

REPORT ON
AN INDUCED POLARIZATION (I.P.) SURVEY
FARO, SEA & BILL CLAIM GROUPS
WHITEHORSE MINING DISTRICT, YUKON TERRITORY

015107

FOR

ANVIL MINING CORPORATION LIMITED

BY

HUNTEC LIMITED
VANCOUVER B.C.
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INTRODUCTION

General

This report contains the results of an Induced Polarisation survey carried out by Huntec Limited for the Anvil Mining Corporation Limited on the Faro, Sea and Bill Claim Groups in the Whitehorse Mining District, Yukon Territory.

The project was part of a larger program studying the capability of the Induced Polarization method for detecting the type of sulphide mineralization which has been found in commercial quantities during the last few years in this district, and to prospect for additional ore.

A specific purpose of the survey over the Faro and Sea grids was to detect any significant correlation between the I.P. results and known gravity anomalies in the areas.

Field work was carried out between July 29th and August 6th; between August 13th and 15th, and on October 1st, 1967. The field party chief for the survey over the Faro and Sea grids was Mr. John James, and over the Bill grid, Mr. Mark Samilski. The project was supervised from Vancouver by Mr. R. K. Watson.

The Properties

The Faro grid lies close to the Anvil airstrip and base camp and the Bill grid lies approximately 2 miles to the south-east. Both properties are accessible on foot. The Sea grid lies about 28 miles, in a direction $E 35^{\circ} S$, from the Anvil airstrip and access is by helicopter or on foot.

SURVEY SPECIFICATIONS

The Equipment

The Induced Polarization equipment used was a 2.5 kw pulse-type instrument manufactured in Toronto by Huntco Limited. The following specifications apply:

| | |
|---------------------------|---|
| Type of Current | Direct Current broken at periodic intervals |
| Frequency | 1.5 seconds "current on" and 0.5 seconds "current off". Alternate pulses have reverse polarity. |
| Integrating time | 400 milliseconds |
| Maximum power available | 2.5 kw |
| Maximum current available | 3.0 amps |

Measurements taken in the field were:

1. The current flowing through the current electrodes C_1 and C_2 .
2. Primary voltage V_p between measuring electrodes during "current on" time.
3. Secondary voltage V_s between measuring electrodes during "current off" time.

The apparent chargeability (M_a) in milliseconds is calculated by dividing the secondary voltage by the primary voltage and multiplying by 400 which is the sampling time in milliseconds of the receiver unit. The apparent resistivity is calculated by dividing V_p by the current and multiplying by the geometrical factor appropriate to the electrode array being used.

Electrode Configuration

The entire survey was carried out using the pole-

dipole electrode configuration or array. In this array the current electrode C_1 and the two potential electrodes P_1 and P_2 are moved in unison along the line to be surveyed. The quantity "a" or "electrode separation" is the distance between C_1 and P_1 . The distance between P_1 and P_2 is kept at some convenient distance equal to "a" or a simple fraction of "a". For the reconnaissance phase of this survey the value of "a" was kept at 200 feet.

Since the value of "a" is a rough approximation to the depth penetration, detailing of anomalies discovered in the reconnaissance phase was done by profiling the anomalies at different electrode separations. This additional data provides information from which depth, dip and location may more easily be calculated than from a single profile.

RESULTS AND INTERPRETATION

Presentation

The results of this survey and their interpretation are shown on Plate 1 in the rear jacket of this report. They are presented in the form of profiles of apparent chargeability (M_a) and apparent resistivity (ρ_a). The designation "apparent" refers to the fact that the physical quantity measured is of a volume of ground directly beneath and adjacent to electrodes and is a combination of the true chargeability or resistivity of overburden, the bedrock, and any mineralized sections of bedrock. In certain cases the true physical property of these units may be calculated or estimated from the "apparent" physical property.

When an anomaly is detected in the field during the reconnaissance survey additional readings are taken using various electrode separations. This additional detail information is shown in profile form and is used to calculate or estimate certain geometrical parameters and, where possible, values of true chargeability and resistivity. In this report the interpreted depth and geometric shape are shown along with the estimated true chargeability and resistivity (M_2 and ρ_2) on the profiles under each anomaly. These are at scale and interpreted depths may be scaled using the zero datum line as ground level. The existing interpretation techniques allow only a minimum chargeability to be estimated and so the value is designated as "greater than" the interpreted value. The same situation holds for resistivity except that it is a maximum value that can be determined so that the designation is "less than" the true resistivity.

The chargeability of a particular rock unit is a

function of the amount of conductive material within it, and the number, size and distribution of the conductive particles. With this number of variables it is not a simple matter to relate chargeability directly to percentage, or grade of conductive particles. In an area where mineralized bodies have a uniform size and distribution of conductors it may be possible to do this, but only after a sufficient number of holes have been drilled to obtain the necessary information.

In this report no estimate of grade has been made from true chargeability (M_2). It may be assumed, however, that the higher M_2 , the higher the percentage of mineralized particles. It would be hoped that a follow-up procedure of this survey would include a comparison of drilling results and calculated M_2 in order to derive a relationship between them.

It is known that graphite is prevalent in this area and that it will often form a strong conductor. Its unusual feature, when compared to metallic sulphides, is the ability of low percentages of graphite particles to be interconnected and to so form a good conductor. It is believed that a high chargeability anomaly caused by graphite will display a strong resistivity anomaly, whereas one caused by disseminated sulphides will show a comparatively weak resistivity anomaly or none at all. It is hoped that this observation may be used to discriminate between anomalies caused by graphite and those caused by disseminated metallic sulphides. It falls down when the anomaly is caused by massive sulphides, which will, of course, show a strong resistivity anomaly.

Interpretation

(i) Fare Group

Five scattered profiles were run on this grid mainly to check existing gravity anomalies. The results are shown on Plate 1, which also shows the positions of each profile relative to each other.

(a) Lines 160W and 164W

Lines 160W and 164W were surveyed to inspect a gravity anomaly. No anomalous chargeability or resistivity response is seen in either of these profiles. At the southern end of both lines a slight chargeability 'high' can be seen to have a coincident resistivity 'high'. This usually indicates that the electrodes have crossed a contact into a different rock type which has both a higher resistivity and chargeability background, and does not normally indicate a discrete chargeable body. No further work based on the result of the I.P. survey is recommended in this area.

weak high M

(b) Lines 120W and 128W

Lines 120W and 128W show a smooth variation of background from 5 - 10 milliseconds. The lines were not quite long enough to really establish a background and it is difficult to say whether the 10 millisecond readings are anomalous or not. In any case there are no strong shallow chargeable bodies in the area covered by these two lines.

weak anom! w/ lower p.

If there is additional evidence of a sulphide body lying between 63N and 67N on line 120W, and 69N on line 128W, it is recommended that further I.P. surveying be done, both to extend the lengths of the lines to determine a background and to survey at 100 ft. and 400 ft.

electrode separations to obtain some depth response. Otherwise it is considered that the fluctuations in chargeability could be normal within the area and the interest in the area could be dropped.

(c) Line 80W

The profile on line 80W was set up to inspect a broad gravity anomaly of 0.4 milligals which was interpreted to have been caused by a strong mass some 700 feet deep. The gravity data was not available to the writer, but it is clear that the strong I.P. anomaly found on this line comes from a much shallower source. Two shallow causative bodies are interpreted as the source of this anomaly and are shown under the profiles. The true chargeability is estimated as greater than 50 milliseconds for both causative bodies and the true resistivity is estimated as below 50 ohm/metres for the south anomaly, and below 20 ohm/metres for the north anomaly. The resistivity response is not quite as low as would be expected from broad graphite bands of the size shown on the interpretation. It may be more disseminated than usual or the causative body may be composed of partly massive and partly disseminated particles of sulphides. An inspection of the gravity profile in the immediate area should be very helpful in discriminating between massive sulphides and graphite in the immediate area of the anomaly.

If the body causing the gravity anomaly was 700 feet in depth, then the I.P. survey did not make an adequate investigation. The broadest electrode separation used was 400 feet and this was for only four readings between stations 63 and 67. To test an anomaly of this depth separations of 800 feet and 1200 feet should have been used in addition to 200 feet and 400 feet. If this is

contemplated in the future it is recommended that a 7.5 kw or a larger instrument be used to measure the largest spacing.

Further development work in the form of drilling or trenching would be recommended on this anomaly if the gravity and any other geophysics or geochemistry gave a favourable indication of the presence of metallic sulphides.

(ii) Sea Group

(a) Line 8E

The results on line 8E show a low smooth chargeability profile with no prominent anomalies present. The resistivity results show a marked 'low' at the north end of the line where values of ρ_a reached as low as 39. In many areas in this general region resistivity values so low would indicate a massive conductor, but since there is no associated chargeability anomaly it is felt this represents merely a change in bedrock type.

No further development work is recommended on the basis of the I.P. results on this line.

(b) Line 16E

The I.P. survey on line 16E was done to test a gravity anomaly of approximately 0.3 milligals above background. The gravity profile, as provided by Anvil Mining Corporation, is shown directly above the chargeability and resistivity results for this line on Plate 2.

The gravity and chargeability results confirm each other to some degree. The gravity results interpret approximately to be caused by a prism-shaped body with a minimum depth of 275 ft. below ground surface. Without the profiles on adjacent lines it is not possible to make

an accurate determination of size and depth extent. The I.P. results are somewhat incomplete in that the results, measured with a 600 foot electrode separation, appear to be higher in intensity than those measured with a 400 foot electrode separation, although there are only two readings and they do not cover the peak of the anomaly. Using the present information it is interpreted that the causative body is a chargeable mass in the shape of a prism lying 300 ft. or greater below ground surface. This matches the gravity interpretation reasonably well.

A chargeable body having a gravity anomaly is presumably a rather massive section of metallic sulphides. It should, therefore, have a noticeable resistivity anomaly but in this case it is clear that one does not exist. It is considered that this lack of correlation amongst the three types of geophysical data is enough to cast doubt on this interpretation but it does not detract from the area as a potential drilling target. The chargeability anomaly itself is strong and appears to represent a concentration of disseminated conductive particles at a depth of approximately 300 ft. To be certain of this, the profile using electrode separations of 600 feet or 800 feet would have to be completed. The gravity anomaly may be explained by bedrock topography, surface topography nearby, or lithologic changes within the bedrock.

(iii) Bill Group

One short reconnaissance line was done across an existing drill hole, presumably to determine the effect of whatever mineralization had been discovered in the drill hole. None of the drill hole information was available to the writer and so a direct comparison cannot be made in this report.

The results indicate that a large chargeable mass lies at least 300 ft. north of the existing drill hole. Its exact position, extent, and depth cannot be determined because the profiles are quite incomplete. However, from the size of the anomaly measured with an 800 ft. electrode separation it appears to be a very large chargeable mass which may or may not be close to the surface. It is recommended that the profile be continued to the north at some future date in order to fully outline what appears to be a very promising anomaly.

SUMMARY

1. Faro Group

An I.P. survey was done on five scattered lines within the Faro Grid to inspect gravity anomalies. The only profile to show any I.P. response was on line 80W. A strong anomaly was detected on this line, which indicates a relatively shallow causative body with strong chargeability and fairly low resistivity. The significant fact is that this body probably did not cause the gravity anomaly if the depth interpretation of the gravity anomaly is correct. To properly confirm the existence of this gravity anomaly it is recommended that the I.P. survey be continued using electrode separations of 800 ft. and 1200 ft. If other geophysical or geochemical information confirms the existence of the present I.P. anomaly it is recommended that further work be done in this area in the form of drilling or trenching.

2. Sea Group

Two profiles were surveyed by the Induced Polarization method. Line 16E was the only line which yielded a recognizable I.P. anomaly. The chargeability and gravity anomalies on this line appear to come from the same causative body, but there is not any confirming evidence on the resistivity profiles. The explanation may lie in the fact that the chargeable body is heavy without being conductive, but this is unusual in this geological setting. It may also be explained by a causative body made of disseminated conductors, and a gravity anomaly which is caused by

bedrock topography or surface topography and which accidentally coincides with the chargeability anomaly.

The I.P. profiling did not completely outline the anomaly and it is recommended that this work be completed with an electrode separation of 800 ft. before any further decisions are made to drill the anomaly.

3. Bill Group

The profile on the Bill Group showed the beginning of a large anomaly to the north end of the line. It was not completed and it is recommended that the I.P. work be continued to the north to fully outline what appears to be a very promising anomaly.



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A handwritten signature in black ink that reads "R. K. Watson". The signature is written in a cursive style with a large, sweeping "W".

R. K. Watson, B.A.Sc., P.Eng.
Geophysicist

APPENDIX A
ASSESSMENT CREDIT DATA

| <u>Miles Surveyed:</u> | <u>Line-Miles</u> |
|-----------------------------------|-------------------|
| Paro Claim - Reconnaissance Phase | 1.70 |
| - Detail Phase | <u>0.42</u> |
| Total | 2.12 |
| Sea Claim - Reconnaissance Phase | 0.68 |
| - Detail Phase | <u>0.65</u> |
| Total | 1.33 |
| Bill Claim - Reconnaissance Phase | 0.15 |
| - Detail Phase | <u>0.15</u> |
| Total | 0.30 |

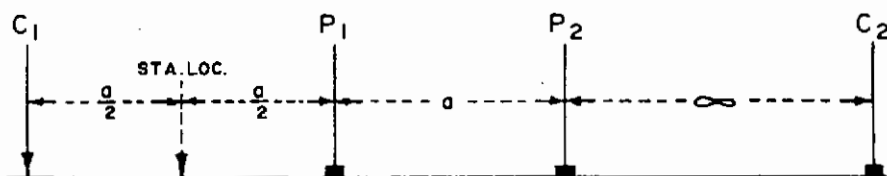
Personnel:

| <u>Name</u> | <u>Occupation</u> | <u>Date</u> |
|--------------|----------------------|---|
| J. James | Operator/Party Chief | July 29 - Aug. 6, Aug. 13 - 15, 1967 |
| M. Samilski | Operator/Party Chief | July 29 - Aug. 6, Aug. 13 - 15, 1967 |
| A. Hovi | Operator | July 29 - Aug. 6, Aug. 13 - 15, Oct. 1, 1967 |
| P. Bucholts | Helper | July 29 - Aug. 6, Aug. 13 - 15, Oct. 1, 1967 |
| M. Lowey | Helper | Oct. 1, 1967 |
| J. Sadler | Helper | Oct. 1, 1967 |
| E. Helkio | Drafting | Nov. 23 - 24, 1967 |
| D. Wilson | Drafting | Nov. 20 - 23, 1967 |
| R. K. Watson | Geophysicist | Nov. 22 - 24, 1967 |
| W. A. Finney | Geophysicist | Nov. 20, 1967 |
| M. Vatcher | Typing | Nov. 27, 1967 |

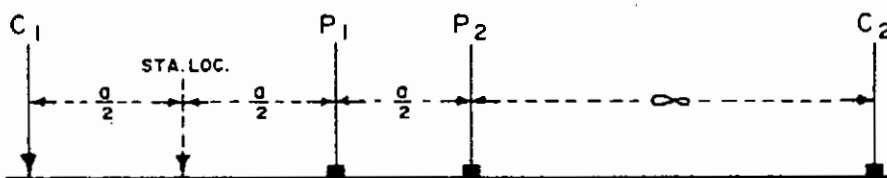
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Sea, Faro, and Bill Claim Groups.

3 - ELECTRODE ARRAY



POLE - DIPOLE ARRAY



NOTE:

P₁ P₂ are Receiver Electrodes.
C₁ C₂ are Transmitter Electrodes.

LEGEND

- ——— ● a = 50'
- ——— ○ a = 100'
- X ——— X a = 200'
- ——— ■ a = 300'
- △ ——— △ a = 400'
- ▲ ——— ▲ a = 600'
- ——— □ a = 800'

Horizontal Scale: 1 inch = 200 feet.

Vertical Scales:

Chargeability 1 inch = 5.0 milliseconds.

Resistivity 2 inches = 1 logarithmic cycle (ohm-meters)

DATE: NOV., 1967.

JOB N^o: PH-666-6