

BC Geological Survey  
Assessment Report  
30192

**GEOCHEMICAL  
and  
ROCK-SAMPLING  
PROGRAM 2007/2008  
REPORT**

on the

**LITTLE GEM COBALT-GOLD  
PROPERTY**

(19 Tenures; contiguous)

Project Centre on Tenure **501174** owned by  
N. Church and R. McMillan

**Gold Bridge/Bralorne Area  
South-Central British Columbia  
Lillooet Mining Division**

NTS 92J15W (92J.086)  
50° 53'47"N, 122° 57'17" W

by

**Goldbridge Mining Ltd.  
947 Frederick Road  
North Vancouver, BC  
V7K 1H7**

**Project Manager and Report Author :**

**A. J. Beaton, P.Eng (Mining)**

Report submission date : Sept. 9, 2008

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## **INTRODUCTION**

In October of 2007, Goldbridge Mining Ltd. completed a physical examination and underground rock-chip sampling program, at the Little Gem Cobalt-Gold Prospect. The Little Gem, located 17 kilometers south-east of Goldbridge, in the Bralorne Gold Camp, has an historical resource of over 8,000 tonnes of 0.65oz/ton Au and 3.0% Co, in one zone, in the No.1 Adit. The purpose of the program was to evaluate the feasibility of planning an underground bulk sample, or, focusing on long-term exploration..

Entech Environmental Consultants Ltd. were retained to initiate a Baseline Hydrological Data Review, prior to any physical exploration or mining. As part of the program, the company made the 4.5 kilometer mine road, to the old mine site, passable for an 8-wheel drive Argo vehicle. The Roxey Creek cabin was repaired to house a small work crew, for a short term.

Almost 1 tonne of rock samples were taken from 167 channel samples, including 200 kilograms of metallurgical samples, from No.1 Adit and No.3 Adit. No. 2 Adit was inaccessible due to caving, at the portal.

The results of this program, including all the known data, determined that accessing No.1 or No.2 Adit, for purposes of mining a bulk sample, was not feasible. Further exploration is required to define and expand the resource, in Adits 1 and 3.

All the information from examining the portals and adits correlated very well with the old reports and mapping.

Assaying of well-mineralized samples also correlated very well with the historical grades and composition of gold and cobalt values.

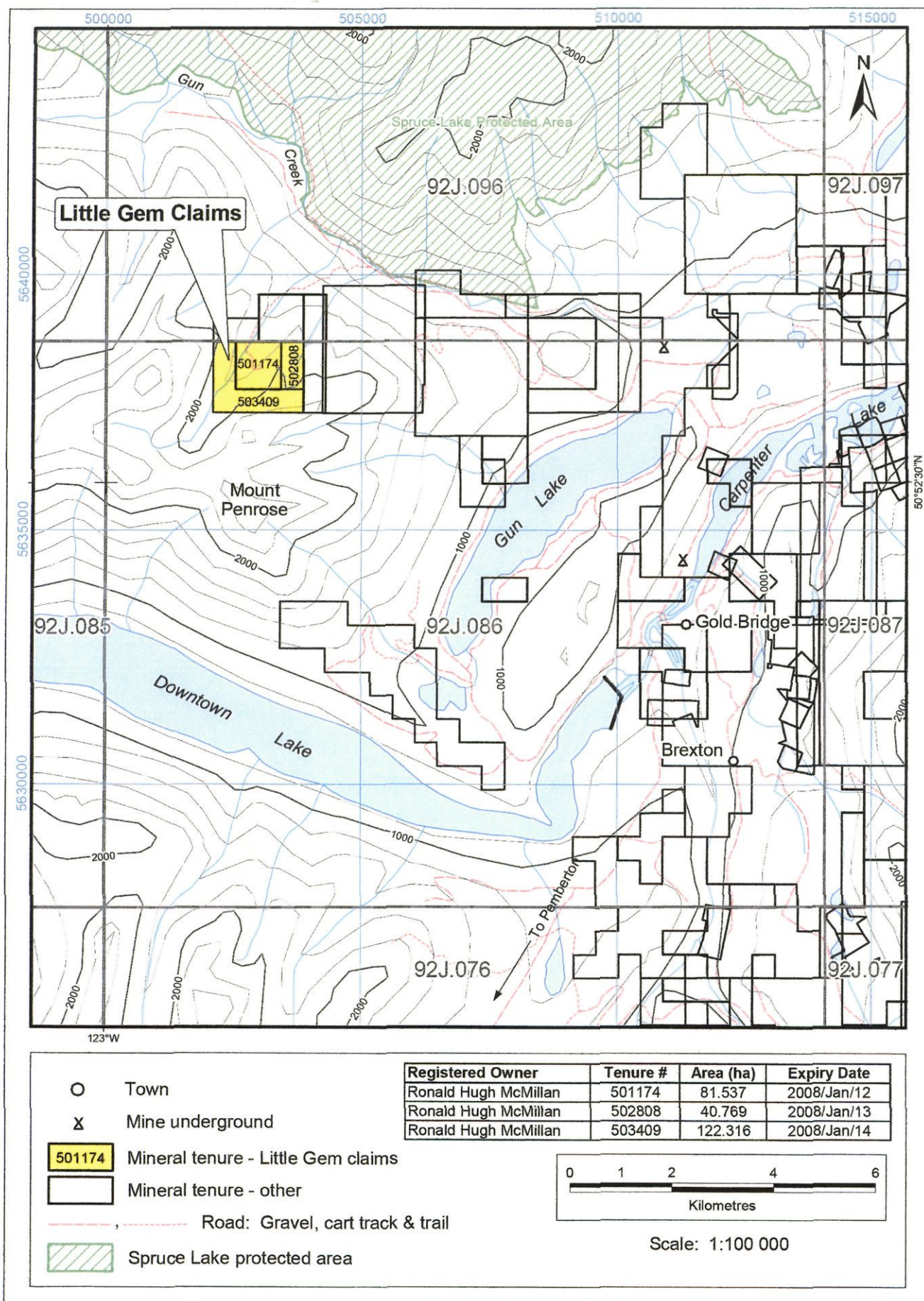


Figure 1 Little Gem claims location



## **ROAD and TRAIL WORK and ACCESS to LITTLE GEM MINE**

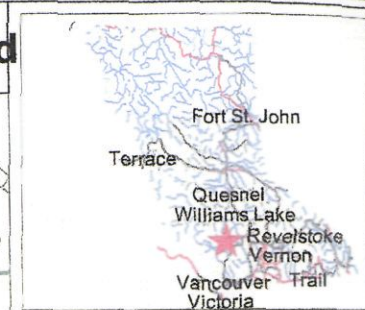
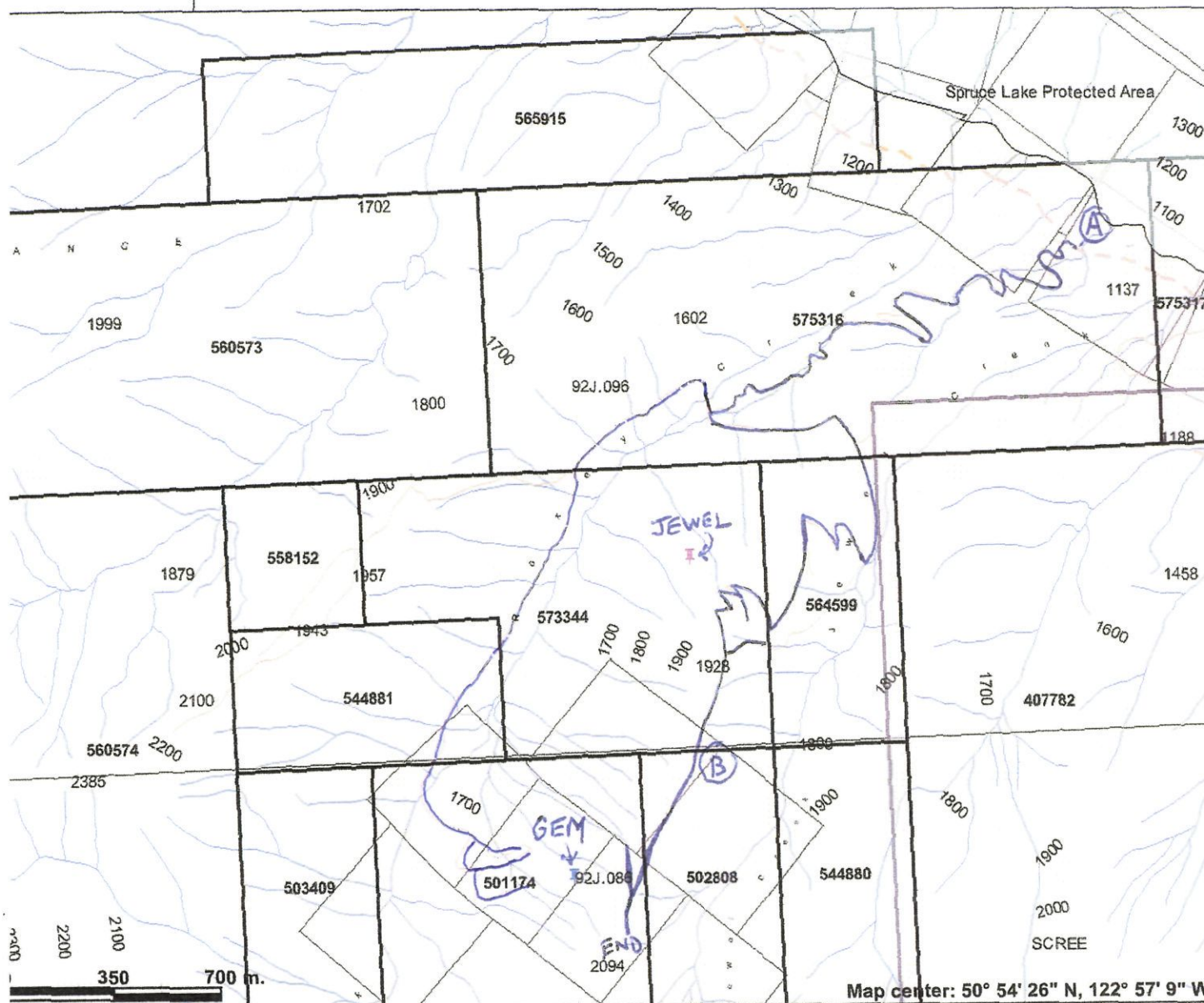
**The follwing page shows a map that indicates the roads and trails from the Slim Creek Logging Road, near the Spruce Lake Campground, which provide vehicle access to the mine and project area.**

**This road was once an active mine haulage road but, with time, became overgrown with dense alders and considerable tree blow-down. Many medium sized boulders had littered the road, also, over the years.**

**Enough chainsaw work, boulder rolling, hole-filling, and boulder winching was required to open the road for travel by the 8-wheel All-terrain ARGO vehicle.**

**Labour and costs for this work are part of the Geochemical/Rock Sampling Project. All workers in the sampling project contributed to this necessary road maintenance .**

# Jewel Mine Road (in blue ink). 6 kms Upgrade Work Required



## Legend

### MINFILE Status

- Producer
- Past Producer
- Developed Prospect
- All others

### Indian Reserves

### National Parks

### Parks

### Mineral Tenure (current)

### Mineral Claim

### Mineral Lease

### Mineral Reserves (current)

### Placer Claim Designation

### Placer Lease Designation

### No Staking Reserve

### Conditional Reserve

### Release Required Reserve

### Surface Restriction

### Recreation Area

### Others

### Integrated Cadastral Fabric

### Survey Parcels

### BCGS Grid

### Annotation (1:20K)

### Transportation - Points (TRIM)

### Helipad

### Transportation - Lines (TRIM)

### Airfield

### Airport

### Airstrip

### Airport Abandoned

### Ferry Route

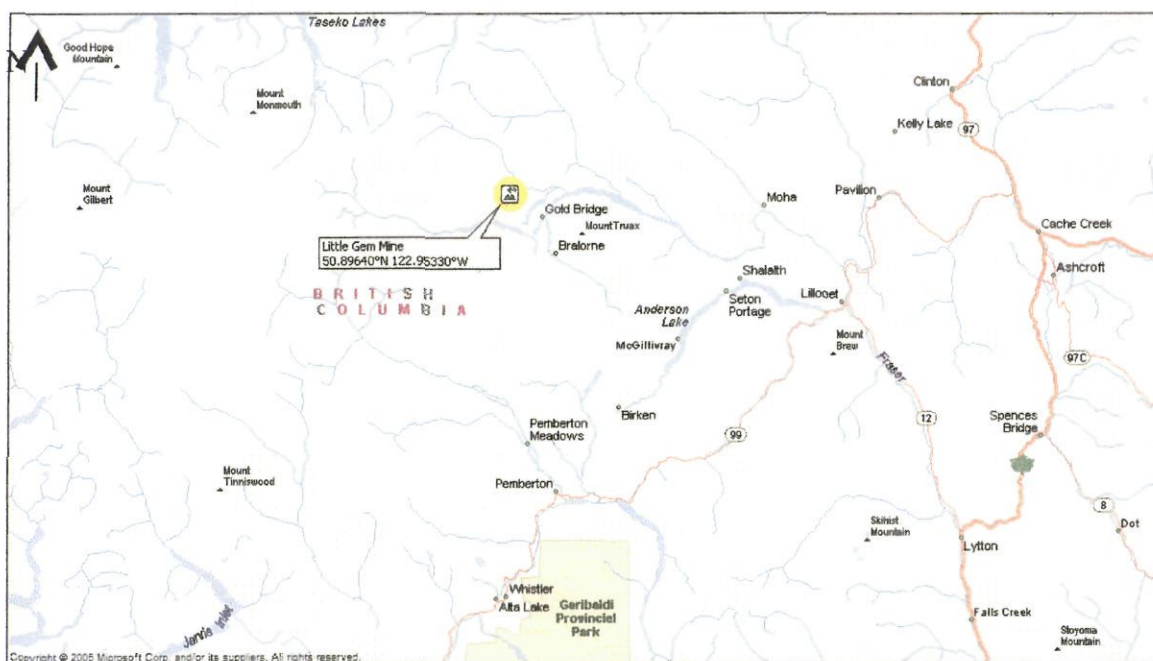
### Road (Gravel Undivided) - 1 Lane



Scale: 1:20,000

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

- (A) START OF MINE RD AT SLIM CREEK RD; 200m SW OF SPRUCE LK CAMPGROUND.
- (B) MID-POINT BETWEEN JEWEL AND GEM = CENTRE OF EXPLORATION AREA, ALONG THE RIDGE ROAD.



**Figure 3** Location map of Little Gem Mine, situated NW of Gold Bridge and Bralorne, BC.

## ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

### Access

Access to the property from Gold Bridge is via Gun Lake and thence on the Slim Creek logging road. At km. 12.9 on the Slim Creek road, a mountain road leads up Roxey Creek to the mine workings, a distance of 3 km. as the crow flies. The access road is partially overgrown by alders and willows at the lower end and some cutting will be necessary to allow four-wheel drive vehicle access.

### Climate

The general area has a high elevation northern inland dominated climate. Dramatic variations in the Little Gem's climate are caused by a combination of elevation, rainshadow effects, and latitude. Generally winters are long and summers cool and short with only occasional hot spells. Average January highs are  $-7^{\circ}\text{C}$ , while July averages to  $22^{\circ}\text{C}$ . These temperatures apply to valley bottoms. At higher elevations temperatures are about  $5^{\circ}\text{C}$  to greater than  $7^{\circ}\text{C}$  cooler. Annual precipitation ranges from less than 380mm at lower elevations to over 1,250mm at higher elevations. The Little Gem area can be worked from June to October most years without handling or plowing snow.



Temperatures from the Bralorne station varied from a low of -36°C in winter to a maximum of 37.8°C in summer. Overall, the annual mean temperature was 4.6°C. In terms of precipitation, total annual rainfall averaged 386mm while total snowfall averaged 231 cm.

## **PHYSIOGRAPHY**

The Co-Au showings are exposed on a steep hillside in the Dickson Range, part of the eastern Coast Mountain Ranges. Steep peaks are separated by wooded valleys and slopes. The timber line is between 1700 metres to 2100 metres in the area. The property is located on a west-facing timbered slope between the elevations of 1800 and 2100 metres. The area is timbered with Douglas fir, spruce and pine with light undergrowth.

The area of the Little Gem Claims has been heavily affected by Pleistocene to recent glaciation with arêtes, cirques, tarns and hanging valleys common in the area. Steep slopes are often covered by a thin veneer of talus.

The lower levels of the property are heavily forested. There is adequate water from several creek drainages for mineral exploration on this property.

## **PROPERTY HISTORY**

Pink cobalt-bloom on weathered mineralization led to discovery of the Little Gem showings by prospectors W.H. Ball and William Haylmore in 1934. The prospectors sold their interests to J.M. and R.R. Taylor in 1937. The property was then optioned to the United States Vanadium Corporation between 1938 and 1939, and during that time the upper (#1) adit and most of the lower (#2) adit were driven. United States Vanadium Corp. subsequently suspended operations in Canada.

In 1940, the property was optioned by Bralorne Mines. The #2 adit and two short raises were completed. Due to the war, the Bralorne option was dropped.

In 1952, Estella Mines optioned the property and completed a switchback road from the Gun Creek Bridge to the Little Gem camp and completed twelve (12) short A-X diamond drill holes totalling 667 feet (203.4 metres) from the #2 adit. Allen (1956) reported incomplete results from seven of the drill holes as follows:



TABLE /  
1952 Estella Drilling

Hole# / length	Location	Angle	Dip	Core Length	Au Oz/ton	Co%
1 / 30 ft.	SW drift	S82E	0	2.5'	0.20	1.28
				20.0'	Disseminated sulphides and lost core	
				10.9'	0.36	1.39
				3.5'	disseminated sulphides	
2 / 24 ft.	SW drift	S88E	0	1.7'	0.28	0.93
				1.3'	massive sulphides and lost core	
3 / 28 ft.	SW drift	S12E	0	1.5'	0.28	2.34
				1.5'	massive sulphides and lost core	
				9.5'	0.35	0.90
4 / 28 ft.	SW drift	S17W	0	6.5'	massive sulphides and lost core	
5 / ?	SW drift	S52E	-25°	3.3'	lost core and heavy sulphides	
				4.7'	massive to disseminated sulphides	
6 / 97 ft.	SW drift	S88E	-25°	9.0'	lost core and massive sulphides	
				2.2'	lost core, massive to disseminated sulphides	
7 / 68 ft.	SW drift	N43W	-25	16.0'	lost core, massive to disseminated sulphides	
				4.0'	lost core, massive to disseminated sulphides	

*\*Measurements are all imperial.*

Estella Mines ran out of money and the property was obtained by Northern Gem Mining Corporation in December of 1955 – this company completed road work, camp improvements and some work on the mineral showings in 1956. The work included four AX-sized diamond drill holes totalling 697 feet (212.5 metres) from the #2 adit. Allen (1956) reported some of the results as follows:

TABLE  
1956 Northern Gem Drilling

Hole# / length	Location	Angle	Dip	From	To	Au oz/ton	Co%	U <sub>3</sub> O <sub>8</sub> %
1-56 / 167'	50 ft. in	S55E	-30	133.5	135.0	0.22	0.21	-
				138.0	139.0	0.54	0.54	nil
				139.0	145.0	3.26	2.42	Nil
				145.0	146.5	2.40	0.25	Nil
				146.5	151.5	Lost core		
				151.5	152.5	1.52	0.20	nil
2-56 / 225'	50 ft. in	S55E	-40	177.0	185.5	0.04	0.13	-
				185.5	192.0	0.02	0.01	-
3-56 / 125 ft.	100 ft. in	S72E	-30	83.0	88.5	0.04	0.08	-
				88.5	97.0	0.04	0.11	-
4-56 / 180 ft.	100 ft. in	S72E	-40	186.0	192.0	massive sulphides		

*\*Drill hole locations are all measured from the portal of the lower adit. \*Measurements are all imperial.*

In 1957, Northern Gem Mining Corp. completed 363 ft. (119 m.) of drifting and 50 ft. (16.4 m.) of crosscutting at the #1 adit. They also collared the #3 adit, completing 435 ft. (142.7 m.) of drifting and 70 ft. (23 m.) of crosscutting. They also completed 2,600 ft. (853 m.) of diamond drilling. This work shows part of the eastern portion of the #3 adit as being mineralized starting at about 10 metres from the portal.

Major Resources Ltd. held the property in 1979, and completed an airborne magnetic, VLF-EM and radiometric survey.

Anvil Resources Ltd. was the most recent company to hold the property, completing two surface diamond drill holes totalling 373.8 metres in 1986. By 1986 a broad program of data compilation geology, geochemistry, geophysics, trenching and drilling had been completed (Lammle, 1986).

## **GEOLOGICAL SETTING**

### **Regional Geology**

The most recent work on the regional geological setting is by Church (1995). The rocks of the Bridge River mining camp comprise a variety of Paleozoic, Mesozoic and Tertiary volcanic and sedimentary strata and igneous intrusions. The Bralorne intrusions and Pioneer volcanic rocks are the most consistently mineralized rocks in the area and the granitic rocks of the Coast Plutonic Complex appear to have been the principal source of mineralizing solutions.

The geology of the camp records repeated cycles of deformation. The oldest rocks are strongly fragmented and intricately folded; spilitic greenschist metamorphism is common. Numerous slices and wedges of Cadwallader and Bridge River metamorphic rocks are found throughout the area testifying to a complicated tectonic history. The youngest units are weakly metamorphosed and block faulted.

It is believed that the inbrication of rocks from Cadwallader (Stikinia) and Bridge River (Cache Creek) terranes occurred at the time of plate collision. Faults and folds disrupt all the units and the general lack of stratigraphic markers makes it difficult to fully evaluate the structures. Although current studies allow tentative restoration of the ancient terranes the details remain controversial. The present map pattern mainly reflects Cretaceous and Tertiary tectonic activity. A relatively young 'slice fabric' dominates the region. This consists of panels of diverse rocks (including ramped blocks of older rocks) bounded by major northwest and north-trending faults of the Cadwallader and Yalakom fault systems, which mark the boundaries of the principal structural domains that have persisted through the emplacement of the late Cretaceous to Early Tertiary granitic plutons.

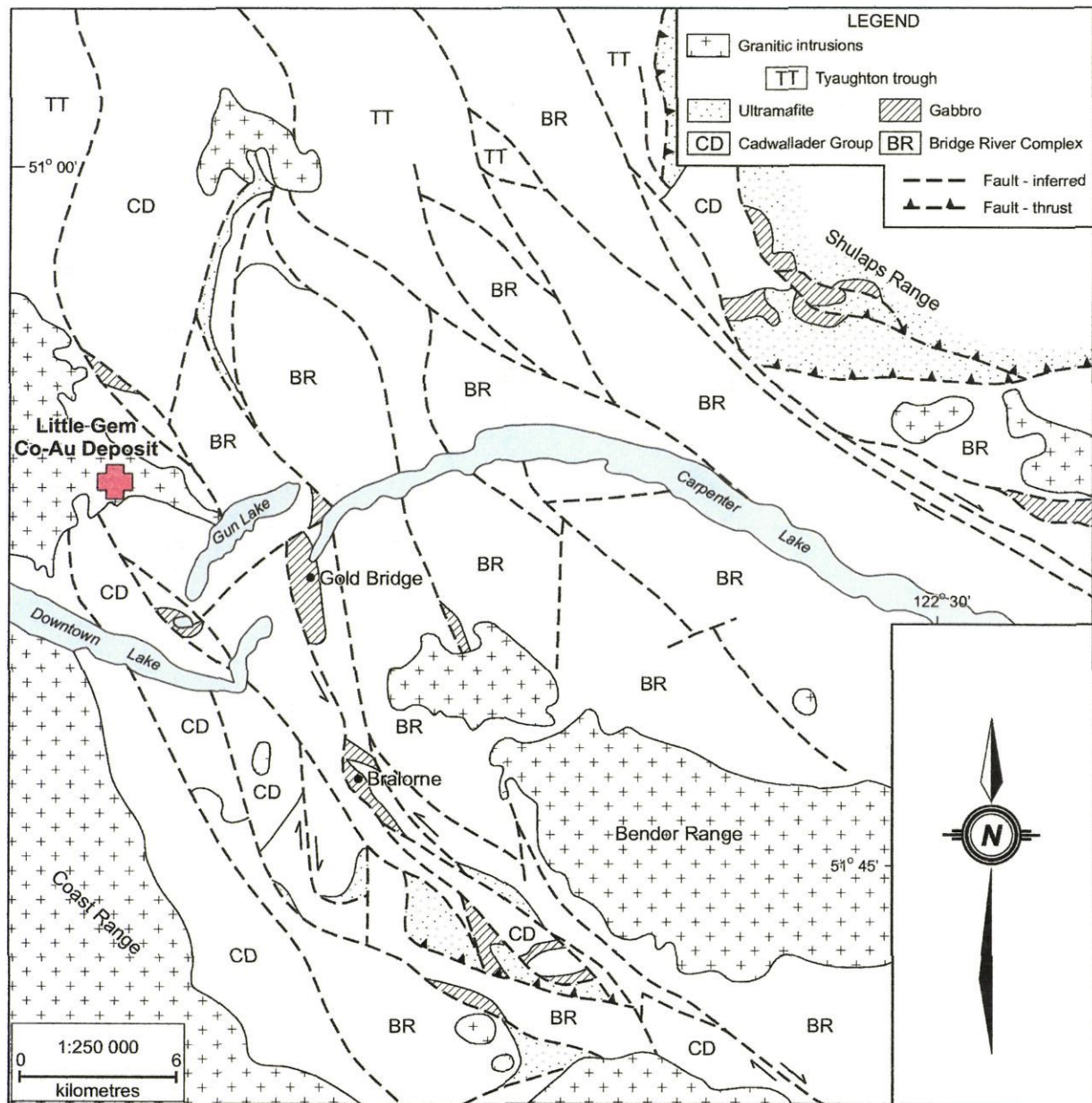


Figure 4 - Location map and generalized geology - Little Gem Property (after Church, 1995)

## PROPERTY DESCRIPTION AND LOCATION

The Little Gem prospect is located within the Dickson Range near the head of Roxey Creek, 8 kilometres northwest of Gold Bridge. The mine workings are between 1800 and 1900 metre elevation, 2.3 kilometres northeast of Dickson Peak, 2.5 kilometres north of Mount Penrose and 5 kilometres northwest of Gun Lake. The town of Bralorne is located 17 kilometres southeast of the property.

The Little Gem Property comprises 244.6 ha in three mineral claims. (Figure ) and listed in the table 1. The three claims are owned jointly by Dr. B. N. Church (FMC # 141786) (B.N.C.) and Dr. R.H. McMillan (FMC #132841) under option to the company. The crowngrants previously holding have all reverted to the crown.

TABLE 2  
List of Claims

Name	Tenure #	Area (ha)	Current Expiry Date	Registered Owner
"No Name"	501174	81.537	Jan. 12/09	RHM 50% BNC 50%
Little Gem	502808	40.769	Jan. 13/09	RHM 50% BNC 50%
Little Gem	503409	122.316	Jan. 14/09	RHM 50% BNC 50%
	558800	40.804	May 16/08	B.N. Church
	561441	81.594	June 27/08	B.N. Church
	560573	244.257	June 13/08	E. Livgard
	560574	407.669	June 13/08	E. Livgard
	560575	509.806	June 13/08	E. Livgard
	560576	509.807	June 13/08	E. Livgard
	561704	489.668	June 29/08	E. Livgard
	561709	489.562	June 29/08	E. Livgard
	561714	509.821	June 29/08	E. Livgard
	561719	408.075	June 29/08	E. Livgard

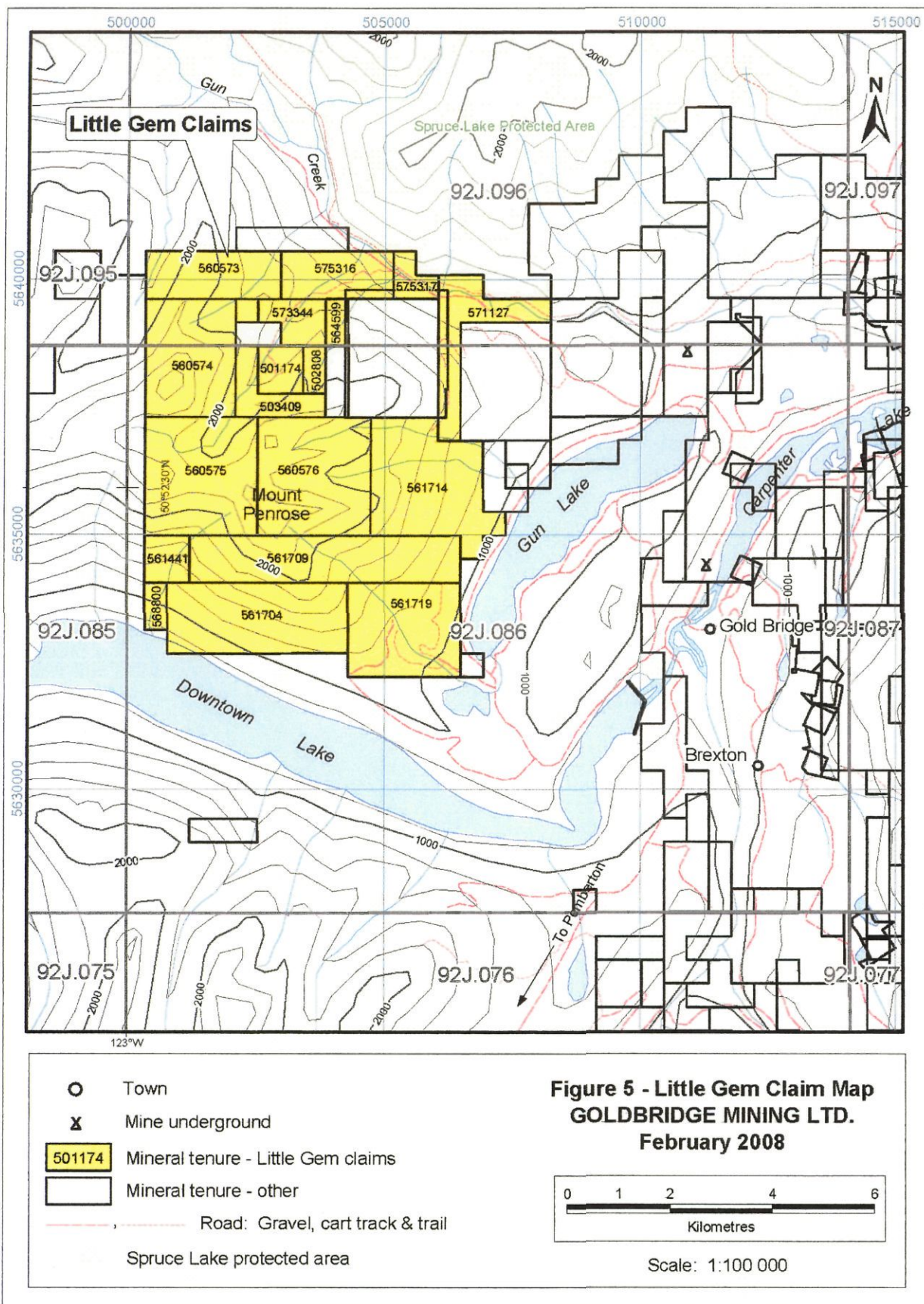
Subsequently 6 claims were purchased on Feb. 14/08 for \$15,000 from R. Billingsley (FMC 139085) for a 100% interest with no royalty or other payments due by Goldbridge Holdings Ltd. (FMC 210834). Goldbridge Holdings is 100% owned by Goldbridge Mining Ltd.

Name	Tenure #	Area (ha)	Current Expiry Date	Registered Ownership 100%
Jewel 2	558152	20.380	Feb. 15/09	210834 100
Jewel 3	564599	40.760	Feb. 15/09	210834 100
Bralorne 4	571127	244.580	Feb. 15/09	210834 100
Jewel 1	573344	101.900	Feb. 15/09	210834 100
Jewel 4	575316	203.770	Feb. 15/09	210834 100
Jewel 4A	575317	61.130	Feb. 15/09	210834 100

Grand Total 4,608.205 ha

The claims have been optioned from Church and McMillan, in an agreement dated October 23, 2007, to Goldbridge Mining Ltd.







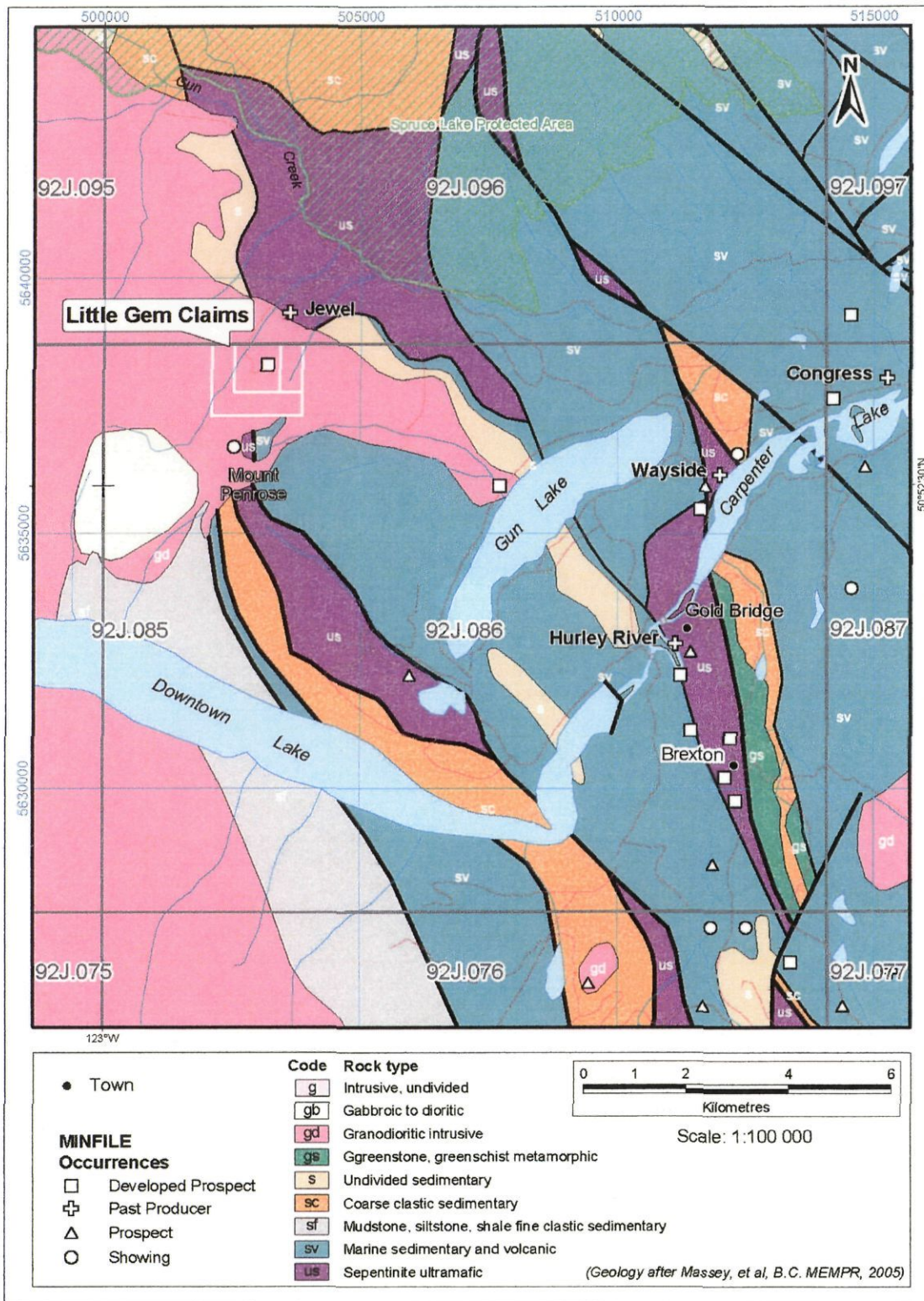
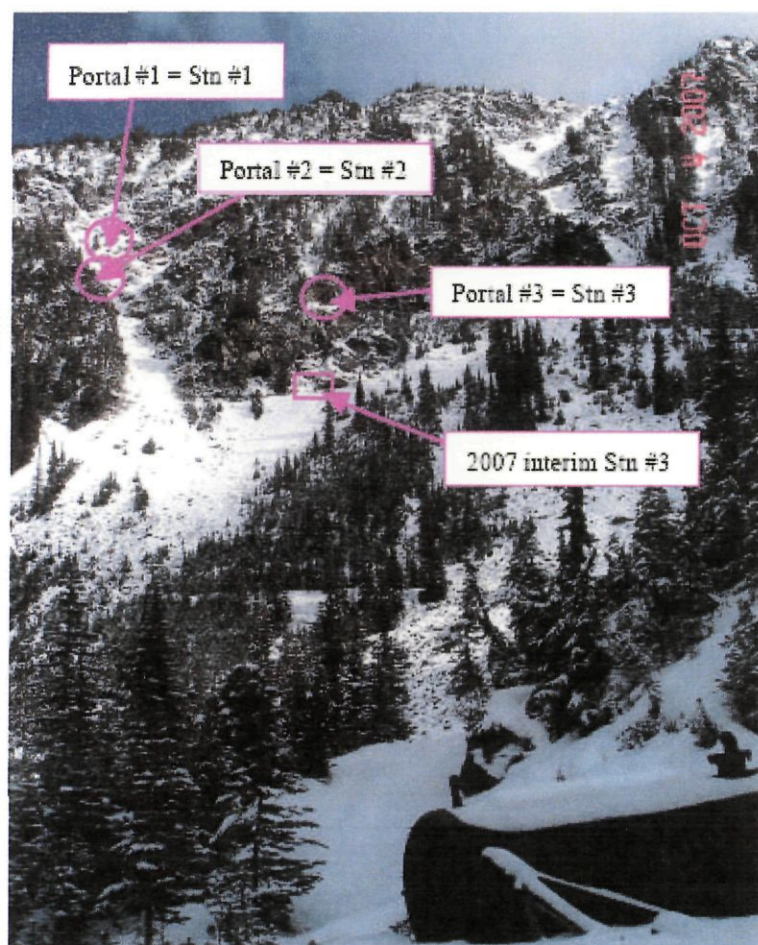


Figure 6 Regional Geology - GOLDBRIDGE MINING LTD., February 2008





**Figure 7**

Overview photo of three portals identified as Portal #1 (uppermost), Portal #2 (intermediate), and Portal #3 (lowest), Little Gem Mine, BC, and corresponding station locations.

That parts of the Cadwallader and Bridge River suites were deposited penecontemporaneously in adjacent terranes is suggested by similar fossil assemblages and similar geochemical signatures of the volcanic rocks. These volcanic rocks are MORB-like tholeiites generated from rising mantle diapirs, possibly in a back-arc setting.

The Bralorne intrusions are small gabbro and diorite stocks mostly aligned along the Cadwallader break. Zircon from a coarse-grained phase near Gold Bridge yields a U-Pb date of  $293 \pm 13$  Ma, indicating that the intrusions are among the oldest rocks in the area. These rocks have silica contents in the range of 45 to 55% (averaging 50.8%), similar to the Pioneer volcanics, but relatively high in magnesia and low in titania and iron oxides. The geochemistry is similar to that of rocks of ophiolitic affinity in the Thetford area of Quebec and in a general way to that of Magmas of oceanic arc tholeiite association.

The Bridge River mining camp is known principally for mesothermal gold-quartz vein mineralization. An intricate system of fractures is thought to have controlled the movement of the ore-solutions; the most profound crustal breaks being the main solution channelways.

Mineralizing solutions in the Bridge River cam were originally considered to be magmatic, the result of differentiation of Bralorne gabbro and diorite that produced the soda granite (plagiogranite). However, it is now known that the Bralorne intrusions and associated ophiolite complex are Paleozoic and much older than the ore veins. Indeed, the age of mineralization at the Bralorne mine, determined by K-Ar dating of wallrock alteration is 85.1 Ma. This is similar to the age of the nearby Gwyneth Lake satellitic stock, dated 85.9 Ma, and within the 69.5 to 98.4 Ma-Zircon-dating range of the adjacent Bendor pluton.

### **Property Geology**

The Little Gem Mine workings and showings are underlain by granitic rocks of the Cretaceous to Tertiary Penrose Stock, a lobe of the Coast Plutonic Complex that projects east from Dickson Peak across Roxey Creek to Gun Lake (Church, 1995). Penrose Stock granitic rocks consist mainly of biotite hornblende granodiorite and some granitic phases that intrude Late Paleozoic to Mesozoic Ferguson Series cherts, argillites and limestones on the southwest. On the northeast the stock intrudes Late Paleozoic to Mesozoic Noel Formation black argillite, calcareous rocks and tuffs and serpentinitized peridotites of probable Jurassic age (Church, 1995). Lammle (1986) believes that the area of the mine workings was close to the upper contact of the Penrose granitic intrusive body which has been shallowly unroofed. Lammle mapped abundant xenoliths of recrystallized volcanic (?) rock that in all probability represents blocks that were incorporated into the quartz diorite during intrusion.

Stevenson (1948) noted the presence of three steeply-dipping feldspar porphyry dykes ranging from 25 centimetres to 16 metres in thickness associated with the showings – these dykes are of varying and different orientations from the altered and mineralized zones and were not considered genetically related to the mineralization. Lammle (1986) observed some lamprophyre dykes in the area of the showings.

A northeasterly trending zone of bleached granodiorite, exposed for a strike length of about 200 metres between Roxey Creek and Jewel Creek, can also be traced on the cliffs and through the mine workings for a vertical range of more than 100 metres. The zone, containing brownish carbonates and minor quartz, attains a maximum width of about 12 metres on the west where it rises above talus slope in the valley of Roxey Creek; it narrows to the east where it is covered by glacial overburden.

A number of tan coloured ankeritic carbonate zones associated with shears are conspicuous near the showings. These cut the zone of bleached granodiorite and are believed to be younger than the main period of mineralization. This second, lower temperature event may have caused some leaching and corrosion of the ore minerals noted by Sebert (1987).



## **Structure and Metamorphism**

The mapping generally shows the hornblende biotite quartz diorite to be relatively unaltered. At the showings, however, it appears to contain a younger more felsic intrusion, and an occasional lamprophyre dyke, and it is much faulted and fractured. Some of the stronger faults have acted as a plumbing system along which hydrothermal fluids migrated, and these have ankeritic alteration along them and at the workings heavy to massive sulphide mineralization. The principal controlling fault system mapped trends east-southeasterly and dips at a steep angle into the mountain to the south; it is mineralized at the workings and near the divide between Roxey and Jewell Creeks, and is covered by overburden in the cirque basin of Roxey Creek.

## **DEPOSIT MODEL CONSIDERATION**

The Little Gem Prospect is a hypothermal cobalt-sulpharsenide uranium and gold vein.

The veins are typically steeply dipping, narrow tabular or splayed veins and commonly occur as sets of parallel and offset veins. Individual pods vary from centimetres up to more than 3m wide and can be followed from a few hundred to more than 1000m in length and depth. Veins may widen to tens of metres in stockwork zones.

The irregular lenses of almost solid sulphides contain cobalt and gold values in association with danaite, loellingite, safflorite, arsenopyrite, scheelite and minor molybdenum. Uranium, in the form of uraninite, occurs in the gangue along with coarse-grained allanite, apatite, feldspar, quartz, chlorite, sericite, calcite, erythrite and limonite. Gold occurs mainly as microscopic veinlets of the native metal within and adjacent to the sulpharsenide minerals. Surrounding the ore, strongly bleached and sericitized granodiorite containing disseminated sulphides, residual quartz, feldspar and kaolin grades into unaltered granodiorite. The metallic minerals occur with the gangue in coarsely crystalline masses but are in general younger than most of the gangue minerals. The combination of the batholithic host rocks and the association of uraninite with hornblende, biotite, apatite, allanite, monazite, orthoclase, cobalt sulpharsenides, arsenopyrite and molybdenite is indicative of high temperature, possibly magma-derived, hydrothermal fluids.

## **MINERALIZATION**

The Little Gem mineralization consists of structurally-controlled lenses of semi-massive and disseminated mineralization associated with pegmatitic intergrowths of iron-cobalt sulpharsenides, allanite (Ce, Di, La and Y group bearing epidote), apatite, K-feldspar, quartz, chlorite, sericite, calcite, molybdenite and uraninite (Stevenson, 1948). Uraninite is associated with the non-metallic gangue minerals within the pegmatite lenses (Stevenson, 1948).

*Assays, Little Gem Mine.*  
CHANNEL SAMPLES.

Sample No.	Width.	Gold.	Silver.	Uranium-Oxide Equivalent.	Cobalt.	Iron.	Arsenic.	Sulphur.	Silica.
	Inches.	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1.....	24	1.04	Nil	0.0055	3.6	.....	.....	.....	.....
2.....	30	0.41	Nil	0.0300	1.3	28.7	42.6	14.5	6.3
3.....	72	0.52	Nil	0.0220	5.1	20.3	48.2	3.7	5.9
4.....	84	0.32	Nil	0.0025	5.1	20.0	61.2	1.6	3.7
5.....	24	0.24	1.1	0.0200	0.3	.....	.....	.....	.....
6.....	25	0.27	Trace	0.0035	4.4	.....	.....	.....	.....
7.....	24	0.35	Nil	0.0200	3.9	.....	.....	.....	.....
8.....	18	1.60	Nil	0.0070	4.3	25.2	42.2	14.2	2.7
9.....	60	0.27	Nil	0.0100	0.9	.....	.....	.....	.....
10.....	96	0.87	Nil	0.0030	0.8	.....	.....	.....	.....
11.....	60	0.22	Nil	0.0100	0.3	.....	.....	.....	.....
12.....	24	0.02	Trace	0.0140	0.5	.....	.....	.....	.....
13.....	13	1.24	0.1	0.0080	6.0	.....	.....	.....	.....
14.....	36	0.53	Nil	0.0380	3.5	.....	.....	.....	.....
15.....	12	0.61	Trace	0.0050	5.7	.....	.....	.....	.....
16.....	33	0.62	0.1	0.0220	4.1	.....	.....	.....	.....
17.....	36	0.51	Nil	0.0320	2.5	.....	.....	.....	.....
18.....	39	0.15	Trace	0.2100	1.5	.....	.....	.....	.....
19.....	36	1.09	0.1	0.0260	6.6	.....	.....	.....	.....
20.....	36	0.23	Trace	1.0100	1.3	.....	.....	.....	.....
21.....	38	0.48	0.3	1.5400	2.9	15.4	12.8	4.9	23.2
22.....	40	0.38	0.1	0.2400	3.0	.....	.....	.....	.....
23.....	53	0.84	0.3	0.5700	4.0	20.1	27.2	9.8	9.8
24.....	49	0.01	Nil	0.2300	0.7	.....	.....	.....	.....
25.....	52	0.51	0.4	0.2100	3.5	.....	.....	.....	.....
26.....	34	1.21	0.1	1.0400	5.3	21.7	36.8	13.0	9.5
27.....	23	1.78	Trace	0.5300	7.2	18.4	32.8	11.6	14.4
28.....	60	0.76	Nil	1.8900	5.4	.....	.....	.....	.....
29.....	39	1.58	0.1	0.0095	3.8	21.5	31.5	11.3	12.5
30.....	39	1.82	Nil	0.0100	1.3	.....	.....	.....	.....
31.....	38	0.58	Trace	0.0030	0.6	.....	.....	.....	.....
32.....	24	0.83	0.1	0.0030	0.5	.....	.....	.....	.....
33.....	48	1.00	Nil	0.0030	1.4	.....	.....	.....	.....
34.....	33	1.26	Nil	0.0025	1.1	.....	.....	.....	.....
35.....	26	1.40	Trace	0.0015	1.2	.....	.....	.....	.....
36.....	12	0.34	Nil	0.0020	0.4	.....	.....	.....	.....
37.....	60	0.12	Trace	0.0040	2.0	.....	.....	.....	.....
38.....	80	2.21	Trace	0.8700	3.1	.....	.....	.....	.....
39.....	72	2.14	Nil	0.0180	4.4	19.8	45.4	3.1	7.6

## MISCELLANEOUS SELECTED SAMPLES.

Sample No.	Description.	Gold.	Silver.	Uranium-Oxide Equivalent.	Cobalt.
		Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.
40	Upper adit, near Sample No. 27, sulpharsenide and non-metallics.....	0.66	Nil	0.130	2.4
41	Upper adit, near Sample No. 27, massive sulpharsenide.....	1.46	Nil	0.003	3.6
42	Upper adit, dump; mixed sulpharsenide and non-metallics.....	0.01	Nil	3.200	0.2
43	Upper adit, dump; principally non-metallics.....	0.06	0.1	0.350	0.91
44	Lower adit, near Sample No. 38, mixed sulpharsenide and non-metallics.....	1.66	Nil	0.210	4.4
45	Surface, near Sample No. 7; selected sulpharsenide crystals; also assaying (per cent.) Fe, 10.3; As, 60.7; SiO <sub>2</sub> , 2.7.....	0.28	0.1	0.005	6.2
46	Similar to Sample No. 45.....	0.33	Nil	0.002	6.5
47	Highest showings, higher of two open-cuts; across 3-inch rib of sulpharsenide and non-metallics.....	4.56	0.5	0.270	2.8
48	Location, ditto; check sample across same material as No. 47.....	23.34	0.6	0.375	4.6
49	Location, ditto; typical mineralization from ore-pile.....	7.04	Trace	0.750	4.5
50	Highest showings, lower of two open-cuts; across 15-inch wide lens of mixed sulpharsenide and non-metallics.....	45.92	1.8	2.800	5.7
51	Location, ditto; across a 2-inch rib of molybdenite in the sulpharsenide lens; Mo, 24.2 per cent.....	1.19	0.2	2.240	0.5
52	Location, ditto; typical mineralization from ore-pile.....	2.10	0.1	2.600	1.6

Table 2 - Assays - Little Gem Mine Property (after Stevenson, 1948)



# GOLDBRIDGE MINING LTD.

## Figure 8 - Little Gem Mine

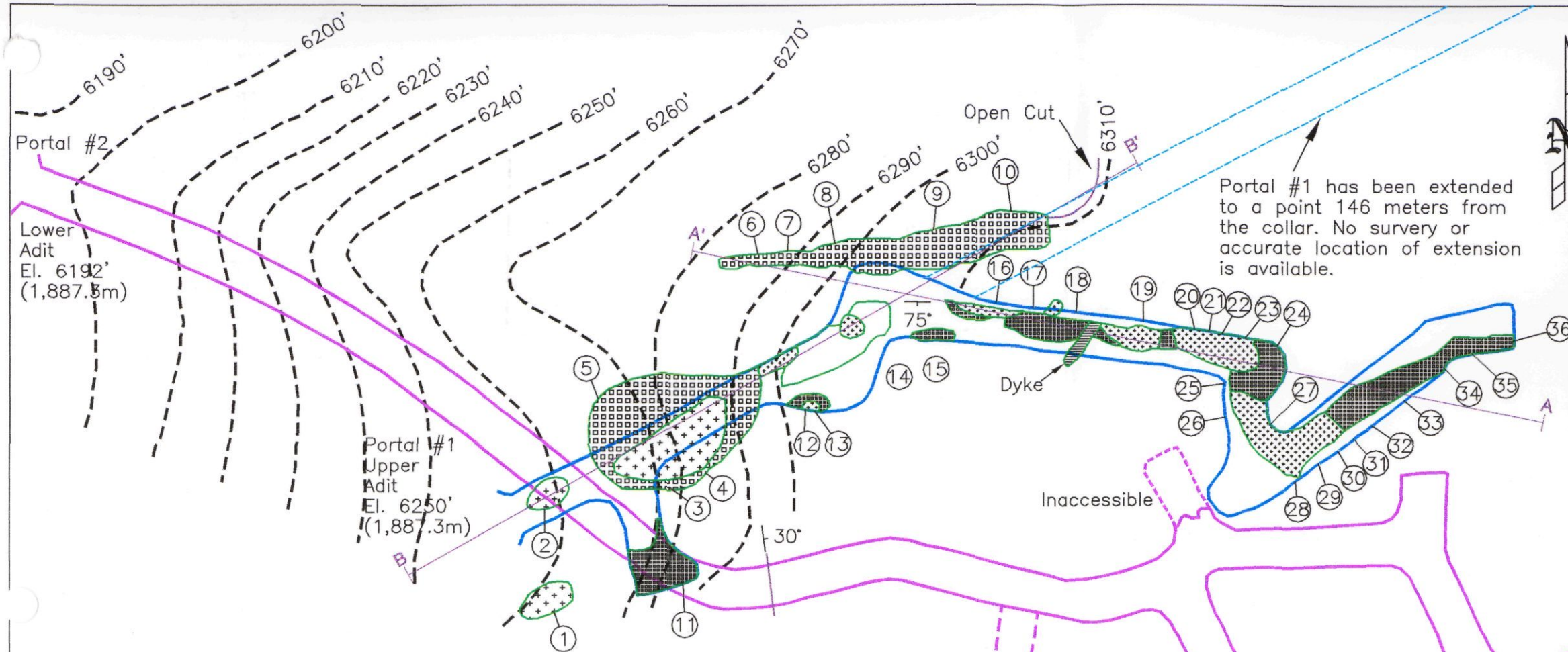
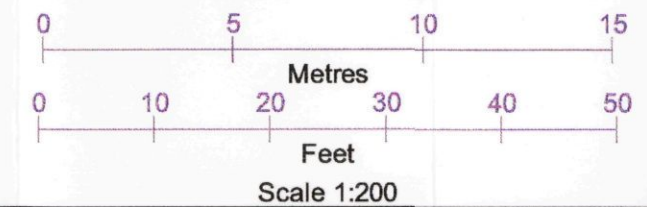
February 2008 (Redrafted June 2009)

Plan of principal showings and underground workings (after Stevenson, 1948)

### LEGEND

- Pegmatite (heavy sulfarsenide) lens on surface
- Pegmatite (heavy sulfarsenide) lens underground
- Disseminated mineralization on surface
- Disseminated mineralization underground
- 30° Fault showing dip
- ① Assay Sample
- Contour approximate interval 10 feet

Rock formation is granodiorite



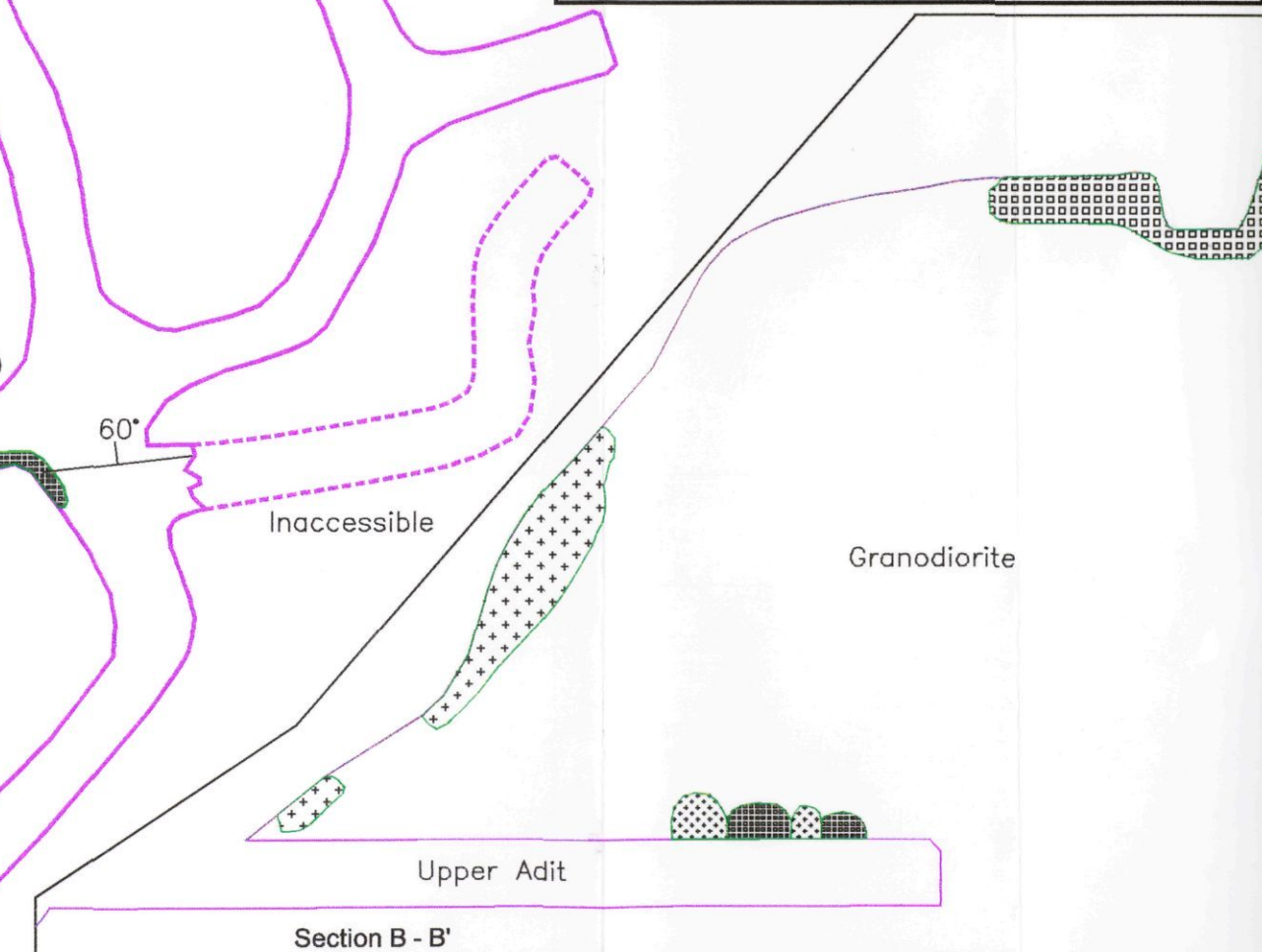
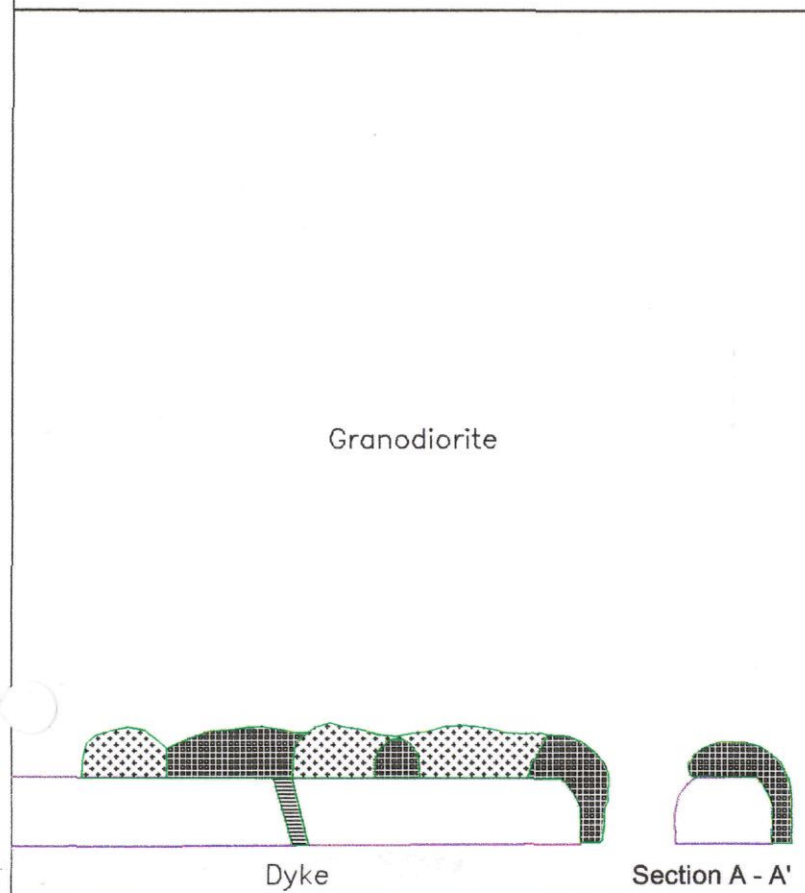
Raise 24' at +45° to SW  
10' at +45° to NE

Raise 45' at +30° to NE

Inaccessible

Granodiorite

Granodiorite



According to Stevenson (1949), the *"massive sulpharsenide ore, containing the cobalt and associated gold, is a mixture of the cobalt-bearing variety of arsenopyrite (danaite) and loellingite-safflorite"*. Church (1995) also reports the presence of minor scheelite. The mineralized lenses range in width from several centimetres to a maximum width of 7 feet (2.1 metres) and occur in a steeply south-dipping east-trending zone (080°) of bleaching and sericitized granodiorite approximately 12 metres (40 feet) wide which has been traced for a length of approximately 40 metres (130 feet) in adit #1. Stevenson (1948) states that on surface and in the underground adits two sub-parallel zones of mineralization and two other possible sub-zones have been exposed. The mineralization is also exposed in adit #2, 58 feet (18 metres) lower in elevation. Stevenson (1948) also describes mineralization exposed in two *"open cuts and strippings further up the mountain-side, just below the top of the ridge at a point 450 feet (140 metres) above and 600 feet (180 metres) easterly from the upper adit"* (adit #1). The altered bleached granodioritic wallrocks consists of sericite and residual quartz with scattered needles of small diamond-shaped crystals of arsenopyrite. Allen (1956) obtained an assay of 0.27% Co across 30 feet (9.2 metres) on a zone of *"disseminated sulphides"* in bleached granodiorite in an outcrop below the trail, 45 metres southwest of the #2 adit portal. Stevenson's maps and sampling results have been reproduced in Figure 5 and Table 2. Church (1995) notes *"a number of tan-coloured ankeritic carbonate zones associated with shears"* being *"conspicuous near the showings"*.

According to Stevenson (1948), *"gold is moderately widespread within the pegmatite lenses"*. Sampling by Stevenson (1948, Table 4) returned several results with assays between 1 and 2 ounces of gold per ton, with two specimens (samples #48 and #50) of selected material from the open-cuts near the top of the ridge assaying 23.34 and 45.92 oz/ton Au. In polished section, Stevenson observed gold intergrown with sulpharsenide minerals, between metallic and non-metallic minerals and some wholly within the non-metallic minerals. Uraninite on the other and is moderately fine grained (generally < 0.03 mm.) and occurs as widely scattered cubic or octahedral grains generally scattered throughout the non-metallic minerals (Stevenson, 1948).

Mapping by Lammle (1986) showed that, in general, the granitic host rock is *"relatively unaltered. At the showings, however, it appears to contain a younger more felsic intrusion, and an occasional lamprophyre dyke, and is much faulted and fractured. Some of the stronger faults have acted as a plumbing system along which hydrothermal fluids migrated. These have ankeritic alteration along them, and at the workings heavy to massive sulphide mineralization. The principal controlling fault system mapped trends east-southeasterly and dips at a steep angle into the mountain to the south: it is mineralized at the workings and near the divide between Roxey and Jewel Creeks, and is covered by overburden in the cirque basin of Roxey Creek"*. He further states that *"the projections along strike of this fault system have exploration potential both to the west and east, but complicating later faults of both steep and flat dips could offset the projections"*.



Technical Consultation  
by  
J.T. Shearer, M.Sc, P.Geo.  
and  
Outline of Rock Sampling Program  
May 2, 2008

## **UNDERGROUND ROCK/ORE SAMPLING**

**October 5, 2007**

In the company of Dr. McMillan, and Underground Shiftboss Alec MacPherson, J.T. Shearer took 5 rock samples from sites inside Portals 1 and 3 of the Little Gem Mine. The assay results are provided with this report. The locations of the samples were in zones of documented mineralization. The assay results of the 5 samples were for confirmation purposes and an adjunct to a larger geological analysis. Sample locations are marked on Figures 9 and 10.

**October 17 – November 2, 2007**

As per J.T. Shearer's guidelines, 2 underground shiftbosses and up to 4 miners and assistants undertook a methodical sampling of the entire accessible lengths of Portals #1 and #3.

A total of 167 samples were taken and sent out for assay. A detailed record of this sampling program and results, follows, in this report.

Considerable preparation work was required before the sampling work could be undertaken. Work involved rudimentary road clearing, for the simplest of vehicles to pass. In this case, an 8-wheel drive ARGO all-terrain was required to negotiate the 5 kilometers of mine road. The vehicle was essential for winching the largest of boulders and trees from the road, and for transporting all personnel, equipment and rock samples.

The shiftbosses had to make the mine portals free of hazards. Sloughed rock from the external slopes of the mountain had to be hand shovelled from both portal entrances. The inner mine workings were in a safe condition and required little maintenance.

Early winter snows began to slow down the operation. The work was completed, successfully before the snows closed the valley, completely.

# GOLDBRIDGE MINING LTD.

## Figure 9 - Plan View

February 2008

(Redrafted June 2009)

## PORTAL #1 - LITTLE GEM U/G Sampling Project

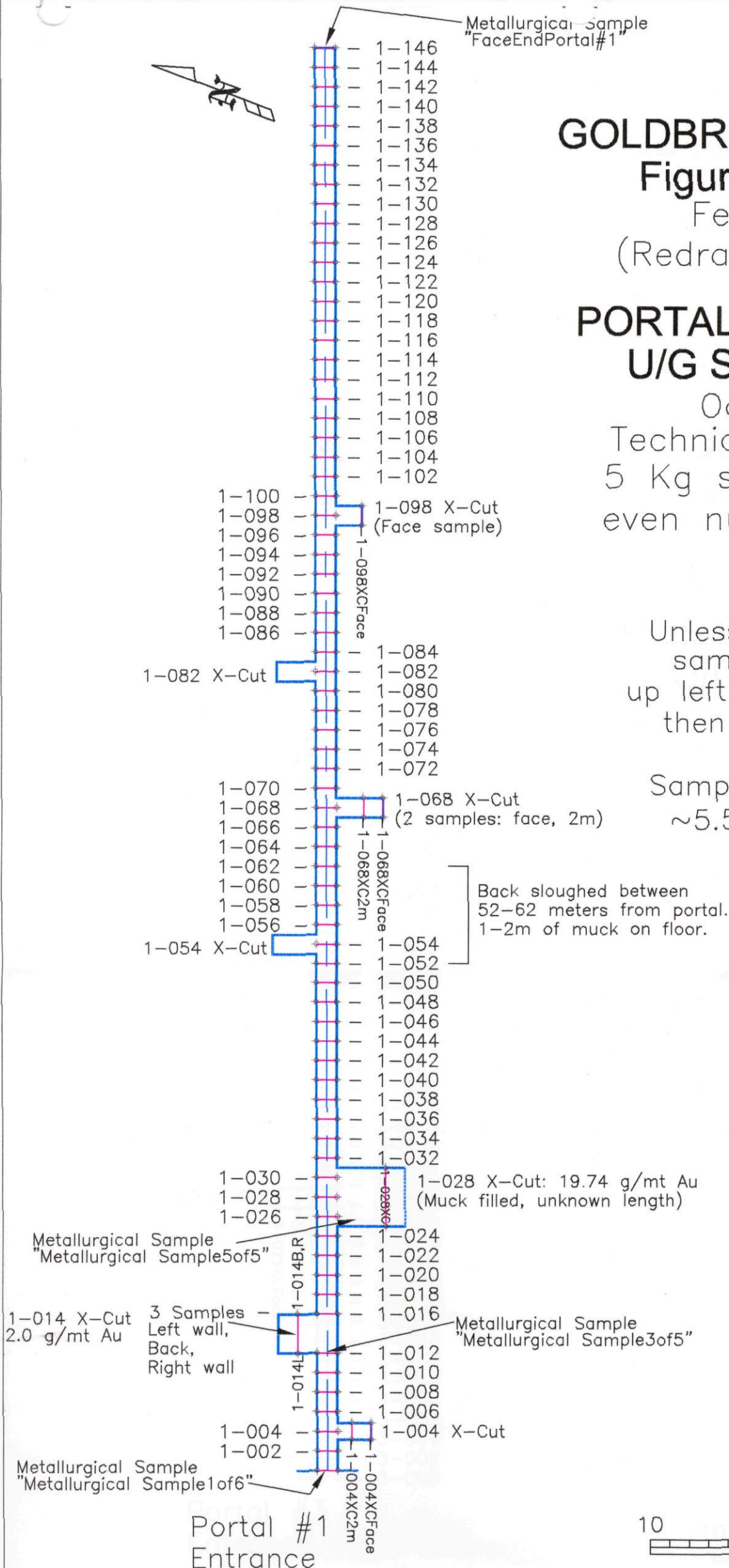
October 2007

Technician: Greg McKee

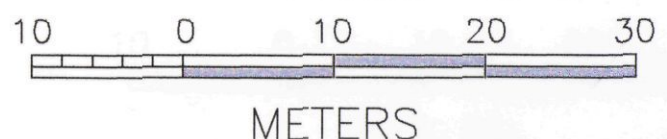
5 Kg samples taken on  
even numbered intervals

Unless otherwise noted  
samples were taken  
up left wall, across back,  
then down right wall.

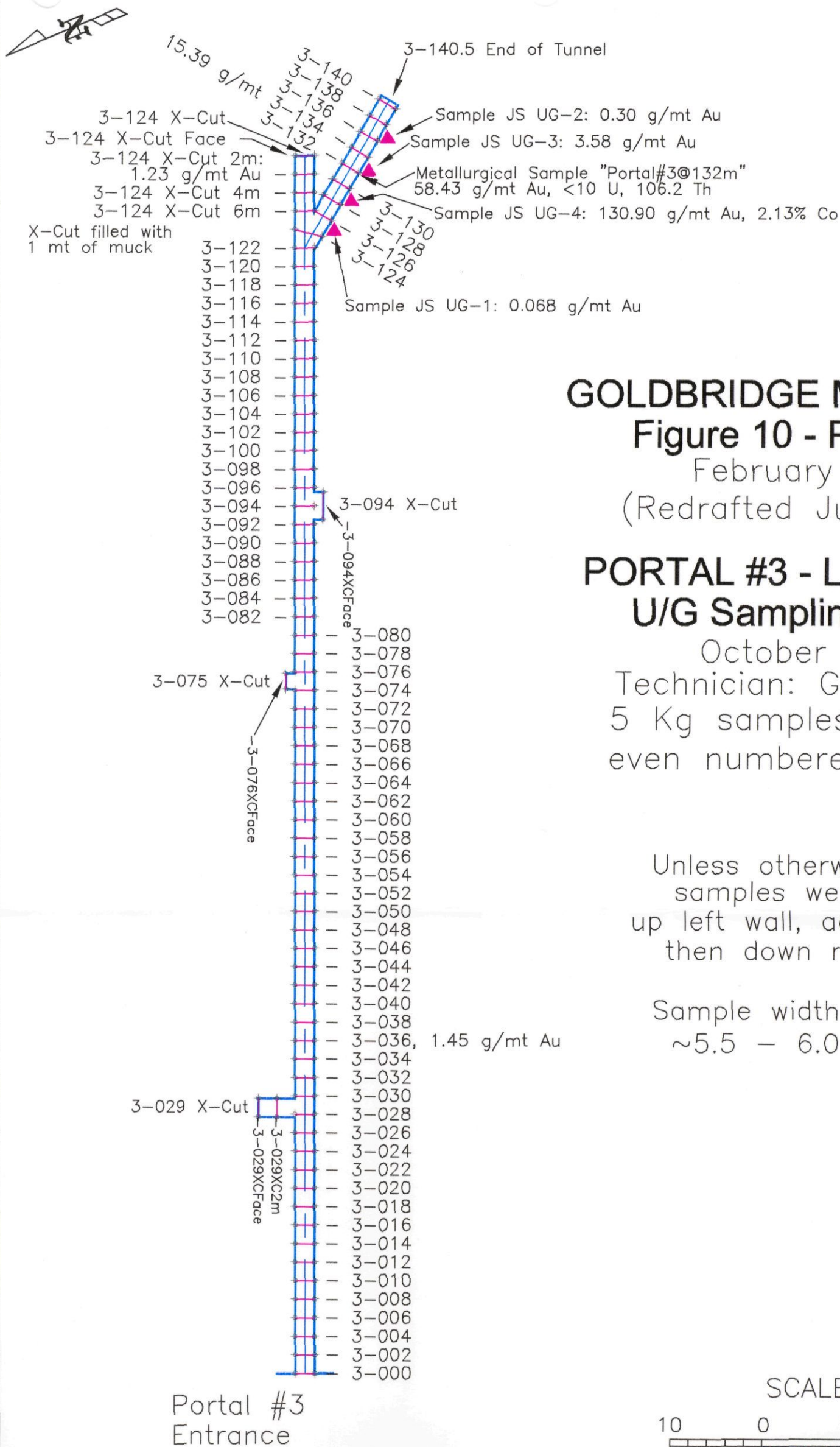
Sample width generally  
~5.5 - 6.0 meters.



SCALE 1:500







## GOLDBRIDGE MINING LTD.

### Figure 10 - Plan View

February 2008

(Redrafted June 2009)

## PORTAL #3 - LITTLE GEM U/G Sampling Project

October 2007

Technician: Greg McKee

5 Kg samples taken on  
even numbered intervals

Unless otherwise noted  
samples were taken  
up left wall, across back,  
then down right wall.

Sample width generally  
~5.5 - 6.0 meters.

## EXPLORATION

This report documents results from a one-day visit by the Author to the property on October 5, 2007, undertaken to assess the property in order to enable the author to recommend a program of follow-up work. Potential drill site locations were examined and located with a portable GPS (global positioning system) unit. Subsequent to October 5, a program of systematic channel samples was completed in Level 1 and Level 3 supervised by G. McKee and two experienced underground shift bosses. Upgrades to the road, camp and safety of the underground workings were also completed.

The assay results of this underground channel sampling are plotted on Figures 9 and 10. High grade zones were identified and channel sampled on both Level 1 and 3. The 2007 sample intervals having very low values in Au and Cu are not plotted on Figure 9 and 10.

The length of each adit was measured, using a 100-meter surveyor's tape. Paint lines were made on the walls and back, at every meter interval, the zero point/start point being at the outer-most post of each adit entrance. The numbering/coding system for each sample site and sample bag was based on the painted distance markings established in each adit. For example, the sample taken at the 10-meter point inside Portal 3 was Sample/Location # 3-010.

Cross-cuts were measured and painted in the same fashion. The zero-point/start-point was established as being the face at the end of each cross-cut. Example: X-cut 3-029 @ 2 meters.

Sampling was done at every 2 meter interval. The total weight and quantity of samples was over 500 kilograms/100+ samples. All samples had to be physically packed down steep mountain trails to the ATV (8-wheel Argo) waiting below.

The adits were measured (toped) wall-to-wall (at the 1-meter intervals) using a folding surveyor's ruler. At the same time, said ruler was used to measure the adit height (top of rail/floor to the back). All information was recorded in the project field book.

Sampling taking was done by channel sampling along the painted arch established at each interval. The arch and channel sample extended from the foot of a wall, across the back and down to the foot of the opposite wall. The channel width and depth was set at 3 inches wide and 1 inch depth. Where the rock was sufficiently soft, geological picks removed the sample material and plastic pans were used to capture the material before falling to the ground. In the very hard granitic areas combinations of hand chisels and light hammers were used by lone samplers. Material was collected on tarpaulins spread out on the ground. Aluminum ladders and planks were needed to make stagings for sampling the highest areas. Two-man teams were required to use heavy chisels and sledgehammers to complete the sampling of the hardest rock areas. All sample material was gathered, put into heavy plastic sample bags and sealed with a nylon zap strap which also held the sample identification tag. Sample



contamination was avoided by doing one sample at a time, having crews work far apart and by ensuring that the tools and tarps were cleaned before moving to the next sample area.

The entire length of each drift was also sampled (Figures 9 & 10). Results show very low uranium and thorium levels throughout.

## **PREVIOUS DRILLING**

Goldbridge has not undertaken any drilling to date. Previous drilling is documented under History.

## **SAMPLING METHOD AND APPROACH**

Five chip samples were collected by the author using a rock hammer to break chips off underground walls. Descriptions of the samples are below and plotted on Figures 9 and 10:

JTSUG-1 – at first drill set up in 3 Level, quartz stringers 184°/65°E.

Gold – 0.68 g/mt, Co – 0.007%, Uranium <10ppm

JTSUG-2 – At end of 3 Level working chip sample over 1m, 381°75°E near bar for drill, past mucking machine. Gold – 0.30 g/mt, Co – 0.011%, U - <10ppm

JTSUG-3 – dark mafic-rich rock, possible lamprophyre dyke. High count material 3 Level.

Gold – 3.58 g/mt, Co – 0.222%, U - <10ppm

JTSUG-4 – quartz-rich rock, mineralized with pyrite, 3 Level.

Gold – 130.90 g/mt or 3.82 oz/ton, Co – 2.126%, U - <10ppm

JTSUG-5 – on 1 Level, cobalt bloom, arsenopyrite, 20m from portal.

Gold – 24.10 g/mt, Co – 0.824%, U - <10ppm

Conversion factor 1 oz/ton = 34.2857 g/mt

## **SAMPLE PREPARATION, ANALYSES AND SECURITY**

Five samples were collected by the author on October 5, 2007. These were placed in plastic sample bags and sealed. They remained in the author's possession until hand delivery at IPL Laboratories in Richmond, BC.

The following is a description of sample preparation and analysis.

Sample preparation:

**CRU-31** Fine crushing the sample to 70% less than 2mm.

**PUL-31** Pulverizing a split of up to 250 grams to 85% less than 75 um in a ring pulverizer.

Sample Analysis (units are indicated on the Analysis Certificate)

**Au AA23** Au 30g FA AA Finish Gold analysis by fire assay and Atomic Absorption analyses. 30 g nominal sample weight.

**ME-ICP41** 34 elements analyzed by aqua-regia acid digestion and ICP-AES analysis. This has partial digestion of several elements.

No blanks or standards were inserted by the author into the sample stream. It is recommended that blanks and standards be used in future sampling programs, especially if there are more samples collected in these programs.

The analyses for the Goldbridge rock geochemistry program were completed by International Plasma Labs of Vancouver, BC.

## DATA VERIFICATION

In his work on the property, including site visits, and research for this report, the author has:

1. Visited the site one time on October 5, 2007.
2. Reviewed all past Assessment Reports, which are available from the BC government ARIS website
3. Reviewed the results from the one 1956 drillhole which are given in a previous section of this report.
4. Reviewed the geological mapping done in the past and verified the location of the mineralized showings.
5. Compared some of the mineralized rock samples taken in 2007 with past assay results.

None of the core from past drilling is available.

As a result of this review of the 2007 program, the author has no concerns about the reliability or of the samples taken or the assays completed. Future sample programs should use a QA/QC protocol of blanks, duplicates and standards in the assay stream.

## ADJACENT PROPERTIES

The Jewel deposit (now owned by Goldbridge), located 1.3 kilometres north of the Gem, hosts mineralization in a fissure vein in a serpentine body. The serpentine is crosscut by several easterly trending porphyritic dykes and is intruded by a quartz diorite approximately 30.5m south of the vein. The vein strikes west to southwest and averages 0.5m in width over a 250

foot (820m [shouldn't this be 76.2m]) strike length. Mineralization comprises predominantly pyrite and arsenopyrite with minor chalcopyrite occurring in streaks, bands and kidneys of nearly massive sulphide and minor quartz and calcite gangue. Average gold content of the ore is nearly 2 oz per tonne across the width of the vein. No sampling by Goldbridge was completed on the Jewel Prospect.

One of the "older" deposits in the area is the Lucky Jem which was staked in 1910 as the White and Bell group. The Lucky Jem property is located in the Eldorado basin on Eldorado Creek, 10 kilometres northeast of the Little Gem property. Mineralization occurs in a quartz diorite and in the sediments intruded by the diorite. A gently folded brecciated zone comprising decomposed rock, narrow veins and nodular masses of mixed pyrite and arsenopyrite was the target of one of the adits. The second adit follows a sheared and shattered zone in an altered porphyrite. Gold bearing arsenopyrite often occurring as massive lenses is the predominant economic mineral. Gold values ranging from trace to 1.28 oz per ton were reported from a series of 21 samples of the showings.

The Lucky Strike property is situated in the upper basin of Taylor Creek, 2.7 kilometres east-southeast of the Lucky Jem property. Mineralization is widespread, comprising massive arsenopyrite, sphalerite, jamesonite and pyrite in vertical veins with gangues of quartz, calcite and mariposite. The veins are hosted by vertical fractures and shear zones in dykes and bodies of serpentine near contacts with porphyry dykes. The serpentinized ultrabasic rocks have also undergone hydrothermal alteration resulting in brown weathering carbonate (possibly ankerite), talc, quartz and mariposite. The dykes are believed to be genetically related to the batholithic intrusions and often contain disseminated sulphides, predominantly pyrite.

The Native Son showing is located just south of Leckie Creek along northeast facing slopes of the Leckie Range north of Downton Lake. Upper Cretaceous Kingsvale Group sedimentary rocks consisting of argillaceous and feldspathic quartzite, greywacke, shale and minor conglomerate underlie most of the property. The northwesterly striking Tchaikazan fault bisects the property, placing sedimentary rocks in contact with quartz diorite to granodiorite of the Jurassic to Tertiary Coast Plutonic Complex on the southwest.

Gold mineralization occurs as fracture controlled replacement bodies of massive to disseminated arsenopyrite and pyrite with chalcopyrite and pyrrhotite, in both sedimentary rocks and quartz diorite. Pyrite-arsenopyrite-galena-sphalerite mineralization is also present in quartz-calcite stockworks and in breccia in highly altered quartz diorite and sedimentary rocks. Alteration of these zones consists of sericite, clay, ankerite and mariposite. Precious metals have not been detected in association with this style of mineralization.

A 1.2m sample of massive arsenopyrite with minor chalcopyrite taken from a trench during 1988 was found to contain 11.14 grams per tonne gold (Assessment Report 17920).



## **MINERAL PROCESSING AND METALLURGICAL TESTING**

According to Allen (1956) *"extensive work by the University of British Columbia and British Columbia Research Council resulted in the development in the 1940's of a flow sheet involving medium-to-high temperature and pressure leaching which would result in an indicated recovery of 90% cobalt and 98% gold. Results of recently completed research by Sherritt Gordon Mines and others have, however, so improved these methods that the Northern Gem Mining Corporation has been advised that treatment by leaching at normal pressure and temperature sufficiently low that no external heating is required, is applicable to the ore and recoveries as good or better than previously anticipated are assured."*

CANMET (Jenkins, 1959) conducted some preliminary small-scale amalgamation, cyanidation, gravity and floatation concentration tests, in addition to mineralogical work (Hughson, 1958). Lammle (1986) references roast tests on mineral concentrates by a French company (Taramazzo, 1986) – unfortunately this and other information which were in the Anvil Resources Ltd. files are not currently available.

Large samples have delivered to West Coast Testing Lab and several metallurgical tests are ongoing with the objective of updating the knowledge of the metallurgical characteristics of the mineralization.

## **MINERAL RESOURCE ESTIMATES**

Goldbridge has not undertaken any independent investigation of the resource estimate nor has it independently analyzed the results of the previous exploration work in order to verify the classification of the resources, and therefore the historical estimates should not be relied upon.

However, the author believes that these historical estimates provide a conceptual indication of the potential of the property and are relevant to ongoing exploration (see Section History).

## **OTHER RELEVANT DATA AND INFORMATION**

No other relevant data is believed to exist and the data discussed in this report is an accurate portrayal of the property's potential.

## INTERPRETATION AND CONCLUSIONS

- 1) The Little Gem (Northern Gem) claims cover significant showings of high-grade cobalt-gold mineralization with associated modest uranium values. These values are well documented sampling and mapping by a Dr. John S. Stevenson (1948), a highly-reputable government geologist employed by the British Columbia Department of Mines.
- 2) Underground exploration and development and underground diamond drilling by several mining companies between the 1930's and 1957 outlined a Historical Resource of high-grade mineralization. Unfortunately, the available data from these programs appears to have been misplaced after Anvil Mining terminated their interest in mining – as a consequence, the records may have been lost. A program of underground rehabilitation was completed in 2007 warranted to document the historical data. High grade gold and cobalt values were obtained by the 2007 work.
- 3) The full extent of the high-grade mineralized “pod” has not been delimited – more drilling is warranted to fully explore the extent of the known mineralization.
- 4) There appears to be considerable exploration potential for more “pods” of high-grade mineralization along a corridor extending from the lower adit portal to the high-grade trenches at the ridge top, 300 metres east of and 180 metres vertically above the #3 adit. This could be explored from the # 2 and #3 adits, and from extensions of these adits.
- 5) The potential for a moderate-tonnage deposit of moderate grade disseminated mineralization has not been considered to date – Allen (1956) obtained assays of 0.27% Co across 30 feet (9 metres) from a zone of “disseminated sulphides” located 150 feet (45 metres) southwest of the #2 adit. (The type of sample is unknown.)
- 6) A further corollary or deduction from the presence of disseminated sulphides 45 metres southwest of the #2 adit is that the two Anvil Resources drill holes may have been collared in the hangingwall of the Little Gem structure – these holes therefore missed the mineralized structure. This suggests that the mineralized corridor remains open to the west and at depth from the #2 adit. Alternatively, there could be a fault offset and the two holes were drilled into the footwall and beneath the structure.
- 7) Documentation regarding past detailed metallurgical test work is not currently available. However, recent work on ores with similar mineralogy has developed flow sheets that can recover the metals in the Little Gem mineralization. Should a small high-grade deposit of economic dimensions be defined, one option would be to direct-ship hand-sorted material to AREVA's mill in Saskatchewan – the Midwest Lake Mine is scheduled to open shortly and will process ore of similar mineralogy to Little Gem (Hendry et al, 2005). Other possibilities are to ship the high-grade ore to Formation Capital's Sunshine facility in Idaho, or possibility to ship it to smelters in Asia – possibly China or Korea.

If however, a sufficient tonnage of moderate-grade mineralization can be proven at Little Gem, a stand-alone milling operation might be feasible.

## RECOMMENDATIONS

- 1) An initial mapping project should be undertaken to confirm or negate the suggestions outlined in the above section (see 21.0), a crew of two senior geologists should spend 4 to 6 days mapping the showings in detail, with an additional day to clear the access road. They could stay in Gold Bridge and would require a truck and quads (ATVs) for access. Digital TRIM maps could be used for basemaps.
- 2) An initial diamond drill program of four holes totalling 600 metres should be undertaken to test extensions on the mineralized corridor at the east and west ends. Two holes (300 metres) could be drilled from the ridgetop 300 metres east of the #3 adit. These holes would test the area under the high-grade trenches (Stevenson's samples 47 to 52 – Table 4). The other two holes could be drilled from the area of the #3 adit – possibly directed north-north-westward from the road southwest of the lower adit or possibly south-south-eastward from the bulldozer trenches approximately 100 metres north-northwest from the adit portal. The specific locations of the proposed holes would be determined following the mapping program.
- 3) Two drillholes are also recommended to test the mineralized structure at the Jewel Showing totalling 300m in length.

## BUDGET

### Preamble

An exploration program is recommended as follows:

Geological compilation, mapping and all previous work to common scales, establish camp facilities, ATV and limited helicopter support, re-establish grid, continued environmental baseline studies, Diamond drilling.



Budget Stage I		
Geological mapping		10,000.00
Base Map Detail		12,000.00
Planning, selection and site confirmation, camp		7,500.00
Compilation, digitization		4,000.00
Characterization and studies of minerals		3,500.00
Consulting, supervision and reports		8,000.00
		<u>\$45,000.00</u>
Surface Diamond Drilling & supervision all in cost,		
	1,200m @ \$125/metre	150,000.00
includes drill moves and consumables		
Characterization and studies of mineralization and assaying		10,000.00
Consulting, supervision and reports		10,000.00
Access Road Opening & Excavator standby		30,000.00
Trenching		30,000.00
		<u>\$230,000.00</u>
	<b>Stage I Totals</b>	<b>\$275,000.00</b>
Stage II    Contingent on the results of Stage I		
Further Road Upgrades		80,000.00
Surface Diamond Drilling, 2,000m @ \$125/metre		250,000.00
Trenching Ridge Area (Gem to Jewel)		30,000.00
Consulting, Supervision, Reports and Permitting		40,000.00
Assaying		20,000.00
Camp		20,000.00
		<u>20,000.00</u>
	<b>Stage II Total</b>	<b>\$440,000.00</b>

## REFERENCES

- Geological Survey of Canada Map 8552G Sheet 92J/15, 1973:  
Aeromagnetic Map, Tyaughton Lake, BC
- Allen, Alfred R., 1955:  
Report on the Gem Property, Bridge River, B.C. Private Company report. B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 25 p.
- 1956:  
The Northern Gem, Bridge River, B.C. Private Company report. B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 24 p.
- 1957:  
Northern Gem Mining Corporation Ltd. (N.P.L.) Progress Report for the year 1957, December 1957.
- Ball, Clive W., 1959:  
Geological Report, Gold-Cobalt-Uranium Occurrences, Northern Gem Mining Corp. Ltd., Bridge River, BC, December 30, 1959.
- Cairnes, C.E., 1943:  
Geology and Mineral Deposits of Tyaughton Lake Map-Area, British Columbia. Canada Department of Mines and Technical Surveys. Geological Survey of Canada Paper 43-15.
- Canadian Mines Handbook 1960:  
Northern Gem Mining Corporation Ltd., p. 265.
- Church B.N., 1995:  
Bridge River Mining Camp, Geology and Mineral Deposits. B.C. Ministry of Energy, Mines and Petroleum Resources Paper 1995-3, 159 p.
- 1990:  
The Control and Timing of Gold-Quartz Veins in the Bralorne-Pioneer Area, Bridge River Mining Camp, BC; Geological Association of Canada, Annual Meeting, Vancouver, Abstracts Volume, page A24.
- 1989:  
Geology and Exploration in the Bridge River Valley; in Exploration in British Columbia 1988, BC Ministry of Energy, Mines and Petroleum Resources, pages B91-102.
- Church B. N., MacLean, M. E., 1987:  
Geology of the Gold Bridge Area (92J/15W); BC Ministry of Energy Mines and Petroleum Resources, Open File 1987-11.

- Church, B. N., Pettipas, A. R., 1989:  
Research and Exploration in the Bridge River Mining Camp (92J15, 16); in Geological Fieldwork 1988, BC Ministry of Energy, Mines and Petroleum Resources, Paper 1989-1, pages 105-114.
- Church, B. N., MacLean, M. E., Gaba, R. G., Hanna, M. J., James, D. A. R., 1988:  
Geology of the Bralorne Map-area (92J/15); BC Ministry of Energy, Mines and Petroleum Resources, Open File 1988-3.
- Cockfield, W. E, Walker, J. F., 1933)  
Cadwallader Creek Gold Mining Area, Bridge River District, British Columbia; in Summary Report 1932, Part A II, Geological Survey of Canada, pages 57-71.
- Hendry, James W., Routledge, Richard E. and Evans, Luke, 2005:  
Technical Report on the Midwest Uranium Deposit Mineral Resource and Mineral Reserve Estimates, Saskatchewan Canada prepared for Denison Mines Inc. Private Report by Roscoe Postle and Associates Inc.
- Hughson, M. R., 1958:  
Mineralogical report on a Gold-Uranium Ore from the Northern Gem Mining Corp. Ltd., Minto, B.C. Canada Energy Mines and Resources Mines Branch (CANMET) Investigation Report IR 58-89.
- Jenkins, W.S., 1959:  
Amalgamation, Cyanidation, Gravity and Floatation Concentration Tests on a Gold Ore from the Northern Gem Mining Corporation Ltd. Minto, B.C. Canada Energy Mines and Resources Mines Branch (CANMET) Investigation Report IR 59-49. 32p.
- Lammle Charles A.R. 1986:  
Assessment Report 1986 Diamond Drilling - Little Gem Property. Report written for Anvil Resources Ltd. B.C. Ministry of Energy, Mines and Petroleum Resources Assessment Report 15,451, 11 p.
- Leckie-Ewin, P., Adams, Percy A., 1939:  
Experimental Reduction and Electrolysis of Cobalt Ore from the Little Gem Mine. Report on Metallurgical and Research, University of British Columbia, May 1939.
- Massey, N.W.D., MacIntyre, D.G., Desjardins, P.J. and Cooney, R.T., 2005:  
Digital Map of British Columbia. B.C. Ministry of Energy and Mines, Geofile 2005-2,
- McCann, W.S., 1922:  
Geology and Mineral deposits of the Bridge River Map-area, British Columbia. Geological Survey of Canada Memoir 130, 140p.



MINFILE 2001:

B.C. Ministry of Energy, Mines and Petroleum Resources Mineral Occurrence Database.

Rutherford C., 1952:

Report on Little Gem Property, Bridge River District. Private company report filed in B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 7 p.

Skerl, A. C., 1957:

The Geology of the Northern Gem Mine, near Minto, BC, October 22, 1957.

Starr, Charles C., 1940:

Report of Preliminary Examination of the Little Gem Group, Gun Creek, Bridge River District, BC. September 4, 1940.

Stevenson, John S., 1948a:

Radioactive Investigations Gun Creek Area, 1948. Report filed in B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 6 p.

1948b:

Little Gem Cobalt-Gold-Uranium. in: Report of the Minister of Mines 1948, B.C. Ministry of Energy, Mines and Petroleum Resources, pp A112-119.

Taramazzo J.L., 1986:

Grillage du Concentre Cobaltifere "Rawmet". Resultas des essays Pilote, Minemet Reserche, Pyrometallurgie, Trappes, France, 17p. (Roast tests on Little Gem concentrates).

Taylor, R. R., 1941:

An Investigation of Treatment Methods of Cobalt Ore from the Little Gem Mine, Bridge River, April 1941.

1960:

Proposed Northern Gem Flow Sheet for the sintering and Smelting of Table Concentrates, 1960.

Tough, T. R., 1979:

Geological Report on the Northern Gem Property, Lillooet M.D., BC for Major Resources Ltd., March 1979.

Woodsworth, G. J., 1977:

Geology, Pemberton (92J) Map-Area, Geological Survey of Canada. O.F. 4B2, 1977.

## STATEMENT OF QUALIFICATIONS

I, J. T. (Jo) Shearer, M.Sc., P.Geo., of Unit 5 – 2330 Tyner St., Port Coquitlam, B.C. V3C 2Z1 do hereby certify that:

I am an independent consulting geologist and principal of Homegold Resources Ltd.

This Certificate applies to the Technical Report titled: TECHNICAL REPORT ON THE LITTLE GEM PROJECT, LILLOOET MINING DIVISION, Prepared for Goldbridge Mining Ltd., North Vancouver, B.C., Prepared by myself, J. T. SHEARER, M.Sc., P.Geo., Consulting Geologist, #5-2330 Tyner St., Port Coquitlam, B.C., V3C 2Z1 dated May 2, 2008 (the Technical Report).

My academic qualifications are as follows: Bachelor of Science, (B.Sc.) in Honours Geology from the University of British Columbia, 1973, Associate of the Royal School of Mines (ARSM) from the Imperial College of Science and Technology in London, England in 1977 in Mineral Exploration, and Master of Science (M.Sc.) in Geology from the University of London, UK, 1977

I am a Member in good standing of the Association of Professional Engineers and Geoscientists in the Province of British Columbia (APEGBC) Canada, Member No.19279 and a Fellow of the Geological Association of Canada, (Fellow No. F439)

I have been professionally active in the mining industry continuously for over 30 years since initial graduation from university and have worked on several epithermal precious metal properties.,

I inspected the Little Gem Property most recently on October 5, 2007.

I have read the definition of "Qualified Person" set out in National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

I am responsible for the preparation of all sections of the technical report entitled "Technical Report for the Little Gem Property" dated May 2, 2008.

I am independent of the Issuer in all respects with reference to NI 43-101, Section 1.4

I have not had prior involvement with the property, which is the subject of the technical report.

I have read the NI 43-101 and this technical report has been prepared in compliance with this instrument

That as of the date of the certificate, to the best of the my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Signed and dated in Vancouver B.C.

\_\_\_\_\_  
Date

\_\_\_\_\_  
J.T. (Jo) Shearer, M.Sc., P.Geo.

## DATE AND SIGNATURE

This report is respectfully submitted this 2<sup>nd</sup> day of May 2008.

S  
J. T. Shearer, M.Sc., P. Geo.  
May 2, 2008

## **Technical Data and Interpretation**

A physical examination and program of underground sampling was conducted at the Little Gem in the fall of 2007. The three known adits, No.'s 1, 2, and 3 were located. No.1 Adit at elevation 6250' (1905m) was open for 146 metres. At 30 metres from the portal, the original tunnel following the vein and lens and was caved or backfilled to the back. Approximately 60 metres of tunnel containing the bulk of the historical well-mineralized vein was inaccessible.

The No. 2 Adit was found 18 metres below No. 1, at elevation 1905 meters, with only the portal timbers showing above the caved in entrance to the portal. No effort was made to clear this portal.

No. 3 Adit, located 120 metres northwest of Adit 1 and at elevation 1855 metres, was driven in competent quartz diorite for 140 metres, in 1957. The small track drift had mining equipment underground.. There was no evidence of mineralization until the last 18 metres. On Oct. 5, 2007, Joe Shearer, P.Geo., accompanied by R.H. McMillan, Ph.D., P.Geo collected five chip samples from the last 20 meters of No. 3 Adit. One sample of mineralization assayed up to 130.g/ton, associated with high arsenic content. Refer to write-up by Joe Shearer and drawing of No. 3 Adit.

From Oct. 17 to Nov. 2, 2007, a five-man crew was utilized to channel sample Adit 1 and Adit 3. Samples were taken at 2-meter intervals. 167 samples were taken. Considerable effort was made to improve the steep trails to No.3 and No.1 Adits and to clear the entrance to No.1 Adit. The crew stayed at the Roxy Creek cabin and traveled by Argo 1.5 kilometres to the base of No.3 Adit.

No.1 Adit, at elevation 6250' (1905m) was open for 146 meters. At 25 to 30 meters, from the portal, the original tunnel, following the vein and lens, turned east, and was caved or back-filled, to the back. Approximately 60 meters of tunnel, containing the bulk of the historical well-mineralized vein, was inaccessible.

In 1957 the No. 1 Adit was extended 116 metres for exploration and a diamond drill drift. This drift, driven off the vein structure in granite, was sampled at 2-metre intervals and did not physically show any mineralization or in the assays. The first 30 metres of No.1 Adit physically and from the assay results, corresponded well with the historical data. The portal was collared in massive sulphide mineralization. Considerable well-mineralized rock, which assayed high in cobalt and gold, were found in the mine dump.

The sampling program indicated high gold and cobalt values in the last 18 metres of No. 3 Adit. This information confirmed anecdotal evidence from previous geologists. There is no known documented assay information for this adit. This mineralized zone is approximately 70 m south of the ore zone in Adit 1 and 50 metres lower. The mineralization was not as massive or defined, as that found at No.1 Adit, in the portal dump, collar, and the first 30-meters. No physical evidence or channel sample assays indicated significant disseminated mineralization, in the first 122 meters of No.3 Adit.



No physical evidence or channel sample assays indicated significant disseminated mineralization away from the vein system, in the last 116 meters of No.1 Adit.

The sampling program carried out in October of 2007, in conjunction with the historical data, showed the widespread occurrence of potential economic cobalt-gold mineralization.

In Oct., 2007, Entech Environmental Consultants Ltd. were retained to carry out a baseline Hydrological Data Review of the Little Gem Mining Property B.C. Their report is enclosed.

## CONCLUSIONS

Although the underground sampling program could not access the core mineralization zone, in No.1 Adit, sufficient information was collected to warrant follow-up work. The location of No.1 Adits and No.2 Adits, in a steep talus slope, subject to snow slides and difficult road access, eliminates the possibility of confirming and expanding ore reserves by underground exploration in No.1 and No.2 Adits. Diamond drilling, from the ridge, 150 meters above No.1 Adit, would be straightforward, with improved road access. Underground diamond drilling, from No.3 Adit, is feasible, along with surface diamond drilling, below No.3 Adit.

Success with these programs could lead to an underground Bulk Sample or mining from the North side or below No.3 Adit.

## RECOMMENDATIONS

1. Currently, access to the Little Gem is limited to travel by ATV and Trail Bikes. The 4.5 km main access road and 3 km access to the ridge, above the adits, must be upgraded to 4x4 truck standard. Travel time to the Town of Goldbridge would be reduced to under 30 minutes. The existing trails, at the Mine Site have to be improved.
2. Carry out a comprehensive mapping program, on surface, including surveying, stream-water sampling and prospecting.
3. Carry out a mechanized trenching and sampling program, on the ridge, above No.1 Adit, where an old Cat trench reportedly uncovered mineralization similar to that found in No.1 Adit.
4. A diamond drill program, from surface, to test the vein ore, above No.1 Adit.
5. An underground diamond drill program, from No.3 Adit, to test for vein ore and disseminations between No.3 Adit and No.1 Adit and No.2 Adit.

## APPENDIX A



## Project Photos



L.to R. Alex Macpherson, RL MacDonald, Al Beaton,  
Rob Wilgosh (w/Annie)  
at  
Little Gem Cabin on Roxey Creek





2 PHOTOS AT PORTAL #3.







End of track. Portal #3. Argo vehicle below.



Taking a Metallurgical Sample.  
Portal #3, 134 meters in from portal entrance.



## APPENDIX B

## **Dr. Ron McMillan's Geological Analysis**

### ***Introduction -- Synopsis***

A potentially economic deposit of cobalt-gold mineralization with minor associated uranium is partially developed by three adits in the Gold Bridge area - the vein-type mineralization is hosted in granitic rocks of the Coast Range Igneous Complex and is part of the Bridge River gold mining district (Church, 1995). Mineralization - *"massive sulpharsenide ore, containing the cobalt and associated gold, is a mixture of the cobalt-bearing variety of arsenopyrite (danaite) and loellingite-safflorite"* (Stevenson, 1948). A previous operator reported a high-grade resource of *"9425 tons (8570 tonnes) grading 0.67 oz./ton (23 g/t Au), 2.97% Co and 0.25% U"* (Allen, 1956), after the 1956 underground program. The 1956 estimate was based on surface and underground channel sampling and diamond drilling within an area approximately 40 metres in length and 20 metres vertical extent. The mineralized pod remained open for expansion along strike and to depth. A later figure quoted in the Canadian Mines Handbook (1960, p.185), and presumably based on additional work, estimated *"20,000 tons (18,000 tonnes) averaging 0.65 oz./ton (22.3 g/t), 3.0% Co and 0.25% U<sub>3</sub>O<sub>8</sub>"*. It must be emphasized however that the two aforementioned *"Historical Resource Estimates"* do not comply with current NI43-101 criteria and should not be relied upon. The mineralized structure has been traced for a length of 300 metres and over a vertical extent of 160 metres and most of this structure has not been tested. There are two possibilities for improvement on these *"Historical Resources"*. Firstly, there is potential to discover additional high-grade pods and/or to extend the known deposit. Secondly, the *"Historical Resource"* calculations have only considered the high-grade massive to semimassive sulphide mineralization - there has been no testing as yet for an orebody composed of *"disseminated mineralization"* of moderate grade and tonnage. The author undertook a one-day visit to the property on 05 October 2007. The object of the visit was to undertake a geological examination of the property as well as to assess potential drill sites on the ridge at the eastern strike extension of the mineralized corridor. Follow-up work is clearly warranted on the property. A geological mapping and diamond drill program is recommended.

### ***Conclusions and Discussion***

- 1) The Little Gem (Northern Gem) claims cover significant showings of high-grade cobalt-gold mineralization with associated modest uranium values. These values are well documented by channel sampling and mapping by a Dr. John S. Stevenson (1948), a highly-reputable government geologist employed by the British Columbia Department of Mines.
- 2) Underground exploration and development and underground diamond drilling by several mining companies between the 1930's and 1957 outlined a *"Historical Resource"* of high-grade mineralization which at current prices could be valued at between US\$1500 and US\$1800 per ton. Unfortunately, the available data from these programs appears to have been misplaced after Anvil Mining terminated their interest in mining - as a consequence, the records may have been lost. Therefore the data presented in this report (*Section 5 - Past Exploration Work*) is incomplete and inconsistent and cannot be relied upon. A program of underground re-habilitation is clearly warranted to document the historical data.

- 3) The full extent of the high-grade mineralized "pod" has not been delimited – more drilling is warranted to fully explore the extent of the known mineralization.
- 4) There appears to be considerable exploration potential for more "pods" of highgrade mineralization along a corridor extending from the lower adit portal to the highgrade trenches at the ridge top, 300 metres east of and 180 metres vertically above the #3 adit. This could be explored from the # 2 and #3 adits, and from extensions of these adits.
- 5) The potential for a moderate-tonnage deposit of moderate grade "disseminated mineralization" has not been considered to date – Allen (1956) obtained assays of 0.27% Co across 30 feet (9 metres) from a zone of "disseminated sulphides" located 150 feet (45 metres) southwest of the #2 adit.
- 6) A further corollary or deduction from the presence of "disseminated sulphides" 45 metres southwest of the #2 adit is that the two Anvil Resources drill holes may have been collared in the hangingwall of the Little Gem structure – these holes therefore missed the mineralized structure. This suggests that the mineralized corridor remains open to the west and at depth from the #2 adit. Alternatively, there could be a fault offset and the two holes were drilled into the footwall and beneath the structure.
- 7) Documentation regarding past metallurgical test work is not currently available. However, recent work on ores with similar mineralogy has developed flow sheets that can recover the metals in the Little Gem ore. Should a small high-grade deposit of economic dimensions be defined, one option would be to direct-ship hand-sorted material to AREVA's mill in Saskatchewan – the Midwest Lake Mine is scheduled to open shortly and will process ore of similar mineralogy to Little Gem (Hendry et al, 2005). Other possibilities are to ship the high-grade ore to Formation Capital's Sunshine facility in Idaho, or possibility to ship it to smelters in Asia – possibly China or Korea. If however, a sufficient tonnage of moderate-grade ore can be proven at Little Gem, a stand-alone milling operation will likely be feasible.

### ***Recommendations***

- 1) An initial mapping project should be undertaken to confirm or negate the suggestions outlined in the above section (*Section 11 - Conclusions and Discussion*). A budget of \$25,000 should be adequate for a crew of two senior geologists to spend 4 to 6 days mapping the showings in detail, with an additional day to clear the access road. They could stay in Gold Bridge and would require a truck and quads (ATVs) for access. Digital TRIM maps could be used for basemaps.
- 2) An initial diamond drill program of four holes totalling 600 to 800 metres could be undertaken to test extensions on the mineralized corridor at the east and west ends. Two holes (350 metres) could be drilled from the ridgetop 300 metres east of the #3 adit, These holes would test the area under the high-grade trenches (Stevenson's samples 47 to 52). The other two holes could be drilled from the area of the #3 adit – possibly directed  
14  
north-north-westward from the road southwest of the lower adit or possibly south-southeastward from the bulldozer trenches approximately 100 metres north-northwest from the adit portal. The specific locations of the proposed holes would be determined following the mapping program.
- 3) The adits should be re-habilitated and initially an underground drill program completed from adit #2 to document the attitude of the high-grade lens. Drilling at 10 metre centres, a total of 18 drill holes totalling approximately 1000 metres should be adequate to complete the program, after which it should be possible to initiate data

compilation for a NI43-101 compliant mineral resource.

### ***Bibliography***

- Allen, Alfred R. (1956): The Northern Gem, Bridge River, B.C. Private company report. B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 24 p.
- Allen, Alfred R. (1955): Report on the Gem Property, Bridge River, B.C. Private company report. B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 25 p.
- Cairnes, C.E. (1943): Geology and Mineral Deposits of Tyaughton Lake Map-Area, British Columbia. Canada Department of Mines and Technical Surveys. Geological Survey of Canada Paper 43-15.
- Canadian Mines Handbook (1960): Northern Gem Mining Corporation Ltd., p. 265.
- Church B.N. (1995): Bridge River Mining Camp, Geology and Mineral Deposits. B.C. Ministry of Energy, Mines and Petroleum Resources Paper 1995-3, 159 p.
- Hendry, James W., Routledge, Richard E. and Evans, Luke (2005): Technical Report on the Midwest Uranium Deposit Mineral Resource and Mineral Reserve Estimates, Saskatchewan Canada prepared for Denison Mines Inc. Private Report by Roscoe Postle and Associates Inc.
- Hughson, M. R. (1958): Mineralogical report on a Gold-Uranium Ore from the Northern Gem Mining Corp. Ltd., Minto, B.C. Canada Energy Mines and Resources Mines Branch (CANMET) Investigation Report IR 58-89.
- Jenkins, W.S. (1959): Amalgamation, Cyanidation, Gravity and Floatation Concentration Tests on a Gold Ore from the Northern Gem Mining Corporation Ltd. Minto, B.C. Canada Energy Mines and Resources Mines Branch (CANMET) Investigation Report IR 59-49. 32p.
- Lammle Charles A.R. (1986): Assessment Report 1986 Diamond Drilling - Little Gem Property. Report written for Anvil Resources Ltd. B.C. Ministry of Energy, Mines and Petroleum Resources Assessment Report 15,451, 11 p.
- Massey, N.W.D., MacIntyre, D.G., Desjardins, P.J. and Cooney, R.T. (2005): Digital Map of British Columbia. B.C. Ministry of Energy and Mines, Geofile 2005-2, 15
- McCann, W.S. (1922): Geology and Mineral deposits of the Bridge River Map-area, British Columbia. Geological Survey of Canada Memoir 130, 140p.
- MINFILE (2001): B.C. Ministry of Energy, Mines and Petroleum Resources Mineral Occurrence Database.
- Rutherford C. (1952): Report on Little Gem Property, Bridge River District. Private company report filed in B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 7 p.
- Stevenson, John S. (1948): Radioactive Investigations Gun Creek Area, 1948. Report filed in B.C. Ministry of Energy, Mines and Petroleum Resources Property File 93JNE 068, 6 p.
- Stevenson, John S. (1948): Little Gem Cobalt-Gold-Uranium. in: Report of the Minister of Mines 1948, B.C. Ministry of Energy, Mines and Petroleum Resources, pp A112-119.
- Taramazzo J.L (1986): Grillage du Concentre Cobaltifere "Rawmet". Resultas des essays Pilote, Minemet Reserche, Pyrometallurgie, Trappes, France, 17p. (Roast tests on Little Gem concentrates).

### ***CERTIFICATE***

I, RONALD HUGH McMILLAN, of 6606 Mark Lane, Victoria, British Columbia (V9E 2A1), do hereby certify that:

1. I am a Consulting Geologist, registered with the Association of Professional Engineers and Geoscientists of British Columbia since 1992, and with the Association of Professional Engineers of Ontario since 1981.

2. I am a graduate of the University of British Columbia with B.Sc. (Hon. Geology, 1962), and the University of Western Ontario with M.Sc. and Ph.D. (1969 and 1972) in Mineral Deposits Geology.

3. I have practiced my profession throughout Canada, as well as in other areas of the world continuously since 1962.

4. The foregoing report on the Little Gem Property is based on a review of published and unpublished information regarding the geological setting, styles of mineralization and results of previous exploration programs within the subject property. A one-day visit was made to the property on October 5, 2007.

5. I have a 50% interest in the mineral claims which constitute the Little Gem Property. Dr. Neil Church holds a 50% interest in the property.

R. H. McMillan Ph.D. P.Geo.

Victoria, B. C.



## APPENDIX C

---

**2007 Baseline Hydrological Data Review**  
**of**  
**Little Gem Mining Property**

Prepared on behalf of:

**A.J. Beaton Mining Ltd.**  
**947 Frederick Road**  
**North Vancouver, BC**  
**V7K 1H7**

**Attn: Mr. A.J. Beaton**

November 12<sup>th</sup>, 2007

**ENTECH**

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# ENTECH ENVIRONMENTAL CONSULTANTS LTD.

3187 Thompson Place, West Vancouver, BC, CANADA V7V 3E3  
Ph 604 921 1932 email: [info@entech.ws](mailto:info@entech.ws) FAX 604 921 1934  
web: <http://www.entech.ws>

November 12<sup>th</sup>, 2007

A.J. Beaton Mining Ltd.  
947 Frederick Road  
North Vancouver, BC  
V7K 1H7

Attn: Mr. A.J. Beaton

Dear Mr. Beaton:

**RE: Baseline Hydrological Data Review of Little Gem Mining Property, BC.**

We are pleased to submit the results of our 2007 Baseline Hydrological Data Review of the Little Gem Mining Property, BC, in preparation for the resuming operations of the Mine.

The information compiled represents the most accurate information available at the time of our investigation with recommendations for future environmental studies.

Thank you for the opportunity to be of service, and should you have any questions please contact us through any of the avenues noted above.

Respectfully Submitted,  
ENTECH ENVIRONMENTAL CONSULTANTS LTD.



S.F. Sverre, M.Sc., R.P.Bio.  
President

Encl.

**2007 Baseline Hydrological Data Review**  
**of**  
**Little Gem Mining Property**

Prepared on behalf of:

**A.J. Beaton Mining Ltd.**  
**947 Frederick Road**  
**North Vancouver, BC**  
**V7K 1H7**

**Attn: Mr. A.J. Beaton**

November 12<sup>th</sup>, 2007

**By**

**ENTECH** ENVIRONMENTAL CONSULTANTS LTD.

3187 Thompson Place, West Vancouver, BC, Canada V7V 3E3  
Ph: 604 921 1932    email: [info@entech.ws](mailto:info@entech.ws)    Fax: 604 921 1934  
<http://www.entech.ws>

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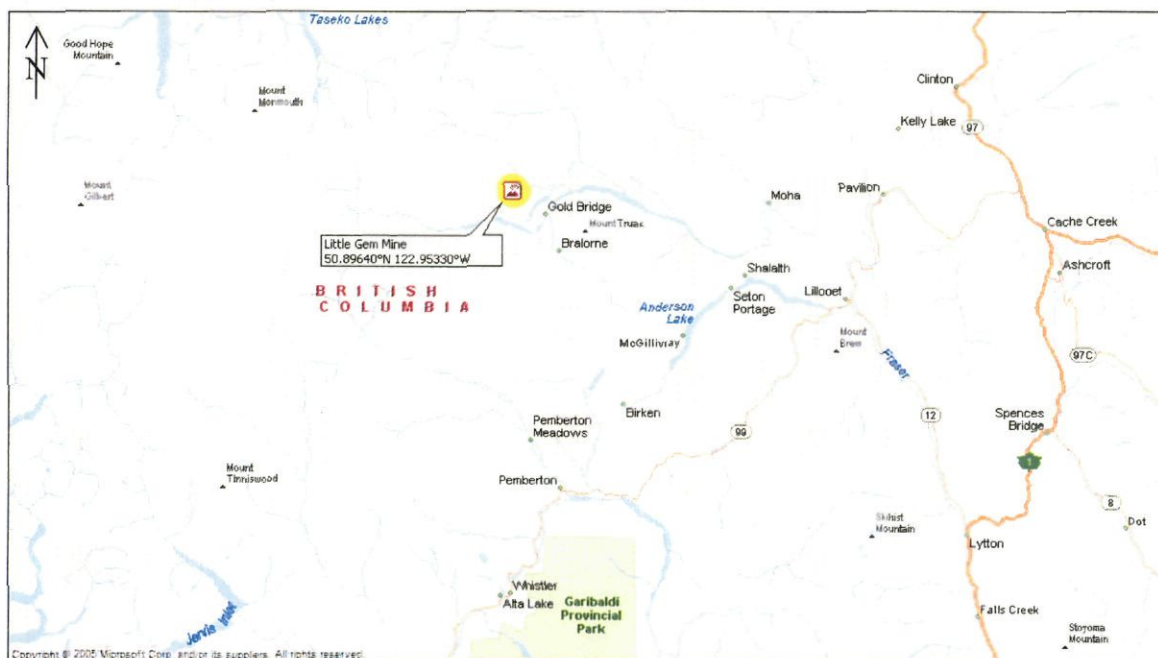
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## 1.0 INTRODUCTION

ENTECH Environmental Consultants Ltd. (ENTECH) was retained by Mr. A.J. Beaton of A.J. Beaton Mining Ltd., to summarize the associated hydrological regime of the Roxey Creek Drainage Basin, which could potentially be affected by the proposed mining operations of the Little Gem Mine. This report will then be part of a submission to the BC Ministry of Energy, Mines, and Petroleum Resources, in support of an application to reopen the Little Gem mine, situated approximately 8 km NW of Gold Bridge and 17 km NW of Bralorne, BC (Figure 1).

A potentially economic deposit of cobalt-gold (Co-Au) mineralization with minor uranium (Ur) is partially developed by three adits in the Gold Bridge area. The vein-type mineralization is hosted in granites rocks of the Coast Range Igneous Complex and is part of the Bridge River gold mining district. The mineralized structure has been traced for a length of 300 m and over a vertical extent of 160 m, most of which has yet to be tested, as described in the following report:

*R.H. McMillan, Ph.D., P. Geo. January 15<sup>th</sup>, 2007. Geological Report on the Little Gem (Northern Gem) Cobalt-Gold Property, Gold Bridge/Bralorne Area, South-Central British Columbia, 16 pages.*



**Figure 1.** Location map of Little Gem Mine, situated NW of Gold Bridge and Bralorne, BC.

### **1.1 Scope of Work**

The scope of work for this contract includes the following:

1. A visual site inspection of Little Gem Mine, its 3 associated portals, their site-specific conditions, and drainage patterns.
2. A traverse and documentation of the possibly affected watercourse, Roxey Creek and other ephemeral drainages.
3. Collection, analysis, and summary of freshwater samples from the aforementioned watercourse(s),
4. A summary of available climatological and fluvial statistical data from the region as collected from the field and from independent research.
5. Determination of land use of the area and possible scenarios of environmental impacts to watercourse(s) from mining operations.
6. A summary of all available baseline hydrological data and provision of a written report containing the findings of the investigative work.

### **1.2 Objective**

The objective of this study is to formulate a baseline dataset of hydrological data from the Roxey Creek drainage basin in order to compare it with future investigations to determine if the proposed mining operations of the Little Gem Mine are significantly impacting the region, or not.

### **1.3 Regulatory Framework**

For this Baseline Hydrological Data Review, the emphasis of this report will be concerned with quantitative water quality data. Collected and analyzed freshwater data will be compared with numerical limits from the CCME and the BC Ministry of Environment to determine if compliance is met and if significant changes are occurring over time. To do this appropriately, one must also consider the historical operations in the area to determine what background levels might be expected and acceptable to the proposed operations, as well as any known potential contamination issues.

Any observed changes in water quality would be an effective measuring tool of changes in the surrounding area that could also affect the land, air, and both aquatic and terrestrial wildlife. Although documenting every significant aspect of the environment is beyond the scope of this hydrological report, it would be an invaluable tool in determining long-term environmental change. It will be briefly touched upon since it is inherently linked with water quality and can be documented by completing a thorough Environmental Impact Assessment.

### 1.3.1. CCME's Canadian Environmental Quality Guidelines

In 1987, the Canadian Council of Resource and Environment Ministers (CCREM), the forerunner of the Canadian Council of Ministers of the Environment (CCME), published *Canadian Water Quality Guidelines*, which provided national environmental quality guidelines for major water uses in Canada. In April 1996, the Deputy Minister's Committee of the CCME gave its approval to the Water Quality Guidelines Task Group to work towards assembling a document, *Canadian Environmental Quality Guidelines*, that would integrate national environmental quality guidelines for all environmental media including water (drinking water, recreational water, water for aquatic life, irrigation water, and livestock water), soil (agricultural, residential/parkland, commercial, and industrial land uses), sediment, tissue residue (for wildlife consumers of aquatic biota), and air (for human health, vegetation, animals, materials, and aesthetic atmospheric properties).

For the first time, environmental quality guideline activities in Canada for air, water, soil, sediment and tissue residue have been integrated into one comprehensive document, the *Canadian Environmental Quality Guidelines*.

For the purposes of this report, the summary table of *Canadian Water Quality Guidelines for the Protection of Aquatic Life* were applied against water samples from the subject area. Guidelines for both freshwater and marine environments were provided by CCME; however, only the former is applicable.

### 1.3.2. BC Water Quality Guidelines (Criteria)

The BC Ministry of Environment's Environmental Protection Division has produced a series of documents which establishes ambient water quality guidelines, formerly known as criteria, for British Columbia. The reports were prepared pursuant to Section 2(e) of the *Environmental Management Act*, 1981 and includes:

1. Approved Water Quality Guidelines;
2. Working Water Quality Guidelines (not yet approved);
3. Draft Guidelines (under review or soon to be posted);
4. Summary Reports; and
5. Technical Documents (contains all the original data, literature references, and rationale).

For the purposes of this report, those substances with approved or working water quality guidelines for freshwater aquatic life were adopted. In some instances, where maximum and average guidelines were provided, maximum values were applied.

### 1.3.3. Contaminated Sites Regulation

Contaminated sites in the Province of British Columbia were regulated by the *Waste Management Act* (RSBC 1996, Chapter 482) and the *Environment Management Act* (RSBC 1996, Chapter 118) from the Ministry of Environment. Under the *Waste Management Act*, the *Contaminated Sites Regulation* (BC Reg. 375/96) and the *Special Waste Regulation* (BC Reg. 63/88) contained provisions for contaminated sites. The new *Environmental Management Act* was brought into effect in July of 2004 (SBC 2003, Chapter 53) and replaced the *Waste Management Act* and the *Environment Management Act* by bringing provisions from both acts into one statute. At this time, the *Special Waste Regulation* was renamed *Hazardous Waste Regulation* which identifies wastes as being particularly hazardous and the *Contaminated Sites Regulation* (CSR) continues to ensure that contaminated soil, surface water, sediments, and groundwater are cleaned up to scientifically-based standards. This legislation includes a comprehensive framework for environmental investigation.

The *Contaminated Sites Regulation* (CSR) specifies numerical concentration limits for a large number of substances. In soil, generic numerical standards have been established for some parameters, and matrix numerical standards have been established for others. Different standards have been designated for various land uses such as industrial (IL), commercial (CL), residential (RL), urban park (PL) and agricultural (AL), to protect environmentally sensitive organisms or to protect human health.

For water, general numerical standards have been established to protect specific uses of the groundwater, specifically aquatic life (AW), irrigation (IW), livestock watering (LW), and drinking water (DW), as detailed in Schedule 6 of the CSR. When the concentration of one or more contaminants exceeds the applicable numeric standards, corrective or remedial action is called for. Remedial action can either reduce the concentration of offending substances or parameters to less than the applicable numeric standard(s). In addition, it can reduce the risk to human health and the environment to less than defined limits using specific engineered or administrative controls.

For the purpose of this report, the aquatic life (AW) standard was applied against water samples. Where standards existed to protect freshwater and aquatic life, the freshwater aquatic life standard was applied.

### 1.3.4. Environmental Impact Assessment

Environmental Impact Assessments in the Province of British Columbia are regulated by the *Environmental Impact Assessment Regulation* (BC Reg. 330/81 with amendments up to BC Reg. 321/2004) under the new *Environmental*



*Management Act (EMA)*. An Environmental Impact Assessment (EIA) may be defined as a formal process used to predict the environmental consequences of any development project. The EIA ensures that the potential problems are foreseen and addressed at an early stage in the project's planning, design, and operation. Therefore, the EIA can be a tool used to document a region's water quality, air quality, land use, water use, aquatic ecology, and terrestrial ecology. With these types of observations recorded, any detrimental and/or beneficial impact(s) upon the environment could be determined by comparing the original EIA data with future surveys.

#### **1.3.5. Combined Framework**

Overall, in reference to the scope of this report, if collected freshwater samples meet CCME Canadian Environmental Quality Guidelines, BC MOE Water Quality (Criteria) Guidelines, and BC MOE CSR Aquatic Life (AW) standards, those samples will be in compliance with the applicable governing standards. In addition, the limited EIA data may or may not show that the general area was significantly or adversely affected by the proposed mining operations or not over time.

Therefore, a holistic view and approach is more beneficial to assess and document any observable changes caused by the proposed mining operations. Quantitative water quality data and qualitative observation data will have to be combined to construct (and later compare) the baseline data to discover any significant hydrological or environmental changes in the area.

Summarized analytical data tables are provided in Appendix A, and include all discussed and applicable standards. Laboratory originals are presented in Appendix B.

## 2.0 METHODOLOGY

The investigative approach to forming a baseline hydrological dataset for any area involves a site inspection to better understand the site-specific conditions of the subject area. In this instance, the Little Gem mining property was inspected on October 4<sup>th</sup>, 2007. The inspection included general observations regarding the mine, ecology, weather, and local drainage patterns. Surficial freshwater samples were collected and discharge flow rates from some locations were measured.

In addition, traverses and observations of possibly affected watercourses in the immediate area are also warranted since they are down-drainage from the mine. Inspections and sampling was then conducted within the Roxey Creek drainage basin.

Careful consideration must be adopted to both natural forces and construction activities which take place near Little Gem. Situated on the side of a mountain in BC's interior, the terrain can be steep, unstable, and unforgiving. The area is prone to active avalanches, ice flows in creeks near the valley bottom, and mass movement from creep to slumps and landslides. Infield documentation and air photo interpretation can help minimize the impacts of such forces. This investigation can also aid in determining optimal and safe locations for roads and planned facilities.

In addition to field-collected data, Internet searches from Environment Canada were completed to gain a historical prospective and summary of available climatological statistical data. Unfortunately, no stream gauges in the general area are known, so all required fluvial data will need to be collected during the spring thaw.

In order for baseline hydrological data to be useful, it must be compared to future datasets and those changes, if present, need to be related to how the environment will be impacted. Therefore, a firm understanding and documentation must be completed for the system as a whole. In addition to compiling the water quality data, a limited EIA will be performed to lightly touch on and document the local environment in a means to observe and compare any environmental changes, as well as reducing adverse environmental impacts, and shaping projects to suit the local environment.

Taking photos of the subject site, and gathering all pertinent information to be able to adequately determine the impacts of the project on fisheries, forestry, water/land/air protection, wildlife and habitat, and any other requirements of the study is useful. The long term history of mining activities may already have impacted the native flora in the area making the identification of plant

communities and endangered plant species of reduced significance since the ecology of the immediate area has already been disturbed. An inspection of the subject site and nearby lands can identify, predict, and assess the likely consequences of the proposed development activities. Following the EIA study parameters, the local setting is well understood and any future changes, whether hydrological, ecological, or otherwise, can be quantified.

However, even one that is very limited in scope, as this one is due to the constraints of this hydrological report, it will still contain invaluable data in determining environmental change.

The information gathered provides preliminary baseline hydrological data to identify environmental concerns and potential impacts on water quality caused by the proposed reactivation of the Little Gem Mine, although a more thorough analytical program is recommended to be completed as part of the detailed planning and operation of the mine.

## 3.0 SETTING

### 3.1 Location, Access, and Environmental Setting

The subject area is sparsely inhabited, and is given over to logging, seasonal cattle ranging, and some mining exploration. The Little Gem prospect is located at about 50° 53' 47" N and 122° 57' 12" W within the Dickson Range near the head of Roxey Creek. The mine workings are at an approximate elevation between 1800 to 1900 m, 2.3 km NE of Dickson Peak, 2.5 km N of Mount Penrose, and 5 km NW of Gun Lake.

Access to the property from Gold Bridge is via Gun Lake and by the Slim Creek logging road. At km 12.9 on the Slim Creek road, a mountain road leads up Roxey Creek to the mine workings approximately 3 km. The access road is partially overgrown by alders and willows at the lower end, has some washouts present, and will require some refurbishment to permit vehicle access to the site. Presently, the site is only accessible by ATV, 8 wheeler, or Argo.

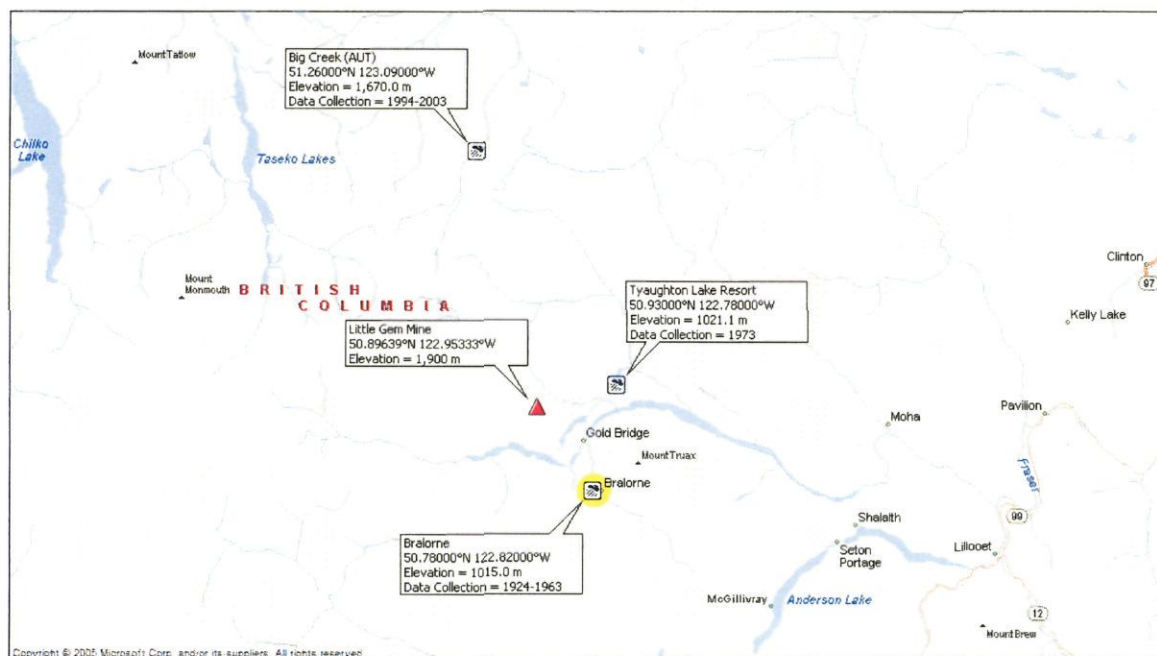
Little directly relevant climatological information is available for the Little Gem Mine region. The National Climate Data and Information Archive from Environment Canada has maintained at least 11 different stations within a 50 km radius of the mine at different times. A summary of those stations with respective times of data collection and elevations are provided in the following table.

**Table 1. Summary Table of 11 Climatological Data Collection Stations within a 50 km Radius of Little Gem Mine, BC, indicating dates of data collection and station elevations, as recorded on Environment Canada's National Climate Data and Information Archive at <http://www.climate.weatheroffice.ec.gc.ca/>**

Station Name	Year(s) of Data Collection	Elevation (m)
Big Creek (AUT)	1994-2003	1,670.0
Birkenhead Lake	1983-1985	715.1
Bralorne	1924-1963	1,015.0
Bridge River	1924-1929	609.6
Lajoie Dam	1963-1982	685.8
McGillivray Falls	1988	419.0
Meager Creek	1981-1982	430.1
Moha	1924-1947	548.6
Pemberton Meadows 4NW	1975-1976	243.8
Pemberton Wolverine Cr	1983-1984	271.0
Tyughton Lake Resort	1973	1,021.1

It is of great importance that any climatological data used from a nearby station be representative of Little Gem and should therefore be at a similar elevation (1,800 to 1,900 m) and environmental setting (e.g. similar position in relation to mountainous barriers). As noted in Table 1, the Big Creek (AUT) climatological station was situated in a relatively comparable elevation; however, data collection was only done for a short period of time (10 years), but several years of this data was listed as missing. The next highest climatological stations were Tyaughton Lake Resort and Bralorne stations at 1021.1 and 1015.0 m, respectively. Data from the former was only collected in 1973 while data was collected from the latter for a period of nearly 40 years. Therefore, the most representative climatological dataset for the Little Gem Mine would be the Bralorne Station.

It should be noted that some differences in temperature, snow/rain ratios, and snow pack are expected to exist. Although total precipitation quantities would be expected to differ somewhat, as would seasonal timing and variation, their differences are not considered to be significant. Overall, this data may be used to estimate a range of climatological conditions common in the area.



**Figure 2.** Location map of most representative and applicable climatological data collection stations for Little Gem Mine, BC, detailing their respective elevations and dates of data collection.

Temperatures from the Bralorne station varied from a low of -36.1 °C in winter to a maximum of 37.8 °C in summer. Overall, the annual mean temperature was 4.6 °C. In terms of precipitation, total annual rainfall averaged 386 mm while total snowfall averaged 231 cm.

Little Gem Mine is situated on a steep hillside in the Dickson Range, which is part of the eastern Coast Mountain Ranges. Wooded valleys and steep slopes are separated by equally steep mountain peaks. The Co-Au showings are located on a NW-facing timbered slope at around 1,900 m. The timber line is between 1,700 and 2,100 m in the general area and is timbered mainly with mature balsam fir and a canopy of alder and some maple trees. There was also a brush canopy consisting of buffalo berries, willow, and vacciniums with some berries, which were noted in the area.

Wildlife frequenting the area include black bears, mule deer, coyotes, the occasional moose, cougars, and some grizzly bears. No signs of elk, mountain goats, or bighorn sheep were noted in the immediate vicinity. Due to the steepness of Roxey Creek, it is unlikely that it supports aquatic life other than invertebrates, periphyton, and possibly some amphibian occurrences. However, Roxey Creek drains into Gun Creek, which empties into Carpenter Lake, and is likely to support bull and rainbow trout, among other species. ENTECH recommends investigating the aquatic life of Roxey Creek and Gun Creek next Spring.

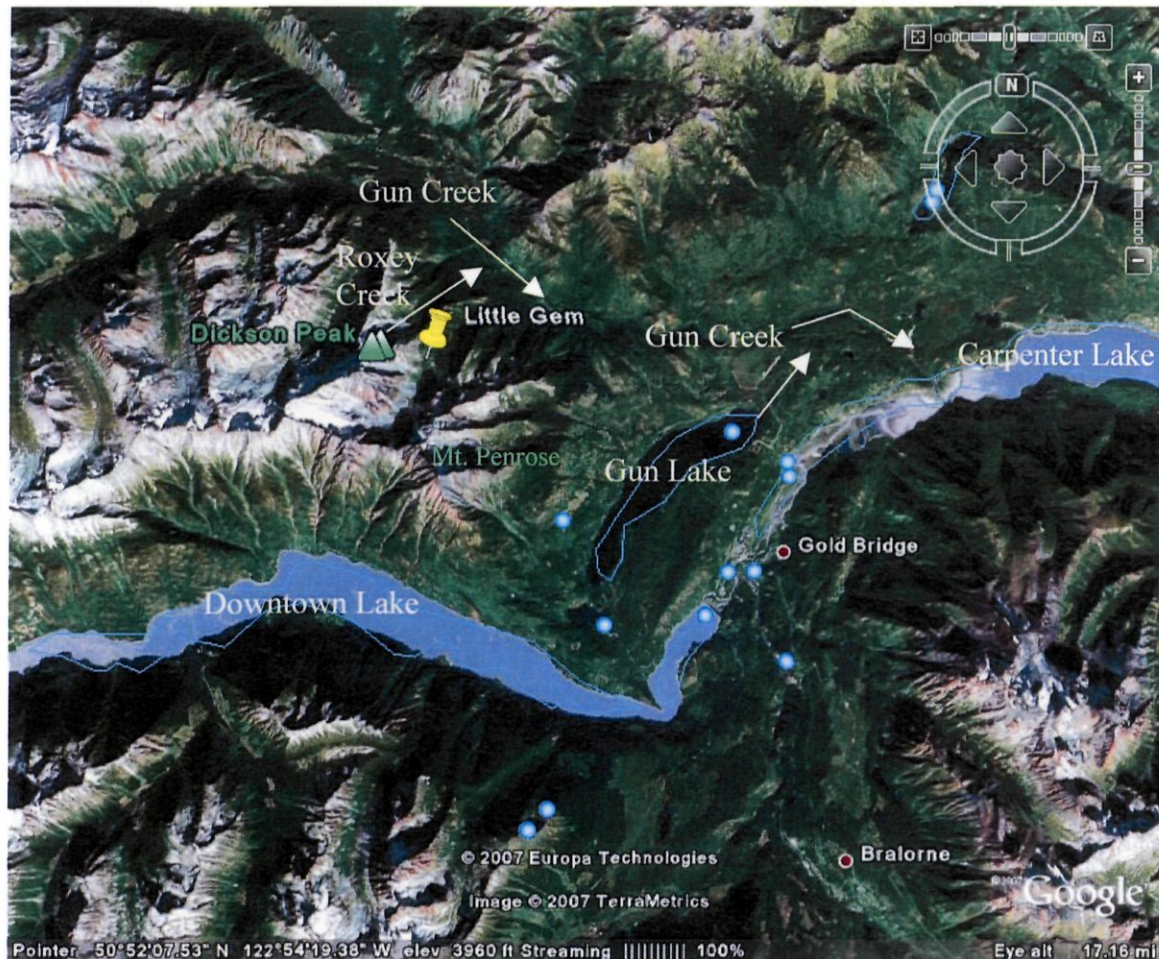
Recreational uses of the land in the area include hunting, fishing, four-wheeling, horseback riding in the summer, snowmobiling in the winter, and some of the peaks in the area attract hikers and climbers. The area around Gun Lake is a popular for vacationers and many cabins are situated along its perimeter.

### **3.2 Hydrology**

As previously mentioned, watercourses in the area including Roxey Creek and Gun Creek. The Little Gem mining property is situated just SE of NE-flowing Roxey Creek. The sub-catchment basin of Little Gem and its mining portals flows towards Roxey Creek and is part of the larger Roxey Creek watershed. Further to the NE, Roxey Creek enters SE-flowing Gun Creek that empties into Carpenter Lake (Figure 3).

Groundwater travels in a simple flow system from the recharge area, mostly on top of the ridge, and discharges into the valley below. Recharge is from precipitation, mostly during the snowmelt period from March to late June. Once the snow cover melts away in the Spring of 2008, ENTECH will be able to determine the permeability of overlying sediments to see how well surface runoff infiltrates the subsurface as compared to draining directly into surface channels.





**Figure 3. Aerial photo of Little Gem mining property, part of the Roxey Creek and Gun Creek drainage systems, Little Gem Mine, BC.**

The surficial geology, groundwater, and surface water hydrology requires careful studies to examine peak runoff from disturbed and undisturbed areas, drainage system design including interceptor and drainage ditches, and impacts on existing watercourses in the area. During the Spring and Summer of 2008, ENTECH will be able to better estimate creek channel widths and depths to calculate flow rates of sub-drainages within the Little Gem property. In addition, the installation of a hydrometric station including a stream gauge and weir could provide more accurate fluvial data for the watershed.

### 3.3 Potential Environmental Issues

Environmental problems often associated with metal mines include acid mine drainage and contamination of local waters with heavy metals. Preliminary onsite studies have shown that surface waters in the vicinity of the mine workings have pH values higher than 7. Some observed calcareous rocks may neutralize the

small amount of acidic water that is produced since sulphides like arsenopyrite do not oxidize to any extent or dissolve into solution. Overall, very little oxidation of the arsenopyrite and other sulphides has occurred, likely due to the quantities of carbonate minerals present, minimizing the effects of acid mine drainage in the area. Acid water usually comes from the oxidation of pyrite ( $\text{FeS}_2$ ) to produce sulphuric acid. When water has a pH lower than 7, it is acidic and capable of picking up other metallic ions in addition to iron.

The main sources of water contamination around mines are associated with waste dumps and drainage of groundwater from underground workings. Neither of these sources are expected to be troublesome at Little Gem if the pH can be maintained at a high level to prevent dissolving minerals in the rocks or mining spoils.

An overview of measurable critical parameters that will be focussed on in an analysis of water quality is provided in Appendix C.

Other potential areas of environmental concern exist in addition to the examination of the acid generation potential of mined materials. For example, waste rock effluent management, sewage and refuse disposal, potential contamination of receiving waters through surface runoff, air emissions, and the use of reagents, fuels, and explosives, all require examination.

Being situated on the side of a mountain, the general area is prone to possible avalanching, mass wasting, and ice flows, all of which can compromise the safety of trails, roads, bridges, planned mining facilities, and associated pipelines. Within a fraction of a moment, they can alter the landscape and drainage patterns, depositing geologic material, ice, and snow, in new locations, often with catastrophic results.

Currently, no crusher/mineral concentrator mill is being considered at this time since the current plan calls for shipping the high-grade ore in bulk to an offsite processing plant.

In order to reduce the risk of environmental contamination in the area, domestic and industrial waste from the operations of the mine will be required to be disposed of by an approved landfill in association with a detailed and effective waste management plan, while sewage will be required to be discharged into septic tanks and tile fields.

With careful consideration, a detailed reclamation plan would be a great asset in reducing environmental impacts on the plants and wildlife in the area if the locations of buildings and roads are identified in the early planning stages, as well as the ultimate deposition of waste rock and water storage/treatment areas, if required.

The thinly treed slopes and the forested area near the valley appear to be browsing habitat for deer and some moose during summer and autumn. This area appears unsuitable for the wintering of moose and deer, when the coastal mountain regions are blanketed with deep snow. The waste rock storage areas as well as other required facilities and activities associated with a working mine would temporarily alienate some of this habitat for wildlife use during the life span of the mine. However, deer and bears may continue to utilize the slopes and valley bottom unaffected by mining activities for summer feedings once mine development resumes.

The wildlife issue needing utmost consideration would be a management plan to minimize the impact(s) upon the pike and marmot colonies. However, since the mining activities will be mainly underground, the impacts will mostly be upon the areas designated waste rock and water, and some relocated overburden materials needed for roads and berms. Therefore, the habitat disturbance will be limited in scope, perhaps some 5 to 10 ha in size. After the life expectancy of the mine is completed, the area is expected to revert back to natural vegetation that is native to the area.

Impacts on other terrestrial and aquatic wildlife are expected to be minimal. Roxey Creek is not expected to be greatly disturbed by the siting of the required mining facilities. Safeguards such as ditches and culverts/bridges along roads with round crowns help to minimize sediment movement, and the use of pipelines to divert water for treatment, if required. On the other hand, the use of silt fencing and settling ponds on surface water drainage channels can be employed during the construction phases to prevent the release of excessive quantities of silt to the creeks, and as discussed, the release of dissolved contaminants is expected to be minimal. Increased runoff and decreased retention of surface waters are other factors to be considered, although this is not expected to be significant. It is anticipated that fish habitat in Gun Creek may not be greatly affected when the baseline parameters have been established and the reactivation of the mine is carefully planned.

## 4.0 RESULTS OF THE INVESTIGATION

### 4.1 Site Visit and Station Determinacy

ENTECH personnel collected field data and samples during a site visit on October 4<sup>th</sup>, 2007. The purpose of this trip was to collect a rudimentary baseline environmental dataset to aid in the assessment for potential reactivation of the Little Gem Mine before the onset of winter. In addition, recommendations would be made for all work and data collection that would be required in the Spring.

The property was accessed by travelling with truck up the Slim Creek logging road located NW of Gun Lake in the Gold Bridge area of BC, to the intersection of the road leading up to the Roxey Creek drainage. An access road from Slim Creek Road was traversed from an elevation of 1113 m asl (above sea level) to where a cabin was situated at an elevation of 1704 m asl. Thereafter, hiking continued towards the three mining portals (Portals #1, #2, and #3).

Permanent stations for water sampling have been/will be situated at the uppermost portal (Stn #1 at Portal #1), the intermediate portal (Stn #2 at Portal #2), and the lowest portal (Stn #3 at Portal #3). Stn #4 was situated above the influence of the mine while Stn #5 was situated below it, both on Roxey Creek. Elevations for interim Stn #3, #4, and #5 were recorded with a GPS while elevations at Stn #1, #2, and #3 were estimated from the known elevation of interim Stn #3. The following describes the five determined stations thus far:

**Stn # 1 (~1,865 m asl):** No water sample was collected from the uppermost portal (Portal #1) since about 1.5 ft of snow covered the area leading to the portal and no seepage or drainage was observed at the time. Although this portal was covered up by snow and marred by a talus slope, its approximate location was pointed out by Mr. Beaton. It is recommended that an initial sample be collected from this portal in the spring of 2008.

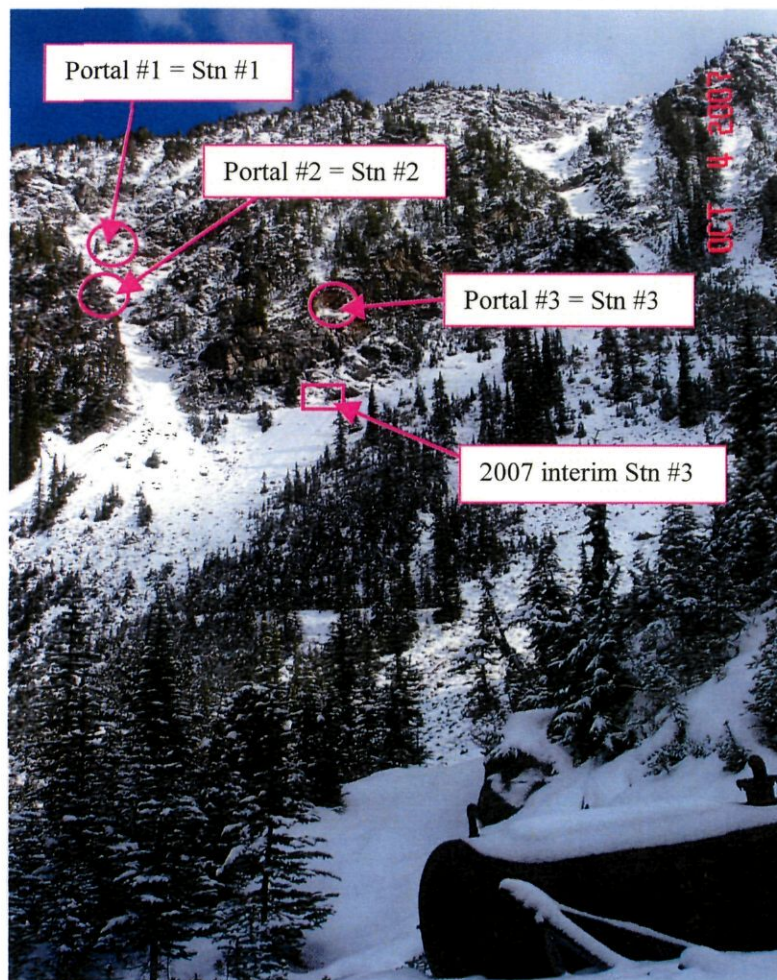
**Stn # 2 (~1,860 m asl):** No water seepage was observed that could be attributed to this intermediate portal (Portal #2) as there was about 1.5 ft of snow covering the area in the vicinity of its talus slope, whose approximate location was also pointed out by Mr. Beaton. This portal was even more difficult to eye with binoculars from our position of safety below the ice and talus slope, since the portal was oriented on a west-facing side of the mountain. It is recommended that an initial sample be collected in the spring of 2008.

Overall, no surface flow was observed on the talus slopes directly below Stn #1 or #2 due to snow cover. Therefore, at present time, it is unknown if drainage from these two upper portals is travelling through the subsurface, between rocks of the talus slopes, or through snow covered channels, etc.



**Stn # 3** (~1,840 m asl): Water was running out of this lower portal and was draining into the road below where there was an exposed seepage/drainage area, which is where a water sample was collected, some 20 m below Portal #3 at 1,820 m asl (interim Stn #3). Due to snow cover, melting icicles, and sheets of ice immediately below the entrance to Portal #3, it was unsafe to access the portal itself. It is recommended that Stn #3 be situated at the mouth of the portal when freed from snow during future sampling events instead of at the lower and interim location where the initial sample was collected (Figures 4 and 5). The estimated volume of the surface seepage at the time of sampling was <1 l/s (0.001 m<sup>3</sup>/s).

Based on the topography and the local drainages from the three mining portals, it appears that they do join into one channel or sub-drainage basin before draining into Roxey Creek. However, the talus slopes and rock outcrops make it difficult to determine the exact drainage patterns until the snow is gone. Again, the final determination of the flow regime will need to be completed during the spring of 2008.



**Figure 4.**

Overview photo of three portals identified as Portal #1 (uppermost), Portal #2 (intermediate), and Portal #3 (lowest), Little Gem Mine, BC, and corresponding station locations.



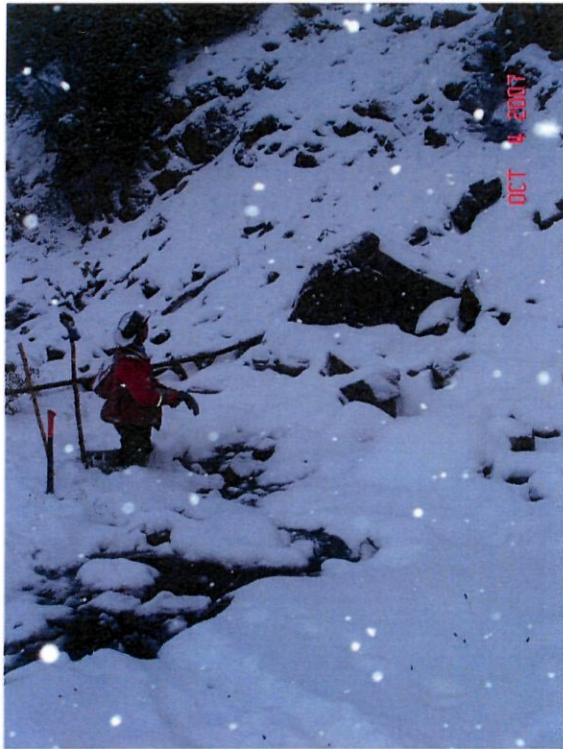
**Figure 5.**

Photo of interim Stn #3 on road some 50 m below lowermost portal (Portal #3), Little Gem Mine, BC.

**Stn # 4** (1,698 m asl): Is situated on Roxey Creek, just above the access road creek crossing near the cabin. At this location, Roxey Creek had an average depth of 0.16 m, was 2.0 m wide, and a mean velocity of 2.2 m/s was calculated on October 4, 2007. In addition, the flow volume of Roxey Creek at this location was measured to be 704 l/s (0.704 m<sup>3</sup>/s). Three depth measurements at  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and  $\frac{3}{4}$  across the channel were recorded and three velocity measurements were made at these locations, and their average was used to determine velocity and flow volume. This station on Roxey Creek will provide values for background levels of water quality entering the drainage area of the proposed mining activities (Figure 6).

**Figure 6.**

Photo of section of Roxey Creek where Stn #4 sample (circled) was collected, Little Gem Mine, BC.

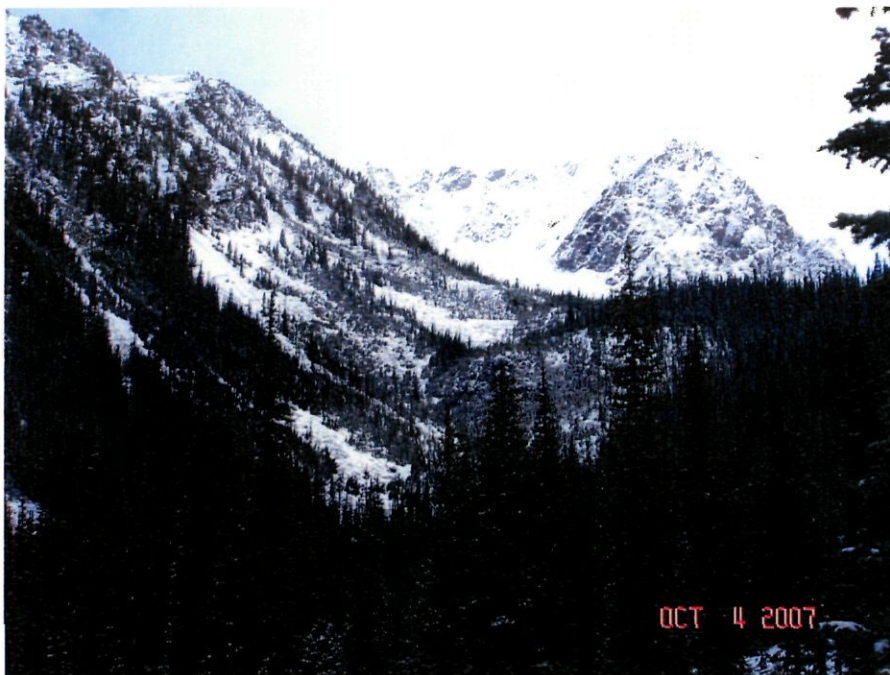


**Stn # 5** (1,453 m asl): Is situated on Roxey Creek, where the access road crosses the creek, below the influence of the water coming from the mining portals. The elevation of this station was approximately at 1453 m, or some 250 m lower in elevation as compared to Stn #4. At this location, Roxey Creek had an average depth of 0.233 m, was 1.9 m wide, and a mean velocity of 1.13 m/s was calculated on October 4, 2007. In addition, the flow volume of Roxey Creek at this location was measured to be 500 l/s (0.500 m<sup>3</sup>/s). Measurements were recorded as they were for Stn #4. This station on Roxey Creek will provide values for mixed background levels of water quality associated with the proposed mining activities.

Two additional stations are recommended to be added next year in order to better establish a baseline level of water quality entering Roxey Creek at an approximate elevation of 1550 m to understand the effects of the mixed drainages and their comparable ratios.

#### 4.2 Creek Investigation

Based on streams and contours, major and sub-catchment watersheds were identified and their areas were measured with a compensating planimeter from the Department of Mines and Technical Surveys Map 546A, Tyaughton Lake, Lillooet District, BC, circa 1936. The Roxey Creek drainage basin was estimated to be approximately 12 km<sup>2</sup> in size. The sub-catchment basin from which the three portals drain into Roxey Creek was estimated to cover an area of approximately 1.0 km<sup>2</sup> (Figure 7). These estimates will require confirmation once newer and updates topographic maps of the area are reviewed.



**Figure 7.**

**Photo of Little Gem sub-catchment drainage in area of the mining portals that drain into Roxey Creek, Little Gem Mine, BC.**



Estimates of flow were based upon channel gradient, cross-sectional area, water velocity, and roughness of wetted perimeter. Elevations and coordinates were recorded with a handheld GPS.

During the October 4<sup>th</sup>, 2007 site visit, the greatest measured flow was recorded near the cabin. Although observable surficial flow is significant, subsurface flow, especially in the steep broken rock drainages as found in Roxey Creek, is a major part of the drainage system.

The reduced flow of some 200 l/s at Stn #5 (500 l/s) compared to Stn #4 (704 l/s) indicates that an excess of 30% of flow is being lost to subsurface infiltration, which will require careful consideration for environmental impact.

As previously discussed, the installation of hydrometric stations including stream gauges and weirs should be considered for data collection along the creeks. Further water flow measurements in 2008 will be required in order to establish the best locations for such hydrometric stations. In addition, a benthic and fisheries assessment should be done at this time also.

#### 4.2 Wildlife Observations

An active marmot colony was observed at an elevation of about 1820 m. The colony was situated both above and below the access road (drill trail) for a distance of some 150 to 200 m (Figure 8). Two hoary marmots were observed on the rocky slopes with a ground cover of 1 to 1.5 ft of snow on October 4<sup>th</sup>, 2007, and their tracks were plentiful. One large adult was observed on an outlook rock eyeing potential dangers to the colony, while a second and younger marmot was observed running from one area to the next within the colony. Up slope from the road, three air vents from sub-surface colonies were observed, but no fresh tracks in the snow were observed near them.



**Figure 8.**

Photo of access road to the two upper portals (Portals #1 and #2) where signs of an active marmot colony was observed on both sides of the road, Little Gem Mine, BC.

Fresh tracks of a cougar with one young one was also observed in and out of the marmot colony. It may be that the young marmot observed, being relatively skinny, may have been disturbed by cougars or other predators over an extended time period and therefore had not been able to feed substantially and thusly, was still searching for food. Normally the marmots in this region of BC should have entered the hibernation phase of their life by mid-September.

Mr. Greg McKee, assistant to Mr. Al Beaton, informed us that there was an active Pica colony in the area as well. However, none were observed during the initial site visit. Both the Pica and Marmot colonies will need to be mapped during the summer of 2008, when the animals are active.

One fresh set of deer tracks was observed crossing the road between the cabin and the Marmot colony. No other deer tracks were observed in the snow above the 1500 m level on the day of our visit, but there were several deer tracks of both small and larger animals at lower elevations below the snow line. No bear tracks were observed during this one-day field trip. In the area from about 1500 to 1700 m elevation, the tracks of 3 martens, 4 to 5 squirrels, and tracks from as many as 40 mice, were observed in the fresh snow.

The most important habitat for the ungulates and bears may be the meadow along Roxey Creek above the cabin at the 1700 m level. This mountain meadow with a stream flowing through it will also need to be assessed next summer.

#### **4.4 Analytical Data**

As previously mentioned, water quality samples could not be collected from Stn #1 and #2, the two uppermost mining portals. However, a water sample was collected from below the lowest portal at interim Stn #3. In addition, water samples along Roxey Creek were collected from above the influence of the mine (Stn #4) and below it (Stn #5). A summarized table of the analytical data is presented in Appendix A and laboratory originals are included as Appendix B.

It should be noted that the water sample collected from below Portal #3 on October 4<sup>th</sup>, 2007 was incorrectly labelled as Stn #2. This sample should have been labelled as interim Stn #3, collected some 20 m below Portal #3, which will become the permanent location of Stn #3, once accessible. This has been corrected within the text of this report and on the summarized data table in Appendix A; however, is still incorrectly named as Stn #2 on the laboratory originals (Appendix B).

Preliminary data indicates that the three collected samples were in compliance for dissolved metals when compared to CCME, BC MOE Criteria, and BC CSR standards. The only exception to this was an elevated measurement for arsenic at 0.068 mg/L from interim Stn #3, which was above the respective 0.005 and

0.05 mg/L limits for CCME's Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life and the BC CSR's Freshwater Aquatic Life Standards.

However, it should be noted that this water sample had elevated levels of both calcium and magnesium compared to the other samples and had a pH >7, which can minimize the effects of acid drainage from the mine's workings due to its natural buffering capacity.

Arsenic values from Stn #4 and Stn #5 recorded values of 0.0024 (above influence) and 0.0036 mg/L (below influence). This preliminary arsenic data indicates the mineralization of the mine (interim Stn #3), background levels (Stn #4), and how the mine affects Roxey Creek downstream (Stn #5).

Scheduled, perhaps monthly, water sample collection is recommended in 2008 during snow- and ice-free conditions at the current five stations, and possibly as many as two additional locations, as required.

Summaries of analytical data and explanations of all footnotes are provided in Appendix A. Original laboratory results for data collected in 2007 are included as Appendix B. In addition, overviews of critical parameters analyzed and discussed are presented in Appendix C.

## 5.0 SUMMARY AND RECOMMENDATIONS

This report is a baseline hydrological data review for Little Gem Mine, which will aid A.J. Beaton Mining Ltd. to determine immediate and long-term changes that might occur to the hydrology of the area when the proposed mining operations resume.

Infield data was collected in October of 2007 to inspect drainage patterns from Little Gem's three associated portals that drain into Roxey and then Gun Creek. Information was collected regarding drainage patterns and estimates of maximum drainage flows for each of the stations with running water was calculated.

For those locations where running water was observed (interim Stn #3, Stn #4, and Stn #5), water samples were collected. Concentrations of metals were analyzed for and all three samples met applicable compliance standards except for an arsenic exceedance of the sample collected below the lower portal at interim Stn #3.

However, surface water samples all recorded pH values greater than 7, which has a natural buffering capacity when paired with available calcium and magnesium, minimizing the effects of acid drainage from the mine's workings.

Although this one exceedance was observed, it should be noted that these standards cannot be regarded as blanket values to assess water quality in all areas. Therefore, local conditions and other supporting information such as site-specific background concentrations naturally occurring in the area must also be addressed. For example, observed exceedances may be a result of the natural mineralization of the Dickson Peak/Mt. Penrose complex or varied due to creek flow rates.

Summaries of historical climatologically data from the region are also included to determine precipitation and temperature extremes.

Once the subject area is free from snow next year, a further detailed environmental assessment will be required and should include the following:

1. During snow- and ice-free months, collect monthly water samples from current stations and newly appointed stations, as required.
2. Further study of portal water flows and drainages.
3. Further study of creek channels, flow rates, and associated flora and fauna.
4. Continue to identify and map wildlife and habitat in the general area.



5. Map high-risk environments for mass wasting, avalanches, debris flows, and ice flows to relate them to required culverts, bridges, and roads for the mine to minimize erosion.

Overall, this report represents a mere baseline review of hydrological information. It is recommended that when further studies are completed regarding positions of roads, pipelines, and mining facilities, treatment options, and additional water quality data be acquired. This could also include collecting data regarding seasonal variations in precipitation (rain and snow) and water flow with creek cross-sections to be made at representative locations to obtain a more accurate understanding and view of Roxey Creek as possibly Gun Creek.

## 6.0 REFERENCES

Cantest. October 23<sup>rd</sup>, 2007. Analysis of Water Samples, Chain of Custody 2089284, Group Number 81009066, Little Gem.

Department of Mines and Technical Surveys, 1936(?) MAP 546A [Canada], Tyaughton Lake, Lillooet District, British Columbia.

R.H. McMillan, Ph.D., P. Geo. January 15<sup>th</sup>, 2007. Geological Report on the Little Gem (Northern Gem) Cobalt-Gold Property, Gold Bridge/Bralorne Area, South-Central British Columbia, 16 pages.

<http://euphrates.wpunj.edu/faculty/partnership/CBL/ex-cbl05.htm>

<http://www.climate.weatheroffice.ec.gc.ca/>

[http://www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science\\_of\\_AMD.htm](http://www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science_of_AMD.htm)

<http://www.earthscape.org/t1/nas27/nas27.html>

[http://www.jacksonbottom.org/waterquality\\_concepts.htm](http://www.jacksonbottom.org/waterquality_concepts.htm)

[http://en.wikipedia.org/wiki/Acid\\_rock\\_drainage](http://en.wikipedia.org/wiki/Acid_rock_drainage)

<http://en.wikipedia.org/wiki/Alkalinity>

<http://en.wikipedia.org/wiki/Hardness>

<http://en.wikipedia.org/wiki/pH>

## **7.0 DISCLAIMER**


This Baseline Hydrological Data Review of The Little Gem Mine, BC was conducted and reported using generally accepted hydrologic and environmental engineering practices and in accordance with MOE regulations. ENTECH Environmental Consultants Ltd. has made all reasonable attempts to complete this project in a professional manner but cannot be held responsible for errors and omissions resulting from unknown field conditions, unavailable data, or from information not received. Data was collected from site-specific locations and hence may vary from actual site conditions, although the reported information is believed to provide a reasonable representation of the environmental conditions within the areas of investigation. This report is subject to copy write law and is the sole property of A.J. Beaton Mining Ltd. Any third party use of this report is at the sole risk of this party or person, as ENTECH and the authors of this report assume no liability whatsoever. The BC Ministries of Environment and Energy, Mines, and Petroleum Resources may rely upon this report.

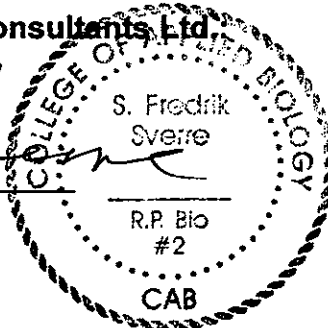
## 8.0 QUALIFICATIONS OF ASSESSOR

Entech Environmental Consultants Ltd. has been conducting environmental investigations since 1973, and is one of the oldest companies in the business in BC conducting baseline studies and impact assessments for developmental projects including mines in the Lower Mainland. Recent projects have included Stage I and II assessments of an abandoned mine site in Nanaimo on Vancouver Island for Base – Mana Securities Ltd. and a similar baseline hydrological study for Huldra Silver Inc.'s Treasure Mountain Mine.

The investigator for this project was S. Fredrik Sverre, M.Sc., R.P.Bio. with more than 30 years of environmental investigative experience. Mr. Sverre is a Project Manager and Senior Scientist who has a Bachelor's Degree in Biology from Lethbridge University, and a Bachelor's Degree in Biochemistry, and a Master's Degree in Ecology from Brock University, St. Catherine's, Ontario. He has been practicing as an Environmental Consultant in the province of BC since 1973.

**ENTECH Environmental Consultants Ltd.**

  
Fred Sverre, M.Sc., R.P.Bio.  
President



Encl.



**Appendix A**

**Summary of Analytical Data**

Table 1.1. Metals in Water for Little Gem Mine, BC.

Sample Name and Preparation:	interim Stn #3 dissolved	Stn #4 dissolved	Stn #5 dissolved	Detection Limit	CCME, 2006 (Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life).	BC MOE Water Quality Guidelines (Criteria) for Freshwater Aquatic Life.	Freshwater Aquatic Life (AW) Standards from CSR, BC Reg. 376/96 and amendments up to BC Reg. 76/2005.
Sampling Date:	4-Oct-07	4-Oct-07	4-Oct-07				
Lab Reference #:	710090204	710090212	710090213				
pH, Laboratory	7.68	7.27	7.38	pH units			
Conductivity	113	37	48	1 µS/cm			
Hardness	CaCO <sub>3</sub> 51.8	14.4	21.3	0.2 mg/L			
Aluminum	Al 0.003	0.003	0.003	0.001	0.005-0.1 <sup>a</sup>	0.1 <sup>k</sup>	None
Antimony	Sb 0.0004	<	0.0003	0.0002	None	0.020 <sup>l</sup>	0.2
Arsenic	As 0.068	0.0024	0.0036	0.0002	0.005	5	0.05
Barium	Ba 0.0055	0.0037	0.0058	0.0002	None	5 <sup>l</sup>	10
Beryllium	Be <	<	<	0.0002	None	0.0053 <sup>l</sup>	0.053
Bismuth	Bi <	<	<	0.0002	None	None	None
Boron	B 0.001	<	<	0.01	None	1.2	50
Cadmium	Cd 0.00001	<	<	0.00001	EQUATION <sup>b</sup>	EQUATION <sup>b,l</sup>	0.0001-0.0006 <sup>u</sup>
Calcium	Ca 13.4	4.52	5.77	0.01	None	None	None
Chromium	Cr 0.0002	<	0.0002	0.0002	0.001/0.0089 <sup>c</sup>	0.001/0.0089 <sup>c,l</sup>	0.01/0.09 <sup>v</sup>
Cobalt	Co <	<	<	0.0002	None	0.11	0.04
Copper	Cu 0.0008	0.0002	0.0002	0.0002	0.002-0.004 <sup>d</sup>	EQUATION <sup>m</sup>	0.02-0.09 <sup>w</sup>
Iron	Fe 0.02	<	0.01	0.01	0.3	0.3 <sup>l</sup>	None
Lead	Pb <	<	<	0.0002	0.001-0.007 <sup>e</sup>	EQUATION <sup>n</sup>	0.04-0.16 <sup>x</sup>
Lithium	Li 0.001	<	0.0003	0.0002	None	0.87 <sup>l</sup>	None
Magnesium	Mg 4.45	0.76	1.66	0.01	None	None	None
Manganese	Mn 0.0004	0.0003	0.0004	0.0002	None	0.8-3.8 <sup>o</sup>	None
Mercury	Hg <	<	<	0.00002	0.000026 <sup>f</sup> /0.000004 <sup>g</sup>	None	0.001
Molybdenum	Mo 0.01	0.0033	0.0034	0.0001	0.073 <sup>h</sup>	2	10
Nickel	Ni 0.0003	0.0004	0.0005	0.0002	0.025-0.150 <sup>i</sup>	0.025-0.150 <sup>i,l</sup>	0.25-1.5 <sup>y</sup>
Phosphorus	P <	<	<	0.03	Narrative <sup>j</sup>	None	None
Potassium	K 0.34	0.52	0.67	0.02	None	373-432 <sup>lp</sup>	None
Selenium	Se <	<	<	0.0002	0.001	mean of 0.002	0.01
Silicon	Si 2.43	2.27	2.61	0.05	None	None	None
Silver	Ag <	<	<	0.00005	0.0001	0.0001/0.003 <sup>q</sup>	0.0005/0.015 <sup>z</sup>
Sodium	Na 2.26	0.75	0.85	0.01	None	None	None
Strontium	Sr 0.116	0.0085	0.016	0.0002	None	None	None
Tellurium	Te <	<	<	0.0002	None	None	None
Thallium	Tl <	<	<	0.00002	0.0008	0.0003 <sup>l</sup>	0.003
Thorium	Th <	<	<	0.0001	None	None	None
Tin	Sn <	<	<	0.0002	None	0.000008/0.0004/0.000022 <sup>lr</sup>	None
Titanium	Ti <	<	<	0.0002	None	2/4.6 <sup>ls</sup>	1
Uranium	U 0.0045	<	0.0003	0.0001	None	0.3 <sup>l</sup>	3
Vanadium	V 0.001	0.0011	0.001	0.0002	None	0.006 <sup>l</sup>	None
Zinc	Zn <	<	<	0.001	0.03	EQUATION <sup>t</sup>	0.075-2.4 <sup>aa</sup>
Zirconium	Zr <	<	<	0.002	None	None	None

**Notes for Tables 1.1:**

Values in mg/L (ppm) unless otherwise noted.

\*By Hydride Generation – ICP Spectroscopy (so, a different detection limit was used).

Code	
	Exceeds CCME standards
	Exceeds BC MOE Water Quality (Criteria) Guidelines
	Exceeds CSR standards
	Exceeds CCME & BC MOE Water Quality (Criteria) Guidelines
	Exceeds CCME & CSR standards
	Exceeds BC MOE Water Quality (Criteria) Guidelines & CSR standards
	Exceeds CCME & BC MOE Water Quality (Criteria) Guidelines & CSR standards

*Italicized* values require a finer laboratory detection limit to have been used in order to determine whether or not compliance was met by 1 or more of the provided standards.

<sup>a</sup>Aluminum guideline is:

pH	mg/L
<6.5	0.005
≥6.5	0.1

<sup>b</sup>Interim guideline; Cadmium guideline =  $10^{(0.86[\log(\text{hardness})] - 3.2)}$

<sup>c</sup>Interim guideline; Chromium guideline is:

Cr Species	mg/L
Cr (III)	0.0089
Cr (IV)	0.001

however, the species of Chromium is not known, so values were italicized in summary tables to be identified as possible exceedances only if above 0.001 mg/L.

<sup>d</sup>Copper guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
0-120	0.002
120-180	0.003
>180	0.004

<sup>e</sup>Lead guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
0-60	0.001
60-120	0.002
120-180	0.004
>180	0.007

<sup>f</sup>Inorganic mercury.; this guideline was applied for mercury (see following footnote).

<sup>g</sup>Methylmercury - Interim guideline; may not prevent accumulation in aquatic life and may not protect aquatic life consumers; may not fully protect higher trophic level fish; this guideline was not applied since it was lower than all provided laboratory detection limits.

<sup>h</sup>Interim guideline.

<sup>i</sup>Lead guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
0-60	0.025
60-120	0.065
120-180	0.11
>180	0.15

<sup>j</sup>Narrative; Canadian Trigger Ranges (see factsheet). Total Phosphorous guideline is:

Environment	mg/L
ultra-oligotrophic	<0.004
oligotrophic	0.004-0.01
mesotrophic	0.01-0.02
meso-eutrophic	0.02-0.035
eutrophic	0.035-0.1
hyper-eutrophic	>0.1

<sup>k</sup>Aluminum guideline is:

pH	mg/L
≥6.5	0.1
<6.5	$e^{(1.209 - 2.426 (\text{pH}) + 0.286 K)}$

where  $K = (\text{pH})^2$

<sup>l</sup>Working water quality guideline for British Columbia (not yet approved by MOE).

<sup>m</sup>Copper guideline is:  $[0.094 (\text{hardness}) + 0.002]/1000$ .

<sup>n</sup>Lead guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
≤8	0.003
>8	$[e^{(1.273 \ln(\text{hardness}) - 1.460)}]/1000$

<sup>o</sup>Manganese guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
25	0.8
50	1.1
100	1.6
150	2.2
300	3.8

<sup>p</sup>Threshold for *Daphnia magna* immobilization.<sup>q</sup>Silver guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
≤100	0.0001
>100	0.003

<sup>r</sup>Tin Guidelines are:

Tin Species	mg/L
Tributal	0.000008
Triethyl	0.0004
Triphenyl	0.000022

but are all below provided laboratory detection limits and could therefore not be applied.

<sup>s</sup>Titanium guidelines are:

Median Threshold Level	mg/L
<i>Scenedesmus</i>	2
<i>Daphnia</i>	4.6

<sup>t</sup>Zinc guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
≤90	0.033
>90	$[33 + 0.75 \times (\text{hardness} - 90)]/1000$



<sup>u</sup>Cadmium guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
<30	0.0001
30 - <90	0.0003
90 - <150	0.0005
150 - <210	0.0006

<sup>v</sup>Chromium guideline is:

Cr Species	mg/L
Cr (III)	0.09
Cr (IV)	0.01

however, the species of Chromium is not known, so values may be italicized in summary tables to be identified as possible exceedances only if above 0.01 mg/L.

<sup>w</sup>Copper guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
<50	0.020
50 - <75	0.03
75 - <100	0.04
100 - <125	0.05
125 - <150	0.06
150 - <175	0.07
175 - <200	0.08
≥ 200	0.09

<sup>x</sup>Lead guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
<50	0.04
50 - <100	0.05
100 - <200	0.06
200 - <300	0.11
≥300	0.16

<sup>y</sup>Nickel guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
<60	0.25
60 - <120	0.65
120 - <180	1.1
≥180	1.5

<sup>z</sup>Silver guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
≤100	0.0005
>100	0.015

<sup>aa</sup>Zinc guideline is:

Hardness [CaCO <sub>3</sub> ]	mg/L
≤90	0.075
90 - <100	0.15
100 - <200	0.9
200 - <300	1.65
300 - <400	2.4

**Appendix B**

**Original Laboratory Data (2007)**

## Analysis Report



REPORT ON: Analysis of Water Samples  
REPORTED TO: Entech Environmental Consultants Ltd.  
3187 Thompson Place  
West Vancouver, BC  
V7V 3E3

Att'n: Mr. Fred Sverre

CHAIN OF CUSTODY: 2089284  
PROJECT NAME: Little Gem

NUMBER OF SAMPLES: 3

REPORT DATE: October 23, 2007

DATE SUBMITTED: October 9, 2007

GROUP NUMBER: 81009066

SAMPLE TYPE: Water

NOTE: Results contained in this report refer only to the testing of samples as submitted. Other information is available on request.

## TEST METHODS:

Conductivity in Water - was performed based on Method 2510 in Standard Methods (21st Edition) and Method X322 in the BC Laboratory Manual (2005 Edition).

pH in Water - was determined based on Method 4500-H in Standard Methods (21st Edition) and Method X330 in the BC Laboratory Manual (2005).

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

Low Level Dissolved Cadmium - Samples were filtered in the laboratory, concentrated and quantitatively determined using Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).


Mercury in Water - analysis was performed using procedures based on U. S. EPA Method 245.7, oxidative digestion using bromination, and analysis using Cold Vapour Atomic Fluorescence Spectroscopy.

Dissolved Metals in Water - Samples were filtered in the laboratory and quantitatively determined using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP) and/or Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

## TEST RESULTS:

(See following pages)

CANTEST LTD.

  
Anna Becalska, PhD  
Coordinator, Trace Metals

Page 1 of 4

REPORTED TO: Entech Environmental Consultants Ltd.

REPORT DATE: October 23, 2007

GROUP NUMBER: 81009066



## Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	pH, Laboratory	Conductivity	Hardness CaCO <sub>3</sub>
Stn #2	Oct 4/07	710090204	7.68	113	51.8
Stn #4	Oct 4/07	710090212	7.27	37	14.4
Stn #5	Oct 4/07	710090213	7.38	48	21.3
DETECTION LIMIT UNITS			-	1	0.2
			pH units	$\mu$ S/cm	mg/L

 $\mu$ S/cm = microsiemens per centimeter

mg/L = milligrams per liter



REPORTED TO: Entech Environmental Consultants Ltd.

REPORT DATE: October 23, 2007

GROUP NUMBER: 81009066



## Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Stn #2	Stn #4	Stn #5	DETECTION LIMIT	UNITS
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Oct 4/07	Oct 4/07	Oct 4/07	DETECTION LIMIT	UNITS
CANTEST ID:		710090204	710090212	710090213		
Aluminum	Al	0.003	0.003	0.003	0.001	mg/L
Antimony	Sb	0.0004	<	0.0003	0.0002	mg/L
Arsenic	As	0.068	0.0024	0.0036	0.0002	mg/L
Barium	Ba	0.0055	0.0037	0.0058	0.0002	mg/L
Beryllium	Be	<	<	<	0.0002	mg/L
Bismuth	Bi	<	<	<	0.0002	mg/L
Boron	B	0.01	<	<	0.01	mg/L
Cadmium	Cd	0.00001	<	<	0.00001	mg/L
Cadmium	Cd	0.00001	<	<	0.00001	mg/L
Calcium	Ca	13.4	4.52	5.77	0.01	mg/L
Chromium	Cr	0.0002	<	0.0002	0.0002	mg/L
Cobalt	Co	<	<	<	0.0002	mg/L
Copper	Cu	0.0008	0.0002	0.0002	0.0002	mg/L
Iron	Fe	0.02	<	0.01	0.01	mg/L
Lead	Pb	<	<	<	0.0002	mg/L
Lithium	Li	0.0010	<	0.0003	0.0002	mg/L
Magnesium	Mg	4.45	0.76	1.66	0.01	mg/L
Manganese	Mn	0.0004	0.0003	0.0004	0.0002	mg/L
Mercury	Hg	<	<	<	0.02	µg/L
Molybdenum	Mo	0.010	0.0033	0.0034	0.0001	mg/L
Nickel	Ni	0.0003	0.0004	0.0005	0.0002	mg/L
Phosphorus	P	<	<	<	0.03	mg/L
Potassium	K	0.34	0.52	0.67	0.02	mg/L
Selenium	Se	<	<	<	0.0002	mg/L
Silicon	Si	2.43	2.27	2.61	0.05	mg/L
Silver	Ag	<	<	<	0.00005	mg/L
Sodium	Na	2.26	0.75	0.85	0.01	mg/L
Strontium	Sr	0.116	0.0085	0.016	0.0002	mg/L
Tellurium	Te	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	0.0001	mg/L

(Continued on next page)

REPORTED TO: Entech Environmental Consultants Ltd.

REPORT DATE: October 23, 2007

GROUP NUMBER: 81009066



## Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Stn #2	Stn #4	Stn #5	DETECTION LIMIT	UNITS
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Oct 4/07	Oct 4/07	Oct 4/07		
CANTEST ID:		710090204	710090212	710090213		
Tin	Sn	<	<	<	0.0002	mg/L
Titanium	Ti	<	<	<	0.0002	mg/L
Uranium	U	0.0045	<	0.0003	0.0001	mg/L
Vanadium	V	0.0010	0.0011	0.0010	0.0002	mg/L
Zinc	Zn	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	0.002	mg/L

mg/L = milligrams per liter  
< = Less than detection limit

µg/L = micrograms per liter

## CHAIN OF CUSTODY RECORD

**CANTEST**  
0000

2089284

4606 Canada Way  
Burnaby, B.C.  
V5G 1K5Tel: 604.734.7276  
Fax: 604.731.2386  
Toll Free: 800.665.8566

www.cantest.com

Client Name:

Entech

Postal Code

V7V 3E3

Page 1 of 1

Street Address (including suite number):

3187 Thompson Pl.

City:

West Vancouver

Telephone:

604-921-1932

Fax:

921-1934

E-Mail Address (Required for Electronic Reporting):

info@entech.ws

Contact Name:

Fred Suerre

Sampler's Name:

Quotation Number:

Project Number:

Project Name:

Little Gem

P.O. Number:

RESULTS  
REQUESTED BY:

Day Month Year

(Surcharges May Apply)

Special Instructions: ☐ AutoFax ☐ AutoEmail  
☐ Return Cooler ☐ Ship Sample Bottles (please specify)\* make sure Cd + Ag are  
done to 0.0001 mg/L  
omwSample(s) are  
from a Drinking  
Water source  
servicing multiple  
householdsYes ☐

Group Number	Sample Identification	Date/Time Sampled (DIMY & 24hr clock)	Sample Type	Total Metals	Dissolved	Field Filtered	Soil Metals	pH	Conductivity	TSS	TDS	Alkalinity	BOD	COD	Coliform, Cultured	F	Cl	Nitrite	Oil & Grease	Oil & Grease (Tri)	PCP (Tri)	PCP (Mono)	BETXNPH	VOC	EPH (not PAH)	LEPH/HEPH	PCB	Asbestos	HOLD - E	Number	
710090204	Stn #2	D: 4/10/7 T:	H <sub>2</sub> O	✓	✓																										1
710090204	Stn #4	D: 4/10/7 T:	H <sub>2</sub> O	✓	✓																										1
710090204	Stn #5	D: 4/10/7 T:	H <sub>2</sub> O	✓	✓																										1
USE		D:																													
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		D:																													

Relinquished by:

Date

Time

Received by:

Relinquished by:

Date

Time

Received by:

Method of Shipment:

Waybill No.:

Received for Lab by:

Date

Time

Shipped by:

Shipment Condition:

Cooler opened by:

Date

Time

Total Number of Containers: 3

## FOR LABORATORY USE ONLY

Sample State at Receipt:

☐ Ambient☐ Cold☐ Frozen☐ N/A

Comments:

Temperature

Custody Seal Intact? ☐ Yes ☐ No ☐ N/A

Number of Coolers/Shipping Containers: 3

\*Please indicate appropriate regulatory guidelines:

## WATER

☒ CCME☒ BC-CSR☐ Other (please specify)

## SOIL

☐ CCME☐ BC-CSR☐ Other (please specify)

## **Appendix C**

### **An Overview of Critical Parameters**

## pH<sup>1</sup>

pH is a measure of how acidic or basic water is. It is a measure of the balance of positive hydrogen ions ( $H^+$ ) and negative hydroxide ions ( $OH^-$ ) in the water. Water that has more hydrogen ions is acidic ( $pH < 7$ ), whereas water that has more hydroxyl ions is basic ( $pH > 7$ ), and water with a pH of 7 is neutral. pH values are on a logarithmic scale, where each successive number represents a 10-fold change in the acidity (or basicness) of the water.

pH is a measure of the activity of a solution in terms of its activity of hydrogen ions ( $H^+$ ). In aqueous systems, the hydrogen ion activity is dictated by the dissociation constant of water ( $K_w$ ) in terms of Molarity (M), which denotes the number of moles of a given substance per litre of solution, and interactions with other ions in solution by:

$$K_w = 1.011 \times 10^{-14} \text{ M}^2 \text{ at } 25^\circ\text{C}$$

The pH scale is a reverse logarithmic representation of relative  $H^+$  concentration. On the pH scale, a shift up in value by one would represent a ten-fold decrease in value, whereas a shift up in value by two would represent a one hundred-fold decrease in  $H^+$  concentration. For example, water with a pH of 4 is ten times more acidic than water having a pH of 5. The precise formula for calculating pH is:

$$pH = -\log_{10} (a_{H^+})$$

where  $a_{H^+}$  denotes the activity of  $H^+$  ions, and is dimensionless. In solutions that contain other ions, activity and concentration are not the same. The activity is an effective concentration of hydrogen ions, rather than the true concentration; it accounts for the fact that other ions surrounding the hydrogen ions will shield them and affect their ability to participate in chemical reactions. These other ions effectively change the hydrogen ion concentration in any process that involves  $H^+$ .

An example of a pH scale is shown below, detailing the pH's of some common acids and bases as well as showing approximations of pH ranges which can affect aquatic wildlife:

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<sup>1</sup> From <http://www.wikipedia.org/wiki/pH> and [http://www.jacksonbottom.org/waterquality\\_concepts.htm](http://www.jacksonbottom.org/waterquality_concepts.htm)



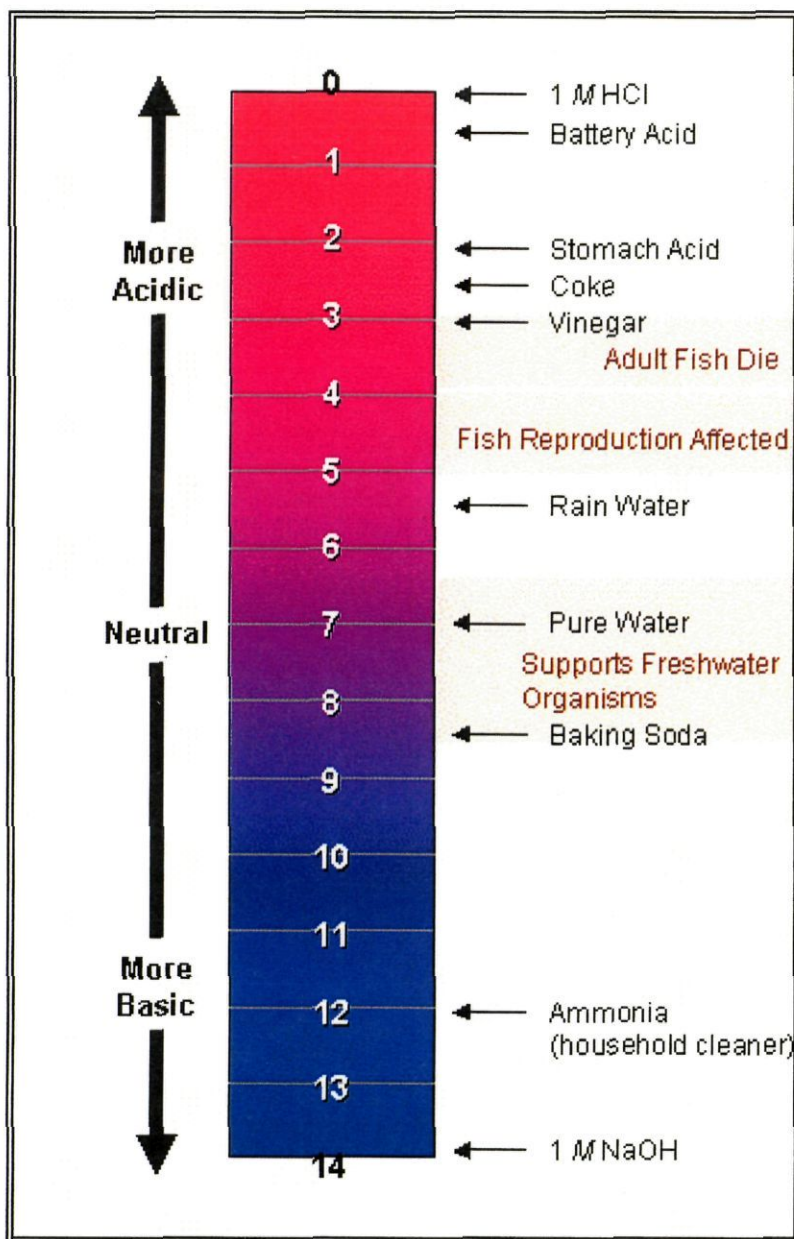
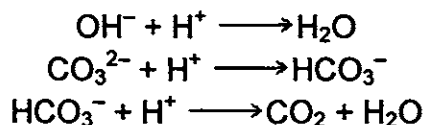


Diagram from [http://www.jacksonbottom.org/waterquality\\_concepts.htm](http://www.jacksonbottom.org/waterquality_concepts.htm)

## Alkalinity<sup>1</sup>

The buffering capacity of water is a measure of its alkalinity. Alkalinity does not refer to pH, but instead refers to the ability of the water to resist changes in pH. The presence of buffering materials, principally the bases  $\text{HCO}_3^-$ ,  $\text{CO}_3^{2-}$ , and  $\text{OH}^-$ , help neutralize acids as they are added to or created within the water column. A total alkalinity level of 100-200 ppm will stabilize the pH level in a stream, where levels of 20-200 ppm are typical of fresh water, and levels below 10 ppm indicate that a system is poorly buffered. Those poorly buffered waters are susceptible to changes in pH from both natural and anthropogenic sources.

The alkalinity of surface water is primarily due to the presence of hydroxide,  $\text{OH}^-$ , carbonate,  $\text{CO}_3^{2-}$ , and bicarbonate,  $\text{HCO}_3^-$ , ions. These ions react with  $\text{H}^+$  ions by means of the following chemical reactions:



Most alkalinity in surface water comes from calcium carbonate,  $\text{CaCO}_3$ , being leached from rocks and soil. This process is enhanced if the rocks and soil have been broken up for any reason, such as from mining or urban development. Some various sources of alkalinity are listed below.

### Sources of Alkalinity

- Leached from rock
  - limestone
- Leached from minerals
  - dolomite
  - calcite
- Leached from soil

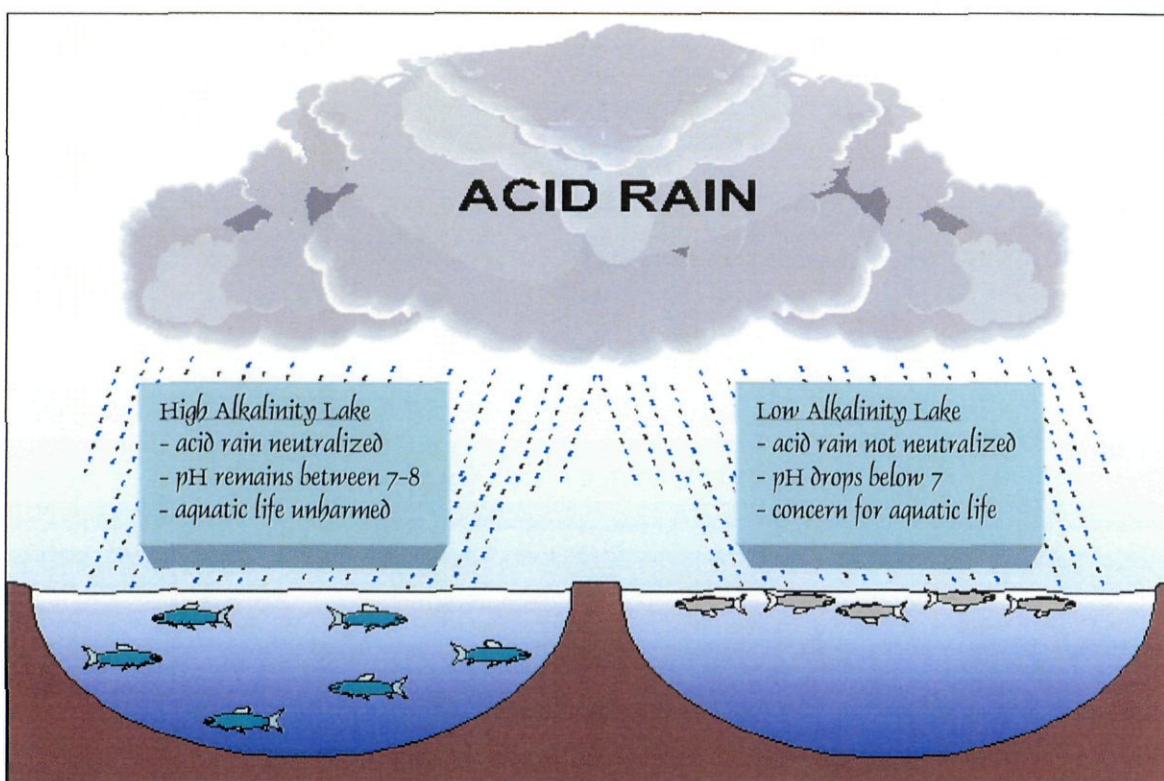
As increasing amounts of acid are produced, the buffering capacity is consumed. Natural buffering materials in water slow the decline of pH to around 6. A rapid pH drop follows this gradual decline as the bicarbonate buffering capacity is used up. At a pH of about 5.5, only very weak buffering ability remains and the pH drops further with additional acid.

Overall, alkalinity is the quantitative capacity of water to neutralize an acid; that is, a measure of how much acid can be added to a liquid without causing a significant change in pH. Alkalinity is not the same as pH because water does

<sup>1</sup> From <http://en.wikipedia.org/wiki/Alkalinity> and <http://euphrates.wpunj.edu/faculty/partnership/CBL/ex-cbl05.htm>

not have to be strongly basic (high pH) to have high alkalinity. The alkalinity of water is a measure of how much acid it can neutralize. If any changes are made to the water that could raise or lower the pH value, alkalinity acts as a buffer, protecting the water and its life forms from sudden shifts in pH. This ability to neutralize acid, or  $H^+$  ions, is particularly important in regions affected by such things as acid rain and acid mine drainage.

In the diagram below, for example, the lake on the right has low alkalinity. When acid rain falls, it is not neutralized, so the pH of the water decreases. This drop in the pH level can harm or even kill some of the aquatic organisms in the lake. The lake on the left, however, has high alkalinity. When acid rain falls in this lake, the acid is partially neutralized and the pH of the water remains fairly constant. In this way, a high alkalinity level helps maintain the health of the water and the organisms that live there.



Adapted diagram of relationship between alkalinity and pH with changes in acidity from:  
<http://euphrates.wpunj.edu/faculty/partnership/CBL/ex-cbl05.htm>

Therefore, alkalinity should not be confused with pH. The pH of a solution is a measure of the concentration of acid (or  $H^+$  ions) in the water, whereas alkalinity is a measure of the water's capacity to neutralize an acid (or  $H^+$  ions), thereby keeping the pH at a fairly constant level.

## **Hardness<sup>1</sup>**

Water hardness is a historical term expressing the total concentration of cations, specifically  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$ , and  $\text{Mn}^{2+}$  in water. Hardness, however, refers primarily to the amount of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  ions present, which generally enter streams through the weathering of rocks.

Rainwater is naturally soft (low in dissolved minerals), but as it seeps through the ground it can pick up minerals, such as calcium and magnesium compounds, from the soil and rocks it passes through. If rainwater passes through soft rocks like chalk or limestone, it will pick up these kinds of minerals. If it passes through hard rocks, such as granite or through peaty soils, it does not pick up these minerals and will remain soft.

Since the hardness of a watercourse is mainly a reflection of the geology of an area, it is expected to remain fairly constant and can be an excellent indicator of a system's equilibrium and its water quality.

However, any observed changes in a stream's hardness would reflect a change in the geology of the catchment area and would provide a measure of the influence of human activity in a watershed. For instance, acid mine drainage often results in the addition of  $\text{Fe}^{2+}$  into a stream.

It should be noted that these ions do not pose any health threat, but they can engage in reactions that leave insoluble mineral deposits, which can make hard water unsuitable for many uses and purposes. For the purposes of this report, hardness has been used as an indicator of changes in water quality.

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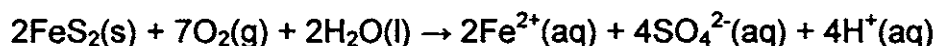
<sup>1</sup> from <http://en.wikipedia.org/wiki/Hardness> and <http://www.earthscape.org/t1/nas27/nas27.html>

## Metals<sup>1</sup>

Acid Mine Drainage (AMD) or Acid Rock Drainage (ARD) refers to the drainage flow from or caused by natural dissolution, surface mining, deep mining or coal refuse piles that are typically highly acidic with elevated levels of dissolved metals. Acid rock drainage occurs naturally within some environments as part of the rock weathering process but is exacerbated by large-scale earth disturbances characteristic of mining and other large construction activities, usually within rocks containing an abundance of sulphide minerals.

The formation of AMD is primarily a function of the geology, hydrology and mining technology employed for the mine site. AMD is formed by a series of complex geo-chemical and microbial reactions that occur when water comes in contact with pyrite (FeS<sub>2</sub>), coal, refuse, or the overburden of a mine operation. The resulting water is usually high in acidity and dissolved metals, which stay dissolved in solution until the pH raises to a level where precipitation occurs. In other words, after being exposed to air and water, the oxidation of metal sulphides within the surrounding rock and overburden generates acidity.

In addition to pyrite, other predominant metallic ions that are culprits of AMD are zinc, nickel, and copper. However, even though a host of chemical processes contribute to AMD, pyrite oxidation is by far the greatest contributor. A simplified general equation for this process is:



Pyrite + Oxygen + Water → Ferrous Iron + Sulphate + Acidity

The solid pyrite, when introduced to oxygen and water, is catalyzed to form Fe(II) ions, SO<sub>4</sub><sup>2-</sup> ions, and H<sup>+</sup> ions. The hydrogen ions then bind to the sulphate ions to produce sulphuric acid. Many acid rock discharges also contain elevated levels of toxic metals, especially nickel and copper with lower levels of other heavy metal ions such as lead, arsenic, aluminium, and manganese.

<sup>1</sup> From [http://en.wikipedia.org/wiki/Acid\\_rock\\_drainage](http://en.wikipedia.org/wiki/Acid_rock_drainage) and [http://www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science\\_of\\_AMD.htm](http://www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science_of_AMD.htm)



## APPENDIX D

Chip Sample Assay Results  
from  
J.T.Shearer's Site Visit  
on  
Oct. 5, 2007  
5 samples



**International Plasma Labs Ltd.**  
ISO 9001:2000 Certified Company

#200 - 11620 Horseshoe Way  
Richmond, B.C.  
Canada V7A 4V5

Phone: 604/879-7878 604/272-7818  
Fax: 604/879-7898 604/272-0851  
Website: [www.ipl.ca](http://www.ipl.ca)  
Email: [info@ipl.ca](mailto:info@ipl.ca)



Certificate#: 07J4590  
Client: Homegold Resources  
Project: Little Gem  
Shipment#:  
PO#: None Given  
No. of Samples: 5  
Analysis #1: Au(FA/AAS)Ag Cu Zn Pb Co U  
Analysis #2: ICP(AqR)30  
Analysis #3:  
Comment #1:  
Comment #2:  
Date In: Oct 10, 2007  
Date Out: Oct 19, 2007

Sample Name	SampleType	Int Wt Kg	Au g/mt	Au g/mt	Ag ppm
JTSUG-1	Rock	1.90	0.68	--	1.0
JTSUG-2	Rock	1.70	0.30	--	1.0
JTSUG-3	Rock	2.50	3.82	3.58	<0.5
JTSUG-4	Rock	--	131.32	130.90	1.0
JTSUG-5	Rock	2.20	22.00	24.10	<0.5
RE JTSUG-1	Repeat	--	0.64	--	<0.5
Blank iPL	Blk iPL	--	<0.01	--	--
GS-1P5B	STD iPL	--	1.56	--	--
GS-1P5B REF	STD iPL	--	1.46	1.46	--
Minimum detection		0.01	0.01	0.07	0.5
Maximum detection		99999	5000	5000	1000
Method		Spec	FA/AAS	FAGrav	MuAICP

\* Values highlighted (in yellow) are over the high detection limit for the corresponding methods. Other testing met

Cu %	Pb %	Zn %	Co %	U ppm	Ag ppm	Cu ppm	Pb ppm
<0.01	<0.01	0.02	0.007	<10	0.1	20	<2
<0.01	<0.01	0.01	0.011	<10	0.1	3	<2
<0.01	<0.01	0.01	0.222	<10	<0.1	<1	<2
<0.01	<0.01	<0.01	2.126	<10	0.9	<1	<2
<0.01	<0.01	0.01	0.824	<10	0.1	<1	<2
<0.01	<0.01	0.02	0.008	<10	0.1	19	<2
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
0.01	0.01	0.01	0.001	10	0.1	1	2
20	20	20	100	1000	100	10000	10000
MuAICP	AsyMuA	MuAICP	AsyMuA	ICPM	ICP	ICP	ICP

hods would be suggested. Please call for details.

Zn ppm	As ppm	Sb ppm	Hg ppm	Mo ppm	Tl ppm	Bi ppm	Cd ppm
176	712	<5	<3	2	<10	9	<0.2
55	2298	<5	<3	1	<10	6	<0.2
119	27342	<5	<3	<1	<10	34	<0.2
62	224834	21	3	<1	<10	1903	<0.2
135	86404	<5	<3	<1	<10	129	<0.2
165	722	<5	<3	2	<10	9	<0.2
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
1	5	5	3	1	10	2	0.2
10000	10000	2000	10000	1000	1000	2000	2000
ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

60



Co ppm	Ni ppm	Ba ppm	W ppm	Cr ppm	V ppm	Mn ppm	La ppm
52	<1	53	<5	53	31	450	5
94	<1	50	<5	39	46	625	80
2470	5	277	<5	28	164	915	147
22793	20	27	754	20	19	631	<2
9333	16	26	<5	14	44	1370	<2
59	<1	53	<5	51	30	442	5
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
1	1	2	5	1	1	1	2
10000	10000	10000	1000	10000	10000	10000	10000
ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

Sr ppm	Zr ppm	Sc ppm	Ti %	Al %	Ca %	Fe %	Mg %
162	22	9	<0.01	0.44	4.40	2.50	1.11
128	50	10	<0.01	0.81	3.29	5.22	1.03
57	195	9	0.08	2.26	0.72	14.43	1.79
66	157	7	<0.01	0.46	1.44	17.02	0.89
192	177	11	0.01	3.98	3.22	17.49	2.02
161	23	9	<0.01	0.44	4.36	2.45	1.09
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
1	1	1	0.01	0.01	0.01	0.01	0.01
10000	10000	10000	10	10	10	10	10
ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

K %	Na %	P %
0.16	0.03	0.04
0.23	0.03	0.05
1.58	0.03	0.03
0.07	0.02	0.07
0.05	0.02	0.03
0.15	0.03	0.04
--	--	--
--	--	--
--	--	--
0.01	0.01	0.01
10	10	5
ICP	ICP	ICP

Assay Results  
from  
Underground Channel Sampling  
and  
Underground and Surface Metallurgical Sampling  
167 samples

ICP

ICP

ICP

ICP

ICP

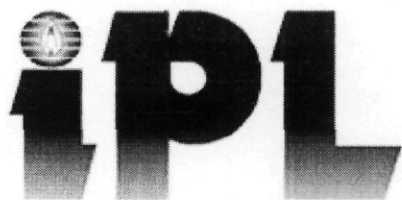
ICP

ICP

ICP

*thods would be suggested. Please call for details.*





**International Plasma Labs Ltd.**  
ISO 9001:2000 Certified Company

#200 - 11620 Horseshoe Way  
Richmond, B.C.  
Canada V7A 4V5

Phone: 604/879-7878 604/272-7818  
Fax: 604/879-7898 604/272-0851  
Website: [www.ipl.ca](http://www.ipl.ca)  
Email: [info@ipl.ca](mailto:info@ipl.ca)



Certificate#: 07K5452  
Client: Homegold Resources  
Project: Little Gem  
Shipment#:  
PO#: None Given  
No. of Samples: 167  
Analysis #1: Au(FA/AAS) U Th  
Analysis #2: ICP(AqR)30  
Analysis #3:  
Comment #1:  
Comment #2:  
Date In: Nov 15, 2007  
Date Out: Dec 31, 2007

Sample Name	SampleType	Wt Kg	Au g/mt	Au g/mt	U ppm	Th ppm
MetallurgicalSample1of6	Rock	--	20.66	20.04	5547	307.4
MetallurgicalSample3of5	Rock	--	29.43	29.60	<10	100.4
MetallurgicalSample4of5	Rock	--	22.95	25.20	<10	118.4
MetallurgicalSample5of5	Rock	--	20.62	20.00	<10	108.6
Portal#3@132m	Rock	--	58.96	58.43	<10	106.2
FaceEndPortal#1	Rock	2.1	0.02	--	<10	22.8
1-002	Rock	2.0	0.10	--	<10	23.9
1-004	Rock	2.8	0.02	--	<10	24.2
1-004x-cut face	Rock	3.0	0.10	--	<10	31.1
1-004x-cut 2 meter	Rock	3.7	0.07	--	<10	29.2
1-006	Rock	3.3	0.01	--	<10	27.3
1-008	Rock	3.3	0.02	--	<10	26.6
1-010	Rock	3.3	0.45	--	<10	29.1
1-012	Rock	3.9	7.58	8.10	<10	72.4
1-014B	Rock	4.2	1.99	2.00	<10	35.8
1-014L	Rock	3.7	0.17	--	<10	19.7
1-014R	Rock	3.1	0.03	--	<10	26.3
1-016	Rock	3.5	1.48	1.46	892	81.5
1-018	Rock	3.7	2.67	2.48	<10	38.5
1-020	Rock	4.0	0.89	--	<10	36.0
1-022	Rock	3.5	1.45	1.34	<10	32.9
1-024	Rock	3.5	5.21	5.14	<10	48.8
1-026	Rock	3.6	10.49	10.53	<10	65.7
1-028	Rock	2.8	1.39	1.43	<10	27.7
1-028x-cut 6m	Rock	3.6	19.97	19.74	<10	102.0
1-030	Rock	3.1	1.32	1.31	<10	26.7

		Kg	Au	Au	U	Th
1-032	Rock	2.8	1.28	1.32	<10	30.6
1-034	Rock	3.2	1.48	1.49	<10	28.5
1-036	Rock	3.2	0.01	--	<10	23.2
1-038	Rock	2.3	0.02	--	<10	21.7
1-040	Rock	2.4	0.02	--	<10	22.5
1-042	Rock	2.6	0.01	--	<10	26.2
1-044	Rock	2.9	0.02	--	<10	25.3
1-046	Rock	2.4	0.02	--	<10	21.4
1-048	Rock	2.8	0.02	--	<10	23.4
1-050	Rock	3.0	0.01	--	<10	22.6
1-052	Rock	3.1	0.01	--	<10	26.6
1-054	Rock	2.4	0.01	--	<10	27.5
1-056	Rock	2.4	0.01	--	<10	31.8
1-058	Rock	2.9	0.01	--	<10	24.4
1-060	Rock	3.2	0.02	--	<10	28.3
1-062	Rock	3.0	0.01	--	<10	25.5
1-064	Rock	2.9	0.01	--	<10	23.0
1-066	Rock	2.9	0.02	--	<10	23.2
1-068	Rock	2.9	0.03	--	<10	24.5
1-068x-cut face	Rock	4.0	0.01	--	<10	26.4
1-068x-cut 2 meter	Rock	3.9	0.02	--	<10	23.3
1-070	Rock	2.2	0.01	--	<10	23.7
1-072	Rock	1.9	0.01	--	<10	22.8
1-074	Rock	2.0	0.04	--	<10	21.3
1-076	Rock	2.2	0.02	--	<10	22.0
1-078	Rock	2.6	0.02	--	<10	23.8
1-080	Rock	2.7	0.02	--	<10	22.7
1-082	Rock	3.3	0.02	--	<10	21.5
1-084	Rock	2.9	0.02	--	<10	21.5
1-086	Rock	3.0	0.03	--	<10	21.1
1-088	Rock	3.7	0.02	--	<10	20.9
1-090	Rock	4.0	0.03	--	<10	20.6
1-092	Rock	4.5	0.01	--	<10	21.3
1-094	Rock	3.7	0.01	--	<10	21.9
1-096	Rock	3.7	0.01	--	<10	22.0
1-098	Rock	3.2	0.01	--	<10	21.9
1-098x-cut face	Rock	5.3	0.01	--	<10	24.7
1-100	Rock	4.2	0.01	--	<10	22.1
1-102	Rock	3.6	0.01	--	<10	21.8
1-104	Rock	4.3	0.01	--	<10	21.9
1-106	Rock	4.5	0.01	--	<10	21.6
1-108	Rock	4.2	0.01	--	<10	21.0
1-110	Rock	3.8	0.01	--	<10	21.0
1-112	Rock	5.1	0.01	--	<10	21.3
1-114	Rock	3.7	<0.01	--	<10	21.2
1-116	Rock	4.2	<0.01	--	<10	21.1
1-118	Rock	4.7	<0.01	--	<10	22.2
1-120	Rock	3.8	<0.01	--	<10	22.0
1-122	Rock	4.1	0.01	--	<10	21.9
1-124	Rock	4.0	0.01	--	<10	21.5
1-126	Rock	4.5	0.01	--	<10	20.8
1-128	Rock	4.7	<0.01	--	<10	20.3

		Kg	Au	Au	U	Th
1-130	Rock	4.5	0.01	--	<10	21.7
1-132	Rock	4.2	<0.01	--	<10	21.5
1-134	Rock	4.3	0.01	--	<10	21.7
1-136	Rock	3.7	0.01	--	<10	20.8
1-138	Rock	3.0	<0.01	--	<10	20.3
1-140	Rock	4.0	0.01	--	<10	20.9
1-142	Rock	3.1	<0.01	--	<10	19.8
1-144	Rock	3.8	<0.01	--	<10	19.8
1-146	Rock	2.3	<0.01	--	<10	19.5
3-000	Rock	2.3	0.01	--	<10	21.8
3-002	Rock	3.1	0.01	--	<10	24.0
3-004	Rock	4.6	<0.01	--	<10	21.3
3-006	Rock	2.2	<0.01	--	<10	22.3
3-008	Rock	2.1	<0.01	--	<10	23.6
3-010	Rock	1.9	0.03	--	<10	27.8
3-012	Rock	1.9	0.01	--	<10	22.4
3-014	Rock	2.6	0.01	--	<10	19.5
3-016	Rock	2.0	0.01	--	<10	18.2
3-018	Rock	2.3	0.01	--	<10	22.0
3-020	Rock	3.0	0.03	--	<10	27.2
3-022	Rock	3.1	0.01	--	<10	21.7
3-024	Rock	3.3	0.01	--	<10	20.0
3-026	Rock	2.4	0.01	--	<10	20.2
3-028	Rock	2.7	0.02	--	<10	20.5
3-029xCut Face	Rock	3.9	0.02	--	<10	21.4
3-029xCut 2m	Rock	3.2	0.04	--	<10	20.6
3-030	Rock	2.0	0.03	--	<10	20.6
3-032	Rock	2.0	0.08	--	<10	16.1
3-034	Rock	2.1	0.04	--	<10	20.3
3-036	Rock	2.6	1.46	1.46	<10	23.0
3-038	Rock	4.4	0.04	--	<10	20.7
3-040	Rock	4.3	0.13	--	<10	22.7
3-042	Rock	4.2	0.22	--	<10	27.8
3-044	Rock	4.3	0.19	--	<10	23.9
3-046	Rock	4.0	0.05	--	<10	21.2
3-048	Rock	4.3	0.02	--	<10	23.7
3-050	Rock	3.5	0.03	--	<10	23.3
3-052	Rock	2.9	0.02	--	<10	21.0
3-054	Rock	2.9	0.02	--	<10	21.3
3-056	Rock	2.4	0.03	--	<10	20.9
3-058	Rock	3.0	0.01	--	<10	19.6
3-060	Rock	2.2	0.02	--	<10	20.0
3-062	Rock	3.0	<0.01	--	<10	21.3
3-064	Rock	2.9	<0.01	--	<10	30.7
3-066	Rock	3.4	0.01	--	<10	23.2
3-068	Rock	2.5	<0.01	--	<10	22.4
3-070	Rock	2.4	<0.01	--	<10	22.1
3-072	Rock	2.7	<0.01	--	<10	22.1
3-074	Rock	3.5	<0.01	--	<10	20.2
3-075xCut Face	Rock	2.0	<0.01	--	<10	20.2
3-076	Rock	2.9	<0.01	--	<10	24.2
3-078	Rock	3.3	0.01	--	<10	23.9

		Kg	Au	Au	U	Th
3-080	Rock	3.3	<0.01	--	<10	20.5
3-082	Rock	3.9	0.01	--	<10	22.0
3-084	Rock	3.5	<0.01	--	<10	21.8
3-086	Rock	2.8	<0.01	--	<10	21.5
3-088	Rock	3.1	<0.01	--	<10	19.7
3-090	Rock	3.4	<0.01	--	<10	21.4
3-092	Rock	3.4	<0.01	--	<10	22.9
3-094	Rock	4.2	<0.01	--	<10	21.2
3-094xCut Face 3m wide	Rock	2.8	0.02	--	<10	16.2
3-0 96	Rock	3.2	0.02	--	<10	11.3
3-0 98	Rock	3.1	0.01	--	<10	20.1
3-0100	Rock	3.3	0.01	--	<10	22.5
3-0102	Rock	4.2	0.01	--	<10	22.3
3-0104	Rock	3.6	0.03	--	<10	21.6
3-0106	Rock	3.8	0.04	--	<10	22.3
3-0108	Rock	3.2	0.06	--	<10	22.9
3-0110	Rock	3.9	0.04	--	<10	23.0
3-0112	Rock	3.5	0.05	--	<10	20.0
3-0114	Rock	3.0	0.14	--	<10	22.6
3-0116	Rock	3.6	0.02	--	<10	21.0
3-0118	Rock	3.5	0.03	--	<10	25.6
3-0120	Rock	3.1	0.55	--	<10	30.2
3-0122	Rock	3.1	0.78	--	<10	26.9
3-0124	Rock	3.6	0.19	--	<10	24.4
3-124xCut Face	Rock	3.6	0.02	--	<10	21.0
3-124xCut 2m	Rock	3.0	1.23	1.23	<10	33.8
3-124xCut 4m	Rock	2.6	0.42	--	<10	24.1
3-124xCut 6m	Rock	2.3	0.01	--	<10	20.2
3-126	Rock	2.6	0.02	--	<10	19.8
3-128	Rock	2.5	0.89	--	<10	28.2
3-130	Rock	3.2	0.12	--	<10	22.2
3-132	Rock	3.2	2.34	2.30	<10	27.7
3-134	Rock	3.6	15.40	15.39	<10	125.0
3-136	Rock	2.9	0.09	--	<10	26.1
3-138	Rock	2.3	0.02	--	<10	20.1
3-140	Rock	3.3	0.26	--	<10	19.8
Portal#3 3-140.5	Rock	4.1	0.02	--	<10	18.9
RE Metallurgical Sample 1 of 6	Repeat	--	19.68	--	5538	302.8
RE 1-020	Repeat	--	0.88	--	<10	33.7
RE 1-058	Repeat	--	0.02	--	<10	23.7
RE 1-092	Repeat	--	0.01	--	<10	19.6
RE 1-130	Repeat	--	<0.01	--	<10	20.0
RE 3-020	Repeat	--	0.03	--	<10	26.8
RE 3-056	Repeat	--	0.03	--	<10	20.9
RE 3-092	Repeat	--	<0.01	--	<10	21.8
RE 3-124xCut 4m	Repeat	--	0.43	--	<10	23.4
Blank iPL	Blk iPL	--	<0.01	--	--	--
GS-1P5B	STD iPL	--	1.46	--	--	--
GS-1P5B REF	STD iPL	--	1.46	--	--	--
Minimum detection		0.1	0.01	0.07	10	0.1
Maximum detection		9999	5000	5000	1000	1000

Method	Spec	FA/AAS	FAGrav	ICPM	AqR/AA
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*\* Values highlighted (in yellow) are over the high detection limit for the corresponding methods. Other testing met*

Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Hg ppm	Mo ppm
0.7	<1	68	58	196225	51	<3	464
0.7	<1	<2	49	405659	78	<3	20
0.6	<1	<2	36	325907	105	<3	14
0.6	<1	<2	102	215753	36	<3	16
0.5	<1	<2	54	215963	19	<3	10
0.4	28	4	36	1909	<5	<3	2
0.3	3	<2	33	774	<5	<3	3
0.3	3	<2	50	489	<5	<3	2
0.2	2	<2	45	7878	<5	<3	4
0.5	6	<2	43	5504	<5	<3	4
0.3	27	<2	39	146	<5	<3	2
0.2	26	<2	48	212	<5	<3	4
0.5	12	<2	42	8463	<5	<3	8
0.3	<1	<2	50	74921	<5	<3	35
0.4	5	11	49	26520	<5	<3	27
0.4	3	<2	28	4983	<5	<3	10
0.3	24	<2	51	405	<5	<3	4
0.3	7	37	47	21238	<5	<3	41
0.4	12	<2	49	36303	<5	<3	16
0.5	30	<2	63	14441	<5	<3	47
0.3	11	<2	47	18981	<5	<3	856
0.3	<1	<2	53	43526	<5	<3	18
0.5	<1	<2	72	86686	9	<3	12
0.2	2	<2	38	5487	<5	<3	7
0.5	<1	<2	121	116268	7	<3	9
0.3	16	<2	42	4384	<5	<3	5



Ag	Cu	Pb	Zn	As	Sb	Hg	Mo
0.2	6	<2	44	4936	<5	△△	3
0.4	2	<2	40	9829	<5	△△	3
0.4	7	<2	37	113	<5	△△	3
0.5	9	<2	32	50	<5	△△	3
0.3	5	<2	31	52	<5	△△	3
0.3	16	<2	52	17	<5	△△	2
0.3	12	<2	33	18	<5	△△	2
0.4	5	<2	27	108	<5	△△	3
0.3	4	<2	28	69	<5	△△	6
0.3	6	<2	30	23	<5	△△	2
0.3	37	<2	40	25	<5	△△	4
0.4	27	<2	52	38	<5	△△	2
0.1	32	<2	83	20	<5	△△	3
0.4	22	<2	49	23	<5	△△	3
0.3	12	<2	45	71	<5	△△	3
0.5	11	<2	43	46	<5	△△	3
0.1	12	<2	42	21	<5	△△	2
<0.1	14	<2	45	18	<5	△△	2
0.1	23	<2	42	14	<5	△△	3
0.3	22	<2	59	27	<5	△△	3
0.3	41	<2	44	20	<5	△△	3
<0.1	61	<2	47	5	<5	△△	3
0.1	44	<2	40	6	<5	△△	3
0.2	338	<2	33	6	<5	△△	3
<0.1	23	<2	35	<5	<5	△△	3
0.1	48	<2	45	10	<5	△△	4
0.1	75	<2	36	<5	<5	△△	4
0.1	37	<2	30	6	<5	△△	3
<0.1	224	<2	46	7	<5	△△	4
<0.1	421	3	48	6	<5	△△	2
0.2	65	<2	38	6	<5	△△	3
<0.1	770	3	42	13	<5	△△	3
<0.1	72	<2	40	<5	<5	△△	2
<0.1	100	<2	44	<5	<5	△△	3
0.1	69	<2	44	9	<5	△△	3
<0.1	60	<2	49	<5	<5	△△	2
0.2	69	<2	90	<5	<5	△△	2
<0.1	68	<2	42	<5	<5	△△	2
<0.1	64	<2	40	<5	<5	△△	2
0.1	66	<2	41	<5	<5	△△	2
0.1	70	<2	39	<5	<5	△△	2
<0.1	45	<2	37	<5	<5	△△	2
0.1	54	<2	38	<5	<5	△△	2
0.1	70	2	41	<5	<5	△△	2
0.2	95	<2	41	<5	<5	△△	2
<0.1	101	<2	44	<5	<5	△△	2
<0.1	64	<2	45	<5	<5	△△	2
0.1	56	<2	42	<5	<5	△△	2
0.1	62	<2	47	<5	<5	△△	2
0.1	52	<2	44	<5	<5	△△	2
<0.1	88	<2	41	<5	<5	△△	2
0.1	59	<2	44	<5	<5	△△	2

Ag	Cu	Pb	Zn	As	Sb	Hg	Mo
<0.1	58	6	34	<5	<5	<5	2
<0.1	36	41	32	<5	<5	<5	2
<0.1	30	3	28	<5	<5	<5	2
<0.1	63	6	30	<5	<5	<5	2
0.2	31	<2	33	<5	<5	<5	2
0.2	121	<2	32	<5	<5	<5	2
<0.1	23	<2	34	<5	<5	<5	2
0.1	17	<2	33	<5	<5	<5	2
<0.1	10	<2	35	<5	<5	<5	2
<0.1	22	<2	19	<5	<5	<5	3
<0.1	21	<2	21	<5	<5	<5	2
0.1	54	<2	25	9	<5	<5	5
0.4	32	<2	30	<5	<5	<5	4
0.1	12	<2	35	<5	<5	<5	3
0.1	304	<2	57	28	<5	<5	4
<0.1	63	<2	59	147	<5	<5	3
<0.1	31	<2	53	92	<5	<5	4
0.1	48	<2	49	31	<5	<5	3
0.1	13	<2	35	<5	<5	<5	3
0.3	23	<2	37	7	<5	<5	2
0.1	15	<2	27	<5	<5	<5	4
<0.1	27	<2	28	<5	<5	<5	2
0.1	15	<2	28	<5	<5	<5	2
<0.1	25	<2	26	<5	<5	<5	2
0.1	12	<2	28	<5	<5	<5	2
<0.1	15	<2	30	<5	<5	<5	3
0.2	44	<2	31	<5	<5	<5	2
0.1	262	<2	25	<5	<5	<5	3
0.1	46	<2	29	<5	<5	<5	2
<0.1	57	<2	33	<5	<5	<5	2
<0.1	122	<2	58	<5	<5	<5	3
<0.1	300	<2	40	<5	<5	<5	2
0.1	257	<2	68	13	<5	<5	3
0.2	882	<2	74	12	<5	<5	5
0.1	103	<2	64	<5	<5	<5	3
0.4	142	<2	93	<5	<5	<5	3
0.4	151	<2	95	<5	<5	<5	4
0.2	140	<2	62	<5	<5	<5	2
0.2	67	<2	49	<5	<5	<5	2
0.1	56	<2	40	<5	<5	<5	3
0.4	33	<2	34	<5	<5	<5	3
<0.1	49	<2	39	<5	<5	<5	3
0.2	43	<2	40	<5	<5	<5	3
0.3	53	<2	62	<5	<5	<5	4
0.2	67	<2	38	<5	<5	<5	3
0.1	61	<2	45	6	<5	<5	3
0.3	78	<2	42	<5	<5	<5	3
0.1	33	<2	36	<5	<5	<5	3
0.3	26	<2	32	<5	<5	<5	2
0.1	18	<2	30	<5	<5	<5	3
0.3	31	<2	59	<5	<5	<5	2
0.2	75	<2	50	<5	<5	<5	2

Ag	Cu	Pb	Zn	As	Sb	Hg	Mo
0.3	157	<2	35	<5	<5	<3	3
0.3	70	<2	36	<5	<5	<3	2
0.3	44	<2	35	<5	<5	<3	3
0.1	58	<2	29	6	<5	<3	2
0.1	53	<2	26	<5	<5	<3	4
0.2	62	<2	133	20	<5	<3	8
0.1	76	<2	37	21	<5	<3	3
0.2	24	<2	38	21	<5	<3	3
0.1	80	<2	29	13	<5	<3	3
0.4	88	<2	27	28	<5	<3	3
0.2	48	<2	28	22	<5	<3	2
0.2	35	<2	27	81	<5	<3	5
0.4	95	21	28	52	<5	<3	3
0.1	47	3	39	190	<5	<3	2
<0.1	451	<2	37	322	<5	<3	2
0.3	39	<2	34	718	<5	<3	2
0.2	34	<2	39	344	<5	<3	3
0.3	773	<2	26	722	<5	<3	2
0.2	21	<2	33	1497	<5	<3	2
0.3	7	<2	30	139	<5	<3	3
0.2	23	<2	42	163	<5	<3	2
<0.1	7	<2	35	17199	<5	<3	2
0.2	25	<2	43	5751	<5	<3	2
0.1	55	<2	50	1835	<5	<3	2
0.3	16	<2	28	65	<5	<3	2
0.1	15	<2	47	6520	<5	<3	3
0.1	23	<2	39	3820	<5	<3	2
<0.1	5	<2	23	35	<5	<3	2
0.2	16	<2	25	166	<5	<3	2
0.2	31	<2	40	7189	<5	<3	2
0.1	14	<2	28	509	<5	<3	2
0.1	8	<2	31	6279	<5	<3	2
0.4	<1	<2	58	54973	<5	<3	6
0.1	9	<2	33	1469	<5	<3	1
<0.1	10	<2	31	48	<5	<3	2
0.4	26	<2	28	37	<5	<3	1
<0.1	142	<2	32	20	<5	<3	2
0.7	<1	21	53	197330	38	<3	463
0.5	29	<2	58	14818	<5	<3	43
0.4	21	<2	45	34	<5	<3	3
<0.1	69	<2	38	9	<5	<3	2
<0.1	55	4	32	7	<5	<3	2
0.3	25	<2	36	6	<5	<3	2
0.1	55	<2	40	17	<5	<3	3
0.1	71	<2	35	31	<5	<3	2
0.1	21	<2	39	3880	<5	<3	2
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0.1	1	2	1	5	5	3	1
100	10000	10000	10000	10000	2000	10000	1000

Tl ppm	Bi ppm	Cd ppm	Co ppm	Ni ppm	Ba ppm	W ppm	Cr ppm
<10	<2	<0.2	38119	754	11	<5	46
<10	<2	<0.2	53392	3386	25	<5	22
<10	<2	<0.2	68041	2336	23	<5	17
<10	<2	<0.2	41535	564	25	<5	55
<10	484	<0.2	43197	380	24	<5	31
<10	<2	<0.2	174	15	104	<5	68
<10	<2	<0.2	90	14	54	<5	68
<10	<2	<0.2	27	13	64	<5	67
<10	<2	<0.2	297	20	94	<5	51
<10	<2	<0.2	403	23	68	<5	52
<10	<2	<0.2	18	14	85	<5	45
<10	<2	<0.2	31	14	160	<5	51
<10	<2	<0.2	967	158	120	<5	46
<10	<2	<0.2	10949	1169	33	<5	34
<10	<2	<0.2	6825	435	68	<5	41
<10	<2	<0.2	416	23	54	<5	49
<10	<2	<0.2	64	17	91	<5	58
<10	<2	<0.2	4381	231	104	<5	72
<10	<2	<0.2	2727	107	51	<5	57
<10	<2	<0.2	2444	132	125	<5	77
<10	<2	<0.2	2787	135	95	<5	45
<10	<2	<0.2	6403	119	49	<5	45
<10	<2	<0.2	15199	279	34	<5	55
<10	<2	<0.2	234	13	66	<5	48

Ti	Bi	Cd	Co	Ni	Ba	W	Cr
<10	<2	<0.2	294	15	59	<5	67
<10	3	<0.2	313	11	84	<5	54
<10	<2	<0.2	18	12	87	<5	60
<10	<2	<0.2	15	11	101	<5	55
<10	<2	<0.2	14	12	104	<5	63
<10	<2	<0.2	20	13	67	<5	44
<10	<2	<0.2	16	13	152	<5	75
<10	<2	<0.2	19	12	91	<5	60
<10	<2	<0.2	18	12	158	<5	74
<10	<2	<0.2	14	14	57	<5	52
<10	<2	<0.2	16	14	107	<5	53
<10	<2	<0.2	19	15	40	<5	52
<10	<2	<0.2	18	17	176	<5	67
<10	<2	<0.2	16	15	120	<5	60
<10	<2	<0.2	20	17	84	<5	53
<10	<2	<0.2	16	17	40	<5	48
<10	<2	<0.2	16	14	77	<5	46
<10	<2	<0.2	14	13	80	<5	51
<10	<2	<0.2	16	15	179	<5	57
<10	<2	<0.2	19	18	102	<5	46
<10	<2	<0.2	17	16	146	<5	67
<10	<2	<0.2	17	16	211	<5	84
<10	<2	<0.2	17	14	240	<5	85
<10	<2	<0.2	16	13	230	<5	75
<10	<2	<0.2	16	14	283	<5	81
<10	<2	<0.2	19	17	209	<5	77
<10	<2	<0.2	17	17	229	<5	105
<10	<2	<0.2	15	14	204	<5	93
<10	<2	<0.2	17	18	148	<5	110
<10	<2	<0.2	16	18	164	<5	111
<10	<2	<0.2	16	20	171	<5	128
<10	<2	<0.2	17	20	165	<5	130
<10	<2	<0.2	16	20	157	<5	134
<10	<2	<0.2	17	30	165	<5	141
<10	<2	<0.2	18	22	163	<5	140
<10	<2	<0.2	17	22	202	<5	144
<10	<2	<0.2	19	26	133	<5	161
<10	<2	<0.2	17	21	190	<5	141
<10	<2	<0.2	16	20	182	<5	136
<10	<2	<0.2	15	19	210	<5	137
<10	<2	<0.2	15	19	192	<5	141
<10	<2	<0.2	16	19	130	<5	130
<10	<2	<0.2	16	20	132	<5	137
<10	<2	<0.2	17	20	153	<5	143
<10	<2	<0.2	17	22	127	<5	170
<10	<2	<0.2	16	19	170	<5	140
<10	<2	<0.2	17	17	211	<5	119
<10	<2	<0.2	16	15	220	<5	105
<10	<2	<0.2	16	14	241	<5	97
<10	<2	<0.2	15	13	246	<5	85
<10	<2	<0.2	15	13	230	<5	89
<10	<2	<0.2	16	13	245	<5	89

Ti	B	Cd	Co	Ni	Ba	W	Cr
<10	<2	<0.2	14	12	166	<5	84
<10	<2	<0.2	13	12	162	<5	84
<10	<2	<0.2	13	11	147	<5	85
<10	<2	<0.2	12	11	148	<5	82
<10	<2	<0.2	12	11	170	<5	88
<10	<2	<0.2	12	11	164	<5	84
<10	<2	<0.2	12	11	180	<5	79
<10	<2	<0.2	12	11	151	<5	74
<10	<2	<0.2	13	12	116	<5	73
<10	<2	<0.2	7	9	96	<5	86
<10	<2	<0.2	8	9	51	<5	85
<10	<2	<0.2	8	10	62	<5	87
<10	<2	<0.2	15	15	160	<5	78
<10	<2	<0.2	15	16	98	<5	70
<10	<2	<0.2	25	37	99	<5	54
<10	<2	<0.2	16	15	52	<5	50
<10	<2	<0.2	16	15	36	<5	53
<10	<2	<0.2	22	29	93	<5	80
<10	<2	<0.2	16	19	54	<5	105
<10	<2	<0.2	24	24	33	<5	88
<10	<2	<0.2	14	17	56	<5	87
<10	<2	<0.2	14	14	166	<5	85
<10	<2	<0.2	15	14	148	<5	84
<10	<2	<0.2	14	13	173	<5	81
<10	<2	<0.2	14	14	110	<5	73
<10	<2	<0.2	15	15	147	<5	75
<10	<2	<0.2	14	15	95	<5	72
<10	<2	<0.2	11	13	99	<5	55
<10	<2	<0.2	12	16	80	<5	88
<10	<2	<0.2	19	25	138	<5	68
<10	<2	<0.2	19	123	150	<5	205
<10	<2	<0.2	19	30	124	<5	81
<10	<2	<0.2	29	41	149	<5	80
<10	<2	<0.2	27	37	157	<5	87
<10	<2	<0.2	16	17	223	<5	86
<10	<2	<0.2	18	21	177	<5	108
<10	<2	<0.2	16	18	97	<5	91
<10	<2	<0.2	16	17	68	<5	82
<10	<2	<0.2	16	17	168	<5	87
<10	<2	<0.2	22	208	120	<5	130
<10	<2	<0.2	15	17	221	<5	87
<10	<2	<0.2	14	15	141	<5	73
<10	<2	<0.2	14	15	111	<5	63
<10	<2	<0.2	25	29	100	<5	102
<10	<2	<0.2	17	18	138	<5	82
<10	<2	<0.2	18	18	221	<5	79
<10	<2	<0.2	16	22	114	<5	93
<10	<2	<0.2	14	15	134	<5	55
<10	<2	<0.2	14	17	96	<5	65
<10	<2	<0.2	14	15	100	<5	65
<10	<2	<0.2	20	29	42	<5	78
<10	<2	<0.2	17	23	59	<5	79



Ti	Bi	Cd	Co	Ni	Ba	W	Cr
<10	<2	<0.2	14	15	111	<5	63
<10	<2	<0.2	25	29	100	<5	102
<10	<2	<0.2	17	18	138	<5	82
<10	<2	<0.2	18	18	221	<5	79
<10	<2	<0.2	16	22	114	<5	93
<10	<2	<0.2	14	15	134	<5	55
<10	<2	<0.2	14	17	96	<5	65
<10	<2	<0.2	14	15	100	<5	65
<10	<2	<0.2	20	29	42	<5	78
<10	<2	<0.2	17	23	59	<5	79
<10	<2	<0.2	16	24	134	<5	103
<10	<2	<0.2	15	16	115	<5	90
<10	<2	<0.2	14	23	103	<5	105
<10	<2	<0.2	15	32	125	<5	113
<10	<2	<0.2	14	32	161	<5	145
<10	<2	<0.2	14	15	164	<5	71
<10	<2	<0.2	14	15	166	<5	75
<10	<2	<0.2	14	12	112	<5	71
<10	<2	<0.2	9	14	54	<5	37
<10	<2	<0.2	10	17	47	<5	41
<10	<2	<0.2	12	11	70	<5	42
<10	<2	<0.2	18	13	157	<5	83
<10	<2	<0.2	16	13	148	<5	79
<10	<2	<0.2	27	13	145	<5	73
<10	<2	<0.2	41	15	131	<5	80
<10	<2	<0.2	72	14	132	<5	78
<10	<2	<0.2	39	24	114	<5	88
<10	<2	<0.2	68	12	126	<5	70
<10	<2	<0.2	126	14	142	<5	66
<10	<2	<0.2	23	12	114	<5	66
<10	<2	<0.2	29	14	138	<5	63
<10	<2	<0.2	1593	21	69	<5	59
<10	<2	<0.2	492	16	207	<5	60
<10	<2	<0.2	172	15	284	<5	64
<10	<2	<0.2	21	13	80	<5	54
<10	<2	<0.2	541	16	229	<5	59
<10	<2	<0.2	193	12	123	<5	63
<10	<2	<0.2	12	10	116	<5	57
<10	<2	<0.2	18	11	83	<5	54
<10	<2	<0.2	740	23	207	<5	57
<10	<2	<0.2	59	15	111	<5	70
<10	23	<0.2	459	14	98	<5	59
<10	162	<0.2	7081	66	28	<5	39
<10	<2	<0.2	105	14	62	<5	43
<10	<2	<0.2	16	14	71	<5	69
<10	<2	<0.2	14	17	57	<5	65
<10	<2	<0.2	13	14	101	<5	75
<10	<2	<0.2	38079	797	11	<5	41

Tl	Bi	Cd	Co	Ni	Ba	W	Cr
<10	<2	<0.2	2401	124	115	<5	69
<10	<2	<0.2	20	14	108	<5	54
<10	<2	<0.2	15	19	151	<5	128
<10	<2	<0.2	14	12	154	<5	78
<10	<2	<0.2	23	24	33	<5	86
<10	<2	<0.2	21	207	119	<5	129
<10	<2	<0.2	14	15	160	<5	70
<10	<2	<0.2	200	12	124	<5	59
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10	2	0.2	1	1	2	5	1
1000	2000	2000	10000	10000	10000	1000	10000
ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

V ppm	Mn ppm	La ppm	Sr ppm	Zr ppm	Sc ppm	Ti %	Al %
46	288	1159	38	2	8	<0.01	0.31
35	397	480	104	<1	6	<0.01	0.13
10	83	15	13	<1	<1	<0.01	0.04
295	741	6093	98	<1	29	0.01	2.83
264	843	8423	100	<1	53	0.02	1.26
74	393	48	44	<1	5	0.11	1.57
54	396	38	90	<1	5	0.04	0.99
40	456	13	163	<1	7	0.01	0.81
41	447	16	115	<1	5	0.01	0.69
30	456	7	161	<1	5	<0.01	0.54
86	500	5	110	<1	7	0.07	1.09
103	549	8	109	<1	6	0.12	1.25
62	472	139	133	<1	7	0.02	1.03
144	547	6282	204	2	29	<0.01	0.96
37	545	2052	144	<1	10	<0.01	0.63
15	511	34	80	<1	7	<0.01	0.45
90	484	28	86	<1	7	0.08	1.37
187	465	10260	159	4	35	0.02	1.90
129	443	1874	85	<1	13	0.05	1.75
128	609	204	94	<1	10	0.02	2.16
117	398	1922	54	1	10	0.06	1.50
126	490	1576	63	<1	10	0.03	1.60
167	603	3061	74	<1	15	0.03	2.14
62	429	89	75	<1	6	0.02	1.02

V	M	La	Sr	Zr	Sc	Ti	Al
158	933	1381	114	<1	13	0.03	3.24
71	515	19	115	<1	9	0.03	1.38
68	412	14	61	<1	5	0.06	1.53
43	548	5	102	<1	5	0.01	0.79
85	444	9	60	1	6	0.09	1.37
66	404	8	61	1	6	0.08	1.09
58	431	10	73	1	7	0.03	0.97
95	690	9	95	<1	13	<0.01	0.75
69	439	8	65	1	9	0.07	0.86
55	450	5	68	<1	7	0.03	0.90
70	391	5	67	<1	8	0.09	1.10
56	527	4	99	<1	10	<0.01	0.82
87	551	6	89	<1	10	0.03	1.29
74	900	<2	139	<1	12	<0.01	0.60
104	661	7	99	<1	13	0.03	1.64
76	693	5	131	<1	11	0.01	0.91
76	724	4	143	<1	12	<0.01	0.89
64	731	2	155	<1	13	<0.01	0.60
63	650	3	147	<1	9	0.01	0.84
60	559	3	174	<1	9	0.01	0.90
89	466	5	73	<1	9	0.08	1.37
95	744	6	118	<1	12	0.03	1.05
82	570	4	106	<1	8	0.08	1.04
110	414	5	61	<1	7	0.17	1.47
105	347	5	44	<1	4	0.21	1.59
93	365	5	46	<1	4	0.22	1.65
101	387	6	51	<1	5	0.23	1.77
115	452	5	74	<1	6	0.18	2.14
107	334	5	48	<1	4	0.24	1.73
89	410	6	50	<1	4	0.21	1.67
100	346	4	48	<1	4	0.19	1.65
92	566	4	69	<1	4	0.17	1.58
106	352	3	53	<1	3	0.18	1.71
104	368	3	54	<1	4	0.18	1.70
104	381	3	57	1	4	0.17	1.70
116	426	4	61	<1	5	0.19	1.85
116	420	4	61	1	5	0.20	1.93
119	418	4	61	<1	5	0.21	1.89
112	653	5	107	<1	10	0.09	1.61
116	364	4	59	1	4	0.22	1.88
111	338	4	53	<1	3	0.21	1.75
109	288	4	51	1	3	0.22	1.69
106	282	3	50	1	3	0.20	1.70
103	312	3	44	<1	4	0.18	1.66
111	368	4	54	<1	4	0.21	1.85
112	411	4	58	1	4	0.22	1.77
114	365	3	56	1	4	0.20	1.75
110	391	4	53	1	4	0.22	1.72

V	Mn	La	Sr	Zr	Sc	Ti	Al
109	398	4	54	<1	4	0.23	1.76
105	346	5	52	<1	4	0.23	1.69
110	364	5	56	<1	4	0.24	1.81
103	329	4	53	<1	3	0.23	1.69
99	312	5	48	<1	3	0.22	1.65
105	320	4	54	<1	3	0.22	1.72
85	339	5	40	<1	4	0.18	1.52
82	321	5	40	<1	4	0.18	1.48
73	307	5	39	<1	3	0.17	1.43
72	331	6	40	1	3	0.17	1.39
76	302	5	39	<1	3	0.17	1.42
75	318	6	39	<1	4	0.17	1.43
74	316	6	37	<1	3	0.17	1.35
71	343	6	38	<1	4	0.15	1.41
68	436	6	45	<1	6	0.09	1.49
34	245	9	25	1	4	0.04	0.72
42	184	9	27	2	4	0.07	0.91
40	341	7	40	2	4	0.04	0.87
91	330	5	40	<1	5	0.17	1.67
84	604	7	48	<1	8	0.09	1.68
113	656	5	109	1	14	0.05	1.60
54	710	5	122	<1	11	<0.01	0.69
38	645	3	108	<1	10	<0.01	0.54
68	360	5	56	<1	7	0.03	1.26
90	362	4	35	1	6	0.13	1.76
109	404	93	30	<1	4	0.09	1.99
84	300	3	36	<1	5	0.16	1.60
96	273	4	44	<1	3	0.22	1.65
97	311	3	45	<1	5	0.21	1.75
100	270	4	47	<1	3	0.23	1.71
93	324	4	41	<1	4	0.20	1.79
99	297	3	41	<1	4	0.20	1.85
90	338	5	36	<1	4	0.15	1.79
71	299	7	37	<1	5	0.15	1.38
81	268	3	36	<1	4	0.14	1.52
103	294	59	40	<1	5	0.15	1.72
89	312	4	34	<1	4	0.22	1.85
105	305	4	29	<1	4	0.21	1.63
110	398	7	31	<1	4	0.19	2.01
107	344	5	41	<1	5	0.17	1.67
96	311	5	38	<1	3	0.26	1.65
111	423	5	54	<1	6	0.22	1.88
108	414	5	40	<1	6	0.21	1.75
90	328	5	35	<1	4	0.17	1.60
92	281	4	38	<1	4	0.22	1.59
64	392	3	24	<1	3	0.15	1.34
97	266	4	44	<1	3	0.22	1.58
80	347	5	55	<1	5	0.16	1.41

V	Mn	La	Sr	Zr	Sc	Ti	Al
84	468	6	99	<1	9	0.09	1.26
107	616	5	107	<1	13	0.03	2.03
99	397	5	78	<1	9	0.12	1.47
106	429	5	103	<1	8	0.16	1.64
89	438	5	99	1	11	0.06	1.40
78	686	5	137	<1	9	0.07	0.94
73	471	5	90	<1	7	0.07	1.35
83	344	5	56	<1	5	0.15	1.52
107	641	4	94	2	10	0.08	2.16
93	565	4	56	1	9	0.08	1.91
100	292	3	33	1	5	0.22	1.73
100	307	4	35	<1	4	0.22	1.70
89	348	4	39	<1	5	0.17	1.72
78	445	5	60	<1	7	0.11	1.69
79	294	4	41	<1	5	0.18	1.63
86	289	6	44	<1	5	0.18	1.40
84	330	6	50	<1	6	0.16	1.39
79	336	7	39	<1	4	0.17	1.40
31	423	4	152	<1	7	<0.01	0.66
30	254	4	92	1	5	0.02	0.80
34	454	7	159	<1	7	<0.01	0.74
79	290	6	49	<1	4	0.17	1.42
83	279	6	42	<1	4	0.20	1.51
80	285	5	40	<1	4	0.18	1.46
79	272	5	36	<1	4	0.18	1.52
73	286	5	39	<1	4	0.16	1.45
85	292	5	35	1	4	0.18	1.61
74	292	7	47	<1	4	0.14	1.41
76	366	7	48	<1	5	0.12	1.44
68	364	6	52	<1	6	0.11	1.46
105	325	5	94	<1	9	0.09	1.71
77	378	9	50	<1	5	0.08	1.83
93	400	12	62	<1	5	0.13	1.73
119	410	11	52	<1	5	0.25	2.01
61	379	5	103	<1	7	0.04	1.23
105	383	432	53	<1	7	0.15	1.86
53	556	9	140	<1	7	0.03	0.83
58	301	6	70	<1	5	0.07	1.26
36	526	5	130	<1	7	0.02	0.64
103	366	254	51	<1	7	0.12	1.76
80	295	14	47	<1	5	0.14	1.51
74	351	62	48	<1	5	0.08	1.55
129	636	4821	96	6	27	0.02	1.45
64	409	23	87	<1	6	0.03	1.19
76	335	16	52	<1	4	0.16	1.54
73	300	5	42	<1	5	0.13	1.48
85	292	5	40	1	4	0.17	1.53
40	265	1164	35	<1	7	<0.01	0.30



V	Mn	La	Sr	Zr	Sc	Ti	Al
112	589	198	82	<1	9	0.02	2.11
68	635	5	121	<1	10	0.01	0.92
96	348	3	53	<1	4	0.17	1.70
79	314	5	37	<1	3	0.19	1.53
105	391	89	29	<1	4	0.09	2.00
63	389	4	23	<1	3	0.15	1.36
79	313	6	47	<1	6	0.16	1.38
51	537	7	134	<1	7	0.03	0.82
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1	1	2	1	1	1	0.01	0.01
10000	10000	10000	10000	10000	10000	10	10
ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

Ca %	Fe %	Mg %	K %	Na %	P %
0.37	10.64	0.38	0.07	0.01	0.01
2.43	19.09	0.75	0.07	0.02	0.06
0.13	22.95	0.01	0.03	0.02	0.03
2.88	20.96	1.67	0.08	0.02	<0.01
2.26	14.15	0.94	0.22	0.02	0.03
2.01	3.35	1.00	0.19	0.08	0.06
3.77	3.48	0.79	0.12	0.04	0.05
4.00	3.55	0.87	0.17	0.03	0.05
2.00	5.13	0.64	0.23	0.02	0.06
2.99	4.63	0.68	0.18	0.02	0.06
2.90	4.65	1.05	0.16	0.05	0.08
3.86	4.27	1.03	0.30	0.06	0.08
3.13	4.70	0.99	0.23	0.04	0.07
2.83	9.18	0.85	0.26	0.02	0.05
3.50	5.44	0.84	0.26	0.02	0.03
4.42	3.21	0.36	0.19	0.02	0.04
3.08	4.48	1.07	0.23	0.05	0.09
3.18	5.86	1.00	0.40	0.04	0.05
2.68	6.78	1.11	0.20	0.08	0.08
2.46	6.24	1.78	0.22	0.09	0.08
1.62	5.55	0.92	0.21	0.05	0.09
2.01	8.04	0.78	0.13	0.04	0.05
2.24	11.54	1.44	0.12	0.04	0.03
2.99	4.47	0.87	0.12	0.03	0.05

Ca	Fe	Mg	K	Na	P
1.98	20.38	2.15	0.19	0.02	0.05
3.25	4.41	1.40	0.18	0.05	0.05
1.98	4.85	0.96	0.15	0.05	0.06
6.36	4.77	1.79	0.11	0.03	0.04
3.04	3.46	1.24	0.19	0.06	0.07
3.24	3.24	1.19	0.20	0.05	0.06
3.17	3.30	1.07	0.17	0.04	0.05
3.27	4.31	1.30	0.15	0.02	0.09
1.76	3.54	0.93	0.30	0.06	0.06
3.28	3.21	0.93	0.22	0.03	0.05
1.92	3.37	0.83	0.36	0.06	0.05
2.99	3.63	1.02	0.15	0.03	0.06
2.65	4.48	0.91	0.21	0.04	0.08
4.42	4.87	1.60	0.12	0.02	0.05
3.11	5.19	1.32	0.33	0.03	0.07
3.82	4.08	1.32	0.21	0.04	0.06
3.42	4.57	1.34	0.17	0.03	0.07
3.72	4.36	1.42	0.11	0.02	0.04
4.02	3.88	1.45	0.18	0.03	0.05
4.09	3.66	1.34	0.17	0.04	0.05
2.23	3.50	0.97	0.32	0.06	0.07
3.88	4.25	1.30	0.19	0.04	0.07
2.78	3.55	1.22	0.30	0.06	0.06
1.71	3.36	1.04	0.40	0.11	0.07
1.21	3.17	1.09	0.46	0.13	0.07
1.50	3.02	1.10	0.44	0.11	0.07
1.66	3.31	1.15	0.52	0.14	0.07
2.12	3.84	1.58	0.38	0.09	0.08
1.20	3.29	1.13	0.46	0.12	0.07
2.00	3.12	1.08	0.40	0.10	0.06
1.53	3.08	1.09	0.30	0.10	0.07
3.37	3.38	1.38	0.32	0.12	0.06
1.48	3.17	1.15	0.33	0.14	0.07
1.59	3.21	1.17	0.31	0.13	0.07
1.73	3.20	1.18	0.28	0.13	0.07
1.98	3.52	1.30	0.32	0.14	0.07
2.04	3.50	1.33	0.31	0.14	0.07
2.03	3.52	1.32	0.39	0.14	0.07
3.82	4.15	1.61	0.25	0.08	0.07
1.57	3.42	1.30	0.37	0.14	0.07
1.44	3.24	1.24	0.36	0.13	0.07
1.10	3.21	1.14	0.42	0.14	0.07
1.14	3.14	1.14	0.38	0.14	0.07
1.43	3.22	1.20	0.25	0.11	0.07
1.88	3.45	1.32	0.26	0.12	0.07
2.20	3.41	1.30	0.29	0.12	0.07
1.62	3.33	1.34	0.23	0.12	0.07
1.72	3.36	1.26	0.31	0.13	0.07

Ca	Fe	Mg	K	Na	P
1.74	3.49	1.23	0.39	0.14	0.07
1.44	3.33	1.12	0.41	0.14	0.07
1.40	3.54	1.16	0.44	0.17	0.07
1.26	3.33	1.08	0.44	0.16	0.07
1.16	3.25	1.05	0.41	0.15	0.07
1.23	3.32	1.07	0.45	0.16	0.07
1.24	3.01	0.99	0.27	0.11	0.06
1.21	2.97	0.98	0.29	0.11	0.06
1.18	2.77	0.91	0.25	0.10	0.05
1.35	2.73	0.89	0.25	0.09	0.05
1.11	2.83	0.91	0.30	0.11	0.05
1.15	2.87	0.92	0.28	0.10	0.05
1.16	2.77	0.88	0.31	0.10	0.05
1.58	2.84	0.92	0.26	0.09	0.05
2.54	3.02	0.93	0.21	0.06	0.05
1.62	2.11	0.38	0.24	0.05	0.03
1.10	2.13	0.47	0.22	0.06	0.03
2.70	2.43	0.57	0.19	0.04	0.04
1.85	3.51	1.21	0.27	0.08	0.06
2.94	3.76	1.01	0.16	0.04	0.06
4.12	5.00	1.12	0.19	0.07	0.07
3.68	3.67	1.04	0.15	0.02	0.05
3.46	3.19	0.86	0.12	0.02	0.03
1.90	2.62	0.73	0.19	0.04	0.06
1.87	3.53	1.44	0.11	0.06	0.06
1.69	4.32	1.49	0.07	0.04	0.06
1.39	3.19	1.27	0.14	0.07	0.06
1.14	3.21	1.10	0.37	0.13	0.07
1.49	3.43	1.19	0.31	0.13	0.07
1.20	3.34	1.07	0.37	0.15	0.07
1.66	3.42	1.23	0.23	0.10	0.07
1.43	3.69	1.26	0.30	0.11	0.07
1.95	3.54	1.25	0.21	0.08	0.06
2.21	2.61	1.01	0.21	0.08	0.06
1.51	3.24	1.03	0.18	0.07	0.06
1.73	3.85	1.18	0.26	0.07	0.06
1.20	3.52	1.91	0.60	0.09	0.05
1.32	3.81	1.18	0.26	0.08	0.07
1.37	5.02	1.47	0.32	0.07	0.08
1.56	3.78	1.14	0.46	0.10	0.12
0.82	3.52	1.09	0.54	0.15	0.06
1.48	3.90	1.31	0.48	0.15	0.06
1.85	4.07	1.26	0.36	0.12	0.06
1.55	3.55	1.13	0.21	0.08	0.06
0.94	3.38	1.04	0.43	0.12	0.06
0.76	3.55	2.91	0.32	0.07	0.06
1.07	3.17	1.08	0.42	0.13	0.07
1.54	3.20	1.16	0.31	0.08	0.06

Ca	Fe	Mg	K	Na	P
2.92	3.54	1.24	0.24	0.06	0.06
4.13	5.79	1.62	0.18	0.04	0.06
2.30	3.97	1.28	0.31	0.08	0.06
2.73	3.93	1.34	0.52	0.11	0.07
2.59	3.57	1.16	0.21	0.07	0.06
5.09	3.95	1.95	0.26	0.06	0.05
3.38	3.29	1.15	0.20	0.05	0.06
1.99	3.34	1.14	0.19	0.08	0.06
4.04	4.37	2.06	0.07	0.05	0.07
3.09	4.22	1.70	0.13	0.06	0.07
0.98	3.57	1.48	0.29	0.11	0.07
1.25	3.45	1.32	0.24	0.12	0.07
1.73	3.63	1.39	0.22	0.09	0.05
3.45	3.55	1.39	0.32	0.06	0.05
1.63	3.26	1.29	0.39	0.10	0.05
1.48	3.17	0.98	0.37	0.09	0.06
1.83	3.49	1.00	0.38	0.08	0.05
1.42	3.17	0.99	0.34	0.09	0.05
4.62	2.52	1.24	0.17	0.03	0.04
2.66	1.67	0.89	0.14	0.06	0.04
4.77	3.00	1.18	0.23	0.03	0.05
1.59	3.28	0.98	0.37	0.08	0.05
1.42	3.24	0.99	0.39	0.10	0.05
1.29	3.12	1.00	0.33	0.09	0.05
1.29	3.28	1.08	0.35	0.09	0.05
1.30	3.24	0.99	0.34	0.09	0.05
1.21	3.36	1.38	0.30	0.09	0.05
1.55	3.12	1.00	0.28	0.08	0.05
1.60	3.51	0.93	0.28	0.08	0.05
1.88	3.16	0.87	0.24	0.08	0.05
2.34	4.66	1.06	0.29	0.08	0.07
1.72	5.43	1.19	0.16	0.06	0.06
1.65	4.55	1.13	0.43	0.09	0.07
1.60	4.25	1.38	0.61	0.15	0.08
3.36	3.49	1.10	0.20	0.04	0.05
1.54	5.12	1.24	0.47	0.11	0.07
3.80	3.91	1.25	0.30	0.05	0.05
2.39	3.08	0.79	0.26	0.06	0.05
4.51	3.10	1.15	0.25	0.04	0.05
1.61	4.75	1.18	0.40	0.09	0.08
1.60	3.67	1.05	0.27	0.08	0.06
1.91	4.68	1.13	0.24	0.06	0.06
1.91	10.28	1.14	0.28	0.03	0.04
2.61	4.43	1.11	0.22	0.04	0.06
1.97	3.35	1.25	0.19	0.07	0.05
1.80	3.09	1.07	0.13	0.07	0.05
1.48	3.09	1.13	0.20	0.10	0.06
0.37	10.63	0.38	0.07	0.01	0.01

Ca	Fe	Mg	K	Na	P
2.48	6.29	1.80	0.21	0.09	0.08
3.80	4.07	1.31	0.21	0.04	0.05
1.71	3.25	1.14	0.28	0.13	0.07
1.23	3.00	0.99	0.27	0.11	0.06
1.70	4.31	1.50	0.07	0.04	0.06
0.76	3.48	2.90	0.32	0.06	0.06
1.81	3.44	1.01	0.36	0.08	0.05
3.85	3.92	1.21	0.29	0.05	0.05
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0.01	0.01	0.01	0.01	0.01	0.01
10	10	10	10	10	5
ICP	ICP	ICP	ICP	ICP	ICP



## APPENDIX E

## STATEMENT OF COSTS

### Preparation of this report

J.T. Shearer, P. Geo; 2 days @ \$700/day	\$1,400.00
G. McKee; Mining Technician 5 days @ \$200/day	<u>\$1,000.00</u>
	\$3,400.00

Technical Reports by J.T. Shearer, P.Geo and Dr. R. McMillan, Ph.D, P.Geo.	\$3,000.00
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### Labour Oct. 17 to Nov. 2, 2007

Greg McKee, Mine. Tech.; 15 shifts @ \$300/day	\$4,500.00
R.L. McDonald, Underground Shiftboss; 15 shifts @ \$500/day	\$7,500.00
Alex McPherson, Miner; 9 shifts @ \$300/day	\$2,700.00
Bryan Livgard, Technician; 10 shifts @ \$300/day	\$3,000.00
Rob Wilgosh, Labourer; 6 shifts @ \$300/day	\$1,800.00
Al Beaton, Mining Engineer; 9 shifts @ \$500/day	<u>\$4,500.00</u>
Labour total for 64 man-shifts	\$24,000.00

### Room and Board

Goldbridge Hotel and/or Mine Camp 64 man-shifts/man-days @ \$100/day/man	\$6,400.00
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Assay costs for 167 rock samples, IPL Labs	\$4,822.00
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### Instrument Rentals

GPS units	
Walkie Talkies	
Satellite Telephone	\$500.00

### Itemized Costs

Safety Ropes	\$300.00
Safety Gear for 6 workers @ \$100/man	\$600.00
Tools	<u>\$500.00</u>
	\$1,400.00

ARGO (ATV/truck/ personnel carrier/winch/emergency vehicle) . 27 day rental @ \$200/day	\$5,400.00
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Project Costs Sub- Total	\$48,522.00
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<b>Project Costs Sub-Total (Balance forward)</b>	<b>\$48,522.00</b>
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**Transportation**

**Add 20% of Project Costs Total :**

**\$48,522.00 x 20% =**

**\$9,704.40**

**Project Costs Total**

**\$58,226.40**

**Hydrological/Environmental Report by Entech**

**\$10,000.00**

**Grand Total Project Costs**

**\$68,226.40**

## APPENDIX F

**June 10, 2008  
Exploration and Development Work  
SOW and Expiry Date Change  
Event # 4220722**

**Details**

**Purpose: to explain on what tenures, of the Little Gem Property, work was done, regarding Goldridge Mining Ltd.'s 2007/2008 Geochemical and Rock-sampling Program.**

- **\$68226.40 worth of work performed on GML's Little Gem Project.**
- **Of that, \$15,536.24 was applied to 14 (list provided) of the 19 claims that comprise the Little Gem Claim Group. Co owners are McMillan, Church and GML.**
- **The remaining \$52,690.16 was credited to GML's PAC Account.**
- **100% of the Rock-sampling/Geochem work was done on tenure # 501174**
- **Necessary road and trail work was done on tenure #'s**

**575316**

**573344**

**564599**

**502808**

- **The Hydrological Data Review/Environmental Study was performed in reference to all 19 claims of the Little Gem Property.**


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### Exploration and Development Work - Expiry Date Change Event Detail

<b>Event Number ID</b>	<b>4220722</b>
Work Type Code	Technical and Physical Work (B)
Amount	\$ 68226.40
Work Start Date	2007/jun/29
Work Stop Date	2008/jun/10
Mine Permit Number	
PAC name	Goldbridge
PAC credit	\$ 52690.16
Tenure Numbers	503409
Work Performed Index	Y
Old Good To Date	2009/jan/14
New Good To Date	2009/jun/29
Tenure Area	122.316
Required Work Amount	\$ 445.03
Submission Fee	\$ 22.25
Tenure Numbers	558800
Work Performed Index	Y
Old Good To Date	2013/may/16
New Good To Date	2013/jun/29
Tenure Area	40.804
Required Work Amount	\$ 39.35
Submission Fee	\$ 1.97
Tenure Numbers	501174
Work Performed Index	Y
Old Good To Date	2013/jan/12
New Good To Date	2013/jun/29
Tenure Area	81.537
Required Work Amount	\$ 300.23
Submission Fee	\$ 15.01
Tenure Numbers	560573
Work Performed Index	Y
Old Good To Date	2008/jun/13
New Good To Date	2009/jun/29
Tenure Area	244.527
Required Work Amount	\$ 1020.98
Submission Fee	\$ 102.10
Tenure Numbers	560574
Work Performed Index	Y
Old Good To Date	2008/jun/13
New Good To Date	2009/jun/29
Tenure Area	407.669
Required Work Amount	\$ 1702.16
Submission Fee	\$ 170.22
Tenure Numbers	560575
Work Performed Index	Y



Old Good To Date	2008/jun/13
New Good To Date	2009/jun/29
Tenure Area	509.806
Required Work Amount	\$ 2128.62
Submission Fee	\$ 212.86
Tenure Numbers	560576
Work Performed Index	Y
Old Good To Date	2008/jun/13
New Good To Date	2009/jun/29
Tenure Area	509.807
Required Work Amount	\$ 2128.62
Submission Fee	\$ 212.86
Tenure Numbers	561441
Work Performed Index	Y
Old Good To Date	2013/jun/27
New Good To Date	2013/jun/29
Tenure Area	81.594
Required Work Amount	\$ 3.58
Submission Fee	\$ .18
Tenure Numbers	502808
Work Performed Index	Y
Old Good To Date	2013/jan/13
New Good To Date	2013/jun/29
Tenure Area	40.769
Required Work Amount	\$ 149.23
Submission Fee	\$ 7.46
Tenure Numbers	558152
Work Performed Index	Y
Old Good To Date	2009/feb/15
New Good To Date	2009/jun/29
Tenure Area	20.38
Required Work Amount	\$ 29.93
Submission Fee	\$ 2.99
Tenure Numbers	561704
Work Performed Index	Y
Old Good To Date	2008/jun/29
New Good To Date	2009/jun/29
Tenure Area	489.668
Required Work Amount	\$ 1958.67
Submission Fee	\$ 195.87
Tenure Numbers	561709
Work Performed Index	Y
Old Good To Date	2008/jun/29
New Good To Date	2009/jun/29
Tenure Area	489.562
Required Work Amount	\$ 1958.25
Submission Fee	\$ 195.82
Tenure Numbers	561714
Work Performed Index	Y
Old Good To Date	2008/jun/29
New Good To Date	2009/jun/29
Tenure Area	509.821
Required Work Amount	\$ 2039.29
Submission Fee	\$ 203.93
Tenure Numbers	561719
Work Performed Index	Y
Old Good To Date	2008/jun/29
New Good To Date	2009/jun/29

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Tenure Area	408.075
Required Work Amount	\$ 1632.30
Submission Fee	\$ 163.23

Work Type Item Code	Geochemical (C)
Work Type Code	Technical Work (T)
Work Type Item Code	Transportation / travel expenses (TT)
Work Type Code	Physical Work (P)
Work Type Item Code	Machinery and equipment (M)
Work Type Code	Physical Work (P)
Work Type Item Code	Labour (L)
Work Type Code	Physical Work (P)

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143.

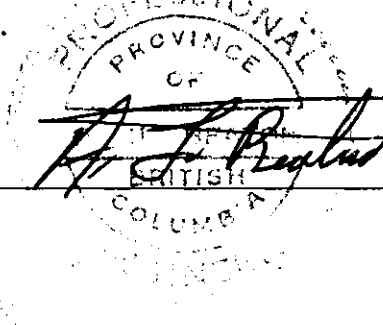
## APPENDIX G

### Certificate

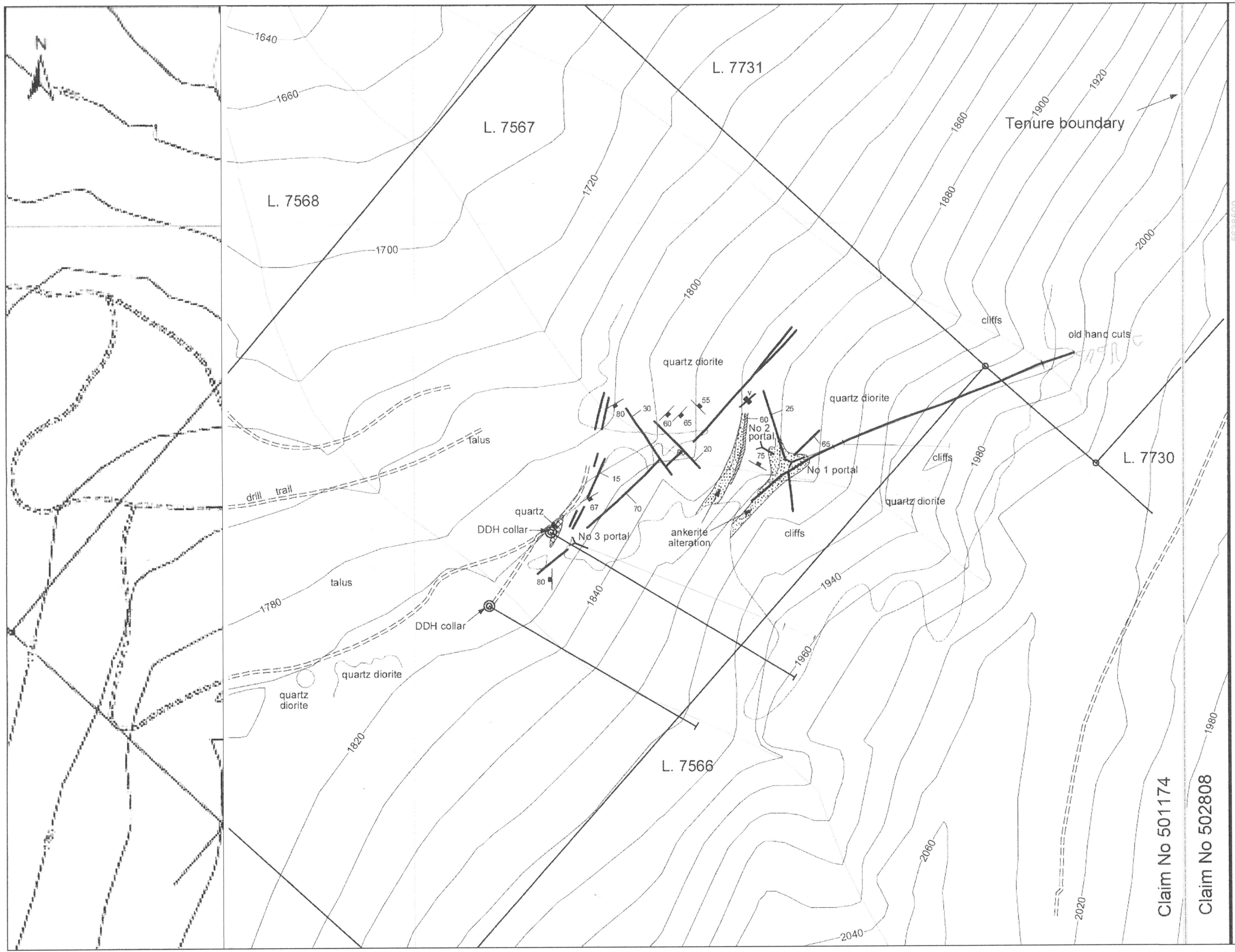
I, Allan J. Beaton of 947 Frederick Road, North Vancouver, British Columbia V7K 1H7, do certify that,

1. I am a consulting Mining Engineer, registered with the Association of Professional Engineers and Geoscientists of British Columbia, since 1978, with Registration Number 11423.
2. I am a graduate in Mining Engineering from Nova Scotia Technical College (now Dalhousie University).
3. I have worked as a Mining Engineer, Consultant and Mining Contractor since 1970.
4. This Report on the Little Gem Property is based on a review of published information and consultation with men who actually worked on the property and property examinations, in 2007.
5. I spent several days on-site, during the sampling program.
6. I am President and Director of Goldbridge Mining and carried out the work program.

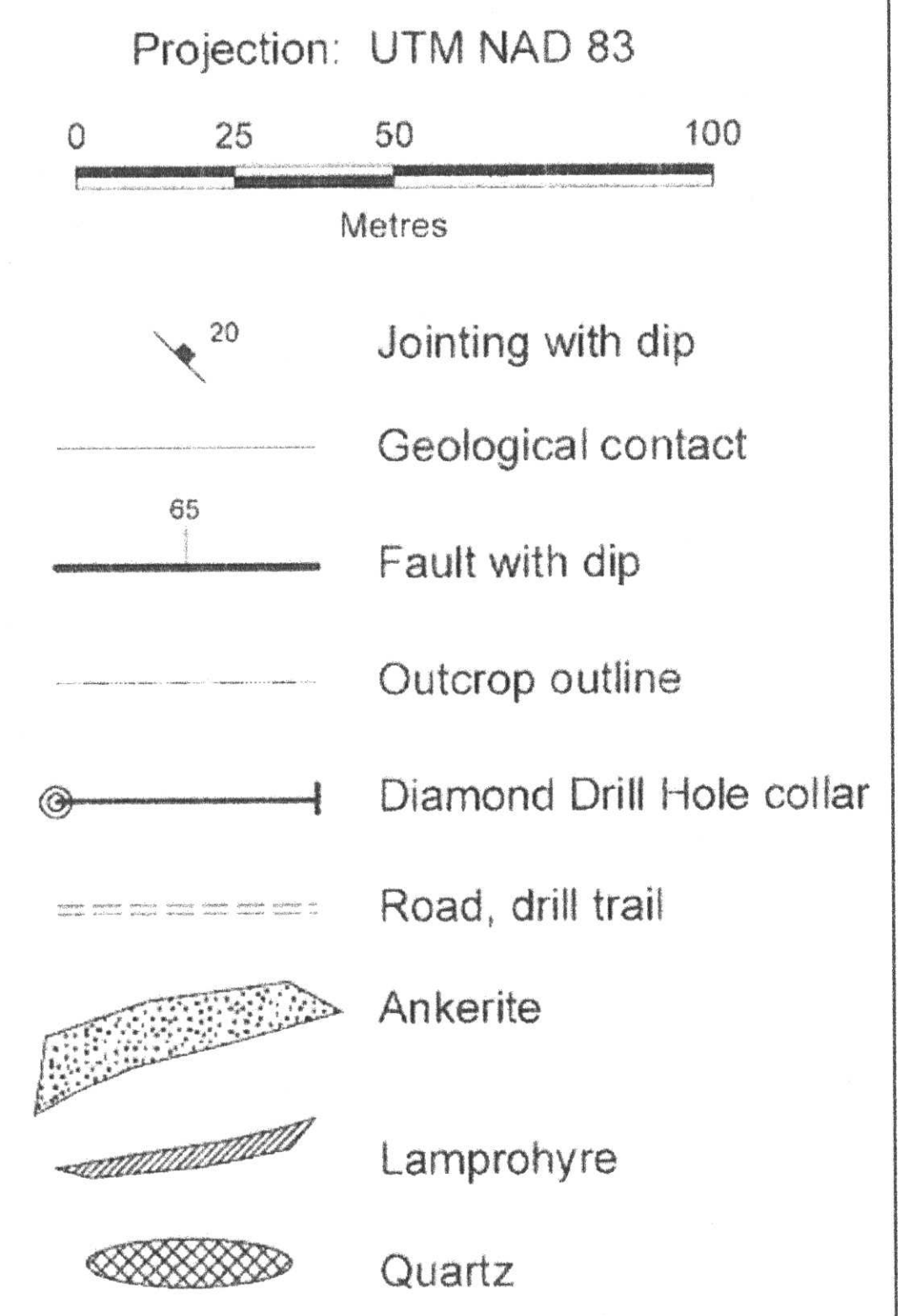
Signed

A circular professional seal for the Province of British Columbia. The outer ring contains the text "PROFESSIONAL ENGINEER" at the top and "BRITISH COLUMBIA" at the bottom. The inner circle contains the text "PROVINCE OF" at the top. A signature, "A. J. Beaton", is written across the seal.

Allan J. Beaton, P.Eng. Sept 09, 2008



**Figure 3 - Surface Plan  
Little Gem Property**



(after Lammle, 1986)