520578

AQUARIUS RESOURCES LTD.

AND

CAROLIN MINES LTD.

A SURVEY OF THE MINERAL PROSPECTS IN THE LIKELY DISTRICT, BRITISH COLUMBIA

BY

JOHN D. GODFREY, P.Geol.

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8208 - 139 Street
Edmonton, Alberta

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1. INTRODUCTION

Aquarius Resources Ltd. and Carolin Mines Ltd. requested that an evaluation be made of certain auriferous mineral showings in the Likely district, B. C., and an assessment be attempted of the regional potential for the nearby Takla Group rocks within which the Likely showings are situated. Fieldwork was undertaken by John D. Godfrey, P.Geol. and Daniel G. Cardinal, P.Geol., of Edmonton and Robert E. Mickle, Powell River, from November 9 to 14 inclusive, 1979.

An area of some 60 square miles in the immediate Likely district was covered in the course of examination of numerous mineral showings.

2. LOCATION AND ACCESS

The Likely district is situated about 50 miles northeast of Williams Lake and can be reached by a year-round road that is used principally for hauling logs (Fig. 1). A network of lower standard logging roads provides good access off the main highway into most of the significant mineral showings.

The Likely district is situated in the vicinity of latitude 52° 30' to 52° 40' N and longitude 121° 20' to 121° 40' W, which occurs in the Quesnel Lake map sheet, 93A, of the National Topographic System.

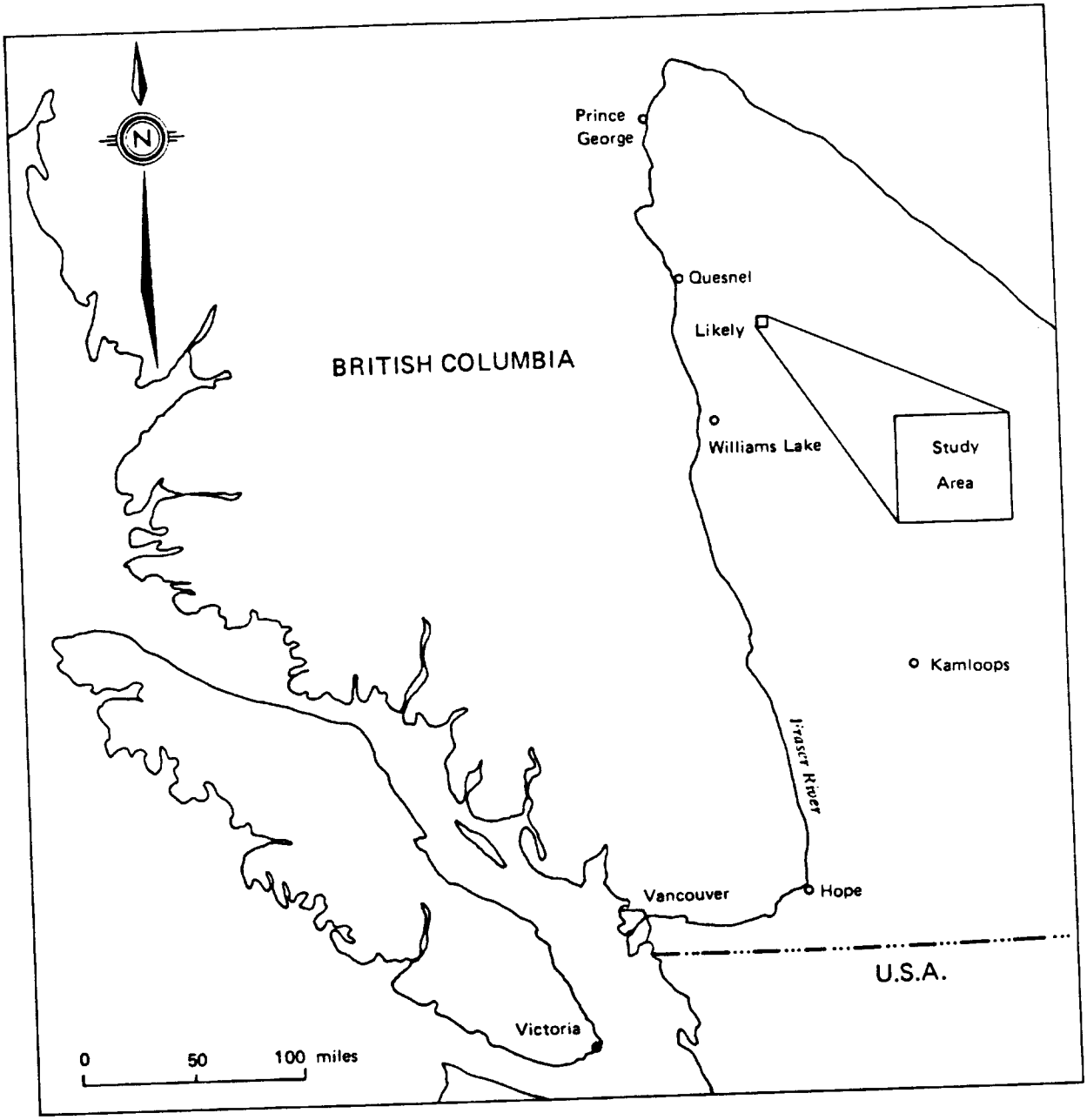


FIGURE 1. Location of study area.

3. MINERAL CLAIMS

Minerals claims either under option or owned outright by the Aquarius Resources-Carolin Mines joint venture, include:

Claim Name	Record Number	Anniversary
MAR 1	1531	Mar. 17
MAR 2	1532	Mar. 17
JUNE	1050	June
JULY 1	1057	July 9
AUG 1	1149	Aug. 31
EASY 1	877	Nov.
EASY 2	878	Nov.
EASY 3	879	Nov.
EASY 4	880	Nov.
EASY 5	881	Nov.
EASY 6	923	Dec.
EASY 7	1007	May
* DUG	-	-
* NOV 4	-	Nov.

* Information unavailable at this time as to the Record Numbers and Anniversary Dates.

The area included in these claims covers about 40 square miles, equivalent to about 102 square km.

4. MINING HISTORY

The Likely district has experienced considerable attention by way of exploration and production of placer gold following the spectacular placer gold developments at Barkerville (1861), situated 32 miles (50 Km) to the north. The Barkerville district lies in the Kaza Group of the Omineca Crystalline Belt, whereas the Likely district is situated in the adjoining belt to the west, the Takla Group of the Quesnel Belt.

During the intervening period of time, there have been many producing placer gold operations in the Likely district, and several small producers remain active today. The most noteworthy was the Bullion Mine (B.C. Minister of Mines, 1923, 1936, 1941, 1943), with a history that dates back some 50 years from 1941, and a record of processing tens of millions of cubic yards of gravel altogether. In the mid 1930's the Bullion was the largest hydraulic operation in British Columbia, and was equipped to handle 3/4 to 1 million cubic yards per season.

Placer gold operations in the lower section of Cedar Creek are reported (verbal communication) to have yielded several million dollars in production, at times when the price of gold was in the range $20 to $36/troy oz. An adit, in this same area, explored a mineralized shear zone in the valley wall and found high but erratic gold values (B.C. Minister of Mines Annual Report for 1922, 1923). In more recent years the potential for economic gold deposits in the bedrock has attracted exploration and prospecting interest. Pits, trenches, short adits, and diamond drill holes have augmented the traditional prospecting methods as well as geochemical and

geophysical surveys, all of them of an exploratory nature used in the search for economic deposits.

The recent increase in price of precious metals has intensified the exploration efforts in the Takla Group of rocks in the vicinity of Likely.

5. GENERAL GEOLOGY

Figure 2 shows the basic elements of the regional geology for the Likely district, B.C. The gold showings at Likely are found largely in a northwesterly trending Permian-Tertiary basin that includes a major volcanic belt (Takla rocks). Auriferous showings are also found to the northeast side of the belt in a fault-contact block of Lower Cambrian rocks of low metamorphic grade.

An eroding Cambrian landmass was undoubtedly a source of sediment (conglomerate and silty carbonates) in the tectonic Permian-Tertiary basin, but the main basin fill came from probably widespread sources of submarine volcanic flows and pyroclastics. Mount Warren (4,000 feet) with an impressive agglomeratic pile in its summit region, is identified as one local volcanic vent source (Fig. 2). A second volcanic source is indicated just east of Quesnel Forks. The thick pile of agglomerates at Mount Warren points to an explosive, central vent type eruption, and interbedded or blanketing pillow lavas establish a submarine environment. These two volcanic centres may be directly related to the intersection of two regional fault systems (volcanic rifts) which trend northeasterly and northwesterly.

There appear to have been deeper, quieter parts of the Permian-

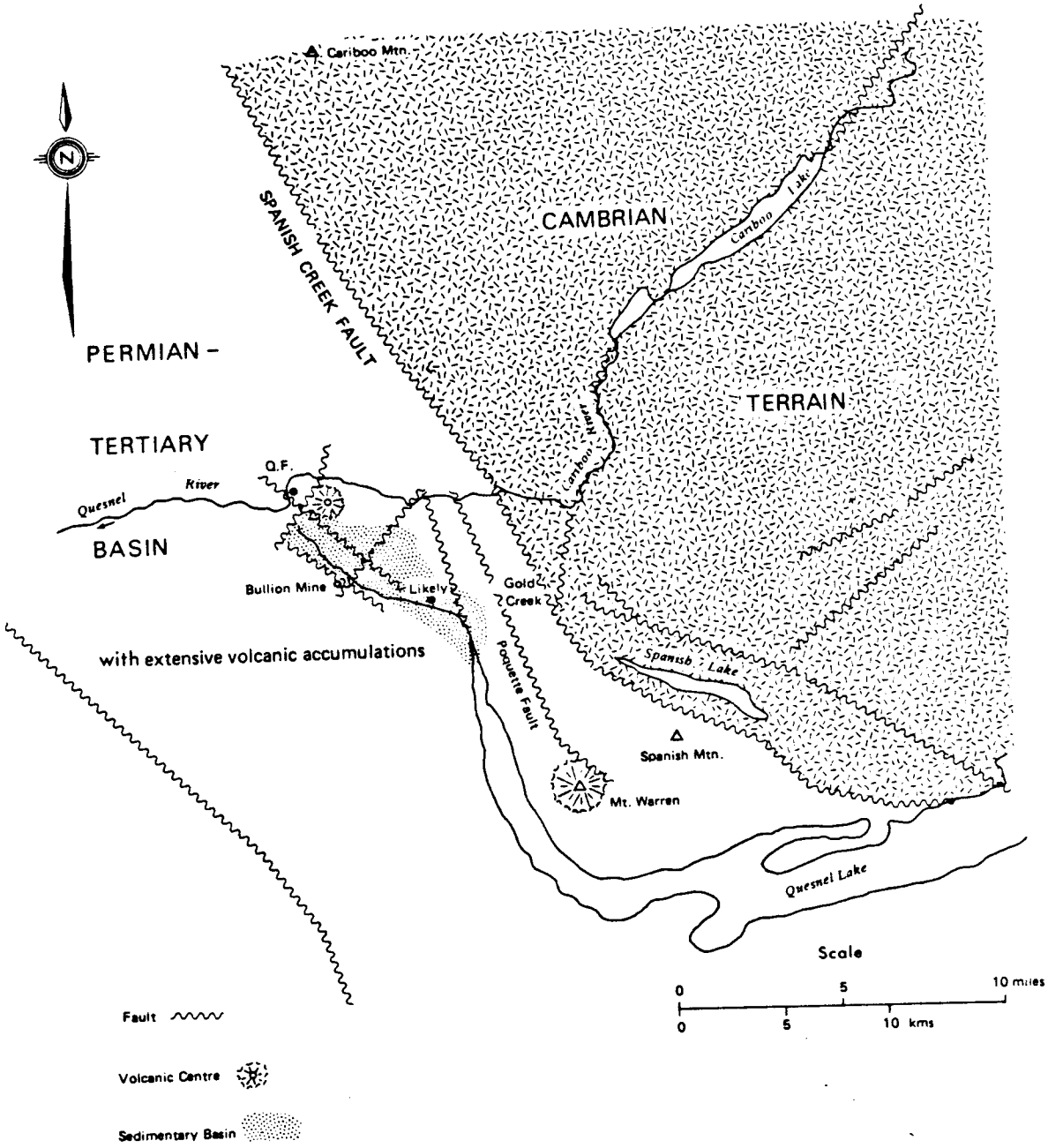


FIGURE 2. Regional geological setting of Likely district, B.C.

Tertiary basin where argillaceous limy sediments accumulated. More proximal sections of the basin received polymictic conglomerates, probably reflecting the mixed igneous-metamorphic lithologies of the Cambrian block undergoing erosion to the northeast.

Although not noticeably metamorphically altered the Permian-Tertiary rocks have been subjected to deformation and are tightly folded and faulted.

The composition of the flows appears to range from basic-intermediate to distinctly acidic; pillow lavas, agglomerates, explosion breccias, and flow banding are all found in the Likely district.

Hydrothermal alteration, closely related to important auriferous mineralization in the Likely district, may be controlled by volcanic vent sources in combination with volcanic rift zones.

6. GLACIAL GEOLOGY

The glacial history of the immediate area is not well known. Glacial striae measured on Mount Warren summit show an advance from east to west, and a brief check of Department of Forestry aerial photographs shows a pronounced glacial advance from east to west over the local region.

Till is evident throughout most of the region examined. A series of parallel kame terrace ridges are prominent on the upper south slope of the mountain just north of Spanish Lake.

A fairly thorough understanding of the glacial history and distribution of deposits in the region is needed in order to design geochemical soil sample

surveys and to obtain the best possible interpretation of geochemical soil sample assay data. Much of the useful data on glacial-surficial deposits should be obtained from the interpretation of stereoscopic aerial photographs.

7. PRESENT STUDY

Fieldwork for the present reconnaissance geological study was undertaken by Godfrey and Cardinal from November 9 to 14, 1979, inclusive. Transportation by 4-wheel drive vehicle gave excellent access to sections and outcrops using a system of public highways and logging roads. Prospector, Mr. R. E. Mickle, experienced and knowledgeable in the Likely district, assisted the geological exploration team and generally made our efforts effective and productive.

Exploration work conducted previously by Aquarius Resources Ltd. in the Likely district is well documented (Littlejohn 1977, Cochrane 1979). The principal objectives of this field project were directed towards:

1. collecting representative samples, some of them bulk samples, to establish and verify assay values reported from a number of known mineral showings; and

2. establishing the geological setting and possible controls for the auriferous mineralization in the district; and

3. attempting to develop a model for the auriferous occurrences at Likely, and thereby assess the additional potential for significant mineralization within the Quesnel Belt (Takla Group). The Quesnel Belt extends for over 350 miles in the Parsnip River area, map sheet 93, (Douglas, 1979);

however, the extent of the Takla Group volcanics within this belt remains unknown at this time.

Numerous showings were sampled (Figs. 3 and 4), and bulk samples were obtained from the more significant mineralized outcrops. A wealth of assay data are available through mining companies who have held working agreements with Mr. R. E. Mickle, and many of the more critical values and showings were sampled for verification purposes (Appendix B).

In the course of this reconnaissance study several fresh rock sections recently exposed in new road cuts were sampled for assay purposes. In addition, stream silts were collected, an unexplored area of Mount Warren and a logging road on its north face sampled, and, most importantly, an area of major faulting, intrusion and intense hydrothermal alteration was discovered and preliminary samples taken.

In all, over 250 lbs. of samples were brought from the field, and up to three quarters of these materials were assayed.

Geological map data are shown in figure 3, assays and bedrock claims are shown in figure 4, and sample descriptions are summarized in Appendix B.

Sites and local areas of particular economic interest are described in more detail in the following section.

Throughout the fieldwork, the ground was clear of snow; there were patches of heavy hoar frost at elevations above 4,000 feet on north-facing slopes. Working conditions are considered to have been good throughout.

8. SUMMARY OF EXPLORATION AT SELECTED SITES

8A. Quesnel Forks-Kangaroo Creek Faults at Quesnel River-Lawless Creek

The area briefly prospected is located near Quesnel Forks and Lawless Creek. Outcrop is plentiful along the east bank of the Quesnel River (Fig. 6) where the geology primarily consists of faulted sedimentary and volcanic rocks, and an intrusive stock.

The faulted and fractured black calcareous shaley argillite with minor black chert is of probable Upper Triassic to Lower Jurassic age.

Two major fault systems cut the black argillites (Figs. 6 and 7). The Quesnel Forks Fault striking N70°W and dipping 75°S and the Kangaroo Creek Fault striking approximately N25°E and dipping 75°W appear to intersect at the Quesnel River outcrop. An intensely oxidized fault gouge, 3 to 6 feet (1-2 m) wide in the Kangaroo Creek Fault, appears to be hydrothermally altered. The exposed Quesnel Forks Fault surface does not exhibit intense alteration, but a white mineral coating covers the fault face. The white encrustation may in part be hydrozincite, although pyrite was the only sulphide noted.

A small intrusive stock (300 x 300 feet, or 100 x 100 m), possibly subvolcanic, porphyritic in texture and syenitic in composition, crops out ~~x~~ NO along the river bank approximately 300 feet (100 m) south of the black calcareous argillite outcrop. The intrusion appears to be cut by the Kangaroo Creek Fault and is intensely hydrothermally altered with the majority of feldspars altered to kaolinite. Pyrite, the only visible sulphide, occurs in

not o/c
talus

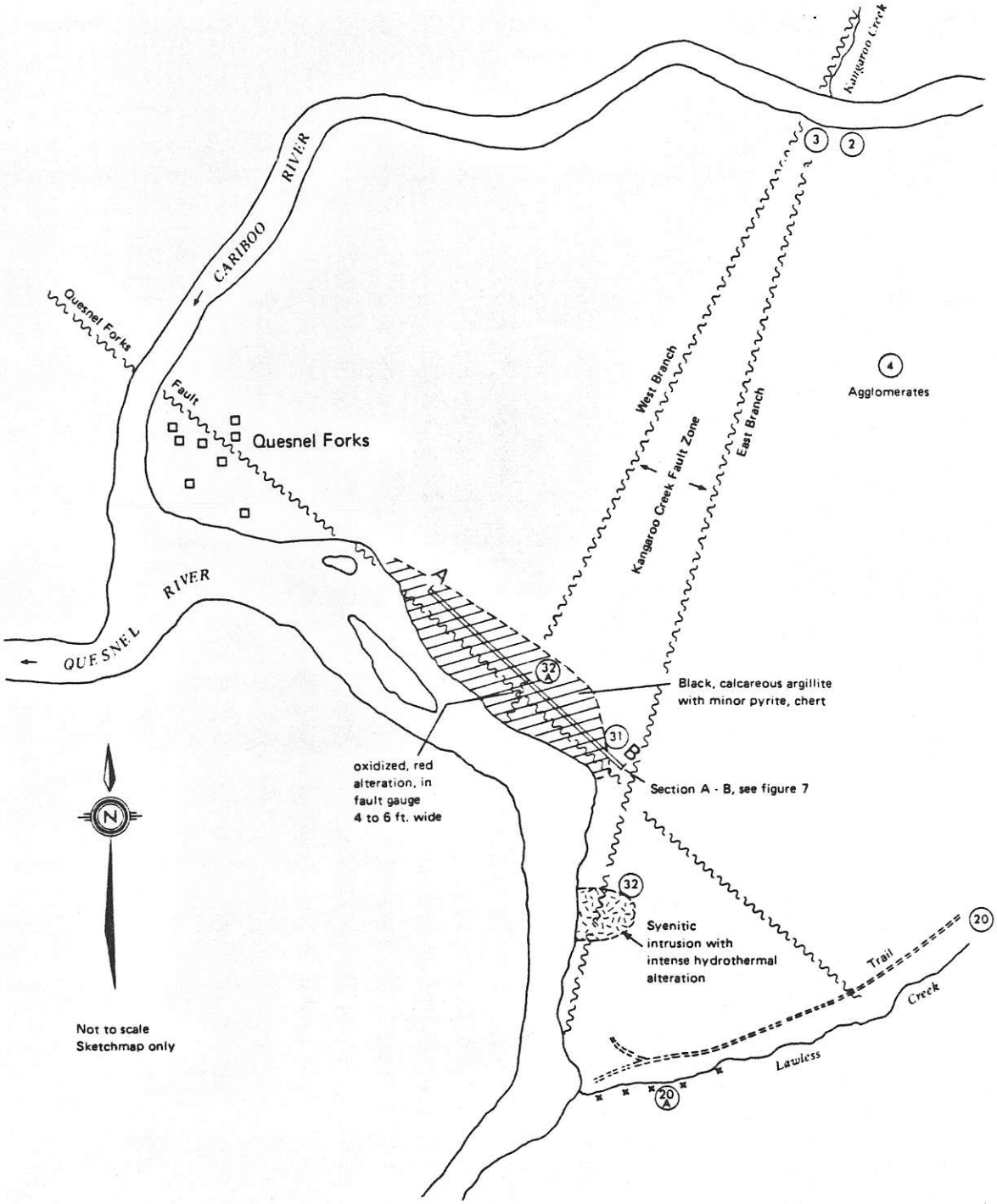


FIGURE 6. Sketchmap of intersection of Quesnel Forks-Kangaroo Creek Faults, between Lawless Creek and Quesnel Forks (unsurveyed).

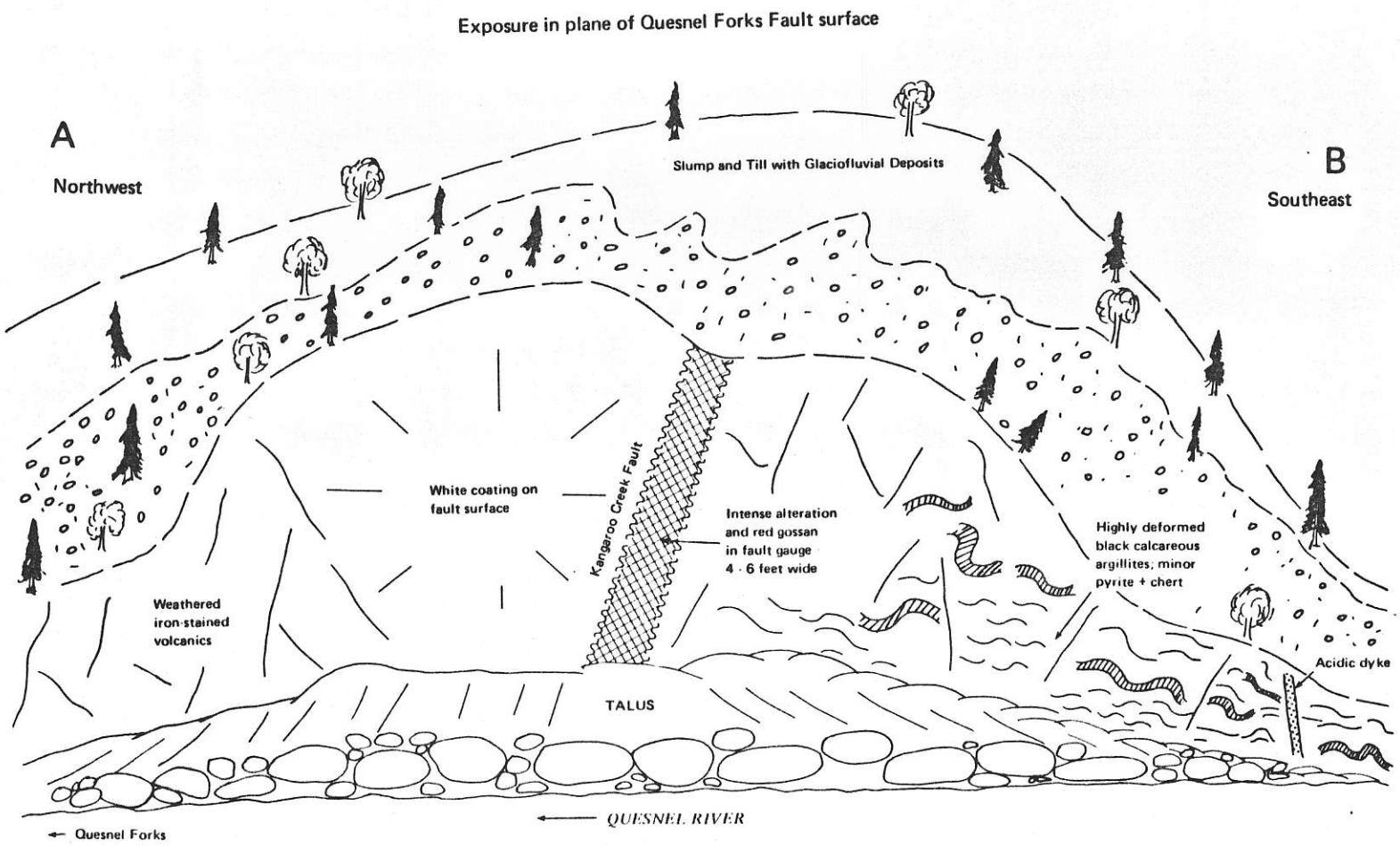


FIGURE 7. Perspective sketch of intersection of Quesnel Forks-Kangaroo Creek Faults in plane of Quesnel Forks Fault; looking northwards toward exposure in bank of Quesnel River (see figure 6).

blebs up to 2 cm in size.

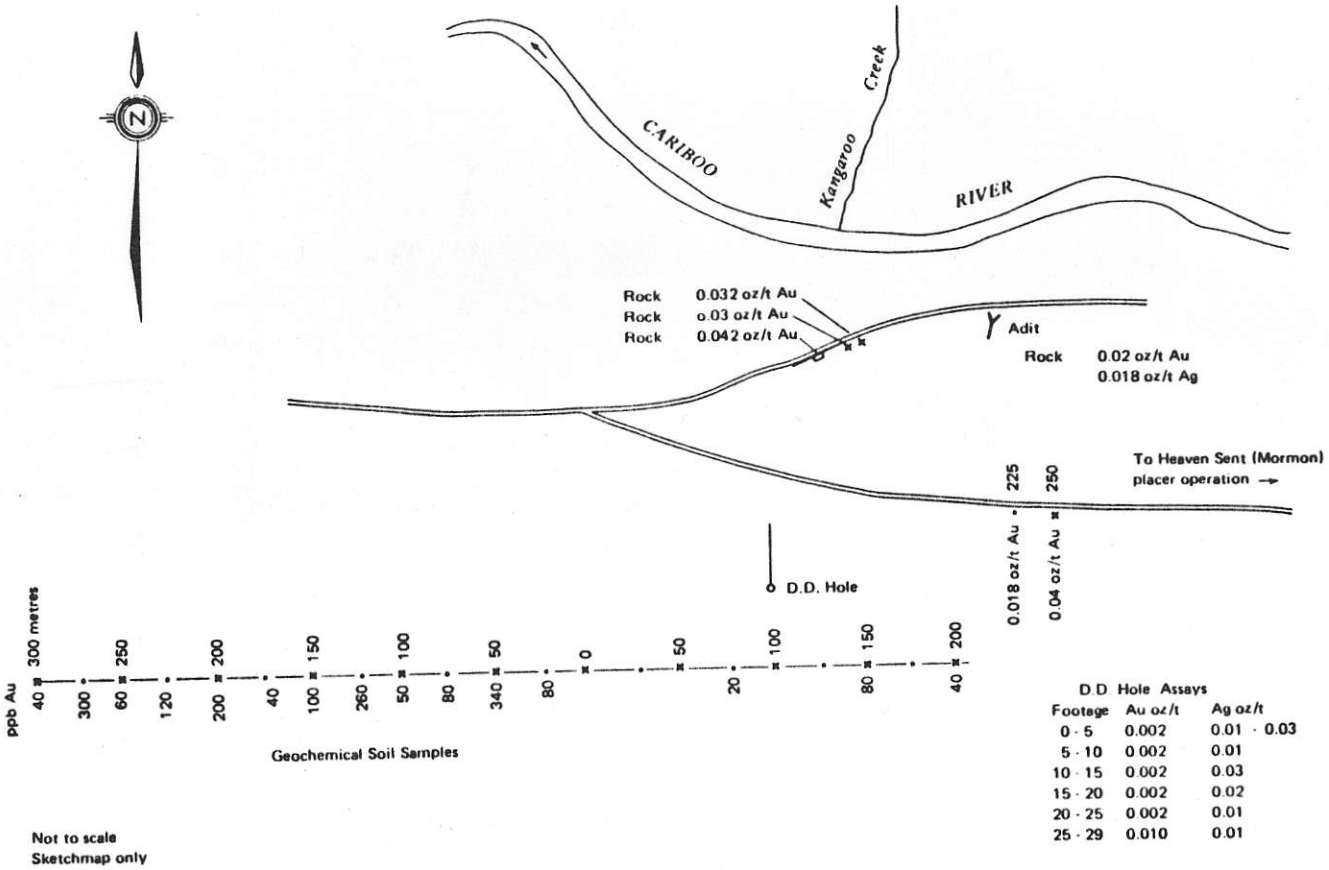
If gold or other mineralization is found in the area it may be epigenetic (due to possible remobilization from host rocks during metamorphism) or epithermal in origin. Such deposits are likely to form along or adjacent to faults and dilatent zones that acted as channelways. The appropriate structural features are present in the Quesnel Forks-Lawless Creek area. It is evident from the condition of the intrusion and the Kangaroo Creek Fault Zone that hydrothermal alteration was very effective and could have been metaliferous.

8B. South of Kangaroo Creek at Cariboo River

Outcrops of felsic and tuffaceons volcanics (Stops 2 and 3, Fig. 3) were examined in road cuts near the south bank of the Cariboo River, across from Kangaroo Creek (Fig. 8).

The main outcrop (Stop 2) is approximately 10 ft. (3 m) high and consists of light grayish green rhyolitic flows and fragmental tuff cut by small quartz-carbonate stringers. The flows strike N40^{o}W and dip 30°NE with fractures parallel to the flow banding. The Kangaroo Creek Fault trends through the area but was not observed because of limited bedrock exposure. The tuff includes 10% fragments from 1 to 3 mm in size. Both tuff and rhyolite have a relatively soft matrix which gives a positive reaction with HCl, indicating a carbonate matrix, and hence an interpreted carbonate exhalative mode of origin.

Approximately 1,500 ft. (500 m) west along the road another outcrop, (Stop 3) 5 - 6 ft. (2 m) high, consists of highly altered volcanogenic



D.D. Hole Assays

Footage	Au oz/t	Ag oz/t
0 - 5	0.002	0.01 - 0.03
5 - 10	0.002	0.01
10 - 15	0.002	0.03
15 - 20	0.002	0.02
20 - 25	0.002	0.01
25 - 29	0.010	0.01

FIGURE 8. Assay plan of showings and geochemical soil sample traverse along Cariboo River, south of Kangaroo Creek. Data supplied by R.E. Mickle.

rock. The decomposed material was bulk sampled at 10 points along a 60 foot (20 m) exposure.

The main mineralization consists of finely disseminated pyrite with some quartz/carbonate veins carrying sparse galena, sphalerite, and blebs of a green, copper weathering mineral, possibly tetrahedrite. Several rock samples collected by R. E. Mickle (prospector) were analyzed for gold. One Station (0 + 250 meters north) assayed 0.04 oz/ton, and minor scheelite was panned by R. E. Mickle from a nearby weathered outcrop.

The secondary quartz/carbonate veins show that sulphides, such as sphalerite and galena, were mobile and co-crystallized along with quartz and calcite. Gold may be sygenetic in the volcanics. The significance of the projected Kangaroo Creek Fault relative to the observed mineralization is not apparent due to limited outcrop. Scheelite is indicative of high temperature, contact metamorphism, and could be related to a nearby, overburden-masked, intrusion.

8C. The LK Group

The LK Group (Stop 4) is located on an upland area approximately 3/4 mile south of Stops 2 and 3 (Fig. 9). The bedrock consists of felsic and mafic agglomeratic volcanics, with pyrite as the main sulphide mineral.

Mafic agglomeratic flows crop out on a small hill in a logged-out area. The agglomeratic clasts are 1-3 inches (2-7 cm) in diameter with abundant porphyry amphibole (hornblende?) phenocrysts, calcite-filled vesicules, and quartz/carbonate veinlets. Rhyolite, similar to that found at Stop 3 on the Cariboo River, also crops out on the cleared hill.

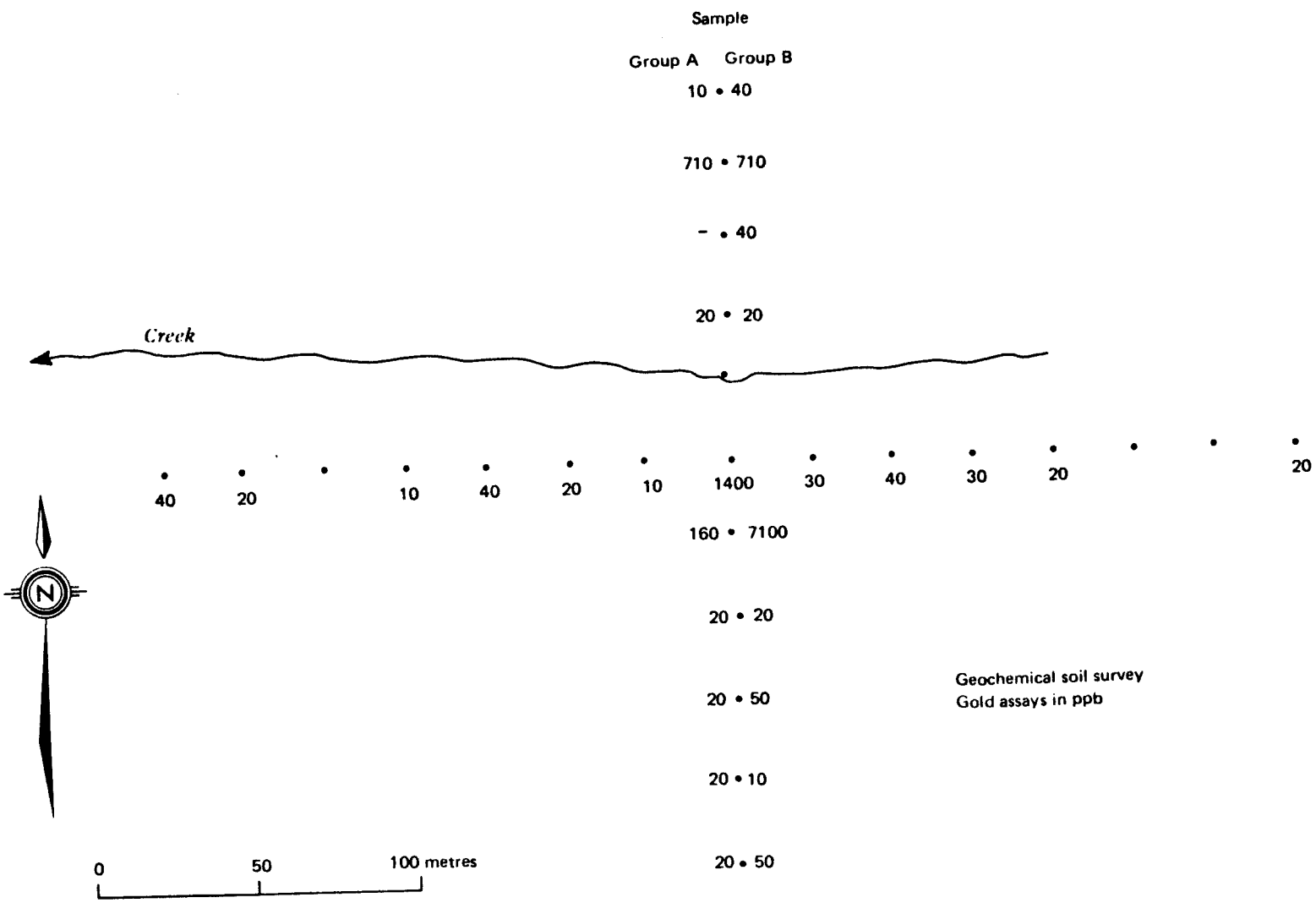


FIGURE 9. Assay plan of geochemical soil survey traverses on LK group. Data supplied by R.E. Mickle.

Approximately 400 ft. (130 m) north, in a low-lying area near dense scrub willow, a pit 80 x 15 ft. (25 x 5 m) exposes unaltered rhyolite with a small quartz veinlet stockwork and disseminated pyrite. Rusty weathered mafic agglomerates, with clasts up to 4 inches (10 cm) in size, were noted close to the pit.

Pyrite tends to be more abundant in the rhyolites than in mafic agglomerates. Several rock samples collected earlier by R. E. Mickle from the LK Group (Fig. 9) showed gold values, two weathered rock samples assayed 1600 and 1800 ppb Au. Two geochemical rock samples from the low-lying area near the willows assayed 7100 and 1440 ppb Au, and after blasting, a grab sample from the rubble assayed 1380 ppb Au.

The agglomerates are indicative of a nearby volcanic vent which could also have provided a local source of the gold. Gold seems to associate more with the acidic rather than the mafic volcanics in the LK Group. The carbonate matrix, typical of these acidic rocks, may have acted as a buffer to aid in the precipitation of gold. Prospecting experience in the district has shown that gold mineralization is invariably associated with hematite-stained decomposition zones, and the latter is used as a prospecting guide.

8D. Gold Creek

During the 1979 field season, the Gold Creek (Easy Mineral Claim 1) area, received considerable attention by way of closely spaced geochemical grid sampling and a series of four diamond drill holes by Silver Standard Mines Ltd. The Gold Creek section is reputed to be one of the best gold showings in the Likely district. Consequently, this well-

exposed section was sampled in detail (requiring 10 man hours) in order to check assay values and to establish the equivalent of a representative bulk sample.

The steep-sided exposure consists of fine-grained volcanic flows (unit 3, Fig. 3) which either overlie or abut an angular volcanic talus deposit (Fig. 10). The latter is interpreted as a scarp slope accumulation of volcanic blocks, the scarp being either a rift fault or collapse feature closely associated with a volcanic vent. The talus breccia is partially cemented by calcite of possible groundwater or late-stage hydrothermal origin. A similar deposit was noted 1,000 to 1,500 feet (300 to 500 km) south of Gold Creek alongside the highway in the cuttings of a recently installed power pole.

The Gold Creek section of flows is cut by two greenstone dykes, estimated to be 4 to 5 feet (1-1/2 m) thick (Fig. 10).

Hematite red-stained alteration is noted in numerous cross-cutting zones, typically from 1 to 5 inches (2 to 10 cms) thick, but locally up to 10, 20, and 40 inches (25, 50, and 100 cms). The rock in these alteration zones is thoroughly decomposed, and commonly accompanied by quartz veins from 1 to 2 inches (2 to 5 cms) thick in vertical or steeply dipping shear zones. The more flatly oriented alteration zones may be related to volcanic stratification or cross fractures.

The net result of the irregular, closely spaced, criss-cross network of narrow, intensely altered zones, interspersed with solid wallrock 6 to 20 inches (15 to 50 cms) wide between alteration zones, makes channel sampling an impractical approach to obtaining the desired unbiased repre-

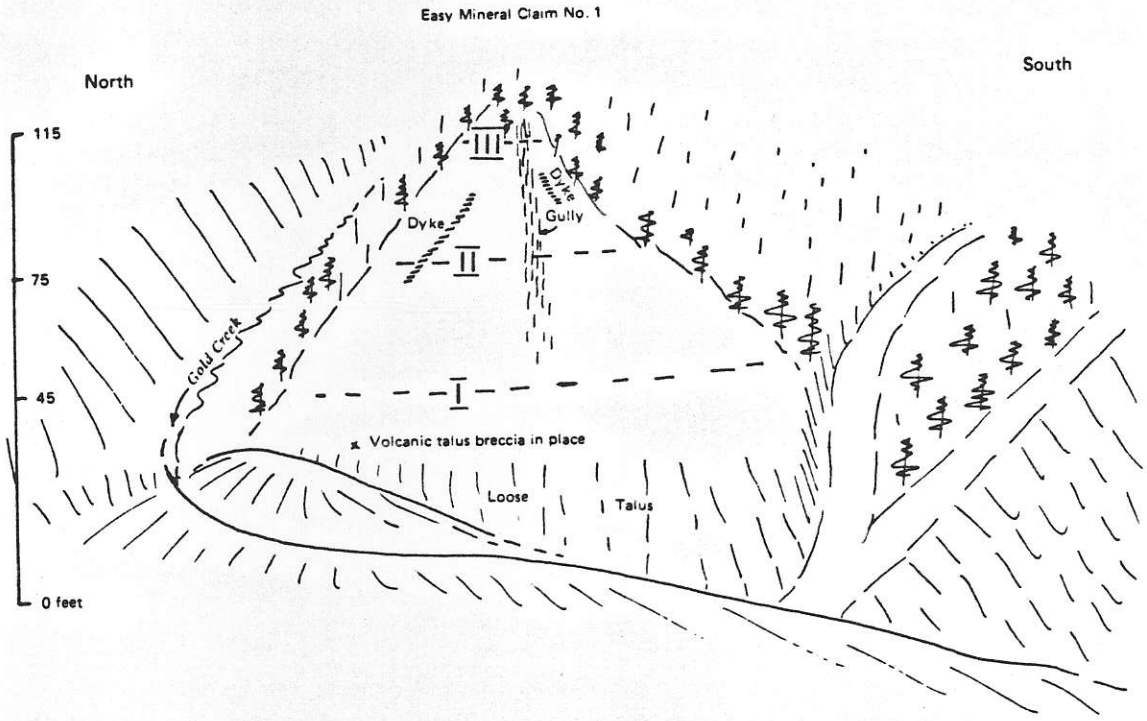


FIGURE 10. Perspective sketch of Gold Creek exposure, looking east from road, showing three levels (elevations) of rock sampling, greenstone dykes and gully formed by intense shear-zone decomposition with quartz veins. Easy Mineral Claim No. 1 (see figs. 11 and 12 for sample details).

sentation of these mixed hard and very soft ("concrete and butter") lithologies.

The sampling approach taken was to separately sample the fresh wallrock and the decomposed zones, working along three levels (Figs. 10, 11, and 12) of the outcrop. Thirty-one samples were taken in this manner, using a steel tape to provide a record of sample intervals and thicknesses of decomposed zones and fresh wallrock along the levels (Table 1). A single sample of decomposed material for assay may represent from 1 to 5 zones collected within a neasured footage interval. For example, assay sample JG-79-10-3 ID represents one 6 inch wide decomposed zone that occurred between 19 to 21 feet along level I. Whereas assay sample JG-79-10-3-IE represents 3 decomposed zones (2, 2, and 1 inch wide) that occurred between 21 and 22 feet along level I.

Average values have been calculated for the three sample levels and the entire section (Table 3) from the data given in Table 1.

The 10 foot-wide (3 m) decomposed shear zone (level III, Fig. 11) is the dominant shear zone in the outcrop. It parallels Gold Creek (which erodes a possible parallel shear) and forms a pronounced gully down the exposure face to level IIE, and is also represented by strong shears and quartz veins at level I, from E to G.

Beaton (1979a) reports on a geochemical soil survey carried out in May, 1979, on Easy #1 M.C. and Beaton (1979b) reports on a follow-up program of four diamond drill holes in October, 1979, on behalf of Mutual Resources Limited.

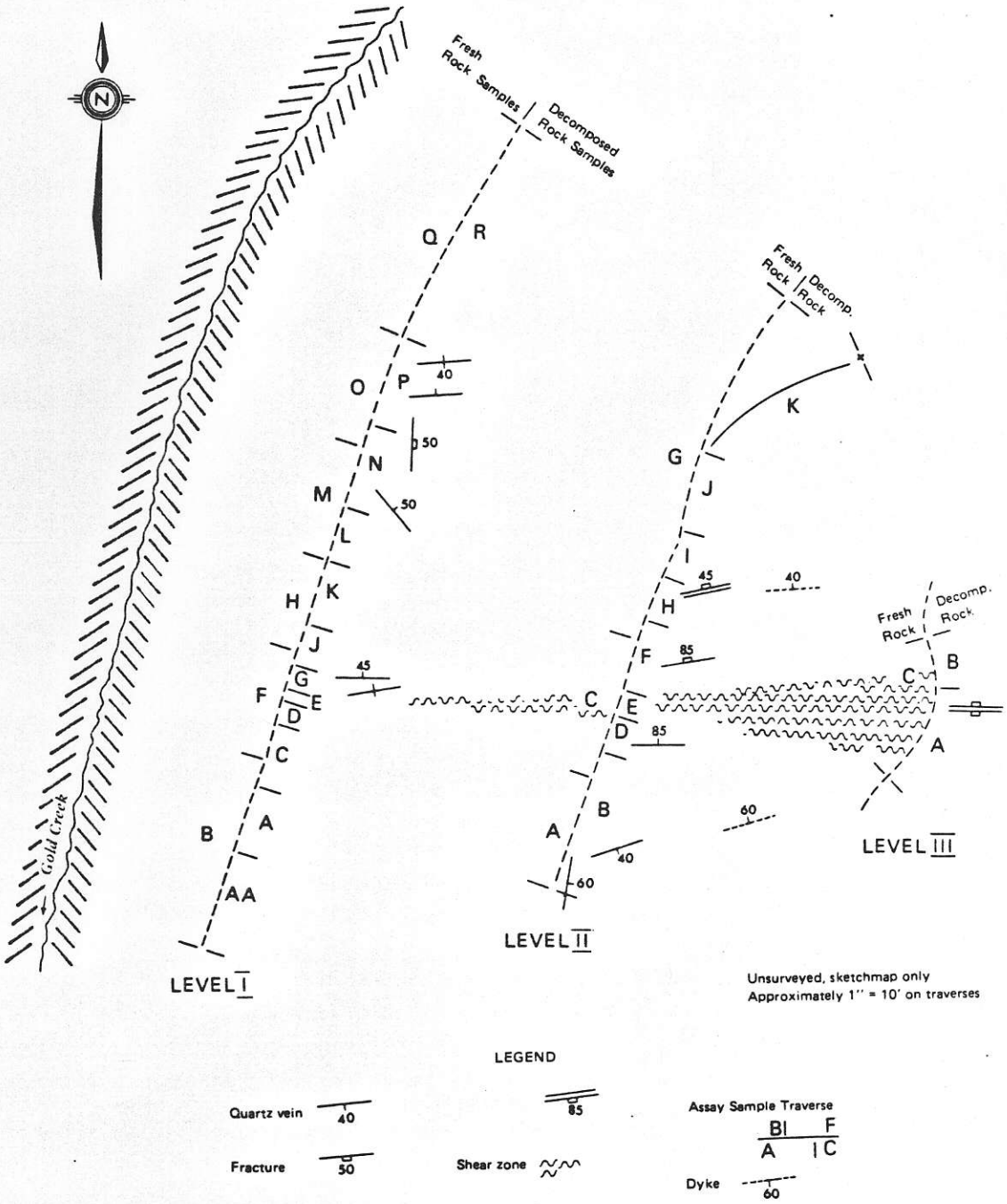


FIGURE 11. Geological sketchmap of Gold Creek roadside exposure, (see figure 10), two miles east of Likely; showing sampling levels and locations (unsurveyed).

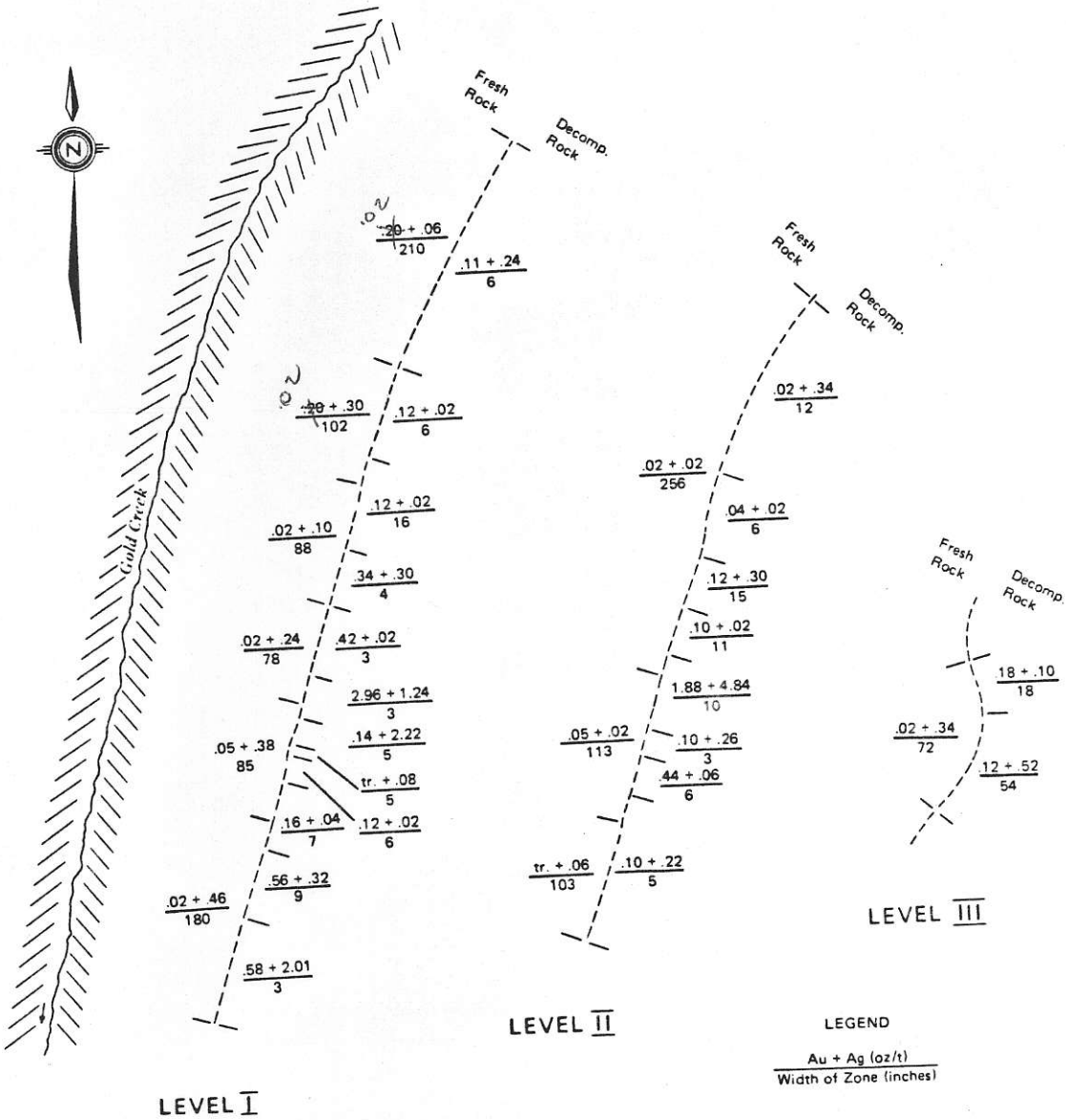


FIGURE 12. Assay plan of Gold Creek showings, (see figure 11).

TABLE 1: SAMPLE AND ASSAY KEY TO GOLD CREEK ROADSIDE SECTION, EASY MINERAL CLAIM 1 (See Figs. 10 and 11)

FRESH ROCK			DECOMPOSED ROCK				FIELD	ASSAYS (oz/t)		COMBINED	RATIO	
FOOTAGE	NUMBER	THICKNESS (inches)	FOOTAGE	NUMBER	THICKNESS (inches)		OBSERVATIONS	Au	Ag.	Au & Ag(oz/t)	Au/Ag	Au:Ag
LEVEL I (Tape measured)												
			0 - 8	10-3IAA	3	(3)*		.58	2.01	2.59	.29	1:3.5
			8 - 14	10-3IA	2+1+1+3+2	(9)		.56	.32	.88	1.75	1.8:1
0 - 16	10-3IB	180						.02	.46	.48	.043	1:23
			14 - 19	10-3IC	4+3	(7)		.16	.04	.20	4.0	4:1
			19 - 21	10-3ID	6	(6)		.12	.02	.14	6.0	6:1
			21 - 22	10-3IE	2+2+1	(5)	Q.Vns. N80E, 90	trace	.08	.08	-	-
			22 - 24	10-3IG	1+1+1+1+1	(5)	Q. Vn. N90, 45N	.14	2.22	2.36	.0-3	1:15.9
16 - 25	10-3IF	85						.05	.38	.43	.132	1:7.6
			24 - 27	10-3IJ	1+2	(3)		2.96	1.24	4.20	2.38	2.4:1
			27 - 32	10-3IK	3	(3)		.42	.02	.44	21.0	21:1
25 - 32	10-3IH	78						.02	.24	.26	.083	1:12
			32 - 36	10-3IL	2+2	(4)		.34	.30	.64	1.13	1.1:1
			36 - 43	10-3IN	10+6	(16)	Q.Vns. N40W,50E	.12	.02	.14	6.0	6:1
32 - 41	10-3IM	88					Fract. N0, 50E	.02	.10	.12	.20	1:5
			43 - 50	10-3IP	2+4	(6)	Q.Vns. N85E, 40N	.12	.02	.14	6.0	6:1
41 - 50	10-3IO	102					Q.Vns.N85E,90	.02	.30	.32	.067	1:15
			50 - 68	10-3IR	2+2+2	(6)		.11	.24	.35	.46	1:2.2
50 - 68	10-3IQ	210						.02	.06	.08	.33	1:3
LEVEL II (Tape measured)												
0 - 9	10-3IIA	103					Q.Vns.N10E,60E; N70E, 40S;	trace	.06	.06	-	-
			0- - 11	10-3IIB	1+2+2	(5)	**Blue Q.VNS. 3x12"x3"	.10	.22	.32	.45	1:2.2
			11 - 14	10-3IID	2+4	(6)	Q.Vns. N90, 85N	.44	.06	.50	7.3	7.3:1
			14 - 16	10-3IIE	1+3	(4)	Pronounced Gully	.10	.26	.36	.385	1:2.6
9 - 20	10-3IIC	113						.05	.02	.07	2.5	2.5:1
			16 - 21	10-3IIF	3+2+4+1	(10)	Strong shr.-vns. N80E, 85N	1.88	4.84	6.72	.39	1:2.6
			21 - 25	10-3IIH	3+4+1+3	(11)	Strong shr.-vns. N80E, 45N	.10	.02	.12	5.0	5:1
			25 - 29	10-3III	3+3+3+2+5	(15)		.12	.30	.42	.40	1:2.5
			29 - 35	10-3IIJ	2+4	(6)		.04	.02	.06	2.0	2:1
			35 - 45	10-3IIK	2+3+4+2+1	(12)	10ft. upslope from level II	.02	.34	.36	.059	1:17
20 - 45	10-3IIG	256						.02	.02	.04	1.0	1:1

TABLE 1: SAMPLE AND ASSAY KEY TO GOLD CREEK ROADSIDE SECTION, EASY MINERAL CLAIM 1 (See fig. 10 and 11) (con't)

FRESH ROCK			DECOMPOSED ROCK			FIELD	ASSAYS (oz/t)		COMBINED	RATIO	
FOOTAGE	NUMBER	THICKNESS (inches)	FOOTAGE	NUMBER	THICKNESS (inches)	OBSERVATIONS	Au	Ag.	Au &Ag(oz/t)	Au/Ag	Au:Ag
LEVEL III (Not tape measured)											
			0 - 6	10-3IIIA	75% (54)	10ft. wide gully to IIE	.12	.52	.64	.23	1:4.3
			6 - 12	10-3IIIB	25% (18)	Q.vns. N90, 90±	.18	.10	.28	1.8	1.8:1
0 - 12	10-3IIIC	72					.02	.34	.36	.059	1:17
* Composite thickness for sample (inches)											
** Blue quartz veins only							.02	.28	.30	.071	1:14
Composite sample of greenstone dykes						10 - 3Z	trace	.26	.26	-	-
Composite sample of volcanic breccia (talus accumulation)						10 - 3Y	.02	.30	.32	.067	1:15

The geochemical soil survey on Easy #1 (using Au, Ag, and As analyses identified two highly anomalous areas. One, on the lower section of Gold Creek on the east side of Poquette Creek, and a second just west on the opposite side of Poquette Creek. The fairly sharply defined anomalies point to the successful use of geochemical soil sampling in areas with little or no glacial cover.

The bedding of vulcanoclastic deposits was determined to strike northerly and to dip steeply (65 to 80 degrees) east. The main quartz vein structures strike easterly and dip vertically.

The orientation of the four diamond drill holes was designed to intersect both the volcanic stratification and the main quartz vein structures. Core recovery is not described systematically, and is referred to once in the core description, i.e., 70% recovery for a 38 m length in D.D.H. 79-1. No reference is made to the return drill sludge being either collected or analysed. But direct note was made of the highly shattered condition of the rocks, the mixture of hard and very soft rocks, and the frequent presence of gouge in all four drill holes.

The gold-silver assays on core samples are described as "disappointing" and led to the Easy property being dropped. The disappointing assays were attributed to the paucity of quartz veins.

Reinterpretation of the data from the diamond drilling program could view the results to be generally encouraging. The low proportion of core recovery is explained by: (a) the shattered condition of the rocks; and (b) the high proportion of gouge (i.e. hydrothermally decomposed rock).

Gold mineralization in the Likely district is closely associated with the hematitic decomposition material. In fact, D. D. H. 79-4, from 12.5 to 36 meters, is described as mostly "decomposed to dark brown material of earthy texture presumably due to appreciable disseminated pyrite." This intersection would appear to represent a 23.5 meter section of hydrothermal decomposition.

Gold-silver mineralization in the Likely district is found largely in hydrothermal decomposition zones, which may also contain other hydrothermal phenomena such as quartz veins, particularly where shear zones are involved. Although there may be some large-scale stratiform control to the gold-silver mineralization, the principal local control is the decomposition. Therefore, taking this fact into consideration, the orientation of exploratory diamond drill holes should be designed to probe for extentions of strong hydrothermal zones which have been proven at the surface.

8E. Spanish Mountain

The northern slope of this mountain has been the target of a great deal of exploration effort over a considerable number of years. The lower slopes have been logged out, leaving a network of logging roads that provide access to many of the mineral showings. Numerous bulldozer cuts, two adits, and probably several diamond drill holes, have formed part of that exploration effort. Much of the geology and mineral showing described below refer to ground in the Mariner II claim, presently under discussion and negotiation.

The regionally scaled Spanish Creek Fault is represented here by a zone of shears up to 0.2 mile (0.3 km) wide where it passes through the

lower northern slopes of Spanish Mountain (Fig. 13). This fault brings Lower Cambrian low-grade argillites on the north side against felsic flows with flow breccias of Middle Jurassic or Cretaceous age on the south side.

Rusted out pyrite and ankerite crystals are prominent as brown "spots" and vugs up to 0.2 inch across and locally make up to 20% of the well foliated argillite, having an average concentration of 5 to 15%. Numerous quartz veinlets characterize the argillite outcrops (e.g., Stop 9). Well-developed shear zones at several places along the lower slopes, below Stop 15, point to considerable fault disturbance of these folded rocks.

The flows are notably felsic, somewhat fragmental, with a streamlined flow breccia pattern and flow banding in a few places rather than being of an agglomeratic character.

Mineralization is limited to pyrite, ankerite, mariposite, vein quartz and calcite, minor galena and possibly malachite.

A 42 foot-long (14 m) channel sample (Aqarius sample 4-6, Appendix B) was taken across rusty, altered, shattered rock at Stop 15. Twenty feet higher up a bulldozed slope at Stop 15, a 6 foot-long (2 m) channel sample (Aquarius sample 4-7) was taken across a rusty shear zone striking north 20° west and dipping 85° east.

Massive, milky white vein quartz in shear zones over 50 feet (17 m) wide, strike N20 to 25° east and dip 75 to 80° west, appear to be barren of sulphides. This quartz vein-shear zone system, just west of Stop 16, has been exposed in a series of three parallel bulldozer cuts, and explored by 2 adits and at least one diamond drill hole.

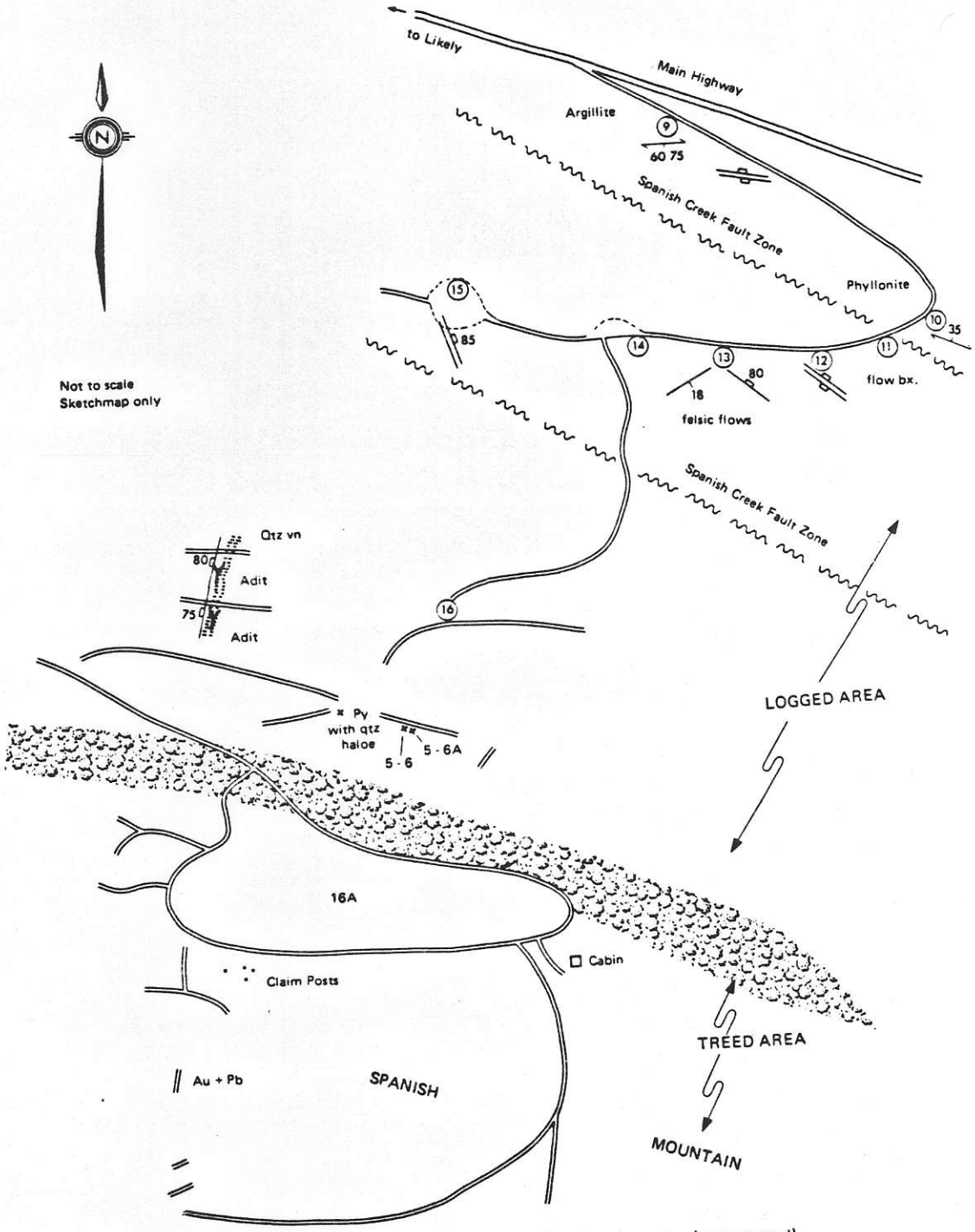


FIGURE 13. Sketchmap of showings on Spanish Mountain, assays by Aquarius (unsurveyed).

Southwest of Stop 16 an area of felsic flows contains rusty pyrite spots and vugs, but here there is also a well-developed halo of quartz 0.05 ± inch thick around the pyrite. It is reported (verbal communication) that visible specks of free gold have been seen with the aid of a hand lens in such pyrite vugs.

Southeast of Stop 16, a 4 foot-wide (1 m), steeply dipping decomposed sheared quartz-vein zone, within felsic volcanic flows, was sampled. Aquarius sample 5-6 is from 1 to 2 feet wide (1/3 - 2/3 m) sheared wallrock section, adjacent to 5-6A.

The upper slopes of Spanish Mountain, in the treed area, appear to be underlain by particularly felsic flows. It is reported (verbal communication) that galena and auriferous mineralization was uncovered in bulldozer cuts, south of the claim posts towards the top of Spanish Mountain.

A geological reconnaissance survey of the Peso Claims by A. L. Littlejohn (1977) yielded numerous anomalous gold values in rock and soil samples, many of them being taken in the proximity of known showings and workings. Littlejohn points to the association of gold with both short gash (tensional) quartz veins and massive quartz veins that parallel the major fault. Pyritization and carbonatization (ankerite/siderite) of the host rocks are widespread, and visible gold commonly occurs with pyrite. Littlejohn concludes that the best gold concentrations are in the short gash veins but that the latter are too far apart to be economic. His recommendations call for a geochemical soil sample survey with a view to both extending the areas of known auriferous quartz veins and in the search for potential replacement

gold deposits, for example, in the local phyllitic host rock.

Following the work of Littlejohn on the Peso claims, Cochrane (1979) reported on a geochemical soil sampling survey over a grid that covered part of the adjacent Peso B claims. Gold and lead were analysed in these soil samples and many highly anomalous gold and gold-lead areas were identified. The effect of downslope movement of the soils (colluvium) is evident in the contoured shapes of the geochemical anomalies (Fig. 5, Cochrane, 1979).

The high frequency, areal extents, and concentrations (90 ppb) of the gold anomalies warrant further exploration on the Peso, Peso B, Peso E, and the surrounding area, especially to the north. The Cochrane geochemical soil sample grid should be extended in virtually all directions, with priority to the north of Peso B, onto the adjacent Peso D claims. Basic geological mapping and a surficial deposits classification should accompany the soil sampling survey extension. Stripping, trenching and bedrock sampling should follow the delineation and priority rating of the geochemical anomalies.

The concentration of showings, the prominent shear zone and alteration associated with the Spanish Creek Fault, the wide quartz vein shear systems, the extensive geochemical anomalies, and pyrite-ankerite galena mineralization make the property of economic interest and worthy of continued exploration.

8F. Cedar Creek

A considerable number of mineral showings and assays are

available from over a length of two miles (3 km) in the Cedar Creek valley (Table 2) where significant placer production was achieved in the past (now largely inactive).

Placer production from the lower Cedar Creek section is stated to be in the order of several million dollars (verbal communication). A large placer operation (now abandoned) is evident in the form of a major trench at Stop 30 (Fig. 14). This trench is about 20 feet deep, 400-500 feet wide and of unknown length. Don McLeod is presently reworking the gravels in this trench. Bedrock exposed at the base of this trench is shattered, highly altered, and presumably forms part of unit 3 (Fig. 3).

The B.C. Minister of Mines Annual Report for 1922 and 1923 describes mineralization in the bedrock of the creek walls and refers to three red-stained zones. An adit was driven on one of these zones: the zone was 4 to 8 feet (1.3 to 2.6 m) wide and could be traced on surface for several hundred feet. The three mineralized shear zones range from 1 to 8 feet (0.2 to 2.6 m) wide, strike north 35° west and dip gently to the northeast. The sulphides consists of: pyrrhotite, pyrite, arsenopyrite, galena and chalcopyrite, with a gangue of calcite and chlorite.

Assays from the three mineralized zones are reported as shown in the following table:

	Au oz/t	Au oz/t
7 foot sample on main zone (from adit?)	0.40	0.12
5 foot sample on main zone (from adit?)	0.12	0.08
Selected sample	3.2	3.0
Grab sample from 2nd zone	Nil	Nil
Grab sample from 3rd zone	3.0	1.0

TABLE 2. ASSAYS FROM CEDAR CREEK (DATED AUGUST 29, 1979: SUPPLIED BY R. E. MICKLE AND S. MASON)

Sample No.	Sample Type	Gold		Silver	
		oz/ton	ppb	oz/ton	ppb
SM-1	Rock	0.052		0.50	
SM-2	Stream silt				1000
SM-3	Stream silt				1200
SM-4	Stream silt		20		900
SM-5	Stream silt				1000
SM-6	Stream silt				900
SM-7	Stream silt				800
SM-8	Stream silt				800
SM-9	Rock	trace		0.50	
SM-10	Rock	0.066		0.08	
SM-11	Rock	0.070		0.05	
SM-12	Rock	trace		trace	
SM-13	Stream silt		20		
SM-14	Soil		30		
SM-15	Soil		30		
SM-16	Soil		20		
SM-17	Soil		20		
SM-18	Soil		20		
SM-19	Soil		20		
SM-20	Rock	0.005		0.05	
SM-21	Soil		20		900
SM-22	Soil		20		900
SM-23	Rock	0.022		0.03	
SM-24	Rock	0.004		0.04	
SM-25	Rock	0.04		0.48	

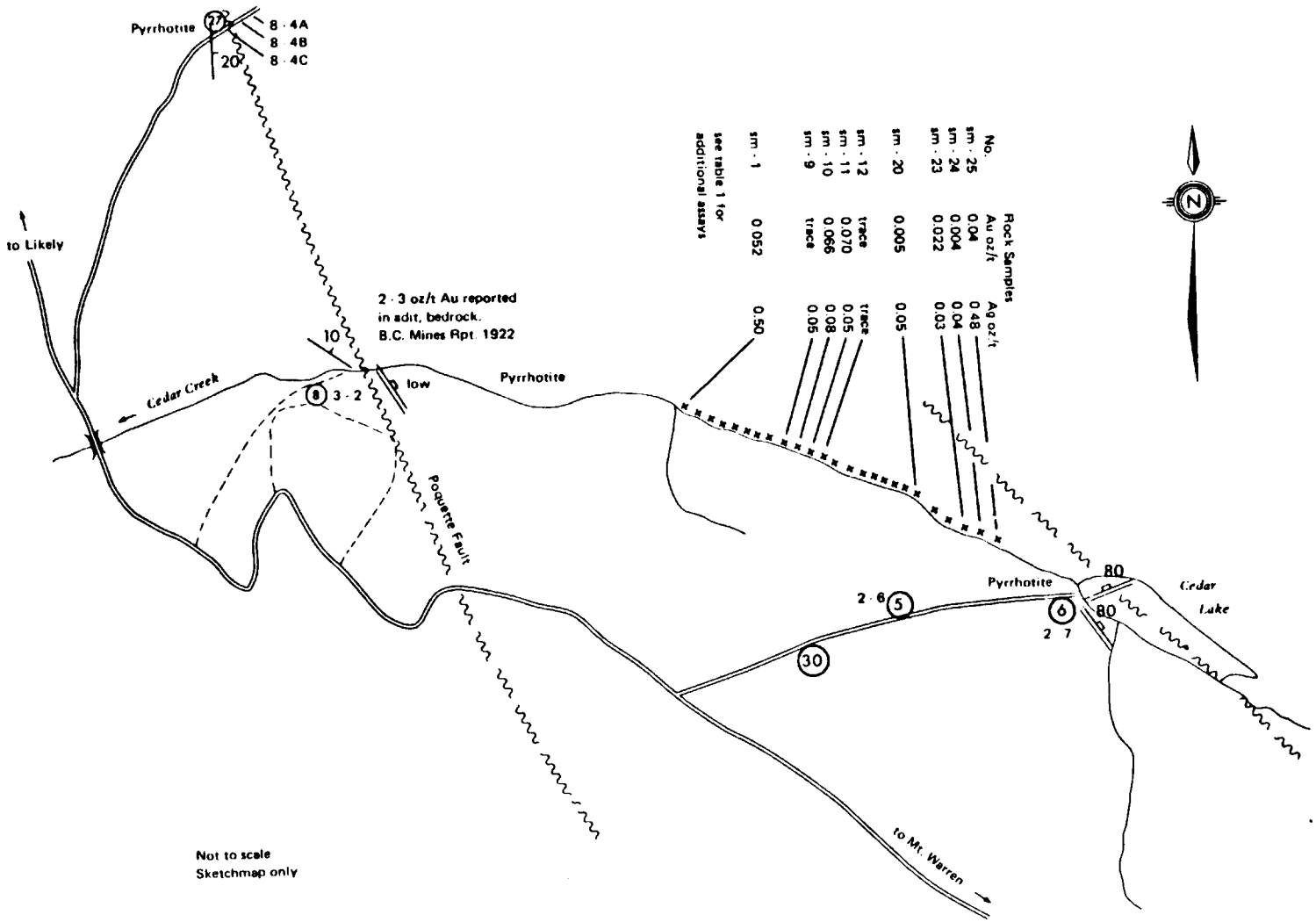


FIGURE 14. Sketchmap of showings in the vicinity of Cedar Creek. Compilation of pre-existing assays (supplied by R.E. Mickle) and assays by Aquarius, (unsurveyed).

Cedar Creek was not traversed in the present study so that the precise location of three mineralized shear zones is uncertain. However, it seems likely that the shears and their mineralization are related to the Poquette Fault. It should be noted that the newly observed mineral showings at Stop 27 were not apparent at the time of field examination; closer observation over a larger area may yield substantiating information.

It is noteworthy that the only three observations of pyrrhotite in the entire Likely district occur within a distance of 2.5 miles in the vicinity of Cedar Creek. Sparse structural data thus far leave an inconclusive explanation. The presence of pyrrhotite is either stratigraphically controlled on the limb of folded volcanic strata, or it was introduced along two separate shear fault zones. Arsenopyrite is also found in association with pyrrhotite at two of these three locations (Stop 27 and Cedar Creek).

Assays have been obtained by R. E. Mickle on a series of four samples at Stop 6, Cedar Lake. The samples from a scraped clearing that exposes an altered rock surface, were taken across a total lateral distance of 300 feet, and are listed from west to east (top to bottom) in the following table:

	Au ppm	Cu ppm
(West) CD25	0.14	<300
CD26	0.50	<300
CD27	0.07	<300
(East) CD28	0.50	<300

At sample site CD28 (Aquarius sample 2-7) a rusty, steeply

dipping shear zone contains a 6 inches ± (15 cm ±) wide zone of intense decomposition with notable amounts of pyrrhotite, all within a felsic flow host rock. The mineralization and rock alteration noted above indicates that the Cedar Creek area is worthy of further exploration. A detailed traverse along the creek valley should be made in the fall, when water levels are generally low.

9. ECONOMIC GEOLOGY

9A. Introduction

The abundance of gold in the crust of the Earth is about 5 parts per billion, and the Au:Ag ratio is about 0.1, i.e., there is ten times more silver than gold.

The average gold contents of some common rocks (Boyle 1979) is listed below:

ultrabasic	4 ppb
gabbro, basalt	7 ppb
diorite, andesite	5 ppb
granite, rhyolite	3 ppb
sandstone, conglomerate	30 ppb
shale	4 ppb
limestone	3 ppb

Some graphitic shales, sulphide schists, phosphorites, sandstones and conglomerates contain up to 2,100 ppb gold, or more.

The average gold content of soils is 5 ppb, of natural fresh waters is .03 ppb, of sea and ocean waters is .012 ppb. Plants and animals contain trace amounts, and some coals are enriched to 100 ppb.

In geochemical soil and stream silt analyses, levels of 20 ppb gold might be considered anomalous, and 50 + ppb gold certainly qualifies as an unusual concentration.

9B. Precious Metals Concentrations

The Likely, B.C., region has been historically, and is currently primarily regarded as a gold camp. However, inasmuch as values of both gold and silver have been reported in the range of economic concentrations, exploration in this region should clearly focus on the economic prospects of both of these metals.

9C. Bedrock Gold Deposits

The widespread anomalous gold and silver values in geochemical soil, rock, and stream silt samples, and in mineralized rock samples from the Likely district, suggest the potential for a large, low-grade deposit of gold and silver.

The regional geology (Fig. 2) shows that the sedimentary-vulcanogenic rocks of the Likely district rest in a Permian-Tertiary basin (possibly a graben) bordered by a Cambrian upland to the east on which flows have overlapped.

Minor anomalous mineralization has been found in phyllitic-argillites of the Cariboo Group (unit 1, Fig. 3), but by far the most important host rock for gold-silver mineralization has been the vulcanogenic and vulcanoclastic rocks of unit 3, of Middle Jurassic (?) to Cretaceous age.

Rocks of unit 2 (Upper Triassic to Lower Jurassic age) west of the Quesnel River and Quesnel Lake were not examined in this preliminary geological survey.

Cobble conglomerates and argillaceous limestone of unit 2A (Upper Triassic to Lower Jurassic) were mapped and spot sampled, but

anomalous gold-silver values were not discovered. These polymictic conglomerates represent the proximal phase of a sedimentary basin enclosed within the Takla vulcanogenic belt. Argillaceous limestone beds indicate deeper, quiet-water sedimentation in more distal regions of the basin.

Gold-silver mineralization in the Likely district have been found in:

(i) rusty, pyrite - and ankerite-bearing vulcanogenic rocks of Spanish Mountain, which extend northwesterly into the upper part of the Spanish Creek valley (e.g., Stop 26);

(ii) quartz veins that cut a variety of rocks, but are especially typical of the upper north slopes of Spanish Mountain; and

(iii) close association with decomposition zones that in turn are spatially related to fault-shear zones. This latter mode of occurrence is probably by far the most important and abundant form in which gold is found in the Likely region.

Rusty, pyritic and ankerite phyllites and vulcanogenic rocks can be found on both sides of the Spanish Creek Fault where it passes through the lower slopes of Spanish Mountain.

Assays of rock samples from the phyllites yielded trace amounts of gold and low values in silver (Table 7, 4-1, 4-3). Assays of rusty pyritiferous felsic flows from higher up the slope, (above Stop 16), are reported to have yielded good gold values, and in fact, some small specks of visible gold have been reported (Mickle) in the rusted-out vugs of pyrite cubes. In this latter locality the pyrite is characteristically enclosed in a halo of

quartz up to 0.1 inch thick. Similar quartz-haloed pyrite vugs were seen at Stop 26.

Short, narrow, gash quartz veins on the upper slopes of Spanish Mountain (just above Stop 16) are reported (Mickle) to carry gold values within the economic range. Massive, milky white quartz veins, just west of Stop 16, occupy shear zones up to 50 feet (17 m) wide. These veins were not sampled and their economic significance is not known at this time. However, from the brief field examination they appeared barren and, since they were not given any prominence in earlier reports, it is assumed that they largely lack mineralization.

Decomposition zone-related gold-silver mineralization is prevalent at Gold Creek (Stop 32) and is likewise related to gold-silver values obtained at Stops 2, 3, 6, 7, 15, 27 and 33.

Thin decomposition zones (1 to 4 inches wide) within otherwise fresh-looking outcrops (e.g., Gold Creek), are the specific sites at which the gold-silver mineralization is usually most concentrated. In wider decomposition zones (2 to 4 feet +) the higher concentrations seem to occur in the adjacent shattered wallrock. The wide decomposition zone of the Kangaroo Creek Fault (Stop 32A) carries only trace amounts of mineralization and the mineral potential of the wallrocks (argillaceous limestone) is unknown at this time. However, numerous assays of decomposition zones and the adjacent fresh rock at Gold Creek, proves the point.

Wherever the ochre-red color of hematite occurs, whether in intensely altered seams in bedrock or scattered in soils, it reliably accounts

for anomalously high values of gold and silver. This association has been repeatedly proven by Mr. R. E. Mickle in panning such materials and by explorationists in assaying samples (including Aquarius Resources Ltd.). The hematite-stained decomposition-alteration zones are an almost infallible guide to gold-silver mineralization in the Likely district. Whether or not the nature of the host rock is also a significant factor in this generalization remains to be seen, as exploration extends beyond the Likely area and involves rocks of lithologies and ages other than those of unit 3.

The hematite-stained decomposition zones are attributed to chemical alteration by hydrothermal solutions and vapors emanating from centres of igneous activity, be they volcanic, subvolcanic, or plutonic in origin.

It is suggested that hydrothermal solutions leached low (background) values of metals from volcanic materials lower in the volcanic pile. The ascending solutions continued to leach along permeable zones higher up, causing intense decomposition in the more permeable zones, and depositing quartz veins and gold-silver mineralization in the channelways and adjacent (shattered) wallrock.

Felsic flows have the required physical properties of strength and brittleness for fracturing, but there is some doubt that all the argillaceous limestone (unit 2A) possesses the necessary brittle property for fracturing. The alkaline nature of limestone may be critical as a chemical buffer in promoting precipitation of metals from acidic hydrothermal solutions.

The importance of the carbonate basin as a favorable chemical environment for the deposition of metals is uncertain. The basin is fairly well defined within the Likely area, and it remains for further exploration ultimately to show if the basin has any direct spatial relationship to the distribution of metalliferous mineralization.

The importance of major rift and fault-shear zones as controls for the mid- and long-range passage of hydrothermal solutions is apparent. Some major fault zones may pre-date the volcanism and have penetrated deeply enough to tap a magmatic source and thereby establish the loci for volcanic centres. Two, three, or four principal rifts connected to volcanically active major centres usually provide the sites for a series of secondary eruptive centres. Therefore, from a mineral exploration viewpoint, it becomes important to be able to not only identify the major volcanic centre, but also to determine any fundamental lineament (rift) to which they may be also connected.

Since hydrothermal solutions have been identified as the mineralizing agent, then it follows that we should determine the pattern of faults along which those solutions may have circulated, and the igneous (volcanic) centres from which those solutions must have originated. It is generally expected that hydrothermal alteration will be more intense closest to the sources of hydrothermal solutions and to those major rifts and faults which pass through the igneous centres.

Volcanic centres near Quesnel Forks and at Mount Warren are indicated from fieldwork, and both of these sites coincide with the intersection of two sets of regional faults, oriented northwesterly and northeasterly (Fig. 2).

Where the eruptive activity is sub-aerial, fumerolic vapors will be largely dispersed and lost to the atmosphere. By contrast, in sub-aqueous volcanism the fumerolic vapors, etc. (exhalatives) are trapped in the ocean waters and have an opportunity to contribute and interact with the surrounding sediments.

In the case of the Likely district, the presence of pillow lavas overflowing coarse agglomerates at the summit of Mount Warren, proves that this igneous complex was sub-aqueous. The existence of a carbonate sedimentary basin (unit 2A) adds the possibility for the deposition of metals. The presence of locallized bedded pyrite in the argillaceous limestones (unit 2A) near Lawless Creek could have resulted from the introduction of exhalatives from a nearby volcanic source. However, the source of hydrothermal solutions could be related to: volcanic exhalations, sub-volcanic or plutonic intrusions, or to all three at different times and stages in the evolution of an igneous complex.

Hydrothermal alteration in the shear zone of the Kangaroo Creek Fault (Stop 32A) could be due to either a volcanic centre situated near to Stop 4, or to exhalations from a sub-volcanic intrusion (Stop 32), exposed in the north bank of the Quesnel River. This porphyritic, felsic, shallow-level (?) intrusion, is highly fractured and hydrothermally altered. A grab sample from the altered intrusion was poorly mineralized (Table 8, 8-8, gold-trace, silver 0.18 oz/t). This intrusion and its contact should be prospected, representative samples obtained, and checked for high temperature mineralization, such as tungsten, tin and possibly rare earth metals.

Interpretation of aerial photographs to help delineate major fault structures could be a great help in isolating targets for detailed exploration. Aeromagnetic maps may also be an important aid in deciphering the underlying bedrock lithologies and their contacts in areas of extensive, but probably thin, glacial cover.

9D. Assays and Grade Calculations

Examination of the gold and silver assays on rock samples reveals some significant information and relationships especially in terms of the nature and distribution of mineralization relative to decomposition-shear zones.

1. Major, intensely decomposed zones, typically associated with faults and measuring from 4 to 8 feet wide, appear to be rather low or lack gold and silver mineralization; e.g. Kangaroo Creek Fault at Quesnel River and main shear zone at Gold Creek. Significant concentrations of gold and silver appear largely to accompany these decomposition zones in the adjacent wallrock, i.e., within five feet of the edge of the decomposition zone; e.g. Table 1, 10-3IID, E and F from the Gold Creek showings.

2. Narrow decomposition zones, in the order of 1 to 4 inches wide, generally appear to be well mineralized; e.g. the many examples from the Gold Creek showings (Table 1).

3. The gold-silver ratio varies widely over the region studied, from 21:1 to 1:23. This inconsistent gold:silver ratio suggests that gold and silver have been either deposited from different (independent) systems, or that they have different degrees of mobility under the prevailing geological

conditions (hydrothermal, metamorphic).

4. The suggested source of gold and silver mineralization, the local volcanic rocks, have a combined (Au + Ag) content of 0.04 to 0.48 oz/t.

5. The mineralized decomposed rock is always enriched in gold relative to the average crustal ratio of Au/Ag (1:10 or 0.1); i.e., it appears that gold has been preferentially mobilized (leached?) from the source rocks during mineralization. Therefore, the "missing" silver should be concentrated either in the source rocks or elsewhere in the hydrothermal system.

6. At Gold Creek, the fresh rock between visible decomposition zones, though largely lacking significant gold values (.02 to .04 oz/t) tends to show good concentrations of silver (e.g., .24 to .46 oz/t). Much of this fresh volcanic host rock, making up 86% by volume of the Gold Creek roadside section, may be ultimately classified as silver ore, if the silver values are recoverable.

7. Weighted average reduction of the assays in relation to the proportions of fresh rock and decomposed rock at each sampling level are shown in Table 3. The average dollar values per ton at the three sampling levels are shown to range from $25.42 to $34.79 with an average value for the whole section of $27.78 (assuming a 10% loss in recovery and processing, and gold at $450.00 per ounce, and silver at $20.00 per ounce, Canadian dollars).

9E. Placer Gold

The Likely region has a long history in placer gold mining; however, a complete literature search to verify the extents of exploration

TABLE 3 CALCULATIONS OF "EQUIVALENT CHANNEL SAMPLE" ASSAYS ALONG THREE SAMPLE LEVELS AND WEIGHTED AVERAGE OF GOLD AND SILVER VALUES AT GOLD CREEK

EQUIVALENT CHANNEL SAMPLE CALCULATIONS		Au oz/t	Ag oz/t	Avg.	Avg.
LEVELI	68 feet long, 18 paired assays;	.051	.262	0.057/57'	0.058/42'
LEVEL II	45 feet long, 11 paired assays;	.067	.135		
LEVEL III	12 feet long, 3 paired assays;	.069	.378		

Reduce by 10% for recovery and processing losses:

LEVEL I	.046	.236
LEVEL II	.060	.122
LEVEL III	.062	.340

Assume gold at $450.00/oz (Can,)

LEVEL I	$20.70	+	$4.72	=	$25.42 total
LEVEL II	$27.00	+	$2.44	=	$29.44 total
LEVEL III	$27.90	+	$6.80	=	$34.70 total

Weighted average value for Gold Creek Section

Combining all sample levels, assume gold at $450.00/oz. and silver at $20.00 oz. (Can.) Allow 10% reduction for recovery and processing losses. Overall average value of Gold Creek section = $27.78/ton.

and production has not been possible to this point.

Placer rights in B.C. allow exploration and production from loose, surficial materials situated above bedrock, and reference to 'placer gold production' does not necessarily refer to true placer deposits in the geological sense. Consequently, references to 'placer gold production' requires further information as to the correct geological interpretation, and origin of the deposits in each case.

In the Likely region distinction needs to be made between deposits whose origin may be alluvial, glacial, colluvial or eluvial (weathered in place bedrock).

There is considerable evidence in the Likely district of an active placer mining industry, both past and present. At Stop 30, a dragline trench some 20 feet deep, 400 to 500 feet wide, and of unknown length, has been inactive for some time. An old steam-powered shovel that moved on steel rail is presently rusting in the bush, a memorial to some grand scheme many tens of years ago. Millions of dollars of placer gold are reported to have been taken from the surficial deposits of the Cedar Creek Valley. The now abandoned Bullion Mine situated in the Quesnel River valley, operated for almost 50 years, up to 1941, as a major hydraulic placer gold producer.

At the present time several small operations are active. The Heaven Sent placer operation is situated on the south bank of the Cariboo River, just east of Stop 2. Don McLeod has a small operation reworking surficial materials in the area west of Stop 5. Another small operation (not visited) is situated just south of Stop 27. Prospector Stewart Mason uses

skin-diving equipment to recover fairly coarse-grained gold flakes from a river bed. A number of other placer miners are based in Likely and several other small placer operations are probably active in the area.

In six days of mapping, sampling and prospecting in the Likely district, not one speck of free gold was seen in bedrock. All gold values in the assays pertain to very fine-grained gold - too fine to be seen with the aid of a hand lens.

The gold recovered at the Bullion Mine operation is reported to have been coarse-grained, i.e., it was not far travelled. The gold being recovered by Stewart Mason is medium to coarse grained; probably it too is not far travelled. One question that should be answered relates to the type of mineralization that gave rise to this coarse placer gold. The bedrock showings and geology examined to date give no indication of any coarse gold having been locally formed. Has erosion effectively removed the evidence of the bedrock source, or is there still a more locally varied geologic terrain to be examined and understood? Perhaps there is a peculiar aspect of the geologic history not yet deciphered, such as glacially-transported gold brought in from an area outside of the Likely district?

The placer gold potential of this district cannot be ignored, in view of its long history and past profitable placer gold production. Figure 5 summarizes the placer claims coverage as far as recent claims maps allow. A terrain analysis by aerial photographs, a literature search for records of placer exploration and production, their geology and site of operation, and follow-up soil sampling with assays could help in better understanding the

pattern and economic successes of placer operations in the Likely district.

9F. Exploration Guidelines

Preliminary investigation of the geology and mineralization shows that a number of features could be of help in guiding exploration for gold-silver deposits in the Likely region.

Intense hydrothermal alteration is directly associated with the majority of gold-silver concentration observed in the field. Zones of decomposed rock range from a fraction of an inch (less than 2 cm) up to 6 or more feet (2 m) wide. The altered rock is typically thoroughly decomposed and has a strong, ochre-red (hematite) coloration. The red coloration is used by prospectors as an exploration guide for gold mineralization in the Likely district.

The decomposition and red coloration may be accompanied by thin (1-2 inches (2-5 cm) wide) quartz veins, and are usually found together in well-sheared fault zones. Concentrations of gold-silver can be expected in both the decomposition zones and the shattered wallrock; consequently, both types of sample should be taken as a routine procedure.

Since hydrothermal alteration is an important factor in the gold-silver mineralization near Likely both the fault systems and the locations of igneous complexes - intrusions and volcanic centres - become significant as controls for the sources and channelways in the movement of mineralizing solutions.

A detailed geological mapping program will determine the locations and nature of various igneous masses, of both intrusive and extrusive

origin. This mapping will also help to identify other factors that may have influenced the deposition of gold-silver mineralization. The presence of carbonate or tuffaceous exhalatives, or the proximity to carbonate sedimentary rocks may have been important geochemical factors in promoting mineralization.

The need for open fracture preparation of rock to enable the passage of mineralizing solutions is apparent, and detailed field mapping will be of great help in establishing fault and fracture systems. A geophoto study with emphasis on structural observations will be important both in determining the regional framework of faults, and in extrapolating between points of ground observations.

Aeromagnetic survey data may be of practical assistance in determining regional fault patterns and lithologic boundaries if there is sufficient contrast in magnetic susceptibility amongst the principal rock types. Glacial deposits vary in thickness within the study area. Aeromagnetic data could be of particular help where glacial deposits are extensive, i.e. in those areas where geophoto (bedrock) studies are rendered ineffective.

Where bedrock is unavailable, geochemical soil sampling could be tried over a large part of the Likely district. Only in areas of the thickest glacial cover (e.g., major valley bottoms) is soil geochemistry likely to yield results that are of little or no value. Fault decomposition zones and volcanic or intrusive complexes could be traced beneath a surficial cover by geochemical soil surveys.

A considerable amount of exploration by geochemical soil sampling

has taken place over extensive covered areas in the Likely district. It is felt that the value of this method of exploration could be increased, and the interpretation of results greatly enhanced, if an effort was made to discriminate between the several possible origins of the parent soil materials. The geological history of the district is complex, and parent materials for soils may result from combinations of: glacial deposits (moraine, outwash, fluvial or lacustrine), colluvial, alluvial or eluvial (bedrock weathered in place).

9G. Exploration Targets

From the existing, preliminary state of knowledge of the field geology, the following local areas are selected for further exploration:

(a) Lawless Creek-Quesnel Forks-Kangaroo Creek

This area includes a variety of features that in concept at least present an ideal exploration target: host rocks include the favorable volcanic unit 3, the older volcanic unit 2, and the argillaceous carbonate unit 2A. These lithologies are brought together in fault contact by two regional fault systems that intersect at the Quesnel River. One nearby volcanic centre is indicated by coarse agglomerates at Stop 4 and a second intrusive (subvolcanic?) igneous complex is located at Stop 32, close to the fault intersection. A 6 foot (2 meter) wide hydrothermal decomposition zone is associated with the Kangaroo Creek Fault and the Stop 32 (syenitic?) intrusion is hydrothermally altered and highly fractured. Gold-silver mineralization has been indicated (and scheelite reported) at Stops 2 and 3, towards the northern end of the Kangaroo Creek Fault, at the Cariboo River. Additional decomposition and mineralization has been reported along the

Kangaroo Creek Fault north of the Cariboo River. Exploration should focus on the surface trace of the Kangaroo Creek Fault, within the study area, farther north across the Cariboo River into Kangaroo Creek, and southwest across the Quesnel River. The nature of the Bullion Mine syenite is unknown at this time (not visited); it might be another subvolcanic intrusion.

(b) Gold Creek

Detailed sampling of the best exposed rock section reveals the presence of ore-grade gold-silver mineralization. This mineralization occurs at the intersection of the Poquette Fault and a highly decomposed, steeply dipping, shear zone up to 10 feet (3 meters) wide, oriented easterly to southwesterly along Gold Creek. A dioritic intrusion has been mapped by Silver Standard Mines just west of the main mineral showings. The east-southeast and west-northwest extensions of the Gold Creek decomposition-shear zone should be thoroughly prospected. To the east, this shear structure extends towards Hepburn Lake and may intersect the important Spanish Creek Fault near to Stop 26, representing some 2.5 miles (4 kms) of highly prospective ground.

(c) Poquette Lake-Likely Gulch

The geological circumstances described above at Gold Creek appear to be repeated towards the north end of Poquette Lake. This location was not examined during the fieldtrip but has a similar geological setting to that at Gold Creek, almost two miles (3 kms) to the south, and should receive at least a preliminary examination and sampling.

Similar circumstances prevail at Likely Gulch, where a pro-

bable east-west structure is intersected by the Poquette Fault. Prospecting is justified at this site and, in fact, along the entire strike trace of the Poquette Fault.

(d) Cedar Creek

The area from Cedar Lake to Stop 27, and even farther north to the hornblende granitoid, a distance of some 4 miles (6 km), should constitute highly prospective ground. The area is well faulted, is underlain by the same favorable formation found at Gold Creek, and gold-silver mineralization is accompanied in part by indicator minerals arsenopyrite and pyrrhotite.

A northwest extension of the Cedar Creek Fault intersects the Poquette Fault in the vicinity of Stop 27, where two intrusions have been previously noted. The edge of the carbonate basin lies just west of the Poquette Fault (Silver Standard Mines mapping) and is probably bounded by this structure. Note that the hornblende granitoid body is shown as cutting the carbonate rocks, possibly also rocks of unit 3, and itself is probably involved in two fault zones.

At Stop 27, decomposition seams were found over 600 feet (180 m) in a fresh road cut, along with pyrrhotite. One mile (1.6 m) to the south, in the Cedar Creek Canyon, the best gold assays of the district have been reported at 2 to 3 ozs. per ton. Again, pyrrhotite was reported. Therefore, the trace of the Poquette Fault should be prospected for 2 miles (3 kms) or more in the area described above. Cedar Creek should be traversed and prospected. The Cedar Creek Fault should be thoroughly prospected between

the hornblende granitoid and Cedar Lake, and the area between Cedar Creek and Poquette Fault should be prospected and crossed by several geochemical traverses on an east-west alignment.

(e) Spanish Mountain

Although the recent brief visit to Spanish Mountain failed to produce any new substantial gold-silver assays or to add new geological observations to the explorations already carried out, the reports of mineral showings, geochemical survey anomalies, and known geological factors make this area a target for further investigation.

9H. Mineralization Model

The vulcanogenic rocks of unit 3 are a source of anomalous high background level gold-silver concentrations. The vulcanogenic activity giving rise to these rocks was subaqueous in large part, if not entirely. The area was tectonically active at the time of vulcanism. Shaley limestones accumulated in deeper basins, whereas more proximal zones relative to the Cambrian landmass to the east are characterized by polymictic conglomerate.

This vulcanoclastic environment would be ideal for the formation of the favorable tuffaceous sediments, carbonate-exhalatives, etc. in the vicinity of volcanic centres. Whether or not the anomalously high gold-silver background values were established initially at the time of lava extrusion, or whether they were subsequently added as a consequence of permeating hydrothermal solutions during a later phase of igneous activity, is difficult to determine.

It is assumed that late-stage hydrothermal activity leached,

remobilized, and reconcentrated gold-silver mineralization from the volcanic rocks into hydrothermally altered, active shear zones. Carbonate-rich waters may have played an important role as a buffer in relation to hydrothermal solutions, thereby promoting the mineralization process.

Post-vulcanogenic, low-grade metamorphism is evident in the Spanish Mountain area in the formation of argillites and phyllites. This metamorphism also probably resulted in the formation of pyrite and ankerite porphyroblasts on the northern slopes of Spanish Mountain. Specks and thin films of native gold are reported to be directly associated with (cutting through and within) typically rusty pyrite cubes. Insofar as the pyrite crystals are of metamorphic origin, then the occurrence of native gold in the pyrite can also be attributed to metamorphic processes of remobilization, migration and reconcentration as secretion-type growths.

Thus, the gold-silver mineralization on Spanish Mountain appears to be of two origins; one, the hydrothermal transport and deposition of metals in decomposed, quartz-veined shear zones; and two, the low-grade metamorphic recrystallization accompanied by the formation of auriferous pyrite porphyroblasts.

10. CONCLUSIONS

Field observations combined with assay results from Loring Laboratories Ltd., have led to conclusions that have been largely stated throughout the body of this report. The main points are restated briefly below:

(1) Gold-silver background levels for the Likely district are generally

anomalously high, especially for the widespread volcanic rock suite of unit 3.

(2) Hydrothermal solutions are believed to have leached much of their gold-silver content from the lower parts of a volcanoclastic pile of subaqueous origin. These metals were moved higher up in the pile and concentrated in hydrothermally decomposed shear zones and adjacent dilatant fractures. Mineralization consists of gold-silver (not megascopically visible), minor galena, chalcopyrite, sphalerite, arsenopyrite, pyrrhotite and pyrite, commonly in a quartz vein association.

(3) The movement of mineralizing hydrothermal solutions is strongly influenced by pre-existing shear zones, so that decomposed fault structures are a key factor to guiding exploration. Proximity to volcanic centres, (e.g. as indicated by coarse agglomerates) may also serve as a useful exploration guide to sources of hydrothermal solutions.

(4) It is uncertain whether or not a carbonate host environment has been instrumental in aiding the mineralization process. A large sedimentary carbonate basin is present in the Likely district and it may have been an important chemical component in the mineralization systems.

(5) The source of hydrothermal solutions may have been derived either solely from subaqueous volcanic eruptions, or possibly in part from a number of subvolcanic, presumably shallow-level, intrusions.

(6) The wide distribution of low-grade, gold-silver mineralization suggests the possibility for the presence of a high tonnage, low-grade, open-pit operation in the Likely district. For example, the estimated grade of the Gold Creek roadside section has been calculated to be .0585 oz/ton Au;

.277 oz/ton Ag; for an average of $30.87/ton (Au @ $450.00 (Can.) and Ag @ $20.00 (Can.)). The numerous faults of considerable strike length and the wide extents of hydrothermal alteration and gold-silver mineralization in the study area, provide a number of very good targets for further exploration.

(7) Although the emphasis throughout this study has been directed towards evaluation of bedrock mineral showings, the Likely district has a long history of placer gold production. Potential for further discovery and production of placer gold in the area is apparent and consideration should be given to this aspect as exploration programs are formulated. Suitable targets should be defined by combining a review of the literature, geochemical surveys, and the geophoto study.

11. RECOMMENDATIONS

(1) Prior to the next phase of field exploration all relevant documented technical information should be acquired and assessed; such information includes:

(a) reference to exploration, production, geology and geography of mining activities (placer and bedrock) in the Likely district, with particular note being made of information in the same Takla Group rocks (Quesnel Belt, Tipper et al, 1979) outside of the Likely district, as reported in the B.C. Minister of Mines Annual Reports;

(b) assessment reports and other mining company reports as may be available from mining organizations who have been active in the Likely district from time to time.

(2) A geophoto study should be carried out in sufficient detail to establish the framework of the regional fault structures and to provide continuity to structures observed on the ground. The geophoto study should also yield a map and classification of surficial deposits with particular reference to glacial deposits and the paths of glacial ice movements. The glacial data will help in the design of geochemical seil sampling surveys and in the interpretation of geochemical survey results.

(3) Government aeromagnetic surveys should be studied for extrapolation of fault structures and lithological boundaries in terrain covered by surficial deposits.

(4) The geological mapping and prospecting undertaken in the Likely district during the 6-day field trip was of a reconnaissance nature, and though very helpful it constitutes an incomplete geological base on which to plan a comprehensive exploration program. The details and direction of an exploration program designed for the Likely district would be greatly strengthened if during the early part of the next field season the many gaps in the reconnaissance geological mapping could be filled, and the area extended.

(5) Exploration targets in the Likely district should be given a priority rating based on the technical information presently on hand combined with additional information derived from the above recommendations. Specific local areas designated for follow-up exploration have already been described earlier in this report. Priorities based solely on information given in this report would suggest an exploration ranking at two levels.

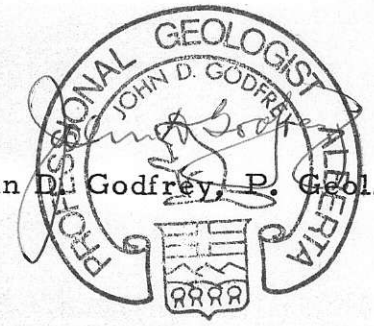
First Level:

- Gold Creek and east to Hepburn Lake;
- Cedar Creek, Cedar Creek Fault and Stop 27 area;
- Spanish Mountain, north slope;
- Kangaroo Creek Fault, including the north and south extensions beyond the Cariboo River and Quesnel River.

Second Level:

- Poquette Lake and Likely Gulch.

Respectfully submitted



John D. Godfrey, P. Geol.

12. BUDGET ESTIMATES

A. The Likely District

Reconnaissance fieldwork (mapping, sampling, assays)		$ 10,200.00
Base map preparation		1,500.00
Air photos, interpretation, preparation of map report		10,250.00
Literature search, review, outside consultation		1,600.00
Purchase technical maps, reports		750.00
Personnel, field crew:		
Senior geologist	33 days	9,900.00
Project geologist	51 days	7,750.00
Field assistant	84 days	4,200.00
Field assistant	84 days	4,200.00
Field assistant	92 days	4,600.00
Field assistant	92 days	4,600.00
Field manager	92 days	13,800.00
Prospector	24 days	2,400.00
Trenching contract	20 days	6,000.00
Drilling contract	2,000 feet	50,000.00
Assays		18,900.00
Preparation report, maps		9,000.00
Air travel		4,000.00
Subsistence		15,800.00
Vehicle rentals, gas, oil, maintenance		6,150.00
Administration, office management		13,000.00
Contingency		11,400.00
	sub-total	$ 210,000.00

B. The Likely Regional Belt

Base maps preparations		$ 1,500.00
Air photos, interpretation, preparation of map and report		4,250.00
Literature search, review, outside consultation		1,600.00
Personnel, field crew:		
Senior geologist	5 days	1,500.00
Project geologist	22 days	3,300.00
Field assistant	22 days	1,100.00
Field assistant	22 days	1,100.00
Prospector	20 days	2,000.00
Assays		4,400.00
Preparation report, maps		3,000.00
Subsistence		2,275.00
Vehicle rentals, gas, oil		850.00
Administration		2,600.00
Contingency		3,000.00
	sub-total	$ 32,475.00

project total, $242,475.00

13. REFERENCES

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B.C. Minister of Mines, (1936): Annual Report for 1935; pp. C16-19.

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Boyle, R. W., (1979): The geochemistry of gold and its deposits; Geol. Surv. Can., Bull. 280, 584 pages.

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Cochrane, D. R., (1979): Geochemical assessment report on the Likely Group (Peso, Peso B and Peso E mineral claims), located 8 km southeast of Likely, B.C., Cariboo Mining Division; 14 pages.

Littlejohn, A. L., (1977): Report on the Peso Claims (Likely Group; Peso, Peso B and Peso E claims) near Likely, B.C., Cariboo Mining Division; 19 pages.

Tipper, H. W., Campbell, R. B., Taylor, G. C. and D. F. Stott, (1979): Parsnip River, British Columbia; Geol. Surv. Can., Map 1424A, scale 1:1,000,000.

14. CERTIFICATE OF DECLARATION

I, JOHN DERRICK GODFREY OF THE MUNICIPALITY OF EDMONTON, ALBERTA, DO HEREBY CERTIFY THAT:

1. I am a professional geologist, residing at 8208 - 139 Street, Edmonton, Alberta, T5R 0G4.

2. I am a graduate of the University of Nottingham (1950) into a Bachelor of Science (B. Sc.) degree in the combined subjects of Geology and Physics; and a graduate of the University of Chicago with a master of Science (M. S.) in Geology (1955) and a doctor of philosophy (Ph. D.) degree in Geology, (1962).

3. I have practised my profession continuously since graduation while being employed by such agencies as The University of Alberta, Research Council of Alberta, and The Canadian International Development Agency. I have undertaken numerous independent projects during the past thirty (30) years.

4. I have no interest, either direct or indirect, in the properties or securities of Aquarius Resources Ltd., or Carolin Mines Ltd., nor do I expect to acquire any such interest.

5. I am a member in good standing of the Association of Professional Engineers, Geologists and Geophysicists of Alberta, Association of Engineering Geologists, Edmonton Geological Society, and a fellow of the Geological Association of Canada. Application is in progress for membership to The Association of Professional Engineers of British Columbia.

PROFESSIONAL GEOLOGIST
JOHN D. GODFREY

JOHN D. GODFREY, P. GEOL.

March 27, 1980
EDMONTON, Alberta

APPENDIX A

TABLE 4: LORING LABORATORIES LTD. ASSAY CERTIFICATES OF AQUARIUS RESOURCES LTD. SAMPLES

To: AQUARIUS RESOURCES LIMITED
8208-139 Street
Edmonton, Alberta
T5R 0G4

ATTN: John D. Godfrey
cc: Warren Geiger

File No. 18292
Date November 29, 1979
Samples Chip & Soil

Certificate of ASSAY

LORING LABORATORIES LTD.

Page # 1

SAMPLE No.	OZ./TON GOLD	OZ./TON SILVER	% Cu	% Zn
CHIP & SOIL SAMPLES				
JG-2-1	Trace	.12	-	.01
JG-2-1A	Trace	.34	-	-
JG-2-2	Trace	.04	-	.21
JG-2-3	Trace	.44	-	.02
JG-2-4A	.020	.02	.01	-
JG-2-6	Trace	.02	.04	-
JG-2-7	Trace	.02	-	-
JG-3-1	.020	.36	-	-
JG-3-2	Trace	.10	-	-
JG-4-1	Trace	.02	-	-
JG-4-3	Trace	.34	-	-
JG-4-5	Trace	.06	-	-
JG-4-6	.010	.20	-	-
JG-4-7	.040	.02	-	-
JG-5-4	.030	.14	-	-
JG-5-6	.180	.50	-	-
JG-5-6A	Trace	.02	-	-
JG-6-5	Trace	.02	-	-
JG-7-2	Trace	.02	-	-

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: AQUARIUS RESOURCES LIMITED
8208-139 Street
Edmonton, Alberta
T5R 0G4
ATTN: John D. Godfrey
cc: Warren Geiger

File No. 18292
Date November 29, 1979
Samples Chip & Soil

Certificate of ASSAY

LORING LABORATORIES LTD.

Page # 2

SAMPLE No.	OZ./TON GOLD	OZ./TON SILVER	% Cu	% WO3
JG-7-4	Trace	.20	-	-
JG-8-1B	Trace	.30	-	-
JG-8-3	Trace	.14	-	-
JG-8-4A	Trace	.38	-	-
JG-8-4B1	.010	.06	-	-
JG-8-4B2	Trace	.60	-	-
JG-8-4B3	Trace	.40	-	-
JG-8-4B4	Trace	.06	-	-
JG-8-4C	Trace	.02	-	-
JG-8-6A	Trace	.06	-	-
JG-8-6Ba	Trace	.02	-	-
JG-8-6Bb	Trace	.04	-	-
JG-8-7	Trace	.02	.01	-
JG-8-8	Trace	.18	-	Trace
JG-10-1A	**	**	-	-
JG-10-1B	**	**	-	-
JG-10-1C	**	**	-	-
JG-10-1D	**	**	-	-
JG-10-2	Trace	.30	-	-
JG-10-3IAA	.580	2.01	-	-
JG-10-3IA	.560	.32	-	-
(**)=Missing	I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES			

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

C. L. McLean
Licensed Assayer of British Columbia

To: AQUARIUS RESOURCES LIMITED
8208-139 Street
Edmonton, Alberta
T5R 0G4
ATTN: John D. Godfrey
cc: Warren Geiger

File No. 18292
Date November 29, 1979
Samples Chip & Soil

Certificate of ASSAY

LORING LABORATORIES LTD.

Page # 3

SAMPLE No.	OZ./TON GOLD	OZ./TON SILVER
JG-10-3IB	.020	.46
JG-10-3IC	.160	.04
JG-10-3ID	.120	.02
JG-10-3IE	Trace	.08
JG-10-3IF	.050	.38
JG-10-3IG	.140	2.22
JG-10-3IH	.020	.24
JG-10-3IJ	2.960	1.24
JG-10-3IK	.420	.02
JG-10-3IL	.340	.30
JG-10-3IM	.020	.10
JG-10-3IN	.120	.02
JG-10-3IO	.020	.30
JG-10-3IP	.120	.02
JG-10-3IQ	.020	.06
JG-10-3IR	.110	.24
JG-10-3IIA	Trace	.06
JG-10-3IIB	.100	.22
JG-10-3IIC	.050	.02
JG-10-3IID	.440	.06
JG-10-3IIE	.100	.26

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: AQUARIUS RESOURCES LIMITED
8208-139 Street
Edmonton, Alberta
T5R 0G4
ATTN: John D. Godfrey
cc: Warren Geiger

File No. 18292
Date November 29, 1979
Samples Chip & Soil

Certificate of ASSAY

LORING LABORATORIES LTD.

Page # 4

SAMPLE No.	OZ./TON GOLD	OZ./TON SILVER	% Cu	% Pb	% Zn	% WO3
JG-10-3IIF	1.880	4.84	-	-	-	-
JG-10-3IIG	.020	.02	-	-	-	-
JG-10-3IIH	.100	.02	-	-	-	-
JG-10-3III	.120	.30	-	-	-	-
JG-10-3IIJ	.040	.02	-	-	-	-
JG-10-3IIK	.020	.34	-	-	-	-
JG-10-3IIIA	.120	.52	-	-	-	-
JG-10-3IIIB	.180	.10	-	-	-	-
JG-10-3IIIC	.020	.34	-	-	-	-
JG-10-3Y	.020	.30	-	-	-	-
JG-10-3Z	Trace	.26	-	-	-	-
BLUE QUARTZ 10-3C 211	.020	.28	-	-	-	-
O RIVER FAULT A	Trace	.02	.01	Trace	.01	Trace
O RIVER FAULT B	Trace	.02	.02	Trace	.04	Trace
O RIVER FAULT C	Trace	.02	.01	Trace	.02	Trace
O RIVER FAULT D	Trace	.02	.01	Trace	.02	Trace

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: AQUARIUS RESOURCES LIMITED,
8208 - 139th Street,
Edmonton, Alberta T5R 0G4
ATTN: John D. Godfrey
cc: Warren Geiger

File No. 18517
Date January 21, 1980
Samples Chip & Soil
Old File # 18292

Certificate of ASSAY
LORING LABORATORIES LTD.

SAMPLE No.	% Te
"Chip & Soil"	
JG 79 10-31 AA	-0.01
JG 79 10-31 B	-0.01

(-) = Less Than

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: AQUARIUS RESOURCES LIMITED,
11450 - 124th Street,
Edmonton, Alberta
ATTN: Warren Geiger
cc: J. Godfrey

File No. 18294
Date November 29, 1979
Samples Soil

Certificate of ASSAY
LORING LABORATORIES LTD.

SAMPLE No.	OZ./TON GOLD	OZ./TON SILVER	PPM Cu
"Soil Samples"			
JG-79-6-9A	Trace	.10	31
JG-79-6-9B	Trace	.02	32
JG-79-6-9C	Trace	.30	37
JG-79-6-9D	Trace	.02	35
JG-79-6-9E	Trace	.32	39
JG-79-9-1A	Trace	.02	295
JG-79-9-1B	Trace	.50	41
JG-79-9-1C	Trace	.02	102
JG-79-9-1D	Trace	.02	152

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month
specific arrangements
made in advance.

A. T. McIsaac
Licensed Assayer of British Columbia

APPENDIX B

TABLE 5: LIST OF AQUARIUS RESOURCES LTD. SAMPLES, ASSAYS, AND ASSAYS OF OTHER ORIGIN

TABLE 7: LIST OF AQUARIUS RESOURCES LTD. SAMPLES, ASSAYS AND ASSAYS OF OTHER ORIGIN

FIELD STOP	SAMPLE NUMBER	SAMPLE DESCRIPTION	AQUARIUS ASSAYS				OTHER ASSAYS	
			Au oz/t	Ag oz/t	Cu	Miscell.	Au	Miscell.
		Gold Creek Roadside Section						
1	JG-79-1-1	Grab bag of rock chips representing the range of lithologies						
		South of Kangaroo Creek at Cariboo River						
2	2-1	Grab bag, chips and alteration zone: tuffaceous volcanoclastics (?) galena and tetrahedrite (?)	tr.	.12				
2	2-1A	Chips, tuffaceous volcanoclastic: pyrite, HCl positive	tr.	.34				
2	2-2	Chips, tuffaceous volcanoclastic with quartz & calcite veins, brecc, sphalerite, tetrahedrite (?), pyrolusite (?)	tr.	.04			.04 oz/t	
3	2-3	Decomposed rock chips: volcanogenic: 10 sample points over 60 feet	tr.	.44				
		LK Group						
4	2-4	Volcanic rocks; agglomerate, hornblende porphyry, minor felsic flows						
4	2-4A	Pit; fractured, rusty-decomposed volcanic rocks; pyrite, chalcopyrite	.02	.02				
4	2-5	Pit; rusty decomposed agglomerate, chalcopyrite						
		Cedar Creek and Cedar Lake Vicinity						
5	2-6	Creek, McLeod operation; chips, felsic flow, pit, abundant pyrite	tr.	.02				
6	2-7	Lake; cleared area; decomposed rusty sheared rock, pyrrhotite, corresponds to Mickle sample CD 28	tr.	.02			>.50 ppm	Cu >300 ppm
6	2-8	Lake; cleared area; decomposed rusty volcanic rock (Missing) corresponds to Mickle sample CD 25					.14 ppm	Cu >300 ppm
7	3-1	Cleared area; decomposed-oxidised zones in volcanics with agglomerates	.02	.36			.02 oz/t	Ag .22 oz/t
8	3-2	Creek, roadside section; shattered volcanics with red alteration zones	tr.	.10			.026 oz/t	

TABLE 7: LIST OF AQUARIUS RESOURCES LTD. SAMPLES, ASSAYS, AND ASSAYS OF OTHER ORIGIN (CONTINUED)

FIELD STOP	SAMPLE NUMBER	SAMPLE DESCRIPTION	AQUARIUS ASSAYS Au oz/t	AQUARIUS ASSAYS AG oz/t	AQUARIUS ASSAYS Cu	AQUARIUS ASSAYS Miscell	OTHER ASSAYS Au	OTHER ASSAYS Miscell.
		Spanish Mountain						
9	JG-79-4-1	Roadside; chip, meta volcanogenic; abundant pyrite, ankerite	tr.	.02				
10	4-2	Roadside; chip, oxidised phyllite, pyrite						
11	4-3	Roadside; chip, volcanogenic, flow breccia, pyrite, ankerite, mariposite	tr.	.34				
12	4-4	Roadside; chip, rusty volcanogenic, ankerite, mariposite						
13	4-5	Roadside; chip, felsic flow breccia, ankerite, mariposite	tr.	.06				
15	4-6	Roadside clearing; 42 foot channel sample, rusty sheared phyllonite, volcanogenic (?); pyrite, ankerite	.01	.20				
15	4-7	Roadside clearing; 20 ft. above road; representative chip sample across 6 foot wide rusty, steep shear zone	.04	.02				
15	4-8	Roadside clearing; aggregate of selected quartz veins with galena						
16	5-1	Grab bag of mixed volcanogenic lithologies from middle slopes						
16A	5-2	Grab bag of mixed lithologies from loop road, upper slopes (fig. 12)						
16	5-3	Felsic flow with 20-30% (pyrite & ankerite)						
16	5-4	Flow with pyrite and quartz rim	.03	.14				
16	5-5	Flow rock with pyrite and quartz rim						
16	5-6	Shattered wallrock (1-2 feet wide) adjacent to decomposed shear zone represented in sample 5-6A	.18	.50				
16	5-6A	Decomposed shear zone (2 feet wide)	tr.	.02				
16	5-6B	Selected vein quartz with weathered pyrite						
		Likely Settlement Vicinity						
17	6-1	School; recrystallized grey limestone, minor interbedded shale						
17	6-2	School 1800 ft. east, roadside; sediment from east side fault						
17	6-3	School 1800 ft. east, roadside; limestone from west side fault						

TABLE 7: LIST OF AQUARIUS RESOURCES LTD. SAMPLES, ASSAYS AND ASSAYS OF OTHER ORIGIN (CONTINUED)

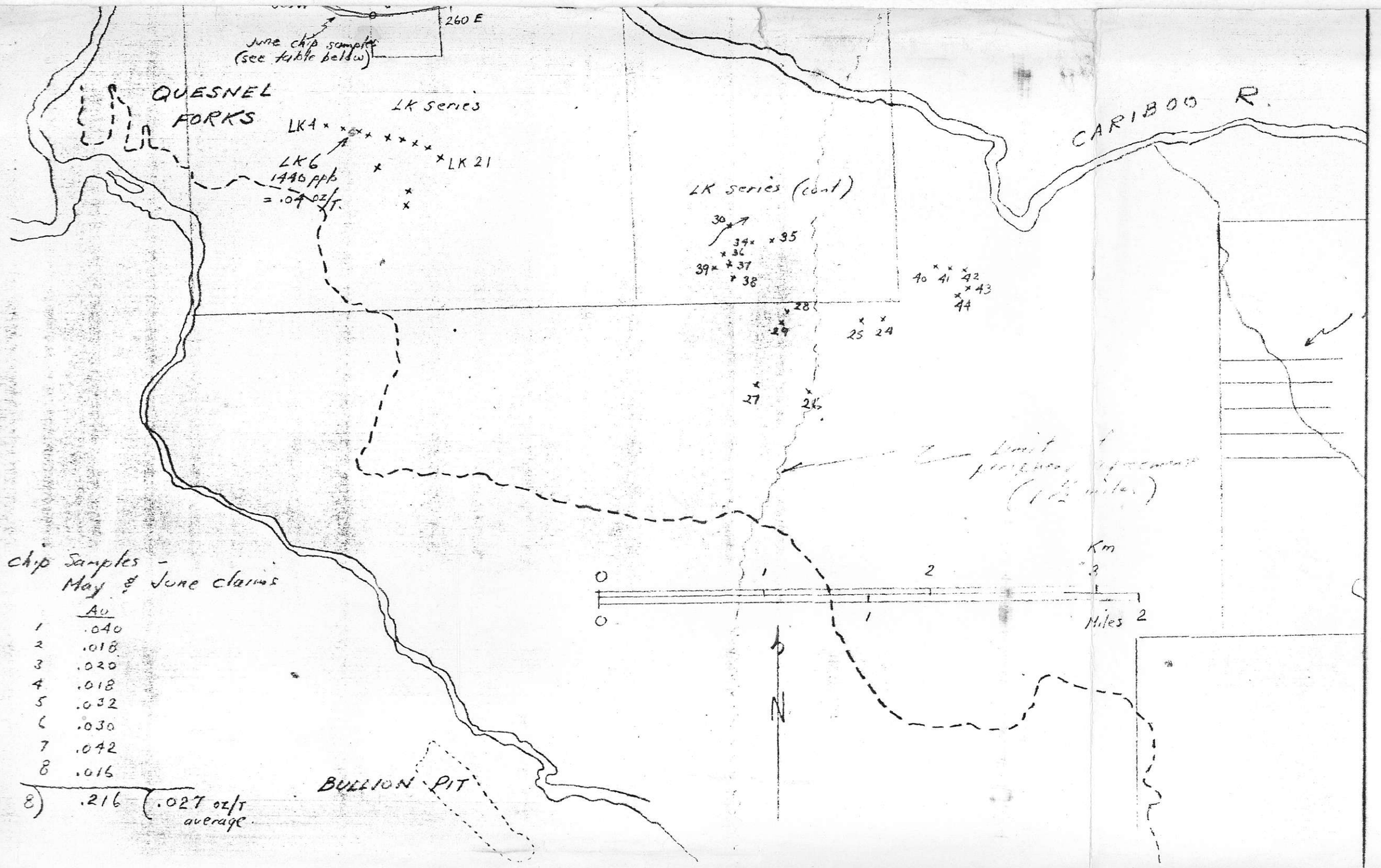
FIELD STOP	SAMPLE NUMBER	SAMPLE DESCRIPTION	AQUARIUS ASSAYS Au oz/t	AQUARIUS ASSAYS Ag oz/t	AQUARIUS ASSAYS Cu	AQUARIUS ASSAYS Miscell.	OTHER ASSAYS Au	OTHER ASSAYS Miscell.
18	JG-79-6-4	Roadside, Quesnel Forks Road, conglomerate, fresh, no alteration						
18	6-5	Roadside, Quesnel Forks Road, SW side; conglomerate with red decomposition seams	tr.	.02				
		Rosette Lake Road						
19	6-6	Roadside; conglomerate, fresh, no alteration						
		Lawless Creek						
20	6-7	Creek walls, to east side; grey limestone						
20	6-7A	Creek to west side; grab bag along Quesnel River, argillaceous limestone with pyrite, fine grained (collected by D.C.)						
20	6-8	Creek to east side; grey limestone						
	6-8A	Creek to west side; grab bag at Quesnel River, argillaceous limestone with pyrite, (collected by D.C.)						
20A	6-9A	Lawless Creek, west side; stream silt (collected by R.E. Mickle)	tr.	.10	31 ppm			
	6-9B	Lawless Creek, west side; stream silt (collected by R.E. Mickle)	tr.	.02	32 ppm			
	6-9C	Lawless Creek, west side; stream silt (collected by R. E. Mickle)	tr.	.30	37 ppm			
	6-9D	Lawless Creek, west side; stream silt (collected by R. E. Mickle)	tr.	.02	35 ppm			
	6-9E	Lawless Creek, west side; stream silt (collected by R.E. Mickle)	tr.	.32	39 ppm			
		Mount Warren						
21	7-1	Roadside; agglomerate, fresh, augite porphyry flow, calcite-filled vesicles						
22	7-2	Roadside; agglomerate, mafic, fresh, augite phenocrysts, vesicular	tr.	.02				
22	7-3	Roadside, agglomerate, mafic, fresh, augite phenocrysts, vesicular						
22	7-4	Roadside; agglomerate, mafic, fresh, augite phenocrysts, vesicular	tr.	.20				
23	7-5	Peak, Lookout Tower; agglomerate, mafic, fresh, no visible mineralization						

TABLE 7: LIST OF AQUARIUS RESOURCES LTD. SAMPLES, ASSAYS AND ASSAYS OF OTHER ORIGIN (CONTINUED)

FIELD STOP	SAMPLE NUMBER	SAMPLE DESCRIPTION	AQUARIUS ASSAYS Au oz/t	Ag oz/t	Cu	Miscell	OTHER ASSAYS Au	Miscell.
		Spanish Creek Road						
24	JG-79-8-1	Roadside cut; limy argillite with interbedded siltstone						
24	8-1A	Roadside; phyllonite, black shale, calcite, pyrite with quartz rim						
24	8-1B	Roadside; chip, argillite with red alteration seam	tr.	.30				
25	8-2	Roadside, lower road; argillite, black shale, Limy; 10-20% pyrite, ankerite (?)						
25	8-2A	Roadside, quartz vein with minor galena, rusty, pyrite, red alteration						
26	8-3	Roadside clearing; near bedrock, phyllonite, pyrite with quartz rim, ankerite (?)	tr.	.14				
		Cedar Creek - Poquette Fault						
27	8-4	Roadside; grab bag, felsic flows, local pyrrhotite						
	8-4A	Roadside; grab bag, chip, siliceous flows, pyrrhotite, arsenopyrite	tr.	.38				
	8-4B1	Roadside; red alteration seams in flows,sample points over 300 feet to north	.01	.06				
	8-4B2	Roadside, red alteration seams in flows; sample points over 300 feet to north	tr.	.60				
	8-4B3	Roadside; red alteration seams in flows, sample points over 300 feet to north	tr.	.40				
	8-4B4	Roadside; red alteration seams in flows, sample points over 300 feet to the north	tr.	.06				
	8-4C	Roadside; sample points over 300 feet to south	tr.	.02				
		Mount Warren						
28	8-5	Roadside; agglomerate with barren quartz stringers						
29	8-6	Peak, Lookout Tower; vesicular pillow lavas with quartz stringers						
	8-6A	Peak, Lookout Tower; pillow lavas	tr.	.06				
	8-6Ba	Peak, Lookout Tower; pillow lavas	tr.	.02				
	8-6Bb	Peak, Lookout Tower; agglomerate	tr.	.04				
	8-7	Peak, Lookout Tower; agglomerate, mafic, rusty with pyrite, chalcopyrite	tr.	.02	.01%			

TABLE 7: LIST OF AQUARIUS RESOURCES LTD. SAMPLES, ASSAYS AND ASSAYS OF OTHER ORIGIN (CONTINUED)

FIELD STOP	SAMPLE NUMBER	SAMPLE DESCRIPTION	AQUARIUS ASSAYS Au oz/t	AQUARIUS ASSAYS Ag oz/t	AQUARIUS ASSAYS Cu	AQUARIUS ASSAYS Miscell.	OTHER ASSAYS Au	OTHER ASSAYS Miscell.
29	JG-79-8-7A	Peak, Lookout Tower; agglomerate, mafic, rusty with pyrite, chalcopyrite						
29A	9-1A	Northslope logging road; surficial deposit, roadside (collected by R.E.Mickle)	tr.	.02	295 ppm			
	9-1B	Northslope logging road; surficial deposit, roadside (collected by R.E. Mickle)	tr.	.50	41 ppm			
	9-1C	Northslope logging road; surficial deposit, roadside (collected by R. E. Mickle)	tr.	.02	102 ppm			
	9-1D	Northslope logging road; surficial deposit, roadside (collected by R. E. Mickle)	tr.	.02	152 ppm			
		Lawless Creek - Quesnel River Fault						
31	8-9	River section; acidic dyke in argillaceous limestone host				WO_3 Pb Zn		
32	8-8	River section; hydrothermally altered felsic intrusion	tr.	.18		tr.		
32A	10-1A	River section; Kangaroo Creek Fault decomposition zone	tr.	.02	.01	tr. tr. .01		
	10-1B	River section; Kangaroo Creek Fault decomposition zone	tr.	.02	.02	tr. tr. .04		
	10-1C	River section; Kangaroo Creek Fault decomposition zone	tr.	.02	.01	tr. tr. .02		
	10-1D	River section; Kangaroo Creek Fault decomposition zone	tr.	.02	.01	tr. tr. .02		
		Easy #1 M.C., Old Lumber Mill Site						
33	10-2	Creek bank section and cut; chip bulk sample across 15 feet in rusty, shattered volcanic rock with thin decomposition zones	tr.	.30			0.2	
34	10-3	Easy #1 M.C., Gold Creek Section Details given in table 1						



chip samples -
May & June claims

	Au
1	.040
2	.018
3	.020
4	.018
5	.032
6	.030
7	.042
8	.016
8)	.216 (.027 oz/T average

AQUARIUS RESOURCES LTD.
CAROLIN MINES LTD.
LIKELY, B.C. PROJECT
FIGURE 5: PLACER CLAIMS MAP

COMPILED FROM LATEST AVAILABLE INFORMATION

GODFREY DECEMBER, 1979