3291

GEOCHEMICAL REPORT

ON THE

JO GROUP

(JO 5, 7, 8, 9, 10, 27, 28, 30, 32, 50, 225, 226,
227, 228, 229, 230, 231, 233, 336, 337, 339, 341)

TEN MILES WEST OF EDDONTENAJON, B.C.

Lat. $57^{\circ}\ 48\frac{1}{2}'$ N; Long. $130^{\circ}\ 12'$ W

104 G / 16E

FOR

SUMITOMO METAL MINING CANADA LTD.

FIELD WORK

July 27, 1971 to August 6, 1971

By : G. R. Hilchy, P. Eng.

Date : September 30, 1971.

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ILLUSTRATIONS

BASE MAP

INTRODUCTION

The Jo Group of claims was staked on behalf of Sumitomo Metal Mining Canada Ltd. during August, 1970. Beginning on July 27th and continuing to August 6th, 1971, a detailed geochemical soil sample survey was carried out on the property.

Operations were conducted from a base camp near the northeast end of Morchuea Lake about 12 miles northeast of the property. A fly camp was established near the center of the property to facilitate the work. The fly camp was serviced by helicopter based at Morchuea Lake.

LOCATION AND ACCESS

The Jo Group lies on the Klastline Plateau in the Stikine river area of Northern British Columbia. The group is centered near Lat. 57° $48\frac{1}{2}$' North, Long. 130° 12' West. The elevation of the property varies from approximately 5,200 feet (1,600 m) to 6,600 feet (2,000 m) above sea level.

Access is by helicopter from the Stewart-Cassiar highway near Eddontenajon Lake. At the north end of Eddontenajon Lake, is a store and post office (Eddontenajon, B.C.). Nearby is a small Indian Village and an airstrip suitable for Otter aircraft. Eddontenajon is served by scheduled aircraft from Terrace, B.C. and truck from Watson Lake, Yukon.

TOPOGRAPHY & CLIMATE

The project area is snow covered from the latter part of September until about mid-July. Some patches of snow and a few small glacial remnants persist throughout the year. The brief summer is usually cool with frequent rain although the summer of 1971 was unusually dry and warm with only a few rainy days.

As a result of the cool summers the area lies entirely above timberline. The ground cover is typical alpine tundra frequently interrupted with bare solifluction slopes and talus on the steeper slopes.

BASE MAP

A base map was prepared by McElhanney Surveying and Engineering Ltd. on a scale of 1:12,500.

In view of the proposal for Canada to convert to the metric system, it was decided to use metric base maps. The scale chosen for the topographic base map is very nearly 1 inch equals 1,000 feet.

A contour interval of 20 meters (about 65½ feet) was selected in preference to the mixed system of metric horizontal scales and contours in feet used on the national topographic maps.

FIELD PROCEDURE

A base line-picket line system was established over the area surveyed using a metric tape. Pickets were set on the corners of a 100 meter square grid. Slope corrections were made with a clinometer.

Samples were taken at the corners of the grid squares where possible. Occasionally it was necessary to take samples at locations slightly offset from the grid owing to topography and related problems. Most of the offsets were too small to show on the final plot. Part of the area was sampled on a 50 meter grid.

Soil samples were taken from the upper "B" horizon or where this was not present, from the "C" horizon. Since the organic "A" horizon was rather thin over the area (sometimes missing), samples were taken with a trowel after digging through the "A" horizon with a mattock.

The soil samples were collected in standard high wet-strength kraft soil sample bags.

SAMPLE PREPARATION

The samples were delivered from the field to the base camp where they were dried and sieved through a stainless steel screen to -80 mesh. The -80 mesh material was placed in numbered coin envelopes and shipped to CHEMEX LABS Ltd., 212 Brooksbank Ave., North Vancouver, B.C., for analysis.

ANALYTICAL PROCEDURES

The samples were analysed for both "total copper" and "cold extractable copper" by the following procedures :

GEOCHEMICAL LABORATORY PROCEDURE FOR THE HANDLING AND ANALYSIS OF SOIL AND SILT MATERIALS CONTAINING TRACES OF Cu, Mo, Zn, Ni AND Co.

Step 1. Samples are dried @ 110°F and then sieved to -80 mesh consistency through a nylon and stainless steel sieve. Presieved materials are processed starting at Step #2.

Step 2. 0.50 grams of the dry pulp is weighed into a calibrated test tube.

Step 3. 3 mls. of perchloric acid and 1 ml. of nitric acid is added to sample.

Step 4. Samples are digested at low heat initially and then the temperature is raised to 203°C. Digestion time 2 to 3 hours.

Step 5. Digested samples are cooled, made up to 25 ml. volume with distilled water and solutions are thoroughly mixed.

Step 6. Analysis for Cu, Mo, Zn, Ni, and Co by Atomic Absorption procedures. Detection limits as per our brochure.

Bruce W. Brown
Manager Laboratory Division.

COLD EXTRACTABLE COPPER DETERMINATION

Step.1. A 0.50 gram portion of -80 mesh material is weighed into a calibrated test tube.

Step 2. 10 mls. of 1X holman Buffer is added to sample. Sample and buffer is thoroughly mixed and solution is settled for 1 hour.

Step 3. Sample volume is made up to 25 mls. with distilled water. The samples are thoroughly shaken and allowed to settle until clear.

Step 4. The analysis of cold extractable copper is completed by atomic absorption method.
Detection limit - 1 ppm copper.

Notes: Holman Buffer (5X)

For 2 liters (makes 10 liters of 1X working solution)

500 gms Ammonium citrate

200 gms Hydroxylamine hydrochloride

350 ml. concentrated hydrochloric acid

Enough copper-free water to make 2 liters

- Dilute one part 5X solution with 4 parts water and test with 1 ml. of 0.001% dithizone. If blue or red, solution must be scrubbed with dithizone or cleaner water obtained.
- pH of 5X solution is approximately 1.5 pH, of 1X working solution is approximately 2.0 (usually about 3.0 when mixed with soil).

- this buffered solvent will dissolve oxides and carbonates but no sulphides or silicates.

SOIL DEVELOPMENT

Although the area was glaciated relatively recently, field observations indicate that the soil is largely residual in character. The steeper slopes show a considerable amount of down-hill creep (solifluction) which grade into talus as the slopes approach 35^{o}.

The ground water is quite acid in character especially close to the main streams. (The streams gave a pH of about 4.5 (corrected) using pH paper).

As might be expected the soil profile is often not well developed. However, the acid groundwater has resulted in considerable chemical weathering and, in places reasonably good soil development.

As a result of these factors acting over a relatively short period of time, the chemical characteristics of the soil have not stabilized. This is clearly evident in the map showing the ratio of cold extractable to total copper. This tends to be rather erratic in places where solifluction and chemical weathering are strongest.

RESULTS

The statistical distributions of the results were obtained and the distributions plotted as histograms.

Since the 1:12,500 base maps was not suitable for the amount of data obtained from the survey, the results have been plotted on a scale of 1:5,000 or approximately 1 inch = 400 feet. The maps presented show total copper, the ratio of cold extractable copper to total copper expressed as a percentage, and total copper minus cold extractable copper (sulfo-silicate copper).

INTERPRETATION

HISTOGRAMS

The statistical distributions of the results were all found to be approximately log-normal and multi-modal. Since the standard statistical parameters have little meaning in the case of multi-modal distributions these were not calculated.

The histograms were used to determine the approximate limits of the background and anomalous populations. This was done in the following manner using figure 2 to illustrate the procedure. The principal sub-populations (A, B, C, etc.) were identified by inspection and their distribution visually estimated (broken lines). The points where two sub-populations crossed were marked (e.g. a, b, c, etc.). The values at a could belong with equal probability in either sub-population A or B. Similarly b could belong with equal probability to sub-population B or C and so on. These values were then used as contour values on the plan maps of the results. Therefore all points lying between contours a and b - can be considered to have a greater than .50 probability of belonging to sub-population B.

A description of the populations must depend on other data - primarily geology and known mineralization. These descriptions are rather subjective as are of course the limits of the sub-populations.

On the basis of the above procedure, the total copper populations are interpreted as follows :

Sub-population A - This is a minor sub-population. It occurs at various places within the main background population. Its origin is not known but it may be derived from a minor rock type with very low copper content.

Sub-population B - This is the background sub-population. The areas covered by this population on the map are known to be underlain by essentially unmineralized volcanic rock.

Sub-population C - This sub-population can be considered as weakly anomalous. In the field these areas are within a broad pyritic zone. Little copper mineralization was observed within this area.

Sub-population D - This sub-population is required to explain the shape of the histogram. Since it does not occur on the total-copper-minus-cold-extractable copper histogram it is probably a phenomenon associated with cold extractable copper. As it is a small sub-population it can be ignored for present purposes.

Sub-population E - This sub-population is considered to be definitely anomalous. Copper mineralization was frequently observed in bedrock and float within the area.

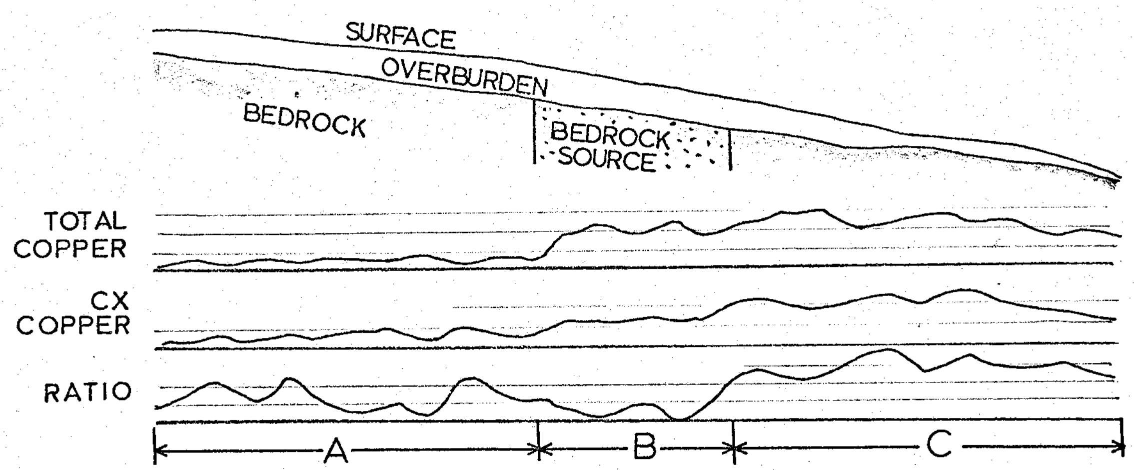
Sub-population F - This sub-population is highly anomalous.

RATIO MAP

The map of the ratio of cold extractable copper to total copper gives an indication of the amount of chemically transported copper in the soil. For brevity this ratio will be referred to as "the ratio" . This type of map is used by some leading geochemists* to interpret the results of soil (and silt) surveys.

* Barringer Research Limited.

A typical profile would be as indicated in the following diagram.



Area A - Low total copper, with low absolute values of cold extractable copper and variable ratios. The pattern of distribution is the result of transport of a minor amount of copper in ground waters. This would be an unmineralized background area.

Area B - High total copper with low ratio. The absolute value of the cold extractable copper is higher than in Area A but the ratio is lower because of the large amount of copper that is not cold extractable - i.e. mechanically derived from the bedrock source. This area is over or slightly down slope from the bedrock source.

Area C - High total copper - usually higher than B - with high cold extractable copper and high ratio.
The high ratio is the result of a high percentage of the total copper being chemically derived from an upslope bedrock source.

In the case of the JO Group, a comparison of the total copper map with the ratio map the following features are apparent :

1) The area lying south west of a line from 300 N, 26 W to 293, 38 is a typical background area. Similar background areas occur elsewhere on the map although they are apparent only when compared with the total copper map.

2) The high values of the ratio at 35.5, 298.5 and 36, 297.5 coincide with lower values of total copper and lie down slope from higher values of total copper with a lower ratio. This is a poorly developed but typical anomaly pattern and indicates a source area in the vicinity of 298, 35 and 297, 35.5.

3) The higher ratio in the vicinity of 296, 35.5 is a-typical as the high ratio value coincides with the highest value for total copper. To a greater or less extent, most of the other high values of the ratio have a similar a-typical character.

As indicated above, the pattern of the ratio is, in places a-typical. This is believed to be due to a combination of the following factors :

a) shallow water table
b) highly acid ground water evidently high in dissolved iron
c) solifluction
d) two or more sub-parallel sources lying along the slope.
e) sources trending down the slope

Although the ratio map is included in this report, it is considered to be of limited value in interpretion.

SULFO-SILICATE MAP

In view of the doubtful value of the ratio map, another map was prepared showing total copper minus cold extractable copper. This will be referred to as sulfo-silicate copper since only sulphide copper and silicate copper will remain after removing the cold extractable copper.

This plot should give a fairly reliable location for the source areas of the copper mineralization. The up-hill edge of the anomalies will very nearly coincide with the farthest up-hill place where the mineralized material from the bedrock source reached the ground surface under the influence of solifluction and/or creep. The distance up-slope to the upper edge of the bedrock source will depend on the depth of overburden and the relative amount of creep or solifluction. It is believed that the overburden is shallow over the area because of the character of the soil (largely residual with a short period of soil development). The amount of down-slope creep is therefore thought to be after the order of a very few meters.

If there are two sub-parallel sources lying along the slope, the sulfo-silicate map should show this with a second fairly abrupt increase in value farther down the slope. If there is a fairly wide area of mineralization or, the mineralization is trending down the slope, the values should increase more uniformly going down-slope. The lower edge of the mineralized area should be indicated by a gradual decrease in values down-slope beginning some distance below the lower edge of the mineralization (the distance will of course depend on the nature of creep and solifluction and the depth of overburden).

Using these interpretative techniques, the probably source areas of the anomalous copper in the soils have been determined and are shown on the sulfo-silicate copper map. The sample density is not high enough to accurately locate the source areas in all cases but errors should be less than 50 meters.

CONCLUSIONS

The principal area of interest lies between 299/32 and 300.5/29. In this area two or three sub-parallel source areas occur over a length of about 300 meters and a width of about 150 - 175 meters. Smaller areas of interest lie near 298.5/34.5, 302/27 to 303/26.5, 308/20 to 309/20, and 318/15 to 316/15.

As experience in British Columbia to date has shown that there is no definite relationship between the value of copper in soil and the value of copper in the underlying bedrock, it is not possible to predict the value of copper in the bedrock source.

Further investigation of the larger source areas by other methods is warranted.

G. R. Hilchey, P. Eng.

DECLARATION OF EXPENSES

Men employed on survey

Ronald Britten,	July 27-30,	4 days	@ $23,26*	$ 93.04
Bernard Stannus,	July 27-Aug 6,	10½ "	@ 23.26	244.23
Darryl Gjerness,	July 27-Aug 6,	11 "	@ 21.15	232.65
Douglas LePatourel,	July 27-Aug 6,	10½ "	@ 21.15	222.08
Peter Lovick,	July 31,	1 "	@ 21.15	21.15
Allistair Mellander,	Aug. 2-Aug. 6,	5 "	@ 21.15	105.75
Gordon R. Hilchey,	July 27, Aug.6	2½ "	@ 72.16	72.16
	Sep.- more than	2 "	@ 72.16	144.32
Board loss	43 man days		@ $ 7.00	301.00
Chemical analysis	452 samples (including sample preparation)		@ $ 1.00	452.00
	452 samples		@ $ .80	361.60
Plus: Helicopter to service camp			@ $140.00/hr.	
Drafting, reproduction, typing, etc.				-
				$2,249.98

* Rates included C.P.P., W.C.B. Vacation Pay, and U.I.C. where applicable. Monthly rates converted to daily rates.

CERTIFIED CORRECT

G. R. Hilchey

G. R. Hilchey, P. Eng.

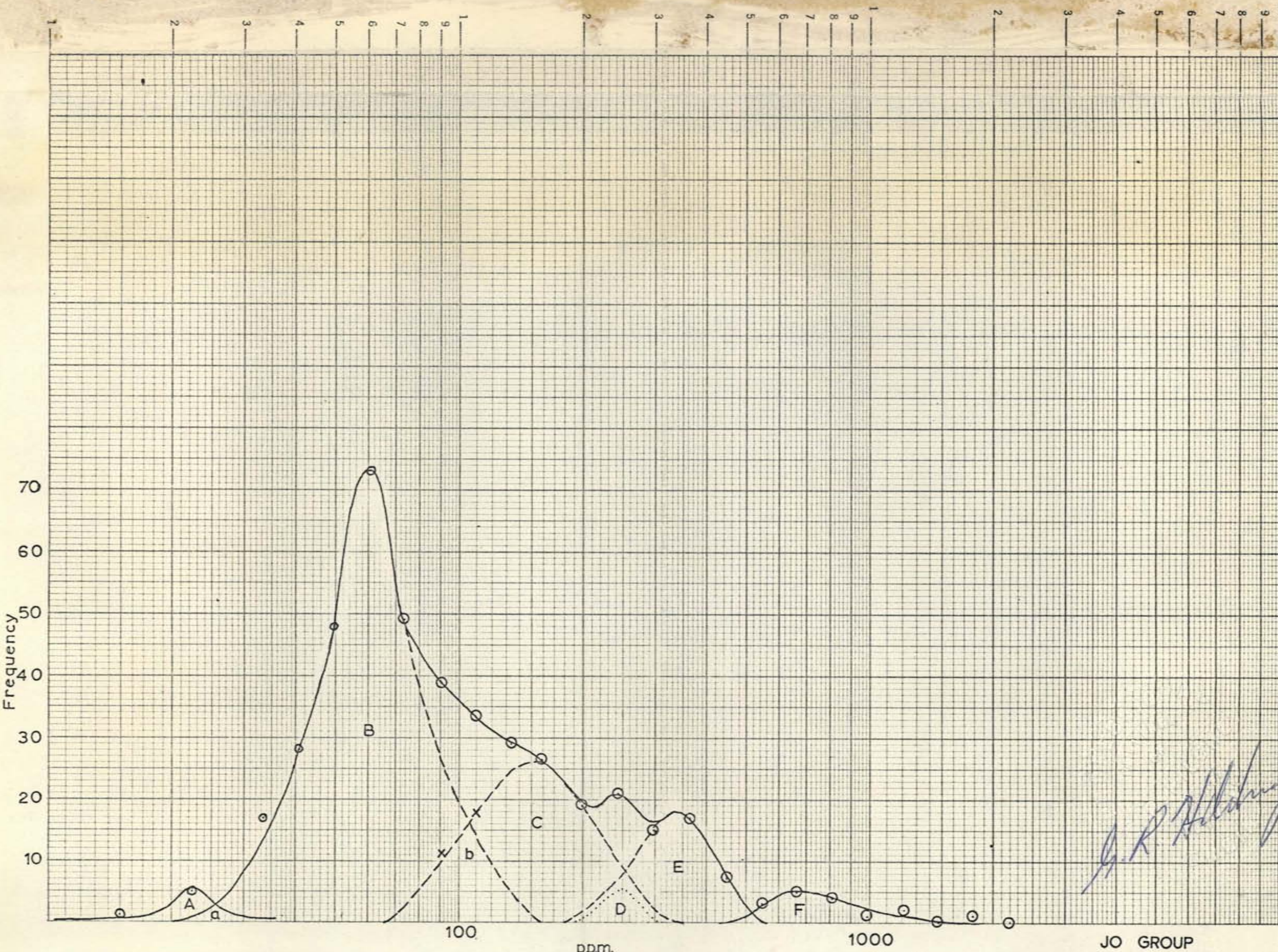


Fig. 2

JO GROUP
HISTOGRAM OF TOTAL COPPER

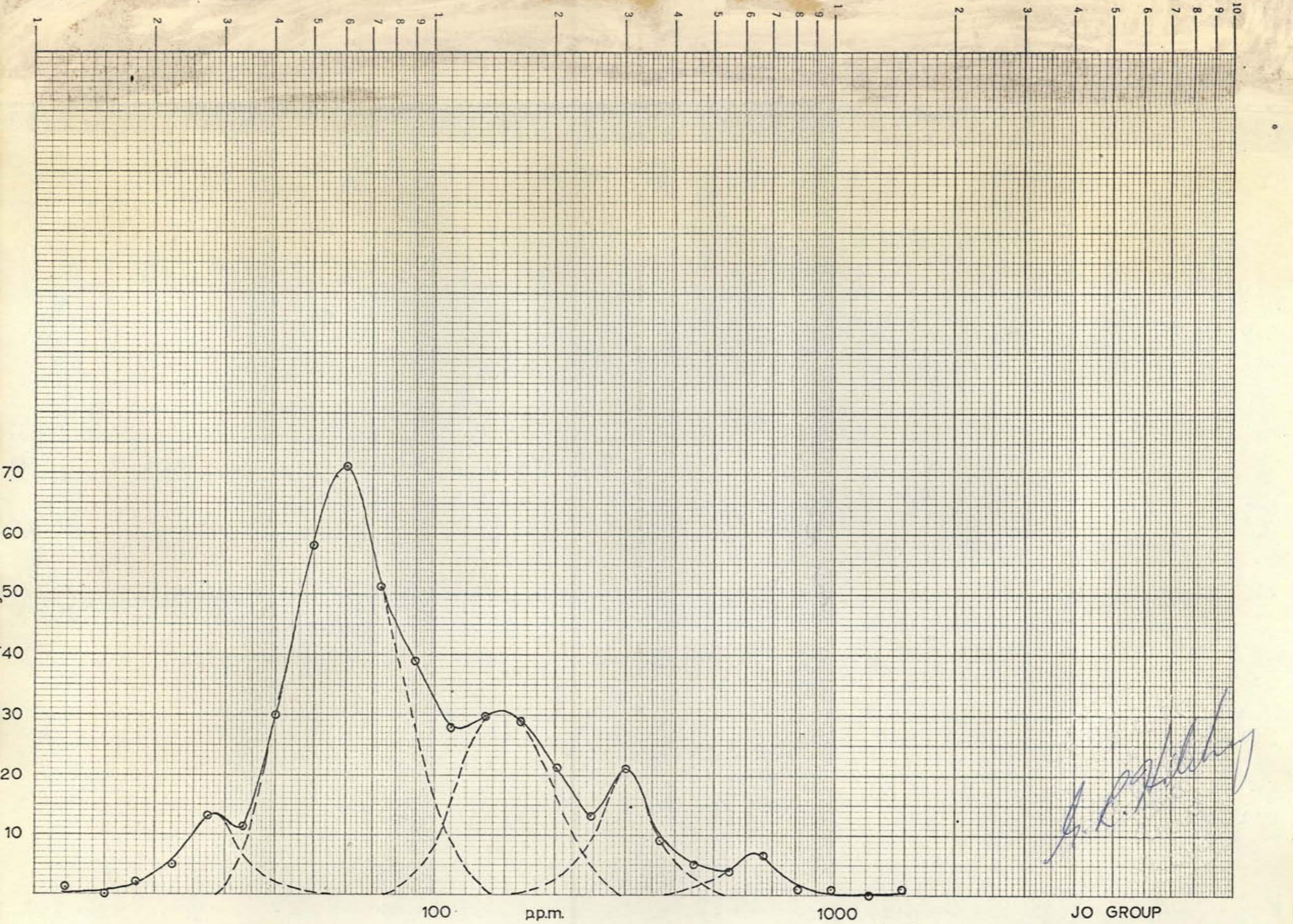
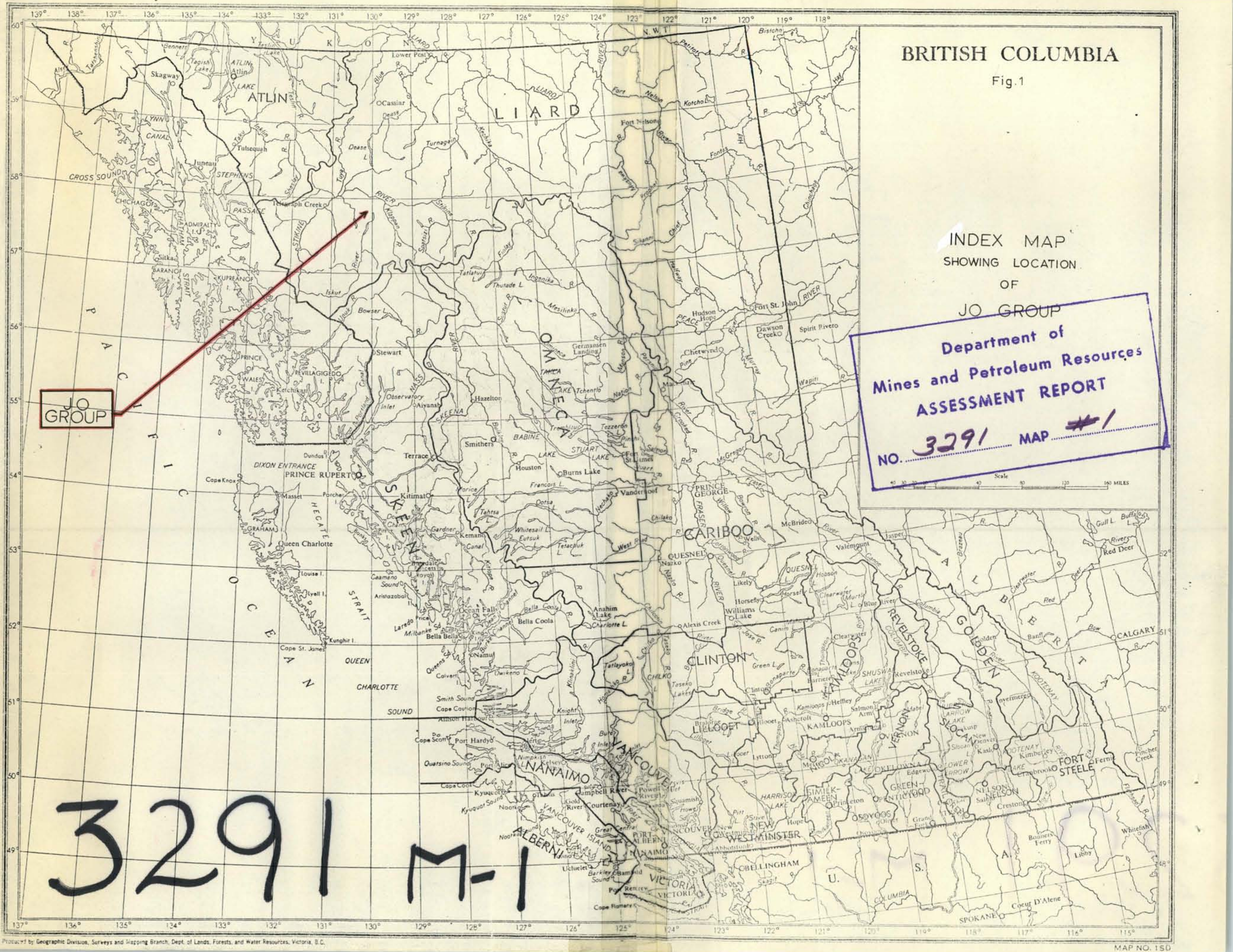


Fig. 3

JO GROUP
SULFO-SILICATE COPPER



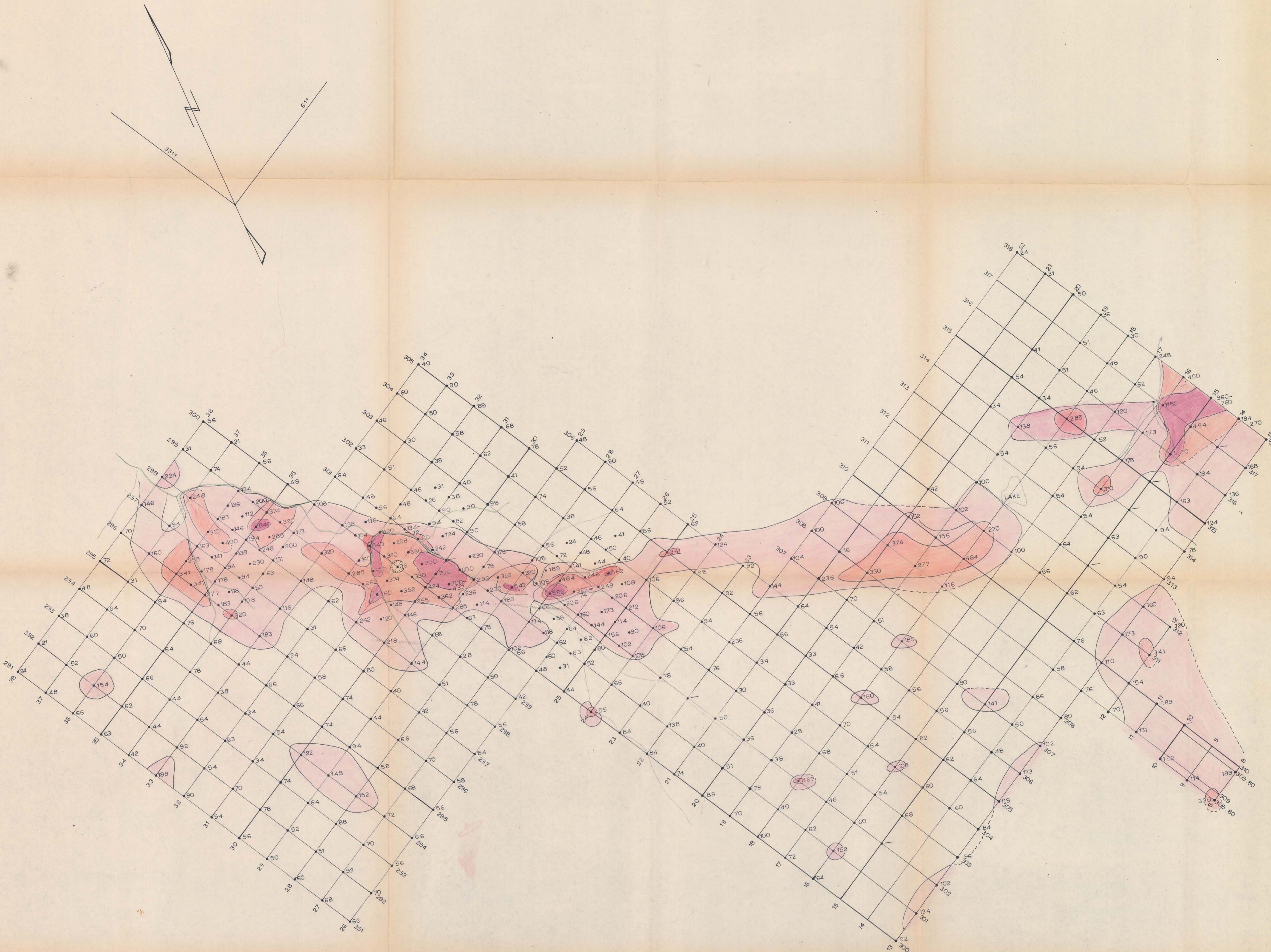
BRITISH COLUMBIA

Fig. 1

INDEX MAP
SHOWING LOCATION
OF
JO GROUP

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3291 MAP #1

3291 M-1



LEGEND

p.p.m. Cu.

- >500
- 250-500
- 100-250

.1 .05 0 .1 .2 .3 MILES
100 50 0 100 200 300 400 METRES
300 150 0 300 600 900 1200 FEET

TO ACCOMPANY GEOCHEMICAL REPORT
BY G.R.HILCHEY P.Eng. ON
JO GROUP
10 mi. WEST OF
EDDONTENAJON, B.C.
LIARD MINING DIVISION
DATED SEPT. 30, 1971

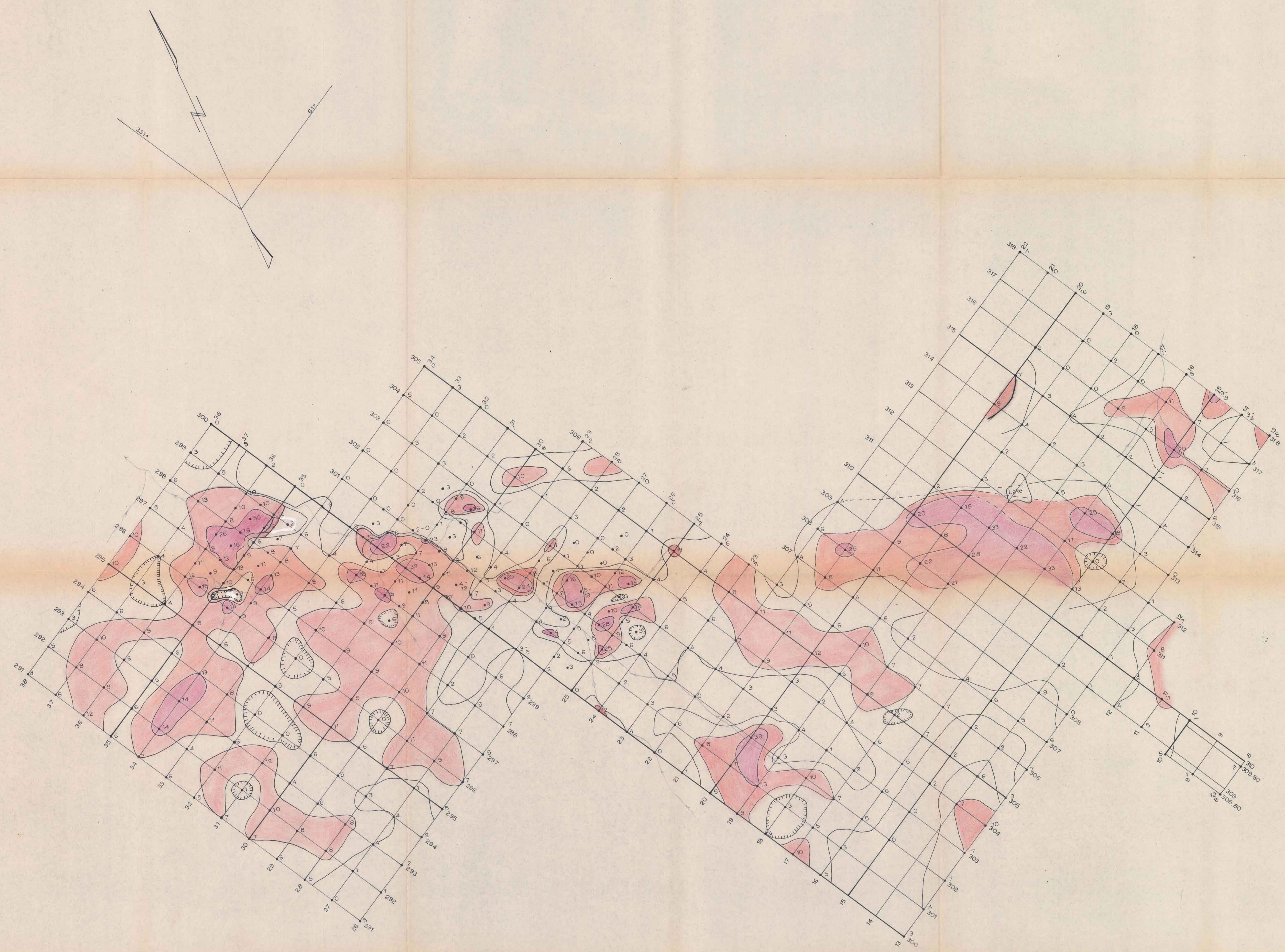
SUMITOMO METAL MINING CANADA LTD.

SCALE : 1: 5,000 or 1 in.= 415 ft. (approx.)

DATE SEPT 7, 1971

JO GROUP
SOIL SAMPLE SURVEY
TOTAL COPPER MAP

MAP No. 11-1-71



LEGEND

VALUE OF RATIO X 100

- > 13
- 7 - 13
- 4 - 7

100 50 0 100 200 300 400 METRES
300 150 0 300 600 900 1200 FEET

* Values shown are Cold Extractable Copper divided by Total Copper times 100.

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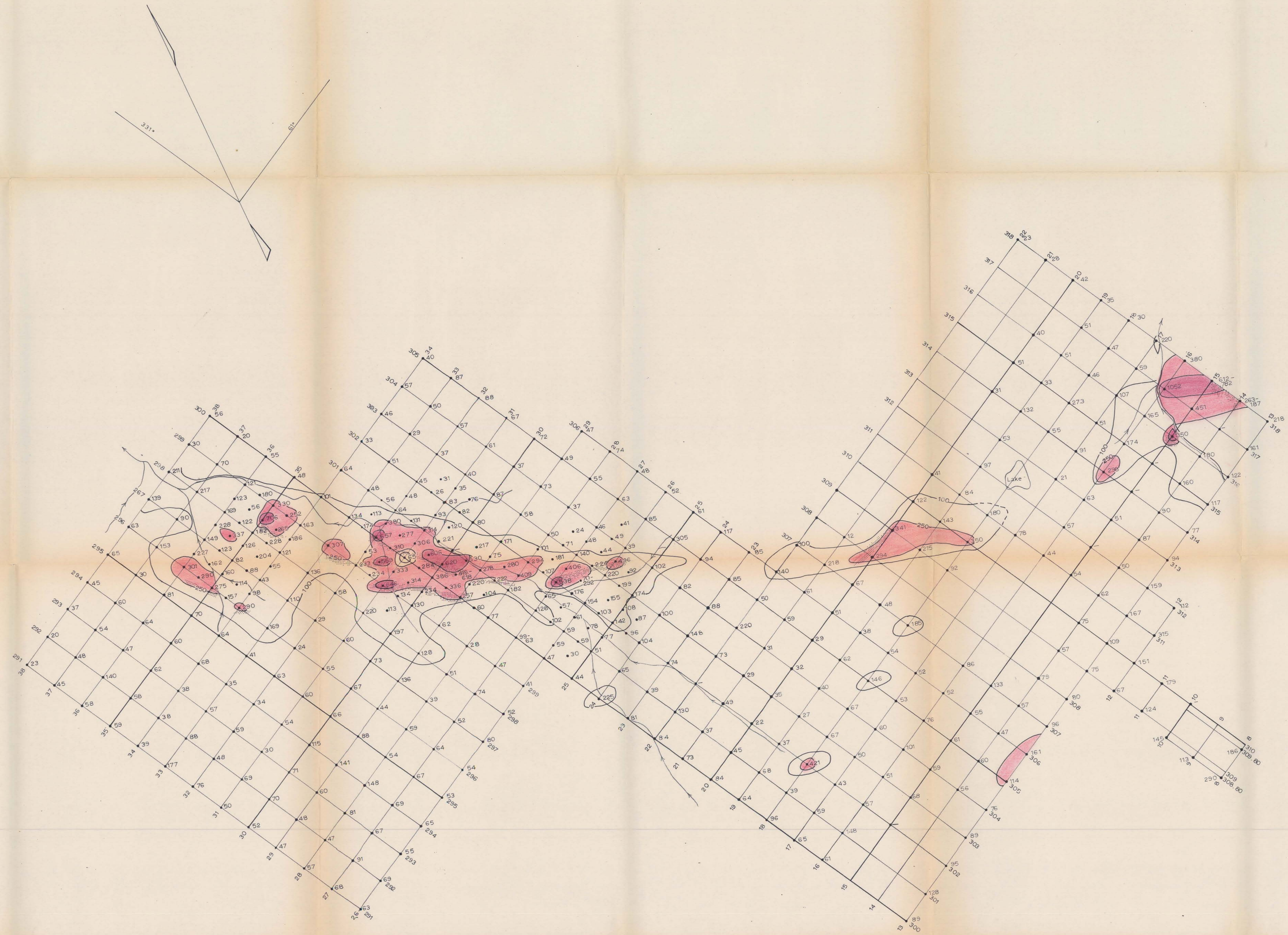
SCALE: 1:5,000 or 1 in.= 415 ft. (approx.)

DATE SEPT. 30, 1971

JO GROUP
SOIL SAMPLE SURVEY
* COLD EXTRACTABLE / TOTAL COPPER RATIO MAP

MAP No. 11-2-71



LEGEND

p.p.m.

- >500
- 250-500
- 100-250
- Probable source areas of anomalous copper

* TOTAL COPPER MINUS COLD EXTRACTABLE COPPER

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SUMITOMO METAL MINING CANADA LTD.	JO GROUP SOIL SAMPLE SURVEY * SULFO-SILICATE COPPER
SCALE: 1: 5,000 or 1 in.= 415 ft. (approx.) DATE SEPT. 30, 1971	MAP No. 11-3-71

SCALE AND ELEVATION DATUM BASED ON LIMITED GROUND CONTROL RESULTING IN GOOD RELATIVE, BUT UNCERTAIN ABSOLUTE MAP ACCURACY

COMPILED FROM AERIAL PHOTOGRAPHY AT AN APPROXIMATE SCALE OF 1 INCH EQUALS 3000 FEET FLOWN IN 1969

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DATED SEPT. 30, 1971

SUMITOMO METAL MINING CANADA LTD.

JO GROUP— BASE MAP

PRELIMINARY RECONNAISSANCE TYPE MAPPING

Compiled by
McELHANNEY SURVEYING & ENGINEERING LTD.
1200 West Pender St. Vancouver, B.C.

SCALE	CONTOUR INTERVAL	DATE	JOB NO.	SHEET NO.
1:12,500	20 Metres	OCT. 4, 1971	05659 - 1	10 - 4 - 71