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# REPORT ON

# SEISMIC AND INDUCED POLARIZATION SURVEYS

# SHOT GROUP OF CLAIMS

# NEAR MERRITT, BRITISH COLUMBIA

for

CONSOLIDATED STANDARD MINES LIMITED

by

HUNTING SURVEY CORPORATION LIMITED

Toronto, Canada

December, 1961

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# INTRODUCTION

During the period of November 10th. to November 13th., 1961, two types of geophysical surveys were carried out by Hunting Survey Corporation Limited on part of the Shot Group of claims owned and operated by Consolidated Standard Mines Limited. The property is located six miles west of Merritt, British Columbia (50°, 121°, SE). This property is composed of mineral claims Shot No. 1 to 8 inclusive and Nora No. 6 FR.

The purpose of the geophysical surveys was to investigate the possibility of mineralization associated with four weak magnetic anomalies. Due to the geological and geographical setting of the property, the mineralization, if any, could be in the form of disseminated sulphides undetectable on the basis of its conductivity. Thus the Induced Polarization (I.P.) method was chosen as a basic geophysical tool. At the same time, two shallow refraction seismic depth to bedrock determinations were carried out to obtain some idea of the depth of overburden on the property to aid in the interpretation of the I.P. survey and to increase the general knowledge of the geological conditions.

The field work was under the able supervision of E. L. Gregotski, Project Geophysicist of Hunting Survey Corporation Limited who also carried out the required preliminary field interpretation. Final interpretation and report preparation by the senior geophysicist, and drafting were done at Hunting's head office in Toronto, Ontario.

In the following sections of this report the field procedures and data such as time, personnel employed, line mileage etc., for each method used are presented separately.

## FIELD PROCEDURES AND DATA

The geophysical surveys were carried out along pre-cut and chained picket lines of a previous ground magnetometer survey.

### Shallow Refraction Seismic Depth Determinations

Two determinations of depth to bedrock were carried out on November 11th., 1961 by a two-man crew. The operator and the helper were E. L. Gregotski and F. Faulkner, respectively, of Hunting Survey Corporation Limited.

The seismograph used is the FS-2 produced by Ronka Geophysical Instruments Limited. Based on the use of dry electro-sensitive (facsimile) paper, the FS-2 registers seismic events directly, permanently, and without processing, on an accurate time base. Single recording channel operation allows geophone spacing to be varied as required. The distance between successive recordings on the chart is varied accordingly, producing a correctly scaled time-distance plot. An unique feature that is standard on the FS-2 is two complete input channels (geophones, amplifiers, filters, pulse shapers) and built-in

coincidence circuitry. This feature makes the instrument directional and suppresses a good portion of the natural surface noises. The seismic energy is obtained by hitting a steel plate on the ground with a 10 lb. sledge hammer and, at larger distances, by detonating small quantities of dynamite and/or caps.

The field procedure consisted of setting up the geophones and equipment in a given spot and in obtaining time-distance plots for increasing distances from the geophone to the energy source. The maximum distance required will depend on the depth of overburden and/or the velocities encountered in the overburden and in the bedrock. In this survey, the maximum distance between energy source and geophone was 800 feet for both determinations.

The map in the pocket at the end of this report shows the location of the two seismic stations. Seismic Station No. 1 is located in claim Shot No. 5 and Station No. 2 in claim Shot No. 1.

## Induced Polarization (I.P.) Survey

The Induced Polarization (I.P.) survey was carried out between November 10th. and November 13th., 1961. The survey consists of four disconnected I.P. lines labelled Line Nos. 1, 2, 3 and 4. Line No. 1 extends from 0+00 to 11+00N on the ground magnetometer survey Line 64. The I.P. Line No. 2 extends from 13+00N to 21+00N on the ground magnetometer survey Line 76. The I.P. Line No. 3 extends from 42+00N to 52+00N on the ground magnetometer survey Line 72. The I.P. Line No. 4 extends from 49+00N to 57+00N on the ground

magnetometer survey Line 80. In this manner, a total of 3,700 feet of profiles were obtained.

The data were obtained using the "three electrode array". This array consists of one current electrode ($C_1$), two potential electrodes ($P_1$ and $P_2$), the second current electrode ($C_2$) being at "infinity". The data were obtained at intervals of 100 feet on all the lines, using basic electrode spacings of 400 and 800 feet. Additional data at an electrode spacing of 200 feet were obtained on Line No. 1.

The survey was performed by a five-man crew. The project geophysicist, the technician-operator and the line boss were E. L. Gregotski, G. Brand and S. Semczuk respectively. The line crew was formed by D. Roy and L. Ovington. All personnel were provided by Hunting Survey Corporation Limited.

The Hunting pulse-type instrument is similar in design and operation to those described by R. W. Baldwin in "A Decade of Development in Overvoltage Survey", A.I.M.E. Transactions, Volume 214, 1959. Power is obtained from a Volkswagen motor coupled to an 18 kw., 400 cycle generator which provides a maximum of 10,000 watts d.c. to the ground. The cycling rate is 1.5 seconds current on and 0.5 seconds current off, the pulses reversing continuously in polarity. The data collected in the field consist of careful measurement of the current (I) im amperes flowing through electrodes $C_1$ and $C_2$, and of the primary voltage ($V_p$) in volts appearing between $P_1$ and $P_2$ during the "current on" part of the cycle. Also, the secondary voltage or overvoltage appearing between electrodes $P_1$ and $P_2$ during the "current off" part

of the cycle is integrated electronically with respect to time, to provide a measurement of polarization ($V_s$) in millivolt-seconds. The "apparent chargeability" in milliseconds is calculated by dividing the polarization ($V_s$) by the primary voltage ($V_p$). The "apparent resistivity" in ohm-meters is proportional to the primary voltage ($V_p$) divided by the measured current (I), the proportionality factor depending on the geometry of the array used. The resistivity and chargeability obtained are called "apparent" as they are the values which that portion of the earth sampled by the array must have if it were homogeneous. As the earth sampled is usually inhomogeneous, the calculated "apparent resistivity" and "apparent chargeability" are functions of the "true" resistivities and chargeabilities of the various sections of the earth sampled and of the geometry of those sections.

## DATA PRESENTATION

### Shallow Refraction Depth Determinations

The results of these depth determinations are shown at their proper locations on the I.P. profiles in the Appendix at the end of this report. The seismic station locations are shown on the map in the pocket of this report.

Induced Polarization (I.P.) Survey

The results of this survey are shown on the individual profiles in the Appendix of this report. The I.P. lines are located on the map in the pocket of this report.

The profiles have a horizontal scale of 1 inch to 100 feet. The "apparent chargeability" is plotted at a vertical scale of 2.0 milliseconds per inch. The "apparent resistivity" is plotted on a logarithmic scale of 1 logarithmic cycle per two inches. The location map in the pocket of this report is at a scale of 1 inch to 500 feet.

## KNOWN GEOLOGY

No geology is available directly on the property. However, the geology of the Craigmont Mines Limited property immediately west of the Shot group of claims is shown on the location map in the pocket of this report. By extrapolation it is expected that the northernmost claims of the Shot property are underlain by the granodiorites of the Guichon batholith, whereas the southernmost claims are underlain by the volcanic rocks of the Kingsvale group. The adjacent property shows that the Kingsvale group overlaps the volcanic and sedimentary rocks of the Nicola group which outcrop as a relatively narrow band. The same relationship can be expected on the Shot property. The Eric shaft which is reported to have provided three samples averaging 0.38%

copper is located approximately one-quarter of a mile due west of the southwestern corner of mineral claim Shot No. 4. The Craigmont open pit is located roughly two miles west of the centre of the Shot group of claims.

## INTERPRETATION

### Shallow Refraction Seismic Depth Determinations

Two seismic depths to bedrock were obtained in this survey. Seismic Station No. 1 is located at 17+00N on the I.P. Line No. 2. Seismic Station No. 2 is located 200 feet due east of Station 48+00N on the I.P. Line No. 4.

In general, the seismic data showed four distinct layers: the first layer of dry overburden with a velocity of 1,300 to 1,500 feet per second; a second layer of dry overburden with a velocity of 2,200 to 2,400 feet per second; a third layer of wet overburden indicating the water table, with a velocity of 4,200 to 5,500 feet per second; and finally a fourth layer consisting of the bedrock with a velocity of 12,000 to 13,000 feet per second. At Seismic Station No. 2, the water table and the bedrock surface are at a depth of 100 and 235 feet respectively. These results are summarized graphically on the I.P. profiles of Lines No. 2 and 4, in the Appendix of this report.

The continuous mining operations at the adjoining Craigmont Mines Limited, hindered the seismic field operations by increasing the noise level in the area. Seismocaps and dynamite were used as the main source of seismic energy in an attempt to overcome the high noise level. Despite these precautions, at large distances between geophone and energy source at Seismic Station No. 1, the seismic events recorded by the equipment are not as clearly indicated as they could be under better working conditions. Thus, it is remotely possible that the bedrock velocity and therefore the bedrock depth at Seismic Station No. 1 is erroneously interpreted. If this should be the case, the bedrock depth indicated at Seismic Station No. 1 in the preceding paragraph must then be considered as a minimum depth. This situation did not occur at Seismic Station No. 2, possibly because it is located at a greater distance from the mining operations. There, the depth to bedrock is considered to be accurate within the limits of the method, that is ±10%.

Induced Polarization Survey

The apparent chargeabilities observed on the I.P. Lines Nos. 2, 3 and 4 indicate no anomalous conditions. The chargeability background is between 2.0 and 3.0 milliseconds both for bedrock and overburden. The chargeability of the overburden appears to drop down to approximately 1.0 milliseconds in the northern half of the I.P. Line No. 3. Such chargeability backgrounds are quite normal, both for overburden and bedrock without any sulphide content. The resistivity

data over the same lines indicates a very high resistivity overburden (possibly as high as 3,000 ohm-meters). The bedrock resistivity appears to be quite a bit lower, in the order of 100 ohm-meters. The high resistivity values obtained on the 800 foot electrode spacing on Line No. 3 suggest a marked thickening of the overburden.

The situation is rather different in the case of the I.P. Line No. 1. Here, we have definite anomalous conditions both on the resistivity and on the chargeability profiles. This statement does not apply to the higher apparent resistivity and apparent chargeability readings at 10+00N on the 400 foot electrode spacing. This single station high reading is definitely due to surface effects at one or the other electrodes of the array which were missed on the other electrode spacings by slight misplacement of the electrodes. It has no possible significance.

The statement about the anomalous condition on this line is restricted to the southern half of this profile. Unfortunately, there is insufficient data on resistivity and chargeability to permit a definite interpretation. On the basis of the available data there appears to be a body of very low resistivity (10 ohm-meters or less) located at the south end of the profile at some unknown depth. Immediately north of this low resistivity body, a chargeability high is observed mainly on the 800 foot electrode spacing. The high chargeability body (6 milliseconds or more) may coincide with the low resistivity body if the chargeability high on the 800 foot electrode spacing is taken to be the northern half of a double-peaked anomaly, the southern peak being located south

of 0+00. A second possibility occurs if the chargeability high on the 800 foot electrode spacing is a single-peaked anomaly in which case its causative body does not coincide with the resistivity low body. The situation is further complicated by the fact that the anomalous body or bodies may be located to one or the other side of the line and that only end-effects are observed. Under these conditions, it is impossible to state all possible interpretations, nor would it be feasible to select the most probable one. Thus, it can only be stated that anomalous conditions exist at the south end of this line or in its immediate vicinity, the nature of the disturbing body or bodies and their possible economic significance being unknown at this stage.

## SUMMARY AND CONCLUSIONS

The partial survey of the Shot group of mineral claims by shallow refraction seismic investigations indicate that the property is covered by relatively thick overburden. At the two seismic stations, the depths to bedrock indicated are over 200 feet with the possibility that the depth at Seismic Station No. 1 might be much greater.

The Induced Polarization survey showed no response over the three northernmost I.P. lines (Lines No. 2, 3 and 4). On the other hand, the south end of I.P. Line No. 1 indicates anomalous conditions

which cannot be interpreted with any degree of certainty on the basis of the available data. Thus, it cannot be estimated whether or not these anomalous conditions are of economic significance.

## RECOMMENDATIONS

The geophysical surveys under discussion in this report far from covered in any detail the property under investigation. Admittedly, the results on three of the four I.P. lines are rather discouraging but there is no assurance that some features of interest may not have been overlooked by the very sketchy coverage of the surveys. On the other hand, the anomalous conditions at the south end of the I.P. Line No. 1 clearly warrant further investigation. However, the data available is insufficient to permit the recommendation of a drilling program. Considering the deep overburden indicated, a wildcat drilling program would be extremely expensive and would have little chance of success.

It is recommended, therefore, that the Induced Polarization survey be extended at least in the southern part of the property to fully investigate the anomalous condition indicated by the I.P. Line No. 1. Such a program should consist of lines at intervals of 400 feet and stations at 100 foot intervals with electrode spacings of 400 and 800 feet. The lines should be extended at least to the claim boundaries and preferably to about 6+00S on the I.P. Line No. 1.

Additional data should be obtained over all anomalous conditions with both shorter and longer electrode spacings to completely develop the picture of the depth effect of the causative bodies. It is imperative that the lines extend beyond each anomaly by a distance equivalent to at least one electrode spacing. A full appraisal of the whole property could be obtained by extending such a survey over the whole claim group.

It is further recommended that seismic depth to bedrock determinations be obtained at all I.P. anomalies to help in their interpretation. This can be accomplished at relatively low cost by having an FS-2 seismic equipment on hand as the I.P. program progressed.

HUNTING SURVEY CORPORATION LIMITED

C. W. Faessler,
Senior Geophysicist.

DOMINION OF CANADA:

PROVINCE OF BRITISH COLUMBIA. } In the Matter of THE SHOT GROUP OF MINERAL CLAIMS SITUATE IN THE NICOLA MINING DIVISION AND COMPRISING THE FOLLOWING CLAIMS:

TO WIT:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Shot No. 1 | Record No. | 9905 | Shot No. 5 | Record No. | 9909 | J.J.M.#1 Fr. | Record No. | 12547 |
| Shot No. 2 | " | " 9906 | Shot No. 6 | " | " 9910 | J.J.M.#2 Fr. | " | " 12548 |
| Shot No. 3 | " | " 9907 | Shot No. 7 | " | " 9911 | Nora #6 Fr. | " | " 9247 |
| Shot No. 4 | " | " 9908 | Shot No. 8 | " | " 9912 | Vulgar Fr. | 2 | " 15467 |

I, GEORGE H. DAVENPORT, FREE MINERS LICENCE NO. 159716 ISSUED AT HAYMORE, B.C., ON MAY 31st, 1961

of ROOM 320 - 355 BURRARD STREET, VANCOUVER,

in the Province of British Columbia, do solemnly declare that THE FOLLOWING EXPENDITURES HAVE BEEN MADE TO HUNTING SURVEY CORPORATION LIMITED:

INDUCED POLARIZATION AND SESIMIC SURVEY CARRIED OUT USING 10,000 WATT I.P. SURVEY EQUIPMENT AND $FS_2$ SEESMIC EQUIPMENT:

| | |
|---|---|
| Mobilization | $550.00 |
| Field Work | 725.00 |
| Expenses | 357.74 |
| Interpretation & Drafting | 375.00 |
| | $2007.74 |

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the City of Vancouver, in the Province of British Columbia, this 4th day of January 1962, A.D.

G. H. Davenport

Sub-Mining Recorder

~~A Commissioner for taking Affidavits within British Columbia~~ or ~~A Notary Public in and for the Province of British Columbia.~~

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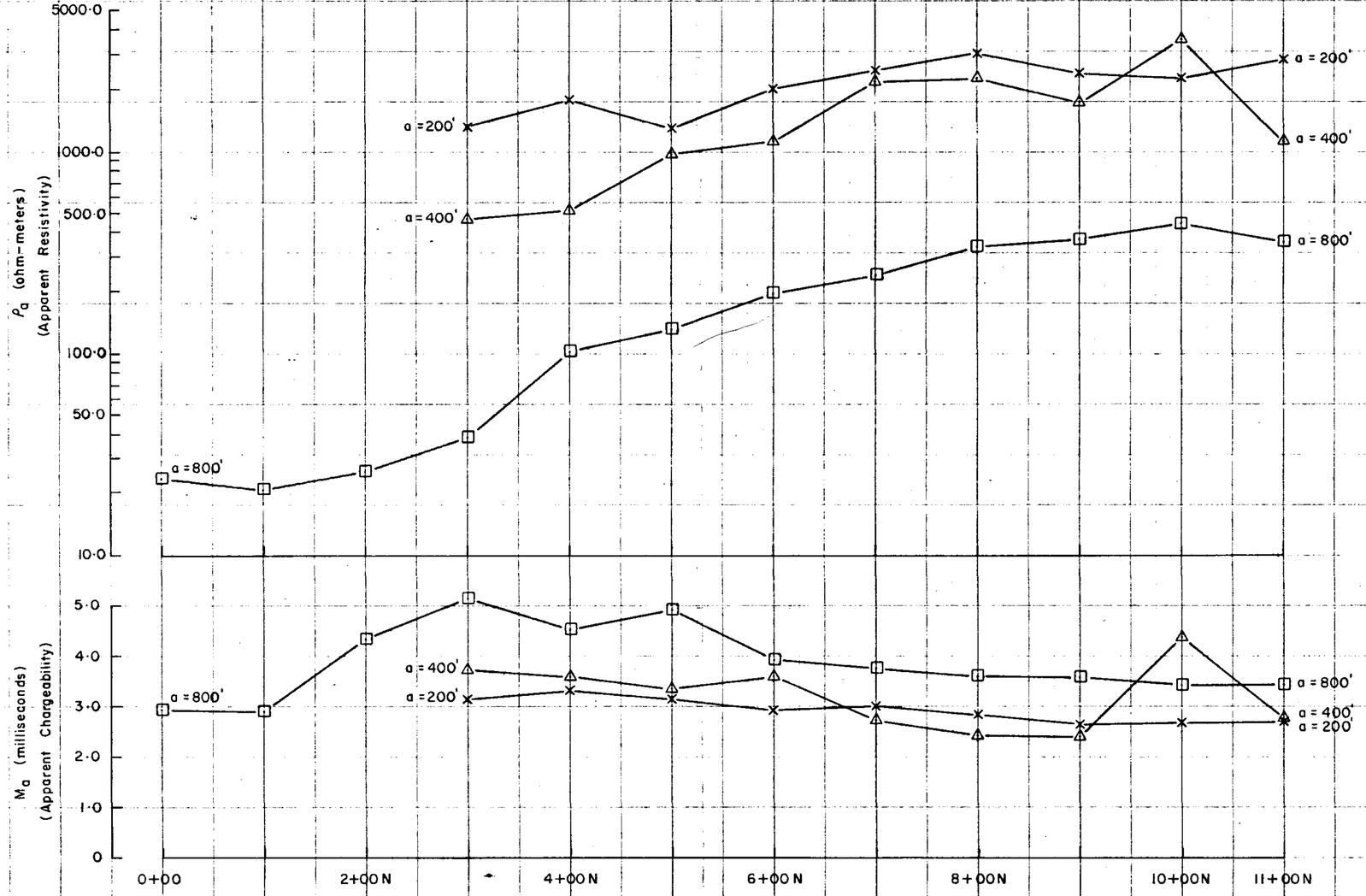
# APPENDIX

I.P. Profiles - Line No. 1

Line No. 2

Line No. 3

Line No. 4




CONSOLIDATED STANDARD MINES LIMITED

SHOT PROPERTY

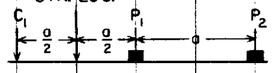
MERRITT, B.C.

I.P. PROFILE - LINE No. 1

November, 1961.

3 ELECTRODE ARRAY

STA. LOC.

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HUNTING SURVEY CORPORATION LIMITED - TORONTO, CANADA

C.W. RAESSLER, GEOPHYSICIST

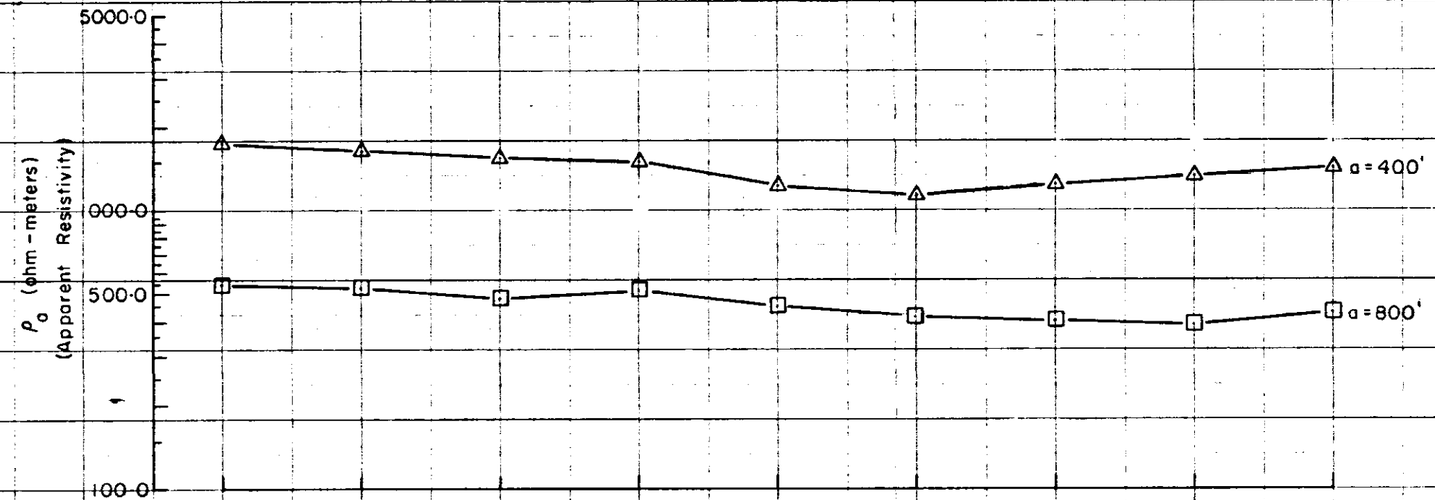
CONSOLIDATED STANDARD MINES LIMITED

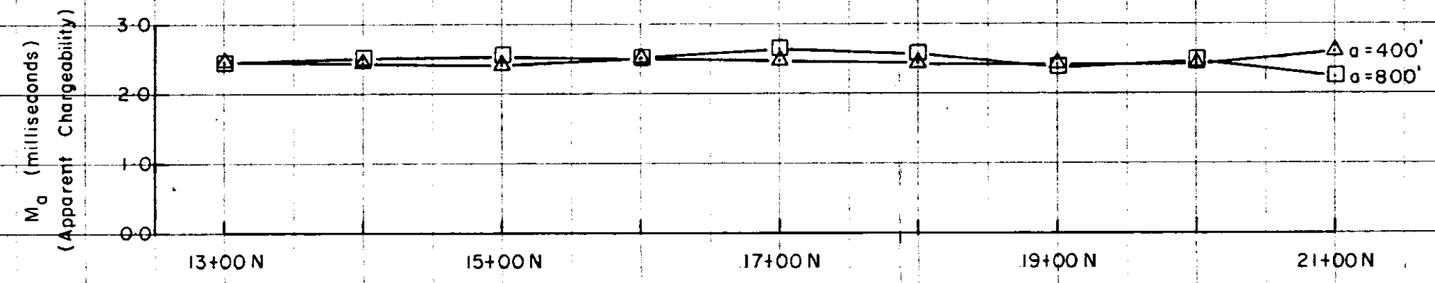
SHOT PROPERTY

MERRITT, B.C.

I.P. PROFILE – LINE No. 2

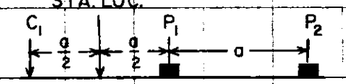
November, 1961.

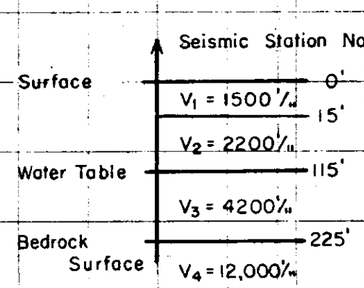



3 ELECTRODE ARRAY

STA. LOC.




Notes :–Depth to bedrock may have to be considered as minimum. See report for more detail.

–Section not to scale vertically.

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HUNTING SURVEY CORPORATION LIMITED – TORONTO, CANADA

C.W. FAESSLER, GEOPHYSICIST

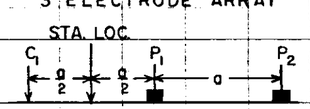
CONSOLIDATED STANDARD MINES LIMITED

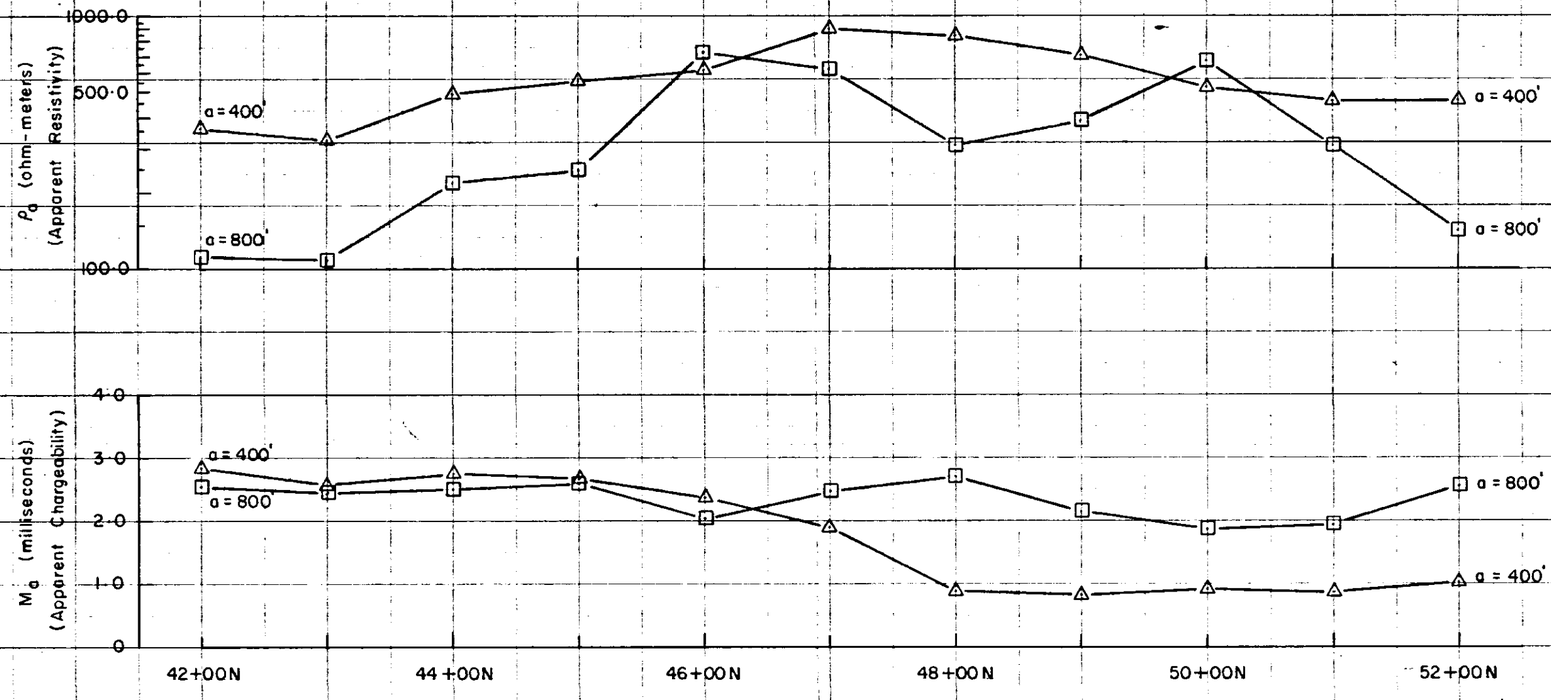
SHOT PROPERTY

MERRITT, B.C.

I P. PROFILE - LINE No. 3

November, 1961.

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HUNTING SURVEY CORPORATION LIMITED - TORONTO, CANADA

C.W. FAESSLER, GEOPHYSICIST

CONSOLIDATED STANDARD MINES LIMITED

SHOT PROPERTY

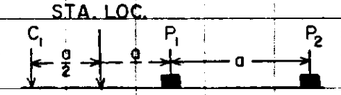
MERRITT, B.C.

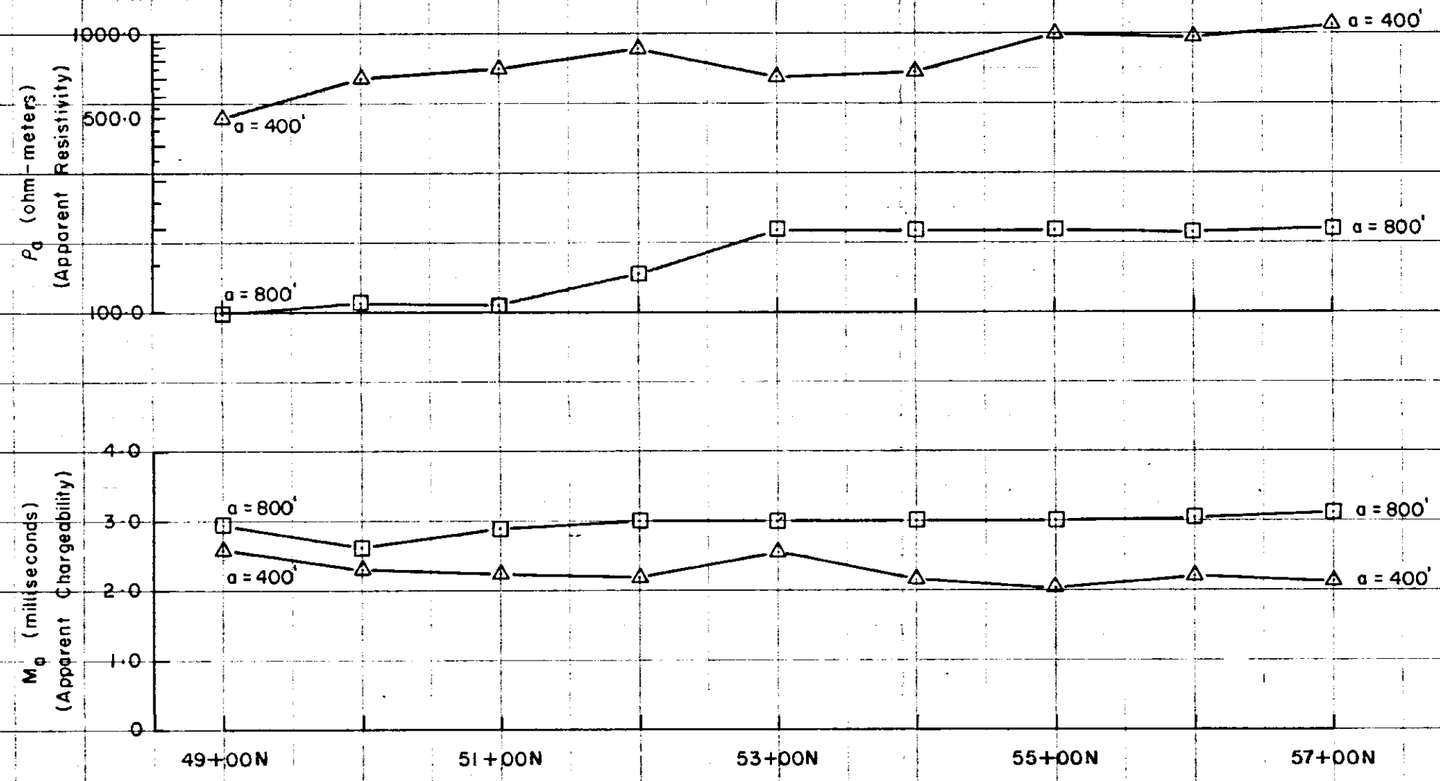
I.P. PROFILE – LINE No. 4

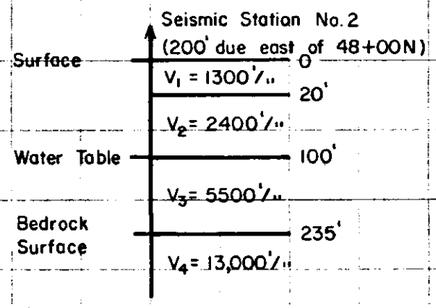
November, 1961.

3 ELECTRODE ARRAY

STA. LOC.




Note:– Section not to scale vertically

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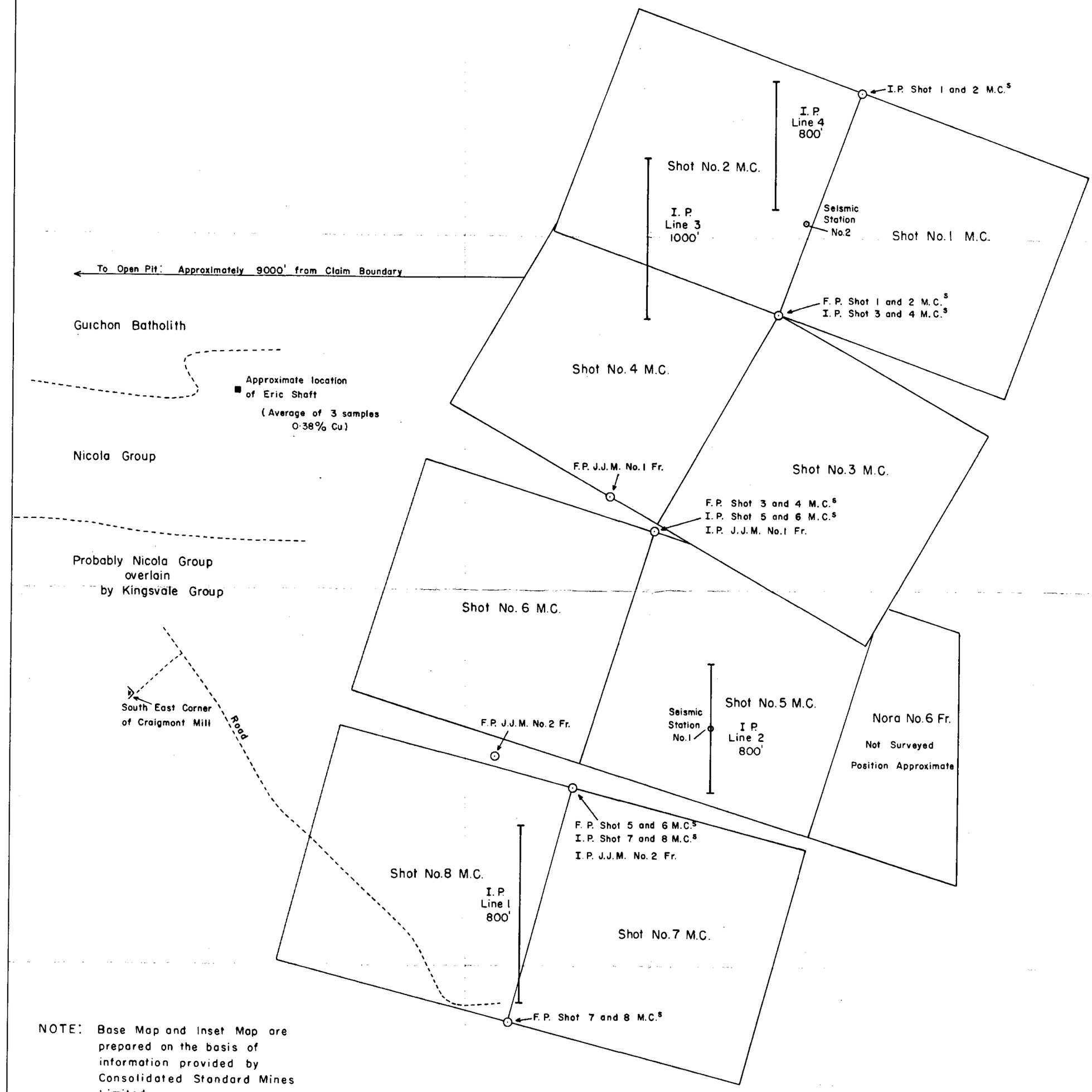
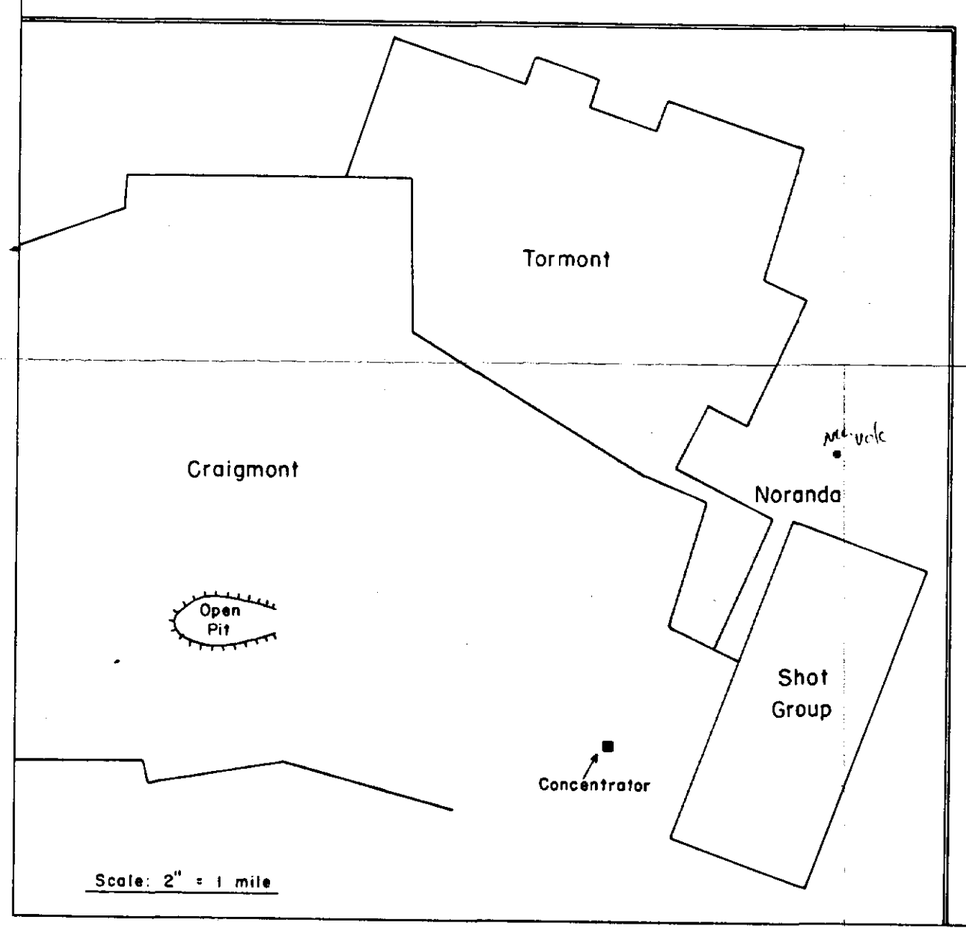
HUNTING SURVEY CORPORATION LIMITED – TORONTO, CANADA

C.W. FAESSLER, GEOPHYSICIST




NOTE: Base Map and Inset Map are prepared on the basis of information provided by Consolidated Standard Mines Limited.

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CONSOLIDATED STANDARD MINES LIMITED

SHOT PROPERTY

MERRITT, B.C.

LOCATION MAP

SHOWING

INDUCED POLARIZATION LINES & SEISMIC STATIONS

SCALE : 1 in. = 500 ft.

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 395 MAP 1

C.W. FAESSLER, GEOPHYSICIST.

HUNTING SURVEY CORPORATION LIMITED - TORONTO, CANADA.
NOVEMBER, 1961