# BETHEX EXPLORATIONS LTD. (N.P.L.)

GEOPHYSICAL SURVEY OF BABINE PROPERTY, B.C. (Lat. 55°00 - Long. 126°03')

TREK GROUP OF CLAIMS

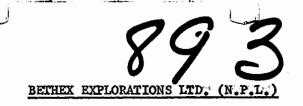
TREK CLAIMS 1-100 TREK FRACTIONAL CLAIMS 1-5

OMINECA M.D.

Work performed July 24th to September 29th, 1966 Supervised by : C. J. Coveney, P.Eng.

931/16E





## REPORT ON

## GEOPHYSICAL SURVEY

TREK GROUP OF MINERAL CLAIMS

BABINE AREA, B.C.

Latitude 55<sup>0</sup>00 Longitude 126<sup>0</sup>03'

OMINECA M.C.

Work performed July 24th to September 29th, 1966

Owner: Bethex Explorations Ltd. (N.P.L.)

NOVEMBER 25th, 1966

BY

T. SUZUKI

T. YOKOYAMA

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ACCOMPANY PLANS AND PROFILES.

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#### 1. INTRODUCTION

Geophysical surveys were carried out from July 24th, to September 29th, 1966, over the Babine Lake property in British Columbia. Of the 100 claims and 5 fractions comprising the TREK GROUP, only 50 claims and 5 fractions were covered by the geophysical surveys.

## 2. INDUCED POLARIZATION PROCEDURES

I-P reconnaisance (hereafter induced polarization is abbreviated as I-P) was measured at 200' intervals along the lines, using pole-dipole array with electrode separation of 200'.

The detail I-P survey was done on some parts of surveyed areas, using pole-dipole or dipole-dipole array with electrode separation of 200', 400' and 600' (n=1, 2. and 3.).

The I-P reconnaisance data are presented as contoured plans of metal factor (M.F.), frequency effect (F.E.) and apparent resistivity ( $\frac{\rho}{\rho}/2\pi$ ), using a scale of 1" to 200'.

The detail data are shown as sections using 1" to 200' or 1" to 100' scale.

I-P measurement was carried out by means of the variable frequency method using the Mcphar Type instruments of which the generator provided 0.3 and 5 cycle-per=second current of 2.5 K.W. to ground.

Careful attention was paid to the regulation of current flowing through C, and C<sub>2</sub>, and to reading of voltage and frequency effect appearing between  $P_1$  and  $P_2$ . Apparent resistivity is proportional to voltage and inversely proportional to supplied current and the proportional coefficient depends upon the geometry of the array used. Metal factor is calculated from frequency effect and resistivity.

Formulae shown as follows :

F. E. = 
$$\frac{P_{DC} - P_{AC}}{P_{AC}} \ge 100$$
 (%)  
M. F. =  $\frac{\frac{P_{DC} - P_{AC}}{P_{AC}} \ge 100}{\frac{P_{DC}}{2\pi}} \ge 1000$   
Apparent Resistivity =  $\frac{P_{DC}}{2\pi}$ 

These parameters which are used on the basic of the assumption that the electrical properties and the geometry of subsurface are homogeneous.

The data plotting procedure is shown on the accompanying plans and profiles.

 $C_1$ ,  $P_1$ ,  $P_2$ , for the pole-dipole array and  $C_1$ ,  $C_2$ ,  $P_1$ ,  $P_2$ , for the dipole-dipole array are moved in unit length along the lines. For pole-dipole array, the infinite electrode is placed away from  $P_2$ , about ten times of the distance between  $C_1$  and  $P_1$ . The current wire for the infinite electrode must be pulled down in a right-angled way to the line to be measured, unless the electrode-magnetic coupling or capacitive coupling occurs between the current wire and the potential wire.

Stainless steel electrodes were used for the current electrodes ( $C_1$ ) and porous pots for the potential electrodes ( $P_1$  and  $P_2$ ).

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Copper screen electrodes with salt water are, in cases, used instead of stainless steel electrodes.

The variable, frequency method measures polarization in the ground. It is detected by decrease in apparent resistivity as frequency of the applied current is increased.

Frequency effect correspond with chargeability of the pulse method.

Metal factor corrects effect of variations in absolute resistivity of rocks and has been experimentally proven to be proportional to the content of metals or submetals, (See Table 1), so that it can be generally used as an indicator of mineralization.

### Table 1

#### Common Metal Factor Values

Rock Type and Mineralization	Metal Factor
unmineralized granite	< 1
unmineralized basic rocks	1~10
finely disseminated sulphide	10 ~ 100
disseminated sulphide	100 ~ 1000
fracture filling sulphide	1000 - 10000
massive sulphide	> 10000

Reference: T. R. Madden et. al., Background Effects in the Induced Polarization Method.

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Resistivity Value of Rocks and Minerals

Rocks and Minerals	Phen feet
Basalt	$4 \times 10^3$
Granite	$60 - 2 \times 10^3$
Diorite	10 <sup>4</sup>
Sandstone	$6 - 2 \times 10^4$
Shale	$0.2 - 2 \times 10^3$
Clay	$0.2 - 2 \times 10^2$
Chalcopyrite	$3 \times 10^{-5}$ $8 \times 10^{-2}$
Magnetite	$10^{-3}$ 10
Graphite	$2 \times 10^{-6} 10^{-2}$
Pyrite	$1 \times 10^{-4} - 2 \times 10^{-2}$

It must, however, be noticed that a frequency effect could be a better indicator than metal factor in some cases; for example, in the case that mineralization is restricted to highly resitive rocks which are surrounded by rocks with considerably low resistivity. Moreover, I-P phenomenon could be caused not only by metals but also by clay, graphite and so on. In conductive medium, electro-magnetic coupling effect gives rise to high frequency effect without metals.

Accordingly, it should be essential for geophysisist to interpret data with careful attention for geological environment.

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### 3. MAGNETOMETER SURVEY

Magnetic survey, using sharp flux gate type magnetometer, was done over the Babine Lake property as a preliminary survey in advance of I-P survey.

Where magnetic methods are used for prospecting ore deposits or non-ferrous metal, it is important to consider its adaptability to the geological environment of the ore deposit concerned. The Granisle Copper property lying about 3 miles to the southwest, contains sufficient magnetite to give a magnetic anomaly. Therefore, when searching for a deposit of this type it is more efficient to cover the ground first with a magnetic survey, followed by a check of the magnetic anomaly with I-P equipment. This procedure greatly reduces the area that requires I-P coverage.

The vertical component of the earth magnetic field was measured at 100 feet intervals along lines. The result is shown as profiles of anomalous magnetic force ( $\triangle$  Z), using a scale of 1" to 400' and as contoured plans for some interesting parts, using a scale of 1" to 200'. (Fig 3-1).

A non-magnetic place was selected as the base point and all readings were taken as difference from the reading at the base point. The diurnal variation of the earth magnetic field was measured at the base point from 9:00 A.M. to 5:30 P.M. on September 11th, 1966. All readings were correlated to those of the diurnal variation. The diurnal variation has been less than 100 during the day measured, and has not affected detection of magnetic anomaly.

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Prior to conducting a survey over the TREK GROUP, a preliminary magnetic survey was done on a section of the Granisle deposit. The results of this survey are shown in fig.3-18.

### 4. RESULTS and INTERPRETATIONS (Fig 3-17)

Both I-P and magnetic survey was carried out over the Babine Lake property. According to the results of the geophysical survey (Fig 3-1, 3-16) the Area can be grouped into several zones. An I-P survey was done on at least one of the lines cutting through each zone.

These zones are shown in fig 3-17. An I-P anomaly with low resistivity high frequency effect and metal factor, was detected in zone A, over a length of about 3000 feet and an average width of 1000 feet.

A part of this zone (sub-zone A') showed magnetic anomaly also. In comparison with the result of the Granisle ore deposits, the sub-zone A' may be a weakly mineralized zone containing some amount of magnetite.

The other part of the zone A(the sub-zone A") in which no magnetic anomaly was detected, may contain small amount of metals except magnetite. The smaller magnetic anomaly of the sub-zone A' comparing to the Granisle ore deposit, could be caused by difference of thickness of overburden.

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According to the result of the detail I-P survey, the causative body in the zone A can be presumed to be of massive shape, and the overburden to be about 50' in thickness.

The narrow anomalous zone (the zone B) elongated in the eastwest direction, showed low resistivity, high frequency effect and high metal factor. The dimension of the zone B is 8000' long by 800' wide.

Judging from the shape of the anomalous zone, restricted mainly to the line 56N, its elongation may indicate the strike of the causative body which can be presumed to be of the vein type. On the other hand, it may be that the broader distribution of the frequency effect anomaly compared to that of the low resistivity anomaly, means the existence of a broad and weakly mineralized zone.

The result of the detail survey on line 56N and the supplimentary line crossing line 48 to line 64, indicates that the anomaly tends to become stronger with depth with the causative body dipping steeply south.

The magnetic anomaly in the zone B is inconspicuous. The small anomalous patches scatters broadly in the zone, and may be interpreted to be due mainly to topographic relief and the irregular distribution of bedrocks.

Lower resistivity, higher frequency effect and metal factor of zone B to that of zone A, in both anomalous zone and background, might mean the existence of stronger mineralization in zone B than in zone A.

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The zones C, D and E showed high resistivity and magnetic anomalies which might be caused by shallow overburden and igneous rocks.

A small outcrop containing a weakly mineralized calcite vein was found in the zone F, in which a small I-P anomaly was detected, No further work is necessary in this zone.

Generally speaking, thick overburden may be presumed to exist in the zones of low resistivity, frequency effect and magnetic value, and sedimentary rocks, in the zones of high resistivity, low frequency effect and magnetic value.

The most part of the area without magnetic anomaly remains to be survey by Induced Polarization Method.

### 5. SUMMARY - CONCLUSIONS and RECOMMENDATIONS.

Only a few outcrops, widely scattered, have been found in this area. They are composed of porphyritic grano-diorite, argillite and sandstone.

The distribution of rock types and their boundary cannot be determined because of scarceness of outcrops.

There is an outcrop of mineralized calcite vein from 14 to 19 east along the line 88. It contains quite small amounts of galena, chalcopyrite and pyrite, and strikes N. 74<sup>°</sup> E and dips 75<sup>°</sup> to northeast.

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Along the line 56 N, from 40 to 43 east there outcrops porphyritic grano-diorite impregnated with small amount of pyrrhotite.

Though it is, at present, quite difficult to interpret the geology of this property from the few outcrops observed, it is quite possible that the geological situation is more or less similar to that of the Copper Island.

Besides, by means of geophysical survey, two anomalous zones have been detected in the grano-diorite distributing area. One, zone A, located in the southeast part of the area, shows partly both I-P and magnetic anomalies. From the fact that there is a strong magnetic anomaly over the richest part of the Granisle ore deposit, and also that the trend of the anomalous zone A corresponds with that of the Granisle ore deposit, there is a good possibility that a deposit of the Granisle type may exist on the TREK ground.

The other anomaly is that of quite difference type and elongated eastwesterly. Judging from the shape of the anomaly, this could be interpreted to be caused by a vein type ore deposit.

The high value of the frequency effect and the metal factor can be explained only by a huge body impregnated with metallic minerals or by a condenced ore body.

The writers would like to recommend diamond drilling for these two anomalous zones, as follows :

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Proposed Diamond Drilling (Fig. 3-16)

No.	Location	Bearing	Dip	
1	24 + 00 N 52 + 00 E		90 <sup>0</sup> 500'	
2	24 + 00 N 58 + 50 E		90 <sup>0</sup> 500'	
3	32 + 00 N 62 + 00 E		90 <sup>0</sup> 500'	
4	54 + 00 N 38 + 00 E	N 30 E	45 <sup>0</sup> 600'	
5	58 + 00 N 44 + 00 E	N 30 E	45° 600'	
6	56 + 00 N 42 + 50 E		90 <sup>0</sup> 500'	

No.5 and No.6 can be changed by the result of No.4 Three (3) diamond drill holes are recommended for zone A, and three (3) for zone B.

T Suzuki T. SUZUKI, B. Sc. Jun Coloring T njokogama Jun Manag T. YOKOYAMA, M.A.

## 6. QUALIFICATIONS OF GEOPHYSICISTS

MR. TORU SUZUKI received his B.Sc. degree in geophysics in 1950 from the University of Tohohu, Japan.

For the past nine (9) years he has been actively engaged in his profession in various parts of Japan, including the Konomai Gold Mine area, and the base metal properties of Hokuroku.

He is on the geophysical staff of Sumitomo Metal Mining Co., Japan.

MR. TAKEO YOKOYAMA graduated from the University of Kyoto, Japan. He received his B.Sc., degree in geophysics in 1960 and then spent two years doing graduate work in geophysics, receiving his M.A. degree in 1962.

He has practised his profession for the past six (6) years. His experience includes work on the Hokuroku base metal properties, as well as in the Nansatsu gold area.

He is on the geophysical staff of Sumitomo Metal Mining Co., Japan.

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90E 80E 59 45 42 98 37 36 35 28 25 26 20 22 -40N-22/30 39 72 75 54 52 112 77 52 70 58 38 27 18 16 17 -16N-12 10 14 -8N-Department of Mines and Petroleum Resources ASSESSMENT REPORT NO. 893 MAP To Accompany Report on TREK GROUP - Babine Lake Area OMINECA MD -3 10 BETHEX EXPLORATIONS LTD BABINE PROPERTIE OMINECA M.D. MAGNETIC (AZ) PLAN FIG3-DATE 20 SEPT. 1966 8 C A

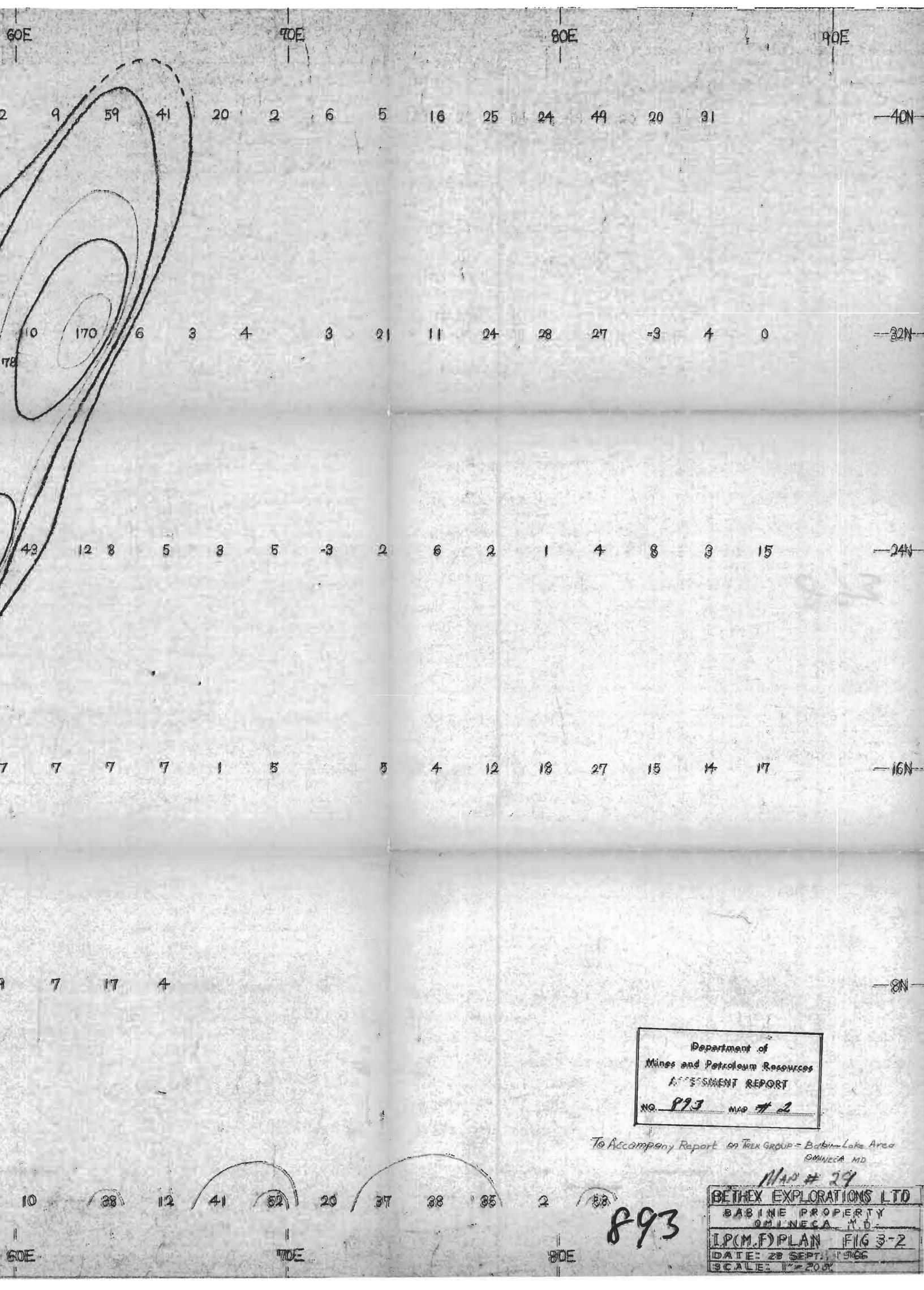
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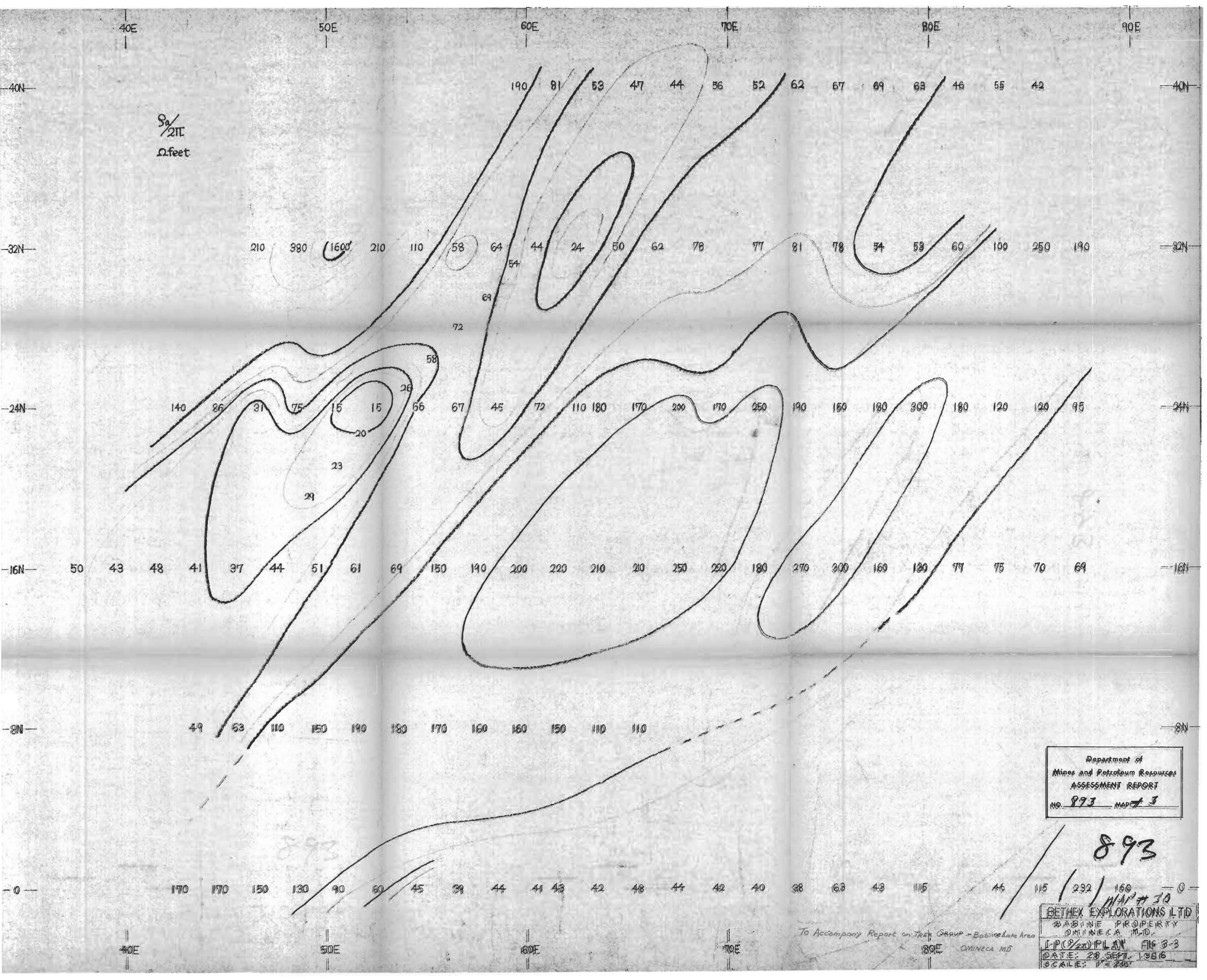
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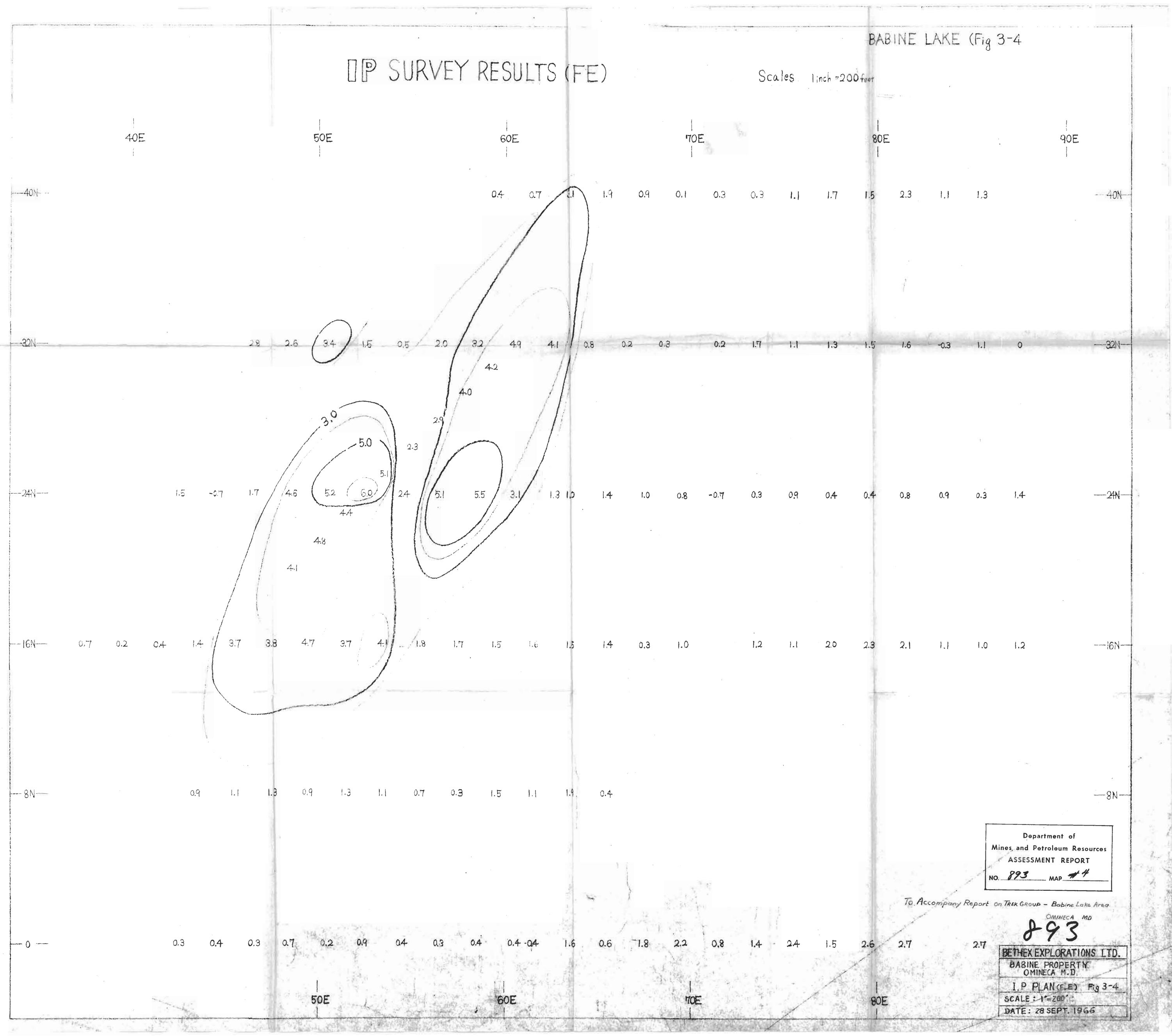
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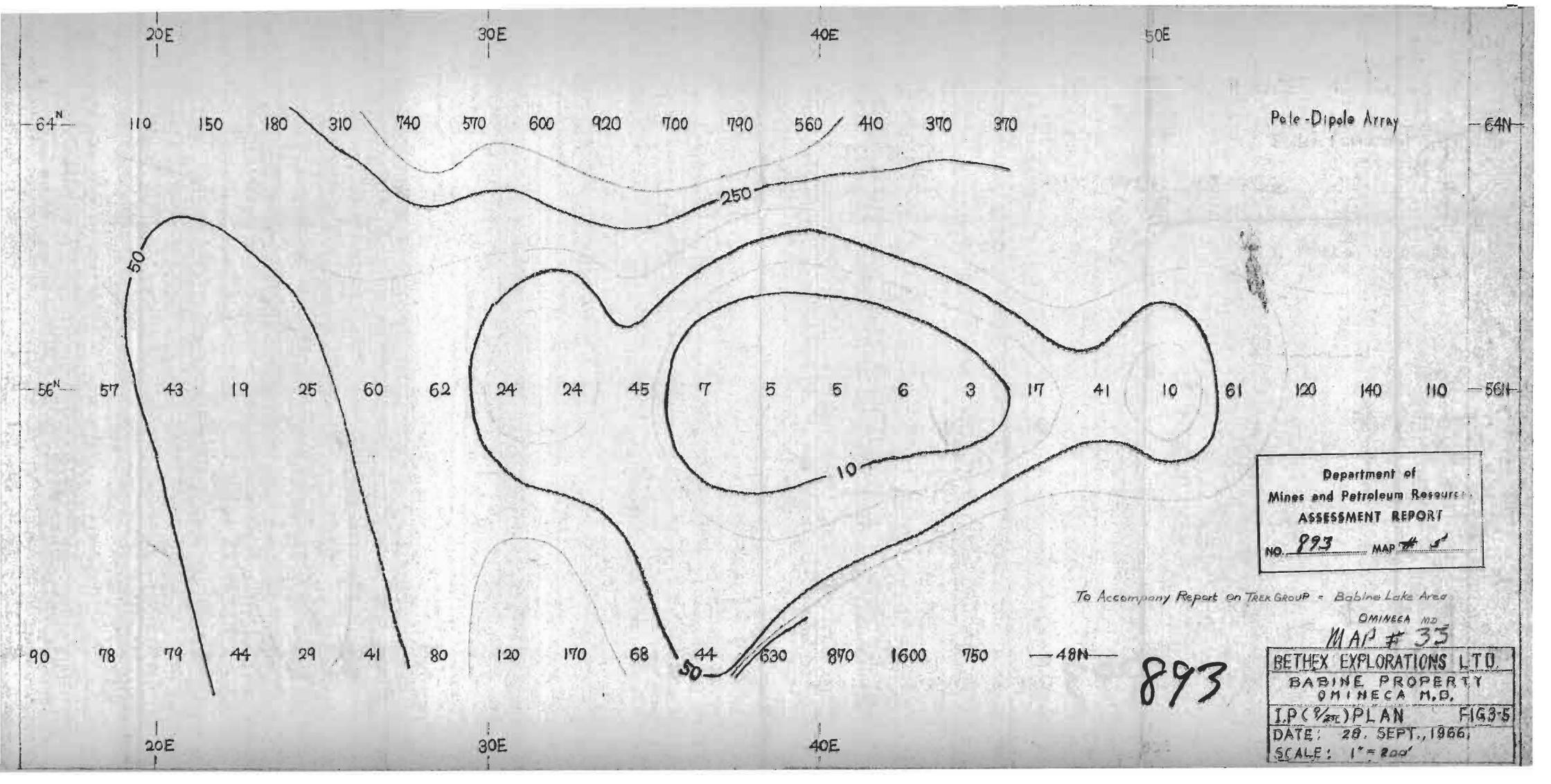
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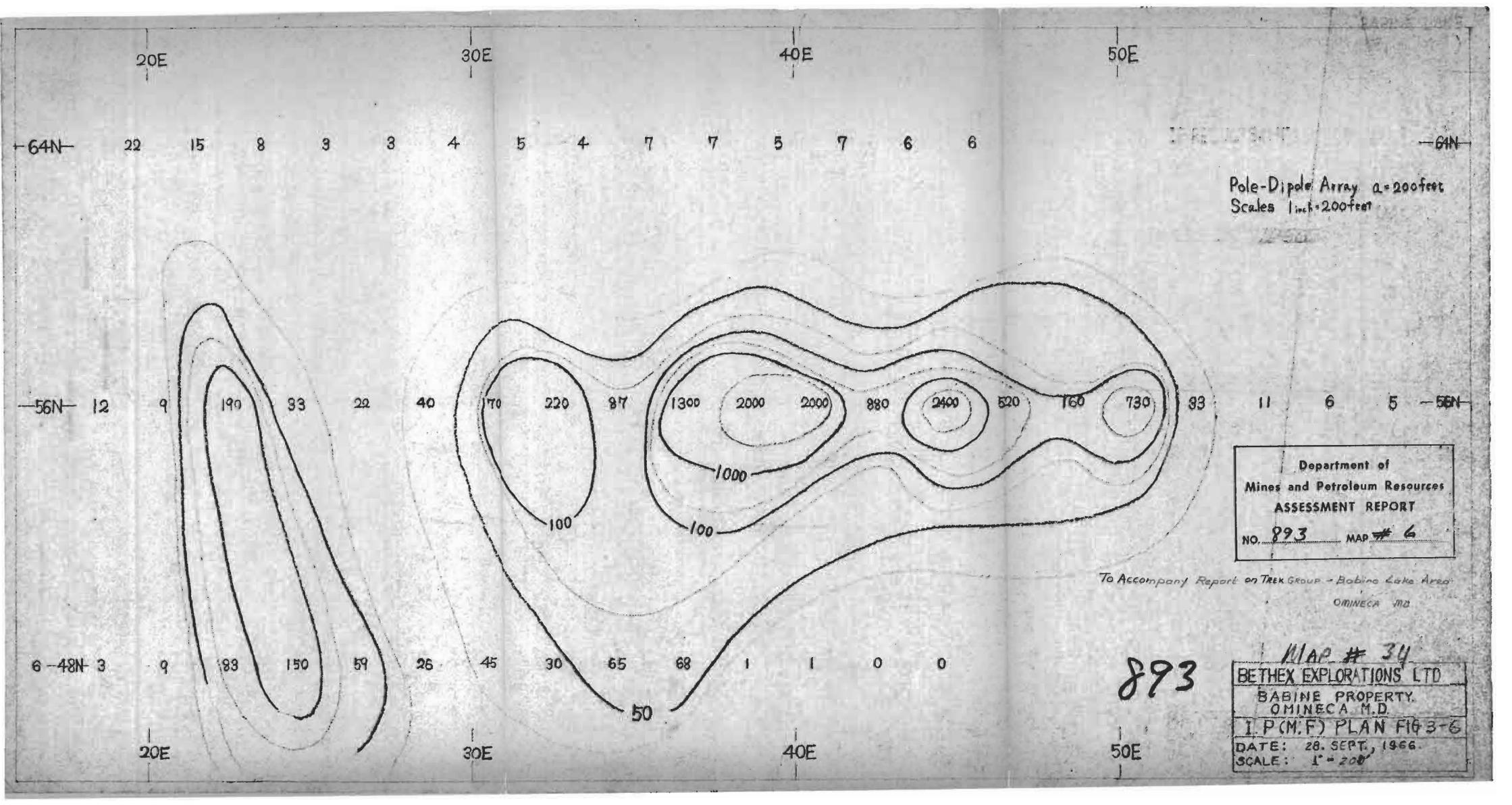
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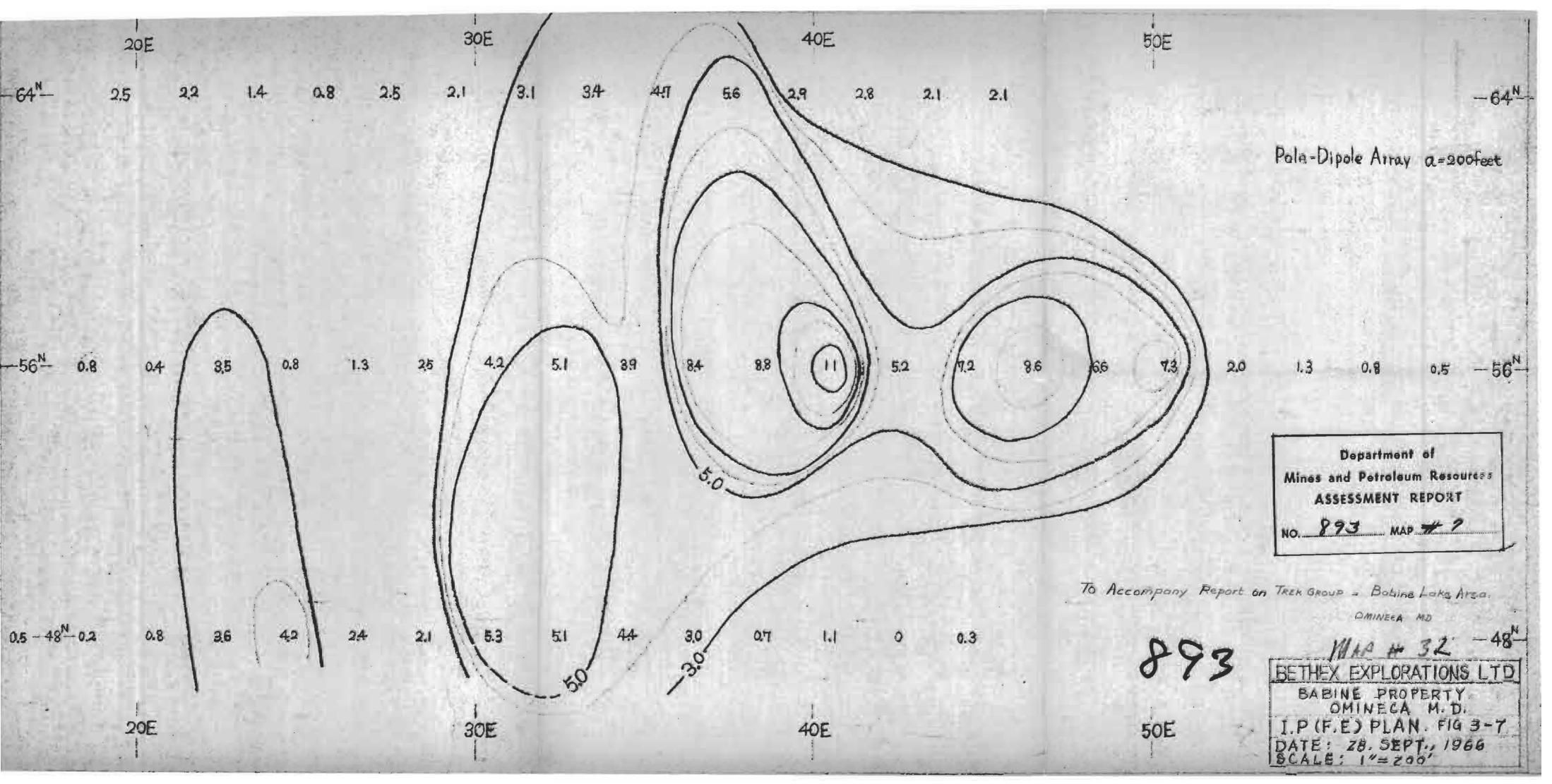


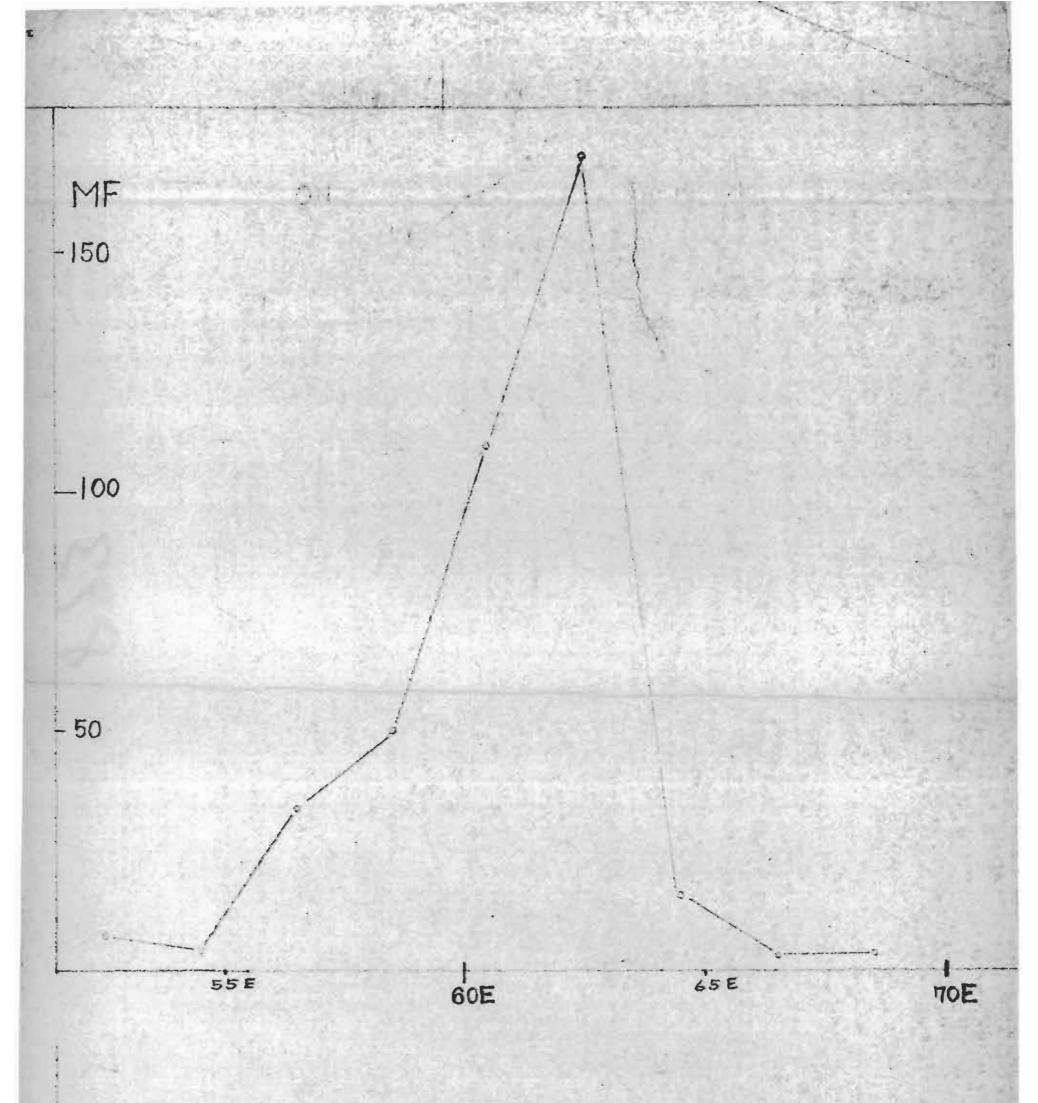


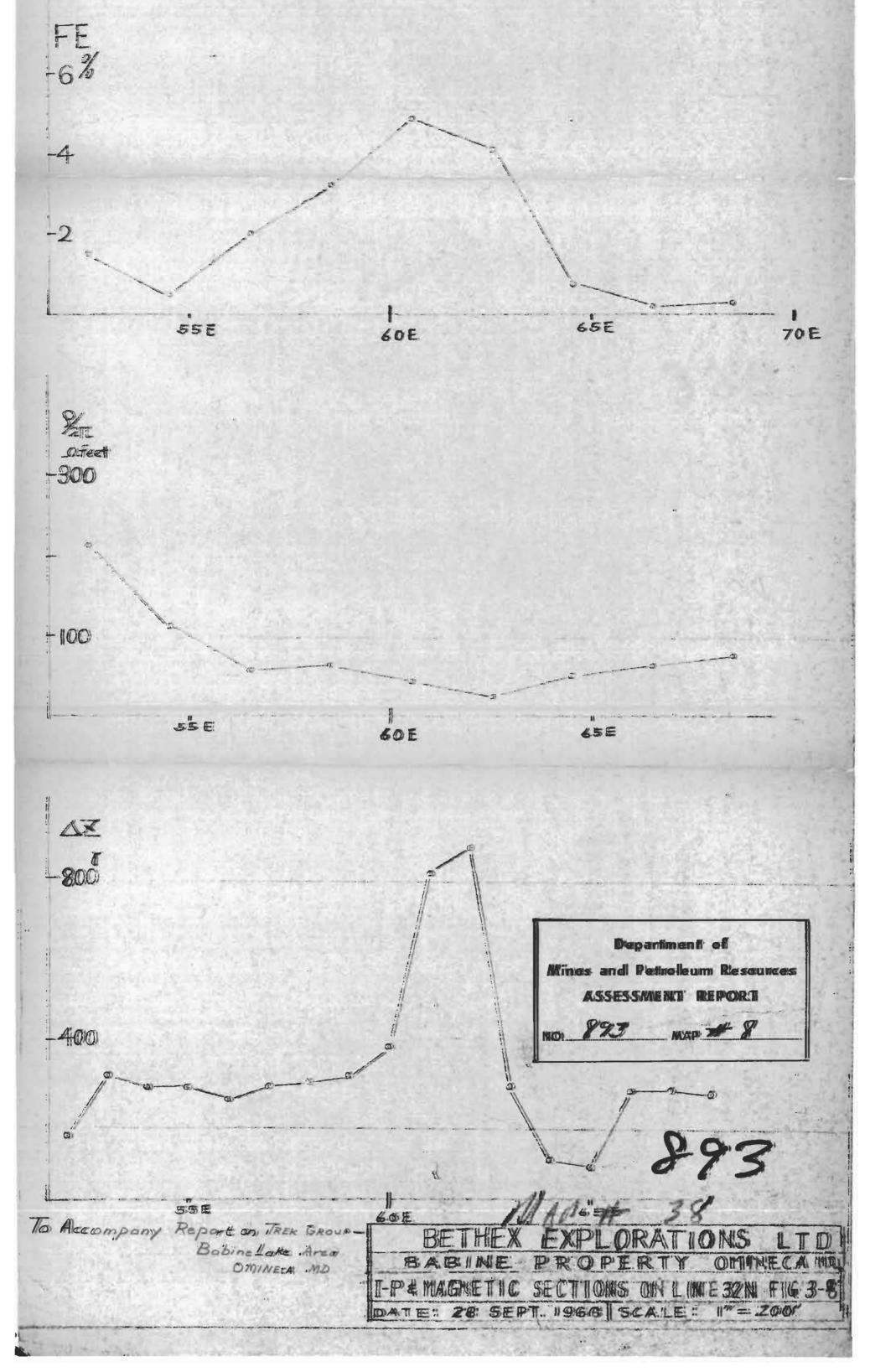


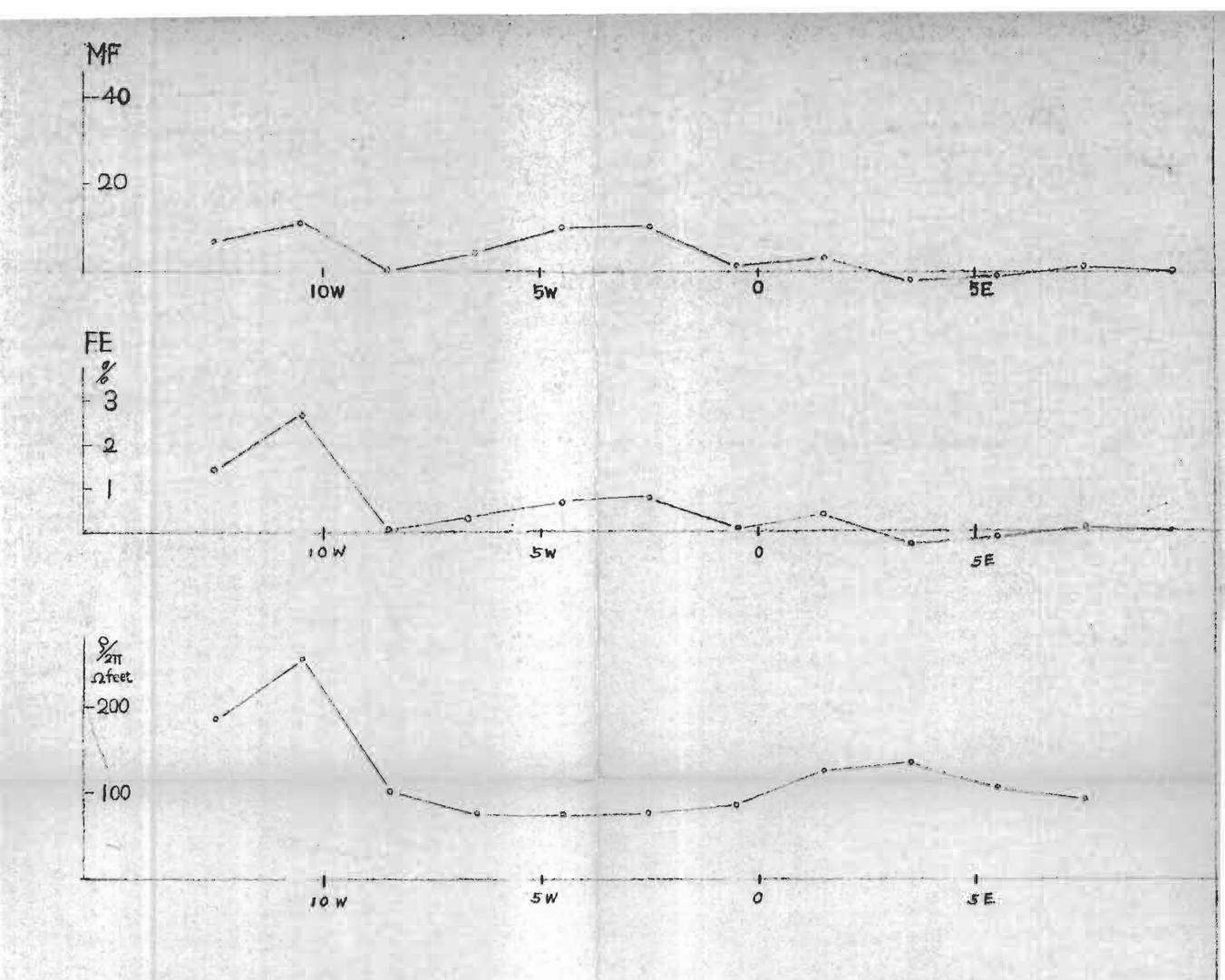






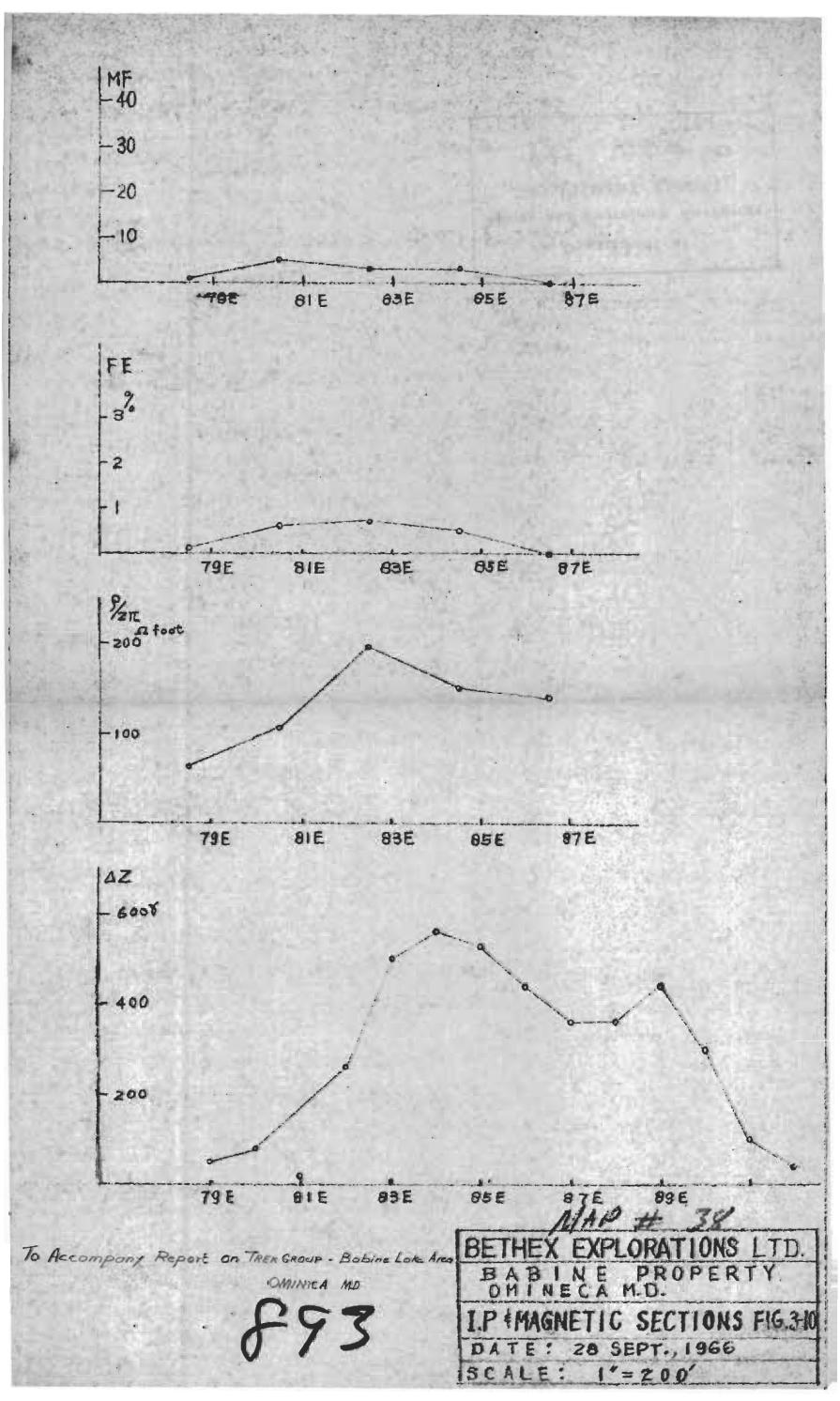


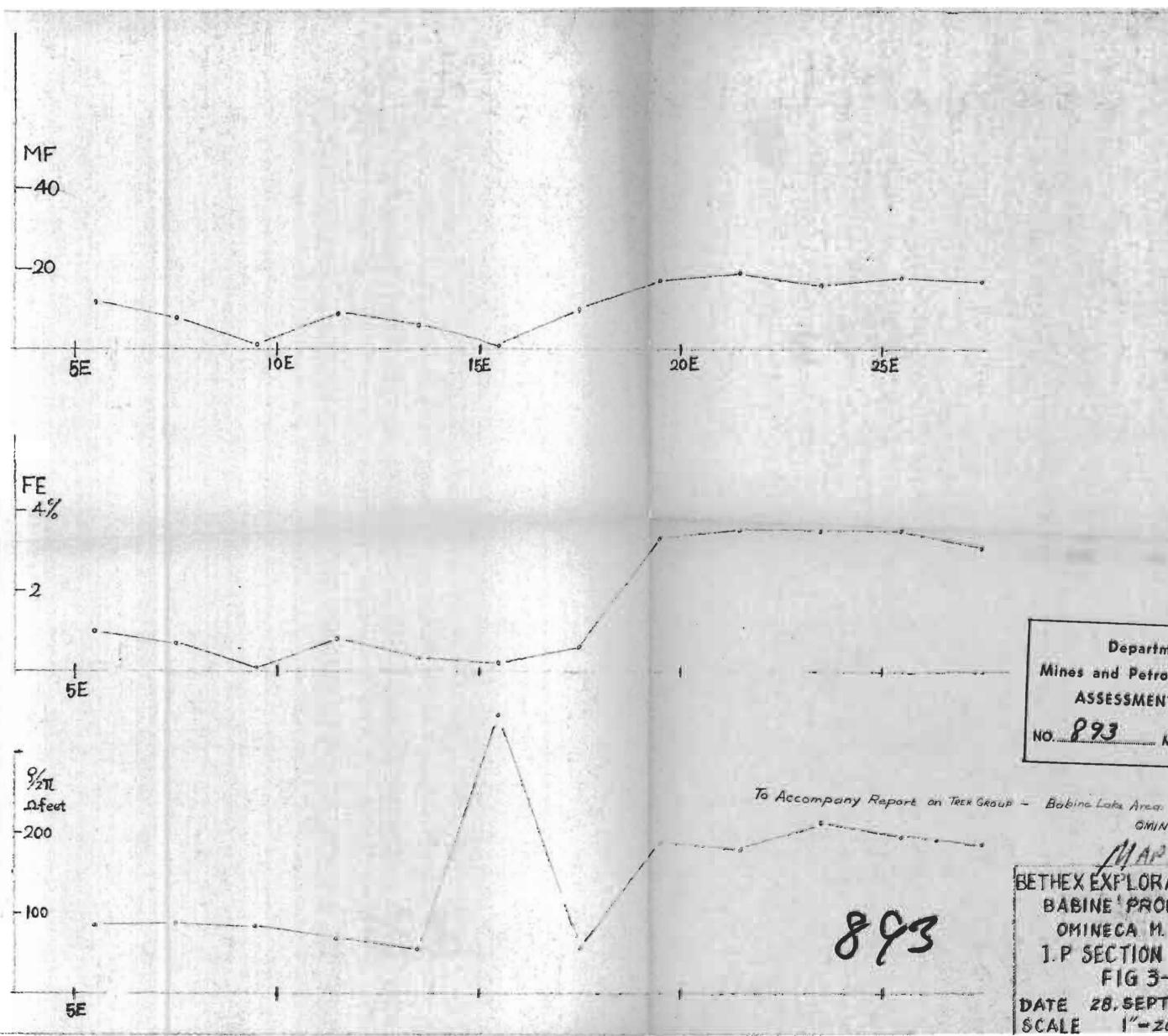




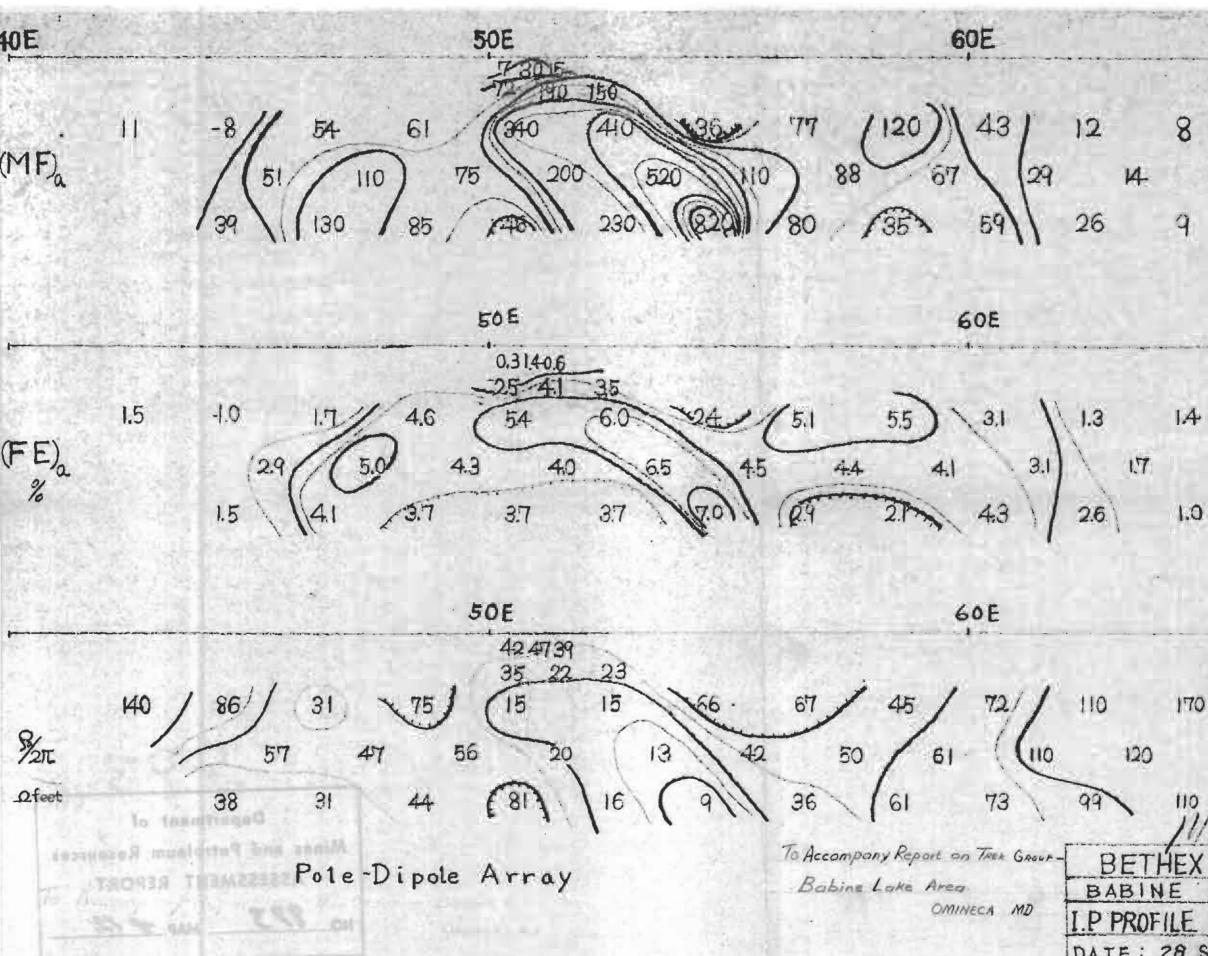
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Department of - 400 Mines and Petroleum Resources ASSESSMENT REPORT NO. 893 MAP 7 9 - 200 5ALAD # 0 SION 5 W 20 BETHEX EXPLORATIONS LTD. To Accompany Report on BABINE PROPERTY. OMINECA M.D. TREA GROUP - Babine Lake Area I.P & MAGNETIC SECTIONS. OMINECA MD FIG 3-9 ON LINE 48N DATE: 28 SEPT., 1966 SCALE: 1" = 200'

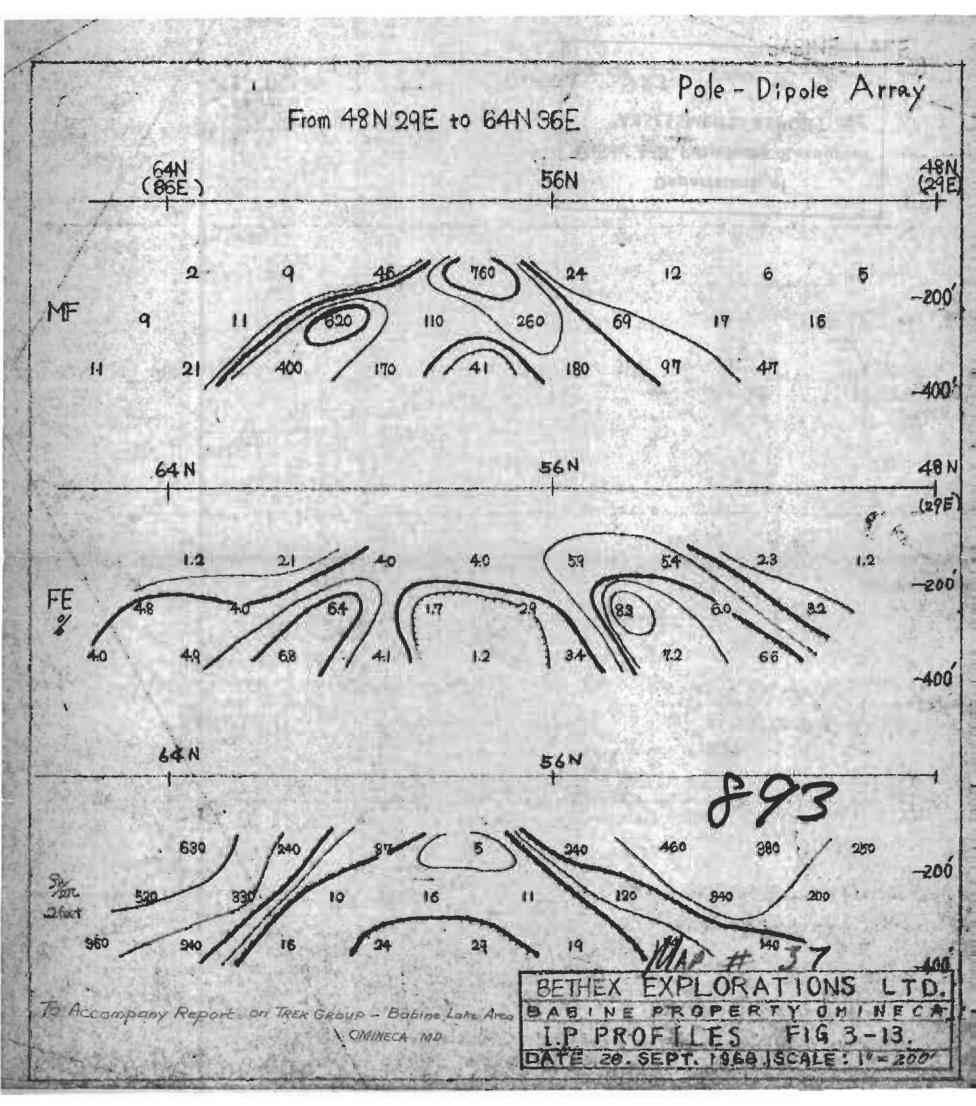


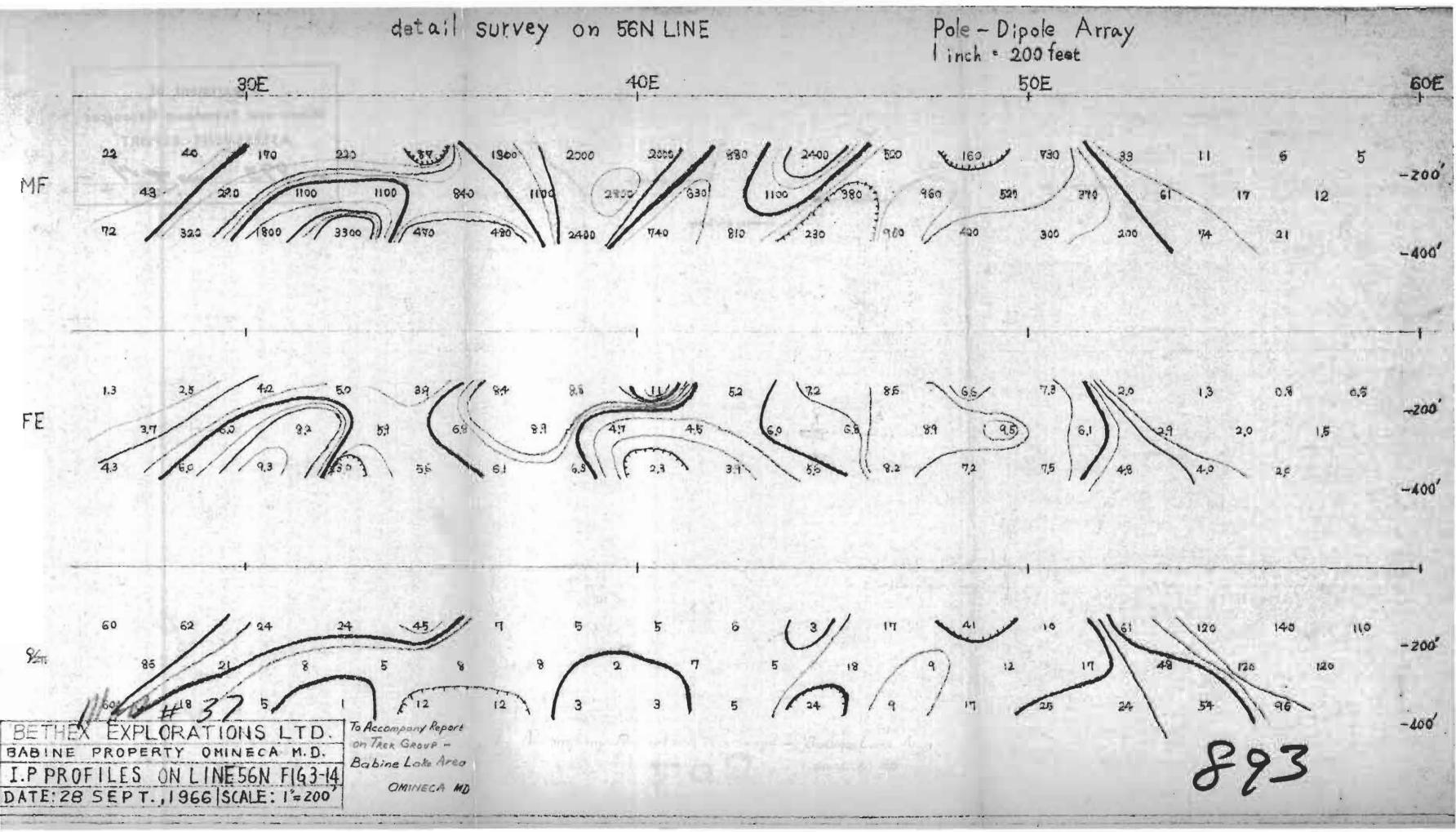


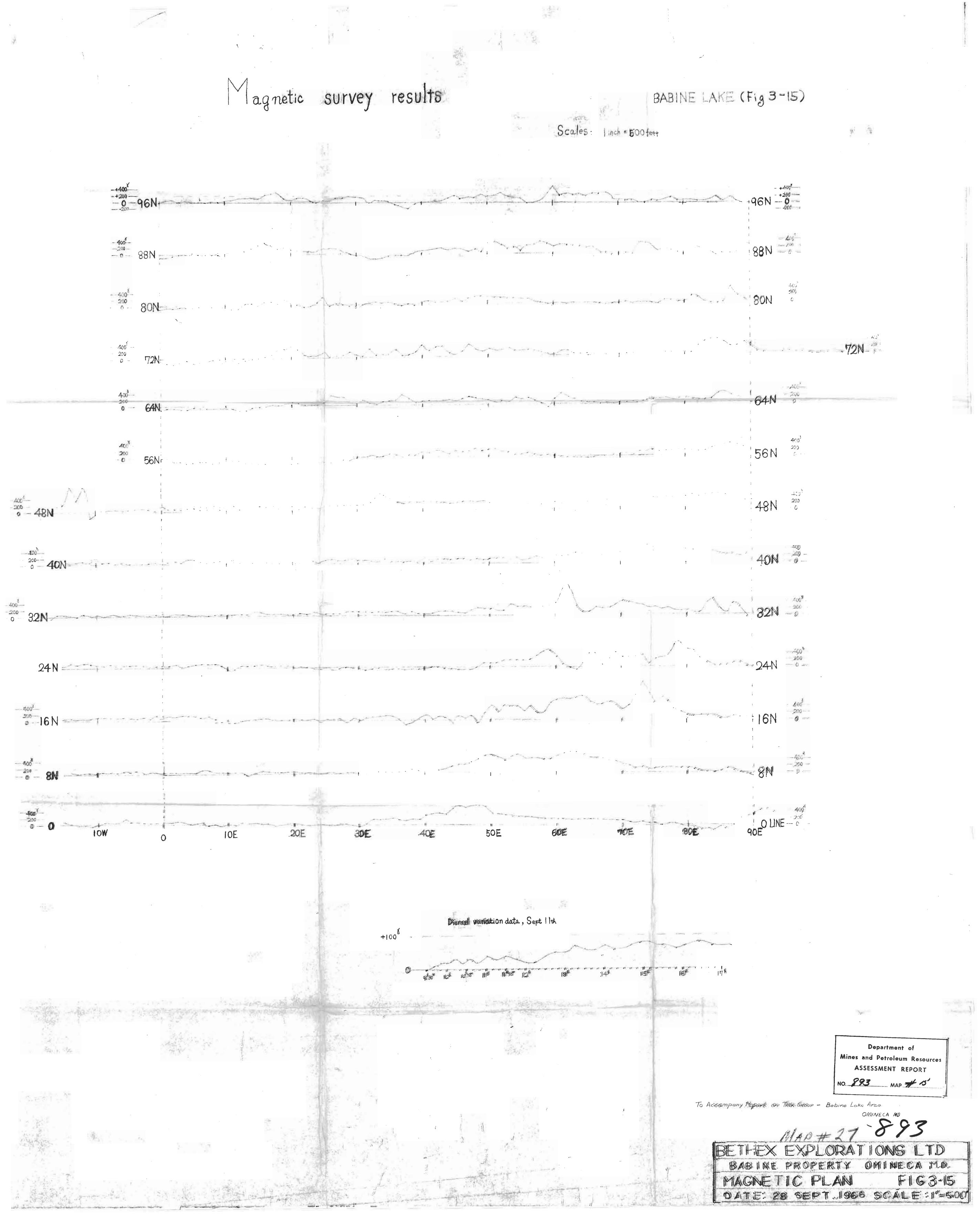
Department of Mines and Petroleum Resources ASSESSMENT REPORT NO. 893 - MAP # // OMINEEA MD 38 22 BETHEX EXPLORATIONS LTD. BABINE PROPERTY OMINECA M.D. 1. P SECTION ON LINE 88N FIG 3-11 DATE 28. SEPT., 1966 1-200

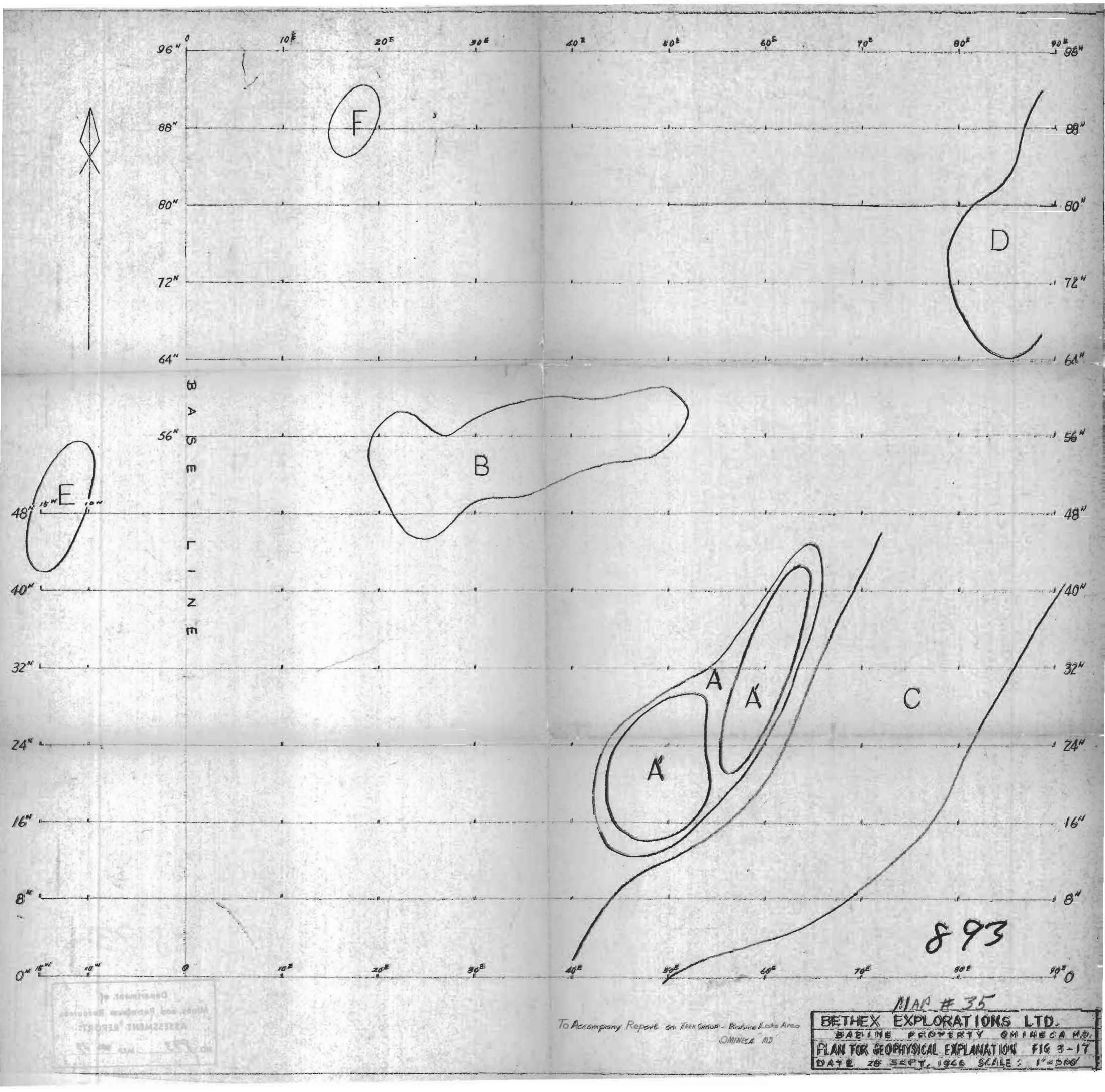


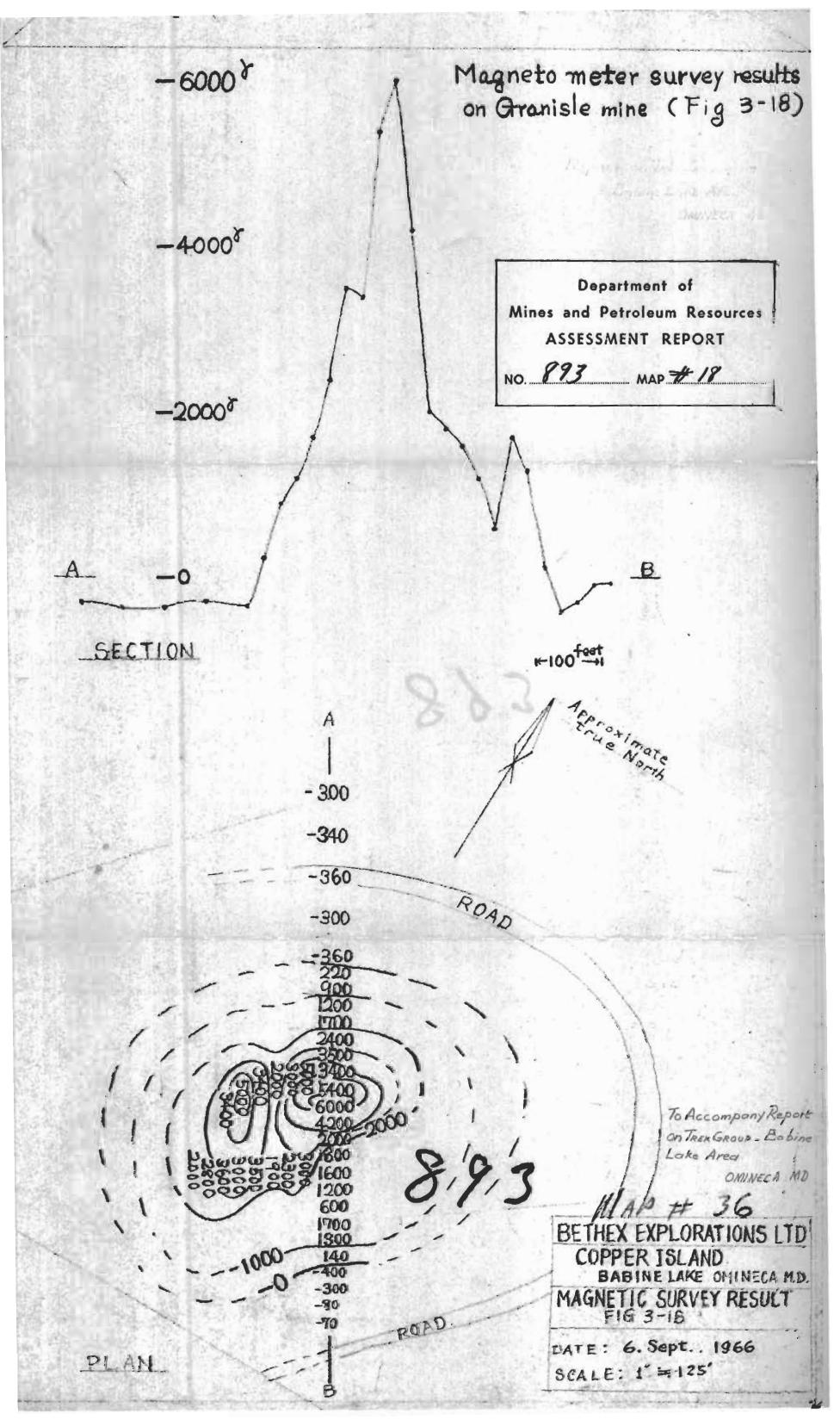
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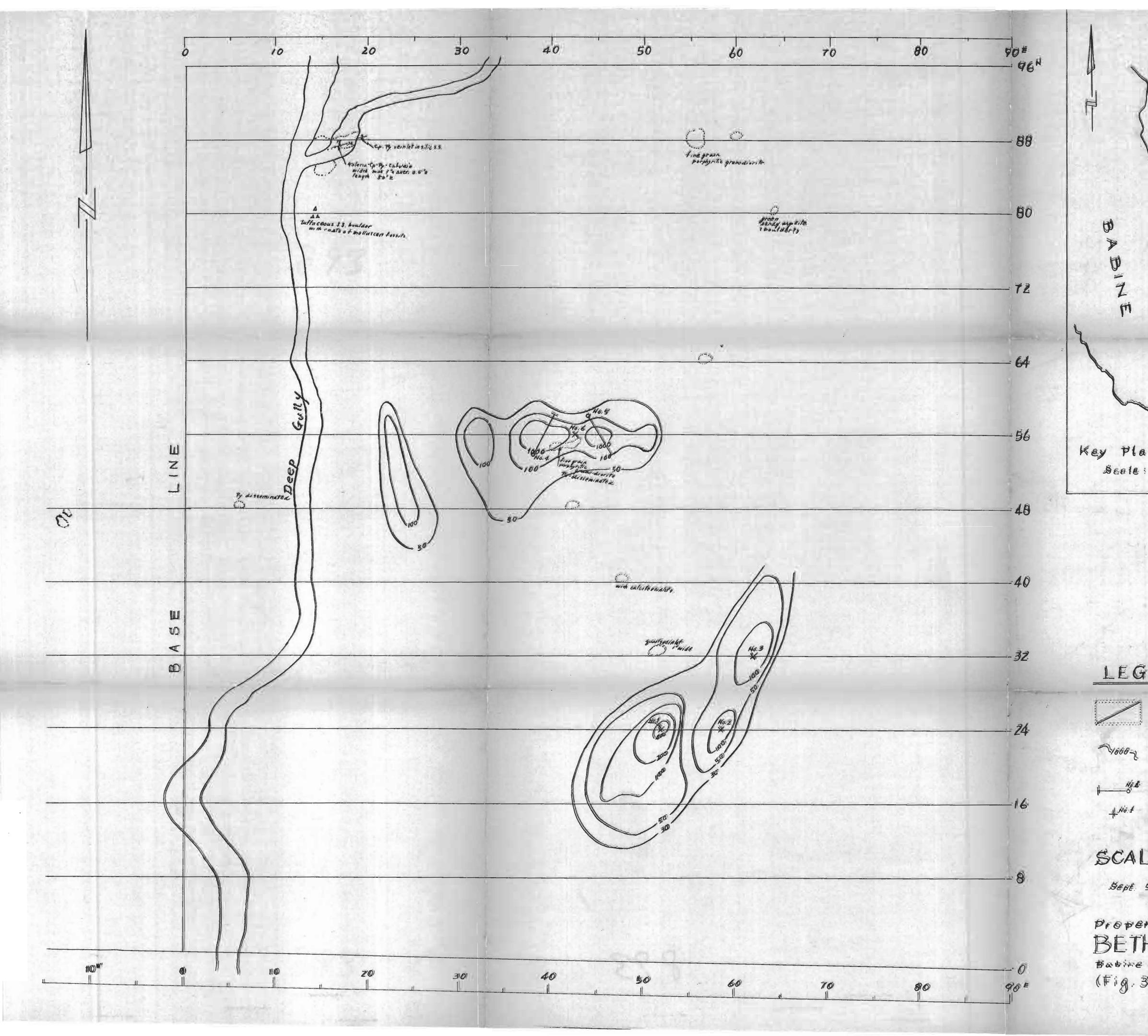












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GROUP #2

GROUP #3 GROUP #4

FIG 3-19 Bethez Explorations Ltd Babine Property Scale 1" = 1000' Date 11% Oct 1966

