ARIS SUMMARY SHEET

istrict Geologist, Nelson   Off Confidential: 90.05.03

SSESSMENT REPORT 18741   MINING DIVISION: Nelson

ROPERTY:	OGG				
OCATION:	LAT	49 23 00	LONG	117 22 00	
	UTM	11	5469916	473386	
	NTS	082F06W			
LAIM(S):	OGG 1-7				
PERATOR(S):	Hiawatha Res.				
UTHOR(S):	Sevensma, P.H.;Ricker, K.				
EPORT YEAR:	1989, 33 Pages				
OMMODITIES EARCHED FOR:	Gold,Silver,Tungsten,Copper,Zinc				
EYWORDS:	Elise Formation,Volcanics,Archibald Formation,Sediments,Intrusions Granodiorite,Silver King porphyry,Tetrahedrite				
ORK ONE:	Physical FOTO 1500.0 ha				
INFILE:	082SW 302				

HIAWATHA RESOURCES INC.

AIRPHOTO GEOLOGICAL INTERPRETATION

OGG PROPERTY

NELSON M.D., B.C. NTS 82-F-6 W/2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

18,741

by

P.H. SEVENSMA, Ph.D., P.Eng.

Vancouver, B.C. May 1st, 1989

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HIAWATHA RESOURCES INC.

680-650 West Georgia Street, Box 11562
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GEOLOGICAL FRAMEWORK OF THE OGG PROPERTY

NTS 82-F-6/W NELSON MINING DIVISION, B.C.

1. INTRODUCTION

The OGG property is owned by OGG Resources Ltd.of Penticton and Chicago. The property is held under 100% option by Hiawatha Resources Ltd. since March, 1989.

The property was examined along the Copper Mountain fire-tower road on August 9, 1988 by P.H. Sevensma, Ph.D., P.Eng. and R.J. Nicholson, P.Eng. and 19 soil-samples were taken along the road, which crosses the claim boundary between the Rozan Group, where an extensive mapping and soil-sampling program was carried out by Hiawatha Resources Inc. at the time, and the OGG Group. The structures and soil sample trends mapped on the Rozan Group to the East boundary of claim OGG 3, now appear to continue for an as yet unknown distance into the OGG 3, close to where an airborne survey in 1984 had outlined an electromagnetically conducting zone on OGG 1 and 3, (Figure 6).

As a result, it was decided to cover the area by an airphoto geological interpretation, to determine especially if a major fault structure mapped by the B.C. Department of Mines in 1988 (the Red Mountain Fault) would find an expression in the airphotos and if possible, to locate the top of the glacial till, which had been observed on the Rozan group around elevation 5,000' or about 1,500 - 1,600 m.

2. PROPERTY

The property consists of the following claims:

Claim No.	No. of Units	Record No.	Due Date
1	12	3696 (5)	May 8, 1989
2	6	3339 (7)	July 19, 1989
3	3	2623 (5)	May 6, 1989
4	4	2732 (9)	Sept. 2, 1989
5	9	2733 (9)	Sept. 2, 1989
6	6	2703 (7)	July 23, 1989
7	6	3340 (7)	July 19, 1989
1 - 7	46		

<u>See Figure 1</u>:

Access is by a 16 km bushroad from Blewett to the Copper Mountain fire-tower. The claims lie at the headwaters of Erie, Hall and Forty-nine Creeks, which have all produced placer gold, especially Hall and Forty-nine.

On the Rozan Group, P.J. Santos, in 1983, reported total production of 146 tons @ 1.47 oz/t gold and .74 oz/t silver with minor lead and zinc, from 1928 to 1958.

Five km South of the OGG, the Second Relief Mine has produced 228,200 tons @ .43 oz/t gold and .12 oz/t silver between 1902 and 1948, with very minor copper and lead.

A sketch-map at a scale of 1" = ½ mile, shows the approximate location of a number of pits, trenches and short adits on the OGG. None of these were ever tied in to a permanent marker. Summary unverified notes are as follows. (Fig. 2)

A - Unknown vein (1930). 9" wide, grey copper, 2.4% Cu, 89.0 oz/t Ag Reah vein. Ribboned quartz, .40 m. wide, 3 samples: 60 oz/t Ag, 6.6 ppm (Noranda), 0.5 gr/t. Central trenches visible on airphotos.

B - OGG vein. Strike ? Float (Noranda): 90 ppm = 2.6 oz/t gold.

C - Test pit, below PHS soil sample of 470 ppb gold.

D - Seven trenches in As-bearing Quartz vein 2.5 m. to 10 m. wide, vertical height 150-180 m. No assays. Probable location of Red Mountain Fault.

E - Adit. Unchecked assays up to .82 oz/t Au.

F - Traverse: hydrothermal alteration system, sericite; chlorite-epidote-calcite; lamprophyre dykes, sulphide stockworks striking E to NE.

G - Amoco soil-sampling Aug. (1980). Moderate zinc at granodiorite-sediment contact? Some 400 samples for Mo, Cu, Pb, Zn and occasional gold. Spot highs Mo, Cu, Zn.

Intense prospecting should be used to relocate and pinpoint these various occurrences in their exact relationship to topographical marker points, or to a surveyed grid.

3. GEOLOGICAL FRAMEWORK

Geological mapping by T. Hőy and K. Andrew in 1988 and 1989 has conclusively shown the Archibald host rock of the Second Relief to be present in the area covered by the OGG and Rozan claims. It consists of rusty, thin bedded silty argillites, observable with field glasses from the Rozan Group on the OGG claims.

A major fault or "break" was mapped as the Red Mountain Fault, separating the Archibald on the East from the Upper Elise on the West (Figure 3).

This fault is pre-intrusive.

The intrusive plug on the Rozan Group and its "Silver King" porphyry companion outcrops are not shown on Figure 3 due to their relative small scale (500 x 150 m. and 800 x 500 m. for the SK porphyry, both open, and about equal in size to the area of granodiorite outcrops).

The contacts of these porphyry masses with the granodiorite, the Archibald formation and the Elise volcanics underlie most of the high-gold soils on the Rozan property up to its West boundary with the OGG 3 claim.

Similar porphyries are associated with the gold-copper ore in the Silver King deposit (220,000 tons @ 20 oz/t silver and 3.36% copper between 1889 and 1948) and in the Second Relief, where the main vein follows for 1,500 feet the hanging wall of a 2,000 feet long diorite porphyry dyke only about 10 meters wide. In this deposit there are four other non-commercial veins parallel to the first one in a distance of about 100 m. in the footwall of the diorite dyke, forming a sort of miniature under-mineralized Rossland camp. The No. 2 vein shows some promise and is at present being explored.

It is of interest that even old descriptions of these porphyries indicate a close petrological relationship with the main Nelson granodiorite intrusives.

Attached hereto as Appendix "A" is a report by Dr. John G. Payne of Vancouver Petrographics Ltd. on two thin sections made of the granodiorite and Silver King porphyry samples as these rocks occur at the OGG-Rozan boundary, pointing out the highly intriguing problem of their origin and relationship to the skarn affiliated ore of the Second Relief Deposit.

Several small plugs of granodiorite have been mapped on the OGG claims by G. Salazar in 1984 and 1985 (Assessment reports 12720 and 14280) and above the Copper Mountain road a long conducting zone is associated with one of these plugs and some Silver King porphyry float was found by the writer in this area. This conductive zone could be associated with the previously mentioned OGG vein (B) in this area, although it follows the topographical high for more than half its length. This work was done by airborne VLF, which is sometimes subject to show conductors along ridges (Figure 6).

Apart from these geological factors of great interest, it is most remarkable that the age of the mineralization in this area affects rocks of Pliensbachian age, i.e. of the same age as the rocks in the Golden Triangle in the Stewart-Iskut River area, where this writer has spent a number of seasons on the Skyline property.

In the Nelson area, a recent discovery of alkaline porphyry Cu-Mo-Au mineralization on the Shaft showing extends the number of similarities between the Golden Triangle and the Nelson areas, but in the former the potash rich alcaline intrusions are very prominent orthoclase porphyries.

These various considerations have led the writer to the conclusion that the Rozan-OGG area is likely to contain a significant and essentially blind deposit of the Second Relief type, i.e. a porphyry associated vein, or veins, of skarn affiliation, with copper-tungsten-moly and gold, of the same family as the famous Rossland veins.

An airphoto study of the OGG claims shows definitely that the areas above about 5,000' (1,550 m.) elevation have only a rapidly thinning veneer of mostly residual soil, whereas glacial till develops strongly below this elevation, so that soil sampling is an excellent technique for exploration in the upper elevations. Cirques where glaciers may have originated open up mostly on the North side of the local peaks.

4. AIRPHOTO INTERPRETATION

Physiographically, the area is one of quite thick forest below elevation of about 1,600 metres; on the OGG and Rozan a big old fire dating back to the late 1930's has ravaged the Southerly slopes, leaving scattered spruce in Alpine scrubby open areas. The area North of Copper and Red Mountains is well timbered and logging is gradually progressing towards the higher summits.

Old maps show roads and trails following Hall Creek Valley, but very little of this is visible on most airphotos. Similarly, many old cabins and trenches are completely overgrown and invisible on airphotographs, but old maps and records suggest the area was well travelled around the turn of the century. For instance, the Golden Eagle claim on the Rozan Group was surveyed and Crown-granted in 1899, but shown on a creek further East than where it actually is.

Air photographs available for analysis were flight line BC 82021, No. 181, enlarged to about 1:12,400 and normal stereoscopic pairs covering the North half of the OGG group, as well as the Rozan-Eagle Group.

None of these provided any clues as to the distinction between the Elise volcanics, the intrusives and the granodioritic intrusives. Even the Red Mountain Fault is not visible on the photographs, whereas field glasses show the trenches on the West side of Hall Creek quite clearly.

Areas of undifferentiated Till Colluvium M:Cbv stand out quite clearly, as do the Blocky Talus Slopes aCa (active) and the silty rubbly Colluvial areas fr. Ca-A, particularly abundant along upper Hall Creek.

A great advantage of the airphoto interpretation is that it allows to lay out good grids for soil-sampling, adjusted to the terrain, instead of a regular grid as proposed in a previous report (Figure 4).

Soils were examined and sampled along a part of the Copper Mountain Road on August 9, 1988 by the writer and R. J. Nicholson and SK prophyry float was observed on the OGG claims (Figure 5).

Nineteen samples CM 0-18 can be compared to field results obtained on the Rozan. They show anomalous iron above 4.5%, fairly high strontium and vanadium. Cr is exceptionally high especially over melanocratic rocks,(Nos. 13, 14, 15), some of which look like gabbro rather than augite porphyry. Most barium is over 100 ppm; tungsten is moderately anomalous in Nos. 7 to 12 in the same samples where gold is anomalous, as well as weakly anomalous copper. At the time of examination, results of the work on the Rozan Group were not yet available.

A more detailed Appendix "B" discusses further the airphoto interpretation.

5. CONCLUSIONS

The OGG property is well located geologically, adjoining the Rozan property on the SW and straddling the Red Mountain Fault.

Airphoto interpretation and some reconnaissance soil sampling, as well as the over 90 ppb trends coming from the

Rozan group on the East side, and the presence of Silver King porphyry, granodiorite and Archibald rocks, (previously known as the Sinemurian beds), indicate that the extension of the Rozan gold anomalies could be substantial on both the OGG 3 and 1.

A detailed soil survey with samples analyzed by ICP methods for 30 metals and gold analysis by acid leach and AA is fully justified, starting on OGG 3 and extending to the West on OGG 1, with emphasis on the area above and below the Copper Mountain Road near the conducting zone indicated, by an airborne VLF survey.

Intensive prospecting is required on the remaining property, especially the areas listed on Figure 2.

The details of this program will be prepared at a later date.

P.H. Sevensma, Ph.D., P.Eng.
Exploration Manager

CERTIFICATE

I, Peter H. Sevensma, of 8404 - 85th Street, Osoyoos, B.C., DO HEREBY CERTIFY:

1) That I am a Consulting Geologist with business address as above.

2) That I graduated at the University of Geneva, Switzerland in 1937 and that I obtained my Ph.D. in Geological Sciences in 1941 at the same institution, my thesis subject being the study of certain gold mines in Central France.

3) That I am a registered Professional Engineer, member of the Association of Professional Engineers in British Columbia.

4) That I have practised my profession for the last fifty-one years with the only interruption the war in the Far East from 1942 to 1946.

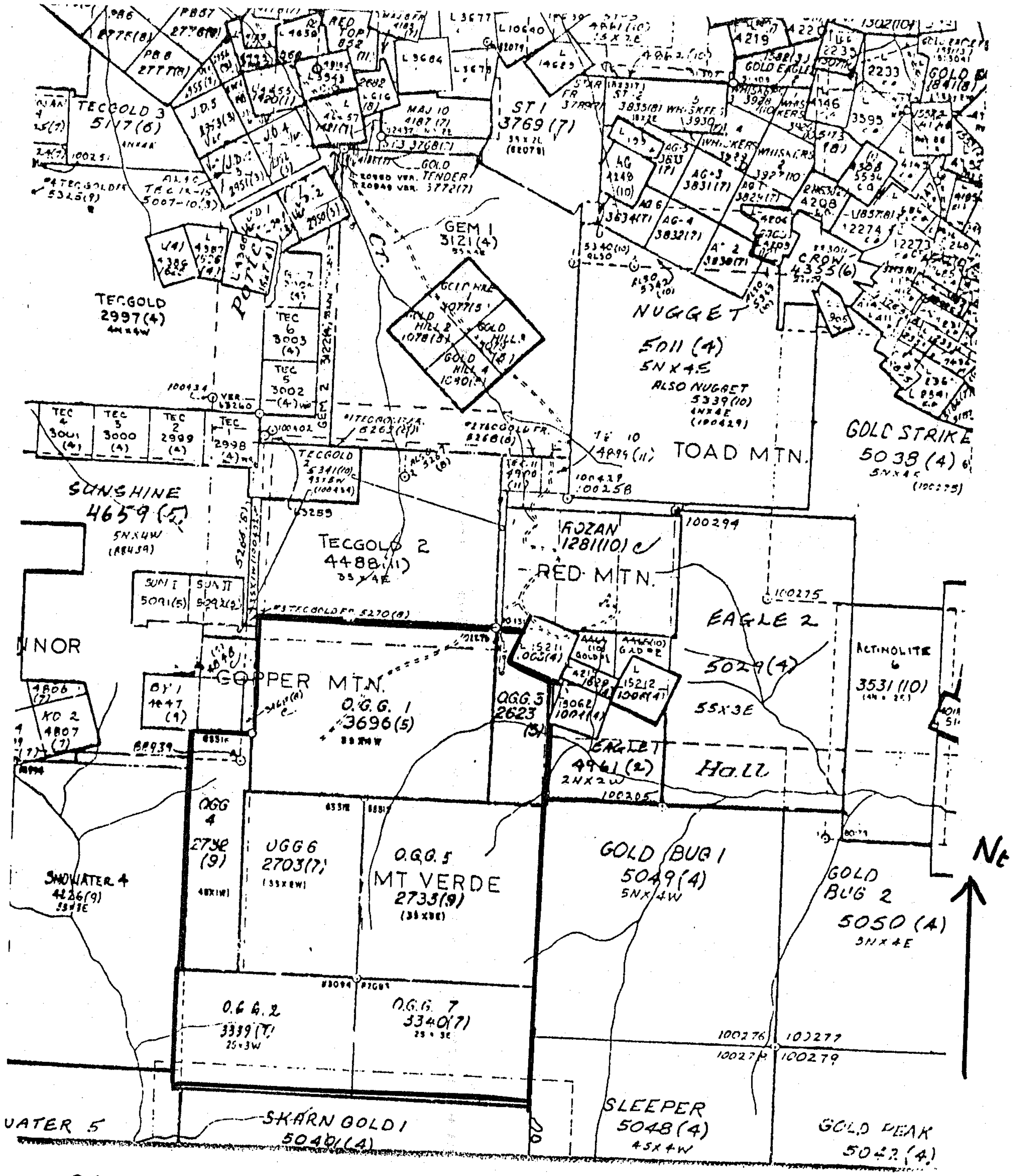
5) That I have personally directed a work-program on the Rozan property, which adjoins the OGG property on the East, and have examined the OGG 1 and 3 on August 9, 1988, when I personally collected samples CM 0-18.

6) That I am the exploration manager of Hiawatha Resources inc.

P.H. Sevensma

P.H. Sevensma, Ph.D., P.Eng.

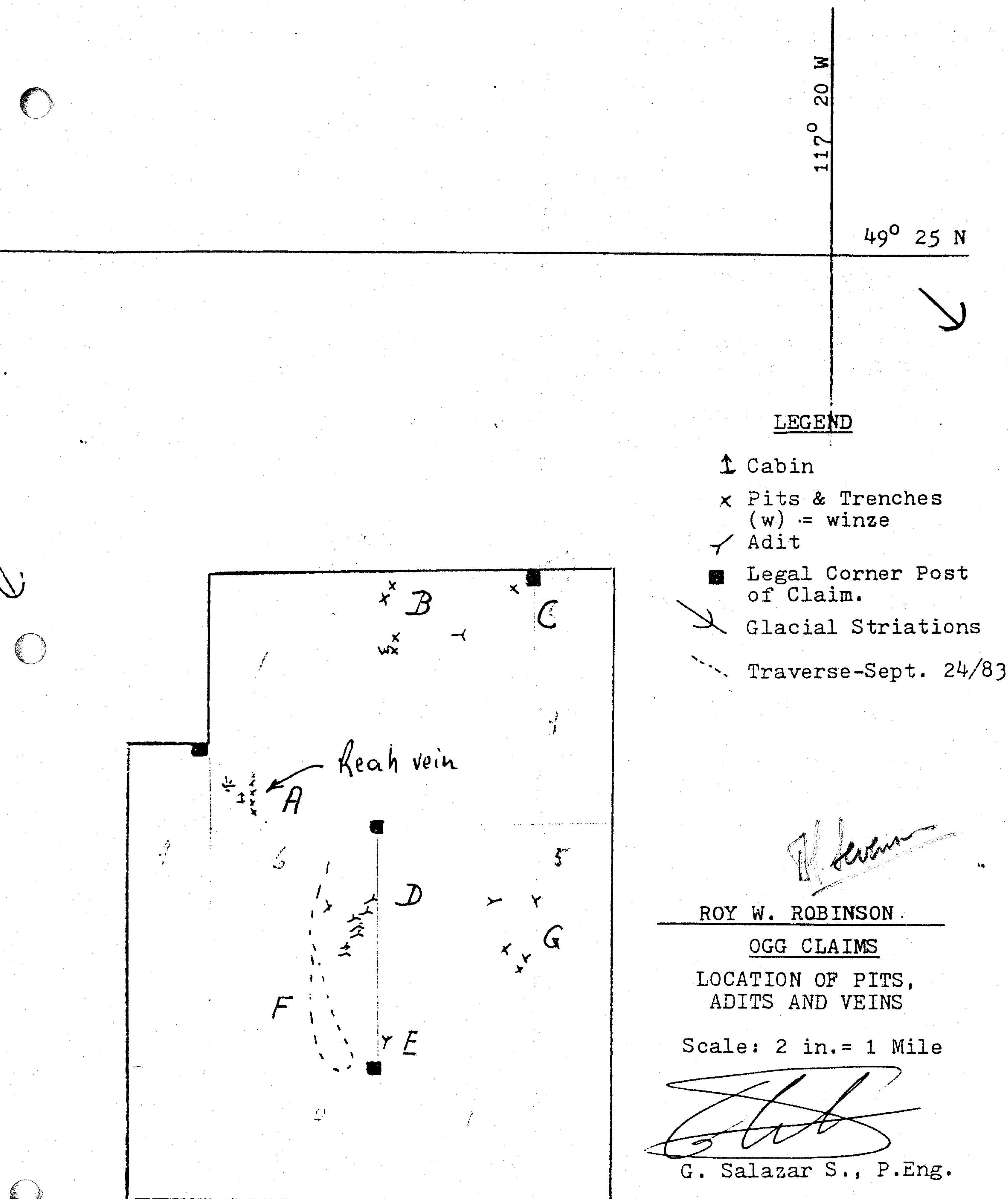
Vancouver, B.C.,
May 3, 1989



Claim-map. April 7, 1989.
OGG Group. NTS 82-F-6/W. Nelson M.D. B.C.

0 — 2.5 Km.

Fig. 1.



ROY W. ROBINSON

OGG CLAIMS

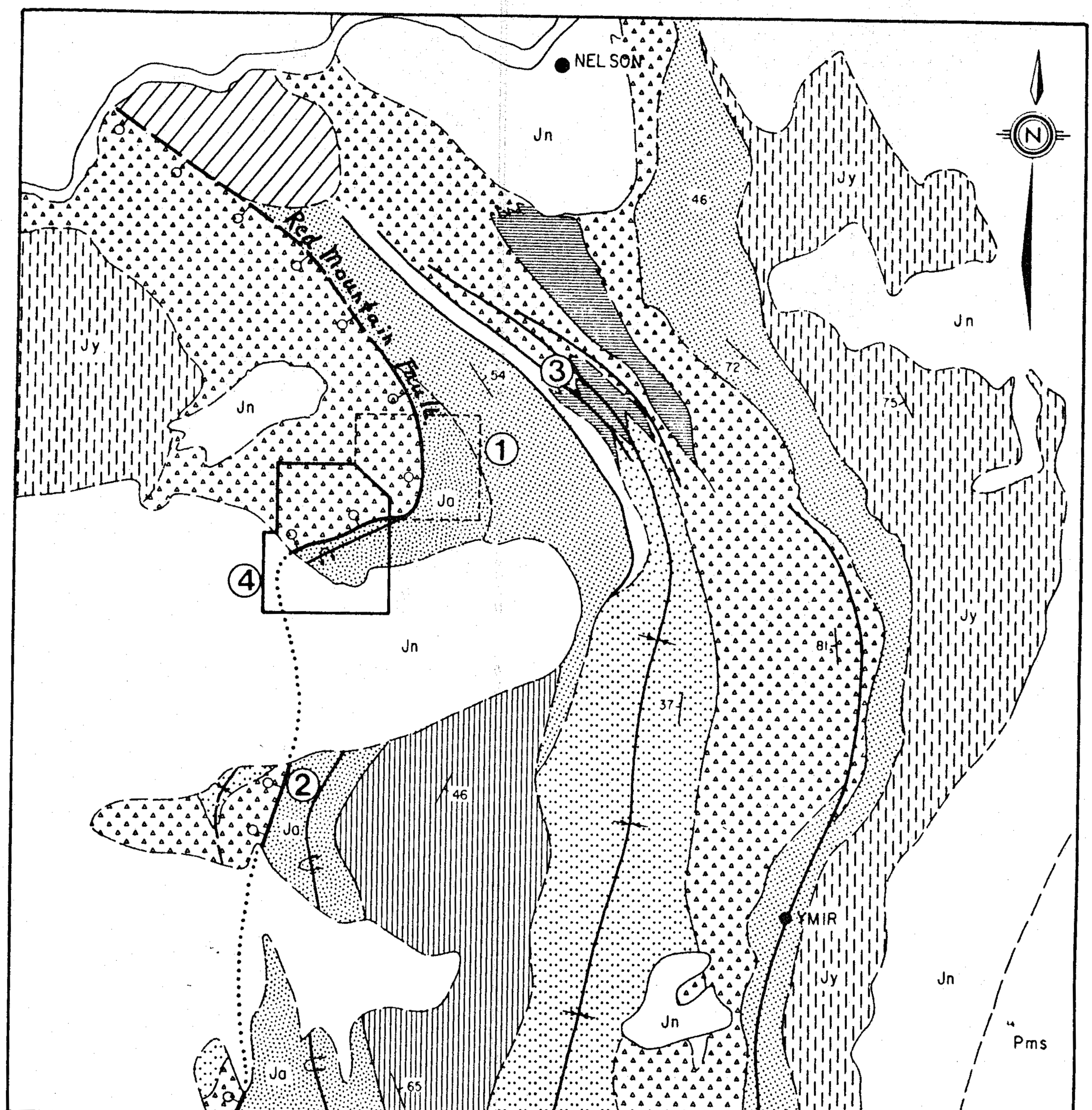
LOCATION OF PITS,
ADITS AND VEINS

Scale: 2 in.= 1 Mile

G. Salazar S., P.Eng.

August 31, 1984

PHS. FIG. 2.



MIDDLE JURASSIC

Jn — NELSON Intrusions

LOWER OR MIDDLE JURASSIC (?)

diorite (?)

LOWER JURASSIC
ROSSLAND GROUP

SILVER KING intrusions

HALL FORMATION

ELISE FORMATION

Upper Elise

intermediate to mafic lapilli crystal and fine tuff

intermediate lapilli and crystal tuff

lower Elise

mafic flow breccia

mafic pyroclastic breccia crystal tuff

Ja — ARCHIBALD FORMATION

Jy — YMIR GROUP

PALEOZOIC

Pms — metasedimentary rocks

.... Fault obliterated by later granodiorite

Adapted From: Höy & Andrew, 1989.

1 Rozan-Eagle Group
2 Second Relief
3 Silver King
4 OGG Claims

P H Sevensma [signature]

Km 0 1 2 3 4 5 Km

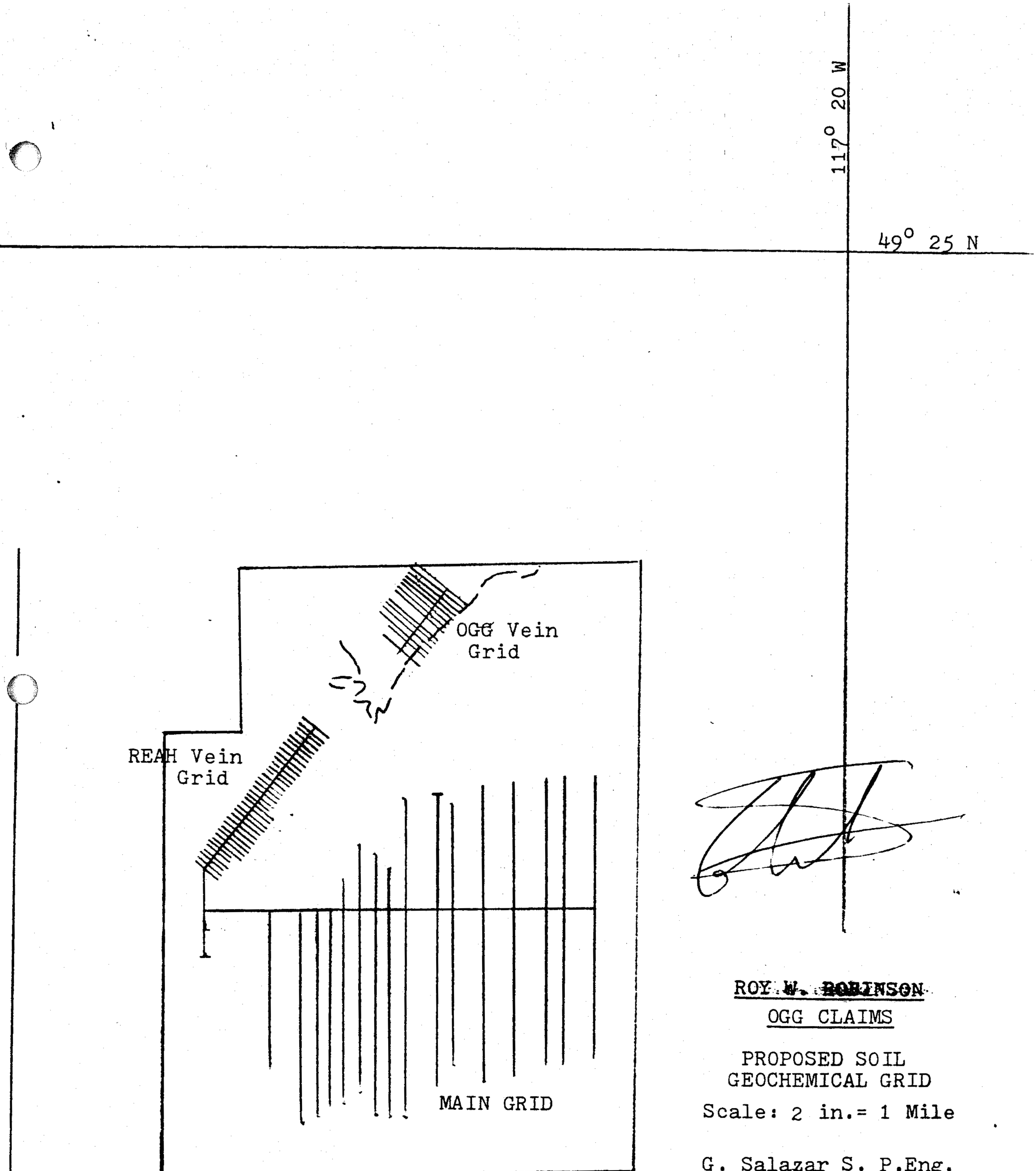
HIAWATHA RESOURCES INC.

OGG GROUP GEOLOGICAL FRAMEWORK

NELSON M.D., B.C.

PETER H. SEVENSMA, PH.D., P. ENG.

N.T.S. 82F/6W	SCALE 1:150,000	FIGURE
DATE. APRIL, 1989	DRAWN J.W.	3



ROY W. ROBINSON

OGG CLAIMS

PROPOSED SOIL
GEOCHEMICAL GRID

Scale: 2 in.= 1 Mile

G. Salazar S. P,Eng.

August 31, 1984

PHS : FIG. 4

G. SALAZAR S. & ASSOCIATES LTD.

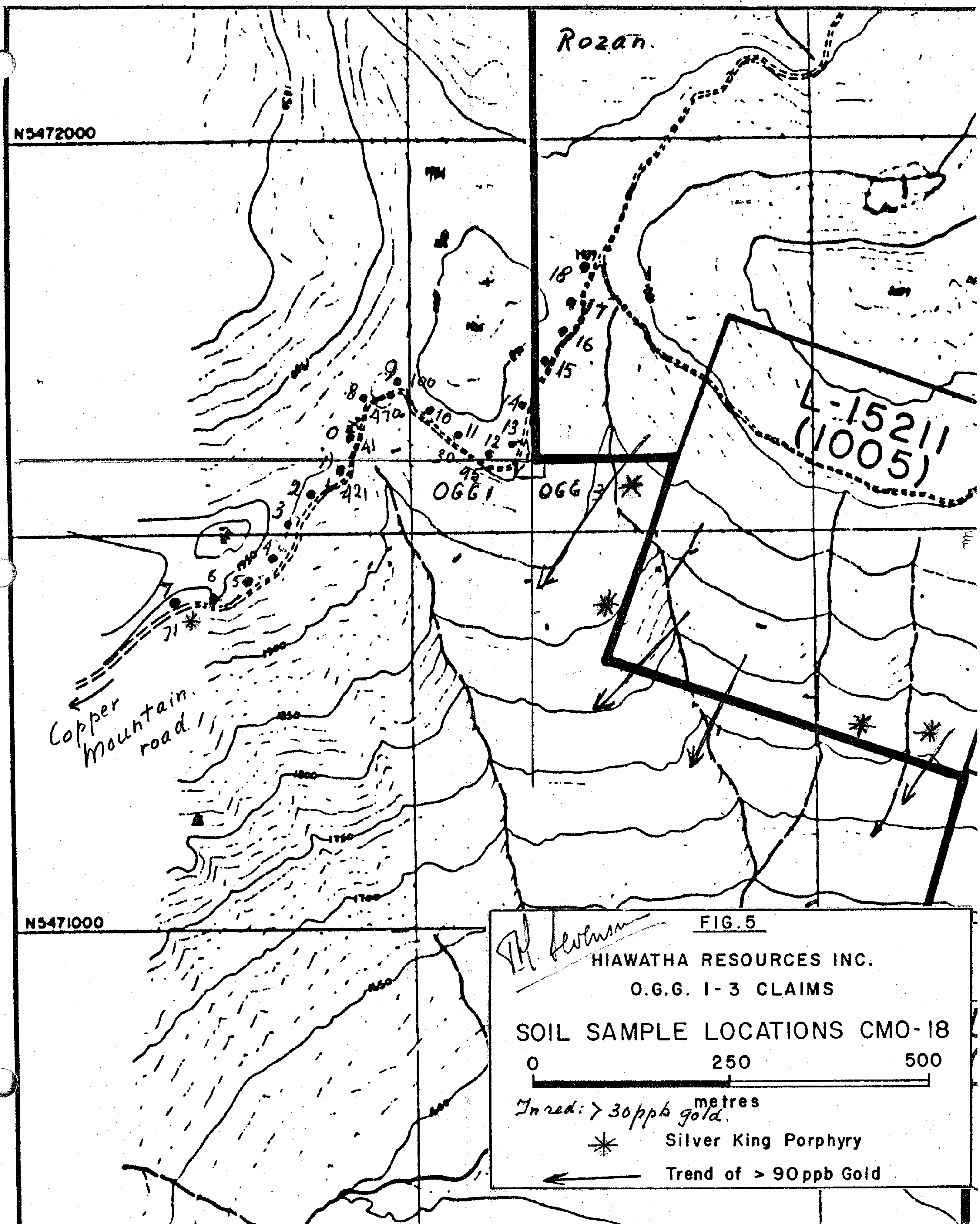
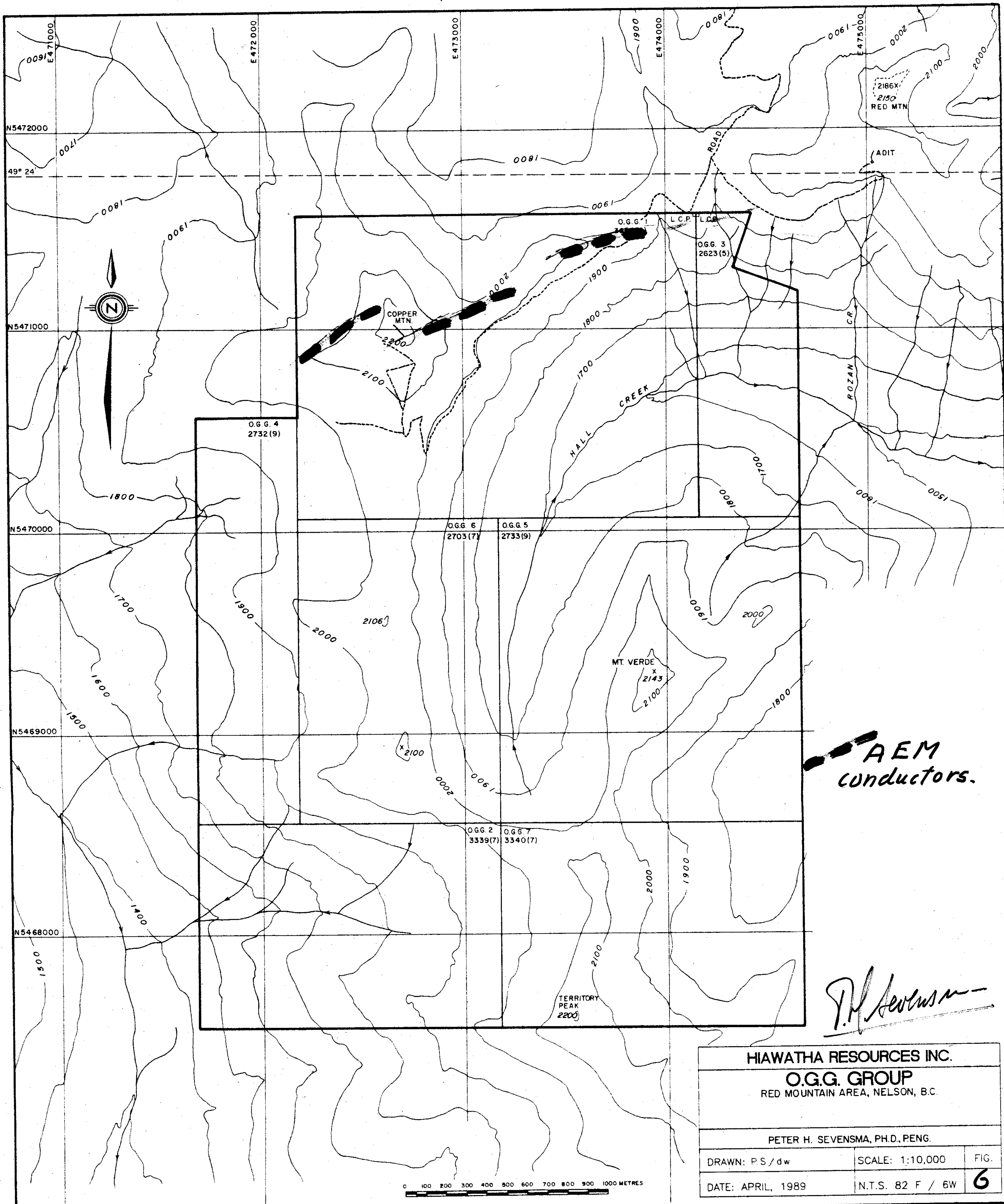


FIG. 5

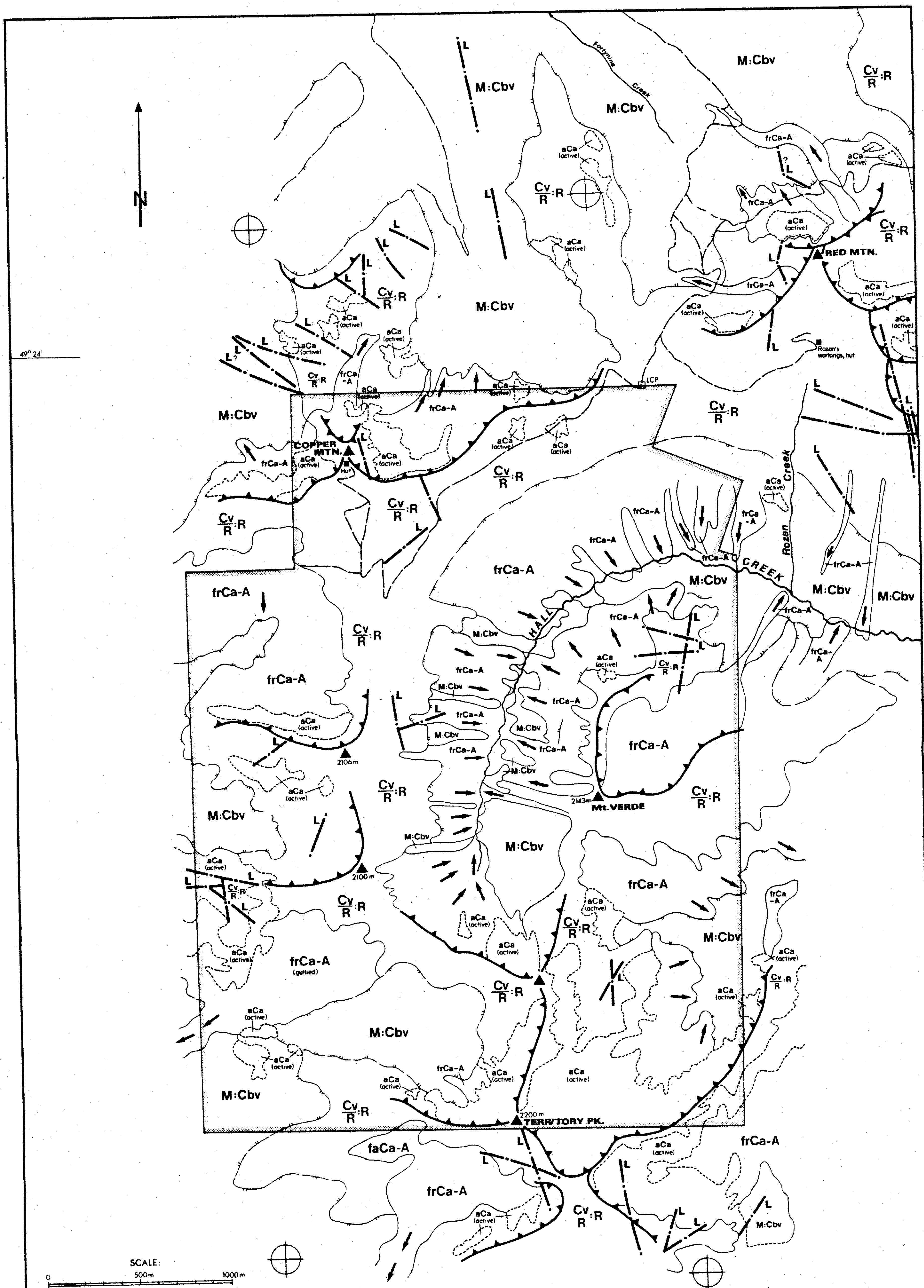
HIAWATHA RESOURCES INC.

O.G.G. 1-3 CLAIMS

SOIL SAMPLE LOCATIONS CMO-18



E471000
E472000
E473000
E474000
E475000
N5472000
N5471000
N5470000
N5469000
N5468000
49° 24'
RED MTN
ADIT
ROAD
O.G.G. 1
L.C.P.
O.G.G. 3
2623(5)
COPPER MTN.
O.G.G. 4
2732(9)
O.G.G. 6
2703(7)
O.G.G. 5
2733(9)
HALL CREEK
ROZAN CR.
MT. VERDE
2143
O.G.G. 2
3339(7)
O.G.G. 7
3340(7)
TERRITORY PEAK
2200
AEM conductors.
0 100 200 300 400 500 600 700 800 900 1000 METRES
HIAWATHA RESOURCES INC.
O.G.G. GROUP
RED MOUNTAIN AREA, NELSON, B.C.
PETER H. SEVENSMA, PH.D., PENG.
DRAWN: P.S./dw
SCALE: 1:10,000
FIG. 6
DATE: APRIL, 1989
N.T.S. 82 F / 6W



LEGEND

▲	Mountain Summit		Lineament (including bedding, faults, joints and foliation - undiff.)	aCa (active)	Blocky Talus Slopes (active)
	Creek		Cirque	frCa-A	Silty/rubbly Colluvial Areas - Avalanche inundated
	Road (condition variable)		Upper Limit of Glacial Till (approximate)	M:Cbv	Undifferentiated Till Colluvium (veneer <2m; blanket >2m)
■	Building			Cv/R:R	Bedrock and Colluvial veneer overlying Bedrock
	Boundary of O.G.G. Claim Group				

Modified Terrain Legend: after Surveys and Resource Mapping Br., B.C. Min. Environment

PHOTOGEOLOGY OF THE O.G.G. CLAIM GROUP

HIAWATHA RESOURCES INC.

Nelson Mining Division, B.C.

NTS 82 F/6
April 27/89

Photo interp. by: K. Ricker, F.G.A.C.
Drawn by: N.K. Cukor

FIG. 7

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph.D. Geologist
CRAIG LEITCH, Ph.D. Geologist
JEFF HARRIS, Ph.D. Geologist
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Report for: **Peter Sevensma,**
Hiawatha Resources Inc.,
680 - 650 West Georgia Street
VANCOUVER, B.C., V6B 4N8

Invoice 8017
February 1989

Samples: 1 - Nelson "granodiorite";
2 - Silver King "andesite porphyry"

Summary:

The samples probably are from the same magmatic source. This suggested by similarities in textures and alteration of plagioclase phenocrysts, and by the texture and mineralogy of the groundmass. Biotite in both has an unusual texture (partly associated with epidote and Ti-oxide, and possibly in part after original hornblende). Minor and accessory minerals are similar in each, being opaque (magnetite[?] and pyrite), sphene, Ti-oxide, apatite, and epidote.

The major compositional difference, which could be because of magmatic fractionation, is the much greater abundance of K-feldspar in the plutonic rock than in the hypabyssal rock.

Veins and veinlets are dominated by one or more of epidote, pyrite, and calcite, with lesser biotite and quartz.

Sample 1	porphyritic biotite granodiorite; vein of pyrite-(epidote-biotite-calcite-quartz)
Sample 2	slightly porphyritic, hypabyssal biotite quartz diorite; vein dominated by calcite, veinlets dominated by epidote with lesser biotite, quartz, and calcite

John G Payne
John G. Payne
604-986-2928

Appendix "A"

Sample 1 **Porphyritic (Plagioclase) Biotite Granodiorite with Vein of Pyrite-(Epidote-Biotite-Calcite-Quartz)**

Phenocrysts of plagioclase are surrounded by interstitial quartz and lesser K-feldspar and biotite, with minor pyrite, magnetite, sphene, calcite, Ti-oxide, and apatite. A lensy vein is dominated by pyrite with lesser epidote, biotite, calcite, and quartz.

phenocrysts			
plagioclase	60-65%		
groundmass			
quartz	12-15	sphene	0.5%
K-feldspar	10-12	Ti-oxide	0.3
biotite	4- 5	apatite	0.2
pyrite	1- 2	epidote	minor
magnetite	1	muscovite	trace
calcite	0.5		
veinlet			
pyrite-epidote-(biotite-calcite)	2- 3		

Plagioclase forms subhedral phenocrysts averaging 1.5-3 mm in size. Alteration is moderate to patches of sericite and much less calcite and epidote. The general appearance of plagioclase, R.I. moderately less than that of quartz, and alteration mineralogy suggest that plagioclase is andesine/oligoclase (about An30-25).

Quartz forms interstitial grains averaging 0.5-1 mm in size.

K-feldspar forms interstitial grains averaging 0.5-1 mm in size, with a few up to 2 mm long. They commonly contain irregular intergrowths of very fine grained biotite, calcite, and trace muscovite.

Biotite forms scattered, subhedral grains averaging 0.1-0.5 mm in size, and clusters up to 0.9 mm in size, commonly of much finer grains. Associated with some of the latter are patches of epidote; textures suggest that these aggregates may be secondary after hornblende. Some biotite flakes contain moderately abundant patches of Ti-oxide, suggesting that they are altered somewhat towards chlorite or muscovite. Biotite also occurs as subradiating aggregates averaging 0.1-0.5 mm in grain size in quartz and K-feldspar. Pleochroism is from pale to medium green, with local brownish shades.

Pyrite forms disseminated subhedral to euhedral grains averaging 0.1-0.5 mm in size, with a few up to 1 mm across.

Sphene forms subhedral wedge-shaped grains up to 0.4 mm long. Some are altered partly to Ti-oxide.

Magnetite(?) forms anhedral grains averaging 0.05-0.15 mm in size, commonly concentrated in clusters with biotite and/or pyrite. Although the mineral has the optical properties of magnetite, the rock is not magnetic.

Ti-oxide, probably after sphene, forms patches averaging 0.1-0.2 mm in size, with a few up to 0.7 mm long.

Apatite forms subhedral, equant grains averaging 0.1-0.15 mm in size associated with quartz, and smaller grains averaging 0.01-0.02 mm in size associated with biotite.

A lensy veinlet averaging 0.2-1 mm wide cuts the rock. Its wider parts are dominated by subhedral to euhedral pyrite/marcasite grains averaging 0.2-0.7 mm in size. Bordering pyrite/marcasite aggregates are minor quartz, biotite, and epidote. Narrower parts of the veinlet are dominated by aggregates of extremely fine grained epidote, calcite, and biotite, or less commonly by quartz.

Sample 2 **Slightly Porphyritic Hypabyssal Quartz Diorite; Vein dominated by Calcite, Veinlets dominated by Epidote**

Plagioclase phenocrysts are set in a groundmass of fine to very fine grained plagioclase with less quartz and biotite, and minor K-feldspar, sphene, opaque, and epidote, and trace apatite. One vein is dominated by calcite with much less quartz. Veinlets are dominated by epidote with lesser biotite, quartz, and calcite.

phenocrysts	
plagioclase	7- 8%
groundmass	
plagioclase	55-60
quartz	15-17
biotite	10-12
K-feldspar	1
epidote	1
opaque	0.7
sphene	0.5
apatite	0.2
veinlets	
1) epidote-biotite-calcite-quartz	1- 2%
2) calcite-(quartz-epidote-biotite)	1- 2

Plagioclase forms subhedral to euhedral phenocrysts averaging 1-2.5 mm in size. Alteration is slight to moderate to sericite and epidote, with locally minor calcite. Many grains contain minor to abundant clusters of irregular inclusions of extremely fine grained quartz, and a few contain coarser grained, intergrown patches of quartz up to 0.7 mm in size.

Groundmass plagioclase forms anhedral grains averaging 0.2-0.8 mm in size. Alteration is slight to moderate to sericite.

Quartz forms anhedral grains averaging 0.1-0.8 mm in size, intergrown irregularly with groundmass plagioclase and biotite patches.

Biotite forms ragged clusters averaging 0.5-1 mm in size of grains averaging 0.05-0.15 mm in size. Many of these clusters contain minor to abundant subhedral to anhedral epidote grains averaging 0.05-0.15 mm in size, and lesser patches of extremely fine grained Ti-oxide. Textures suggest that some patches are secondary after hornblende.

K-feldspar (microcline) forms anhedral grains averaging 0.1 mm in size intergrown with quartz and plagioclase of similar size in the groundmass.

Epidote forms anhedral patches averaging 0.05-0.2 mm in size associated with biotite and with plagioclase.

Opaque forms subhedral to euhedral, equant grains averaging 0.05-0.1 mm in size, with a few up to 0.3 mm across. Some finer grained, irregular opaque (pyrite?) patches are surrounded by epidote.

Sphene forms anhedral, equant grains averaging 0.1-0.2 mm across.

Apatite forms subhedral elongate, prismatic grains averaging 0.05-0.1 mm in length, and a few stubby prismatic grains up to 0.15 mm long. These commonly associated with biotite.

Wispy, discontinuous, subparallel veinlets up to 0.1 mm wide consist of extremely fine to very fine grained epidote with lesser biotite. Where a few veinlets cut plagioclase phenocrysts, they are dominated by calcite.

One vein averaging 0.4 mm wide is dominated by very fine grained calcite with less quartz and much less epidote and biotite.

PHOTOGEOLOGY OF THE O.G.G. GROUP,

NELSON MINING DIVISION, B. C.

by

Karl E. Ricker, F.G.A.C.

for

Hiawatha Resources Inc.

680 - 650 Granville Street

Vancouver, B. C.

May 2, 1989

Our Project 2-89A

Appendix "B"

Table of Contents

INTRODUCTION

The O.G.G. Mineral Claim Group covers the upper reaches of Hall Creek, some 11-13 kilometres to the southwest of Nelson, British Columbia. Work over the last decade on this property and predecessors (known as "Reah") has established a good gold-silver showing on the south upper slopes of Copper Mountain. The showing appears to be part and parcel of an obvious structural lineament which cuts across the east face of this mountain. Investigations of other linear features could possibly discover related features or extensions to the showing. Many of these features are not obvious on the ground, and discovery of such by geochemical and geophysical methods has been only partially successful. An air photogeologic appraisal of the property has accordingly been carried out to find other linears, as well as assist in the conducting of further geochemical surveys.

PHYSIOGRAPHY

Topography

The O.G.G. Group lies within the Bonnington Range of the Selkirk Mountains. Ridge crests and mountain tops lie at elevations of about 2,000 to 2,200 metres respectively; they are moderately sharp and have cirque bowls on their northerly slopes. The major drainage is the Hall Creek Valley, at elevation 1,200 to 1,500 metres within the property area. It flows northeast and then easterly into the adjacent Rozan property. The valley is markedly U-shape in cross profile and the slopes are festooned with snow avalanche paths. Development of access roads in this Valley will be continually plagued with avalanche debris cover and exposure to much hazard.

Glaciation

During the Pleistocene Epoch the entire area was likely covered by several pulses of development and withdrawal of the Cordilleran Ice Sheet. However, the evidence is circumstantial, based on straie found on ridge tops to the southwest (Little, 1982), because air photo interpretation did not reveal conclusive evidence within the project area. However, during the last Pleistocene ice advance glaciers of local origin, initiated in cirques located at valley heads, extended down valleys with an upper ice limit of about 2,000 metres, as shown by a succession of faceted spurs on the main valley walls. Ground moraine, which develops under the ice, would not in most cases be preserved to this elevation as a continuous sheet or blanket deposit because the slops are steep and much post glacial erosion has taken place, producing very gullied valley walls in Hall Creek basin especially. There is no conclusive evidence of recent glacier ice occupying the cirque basins, with the possible exception of those on the ridge line to the south of Territory Peak. Rather, the fresh rock rubble which lies in mounds on the headwalls of these cirques is a product of protalus mass wasting processes which adds fresh debris after each winter. Thus the cirques within the project area are likely a product of the Latest Pleistocene ice advance. Post glacial processes have mantled much of the area with veneers, blankets, aprons and fans of colluvial debris.

Bedrock Geology

Bedrock underlying the project area is of the clastic (Archibald) and volcanic (Elise) suites of the Rossland Group, mainly Jurassic in age, which were deposited in an eugeosynclinal environment. Hoy and Andrews (1989) show a northwesterly to northeasterly strike of the strata which is steeply dipping in tight synclines and anticlines, and with some overturned folds on the summit of Mt. Verde. The strata is vertically offset by a normal fault which arcs south through Red Mountain to Mt. Verde's north flank and then swings west southwesterly across Hall Creek Valley. The upthrown clastic Archibald Formation, on the east and south side of the fault, is in turn intruded by the extensive Bonnington Pluton which cuts across the south end of the property. Smaller intrusion of less than one square kilometre in extent occur elsewhere between Copper and Red Mountains, and may have some genetic relationship to nearby mineralization.

METHODOLOGY

Air Photo Interpretation

Two sets of stereo-paired air photos were used to outline the linear features and surficial geologic deposits. The photos were flown in 1952 and 1983 and are about 1:30,000 and 1:16,000 scales respectively. Broad overviews were used to map out cirques, upper limit of Late Pleistocene glaciation and the obvious mega-linear features. The stereoscope was then reset to three power magnification to delineate deposit boundaries, search for workings and delineate any subtle contacts. The features were scribed directly onto the photos in wax pencil, and then transcribed onto a blowup air photo of the entire project area which has a ridge top scale of 1:12,800. This photo was also search for additional smaller details which may have been inadvertently overlooked. South of Mt. Verde this was the only available photo coverage, and without a three dimensional view there is no guarantee that all geomorphic-geologic elements of interest were indeed found or properly interpreted. None the less the mapped out elements were compared to the 1:50,000 scale geologic map of Hoy and Andrew (1989).

Terrain Code

For the complex array of surficial deposits the latest provincial terrain code (Ryder and Howe, 1984) was used to delineate them significant in a simplistic manner, in order to eliminate excessive clutter. For those not familiar with the code the following explanation of one symbol, seen everywhere on the map, should suffice: frCa-A

- fr - refer to sediment particle size -"f" for fines and "r" for rubbly rock of 2 to 256 mm in b-axis diameters.
- C - capital "C" refers to Colluvial origin; that is the mode of genesis of the deposit.
- a - refers to land form, in this case an apron or coalescing fans.
- -A - hyphenated "A" refers to modifying processes which is snow avalanching for much of this project area.

Other particle sizes shown on the map are: "a"- angular blocks of 256 mm or larger. "M" refers to morainal origin and thus the deposit is till; "R" denotes bedrock. Other landforms are non descript veneers (v) which are thin layers of colluvium usually overlying bedrock, and blankets (b) which mask the underlying rock, and thus are thicker than 2 metres. Without great effort and a confusion of resulting lines, it is impossible to differentiate between Colluvial and Morainal blankets and/or veneers in many areas. Further, the former could overlie the latter in part. However, active talus slopes (ie. : aCa-active) are easily recognized by a high reflectance on the aerial photos, because of lack of discoloration by lichen cover.

Construction of Map

The map is traced from the enlarged aerial photo without correction for distortion. The claim boundary was plotted by using intersections with creeks and roads shown on the topographic maps which are at 1:10,000 scale. The air photo was enlarged to this scale on the north-south axis which leads to inevitable distortion on the east-west. The map, however, is registered to fit as an overlay on the large aerial photo, without loss of position to the underlying topography.

RESULTS

Upper Limit Of Glacial Till

In Hall Creek Valley the till occurs only as a more or less continuous sheet on the lower wall and valley floor on the east edge of the property. Elsewhere, it is either overlain by colluvial deposits or eroded out altogether, leaving only ever decreasingly smaller patches up to the limit of indicated glaciation at ca 2,000 metres. As far as can be discerned the ridge crests do not have a mantle of till. On north and west facing cirques the floors of such are more or less mantled with till, here and there overridden by colluvium. Most till is of very local origin and hence is a good medium to test geochemically for the dispersion of "path finder" elements as well as traces of gold.

Talus Distribution

Active talus is especially prolific on cirque headwalls and especially in areas underlain by granitic rock. Elsewhere, forest or brush covered talus is modified by the addition of organic material and debris carried by snow avalanches. This is particularly so on the north side of Copper Mountain. Geochemical work in such areas will likely yield erratic results as well as false expectations.

Colluvial Avalanche Debris Zones

Slopes of Hall Creek Valley and the tributary to the southeast of Vt. Verde are virtually obliterated by long tongues of colluvial debris which coalesce with one another across much of the valley floor. The prominent snow avalanche paths are marked on the map. Geochemical exploration in this area will be fraught with erratic sample results.

Linear Features

The Red Mountain fault is scarcely discernible on the aerial photos. Linears on the map which line up this feature occur on the following: the west cirque rim of Red Mountain, the north flank of Mt. Verde, and the west wall of Hall Creek valley. Without the geologic map, however, the fault, as such, would not be recognized.

Other prominent lineaments are: on Copper Mountain (east face), a northwesterly pair on Territory Peak (in the Bonnington Pluton), and about 500 metres west of Pk 2100 m. on the west side of Hall Creek valley. The latter is of a complex intersecting set in a zone of talus on the contact of the intrusive to the Archibald Formation. This is the only site where the intrusive contact is conspicuous on the aerial photos. The Copper Mountain linear run toward the Territory Peak structures, perhaps signifying that other elements of it may be hidden on the west wall of Hall Creek valley. Certainly the origin of the lineaments on Territory Peak warrant evaluation.

Another prominent linear marks the axis of Porter Creek which runs northwesterly between Copper and Red Mountains.

Bedding and Foliation

Neither of these two micro-structural elements are obvious on the aerial photos, which were taken through a 150mm lens. The absence may be accounted for by the following:

1) the photo reproduction lacks fine resolution,
2) the required focal length was not used,
3) the lithology is sufficiently rubbly or fissile to mask bedding planes, and/or
4) a higher magnification stereoscope is required.

The only hint of such structures is shown on the north flank of Mt. Verde and on the cirque rims located southeast of Red Mountain.

Roads and Workings

The Fortynine Creek access road to Copper Mountain is obvious on both ages of photography. From the latter a trail leads southwest to four areas of trenching located above tree line but downslope of the access road. The trenches and trail are not shown on the map. The road developments in Hall Creek Valley are not shown on the available photography. A new road spur road on the west side of Porter Creek may have an older obscure continuation which leads to the basin northwest of Copper Mountain.

CONCLUSIONS

An air photo interpretation of the O.G.G. Mineral Claim Group has found the following:

- a prominent linear on or near the mineralized trend of Copper Mountain, which might continue on the west wall of Hall Creek Valley to Territory Peak (which should be checked);

- a complex set of lineaments 500 metres west of Pk 2100 m which is on the contact of Archibald Formation sediments to the Bonnington Pluton; this also warrants an inspection;

- very little of the Red Mountain normal fault is discernible, and most geologic formation contacts are obscure altogether;

- bedding and foliation are masked either by lack of photo clarity or by the intense frost shattering on the rock outcrop;

- the upper most limit of glacial till is about 2,000 metres, below ridge crest, and elsewhere it is intermixed or overlain by colluvium;

- while glacial till, and colluvial veneers overlying bedrock, are good medium for geochemical surveys, the ubiquitous presence of colluvial avalanche fans will generate very erratic results because of the long distance travel of some debris; Hall Creek Valley will have to be very carefully test pitted in this regard; and

- there is an active talus and avalanche hazard to warrant extra caution.

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This report has been compiled by Karl Ricker who is an active Fellow, Geological Association of Canada.

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM
R-48	1	93	13	90	.1	28	18	534	4.61	3	5	ND	1	47	1
R-49	1	89	17	115	.1	35	23	1095	5.40	2	5	ND	1	56	1
R-49A	1	133	15	90	.4	106	32	1020	5.20	2	5	ND	1	75	1
CM 0	2	51	26	95	.1	64	15	882	4.69	4	5	ND	3	78	1
CM 1	1	61	20	93	.1	72	17	814	4.91	5	5	ND	2	90	1
CM 2	2	63	23	91	.1	79	18	519	5.25	3	5	ND	4	62	1
CM 3	2	30	21	82	.1	41	10	362	4.89	9	5	ND	3	26	1
CM 4	2	52	17	57	.1	55	14	369	4.49	6	5	ND	2	99	1
CM 5	1	55	19	75	.2	53	16	456	4.69	3	5	ND	6	47	1
CM 6	1	82	20	71	.1	56	18	442	4.97	2	5	ND	1	151	1
CM 7	11	190	24	88	.4	29	25	721	5.89	9	5	ND	1	117	1
CM 8	6	187	25	73	.6	19	36	1071	5.94	2	5	ND	1	179	1
CM 9	4	84	22	78	.1	63	17	564	5.28	14	5	ND	4	99	1
CM 10	5	40	26	81	.3	23	8	393	4.81	11	5	ND	4	20	1
CM 11	3	109	21	87	.1	74	22	630	5.59	7	5	ND	5	68	1
CM 12	3	63	26	98	.2	49	17	583	4.66	17	5	ND	4	28	1
CM 13	1	84	26	104	.1	110	25	747	5.33	3	5	ND	4	224	1
CM 14	3	47	18	78	.1	61	15	592	5.90	8	5	ND	4	90	1
CM 15	2	93	22	116	.1	114	24	670	6.17	8	5	ND	5	208	1
CM 16	2	49	29	69	.2	38	10	322	3.63	6	5	ND	6	22	1
CM 17	2	63	22	102	.1	56	14	458	5.19	4	5	ND	3	72	1
CM 18	2	70	18	88	.2	35	13	354	4.87	19	5	ND	2	34	1
Rock → 706	12	99	14	227	.7	48	10	1209	11.83	87	5	ND	2	209	2
STD C/AU-S	18	61	38	130	6.8	69	29	1059	3.76	42	19	8	36	52	19

SAMPLE#	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM	Au* PPB
R-48	2	2	93	.32	.136	9	53	1.27	145	.20	4	3.63	.01	.14	1	1
R-49	2	2	102	.40	.228	5	64	1.54	156	.19	5	3.31	.01	.15	1	11
R-49A	2	2	116	1.04	.094	6	144	2.30	147	.17	12	2.75	.02	.39	1	7
CM 0	3	2	94	.42	.304	24	124	1.41	140	.24	6	4.10	.02	.08	3	41
CM 1	2	2	103	.45	.237	28	156	1.66	157	.29	5	3.44	.01	.07	2	42
CM 2	2	2	108	.31	.286	27	165	1.79	169	.32	3	4.35	.02	.14	1	9
CM 3	2	2	89	.12	.189	12	105	.95	90	.27	3	3.61	.02	.06	1	4
CM 4	2	2	99	.59	.285	30	138	1.27	138	.21	5	3.61	.01	.10	1	17
CM 5	2	2	98	.24	.243	19	111	1.30	132	.25	5	4.15	.01	.12	1	15
CM 6	2	2	103	.84	.258	39	108	1.46	249	.22	9	3.66	.02	.13	2	24
CM 7	2	2	99	.44	.198	18	42	1.21	162	.18	7	5.42	.01	.11	21	71
CM 8	2	2	82	1.29	.152	15	24	.92	102	.16	3	7.99	.02	.09	17	470
CM 9	2	2	104	.66	.334	23	102	1.61	146	.24	12	6.25	.01	.11	8	100
CM 10	2	2	82	.11	.123	10	52	.67	67	.20	3	5.50	.01	.10	12	16
CM 11	2	2	121	.41	.256	22	112	1.85	159	.28	4	5.02	.01	.14	14	30
CM 12	2	2	97	.14	.183	18	90	1.15	133	.26	2	5.48	.02	.12	7	95
CM 13	2	2	105	.97	.451	62	165	2.15	279	.27	14	4.08	.02	.22	3	44
CM 14	2	2	104	.46	.607	33	133	1.46	151	.24	3	4.84	.02	.10	2	9
CM 15	2	2	123	.89	.470	49	199	2.46	226	.29	12	4.96	.02	.19	2	8
CM 16	5	2	62	.09	.230	20	66	.70	111	.23	4	6.03	.02	.05	2	2
CM 17	2	2	99	.31	.291	23	120	1.55	132	.27	4	5.44	.01	.11	1	3
CM 18	2	3	83	.21	.136	13	41	1.19	117	.19	9	4.42	.01	.06	2	22
Rock → 706	3	2	72	6.01	.429	8	39	.80	49	.06	2	1.44	.02	.05	1	13
STD C/AU-S	18	20	59	.45	.086	40	59	.86	173	.07	39	1.74	.06	.14	12	50

Copper Mtn. road (CM 0 – CM 18)

Acme Anal. Laboratories.
Report No. 88-3515
August 20, 1988.

On OGG:
CM 1-7
CM 12 & 13 at border

Appendix "C"

HIAWATHA RESOURCES INC.

ADDENDUM TO REPORT ON OGG 1&3 CLAIMS
<u>MAY 1, 1989 - by P.H. SEVENSMA, Ph.D.,P.Eng.</u>

August, 1989

<u>**ADDENDUM** to report on OGG, 1&3 claims of May 1, 1989</u>

<u>by P.H. Sevensma, Ph.D., P.Eng.</u>

1. <u>Soil Survey</u>

The soil survey along Copper Mountain Road, samples C.M. 0-18, was an extension of a 500 sample survey carried out over the Rozan and Eagle 1 claims. This survey, carried out as much as possible in the <u>B</u> horizon, at depths from 5" to 15", outlined a large gold soil anomaly, averaging about 100 ppb gold, with some peak valued of over 2000 ppb and some areas with anomalous tungsten (15-116 ppm w). This survey showed high values over and near the contact areas of large masses of Silver King porphyry that Hiawatha has mapped on the Rozan.

As a large and quite strong conducting zone had been located by an airborne VLF survey trending from OGG 1 through OGG 3 into the Rozan group and close to the Copper Mountain Road, there was an additional reason to investigate this area with an extension of the Rozan soil survey.

This survey resulted in the finding of additional Silver King porphyry beyond the boundary of the Rozan and near the end of the survey near sample CM 7 (see figure 5), of 71 ppb gold and 21 ppb tungsten.

The samples in the field were collected in the "B" horizon location with a pick and trowel, at depths of from 5" - 10" on the upslope side of the road, and placed in kraft paper bags containing about 8 spoonfulls, taken to town and immediately shipped to Acme Analytical Laboratories where they were dried. .500 grams of the sample is them digested with 3 ml 3-1-2 HC1-HN03-H20 at 95 degrees C for one hour and diluted to 10ml with water. This leach is partial for a number of metals and limited for Na, K and Al. Gold is not detected below 3 ppm (= 3000 ppb). Au analysis is done by acid leach of a 10 gr sample, followed by atomic absorption, with a detection limit of 1 ppb

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1. Soil Survey Cont'd

The results were encouraging as sample 7, near a small Silver King porphyry occurrence, showed 71 ppb gold and 21 ppm tungsten.

As a result a further reconnaissance soil survey will be undertaken, to be supplemented by mapping to establish the amount of gold in the soil and the extent of Silver King porphyry in this area and their possible relationship. The samples further to the west of 7 overlie in general Elise volcanics, with both massive rocks and bedded tuffs being recognized.

The survey was carried out on August 9, 1988, by the writer, P.H. Sevensma, Ph.D., P.Eng and R.J. Nicholson, P.Eng., using a 4 w.d. suburban vehicle.

Assays are recorded on Appendix "C" in this report.

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August, 1989

2. Costs

1. Aug. 9, 1988	- Soil sampling and rock examination by P.H. Sevensma and R.J. Nicholson	$ 400.00
Feb., 1989	- Two thin sections and report by John Payne, Ph.D., Vancouver Petrographics	165.50
May 2, 1989	- Drafting, D. Walker	182.82
May 2, 1989	- Drafting, Winfield & Ellam	180.00
May 2, 1989	- Reductions of maps, Western Reproducers	36.01
	Karl Ricker, Airphoto map and report	1,242.57
May 3, 1989	- Lilian Ahlberg, typing OGG report	50.00
May 3, 1989	- Supervision and report, P.H. Sevensma	556.76
	Total	$2,813.66
	Pac withdrawal from excess work Rozan Group (including assaying and vehicle use)	844.10
	Grand Total	**$3,657.76**

P.H. Sevensma

P.H. Sevensma, Ph.D., P.Eng.