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1970 Geological and Geochemical Report

EUREKA PEAK COPPER PROSPECT

Cariboo Mining Division
93 A 7

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2662 MAP

AMAX Kamloops Office

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SUMMARY

Geological mapping and geochemical sampling were conducted on the 84 CS and EN claims of E. Scholtes and J. Carson on Eureka Peak, situated near the western border of Wells Grey Park, British Columbia.

Geologically the property lies within the "Quesnel Trough", a Mesozoic sequence of volcanic and sedimentary strata, near its eastern contact with the metamorphosed Cariboo Group of Paleozoic Age. On Eureka Mountain a thick sequence of siltstones and phyllites have been intruded successively by irregular bodies of amphibolite, augite porphyry and granodiorite.

Chalcopyrite, pyrrhotite and pyrite occur in pods, veins and disseminations within and adjacent to the granodiorite, and to a lesser extent apparently unrelated to the granodiorite within augite porphyry. The main area of mineralization extends for about 10,000 feet from upper Cirque I through Cirque 2 to lower Cirque 3. Here the tenor of mineralization in several trenches and diamond drill holes is fairly uniform at 0.05 to 0.2 per cent Cu although selected grab samples containing up to 3.5 per cent Cu have been recorded.

Geochemical sampling indicates the presence of anomalous copper in several areas on the property, most of which coincide with zones of known surface mineralization. Molybdenum is present in anomalous amounts locally, although no molybdenite mineralization was observed on the property.

INTRODUCTION

The property was visited during the period July 28 to August 1, 1970 by a crew of nine men under the supervision of C.J. Hodgson, P.Eng. During this period geological mapping was carried out on a scale of 1" = 1000', and a total of 222 silt, soil, water and rock chip geochemical samples were collected on the property.

Location and Access

Eureka Peak Prospect lies between Crooked Lake and MacKay River in the Upper Horsefly River watershed. The approximate coordinates of the centre of the property are 120°38' and 52°18'N.

A four-wheel drive bush road which takes off from the Horsefly River road at MacKay River provides access to a camp on the property in Cirque 2. From this bush road, cat trails lead off to other cirques along the ridge, although access on the property is best achieved by helicopter.

Topography and Drainage

Eureka Mountain comprises a northwestern-trending ridge dividing the drainage of MacKay River and McKusky Creek, both northwest flowing tributaries of Horsefly River. The ridge rises above 6500' for six miles of its length and culminates in Eureka Peak at 7959 foot elevation. The northeast flank of the ridge is scalloped to form a series of nine well-defined cirques which are referred to by number, Cirque 1 being to the southeast. On the northeast side of the ridge the upper slopes are precipitous rock faces; on the southwest, gentle slopes and alpine meadows predominate. Streams flowing

off the ridge are turbulent, but numerous small tarn lakes form silt traps.

Climate

At the elevation of the camp, the effective working season is at best from mid-June through to mid-October. Small areas of permanent snow and ice occur in most cirques. At the Boss Mountain Mine some twenty miles to the southwest, an average annual snowfall of 35 feet is reported between October and April.

Property and History

The copper showings were discovered on Eureka Mountain by E. Scholtes in 1958, and in 1965 prospectors Scholtes and J. Carson, both of Williams Lake, optioned the property to Helicon Explorations, a subsidiary of Chapman, Wood and Griswold Limited. Work was done by Helicon in 1965 and 1966 included construction of an access road and base camp, X-ray drilling in cirques 1 and 7 and construction of the 72 foot Cirque 2 adit from which was drilled a 630 foot horizontal drill hole. A topographic map of the area with 100 foot contour interval was compiled. Reconnaissance aeromagnetic, geochemical and geological surveys were carried out, as well as ground EM and IP surveys in Cirque 2. Chapman, Wood and Griswold dropped their option in 1967, having spent a reported \$155,000.

In 1968, Mr. Howard Traris spent \$20,000 on an EM survey in Cirque 2 and on follow-up diamond drilling (one hole of three reached bedrock, that located at the end of the upper access road).

The EN claims northwest of Cirque 3 expired in August

1968, and were restaked as the CS claims by Carson in October of that year.

At present the property is owned jointly by Scholtes and Carson and consists of two groups totalling 84 claims as follows (See Figure 2).

	<u>Number of Claims</u>	<u>Recording Date</u>
CS #1 - #56	56 full sized	October 24, 1968
EN #1-#15, #17, #28,	1 fractional	August 16, 1965
#29 Fr., #104-#107,	27 full sized	August 4, 1965
#109-#111, #126, #127,		August 16, 1965
#128		

GEOLOGY

General Statement

Eureka Peak lies on the eastern edge of the so-called "Quesnel Trough" (Campbell and Tipper, 1970, C.I.M.M. Bulletin), a belt of Mesozoic volcanic and sedimentary strata which is flanked on the east and west by variably metamorphosed Paleozoic strata of the Cariboo and Cache Creek groups, respectively. The Mesozoic-Cariboo contact lies immediately east of the MacKay River, and the Cariboo Group here consists of garnetiferous gneisses and schists.

Eureka Mountain itself consists of a complex of amphibolite, augite porphyry and granodiorite intrusions surrounded by weakly metamorphosed siltstones and phyllites. The intrusive complex lies mainly on the northeast flank of the ridge and extends from Cirque 9 to Fraser Peak, a distance of seven miles.

The intrusive sequence appears to be amphibolite (probably originally pyroxenite) and augite porphyry followed by granodiorite. There is some doubt as to the relationship between the amphibolite and augite porphyry. They may be parts of a single layered intrusion as there is little evidence of an intrusive relationship between them and as they appear to grade into each other in places along the contact, particularly northwest of Cirque 6. A less likely possibility is that the amphibolite is a product of metamorphism of the augite porphyry by the Cariboo metamorphic event to the east. Granodiorite stocks and dykes in the area of Cirques 2 and 9 cut both amphibolite and augite porphyry and are hybridized adjacent to the augite

porphyry. The disposition of these stocks near the amphibolite-augite porphyry contact suggests structural control by that contact. Late augite porphyry dykes which cut the granodiorite stock point to a resurgence of basic volcanism.

Sulphide mineralization consists of chalcopyrite, pyrite and pyrrhotite within and adjacent to the granodiorite stocks. The most important of these stocks extends 10,000 feet from upper Cirque 1 to lower Cirque 3 and is surrounded by a well-developed pyritic halo in the adjacent augite porphyry.

Lithological Descriptions

Sedimentary strata on Eureka Mountain consist of siltstones, phyllites, and minor limestones and quartzites. These strata form the backbone of the northern portion of the ridge and are approximately parallel to it in strike. Dips vary from steeply SW in the north to moderately NE in the south around Fraser Peak. The strata are thinly bedded, unfossiliferous, and show weak phyllitic metamorphism in suitable lithologies.

The phyllite sequence in the MacKay River valley shows slightly more pronounced metamorphism and small-scale folding than the strata on the ridge. Minor angular unconformities indicate tops to the southwest. Weak rusty alteration is characteristic of these strata but background copper and molybdenum content is about 20 and 2, respectively. The sequence is intruded by augite porphyry dykes near the main augite porphyry contact, and by rare granodiorite dykes.

The amphibolite unit occurs below treeline in the lower portion of the cirques. Typically it is a very coarse

grained pale-green rock composed of 85 per cent actinolite, 10 per cent chlorite and 5 per cent plagioclase. Zones of chlorite schist are fairly common in the unit. Background copper and molybdenum are 35 and 1, respectively in the amphibolite.

Augite porphyry underlies an area of about six square miles extent around Eureka Peak itself, continues as a concordant lense or sill at least three miles northwest of the Peak, and occurs as irregular bodies and dykes in the vicinity of Fraser Peak. In lower Cirque 2 and in other cirques to the northwest, augite porphyry is a uniformly textured rock with 10-20 per cent chloritized augite prisms up to 7 mm in a fine grained feldspathic groundmass. In Cirques 1, 2, 3 and 4, and in some exposures in the Fraser Peak area the augite porphyry displays a well developed breccia structure which is identical to that observed in extrusive augite porphyry breccia units in the Hydraulic area to the west. This augite porphyry breccia consists of up to 70 per cent rounded fragments of augite porphyry up to 8 inches in diameter in an augite porphyry matrix. Gabbro and pyroxenite are also represented among the fragments. Thus the augite porphyry shown in Figure 2 may be part intrusive and part extrusive in origin.

The augite porphyry and augite porphyry breccia are generally massive and dull grey in colour. In the vicinity of Cirque 2 the unit shows pronounced rusty weathering due to the presence of 2 - 5 per cent disseminated pyrite. Background copper and molybdenum in the augite porphyry are 100 and 1,

respectively.

Granodiorite in cirques 1, 2, 3, 8 and 9 consist of two phases: a leucocratic, fine grained, equigranular phase and a hybridized dioritic marginal phase. The former consists of 65 per cent plagioclase, 20 per cent quartz, 10 per cent potash feldspar and 5 per cent mafics. The latter contains up to 30 per cent mafics and less quartz and potash feldspar. Chlorite and epidote comprise a large portion of the mafics and are common along fractures within the rock.

Quartz veins cut all rock types but are slightly more abundant in the sedimentary strata than in the augite porphyry or amphibolite units. Some quartz veins in the granodiorite contain chalcopryrite but most are barren, and veins in the strata are invariably barren. Quartz veins vary from two inches to four feet in width and are quite irregular in strike; none is traceable for more than several tens of feet.

Structure

An episode of penetrative deformation has affected all rock types on the property, producing phyllites in the sedimentary strata, chlorite schists in the augite porphyry and amphibolite, and pronounced jointing locally in the granodiorite. This planar feature varies in attitude from 090° to 120° azimuth, with steep northerly dips. It is approximately parallel to the Mesozoic-Cariboo contact and is presumed related to the Cariboo metamorphic event. Quartz veins were probably "sweated out" of the various rocks, particularly the siltstones and phyllites at the same time.

Only one major fault was defined in the area; a

vertical NNE-trending fault with unknown amount of offset between Eureka and Fraser Peaks. Minor faults occur throughout the property and one in Cirque 2 occurs along the amphibolite-augite porphyry contact.

Economic Geology

Significant sulphide occurrences have been found in several areas of the property, notably in Cirques 1, 2, 3, 6 and 7 and minor occurrences have been noted in the Fraser Peak area. The most promising area is centered on Cirque 2 and includes parts of Cirques 1 and 3. Here, chalcopyrite, pyrite and pyrrhotite are present in minor amounts throughout the granodiorite stock as veins, pods and disseminations. Copper mineralization extends up to several hundred feet into the adjacent augite porphyry, beyond which a pyritic halo extends for up to another 2000 feet. Sulphide mineralization is absent in the amphibolite on the northeast side of the granodiorite stock. The area of best mineralization in the stock and elsewhere on the property appear to be localized by strong ESE jointing and faulting, as is observed in Cirques 1, 6 and 7 and at the adit in Cirque 2 where discontinuous sulphide seams and pods up to several inches wide occur along this direction. In addition, the area of better mineralization around the adit consist of the assemblage chalcopyrite-pyrrhotite whereas lower grade disseminated mineralization elsewhere in the stock consists of chalcopyrite and pyrite with rare pyrrhotite. It would appear that the penetrative deformation was responsible for concentrating sulphides already present in the stock, and that sulphide remobilization was accompanied by partial loss

of sulphur from the environment.

In general, background copper content of the stock is in the order of 500 ppm, and increases to the 1000 - 2000 ppm range (0.1 to 0.2% Cu) in areas of better mineralization. The best trench in Cirque 2 ran 85 feet of 0.21% Cu, including 25 feet of 0.36% Cu. This trench (#3) lies southwest of the adit which was driven to provide a safe drill site to test the downward extension of this zone. The target area was not reached by drilling because of mechanic difficulties but copper content of the core showed a slight increase towards the end of the hole. Overall, the 630 feet of drill core averaged 0.10 per cent Cu.

GEOCHEMISTRY

A total of 222 geochemical silt, water, soil and rock chip samples were collected on and adjacent to the property. The methods of collecting and analysing these samples are given in Appendix II. Analyses were carried out at the Amax Geochemical Laboratory in Burnaby, B.C. Analytical values were plotted on a distribution curve and were colour coded from the resulting histogram as follows:

<u>Soil, Silt, Rock Chip</u>	Green	0 - 59	ppm Cu background
	Blue	60 - 89	ppm Cu positive
	Orange	90 - 149	ppm Cu anomalous
	Red	150 - 500	ppm Cu highly anomalous
	Purple	+ 500	ppm Cu extreley anomalous
<u>Water</u>	Green	0 - 2	ppb Cu background
	Red	+ 2	ppb Cu anomalous

The results of this survey were as follows:

Molybdenum - is present only in trace amounts on the property and most of the samples with significant molybdenum content are from sedimentary strata or soils derived therefrom, suggesting a high molybdenum background locally in the strata.

Copper - is widely distributed in geochemical samples from the property, and most areas of better copper geochemistry coincide with areas of known surface copper mineralization, as in Cirques 1, 2, 5, 6 and 7. Weak anomalies coincide with the area of augite porphyry, as this unit has a fairly high background copper content (about 100 ppm Cu).

AMAX KAMLOOPS OFFICE

October 1970

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

APPENDIX IASSESSMENT DATACS and EN Claims

Work done on CS #1 - #56 and
 EN #1 - #15, #17, #28, #29 Fr., #104-
 #107, #109 - #111, #126, #127, #129.

from July 28 to August 1, 1970.

Geological mapping and geochemical sampling -
 12 square miles

Geochemical samples analyzed - 222

Personnel Employed

C.J.Hodgson, P.Eng. Geologist I/C; 1289 Kimberley Crescent, Kamloops
 F.R.Harris, Geologist; 7520 Lawrence Drive, Burnaby
 L.Tattersall, Prospector; General Delivery, Williams Lake
 D.Smith, Senior Assistant; Box 143, City of Leicester Polytechnic,
 Leicester, England
 R.Bailes, Senior Assistant; 36 Greenwich Bay, Winnipeg 6, Manitoba
 P.Vanstone, Senior Assistant; Box 39, Bowmanville, Ontario
 T.Underwood, Junior Assistant; Box 150, Montrose
 A.Lau, Junior Assistant; 2185 E 61st Ave., Vancouver 16
 K.Zurbuchen, Cook; General Delivery, Williams Lake

Salaries - July 28 to August 1, 1970

C.J.Hodgson	5 days @ \$55.00/day	\$275.00
F.R.Harris	5 days @ \$54.00/day	270.00
L. Tattersall	5 days @ \$25.00/day	125.00
D. Smith	5 days @ \$25.00/day	125.00
R. Bailes	5 days @ \$26.00/day	130.00
P. Vanstone	5 days @ \$21.16/day	105.80
T. Underwood	5 days @ \$17.50/day	87.50
A. Lau	5 days @ \$15.83/day	79.15
K. Zurbuchen	5 days @ \$21.67/day	108.35

Board

45 days @ \$ 6.00/day 270.00

Geochemical Samples Analyses

Soils, silts, and waters -	95 @ \$2.00/sample	190.00
Rock chips	- 127 @ \$3.00/sample	381.00

Transportation

Three 4-wheel drive vehicles

5 days @ \$10.00/day 150.00

Preparation of Report

\$200.00

Total \$ 2,496.80

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

R.F. Horsnail

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.

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 pulverized 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 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.

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

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 Hx1O_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% HClO₄. 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 calcu-
lated 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, H₂O, HCl, HNO₃, HClO₄, fumed to HClO₄ -
make up to 100 mls H₂O

1000, 100 gamma/ml and 100 ml by dilution in 20 % HClO₄

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% HClO₄ 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, HNO₃, and fumed into
HClO₄, dilute to 1 liter

Pipette

1, 2, 10, 20 mls into 100 ml vol flasks diluted to mark
with 20% HClO₄

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% HClO₄. 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 N₂O 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 MoO₃ (acid molybdic) with 20 mls H₂O, 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% AlCl₃

and dilute to 100 mls with 20% HClO₄

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/ml

Weigh 5.000 gms iron wires, into beaker, add H₂O, HCl, HNO₃,

HClO₄, heat to HClO₄ fumes. Add HClO₄ to 100 mls + 100 mls

H₂O, warm, dilute to 500 mls

Pipette

1, 5, 10, 20, 30, 50, 80 mls 10,000 gamma/ml dilute to 100
mls with 20% HClO₄ 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 - 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, HNO₃, HClO₄ to
perchloric fumes, dilute to 100 ml H₂O

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% HClO₄

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 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, H₂O, HCl, HNO₃ until dissolved, addHClO₄, fume dilute to 100 mls

1000 gamma/ml 10x dilution above in 20% HClO₄

2000 gamma/ml 20 mls 10,000 gamma/ml - dilute to 100 mls in
20% HClO₄

100 gamma/ml 10x dilution 1000 gamma/ml dilute to 100 mls in
20% HClO₄

200 gamma/ml 10x dilution 2000 gamma/ml dilute to 100 mls in
20% HClO₄

Pipette

1, 2, 3, 5, 8, 10 mls 100 gamma/ml - dilute to 100 mls with
20% HClO₄ 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 $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$ 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 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 SnCl₂
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 H₂O, 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 H₂O to methanol to match. Seal tightly

SnCl₂ - 15% in .15% HCl

300 gm SnCl₂ · 2H₂O + 300 mls HCl, until SnCl₂ dissolved
dilute to 2 liters

KSCN - 5% in H₂O

Mixed SnCl₂ - KSCN

3 parts SnCl₂ 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 $m\mu$ against a demineralized water blank
4. Read again at 400 $m\mu$ and subtract from sulphate reading
5. Calculate ppm sulphate from the graph

Reagent

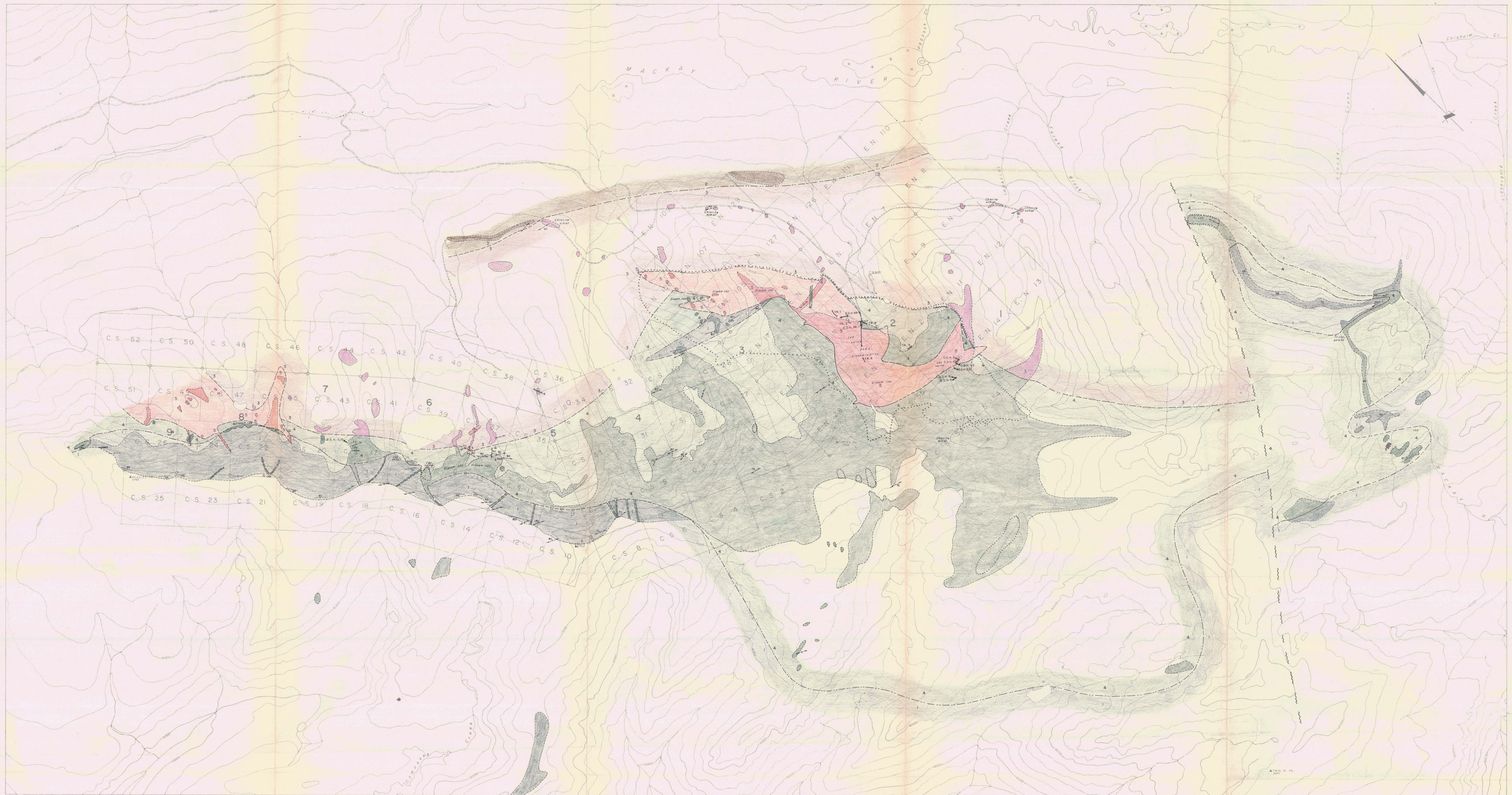
Dissolve 54 grams red mercuric oxide (J.T. Baker 2620- Can Lab) in 185 ml 70% perchloric acid and 20 ml H₂O, shake for one hour. Add 46.3 grams ferric perchlorate $\text{[Fe(ClO}_4\text{)}_3 \cdot 6\text{H}_2\text{O]}$ (GFS 39) and 47 grams aluminum perchlorate $\text{[Al (ClO}_4\text{)}_3 \cdot 8\text{H}_2\text{O]}$ (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.

APPENDIX IIIASSAY DATA

<u>Drill Hole or Trench</u>	<u>Location</u>	<u>Source of Information</u>
DDH-66-1	Cirque 2 (adit)	Chapman, Wood & Griswold, 1966
DDH-1 to 8	Cirque 1	" "
DDH-9, 10	Cirque 7	" "
Miscellaneous samples	Cirques 1, 2, 7	" "
Trenches 1 - 3	Cirque 2	" "
Trenches 4, 5	Cirque 2	AMAX assays, 1970



LEGEND

- Granodiorite.
- Augite porphyry and augite porphyry breccia.
- Amphibolite, pyroxenite.
- Phyllite, argillite.
- Siltstone, argillite, minor limestone, quartzite.

- Adit, Trench
- Outcrop boundary.
- Geological contact (defined, approximate, assumed).
- Gossan zone outline.
- Fault (defined, assumed).
- Schistosity.
- Bedding attitude.
- Topographic contour (contour interval 200').

- Diamond drill hole (vertical, inclined).
- Swamp.
- Claim post, claim location line.
- Claim boundary line.
- Cirque number.
- Road, trail.
- Stream.
- Intermittent stream.

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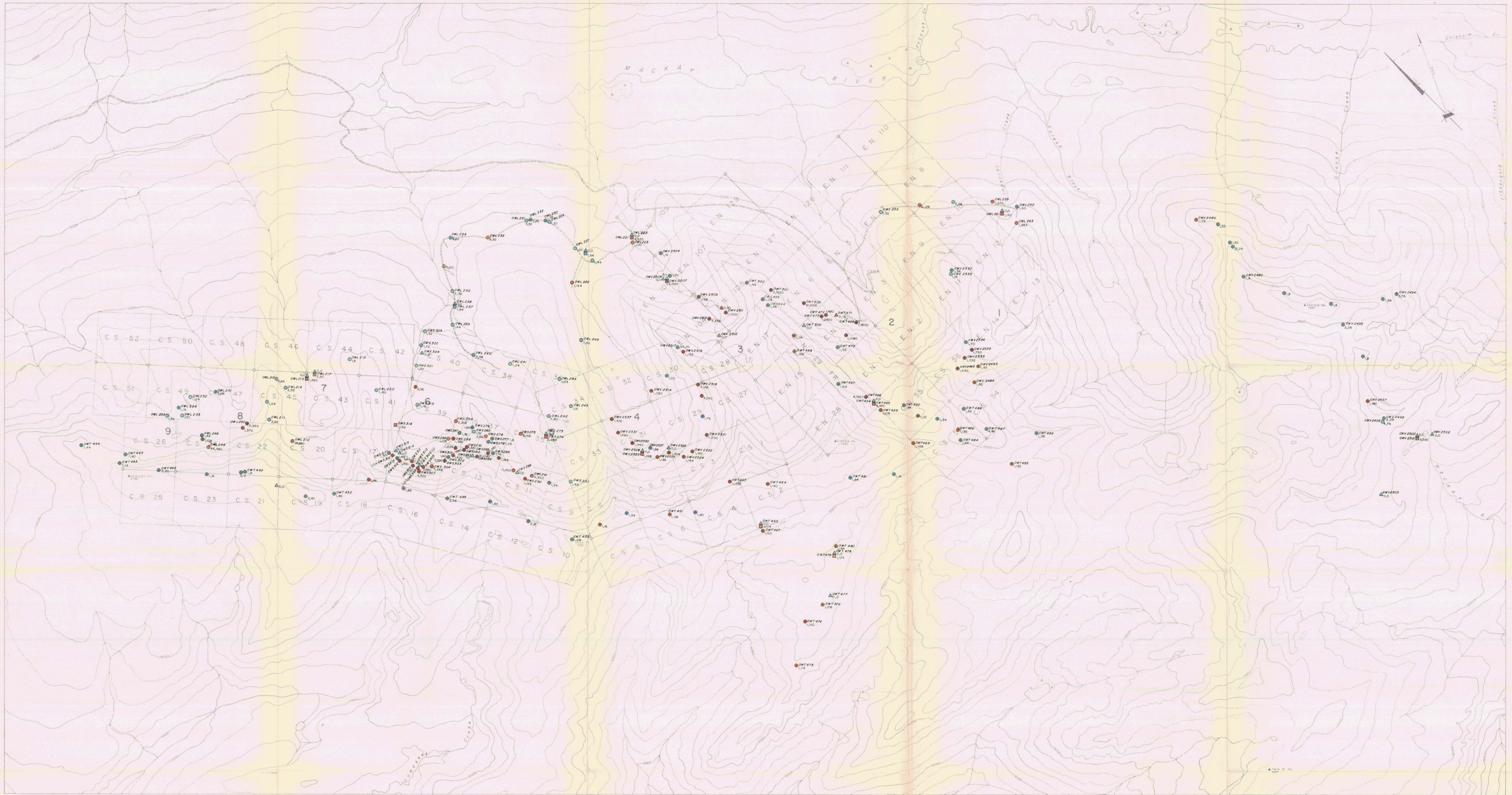
Department of
 Mines and Petroleum Resources
 ASSESSMENT REPORT
 NO. 2662 MAP

AMAX EXPLORATION INC.
EUREKA PEAK COPPER PROSPECT
 CARIBOO MINING DIVISION - BRITISH COLUMBIA
GEOLOGICAL MAP

SCALE 1" = 1,000'

DATE	DRAWN BY	INCHES	DRAWN BY	FIG. 2

To accompany "GEOLOGICAL AND GEOCHEMICAL REPORT ON THE EUREKA PEAK COPPER PROSPECT" by C. J. Hodgson.



S Y M B O L S

GEOCHEMICAL LEGEND

SOIL, SILT AND ROCK CHIP SAMPLE (p.p.m. Cu)

- 0 - 59 Background.
- 60 - 89 Positive
- 90 - 149 Anomalous.
- 150 - 500 Highly Anomalous
- >500 Extremely Anomalous

WATER SAMPLE (p.p.b. Cu)

- ▲ 0 - 2 Background.
- ▲ > 2 Anomalous.

- Soil sample site, sample number, p.p.m. Mo, Cu
- Silt sample site, sample number, p.p.m. Mo, Cu
- Rock chip sample site, sample number, p.p.m. Mo, Cu
- ▲ Water sample site, sample number, p.p.b. Mo, Cu
- Claim post, claim location line
- - - Claim boundary line

- 4 Cirque number
- Road
- Trail
- Topographic contour (contour interval 200')
- Swamp
- Stream, intermittent stream

2662

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EUREKA PEAK COPPER PROSPECT
CARIBOO MINING DIVISION - BRITISH COLUMBIA
GEOCHEMICAL MAP

SCALE 1" = 1,000'

DATE	BY	Drawn by	H.C.P.
		24/9/70	
		NTS File	93 A 7
			FIG. 3

To accompany "GEOLOGICAL AND GEOCHEMICAL REPORT ON THE EUREKA PEAK COPPER PROSPECT" by C. J. Hodgson.