#547 - #7668

1979 Assessment Report
Geological and Geochemical

TITLE	TROUT LAKE PROPERTY
CLAIMS	LEMAR 1, 4, 5, 7-18, and ED 1
COMMODITY	Mo
LOCATION	10 km west of Trout Lake, centred on Staubert Lake Longitude 117°39'W Latitude 50°41'N Revelstoke Mining Division 82 K/12
BY	S.G. Enns and C.J. Hodgson, P.Eng. (B.C.)
FOR	AMAX OF CANADA LIMITED
WORK PERIOD	June 2 - August 11, 1979

AMAX VANCOUVER OFFICE

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ILLUSTRATIONS

SUMMARY

This report presents results of geological mapping and soil and stream sediment sampling on the Lemar and Ed claims (16 claims, 115 units) conducted by AMAX during the period June 2 - August 11, 1979. The claims, optioned by AMAX from JOA Resources Ltd. (a private company) in May 1979 are located 8 to 10 km west of Trout Lake and 80 km southeast of Revelstoke. Highway 31 runs through the property.

Bedrock on the claims consists of northwest striking vertically dipping Cambrian to Devonian marine sediments and minor basic volcanics (Lardeau Group) in Trout Lake Valley flanked on either side by younger marine sediments of the Mississippian Milford Group. Black phyllites are the predominant lithology. The syenitic Kuskanax batholith of mid-Jurassic age lies immediately south of the property, and numerous off-shoot sills are present on the claims.

Mineral occurrences on the property consist of minor cross-cutting quartz veins with pyrite and rare galena and sphalerite. Minor galena and trace molybdenite accompany pyrite in cross-cutting quartz veins found in black phyllite talus at the extreme head of Fullmer Creek.

A total of 533 soil stream sediment and rock samples served to outline six geochemical anomalies.

1. A strong Mo-Pb soil and stream sediment anomaly in the extreme headwater of Fullmer Creek. Minor galena and trace molybdenite was found in phyllite talus containing quartz veining.
2. A weak Zn soil anomaly in the northeast corner of Lemar 15 underlain by black calcareous phyllite and black slaty limestone.
3. A weak Zn soil anomaly on the east side of Ed 1 underlain by dark grey phyllite.

4. A weak Zn stream sediment anomaly with a source in the north-western Lemar 16 claim.
5. Weakly anomalous Ag and Zn in stream sediments draining a limonite stain-zone in black phyllite/argillite adjacent to a quartz monzonite sill in northern Lemar 18.
6. A small but strong Pb soil anomaly on the northwestern side of lower Beaton Creek on the Lemar 9 claim.

The total direct cost of the 1979 field work applied toward assessment is $9,973.16.

I INTRODUCTION

1. General Statement

This report represents the results of 1979 geological mapping and geochemical sampling on the Trout Lake property. The work was conducted during the period June 2 to August 11, 1979 by S. Enns and J. Candy assisted in part by C. Hodgson, S. Parry and B. Parry.

2. Definition and Location

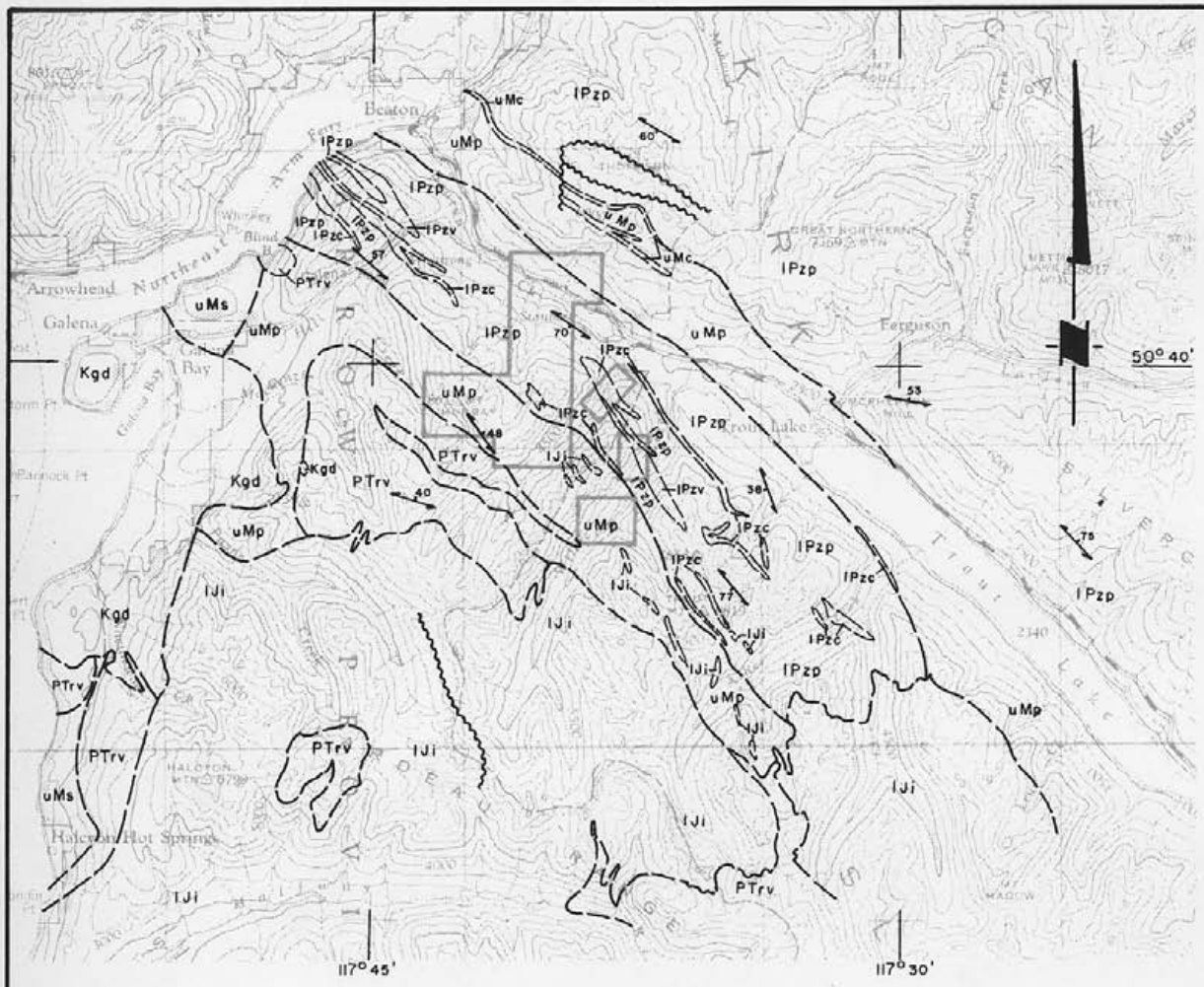
The Trout Lake property consists of 16 claims totalling 115 units. Nine of the claims are two post, the remainder are MGS claims.

Located in the north Lardeau Valley, 4-8 km northwest of Trout Lake, a summer fishing resort, this property lies approximately 80 km (50 miles) southeast of Revelstoke (Figure 1). It is centred approximately at latitude 50°41'N, longitude 117°39'W.

For convenience of discussion, the Trout Lake property is divided into the North Claims which includes Lemar 1, 15, Ed 1, and Staubert claims and the South Claims which includes the remainder of the claims; i.e. Lemar 4, 5, 7-14, 16, 17 and 18 (Figure 2).

3. Access

Highway 31 (partly paved) passes through the North Claims and provides northerly access to Revelstoke from Trout Lake and Kaslo to the south. Local logging roads give access to most of the North Claims. Access to the South Claims is either by foot or by helicopter to ridge tops and then by foot. Most ridge tops afford several good helicopter landing zones.



AMAX OF CANADA LIMITED

TROUT LAKE PROPERTY

REVELSTOKE MINING DIVISION — BRITISH COLUMBIA

LOCATION AND REGIONAL GEOLOGY

SCALE 8 0 8 KILOMETRES / MILES
4 0 4
1 : 250,000

Vancouver —

L E G E N D

CRETACEOUS

Kgd — *Medium to coarse gained muscovite biotite granodiorite and quartz monzonite.*

JURASSIC

IJi — *Leucocratic quartz monzonite and syenite.*

PERMIAN – TRIASSIC
KASLO GROUP

PTv — *Meta-andesite flows, tuff and breccia; amphibolite.*

UPPER MISSISSIPPIAN
MILFORD GROUP

uMp — *Gray and brown phyllite, meta-sandstone.*

uMc — *Gray and white limestone.*

uMs — *Biotite schist, paragneiss.*

CAMBRIAN TO DEVONIAN
LARDEAU GROUP

IPzp — *Gray phyllite, siliceous phyllite, gritty phyllite, rare quartzite.*

IPzv — *Green phyllite, limy green phyllite and greenstone.*

IPzc — *Limestone, phyllitic limestone.*

IPzs — *Biotite schist.*

S Y M B O L S

Lithological boundary

50 — *Foliation attitude.*

Fault.

H.P.

N. T. S. Ref. 82 K 12

FIG. 1

4. Physiography and Climate

The claims lie within the rugged Selkirk Mountains, which are characterized by deep valleys and steep-walled lakes, the rugged mountains are densely clothed with heavy brush and trees on lower slopes and with high snow-capped rocky summits. Maximum relief on the property is 1675 metres with local peaks reaching 2690 metres. Stream tributaries are characteristically narrow, deeply incised and heavily vegetated with mature stands of red cedar, fir, and spruce. On steeper slopes (often 35^0 to 45^0), forest cover is cut by numerous avalanche chutes consisting of a thick tangle of slide-alder, maple, devil's club and stinging nettle. Timberline is at about 2200 metres. The North Claims straddle Trout Lake Valley while most of the South Claims occupy the more rugged alpine terrain to the south.

Known as British Columbia's "second rain belt" the Selkirks receive a mean annual precipitation of between 100 and 150 cm, a good deal of which comes in the form of heavy winter snow. Snowfall varies with the year and with elevation, 7 to 10 metres being average.

Summers are usually warm (20^0 to 30^0C) and yield about two months of good prospecting conditions above timber line. Electrical thunder storms are frequent, often starting serious fires. Winters are long in the valley but temperatures are not extreme. Field work before the end of May at elevations above 1100 metres is usually thwarted by presence of snow. Field season during 1979 lasted from June 1 to mid-October after which permanent snows occupied elevations above 1200 metres.

4. Claims Data

Claims are shown on Figure 2, and pertinent claim data are summarized in Table I.

TABLE I - TROUT LAKE PROPERTY CLAIMS DATA

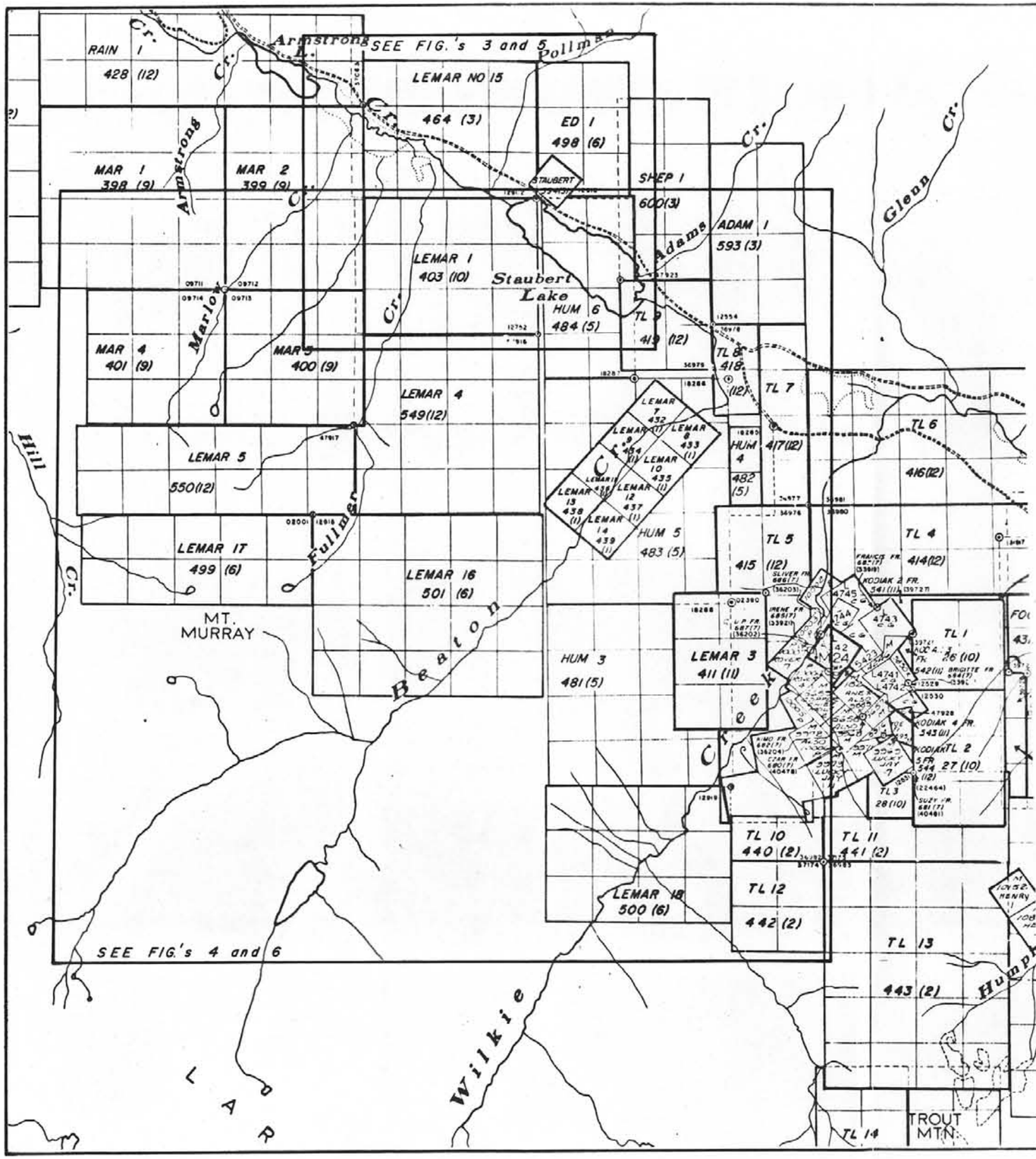
Claim	Units	Location Date	Recording Date (#)	Expiry Date
Ed 1	6	June 5/79	June 7/78 (498)	June 7/81
*Staubert	1	Mar. 23/79	Mar. 23/78 (594)	Mar. 23/81
Lemar 1	12	Oct. 10/77	Oct. 14/77 (403)	Oct. 14/80
Lemar 3	6	Nov. 5/77	Nov. 14/77 (411)	Nov. 14/89
Lemar 4	16	Dec. 20/78	Dec. 21/78 (549)	Dec. 21/80
Lemar 5	12	Dec. 21/78	Dec. 21/78 (550)	Dec. 21/80
**Lemar 7 to 14	8	Jan. 29/78	Jan. 30/79 (433-439)	Jan. 30/81
Lemar No. 15	12	Feb. 14/78	Mar. 13/78 (464)	Mar. 13/81
Lemar 16	20	May 24/78	June 7/78 (501)	June 7/81
Lemar 17	10	May 27/78	June 7/78 (499)	June 7/81
Lemar 18	12	June 2/78	June 7/78 (500)	June 7/81

*Staubert is a two post claim of a reverted crown grant

**Lemar 7-14 are two post claims

Grouping Data

Red No. 1 Group	Lemar 1, 15, Ed 1, Staubert	Total 31 units
Blue Group	Lemar 4, 5	28 units
Yellow Group	Lemar 7 - 14 inclusive	8 units
Green Group	Lemar 16, 17	30 units



AMAX OF CANADA LIMITED

TROUT LAKE PROPERTY

REVELSTOKE MINING DIVISION — BRITISH COLUMBIA

CLAIM MAP

SCALE 2000 0 2000 METRES
4000 0 4000 FEET
1:50,000

Vancouver

N. T. S. Ref 82 K 12

FIG. 2

II REGIONAL GEOLOGY

The claims lie on the northern end of the Kootenay Arc immediately north of the Jurassic Kuskanax batholith. To the west is the long and deep trough of the Columbia River and Arrow Lakes, and to the east is the subparallel Purcell Trench occupied by the Kootenay and Duncan Lakes. Regional geology of the property (Figure 1) was taken from G.S.C. Open File Map 332(1976) by P. Read. The claims straddle two marine sedimentary sequences; the younger Upper Mississippian Milford Group (uMs, uMc, uMp) of brown phyllite, minor conglomerate and limestone, and the tightly folded older, Cambrian to Devonian Lardeau Group (lPzs, lPzc, lPzv, lPzp) of grey phyllite, greenstone and limestone. The Lardeau Group is structurally more deformed and unconformably underlies the Milford Group. It contains a relatively greater proportion of basic volcanics and carbonates and may represent a deeper marine sequence than the younger Milford Group. Trout Lake Valley appears to occupy the east limb of a tight antiformal structure with a northwesterly trending axis.

Permain to Triassic mafic volcanics (PTv) separate the Lardeau and Milford Groups from the Kuskanax batholith.

Narrow leucocratic syenite and quartz monzonite dykes and sills, some of which are off-shoots of the Kuskanax batholith (lPi) are common along the northeastern margin of the batholith. Cretaceous granodiorite and quartz monzonite intrude the north margin of the batholith as a large stock known as the Galena Bay stock. At the nearby Trout Lake molybdenum deposit, a small granodiorite intrusion of late Cretaceous age represents the youngest and most economically significant igneous event.

III PROPERTY GEOLOGY

1. General Statement

Geologic mapping was conducted over an area of approximately 25 square kilometres. Traverses were run along existing logging roads, creeks beds, along contour and ridge tops to collect geologic data. Ground control was provided by fairdrawn metric 1:5,000 contour maps for the North Claims, and by 1:10,000 topographic enlargement for the South Claims. Topofil and compass traverses were utilized to local advantage. Helicopter transport was necessary for work on most of the South Claims, i.e. Lemar 4, 5, 16, 17 and 18.

Exposure of bedrock above timberline is generally quite good. Below timberline steep slopes give rise to many small bluffs and cliffs, some in mature timber stands, others in heavy underbrush. Overall, valley slopes provide adequate geological information. Most lower stream beds (particularly Pollman, Beaton and Wilkie Creeks) though rugged, reveal almost continuous exposure. Trout Lake valley is completely covered by glacial drift and alluvium.

Figure 3 shows outcrop geology for the North Claims (Lemar 1, 15 and Ed 1) and Figure 4 illustrates the geology of the South Claims.

2. Lithology

Ten lithologic units were mapped in the area shown in Figures 3 and 4. They are described in general order of apparent age beginning with the oldest. Units 1 through 3b are Cambrian-Devonian and Upper Mississippian age representing both Lardeau and Milford Groups. No distinction has been made between these groups since no obvious lithologic differences are present. Relative ages of clastic sediments, greenstones and limestone are not known. Dark clastic sediments form the predominant lithology in this region.

Dark Clastic Sediments

Unit 1 consists of undifferentiated clastic sediments composed of dark grey to black phyllite and argillite, calcareous grey phyllite with interbedded gritty phyllite and minor quartz mica schist. In outcrop this unit displays a strongly developed fissility. Thicker gritty interbeds tend to be massive. Some units contain one to two per cent pyrite as large as 2 cm crystals. Locally, limonite stain zones are developed where finely disseminated pyrite and pyrrhotite has been subjected to weathering. Unit 1 constitutes the greatest proportion of the sedimentary sequence which occupies the Trout Lake Valley.

Unit 1A is a poorly sorted white to grey immature conglomerate and conglomeratic phyllite. Clasts consist of white quartzite, dark grey phyllite, often interbedded with, and gradational to finer grits and phyllite beds. Conglomerate beds range in width from 10 to 100 metres and are found most commonly in the southwest region of the area mapped, the Lemar 5, 16 and 17 claims (Figure 4).

Quartzite Unit 1B is found interbedded with the predominant grey phyllite as bands 10 metres to more than 100 metres wide. Composed of dark to almost white micaceous quartzite and graphitic quartzite, this lithology grades locally into banded siliceous and cherty argillite. High silica content and lack of predominant foliation causes massive outcrop development, often with abundant remobilized cross-cutting barren white quartz veins.

Light coloured quartz-sericite schist (Unit 1C) forms local bands several tens of metres wide (often too narrow to map) within grey phyllite. In hand specimen it is a slippy, cream coloured schist locally spotted by limonite specks after ankerite and pyrite. Extreme fissility renders the rock largely unresistive to weathering. The largest exposure, 100 metres wide is found along lower Fullmer Creek and on Lemar 1 (Figure 3). This unit is restricted to only a few occurrences.

Volcanics

Unit 2 is a massive dark green coloured greenstone and chlorite schist. Locally amphibolite is present. Greenstone is most often massive, forming large resistant outcrops. Chlorite schist and greenstone bands are frequently interbedded with grey phyllite country rock and vary from several tens of metres to several hundred metres in width. They are found throughout the sedimentary sequence but the widest bands occur in Lemar 1 east of Fullmer Creek and at Beaton Creek and Wilkie Creek where massive greenstone is associated with the western margin of a massive crystalline limestone unit. Here ellipsoidal jointing, characteristic of pillow flows is present.

Carbonates

Grey to white crystalline limestone mapped as Unit 3 displays massive cliffs upon weathering. Massive limestone outcrops at Beaton Creek form a 500 metre wide, vertical dipping and northeast striking band. In association with the adjacent massive greenstone, it constitutes a good marker bed. The massive unit contains no fossils. Also included in this unit are thin bands (20 to 50 metres wide) of impure grey limestone.

In Upper Fullmer Creek at the locality marked "F" in Figure 4, crinoid fossils were observed. Bedding textures are present in other limestone bands of this area.

Unit 3A is orange weathering massive dolomite which occurs as elongate resistant outcrops. Buff to orange colouration is caused by weathering of ankerite to limonite. Local healing of brittle fractures had produced quartz veins. This unit was mapped only on the Lemar 15 and Ed 1 claims on the northeast side of Trout Lake Valley.

Unit 3B is black slaty limestone and dark grey calcareous schist. The slabby structure of slaty limestone is caused by the abundance of black graphite and argillaceous

partings. Dark grey calcareous phyllite grades into the calcareous schist included in this unit. Black slaty limestone is found at upper Pollman Creek in the north end of Ed 1 on Lemar 15 claim, at lower Beaton Creek and in the southern part of Lemar 1 (Figures 3 and 4).

During the course of mapping it was noted that the sedimentary sequence in the vicinity of upper Fullmer Creek (Lemar 5, 16 and 17) differs from that in lower Trout Lake Valley.

In upper Fullmer Creek region:

1. There is a distinct lack of massive greenstone and crystalline massive limestone.
2. There is a greater abundance of conglomeratic beds, and sandstone argillite interbeds.
3. Clastic and sedimentary bedding textures and structures are better preserved. There appears to be less severe structural deformation.
4. Carbonates tend to be narrow, and often contain much argillaceous material with preserved bedding structure; and in one case are fossil bearing (crinoid stems).

Intrusive Rocks

Unit 4 is composed of medium to coarse grained gabbro and fine grained diabase as intrusive dykes and sills. Mapped by the G.S.C. as Permian to Triassic amphibolite it is reported to be equivalent to the Kaslo Group. Where mapped in the extreme south and southwest part of the property, this unit is relatively fresh despite the proximity of Kuskanax batholith. It appears to represent a large gabbro stock centred immediately west of Mount Murray (Figure 4).

Unit 5a consists of leucocratic equigranular monzonite and syenite dykes and sills.

Unit 5b is a medium to coarse grained equigranular biotite quartz monzonite, and aplite. Quartz monzonite forms a sill-like structure approximately 100 metres wide in Pollman Creek (Figure 3) and between Lemar 16 and 18 (Figure 4). Elsewhere numerous narrow two to ten metre wide leucocratic syenite sills intrude grey phyllite. These narrow sills commonly contain up to ½% pyrite and occasionally cross-cutting quartz-muscovite veinlets. Most of these intrusives are probably related to the nearby Jurassic Kuskanax batholith.

3. Structure

Foliation measurements and lithologic attitudes display an overall northwesterly structural grain. Limestone/greenstone bands suggest a sequence striking 140° with a subvertical dip. In Trout Lake Valley detail outcrop examination indicates tight isoclinal folding superimposed on a pre-existing set of folds. Some evidence for initial folding by soft sediment slumping is locally present in fine grained marine sediments.

4. Glaciation

The Cordilleran ice sheet covered the Trout Lake area to a depth exceeding 2300 metres (7500 feet) in elevation. Movement in the Trout Lake Valley is southeasterly with local alpine glaciers moving north-eastward along tributaries from cirque areas near Trout Mountain and Mount Murray toward Trout Lake Valley. Glacial drift as basal and lateral moraine material is present in thicknesses up to 20 m along the steep valley slopes. A glacial terrace is present at an elevation of 900 to 980 metres with kettle-like features at 940 to 1040 metre elevations in the vicinity of Pollman Creek on Ed 1 claim. Elevations between 960 and 1040 metres on Lemar 1 also represent a glacial terrace. These glacial terraces may represent a modified last stage lateral moraine formed during the final period of ice stagnation. The Trout Lake Valley floor is covered by thick glacial material. Hanging valleys occur at upper Fullmer Creek and at the extreme headwater of Humphries Creek. The cirque at Humphries Creek is

occupied by a small remnant alpine glacier on the north side of Trout Mountain.

5. Mineralization

Pollman Creek (#1)

Minor sporadic galena with very coarse pyrite in a white 5 to 12 cm wide quartz vein at 040°/15°NW. Wallrock quartz monzonite is unaltered.

Staubert Trench (#2)

Old trenching was done on a large white quartz vein or pod measuring 7 to 10 metres wide. Limonite after pyrite and possibly dolomite/ankerite is present. Sporadic streaks of minor pyrite, galena and sphalerite are present in a few broken rocks scattered about the trench. The adjacent grey phyllite displays no sign of hydrothermal alteration. Specimens taken from the trench previously by E. Marlow (nearby resident and part-owner of the claim) were examined and found to contain coarsely crystalline galena and some scheelite. No scheelite was found in the trench by the writer.

Lemar 1 - Logging Road (#3)

The showing is a small fuchsite-pyrite bearing calcite and quartz filled shear zone within quartzite. This zone is less than 0.5 metres wide. A rock chip taken from this locality indicates (in ppm): Mo 1, Cu 256, Ag 10.0, Pb 612, Zn 284.

Upper Fullmer Creek (#4)

In the upper headwaters of the south fork of Fullmer Creek "white quartz vein" in phyllite talus contains coarse pyrite with trace galena and molybdenite. The extent of veined talus, outlined on Figure 4, measures 600 and 200 metres across slope in two zones.

IV GEOCHEMISTRY

1. General Statement

343 soils, 121 stream sediments and 70 rock chips were collected on the claims. Soil samples were taken every 100 metres along contour traverses. Wherever possible the B-Fe horizon was sampled. Humic-ferric podzols predominate in mature timber stands, some of which are partially logged off. Above timberline lithic podzols are common.

Stream sediment samples were collected routinely on any encountered stream courses. Rock chip samples were taken for lithologic background metal evaluation and in some cases to test for metal values in quartz veins.

All samples were submitted to Rossbacher Laboratory, Burnaby for analysis for Mo, Cu, Ag, Pb and Zn. Analytical methods are described in Appendix II.

2. Results

Figure 5 displays the results for North Claims on a scale of 1:5000. Results for the South Claims shown on Figure 6 on a scale of 1:10,000.

Threshold values were derived by inspection. The following values were taken as guides in definition of anomalies for each respective element in soils:

	Weakly Anomalous(ppm)	Highly Anomalous(ppm)	Background Range(ppm)
Mo	11-20	>20	1-3
Cu	101-200	>200	30-60
Ag	1.1-2.0	>2.0	0.2-0.6
Pb	51-100	>100	10-20
Zn	251-500	>500	100-150

Similar threshold values were used for stream sediments, except in the case of Mo, where 6 ppm was used as the weakly anomalous threshold.

North Claims

In the North Claims a weak Zn soil anomaly (250 to 428 ppm) at least 4000 metres along contour can be defined in the northeast corner of Lemar 15. This anomaly is open up slope, and underlain by black calcareous phyllites and slaty black limestone. There is no support from other elements.

Another weak Zn anomaly occurs near the eastern border of Ed 1 with Zn values ranging from 260 to 370 ppm. Little support is shown from other elements. Dark grey phyllite constitutes bedrock.

There are several weakly anomalous Mo, Cu, Ag and Zn soil samples taken from southern Ed 1, Lemar 15 and Lemar 1. These are sporadic and single, and some of the anomalous samples were taken from logged off areas. Generally, these single samples lack support from fellow elements.

All stream sediments show normal metal values.

South Claims

The extreme headwater of Fullmer Creek in Lemar 5 and Lemar 17 contains anomalous Mo and Pb in soils and stream sediments. Small streams contain 8 to 36 ppm Mo, 74 to 116 ppm Pb and lithic soil samples taken from the area show 20-70 ppm Mo and 75 to 400 ppm Pb. Minute quantities of molybdenite and minor galena in white quartz veined black phyllite/ argillite talus have been mapped in this area.

On Lemar 16, a weak Zn anomaly is indicated by stream sediment analysis (300-500 ppm). There is no support from other elements.

On Lemar 18 weakly anomalous Ag and Zn soil values (1.2 - 1.4 ppm Ag; 304 - 604 ppm Zn) are associated with a limonite stained area. The anomaly at the north end of the

soil traverse along the northwestern side of the creek is associated with a medium grained biotite quartz monzonite sill and adjacent stain zone. Several other single soil and stream sediment samples show weakly anomalous Ag and Zn values along the southern half of the same traverse. Bedrock in the topographic section of influence is predominantly black phyllite and argillite intruded by leucocratic syenite and aplite sills related to nearby Kuskanax batholith. A limonitic one metre wide quartz vein near the ridge crest immediately west of the claim boundary contains 16 ppm Mo, 4.2 ppm Ag and 4700 ppm Pb. No mineralization was noted in the sample taken.

A small soil anomaly with strong Pb and weak Zn values is indicated by two adjacent soil samples taken on the slope northwest of Beaton Creek on Lemar 9 claim. This region is underlain by micaceous quartzite and grey phyllite. Two single soil samples show strongly anomalous Pb (210 and 246 ppm) and weakly anomalous Zn. They were taken southeast of Beaton Creek on Lemar 12 and 14 claims and are underlain by crystalline limestone bedrock. There is no Mo support for these anomalies.

S.G. Enns

C.J. Hodgson, P.Eng. (B.C.)

APPENDIX I - STATEMENT OF COSTS

LEMAR 1, 4, 5, 15, 16, 17 and ED 1 CLAIMS

Summary of Work — Geochemical Sampling and Geologic Mapping

Period of Work — June 2 - July 16, 1979

Costs

Personnel		
C.J. Hodgson, Geologist, 601-535 Thurlow Street, Vancouver, B.C.		
July 14, 16	2 days @ $177.60	$355.20
S.G. Enns, Geologist, 601-535 Thurlow Street, Vancouver, B.C.		
June 2,3-5,7-11 & July 1,3-5,7,14,16	16 days @ $129.60	2,073.60
S.E. Parry, Geologist, 601-535 Thurlow Street, Vancouver, B.C.		
June 14,16	2 days @ $ 59.17	118.34
J.R. Candy, Geological Asst., 2426 Lawson Avenue, West Vancouver, B.C.		
June 2,3-5,7-11 & July 1,3-5,7,14,16	16 days @ $ 45.37	725.92
B.J. Parry, Geological Asst., 601-535 Thurlow Street, Vancouver, B.C.		
July 14,16	2 days @ $ 39.46	78.92
Room and Board	38 days @ $ 25.00/man day	950.00
Transportation		
Canuck Truck Rental Ltd., Prince George, B.C.		
3/4 Ton w/winch and canopy	16 days @ $25.00/day	400.00
Invoice #6054, 6239		
Vernon Helicopters, Vernon, B.C.		
Bell 47-G3B2	6.1 hrs. @ $195.00/hr	1,189.50
Fuel	6.1 hrs @ $ 20.00/hr	122.00
Invoice #1953, 1956, 23185, 659		
Geochemical Analysis		
Rossbacher Laboratory, Burnaby, B.C.		
123 soil and stream sediment analysis for Mo,Cu,Ag,Pb,Zn	@ $2.70	332.10
32 rock analysis for Mo,Cu,Ag,Pb,Zn	@ $3.50	112.00
Drafting and Report Preparation		400.00
Credit from PAC		2,100.00
	TOTAL	$8,957.58

To be applied LEMAR 1, 4, 5, 15, 16, 17, and ED 1 Claims

for 1 year

C J Hodgson

APPENDIX I - STATEMENT OF COSTS

LEMAR 7-14

Summary of Work Geochemical Sampling and Geologic Mapping

Period of Work June 15 - 17, 1979

Costs

Personnel

S.G. Enns, Geologist, 601-535 Thurlow Street, Vancouver, B.C.		
June 15-17	3 days @ $129.60/day	388.80
J.R. Candy, Geological Asst., 2426 Lawson Avenue, West Vancouver, B.C.		
June 15-17	3 days @ $ 45.37/day	136.11
Room and Board	6 days @ $ 25.00/man day	150.00

Transportation

Canuck Truck Rental Ltd., Prince George, B.C.		
3/4 Ton w/winch & canopy	3 days @ $25.00/day	75.00
Invoice #6054		

Geochemical Analysis

55 stream sediment and soil for Mo,Cu,Ag,Pb,Zn		
	@ $2.70	148.50
	TOTAL	$898.41

To be apolied to LEMAR 7-14 for 1 year

C J Hodgson

APPENDIX II

Procedures for Collection and Processing of Geochemical Samples

APPENDIX I - STATEMENT OF COSTS

LEMAR 18

Summary of Work — Geochemical Sampling and Geologic Mapping

Period of Work — July 13 - August 11, 1979

Costs

Personnel

S.G. Enns, Geologist, 601-535 Thurlow Street, Vancouver, B.C.		
July 13 & August 11	2 days @ $129.60/day	259.20
S.E. Parry, Geologist, 601-535 Thurlow Street, Vancouver, B.C.		
June 13	1 day @ $ 59.17/day	59.17
J.R. Candy, Geol. Asst., 2426 Lawson Avenue, West Vancouver, B.C.		
July 13 & August 11	2 days @ $ 45.37/day	90.74
B.J. Parry, Geol. Asst., 601-535 Thurlow Street, Vancouver, B.C.		
July 13	1 day @ $ 39.46/day	39.46
Room and Board	6 days @ $ 25.00/man day	150.00

Transportation

Vernon Helicopters Ltd., Vernon, B.C.		
Bell 47-G3B2	6.6 hrs. @ $195.00/hr	1,287.00
Fuel	6.6 hrs. @ $ 20.00/hr	132.00
Invoice #1953, 1956, 23185, 659		

Geochemical Analysis

Rossbacher Laboratory, Burnaby, B.C.		
48 soil and stream sediment for Mo,Cu,Ag,Pb,Zn	@ $2.70	129.60
20 rock for Mo,Cu,Ag,Pb,Zn	@ $3.50	70.00
	TOTAL	$2,217.17

To be applied to LEMAR 18 for 1 year

C J Hodgson

Procedures for Collection and Processing of Geochemical Samples

Analytical Methods for Ag, Mo, Cu, Pb, Zn, Fe, Mn, Ni, Co and W in sediments and soils; Mo, Cu, Zn, Ni and SO_4^{--} in waters.

Amax Exploration, Inc.
Vancouver Office.

September 1970

SAMPLE COLLECTION

Soils

B horizon material is sampled and thus organic rich topsoil and leached upper subsoil are avoided. Occasionally organic rich samples have to be taken in swampy depressions.

Samples are taken by hand from a small excavation made with a cast iron mattock. Approximately 200 gms of finer grained material is taken and placed in a numbered, high wet-strength, Kraft paper bag. The bags are closed by folding and do not have metal tabs.

Observations as to the nature of the sample and the environment of the sample site are made in the field.

Drainage Sediments

Active sediments are taken by hand from tributary drainages which are generally of five square miles catchment or less. Composite samples are taken of the finest material available from as near as possible to the centre of the drainage channel thus avoiding collapsed banks. More than one sample is taken if marked mineralogical or textural segregation of the sediments is evident.

Some 200 gm of finer material is collected unless the sediment is unusually coarse in which case the weight is increased to 1 kg. Samples are placed in the same type of Kraft paper bag as are employed in soil sampling. Water samples are taken at all appropriate sites. Approximately 100 mls are sampled and placed in a clean, screw sealed, polythene bottle. Observations are made at each site regarding the environment and nature of the sample.

Rock Chips

Composite rock chip samples generally consist of some ten small fragments broken from unweathered outcrop with a steel hammer. Each fragment weighs some 50 gms. Samples are placed in strong polythene bags and sealed with non-contaminating wire tabs. Samples are restricted to a single rock type and obvious mineralization is avoided.

Soil, sediment and rock samples are packed securely in cardboard boxes or canvas sacks and dispatched by road or air.

Rossbacher Laboratory
GEOCHEMICAL ANALYSTS & ASSAYERS

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BURNABY, B.C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

April 30, 1974

SUMMARY OF SOME ANALYTICAL TECHNIQUES CURRENTLY IN USE AT ROSSBACHER LABORATORY

A ANALYTICAL TECHNIQUES FOR GEOCHEMICAL SAMPLES

SAMPLE PREPARATION

Packages of samples are opened as soon as they arrive at the laboratory and the bags placed in numerical sequence in an electrically heated sample drier (maximum temperature 70°C).

After drying soil and sediment samples they are lightly pounded with a wooden block to break up aggregates of fine particles and are then passed through a 35 mesh stainless steel sieve. The coarse material is discarded and the minus 35 mesh fraction replaced in the original bag providing that this is undamaged and not excessively dirty.

Rock samples are exposed to the air until the outside surfaces are dry; only if abnormally wet are rocks placed in the sample drier. Rock samples are processed in such manner that a fully representative 1/2 g. sample can be obtained for analysis. The entire amount of each sample is passed through a jaw crusher and thus reduced to fragments of 2 mm. size or less. A minimum of 1 kg. is then passed through a pulverizer with plates set such that 95% of the product will pass through a 100 mesh

screen. Where samples are appreciably heavier than 2 kg the material is split after [illegible] by means of a Jones splitter. After pulverising the sample is mixed by rolling on paper and is then placed in a Kraft paper bag.

SAMPLE DIGESTION

Digestion tubes (100 x 16 mm) are marked at the 5 ml level with a diamond pencil. Tubes are cleaned with hot water and concentrated HCl. 0.5 g samples are weighed accurately, using a Fisher Dial-O-Gram balance, and placed in the appropriate tubes.

To each of the samples thus prepared are added 2 ml of an acid mixture comprising 15% nitric and 35% perchloric acids. Racks of tubes are then placed on an electrical hot plate, brought to a gentle boil ($\frac{1}{2}$ hour) and digested for $4\frac{1}{2}$ hours. Samples unusually rich in organic material are first burned in a porcelain crucible heated by a bunsen burner before the acid mixture is added. Digestion is performed in a stainless steel fume hood.

After digestion tubes are removed from the hot plate and the volume is brought up to 5 ml with deionized water. The tubes are shaken to mix the solution and then centrifuged for one minute. The resulting clear upper layer is used for Cu, Mo, Pb, Zn, Ag, Fe, Mn, Ni and Co determination by a Perkin-Elmer 290B atomic absorption spectrophotometer. Analytical procedures are given on the following pages.

ANALYTICAL PROCEDURES

Silver

1. Scope - This procedure covers a range of silver in the sampl from less than .5 to 1000 ppm
2. Summary of Method - The sample is treated with nitric and perchloric acid mixture to oxidize organics and sulphides. The silver then is present as perchlorate in aqueous solution. The concentration is determined by atomic absorption spectrophotometer
3. Interferences - Silver below 1 gamma/ml is not very stable in solution. Maintaining the solution in 20% perchloric prevents silver being absorbed on the glass container. Determination must be completed on the same day as the digestion.

   Samples high in dissolved solids, especially calcium, cause high background absorbance. This background absorbance must be corrected using an adjacent Ag line.

Silver AA Settings P.E. 290

Lamp - Ag

Current 4 ma position 3

Slit 7 A

Wavelength 3231A Dial 287.4

Fuel - acetylene - flow - 14

Oxidant - air - flow - 14

Burner - techtron AB_51 in line

Maximum Conc. 3 to 4x

Calibration

1. Set 1 gamma/ml to read 40 equivalent to 20 gamma/gm

   Factor $\frac{1}{2}$ x meter reading

   Check standards

   4, 10, 20, 40 ppm Ag in sample

2. Set 15 gamma/ml to 100 equivalent to 100 ppm

   Check standards

   40, 100 ppm

   Factor directly in ppm Ag

3. Rotate burner to maximum angle

   Set 10.0 gamma/ml Ag to read 100

   Check standards

   100, 200, 400, 1000 ppm Ag

   Factor 10x scale reading

4. Samples higher than 1000 ppm should be re-analyzed by assay procedure

5. Background correction for sample reading between 1 to 5 ppm

   Calibrate AA in step 1

   Dial wavelength to 300 (peak)

   Read the samples again

   Subtract the background reading from the first reading

Standards

1. 1000 gamma/ml Ag - 0.720 gm Ag_2SO_4 dissolved in 20 mls $Hx10_3$ and dilute to 500 mls

2. 100 gamma/ml Ag - 10 mls of above + 20 mls $HClO_4$, dilute to 100 mls

3. Recovery spiked standard

5 gamma/ml Ag - 5 mls 100 gamma/ml dilute to 100 mls with "mixed" acid

Working AA Standards

Pipette .2, .5, 1, 2, 5, 10 mls of 100 gamma/ml and 2, 5 mls 1.000 gamma/ml dilute to 100 mls with 20% $HClO_4$. This equivalent to 4, 10, 20, 40, 100, 200, 400, and 1000 ppm Ag in the sample .50 gm diluted to 10 mls.

Recovery Standard

Pipette 2 mls of 5 gamma/ml Ag in mix acids into a sample and carry through the digestion. This should give a reading of 20 ppm Ag + original sample content.

Follow the general geochemical procedure for sample preparation and digestion.

For low assay Ag, the same procedure is used. Ag is then calculated in oz/ton.

1 ppm = .0292 oz/ton

conversion factor

oz/ton = .0292 x ppm Ag

Zn Geochemical AA Setting

Lamp Zn

Current 8 #3 Slit 20A

Wave length 2133 Dial 84.9

Fuel - Acetylene Flow 14

Oxidant - Air Flow 14

Burner - P.E. short path 90°

Range

0 - 20 gamma/ml Factor 4x - 0 to 400 ppm

0 - 50 gamma/ml Factor 10x -0 to 1000 ppm

For Waters - Burner AB- 51 in line 1 gamma/ml read 100 to give 0 to 1000 ppb

High Zn Burner Boling in line. Wavelength 3075. Dial 250 Slit 7A

Fuel 14 Air 14.5

0 to 1000 gamma/ml read 0 to 20 Factor 400 x

Pure Standard 10,000 gamma/ml

1 gm Zn dissolved, H_2O, HCl, HNO_3, $HClO_4$, fumed to $HClO_4$ - make up to 100 mls H_2O

1000, 100 gamma/ml and 100 ml by dilution in 20 % $HClO_4$

0 to 200 gamma/ml Zn use combined Cu, Ni, Co, Pb, Zn standards

Pipette

1, 2, 3, 5, 8, 10 mls of 10,000 gamma/ml - dilute to 100 mls with 20% $HClO_4$ to give

100, 200, 300, 500, 800, 1000 gamma/ml Zn for high standards

Co Geochemical AA Setting

Lamp - 5 multi element

Current 10 #4 Slit 2A

Wavelength 2407 Dial 133.1

Fuel - Acetylene Flow 14

Oxidant - Air Flow 14

Burner - AB 51 in line

Range

0 - 10 gamma/ml read 100 Factor 2 x reading to 200 ppm

0 - 20 gamma ml read 100 Factor 4 x reading to 400 ppm

Burner at maximum angle

0 - 100 gamma/ml read 100 Factor 20 x reading to 2000 ppm

0 - 200 gamma/ml read 100 Factor 40 x reading to 4000 ppm

Standards - 1000 gamma/ml

1.000 gm cobalt metal dissolved in HCl, HNO, and fumed into $HClO_4$, dilute to 1 liter

Pipette

1, 2, 10, 20 mls into 100 ml vol flasks diluted to mark with 20% $HClO_4$

This gives

10, 20, 100, 200 gamma/ml Co

Mixed - combination standards of Cu, Ni, Co, Pb, Zn of

1, 2, 5, 10, 20, 30, 50, 80, 100, 150, 200 gamma/ml are us for calibration

Mn Geochemical AA Setting

Lamp Multi element Ca, Ni, Co, Mn Cr

Current 10 #4 Slit 7A

Wave length 4030.8 Dial 425.2

Fuel - Acetylene Flow 14.0

Oxidant - Air Flow 14.0

Burner - P.E. short path (or AB 50)

Range

0 - 100 gamma/ml Factor 20x - 0 to 2000 ppm

0 - 200 gamma/ml Factor 40x - 0 to 4000 ppm

Burner 90°

0 - 1000 gamma/ml Factor 200x - 0 to 20,000 ppm

0 - 2000 gamma/ml Factor 400x - 0 to 40,000 ppm

EDTA Extraction - use AB 51 in line

0 - 20 gamma/ml Factor 4x - 0 to 400 ppm

Standards

Fisher 10,000 gamma/ml (ml)

10x Dilution 1000 gamma/ml

Pippette

.5, 1, 2, 3, 5, 8, 10, ml of 1000 gamma/ml

2, 3, 5, 8, 10, 15, 20 ml of 10,000 gamma/ml dilute to 100 mls with 20% $HClO_4$. This gives

5, 10, 20, 30, 50, 80, 100, 200, 300, 500, 800, 1000, 1500, 2000 gamma/ml.

Mo Geochemical AA Setting

Lamp ASL H/C Mo

Current 5 #5 Slit 7A

Wavelength 3133 Dial 260.2

Fuel - Acetylene Flow 12.0 to give 1" red feather

Oxidant - Nitrous oxide Flow 14.0

Burner - AB 50 in line

Caution read the operation using N_2O and acetylene flame at end of general AA procedure

Range

0 - 10 gamma/ml Factor 2x - 0 to 200 ppm

Rotate burner to max. angle

0 - 50 gamma/ml Factor 10 x 0 to 1000 ppm

0 - 100 gamma/ml Factor 20 x 0 to 2000 ppm

Standards 1000 gamma/ml

Dissolve .750 gms MoO_3 (acid molybdic) with 20 mls H_2O, 6 lumps NaCH, when all dissolved, add 20 mls HCl, dilute to 500 mls

100 gamma/ml - 10 x dilution

Pipette

.2, .5, 1, 2, 3, 5, 8, 10 mls of 100 gamma/ml

2, 3, 5, 8, 10 mls of 1000 gamma/ml add 5 mls 10% $AlCl_3$ and dilute to 100 mls with 20% $HClO_4$

This gives

.2, .5, 1, 2, 3, 5, 8, 10, 20, 30, 50, 80, 100 gamma/ml M

Fe Geochemical AA Setting

Lamp - Fe

- Do not use multi element Fe

Current 10 #4 Slit 2A

Wavelength 3440.6 Dial 317.5

Fuel - Acetylene Flow 14.0

Oxidant - Air Flow 14.0

Burner - PE Short Path 90°

Range

0 - 5000 gamma/ml 0.1 x % - 0 to 10.0%

0 - 10,000 gamma/ml 0.2 x % - 0 to 20.0%

Higher Fe - 10 x dilution

Standards 10,000 gamma/ml

Weigh 5.000 gms iron wires, into beaker, add H_2O, HCl, HNO_3, $HClO_4$, heat to $HClO_4$ fumes. Add $HClO_4$ to 100 mls + 100 mls H_2O, warm, dilute to 500 mls

Pipette

1, 5, 10, 20, 30, 50, 80 mls 10,000 gamma/ml dilute to 100 mls with 20% $HClO_4$ to give

100, 500, 1000, 2000, 3000, 5000, 8000 gamma/ml to be equivalent to .2, 1.0, 2.0, 4.0, 6.0, 10.0%, 16.0% Fe in geochem sample

Ni Geochemical AA Setting

Lamp P.E. H/C. Ni or multi element Cu, Ni, Co, Mn, Cr

Current 10 #4, Slit 2A

Wave length 3415 Dial 312.5

Fule - Acetlylene Flow 14.0

Oxidant - Air Flow 14.0

Burner AB 51 in line

Range

0 - 20 gamma/ml Factor 4x - 0 - 400 ppm

0 - 100 gamma/ml Factor 20x - 0 - 2000 gamma

45° 0 - 200 gamma/ml Factor 40x - 0 - 4000 ppm

0 - 500 gamma/ml Factor 100x - 0 - 10,000 ppm

Ni in waters and very low ranges

Wave length 2320 Dial 118

Range 0 - 5 gamma/ml Factor 1x - 0 - 100 ppm

Standards 10,000 gamma/ml

1.000 gm pure Ni metal dissolved in HCl, HNO_3, $HClO_4$ to perchloric fumes, dilute to 100 ml H_2O

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% HCl

1, 2, 5, 8, 10 mls of 100 gamma/ml

2, 5, 8, 10 mls 1000 gamma/ml

2, 5, 8, 10 mls 10,000 gamma/ml - dilute to 100 mls in 20% HClO4. This gives

1, 2, 5, 8, 10, 20, 50, 80, 100, 200, 500, 800, 1000 gamma/ml

Combined Standards - Cu, Ni, Co, Pb, Zn is used as a working standard

Cu Geochemical AA Setting

Lamp Single Cu or

5 multi element

Current 10 for multi element #4 Slit 7A

4 for single #3 Slit 7A

Wavelength 3247 Dial 280

Burner Techtron AB 51 (For Cu in natural waters)

P.E. Short Path (For geochem)

Fuel Acetylene Flow 14

Oxidant Air Flow 14

Range

0 - 5 gamma/ml Factor 1x to 100 ppm (for low Cu)

0 - 20 gamma/ml Factor 4x to 400 ppm

Burner 90°

0 - 200 gamma/ml Factor 40x to 4000 ppm

Wavelength 2492 Dial 147

Burner in line

Range

0 - 1000 gamma/ml Factor 200x to 20,000 ppm

0 - 2000 gamma/ml Factor 400x to 40,000 ppm

Higher range than 40,000 ppm requires 10x dilution

Standards

10,000 gamma/ml

1.000 gm metal powder, H_2O, HCl, HNO_3 until dissolved, add $HClO_4$, fume dilute to 100 mls

1000 gamma/ml 10x dilution above in 20% $HClO_4$

2000 gamma/ml 20 mls 10,000 gamma/ml - dilute to 100 mls in 20% $HClO_4$

100 gamma/ml 10x dilution 1000 gamma/ml dilute to 100 mls in 20% $HClO_4$

200 gamma/ml 10x dilution 2000 gamma/ml dilute to 100 mls in 20% $HClO_4$

Pipette

1, 2, 3, 5, 8, 10 mls 100 gamma/ml - dilute to 100 mls with 20% $HClO_4$ to give 1, 2, 3, 5, 8, 10 gamma/ml

Combined standards Cu, Ni, Co, Pb, Zn

1, 2, 5, 10, 20, 30, 50, 80, 100, 150, 200 gamma/ml

Pb Geochemical AA Setting

Lamp ASL H/c Pb

Current 5 ma Slit 7A

Wave length 2833 Dial 208

Fuel - acetylene Flow 14

Oxidant - air Flow 14

Burner AB 51 in line

Range

0 - 20 gamma/ml to read 0 to 80. Factor 5x 0 to 500 ppm

0 - 200 gamma/ml to read 0 to 80. Factor 50x 0 to 5000 ppm

Standards - 10,000 gamma/ml

1.000 pure metal, dissolved in HNO_3, fumed to $HClO_4$ make up to 100 mls in 20% $HClO_4$

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% $HClO_4$

Pipette

1, 2, 5, 8, 10 mls 100 gamma/ml

2, 5, 8, 10, 20 mls 1000 gamma/ml dilute to 100 mls in 20% $HClO_4$ this gives

1, 2, 5, 8, 10, 20, 50, 80, 100, 200 gamma/ml

Combined Standards Cu, Ni, Co, Pb, Zn, are used as working standards

W in Soils and Silts

Reagents and apparatus

Test tubes - pyrex disposable

Test tubes - screw cap

Bunsen Burner

Flux - 5 parts Na_2CO_3

4 parts NaCl

1 part KNO_3 pulverized to -80 mesh

7% $SnCl_2$ in 70% HCl

20% KSCN in H_2O

Extractant - 1 part tri-n-butyl phosphate

9 parts carbon tetrachloride

Standards

1000 gamma/ml W

.18 gms Na_2WO_4 $2H_2O$ dissolved in H_2O, make up to 100 mls

100 gamma/ml, 10 gamma/ml by dilution

Standardization

Pipette .5, 1, 2, 3, 5, 8, 10 ml of 10 gamma/ml

and 1.5, 2 mls of 100 gamma/ml - dilute to 10 mls

continue from step #4

Artificial colors - Nabob pure Lemon Extract, dilute with 1:1 ethanol and water to match. Tightly seal these for permanent standards

Procedure

1. Weigh 1.0 gram sample, add 2 gm flux, mix

2. Sinter in rotary for 2 to 3 minutes (Flux dull read for one minute)
3. Cool, add 10 mls H_2O, heat in sand bath to boiling, cool, let sit overnight
4. Stir, crush, and mix. Let settle
5. Take 2 ml aliquot into screw cap test tube
6. Add 7 mls $SnCl_2$, heat in hot water bath for 5 minutes (80°C)
7. Cool to less than 15°C
8. Add 1 ml 20% KSCN, mix (if lemmon yellow; compare color standard 10x)
9. Add ½ ml extractant, cap, shake vigorously 1 minute
10. Compare color

Molybdenum in Water Samples

1. Transfer 50 mls to 125 separatory funnel
2. Add 5 ml .2% ferric chloride in conc HCl
3. Add 5 mls of mixed KSCN and $SnCl_2$
4. Add 1.2 mls isopropyl ether, shake for 1 minute, and allow phases to separate
5. Drain off water
6. Compare the color of extractant

Standardization

Pipette 0, .2, .5, 1, 2, 3, 4, 5, mls of 1 gamma/ml and 1, 1.5, 2, mls of 10 gamma/ml dilute to 50 mls with demineralized H_2O, d continue step #2.

This equivalent to -

1, 4, 10, 20, 40, 60, 80, 100, 200, 300, 400 ppb Mo

Artificial color - Nabob orange extract dilute with 1:1 H_2O to methanol to match. Seal tightly

$SnCl_2$ - 15% in 15% HCl

300 gm $SnCl_2 \cdot 2H_2O$ + 300 mls HCl, until $SnCl_2$ dissolved dilute to 2 liters

KSCN - 5% in H_2O

Mixed $SnCl_2$ - KSCN

3 parts $SnCl_2$ to 2 parts KSCN

Water Samples Run for AA

1. Cu - 2 gamma/ml reads 80 scale therefore 1 unit = 25 ppb
2. Zn - 1 gamma/ml reads full scale therefore 1 unit = 10 ppb
3. Ni - 2.5 gamma/ml reads 50 scale therefore 1 unit = 50 ppb

Burner: long slot techtron burner in line

Sulphate in Natural Waters

1. Pipette 0.5 ml sulphate reagent mix into a colorimetric tube
2. Add 5 ml water sample and mix
3. Read at 343 mμ against a demineralized water blank
4. Read again at 400 mμ and subtract from sulphate reading
5. Calculate ppm sulphate from the graph

Reagent

Dissolve 54 grams red mercuric oxide (J.T. Baker 2620- Can Lab) in 185 ml 70% perchloric acid and 20 ml H_2O, shake for one hour. Add 46.3 grams ferric perchlorate [$Fe(ClO_4)_3 \cdot 6H_2O$] (GFS 39) and 47 grams aluminum perchlorate [$Al(ClO_4)_3 \cdot 9H_2O$] (GFS 2) Add 400 ml water to dissolve, let settle overnight, decant into bottle and make to 1 liter

pH MEASUREMENTS

Soil and drainage sediment samples are dampened with water in a glass beaker to a pasty consistency. Demineralized water is used for this purpose as it has a low buffer capacity and thus does not influence the pH of the sample. Measurement is made with a Fisher Acument pH meter. Electrodes are stored in buffer overnight. A 30 minute warm up time is allowed for the instrument each morning. A 10 ml aliquot is taken from water samples for pH measurement.

ROSSBACHER LABORATORY

P. Rossbacher

APPENDIX III

STATEMENT OF QUALIFICATIONS

NAME	S.G. Enns
ADDRESS	601-535 Thurlow Street Vancouver, B.C.
EDUCATION	4 year BSc (Honours Geology) 1967 University of Manitoba
	MSc (Ec. Geology) 1971 University of Manitoba
EXPERIENCE	Geol. Assistant Manitoba Mines Branch 1964(field season) Geol. Assistant Sherritt Gordon Mines 1965 " Geol. Assistant AMAX Exploration 1966-1970 " Staff Geologist Cerro Mining of Can. 1971 Staff Geologist Hudson's Bay Oil & Gas 1972 Staff Geologist BP Minerals of Canada 1973-1975 Staff Geologist BP Alaska Exploration 1975-1979 Staff Geologist AMAX of Canada 1979-

STATEMENT OF QUALIFICATIONS

NAME	J.R. Candy
ADDRESS	2426 Lawson Avenue West Vancouver, B.C.
EDUCATION	1st & 2nd year Science leading for a biology major, completed in May 1977 Capilano College
EXPERIENCE	—

1976 D.C. Syndicate - geologist assistant
1977 J.C. Stephens Exploration - prospector/expeditor
1977 AMAX Potash Limited - core splitter
1978 AMAX Potash Limited - Geological Assistant
1979 AMAX Potash Limited - Geological Assistant

STATEMENT OF QUALIFICATIONS

NAME S.E. PARRY

EDUCATION 4 year BSc. (Hons. Geological Sciences)
Queen's University, Kingston, Ontario

MSc. (Geology)
University of Western Ontario, London, Ontario

EXPERIENCE Geological Assistant - Cominco Ltd. - 1975
Geological Assistant - Shell Canada Resources - 1976
Geologist - Falconbridge Copper Ltd. - 1977, 1978
Geologist - AMAX Minerals Exploration - 1979

NAME B.J. PARRY

EDUCATION 3 year B.A. in Geology
Queen's University, Kingston, Ontario

EXPERIENCE Geochemical field assistant - Dickenson Mines - 1975
Geological assistant - Shell Canada Resources - 1976
Geochemist & camp manager, Falconbridge Copper - 1977
Geochemical technician - University of Western Ontario - 1978,1979
Geochemical technician - AMAX Minerals Exploration - 1979

LEGEND

JURASSIC TO CRETACEOUS

5a *Syenite dykes and sills.*

5b *Biotite quartz monzonite and aplite.*

PERMIAN TO TRIASSIC

4 *Gabbro and diabase.*

CAMBRIAN TO MISSISSIPPIAN

3 *Massive white and gray crystalline limestone.*

3a *Orange weathering massive dolomite.*

3b *Black slaty limestone and dark gray calcareous schist.*

2 *Massive greenstone and chlorite schist.*

1 *Undifferentiated gray and black phyllite and argillite, calcareous phyllite and gritty phyllite. Minor quartz mica schist.*

1a *White quartzite conglomerate, coarse grit and conglomeratic phyllite.*

1b *Light coloured micaceous quartzite, black graphitic quartzite, grades locally into banded siliceous and cherty argillite.*

1c *Light coloured quartz sericite schist and phyllite.*

SYMBOLS

- *Outcrop.*
- *Limit of suboutcrop and/or float.*
- *Geological contact.*
- *Cleavage and/or schistosity attitude (inclined, vertical).*
- *Bedding attitude (inclined, vertical).*
- *Mineral occurrence.*
- *Quartz vein.*
- *Adit*
- *Legal corner post, claim boundary*
- *Claim unit boundary*
- *Claim post, claim location line*
- *Claim boundary*
- *Major road*
- *Road, diamond drill road*
- *Stream*
- *Topographic contour (contour interval 20 metres)*

AMAX OF CANADA LIMITED

TROUT LAKE PROPERTY

REVELSTOKE MINING DIVISION — BRITISH COLUMBIA

GEOLOGICAL MAP

SCALE 300 200 100 0 300 METRES
1000 800 600 400 200 0 1000 FEET

1:5,000

To accompany 1979 Assessment Report by S. G. Enns and C. J. Hodgson.

Vancouver -

N. T. S. Ref. 82 K 12

FIG. 3

Staubert Lake

Adams

TL 11278

2511

5693

7926

5694

4000

3800

2500

Marlow Creek

Fennell Creek

LEMAR 1

LEMAR 4

LEMAR 5

LEMAR 17

LEMAR 16

LEMAR 18

LEMAR 13

LEMAR 14

LEMAR 12

LEMAR 11

LEMAR 10

LEMAR 9

LEMAR 7

LEMAR 8

LCP17 LCP18

Mount Murray

Beaton Creek

Cliff Creek

4500

6000

7000

7500

6500

5500

3500

S E L K I R K

M O U N T A I N S

L E G E N D

JURASSIC TO CRETACEOUS

5a *Syenite dykes and sills.*

5b *Biotite quartz monzonite and aplite.*

PERMIAN TO TRIASSIC

4 *Gabbro and diabase.*

CAMBRIAN TO MISSISSIPPIAN

3 *Massive white and gray crystalline limestone.*

3a *Orange weathering massive dolomite.*

3b *Black slaty limestone and dark gray calcareous schist.*

2 *Massive greenstone and chlorite schist.*

1 *Undifferentiated gray and black phyllite and argillite, calcareous phyllite and gritty phyllite. Minor quartz mica schist.*

1a *White quartzite conglomerate, coarse grit and conglomeratic phyllite.*

1b *Light coloured micaceous quartzite, black graphitic quartzite, grades locally into banded siliceous and cherty argillite.*

1c *Light coloured quartz sericite schist and phyllite.*

S Y M B O L S

Limit of outcrop area, outcrop.

Limit of float area.

Fossil locality.

Geological contact (defined, approximate). *Showing dip.*

Fault.

Mineralized shear.

Quartz vein.

Limit of quartz vein zone.

Bedding attitude (inclined, vertical).

Foliation attitude (inclined, vertical).

Limit of stain zone.

Gal., py., Mo *Mineral occurrence.*

Adit.

Legal corner post, claim boundary.

Claim unit boundary.

Claim post, claim location line.

Claim boundary.

Major road.

Road, diamond drill road.

Stream

6000 *Topographic contour (contour interval 100 feet).*

AMAX OF CANADA LIMITED

TROUT LAKE PROPERTY

REVELSTOKE MINING DIVISION — BRITISH COLUMBIA

GEOLOGICAL MAP

C.J. Hodgson

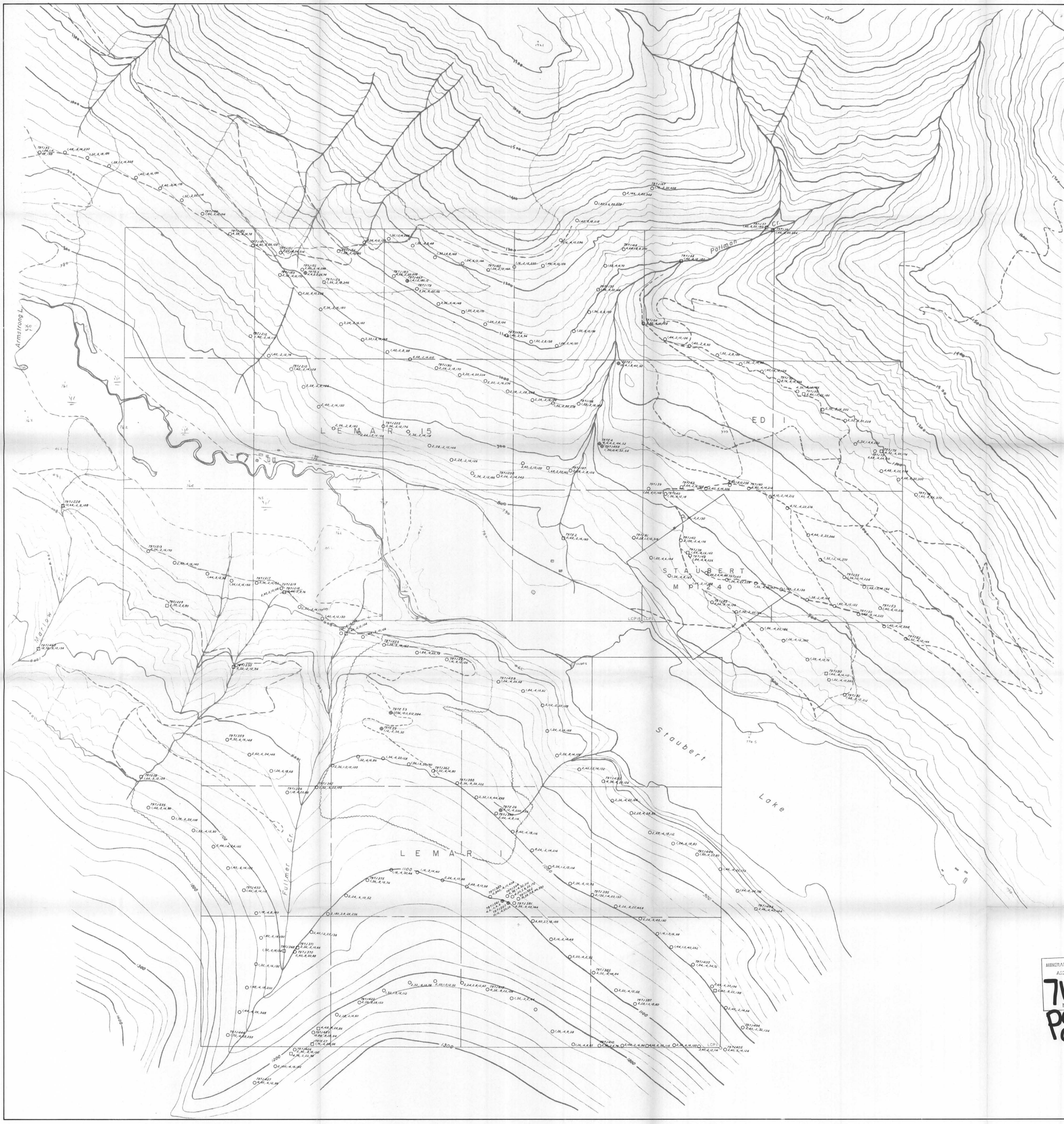
SCALE 1600 800 0 800 1600 FEET
400 200 0 200 400 METRES
1:10,000

To accompany 1979 Assessment Report by S. G. Enns and C. J. Hodgson

Vancouver — G.T., H.P.

N.T.S. Ref 82 K 12

FIG. 4



SYMBOLS

- Soil, Silt, Rock chip — Sample site, sample number, p.p.m. Mo, Cu, Ag, Pb, Zn
- Legal corner post, claim boundary
- Claim unit boundary
- Claim post, claim location line
- Claim boundary
- Major road
- Road, diamond drill road
- Stream
- Topographic contour (contour interval 20 metres)

AMAX OF CANADA LIMITED

TROUT LAKE PROPERTY

REVELSTOKE MINING DIVISION — BRITISH COLUMBIA

GEOCHEMICAL MAP

C.J. Hodgson

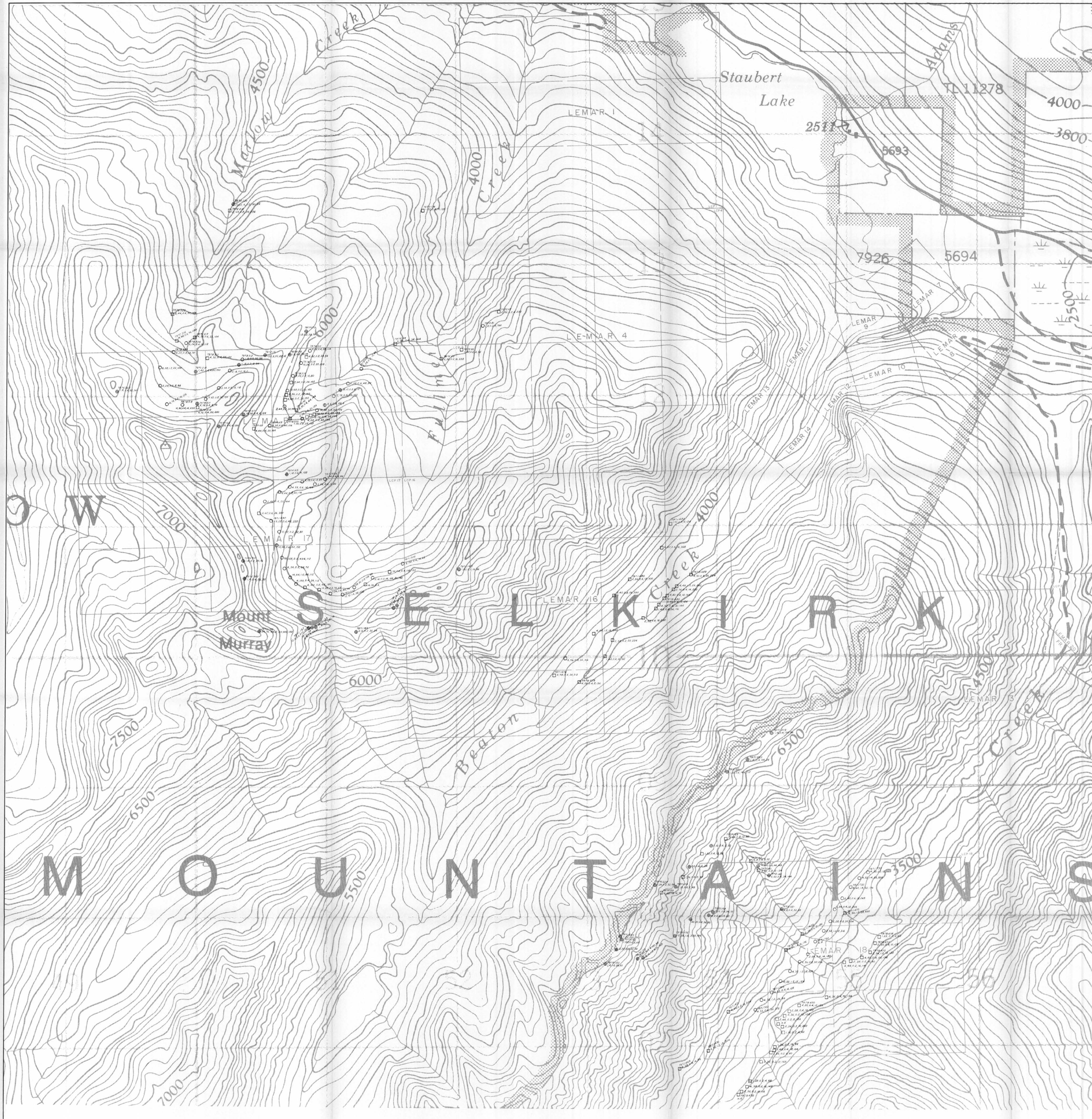
SCALE 300 200 100 0 300 METRES
1000 800 600 400 200 0 1000 FEET
1:5,000

To accompany 1979 Assessment Report by S.G. Enns and C. J. Hodgson.

Vancouver –

N.T.S. Ref. 82 K 12

FIG. 5



LEGEND

- Soil, Silt, Rock chip — Sample site, sample number; p.p.m. Mo, Cu, Ag, Pb, Zn
- Legal corner post, claim boundary
- Claim unit boundary
- Claim post, claim location line
- Claim boundary
- Major road
- Road, diamond drill road
- Stream
- Topographic contour (contour interval 100 feet)

C J Hodgson

AMAX OF CANADA LIMITED

TROUT LAKE PROPERTY

REVELSTOKE MINING DIVISION — BRITISH COLUMBIA

GEOCHEMICAL MAP

SCALE 1600 800 0 800 1600 FEET
400 200 0 200 400 METRES
1:10,000

To accompany 1979 Assessment Report by S.G. Enns and C. J. Hodgson.

Vancouver –

N.T.S. Ref. 82 K 12

Fig. 6