3476

REPORT ON THE EAGLE GROUP OF CLAIMS

104 I 6-11

LIARD MINING DIVISION

for

IMPERIAL OIL LIMITED

104 I /6E, 11E

by

V. H. Ahlborn and K. A. MacLean

JOHN S. VINCENT LIMITED

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FIGURE 1

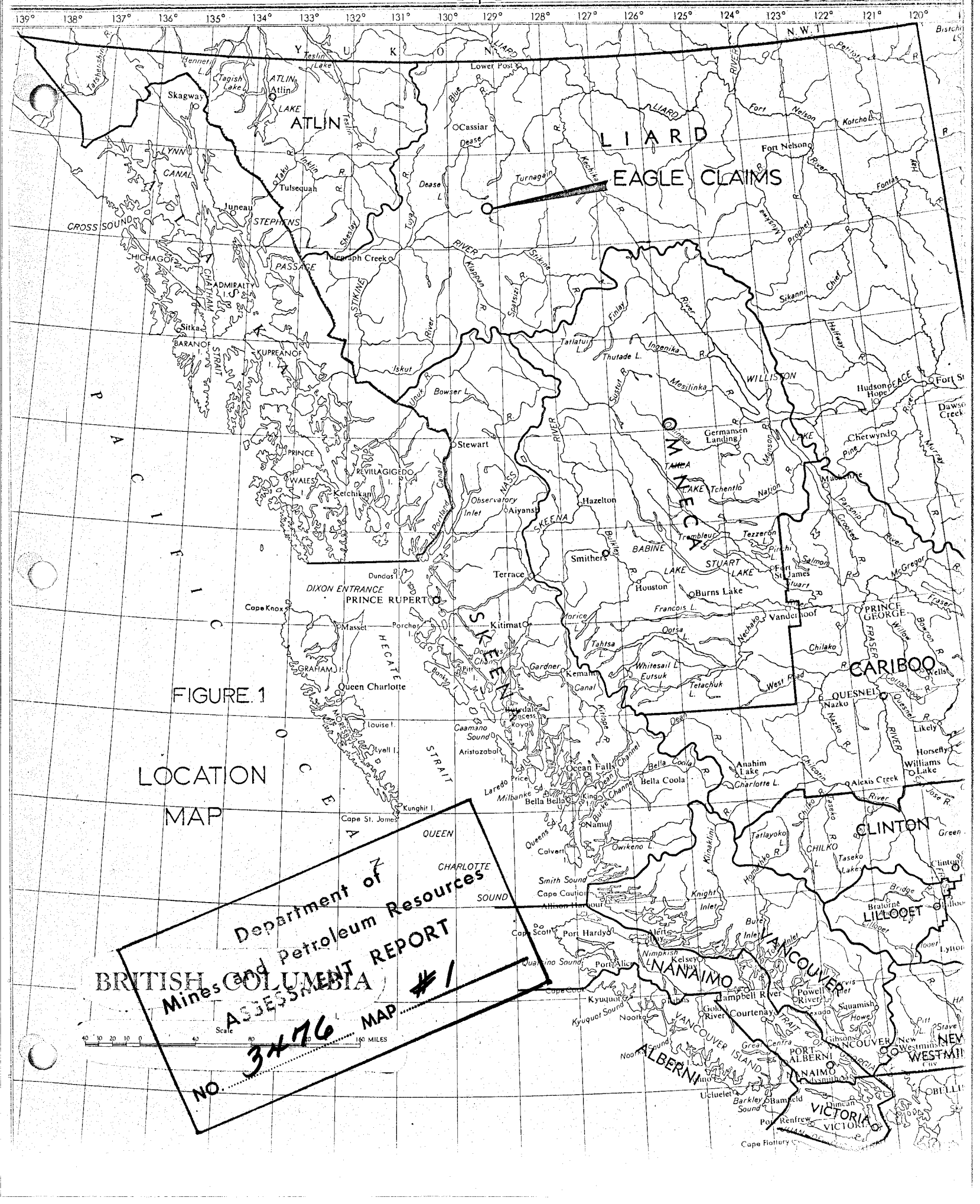
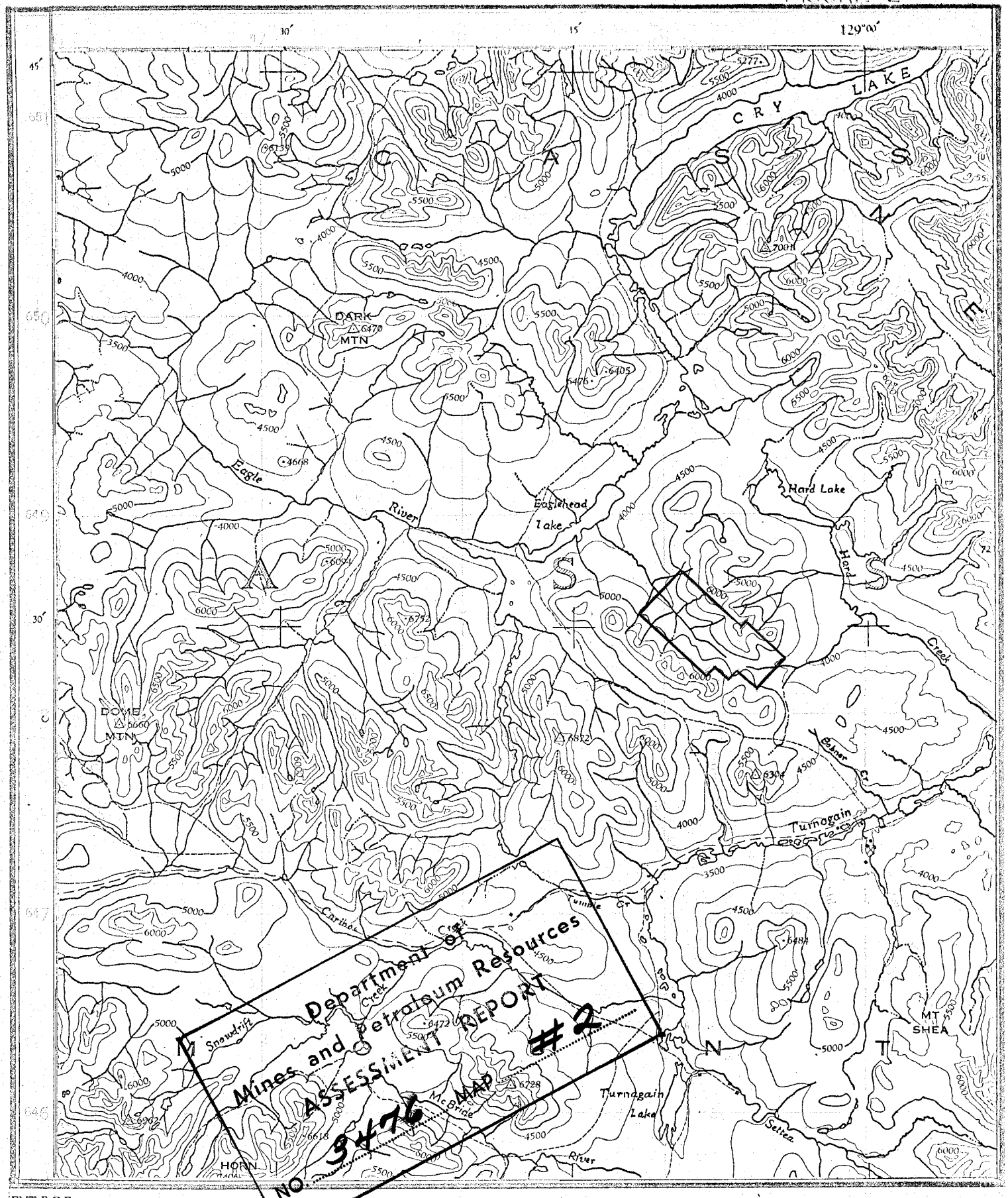


FIGURE 1
LOCATION MAP
EAGLE CLAIMS
ATLIN
LIARD
CARIBOU
CLINTON
LILLOOET
NANAIMO
VANCOUVER
VICTORIA
PRINCE RUPERT
PRINCE GEORGE
QUESNEL
WILLISTON
OMINECA
SKEENA
STIKINE
PACIFIC OCEAN
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
BRITISH COLUMBIA
#1
NO. 3476
MAP

CRY-2-LAKE
BRITISH COLUMBIA

SHEET 104 I
FIRST EDITION

FIGURE 2



ENT R.C.E., 1949-52.

Scale 1 : 250,000
1 Inch to 4 Miles Approximately

Miles 5 0 5 10 15 20 Miles

INTRODUCTION

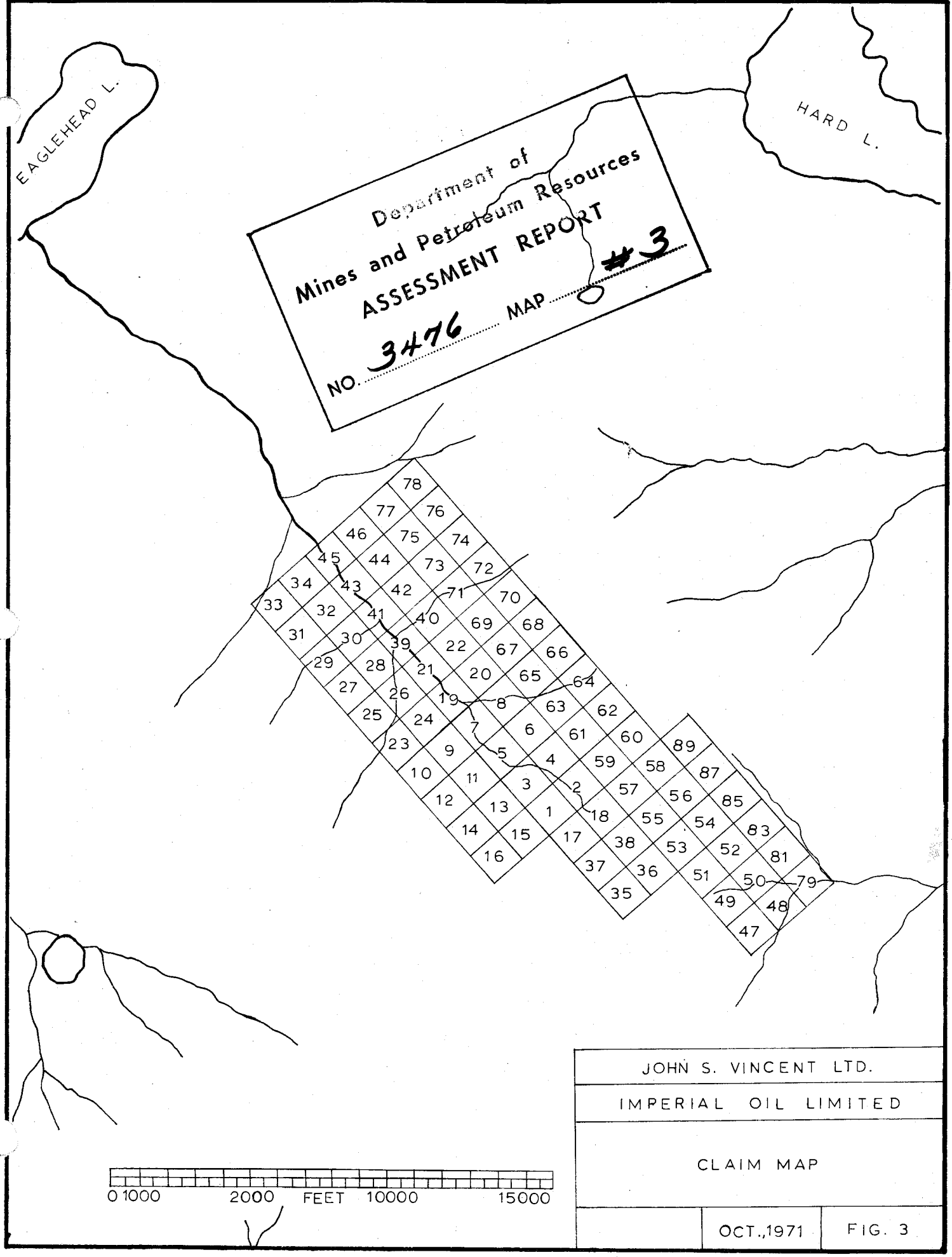
The Eagle claims were first staked as the Joy Group by Kennco Explorations Ltd. in the early 1960's. The claims came open in 1970 and were staked by Spartan Explorations Ltd. (N.P.L.) and were subsequently optioned by Imperial Oil Limited. At the request of Mr. Fenton Scott, we were asked to conduct a detailed geochemical soil sampling program in an area where indications of mineralization had been found, to carry out geological reconnaissance and prospecting and to investigate the applicability of a magnetometer survey. The job was terminated by deteriorating weather on September 29, 1971, but the objectives had been reached in the 20 days spent on the property. Volker H. Ahlborn carried out the field work and computer processing and Keith A. MacLean directed the program and assisted in the interpretation.

PROPERTY LOCATION AND ACCESS

The property is located in the Liard Mining Division 28 miles east of Dease Lake, British Columbia. Eaglehead Lake is 4 miles to the northwest (Figure 1) and Hard Lake is 5 miles to the northeast (Figure 2). National Topographic System maps 104 I 6E and 11E cover the area which is centered on latitude 58° 30' N and longitude 129° 10' W.

Dease Lake can be reached by road from Watson Lake, or by air from Terrace or Smithers. During the 1971 summer season, two helicopter companies were based at Dease Lake. A road link from Terrace and Stewart is in the final

FIGURE 3


EAGLEHEAD L.
HARD L.
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3476 MAP #3
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7
6
61
60
89
23
9
5
4
59
58
87
10
11
3
2
57
56
85
12
13
1
18
55
54
83
14
15
17
38
53
52
81
16
37
36
51
50
79
35
49
48
47
0 1000
2000
FEET
10000
15000
JOHN S. VINCENT LTD.
IMPERIAL OIL LIMITED
CLAIM MAP
OCT., 1971
FIG. 3

stage of completion. Table I gives a breakdown of the claims data and the claims are outlined on Figure 3.

TABLE I

B. C. Mining Claims

Claim Names	Grant No.	Recording Date	Expiry Date	No. of Claims
Eagle 1 - 8	48819-48826	Sept.5, 1970	Sept. 5, 1972	8
Eagle 9 - 22	49132-49145	Sept. 30,1970	Sept. 30,1972	14
Eagle 23 - 79	50672-50728	Mar. 3, 1971	Mar. 3, 1972	57
Eagle 81,83,85, 87,89	50729-50733	Mar. 3, 1971	Mar. 3, 1972	5
				84

HISTORY

In the summer of 1963 Kennco performed a geochemical survey of stream and seepage sediments, an induced polarization survey, and prepared a geological map covering a portion of the area. Four diamond drill exploration holes were drilled in an attempt to check the anomalies which were found by the methods mentioned. In late summer 1970 the claims lapsed and were immediately staked by Spartan Explorations Ltd. (N.P.L.).

GEOCHEMICAL EXPLORATION

From the drainage sample data, Kennco personnel drew a contour map which shows two copper anomalies about 6000 feet apart on the south-facing side of the valley.

GEOLOGY

A geological sketch map made by Kennco personnel shows the general bedrock distribution close to the creek from which the contact between intrusive rocks and sediments can be inferred. A limited amount of structural information is available on the map. Assay data on rock chip samples taken from exposures along the creek indicate the degree of copper and molybdenum mineralization.

In August 1970 Mr. Hiromu Kido of Mitsui Mining & Smelting mapped the northeast section of Murmuring Creek in more detail, and included with the map drill logs for bore holes No. 1 to 3. He later compiled a composite map of all results to that date.

GEOPHYSICS

The frequency domain induced polarization and resistivity survey carried out by McPhar Geophysics Limited defined two anomalies which stretch somewhat along the contact of the intrusive and sediments, coinciding in part with the geochemical anomalies.

DRILLING

Four drill holes were completed during this early activity, two at each end of the property. The drill holes are inclined at 45° and the longest reached 409 feet in length. According to a compilation map it appears that the drill holes do not intersect the I.P. anomalies. Nevertheless, one hole

passed through a 40-foot interval containing 0.4% Cu. and another sampled a 100-foot zone grading 0.5 to 0.6% Cu.

REGIONAL GEOLOGY

The Eagle Group of claims covers part of a granitic extension of the mid-Jurassic or Cretaceous Cassiar Batholith in contact with a sequence of northwest striking Lower Jurassic metasediments. Further to the west a belt of ultramafic rocks has been observed. The region has been mapped geologically by Gabrielse of G.S.C. (1962).

LOCAL GEOLOGY

The granitic rock consists of medium to coarse-grained quartz porphyry which was identified in previous work as a quartz monzonite. Increased K-feldspar content gives the porphyry a reddish tint. The metasediments include greywacke, phyllites and limestone. A felsite appears in the cliff in the northeast corner of the property. Numerous fine-grained andesite dikes of variable width cut the granitic and metasedimentary rock. The rock along the contact is partly exposed by the creek and includes a broad suite of sedimentary and igneous material. Local mechanical and contact metamorphism have largely changed the character of the original rock. Sericitized and chloritized earthy-looking rock is found in narrow shearing zones throughout the property. In fresher-looking rock shearing is evidenced by serpentinization.

STRUCTURE

The contact between the granitic intrusion and the metasediments trends northwest. It is irregular and is characterized by folding in the metasediments which extends into igneous rock. The beds of the undisturbed sedimentary rock farther away from the contact strike in northwest direction and dip uniformly to the southwest. Several north-trending faults are responsible for the irregular distribution of rock types. Some prominent andesite dikes traverse the higher exposures in northwest direction and are well exposed in section at the cliff in the northeast corner of the property. Most of the shear planes lie in the northeast/southwest quadrants (10° to 80°), but there is another set striking between 120° and 145°. All these planes dip at high angles, commonly in the order of 70° to 80°. Slickensides indicate the relative direction of motion in some places. The monzonite in the uphill region is shattered at the surface; only occasional larger rock masses emerge from the surrounding boulder talus to reveal structural orientations.

SAMPLING METHODS.

An attempt was made to get some idea about the form and content of mineralization by taking rock chip samples at several sites on the showings. In the case of the zones containing disseminated chalcopyrite, the assay results are possibly more representative than in the case of highly variable sulphide concentrations along the shearing planes. The purpose of the sampling was to obtain a sample of an average grade of mineralized material, and avoid taking obviously high grade samples. The locations of the chip sampling are shown on Figure 4 and the assay results are listed. An x-ray fluorescence

analysis for 32 elements on five specimens was carried out, and the results are included in the Appendix.

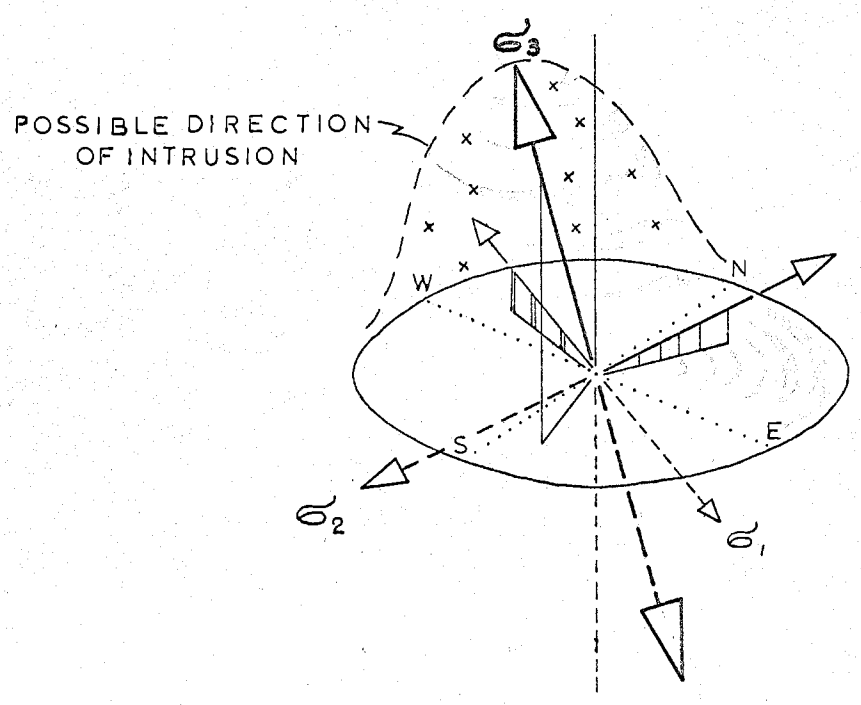
STRUCTURAL ANALYSIS ON MINERALIZED SHEAR ZONES

For analytical purposes the attitudes of 13 mineralized shear zones were measured. Unfortunately overlying rock debris made it difficult to get this valuable information in the time available. Ample time should be allowed for this type of work in future programs.

The poles to the shear zones were stereographically plotted, using an equal area stereonet. The plot reveals that the mineralized shear planes belong at least to two groups of fractures as most of the poles to the zones lie within two planes intersecting at an angle of 27°. The joint set seems to be homogenous throughout the main part of the property. The shear planes in the northwest corner of the indexed occurrences (See Figure 4) appear to be grouped in a subsystem. The associated stress system is defined by σ_1, the minor force, σ_2 the intermediate force and σ_3 the maximum force, with the following attitudes:

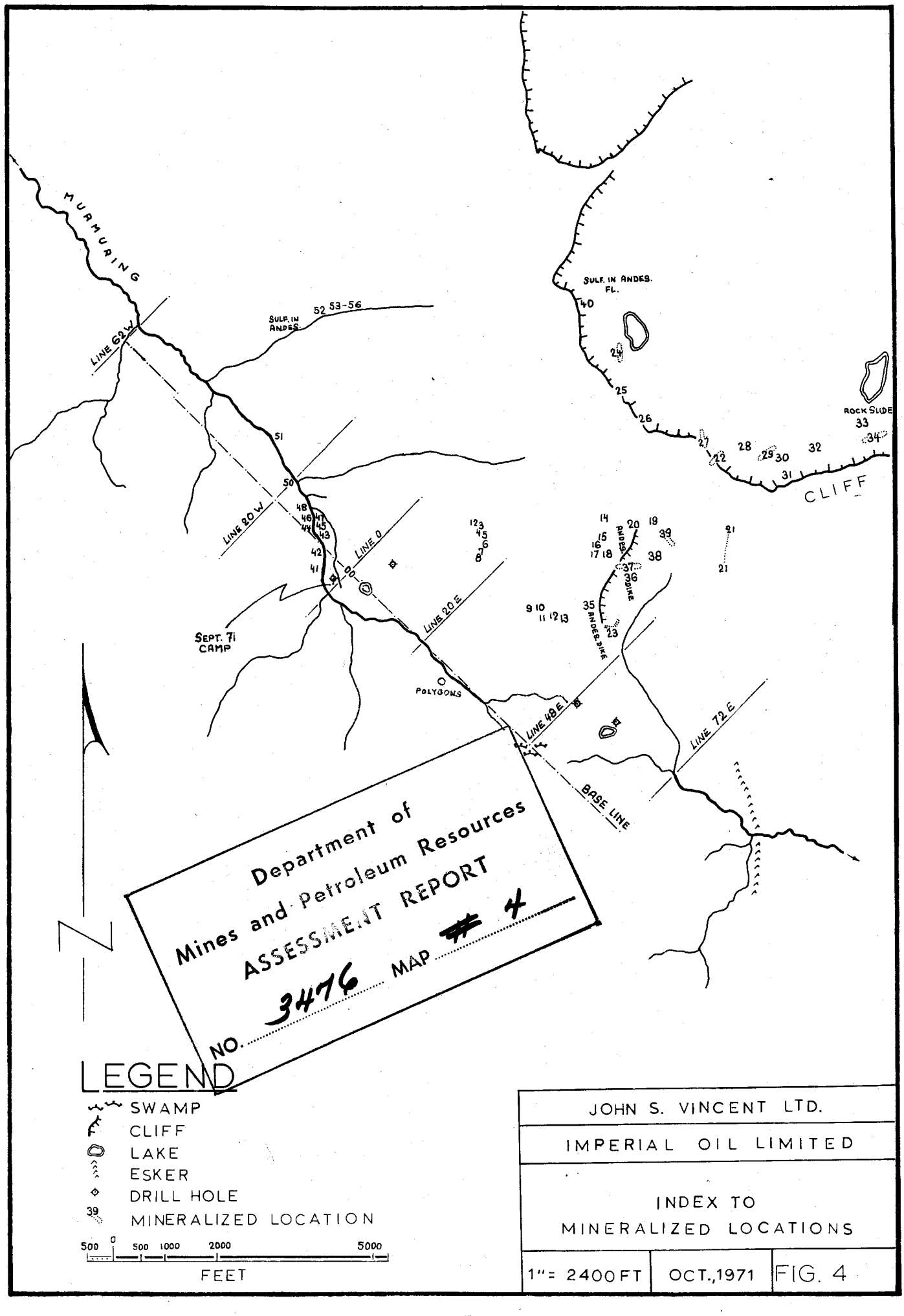
	Plunge Azimuth	Plunge Angle
σ_1	206°	14°
σ_2	127°	16°
σ_3	349°	73°

The sketch below shows schematically the governing forces.



The upwards direction of the major force responsible for the development of the system suggests that it was caused as action/reaction of the upward-pushing igneous intrusive. Mineralized slickensides in the shear zones, the homogenously occurring mineralized shear planes and the upward-pointing maximum force infer that this type of mineral deposition occurred syngenetically with the intrusion of the igneous body, or with repeated (multiple) intrusive events; the latter idea is supported by the high degree of broken up (shattered) rock.

Further investigation using this approach would help to locate suitable environments for mineral deposition.


MURMURING
SULF. IN ANDES.
SULF. IN ANDES. FL.
ROCK SLIDE
CLIFF
LINE 62 W
LINE 20 W
LINE 0
LINE 20 E
LINE 48 E
LINE 72 E
BASE LINE
SEPT. 7i CAMP
POLYGONS
ANDES DIKE
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3476 MAP # 4
LEGEND
SWAMP
CLIFF
LAKE
ESKER
DRILL HOLE
MINERALIZED LOCATION
500 0 500 1000 2000 5000
FEET
JOHN S. VINCENT LTD.
IMPERIAL OIL LIMITED
INDEX TO MINERALIZED LOCATIONS
1" = 2400 FT
OCT., 1971
FIG. 4

Location Number	Type and Width of Mineralization	Rock Type	Metallic Minerals	Assay Number	Assay Results Cu	MoS_2	Spectogr. Analysis
1	shear zone	altered porphyr. quartz monzonite	mal, spec hem, py, little cpy	1606	0.04%	0.005%	X
2 + 3	shear zone	-"-	mal, spec hem, cpy	1607	0.92%	0.003%	X
4	float	qtz. monzonite	mal				
5	float	-"-	mal				
6	float	-"-	mal				
7	float	-"-	mal				
8	float	-"-	mal				
9	shear zone	-"-	mal, little cpy				
10	float	-"-	mal				
11	float	aplitic	py				
12	float	qtz. mon.	mal				
13	float	-"-	mal, little cpy				
14	float	-"-	mal little cpy				
15	float	-"-	mal				
16	float	-"-	mal				
17	float	-"-	mal				
18	float	-"-	mal stain cpy				
19	float	-"-	mal				
20	float	-"-	cpy				
21	float	serpentin.	magnetite				
22	shear zone, vein	alt.qtz. monzonite, qtz.vein	cpy, spec. hem, mal	1608	3.65%	0.003%	
23	shear zone	alt.qtz. monzonite	cpy, mal, az, spec hem	1609	0.76%	0.002%	
24	shear zone	qtz.mon.	cpy, mal, spec hem	1610	6.90%	0.002%	
25	float	-"-	mal				
26	float	-"-	mal				
27	shear zone 5-10 ft wide	altered qtz.mon.	cpy, mal, spec hem	1611	2.30%	0.001%	X
28	broken up rock	-"-	cpy, spec hem, az, mal	1612	3.35%	0.002%	

NOTE: cpy = chalcopyrite
mal = malachite
az = azurite
py = pyrite
spec hem = specular hematite
man = manganese
lim = limonite

Location Number	Type and Width of Mineralization	Rock Type	Metallic Minerals	Assay Number	Assay Results Cu	MoS_2	Spectogr Analysis
29.	shear zone	quartz monzonite	cpy,mal,az				
30	float	-"-	mal				
31	veinlets and disseminated	alt. qtz.mon.	cpy,mal,az	1613	2.25%	trace	
32	float	qtz.mon	cpy				
33	shear zone	alt. qtz.mon.	cpy,mal, spec hem	1614	3.50%	0.002%	
34	shearing, 150 ft	vuggy alt. qtz.mon.	man, spec hem	1615	0.04%	0.002%	X
35	float	qtz.mon.	mal				
36	float	-"-	mal				
37	shear zone	-"-	little cpy, mal				
38	float	-"-	-"-				
39	float	-"-	hem,traces of man,ni,cr, ba				X
40	shear zone	-"-	little cpy	1616	0.22%	trace	
41	shear zone	foliated metasedi-ments	cpy	1617	0.20%	trace	
42	disseminated, 25 ft	qtz.rich metaseds.	cpy	1618	0.01%	0.001%	
43	shear zone	-"-	cpy,mal	1619	3.02%	0.005%	
44	disseminated around '43' 100 ft	-"-	cpy	1620	0.04%	0.004%	
45	d,sseminated 100 ft	metaseds.	cpy	1621	0.08%	0.003%	
46	shear zone 5 ft	metaseds	cpy	1622	0.66%	trace	
47	shear zone, 2 ft	alt. contact rock	cpy	1623	1.95%	0.022%	
48	shear zone 2 ft	metaseds.	cpy	1624	1.40%	0.024%	
50	shear zone	metaseds.	cpy, spec hem, lim, mal	1625	0.22%	0.004%	
51	float	metaseds	cpy				
52	shear zone	qtz.mon.	py,mal				
53-56	narrow shear zones	qtz.mon.	cpy,mal, bournite	4335 4336	4.60% 0.60%	0.001% trace	

MINERALIZATION

Mineralization has been found at several locations on the property, which are detailed on Figure 4. Chalcopyrite and minor pyrite occure disseminated in the rocks exposed along Murmuring Creek. Malachite, minor azurite and a manganese mineral occur adjacent to small veinlets and fracture fillings of chalcopyrite in narrow shear zones exposed along the creek. The wall rock in these shear zones is usually porous, brownish, earthy material containing strongly sericitized plagioclase crystals and quartz phenocrysts which have survived the alteration. Fracture fillings of chalcopyrite up to 3 inches by 10 inches were found in several places north of the base line and in newly-discovered exposures near and on the cliff in the northeastern part of the project area. Some shear zones along the cliff contain four inch thick compact masses of amorphous material which was found to contain significant amounts of copper, manganese, barium, tungsten and iron when analyzed spectrographically. Malachite stain is locally significant in the broken rock on the upper slopes.

Other mineralization includes thin coatings of specular hematite in fractures near the contact. Some andesite dikes carry minor amounts of pyrite.

Figure 4 shows the location, type of mineralization, and grade of all the mineralization located during several days of prospecting and mapping.

GEOCHEMISTRY

General Approach

In order to confirm the anomalies outlined by Kennco from the stream sediment sampling program, a detailed soil survey was performed. The spacing of the lines is 400 feet, the sample locations are 100 feet apart. Samples were taken below the organic layer. The sample grid was established by pace

and compass and flagged, and the base line was chained. For recording data, cards provided by Bondar-Clegg & Company Ltd. were used. These forms are designed to enable a sufficient number of pertinent data about the sample to be recorded quickly and efficiently in a form compatible with computer data processing. The 1030 soil samples were analysed by Bondar-Clegg & Company Ltd. who used a hot aqua-regia extraction and atomic spectrophotometric analysis on -80 mesh material. A cold extraction and atomic absorption analysis was used on 20 representative samples. The results are listed in the Appendix. A map with printed geochemical results was prepared, two others showing the graphical representation of copper and molybdenum on separate sheets (which may be used as overlays and viewed on the light table) for correlation purposes. These maps can be found in the pocket.

Geomorphplogy and Soils

The study area has a maximum relief of 1700 feet. The geochemical exploration grid was 4500 feet at its lowest point and about 5000 feet at its highest. The relief is low to moderate, modified by glacial and fluvio-glacial action which smoothed the granitic hills to the northeast of the property and carved the broad valley of the creek. In the center part of the map area, eskers occur in a confused pattern. Numerous potholes characterize locally thick mass of till which occupies a water divide traversing the main valley and generates two runoff systems, one draining westerly towards Eagle Head Lake, the other easterly towards Bobner Creek. There are remnants of an alluvial flood plain which has been modified by recent creek erosion. The last glacial event is documented by prominent cirques carved into the northerly slopes of the hills, probably contributing sediments to the formation of the

alluvial plain in the northwest part of the property. Boulder polygons, measuring several feet across, appear in dried-out potholes and small lakes, especially in the southeast of the property. The northeast slopes are covered by felsenmeer to an unknown depth.

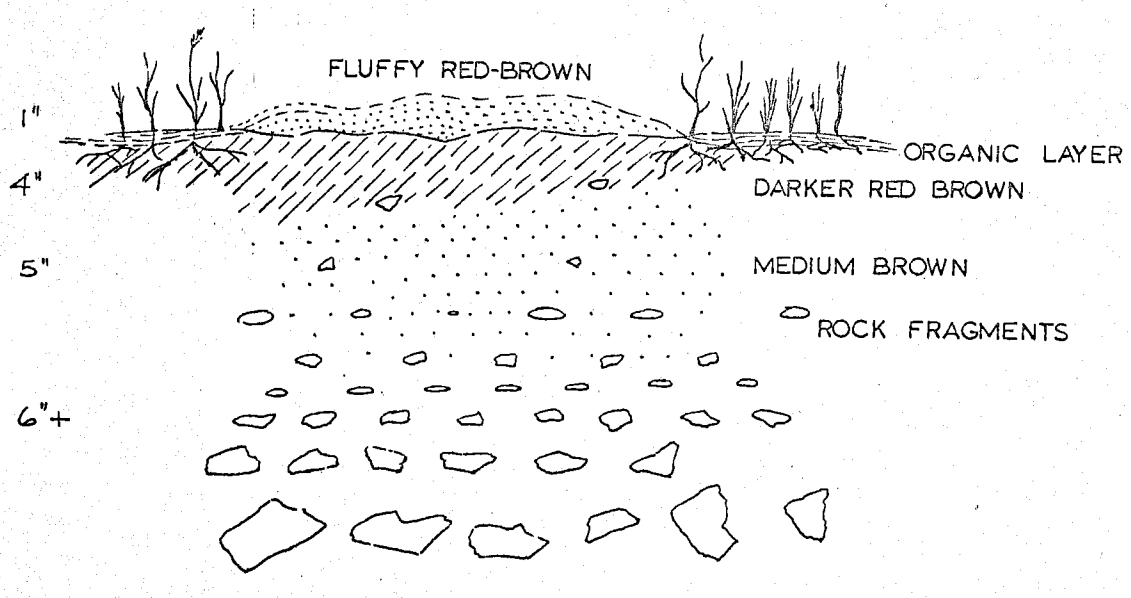
There is an extensive dendritic drainage pattern developed which is locally deranged and disrupted in areas underlain by thick drift. Vegetation is patchy in the southeast part of the property and consists predominantly of low-growing conifers while in the northwest a considerable amount of buck brush fringes the creek and alternates with the evergreens. The treeline lies between 5000 and 5500 feet. In spring and late summer extensive patches of ice needles contribute to frost heaving and soil creep, transporting silt and clay particles to and along the surface of bare ground. Patches devoid of vegetation show best development of ice needles and are thought to be a form of frost boil.

Three major soil types were recognized.

1. A brownish or reddish-brown loess-like alluvial soil can be found throughout the property covering all the different rock types in the lower and intermediate altitudes. This material is fine-grained and homogenous and is usually found in the top six inches or so of the soil profile. Bare spots are often underlain by this material, and these areas are thought to be a form of frost boil. Often a fluffy layer of this soil can be observed on the surface after ice crystals have melted following freezing night-time temperatures in the spring and fall.

2. A glacial soil is primarily confined to eskers and hummocks of glacial till in the northeast end of the property. This material has a high gravel and sand content, a sparse organic layer and poor profile development;

Figure 5



Typical soil profile development

it is inhomogenous and contains cobbles and boulders, but nevertheless it supports mosses, small deciduous plants and occasional low conifers.

3. A form of residual soil can be found in scattered parts of the area. It can be called a true C horizon as it is weathered parent material, often in the form of a crumbly coarse siliceous sand over the granitic units.

Material above the phyllites is dark brown with numerous thin tabular, angular fragments.

Profiles near the banks of creeks and gullies show coarse clastic water-transported material which are inhomogenous and apparently structureless.

Profiles at the south side of the valley are generally more podsolic than those on the north side, which tend to be closer to the tundra type. Several sample sites had a definite podsolic profile; here the samples were taken from the B horizon.

Statistical Treatment of Data

The results of the geochemical analysis for the samples were treated statistically using the method devised by Lepeltier (1969). This is a graphical method which is used to find the type of frequency distribution of the set of data, the average value, an expression of the degree of variation about the average and the limit above which anomalies start, and can also be used to determine the existence of one or several populations in the surveyed area. The method can be applied using nothing more sophisticated than probability-log graph paper and a hand calculator. It has been found to yield reliable results. The results obtained from statistical analysis of Eagle Group samples are shown in Table II:

TABLE II

Element	Geometric Mean	Threshold @ 2 δ	Threshold @ 1.5 δ	Threshold @ 1.0 δ
Cu	60	1700	760	320
Mo	4	55	30	15

The geometric mean is the value at which 50% of the analytical results are greater and 50% are smaller. The thresholds are values corresponding to the mean value plus a specified number of standard deviations. In our interpretation thresholds are determined for 1, 1.5, and 2 standard deviations above the mean.

Representation of Results.

The sample results and their locations on the new grid are shown in Map No. 1. Maps No. 2 and 3 show the locations of the anomalously high values of Cu and Mo, respectively. The size of the circles used to designate a sample location corresponds to the statistical divisions derived in the previous section, with the largest circles being the highest values. This type of display seems to avoid the pitfalls of contouring data points and draws the eye to areas of interest. Histograms constructed during the data analysis shows that Cu and Mo results are both lognormally distributed, although both histograms show larger tails towards the higher values, indicating that part of the population is abnormally high. This may be caused by such factors as variation in clay sized materials in the samples from location to location, or by adsorption of cations on the surface of the particles in areas of high groundwater movement.

Judging from the results of the cold extractions, it appears that loosely-bonded Cu cations account for more than half the total Cu in the samples. The ratio CXCu:TOTAL Cu was calculated for 20 samples, and the results plotted in two forms in Figure 6 and Figure 7. It is important to note that the samples were not selected at random. Nevertheless, most of the

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CCGS MICROGRAPH

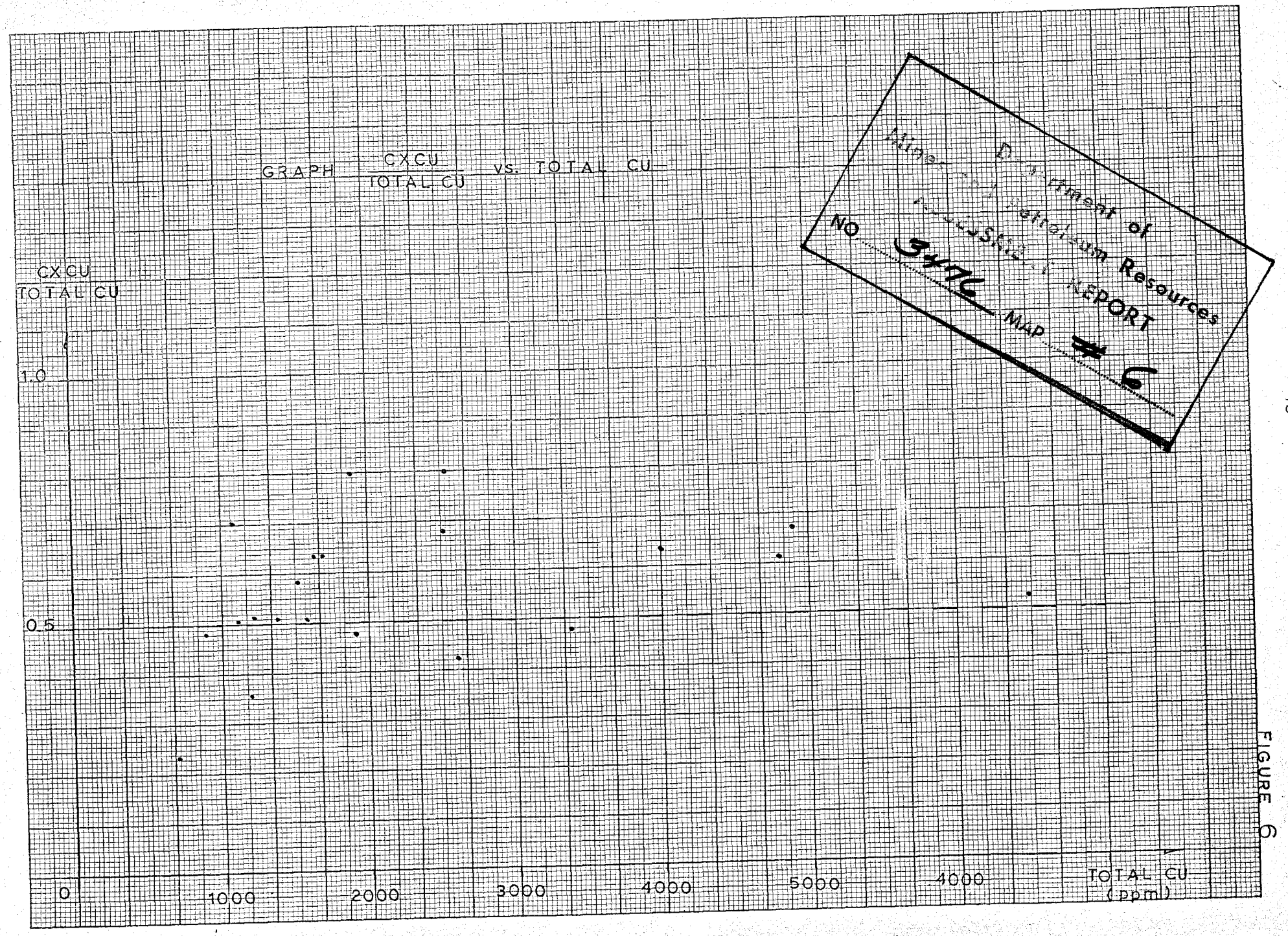


FIGURE 6

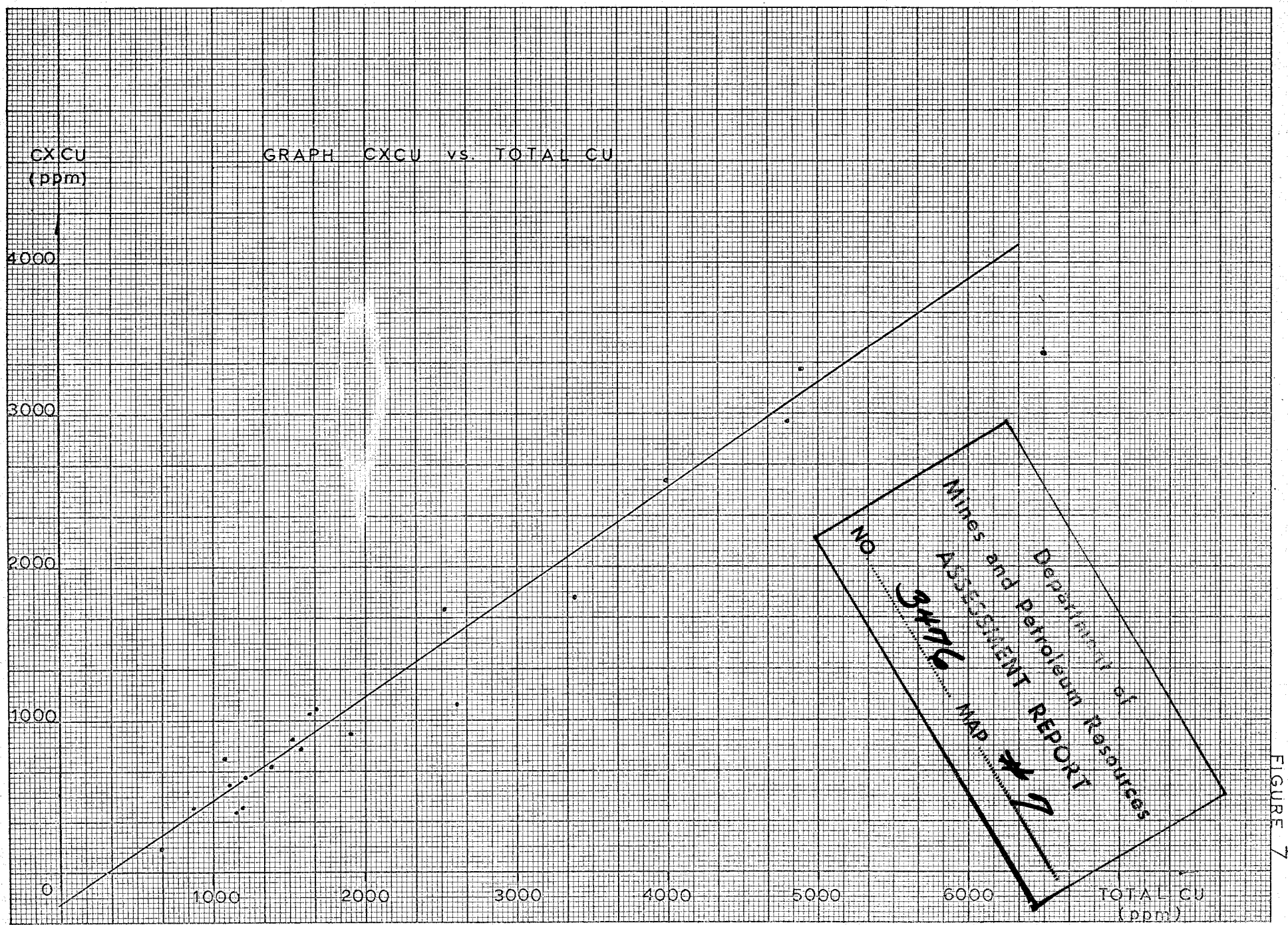


FIGURE 7

FIGURE 8

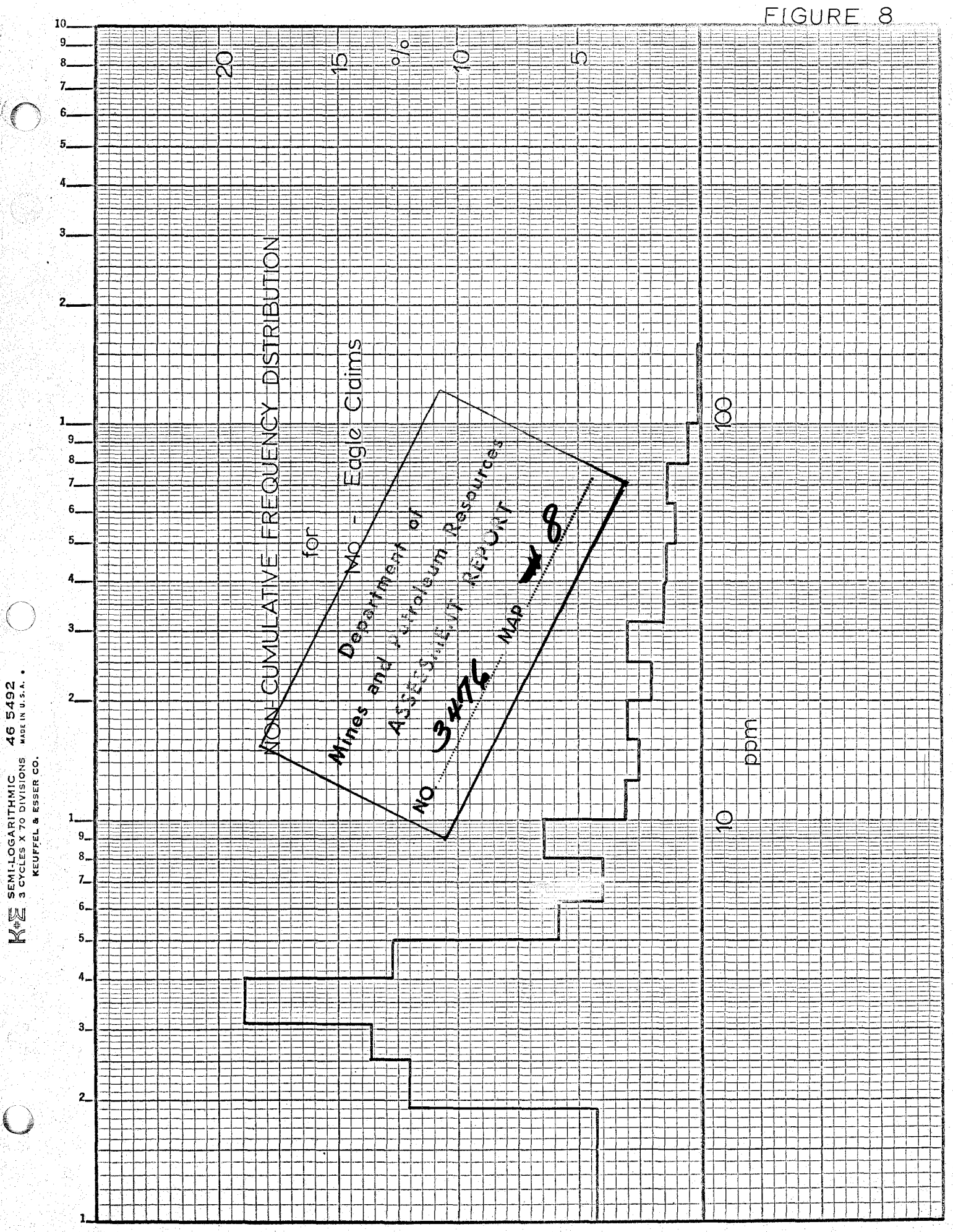

NON-CUMULATIVE FREQUENCY DISTRIBUTION
for
140 - Eagle Claims
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3476
MAP 8
20
15
%
10
5
100
10
ppm
SEMI-LOGARITHMIC
3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.
46 5492
MADE IN U.S.A.

FIGURE 9

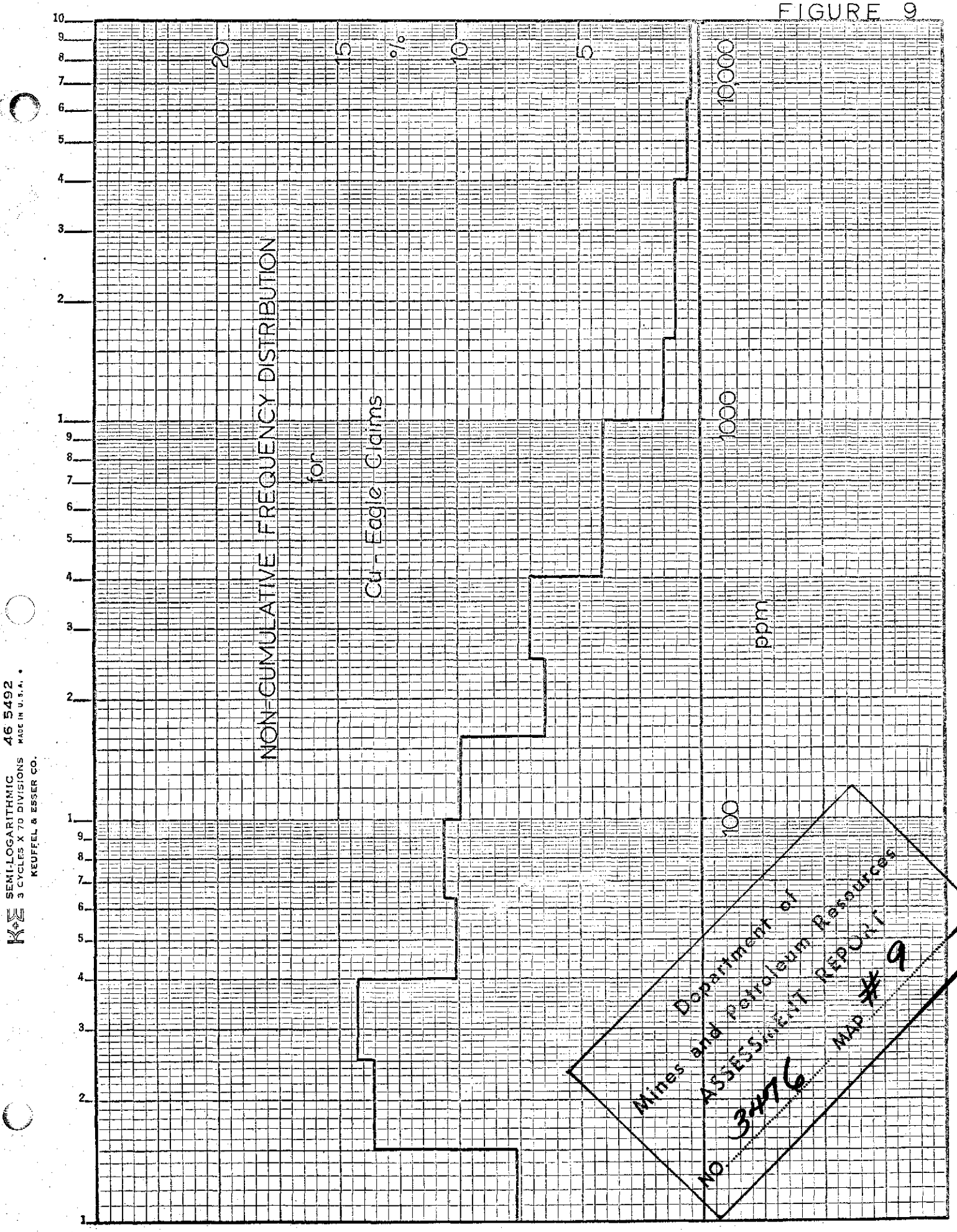

NON-CUMULATIVE FREQUENCY DISTRIBUTION
for
Cu - Eagle Claims
%
20
15
10
5
ppm
10,000
1000
100
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
MAP # 9
No. 3476
SEMI-LOGARITHMIC
3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.
46 5492
MADE IN U.S.A.

FIGURE 10

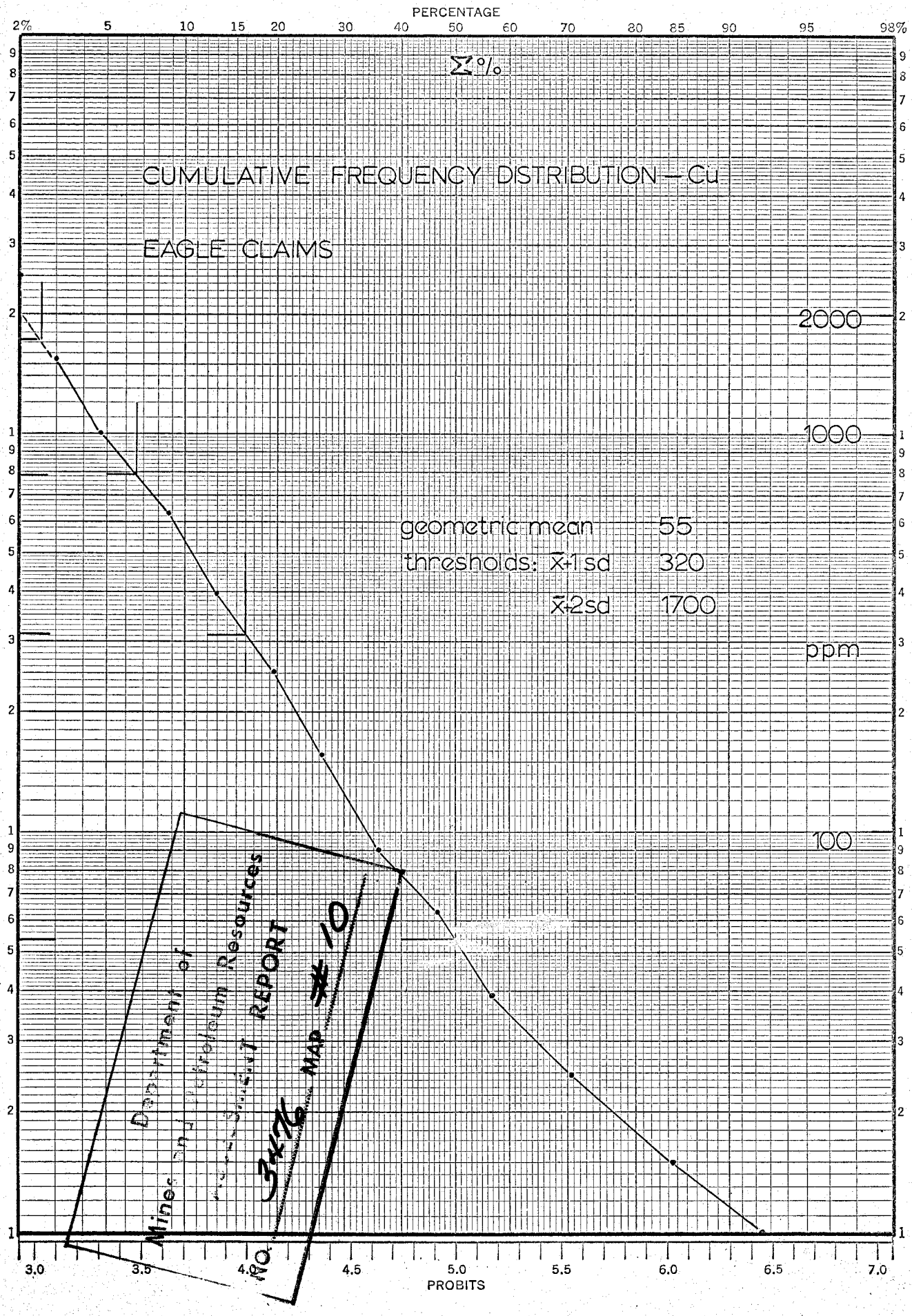
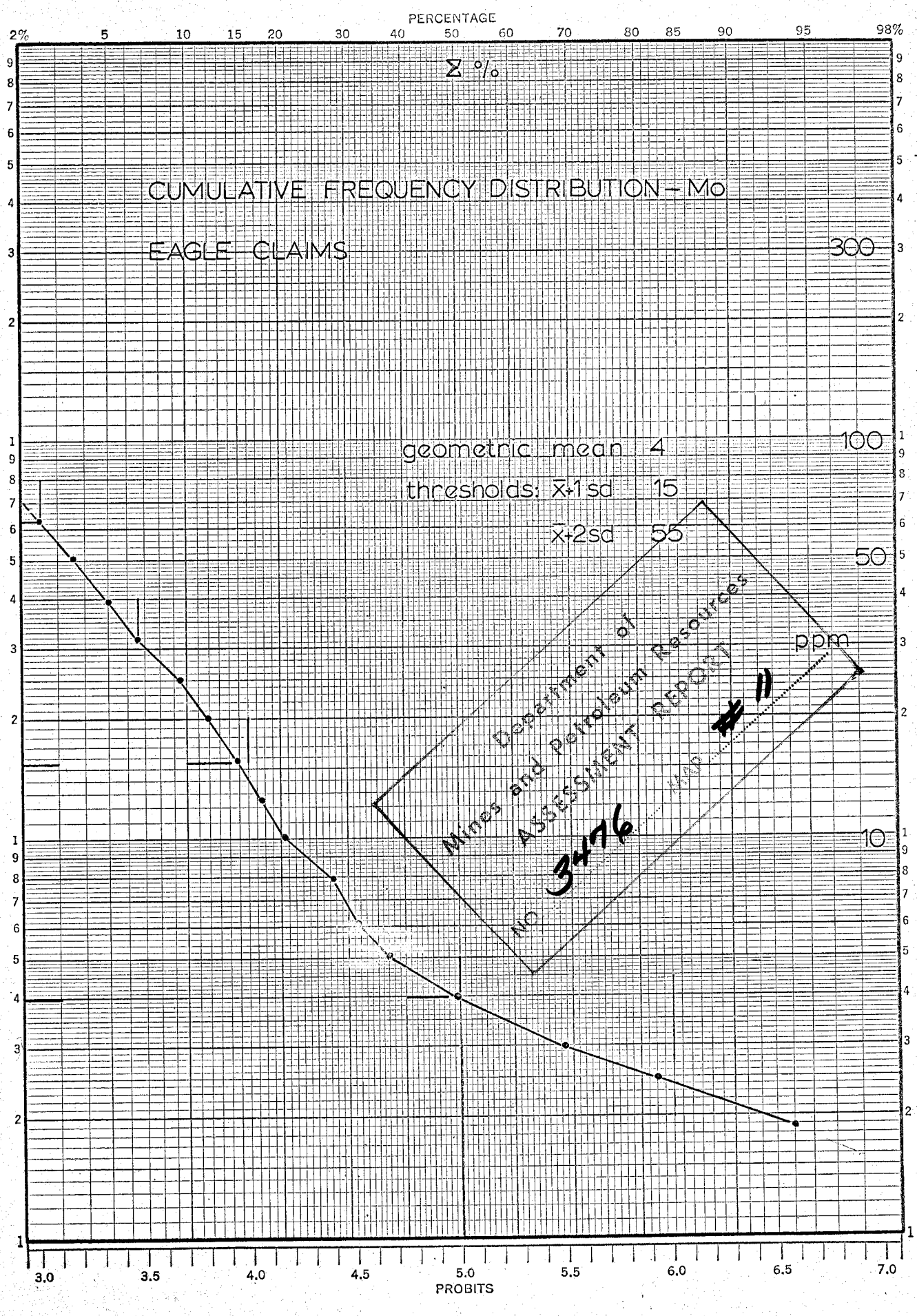


FIGURE 11



samples which report high total Cu have a higher proportion of CXCu than those containing low amounts of total Cu.

Molybdenum, on the other hand, appears to be more tightly bonded, as an insignificant amount of Mo cations could be extracted with cold HCL.

Geochemical Survey Interpretation

Map analysis-

The anomalous Cu values on the map occur in two main clusters both located northeast of the base line. One cluster, 3600 ft. long, extends from about line 20 W to line 16E and appears to be about 1500 ft. wide. The cluster comprises several very high values (+2 standard deviations from the mean) which generally occur within 200 ft. of one another along the cross lines and no further than 200 ft. north of the base line. A second cluster, 1400 ft. long, is found between 28 E and 52 E and is higher up the hillside, between 1500 N and 3000 N. This cluster is made up of more of the lower values, +1.0 and +1.5 standard deviations away from the mean. There are several other significant values north of the main creek from 24 W to 62 W. These occur as pairs or triplets of high values. Where high values are obtained from samples at two or more successive stations an anomaly probably exists and should be checked on the ground.

The high molybdenum values are clustered between 4W and 32E, a distance of 3600' and are in an area bounded by Murmuring Creek and 1500N. Smaller clusters occur between 40W and 12W, between 44E and 52E and on line 72E. A significant difference in the type of distribution pattern of Mo as compared to that of Cu is that the high Mo values are remarkably more persistent over several adjacent sample sites. Line 12E is a good illustration. The clusters of high Mo values is tighter and better defined.

When the two maps are superimposed, coincidental clusters of high Mo and Cu samples can be observed between line 4W and 20E, and smaller ones from 35N to 40N on line 72E, and on line 48E around 20N.

The non-coincidental anomalies suggest that there might be a zoning of the source material. The dispersal patterns of the two elements suggest that Cu anomalies are slightly larger than the Mo anomalies, and closer sample spacing should be used in further defining the extent and shape of the Mo anomalies.

Computer Analysis

In order to determine the magnitude and character of the relationship between the copper and molybdenum values and parameters of the samples on which data had been recorded, (such as topography, size analysis, soil type) a regression analysis was performed by computer. The field data was punched on cards and this input was operated upon by a suitable program. Table III is a summary of the results obtained from the analysis. It is apparent that high concentrations of Cu and Mo occur mainly in a brown, alluvial, fine-grained soil in moderately well-drained areas of gentle relief on low southwest-facing slopes with few trees or shrubs. The daily temperature changes are maximal on the southwest slopes, and the soil on this slope is subject to the greatest amount of frost heaving action. While conducting the survey, ice crystals could be seen on the surface of the ground when the overnight temperatures dropped below freezing. These were especially evident where the vegetation was sparse. A silt-sized residue of soil remained on the surface when the crystals melted.

There is a direct relationship between the amount of fine material in the samples and the concentration of Cu and Mo. A significant number of samples reporting high Cu and Mo concentrations contained high proportions of silt and clay sized material. This feature may be interpreted in several ways.

Firstly, the greater amount of surface area may adsorb a greater number of groundwater-transported cations. Secondly, the parent material containing mineralization might be more easily broken down to finer particles than unmineralized material, and these particles may be mechanically transported more easily than larger breakdown products. There are probably other factors which would yield correlation between size and cation concentration, such as Eh and pH variations affecting both the chemical breakdown and transport of ions.

A low proportion of organic material is characteristic of higher Cu and Mo concentrations on this property. It seems that Cu and Mo were not involved to an abnormal degree in the metabolism of plants in general, and therefore did not lead to much higher concentrations in the organic remains that were collected with the samples. This also reflects the fact that samples were taken below the organic layer, and although some organic material invariably found its way into the sample, the contribution of this small amount did not significantly contribute to the Cu and Mo cation concentration. A low intensity of tree cover correlated with high sample values. This might indicate some degree of toxicity associated with the higher metal cation areas.

The correlation of Cu concentration against Mo concentration in the same sample shows two data clusters. A small cluster occurs at high Mo and low Cu values, and another cluster is found at low molybdenum and high copper values. This indicates the factors controlling the dispersion of the cations are different, and that there may be some zoning in bedrock distribution of these elements. It may also reflect the different mobilities of the cations under similar pH, Eh and mechanical transport conditions.

TABLE III

Soil Geochemical Survey data correlation

Compilation table from computer analysis defining conditions under which highest values occurred.

PARAMETERS		COPPER	MOLYBDENUM
(1)	DEPTH	1 to 3 inches	3 inches, also at 10 inches
(2)	COLOUR	brown	brown
(3)	SOIL TYPE	alluvial, frost heaved	same
(4)	CLASSIFICATION	loesslike soil	same
(5)	RELIEF	gentle	same
(6)	SLOPE AMOUNT	most at 10°, some at 35°	most at 10°
(7)	SLOPE DIRECTION	most on SW slopes	most on southwest to west slopes
(8)	DRAINAGE	moderate drainage	same
(9)	AMOUNT OF GRAVEL	most at 0%, few at 50%	most at 0 to 10%
(10)	SAND	most at 0%, some at 20%	most at 0%, some at 20%
(11)	SILT	most at 40%, some at 20%	most at 35 to 40%
(12)	CLAY	most at 40%, some at 20%	most at 40%
(13)	ORGANICS	most at 15%	most at 10%
(14)	VEGETATION	Spruce	Spruce
(15)	INTENSITY OF TREE COVER	20%	15%
(16)	ALTITUDE	most about 5100 ft., some at 5700 ft.	most about 5250 ft.

GEOPHYSICS

Seven magnetometer profiles were run in an attempt to evaluate differences in magnetic susceptibility over different rock types and the known mineralization. The data and interpretations can be used to evaluate the merit of magnetometer survey on the claims some time in the future. The data have been corrected for diurnal variations and plotted as profiles along the geochemical grid lines.

The range of values is approximately 500 gammas. There is some regional variation with high values towards the northeast. This is probably due to topography, although the large granite mass to the north may have a higher susceptibility which is causing a regional variation. There does not appear to be much contrast across the postulated contact, but perhaps further data screening will point up larger contrasts. There appears to be a slight anomaly between stations 45N and 50N on line 48E which cannot be explained by topographic or surface geological features. Stone polygons were found to give high mag readings for some unexplained reason. The magnetically anomalous areas are detailed below in Table IV.

TABLE IV

Magnetic Anomalies

Line	Station	Possible cause for anomaly
20 W	15 S	steeply dipping beds with probable presence of some iron oxides
48 E	27 N	andesite dike
56 E	3 N	swamp
56 E	7 N	topographic high
56 E	18 N	topographic high
BASE LINE	5 W	topographic high
BASE LINE	00	topographic high
BASE LINE	46 E	frost heaving in polygon (the readings in areas of other polygons give similarly high gamma values, up to 300 gammas higher than the surroundings)

CONCLUSIONS

1. Any further surveys should be conducted during the summer month so that the work will not be hindered by snowfall and rain. It is suggested that September 15th be the absolute last date of work for field programs.

2. Mineralization consisting of copper sulphides and oxides with minor molybdenite has been seen in several parts of the property. Newly discovered occurrences have been located north of the main creek and in exposures near and along the cliff. Both disseminated and fracture filling mineralization have been seen.

3. The geochemical exploration soil survey covered an area measuring 13,400' x 3,500' and revealed several zones on the northeast side of the contact which are anomalous in copper and molybdenum. One of the anomalous copper zones appears to continue into the unsampled area to the northeast, while the molybdenum anomalies have been delineated by the survey. It is apparent that frost action has contributed in the transport of mineralized material. Some extremely high values were obtained during the survey.

4. A computer triangular regression analysis program was used to process the data and interpretations were simplified by this technique.

5. Topographic control established to date is inadequate for further detailed surveys.

6. It is reasonable to conclude that the anomalies are caused by mineralization beneath the soil cover.

7. A magnetometer survey over part of the grid did not show extreme differences in magnetic susceptibility between the intrusive rocks and the metasediments, or between mineralized and unmineralized rocks.

8. The geological work done to date can be expanded upon. Enough information can be gathered from exposures to provide valuable structural and ore control interpretations. The area of interest has been expanded to include the area up to the ridge on the northeast side of the valley.

9. Mineralization was found during the survey which had not previously been discovered.

10. The property merits further investigation.

RECOMMENDATIONS

The results achieved to date suggest that the following steps should be taken.

1. Geochemical Exploration.

   (a) The grid should be expanded to define the limits of the copper anomalies on lines 16E, 20E, 32E, 36E and 40E.

   (b) Any scattered highly anomalous values should be resampled at closer intervals.

   (c) Because mineralization has been discovered northeast of the contact in one part of the claim group, it is recommended that a program of stream sediment sampling of all creeks and gullies flowing into Murmmuring Creek from the northeast be instituted. Sampling sites should be no more than 500 feet apart and soil sampling followup should be done where high values are encountered. This program should be combined with geologic mapping of the drainage system.

2. Geological Exploration.

   (a) The area should be systematically remapped, paying particular attention to structural data: the contact area, the mineralized zones exposed in the area of the creek, the insides of creek meanders and the cliff to the northeast, and alteration distributions.

   (b) Structural analysis using the data from (a) should be conducted. Alteration studies should be made.

   (c) Trenching and further close examination of mineralization discovered.

3. Geophysical Exploration.

(a) A magnetometer survey should be conducted on a 100' x 200' pattern. The data should be filtered by removing topographic and regional effects. The grid should be expanded to the north for this purpose.

(b) IP and resistivity surveys should be conducted over the major soil Cu and Mo anomalies to confirm their presence at depth. A new survey is recommended to take advantage of the developments in technique and interpretation that have taken place in the past 7 years since the previous survey. Some of the smaller anomalies should be investigated as well.

4. Topographic Surveys.

(a) A base map should be constructed for the area at a suitable scale, using air photographs available from the Air Photo Library in Ottawa and the services of a competent contractor. Control points should be established on the ground and previous lines tied into these points. Contours at 25 foot intervals should be shown on the base map.

If all the recommendations are carried out, the project would probably involve two men working on the property for most of the summer season. IP crews would probably be on the property for two or three weeks, and if results warrant, there would be time for a month or two of drilling.

Consideration should be given to exploring other parts of the contact of the Cassiar Batholith in the region. Prospecting along the contact by an experienced two-man party would probably be the most efficient manner in which to accomplish this.

Respectfully submitted:

Volker H. Ahlborn

V. H. Ahlborn, B.Sc.

K. A. MacLean

K. A. MacLean, M.Sc. (Applied)

John S. Vincent Limited

APPENDICES

REFERENCES

DODGE, James S. (1971) — Eagle Group of Claims, Northern British Columbia. Spartan Explorations Ltd. internal memorandum.

GABRIELSE, Hubert (1962) — Geologic Map 29-1962, "Cry Lake", 104I, 1:250,000 Canada Geological Survey.

HALLOF, Philip G. (1964) — Report on the Induced Polarization and Resistivity Survey on the Joy Claim Group, Snowdrift River Area, for Kennco Explorations (Western) Limited, McPhar Geophysics Limited, Toronto. Report and map.

KIDO, H. (1970) — Geologic Map of part of the Eagle Claims. Mitsui Mining & Smelting Co. Ltd.

LEPELTIER, Claude (1969) — A simplified statistical treatment of geochemical data by graphical representation. Econ. Geol. 64, pp. 538-550.

PANTALEYEV, A. and NEY, C.S. (1964) — Report on Geological and Geochemical Surveys, Snowdrift Examination, Kennco (Western) Ltd. report and maps.

CERTIFICATE

I, John S. Vincent, with business and residential addresses in Vancouver, British Columbia, do hereby certify that:

1. I am a Consulting Mining Geologist.

2. I am a graduate of Queen's University, B.Sc., 1959, Geological Sciences, and of McGill University, M.Sc., 1962, Economic Geology.

3. I am a Fellow of the Geological Association of Canada, and a member of the Association of Professional Engineers in the Province of British Columbia.

4. From 1962 until 1969 I was engaged as a mine exploration geologist with the International Nickel Company of Canada Ltd., in Thompson, Manitoba, and since 1969 I have been practicing as a Consulting Mining and Exploration Geologist.

5. The information on which this report is based was obtained from the files of Spartan Explorations Ltd. (N.P.L.), and from work carried out on the property under my supervision September 10th - 29th, 1971.

6. I have not received, nor do I expect to receive any interest, directly or indirectly, in the properties or securities of Spartan Explorations Ltd. (N.P.L.)., or any associated company.

Respectfully submitted,

John S. Vincent, P.Eng.,
Consulting Geologist.
November 9, 1971.

APPENDIX I.

SUMMARY OF COSTS

Geochemical Surveys / Maps	$ 442.14
Geophysical Surveys / Maps	162.50
Geochemical Surveys / Maps	183.43
General Supervision	103.00
Wages / Salaries / Bonuses	2,359.05
Consultants / Management Fees	1,515.00
Travel & Accommodation	2,004.67
Telephone / Telegraph / Radios	12.95
Supplies & Misc. Equipment	94.78
Assaying	2,274.45
Rental of Equipment	164.50
Camp Support	390.02
	$9,706.49

APPENDIX II.

AFFIDAVIT

(Supporting Summary of Costs)

I, Dorothy I. Hamar, Secretary Treasurer with Spartan Explorations Ltd. (N.P.L.), of Vancouver, British Columbia, do hereby state that to the best of my knowledge and belief the Statement of Costs, as presented in this report covering "Geological and Geochemical Surveys on the EAGLE Group of Mineral Claims", is both true and correct.

Dated at Vancouver, British Columbia, this 13th day of December, 1971.

SWORN BEFORE ME at Vancouver, British Columbia, this 13th day of December, 1971.

Donald S. Collins

A Notary Public for taking Affidavits in British Columbia.

D. Hamar.

Dorothy I. Hamar, Sec.Treas.

APPENDIX III.

PERSONNEL

Name	Position	Address
K. A. MacLean	Geologist	VAncouver, B.C.
V. Ahlborn	Geologist	Vancouver, B.C.
Guy St. Jean	Geology Assistant	Whitehorse, Y.T.
J. S. Vincent	Consulting Geologist	Delta, B. C.

STATEMENT OF QUALIFICATIONS

K. A. MacLean

I am a 1963 graduate of Carleton University, having earned the degree of Bachelor of Science, specializing in the geological sciences and chemistry, and a 1971 graduate of the Master of Science (Applied) program at McGill University, specializing in mineral exploration.

I have been employed as a geologist since June of 1963, and prior to that spent four summers doing geological field work as a student.

I am a Fellow of the Geological Association of Canada and a registered Professional Engineer in the Province of Ontario, and have applied for membership in the Association of Professional Engineers of British Columbia.

Material presented in this report was the result of personal observations made in the field on the Eagle Claim Group and during the design, supervision and analysis of the program.

K. A. MacLean
November, 1971

STATEMENT OF QUALIFICATIONS

Volker H. Ahlborn

In spring 1971 I graduated as Bachelor of Science in Honour Geology at the University of British Columbia.

I gained my practical experience in two field seasons as a student, at field school and as a geologist involved in regional and property work in summer 1971.

Volker H. Ahlborn

Volker H. Ahlborn
November, 1971

SPARTAN EXPLORATIONS LTD.(N.P.L.)
1035 WEST PENDER STREET · VANCOUVER 1, BRITISH COLUMBIA
TELEPHONE 688-2355

DETAILED SUMMARY OF COSTS RE "ESSO" PROJECT -

GEOCHEMICAL SURVEYS/MAPS		
Scott Dunbar - Computer run	$ 75.04	
Bondar Clegg - Assays	367.10	$ 442.14
GEOPHYSICAL SURVEYS/MAPS		
Frontier Helicopters - flying magnetometer to camp)		162.50
GEOCHEMICAL SURVEYS/MAPS		
Altair Drafting	$ 180.13	
Misc. Expenses	3.30	183.43
GENERAL SUPERVISION		
J.S.Vincent Ltd.	$ 100.00	
J.S.Vincent Ltd.	3.00	103.00
WAGES/SALARIES/BONUSES		
Guy St. Jean - Sept.7-23/1971 - $600.00 Mo. + Holiday Pay	$ 396.10	
Volker Ahlborn - Sept.7-23/1971 @ $1000.00 Mo. October/1971 @ $800.00 Mo.+Hol.Pay	1723.92	
J.S.Vincent Ltd.-Fee for V.Ahlborn for 1 week $200.00	200.00	
PLUS: Company's share of Canada Pension & Unemp.Insce.	39.03	2359.05
CONSULTING/MANAGEMENT FEES		
J.S.Vincent Ltd. (Sept.)	$ 240.00	
J.S.Vincent Ltd. (Sept.)	800.00	
J.S.Vincent Ltd. (Oct.)	375.00	
J.S.Vincent Ltd. (Nov.)	100.00	1515.00

(fwd.)

TRAVEL & ACCOMMODATION			
Travel - J.S.Vincent Expense Account	$172.75		
K.A.MacLean Expense Account	328.89		
Harrison Airways	167.30		
B.C.Yukon Air Services	156.00		
Frontier Helicopters	952.50		
Harrison Airways	173.70	$1951.14	
Accommodation - J.S.Vincent Exp.Acct.	13.03		
K.A.MacLean Exp.Acct.	40.50	53.53	$2004.67
TELEPHONE & TELEGRAPH			
Long Distance Telephone calls			12.95
SUPPLIES & MISC. EQUIPMENT			
K.A.MacLean Expense Account		23.07	
Vancouver Stationers & Freight		23.53	
Elden Explorations		12.48	
F & G Delivery		7.30	
Harrison Airways (Freight)		28.40	94.78
ASSAYING			
Bondar Clegg - Inv.1922			2274.45
RENTAL OF EQUIPMENT			
Scintrex Limited (Magnetometer)			164.50
CAMP SUPPORT			
J.S.Vincent Exp.Acct. - Groceries		28.11	
K.A.MacLean Exp.Acct. - Groceries		15.92	
Taylor & Drury		108.49	
Frontier Helicopters - Food supply trip		237.50	390.02
			$9706.49

JOHN S. VINCENT LIMITED

IMPERIAL OIL LIMITED

EAGLE CLAIMS

SOIL SURVEY

COPPER & MOLYBDENUM

Scale:	Date:	Map No.
1 inch = 400 Feet	October , 1971	1

3476

M-12

CLIFF

CLIFF

BASE LINE

62 W
56 W
48 W
40 W
36 W
32 W
28 W
24 W
20 W
16 W
12 W
8 W
4 W
0+00
4 E
8 E
12 E
16 E
20 E
24 E
28 E
32 E
36 E
40 E
44 E
48 E
52 E
56 E
60 E
64 E
72 E
40 N
35 N
30 N
25 N
20 N
15 N
10 N
5 N

LEGEND

1700 +	PPM.
760 – 1699	PPM.
320 – 759	PPM.
300 –	PPM.

JOHN S. VINCENT LIMITED

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EAGLE CLAIMS

GRAPHICAL REPRESENTATION of COPPER IN SOIL

Scale:	Date:	Map No.
1 Inch = 400 Feet	October, 1971	2

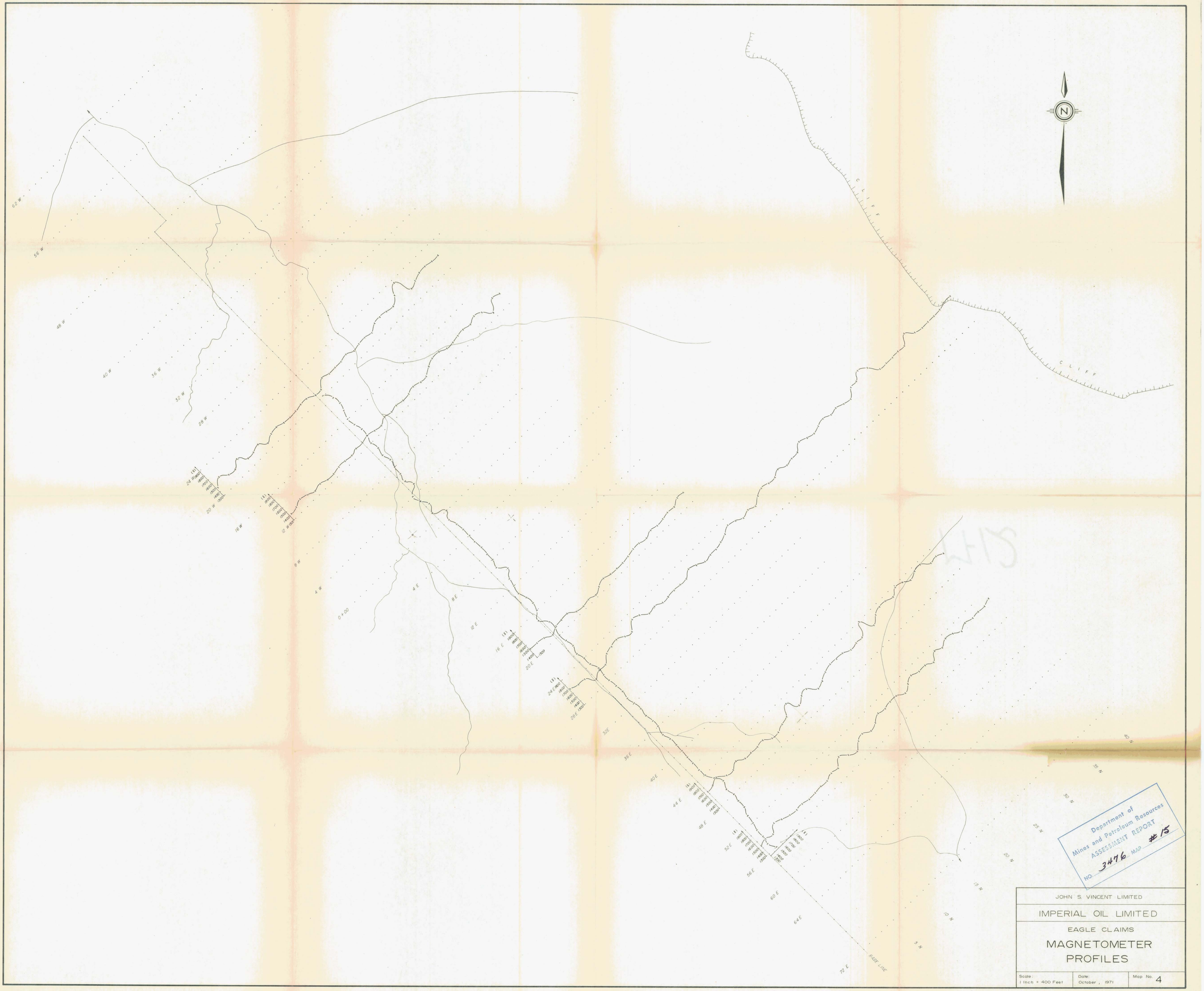
JOHN S. VINCENT LIMITED

IMPERIAL OIL LIMITED

EAGLE CLAIMS

GRAPHICAL REPRESENTATION of MOLYBDENUM IN SOIL

Scale:	Date:	Map No.
1 inch = 400 Feet	October, 1971	3



JOHN S. VINCENT LIMITED

IMPERIAL OIL LIMITED

EAGLE CLAIMS

MAGNETOMETER PROFILES

Scale:	Date:	Map No.
1 Inch = 400 Feet	October , 1971	4