1970 Geological and Geochemical Report

Fab #41 - #59
Claims

2664

COLES CREEK COPPER-MOLYBDENUM PROPERTY

Omineca Mining Division
93 E 11

AMAX Vancouver Office

D.A. Silversides

J.F. Allan, P.Eng. (B.C.)

October 1970

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SUMMARY

The Coles Creek Cu-Mo Property is situated in West Central British Columbia, at latitude 53°31'N, longitude 127° 13'W. Road access is available to within twelve miles of the property.

A program of geological mapping and geochemical sampling was carried out on the Fab #41 - #59 claims of the property during August 16 - 30, 1970.

The claims cover an Early Tertiary (?) intrusive-extrusive complex and Middle Jurassic volcanic and sedimentary rocks. The Middle Jurassic rocks are assigned to the Hazelton Group and are predominately andesite flows, breccias, and tuffs, with minor greywacke and argillite.

The intrusive-extrusive complex consists of at least four types of porphyry in the form of dykes and small stocks, a rhyolite breccia, and rhyolite tuffs.

The intrusive-extrusive complex is central with respect to a pyritic area approximately 8000 feet in diameter.

Chalcopyrite, molybdenite, galena, and sphalerite are present within the claims area. The main area of interest lies in the central part of the claims, where a small stock of feldspar-biotite porphyry cut by a quartz-pyrite-chalcopyrite-molybdenite stockwork occurs.

Soil sampling indicates an anomalous zone of copper and molybdenum present in the western section of the claims. Copper values range up to 2560 ppm, molybdenum values up to 380 ppm.

INTRODUCTION

General Statement

A program of geological mapping and geochemical sampling was carried out on the Fab #41 to #59 claims between August 16 and August 30, 1970. The program was supervised in the field by D.A. Silversides, geologist employed by AMAX Exploration, Inc.

Geological mapping was carried out on a scale of 1"=200'. Soil samples were taken at 100 foot intervals, along lines spaced 400 feet apart. A few water and silt samples were also obtained. This report describes the geological and geochemical data collected.

Location and Access (See Figure 1)

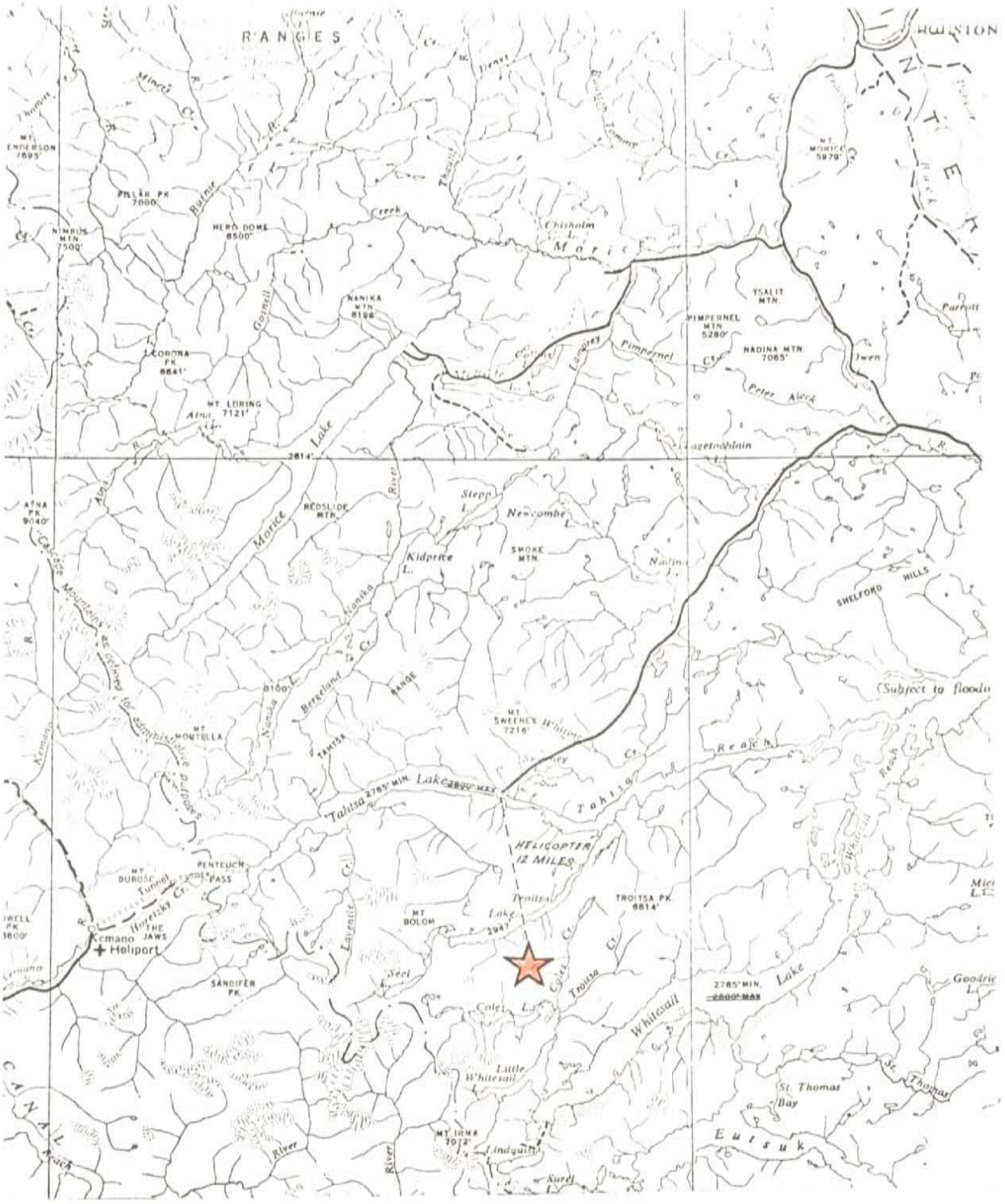
The Coles Creek property is situated in West Central B.C., at latitude 53°31'N, longitude 127°13'W. The nearest town in Houston, sixty-six miles to the northeast.

Access is via the Houston-Tahtsa Lake forestry access road, then via helicopter to the claims. Helicopter flight distance is twelve miles.

Claims (See Figure 2)

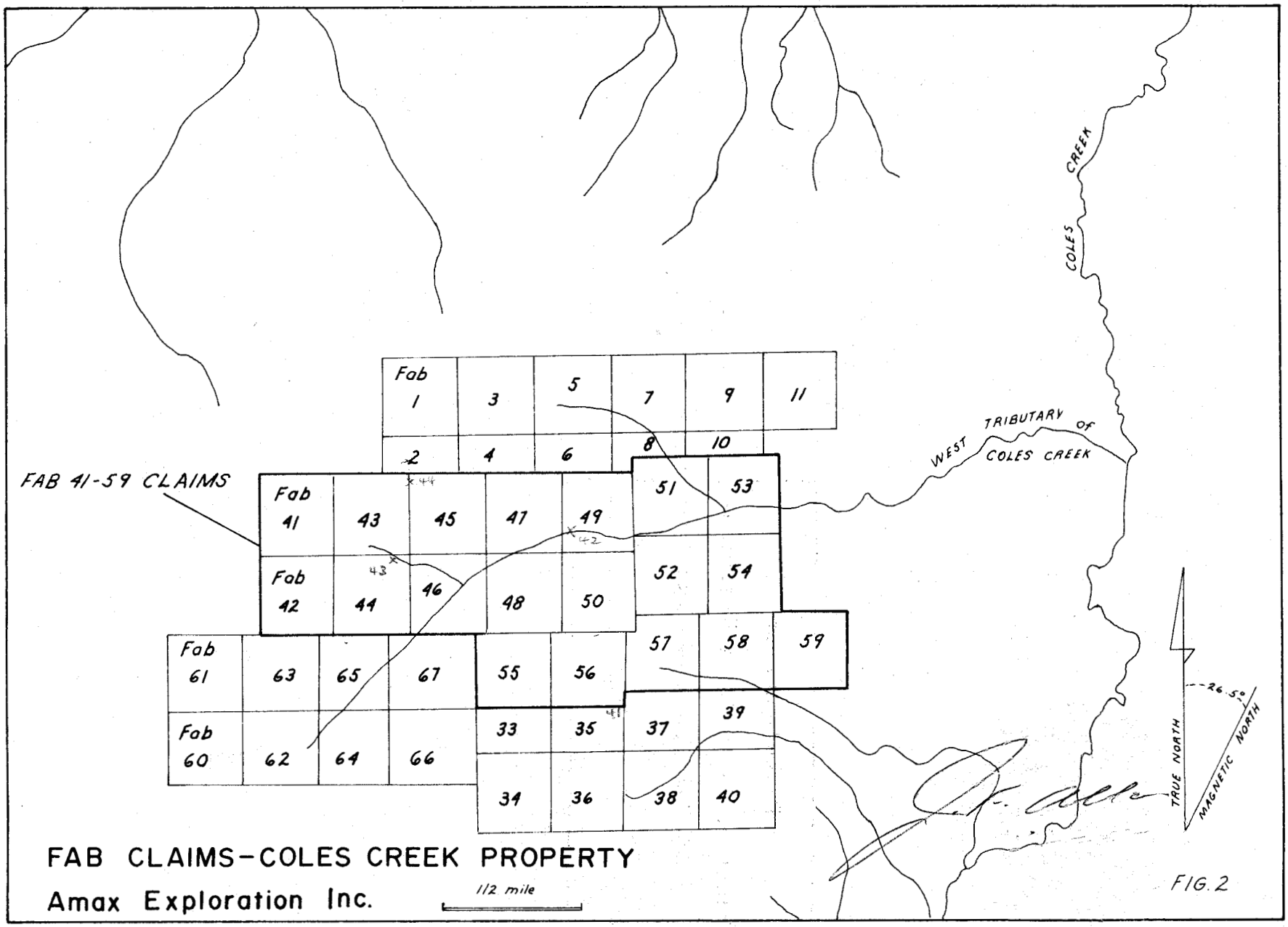
The Fab #41 - #59 claims were staked by AMAX in September 1969. The area underlain by the claims was formerly held by Kennco Exploration.

AMAX has held two claim blocks north and south of the Fab #41 - #59 claims since September 1966. These are the Fab #1 - #11 (north) and Fab #33 - #40 (south) claims. Eight additional claims, Fab #60 - #67, were located in September 1970. These lie on the southwest side of the Fab #41 - #59 claims.



Location of Coles Creek Property

Fig. 1


Fab 1
3
5
7
9
11
2
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10
FAB 41-59 CLAIMS
Fab 41
43
45
47
49
51
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Fab 42
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Fab 61
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67
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Fab 60
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33
35
37
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34
36
38
40
WEST TRIBUTARY of COLES CREEK
COLES CREEK
TRUE NORTH
MAGNETIC NORTH
26.5°
FAB CLAIMS-COLES CREEK PROPERTY
Amax Exploration Inc.
1/2 mile
FIG. 2

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2664 MAP #2

Geological and geochemical assessment reports were filed for the Fab #1 - #11 and Fab #33 - #40 claims in 1968 and 1969.

Topography, Vegetation, and Outcrop Situation

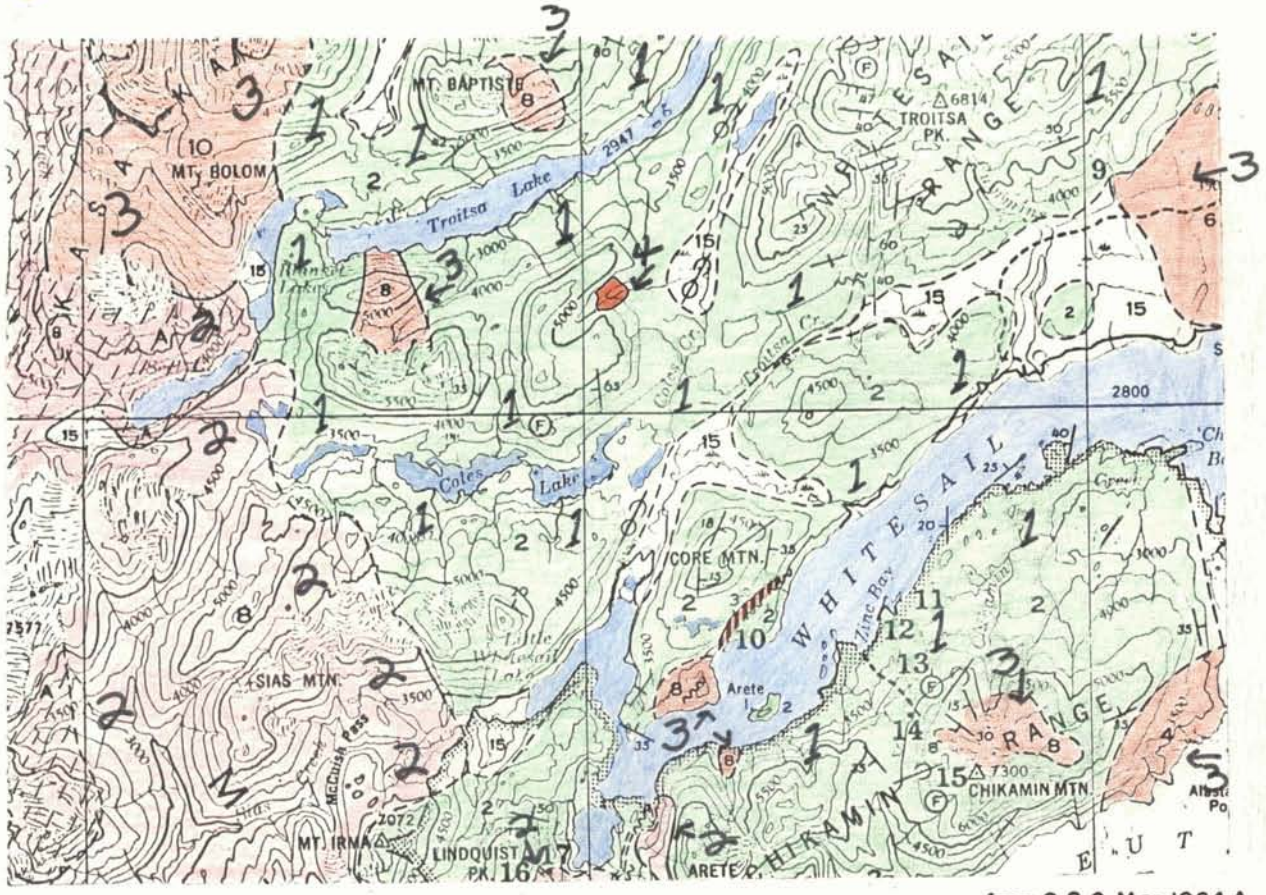
The Fab #41 - #59 claims lie between altitudes 3800 to 5000 feet, and straddle a western tributary of Coles Creek. The tributary has eroded up to 150 feet of clay-boulder till and up to 100 feet of bedrock, to form a steep-sided gully. Relief away from the gully is gentle to moderate.

Timberline is located at altitude 5000 feet. Very dense thickets of scrub spruce occur between altitudes 5000 to 4500 feet. Below 4500 feet, thick growths of spruce, hemlock, and balsam, with butt diameters up to 20 inches, are separated by grassy swamps.

Bedrock exposures are mainly confined to the gully along the western tributary of Coles Creek and its small side creeks. Scattered bedrock exposures occur above timberline. Approximately 90% of the claim area is covered by till.

Regional Geological Setting

The Coles Creek property lies east of the Coast Range intrusive-metamorphic complex, within Middle Jurassic volcanic and sedimentary rocks of the Hazelton Group. Hazelton Group rocks form a belt fringing the Coast Range complex throughout most of Central British Columbia and are intruded by a large number of small plutons of varying composition. Several of these plutons are complex, consisting of multiple porphyritic stocks and dykes, breccia pipes, and quartz vein stockworks. The Coles Creek property contains one of this complexes.



from G.S.C. Map 1064-A

4 2 0 4 miles

LEGEND

Pleistocene Recent	—	Till, Gravel
Early Tertiary	— 4	Coles Creek Intrusive – Extrusive Complex
	3	Gabrro to Granite Stocks
Upper Jurassic	— 2	Coast Range Complex: Intrusive Rocks
		Metamorphic Rocks
Middle Jurassic	— 1	Hazelton Group

COLES CREEK PROPERTY
Regional Geological Setting

FIG. 3

All of the complexes contain varying quantities of copper, molybdenum, lead, zinc and silver. K/Ar dating of several has indicated an early Tertiary time of emplacement.

The northwest regional trend of the Coast Range complex is the dominant structural feature of the Coles Creek area. Hazelton Group rocks have the same regional trend in folding, but locally diverge to northeast trends. The valleys of Whitesail Lake, Troitsa Lake, and Coles Creek represent northeast topographic linears. Faults of this alignment have been recognized along the northeast side of Whitesail Lake. This direction might represent a direction of breaking transverse to the regional northwest trend of the Coast Range.

GEOLOGY AND GEOCHEMISTRY OF THE FAB #41 - #59 CLAIMS

Geology

Geology of the Fab #41 - #59 claims is shown in Figure 3 (in pocket) on a scale of 1" = 200'. Outcrops were located by chain and compass, using a picket-line grid cut previously by Kennco Exploration as the main survey control.

Outcrops occupy 10% of the claim area. To the best of the writer's knowledge, those outcrops shown in Figure 4 are the only ones present within the Fab #41 - #59 claims.

Outcrops are comprised of Hazelton Group volcanic and sedimentary rocks, intruded by a complex of porphyritic dykes and small stocks. One type of porphyry intrudes rhyolite breccia, and vesicular rhyolite tuffs.

Chalcopyrite, galena, sphalerite, molybdenite and pyrite are the only visible sulphides.

Lithologies

Hazelton Group

Hazelton Group rocks present are comprised of maroon to green andesite flows, flow breccia, tuff, basalt, and minor greywacke and argillite. No attempt was made to separate these various lithologies.

A few attitudes observed suggest that the assemblage strikes north-south and dips 20° to 65° east.

Quartz Diorite

Outcrops of quartz diorite are scattered along a distance of 4500 feet in the western part of the claim area. Outcrop distribution suggests the quartz diorite is in the form of a large, northeast striking dyke, with an apparent width of 200 to 700 feet. One observed portion of the contact with Hazelton Group rocks dips 80° west.

The quartz diorite is mainly medium grained, grey and equigranular. It is composed of 5% biotite, 10% quartz, and 85% plagioclase feldspar. In proximity to the Hazelton Group contact, the rock gradationally changes to a dark grey colour, due to an increase of 10 to 15% biotite.

The predominant joint set in the quartz diorite is north-northeast/vertical, parallel to the elongation suggested by outcrops.

Red Breccia

The rock type occurs in the main creek bed, in the eastern part of the claims. The contact with definite Hazelton Group rocks is covered completely by overburden; the contact with vesicular rhyolite tuffs is partly covered by overburden,

and masked by iron oxide.

The rock type is a very coarse breccia, with angular fragments up to two feet in diameter. The large fragments are light red feldspar porphyry similar to the maroon andesite flows in the Hazelton Group. Fine clastic material, similar in colour and interstitial to the fragments, makes up approximately 20% of the volume.

Thin-Bedded, Rhyolite Tuff

This rock type is exposed in small creek beds in the south-central part of the claims. It is thin-bedded (layering 1/4 inch to 2 inches), with attitudes striking northeast, dipping 10-25° east, to striking east, dipping 25° south.

Fragments range from white to dark grey. The majority are white, rhyolitic and subangular. A few are composed of fine grained feldspar porphyry.

Fragment size ranges from 1 mm to 10 mm. Average size is 4 mm, classifying the rock as a lapilli tuff. In one location, large (up to two feet in diameter) angular blocks of Hazelton Group volcanics are included in the beds.

The tuff displays well-developed graded bedding. The thin, graded bedding, and lack of vesicles suggest, but do not prove, that the tuff was deposited in water.

Vesicular Rhyolite Tuff

Vesicular rhyolite tuff outcrops in the eastern and northeastern part of the claims. Outcrops display crude layering, which dips northerly along most of the main creek, and abruptly swings to a southwesterly dip along the length of the northern tributary. These attitudes imply a syncline, whose

axis plunge to the northwest.

The tuff is composed of white rhyolite, scoria, fine grained feldspar porphyry, and rare green to maroon Hazelton Group volcanic fragments. Fragment size ranges from 1 mm to 10 mm. They are set in a white, vesicular rhyolitic matrix. The vesicles are flattened parallel to the layering.

Rhyolite Breccia

Rhyolite breccia is exposed for a distance of 1000 feet in the main creek, and as dykes up to 100 feet wide cutting vesicular rhyolite tuffs in the northern tributary.

It is identical to the vesicular rhyolite tuff in its type of fragments, but does not display layering or vesicles.

Quartz Monzonite Porphyry

Quartz monzonite porphyry constitutes the largest mass of intrusive rock on the claim group. Its precise shape is not known due to scarcity of outcrop, but it is believed to be an irregular-shaped stock approximately 2500 feet in diameter with a number of off-shoot dykes.

The stock and dykes intrude the Hazelton Group, rhyolite breccia, and vesicular rhyolite tuff. The contact with rhyolite breccia and vesicular rhyolite tuff is steeply dipping (vertical to 80°), irregular in detailed strike, but overall trends eastward. The one exposure of contact with Hazelton Group is obscure due to superimposed alteration. However, strong sheet jointing in the quartz monzonite porphyry in the contact area strikes northwest and dips 80° east, suggesting that this is the contact attitude.

The quartz monzonite porphyry is generally altered

and variable in its texture. The possibility that the mass is composed of several related, but separate periodic intrusive phases, cannot be ruled out.

The general appearance of the quartz monzonite porphyry is light grey, bordering on coarse grained (phenocrysts between 3 mm to 6 mm in diameter). Phenocrysts constitute 50% by volume, and include quartz (15%), potash feldspar (30%), plagioclase (15%), and pale green chlorite (2 - 3%) pseudomorphous after biotite. The matrix is aphanitic. Large, glassy quartz phenocrysts, which remain even in areas of intense alteration, is the most characteristic aspect of this rock type.

Textural variations range from fine grained porphyry (phenocrysts 15-20% of the total volume, 1 to 2 mm in diameter) to coarse grained "crowded" porphyry (phenocrysts 90% of the total volume, 6 mm in diameter).

Unaltered, or partly chloritized biotite was observed in only two localities in the main creek; at line 13+200E, and 400 feet east of line 14+000E.

Crowded Feldspar Porphyry Dyke

This rock type is present as a single dyke exposed in the main creek at the center of the claims area. It is approximately 100 feet wide, strikes north-northeast, and has a vertical dip.

The dyke is fine grained and has a salt-and-pepper colour. White plagioclase phenocrysts (80% volume) and biotite flakes (1%) are set in a dark grey, aphanitic matrix.

Feldspar-Biotite Porphyry

Feldspar-biotite porphyry is confined to outcrop in

the main creek bed, where it is exposed for a distance of 600 feet. The precise dimensions of this rock type are not known, due to a lack of outcrop. It is bounded on the east and west by quartz monzonite, but attitudes are obscured by intense alteration and a coating of iron oxides.

The rock is coarse grained (phenocrysts up to 8 mm, average 5 mm) and dark grey. Approximately 40% of the rock is composed of white feldspar phenocrysts, and 5% biotite phenocrysts, set in a grey aphanitic matrix.

The exposures are highly fractured and quartz veined. Veins vary from 1/16 to 1 inch thick, and are spaced at 1/2 inch intervals on the average. Fine grained biotite occurs on vein margins and as disseminated flakes in the matrix. Extremely fine grained (< .5 mm) chalcopyrite, molybdenite, and pyrite are present in the veining.

Dark Brown, Feldspar-Biotite Porphyry Dyke

This rock type occurs in two small outcrops in the northwestern part of the claim group. The outcrops are extrapolated as being a single northeast trending dyke, whose dip is unknown.

The rock is dark brown in colour, containing grey, feldspar (5% volume) and biotite (1%) phenocrysts in a dark brown aplitic matrix. The phenocrysts average 1 mm in diameter. Disseminated chalcopyrite and pyrite are present as grains up to 2 mm in diameter.

Alteration

Portions of the quartz monzonite porphyry and rhyolite breccia show intense sericitic and argillic alteration.

Intense sericitic alteration is situated in the quartz monzonite porphyry adjacent to the feldspar biotite porphyry stock in the main creek. Sericite occurs as fine flakes on fractures, and along sporadically developed quartz veins. The porphyry matrix has a greasy luster, suggesting fine grained, disseminated sericite.

An intense argillic zone appears peripheral to the sericite zone. The continuity of the zone is broken by the appearance of fresh biotite in the quartz monzonite east of the feldspar-biotite porphyry. However, very intense argillic alteration occurs as far east as line 14+000E in the main creek, within rhyolite breccia.

Argillic alteration is total in local areas. Feldspar has completely broken down to clay. The release of silica is reflected in grey wispy streaks of quartz.

A zone of intense argillic alteration occurs along the northern tributary.

Hazelton Group rocks on the west contact of the quartz monzonite porphyry are pervasively bleached. Pervasive bleaching dies out westward to bleaching confined to pyrite-quartz veinlet margins.

The fine grained biotite in the feldspar-biotite porphyry appears to be hydorthermal in its deriviation. This is suggested by its distribution along quartz vein margins.

Hazelton Group rocks are hornfelsed within the pyritic zone (i.e. between the east and west pyrite boundary lines shown in Figure 4). The degree of hornfelsing (i.e. the crystalline size of biotite) increases towards the porphyry

complex. Outside the pyritic zone, magnetite-epidote veinlets are common in Hazelton Group rocks.

Sulphide Mineralization

Pyrite, chalcopyrite, molybdenite, galena, and sphalerite occur in the area of the claims.

Pyrite

The Coles Creek property contains an extensive area of 1% and greater pyrite. The east and west margins of the pyritization are shown in Figure 4 and imply a width in this direction of approximately 8000 feet. The north-south dimension is not precisely known, but is at least of a similar magnitude.

Pyrite in the area of Figure 4 varies in quantity, ranging from less than 1% up to 10% by volume. Outcrops containing 3% to 10% pyrite are shown.

Chalcopyrite

Chalcopyrite has been observed in three localities:

1) Within the feldspar-biotite porphyry in the center of the claims area. Very fine grained chalcopyrite, pyrite, and scarce molybdenite occurs in a quartz vein stockwork. Chip samples of surface exposure contain 700 to 2800 ppm Cu.

2) In the feldspar-biotite porphyry dyke in the northwestern part of the claims. Chalcopyrite and pyrite occur as grains up to 2 mm in diameter.

3) In the quartz diorite outcrop on the western and southwestern part of the claims. Minor amounts of pyrite and chalcopyrite occur in quartz veinlets. The veinlets parallel the predominant joint direction in the quartz diorite.

Trace amounts of malachite are present on fractures in Hazelton Group volcanics in the southwestern part of the claims and in intensely argillized quartz monzonite porphyry in the northeastern part of the claims.

Molybdenite

Molybdenite has been found in two localities in the quartz monzonite porphyry, and within the feldspar-biotite porphyry. These occurrences are situated in the central part of the claim area.

Molybdenite occurs as fine flakes in quartz veinlets. Only trace amounts appear to be present.

Galena and Sphalerite

Galena and sphalerite occur in the thin bedded tuffs in the south-central part of the claims. The mineralization is mainly fracture controlled, but disseminated galena and sphalerite has been observed. Veinlets of massive galena and sphalerite up to $\frac{1}{2}$ inch are present. Gangue material is quartz and calcite.

Exposures of thin bedded tuff are coated with manganese oxides. Manganese oxides also appear in abundance on outcrops of vesicular rhyolite tuff 200 to 300 feet east and west of line 14+800E.

Geochemistry

A total of 650 soil, silt and water samples were collected within the claim area. Samples were analyzed in the AMAX laboratory, North Burnaby. Cu and Mo content was determined for all samples. The pH was measured in every fifth soil and silt sample. Sample handling procedures are outlined

in Appendix II.

The majority of samples taken are soils. Sample locations were spaced at 100 foot intervals, along lines generally 400 feet apart. Uniform spacing between lines was difficult due to thick scrub brush and cliffs in some localities.

Samples were obtained with a sample mattock. An effort was made to collect the B (iron-enriched) horizon. For each sample site, the following information was recorded:

i) parent material
ii) soil type
iii) soil horizon

Topography, Parent Material, and Soil Types

Slope angles for the claim area are shown on both the copper and molybdenum result maps (Figures 5 and 6). Two northeast-trending ridges with slopes of 10° - 20° flank the north and south sides of the west tributary of Coles Creek. Slopes change abruptly to almost flat (2° - 3°) at the tributary valley floor. This gently sloping area has been incised by the western tributary and its smaller branches through depths of up to 150 feet of overburden and up to 100 feet into bedrock.

Parent material varies directly with terrain. The ridge tops are covered by bedrock rubble. The steeper ridge slopes are covered by mixed till and talus, and in a few localities by talus fines and bedrock rubble. The till on the steeper slopes is a loose sand-boulder till.

The gently sloping area is covered by clay-boulder till. Large patches of swampy ground occur north of the main tributary. In the vicinity of line 10+800E, 600 feet north of

line 10+000N, four feet of varved clay is situated directly below the humus layer.

The nomenclature used to describe soil types and horizons is given in Appendix III. Types were found to vary according to slope angle and parent material. The porous bedrock rubble of the ridge tops have brown to grey wooded earth type profiles. The steeper slopes have predominantly podzol profiles, with a few sites containing wooded earth profiles. The gently sloping ground has a mixture of podzol and gleysol profiles. Gleysol profiles occur in the swampy areas.

Results

pH - pH values are shown on both Figures 5 and 6. Values range from 4.9 to 7.0 and average 5.5.

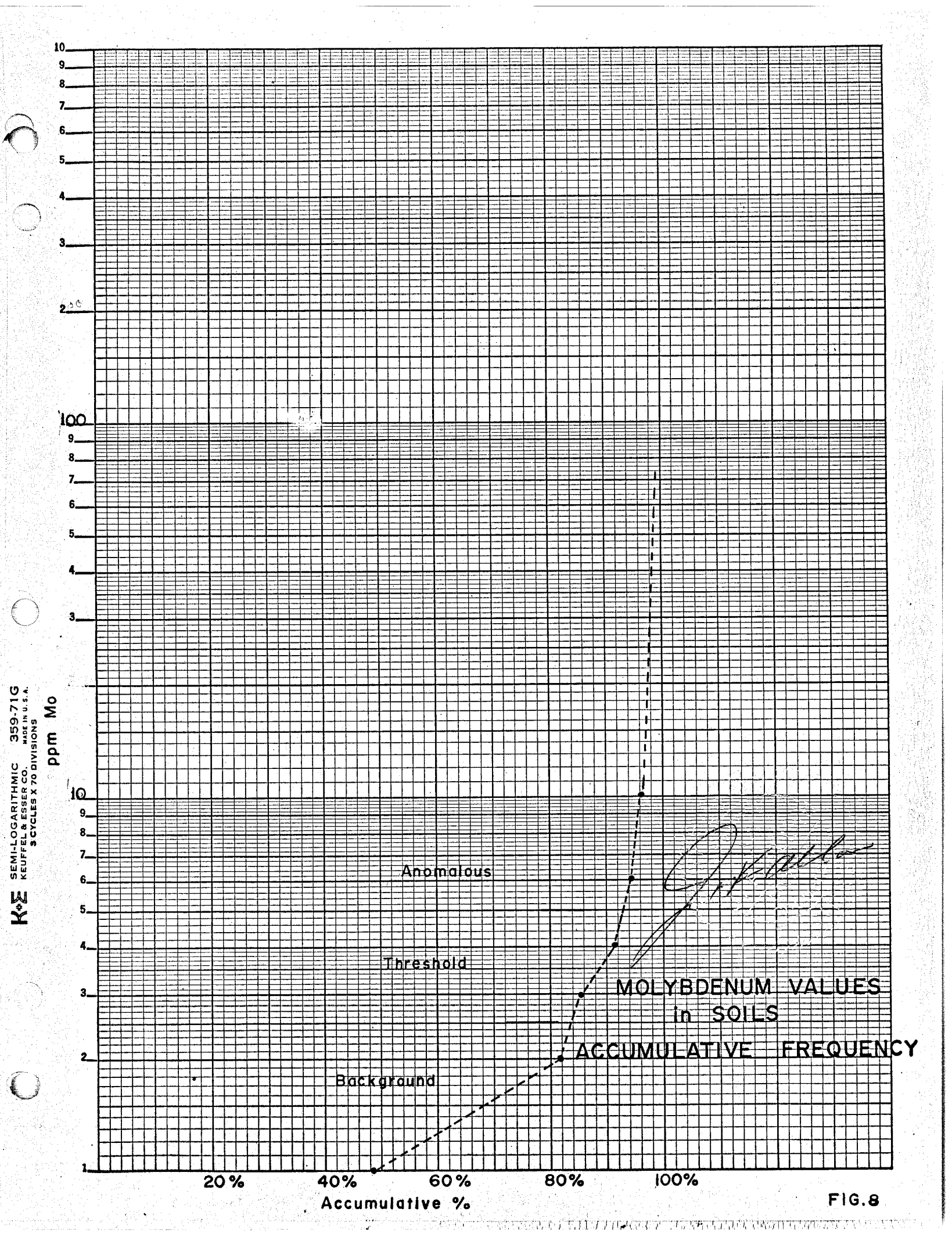
Copper (See Figure 5)- Copper values in soils range from 4 ppm to 2560 ppm. Values have been divided into four categories, each category colour coded at the sample location.

8 - 39	ppm Cu background
40 - 80	ppm Cu threshold
81 - 499	ppm Cu anomalous
+500	ppm Cu highly anomalous

These first three categories were determined statistically by accumulative frequency plots of the copper values ranging between 8 to 200 ppm (See Figure 7).

A northeast-trending zone of anomalous and highly anomalous copper values in soils occurs on the west side of the claim area. The zone is 4500 feet long and up to 1800 feet wide. A smaller low order anomaly occurs in the central part of the claim group.

All water analyses indicated 0 ppm copper. Silts


10
9
8
7
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5
4
3
2
100
9
8
7
6
5
4
3
10
9
8
7
6
5
4
3
2
1
ppm Mo
Anomalous
Threshold
Background
MOLYBDENUM VALUES
in SOILS
ACCUMULATIVE FREQUENCY
20%
40%
60%
80%
100%
Accumulative %
SEMI-LOGARITHMIC 359-71G
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 8

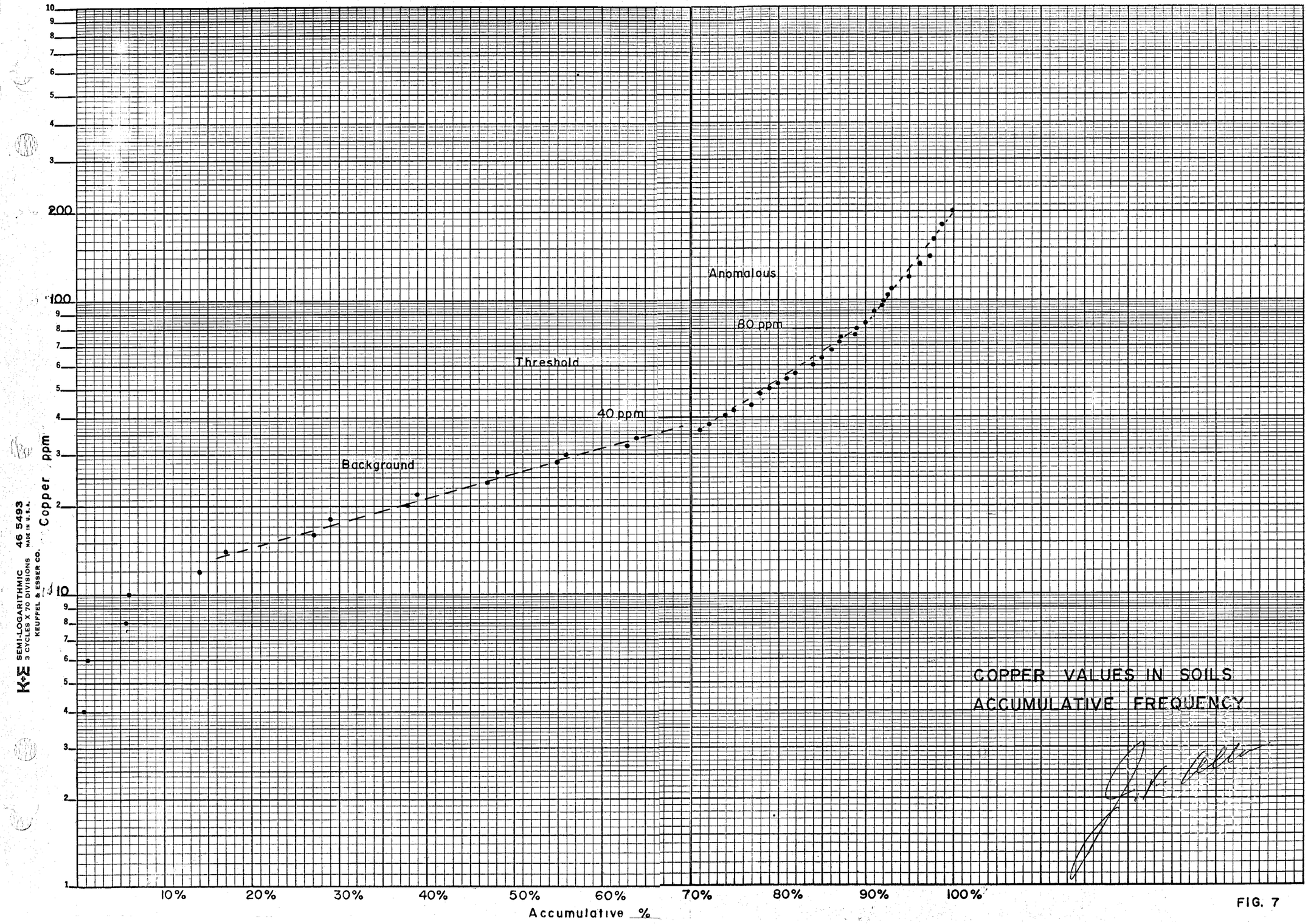
Anomalous
80 ppm
Threshold
40 ppm
Background
Copper ppm
10
9
8
7
6
5
4
3
200
100
2
1
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Accumulative %
K+E SEMI-LOGARITHMIC 46 5493
3 CYCLES X 70 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.
COPPER VALUES IN SOILS
ACCUMULATIVE FREQUENCY

FIG. 7

from the main creek and smaller side creeks have values ranging from 32 to 700 ppm Cu.

Molybdenum (See Figure 6) - Molybdenum values in soils range from 1 ppm to 380 ppm. The 380 ppm was obtained from till at the base of varved clays in the vicinity of line 10+400E, 600 feet north of line 10+000N.

Values have been divided into four categories.

0 - 2	ppm Mo background
3 - 5	ppm Mo threshold
6 - 20	ppm Mo anomalous
+ 20	ppm Mo highly anomalous

The first three groupings were determined statistically by accumulative frequency plots of values (See Figure 8).

A zone of anomalous molybdenum content in soils is coincident with the anomalous copper zone.

Water samples contain no detectable amounts of molybdenum.

No significant molybdenum values were found in silts.

D.A. Silversides.

AMAX Vancouver Office — D.A. Silversides

J.F. Allan.

October 1970 — J.F. Allan, P.Eng. (B.C.)

APPENDIX I - ASSESSMENT DATA

Claims - FAB #41 - #59 inclusive

Record Numbers 80524 to 80542 inclusive.

Period of Work - August 16 - August 30, 1970

Summary of Work

Geological Mapping	- 1½ square miles
Geochemical Sampling	- 1½ square miles
Geochemical Analyses	- 650 samples

Personnel Involved

D.A. Silversides	- 601 -535 Thurlow Street, Vancouver Staff Geologist; 16 days @ $69.50	= $1,112.00
A.L. MacGregor	- 601 -535 Thurlow Street, Vancouver Geological Tech.;16 days @ $35.00	560.00
D. Dubetz	- 5143 Lansdowne Drive, Edmonton Junior Assistant;16 days @ $15.00	240.00
T. Hoy	- 220 McKinstry Rd., Duncan Senior Assistant;16 days @ $27.50	440.00

Board - 64 man days @ $5.00/day 320.00

Helicopter - Access to and from claims, and transport on property
Jet Ranger 206-B - 4 hrs. 35 mins. @ $230.00/hr. 1,054.16

Geochemical Sample Analyses

650 samples for Cu, Mo and pH @ $2.00/sample 1,300.00

$ 5,026.16

To be applied for two years on FAB #41 - #59 claims inclusive.

APPENDIX II

SAMPLE HANDLING PROCEDURE

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.

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 85% 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.

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 Mo

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

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, 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_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

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.

APPENDIX III - SOIL TYPES AND SOIL HORIZON NOMENCLATURE

Soil Type Nomenclature

Wooded Earths - Well aerated even coloured light-medium brown or grey soils, with medium grained friable texture. No marked horizon variations, and no accumulations of surface organic material, except grass roots and a carpet of forest litter. Generally occur on freely drained moderate slopes.

Podzols - Occur on steeper slopes and have free down profile drainage. Consist of an L-H horizon in which humus and forest litter occur and organic acids are formed - an underlying light grey sandy Ae horizon from which much of the trace metal, particularly iron, has been eluviated - and a bright rusty-orange Bf horizon which has been enriched in the iron leached from the Ae.

Gleysols - Occur in topographic lows where poor drainage has caused waterlogging. Organic matter builds up in the topsoil and anaerobic conditions prevail in the subsoil. Colours are greyish with rusty streaks and mottles. Frequently organic matter builds up in the topsoils, where this exceeds six inches the soil is known as a peaty gley and where over twenty-four inches a peat.

The iron enriched horizon of podzols sometimes become indurated forming an imprevious iron pan. This causes the upper horizons to become waterlogged and gleyed and leads to the formation of a peaty gleyed podzol.

Grassland Soils - Even textured well drained loamy soils of which the top 12-18 inches are frequently stained medium or dark grey due to organic compounds being washed down. Lime accumulation often occur in the subsoil.

Soil Horizon Nomenclature

Topsoils -

LH Litter-humus. The typical 2" thick topsoil of freely drained brown forest earths

AH Humic rich topsoil of a gley - up to 6" thick

FH Humic rich topsoil of a waterlogged seepage depression - greater than 6" thick

AE Eluviation (leached) horizon of a podzol immediately below the surface organic layer.

Subsoils -

BF Enriched in iron - the reddish horizon of a podzol

BT Enriched in clay relative to upper horizons

BG Gleyed horizon of a poorly drained soil-grey pallid colours with rusty mottles

BH Enriched in humus washed down from the topsoil - the dark grey stained horizon of grassland soils

BM Mellow-only slightly altered from the parent material

BC Gradational into the parent material

CC Parent material i.e. unweathered till

CG Waterlogged and gleyed parent material.


41
42
43
44
45
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50
51
52
53
54
55
56
57
58
59
Syncline Axis
True North
Magnetic North
26°
EXPLANATION
Rock Types
10 Dark brown, feldspar-biotite porphyry dyke
9 Feldspar-biotite porphyry
8 Crowded quartz-feldspar porphyry dyke
7 Quartz Monzonite Porphyry
7 Quartz monzonite porphyry with biotite
6 Rhyolite breccia
5 Vesicular rhyolite tuff
4 Thin-bedded, rhyolite tuff
3 Red breccia
2 Quartz diorite
2 Fine grained, dark grey quartz diorite
1 Hazelton Group
Symbols
3-10% disseminated and vein pyrite
intense sericitization
intense argillic alteration
edge of 1% pyrite zone
contact; observed, assumed
Mo molybdenite
Pb-Zn galena, sphalerite
Cu chalcopyrite, malachite
joints
fault
bedding
claim boundaries
41 claim number
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2664 MAP #4
AMAX EXPLORATION INC.
FAB 41-59 CLAIMS
GEOLOGICAL MAP
GRID AREA
200' 0' 200' 400'
DATE REVISED
DATE PRINTED
Drawn by: D.A.S
Date 14/10/70
N.T.S. File 93 E 11
FIG. 4
To accompany Report: GEOLOGY AND GEOCHEMISTRY of FAB 41-59 CLAIMS by D.A.Silversides and J.F. Allan P.Eng. (B.C.)
2664

41 43 45 47 49 51 53

42 44 46 48 50 52 54

55 56 57 58 59

11+800 N

10+000 N

8+200 N

7+00E 8+00E 9+00E 10+00E 11+00E 12+00E 13+00E 14+00E 15+00E 16+00E 17+00E 18+00E

TRIBUTARY COLES CREEK

N

MAGNETIC NORTH

LEGEND

- Soil Sample Site
- Water Sample Site
- Silt Sample Site

Horizon, Type / ppm Mo — Soil Profile

Type: GS = gleysol; TL = till
Horizon: AH = Humic, BG = gleyed horizon, CG = waterlogged and gleyed material

OED(S)(L)(W) 1–, OES(S)(L)(W) 409– Sample Code Numbers

pH / 10 10 10 — Cu ppm

change in slope, slope angle in degrees

edge of cliff, steep gully

Claim Boundary

Colour Code for Copper Values

- 0 – 39 ppm Cu
- 40 – 80 ppm Cu
- 81 – 499 ppm Cu
- > 500 ppm Cu

Area of Anomalous Cu Values in Soils

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2664 MAP #5

AMAX EXPLORATION INC.

FAB 41–59 CLAIMS

GEOCHEMICAL MAP
— GRID AREA —
COPPER

Drawn by A.L.M.
Date 6/10/70
N.T.S. File
Scale 1" = 200'

FIG. 5

To accompany Report: GEOLOGY AND GEOCHEMISTRY of FAB 41–59 CLAIMS, by D.A.Silversides and J.F. Allan

2664

41 43 45 47 49 51 53

42 44 46 48 50 52 54

55 56 57 58 59

11+800 N

10+000 N

8+200 N

7+00 E 8+00 E 9+00 E 10+00 E 11+00 E 12+00 E 13+00 E 14+00 E 15+00 E 16+00 E 17+00 E 18+00 E

WEST MALIBU RIVER

COLES CREEK

N

MAGNETIC NORTH

LEGEND

- Soil Sample Site
- Water Sample Site
- Silt Sample Site
- Soil Profile — Horizon, Type, ppm Mo; Type: BS = gleysol; TL = till; Horizon: AH = Humic, BG = gleyed horizon, CG = waterlogged and gleyed material
- OE(S)(I)(L)(W) 1–, OE(S)(I)(L)(W) 409– Sample Code Numbers
- pH / Mo ppm
- change in slope, slope angle in degrees
- edge of cliff, steep gully
- Claim Boundary

Colour Code for Molybdenum Values

- = 0 – 2 ppm Mo
- = 3 – 5 ppm Mo
- = 6 – 20 ppm Mo
- = > 20 ppm Mo

Area of Anomalous Mo Values in Soils

AMAX EXPLORATION INC.

FAB 41–59 CLAIMS

GEOCHEMICAL MAP
— GRID AREA —
MOLYBDENUM

Drawn by: A.L.M.
Date: 7/10/70
N.T.S. File: 93E(1)

FIG. 6

To accompany Report: GEOLOGY AND GEOCHEMISTRY of FAB 41–59 CLAIMS, by D.A. Silversides and J.F. Allan

2664