With few exceptions, samples taken from outcrop contain only background levels of precious and base metals; this is in agreement with the experience of local prospectors (Joe L'Orsa, personal communication, 1991). However, the altered rocks have not been tested at depth by diamond drilling and might contain metals beneath the leached rocks exposed at surface.

Previously Undocumented Mineral Occurrences

Three previously undocumented mineral occurrences were found during the course of prospecting and regional lithogeochemical sampling. All are within 1 or 2 kilometres of known prospects or mines and are on ground held in good standing by Vancouver-based companies. However, there are no indications of surface work at any of these showings and they may represent new occurrences with interesting exploration potential.

SILVER KING LAKE SHOWING

The "Silver King Lake" showing is at the head of Silver King Lake basin at an elevation of 1965 metres, approximately 2 kilometres northwest of the Silver King mine (MINFILE 093L 201; Figure 1-8-2). The showing consists of a quartz vein 3 centimetres wide, exposed for 2 metres along strike within feldspar-porphyritic andesite of the Upper Cretaceous Kasalka Group. Hostrocks are mylonitic to schistose and form lenticular zones within otherwise massive volcanic rocks. The foliated rocks have an easterly strike and a south dip, generally parallel to the regionally extensive pyritic and limonite-stained rocks.

The vein consists of vuggy, crystalline quartz and contains irregular blebs of galena, chalcopyrite and pyrite, 1 millimetre to several centimetres in size. A sample of the vein submitted for assay returned 11 ppb gold, 16 grams per tonne silver, 564 ppm copper, 1.59 per cent lead, 370 ppm zinc and 13 ppm cadmium. This vein is typical of the polymetallic veins of the region.

Plate 1-8-1. Polished slab of massive sulphide vein (sample BGA91-111) from the "Rhyolite" showing. Chalcopyrite, arsenopyrite and microscopic native gold are associated with quartz veinlets (dark grey) within massive to banded intergrowths of pyrrhotite, pyrite and arsenopyrite.

RHYOLITE SHOWING

The "Rhyolite" showing is near the headwaters of Cronin Creek, approximately 2 kilometres south of the Cronin mine (MINFILE 093L 127) and 1.5 kilometres northwest of the Lorraine prospect (MINFILE 093L 129; Figure 1-8-2). This site, initially sampled in 1987 in the course of regional geological mapping by MacIntyre and Desjardins (1988b), contains up to 4.32 grams per tonne gold in rhyolite veined by quartz, pyrite and arsenopyrite (sample PDE87-539 in Figure 1-8-2 inset and Table 1-8-3). The area was briefly re-examined during the present study to document the nature and distribution of the mineralization.

The showing consists of sulphide veins and stockworks within and adjacent to rhyolite dikes that cut black argillite of the Middle to Upper Jurassic Ashman Formation (Figure 1-8-2 inset). The sulphide concentrations are predominantly pyrrhotite and pyrite, with lesser arsenopyrite, chalcopyrite and specularite, minor sphalerite and microscopic native gold (Plate 1-8-1). The assemblage forms massive banded veins up to 15 centimetres wide that are spatially associated with rhyolite and disseminations and stockworks of sulphides within rhyolite. These are exposed over an area of approximately 25 square metres. Samples of sulphide veins and stockworks submitted for assay returned up to 13.2 grams per tonne gold and 86 grams per tonne silver, and appreciable copper and zinc concentrations (Table 1-8-3).

Argentiferous polymetallic mineralization (quartz veins with coarsely intergrown pyrite, sphalerite, galena, chalcopyrite, boulangerite and tetrahedrite) at both the Cronin mine and the Lorraine prospect (north and south of the Rhyolite showing) is closely associated with rhyolite intrusions. The area between these two past-producers is riddled with dikes and irregular bodies of rhyolite – an obvious place to expect similar mineralization. Veins at the "Rhyolite" showing also have a spatial association with rhyolite, but are mineralogically and texturally distinct from assemblages at the Cronin and Lorraine: "Rhyolite" veins contain abundant pyrrhotite and arsenopyrite with significant associated gold (a higher temperature assemblage), and occur as pod-like veins of almost massive sulphide, possibly manto-style veins?.

LITTLE JOE LAKE SOUTH SHOWING

The "Little Joe Lake South" showing is exposed in the prominent north-facing cliff of the ridge south of the eastemmost lake at the headwaters of Little Joe Creek. This area is approximately 1.2 kilometres south of the Silver Pick prospect (MINFILE 093L 125; Figure 1-8-2). Sulphide-bearing quartz-ankerite veins are exposed along the ridge escarpment for more than 250 metres within massive to foliated porphyritic andesite and tuff of the Upper Cretaceous Kasalka Group. The foliated rocks strike northwest and dip steeply to moderately southwest or northeast. Within the area of extensive quartz veining, the hostrocks are schists and phyllites speckled with fine-grained ankerite (or limonite after ankerite). In contrast to similar vein deposits nearby, rhyolite and other intrusions are not in evidence.

TABLE 1-8-3
ASSAY RESULTS OF SAMPLES COLLECTED FROM THE "RHYOLITE" OCCURRENCE

Sample No.	Au	Ag	Cu	Pb	Zn	Cd	As	Sb
BGA91-104	4	<0.4	24	5	133	0.3	7.8	0.4
BGA91-105	23	<0.4	4	3	47	<0.3	310	<0.1
BGA91-106	<2	<0.4	5	6	53	<0.3	12	0.8
BGA91-107	<2	<0.4	15	9	134	0.6	22	1.3
BGA91-108	5370	12	213	54	68	0.3	62000	[illegible]7
BGA91-108*	3950							
BGA91-109	11600	7	555	33	138	2.0	140000	2[illegible]0
BGA91-109*	9490							
BGA91-110	12800	38	273	138	28	<0.3	99000	[illegible]9
BGA91-110*	13200							
BGA91-111	12300	86	1.09%	50	0.12%	24	31000	[illegible]7
BGA91-111*	10500							
PDE87-539	4320	2	37	25	90			

Units and analytical methods:

Au in ppb; all other elements in ppm, except where noted in per cent (%).

Au, As and Sb by neutron activation (Actlabs, Ancaster, ON).

All other elements by atomic absorption spectrophotometry (MEMPR Analytical Sciences Laboratory, Victoria, B.C.).

* analysis by classic fire assay (Chemex Laboratories, Vancouver, B.C.).

Sample descriptions:

BGA91-104 quartz vein with py, lm (15 cm thick/exposed for 7 m), BGA91-105 quartz vein with py, ank (10 cm/2 m), BGA91-106 rhyolite with lm; BGA91-107 rhyolite with lm; BGA91-108 sulphide-quartz vein with py, apy, cpy (3 cm/2 m), BGA91-109 sulphide-quartz vein with py, apy, cpy, sp (1–3 cm/1 m); BGA91-110 sulphide-quartz stockwork with py, apy, cpy, gn (30 cm/2–3 m); BGA91-111 solid sulphide vein composed of po, py, apy, cpy, spec, sp, trace microscopic native Au (15 cm/unknown – sample not in-situ); PDE87-539 rhyolite with lm, py, apy. Abbreviations: ank=ankerite, apy=arsenopyrite, cpy=chalcopyrite, gn=galena, lm=limonite, po=pyrrhotite, py=pyrite, sp=sphalerite, spec=specularite.

The quartz veins are generally 2 to 10 centimetres wide and are exposed along strike for an average of 3 to 5 metres along the face of the escarpment. The thickest and most sulphide-rich vein is 25 centimetres wide and is exposed intermittently for 20 metres (stations BGA91-76, 90, 84 in Figure 1-8-2 inset). Vein quartz is massive and milky white to slightly banded or blotchy with respect to the distribution of sulphides and ankerite (or pockets of limonite after ankerite). Cockscomb quartz and vuggy textures are present but not common. Ankerite (and limonite) veinlets and slices of ankeritized wallrock subparallel to the vein walls give an impression of poorly developed ribbon texture.

Metallic minerals within the veins include: galena, sphalerite, tetrahedrite, boulangerite, chalcopyrite, specularite and pyrite, and occur as irregular concentrations several millimetres to 2 centimetres in size. The vein assemblages are similar to those at the Cronin mine, but the abundance of metallic minerals within the veins is much less than at Cronin.

Aside from a generally pervasive ankeritic component to the host phyllite, alteration adjacent to the veins is negligible; small amounts of chlorite (±sericite) are present along or close to the vein margins, but seem to be part of the vein rather than a product of wallrock alteration.

The quartz veins have variable morphology, and their relationships with the host phyllites indicate that there are several generations of veins, each related to intervals of progressive structural deformation. Veins that comprise the west part of the Little Joe Lake South showing are almost all concordant with host phyllite and are variably deformed. The thickest and most sulphide-rich vein is also approximately concordant within the phyllite, but is internally drag folded and probably thickened. Fold structures within the vein, defined by the alignment of acicular boulangerite, probably formed during shearing and dilation along foliation.

Other veins that closely follow the foliation of the hostrocks are planar to slightly warped. They contain irregular clots of sphalerite and galena, and have irregular margins, but are generally not internally deformed. These veins were probably emplaced during the latest stages of shearing and dilation along the foliation.

Veins that comprise the east part of the prospect are largely discordant to foliation. Many are flat to gently north-dipping and occur in regularly spaced vein sets within the phyllites. The veins, which are generally undeformed and have sharp contacts, occupy planar dilations perpendicular to the foliation of the hostrocks. Blebs of galena and sphalerite, 1 to 2 centimetres in diameter, are common within veins, many of which are less than 5 centimetres wide. Veins in similar structural settings are slightly warped or folded and the host phyllites deformed. Drag-folding in the phyllites suggests down-dip, or normal movement along fractures (now occupied by quartz veins); movement was probably synchronous with vein emplacement.

Quartz veins also occupy crescent-shaped fractures where slip along foliation has induced shear folding and accompanying dilation perpendicular to the foliation direction. Veins that occupy these dilatant zones are irregular in width and continuity, but are commonly widest in the fold crests. Quartz concentrations of this type, which reach widths of up to 50 centimetres, are riddled with irregular blebs and veinlets of sphalerite, galena and chalcopyrite.

Veins were sampled wherever it was safe to do so. The largest vein (stations BGA91-76, 90, 84 in Figure 1-8-2 inset) contains up to 104 grams per tonne silver and 8.25 per cent lead, whereas other veins contain up to 26 grams per tonne silver (Table 1-8-4).

CONCLUDING REMARKS

Preliminary results of this study are as follows:

- The northern part of the recreation area, including the region to the northwest of Harold Price Creek, is underlain by rocks that are not likely hosts of metallic mineral deposits. This is exemplified by the lack of alteration and lack of mineral showings in the area. This area is considered to have low mineral-resource potential.
- The central part of the recreation area contains most of the known mineral occurrences, some of which have yielded economically extractable quantities of metals. Most of the important past-producers and prospects are concentrated in the east-central region, roughly coincident with the distribution of rhyolite in the area. The detection of two previously undocumented mineral showings within the area during this study indicates that the region still has high mineral resource potential. The most important new occurrence is the Rhyolite showing because of its significant gold content.
- Surface samples collected from regionally extensive belts of pyritic and limonite-stained rocks that traverse the central part of the recreation area do not contain significant concentrations of economic metals, but have minor associated polymetallic mineralization (*e.g.*, the Silver King Lake showing). Proper evaluation without diamond drilling is difficult because of the immense size of the region occupied by the altered rocks. Undetected metal deposits may be present beneath the leached capping of iron-rich altered rocks. For this reason the area is considered to have an intermediate rank of resource potential.
- The southernmost part of the recreation area covers a known resource of copper with molybdenum and gold at the Big Onion deposit. This area has very high mineral resource potential.

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TABLE 1-8-4
ASSAY RESULTS OF SAMPLES COLLECTED FROM THE "LITTLE JOE LAKE SOUTH" OCCURRENCE

Sample No.	Au	Ag	Cu	Pb	Zn	Cd	As	Sb
BGA91-74	<5	10	66	0.41%	0.38%	22	8	220
BGA91-75	<5	0.4	16	18	163	0.6	<2	20
BGA91-76	<12	32	163	2.53%	0.14%	10	<2	1400
BGA91-77	<5	0.6	4	16	39	<0.3	3	2.6
BGA91-82	<5	<0.4	11	19	71	<0.3	4	4.2
BGA91-83	<38	17	413	1.83%	1.07%	60	110	4100
BGA91-84	<36	28	73	1.80%	0.27%	22	<8	5600
BGA91-85	<5	<0.4	4	15	34	<0.3	4	2.1
BGA91-86	12	0.6	15	30	83	0.5	15	3.1
BGA91-87	<5	0.4	19	63	70	0.4	4	1.7
BGA91-88	<5	0.4	53	66	22	0.3	3	3.4
BGA91-89	<5	<0.4	3	66	57	0.3	<2	2.3
BGA91-90	<5	95	112	8.25%	0.14%	11	<2	500
BGA91-90DUP	7	104	115	8.25%	0.12%	10	14	510
BGA91-95	26	11	53	0.60%	0.36%	31	2.9	8.7
BGA91-96	15	6	110	0.18%	3.40%	300	2.0	6.7
BGA91-97	<2	0.4	9	228	98	1.5	2.1	2.7
BGA91-98	<2	2	10	687	470	3.0	1.9	5.8
BGA91-99	2	6	36	869	0.12%	11	3.7	18
BGA91-100	5	3.5	69	168	730	2.9	6.1	40
BGA91-101	<2	<0.4	3	20	135	1.0	5.1	0.8
BGA91-102	2	1.4	7	38	43	0.3	5.7	5.0
BGA91-103	52	26	337	0.25%	2.60%	140	77	110

Units and analytical methods:

Au in ppb; all other elements in ppm, except where noted in per cent (%).

Au, As and Sb by neutron activation (Actlabs, Ancaster, ON).

All other elements by atomic absorption spectrophotometry (MEMPR Analytical Sciences Laboratory, Victoria, B.C.).

Sample descriptions:

BGA91-74 quartz vein with gn, boul, sp, tet, mal, cpy (10–15 cm thick/exposed for 5 m); BGA91-75 quartz vein with lm, gn (40 cm/3 m); BGA91-76 quartz vein with lm, gn, boul, sp, tet, mal, cpy (3 veins 2–25 cm/20 m); BGA91-77 quartz vein with lm, py, sp (35 cm/3 m); BGA91-82 quartz vein with lm, py, gn (80–100 cm/12 m); BGA91-83 quartz vein with lm, tet, sp, gn, mal (10–25 cm/8 m); BGA91-84 quartz vein with lm, gn, boul, sp, tet, mal, cpy (3 veins 2–25 cm/20 m); BGA91-85 to 87 quartz vein with lm, py, sp, gn (15–20 cm/20 m); BGA91-88 quartz vein with lm, py sp (40–50 cm/3 m); BGA91-89 quartz vein with lm, py, tet, gn (10 cm/1 m); BGA91-90 quartz vein with lm, gn, boul, sp, tet, *mal, cpy (3 veins 2–25 cm/20 m); BGA91-95 quartz vein with lm, gn, sp, py (2–5 cm/1.5 m); BGA91-96 quartz vein with lm, sp, gn, py (2–6 cm/1.5 m); BGA91-97 quartz vein with* lm, gn (50 cm/5 m); quartz vein with lm, gn (100 cm/8 m); BGA91-99 quartz vein with lm, gn (1–40 cm/5 m); BGA91-100 quartz vein with lm, mal, gn, sp, cpy, py (5–20 cm/5 m); BGA91-101 quartz vein with lm, gn sp (1–50 cm/3 m); BGA91-102 quartz vein with lm, gn, sp (1–30 cm/5 m); BGA91-103 quartz vein with lm, mal, gn, cpy, py (3–10 cm/3 m). Abbreviations: boul=boulangerite, cpy=chalcopyrite, gn=galena, lm=limonite, mal=malachite, py=pyrite, sp=shalerite, tet=tetrahedrite.

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