

808

REPORT ON

AN INDUCED POLARIZATION SURVEY.

OSOYOOS, B. C.

FOR

TORBRIT SILVER MINES LIMITED

BY

HUNTEC LIMITED

TORONTO, ONTARIO

JULY, 1966

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INTRODUCTION

Between April 11th and May 28th, 1966 an Induced Polarization (I. P.) survey was carried out by Hunttec Limited for Torbrit Silver Mines Limited on a property situated in the Osoyoos Mining District of British Columbia. The property is located on the eastern slope of Kruger Mountain to the west of Osoyoos Lake about a mile from Osoyoos, B. C.

The geophysical crew was managed in the field initially by B. H. Howes and in the latter stage by A. Schamotta, and was supervised from Vancouver by P. E. Lane. The field crew consisted of four men except in the latter half of the survey when an additional man was used. All personnel connected with the survey are listed in the appendix to the report. Final interpretation, drafting and typing of the field report was done in the Toronto office of Hunttec Limited. The I. P. survey consisted of reconnaissance and detail phases using an electrode configuration known as the 'three-electrode array' and covered a total of 28 miles along picket lines cut in an approximate north-south direction. In addition to the I. P. measurements, simultaneous readings of resistivity were made. The reconnaissance data is presented in the form of contours of chargeability and resistivity. Detailed sections are shown in profile form.

TOPOGRAPHY AND GEOLOGY

The eastern portion of the area surveyed, to approximately Line 40E is gently rolling terrain. However, west of this the terrain becomes hilly with the contours running generally north-south.

A low terrace area in the northeast portion of the area is covered by overburden which thins as the higher ground to the south and west is approached.

A diversity of rock types occurs in the surveyed area. Sedimentary and volcanic rocks of the anarchist series have been intruded by diorite, gabbro and granodiorite. The latter forms the Osoyoos Batholith and outcrops in the northwest corner of the survey area. The diorite gabbro assemblage together with the anarchist series is of greatest areal extent about and south of the baseline. The anarchist series consists of limestone, chert, and calcareous greenstone; greenstone; shist; slaty beds, and calcareous shist. A number of lamprophyre dikes strike approximately northeast across this area.

Faulting in the area trends from almost north-south to N 35°E. Greenstone bands strike in a similar direction and dip to the northwest as a result of folding.

Considerable previous exploration for gold has concentrated on quartz veining in the area and the occurrence of pyrite and chalcopyrite has been mentioned incidentally in reports on these investigations. Additional disseminated pyrite occurs in the rocks of the anarchist series, particularly in the greenstones.

Copper and molybdenum mineralization is associated with a pegmatite dyke in the grand diorite. This is exposed in trenching on the Gem claim,

SURVEY SPECIFICATIONS

The equipment used was a pulse-type I. P. instrument manufactured by Hunttec Limited in Toronto. Power is obtained from a gasoline motor, coupled to a 2.5 kw, 400 cycle, three-phase generator, providing a maximum of 7.5 kw 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 recorded in the field consist of careful measurements of the current (I) in amperes flowing through electrodes C_1 and C_2 , the primary voltage (V_p) appearing between P_1 and P_2 during the "current on" part of the cycle, and a secondary voltage (V_s) appearing between P_1 and P_2 during the "current off" part of the cycle. 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 in ohmmeters is proportional to the ratio of the primary voltage and the measured current, the proportionality factor depending on the geometry of the array used. The resistivity and chargeability obtained are called "apparent" as they are values which that portion of the earth sampled by the array would have if it were homogeneous. As the earth sampled is usually inhomogeneous, the calculated apparent resistivity and apparent chargeability are functions of the actual resistivity and chargeability of the rocks sampled and of the geometry of the rocks.

The survey was carried out using the "three-electrode array" system. In this system, the current electrode (C_1) and two potential electrodes (P_1 and P_2) are moved in unison along the survey lines. The spacing between C_1 and P_1 is kept constant for each traverse, at the figure roughly equal to the depth to be explored by that traverse. The second electrode (C_2) is kept fixed at "infinity".

Thus, on a three-electrode traverse with a spacing of 200 feet, a body lying at a depth of 100 - 300 feet will produce a strong response, whereas one at a depth of 400 feet will react very weakly. By running subsequent traverses at different electrode spacings, more precise estimates can be made of depth to the top of causative bodies, as well as more detailed information on the geometry and extent of the bodies.

The "three-electrode array" with a 200 foot electrode separation was used over most of the surveyed area except in the northern portions where the overburden was considered to be thick. There a 400 foot electrode separation was employed. Plates 1 and 2 indicate the area where the 200 and 400 foot electrode separations were used.

Further "three-electrode array" measurements were then taken at an electrode separation of 100 and 400 feet to give additional information for the selection of drilling targets.

INTERPRETATION PROCEDURES

I. P. interpretation procedures have been most completely developed in situations of horizontal layering and for bodies such as porphyry coppers of large lateral extent. The complex problem of resolving the combined effects of depth, width, dip and true chargeability of steeply dipping bodies, together with the physical characteristics of overburden and country rocks, has not been solved theoretically. The interpreter must rely in part on empirical solutions plus experience gained from surveys over known bodies in other areas.

The interpretation maps submitted with this report indicate certain anomalous zones which may correspond to disseminated sulphide mineralization. The actual bodies are probably narrower than the indicated zones as shown on the accompanying profiles. Estimates of depth to the top of mineralization have been made on some anomalies by virtue of the three-electrode data. Drill holes have been spotted based on these depths and positions of the probable causative body.

RESULTS AND INTERPRETATION

Reconnaissance Survey

Plates 1 and 2 present the results of the reconnaissance survey in the form of plan contours combined with the outline of claims surveyed as supplied by Torbrit Silver Mines Limited. Plate 1 presents the values of chargeability in milliseconds. The contour interval is one millisecond. Plate 2 presents the values of apparent chargeability in units of ohmmeters and the logarithmic contour intervals of 30, 40, 60, 80, 100, 150, 200, 300, 400, 600, 800, 1000, 1500, 2000 and 3000 ohmmeters.

Inspection of the chargeability results reveal a wide range in background values which are related to diverse geologic conditions, of differences of rock types and varying thicknesses of overburden. Over a large portion of the northeast quadrant of the surveyed area, the background ranges from about 0 to 2 milliseconds. The low background values appear to be associated with the mapped overburden areas. In the northwest portion of the surveyed area, the range of background values increases slightly from about 4 to 5 milliseconds, corresponding with the granodiorite of the Osoyoos Batholith.

About and mainly south of the baseline the background values appear to range from 5 milliseconds to 9 milliseconds as might be

expected in an area of wide spread but not uniformly distributed disseminated sulphides.

Resistivity values similarly exhibit a wide range of values from 20 to 3000 ohmmeters, which also may be attributed to difference in rock types and varying thickness of overburden. The area covered by overburden has a low range from about 20 to 100 ohmmeters. The granodiorite ranges from about 1000 to 3000 ohmmeters. The rocks of the anarchist series, about and south of the baseline, range from 200 to 1500 ohmmeters. The limestones of this series have values mainly within the range of 300 to 800 ohmmeters and the diorite and gabbro from 800 to 1500 ohmmeters. The distribution of the greenstone is limited and a general level of resistivity is not obvious.

There are some indications of linearity in the apparent resistivity contours in the northwest portion of the surveyed area which may separate the underlain granodiorites of the north from the diorites and gabbros to the south.

Three major anomalous zones and five minor zones of interest have been interpreted from the data obtained. The three major zones are notated as Zone A, Zone B, and Zone C. The remaining zones of interest continue the notation to Zone H.

The following is a description of the forementioned zones.

Zone A

As indicated on Plate 1, Zone A is enclosed by the 9 millisecond contour. The irregular shape of this zone may be a result of the causative body being very shallow relative to the electrode spacing used, or irregular zones of sulphide mineralization. Within the zone are several local areas which reach chargeability readings in excess of 12 milliseconds, the maximum chargeability reach being 15 milliseconds on Line 24 at Station 9+00E. A maximum chargeability value of 13.2 milliseconds was recorded in the vicinity of the old mine shaft. Any information of existing sulphide mineralization could possibly be used as an aid in evaluating this zone. The local areas which produce chargeability readings in excess of 12 milliseconds may possibly be due to increased sulphide mineralization and appears to be related to limestones of the anarchist series which are mapped in this area. At Station 15+00S on Line 24+00E within the anomalous zone a chargeability reading of 11 milliseconds is recorded which appears to originate from the greenstone mapped at this location. This relatively high value tends to contribute to the irregularity of the anomalous zone.

Detail Line 24+00E which contains a composite of values for electrode separations of 100, 200 and 300 feet from about Station 39+50S to 13+00N was used in the evaluation of Zones A, D and H.

Considering the portion of Detail Line 24+00E that traverses Zone A between Stations 8+00S and 13+00S, a maximum chargeability value of 18.4 milliseconds was obtained on the 100 foot spacing. The detail data about this anomalous response indicates a shallow body probably extending quite near the surface and continuation much below 200 feet is doubtful. A very sharp resistivity drop displaced northward may probably be related to the anomaly indicating an increase in conduction possibly due to increased sulphide mineralization. The existing data indicates a maximum width of 500 feet.

Zone B

As indicated on Plate 1 this zone enclosed by the 9 millisecond contour appears to be continuous with the east-west trend of Zone A and may be part of some larger anomalous features. The zone is underlain by limestone which is irregularly exposed through an overburden cover. The maximum chargeability reached is 16.1 milliseconds at 2+00S on Line 44+00E. The resistivity varies within the range associated with the limestones. However, no correlation is found to suggest that the more highly anomalous zones are more conductive. Line 44+00E was detailed across the anomalous zone with additional electrode separations. The data from the 100 foot separation (maximum chargeability 19.2 milliseconds) indicates the anomalous source to be at a shallow depth of about 100 feet and approaching the surface. Indications exist that the anomalous zone

with an apparent maximum width of 400 feet may be made up of several shallow narrower zones.

Northward, between 4+00N and 6+00N, an additional narrow anomalous zone appears with a much weaker concentration down to about 100 feet. As the 200 foot spacing did not continue across this area, existing data suggests that it extends to a depth greater than 200 feet and possibly less than 400 feet.

Zone C

This zone enclosed by the 9 millisecond contour indicates a northeast trend. Geologic mapping in this area indicates that diorite, greenstones, and overburden underlie the anomalous area. Resistivity values do not generally correlate with the chargeability. The maximum chargeability reached is 16.1 milliseconds on the 200 foot electrode separation. Further detail data for this zone was obtained from 0+00 to 16+00S on Line 68+00E. The additional data indicates that the source is mainly concentrated within 200 feet of surface between 8+00S to 1+00S. The resistivity data indicates an increase in conductivity over the anomaly.

Zone D

This zone located about Station 36+00S on Line 24+00E is partially enclosed by the 8 millisecond contour and is open to the west. A maximum chargeability of 12 milliseconds was recorded at Station 36+00S on the 200 foot electrode separation. Detail data between Stations 34+00S and 38+00S indicate an anomalous source about 200 feet wide with the main source of the anomaly centered at a depth of 200 feet. The data indicates weaker mineralization reaching to about 100 feet below surface and extending to a depth of about 350 feet. Resistivity data indicates conduction at a shallow depth which may be due to overburden and a highly resistive condition at depth.

Zone E

This zone is located between Lines 16+00W and 24+00W on the southern edge of the Bluebell claim. It is not completely covered by the reconnaissance survey and is open to the south and west. The maximum chargeability of 18 milliseconds is reached at Station 13+00N on Line 20+00W. A resistivity decrease over the maximum chargeability indicates that the rock is relatively more conductive.

The incompleteness of the coverage and lack of detailed information over this anomalous zone make an interpretation with any reasonable degree of accuracy unreliable.

Zone F

This zone is located in the southwest corner of the Whistler claim between Lines 0+00 and 4+00E. The zone remains open to the south. A maximum chargeability of 8.9 milliseconds was reached at Station 1+00N on Line 0+00 and the resistivity data suggests that the zone is associated with the limestones mapped in the area.

Zone G

This anomalous zone is assumed to lie within the granodiorite and appears to strike approximately east-west from Line 12+00E to Line 20+00E at the northern extremities of these lines. The zone is open to the east and west. Readings in excess of 6 milliseconds are considered anomalous and possibly caused by weak sulphide mineralization. The resistivity contours trend to some extent with the chargeability contours. The resistivity values show no significant indication that any mineralization present has influenced the conductive properties of the rock in this area.

Zone H

Data for Zone H was obtained with the reconnaissance spacings of 200 and 400 feet. The zone is located between Lines 12+00E and 28+00E and extends north of the baseline about 1200 feet. High chargeability readings from 8.0 to 13.8 milliseconds on the 400 foot reconnaissance spacings qualify this area as a zone of possible interest. The trend of

the resistivity contours suggest a possible correlation with the chargeability contours. The anomalous zone appears to be associated with the underlain granodiorite and to possible limestone contacts in the area.

Although Zones A, B, F and H are discussed separately, the suggested east-west and northeast-southwest trends of the chargeability contours may be associated with similar trends in the adjacent zones and may possibly be part of some larger anomalous feature.

RECOMMENDATIONS

The following diamond drill holes are recommended to sample anomalies outlined by detailing in order to evaluate the anomalous zones.

Zone A and D

D. D. H. 1 Line 24+00E, 10+75S, north along picket line
with inclination 45°. Total length 200 feet.

Such a hole is expected to encounter the causative body of Zone A at Station 9+50S at a down hole distance of 100 feet to 200 feet.

D. D. H. 2 Line 24+00E, 38+00S, north along picket line
with inclination 45°. Total length 350 feet.

Such a hole is expected to encounter the causative body of Zone D at Station 36+00S at a down hole distance of 200 feet to 350 feet.

Zone B

D. D. H. 3 Line 44+00E, 2+75S, north along picket line
with inclination 45°. Total length 150 feet.

Such a hole is expected to encounter the causative body of Zone B at Station 2+00S at a down hole distance of 75 feet to 150 feet.

Zone C

D. D. H. 4 Line 68+00E, 5+50S, north along picket line
 with inclination 45° . Total length 500 feet.

This hole is expected to encounter the shallow causative body of Zone C at Station 4+00S at a down hole distance of 100 feet to 250 feet and a possible deeper causative body at Station 2+00S at a down hole distance of 300 feet to 500 feet.

Diamond drill hole locations based only on reconnaissance data are liable to be inaccurate and are not recommended. In order to direct additional diamond drill holes accurately, the anomalies should be further surveyed by reconnaissance over intermediate lines followed by multiple electrode detailing over lines selected from data thus obtained.

SUMMARY AND CONCLUSIONS

The chargeability data from the I. P. survey indicated three anomalous zones and five minor zones that appear strong enough to indicate the presence of metallic sulphide mineralization. Accordingly, detail I. P. profiles were made over the three major anomalous zones and two of the minor zones. From the detailed profiles the strong I. P. responses in the three major anomalous zones appear to be related to the limestones and greenstones of the anarchist series underlying these areas. Four exploratory drill holes with a total of 1200 feet have been recommended with further I. P. work pending the results of drilling in order to define and evaluate other anomalies in the area.

HUNTEC LIMITED

E. L. Gregotski

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APPENDIX

1. Instrument

The geophysical instrument used was the Huntec pulse-type Induced Polarization unit, with a power rating of 2.5 kw.

2. Miles Surveyed

The Induced Polarization survey consisted of reconnaissance and detail phases using the "three-electrode" electrode configuration. The detail work entailed using various electrode spacings over lines selected on the results of the reconnaissance survey.

	<u>Miles</u>	<u>Stations</u>
Reconnaissance	24.5	667
Detail	<u>3.5</u>	<u>137</u>
	28.0	804

3. Claims Covered

Completely surveyed:

Blue Bell, Bertha Frn., Moly 1, 2, 4, Moly Frn., Moly 3 Frn.,
Hub 1-4 inclusive, Whistler, Treasury, Ianto, Cat Frn.,
California, Chukar 1-7 inclusive, Chukar Frn., Chukar 8 Frn.,
Chukar 9 Frn., Osoyoos-Hellar, Dividend, Dividend Frn.,
Little Manx Frn., Manx, Eagle Frn., Lakeview, Quail Frn.,
Bullfrog, Bullseye Frn., Gem, Copper King, Tiger Frn., Molka.

Partially surveyed:

Orient, Lion Frn.

4. Assessment Work

	<u>8-Hour Man-days</u>
Field Work	166
Calculations and Drafting	12
Interpretation and Report Writing	10
Office Typing and Supervision	3

5. Personnel Employed on Survey

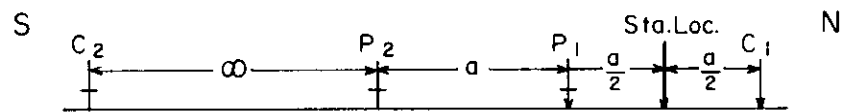
<u>Name</u>	<u>Occupation</u>	<u>Address</u>	<u>Dates</u>
R. K. Watson	Senior Geophysicist	1450 O'Connor Dr., Toronto 16, Ontario	July 14-15, 1966
E. L. Gregotski	Geophysicist	"	July 8-15, 1966
P. E. Lane	"	"	Apr. 13 - May 28, 1966
B. H. Howes	Senior Operator	"	"
A. Schamotta	"	"	May 14-28, 1966
G. Boulay	Operator	"	Apr. 13 - May 28, 1966
R. Carisse	"	"	"

<u>Name</u>	<u>Occupation</u>	<u>Address</u>	<u>Dates</u>
J. McEwing	Helper	Box 457, Osoyoos	Apr. 13 - May 28, 1966
A. Steward	"	R. R. 1 Hazelton, B. C.	May 17-28, 1966
Miss J. Wilson	Drafting	1450 O'Connor Dr., Toronto 16, Ontario	June 22-24, 27, July 7-8, 11, 1966
Miss H. Ricketts	"	"	June 23-24, 27, July 15, 1966
Mrs. L. Brunton	Typing	"	July 15, 1966

DETAIL I. P. PROFILES WITH INTERPRETATION

Lines 24+00E, 44+00E, 68+00E

3 ELECTRODE ARRAY



Horizontal Scale: 1 inch = 200 feet

Vertical Scales:

Chargeability: 1 inch = 4.0 milliseconds

Resistivity: 2 inches = 1 cycle (logarithmic)

INTERPRETATION LEGEND



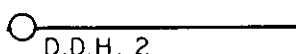
Strongly anomalous zone



Anomalous zone



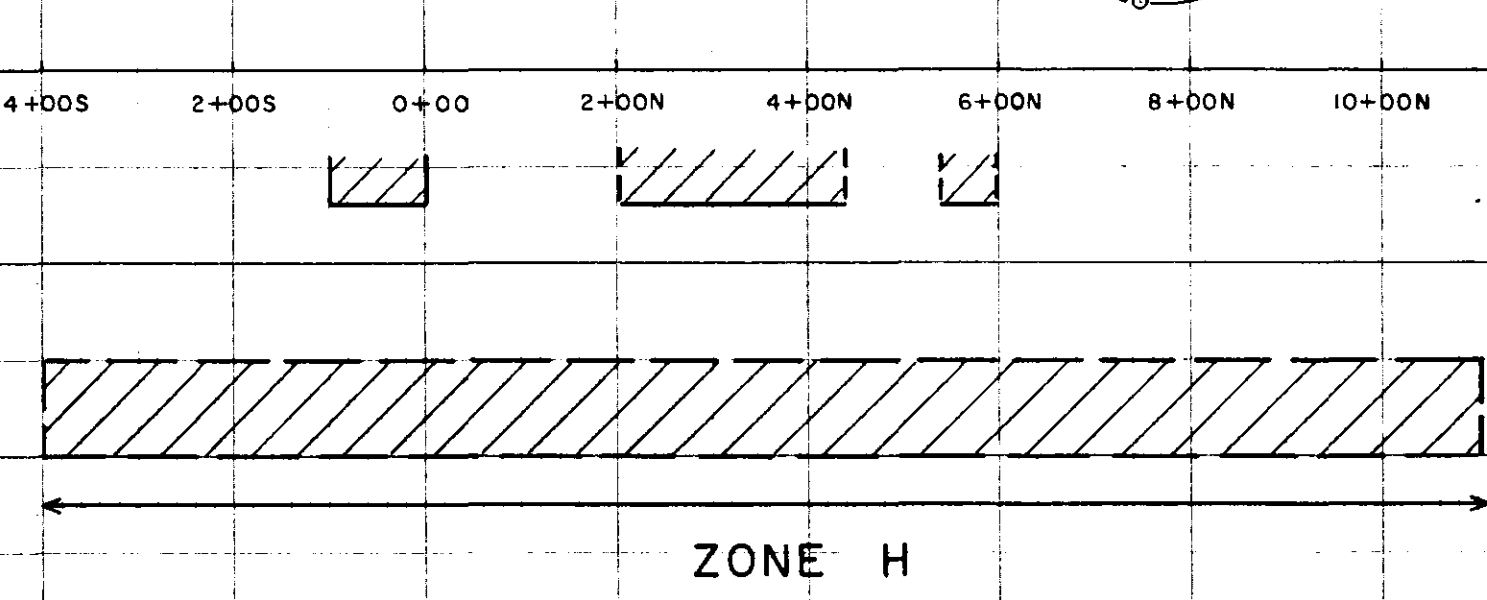
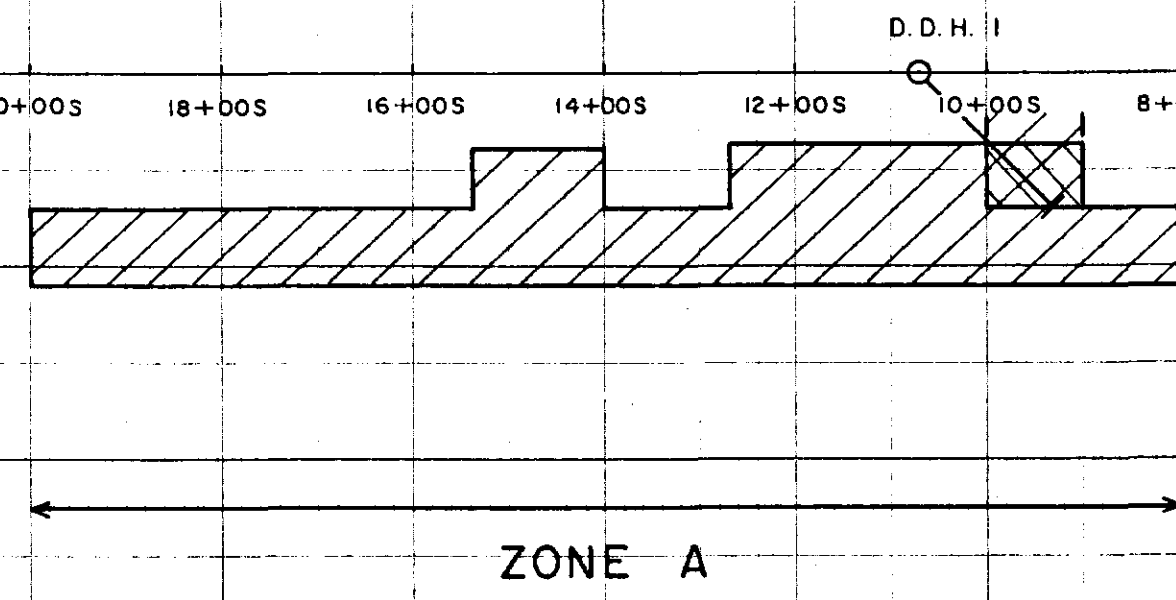
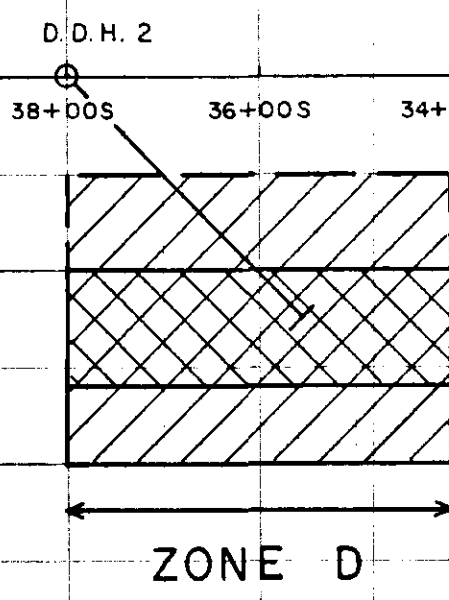
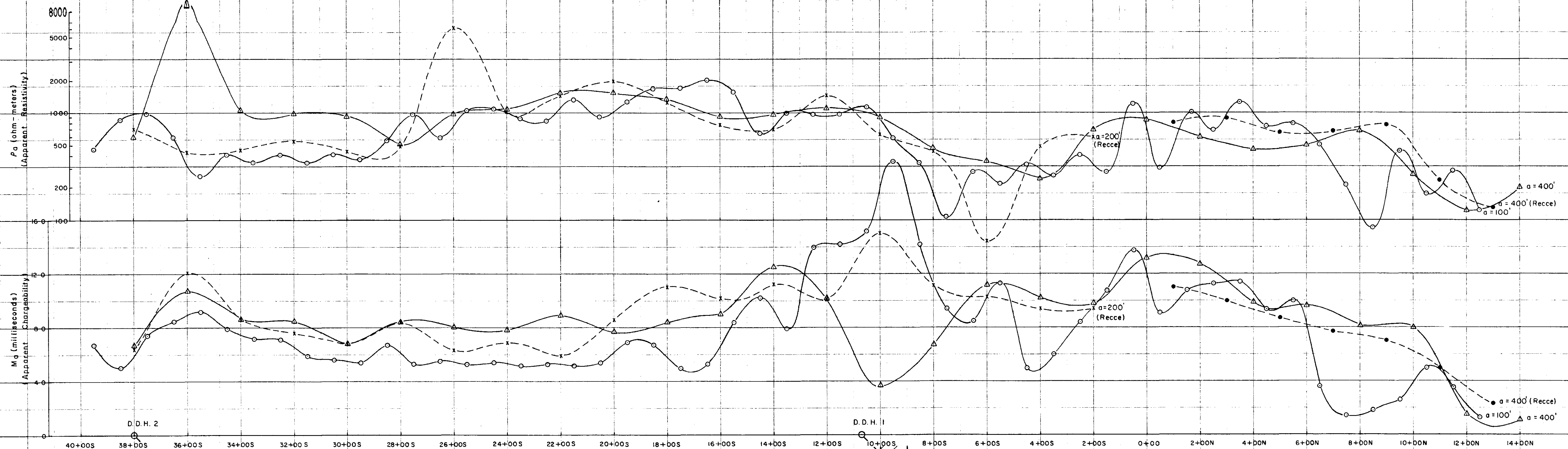
Possible anomalous zone



Recommended drill hole

DETAIL I.P. PROFILE

LINE 24+00E

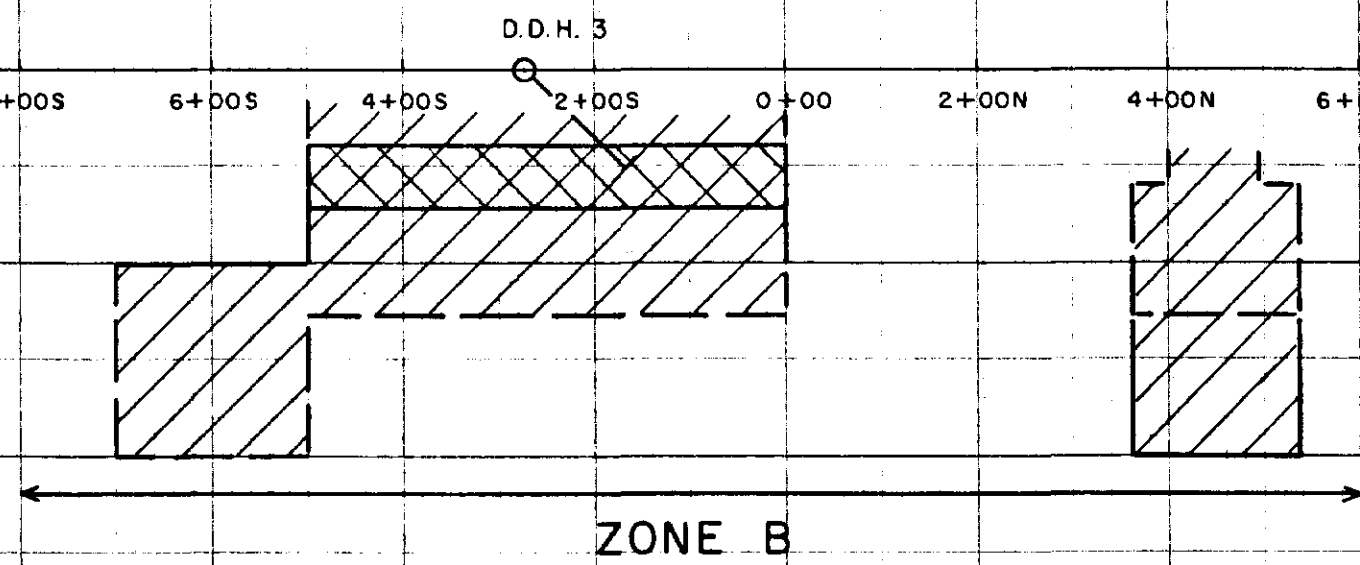
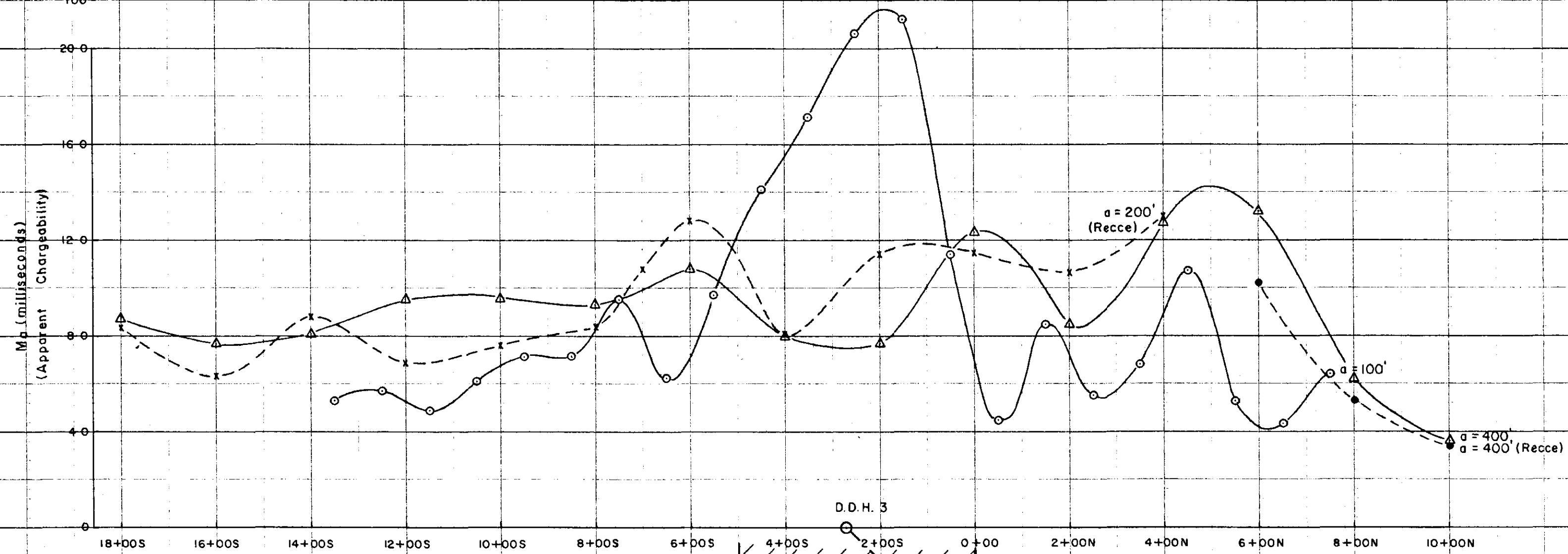
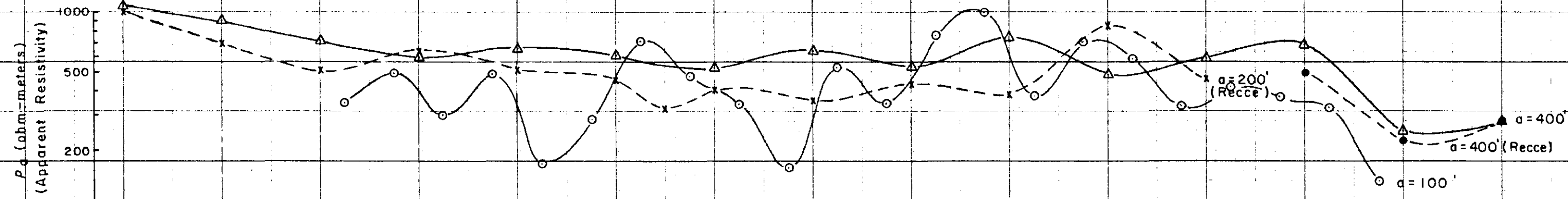


Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 808 MAP # 1

To accompany report by: *E.L. Gregotski*
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DETAIL I.P. PROFILE
 LINE 44+00E

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 NO. 808 MAP # 2

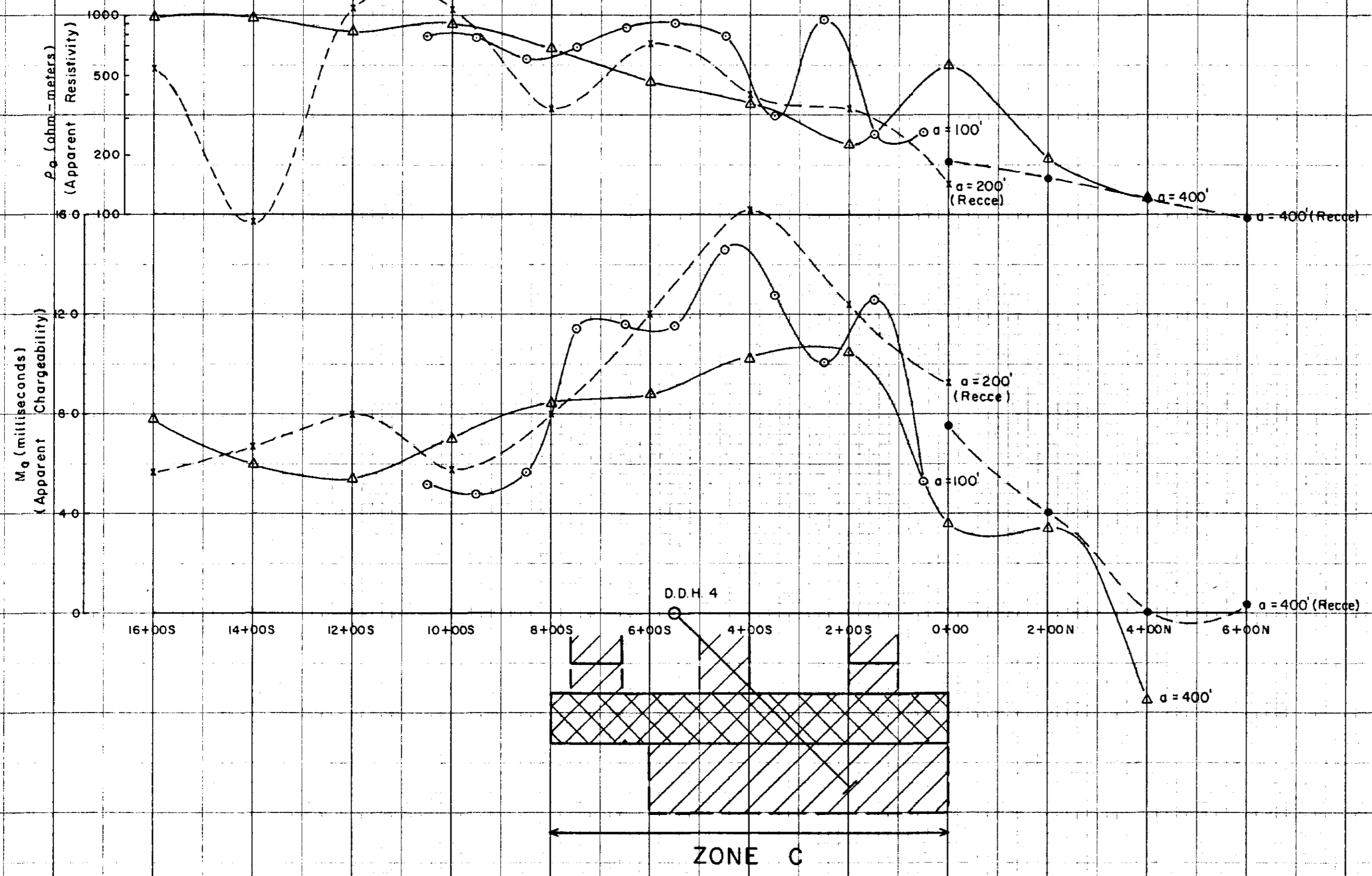
To accompany report by: *P. L. Gregotski*
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DETAIL I.P. PROFILE

LINE 68+00E



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NO. 808 MAP # 3

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NO. 808
MAP # 4
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Department of



TORBRIT SILVER MINES LIMITED

INDUCED POLARIZATION SURVEY
OSOYOOS, B. C.

PLATE 2

APPARENT RESISTIVITY CONTOURS

Contours at (logarithmic intervals) 30, 40, 60,
80, 100, 150, 200, 300 etc. ohm-meters.

SCALE: 1 inch = 400 feet

To accompany report by: *P. E. Lane*
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