

1970 PROPERTY REPORT

2931

TITLE Hanson Lake Molybdenite Prospect  
AUTHOR D.G. Allen  
DATE December 1970  
COMMODITY Molybdenite  
LOCATION - Area North of Endako, B.C.  
- Mining Division Omineca  
- Co-ordinates 54°15'N, 125°01'W  
- NTS 93 K 3  
CLASS Prospect - Physical Work

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT

NO. 2931 MAP

TABLE OF CONTENTS

SUMMARY

INTRODUCTION----- 1  
    Location and Access----- 1  
    Physiography----- 1  
    Property----- 1  
    Scope of Exploration Program----- 1

REGIONAL GEOLOGY----- 2  
    Hanson Lake Area Geology----- 2  
    Structure----- 4  
    Rock Alteration and Mineralization----- 4

GEOCHEMISTRY----- 5

GEOPHYSICS----- 6

REFERENCES----- 7

APPENDICES

- APPENDIX I - Comments on Geochemical Data and Procedures  
            for Collection and Processing of Geochemical  
            Samples
- II - Assessment Data

ILLUSTRATIONS

- #1 Figure 1 - Location Map-----After Page 1  
#2 2 - Location Map and Regional Geology-----After Page 2  
#3 3 - Geological and Geochemical Map(1"=1000')-In Pocket  
#4 4 - Geological and Geochemical Map(1"=400')--In Pocket  
#5 5 - Profile Pits-----After Page 5

SUMMARY

The Hanson Lake Molybdenite Prospect is located on the south side of Hanson Lake ten miles north of Endako, B.C. The property consists of 48 claims (Top #1-48) staked early in 1970 to cover an extensive molybdenum soil anomaly obtained in 1969.

The property is mantled by an extensive veneer of glacial drift hence outcrops are scarce. The geology appears to be relatively simple, the principal rock type being the Rex quartz monzonite, a relatively old phase of the Topley intrusions. A 200 foot wide dyke of porphyritic quartz monzonite is present in the southeast claims.

Molybdenite in place has not been observed on the property, although a sample from an outcrop on the Top #23 claim was found to contain 114 ppm Mo. A few boulders containing molybdenite were found on the claims in 1969 and 1970. It is not known whether or not they were derived locally. The nature of subsoils in two profile pits suggests that fluvio-glacial deposits may underlie a large part of the claims.

Pyrite is also scarce, along with other favourable alteration minerals. The only minerals of possible hydrothermal origin are magnetite and hematite as thin films and scattered grains, and the occasional veinlet of epidote surrounded by narrow envelopes of K-feldspar.

A prominent molybdenum soil anomaly about 6000 feet by 4000 feet was obtained during the 1970 field season. The lack of outcrop over the anomalous area makes interpretation of the geochemical results difficult. The boggy nature of the area and the humic content of many of the samples suggest a considerable degree of organic accumulation. Profile pits, however indicate molybdenum is present in underlying organic-free material.

## INTRODUCTION

### Location and Access (Figures 1 and 2)

The Hanson Lake Molybdenite Prospect is located ten miles north of Endako B.C. The property lies on the south side of Hanson Lake between elevations 2600 feet near the lake to 4100 feet on the ridge south of the lake. Access to the property is by float plane or helicopter from Burns Lake, 29 miles to the west.

### Physiography

The property lies in a dissected part of the Nechako plateau, in an area of broken upland ridges and wide major valleys. Near Hanson Lake, the topography is gentle except near the lake where there is a moderate drop to the lake level.

Glacial till and fluvioglacial gravels mantle much of the area, reaching thicknesses of as much as 40 feet on the higher ground and probably much greater thicknesses in the major valleys.

The slopes south of Hanson Lake are heavily forested with a young growth of jack pine, white spruce, slide alder and devils club, which developed after a fire destroyed most of the vegetation a number of years ago.

### Property

The property consists of 48 claims (Top #1-48) staked for AMAX Exploration, Inc. and recorded on March 31, 1970.

### Scope of Exploration Program

The Hanson Lake property was staked to cover a number of anomalous drainages on the south side of Hanson Lake. Several anomalous soil lines extending over a length of 7000 feet were also obtained. The purpose of the 1970 field program was to outline the extent of the anomaly and possible mineralized zone by geochemical soil sampling and intensive prospecting along a grid.

## REGIONAL GEOLOGY

The Endako area is underlain by a complex composite batholith, one of the Topley intrusions. The name Topley intrusions refers to a number of batholiths and stocks of presumed genetic affiliation, which occur in a broad northwesterly-trending belt about 150 miles long and 30 miles wide across Central British Columbia. They are of interest because they are host rocks for several important molybdenite prospects and one major ore deposit. Molybdenite is commonly associated with acid phases. The most abundant rock type is coarse grained granite or quartz monzonite. Several bodies of foliated biotite-hornblende diorite are also included among the Topley intrusions. Potassium-argon ages range from 114 to 178 m.y. but most cluster around 138 m.y.

In the Endako area, Carr (1965 B.C. Dept. of Mines) divided the Topley rocks into 13 major map units. His terminology will be used here. Near Hanson Lake, three main phases are present: hornblende diorite gneiss, one of the oldest units; Rex quartz monzonite, a relatively old phase; and Triangle quartz monzonite, one of the youngest units.

Tertiary basic volcanic rocks of the Endako group, dipping northeast at low angles occupy much of the map area. They are generally considered to be Oligocene or younger in age.

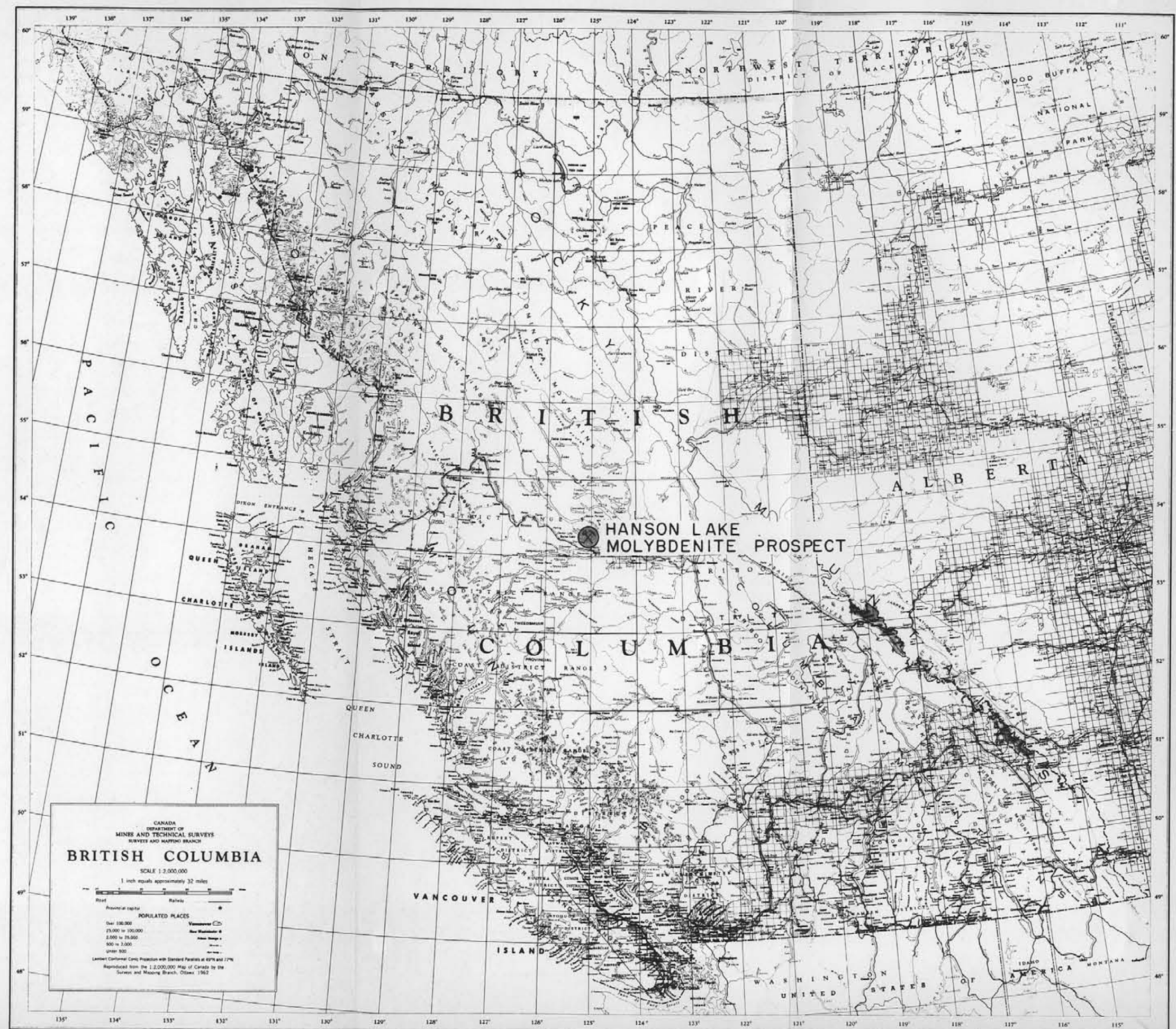
### Hanson Lake Area Geology

The geology of the claims and surrounding area is shown on Figure 2. The geology in the Triangle Lake area is taken from Carr.

Hornblende diorite gneiss (Unit 1)- outcropping on the northeast shore of Hanson Lake is a strongly foliated dark green medium grained plagioclase-amphibole rock with minor amounts of quartz. The foliation trends  $127^{\circ}/75$  SW which is parallel to trends measured by Carr in other dioritic bodies in the Endako area.

Rex hornblende-biotite quartz monzonite (Unit 2) - most

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 2931 MAP #1



CANADA  
 DEPARTMENT OF  
 MINES AND TECHNICAL SURVEYS  
 SURVEYS AND MAPPING BRANCH  
**BRITISH COLUMBIA**  
 SCALE 1:2,000,000  
 1 inch equals approximately 32 miles

Road      Provincial capital      Railway

**POPULATED PLACES**  
 Over 100,000      Vancouver  
 25,000 to 100,000      New Westminster  
 2,000 to 25,000      Port Moody  
 500 to 2,000      Port Alberni  
 Under 500     

Lambert Conformal Conic Projection with Standard Parallels at 49°N and 57°N  
 Reproduced from the 1:2,000,000 Map of Canada by the  
 Surveys and Mapping Branch, Ottawa, 1962

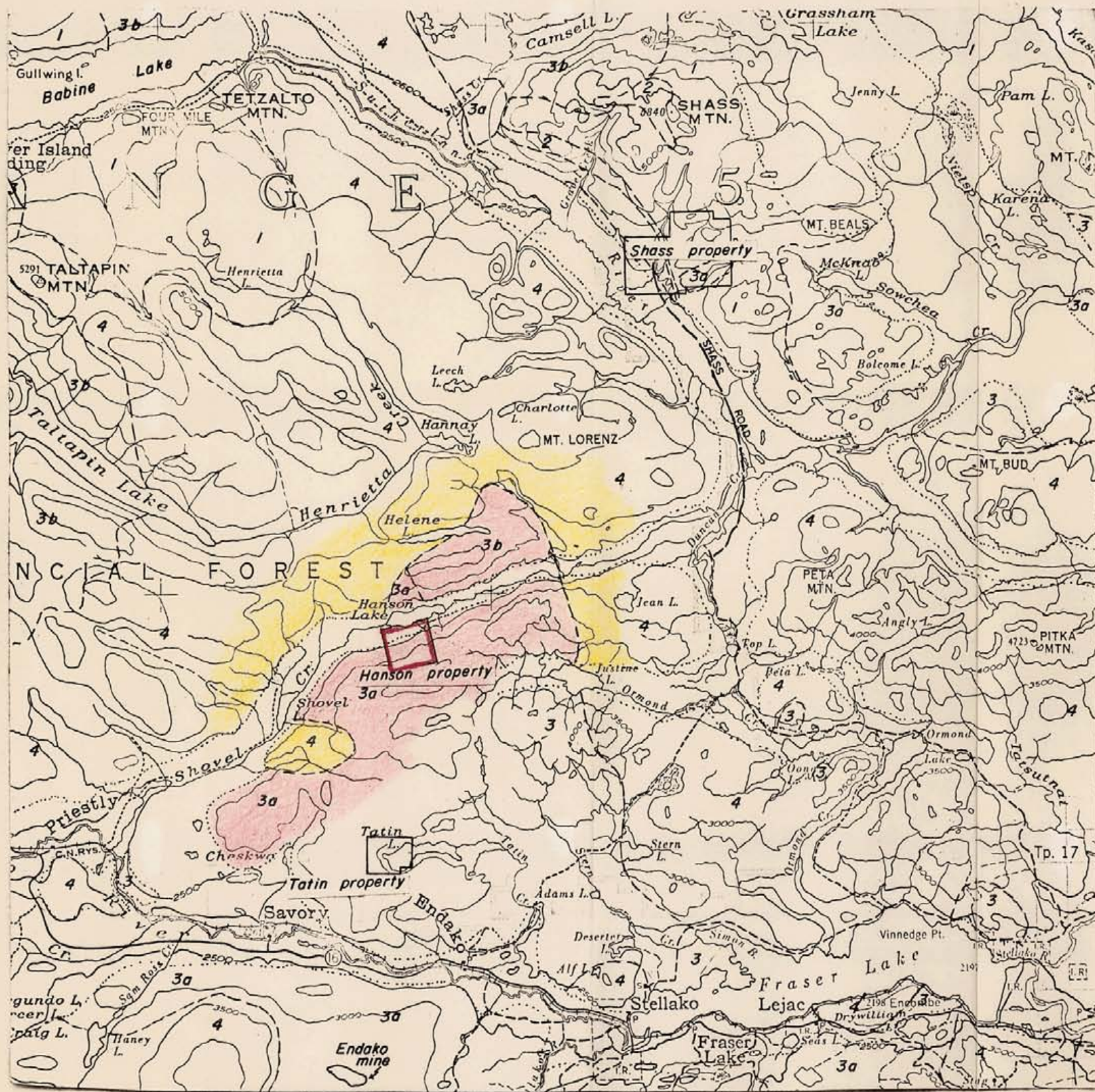
LOCATION MAP

of the claim area is underlain by the Rex quartz monzonite, a relatively old phase of the Topley intrusions along with the Endako, Glenannan, Nithi, Tatin, and Titan quartz monzonites and granites. The rock is mesocratic with 2-5 mm quartz, plagioclase, biotite and hornblende in varying proportions, and scattered pink orthoclase phenocrysts up to 2 cm long. The rock is slightly finer grained on the ridge south of the claims. A few pegmatite and aplite stringers have been observed on the claims.

Porphyritic biotite quartz monzonite (QOP porphyry of Carr) (Unit 3) - a prominent 200 foot wide dyke of porphyritic quartz monzonite outcrops along the ridge on the southeast claims. The rock consists of rounded glassy quartz grains, orthoclase, and plagioclase phenocrysts up to 1 cm in diameter, with smaller ones of biotite in a fine grained pinkish-grey aplitic groundmass. According to Carr the dyke extends southward to the west side of Triangle Lake and is part of a north-northeasterly system of dykes.

Rhyolite (Unit 4) - rhyolite dykes are abundant on the north side of Hanson Lake cutting the Rex quartz monzonite and the hornblende diorite. They have not been observed on the south side of the lake. The dykes may be important because similar ones are also found in the Endako Mine area and near mineralized showings on Nithi Mountain. They generally trend northwest although a few trend northeast. The dykes are aphanitic, buff-colored and in places have a sugary texture. A few dykes are porphyritic with rounded quartz phenocrysts and some are flow-banded.

Triangle quartz monzonite (Unit 5) - the Triangle quartz monzonite outcrops around Triangle Lake. Its age relative to the Rex quartz monzonite is unknown. Carr notes its similarity to the Tatin quartz monzonite but White et al (1970) correlate the body with the group of youngest Topley intrusions because of its abundance of mafic xenoliths, a characteristic of the younger rocks.



**LEGEND**

- 4 Tertiary volcanic and sedimentary rocks
- 3 Topley intrusions  
3a granite, granodiorite; 3b diorite
- 2 Serpentinite
- 1 Permian Cache Creek group

Department of  
 Mines and Petroleum Resources  
**ASSESSMENT REPORT**  
 NO. 2931 MAP # 2

AMAX EXPLORATION INC.  
**HANSON LAKE**  
**MOLYBDENITE PROSPECT**  
 OMINECA MINING DIVISION — BRITISH COLUMBIA  
**LOCATION MAP & REGIONAL GEOLOGY**

SCALE 1: 250,000

*Donald S. Miller* Figure 2



Porphyritic andesite (Unit 6) - a few basic dykes of porphyritic andesite have been observed in the Hanson Lake area. They are generally fine grained and dark green in colour with tiny phenocrysts of hornblende or plagioclase.

#### Structure

Evidence of any significant structure on the claims is lacking because of the limited amount of outcrop. The Rex quartz monzonite has a well developed conjugate joint system but no attempt has been made to study the trend. On a regional scale, a number of prominent north-northwest structures are obvious from air photos and topographic maps. Carr notes that the northeast trending dykes in the Triangle Lake area are emplaced in previously sheared rocks.

#### Rock Alteration and Mineralization

Molybdenite in place was not observed on the Hanson Lake property, although quartz monzonite from an outcrop on the Top #23 claim was found to contain 114 ppm Mo. A small amount of molybdenite was found in float on the Top #14 claim and was associated with pyrite along a 4 cm aplite stringer in the Rex quartz monzonite.

Evidence of hydrothermal alteration is scarce. Thin films and scattered grains of magnetite and hematite are present on joints in a few places. Rarely, films of epidote about 1 mm wide surrounded by a 1-2 cm envelope of reddish-K-feldspar alteration are present in the quartz monzonite. A few thin veinlets of vuggy quartz occur in the porphyritic quartz monzonite on the Top #12 claim.

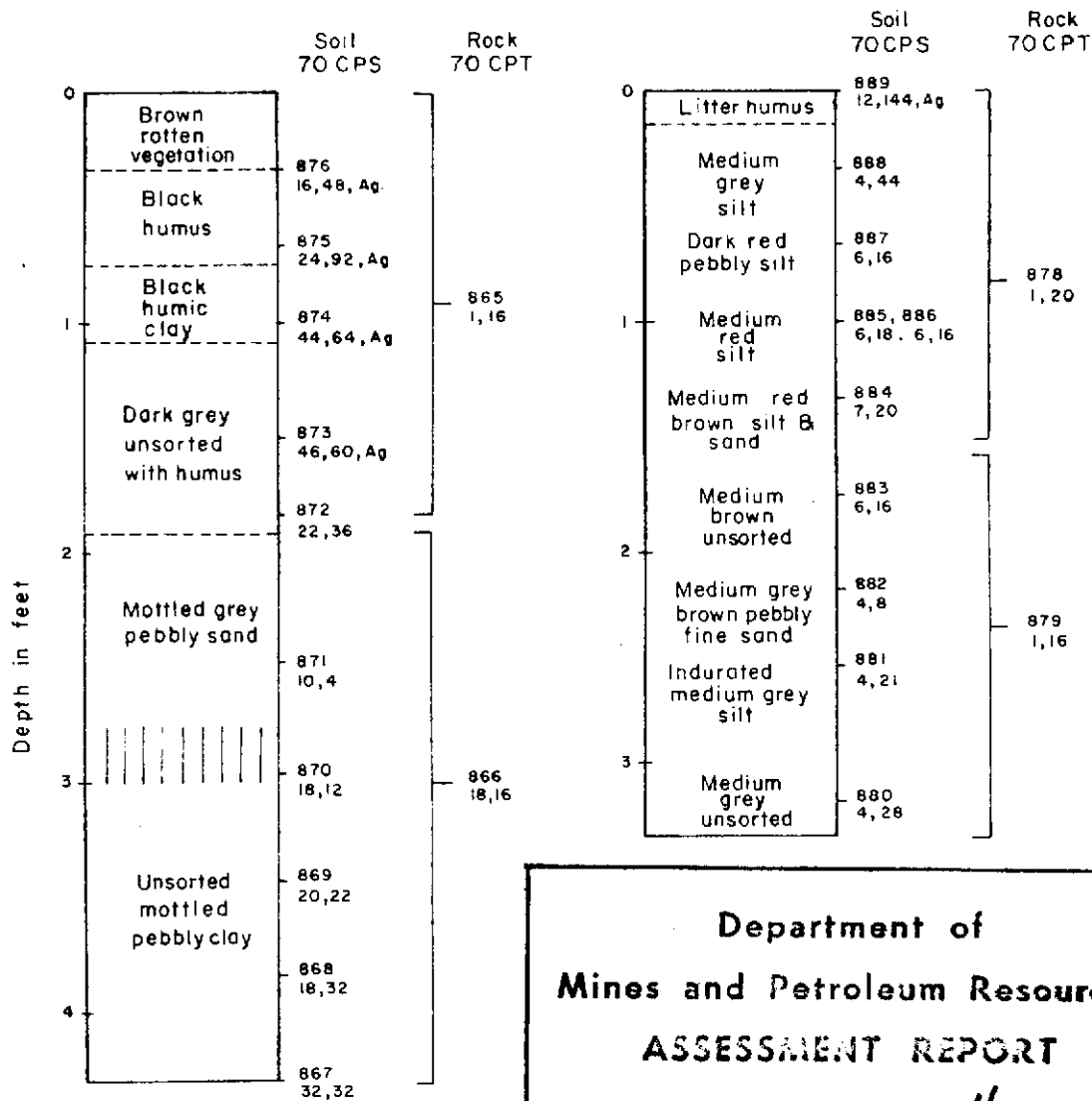
## GEOCHEMISTRY

Geochemical soil sampling has revealed a prominent anomalous area approximately 6000 feet by 4000 feet (Figure 3) on the southern Top claims. Almost no outcrops are present in the anomalous area to aid in interpretation of the anomaly. The anomaly is on a poorly drained, gentle slope with numerous boggy areas, indicating that some degree of organic accumulation may have occurred (see comments by R.F. Horsnail, Appendix I). Profile pits indicate that molybdenum is present in the underlying subsoils (Figure 4). The overburden in the pits may be of fluvio-glacial origin thus complicating the interpretation.

A number of anomalous silt and soil samples were obtained on the north side of Hanson Lake. Anomalous molybdenum was found to be present on one tributary (Figure 2) but was not confirmed upstream. Anomalous copper (up to 316 ppm Cu) was found in the northeast tributary of Hanson Lake.

PROFILE A

PROFILE B



**Department of**  
**Mines and Petroleum Resources**  
**ASSESSMENT REPORT**  
 NO. 2931 ..... MAP # 5

HANSON LAKE PROPERTY

PROFILE PITS

868 18, 32 Sample number p.p.m. Mo, Cu

*Donald B. Allen*

Fig. 5

GEOPHYSICS

The only geophysical data available is the one mile aeromagnetic coverage of the area. The magnetic pattern is simple with a broad gradient across the claims and weak lows to the north and east of the claims.

AMAX Vancouver Office  
December 1970

*Donald S. Allen*  
D.G. Allen, P.Eng. (B.C.)

REFERENCES

- CARR, J.M. 1965; The geology of the Endako area. B.C. Minister of Mines and Petroleum Resources Annual Report, pp 114-134
- WHITE, H.H. et al, 1970; Potassium-argon ages of Topley Intrusions near Endako, B.C. Canadian Journal Earth Sciences, Vol. 7, pp 1172-1178

APPENDIX I - COMMENTS ON GEOCHEMICAL DATA  
AND PROCEDURES FOR COLLECTION  
AND PROCESSING OF GEOCHEMICAL  
SAMPLES

---

Comments on Geochemical Data from the Hanson Lake (Top Group)  
Molybdenite Property By R.F. Horsnail

Introduction

The property was discovered in 1964 when anomalous Mo values were detected in sediments and waters of creeks flowing into the south side of Hanson Lake. Sampling by K.E. Card in 1969 revealed an extensive low contrast Mo soil anomaly. During 1970, further soil sampling and geologic mapping was conducted by J. Platt.

Geochemical Data

The Mo soil anomaly has been confirmed and extended by John Platt's work. It appears closed off to the east and west but may still be open to the south. This is particularly so over claims 35 and 36 where a Mo anomaly of 10-20 ppm appears to extend beyond our property boundary.

In many cases the anomalous Mo values (threshold 4 ppm, peaks 40-60 ppm) are associated with anomalous or high background levels of Ag, Pb, Zn, Cu, Mn and Fe (see attached tables). There is also a clear correlation between higher Mo values and organic rich poorly drained soils.

At one site a Mo anomaly (OCPS 162, 56 ppm Mo) was investigated by profile sampling to a depth of four feet. The soil is a humic gley developed on pebbly sand and clay. Peak Mo values of 40-50 ppm occur at 18" depth in humified peat but clearly anomalous values persist in the underlying organic free material. Cu and Ag are present in anomalous concentration in the near surface organic material but only background values are found in the deeper samples. A fragment of quartz monzonite from the subsoil contains 18 ppm Mo.

Discussion

The soil anomalies are of complex origin. It is clear that hydromorphic dispersion followed by organo-metallic complexing has been important -- in fact this may be the dominant factor causing anomalies of metals other than Mo. However the limited profile data currently available suggest that Mo anomalies, though enhanced by humus, also persist into the underlying organic-free subsoil. The Mo soil anomaly may, in part, reflect mineralized bedrock although when the organic influence is removed its contrast is small. Further complication may have been introduced by lateral extension of the anomalies in glacial outwash deposits.

Soil Samples from the SW of the Hanson Lake Property

Sample	Mo	Cu	Ni	Mn	Fe	Ag	Zn	Pb	Horizon	Text.	Colour	Soil	Landscape	Contamination
216	4	24				-	60	12	BG	L	MG	GS	8	
893	8	20	20	360	3.4	1.0	112	16	BM	F	WB	WB	1	
217	10	44				-	123	20	BG	U	DG	GS	8	∅
894	6	12	16	280	2.1	-	76	12			MG	GS	3	∅
213	20	30				1.0	124	20	FH	L	K	GH	6	∅
895	6	12	12	340	2.5	1.0	103	16	BF		MB	PL	3	
219	15	36					156	20	BM	F	MB	WB	3	
896	16	16	12	630	2.6	1.0	120	16	BT	S	WB	WB	3	∅
220	9	36					92	16	BG	U	MG	GS	3	∅
897	6	10	8	360	1.9	1.5	84	24		U	MG		3	
221	8	30				-	60	12	BG	U	MG	GS	8	∅
898	33	60	24	1100	3.5	3.0	163	40	FH	∅	K	GH	8	∅
222	22	76				2.0	140	40	FH	∅	K	GH	8	∅
899	28	52	24	1120	3.2	3.0	164	40	FH	∅	K	GH	8	∅
223	16	56				1.0	160	44	BT	L	MB	WB	7	∅
900	18	132	24	1000	3.1	3.0	500	72		U	MB		4	
224	13	50					236	32	BM	F	MB	WB	3	∅
901	17	16	14	360	2.6	2.0	164	36		U	MB		4	
902	12	48	32	520	3.9	3.0	166	44		S	MB		3	
903	4	12	12	260	2.6	1.0	88	12	BF	U	LB	PL	4	
904	12	80	40	1320	5.0	3.5	232	44		S	DB		3	∅
905	4	32	20	480	2.0	2.0	128	25		S	MB		4	
906	34	144	40	960	4.0	3.0	212	52	BG			GS	3	∅
907	23	64	20	500	2.8	2.5	124	20	BG			GS	3	
908	26	276	20	760	2.5	2.5	384	20	FH	∅	K	PT	3	∅
909	26	48	20	600	3.1	1.5	130	20		U	MB		3	
910	3	8	10	140	2.6	-	104	12	BF	U	MR	PL	3	
911	4	16	16	240	2.4	-	84	12		U	PB		4	
912	10	40	32	700	4.2	2.0	140	20		S	MB		3	
913	15	40	52	1400	6.1	2.0	188	40		S	MB		3	
914	12	12	18	600	2.6		84	16		U	MG		3	
915	20	50	23	800	3.5	1.5	88	24	BG		DG	GS	3	
916	5	10	16	340	2.2	1.0	88	14		S	MB		3	
917	3	6	12	140	2.1	-	56	12	BM	F	MR	WB	3	
918	6	4	8	80	1.4	-	40	12		F	MB		7	
919	16	16	16	230	2.1	-	72	12		C	DB			∅

pH 6.0 - 6.4

All sample numbers are OCPS -----



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  $\text{SO}_4^{--}$  in waters.

Amax Exploration, Inc.  
Vancouver Office.

September 1970

R.F. Horsnail

## 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 to the AMAX geochemical laboratory in Vancouver.

### 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  $\frac{1}{2}$  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 jaw crushing by means of a Jones splitter. After pulverizing 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 PROCEDURESSilver

1. Scope - This procedure covers a range of silver in the sample 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 3281A Dial 287.4

Fuel - acetylene - flow - 14

Oxidant - air - flow - 14

Burner - techtron AB\_51 in line

Maximum Conc. 3 to 4x

V

### 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  $\text{Ag}_2\text{SO}_4$  dissolved in 20 mls  $\text{HxI}_3$   
and dilute to 500 mls
2. 100 gamma/ml Ag - 10 mls of above + 20 mls  $\text{HClO}_4$ , 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<sub>4</sub>. 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.

$$1 \text{ ppm} = .0292 \text{ oz/ton}$$

conversion factor

$$\text{oz/ton} = .0292 \times \text{ppm Ag}$$

Zn Geochemical AA Setting

Lamp Zn

Current 8 #3 Slit 20A

Wave length 2138 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<sub>2</sub>O, HCl, HNO<sub>3</sub>, HClO<sub>4</sub>, fumed to HClO<sub>4</sub> -  
make up to 100 mls H<sub>2</sub>O

1000, 100 gamma/ml and 100 ml by dilution in 20 % HClO<sub>4</sub>

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<sub>4</sub> 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<sub>3</sub>, and fumed into  
HClO<sub>4</sub>, dilute to 1 liter

Pipette

1, 2, 10, 20 mls into 100 ml vol flasks diluted to mark  
with 20% HClO<sub>4</sub>

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 used  
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

Pipette

.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<sub>4</sub>. 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<sub>2</sub>O 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<sub>3</sub> (acid molybdic) with 20 mls H<sub>2</sub>O, 6  
lumps NaOH, 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<sub>3</sub>

and dilute to 100 mls with 20% HClO<sub>4</sub>

This gives

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

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/mlWeigh 5.000 gms iron wires, into beaker, add H<sub>2</sub>O, HCl, HNO<sub>3</sub>,HClO<sub>4</sub>, heat to HClO<sub>4</sub> fumes. Add HClO<sub>4</sub> to 100 mls + 100 mlsH<sub>2</sub>O, 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<sub>4</sub> to give100, 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 - Acetylene 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<sub>3</sub>, HClO<sub>4</sub> to perchloric fumes, dilute to 100 ml H<sub>2</sub>O

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% HClO<sub>4</sub>.

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%

HClO<sub>4</sub>. This gives

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

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<sub>2</sub>O, HCl, HNO<sub>3</sub> until dissolved, add

HClO<sub>4</sub>, fume dilute to 100 mls

1000 gamma/ml 10x dilution above in 20% HClO<sub>4</sub>

2000 gamma/ml 20 mls 10,000 gamma/ml - dilute to 100 mls in  
20% HClO<sub>4</sub>

100 gamma/ml 10x dilution 1000 gamma/ml dilute to 100 mls in  
20% HClO<sub>4</sub>

200 gamma/ml 10x dilution 2000 gamma/ml dilute to 100 mls in  
20% HClO<sub>4</sub>

Pipette

1, 2, 3, 5, 8, 10 mls 100 gamma/ml - dilute to 100 mls with  
20% HClO<sub>4</sub> 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<sub>3</sub>, fumed to HClO<sub>4</sub> make up to 100 mls in 20% HClO<sub>4</sub>

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% HClO<sub>4</sub>

## 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<sub>4</sub> 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  $\text{Na}_2\text{CO}_3$

4 parts  $\text{NaCl}$

1 part  $\text{KNO}_3$  pulverized to -80 mesh

7%  $\text{SnCl}_2$  in 70%  $\text{HCl}$

20%  $\text{KSCN}$  in  $\text{H}_2\text{O}$

Extractant - 1 part tri-n-butyl phosphate

9 parts carbon tetrachloride

## Standards

1000 gamma/ml W

.18 gms  $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$  dissolved in  $\text{H}_2\text{O}$ , 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 red 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 ( $80^\circ C$ )
7. Cool to less than  $15^\circ C$
8. Add 1 ml 20% KSCN, mix (if lemon yellow; compare color standard 10x)
9. Add  $\frac{1}{2}$  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<sub>2</sub>
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<sub>2</sub>O, and 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<sub>2</sub>O to methanol to match. Seal tightly

SnCl<sub>2</sub> - 15% in .15% HCl

300 gm SnCl<sub>2</sub> . 2H<sub>2</sub>O + 300 mls HCl, until SnCl<sub>2</sub> dissolved

dilute to 2 liters

KSCN - 5% in H<sub>2</sub>O

Mixed SnCl<sub>2</sub> - KSCN

3 parts SnCl<sub>2</sub> 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<sub>2</sub>O, shake for one hour. Add 46.3 grams ferric perchlorate [ Fe(ClO<sub>4</sub>)<sub>3</sub> · 6H<sub>2</sub>O ] (GFS 39) and 47 grams aluminum perchlorate [ Al (ClO<sub>4</sub>)<sub>3</sub> · 3H<sub>2</sub>O ] (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 Acumet 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.

(Alpine Helicopters - Burns Lake)				
Helicopter	August 22	1 hr. 15 mins.	@ \$155.00/hr.	\$193.75
	August 27	1 hr. 15 mins.	@ \$155.00/hr.	193.75
(TransProvincial Air Lines - Burns Lake)				
Float Plane	Sept. 9	56 miles	@ 0.78/mile	44.00
	Sept. 12	56 miles	@ 0.78/mile	44.00
				<u>654.50</u>

Geochemical Sample Analysis

Carried out in the AMAX Geochemical Laboratory and charged at commercial rate

370 samples @ \$2.00/sample	740.00
-----------------------------	--------

<u>Report Preparation and Draughting</u>	<u>100.00</u>
--	---------------

<b>TOTAL</b>	<u>\$2,642.10</u>
--------------	-------------------

Declared before me at the  
 of  
 Province of British Columbia,  
 this

A Commissioner for taking Affidavits within British Columbia or  
 A Notary Public in and for the Province of British Columbia.

Declared before me at the  
 of  
**VANCOUVER, B.C.**, in the  
 Province of British Columbia, this  
**MAY 25 1971**  
 day of  
*[Signature]*, A.D.  
 Sub-Mining Recorder

*Donald S. Allen*

A Commissioner for taking Affidavits within British Columbia or  
 A Notary Public in and for the Province of British Columbia.

APPENDIX II - ASSESSMENT DATA

Work to be applied on the Top #6, #8, #10, #12, #13, #15, #17-#24 inclusive, #29-#36 inclusive, #41, #43, #45, #47 claims inclusive.

Work was carried out on the Top #1-#48 mineral claims from June 21 to June 30, August 21 to August 26, and September 10 to 12, 1970.

Geochemical Surveys

316 soil samples on claim group  
54 silt, water, soil and rock samples around Hanson Lake

Geological Mapping

3 square miles on claim group  
4 square miles around property

Geochemical Samples Analyzed

341 soil samples (Mo, Cu plus selected multielement analysis)  
13 rock samples " "  
8 silt samples " "  
8 water samples (pH, Cu, Mo analysis)

Personnel Employed

D.G. Allen, Geologist I/C; 601-535 Thurlow Street, Vancouver, B.C.  
J.P. Platt, Senior Assistant; c/o U. of California, Santa Barbara, Ca.  
J. Slater, Junior Assistant; 1333 Riverside Drive, North Vancouver  
M. Bennett, Junior Assistant; Box 534, Vanderhoof, B.C.

Assessment Charges

D.G. Allen	Sept. 10-12	3 days @ \$51.00/day	\$153.00
J.P. Platt	June 21-30, Aug. 21-26	16 days @ \$31.82/day	509.12
J. Slater	June 21-30, Aug. 21-26	16 days @ \$15.91/day	254.56
M. Bennett	Sept. 10-12	3 days @ \$13.64/day	40.92
			<u>957.60</u>

Board - 38 man days @ \$5.00/day 190.00

Helicopter and Float Plane Time

Access to claims and supplying crews on claims.

Float Plane - June 21	56 miles @ 0.78/mile	44.00
Trans Provincial June 24	28 miles @ 0.78/mile	22.00
Airlines, Burns June 26	28 miles @ 0.78/mile	22.00
Lake June 30	60 miles @ 0.78/mile	47.00
Aug. 20	56 miles @ 0.78/mile	44.00





**LEGEND**

- 5 Triangle quartz monzonite
- 4 Rhyolite
- 3 Porphyritic biotite quartz monzonite (QOP porphyry)
- 2 Rex hornblende biotite quartz monzonite
- 1 Hornblende diorite gneiss

**SYMBOLS**

- OCA 700  
O 1,16 Soil sample, sample number, pp.m. Mo, Cu.
- OCP 130  
□ 4,32 Silt sample, sample number, pp.m. Mo, Cu.
- OCP 128  
△ 2 Water sample, sample number, pp.b. Mo.
- OCA 720  
⊕ 1,96 Rock chip sample, sample number, pp.m. Mo, Cu.
- Outcrop.
- Air photo lineament.

**Range of Mo. in Soils, Silts and Rock chips.  
(pp.m. Mo.)**

- □ ⊕ 0 - 3 Background.
- □ ⊕ 4 - 8 Positive.
- □ ⊕ 9 - 20 Anomalous.
- □ ⊕ > 20 Highly anomalous.

**Range of Mo. in Water  
(pp.b. Mo.)**

- △ 0 - 4 Background.
- △ > 4 Anomalous.

Department of  
 Mines and Petroleum Resources  
**ASSESSMENT REPORT**  
 NO. 2931 MAP #3

AMAX EXPLORATION INC.

**HANSON LAKE MOLYBDENITE PROSPECT**  
 OMECEA MINING DIVISION — BRITISH COLUMBIA

**GEOLOGICAL  
 AND GEOCHEMICAL MAP**

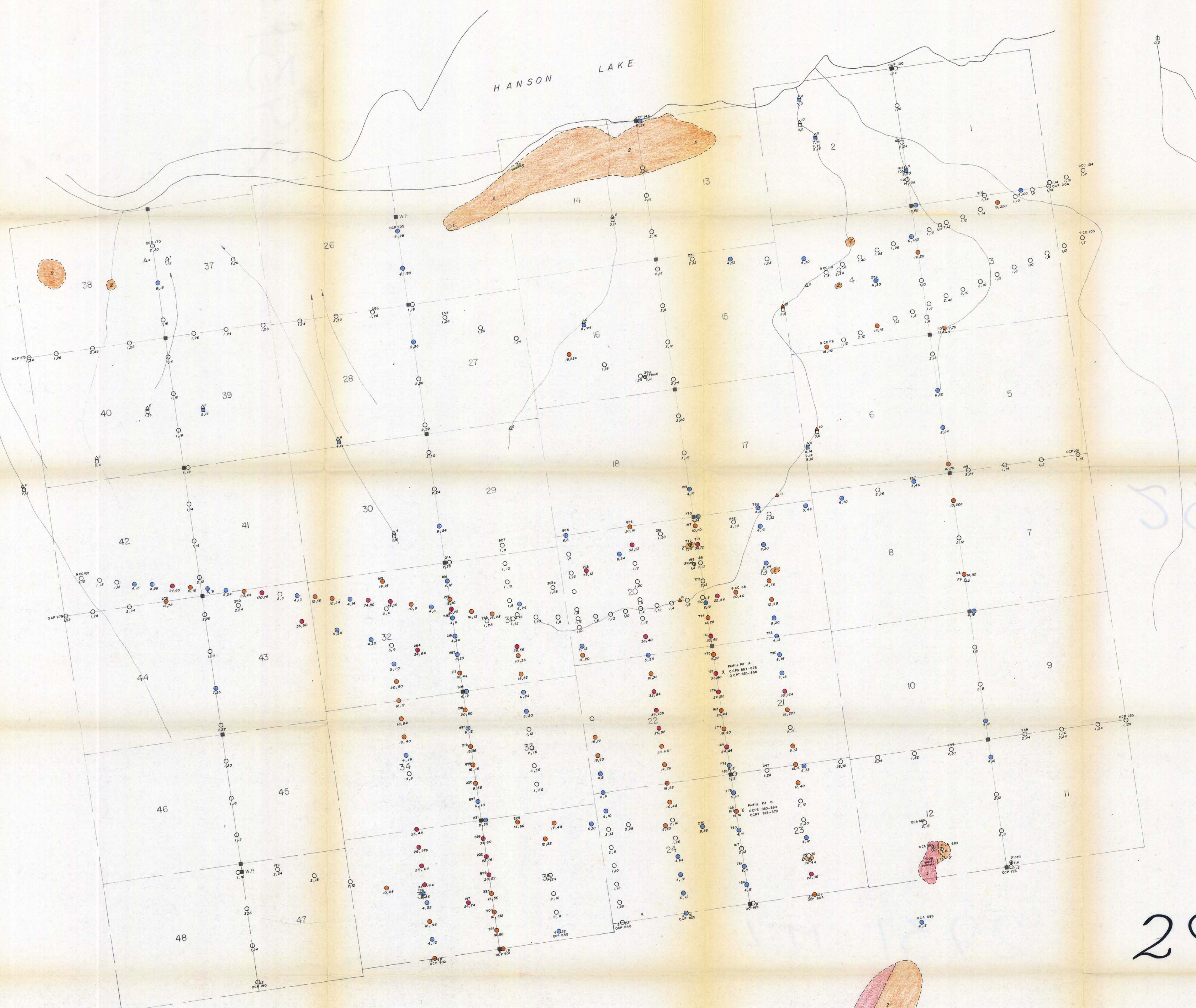
SCALE: 1 inch = 1000 feet.

DATE REVISION	DATE PRINTED	Drawn by: DGA/AHS. Date: 28/10/70	N.T.S. File: 93 K 3

To accompany "REPORT ON THE HANSON LAKE MOLYBDENITE PROSPECT" By: D.G. Allen, December 1970.

2931 M-3

EPS



**LEGEND**

- Porphyritic andesite.
- Porphyritic biotite quartz monzonite.
- Rex hornblende biotite quartz monzonite.

**SYMBOLS**

- Soil sample, sample number, p.p.m. Mo, Cu.
- Rock chip sample, sample number, p.p.m. Mo, Cu.
- Silt sample, sample number, p.p.m. Mo, Cu.
- Water sample, sample number, p.p.b. Mo.
- Outcrop.
- Joint.
- Geological contact.

**Range of Mo. in Soils and Silts (p.p.m.).**

- 0 - 3 Background.
- 4 - 8 Positive.
- 9 - 20 Anomalous.
- > 20 Highly anomalous.

**Range of Mo. in Water (p.p.b.).**

- 0 - 4 Background.
- > 4 Anomalous.

2931 M-4

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 2931 MAP #4

AMAX EXPLORATION INC.

HANSON LAKE MOLYBDENITE PROSPECT  
 OMECEA MINING DIVISION — BRITISH COLUMBIA

**GEOLOGICAL  
 AND GEOCHEMICAL MAP**

SCALE: 1 inch = 400 feet

Drawn by: GSA/AHS	Date: 29/10/70	Fig. 4
NTS. File: 93 K 3		

To accompany "REPORT ON THE HANSON LAKE MOLYBDENITE PROSPECT" By: D. S. Allen, December 1970.