

4945

82L/10E

GEOPHYSICAL REPORT
 on the
 ELECTROMAGNETIC, MAGNETIC AND TOPOGRAPHIC SURVEYS
 of the
 BLACK JACK PROPERTY

KINGFISHER CREEK AREA, B.C.

Latitude: 50°44'N - Longitude: 118°44'W

Vernon Mining Division

N.T.S. 82L/10 & 15

on behalf of

82L/10E

COLBY MINES LTD. (N.P.L.)

FX

<u>CLAIM NAME</u>	<u>RECORD NUMBER</u>	<u>ANNIVERSARY</u>
FC 1	16234	April 18
FC 2 & 3	16514 & 16515	June 12
FC 4 - 9	16426 - 16431	May 17
FC 10 Fr & 11 Fr	16516 & 16517	June 12
FC 12 & 13	16518 - 16519	June 12
FX 2	16230	May 17
FX 3 - 5	16231 - 16233	April 18
FX 6 & 7	16503 & 16504	June 5
FX 8 - 14	16432 - 16438	May 17
FX 15	16503	May 30
FX 16	16520	June 12
FX 17 - 20	16557 - 16560	June 29
FX 21 & 22	16561 & 16562	July 28

by:

P. P. NIELSEN, B.Sc., Geophysicist

NIELSEN GEOPHYSICS LTD.

March, 1974

Mines and Geology Branch

4945

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION.....	1
LOCATION AND ACCESS.....	1
TOPOGRAPHY AND GROUND CONDITIONS.....	2
CLAIMS.....	3
GEOLOGY.....	4
GRID INSTALLATION.....	5
GROUND MAGNETOMETER SURVEY.....	6
TOPOGRAPHIC SURVEY.....	9
GROUND ELECTROMAGNETIC SURVEY.....	10

APPENDICES

Personnel

Costs

Statement of Author's Qualifications

ILLUSTRATIONS

#1 Location Map.....	After Page 1
#2 Claims Location and Topographic Contour Map.....	In Map Pocket
#3 Magnetometer Values and Contour Map...	In Map Pocket
#4 Electromagnetic Profile Map.....	In Map Pocket
#5 Interpretation Map.....	In Map Pocket

INTRODUCTION

During the period from September 18 to September 21, 1973 a ground magnetometer and topographic survey was executed on the Black Jack property in the Vernon Mining Division on behalf of Colby Mines Ltd. (N.P.L.)

A ground electromagnetic survey was also carried out over a portion of the above covered area from November 2 to November 7, 1973.

This work was performed by P. P. Nielsen, B.Sc., of Nielsen Geophysics Ltd. on grids installed by Colby Mines Ltd. (N.P.L.)

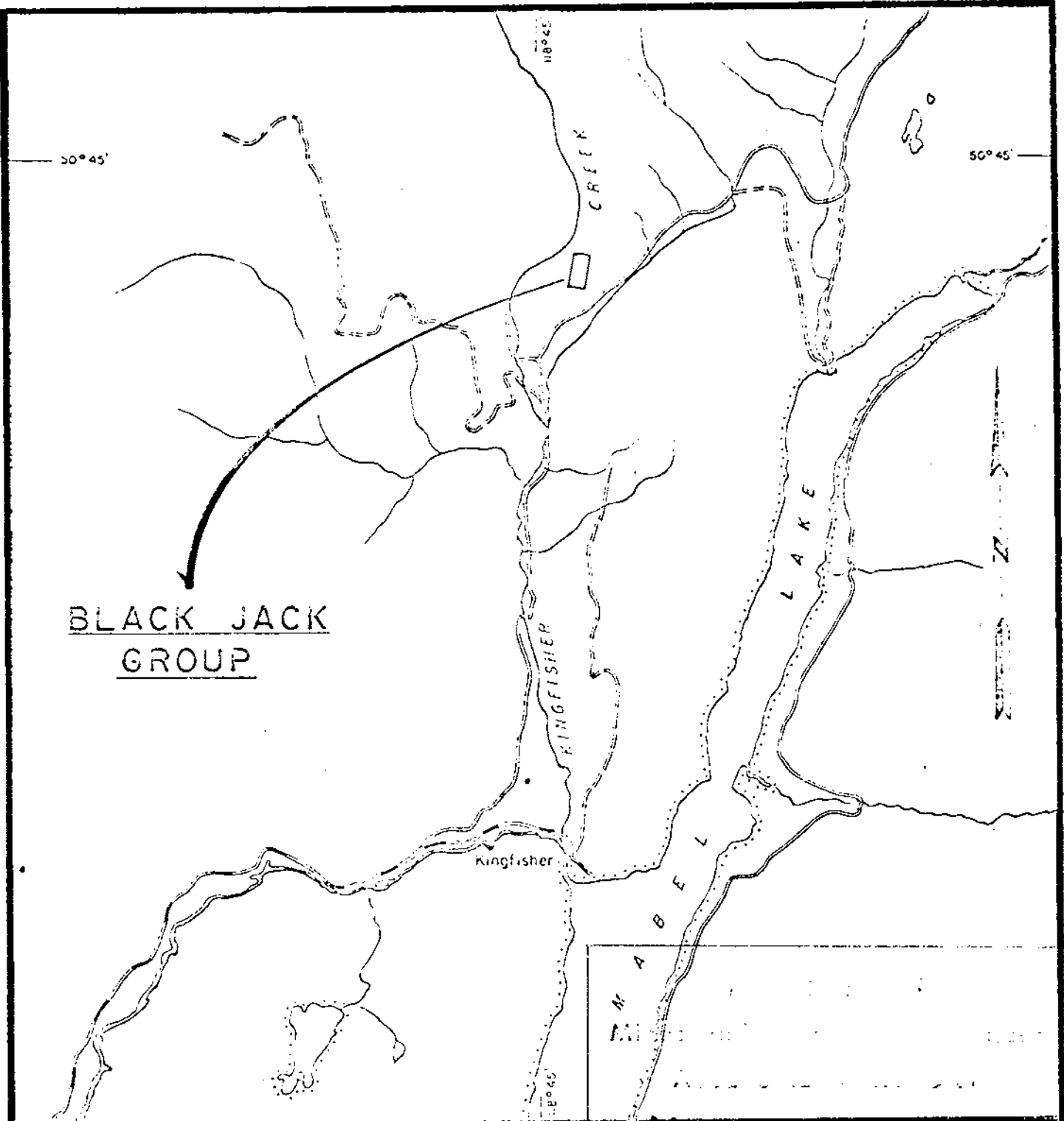
The purpose of the surveys was to assist in delineating and extending known zones of mineralization which include sphalerite, galena, minor chalcopyrite, pyrite and pyrrhotite.

The survey consisted of 7 line-miles of magnetometer coverage, 7 line miles of altimeter readings and 2.9 miles of electrogmagnetic profile coverage.

LOCATION AND ACCESS

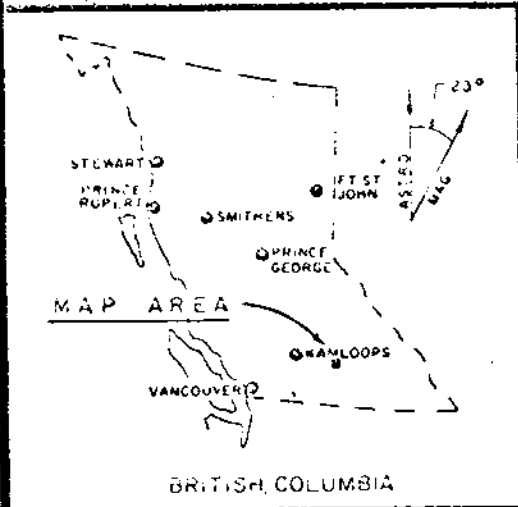
The Black Jack property (FX and FC claims) are located in the Vernon Mining District at 50°44'N latitude and 118°44'W longitude.

The claims are on the north branch of Kingfisher Creek 9 miles north of the Enderby - Mabel Lake road.



BLACK JACK
GROUP

NO. **4945** #1



LOCATION MAP
OF
BLACK JACK GROUP

VERNON MINING DIVISION BRITISH COLUMBIA

4 0 4 8

SCALE IN MILES

The property is reached by way of the Mabel Lake road from Enderby to the hamlet of Hupel. A main logging road is then taken north 9 miles and thence along a local access road for one mile onto the grid.

Total distance by road from Enderby to the property is approximately 26 miles.

TOPOGRAPHY AND GROUND CONDITIONS

The claims lie between 2400 and 2900 feet A.S.L. in the Kingfisher Creek valley and is on the east slope of a low inter-valley ridge.

Topography is moderate over most of the grid although some very steep slopes and bluffs occur at the north end of the grid.

Overburden consists of equal proportions of glacial and colluvial material and appears not to exceed 100 feet in thickness. Outcrops, some mineralized, are numerous providing good geological control.

Vegetation consists of thick stands of cedar, spruce, hemlock, white pine, and birch. Although underbrush is not severe, the low hanging branches of the trees make linecutting necessary for optimum survey coverage and control.

CLAIMS

The Black Jack property consists of 34 contiguous mineral claims which are presently owned by Colby Mines Ltd. (N.P.L.), 885 Dunsmuir Street, Vancouver, B.C.

<u>CLAIM NAME</u>	<u>RECORD NUMBER</u>	<u>ANNIVERSARY</u>
FC 1	16234	April 18
FC 2 & 3	16514 & 16515	June 12
FC 4 - 9	16426 - 16431	May 17
FC 10Fr & 11Fr	16516 & 16517	June 12
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FX 6 & 7	16503 & 16504	June 5
FX 8 - 14	16432 - 16438	May 17
FX 15	16503	May 30
FX 16	16520	June 12
FX 17 - 20	16557 - 16560	June 29
FX 21 & 22	16561 & 16562	July 28

GEOLOGY

(after E. O. Chisolm, September, 1973)

The regional geology is shown on G. S. C. Map 1059A, Vernon Sheet 82L. The property area is within the Shuswap terrain and is underlain by Monashee Group metasediments. A carbonate member strikes northerly through the west side and the east side of the property and consists of white, re-crystallized, impure limestone, biotite gneiss and calcareous quartzite. This member strikes N 20° E to N 30° E and dips from 50° E to 60° E and averages 200 feet in width.

The enclosing rocks are comprised of white quartzite, gneissic quartzite, biotite-quartzite and biotite-gneiss. One late lamprophyre dike has been observed intersecting the sequence.

The major structure feature is a northerly trending fault along Kingfisher Creek valley. The mineralized zones appear to be controlled by and are subparallel to this main fault and could occur along subsidiary faults (shears) to it.

The mineralized zones consists of pyrrhotite, sphalerite, galena with minor chalcopyrite and pyrite. They occur as vertical, replacement-type lenses and veins within the crystalline limestone and calcareous quartzite but have also been observed near the limestone in the enclosing quartzites and gneisses. All mineralization appears to be shear controlled.

There are presently seven elongated zinc-lead showings on the property which are discussed in detail by Mr. E. O. Chisolm in his report

dated September, 1973. These showings vary in length from about 50 feet to over 500 feet and are from 5 feet to 60 feet in thickness. Grades are typically 3% Zn and 1% Pb.

Grid Installation

The main grid over which the magnetometer and topographic surveys were executed consisted of a 3,300 feet baseline cut on a bearing of N20°E and cross-lines spaced 100 feet apart 500 feet each side of the baseline.

The lines were cut with the aid of a power-saw and picketed at a station interval of 100 feet.

For the electromagnetic survey a smaller grid was installed after the magnetometer survey along the main magnetic lineament. The baseline direction was N55°E over a distance of 2,300. Cross-lines 100 feet apart were installed 300 feet each side of the baseline using a 100 foot station interval. These lines were chained and flagged (blue) with a minimum of cutting or blazing.

All grid work was completed prior to the arrival of Nielsen Geophysics Ltd. personnel.

GROUND MAGNETOMETER SURVEY

Comment

A total of 7 line miles was magnetically surveyed over lines spaced 100 feet apart at a station interval of 100 feet. Intermediate stations (25 and 50 feet) were read over some steep gradient sections of the lines.

The purpose of the magnetometer survey was to detect pyrrhotite known to be associated with sphalerite and galena to determine favourable drill targets.

Method

The instrument was adjusted to read on the most sensitive scale (± 1000 gammas full scale). The baseline was run to provide additional control to the looping of cross-lines for the diurnal variations.

A base station at Line 0, stn. 0 was read at the start and finish of each day's surveying for the day-to-day correlation and to monitor any possible magnetic storms.

Instrument Used

A Scintrex Model MF-1 Fluxgate magnetometer was used. It is hand held and levelled using a bubble level on the instrument face.

The unit measures the vertical force variations of the earth's magnetic field displayed in gammas (γ) on a meter having five ranges for a total of $\pm 100,000$.

The MF-1 is very light, is fully portable, has good temperature stability, has negligible orientation error and is of rugged construction.

Treatment of Data

The readings and time of readings were recorded in a metal-free field book and transferred to a planimetric map for contouring after the necessary diurnal and day-to-day corrections were made.

The scale of values-contour map is 1" = 100 feet. Due to the large magnetic relief and the type of response known to be of interest a contour interval of 100 γ was used between 200 and 1000 gammas. Areas below 200 γ are shown "ticked" and areas above 1000 γ are shown "hachured".

The magnetic values are relative as the absolute value of the vertical component for the earth's magnetic field at this location is not accurately known.

Discussion of Results

The magnetic values vary from - 330 γ at Line 31 station 4 + 75E to +2300 γ at Line 19 station 3W and at Line 20 station 1W for a total magnetic relief over the grid area of 5600 gammas.

The most pronounced magnetic feature observed from the contour map is the northeast striking linear across the north-central grid area which consists of a series of dipolar anomalies of magnetic highs with adjacent lows. These dipoles are the responses due to steeply dipping, near-surface dike-like bodies of moderate to high magnetic susceptibility.

The linear is interpreted as a shear-zone in which numerous bands, veins and, possibly, lenses or pods of pyrrhotite occur. Three showings along this linear coincident with these dipoles exhibit a close association of pyrrhotite, sphalerite and galena. The linear is open at both ends of the grid and it is reasonable to assume that further magnetic coverage in these directions will delineate other mineralized zones.

Due to the lack of susceptibility contrast between the gneisses, quartzites and limestones observed within the survey area, magnetic mapping of rock-types and cross-faults has been relatively unsuccessful. However, the series of spot magnetic highs and/or lows as well as flexures corroborated by the electro-magnetic survey and the geological and topographical evidence strongly indicate the existence of cross-faulting which appears to have dissected a continuous zone of mineralization into pods and lenses as observed at the showings.

Broader magnetic coverage, for example, to the northeast of the magnetometer grid, could delineate cross-faults which may also be mineralized.

The present survey coverage has partially delineated another interesting magnetic feature on the eastern ends of Lines 12 to 17 inclusive. Although further surveying must be carried out to close off this broad, moderate high, its present inferred aerial extent could represent sulphides of economic significance.

Numerous other local dipolar anomalies occur throughout the grid and all are thought to be caused by pyrrhotite likely associated with sphalerite and galena.

Recent drilling has shown that the geology is quite complex. Mineralization has been encountered in all rock-types present but the best mineralized intersections to date appear to be along the interpreted "shear" coincident with dipolar magnetic anomalies. The limestone is interfingered with the quartzites and the gneisses are highly folded, faulted and irregular.

TOPOGRAPHIC SURVEY

During the execution of the magnetometer survey, readings were also taken at the magnetometer stations using a "Thommen" aneroid barometer.

The barometer readings were measured in feet and corrected for drift similar to the method used for the correction of the magnetic data.

The readings were then adjusted to the above sea level datum from the government topographic map for the survey area as no local bench mark was known at the time of the Survey.

The adjusted readings were then contoured on the magnetometer base map at a contour interval of 25 feet.

The topographic map has enhanced the interpretation of the geophysics, has improved the understanding of the geology, has assisted in the spotting of drill holes and will, no doubt, be useful in interpreting possible future geochemical results and in determining tonnage and grade.

GROUND ELECTROMAGNETIC SURVEY

Comment

A Horizontal "Shootback" electromagnetic survey was executed along the magnetic lineament (shear zone) over flagged lines spaced 100 feet apart with a station interval of 100 feet. The grid as discussed above was installed at an angle to the main grid to provide maximum coupling to the shear direction.

The purpose of the survey was to assist in the interpretation of the magnetic results and to explore for economic sulphides which may not be associated with magnetic minerals (such as pyrrhotite) along the magnetic lineament.

Prior to the E.M. survey it was appreciated that any possible conductors would likely be quite weak and subtle due to the high concentrations of non-conducting sphalerite relative to the other conducting sulphides and because of the limited strike length of the mineralized zones due to cross-faulting and pinch-outs.

A coil separation of 200 feet and an operating frequency of 1830 Hz was used on all lines. The magnetometer grid baseline was surveyed from station 12 to 24 and two lines on the E M. grid were extended to the south.

Colby mines provided an assistant for the E. M. survey.

Instrumentation

A Crone C.E.M. "Shootback" unit consisting of two identical coils capable of both receiving and transmitting at three frequencies was used.

All circuiting is housed within the coils and the batteries are mounted in an insulated box on a magnesium-aluminium packboard.

Instrument Specifications

- coil diameter 22 inches, weight per coil 8.3 pounds.
- frequencies: 390, 1830 and 5010 Hz.
- accuracy: $\pm 1/2^\circ$ dip-angle at coil spacings up to 300 feet
and $\pm 1^\circ$ up to 600 feet.
- dip angle determined by visual null on field strength meter
or audio null on head-phones.
- power supply: three only six-volt lantern batteries in series
= 18 volts.
- coil spacing = 25 feet to 600 feet.
- no topographic effects.
- deep penetration.
- can be used as Horizontal Shootback, Horizontal loop,
vertical loop and co-axial shootback methods.

Treatment of Data

Profiles for all grid lines are shown in the map pocket.

Vertical scale is 1" = 10° resultant dip-angle. Positive dip-angles are plotted above (to the northeast) and negative dip-angles below (to the southwest) of the survey line.

The profiles are at a horizontal scale of 1" = 100 feet and the interline scale is 1" = 50 feet.

Interpreted conductor axes and zones are also illustrated on the profile map.

An interpretation plan map is also included in the map pocket illustrating conductors, the shear-zone, cross-faults and possible magnetically mineralized bodies interpreted from the magnetic and electromagnetic results using present available geological information. This map also shows the relative positions of the two grids.

Theory of the Horizontal Shootback Method

In general, positive resultant dip-angles are caused by vertical or steeply dipping conductors' having primarily a vertical conductive component. The depth to the top of these conductors exhibiting a positive response is less than one-half the coil separation used and dependent upon the width of the conductor. In these cases, the positive occurs above the top of the conductor and is flanked by negative dip-angles, their amplitude, width and shape being determined by the dip, width and depth to the top of the conductor.

Negative dip-angles over the top of a conductor are primarily caused either by steeply dipping conductors at depths greater than one-half the coil separation or by conductors' having a large horizontal conductive component regardless of depth to the top. The latter include conductive overburden, sulphide lenses, pervasive pyrite concentrated in excess of 15% by volume, graphite horizons, and some alteration products.

Within a certain range, the poorer the conductor, the higher the operating frequency must be to detect it.

The Horizontal Shootback method employs two men using identical instruments who traverse in unison along the same survey line perpendicular to the supposed strike of the conductor(s).

Both operators transmit and receive in turn, measuring the dip-angle of the field. The two dip-angles are then added and equal "0" if no conductors are present. The station measured is the mid-point between the two operators.

A combination of various operating frequencies and coil separations provides an interpretation concerning the geometry, depth to the top, and conductivity of the causative source.

Respectfully Submitted

P. P. Nielsen.

PERSONNEL

NIELSEN GEOPHYSICS LTD.

P. P. Nielsen, B.Sc. - Geophysicist, E.M. and Magnetometer Operator

COLBY MINES LTD.

S. O'Neil - E. M. Assistant Operator

COSTS

The following are the charges made by Nielsen Geophysics Ltd. only and do not include Colby Mines personnel or the cost of grid installation:-

1. Magnetometer and Topographic Survey (September 18 - 21, 1973)	
(a) Geophysicist - operator and instrument rental....\$	823
(b) Food and accommodation.....	85
(c) Transportation.....	138
	<u>1,046</u>
2. Electromagnetic Survey (November 2 - 9, 1973)	
(a) Geophysicist and Instrument Rental.....	695
(b) Food and accommodation. (2 men).....	222
(c) Transportation.....	340
	<u>1,237</u>
3. Report.....	<u>375</u>
	TOTAL CHARGES.....\$ <u><u>2,678</u></u>

STATEMENT OF AUTHOR'S QUALIFICATIONS

I DO HEREBY STATE:

1. I am the author of this report.
2. I have been actively and responsibly involved in mining exploration using airborne, ground and computer applied geophysics in Canada and the United States for the past nine years.
3. I graduated with a B.Sc. degree in Geophysics from the University of British Columbia in 1969.
4. I am President, Nielsen Geophysics Ltd. with business address at 420-475 Howe Street, Vancouver 1, B. C.
5. I am a member of the Society of Exploration Geophysicists, the Canadian Institute of Mining and Metallurgy and the B. C. Geophysical Society.

Signed

P. P. Nielsen
P. P. Nielsen

Date

April 30, 1974.

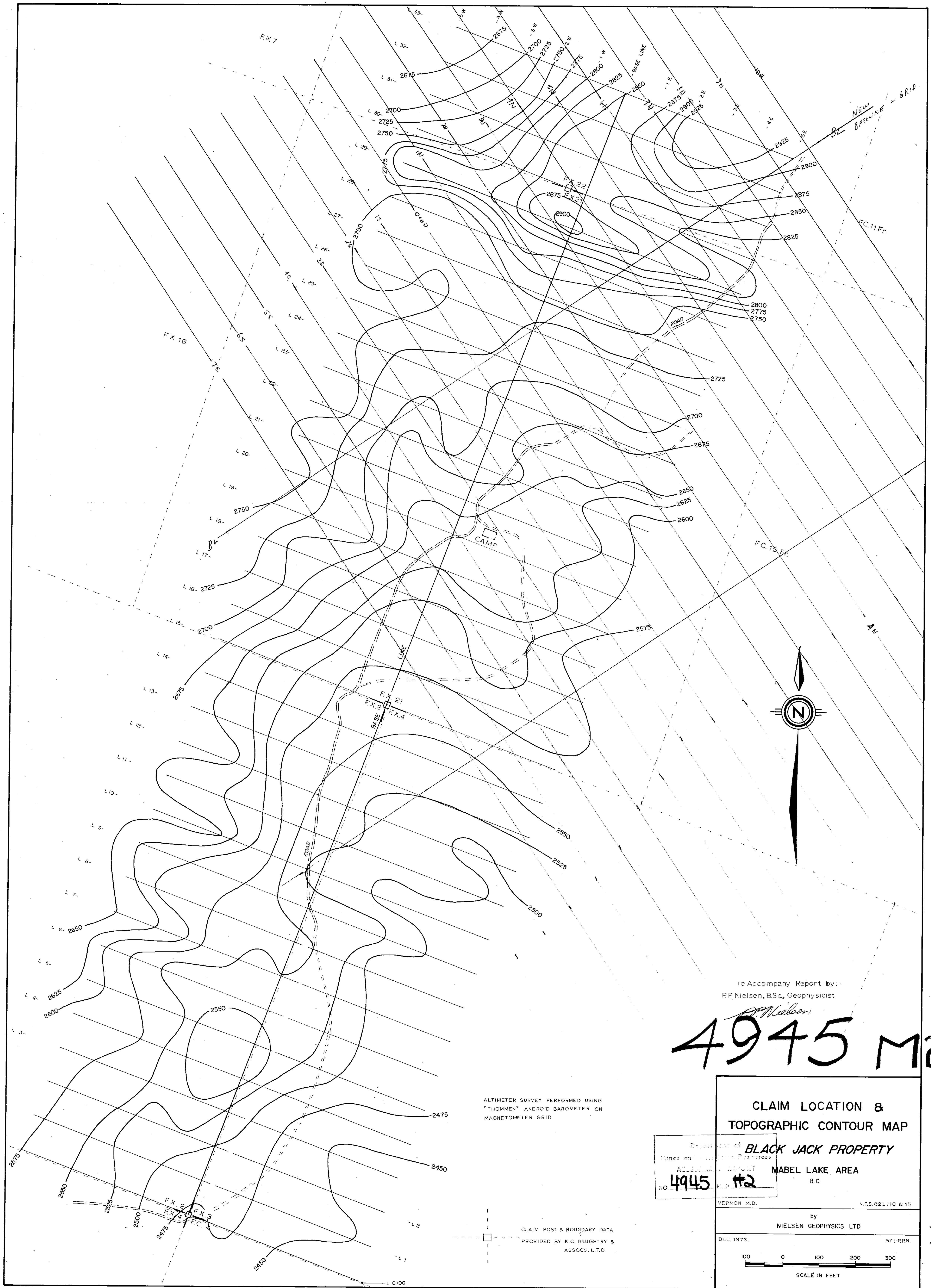
AMENDMENT TO STATEMENT OF COSTS

E.M. Survey

Nov. 2 - 9/73

John O'Neill, assistant operator
8 days @ \$50/day

\$400.00



To Accompany Report by:-
 P.P. Nielsen, B.Sc., Geophysicist

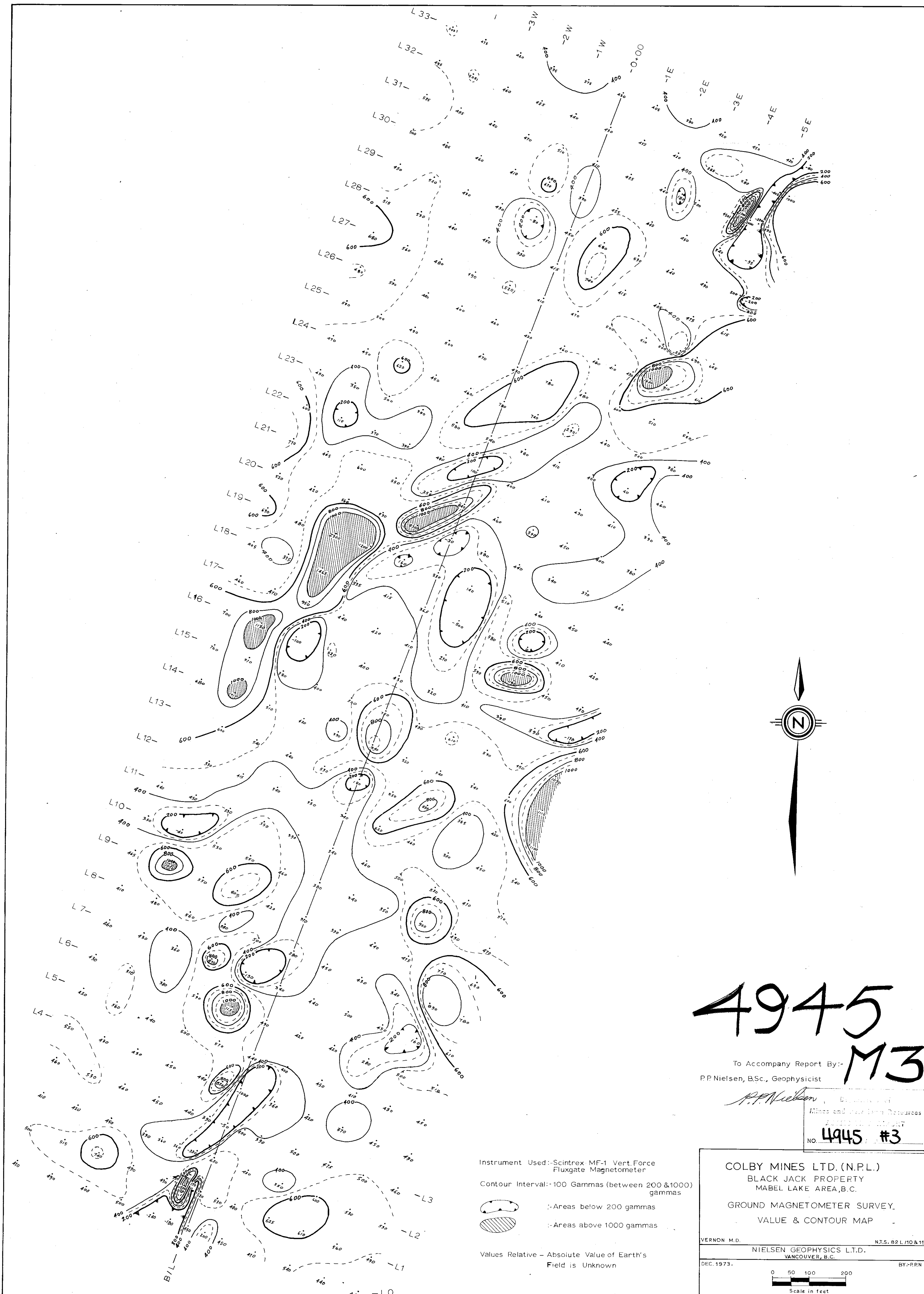
P.P. Nielsen

4945 M2

ALTIMETER SURVEY PERFORMED USING
 "THOMMEN" ANEROID BAROMETER ON
 MAGNETOMETER GRID

CLAIM LOCATION & TOPOGRAPHIC CONTOUR MAP	
Department of BLACK JACK PROPERTY Mines and Geophysical Resources	
ACCIDENTAL REPORT MABEL LAKE AREA B.C.	
NO. 4945	# 2
VERNON M.D.	N.T.S. 82L/10 & 15
by NIELSEN GEOPHYSICS LTD.	
DEC. 1973.	BY:-RPN.
<p>SCALE IN FEET</p>	



CLAIM POST & BOUNDARY DATA
 PROVIDED BY K.C. DAUGHTRY &
 ASSOCS. L.T.D.



4945
M3

To Accompany Report By:-
P.P. Nielsen, B.Sc., Geophysicist

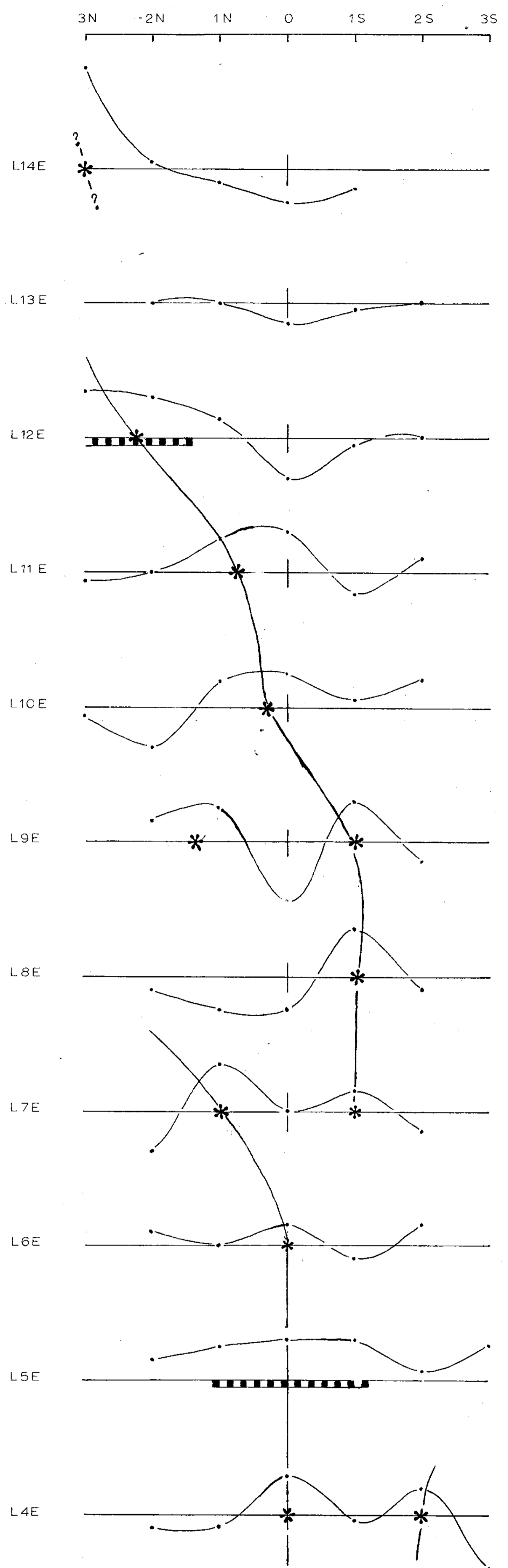
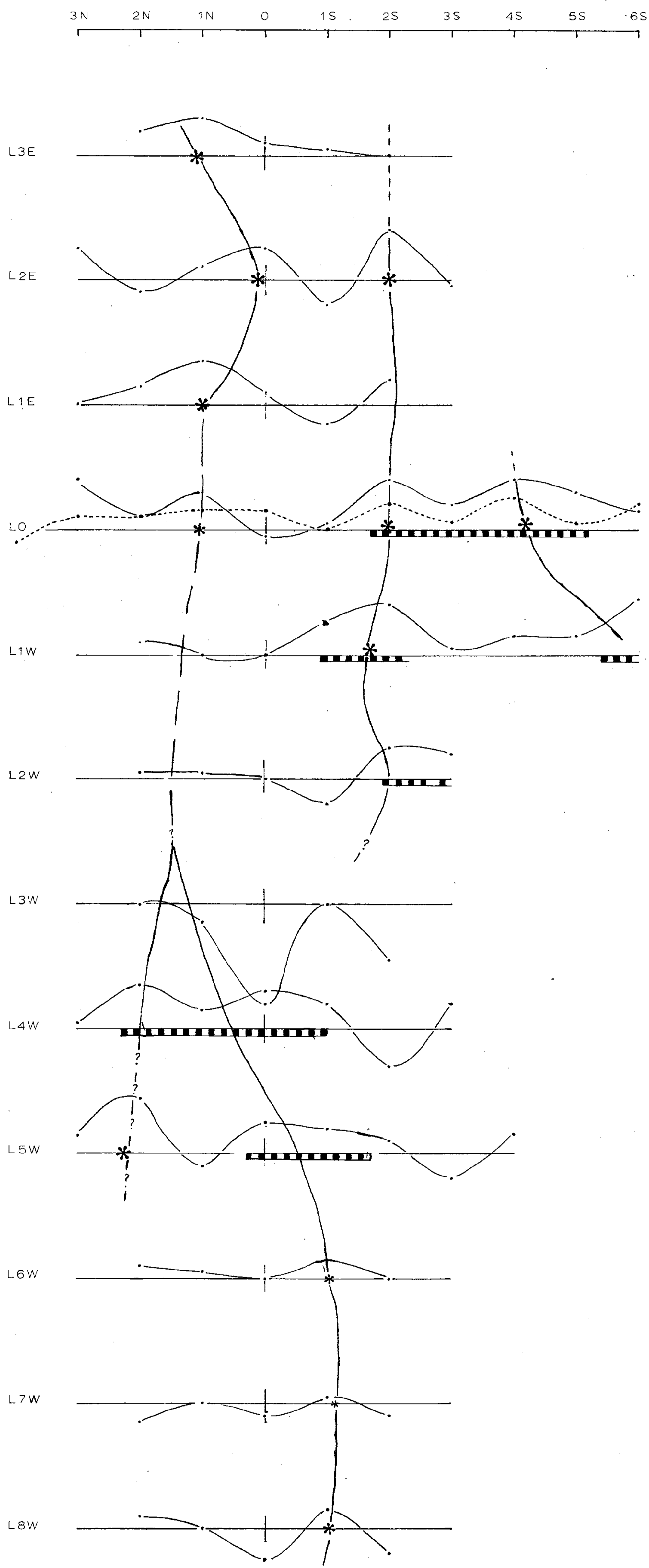
P.P. Nielsen
Director of
Mines and Geophysical Resources
4945 #3

Instrument Used:- Scintrex MF-1 Vert. Force Fluxgate Magnetometer
Contour Interval:- 100 Gammas (between 200 & 1000) gammas
 :- Areas below 200 gammas
 :- Areas above 1000 gammas
 Values Relative - Absolute Value of Earth's Field is Unknown

COLBY MINES LTD. (N.P.L.)
BLACK JACK PROPERTY
MABEL LAKE AREA, B.C.
GROUND MAGNETOMETER SURVEY.
VALUE & CONTOUR MAP

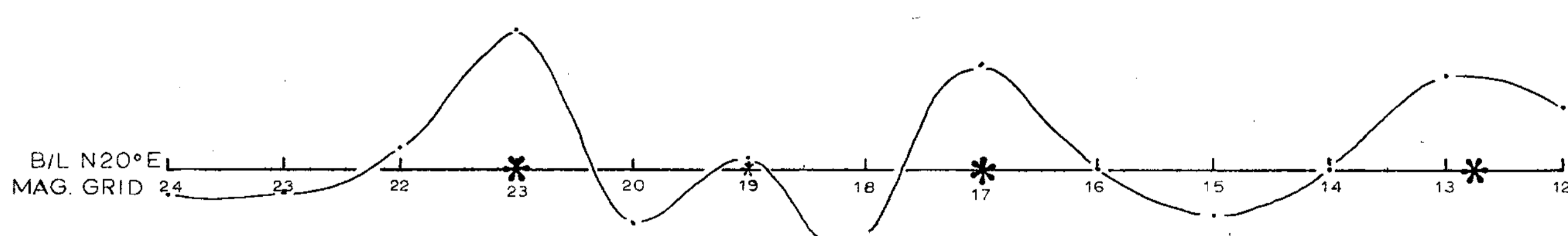
VERNON, B.C. N.T.S. 82 L/10 & 15
NIelsen GEOPHYSICS L.T.D.
VANCOUVER, B.C.
DEC. 1973. BY: PPN

0 50 100 200
Scale in feet



NOTE: INTERLINE SCALE = 1" = 50 FT.

4945 M4



RESULTANT
DIP
ANGLE

+10°
0°
-10°

Company Report by:-
P.P. Nielsen, B.Sc., Geophysicist

NO. **4945 #4**

LEGEND

-*-*-* WEAK CONDUCTOR AXIS } MAINLY VERTICAL,
WEAK CONDUCTIVE ZONE } NEAR SURFACE

1030 Hz.
390 Hz.

SURVEY PARAMETERS

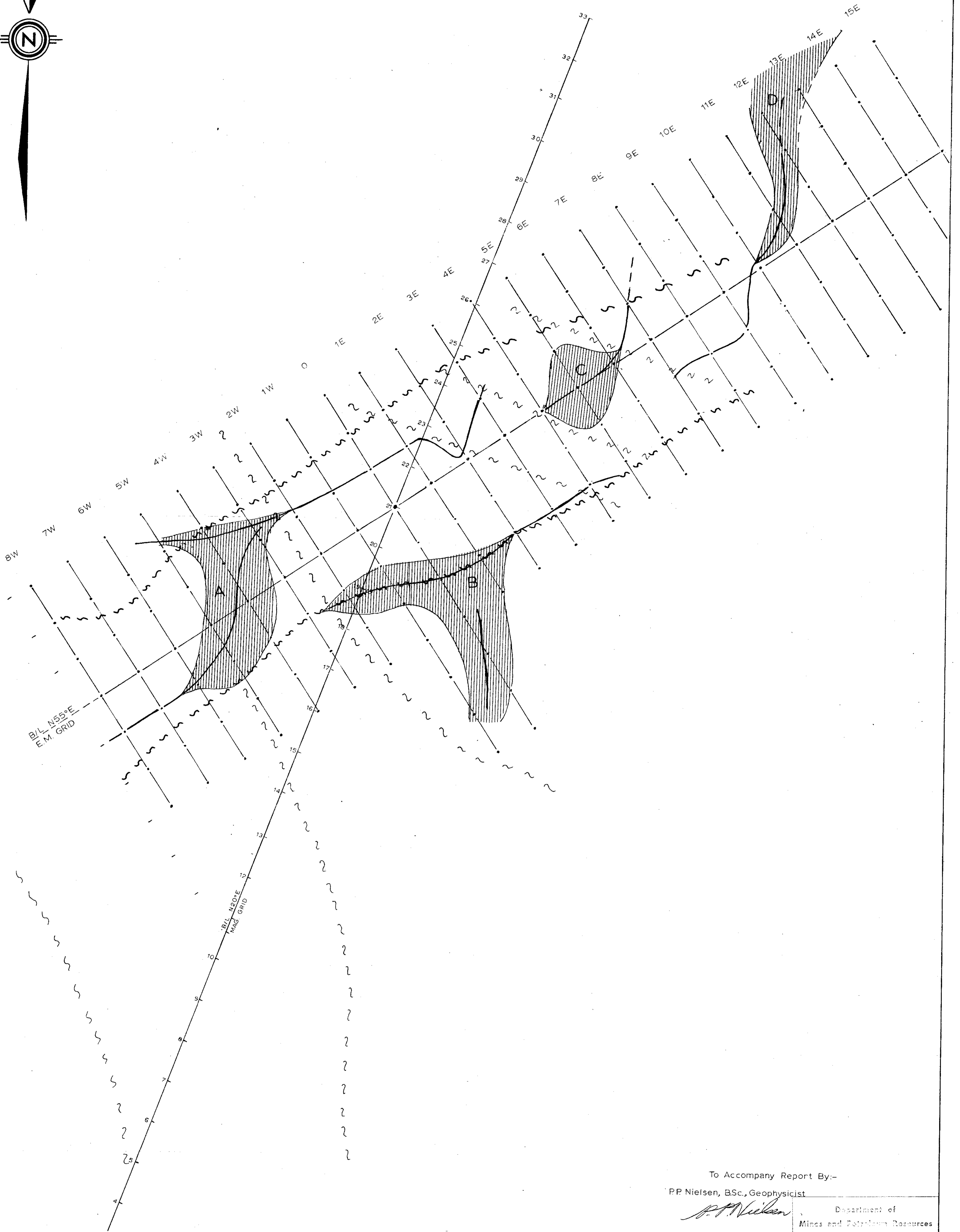
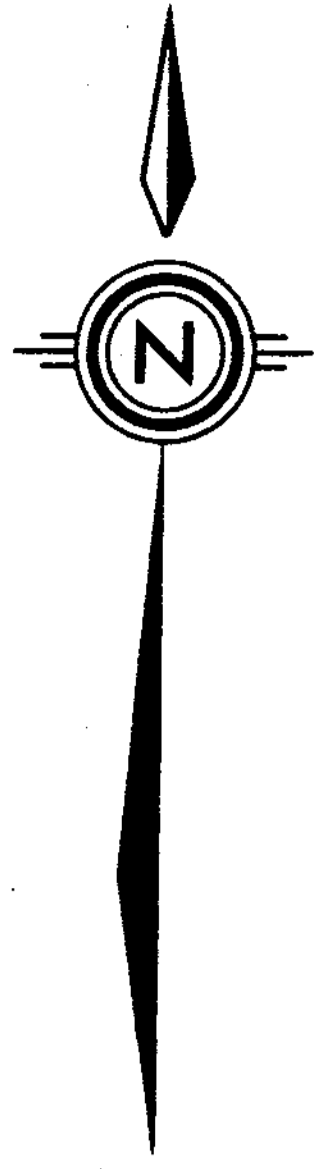
INSTRUMENT USED :- CRONE CEM.
METHOD :- HORIZONTAL SHOOTBACK
OPERATING FREQ. :- 1030 Hz.
COIL SEPARATION :- 200 Feet
OPERATOR :- P.P. NIELSEN

COLBY MINES LTD. (N.P.L.)
BLACK JACK PROPERTY
MABEL LAKE AREA

**ELECTROMAGNETIC SURVEY
PROFILES**

VERNON, B.C. N.T.S. 82L/10 & 15
NIELSEN GEOPHYSICS LTD
VANCOUVER, B.C.



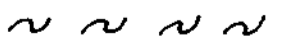
DEC. 1973. 0 50 100 200 BY: P.P.N.
Scale in feet



B/L N55°E
E.M. GRID

B/L N20°E
MAG. GRID

LEGEND

-  WEAK CONDUCTIVE ZONE
-  WEAK CONDUCTOR AXIS
-  FAULT

SURVEY PARAMETERS

INSTRUMENT USED :- CRONE C.E.M.
 METHOD :- HORIZONTAL SHOOTBACK
 OPERATING FREQ. :- 1830 HZ.
 COIL SEPARATION :- 200 FEET
 OPERATOR :- P.P. NIELSEN

To Accompany Report By:-
 P.P. Nielsen, B.Sc., Geophysicist

P.P. Nielsen

Department of
 Mines and Petroleum Resources

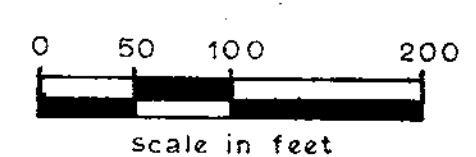
NO. **4945** #5

COLBY MINES LTD. (N.P.L.)
 BLACK JACK PROPERTY
 MABEL LAKE AREA
 GEOPHYSICAL SURVEY
 INTERPRETATION

VERNON M.D. N.T.S. 82L/10&15

NIELSEN GEOPHYSICS LTD.
 VANCOUVER, B.C.

DEC. 1973. BY: P.P.N.



4945 M5