

TRENCHING, GEOCHEMICAL AND GEOPHYSICAL

SURVEYS ON THE JOE CLAIM GROUP



N.T.S. 105 G/5 AND G/6

61° 20' N - 131° 30' W

JULY - AUGUST, 1977

By: E. J. Ballantyne  
and  
C. M. Lalonde

090247



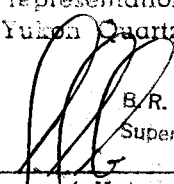
This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

\$ ~~2,400.00~~ 6079.00

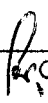


Resident Geologist or  
Resident Mining Engineer

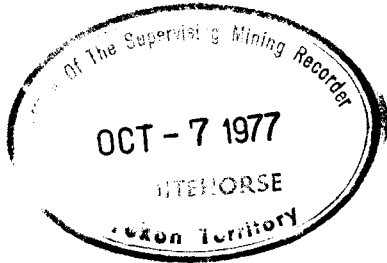
Considered as representation work under  
Section 53 (4) Yukon Quartz Mining Act.



B. R. BAXTER  
Supervising Mining Recorder



Commissioner of Yukon Territory



T A B L E   O F   C O N T E N T S  
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	<u>Page</u>
Introduction	1
Grid Control Survey	2
Geochemical Soil Survey	2
Geophysical Surveys	5
Trenching	6
<del>Statement of Expenses</del>	<del>8</del>
<del>Statement of Qualifications</del>	<del>10</del>

Appendix: C.E.M. Literature

<u>Plates:</u>	<u>Scale</u>
1. Topography Map and Claim Locations	1:2500
2. C.E.M. Survey	1:2500
3. Magnetometer Survey	1:2500
4. Geochemical Survey - Pb contours	1:2500
5. Geochemical Survey - Zn contours	1:2500
6. Location of Trenches	1" = 200'

NEWMONT EXPLORATION OF CANADA LIMITED

REPORT ON TRENCHING, GEOCHEMICAL AND GEOPHYSICAL SURVEYS  
ON THE JOE CLAIM GROUP  
JULY - AUGUST, 1977

INTRODUCTION

The JOE claim group lies 88.5 kilometers (55 miles) southeast of Ross River, Yukon in the Pelly Mountains, approximately 10 kilometers southwest of the Tintina Trench. Ten claims were staked in August, 1976 following examination of sulphide occurrences in the McNeil Lake area which had been located in previous years by Newmont geologists and prospectors. In 1977 another 32 contiguous claims were added to the JOE claim group. The area of the JOE claims had been staked previously by Newmont in 1966 when it was known as the FH claim group. An accompanying 1" = 1/2 mile sketch map shows the location of the claims and their relative position to each other. A list of the claims by name and tag number and the name of the current holder of the claims is as follows:

<u>Name</u>	<u>Tag Number</u>	<u>Holder</u>
JOE 1-10	YA00795-YA00804	Newmont Mining Corporation of Canada Limited
JOE 11-18	YA21469-YA21576	Newmont Mines Limited
JOE 19F-21	YA21738-YA21740	S. Barclay
JOE 22F-29	YA21669-YA21676	D. Nowak
JOE 30-34	YA21677-YA21681	S. Hirowatari
JOE 35-42	YA25474-YA25481	T. Macauley

In July and August a grid was established on part of the claim

group and a C.E.M. horizontal shootback survey, a magnetometer survey and a geochemical soil survey were conducted. Two narrow sulphide zones outcrop in a steep north-facing slope west of the gridded area. Trenches were blasted in several places across the strike of the sulphide zones and chip samples were taken perpendicular to the strike. An accompanying sketch map shows the location of the trenches. Results of the C.E.M., magnetometer and soil surveys are shown on the accompanying maps.

#### GRID CONTROL SURVEY

A grid totalling 62.7 line-kilometers was established on the JOE claims. The baseline was positioned with a transit at an azimuth of  $132^{\circ}$  and chained for a distance of 6900 meters. Crosslines were turned off perpendicular to the baseline at 100 meter intervals using a transit and stations were chained at 30 meter intervals along the crosslines. Each station is marked by a picket or lath at least 4 feet in height and the station number inscribed at each station.

Altimeter readings were taken at each station, using a Thommen pocket altimeter, and a topography map was contoured at 50-foot intervals. An accompanying topography map shows the grid layout with the claim posts, claim names and tag numbers.

#### GEOCHEMICAL SOIL SURVEY

Geochemical soil samples were collected at 30 meter intervals on lines spaced 100 meters apart. Most of the grid area is covered by overburden and a general soil profile consists of 2 to 3 inches of grey silt ("A Horizon") on top of orange-brown silt or clay ("B Horizon").

Sample depths were generally 6 to 8 inches below surface. Some of the samples were taken in talus slopes where samples consisted of fine silt material amongst boulders. A total of 564 samples were collected and analyzed for copper, lead and zinc.

The soil samples were analyzed in the Acme Analytical Laboratory in Ross River and at Whitehorse Assay Office in Whitehorse. All samples were dried and sieved in the laboratory and the minus 80 mesh retained. A 0.50 gram sample was digested with diluted aqua regia in a hot water bath for one hour at approximately boiling point and then diluted to 10 milliliters. The copper, lead and zinc content were determined by atomic absorption spectrophotometry.

The grid area is underlain predominantly by trachytic felsic volcanic flows and pyroclastics with some intercalated intermediate volcanic flows. Strike of the formations are generally southeasterly, with local changes to an easterly direction, and dips range from moderate to steep southwestward. Black shales and dolomite formations underlie the southwest portion of the grid from lines 1 W. to line 15 E. A transverse fault with right lateral movement offsets the formations in the area of lines 7 E. to 15 E. A stratified barite formation contains disseminated galena and pyrite sulphide mineralization.

A statistical study of the results of the 564 sample analyses reveals the background value for lead is 52 p.p.m. and zinc is 192 p.p.m. The anomalous values for lead and zinc are interpreted to be 200 p.p.m. and 500 p.p.m. respectively. The copper values generally are uniformly low and have little significance. The accompanying maps show the contoured results for the lead and zinc values.

The distribution of the lead values correlates with the presence

of a silicified pyritized orange weathering felsic volcanic formation. The strike of the formation is interpreted to be almost parallel to the baseline between lines 8 W. and 2 W. and then swings southward to line 1 E. at approximately 200 meters southwest of the baseline. It is difficult to interpret the cause for the change in the attitude between lines 1 E. and 6 E. because of the overburden cover, however, the formation outcrops again at the northeast end of line 6 E. The formation strikes against the interpreted north-south fault and is displaced southwards a distance of approximately ~~4~~ <sup>6.00</sup> kilometers on the east side of the fault. The silicified pyritic unit outcrops near the baseline of lines 14 E. and 15 E. Barite mineralization with minor disseminated galena has been found in outcrops of this formation and in float in proximity to this formation. The downslope movement of overburden and talus material is responsible for the large areal extent of the anomalous values.

Minor galena and sphalerite mineralization in narrow carbonate veins in andesite outcrop was found on line 8 W. southwest of the baseline. This mineralization may extend under the overburden at the southwest end of lines 7 W. and 6 W. The downslope movement of overburden and talus material spreads the lead and zinc anomalies over a large area.

The zinc anomalies near the baseline on lines 3 E. and 4 E. and 12 E. to 15 E. are believed to be associated with the silicified pyritic trachyte formation. Overburden and talus boulders cover the bedrock in these areas.

The zinc anomalies on lines 5 E. at 480 S. and 510 S. and 3 E. at 420 S. are in the bottom of stream valleys draining topography underlain by the silicified pyritic trachyte. These values are considered to be mechanically transported and not indicative of underlying bedrock.

GEOPHYSICAL SURVEYS

SPECIFICATIONS AND STATISTICS

EM

Survey Executed By	- D. Nowak, D. Logan
Instrument	- Crone C.E.M.
Frequency	- 1830 Hz
Coil Orientation	- Horizontal Shootback
Coil Spacing	- 90 metres

Magnetics

Survey Executed By	- A. Smallwood
Instrument	- Scintrex MP-2
Field Measured	- Total

General

Line Spacing	- 100 metres
Station spacing	- 30 metres
Total coverage	- 62.7 line kilometers

INTERPRETATION AND CONCLUSION

The magnetics are relatively flat. This indicates an absence of magnetite and pyrrhotite associated with mineralized zones.

Along the baseline between L7 E. and L10 E. a twenty gamma anomaly is present and appears to be correlated with the andesites (or diorites) which outcrop in that area.

To the east, on L4 E., station 390 S., a 50 gamma anomaly peaks and trends to the southeast. It is possible that it is due to

a faulted continuation of the andesites (or diorite) previously mentioned.

Attached as an appendix to this report is some information on the description and operation of the C.E.M. instrument used on this property.

No good EM conductors are present to the north and east sectors of the grid. Traversing the length of the grid, a contact between non-conductive rocks to the (grid) north and conductive rocks to the (grid) south has been interpreted and is shown on the map. It is thought that the conductive rocks are probably shales and/or graphitic argillites. It is possible that a conductor caused by sulphides could be masked by the conductive rock unit. Three such questionable conductors have been indicated at L0-240 S., L3E-450 S., and L5E-465 S.

#### TRENCHING

A total of 10 trenches were blasted following drilling of holes using an Atlas-Copco Cobra portable gas drill. An estimated 40 cubic yards of pyrrhotite, pyrite, sphalerite and galena sulphides and andesite host rock were removed from the trenches. A sketch map (scale: 1 = 200 feet) shows the location of the trenches relative to Line 8 W. of the grid area. Listed below are the results of the chip samples taken across the 10 trenches:

<u>Trench No.</u>	<u>Sample No.</u>	<u>Sample Width</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Au</u>	<u>Ag</u>
1.	8860	5.7'	0.03%	0.01%	3.30%	-	0.12 oz/ton
2.	6822	5.0'	0.06%	0.65%	4.20%	-	0.38
3.	8861	2.0'	0.29%	0.02%	7.20%	Tr.	0.04
4.	6823	6.5'	0.06%	0.02%	0.27%	Tr.	0.01
5.	6824	6.0'	0.07%	0.01%	0.28%	-	0.03
6.	8862	4.0'	0.12%	0.01%	4.00%	-	0.03
7.	6825	5.0'	0.09%	0.06%	0.90%	-	0.03
8.	6826	3.0'	0.10%	0.03%	0.33%	Tr.	0.03
9.	8863	8.0'	0.12%	Tr.	2.55%	Tr.	0.03
10.	8864	2.0'	0.07%	0.07%	1.80%	Tr.	0.21



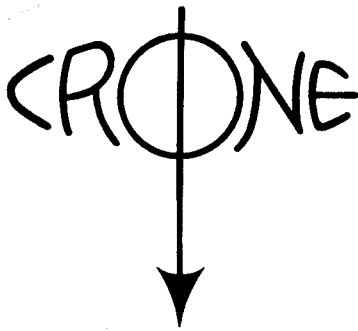
C. M. Lalonde



Edwin J. Ballantyne

## CRONE GEOPHYSICS LIMITED

3607 WOLFEDALE ROAD,  
MISSISSAUGA, ONTARIO,  
CANADA  
L5C 1V8  
Cable: CRONGEO  
Telephone: (416) 270-0096



## CEM

THE CRONE ELECTROMAGNETIC INSTRUMENT DESIGNED TO BE USED WITH THE HORIZONTAL SHOOTBACK EM METHOD AS WELL AS VERTICAL LOOP AND HORIZONTAL LOOP METHODS.

- The Shootback EM Method is a simple field method that does not require accurate survey lines. It retains its effectiveness even in rugged terrain areas. The method has been in use since 1957 and has located many mineral deposits. Interpretative model study curves are available.
- The equipment is flexible in that it can be used with the Shootback, Vertical Loop or Horizontal Loop, (in phase only), EM Methods with coil separations up to 200 meters, (600').
- The equipment is rugged, reliable and easy to operate.



## CEM SPECIFICATIONS

The complete CEM instrument consists of two identical coils both capable of receiving and transmitting alternating magnetic fields at three fixed frequencies. Battery supply is contained in a aluminum box mounted on a magnesium packframe.

Coil dimensions and weight: Diameter of 56 cm (22"); 3.8 Kg (8.3 lb).

Complete unit shipped in two wooden shipping boxes:

Dimensions and weight of one empty box: 31 x 61 x 77 cm (12" x 24" x 30"),  
13 Kg (29 lb).

Weight of one shipping box complete with coil, packframe, batteries and earphones: 23 Kg (51 lb).

Shipping weight of complete unit (2 boxes): 46 Kg (102 lb).

Standard Frequencies: 390, 1830 and 5010 Hz (others available upon request).

Field tilt measurement by visual null on field strength meter and audio null through crystal earphones.

Inclinometer range of 200° , accuracy  $\pm 0.5$  degrees.

Receiver gain control: Linear calibrated 10 turn pot.

Field strength measurements from meter.

Operating range of coils: Up to 200 meters (600').

Battery Supply: 3 of 6 volt lantern batteries, Eveready #731 weight per battery;  
1.3 Kg (2.8 lb).

audio battery supply; 1 of 9 volt, Eveready #216

Normal operational lifetime of battery supply – 3 to 6 weeks.

## OPTIONAL EXTRAS

- Recharge battery supply and audio pack – 3 of 6 volt Gel cells
- Clip on battery pack (two of 9 volt Eveready #216) for use of coil as a visual receiver only (Vertical loop surveys).
- Plug in battery supply and audio pack for use of coil as audio and visual receiver only (Vertical loop surveys).
- Canvas knapsack for carrying coil with above options.

Note that the CEM coil is used as a receiver with the Crone VEM – large Vertical Loop system with a range of 800 meters, (2600').

## CEM INSTRUCTION AND INTERPRETATION BOOKLET

This equipment can be used with 4 standard EM methods:

1. Horizontal Shootback (Transmit coils Horizontal)
2. Co-Axial Shootback (Transmit coils Vertical)
3. Vertical Loop
4. Horizontal Loop - In phase only (no cable)

We recommend basic coverage with the Horizontal Shootback method with detail coverage using the Vertical loop or Horizontal loop methods depending on depth of target, terrain conditions and information required. See the enclosed report "Deep Electromagnetic Exploration with the Horizontal Shootback Method" by J. Duncan Crone. Strong thunderstorm activity may require the use of the older Co-axial or JEM Shootback system as it is less affected by this noise than the Horizontal Shootback method.

### 1. HORIZONTAL SHOOTBACK EM METHOD

With this method both operators traverse along the same line (perpendicular to the expected strike direction). Both operators in turn transmit and receive - measuring the dip angle of the field. The two dip angles are then added together and equal "0" if no conductors are present. The station measured is the mid-point between the two men. The separation between the two men can vary from 100' to 600' (30 meters to 200 meters). Readings are generally taken at two frequencies if a conductor is detected. The ratio of the resultant dip angles permits an evaluation of the conductivity of the body.

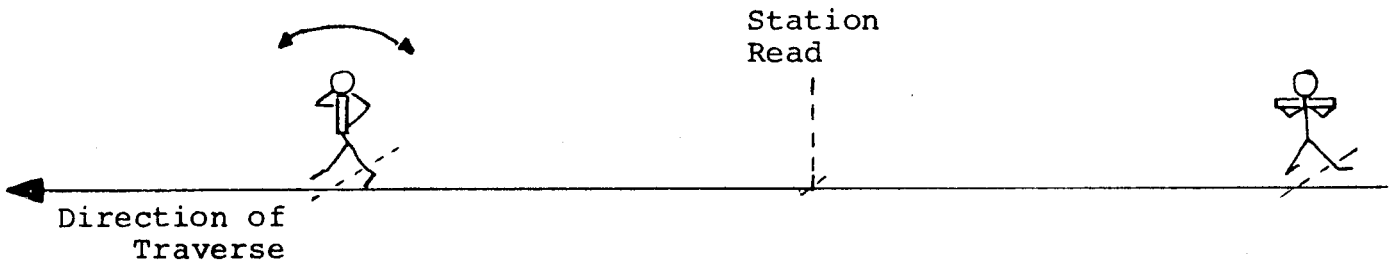
OPERATION: The way the coils are held in the transmit and receive positions is very important and is as follows:

The two operators proceed along the survey line until they reach their positions. The leading operator receives first (switch at Rx). The trailing operator who is the chief operator (he records the readings) places his coil in the transmit position - accurately horizontal - and switches it on Tx. Note both operators must face perpendicular to the line of traverse with the other operator always on his left hand side.

The gain control of the receiver is now set (this is normally done only once per day). This is done by holding the receiver in the Horizontal position and turning the volume control

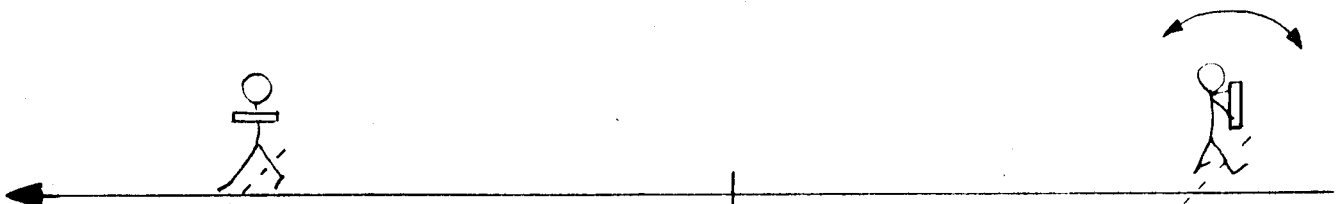
until the Field Strength meter is at 100 on the black scale. This is carried out at the first reading only by both operators preferably in a non-anomalous area.

- | (1) | OPERATOR RECEIVING  | OPERATOR TRANSMITTING  |
|-----|---|--|
|     | <ul style="list-style-type: none"><li>- switch at Rx</li><li>- Coil moved to Null</li><li>- Inclinator read on red scale (Example <math>-8^\circ</math>)</li><li>- Other operator to his left</li></ul> | <ul style="list-style-type: none"><li>- switch at Tx</li><li>- Coil Horizontal</li><li>- Inclinator accurately kept on red T mark</li><li>- Other operator to his left</li></ul> |



- (2) LEADING OPERATOR shouts "OFF" and calls reading  $-8^\circ$  to chief (over 300' use Walki-Talkies)
- (3) Both operators remaining in the same position and facing in the same direction reverse the procedure

- | LEADING OPERATOR TRANSMITTING  | OPERATOR RECEIVING  |
|--|---|
| <ul style="list-style-type: none"><li>- switch at Tx</li><li>- Coil Horizontal</li><li>- Inclinator accurately kept on red T mark</li><li>- Other operator to his left</li></ul> | <ul style="list-style-type: none"><li>- switch at Rx</li><li>- Coil moved to Null</li><li>- Inclinator read on red scale (Example <math>+8^\circ</math>)</li><li>- Other operator to his left</li></ul> |



- (4) Operator records readings - Shouts "OFF" - Both men switch to "OFF" and move to next station

EXAMPLE OF FIELD NOTE BOOK

<p><b>PROJECT:</b> M-10      <b>DATE:</b> Jan 10/71      <b>OPERATOR:</b> J.D.C.</p> <p><b>COIL SPACING</b> - 400'</p>							
STATIONS	M- 1830Hz			Low - 390			REMARKS
	L	C	R	L	C	R	
LINE	600 E						
100 N	-8	8	0				Road 230 N
200 N	-10	9	-1				
300 N	-12	12	0				
400 N	-13	10	-3				
500 N	-16	10	-6				Swamp
550 N	-18	11	-7	-16	12	-4	
600 N	-26	15	-11	-24	18	-6	
650 N	-25	10	-15	-18	10	-8	
700 N	-22	0	-22	-16	4	-12	
750 N	-16	-13	-29	-10	-5	-15	
800 N	-13	-13	-26	-8	-4	-12	
850 N	-13	10	-3	-8	7	-1	
900 N	-8	13	5	-4	7	3	
950 N	-2	18	16	2	6	8	
1000 N	4	14	18	2	7	9	Rusty Zone
1050 N	0	14	14	2	4	6	
1100 N	2	4	6	1	2	3	
1150 N	3	-9	-6	0	-3	-3	
1200 N	-2	-12	-14	-2	-5	-7	
1250 N	-4	-8	-12	-3	-2	-5	
1300 N	-6	1	-5	-5	3	-2	
1350 N	-3	0	-3	-2	1	-1	
1400 N	-1	-1	-2				
1500 N	0	-1	-1				
1600 N	-2	2	0				
1700 N	3	-3	0				

FREQUENCIES:

In most areas use 1830 Hz for basic coverage and 390 Hz in anomalous areas. In areas of highly conductive background conditions where the 1830 Hz frequency produces  $-5^{\circ}$  to  $-20^{\circ}$  readings over wide areas then both 390 Hz and 1830 Hz frequencies should be used for basic coverage. In the exploration for weak conductors use 5010 Hz and 1830 Hz.

OUT OF PHASE MEASUREMENT:

This reading is sometimes helpful in separating overburden effects from subsurface conductors particularly in areas of very high or very low surface conductivity. The reading is simply the minimum Field Strength reading when the coil is in the null position. If the coil is set for a Field Strength reading of 100 (by means of the volume control) when both coils are horizontal, then the out-of-phase is read as a percent of the normal field. Usually the reading is taken only by the Chief operator who must be careful with his notes since the resultant dip angle reading is recorded at the station midway between the two men and the out-of-phase at his own location.

(2) CO-AXIAL SHOOTBACK EM METHOD (JEM)

This is the original shootback method. The operation is identical to the Horizontal Shootback method except that the coil when transmitting is vertical with the axis of the coil along the traverse line. The dip angle is read in the standard manner using the black scale.

The Co-Axial method may be preferred in areas of high surface conductivity since coupling to the surface is reduced with this method. The Co-Axial method is also less subject to "noise" from thunderstorm activity than the Horizontal method and should be used if thunderstorm activity becomes an operational problem.

(3) VERTICAL LOOP

This is an excellent method for detailing deep conductors particularly its help in the determination of dip. It is also a back-up method if one of the coils has an amplifier or transmitter failure.

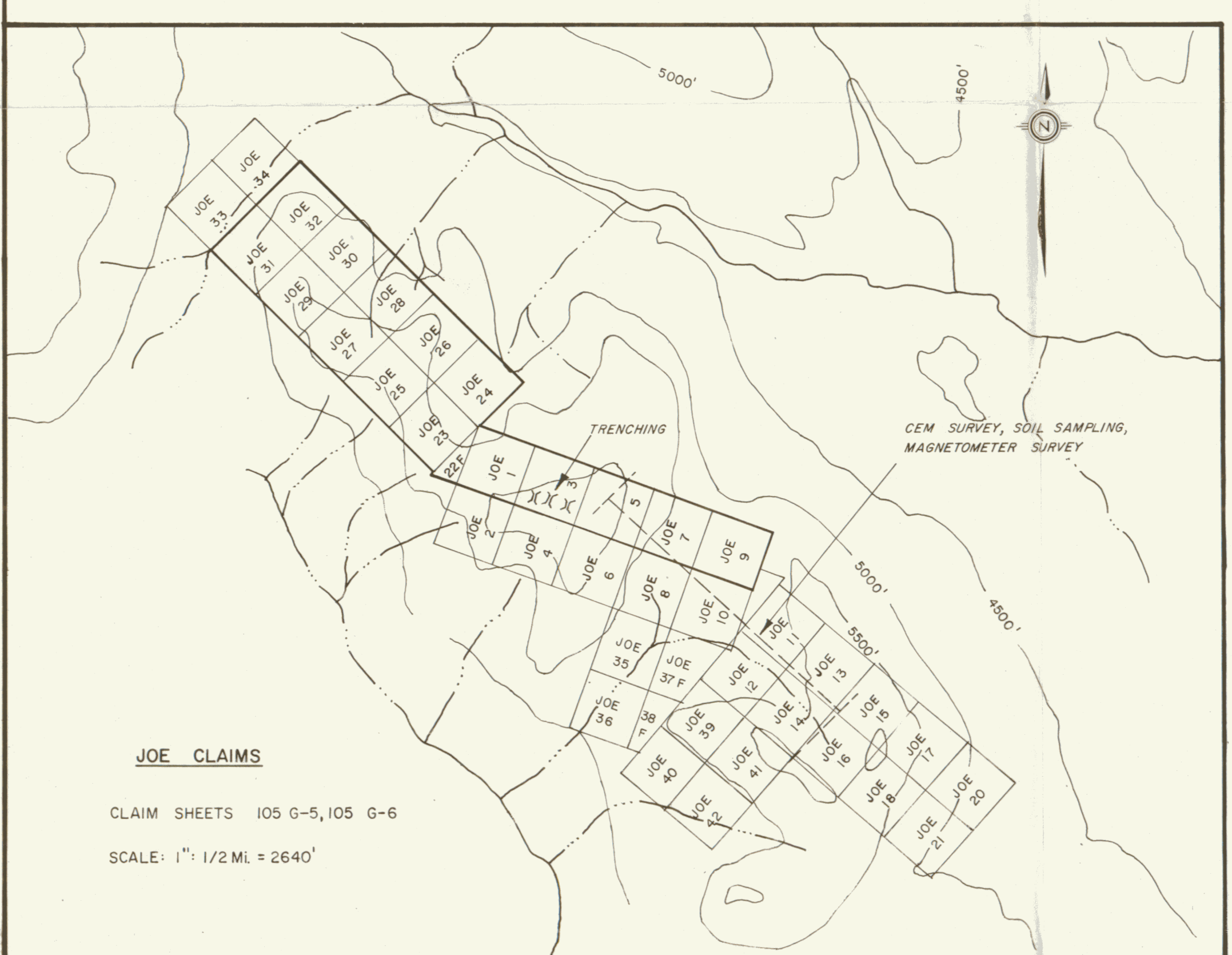
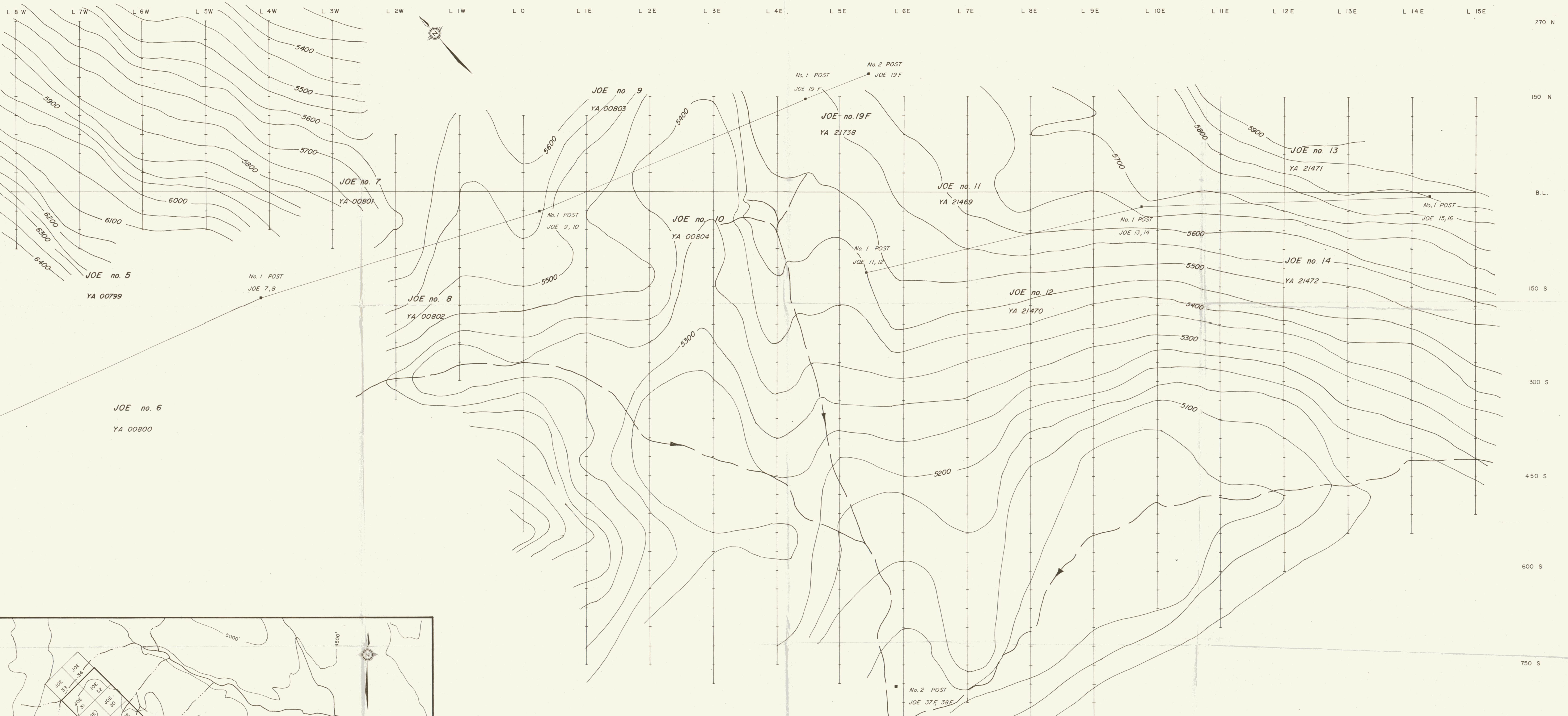
The coil is held accurately vertical while on transmit and orientated such that the receiver is in the plane of the coil. Detailed instructions and interpretation curves are provided by most standard textbooks.

(4) HORIZONTAL LOOP EM

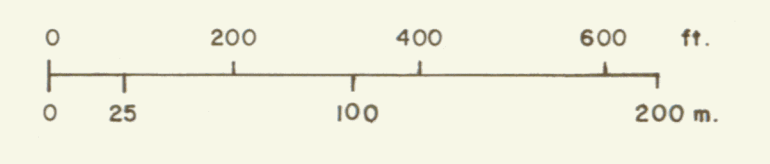
With this equipment the standard Horizontal loop configuration is used but the Total Vertical Field Component is measured at two frequencies rather than the In-phase and Out-of-phase at one. The interpretation curves are identical to the standard published curves. This method has the great advantage that the two coils do not have to be joined with a cable.

When using this method the power supply should consist of 3 fresh batteries. This assures minimum drift of the readings.

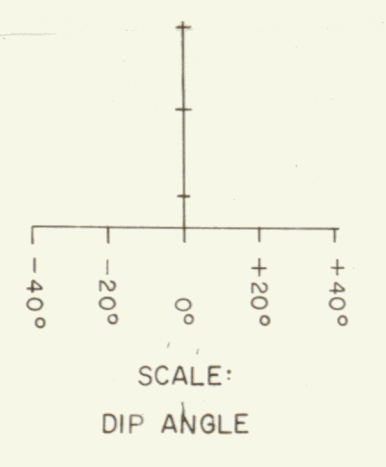
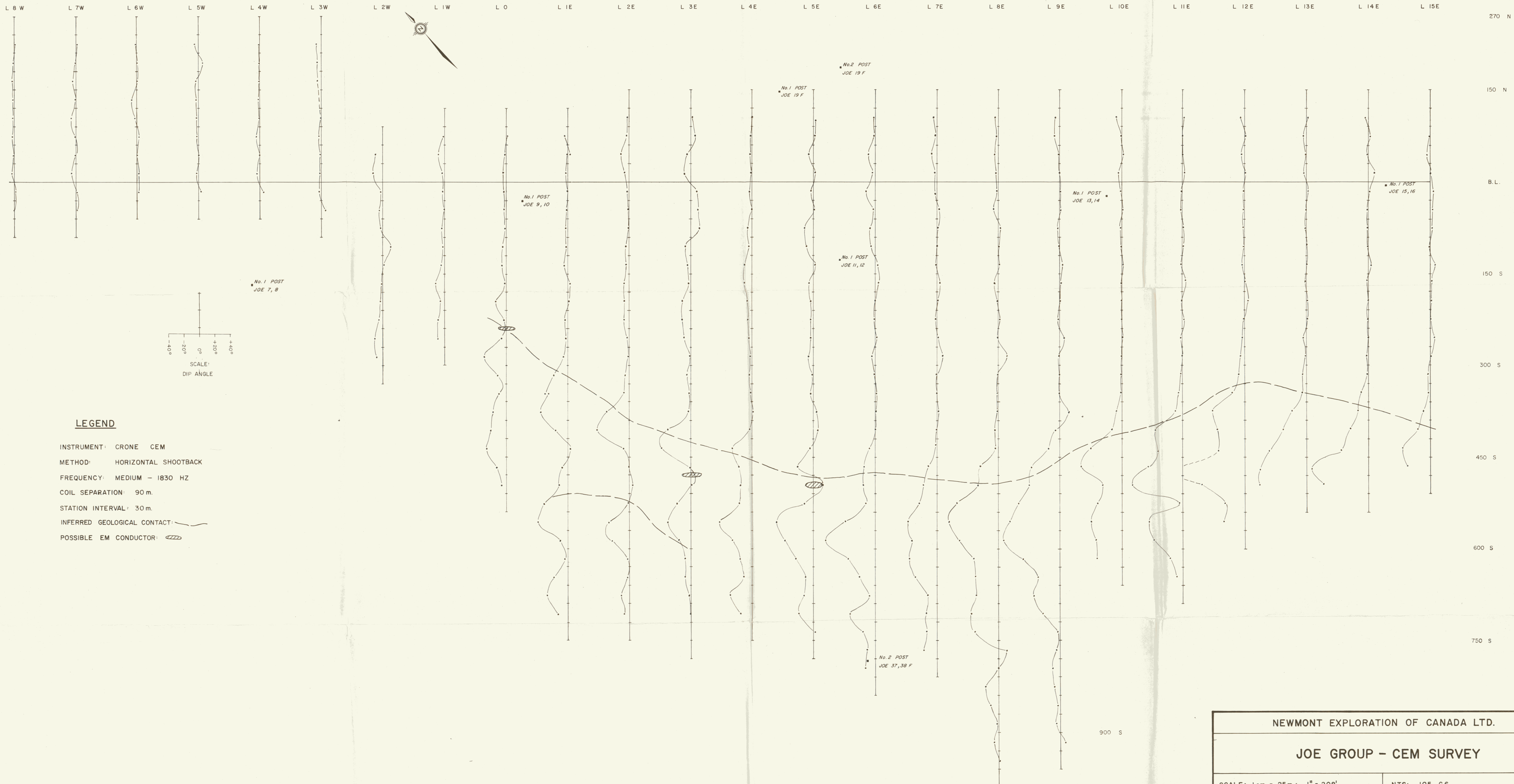
The coils transmit and receive while being held in the horizontal position. Two frequencies are normally used, 5010 and 390 Hz. The receive coils are set up such that the Field Strength is 100% in a non-conductive area, one coil always receiving 5010 and the other coil 390. A rope may be used for accurate spacing of the two men since no cable is required. Operation and interpretation otherwise identical to a standard horizontal loop survey.



**JOE CLAIMS**  
 CLAIM SHEETS 105 G-5, 105 G-6  
 SCALE: 1" = 1/2 Mi. = 2640'

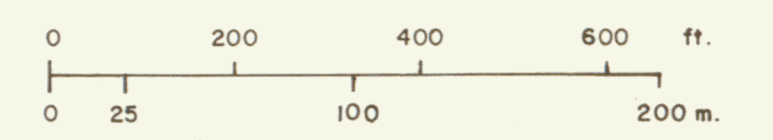


<b>NEWMONT EXPLORATION OF CANADA LTD.</b>	
<b>JOE GROUP-CLAIM LOCATIONS, TOPOGRAPHY</b>	
SCALE: 1 cm. = 25 m.; 1" = 208'	NTS: 105 G6
DRAWN BY: J. NEBOCAT	DATE: SEPTEMBER 15, 1977
CONTOUR INTERVAL: 50 ft.	MEASURED BY: ALTIMETER

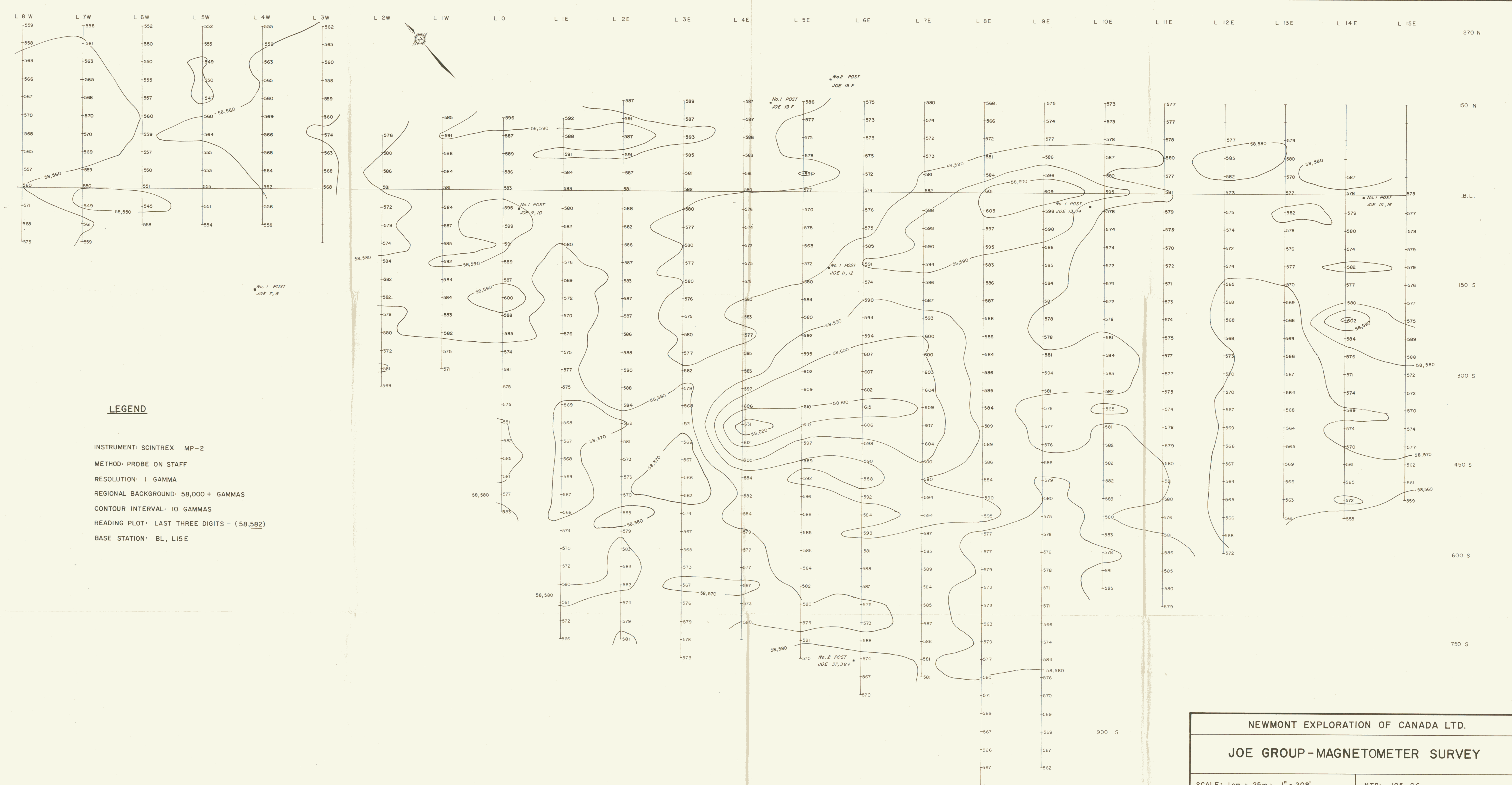


**LEGEND**

INSTRUMENT: CRONE CEM  
 METHOD: HORIZONTAL SHOOTBACK  
 FREQUENCY: MEDIUM - 1830 HZ  
 COIL SEPARATION: 90 m.  
 STATION INTERVAL: 30 m.  
 INFERRED GEOLOGICAL CONTACT:   
 POSSIBLE EM CONDUCTOR:

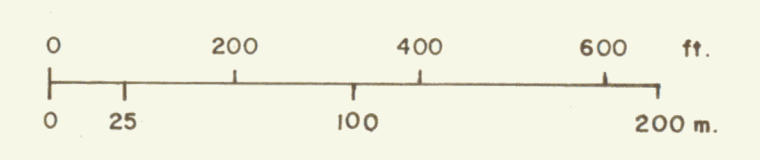


NEWMONT EXPLORATION OF CANADA LTD.	
<b>JOE GROUP - CEM SURVEY</b>	
SCALE: 1 cm. = 25 m.; 1" = 208'	NTS: 105 66
DRAWN BY: J. NEBOCAT	DATE: SEPTEMBER 15, 1977

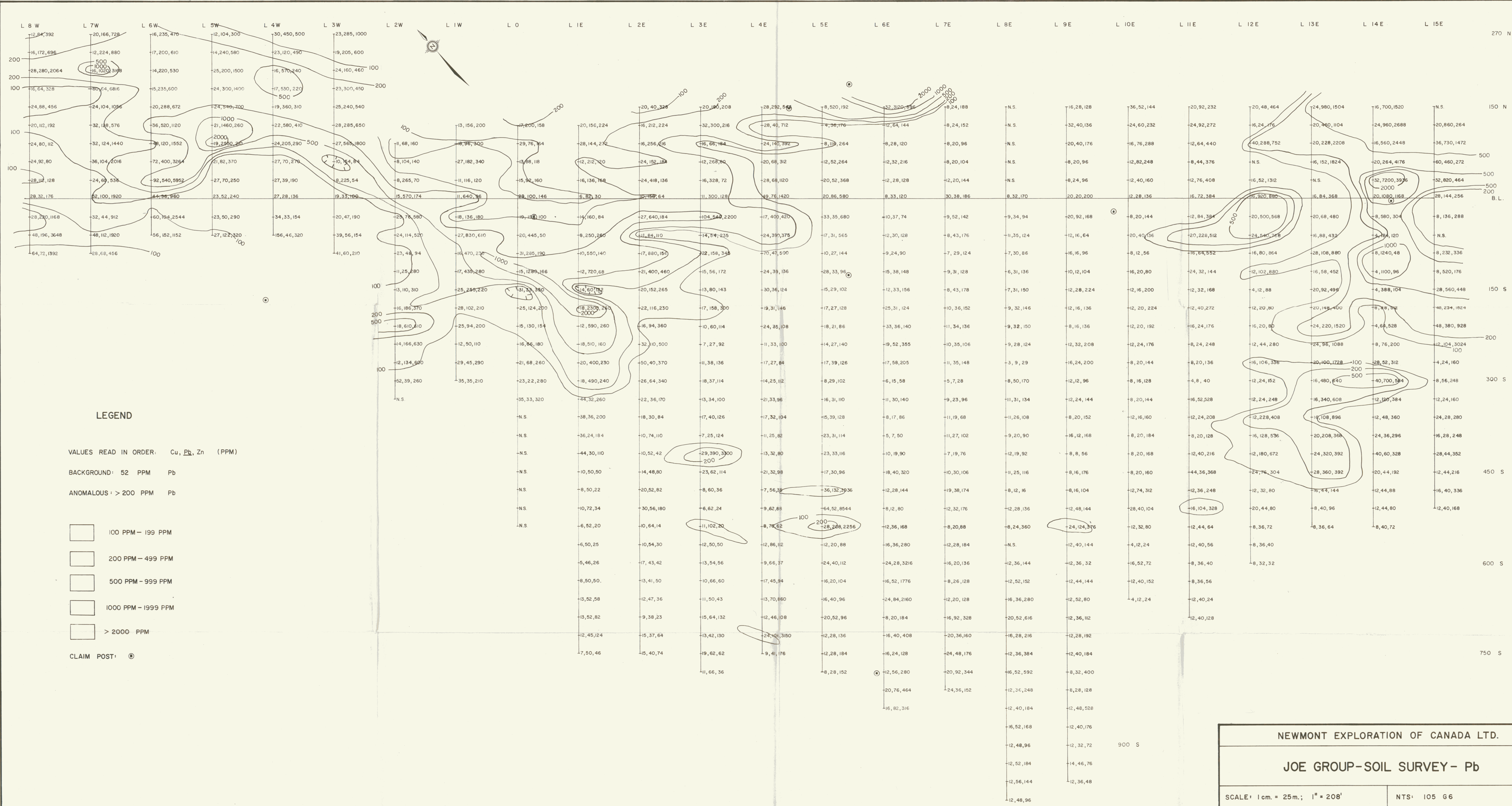


**LEGEND**

INSTRUMENT: SCINTREX MP-2  
 METHOD: PROBE ON STAFF  
 RESOLUTION: 1 GAMMA  
 REGIONAL BACKGROUND: 58,000 + GAMMAS  
 CONTOUR INTERVAL: 10 GAMMAS  
 READING PLOT: LAST THREE DIGITS - (58,582)  
 BASE STATION: BL, L15E



NEWMONT EXPLORATION OF CANADA LTD.	
<b>JOE GROUP - MAGNETOMETER SURVEY</b>	
SCALE: 1 cm. = 25 m.; 1" = 208'	NTS: 105 G6
DRAWN BY: J. NEBOCAT	DATE: SEPTEMBER 15, 1977



**LEGEND**

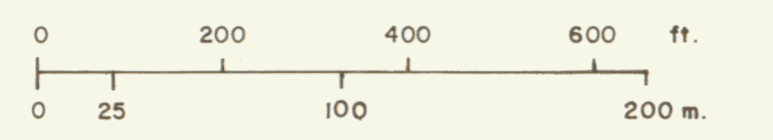
VALUES READ IN ORDER: Cu, Pb, Zn (PPM)

BACKGROUND: 52 PPM Pb

ANOMALOUS: > 200 PPM Pb

- 100 PPM - 199 PPM
- 200 PPM - 499 PPM
- 500 PPM - 999 PPM
- 1000 PPM - 1999 PPM
- > 2000 PPM

CLAIM POST: C



<b>NEWMONT EXPLORATION OF CANADA LTD.</b>	
<b>JOE GROUP-SOIL SURVEY - Pb</b>	
SCALE: 1 cm. = 25m.; 1" = 208'	NTS: 105 66
DRAWN BY: J. NEBOCAT	DATE: SEPTEMBER 15, 1977



**LEGEND**

VALUES READ IN ORDER: Cu, Pb, Zn (PPM)

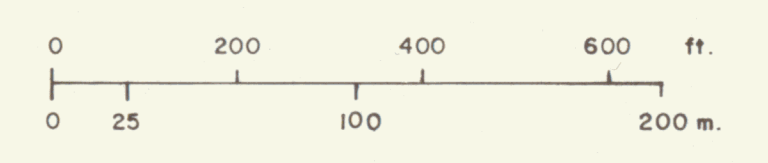
BACKGROUND: 192 PPM Zn

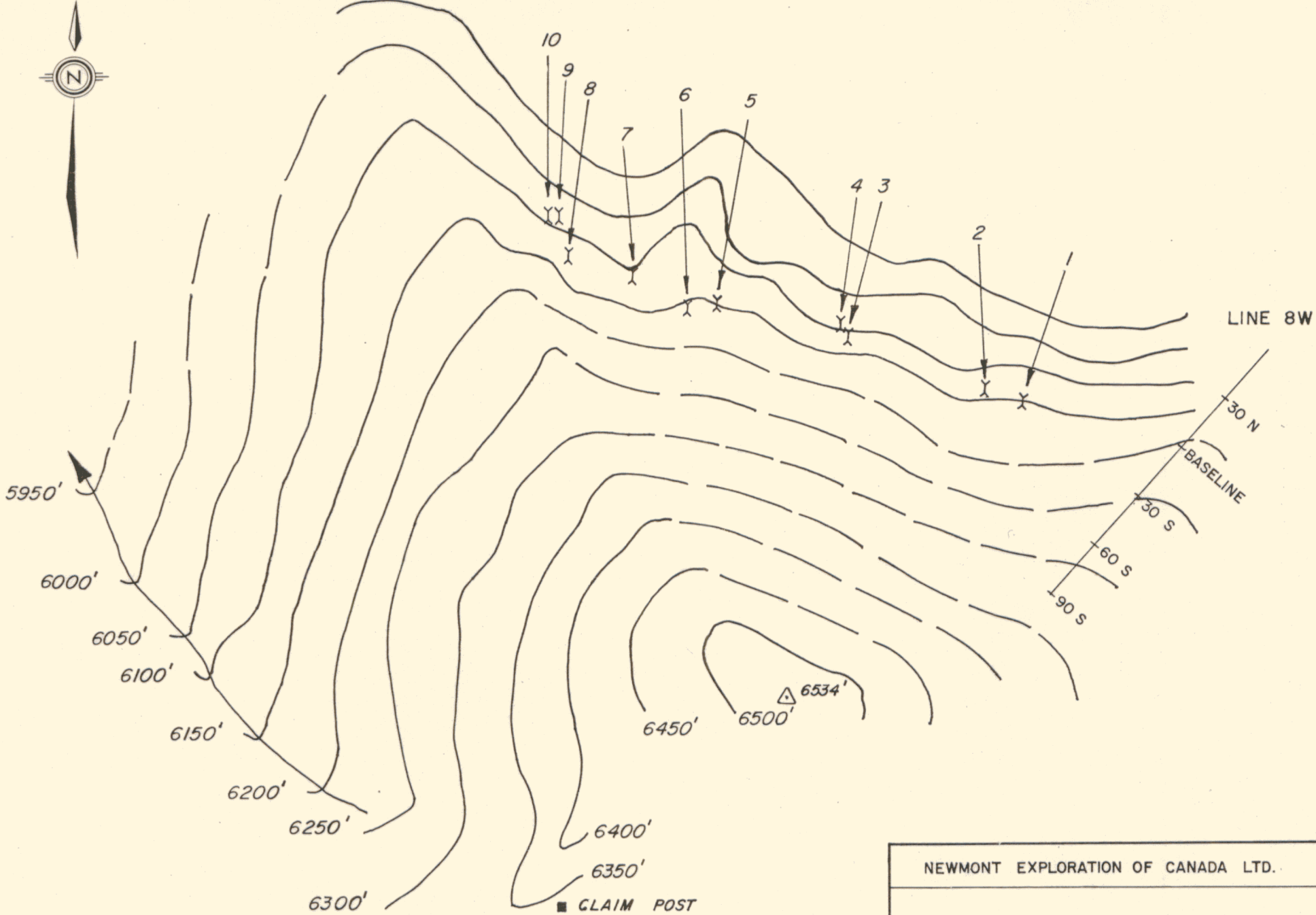
ANOMALOUS: >500 PPM Zn

- 500 PPM - 999 PPM
- 1000 PPM - 1999 PPM
- 2000 PPM - 2999 PPM
- 3000 PPM - 4999 PPM
- > 5000 PPM

CLAIM POST:   

<b>NEWMONT EXPLORATION OF CANADA LTD.</b>	
<b>JOE GROUP - SOIL SURVEY - Zn</b>	
SCALE: 1 cm = 25 m.; 1" = 208'	NTS: 105 G6
DRAWN BY: J. NEBOCAT	DATE: SEPTEMBER 15, 1977





NEWMONT EXPLORATION OF CANADA LTD.

LOCATION OF TRENCHES

SCALE: 1" : 200'      DATE: SEPTEMBER 15, 1977