

RECONNAISSANCE

GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT

on the

Mill Group of Claims

Mill No. 1 to 8, inclusive

Situated near Hope, B. C.

New Westminster M.D.

Latitude $49^{\circ}28'45''N.$: Longitude $121^{\circ}27'W.$

N.T.S. 92 H/6 W. $\frac{1}{2}$

Owned by

KELSO EXPLORATIONS LTD.

Work done between July 3 and July 6, 1968.

W.K. Lee, P.Eng.,

July 18, 1968

Vancouver, B. C.



GEO-X SURVEYS Ltd.
VANCOUVER, CANADA

1593

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INTRODUCTION

A Geo-X Surveys Ltd. field crew under the direct field supervision of W.K. Lee, P.Eng., completed a reconnaissance magnetometer, geochemical and geological program at the request of Kelso Explorations Ltd., (N.P.L.), 470 Granville Street, Vancouver 2, B.C. The work was carried out between July 3 and July 6, 1968 on the Mill claim group situated approximately 10 miles north of Hope, B.C.

This report describes the field procedures and discusses the results of the above program.

LOCATION AND ACCESS

The property is easily reached by driving approximately 8 miles north of Hope, B.C., along Trans Canada Highway No. 1 to the Giant Mascot Mine road and hence 2.5 miles west along a good gravel road (see Location Map - Figure 1).

CLAIMS AND OWNERSHIP

The Mill group consists of 8 located mineral claims in the New Westminster M.D. They are owned outright by Kelso Explorations Ltd. (N.P.L.), 414 - 470 Granville Street, Vancouver 2, B.C. The Mill claim group is part of a larger block of claims also owned by Kelso Explorations Ltd. (see Claim Map - Figure 2).

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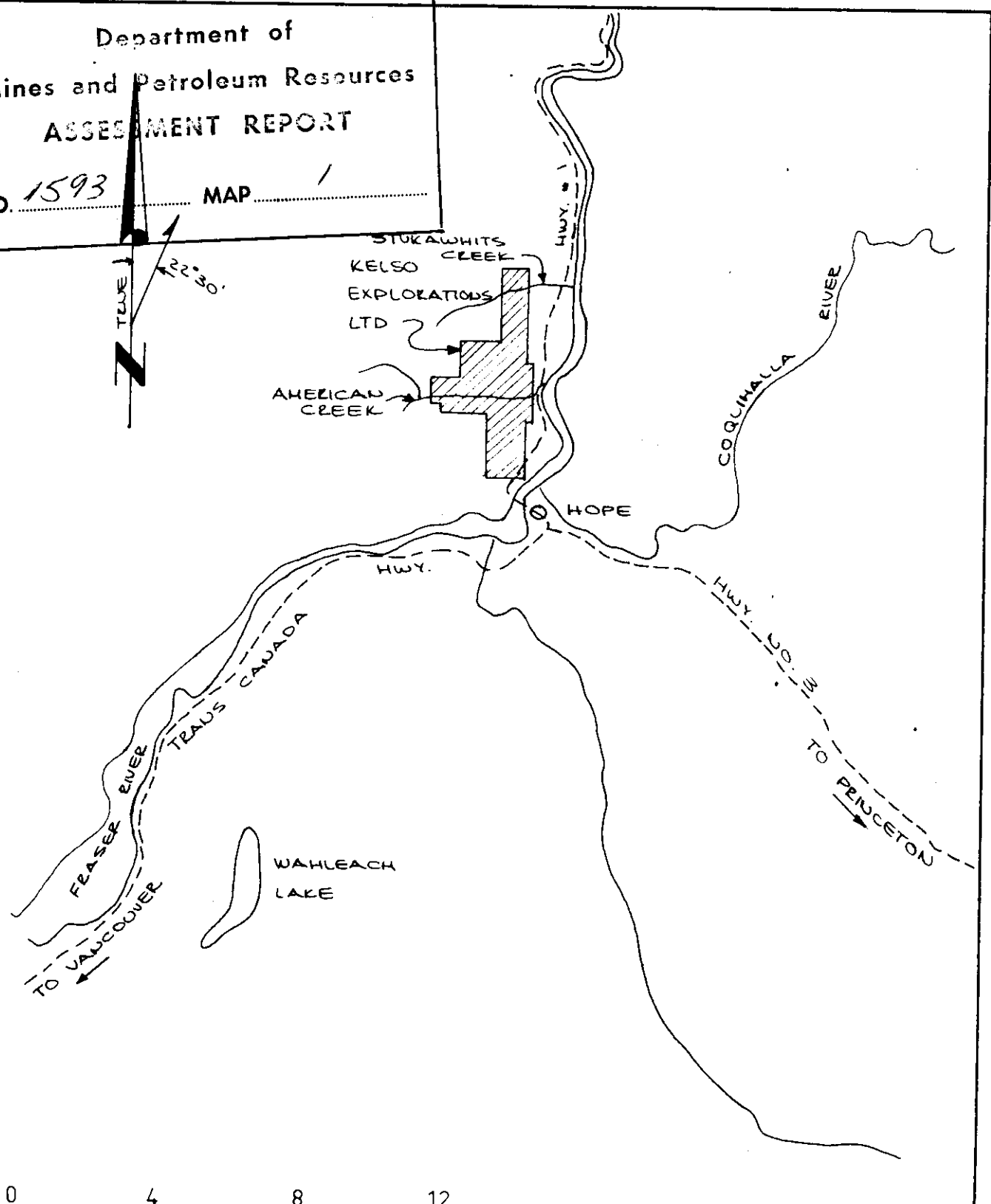
NO. 1593

MAP

1



22°30'



KELSO EXPLORATIONS LTD.
HOPE, NEW WESTMINSTER M.D., B.C.

GENERAL LOCATION MAP



GEO-X SURVEYS Ltd.

DRAWN D.E.Y.	CKD. W.H.L.	FIG 1
APPR'D	DATE 18-7-68	JOB 1032

The mineral claims comprising the Mill Group and their corresponding record numbers are as follows:

<u>Claim Names</u>	<u>Record Numbers</u>
Mill 1 to Mill 8, incl.	15861 to 15868, incl.

TOPOGRAPHY

The topography is mountainous with the highest elevation on the property being approximately 2,150 feet above sea level. Puckat Creek to the south and Stulkawhits Creek to the north flow in steep V-shaped valleys easterly to the Fraser River.

Old logging roads cross the property and provide good access to some sections of the property. However, travel off these roads is very difficult due to heavy underbrush and steep slopes.

SURVEY CONTROL

When possible, survey lines were run along roads or streams so location reference points could be obtained from aerial photographs. Other lines were established by pace and compass surveys.

Magnetic readings were taken at 100 foot intervals along survey lines and each station was flagged and marked.

REGIONAL GEOLOGY

Late Paleozoic and Early Mesozoic rocks underlie the area between Hope and Yale, B.C. These rocks consist of sedimentary and metamorphic rocks of the Chilliwack Group which are thought to be Carboniferous or younger (Cairnes, 1942 - G.S.C. Map 737A).

Intrusive rocks found in the area may be divided into two main groups as follows:

Group 2 - Upper Jurassic and later

Granite, granodiorite, quartz diorite.

Group 1 - Middle to Upper Jurassic

Serpentine, diorite, gabbro, amphibolite, hornblendite, pyroxenite and peridotite. Aho, 1954, describes nickeliferous rocks in the area as follows:

All known nickeliferous pyrrhotite deposits in the area occur in the ultramafic rocks of Group 1. These nickeliferous ultramafic and genetically associated diorites and norites are among the youngest of several ages of Mesozoic intrusive rocks in the Hope area.

The nickeliferous deposits of the Pacific Nickel Mines are associated with metamorphic and intrusive rocks of the B.C. Coast Mountains which have undergone repeated Mesozoic orogenic and igneous activity.

The serpentine bodies associated with large faults in the Hope area indicate deep transgressive structures.

LOCAL GEOLOGY

An understanding of the geological environment which produced the Giant Mascot Mines nickel-copper deposits is

essential before realistic interpretation of geological information obtained on the Mill group can be made. A summary of the lithologic units and their descriptions as recognized by Aho, 1954, is given below. They are listed in order of decreasing age.

1. Metamorphic Rocks (Late Paleozoic)

The metamorphic rocks consist mainly of fine-grained garnetiferous quartz-mica schists of relatively uniform composition and texture - probably derived from silts. The schists contain quartz, plagioclase (An₂₉₋₃₅), biotite and garnet and may or may not be associated with minor graphite, magnetite, pyrrhotite and rutile. Minor muscovite and chlorite retrogressive after biotite are common. Some rocks may contain corroded grains of staurolite and others small amounts of hornblende. More pelitic rocks contain corroded andalusite which in places has retrogressed to muscovite and chlorite.

Basic flows associated with the above schists have the following mineral assemblage:

Blue-green hornblende, zoisite, quartz and graphite.

The above rocks have been classed by Aho, 1954, as being "in the staurolite - kyanite subfacies of the amphibolite facies, characteristic of moderate to high grade regional metamorphism".

2. Older Quartz Diorite (Early Mesozoic?)

Light grey, slightly sheared, medium to coarse grained quartz diorite, commonly with blue-tinted quartz.

3. Diorites with gradations to Norite (Late Mesozoic)

These rocks are cut by ultrabasics and occur as inclusions within them. They in part intermingle with and grade into the ultrabasics at the contacts. They are medium to fine grained, hypidcomorphic in texture, and show distinct primary lineation or foliation in places. They are composed of plagioclase, hypersthene, hornblende, augite, and usually contain less than 40% mafic minerals.

The diorites often grade imperceptibly into norite and from quartz-free to quartz-rich rock types. They also show sharply defined cross-cutting relations.

4. Ultrabasic Rocks (Late Mesozoic)

These rocks are essentially peridotite, pyroxenite and hornblende which form stocklike intrusions and smaller plugs. Most of these rocks contain no feldspar. Most of the rocks are medium to fine grained and are allotriomorphic or hypidiomorphic in texture when olivine or pyroxene predominate, and coarsely porphyritic or poikilitic in texture when dominated by hornblende.

5. Hornblende Diorite (Late Mesozoic)

The hornblende diorite occur as small bodies along contacts between earlier rocks. Various other minor late differentiates are also present.

6. Dikes, veins, and alterations, broadly contemporaneous with fracturing and faulting.

Mill Claim Group

Lithologic Units Recognized

Most of the rock units mapped on the Mill Claim Group are metasedimentary rocks that belong to the Chilliwack Group which are thought to be Carboniferous or younger (Cairnes 1942, G.S.C. Map 737A). The rocks have undergone medium grade metamorphism similar to that described by Aho, 1954, for the Giant Mascot Property. However, no kyanite or sillimanite crystals were recognized in the schists mapped on the Mill Group.

1. Metasedimentary Rocks

(a) Quartz - Sericite - Biotite Schist

A fine grained black-grey rock exhibiting well developed schistosity. Thin white quartz layers commonly parallel the schistosity. They are a product of both compositional layering and metamorphic differentiation. Occasional calcite lenses occur in the schists.

(b) Quartzite

Layers of fine grained tan coloured grey to white quartzite are found interlayered in the quartz-mica schist. The rocks are moderately fractured and slightly stained with limonite. The layers are one inch to twenty-four inches thick and are well exposed along the Giant Mascot road cuts below the tailings pond.

(c) Phyllitic - Graphite Schist

This rock is black, fine grained and very fissile. It forms layers 1 to 12 inches thick and is local in extent. Small drag folds are commonly found in these layers which appear to have acted as zones of preferential slippage during shearing.

(d) Boulder - Pebble Conglomerate

This rock type was the most extensive unit mapped on the property. It is composed of well rounded boulders and pebbles of diorite, quartz diorite, porphyritic rhyolite, quartzite, quartz-mica schists and ultramafics. The matrix which tends to be friable is composed of argillite, silica and calcite.

The conglomerate changes composition and texture along a narrow zone which trends north-south through the middle of claims Mill 5 and 7 (Figure 3). Composition consists mainly of dioritic rocks with subordinate amounts of other rock types.

Rock types a, b, and c, are mapped as one unit due to their discontinuous and interlayered nature. Compositional and textural relationships suggest they were formed mainly from silts and fine grained sand. No garnetiferous schists as mapped by Aho, 1954, on the Giant Mascot Property, were encountered.

2. Igneous Rocks

(a) Amphibolite

A small exposure of fine grained, dark green amphibolite is exposed along the bottom of Stulkawhits Creek (Figure 3 - Map Pocket). The amphibolite is derived from a metamorphosed basalt flow which has undergone slight serpenitization. The amphibolite is interlayered with metasediments and represents the metamorphic assemblage described by Aho, 1954.

(b) Hornblende Diorite

The rock is medium grained in which most of the hornblende has retrogressed to biotite and chlorite. Outcrop occurs two-thirds of the way up Puckat Creek.

(c) Granitic Gneiss

Medium to coarse grained granitic gneiss outcrops along the bottom of Puckat Creek approximately a third of the way up from the highway. Foliation attitudes in the gneiss indicate a small anticline which trends north-south.

STRUCTURAL GEOLOGY

The main structural trend on the property is north-south. Schistosity attitudes suggest a series of tight anticlines and synclines cross the area along north-south axial planes. Shearing and faulting has also occurred along predominantly north-south planes.

GEOCHEMICAL SOIL SURVEY

Procedure

All soil samples were taken from the B horizon. Samples were then placed in standard water resistant geochemical bags, sealed and shipped to Vancouver. They were strung up and air dried in the Geo-X Surveys Ltd. storeroom, then sent to T.S.L. Laboratories for analysis. Samples were analyzed for Cu and Ni using hot acid extraction method (See Appendix I).

The Certificate of Analysis of 57 samples (T.S.L. Report V-3950-1, 2 and 3) is dated July 11, 1968 and was received on July 12, 1968.

RESULTS

A total of 54 soil and silt samples were analyzed and the statistics follow:

<u>Metal</u>	<u>Arithmetic Mean (AM)</u>	<u>Maximum Value</u>	<u>Minimum Value</u>
Cu	40 p.p.m.	1010 p.p.m.	10 p.p.m.
Ni	201 p.p.m.	920 p.p.m.	68 p.p.m.

Metal value between $1\frac{1}{2}$ and $2\frac{1}{2}$ times the arithmetic mean may be classed as "possible anomalous" and those over $2\frac{1}{2}$ times the AM as "probably anomalous". Thus the results may be classed as follows:

<u>Metal</u>	<u>Possible Anomalous</u>	<u>Probably Anomalous</u>
Cu	60 to 100 p.p.m.	+ 100 p.p.m.
Ni	302 to 503 p.p.m.	+ 503 p.p.m.

In calculating the arithmetic mean values for Cu and Ni, the high results from samples taken from Stulkawhits Creek were not included.

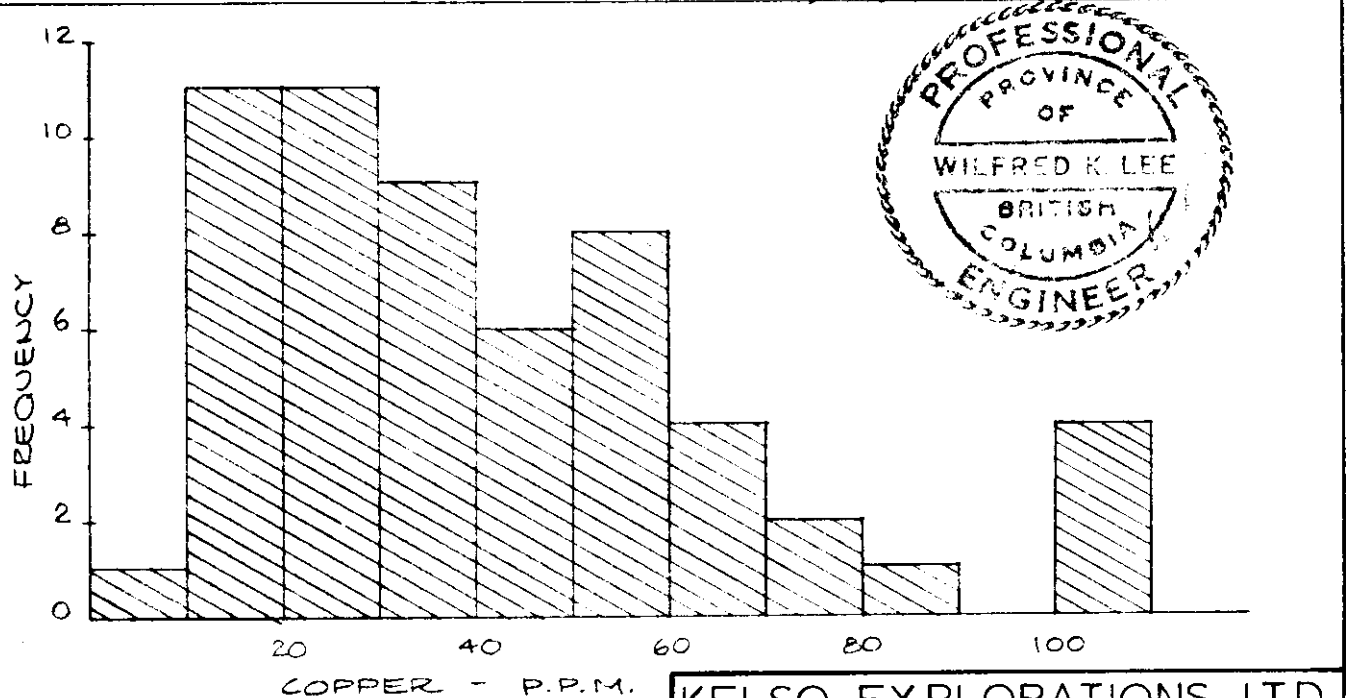
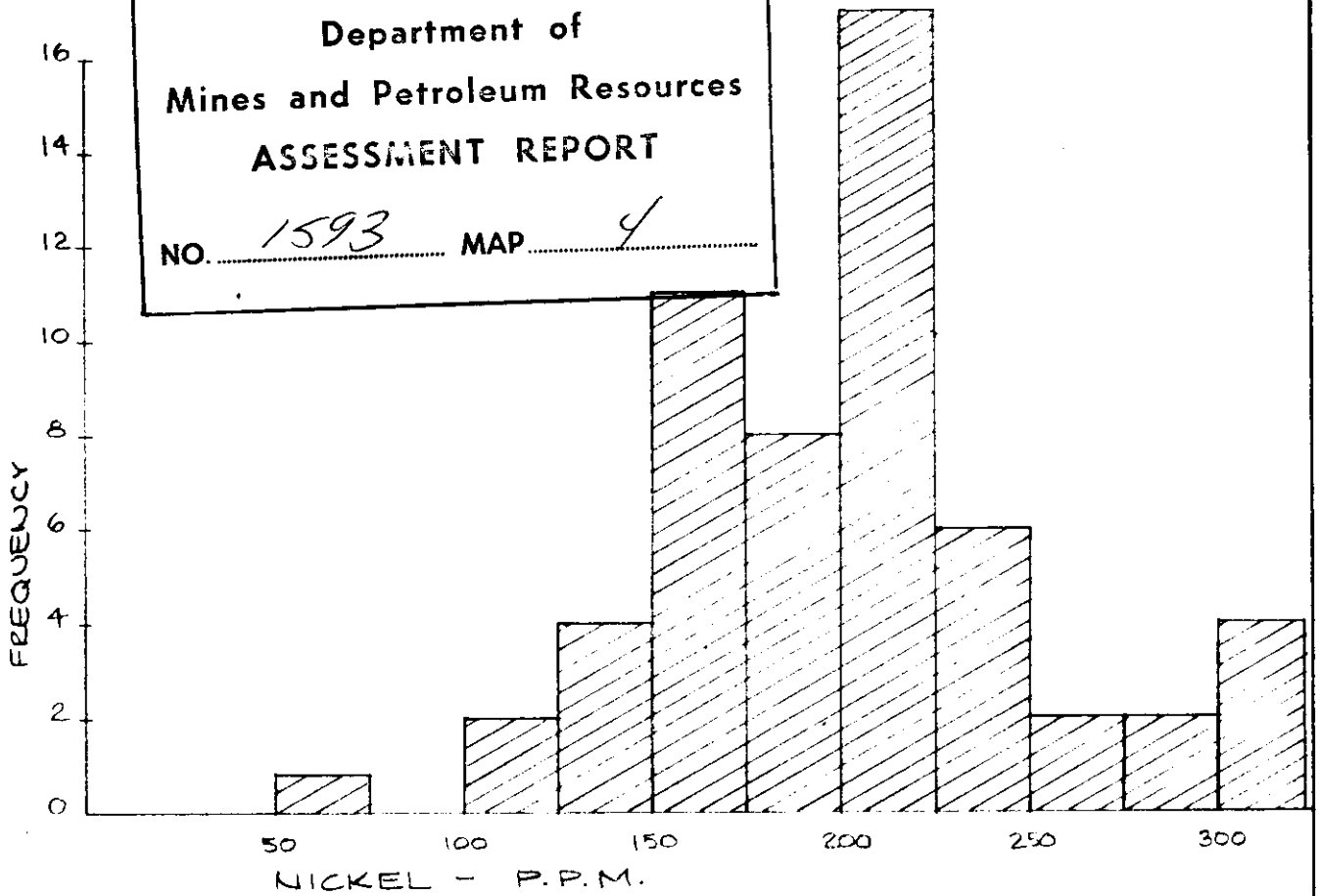
The writer feels that contamination of stream silts in Stulkawhits Creek from the Giant Mascot Mines tailings pond renders meaningless the results of silt samples taken from Stulkawhits Creek.

Based on the above general classification, two slightly interesting geochemical areas for copper were located. The first area is at the end of the survey line on Claim Mill 4 where an isolated value of 159 p.p.m. Cu was obtained. The other area of interest is located along the Giant Mascot Mine road where values of 66 to 83 p.p.m. Cu are obtained from soils on Claim Mill 8.

No anomalous Ni results were obtained from the property except those samples taken from Stulkawhits Creek.

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NO. 1593 MAP 4



KELSO EXPLORATIONS LTD.
HOPE NEW WESTMINSTER M D B.C.

FREQUENCY DISTRIBUTION
HISTOGRAM OF
COPPER & NICKEL VALUES

GEO-X SURVEYS Ltd.

DRAWN B A C K D	FIG 4
APPR'D	DATE
	JOB 1032

Frequency distribution histograms of the copper and nickel results are drawn on Figure 4. Results of the soil analysis and sample locations are plotted on Figure 5 (Map Pocket).

MAGNETOMETER SURVEY

A Jalander Fluxgate Magnetometer (Type 46-65) was used throughout the survey. The instrument is distributed by Huntco Limited, 1450 O'Connor Drive, Toronto 16, Ontario.

Specifications for the instrument are attached as Appendix II.

Magnetic readings were recorded at 100 foot intervals along the survey lines and corrected for diurnal variation. The corrected results and location of each reading is plotted on Figure 6 (Map Pocket).

Arithmetic average of 240 magnetometer readings is 710 gammas. The highest reading obtained was 1440 gammas, the lowest 490 gammas. A small magnetic high, designated Anomaly 1 was located near the corner post of claims Mill 3, 4, 5 and 6 (Figure 6, Map Pocket).

The anomaly is approximately 100 feet wide, 200 feet long, trends northeast, and is open on both ends.

No other areas of interest were delineated by the magnetic survey.

SUMMARY AND CONCLUSIONS

No nickeliferous ultramafic rocks were found on the Mill Claim Group. Two slightly interesting copper geochemical areas were delineated, but outcrops in these areas do not indicate the presence of economic concentrations of copper.

No anomalous nickel results were obtained in the geochemical survey. Background results from the geochemical nickel analysis are, in the opinion of the writer, too high for the metasedimentary rocks underlying most of the Mill Group. Check analyses are now being completed to determine the cause of these high readings.

One magnetic high was outlined during the survey. Situated near the corner post of Claims Mill 3, 4, 5, and 6, the anomaly is approximately 100' by 300' and trends northeast.

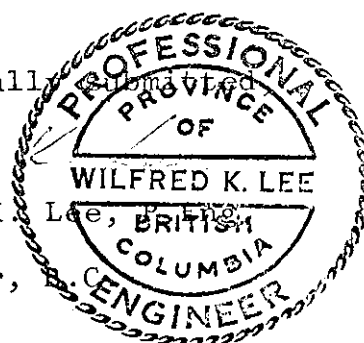
A more detailed magnetic survey combined with an electromagnetic survey should be considered for this anomalous area.

Except for the above area, no other work is recommended for the Mill Claim Group.

Respectfully,

Wilfred

Wilfred K. Lee,
Vancouver,



REFERENCES

- AHO, A.E. 1954 - Geology and Ore Deposits of the Property of Pacific Nickel Mines Near Hope, B.C. Ph.D. Thesis, University of California.
- CAIRNES, C.E. 1942 - Geology Map of the Hope Area, B.C. Map 737A, Geological Survey of Canada.

T

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APPENDIX I

2

Laboratories Limited

325 HOWE STREET - VANCOUVER 1, B.C.

TELEX: 04-50613
CODE NAME: TSL-LABS-VCR.TELEPHONE 688-3504
AREA CODE 604ASSAYERS
CHEMISTS
GEOCHEMISTS

JUN 24 REC'D

Methods of Determination of Copper, Lead, Zinc
Silver, Nickel and Cobalt in Geochemical

The fines are separated to minus 80 mesh,
through a nylon screen.

1 gram sample is digested with Nitric Acid,
and the volume brought to ten mils.

This solution is submitted to the Atomic Absorption
Spectrophotometer and the elements are read and
compared against appropriate standards. The analytical
lines used are:

Copper	3274
Lead	2833
silver	3280
Nickel	2320
Cobalt	2407

June 21, 1968.
T.S.L. LABORATORIES LTD.

SPECIFICATIONS

Temperature compensated up to 1 gamma per degree Fahrenheit.

Improved voltage stabilization circuit. Battery condition does not effect the readings within the given limits.

New easily available batteries.

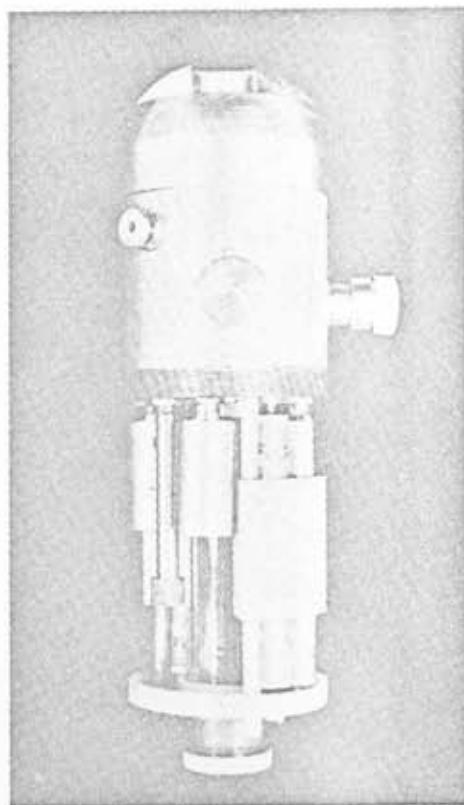
Each instrument is individually calibrated. The readings are essentially linear.

Maximum Accuracy: 10 gammas (range 1)

Dimensions: Diameter 3 5/32 in.
Length 10 in.

Batteries: 1.5 volt
Diameter 9/16 in.
Length 1 31/32 in.

Weight: 3.2 lbs.



Designed by:

H. Jalander, M.Sc. el. eng.,
Geophysicist.
Helsinki, Finland.

Manufactured by:

Optillinen Tehdas Oy,
Helsinki, Finland.

This instrument has been used for many years, with good results, by mining and prospecting companies in different parts of the world. The improved type of instrument is a result of research done on this basis, as well as the personal experience of the designer, under both arctic and tropical conditions.

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837 W. Hastings Street, Vancouver 1, B.C., Canada. Tel: 684-2496


APPENDIX III

Cost Breakdown

The following is a cost breakdown for the Claims Mill 1 to 8, Hope, B.C. area.

4.5 line miles vertical component magnetometer survey @ \$120/line mile	\$540.00
58 soil and silt samples @ \$4.60 each	266.00
Mapping, etc.	<u>125.00</u>
	<u>\$931.00</u>

The above is inclusive of report and drafting.


S.L. Sandner,
President.

APPENDIX IV

<u>Name</u>	<u>Position</u>	<u>Dates Worked</u>
W.K. Lee	Survey Supervisor, P.Eng. Report preparation, interpretation of data	July 3 - July 6/68 July 8 and 17/68
D. Marks	Field Assistant, B.Sc. Magnetometer Operator Data Reduction	July 3 - July 6/68 July 8, 9, 10/68
D. Yip	Draughtsman, Data Reduction - $4\frac{1}{2}$ hrs.	July 9/68

APPENDIX IV

PERSONNEL

Name: LEE, Wilfred Kwong

Education: B.Sc.(Eng.) - Queen's University
M.Sc.(Geol.) - University of Washington,
Seattle.

Professional Associations: Professional Engineer of British Columbia
and Ontario.

Member of G.S.A. Geological Engineer.

Experience: Engaged in the profession since 1962 while
employed with Earl-Jack Exploration Syndicate,
PreCambrian Mining Services Ltd., Inland
Copper Ltd., Westland Mines Ltd.

Presently employed as Engineer with Geo-X
Surveys Ltd.

Experience in Mexico, United States and Canada.

APPENDIX IV

PERSONNEL

NAME: MARK, David

EDUCATION: Graduate of Lord Tweedsmuir Senior Secondary School in Surrey, B. C. - 1964.

B. Sc. with Geophysics Major - University of British Columbia - 1968.

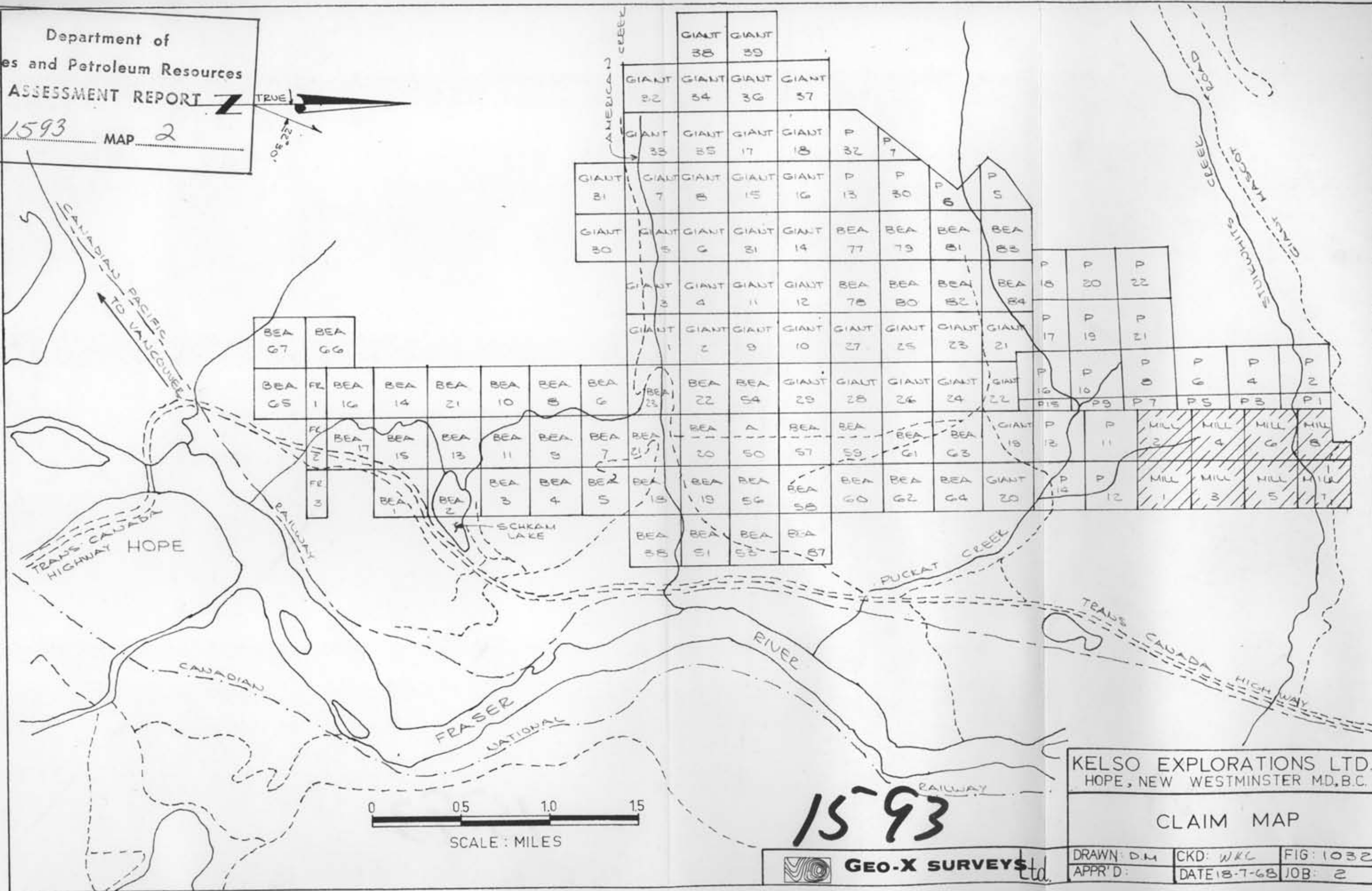
EXPERIENCE: 1965 - Assistant Prospector four summer months for Tulsequah Syndicate (New Taku Mines & Homestake Mineral Development).

1966 - Magnetometer Operator and Assistant Prospector during four summer months for Mastodon Highland Bell Mines Ltd.

1967 - Party Chief during four months of summer work for Anaconda Co. (Canada) Ltd. doing soil sampling, prospecting, claim staking and geological mapping.

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NO. 1593 MAP 2



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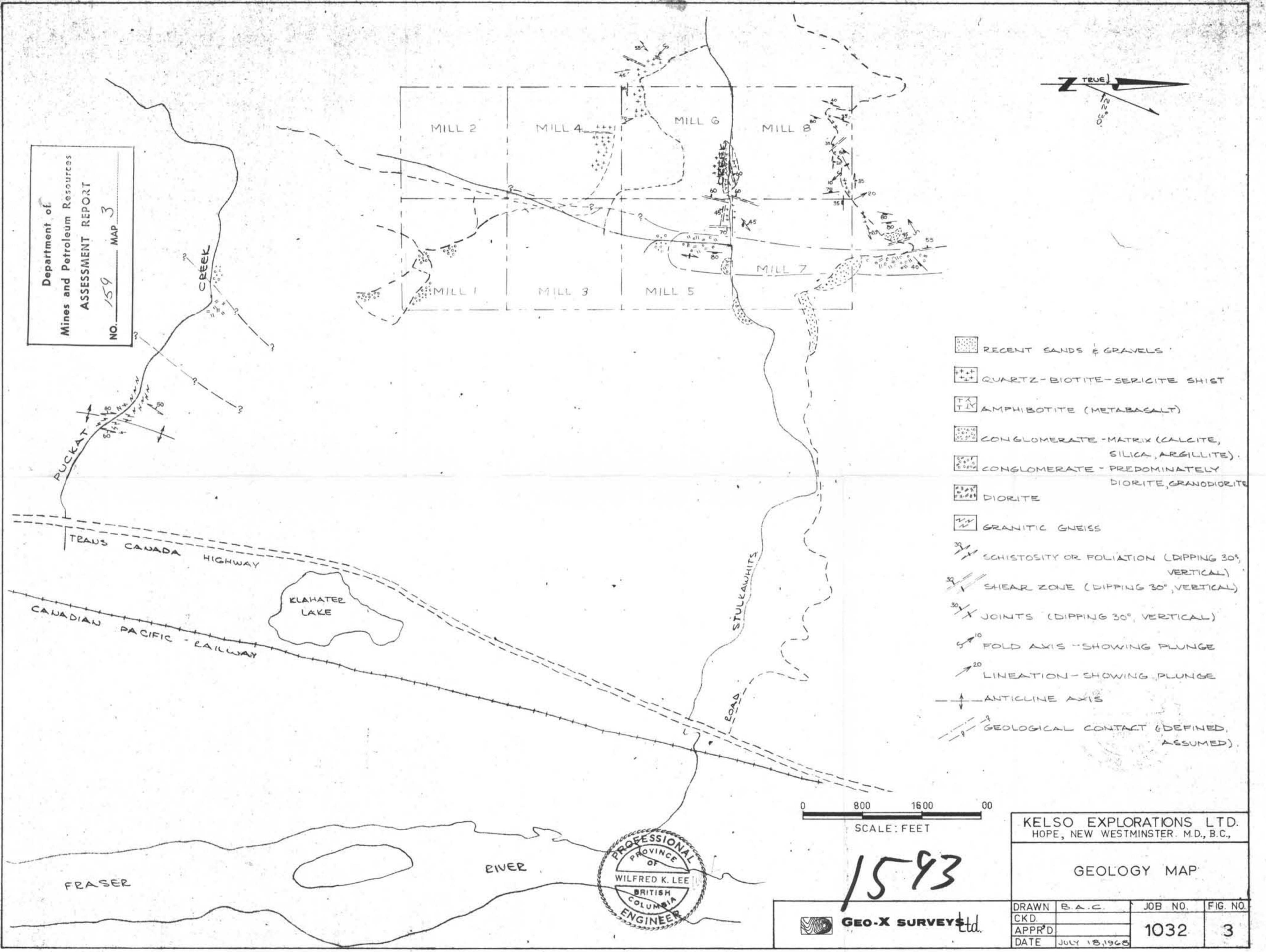
KELSO EXPLORATIONS LTD.
HOPE, NEW WESTMINSTER MD, B.C.

CLAIM MAP

DRAWN: D.M.	CKD: W.K.L.	FIG: 1032
APPR'D:	DATE: 18-7-68	JOB: 2

GEO-X SURVEYS Ltd.

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NO. 159 MAP 3



- RECENT SANDS & GRAVELS
- QUARTZ-BIOTITE-SERICITE SCHIST
- AMPHIBOTITE (METABASALT)
- CONGLOMERATE - MATRIX (CALCITE, SILICA, ARGILLITE)
- CONGLOMERATE - PREDOMINATELY DIORITE, GRANODIORITE
- DIORITE
- GRANITIC GNEISS
- SCHISTOSITY OR FOLIATION (DIPPING 30°, VERTICAL)
- SHEAR ZONE (DIPPING 30°, VERTICAL)
- JOINTS (DIPPING 30°, VERTICAL)
- FOLD AXIS - SHOWING PLUNGE
- LINEATION - SHOWING PLUNGE
- ANTICLINE AXIS
- GEOLOGICAL CONTACT (DEFINED, ASSUMED)

0 800 1600 00
SCALE: FEET

KELSO EXPLORATIONS LTD.
HOPE, NEW WESTMINSTER, M.D., B.C.

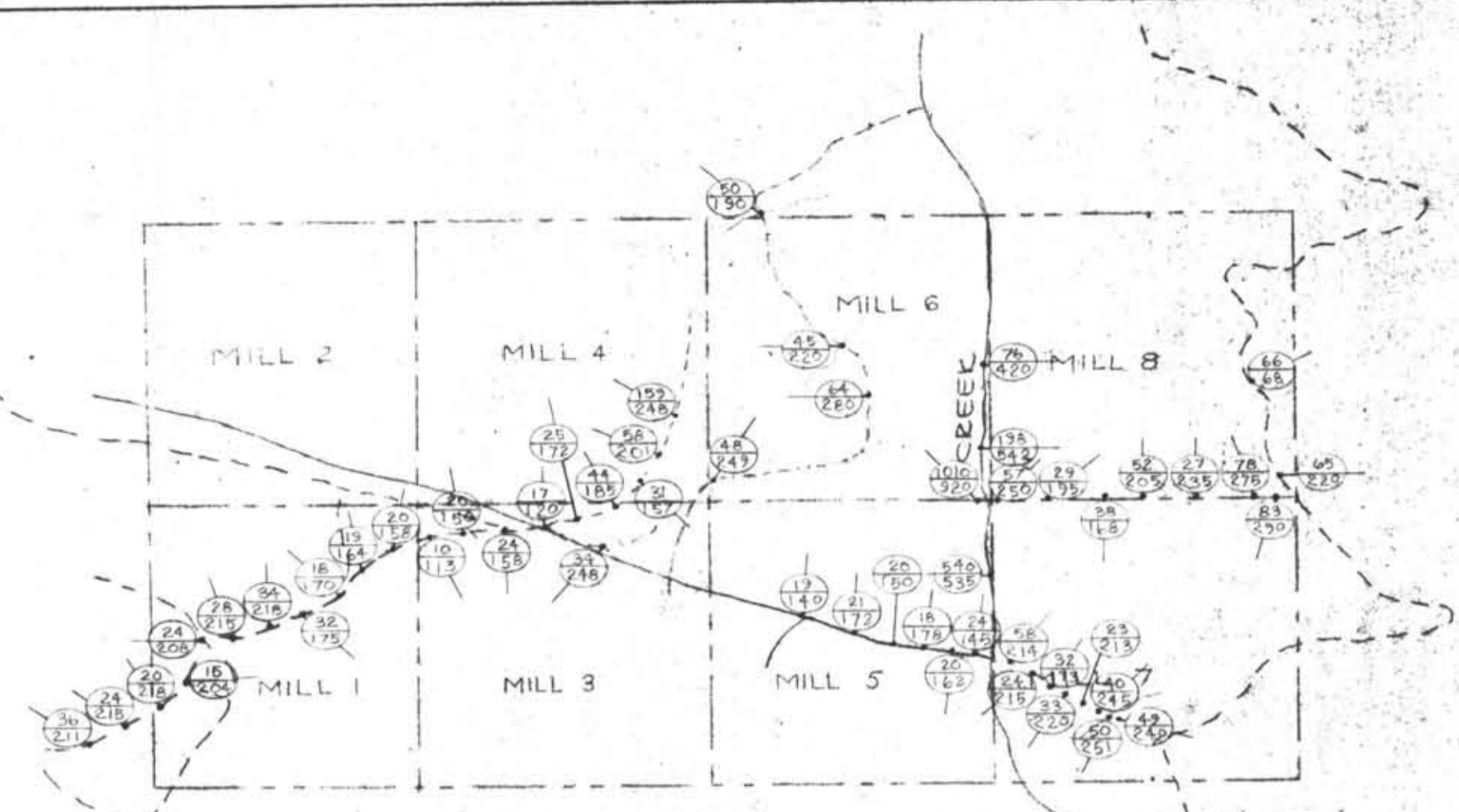
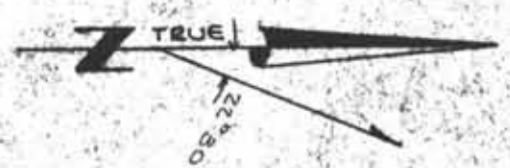
GEOLOGY MAP

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GEO-X SURVEYS Ltd.

DRAWN	B.A.C.	JOB NO.	FIG. NO.
CKD.		1032	3
APPR'D			
DATE	JULY 18, 1968		



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ASSESSMENT REPORT
MAP NO. 1593

FRASER RIVER
KLAHATEE LAKE
CANADIAN PACIFIC RAILWAY
TRANS CANADA HIGHWAY

STULKAWHITS ROAD

TO ACCOMPANY THE GEOPHYSICAL REPORT ON THE MILL 1-B CLAIMS OWNED BY KELSO EXPLORATIONS LTD. SITUATED IN THE NEW WESTMINSTER M.D. BY W.K. LEE, R.E.N.G. VANCOUVER, B.C. DATED JULY, 1968



25
192
COPPER IN P.P.M.
NICKEL IN P.P.M.

1593

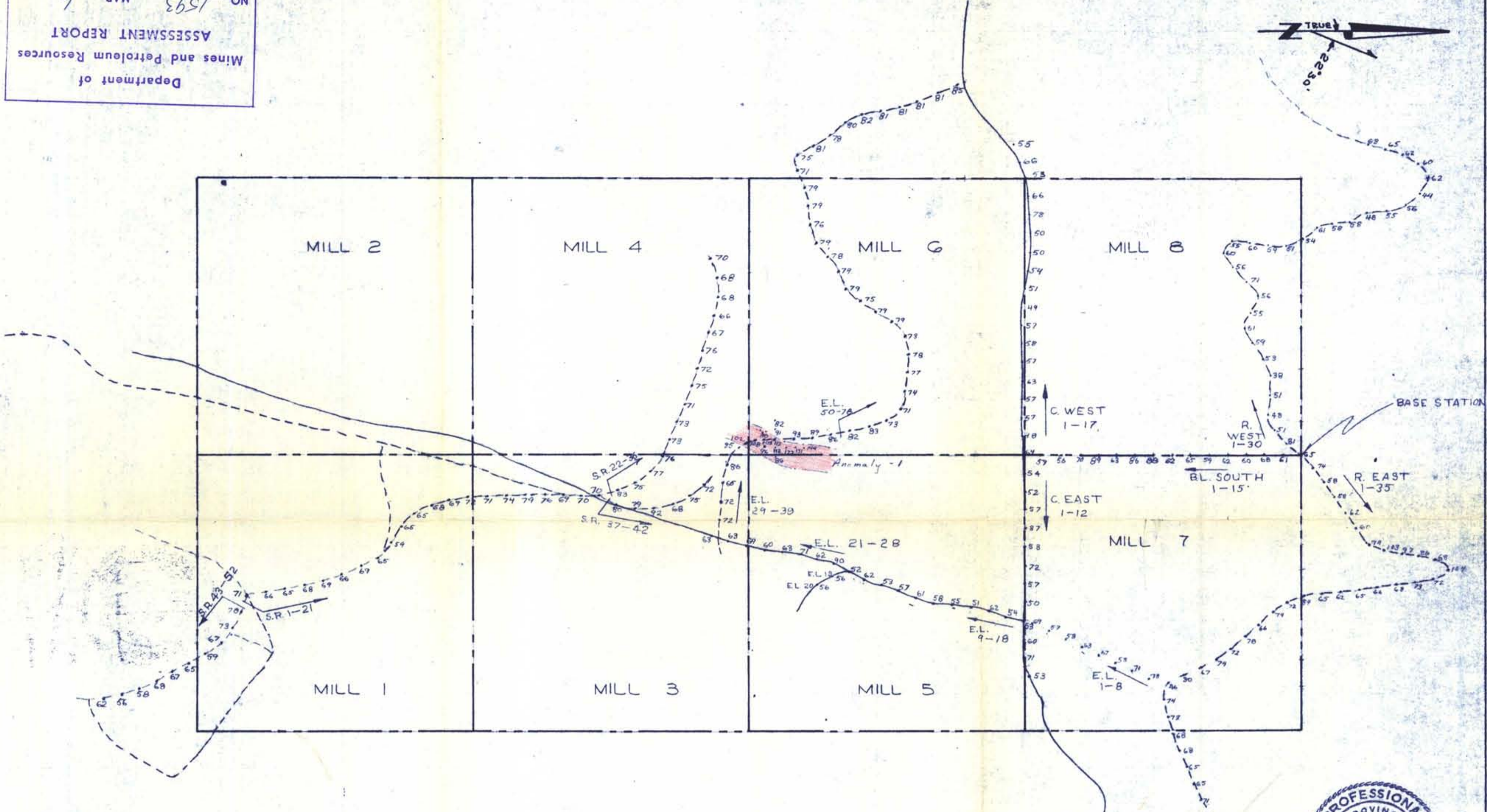
GEO-X SURVEYS Ltd.

KELSO EXPLORATIONS LTD.
HOPE, NEW WESTMINSTER, M.D., B.C.

SILT & SOIL SAMPLING
COPPER & NICKEL

DRAWN	B.A.C.	JOB NO.	FIG. NO.
CKD		1032	5
APPR'D			
DATE	JULY 18, 1968		

Department of
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MAP 6
NO 1593



NOTE
FOR CORRECT MAGNETOMETER VALUES
MULTIPLY EACH VALUE BY TEN (10)



KELSO EXPLORATIONS LTD.
HOPE, NEW WESTMINSTER, M.D., B.C.

ISOMAGNETICS

1593

TO ACCOMPANY THE GEOPHYSICAL REPORT ON THE
MILL 1-8 CLAIMS OWNED BY KELSO EXPLORATIONS LTD.
SITUATED IN THE NEW WESTMINSTER M.D.
BY W. K. LEE, P. ENG., VANCOUVER, B.C.
DATED JULY 1968

GEO-X SURVEYS Ltd.

DRAWN	D.M.	JOB NO.	FIG. NO.
CKD		1032	6
APPR'D			
DATE	JULY 18, 1968		