McPHAR GEOPH

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE REXDALE OPTION FREDHART LAKE AREA RED LAKE MINING DIVISION, ONTARIO FOR COPPER LODE MINES LTD.

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1. INTRODUCTION

At the request of Dr. S.E. Malouf, a detailed induced polarization and resistivity survey has been completed on a portion of the Rexdale Claim Group on behalf of Copper Lode Mines Ltd. The Claim Group is located in the Fredhart Lake Area of the Red Lake Mining Division of Ontario.

A previous electromagnetic survey has located several conductors on the Prpperty, and a magnetic survey is currently being completed by the staff of Copper Lode Mines Ltd. A drilling program has been completed on the property, and a zone of copper-bearing mineralization has been outlined in a region from the Baseline to about 2+50S between Line 16+00W and Line 10+00W.

The zones of mineralization have complex shapes. They are contained within tightly folded bands of quartz-sericite schists, and some bands of magnetite rich rocks are also present. The induced polarization and resistivity survey was planned in an attempt to better locate the edges of the known zone of mineralization and to locate any other, unknown zones of similar mineralization that might be present.

2. PRESENTATION OF RESULTS

The induced polarization and resistivity results are shown on the following enclosed data plots. The results are plotted in the manner described in the notes preceding this report.

Line No.	Electrode Intervals	Dwg. No.
40E	200 foot	IP 5145-1
36E	200 foot	IP 5145-2
32E	200 foot	IP 5145-3
28E	200 foot	IP 5145-4
24E	200 foot	IP 5145-5
20E	200 foot	IP 5145-6
16E	200 foot	IP 5145-7
12E	200 foot	IP 5145-8
8E	200 foot	IP 5145-9
4E	200 foot	IP 5145-10
2E	200 foot	IP 5145-11
0+00	200 foot	IP 5145-12
2W	200 foot	IP 5145-13
	100 foot	IP 5145-14

Line No.	Electrode Intervals	Dwg. No.
4W	200 foot	IP 5145-15
6W	200 foot	IP 5145-16
8W	200 foot	IP 5145-17
	100 foot	IP 5145-18
	50 foot	IP 5145-19
10W	200 foot	IP 5145-20
	100 foot	IP 5145-21
11W	100 foot	IP 5145-22
12W	200 foot	IP 5145-23
13W	100 foot	IP 5145-24
14W	200 foot	IP 5145-25
	100 foot	IP 5145-26
15W	100 foot	IP 5145-27
16W	200 foot	IP 5145-28
	100 foot	IP 5145-29
18W	200 foot	IP 5145-30
	300 foot	IP 5145-31
20W	200 foot	IP 5145-32
22W	200 foot	IP 5145-33
24W	200 foot	IP 5145-34
26W	200 foot	IP 5145-35
	100 foot	IP 5145-36
	50 foot	IP 5145-37
28W	200 foot	IP 5145-38

Two plan maps are also enclosed with this report.

Rexdale Claim Group IP Grid; 1" = 200'	Dwg.IPP 4433
Rexdale Claim Group Central Area, with drill holes; 1" = 100'	Dwg.IPP 4446

The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on these plan maps as well as the data plots. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 200 foot spreads the position of a narrow sulphide body can only be determined to lie between two stations 200 feet apart. In order to locate sources at some depth, larger spreads must be used, with a corresponding increase in the uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

The axes of the magnetic highs, and the drill hole locations shown on Dwg. IPP 4433 and Dwg. IPP 4446 were taken from data supplied by the staff of Copper Lode Mines Ltd.

3. DISCUSSION OF RESULTS

Numerous definite, large magnitude IP anomalies were located by the survey on the Rexdale Claim Group. As shown on the plan maps, most of these anomalies can be correlated into zones. The sources of some of the anomalies are known from drilling, but others are untested.

Line 40E

Only the northern portion of the line has been surveyed. Two weak, shallow, narrow anomalies are indicated, but no further work is warranted at this time.

Line 36E

A definite, large magnitude anomaly is centered at 18S on this line (Zone A). The source of the anomaly is indicated to be at some depth.

Line 32E

The anomaly at Zone A is centered at 16S on this line. Since the maximum apparent IP effects are measured for n = 1, the source of Zone A can be better located and evaluated using shorter electrode intervals. As explained in the Appendix following this report, a shallow, narrow source can best be evaluated using short electrode intervals.

Line 28E

On this line the shallow anomaly (Zone A) is centered at 17S. There is a possible second anomaly at depth at about 14S, that may be an off-the-end effect from Zone B to the west.

Line 24E

The source of Zone B is centered at 13S on this line, and the depth to the top of the source is indicated to be 200 feet, or more. In addition, there is a narrow, shallow anomaly (Zone C) at 4N to 5N that should be checked with shorter electrode intervals.

Line 20E

The two anomalies are present on this line also. The anomalous patterns are very similar to those on the lines to the east.

Line 16E

The anomalous pattern at Zone B is the same here as on the lines to the east. The northern anomaly is not present on this line.

Line 12E

The anomaly at 14S to 12S (Zone B) indicates a narrow, shallow source. As explained in the Appendix, the source can be better evaluated using shorter electrode intervals. The anomaly is large in magnitude, and the source is indicated to be concentrated metallic mineralization.

There is a weak, shallow anomaly at 10N to 14N that does not correlate into a zone. There is a copper showing exposed in a trench at this point that is of some interest. The anomaly should be checked using 100 foot electrode intervals, and intermediate lines should be surveyed.

Line 8E

The anomaly at Zone B is still quite definite. The weak anomaly at 8N to 10N forms the eastern end of Zone D.

Line 4E

The IP results from this line are very different from those on the line 400 feet to the east. Zone B is present at 12S to 10S and Zone D is at 10N to 12N. Since both are shallow, they should be checked using shorter electrode intervals.

The complex, double anomaly at 2N to 6N forms the eastern end of Zone E. In addition, there is a moderate magnitude, shallow source at 4S to 2S (Zone F). This anomaly appears to be due to a narrow zone of concentrated metallic mineralization; it could therefore be of considerable economic interest. It should be checked using 100 foot electrode intervals.

Line 2E

The two most definite anomalies on this line are centered at 11S (Zone B) and at 3S (Zone F). The anomalous patterns are very similar to those on the lines to the east. The n = 1 values are definitely anomalous, so that the source can be better located and evaluated using shorter electrode intervals.

Line 0+00

On this line only weakly anomalous effects were measured from Zone F. The anomaly at 12S to 10S (Zone B) has its source at depth.

Line 2W

The 200 foot spread results on this line show overlapping anomalies that extend from 14S to 5S. There is a source at depth at 14S to 12S that is the extension of Zone B. The shallow anomaly centered at 9S forms the eastern end of Zone G.

The detail with 100 foot electrode intervals confirms the narrow, shallow source at 10S to 9S; it could be better evaluated using 50 foot electrode intervals. The detailed measurements indicate the presence of a second, narrow source, at depth, at 6S to 5S (Zone H). This northernmost source is not evident in the anomalous pattern for 200 foot spreads.

Line 4W

The 200 foot spread results on this line show several of the separate anomalies. There is a source at depth (Zone B) at 12S, a shallow anomaly at 10S to 8S (Zone G), and a source at depth at 6S that may be an off-the-end effect from Zone H.

The weak source, at depth, at 2S to 0+00 forms the eastern end of Zone K. The weak, shallow anomaly at 2N to 4N correlates with the long, weakly anomalous Zone E.

Line 6W

The measurements with 200 foot electrode intervals on this line show three anomalies of varying importance. The strongest anomaly is centered at 10S to 8S (Zone G); the anomaly should be checked using 100 foot electrode intervals. The shallow anomaly at 4S to 2S correlates with Zone K, and it should be checked with shorter electrode intervals also.

The moderate magnitude anomaly centered at 2N to 4N correlates with Zone E; this is the most definite anomaly correlating into Zone E, and detail would be warranted. The 100 foot spread detail should be used to better evaluate the source; closely spaced parallel lines should also be surveyed.

Line 8W

This line passes near the eastern end of the known zone of mineralization; the anomalies located are of definite interest. The detailed measurements with 100 foot and 50 foot electrode intervals clearly outline the sources. There is relatively strong, broad anomaly, at depth, at 10S to 9S; this anomaly correlates with Zone G. The anomaly is more clearly outlined here than on the lines to the east.

The complex anomaly at 3S to 0+50N correlates with the western end of Zone K, and the eastern end of Zone L. The IP anomalies that correlate into Zone L are due to the mineralization in the known zone.

The anomaly at 6S to 5S has been checked with 50 foot electrode intervals. The results show a very strong, relatively broad, irregular source. The IP effects must be due to a volume of concentrated metallic mineralization.

Line 10W

The 200 foot spread results on this line show an irregular anomaly that extends from 11+00S to about 6+00N. The anomaly just south of the Baseline correlates with the known mineralization. The anomalous patterns overlap, and detailed interpretation is difficult.

Most of the measurements made in this interval are anomalous.

The results suggest a wide zone containing variable concentrations of weak mineralization. Within this general anomaly there are smaller volumes of more concentrated mineralization. The extremely large magnitude IP effects at 2S to 1S are some of the strongest we have ever measured; the anomaly appears to correlate with the shallow portion of the known mineralization.

The 100 foot spread data shows a shallow source at 2S to 1S (Zone L) and a broader, weak anomaly at 9S to 8S.

Line 11W

The 100 foot spread data over the known mineralization is much the same here as on Line 10W.

Line 12W

Only 200 foot electrode intervals were used on this line. Several anomalies were located, and they should be better evaluated using shorter electrode intervals.

Line 13W

The 100 foot spread measurements on this line show four separate anomalies. The shallow anomalies at 9+00S to 8+00S (Zone G), at 5+00S to 4+00S (Zone I) and at 1+00S to 0+00 (Zone L) could be better located, and evaluated, using 50 foot electrode intervals.

The source centered at 7+00S to 6+00S (Zone N) is at considerable depth.

Line 14W

The measurements on these lines are similar to those on the lines to the east. The 100 foot spread data on Line 14W is very much the same as that from Line 13W. The anomaly at depth, at 7+00S to 6+00S, is somewhat more definite on this line.

Line 15W

The 100 foot spread results are somewhat different on this line. The anomaly just south of the Baseline (Zone L) is no longer present. To the south, the anomalous patterns overlap to give an anomaly from 9+00S to 2+00S.

Line 16W

This line passes west of the known mineralization south of the Baseline; there is no shallow anomaly in this vicinity. However, the 200 foot spread data, and even the 100 foot spread results, show a strong source at depth at 0+00 to 2+00N (Zone M). The depth to the top of the source could be as much as 200 to 250 feet.

To the south, several strong, narrow anomalies are present. The anomaly at 4+00S (Zone J) seems to be an off-the-end effect. Zone H is still represented by the deep anomaly centered at 7+00S. The shallow sources centered at 9+00S to 8+00S and at 6+00S could be checked using shorter electrode intervals.

Line 18W

The IP results are somewhat simpler on this line. The results suggest a broad anomaly from 7+00S to 3+00N. The 200 foot spread results show a source of concentrated mineralization, at depth, at 6+00S and a second source, at considerable depth, at 1+00N.

The anomaly has been checked using 300 foot electrode intervals. The two sources have been confirmed by the data. The deep anomaly correlates with the similar anomaly on Line 16W to form Zone M.

Zone G does not give an anomaly on this line, and the deep source at 6+00S seems to correlate with Zone H.

Line 20W

The deep source north of the Baseline is not present on this line. There are shallow anomalies centered at 5+00S and 1+00S. They should be checked using 100 foot electrode intervals.

Line 22W

The 200 foot spread results on this line show the same two shallow anomalies. There is some suggestion that the source is a flat-lying zone that comes near the surface at 6+00S and 1+00S. Detailed measurements would be necessary to confirm the fact that the source is continuous at depth.

Line 24W

The 200 foot spread results on this line suggest that the line passes off-the-end of the source. A line between Line 24W and Line 22N should be surveyed to better evaluate the change in the source.

Line 26W

On this line, there is only a single, narrow, shallow source. The detailed measurements show that the source is centered at 4+50S. The measurements with 50 foot electrode intervals confirm the narrow source of concentrated metallic mineralization.

Line 28W

The same narrow source (Zone Q) is present on this line.

4. CONCLUSIONS AND RECOMMENDATIONS

The induced polarization and resistivity survey on the Rexdale Claim Group has indicated the presence of numerous zones of metallic mineralization. As shown on Dwg. IPP 4433, most of the anomalies located can be correlated into continuous zones. Zone L correlates with the known mineralization that lies south of the Baseline. Some of the other anomalous zones have also been tested by the previous drilling.

A detailed ground magnetic survey has been completed on the Rexdale Claim Group by the staff of Copper Lode Mines Ltd. The data shows a magnetic high correlating with the known mineralization. There are other magnetic highs that have been outlined. Some iron formation is present; one band was intersected beneath Line 16W, 4+00S in DDH #B-1. Since magnetite is metallic, these bands could also be expected to cause IP anomalies.

Zone A

This zone lies at the southeastern corner of the area covered by the IP survey. It correlates with the southern edge of a weak magnetic high. DDH D-1 seems to have tested the zone on Line 32E; sulphide mineralization was intersected at several depths. The drill log (and core, if possible) should be examined to determine if further drilling is warranted.

Zone B

This strong IP anomaly extends from Line 28E to Line 4W. On some lines the source is shallow, and on others it is at depth. The IP anomaly lies south of a magnetic high and in general it does not correlate with it. DDH E-1 was drilled on Line 24E. The hole was collared above the source at depth, and drilled to the north; a narrow zone of weak mineralization was intersected near the collar. It is quite evident that DDH E-1 did not test the mineralization causing Zone B.

On Line 12E and on Line 4E, the source of Zone B is indicated to be shallow. The anomaly should be detailed using 100 foot and 50 foot electrode intervals, so that drilling, or trenching, can be planned.

Zone C

This weakly anomalous zone appears to correlate with the known zone of molybdenum mineralization. The most definite anomaly is at 4N to 6N on Line 24E. Since the maximum IP effect is measured for n = 1, the anomaly should be checked using 100 foot and 50 foot electrode intervals. If the anomaly is confirmed, a grid of closely spaced, parallel lines should be surveyed.

Zone D

This narrow, weak zone lies to the north. No further work seems to be warranted at this time unless the area is of specific geological interest.

Zone E

This long, moderate magnitude zone lies north of the known mineralization; it also lies north of the magnetic high. The anomaly is relatively strong and definite on Line 6W. The anomaly should be checked using 100 foot electrode intervals. If the anomaly is confirmed, lines 100 feet to the east and west should be surveyed.

Zone F

This moderate magnitude anomaly was located only on Line 2E and Line 4E. The source is indicated to be shallow and narrow at 4S to 2S on Line 4E. There is no magnetic high correlating with this anomaly, and it should be tested by drilling. Detail using 100 foot and 50 foot electrode intervals should be done on Line 4E in order to locate the drilling target.

Zone G

This long zone extends across the southern edge of the area surveyed. There is no magnetic high in this area. The source is shallow on some lines, and at depth on others. The anomaly lies south of all of the previous drilling, so that it has not been tested.

The source is clearly outlined by the 100 foot spread detail at 9S to 8S on Line 13W and Line 14W. The source could be better evaluated using 50 foot spreads, but drilling could be planned at this time. An angle drill hole should be spotted to pass beneath 8+50S at a depth of 100 feet to 125 feet.

Zone H

This zone lies north of Zone G. At the eastern end the zone correlates with a magnetic high. On Line 8W, the 50 foot spread results show the strong source centered at 5+50S. The metallic mineralization causing the large magnitude IP effects may be associated with the iron formation that was intersected beneath 4+00S on Line 16W, in DDH B-1. However, an angle drill hole spotted to pass beneath 5+50S on Line 8W at a depth of 60 to 80 feet would be warranted.

On Line 16W, Zone H is shown at depth, centered at 7+00S. The anomaly is north of the shallow anomaly that forms the western end of Zone G. An angle hole (-45°) drilled to the north from 9+50S should test both Zone G and Zone H.

Zone I

This short, shallow zone extends from Line 16W to Line 12W. the zone correlates approximately with a magnetic high. This zone should have been tested by DDH B-1, DDH A-25 and DDH A-24. The logs should be examined. If no source is obvious, the anomaly at 6S to 5S on Line 16W should be checked using 50 foot spreads so that the source can be better evaluated.

Zone J

This zone was located by the anomaly centered at 4+00S on Line 16W. This position has been tested by the previous drilling (DDH B-1, DDH A-25). The logs should be examined.

Zone K

This zone lies southeast of the area previously drilled, within the same general magnetic high. The source is shallow, at 4S to 2S, on Line 6W. The anomaly should be checked using 100 foot spreads and Line 7W and Line 5W should be surveyed. A drill hole should then be spotted to test the source.

Zone L

The IP anomaly correlates with the known zone of copper-bearing mineralization. There is a coincident magnetic anomaly. The IP effects measured from the shallow portions of the sulphide mineralization are very large in magnitude.

Zone M

This is one of the more interesting zones located by the IP survey on the Rexdale Claim Group. The I P data from Line 16W and Line 18W suggest a source, at considerable depth at 0+00 to 2+00N. This is northwest of the known, ore-grade mineralization, in a region that has not bean tested by drilling.

It is recommended that three vertical holes be drilled on Line 18W to a depth of 350 feet. The first hole should be collared at 1+00N, and the subsequent holes at 0+00 and 2+00N.

Zone N

This zone may be the northern portion of the mineralization that forms the western end of Zone H. The results on Line 24W are much different from those on Line 26W. It is possible that the anomalous pattern is due to a flat-lying zone that comes to the surface at Line 22W, 1+00S. The measurements on Line 22W should be repeated with 100 foot spreads.

In addition, east-west lines should be surveyed at 4+00S and 2+00S from 30+00W to 15+00W to try to determine if a flat-lying zone is present.

Zone O

This weak, shallow zone lies to the north. The measurements on Line 16W should be repeated from 8N to 24N, using 100 foot electrode intervals.

Zone P

The most definite anomaly from this zone is located at the north end of Line 14W. The anomaly centered, at depth, at 16+00N is not complete. The 200 foot spread results should be extended, and lines 100 feet to each side should be surveyed.

Zone Q

This strongly anomalous zone extends to west, off the area covered by the survey. The anomaly has been detailed on Line 26W. The 50 foot spread detail shows a large magnitude anomaly at 4+50S; this correlates with a magnetic high. There are also several important copper showings at this position.

An angle drill hole should be spotted to pass beneath 4+50S, Line 26W at a depth of 75 to 100 feet.

It is obvious from the results to date, that a great deal of further work is warranted on the Rexdale Claim Group. The drilling recommended above, and the further drilling that will be necessitated by the detailed IP measurements recommended, will give enough information to permit a decision regarding further work.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

P. G. HALLOF
PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

Dated: October 15, 1968

ASSESSMENT DETAILS

PROPERTY: Rexdale Option	MINING DIVISION: Red Lake
SPONSOR: Copperlode Mines Ltd.	PROVINCE: Ontario
LOCATION: Fredhart Lake Area	
TYPE OF SURVEY: Induced Polarization	
OPERATING MAN DAYS: 102.5	DATE STARTED: July 12, 1968
EQUIVALENT 8 HR. MAN DAYS: 153.5	DATE FINISHED: August 9, 1968
CONSULTING MAN DAYS: 5	NUMBER OF STATIONS: 711
DRAUGHTING MAN DAYS: 15	NUMBER OF READINGS: 5218
TOTAL MAN DAYS: 173.5	MILES OF LINE SURVEYED: 22.32

CONSULTANT:

P.G. Hallof, 5 Minorca Place, Don Mills, Ontario.

FIELD TECHNICIANS:

J. L. Mark, 61 Borden Street, Toronto 4, Ontario.
Plus 4 helpers supplied by client.

DRAUGHTSMEN:

V. Young, 703 Cortez Avenue, Bay Ridges, Ontario.
N. Lade, 662 Emerson Court, Oshawa, Ontario.
B. Marr, 19 Kenewen Court, Toronto 16, Ontario.
F. Hurst, 230 Woburn Avenue, Toronto 12, Ontario

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof

Philip G. Hallof
Geophysicist

REGISTERED PROFESSIONAL ENGINEER
P. G. HALLOF
PROVINCE OF ONTARIO

DROP "SPECIAL PROVISION"

Dated: October 17, 1968

173.5 x 7 / 16 = 75.9 days

[illegible] 42 days

Airborne survey - 38 days
I P survey - 42 "
80 " TOTAL

MAX. FOR GEOPHYSICAL SURVEYS IS 80 DAYS.

SUMMARY OF COST

Copperlode Mines Ltd.

Crew

20-1/2 days	Operating		@ $200.00	$4,100.00
5 days	Travel	)		
2 days	Bad Weather	) 8 days	@ $ 65.00	520.00
1 day	Standby	)		

Expenses

Transportation - Car	309.84
Freight and Brokerage	71.80
Meals and Accommodation	85.50
Telephone and Telegraph	15.79
Supplies	44.95
	$5,147.88

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

Dated: October 17, 1968

McPHAR GEOPHYSICS

NOTES ON THE THEORY, METHOD OF FIELD OPERATION AND PRESENTATION OF DATA FOR THE INDUCED POLARIZATION METHOD

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conduction.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains metallic minerals such as base metal sulphides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock, or soil, i.e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The group of minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization mentioned above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a d.c. current is allowed to flow through the rock; i.e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces, to appreciably reduce the amount of current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in a mineralized rock.

When the d.c. voltage used to create this d.c. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their normal position. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

From an alternate viewpoint it can be seen that if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed. This is a consequence of the fact that the amount of current flowing through each metallic interface depends upon the length of time that current has been passing through it in one direction.

The values of the per cent frequency effect or F. E. are a measurement of the polarization in the rock mass. However, since the measurement of the degree of polarization is related to the apparent resistivity of the rock mass it is found that the metal factor values or M. F. are the most useful values in determining the amount of polarization present in the rock mass. The MF values are obtained by normalizing the F. E. values for varying resistivities.

The induced polarization measurement is perhaps the most powerful geophysical method for the direct detection of metallic sulphide mineralization, even when this mineralization is of very low concentration. The lower limit of volume per cent sulphide necessary to produce a recognizable IP anomaly will vary with the geometry and geologic environment of the source, and the method of executing the survey. However, sulphide mineralization of less than one per cent by volume has been detected by the IP method under proper geological conditions.

The greatest application of the IP method has been in the search for disseminated metallic sulphides of less than 20% by volume. However, it has also been used successfully in the search for massive sulphides in situations where, due to source geometry, depth of source, or low resistivity of surface layer, the EM method can not be successfully applied. The ability to differentiate ionic conductors, such as water filled shear zones, makes the IP method a useful tool in checking EM anomalies which are suspected of being due to these causes.

In normal field applications the IP method does not differentiate between the economically important metallic minerals such as chalcopyrite, chalcocite, molybdenite, galena, etc., and the other metallic minerals such as pyrite. The induced polarization effect is due to the total of all electronic conducting minerals in the rock mass. Other electronic conducting materials which can produce an IP response are magnetite, pyrolusite, graphite, and some forms of hematite.

In the field procedure, measurements on the surface are made in a way that allows the effects of lateral changes in the properties of the ground to be separated from the effects of vertical changes in the properties. Current is applied to the ground at two points in distance (X) apart. The potentials are measured at two other points (X) feet apart, in line with the current electrodes is an integer number (n) times the basic distance (X).

The measurements are made along a surveyed line, with a constant distance (nX) between the nearest current and potential electrodes. In most surveys, several traverses are made with various values of (n); i.e. (n) = 1, 2, 3, 4, etc. The kind of survey required (detailed or reconnaissance) decides the number of values of (n) used.

In plotting the results, the values of the apparent resistivity, apparent per cent frequency effect, and the apparent metal factor measured for each set of electrode positions are plotted at the intersection of grid lines, one from the center point of the current electrodes and the other from the center point of the potential electrodes. (See Figure A.) The resistivity values are plotted above the line as a mirror image of the metal factor values below. On a second line, below the metal factor values, are plotted the values of the per cent frequency effect. In some cases the values of per cent frequency effect are plotted as superscripts of the metal factor value. In this second case the frequency effect values are not contoured. The lateral displacement of a given value is determined by the location along the survey line of the center point between the current and potential electrodes. The distance of the value from the line is determined by the distance (nX) between the current and potential electrodes when the measurement was made.

The separation between sender and receiver electrodes is only one factor which determines the depth to which the ground is being sampled in any particular measurement. The plots then, when contoured, are not section maps of the electrical properties of the ground under the survey line. The interpretation of the results from any given survey must be carried out using the combined experience gained from field results, model study results and theoretical investigations. The position of the electrodes when anomalous values are measured is important in the interpretation.

In the field procedure, the interval over which the potential differences are measured is the same as the interval over which the electrodes are moved after a series of potential readings has been made. One of the advantages of the induced polarization method is that the same equipment can be used for both detailed and reconnaissance surveys merely by changing the distance (X) over which the electrodes are moved each time. In the past, intervals have been used ranging from 25 feet to 2000 feet for (X). In each case, the decision as to the distance (X) and the values of (n) to be used is largely determined by the expected size of the mineral deposit being sought, the size of the expected anomaly and the speed with which it is desired to progress.

The diagram in Figure A demonstrates the method used in plotting the results. Each value of the apparent resistivity, apparent metal factor, and apparent per cent frequency effect is plotted and identified by the position of the four electrodes when the measurement was made. It can be seen that the values measured for the larger values of (n) are plotted farther from the line indicating that the thickness of the layer of the earth that is being tested is greater than for the smaller values of (n); i. e. the depth of the measurement is increased. When the F. E. values are plotted as superscripts to the MF values the third section of data values is not presented and the F. E. values are not contoured.

METHOD USED IN PLOTTING DIPOLE-DIPOLE INDUCED POLARIZATION AND RESISTIVITY RESULTS

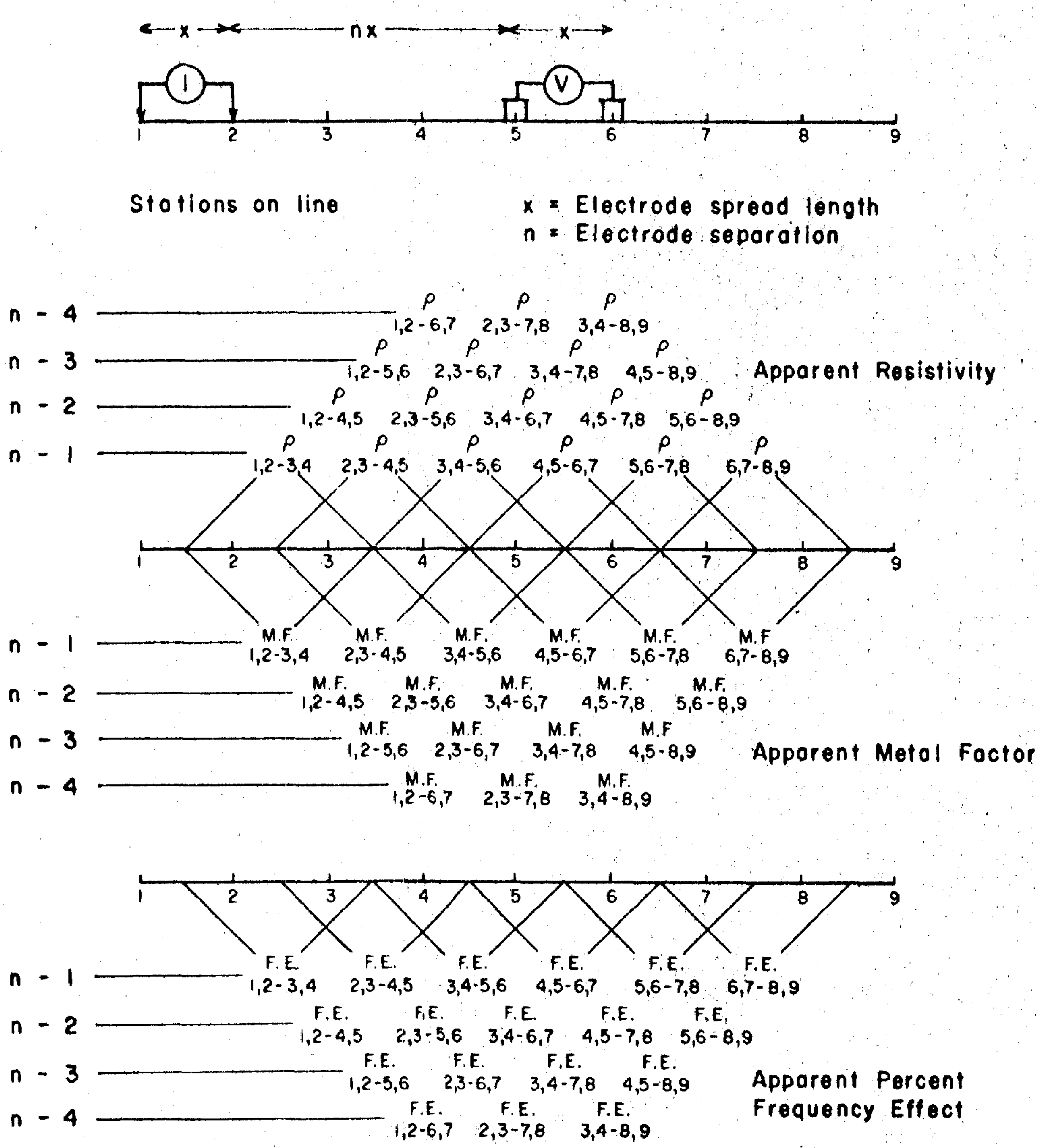


Fig. A

APPENDIX
THE INTERPRETATION OF INDUCED POLARIZATION ANOMALIES FROM RELATIVELY SMALL SOURCES

The induced polarization method was originally developed to detect disseminated sulphides and has proven to be very successful in the search for "porphyry copper" deposits. In recent years we have found that the IP method can also be very useful in exploring for more concentrated deposits of limited size. This type of source gives sharp IP anomalies that are often difficult to interpret.

The anomalous patterns that develop on the contoured data plots will depend on the size, depth and position of the source and the relative size of the electrode interval. The data plots are not sections showing the electrical parameters of the ground. When the electrode interval (X) is appreciably greater than the width of the source, a large volume of unmineralized rock is averaged into each measurement. This is particularly true for the large values of the electrode separation (n).

The theoretical scale model results shown in Figure 1 and Figure 2 indicate the effect of depth. If the depth to the top of the source is small compared to the electrode interval (i. e. d X) the measurement for n = 1 will be anomalous. In Figure 1 the depth is 0. 5 units (X = 1. 0 units) and the n = 1 value is definitely anomalous; the pattern on the contoured data plot is typical for a relatively shallow, narrow, near-vertical tabular source. The results in Figure 2 are for the same source with the depth increased to 1. 5 units. Here the n = 1 value is not anomalous; the larger values of (n) are anomalous but the magnitudes are much lower than for the source at less depth.

When the electrode interval is greater than the width of the source, it is not possible to determine its width or exact position between the electrodes. The true IP effect within the source is also indeterminate; the anomaly from a very narrow source with a very large true IP effect will be much the same as that from a zone with twice the width and 1/2 the true IP effect. The theoretical scale model data shown in Figure 3 and Figure 4 demonstrate this problem. The depth and position of the source are unchanged but the width and true IP effect are varied. The anomalous patterns and magnitudes are essentially the same, hence the data are insufficient to evaluate the source completely.

The normal practise is to indicate the IP anomalies by solid, broken, or dashed bars, depending upon their degree of distinctiveness. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured. As illustrated in Figure 1, Figure 2, Figure 3 and Figure 4, no anomaly can be located with more accuracy than the spread length. While the centre of the solid bar indicating the anomaly corresponds fairly well with the source, the length of the bar should not be taken to represent the exact edges of the anomalous material.

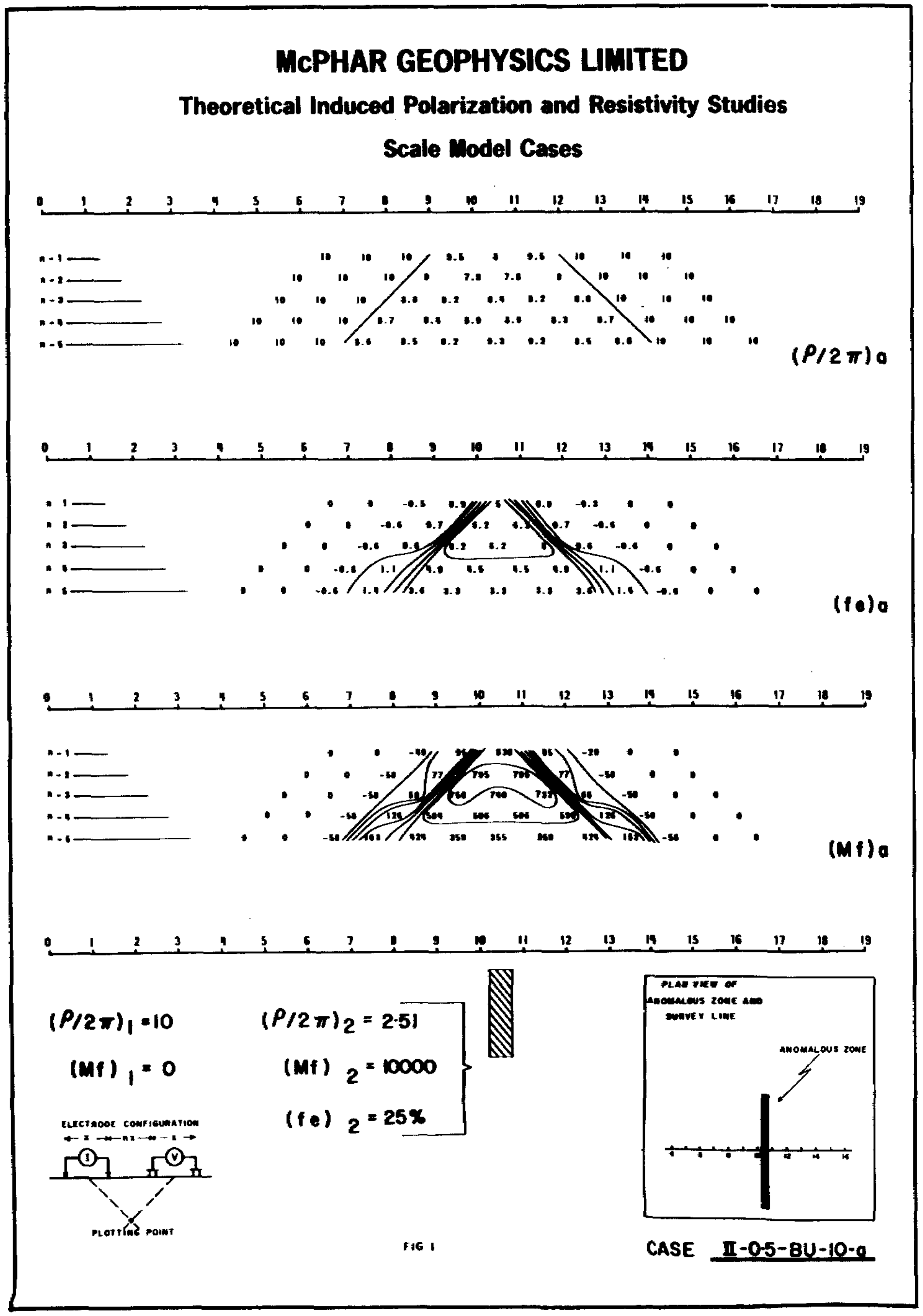
If the source is shallow, the anomaly can be better evaluated using a shorter electrode interval. When the electrode interval used approaches the width of the source, the apparent effects measured will be nearly equal to the true effects within the source. When there is some depth to the top of the source, it is not possible to use electrode intervals that are much less than the depth to the source. In this situation, one must realize that a definite ambiguity exists regarding the width of the source and the IP effect within the source.

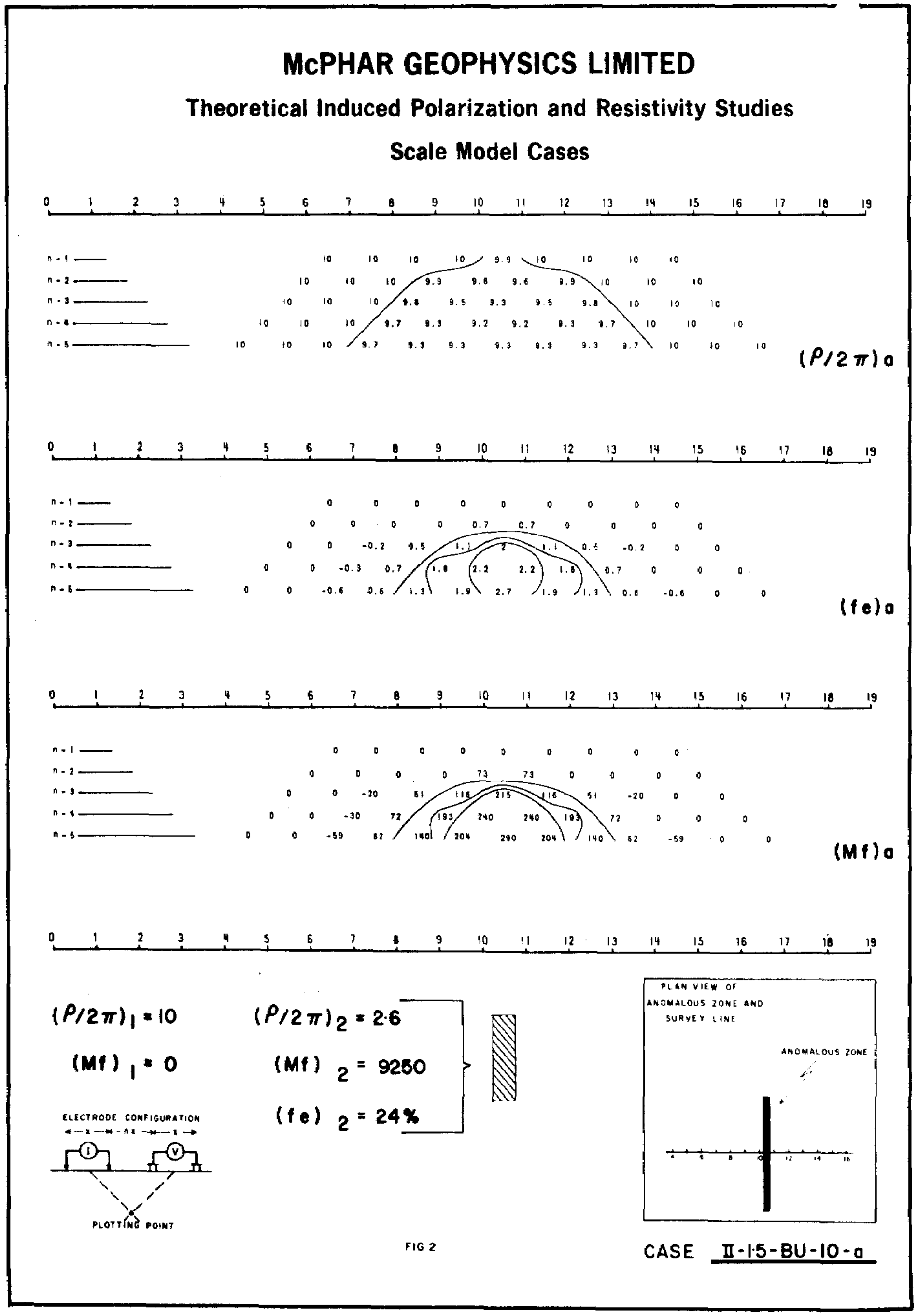
Our experience has confirmed the desirability of doing detail. When a reconnaissance IP survey using a relatively large electrode interval indicates the presence of a narrow, shallow source, detail with shorter electrode intervals is necessary in order to better locate, and evaluate, the source. The data of most usefulness is obtained when the maximum apparent IP effect is measured for n = 2 or n = 3. For instance, an anomaly originally located using X = 300' may be checked with X = 200' and then X = 100'. The data with X = 100' will be quite different from the original reconnaissance results with X = 300'.

The data shown in Figure 5 and Figure 6 are field results from a greenstone area in Quebec. The expected sources were narrow (less than 30' in width) zones of massive, high-grade, zinc-silver ore. An electrode interval of 200' was used for the reconnaissance survey in order to keep the rate of progress at an acceptable level. The anomalies located were low in magnitude.

The very weak, shallow anomaly shown in Figure 5 is typical of those located by the X = 200' reconnaissance survey. Several anomalies of this type were detailed using shorter electrode intervals. In most cases the detail measurements suggested broad zones of very weak mineralization. However, in the case of the source at 20N to 22N, the measurements with shorter electrode intervals confirmed the presence of a strong, narrow source. The X = 50' results are shown in Figure 6. Subsequent drilling has shown the source to be 12.5' of massive sulphide mineralization containing significant zinc and silver values.

The change in the anomaly that results when the electrode interval is reduced is not unusual. The X = 50' data more accurately locates the narrow source, and permits the geophysicist to make a better evaluation of its importance. The completion of this type of detail is very important, in order to get the maximum usefulness from a reconnaissance IP survey.


McPHAR GEOPHYSICS LIMITED
Theoretical Induced Polarization and Resistivity Studies
Scale Model Cases
(ρ/2π)a
(fe)a
(Mf)a
(ρ/2π)1 = 10
(Mf)1 = 0
(ρ/2π)2 = 2.51
(Mf)2 = 10000
(fe)2 = 25%
ELECTRODE CONFIGURATION
PLOTTING POINT
PLAN VIEW OF ANOMALOUS ZONE AND SURVEY LINE
ANOMALOUS ZONE
CASE II-0.5-BU-10-a
FIG 1


McPHAR GEOPHYSICS LIMITED
Theoretical Induced Polarization and Resistivity Studies
Scale Model Cases
(ρ/2π)a
(fe)a
(Mf)a
(ρ/2π)1 = 10
(Mf)1 = 0
(ρ/2π)2 = 2.6
(Mf)2 = 9250
(fe)2 = 24%
ELECTRODE CONFIGURATION
PLOTTING POINT
PLAN VIEW OF ANOMALOUS ZONE AND SURVEY LINE
ANOMALOUS ZONE
CASE II-1.5-BU-10-a
FIG 2

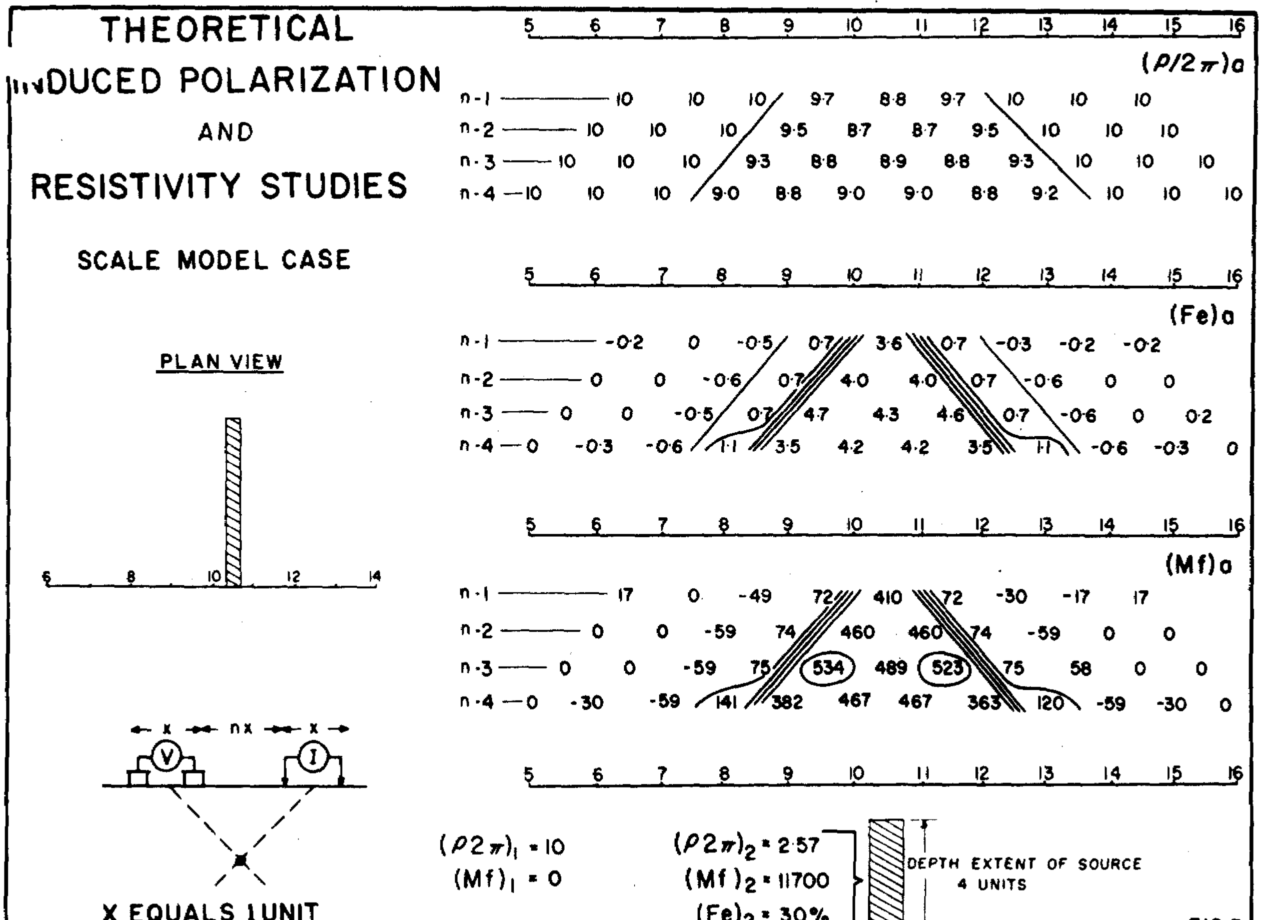

THEORETICAL
INDUCED POLARIZATION
AND
RESISTIVITY STUDIES
SCALE MODEL CASE
PLAN VIEW
6 8 10 12 14
X EQUALS 1 UNIT
5 6 7 8 9 10 11 12 13 14 15 16
(ρ/2π)a
n-1 — 10 10 10 9.7 8.8 9.7 10 10 10
n-2 — 10 10 10 9.5 8.7 8.7 9.5 10 10 10
n-3 — 10 10 10 9.3 8.8 8.9 8.8 9.3 10 10 10
n-4 — 10 10 10 9.0 8.8 9.0 9.0 8.8 9.2 10 10 10
(Fe)a
n-1 — -0.2 0 -0.5 0.7 3.6 0.7 -0.3 -0.2 -0.2
n-2 — 0 0 -0.6 0.7 4.0 4.0 0.7 -0.6 0 0
n-3 — 0 0 -0.5 0.7 4.7 4.3 4.6 0.7 -0.6 0 0.2
n-4 — 0 -0.3 -0.6 1.1 3.5 4.2 4.2 3.5 1.1 -0.6 -0.3 0
(Mf)a
n-1 — 17 0 -49 72 410 72 -30 -17 17
n-2 — 0 0 -59 74 460 460 74 -59 0 0
n-3 — 0 0 -59 75 534 489 523 75 58 0 0
n-4 — 0 -30 -59 141 382 467 467 363 120 -59 -30 0
$(\rho 2\pi)_1 = 10$
$(Mf)_1 = 0$
$(\rho 2\pi)_2 = 2.57$
$(Mf)_2 = 11700$
$(Fe)_2 = 30\%$
DEPTH EXTENT OF SOURCE 4 UNITS

FIG. 3

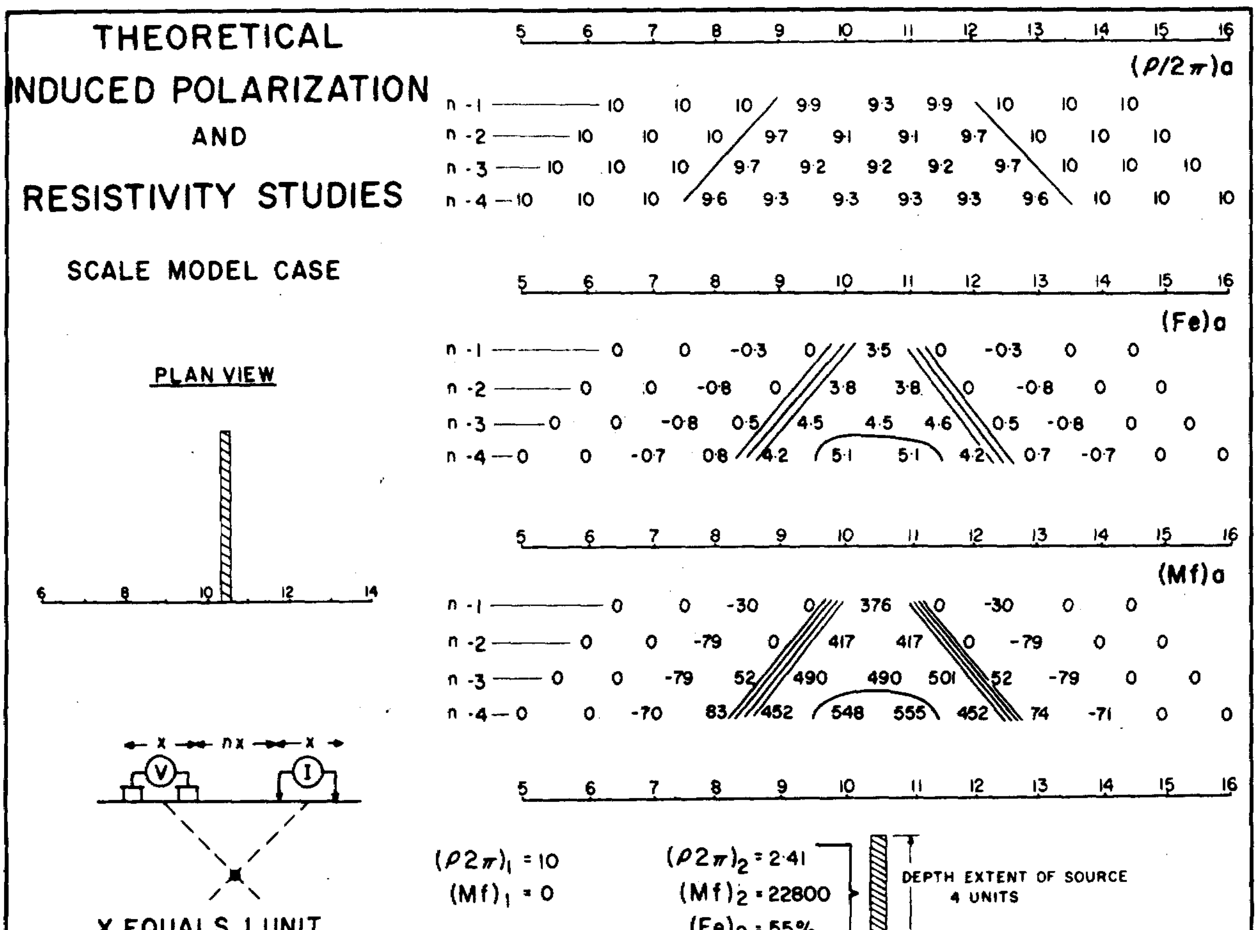

THEORETICAL
INDUCED POLARIZATION
AND
RESISTIVITY STUDIES
SCALE MODEL CASE
PLAN VIEW
6 8 10 12 14
X EQUALS 1 UNIT
5 6 7 8 9 10 11 12 13 14 15 16
(ρ/2π)a
n-1 — 10 10 10 9.9 9.3 9.9 10 10 10
n-2 — 10 10 10 9.7 9.1 9.1 9.7 10 10 10
n-3 — 10 10 10 9.7 9.2 9.2 9.2 9.7 10 10 10
n-4 — 10 10 10 9.6 9.3 9.3 9.3 9.3 9.6 10 10 10
(Fe)a
n-1 — 0 0 -0.3 0 3.5 0 -0.3 0 0
n-2 — 0 0 -0.8 0 3.8 3.8 0 -0.8 0 0
n-3 — 0 0 -0.8 0.5 4.5 4.5 4.6 0.5 -0.8 0 0
n-4 — 0 0 -0.7 0.8 4.2 5.1 5.1 4.2 0.7 -0.7 0 0
(Mf)a
n-1 — 0 0 -30 0 376 0 -30 0 0
n-2 — 0 0 -79 0 417 417 0 -79 0 0
n-3 — 0 0 -79 52 490 490 501 52 -79 0 0
n-4 — 0 0 -70 83 452 548 555 452 74 -71 0 0
$(\rho 2\pi)_1 = 10$
$(Mf)_1 = 0$
$(\rho 2\pi)_2 = 2.41$
$(Mf)_2 = 22800$
$(Fe)_2 = 55\%$
DEPTH EXTENT OF SOURCE 4 UNITS

FIG. 4

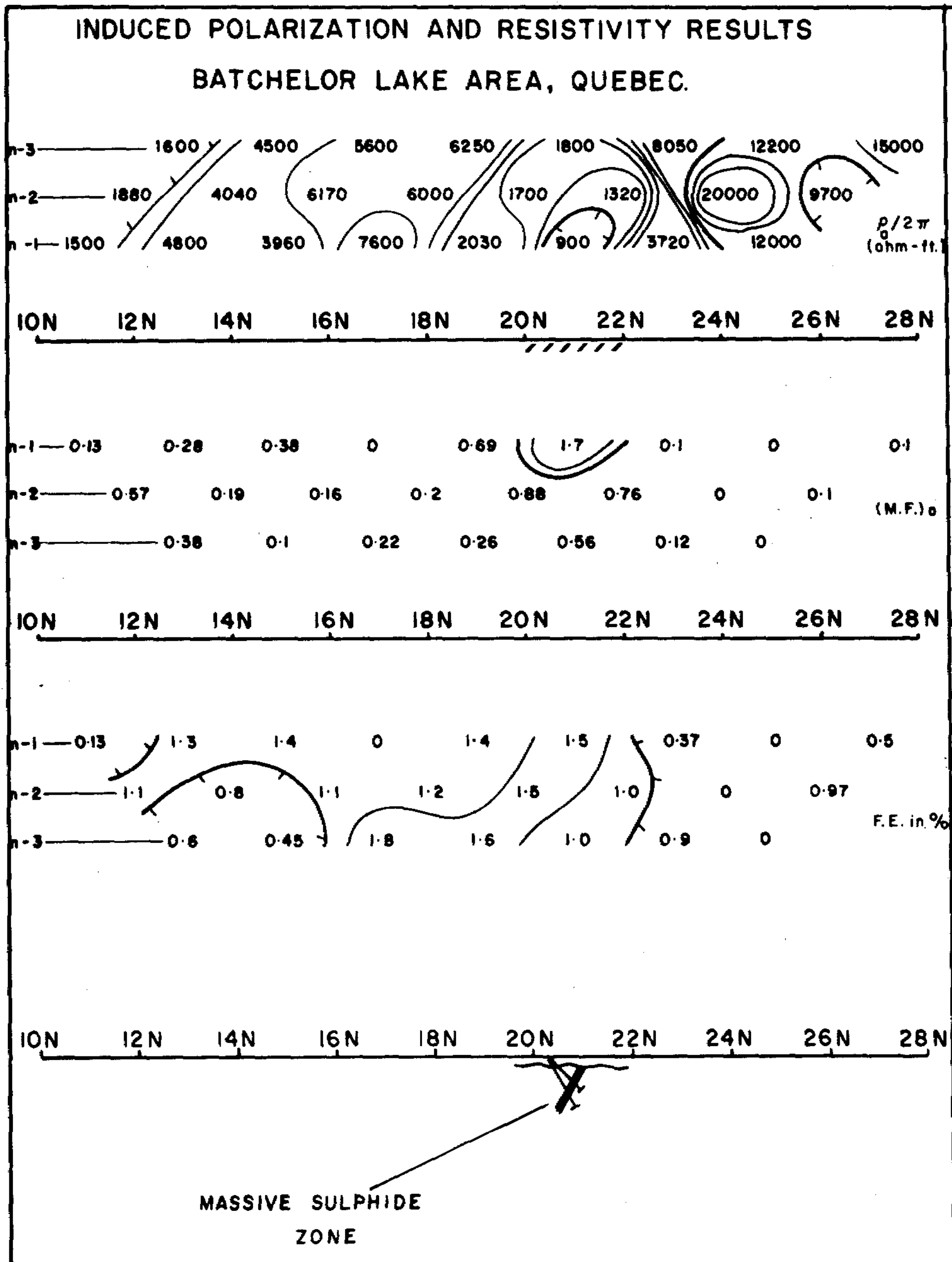

INDUCED POLARIZATION AND RESISTIVITY RESULTS
BATCHELOR LAKE AREA, QUEBEC.
$\rho_a/2\pi$ (ohm-ft.)
(M.F.)a
F.E. in %
10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
MASSIVE SULPHIDE ZONE

FIG. 5

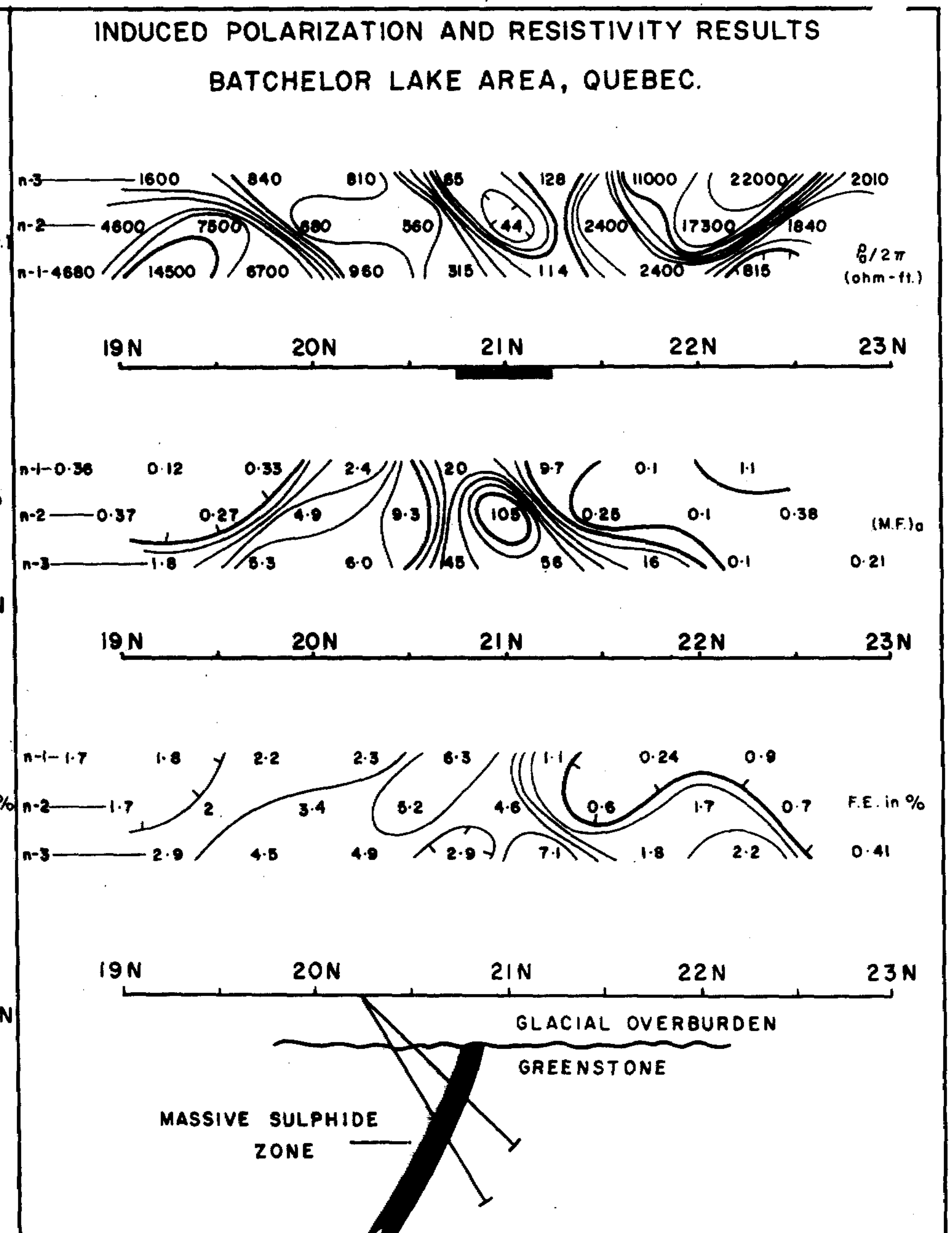

INDUCED POLARIZATION AND RESISTIVITY RESULTS
BATCHELOR LAKE AREA, QUEBEC.
$\rho_a/2\pi$ (ohm-ft.)
(M.F.)a
F.E. in %
19N 20N 21N 22N 23N
GLACIAL OVERBURDEN
GREENSTONE
MASSIVE SULPHIDE ZONE

FIG. 6

REPORT ON THE
COMBINED AIRBORNE MAGNETIC
AND
ELECTROMAGNETIC SURVEY
FREDHART LAKE AREA, ONTARIO
FOR
COPPER LODE MINES LIMITED

1. INTRODUCTION

At the request of Copper Lode Mines Limited a combined air-borne Electromagnetic and Magnetic survey has been carried out over the Company's holdings in the Fredhart Lake Area, Red Lake Mining Division, Ontario. The survey area consists of a block of 212 claims and the sur-rounding ground which has similar geology. A detailed list of the claim numbers is given in Appendix I; the individual claims have also been shown on the attached figure.

The purpose of the survey was to map any magnetic or electro-magnetic anomalies that might be indicative of the base metal sulphides which have been outlined on the claim group itself. Several interesting anomalous zones have been indicated by the airborne survey and a program of detailed ground follow-up work is recommended to pinpoint their location and assess their importance.

2. GEOLOGY & PREVIOUS WORK

A detailed geologic map of the claim group and surrounding area has been provided by the Company. Copper mineralization is reported to occur in a series of metavolcanic rocks on the northwest portion of the property and may be associated with bands of magnetite rich rock. Important copper, zinc and silver values are associated with pyrite - pyrrhotite mineralization on the southeast portion of the claims.

Previous work on the claim group includes ground surveys with electromagnetics, magnetics and induced polarization. The results of this work have also been made available for correlation with the airborne data.

Reconnaissance magnetic coverage of the area is provided by GSC Maps 871G and 872G.

3. SURVEY DETAILS

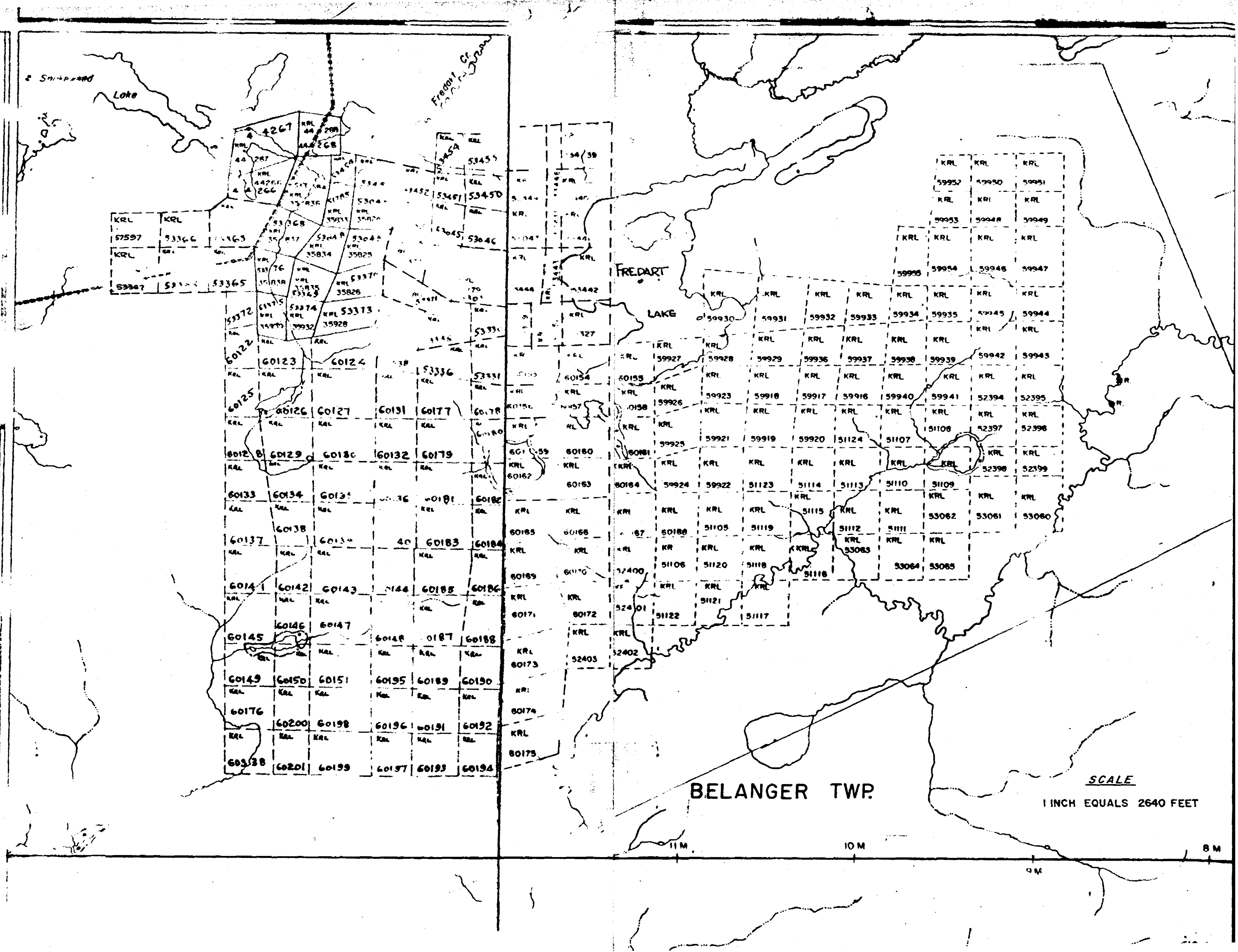
The flight lines were oriented N 25° W and spaced at 1/8 mile intervals over the survey area. A total of 319.7 line miles were covered by the survey of which 101.9 line miles lie within the boundary of the 212 claim group.

The F-400 electromagnetic and magnetic system is described in detail in the notes attached to this report. Assessment details including dates and personnel have been appended.

The field surveying was carried out between September 13th, and 19th, 1968.

4. PRESENTATION OF RESULTS

The results of the electromagnetic survey are shown on the accompanying map AE 6822 at a scale of 1 inch equals 1320 feet. A


51 0
Lake
FREDART
LAKE
BELANGER TWP.
SCALE
1 INCH EQUALS 2640 FEET
11 M
10 M
9 M
8 M

Area (M-24331)

corresponding map AM 6821 is a contoured presentation of the magnetic data.

The attached Figure 1 shows the boundaries of the individual claims and their numbers. It is at a scale of one inch equals 2640 feet.

5. DISCUSSION OF RESULTS

Numerous well-formed EM anomalies have been outlined in the survey area. Many of these show good line-to-line correlation and have been grouped into zones which are indicated on the plan map and are numbered for ease of discussion. Particularly interesting anomalies within a zone have been designated by a small star located to the northeast of the anomaly peak.

In addition to the groups of anomalies, there are individual responses that also warrant special consideration. These have also been shown as numbered zones.

There is some evidence of background conductivity over some lakes and swamps. This is usually characterized by a broad smooth response displaying low apparent conductivity (i.e. low ratio) and is quite readily recognized. It is important to note, that not all of the lakes are conductive, nor are all parts of any one lake conductive. Evidently the lakes and lake shores are partly controlled by structure.

Zones 1 to 11 inclusive

The dominant feature on the magnetic map is the series of strong highs that trends N-E across the northern portion of the survey area and appears to outline the metavolcanic rocks. Eleven electromagnetic zones, numbered 1 to 11 inclusive suggest a set of en echelon or offset conductive bands that are closely associated with this magnetic feature. A detailed discussion of these zones is included below.

Zone 1

This zone consists of two small amplitude responses that lie to the west of the strong magnetic feature. The well-defined response on Line 8 appears to coincide with a magnetic high of less than 50 gammas and is worthy of detailed investigation.

Zone 2

Zone 2 has been interpreted to extend from Line 12 to Line 17. The best responses occur on Lines 14 and 17 as indicated by the stars. The response on Line 17 is particularly noteworthy due to its close correlation with the peak of a magnetic high of about 500 gammas. Zone 2 appears to lie in a small lake and consequently detailing would be more convenient during the winter months.

Zone 3

Good amplitudes and high ratios are characteristic of the responses on this zone. The EM anomaly on Line 21 correlates with a magnetic peak of more than 1700 gammas and is considered a primary target for ground follow-up work.

Zone 4

The strongest EM response, on Line 24, correlates with a magnetic high of more than 800 gammas. This anomaly lies in the vicinity of a pyrite - pyrrhotite showing and several short drill holes. Zone 4 is definitely a first priority anomaly and the results of previous ground surveys in this vicinity should be reviewed.

Zone 5

Zone 5 appears to represent a single zone of good conductivity that extends across four lines. It correlates quite well with available ground EM data.

Zones 6 & 7

These are two of the strongest and best defined EM zones encountered in the airborne survey. They display high conductivity and are closely associated with strong magnetic highs. The indicated offset or en echelon structure near Line 36 is supported by the detailed ground EM survey. Drilling is presently being carried out in their vicinity.

Zone 8

Zone 8 may represent several en echelon conductors or a series of offsets in a single conductor. It has weak magnetic expression, but displays high conductivity and indicates that the conductive zone extends as far as the west shore of Fredhart Lake.

Zone 9

The EM anomalies that constitute this zone are quite weak and the indicated conductivity is low. Nevertheless, they appear to be closely associated with high magnetic relief similar to that found over known mineralization to the west. Zone 9 appears to lie in the east arm of Fredhart Lake. Its importance is enhanced by a reported chalcopyrite-pyrite showing on the south shore of this arm.

Zone 9 is definitely considered a first priority target and merits detailed evaluation.

Zone 10

Most of the EM responses on Zone 10 are quite weak and their correlation is somewhat tenuous. However, the starred anomaly on Line 56 is strong, well-defined, displays good conductivity and is located on the south flank of a 2000 gamma magnetic high. The initial ground detailing of this zone should be carried out near Line 56.

The importance of this conductor is increased by the proximity of a chalcopyrite-molybdenite-pyrite showing on the creek northeast of Fredhart Lake. Zone 10 is a primary target for ground follow-up work.

Zone 11

This zone has been formed from three moderate amplitude responses that display high conductivity. It lies entirely within volcanics and merits detailed examination.

Zone 12

A small, apparently isolated response occurs near the north boundary of the survey on Line 6. Although its indicated conductivity is not high it has an interesting shape and should be regarded as a secondary target.

Zone 13

Zone 13 is a short conductor lying parallel to, and south of, Zone 3. It lies on the south flank of the strong magnetic zone and is worthy of detailing if time permits.

Zone 14

A single line anomaly lies just north of the claim boundary on Line 24 in an area mapped as granite. It is an interesting response and warrants a second priority classification.

Zone 15

The response on Line 24 is one of the best recorded in the survey. There is no obvious magnetic correlation and the indicated conductivity is moderate. Nevertheless, Zone 15 is considered as a prime target for detailed ground surveying.

Zone 16 & 17

These two conductors display similar conductivities and may be closely related. Zone 16 correlates with a small magnetic high and is considered to be the more interesting. Detailed ground investigations should be carried out on the starred responses on Lines 8 and 12.

Zone 18

Zone 18 consists of two well formed anomalies that display moderate conductivity. Part of these zesponses could be caused by conductive lake bottom sediments or overburden. However, Zone 18 should be included in the initial follow-up work on the southwest portion of the survey area.

Zones 19, 20 & 21

These three short zones all display good shape, moderate amplitude and moderate conductivity. They all should be regarded as primary targets.

Zone 22

Zone 22 has been formed from interesting anomalies on the south end of four lines. Unfortunately, the two best anomalies on Lines 15 and 16 were recorded after the camera was turned off and their position is uncertain. Detailing should be carried out on the south end of Line 15 to assess the importance of these indications.

Zones 23, 24, 25, 26, 27, 28 & 29

Seven single line responses that appear to represent isolated conductors. Zone 23 and 24 have some magnetic correlation and are more highly regarded. Although they cannot be considered as prime targets, reconnaissance ground checks are suggested for these zones to assess their importance.

Zone 30

Zone 30 consists of a series of well formed EM anomalies that lies in the south part of Fredhart Lake. It appears to represent a through-going conductor that is parallel to the trend of the strong magnetics to the north. Despite the indicated low conductivity, Zone 30 merits a first priority classification and could be detailed easily from the ice during the winter.

Zone 31

This zone is not as definite as Zone 30 but it has a similar strike and also occurs over water. It displays variable conductivity and may represent several conductive bands. Zone 31 also warrants a first priority classification.

The EM anomalies over the small lake to the west of Zone 30 display poor conductivity and appear to be due to conductive lake bottom sediments. Similar anomalies occur on the lake near the south end of Lines 41, 42, 43 and 44.

Zones 32 & 33

Two, apparently isolated responses occur on either side of small lake near the south end of Lines 54 and 56. Zone 32 correlates closely with a drilled sulphide zone that contains copper, zinc and silver values. Although lake bottom sediments may be partly responsible for Zone 33, it is considered worthy of detailed examination.

Zones 34, 35 & 36

Three isolated responses occur along a creek that follows a narrow band of schists. Zone 36 is particularly interesting because of its magnetic correlation but all three warrant further work.

Zone 37

A north-south trending conductive zone has been interpreted across five flight lines to the east of Fredhart Lake. The shape factor of the individual responses is not high but this could be due to the poor coupling caused by the unusual strike. Zone 37 is not a prime target but the indicated conductivity is high and it appears to merit further work in the vicinity of the best response on Line 55.

Zone 38

This zone displays high ratios but the amplitudes are low, to moderate. It lies on the north flank of a broad magnetic high in an area mapped as greenstone and is parallel to the main trend of the magnetic. Zone 38 is regarded as a secondary target.

Zones 39, 40 & 41

These three isolated responses have been selected as the best of a large group of anomalies on the east end of the survey area. If the results of checking Zones 11 and 38 are encouraging, they would warrant a first priority classification.

6. SUMMARY AND RECOMMENDATIONS

Forty conductive zones have been interpreted from the electro-magnetic results and an extensive program of follow-up work is indicated to assess their importance.

Zones 1 to 11 are closely associated with a series of strong magnetic highs. Important copper values are reported in the drilling presently being carried out in the vicinity of Zones 6 and 7. Because of the apparent association of the magnetic and electromagnetic anomalies, Zones 1 to 11 are considered to be of primary importance. Many of these have been evaluated by detailed ground surveys while others lie on unstaked areas.

Of the remaining zones the following are regarded as prime targets for detailed ground EM and magnetic surveys:- Zone 15 to 22 inclusive and Zone 30 to 36 inclusive. Preference should be given to the anomalies that lie on unstaked ground. Any of the zones that occur over water should be considered for detailed evaluation in the coming winter field season.

The remaining numbered zones have been assigned a second priority classification. However, many of these are single line or isolated responses which can be more difficult to recover on the ground but are often economically more rewarding than the long throughgoing conductors.

There are numerous other responses which have not been included in the above zones. These will require continuing reassessment as the results of the ground work becomes available for study.

McPHAR GEOPHYSICS LIMITED

D. B. Sutherland,
Geophysicist.

A. W. Mullan,
Geologist.

Dated: November 19, 1968

ASSESSMENT DETAILS

PROPERTY: Rexdale Option

SPONSOR: Copper Lode Mines Limited

LOCATION: Fredhart Lake Area

TYPE OF SURVEY: Combined Airborne Magnetic and Electromagnetic

MEAN FLIGHT LINE DIRECTION: N-S

MEAN FLIGHT LINE SPACING: 1/8 mile

MEAN TERRAIN CLEARANCE: 500 feet

AIRCRAFT: Beaver CF - HOE

MINING DIVISION: Red Lake

PROVINCE: Ontario

DATE STARTED: Sept. 13, 1968

DATE FINISHED: Sept. 19, 1968

MILES OF LINE FLOWN: 319.7

MILES OF LINE INSIDE AREA: 101.9

NUMBER OF MINING CLAIMS: 212

CONSULTANTS:

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McPHAR GEOPHYSICS LIMITED

D.B. Sutherland,
Geophysicist.

A.W. Mullan,
Geologist.

Dated: November 19, 1968

(212)

AIR MAG + EM

APPENDIX I

51105	to	51124	Inclusive
51781	to	51785	"
52394	to	52403	"
53044	to	53053	"
53060	to	53065	"
53327			
53329	to	53331	"
53335	to	53336	"
53338			
53363	to	53376	"
53439	to	53456	"
57597			
59916	to	59955	"
60122	to	60201	"
60338			

McPHAR AIRBORNE
GENERAL NOTES ON

ELECTROMAGNETIC & MAGNETIC SYSTEMS

A. EQUIPMENT

The electromagnetic and magnetic units are the primary instruments used in the McPhar combined survey system which is designed for use in a Dehaviland DHC-2 Beaver aircraft. Ancillary equipment consists of a radio altimeter, a frame camera, an intervalometer-fiducial numbering system and a light beam recorder.

I) F-400 Electromagnetic Unit

The F-400 is a sequential dual frequency unit (340 and 1070 Hz) that measures the quadrature response of a conductor. In the absence of a conductor the quadrature response is zero. Two iron cored coils mounted beneath the wings of the aircraft are used to create the primary field which is essentially a forward pointing dipole. A 450 foot cable is used to tow a receiver bird and gives a transmitter-receiver separation of approximately 400 feet. The dipole of the receiver system is vertical and flown in the proper position to be maximum coupled to the primary field. Thus the coil configuration can be designated as an X-Z skew system which is flown In-Line. Sequential dual-frequency EM operation is employed together with time sharing for a proton magnetometer. The cycle consists of one third second at each frequency and one third magnetic readout. The quadrature response at each frequency is recorded on two channels of the recorder.

II) Proton Magnetometer

A varian V-4937, airborne proton free precession magnetometer is used to record the variations in the earth's magnetic field. The sensing head of this unit is conveniently mounted inside the port wing tip. This instrument has a sensitivity of 1 gamma when pulsed at 1 second intervals or 2 gamma when more frequent readings are required. The proton magnetometer has the advantage of reading the absolute value of the earth's magnetic field and is almost completely free of drift or variations due to temperature or environmental changes. The magnetic data is recorded on the same trace as the electromagnetic response for ease of correlation.

III) Ancillary Equipment

A Bonzer doppler radio altimeter provides a continuous ground clearance profile. Flight path coverage is obtained by a frame camera driven by the intervalometer-fiducial unit which synchronizes the individual frames with the time events on the recorder. At the standard flying height of 450 feet the camera is programmed to provide 20% overlap on each frame, which results in a continuous record of the flight path. At greater heights, there is proportionally more overlap.

B. CENTURY 444 RECORD

A light-beam recorder employing a photo-sensitive paper is used to record the data. High-sensitivity galvanometers give almost instantaneous response to the incoming signals and the recorder time log is essentially zero.

With the actual flight record oriented so that the fiducial numbers increase from left to right, the 3.5 inch trace width has been divided into 100 units with zero at the bottom and 100 at the top. Fifty horizontal grid lines are used to mark 2 unit intervals. The ten unit intervals are indicated by the thicker grid lines. Except where noted on individual records the traces are identified as follows:

I) 340 & 1070 Hz Quadrature EM Response

These two primary information traces are centred at 20 and 40 units respectively. Upward excursions represent positive quadrature response, which is normally indicative of the presence of conductors. Negative deflections usually have no interpretational significance. On each of these traces a "full-scale" deflection covers approximately 25 units and anomalies normally give rise to simultaneous response on both traces.

The equipment may be flown at sensitivity ranges of X1, X2, X4 or X8, as indicated by the local geology and topography. Normally a X4 setting is employed and a deflection of 1 unit represents approximately 400 parts per million in terms of the primary field strength at the receiver. Anomalies of 1000 ppm are easily recognized. Scale settings are recorded by the operator on the Flight Report. Changes in scale setting vary the ratio of units to ppm directly and the record is essentially linear over the "full-scale" range. On occasion, strong responses will be recorded as "Off-Scale".

The ratio of the amplitude of the response at the two frequencies is characteristic of the "apparent conductivity" (i.e. size, conductivity - product) of the disturbing body: poor conductors display LO/HI ratios of 1.0 or less while good to excellent conductors have ratios greater than 1.0.

II) Magnetometer

Positive magnetic anomalies (i.e. increase in magnetic field strength) are indicated by upward excursions. The magnetic field is sampled at intervals of approximately 1 second. The observed value of the total magnetic field is then written out on two scales: the 2000 gamma scale for 250 milliseconds followed by the 200 gamma scale for 750 milliseconds.

The absolute value of the magnetic field is a five digit number: the first three of these are set on the zero line and recorded by the operator at the beginning of each flight. The 2000 gamma scale (coarse scale) is recorded in ten steps of 200 gammas (adjusted to the 10 unit lines) covering the entire 100 units: strong anomalies can be easily traced by the short bars that occur on the record. Full scale deflection (i. e. 0 to 100 units) is adjusted to 200 gammas for the fine scale which is recorded as a longer bar. Thus the absolute value of the magnetic field may be read from the trace to an accuracy of 2 gammas.

III) Fiducials

Fiducials are shown in one of two ways and coincide with the shutter opening of the frame camera. Usually the fiducials appear as vertical lines on the trace. Occasionally these are supplemented by an interrupted galvanometer centred near 90 units, these interruptions correspond with the vertical fiducial lines.

IV) Altimeter

The altimeter is adjusted so that 80 units equals 500 feet of ground clearance. The response is non-linear and 74 units correspond to 400 feet, 85 units to 600 feet and 90 units to 700 feet.

C. SURVEY PROCEDURE & COMPILATION

Uncontrolled airphoto mosaics usually serve as the base maps for flying the survey and for compilation of the geophysical data. A common scale is 1/4 mile (i. e. 1320 feet) per inch.

Flight lines are oriented perpendicular to the direction of the expected strike of the target, except in special cases where detail is required in the orthogonal direction.

Copies of the photo mosaic are given to the flight crew with intended flight lines indicated and numbered. Navigation along these lines is done visually from the physical features of the area. The aircraft is flown with a terrain clearance of 450 feet or, in rough terrain, at the lowest altitude that is judged feasible for safe operations.

Flight path is recovered from the film as compared to the photo mosaic. Identifiable points are marked on the mosaic and designated by the fiducial numbers which synchronize the camera and the recorder.

D. DATA PRESENTATION

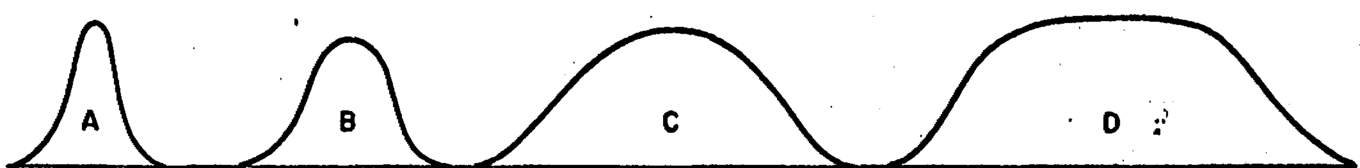
I) F-400 Dual Frequency EM Results

Electromagnetic anomalies result from areas on, or in, the ground which are electrical conductors. Geological sources of conductivity include sulphide mineralization, graphitic formations and fault or shear zones which often contain electrolytes. Other sources of conductivity include poorly conductive surficial materials such as saline waters, swamps and wet clays. The surficial anomalies sometimes extend over large areas and may obscure responses from underlying mineralized zones.

The presentation used on the plan maps has been developed to show the three primary characteristics of each individual response. This is accomplished by the numerals and letters adjacent to each anomaly symbol. For most purposes these characteristics are sufficient to describe the anomaly but for detailed interpretation it is best to study the actual flight trace.

a) Shape

The letters A, B, C and D are used to indicate the recorded shape of the EM response which approximates one of the following curve types. Often, to simplify presentation, the shape is indicated by symbols as shown in the legend of the plan map.



b) Amplitude

The amplitude of the peak response at 340 Hz is shown in units. In cases where there is no definite peak, the amplitude will be the highest value obtained over the anomaly. Except where noted in the legend, the equipment is operated at a gain setting of X4 which results in a scale of approximately 1 unit equals 200 ppm of the primary field strength.

c) Apparent Conductivity Ratio

The ratio of the response at 340 Hz compared to the response at 1070 Hz is shown as the third parameter. Generally ratios less than 1.0 indicate poor conductivity while those greater than 1.0 indicate good to excellent conductivity. However, it should be noted that this ratio is a measure of the Apparent Conductivity and varies with the product of the size and conductivity, where the size is usually a squared function.

d) Evaluation

The response obtained from a conductive body is influenced by a variety of factors which include conductivity, permeability, size, depth, attitude of the body. In addition to the frequencies used geometry and the angle of attack are also important variables. Consequently, the amplitude and shape of the response cannot be regarded as absolute interpretational gradings or classifications. However, they do have interpretational value as illustrated in the following examples.

i) A vertical sheet of highly conductive material (such as a vein of massive sulphides), striking perpendicular to the flight line, would give rise to a strong, sharp response with a high conductivity ratio. A typical characteristic would be:- A, 15, 1.8.

ii) As the angle of attack decreased, the shape of the response from a vertical sheet would change from A to B to C; the magnitude of response could increase while the ratio may decrease (e.g. C, 20, 1.2)

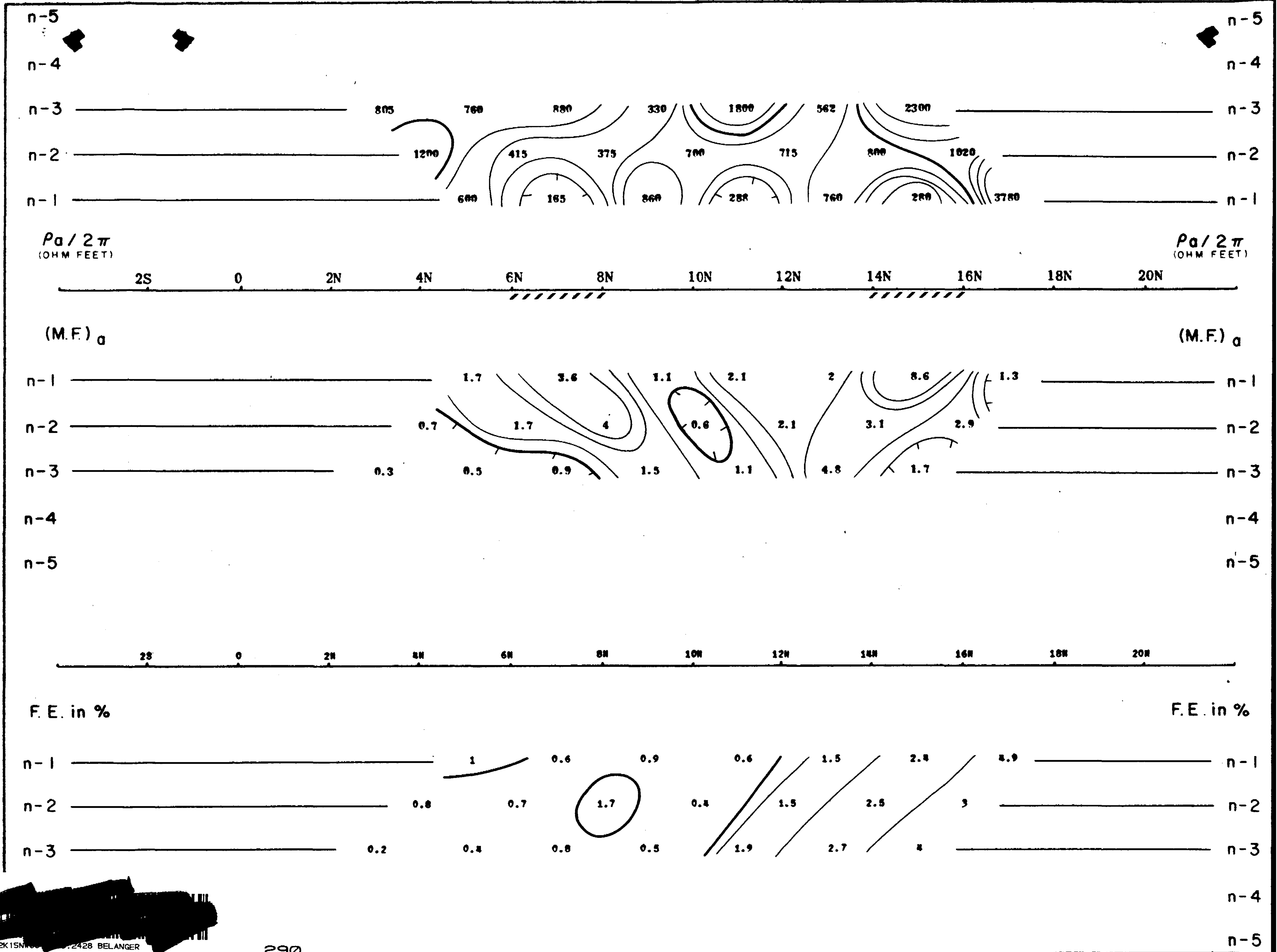
iii) An extensive flat horizontal sheet will show a response similar to C or D. The Amplitude and Apparent Conductivity will be a function of the size - conductivity product and can vary over a wide range. A typical response from poorly conductive overburden would be:- D, 20, 0.4.

Because of the large number of parameters that influence EM response, the anomalies obtained from airborne surveys should be evaluated in the light of all geological, geophysical and physiographical data before embarking on field investigations and follow-up work.

II) Magnetic Results

Usually the magnetic results are shown in contour form. These contours represent lines of equal intensity of the earth's magnetic field and are termed isomagnetic lines. When a proton magnetometer is used these represent the total intensity of the earth's field. In the case of a fluxgate or other type they are relative values only.

Where magnetics are flown only as a secondary method, the location of the magnetic peak relative to the EM anomaly and its amplitude are shown on the plan maps as indicated on the legend.



52K15N[redacted].2428 BELANGER

DWG. NO.- I.P.-5145-1

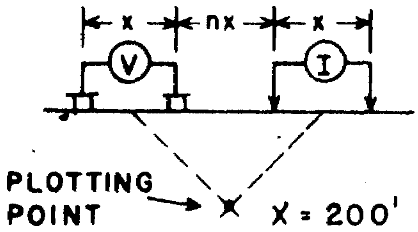
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 40 E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31 – 5.0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R.A. Bell

DATE: Jul 31/68

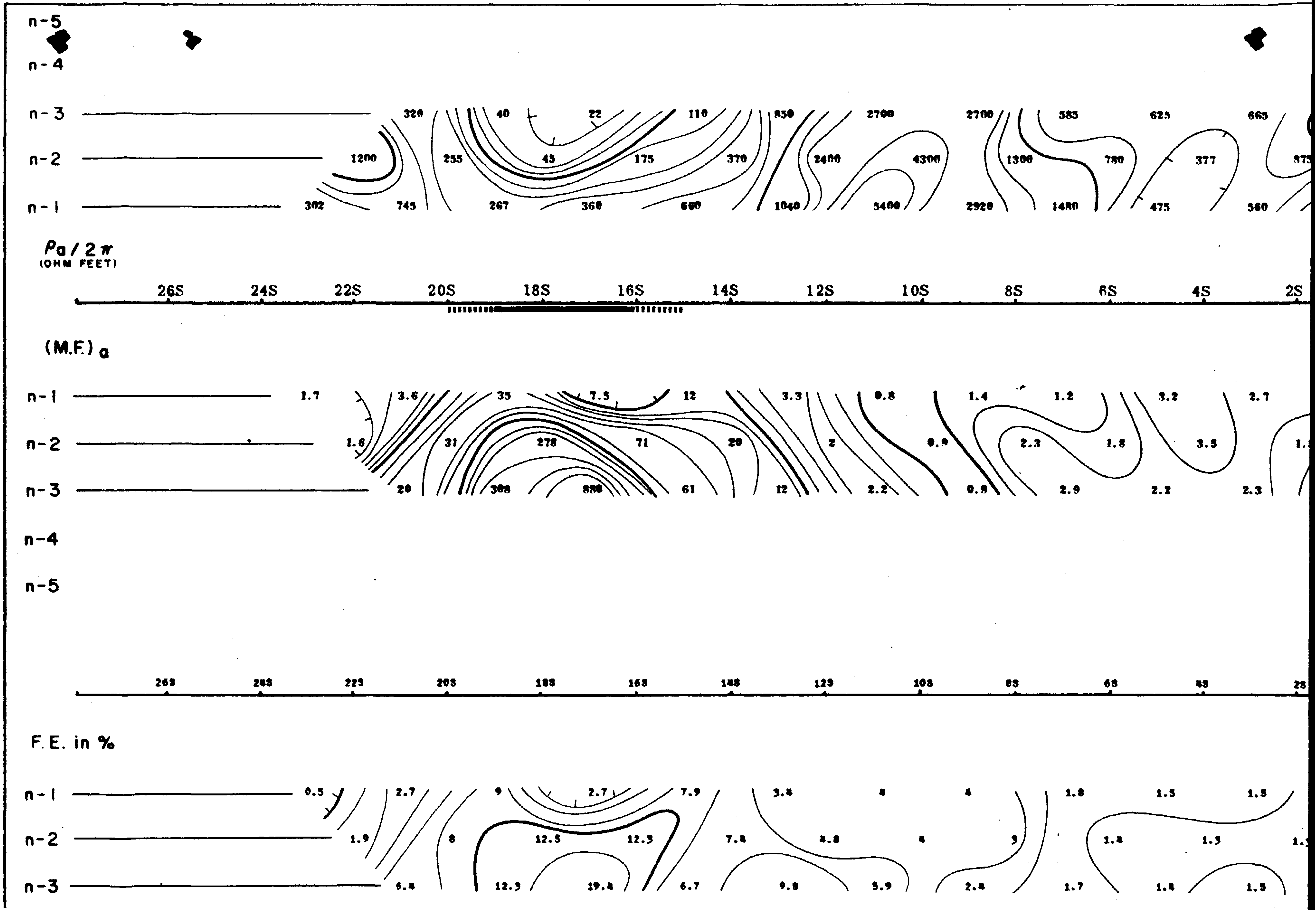
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1.5-2-3-5-7.5-10

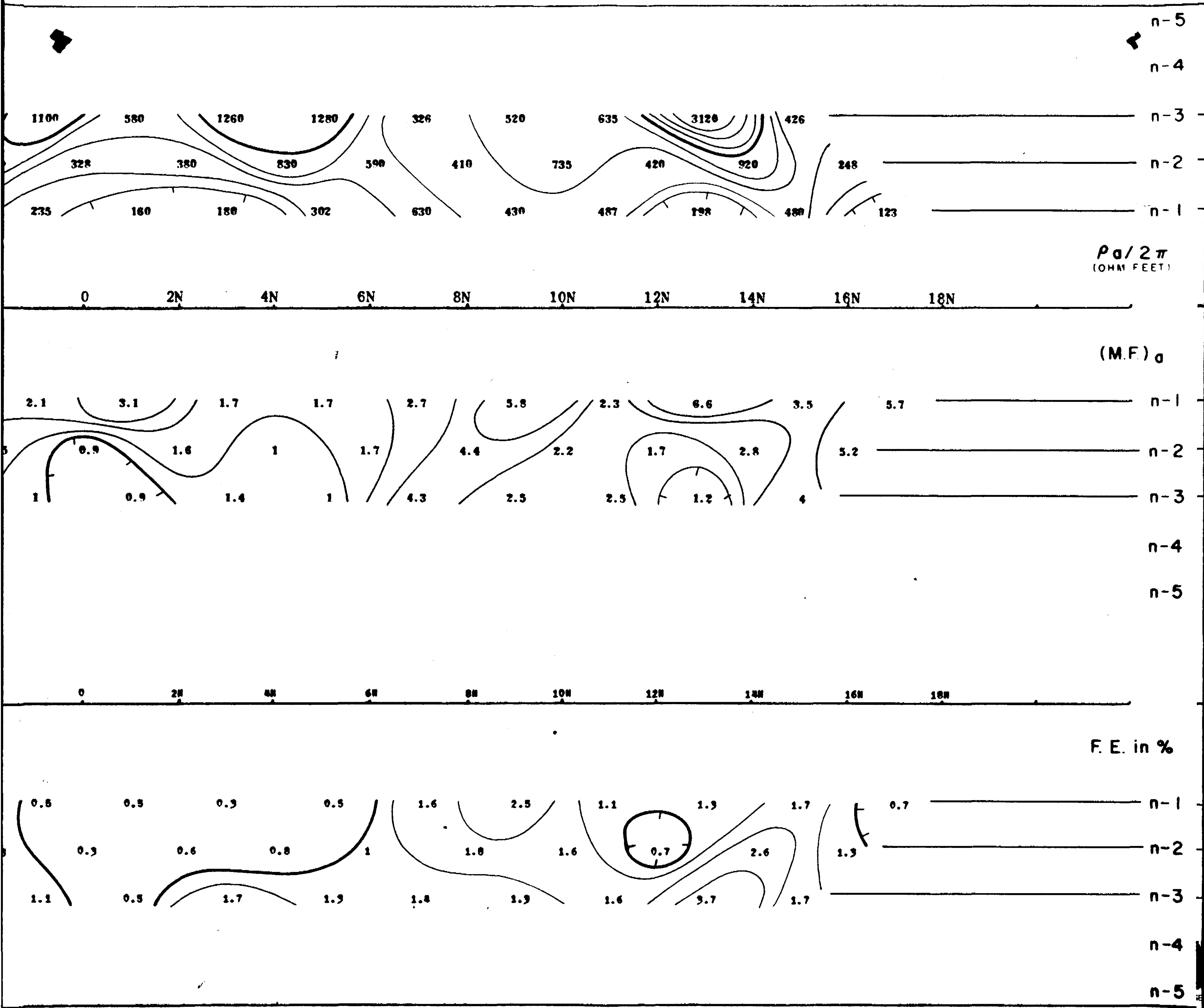
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



S2K15NW0012 6[redacted]LANGER


n-5
n-4
n-3
n-2
n-1
ρa/2π
(OHM FEET)
0
2N
4N
6N
8N
10N
12N
14N
16N
18N
(M.F.)a
F. E. in %

DWG NO - I.P - 5145 - 2

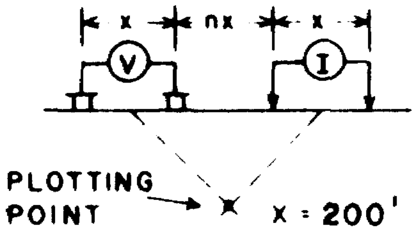
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 36 E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31

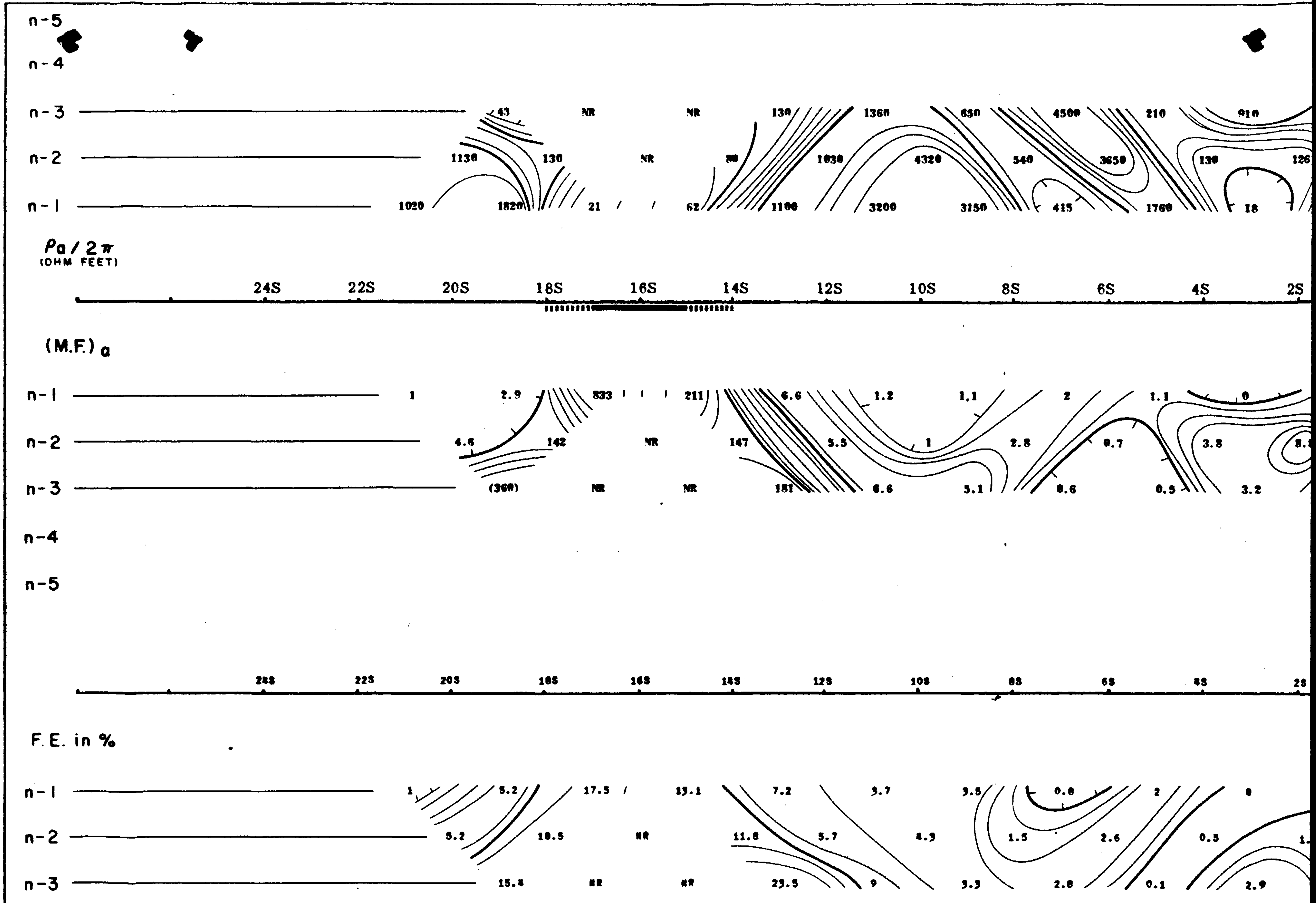
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

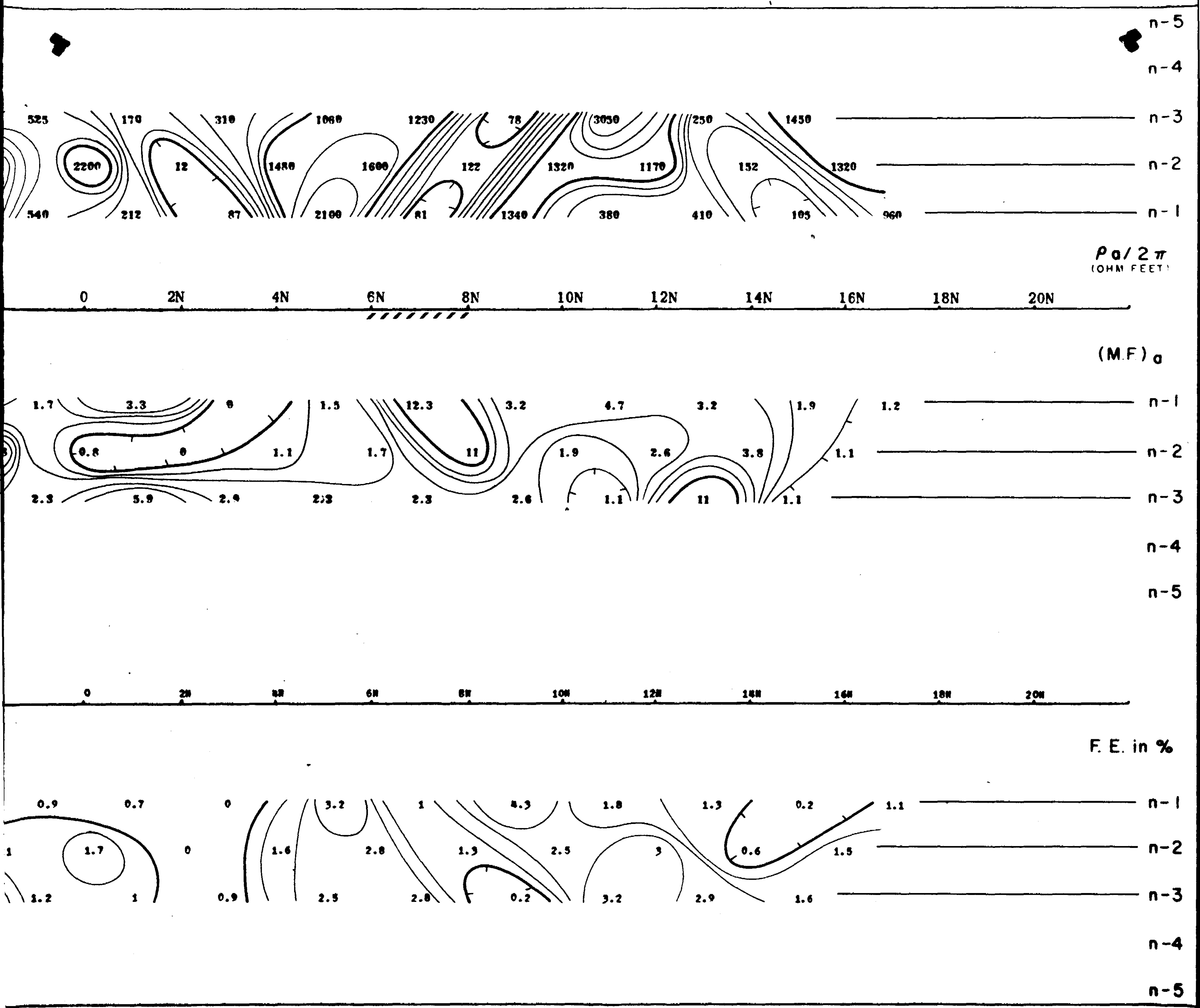
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted] 52K15NW0012 [redacted] LANGER


n-5
n-4
n-3
n-2
n-1
525 170 310 1060 1230 78 3030 250 1450
2200 12 1480 1600 122 1320 1170 152 1320
540 212 87 2100 81 1340 380 410 105 960
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
1.7 3.3 0 1.5 12.3 3.2 4.7 3.2 1.9 1.2
0.8 0 1.1 1.7 11 1.9 2.6 3.8 1.1
2.3 5.9 2.9 2.3 2.6 1.1 11 1.1
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
0.9 0.7 0 3.2 1 4.3 1.8 1.3 0.2 1.1
1 1.7 0 1.6 2.8 1.3 2.5 3 0.6 1.5
1.2 1 0.9 2.5 2.8 0.2 3.2 2.9 1.6

DWG NO - I P - 5145 - 3

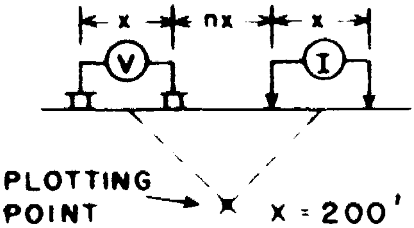
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 32 E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬
PROBABLE ▪▪▪▪▪▪▪▪▪▪▪▪
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31 68

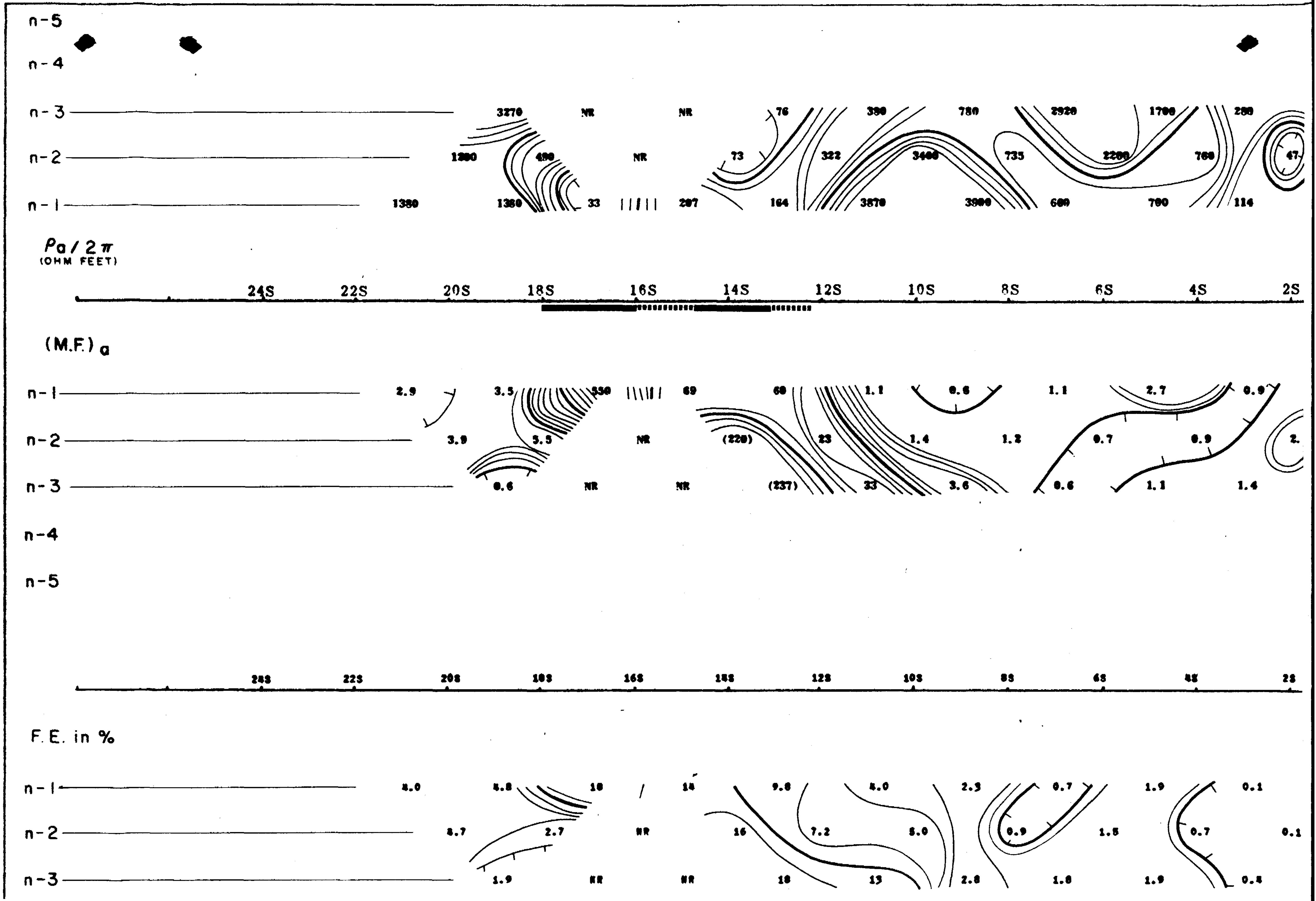
McPHAR GEOPHYSICS LIMITED

NOTE · CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

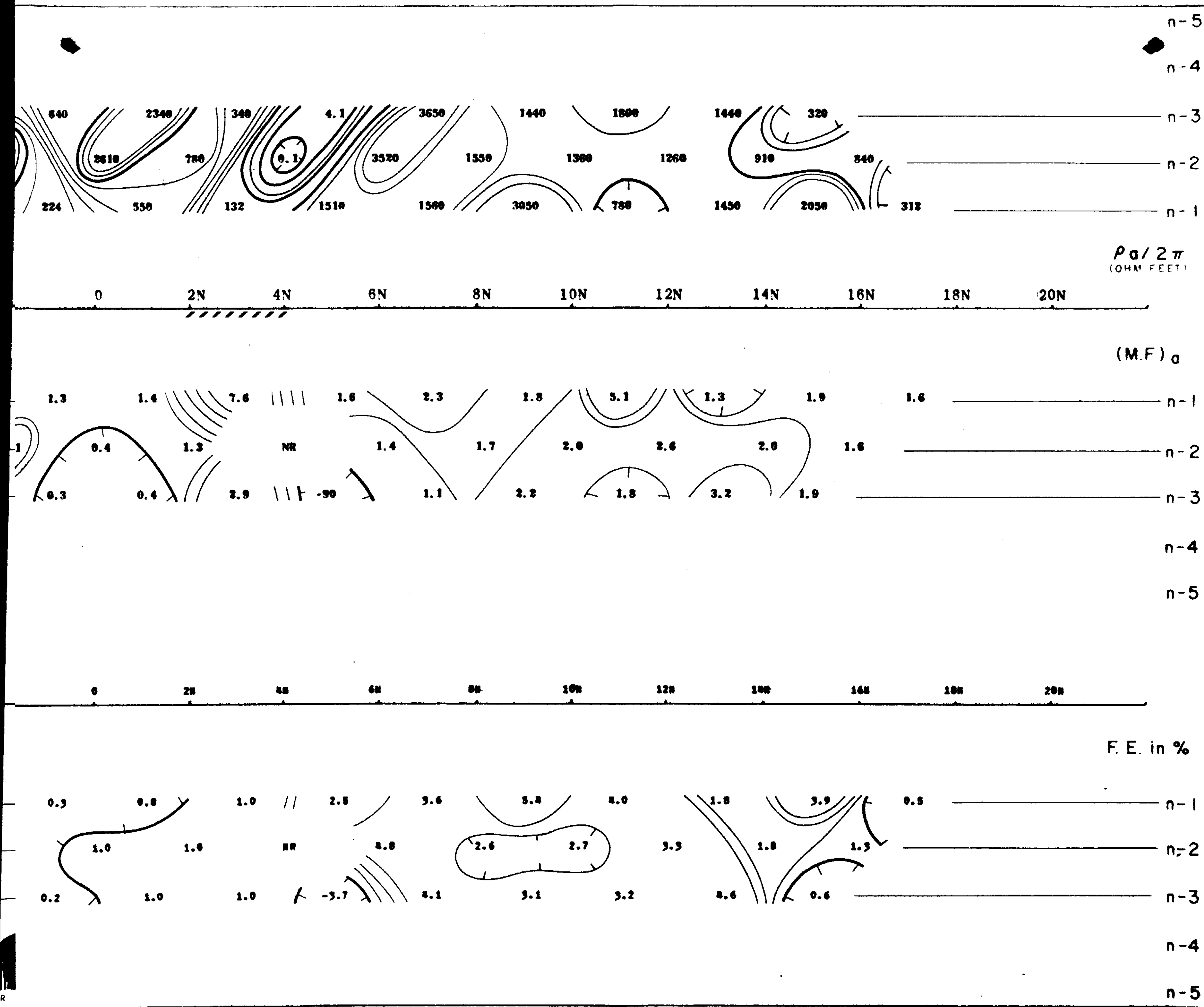
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



52K1[redacted]63.242[redacted]ELANGER



n-5
n-4
n-3
n-2
n-1
ρa/2π
(OHM FEET)
0
2N
4N
6N
8N
10N
12N
14N
16N
18N
20N
(M.F)a
n-1
n-2
n-3
n-4
n-5
F. E. in %
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-4

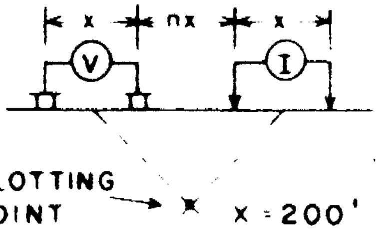
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO - 28 E

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

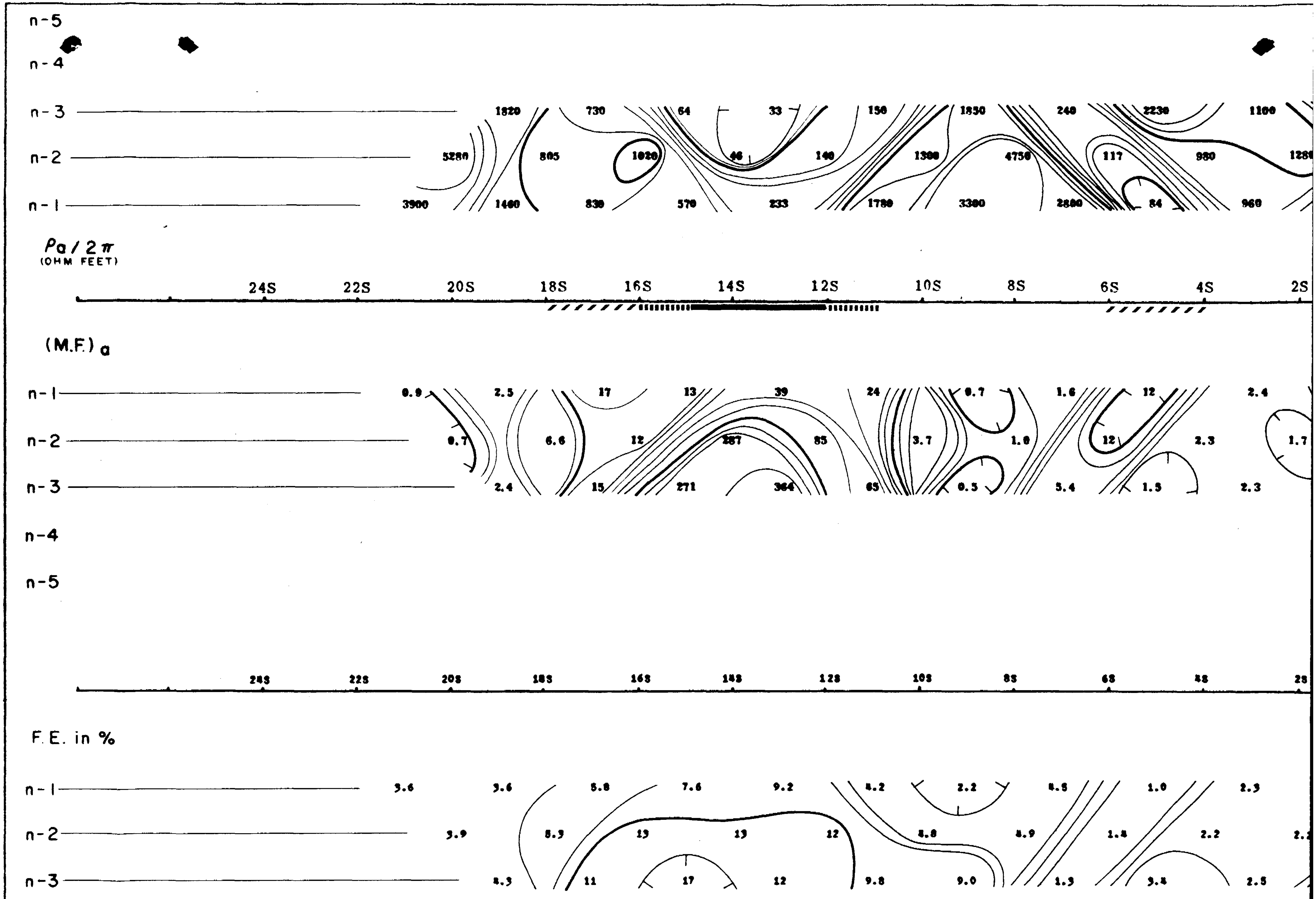
DATE July 31/68

NOTE CONTOURS AT LOGARITHMIC INTERVALS

1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

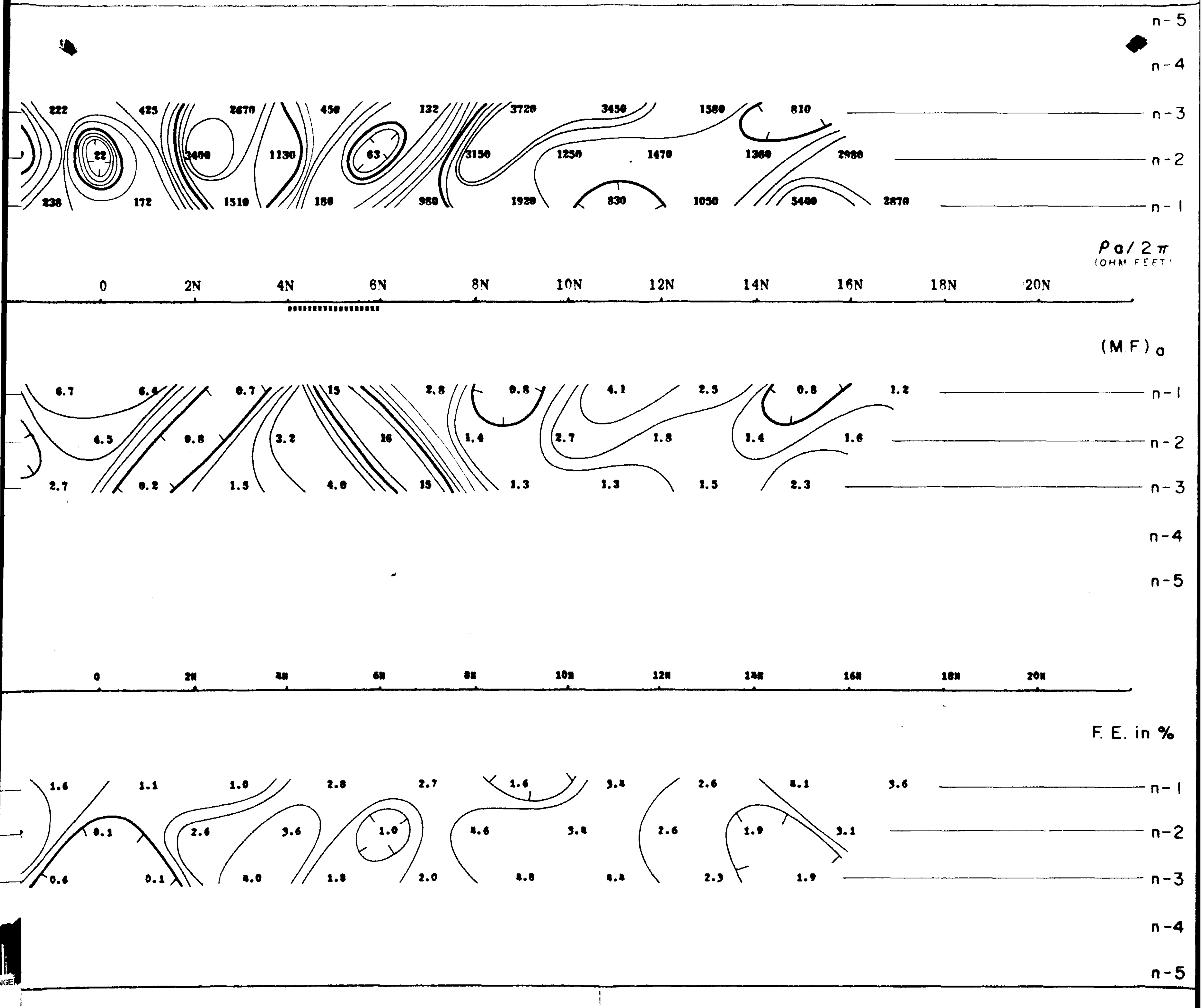
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted]

52K15NW0012 63.2428 BELANGE



ρa/2π
(OHM FEET)
0
2N
4N
6N
8N
10N
12N
14N
16N
18N
20N
(M.F)a
F. E. in %
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-5

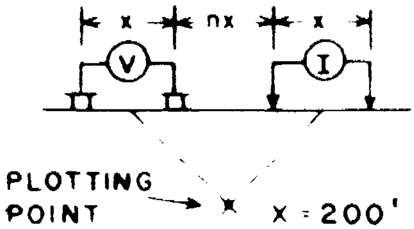
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 24 E

ELECTRODE CONFIGURATION



x = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

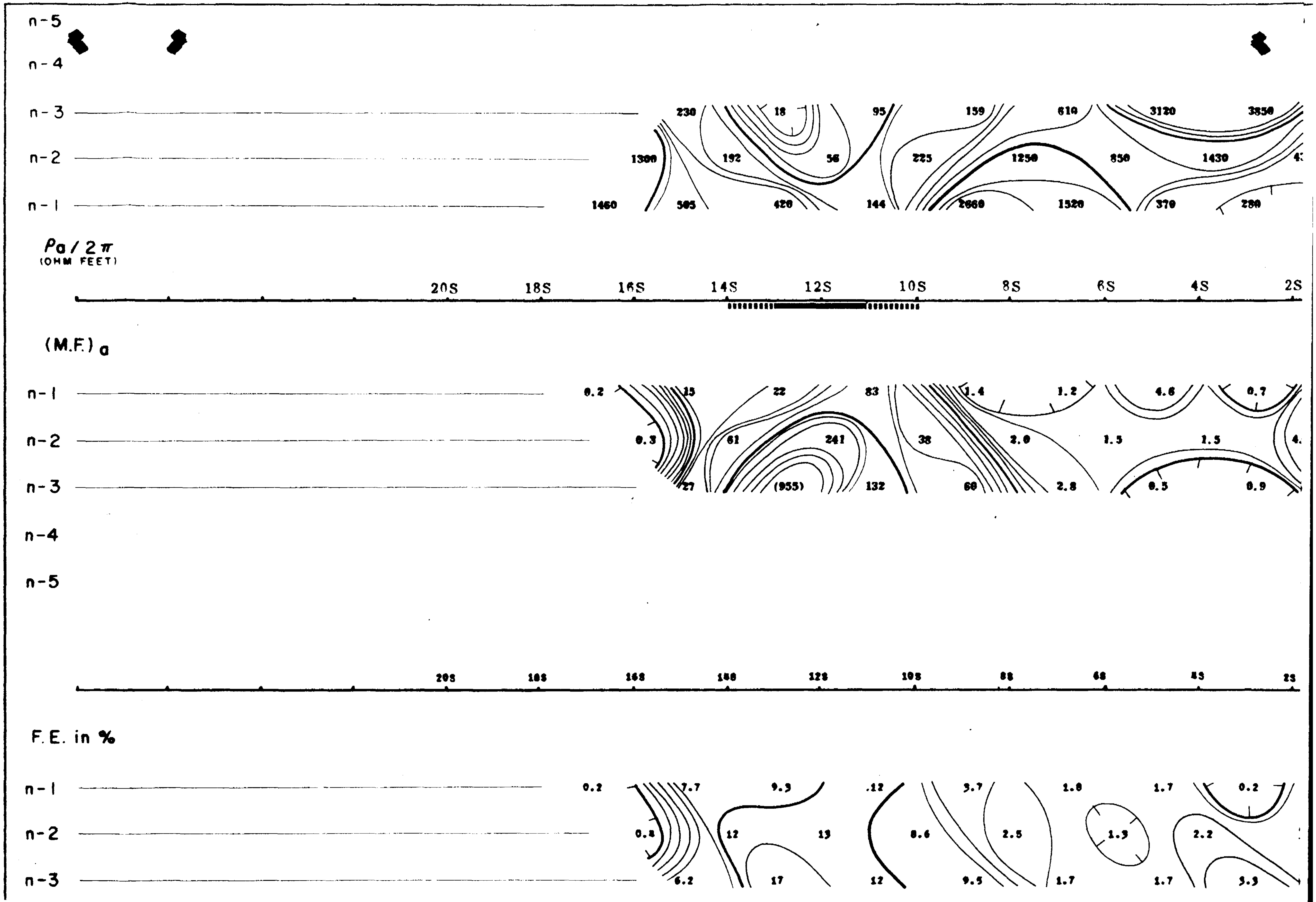
NOTE CONTOURS AT LOGARITHMIC INTERVALS

1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

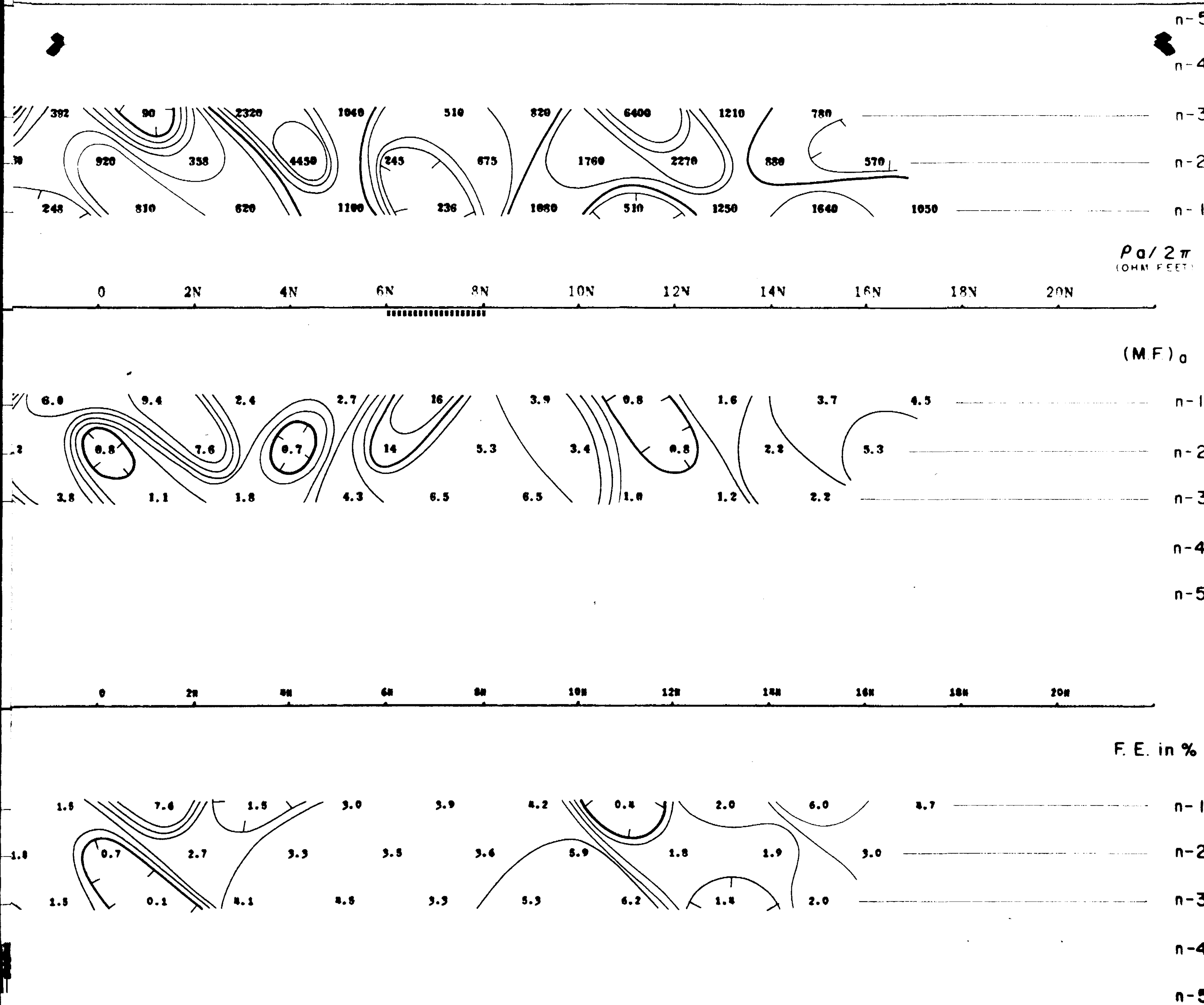
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
230 18 95 159 610 3120 3850
1300 192 56 225 1250 850 1430
1460 505 420 144 2060 1520 370 280
ρa / 2π
(OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
0.2 15 22 83 1.4 1.2 4.6 0.7
0.3 61 241 38 2.0 1.5 1.5
27 (955) 132 60 2.8 0.5 0.9
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
n-1
n-2
n-3
0.2 7.7 9.3 .12 3.7 1.8 1.7 0.2
0.8 12 13 8.6 2.5 1.3 2.2
6.2 17 12 9.5 1.7 1.7 3.3

[redacted]



n-1
n-2
n-3
n-4
n-5
ρa/2π
(OHM FEET)
0
2N
4N
6N
8N
10N
12N
14N
16N
18N
20N
(M.F.)a
F. E. in %
392
90
2320
1040
510
820
6400
1210
780
920
358
4450
245
675
1760
2270
880
570
248
810
620
1100
236
1080
510
1250
1640
1050
6.0
9.4
2.4
2.7
16
3.9
0.8
1.6
3.7
4.5
0.8
7.6
0.7
14
5.3
3.4
0.8
2.2
5.3
3.8
1.1
1.8
4.3
6.5
6.5
1.0
1.2
2.2
1.5
7.6
1.5
3.0
3.9
4.2
0.4
2.0
6.0
4.7
0.7
2.7
3.3
3.5
3.6
5.9
1.8
1.9
3.0
1.5
0.1
4.1
4.5
3.3
5.3
6.2
1.4
2.0

DWG NO - IP - 5145 - 6

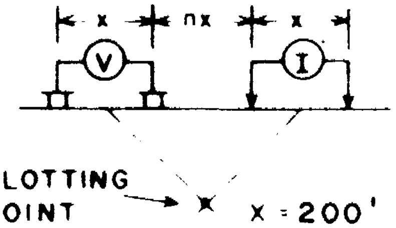
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 20 E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬▬
PROBABLE ••••••••••••••••
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31 68

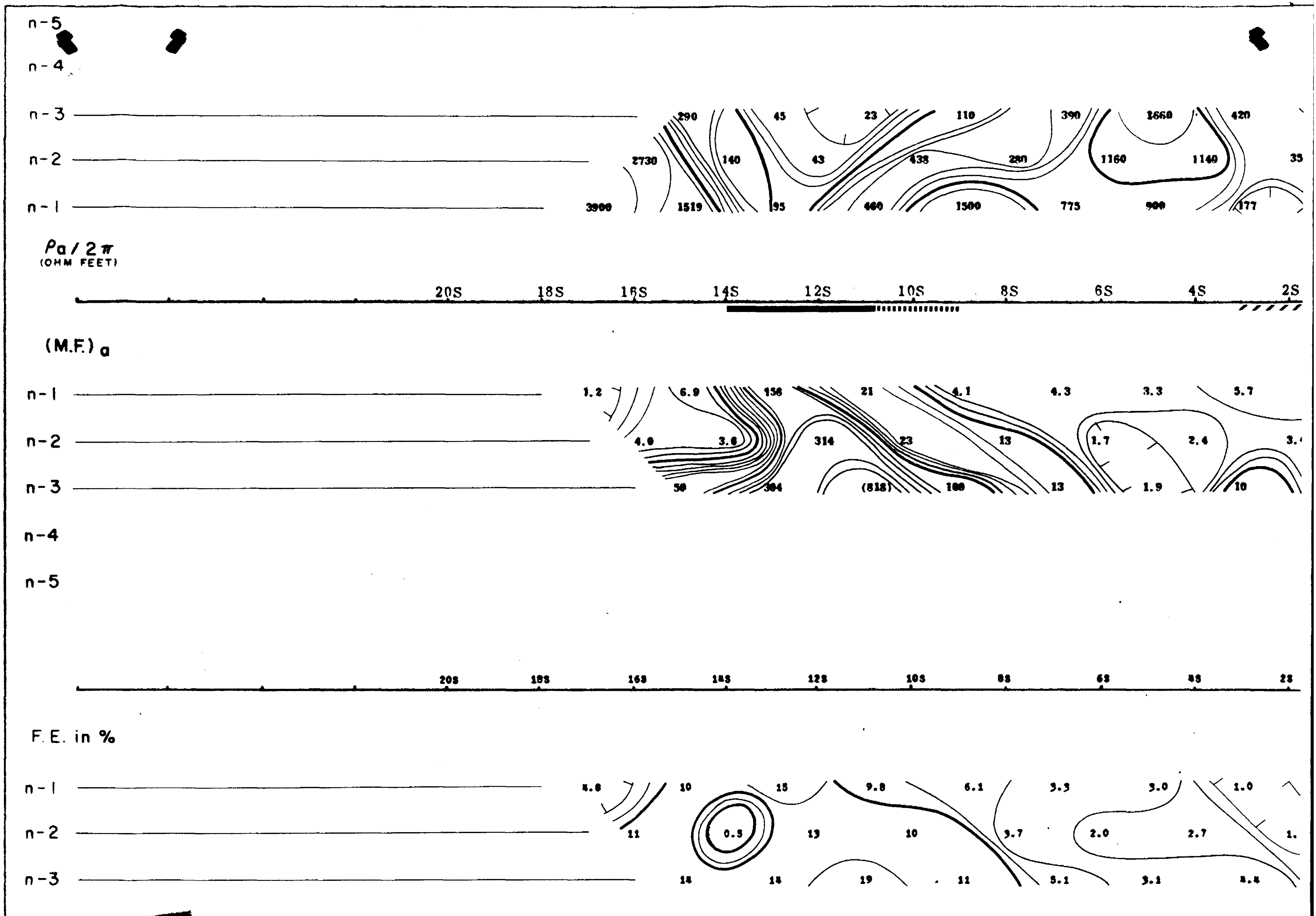
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

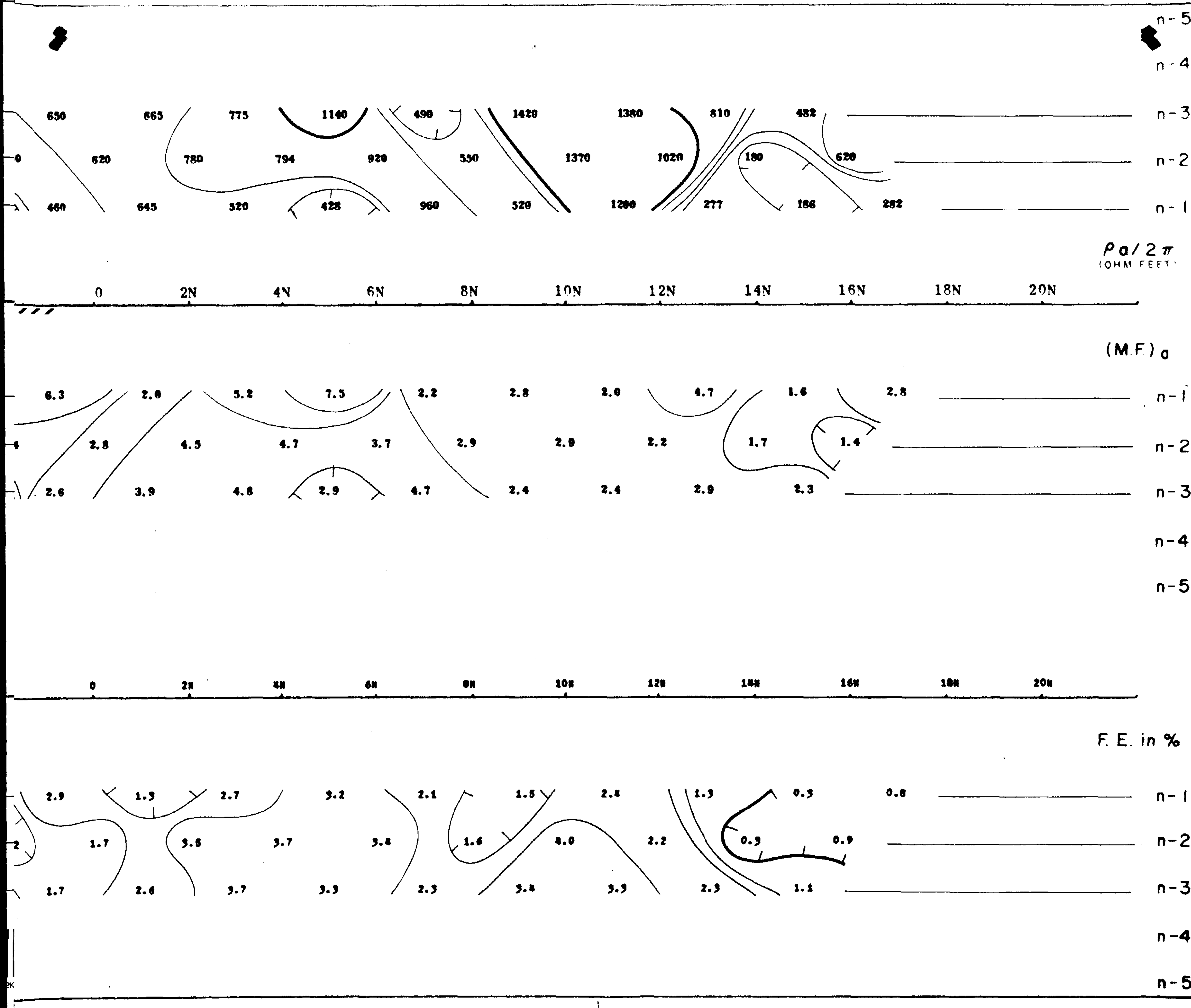
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted]

52K15[redacted]0012 63.2[redacted]8 BELANGER


n-5
n-4
n-3
650 665 775 1140 490 1420 1380 810 482
n-2
620 780 794 920 550 1370 1020 180 620
n-1
460 645 520 428 960 520 1200 277 186 282
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
n-1
6.3 2.0 5.2 7.5 2.2 2.8 2.0 4.7 1.6 2.8
n-2
2.8 4.5 4.7 3.7 2.9 2.9 2.2 1.7 1.4
n-3
2.6 3.9 4.8 2.9 4.7 2.4 2.4 2.9 2.3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
n-1
2.9 1.3 2.7 3.2 2.1 1.5 2.4 1.3 0.3 0.8
n-2
1.7 3.5 3.7 3.4 1.6 4.0 2.2 0.3 0.9
n-3
1.7 2.6 3.7 3.3 2.3 3.4 3.3 2.3 1.1
n-4
n-5

DWG NO - I P - 5145 - 7

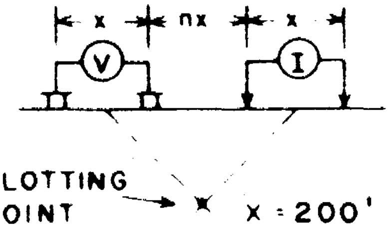
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO - 16 E

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬
PROBABLE ::::::::::::::::
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

McPHAR GEOPHYSICS LIMITED

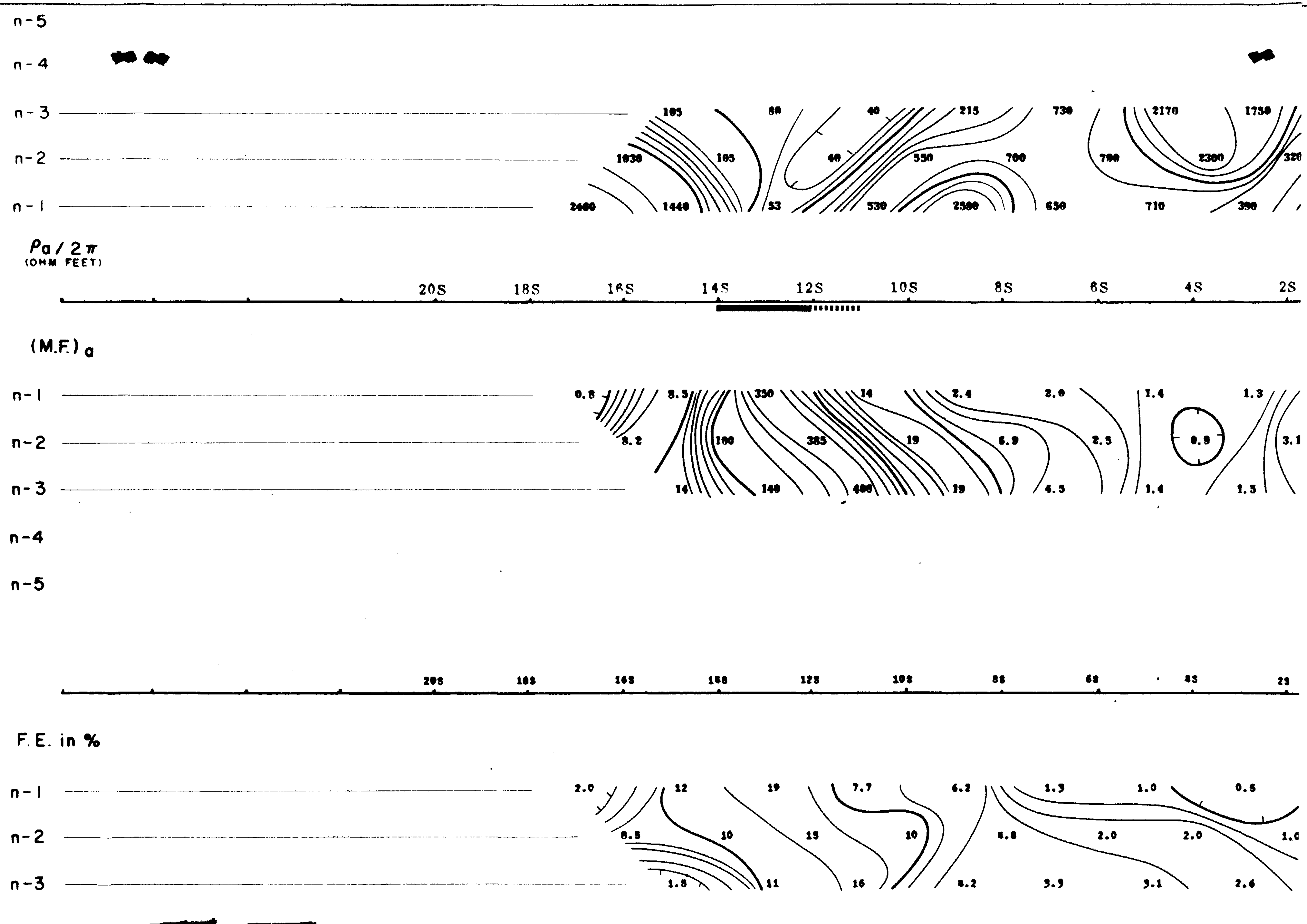
NOTE CONTOURS AT LOGARITHMIC INTERVALS

1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

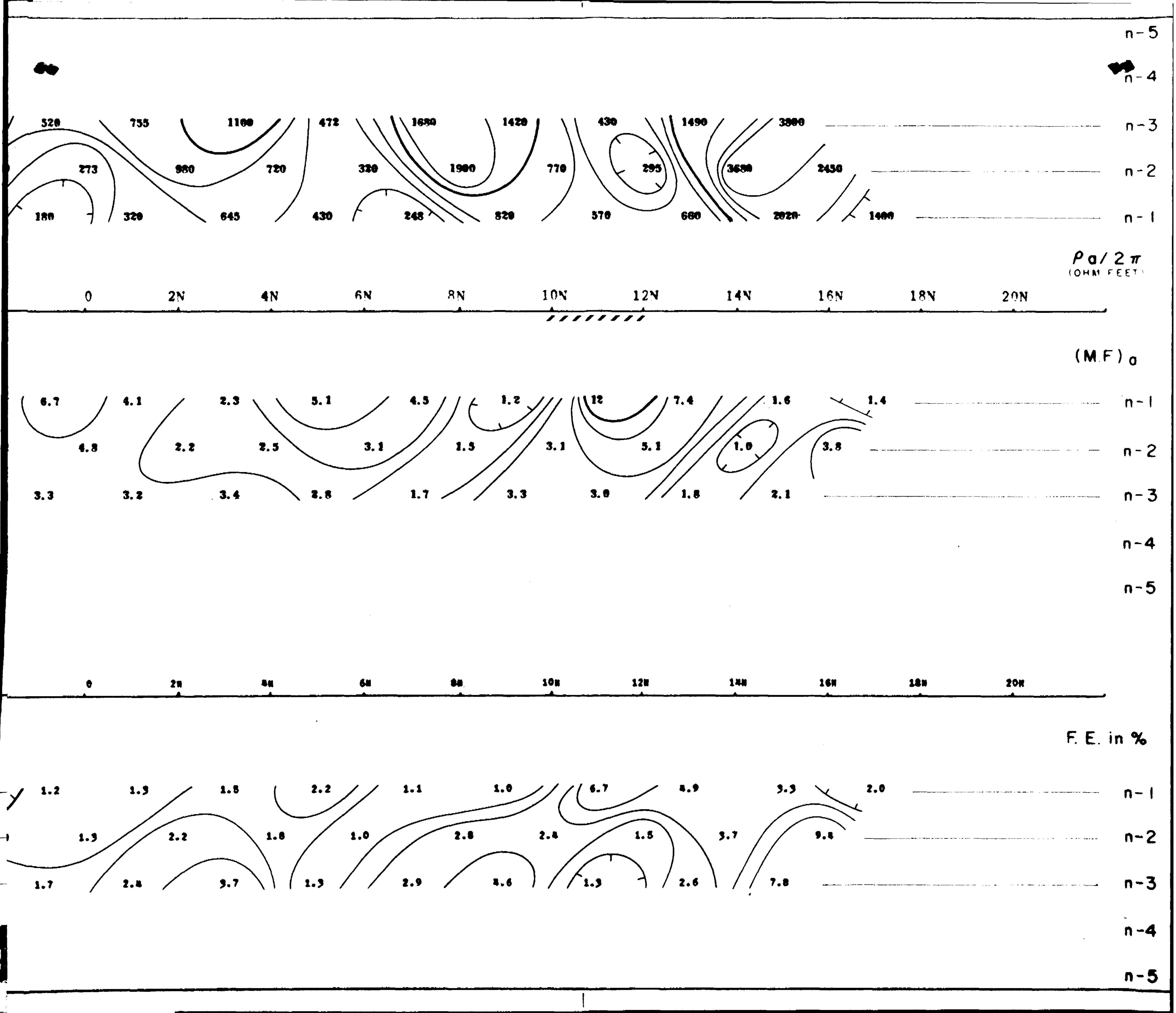
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



52[redacted]3NW0012 63.2428 BELANGER


n-5
n-4
n-3
n-2
n-1
520 755 1100 472 1680 1420 430 1490 3000
273 980 720 330 1900 770 295 3680 2450
180 320 645 430 248 820 570 680 2020 1400
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F)a
6.7 4.1 2.3 5.1 4.5 1.2 12 7.4 1.6 1.4
4.8 2.2 2.5 3.1 1.5 3.1 5.1 1.0 3.8
3.3 3.2 3.4 2.8 1.7 3.3 3.0 1.8 2.1
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
1.2 1.3 1.5 2.2 1.1 1.0 6.7 4.9 3.3 2.0
1.3 2.2 1.6 1.0 2.8 2.4 1.5 3.7 9.4
1.7 2.4 3.7 1.3 2.9 4.6 1.3 2.6 7.8
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 8

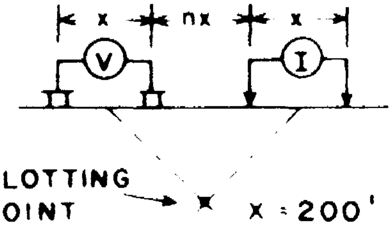
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 12 E

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬

PROBABLE ••••••••••••••••

POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

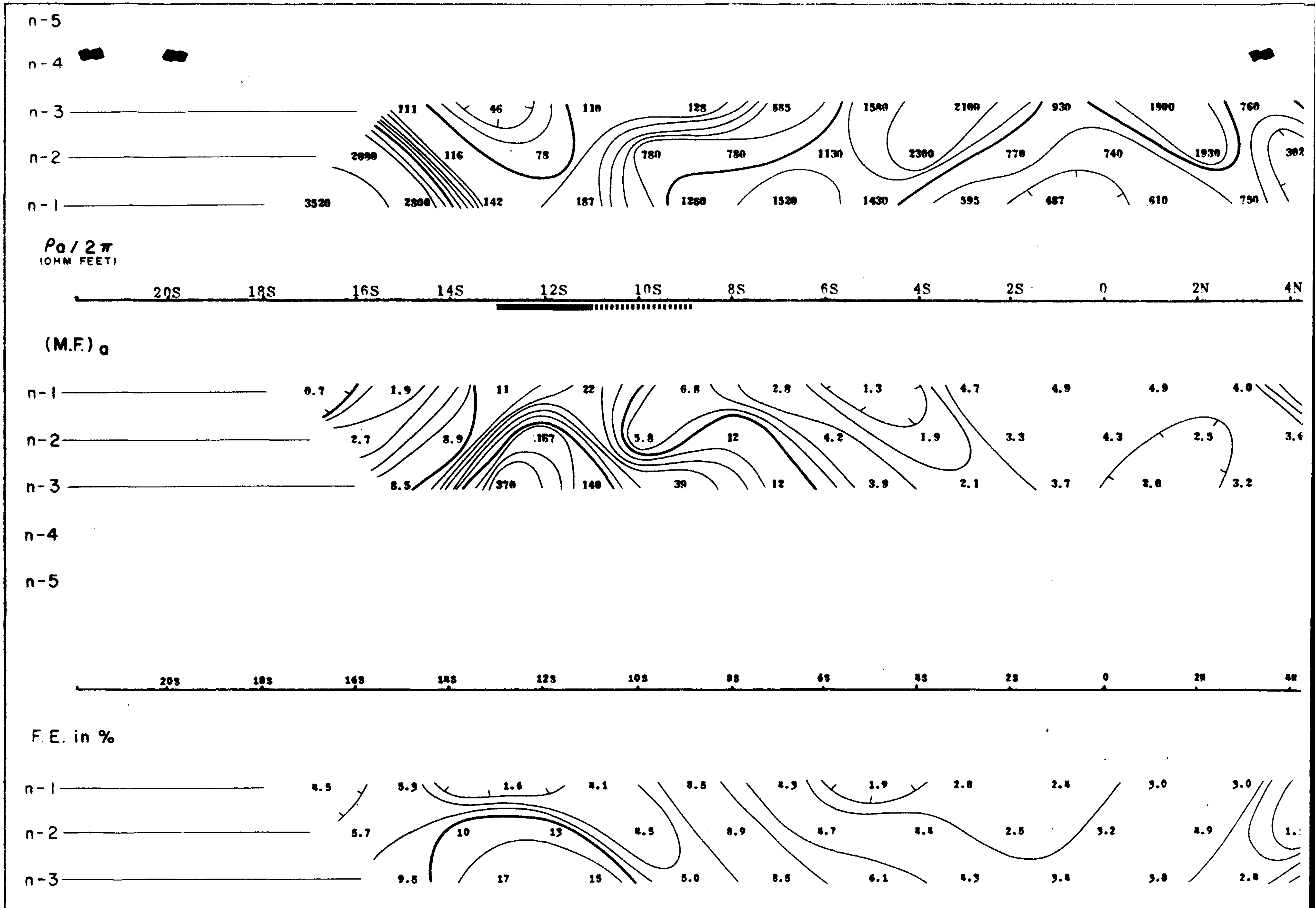
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

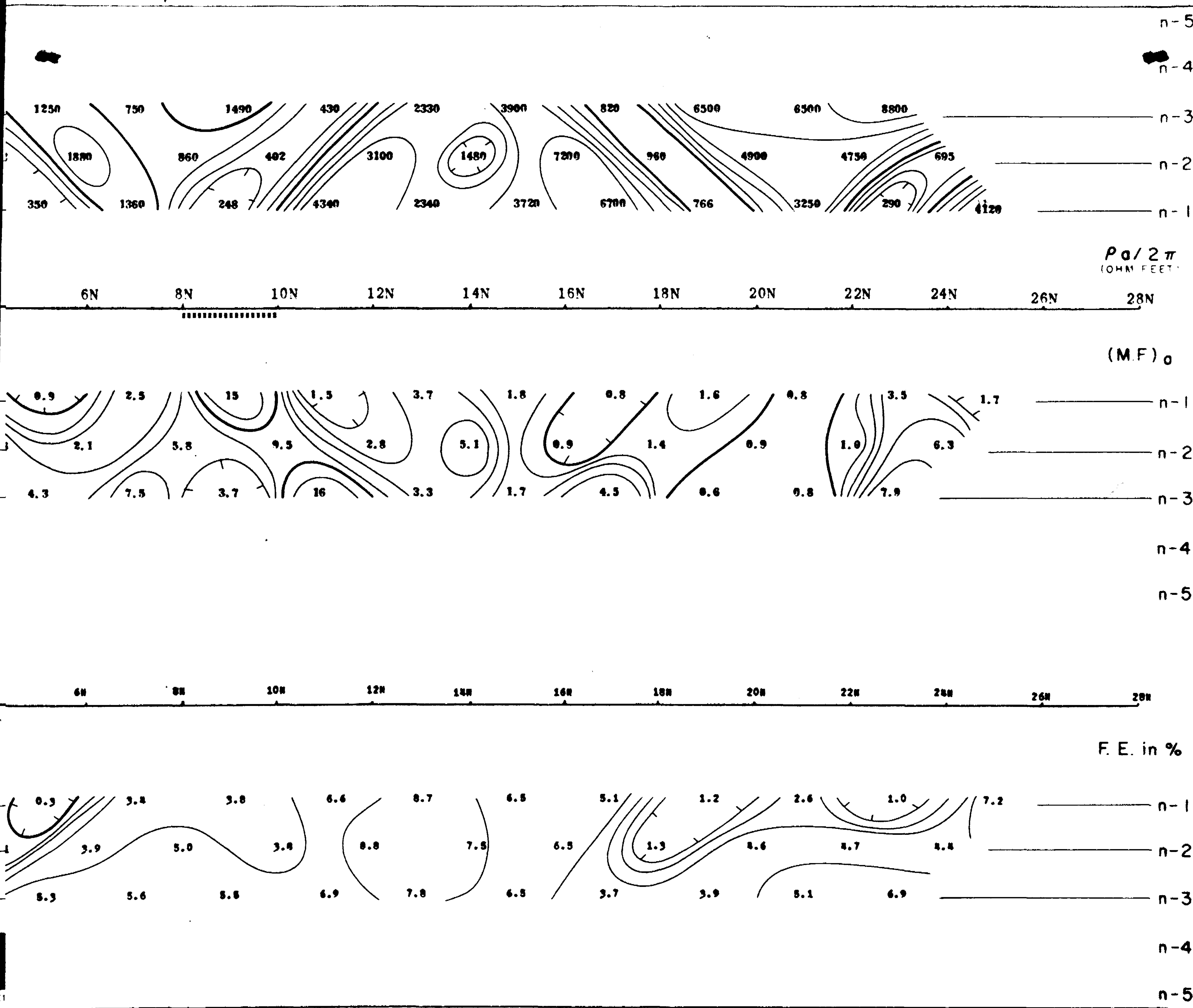
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted]

52K15NW0012 63.2428 BELANGER



n-5
n-4
n-3
n-2
n-1
1250 750 1490 430 2330 3900 820 6500 6500 8800
1880 860 402 3100 1480 7200 960 4900 4750 695
350 1360 248 4340 2340 3720 6700 766 3250 290 4120
Pa/2π
(OHM FEET)
6N 8N 10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
(M.F)a
0.9 2.5 15 1.5 3.7 1.8 0.8 1.6 0.8 3.5 1.7
2.1 5.8 9.5 2.8 5.1 0.9 1.4 0.9 1.0 6.3
4.3 7.5 3.7 16 3.3 1.7 4.5 0.6 0.8 7.9
n-1
n-2
n-3
n-4
n-5
6N 8N 10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
F. E. in %
0.3 3.8 3.8 6.6 8.7 6.5 5.1 1.2 2.6 1.0 7.2
3.9 5.0 3.8 8.8 7.5 6.5 1.3 4.6 4.7 4.4
5.3 5.6 5.6 6.9 7.8 6.5 3.7 3.9 5.1 6.9
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-9

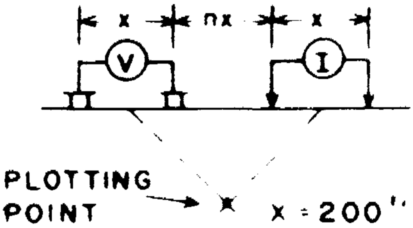
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO - 8E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬
PROBABLE ••••••••
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R.A. Bell

DATE July 31/68

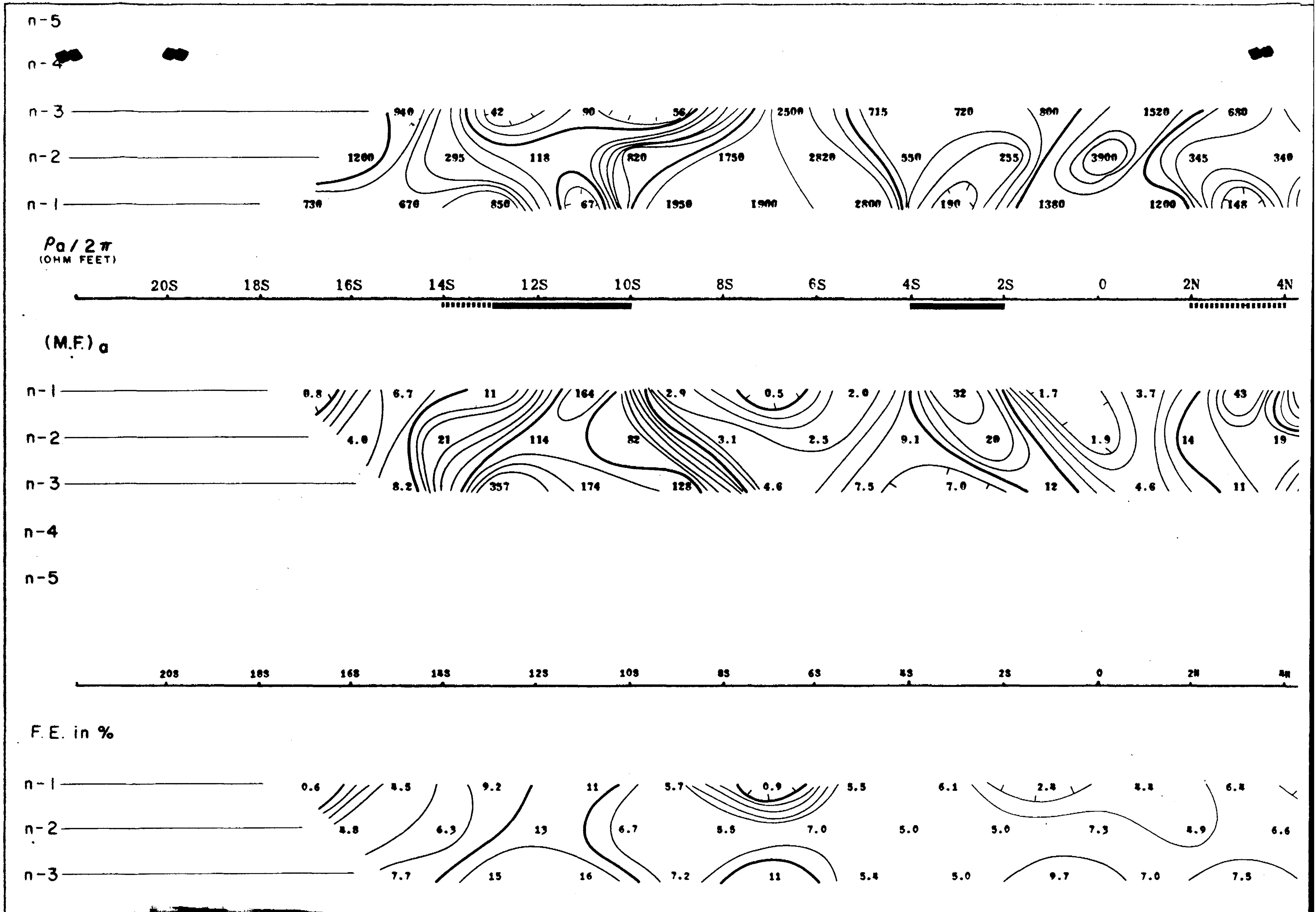
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

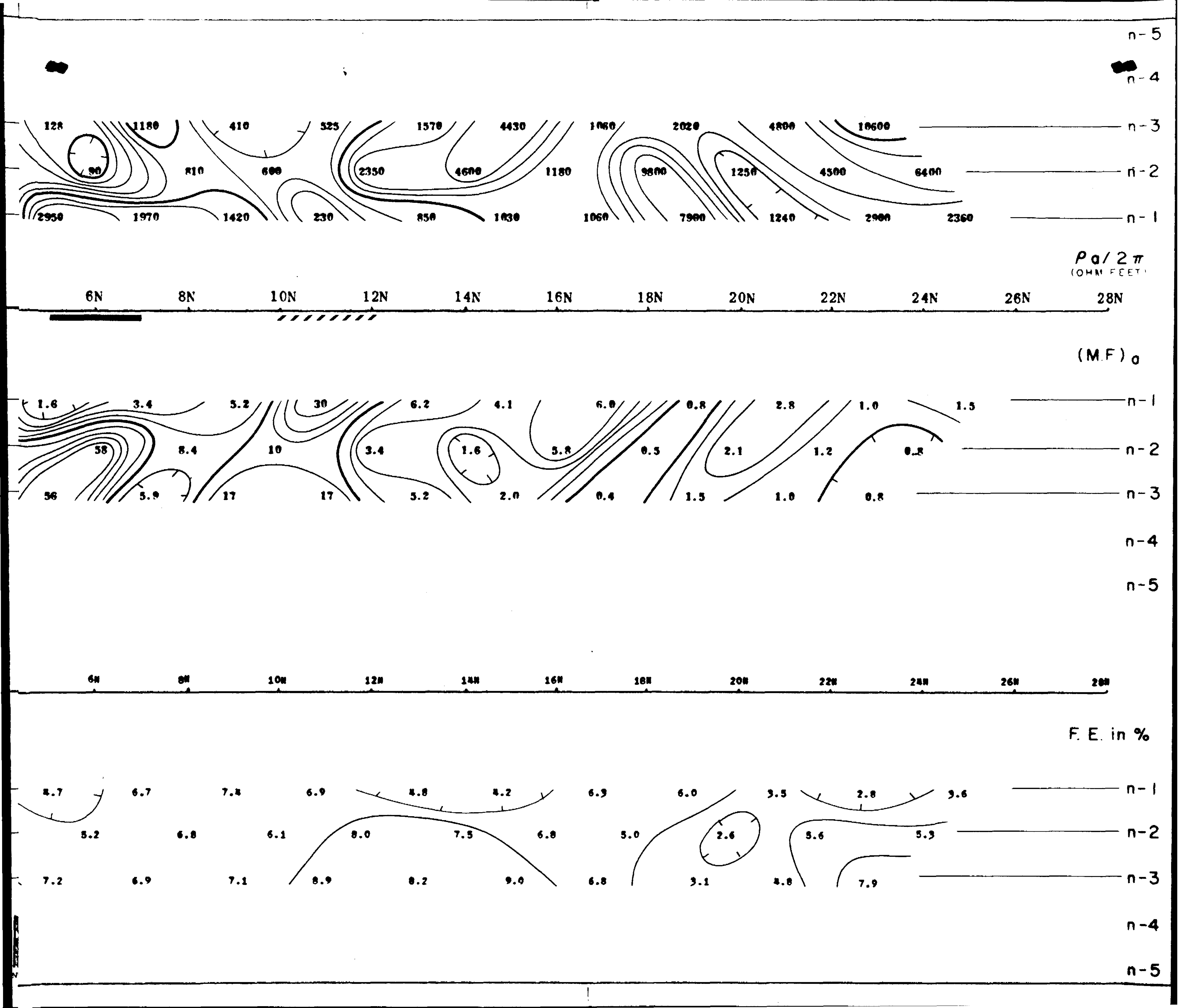
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted]
52K15NW0012 63.2428 BELANGER



ρa/2π
(OHM FEET)
(M.F)a
F. E. in %
6N 8N 10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 10

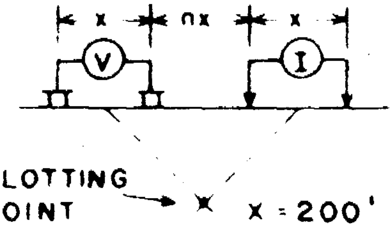
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 4 E

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

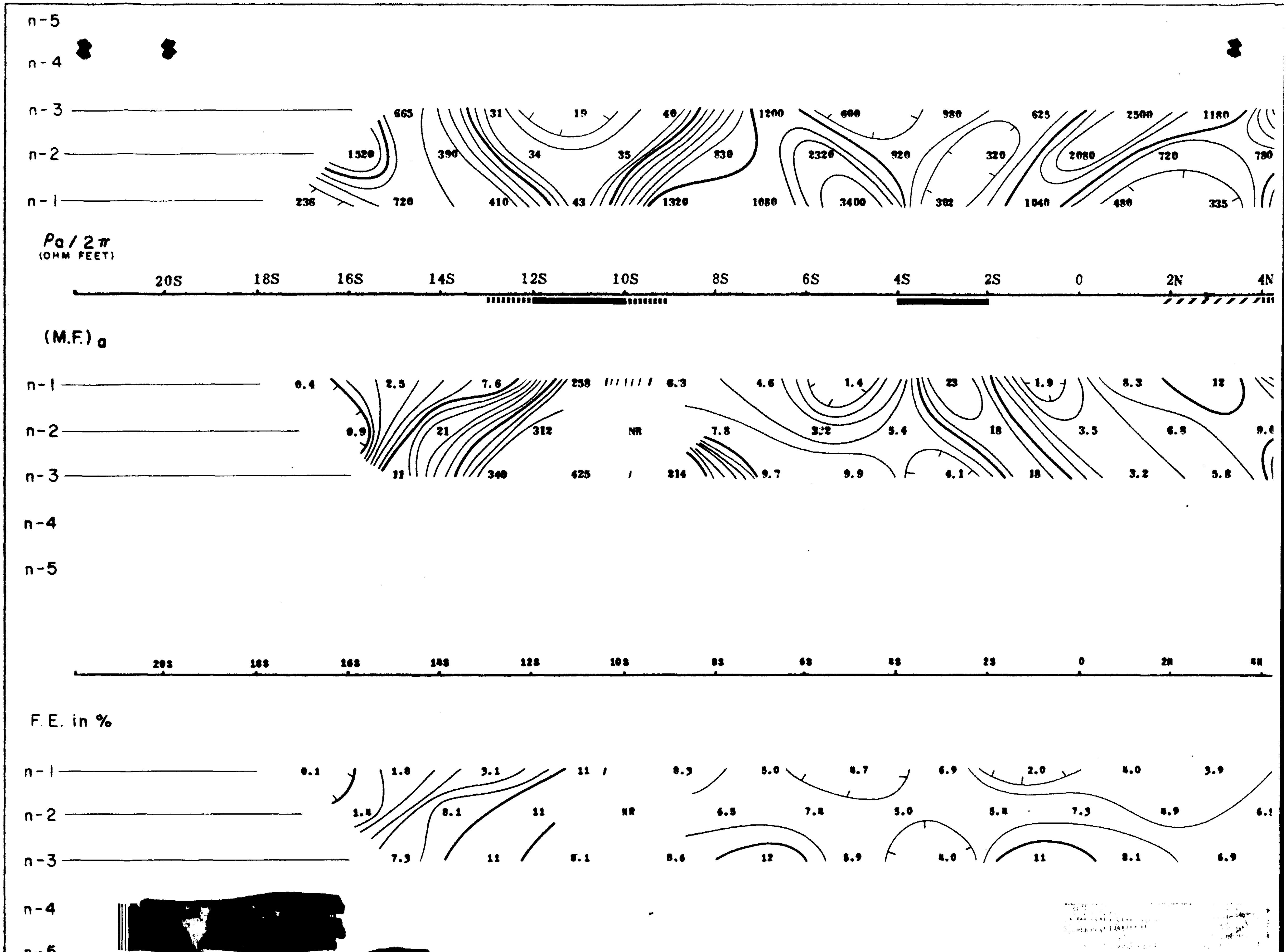
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

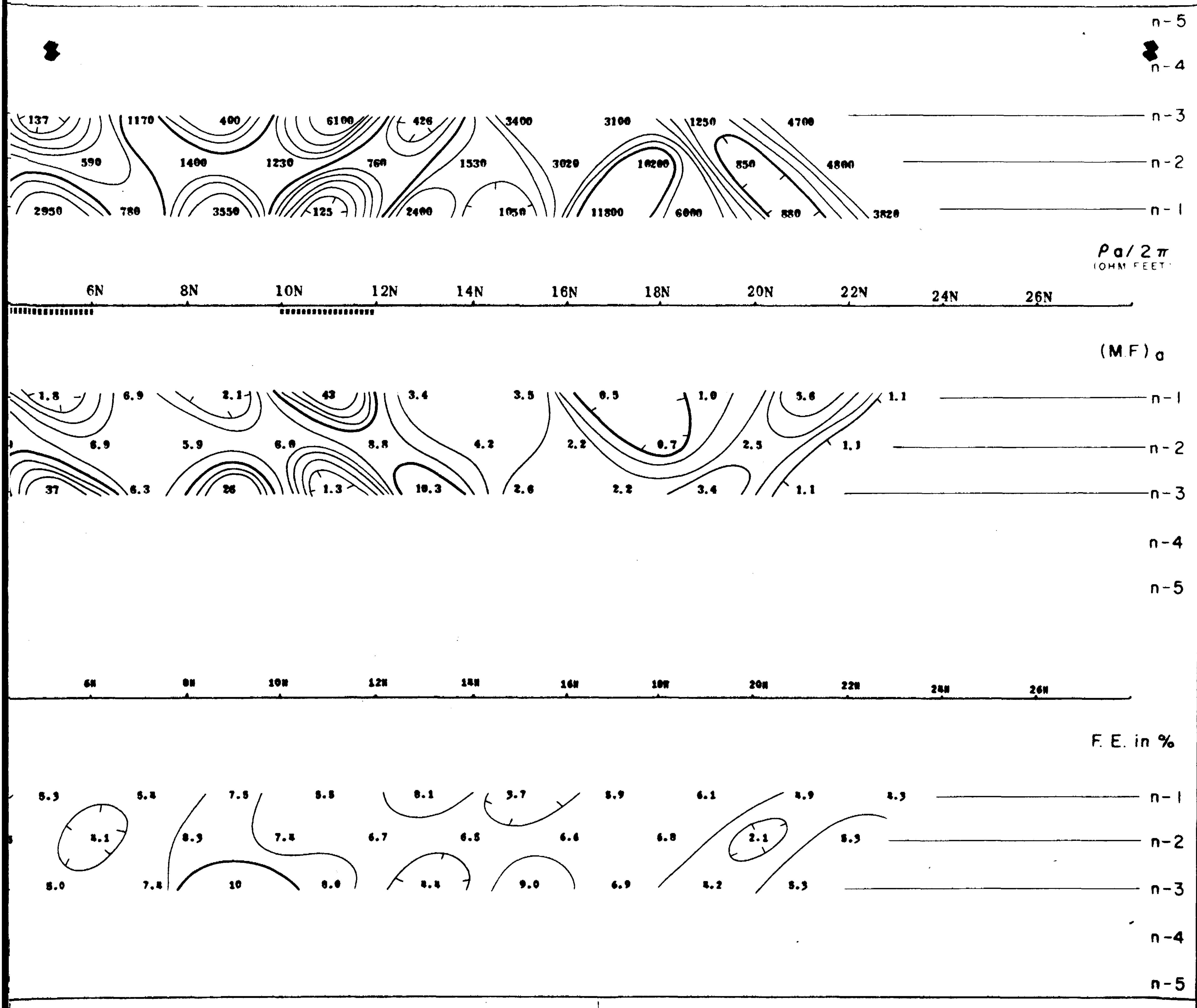
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted]

52K15NW0012 63.?428 BELANGER



ρa/2π (OHM FEET)
(M.F)a
F. E. in %
n-1
n-2
n-3
n-4
n-5
6N
8N
10N
12N
14N
16N
18N
20N
22N
24N
26N
137
1170
400
6100
426
3400
3100
1250
4700
590
1400
1230
760
1530
3020
10200
850
4800
2950
780
3550
125
2400
1050
11800
6000
880
3820
1.8
6.9
2.1
43
3.4
3.5
0.5
1.0
3.6
1.1
5.9
6.0
8.8
4.2
2.2
0.7
2.5
37
6.3
26
1.3
10.3
2.6
3.4
10
9.0
6.9

DWG NO - I P - 5145-11

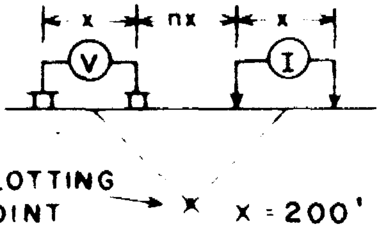
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 2 E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

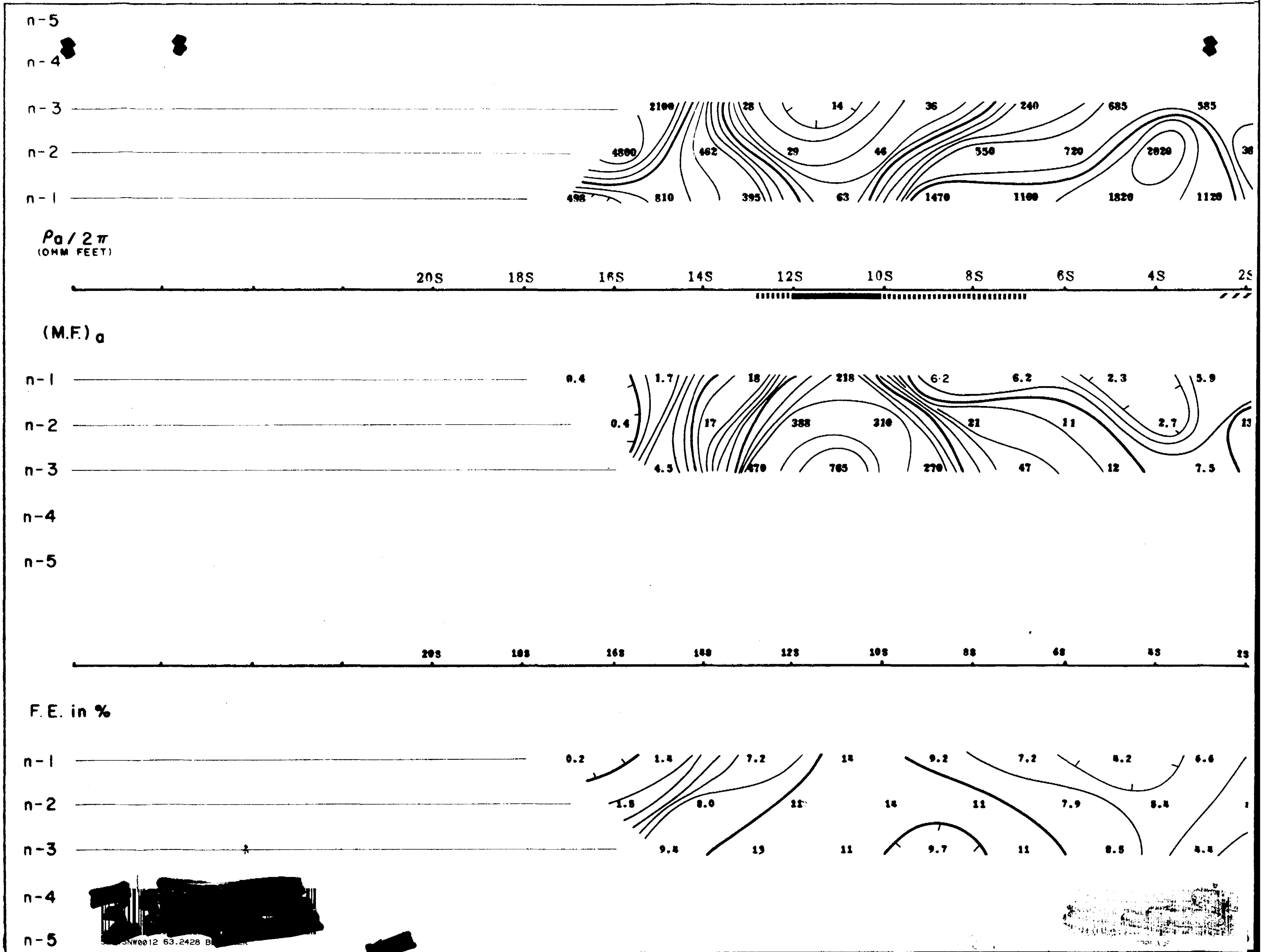
McPHAR GEOPHYSICS

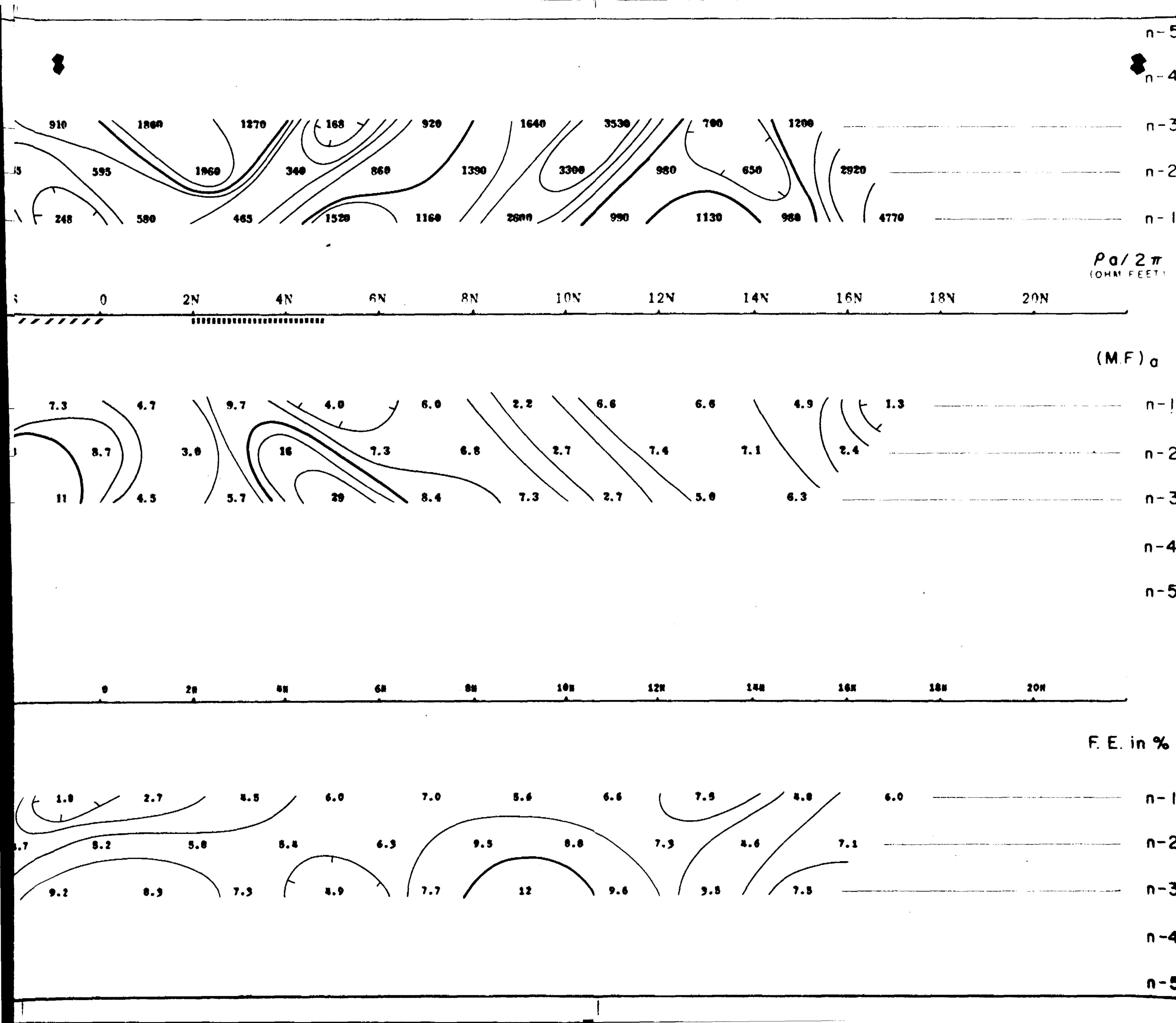
NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
2100 28 14 36 240 685 585
4800 462 29 46 550 720 2820
498 810 395 63 1470 1100 1820 1120
$\rho_a / 2\pi$
(OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.)$_a$
0.4 1.7 18 218 6.2 6.2 2.3 5.9
0.4 17 388 310 21 11 2.7
4.5 470 765 270 47 12 7.5
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
0.2 1.4 7.2 14 9.2 7.2 4.2 6.6
1.5 8.0 12 14 11 7.9 5.4
9.4 13 11 9.7 11 8.5 4.4
[redacted]
SNW0012 63.2428 B[redacted]


n-5
n-4
n-3
n-2
n-1
910 1860 1270 168 920 1640 3530 700 1200
595 1960 340 860 1390 3300 980 650 2920
248 580 465 1520 1160 2600 990 1130 980 4770
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F)a
7.3 4.7 9.7 4.0 6.0 2.2 6.6 6.6 4.9 1.3
8.7 3.0 16 7.3 6.8 2.7 7.4 7.1 2.4
11 4.5 5.7 29 8.4 7.3 2.7 5.0 6.3
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
1.0 2.7 4.5 6.0 7.0 5.6 6.6 7.5 4.8 6.0
8.2 5.8 5.4 6.3 9.5 8.8 7.3 4.6 7.1
9.2 8.3 7.3 4.9 7.7 12 9.6 9.5 7.5
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 12

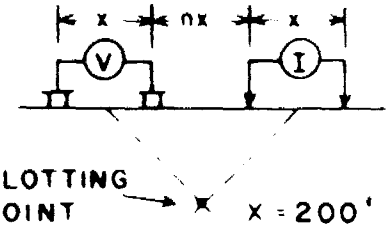
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- O

ELECTRODE CONFIGURATION



PLOTTING POINT

X = 200'

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

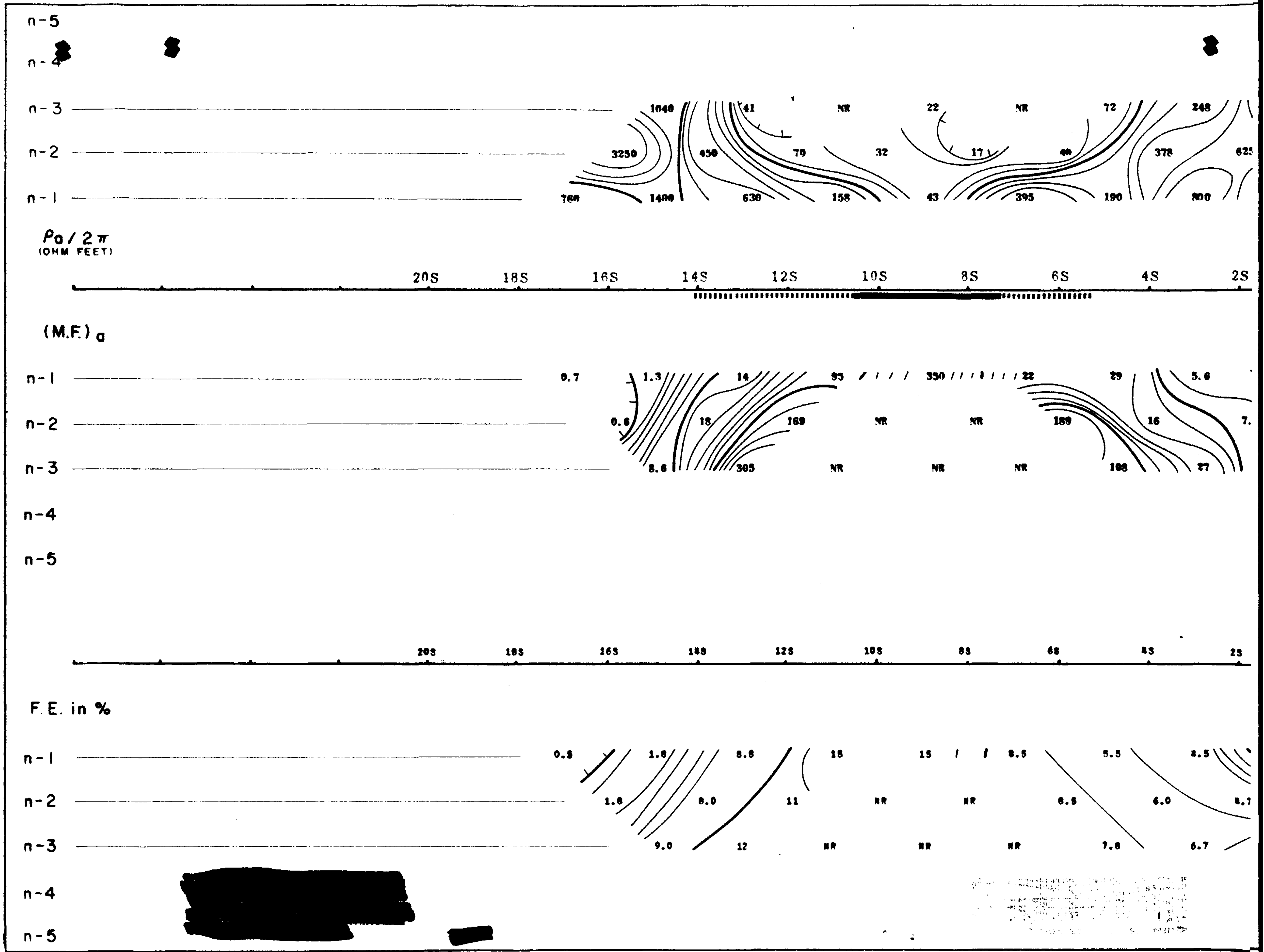
DATE July 31/68

NOTE · CONTOURS AT
LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

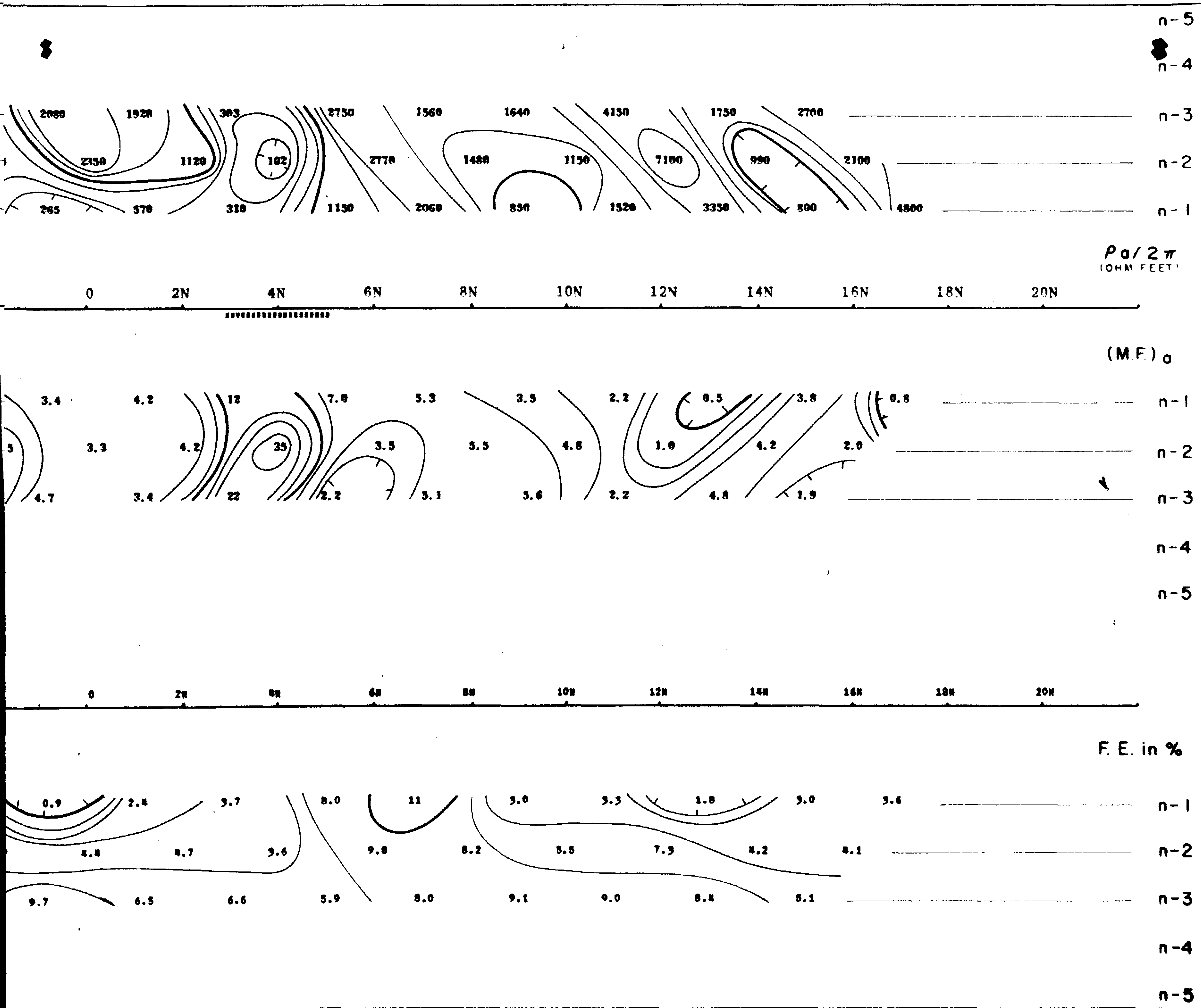
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
1040 41 NR 22 NR 72 248
3250 450 70 32 17 40 378 625
760 1400 630 158 43 395 190 800
ρa / 2π
(OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
0.7 1.3 14 95 350 22 29 5.6
0.6 18 169 NR NR 189 16 7.
8.6 305 NR NR NR 108 27
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
n-1
n-2
n-3
n-4
n-5
0.5 1.6 8.8 15 15 8.5 5.5 4.5
1.8 8.0 11 NR NR 8.5 6.0
9.0 12 NR NR NR 7.8 6.7
[redacted]



n-5
n-4
n-3
n-2
n-1
2080 1920 303 2750 1560 1640 4150 1750 2700
2350 1120 102 2770 1480 1150 7100 990 2100
265 570 310 1130 2060 830 1520 3350 500 4800
Pa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
3.4 4.2 12 7.0 5.3 3.5 2.2 0.5 3.8 0.8
5 3.3 4.2 35 3.5 5.5 4.8 1.0 4.2 2.0
4.7 3.4 22 2.2 5.1 5.6 2.2 4.8 1.9
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
0.9 2.4 3.7 8.0 11 3.0 3.3 1.8 3.0 3.6
4.4 4.7 3.6 9.8 8.2 5.5 7.3 4.2 4.1
9.7 6.5 6.6 5.9 8.0 9.1 9.0 8.4 5.1
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-13

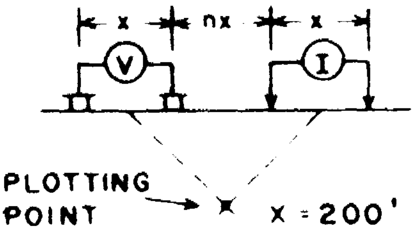
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 2W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31

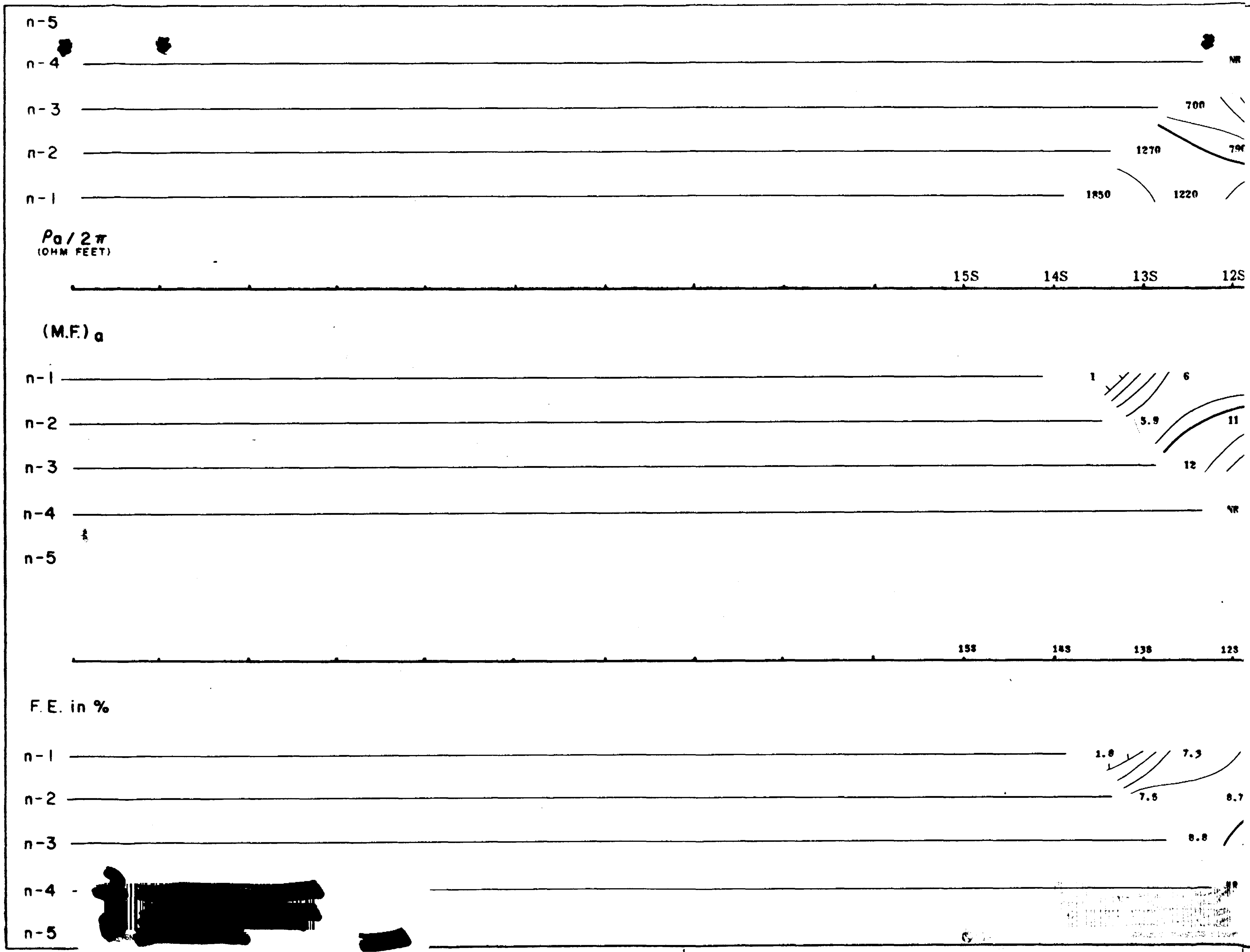
McPHAR GEOPHYSICS APPROVED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

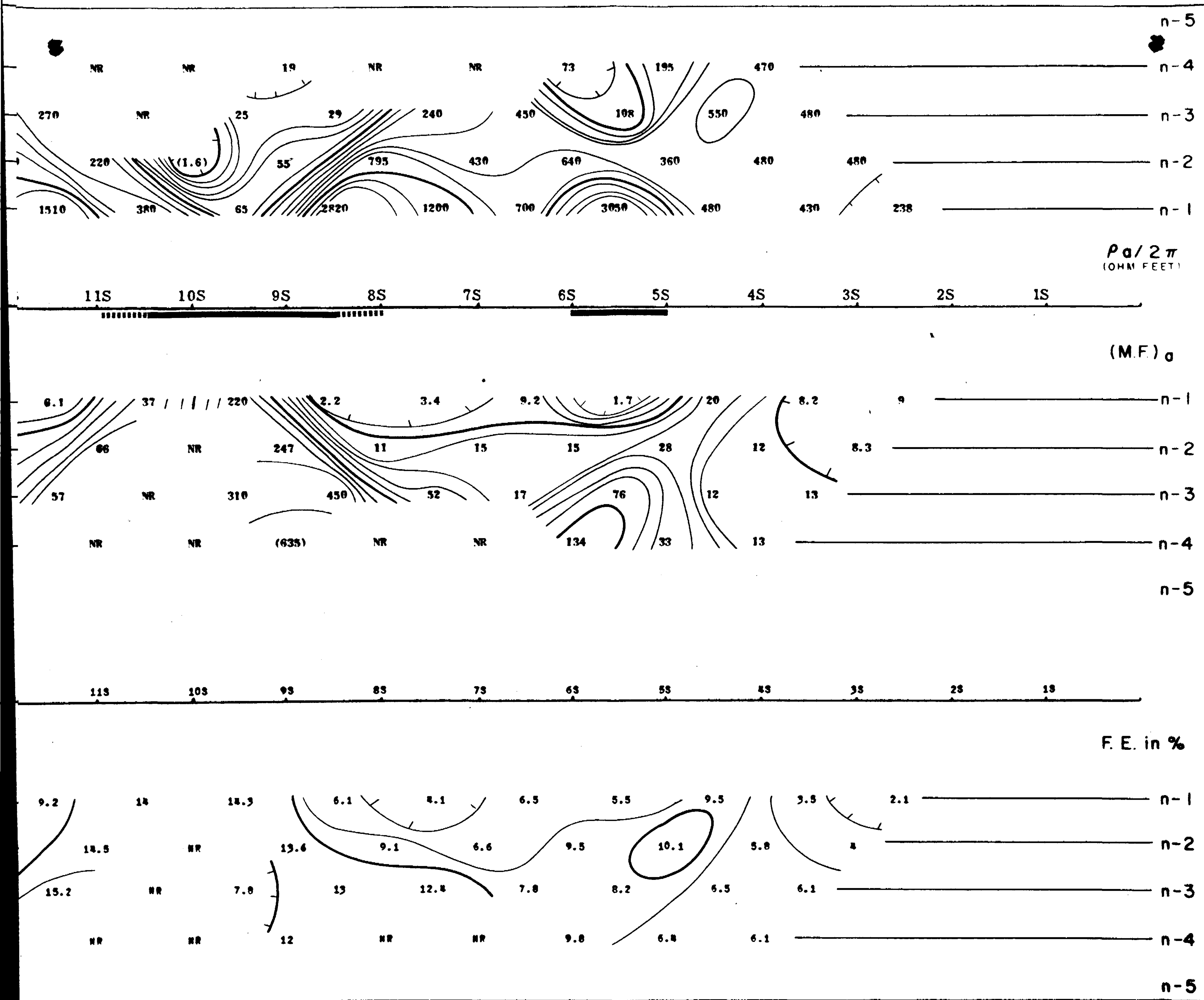
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
NR
n-3
700
n-2
1270
790
n-1
1850
1220
Pa / 2π
(OHM FEET)
15S
14S
13S
12S
(M.F.)a
n-1
1
6
n-2
5.9
11
n-3
12
n-4
NR
n-5
15S
14S
13S
12S
F.E. in %
n-1
1.8
7.3
n-2
7.5
8.7
n-3
8.8
n-4
NR
n-5

[redacted]



n-5
n-4
n-3
n-2
n-1
ρa/2π
(OHM FEET)
11S
10S
9S
8S
7S
6S
5S
4S
3S
2S
1S
(M.F.)a
n-1
n-2
n-3
n-4
n-5
11S
10S
9S
8S
7S
6S
5S
4S
3S
2S
1S
F. E. in %
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 14

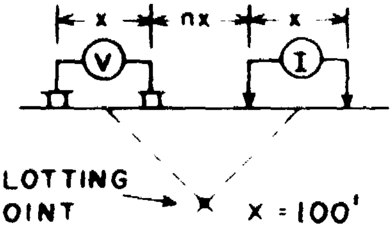
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 2 W

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 100'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬

PROBABLE ┅┅┅┅

POSSIBLE / / / / / / / /

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31 68

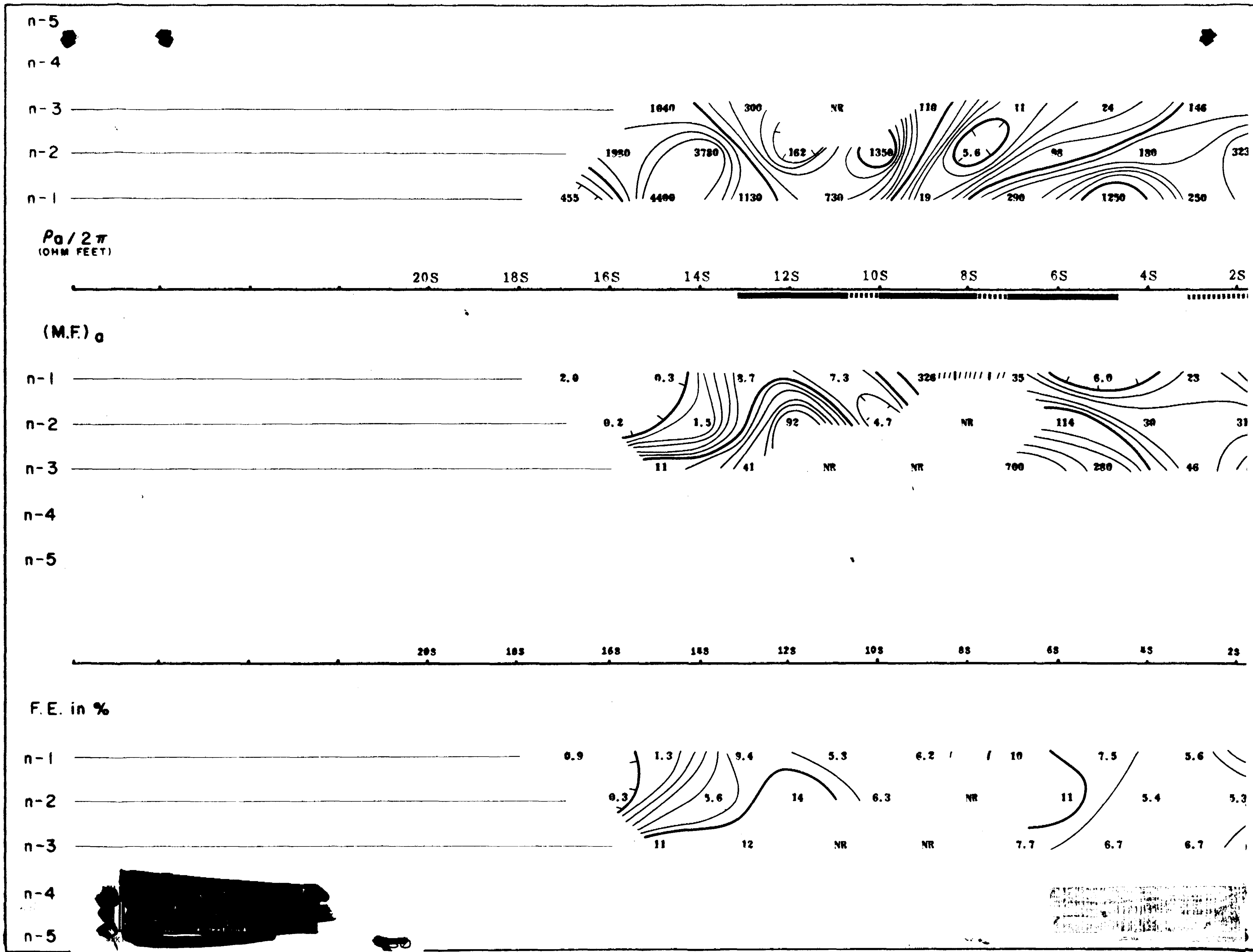
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1-1·5-2-3-5-7·5-10

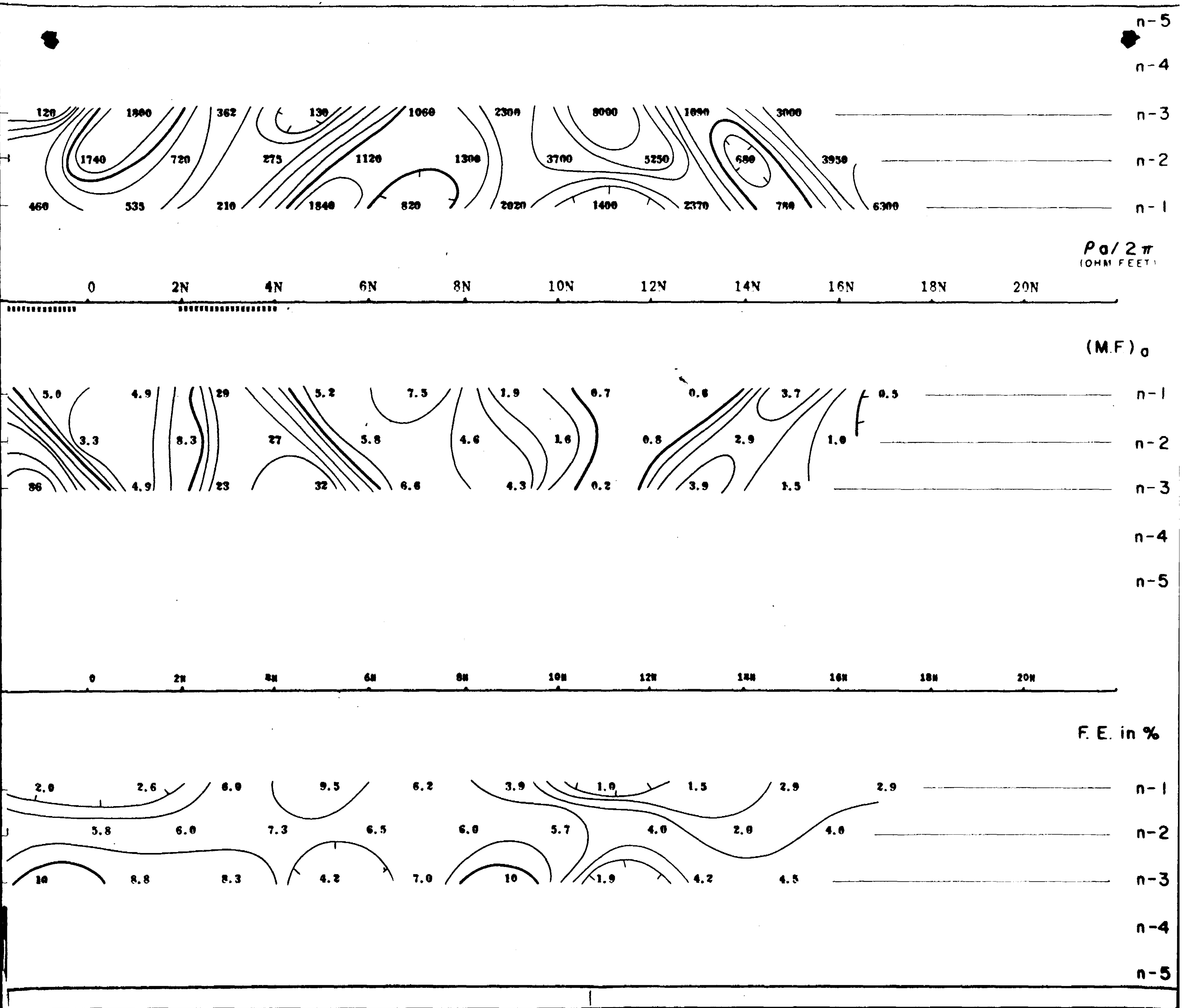
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
1640 300 NR 118 11 24 146
1980 3780 162 1350 5.6 98 180 323
455 4400 1130 730 19 290 1250 250
Pa / 2π
(OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.) a
2.0 0.3 3.7 7.3 328 35 6.0 23
0.2 1.5 92 4.7 NR 114 30 31
11 41 NR NR 700 280 46
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
0.9 1.3 3.4 5.3 6.2 10 7.5 5.6
0.3 5.6 14 6.3 NR 11 5.4 5.3
11 12 NR NR 7.7 6.7 6.7

[redacted]



n-5
n-4
n-3
n-2
n-1
Pa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F)a
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-15

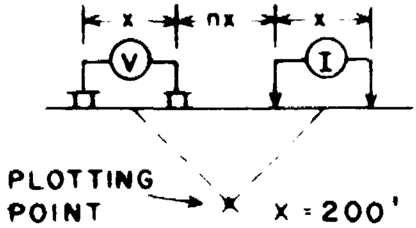
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 4W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬
PROBABLE ••••••••••••••••
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31 68

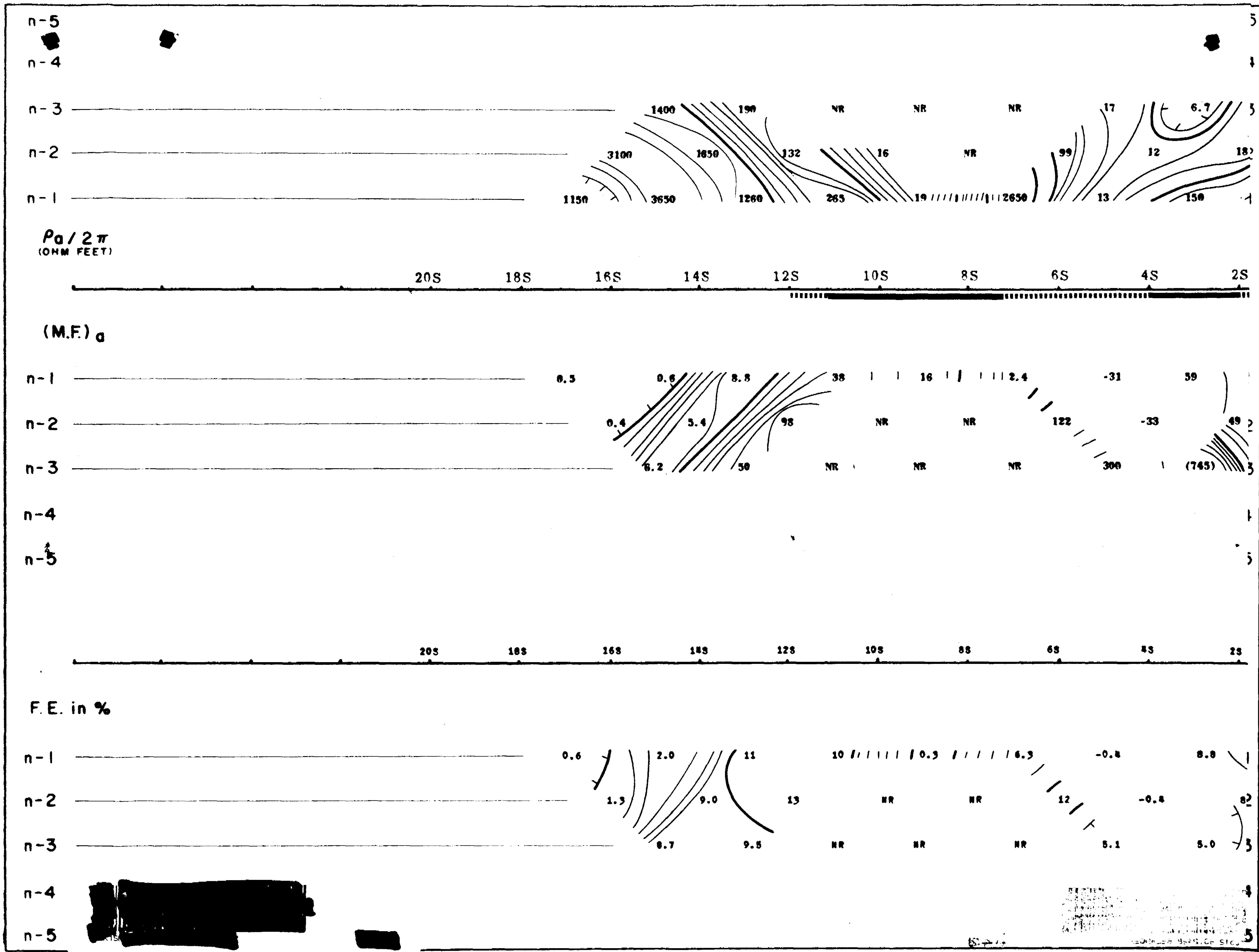
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

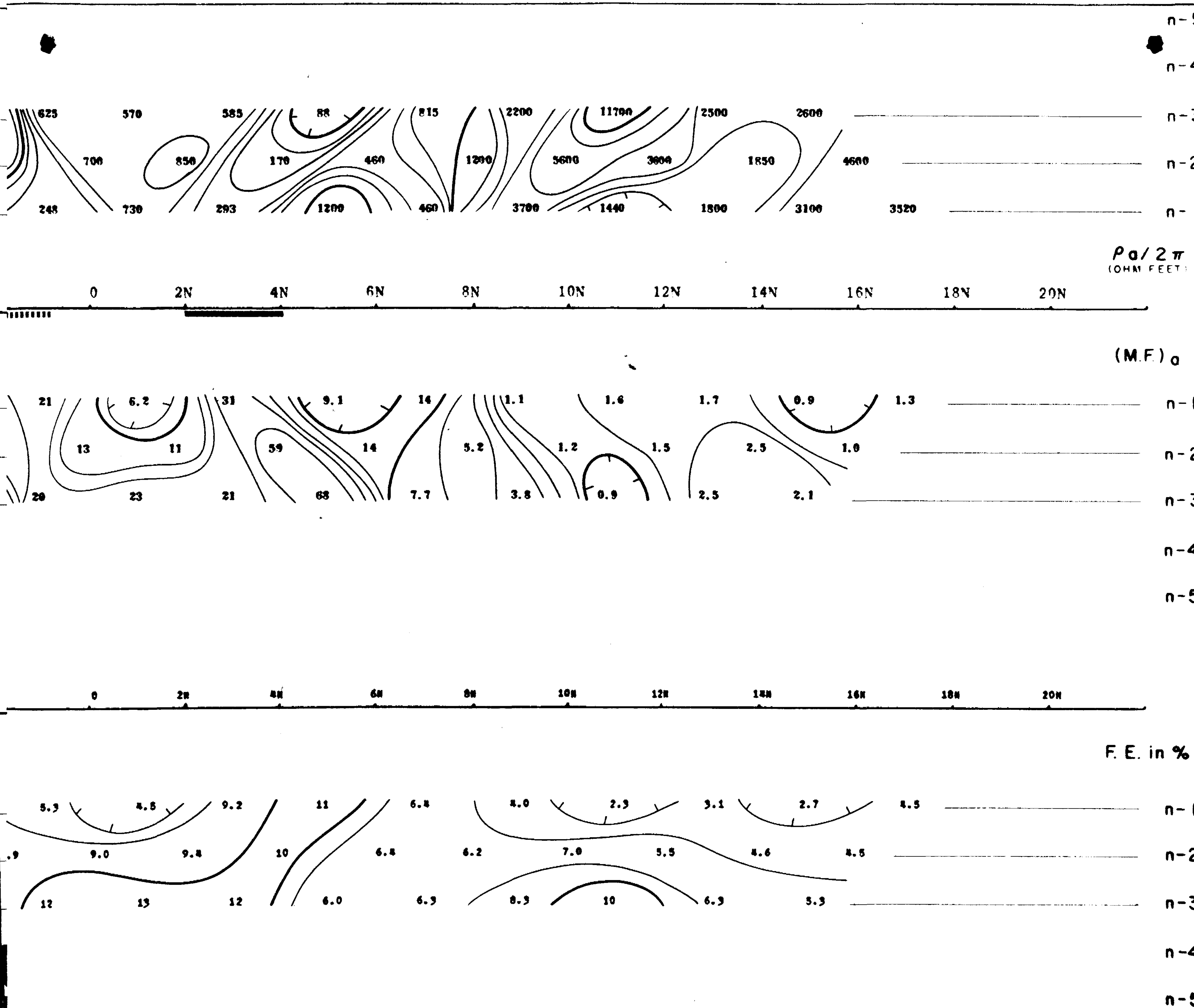
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
1400 190 NR NR NR 17 6.7
3100 1650 132 16 NR 99 12 18
1150 3650 1260 265 19 2650 13 150
ρa / 2π
(OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.)a
n-1
n-2
n-3
n-4
n-5
0.5 0.6 8.8 38 16 2.4 -31 59
0.4 5.4 98 NR NR 122 -33 49
6.2 50 NR NR NR 300 (745)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
n-1
n-2
n-3
n-4
n-5
0.6 2.0 11 10 0.5 6.5 -0.8 8.8
1.3 9.0 13 NR NR 12 -0.8 82
8.7 9.5 NR NR NR 5.1 5.0
[redacted]


n-5
n-4
n-3
n-2
n-1
625 570 585 88 815 2200 11700 2500 2600
700 850 170 460 1200 5600 3600 1850 4600
248 730 293 1200 460 3700 1440 1800 3100 3520
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
21 6.2 31 9.1 14 1.1 1.6 1.7 0.9 1.3
13 11 59 14 5.2 1.2 1.5 2.5 1.0
20 23 21 68 7.7 3.8 0.9 2.5 2.1
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
5.3 4.5 9.2 11 6.4 4.0 2.3 3.1 2.7 4.5
9.0 9.4 10 6.4 6.2 7.0 5.5 4.6 4.5
12 13 12 6.0 6.3 8.3 10 6.3 5.3
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 16

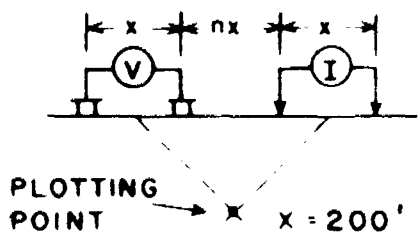
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 6W

ELECTRODE CONFIGURATION



x = 200'

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

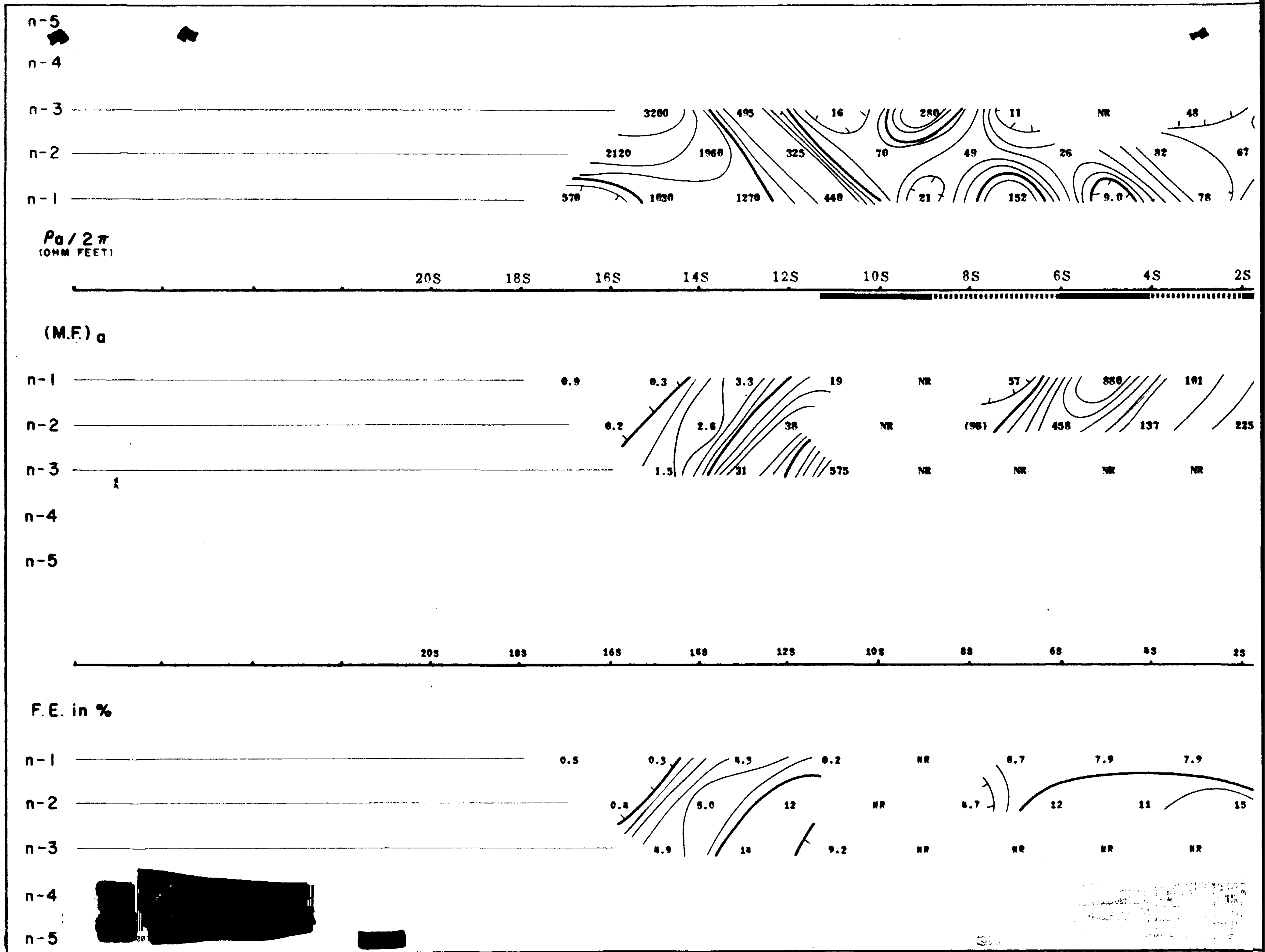
McPHAR GEOPHYSICS LIMITED

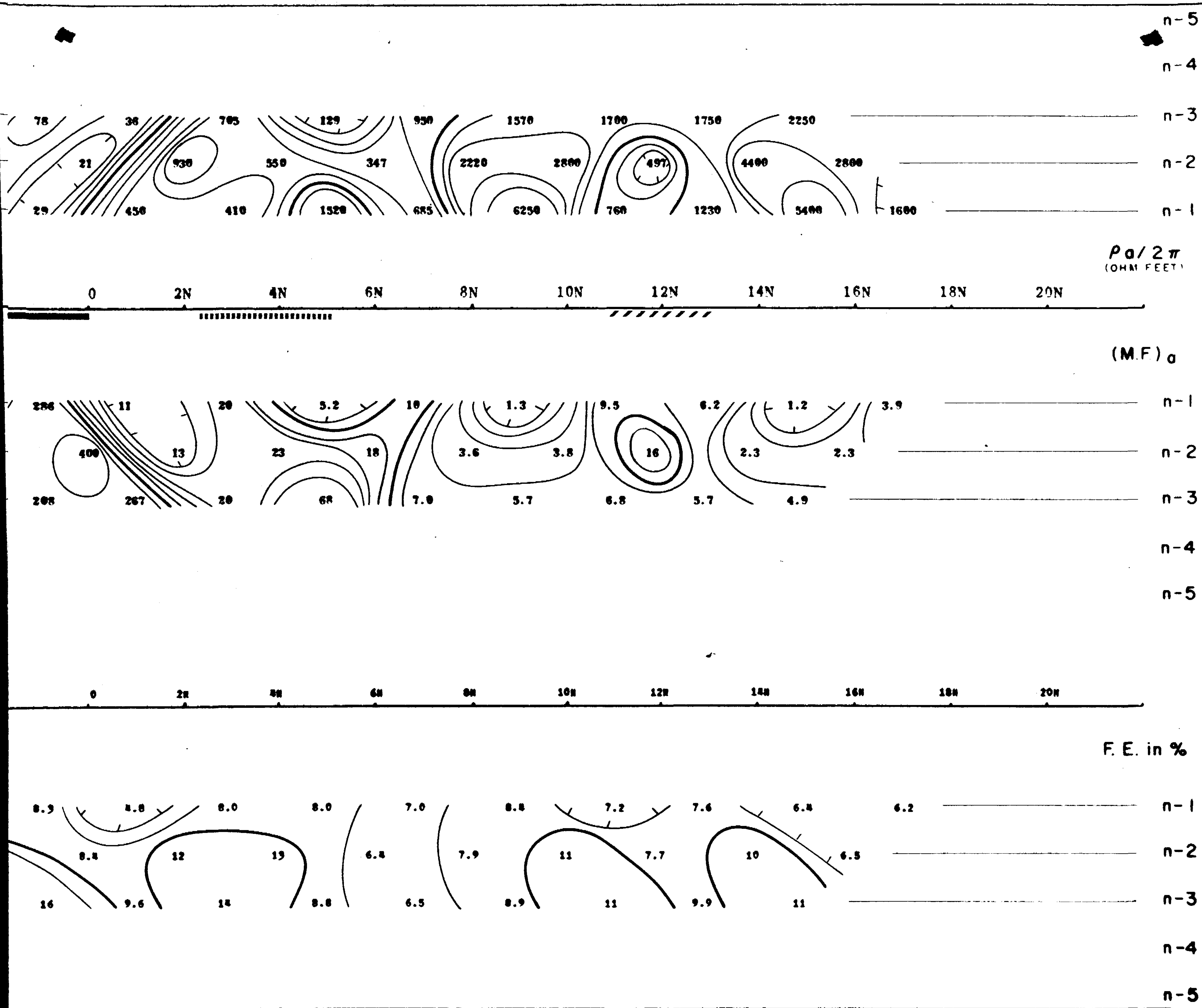
NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
3200
495
16
280
11
NR
48
2120
1960
325
70
49
26
82
67
570
1630
1270
440
21
152
9.0
78
ρa / 2π
(OHM FEET)
20S
18S
16S
14S
12S
10S
8S
6S
4S
2S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
0.9
0.3
3.3
19
NR
57
880
101
0.2
2.6
38
NR
(96)
458
137
225
1.5
31
575
NR
NR
NR
NR
20S
18S
16S
14S
12S
10S
8S
6S
4S
2S
F.E. in %
n-1
n-2
n-3
n-4
n-5
0.5
0.3
4.3
8.2
NR
8.7
7.9
7.9
0.8
5.0
12
NR
4.7
12
11
15
4.9
14
9.2
NR
NR
NR
NR
[redacted]



n-5
n-4
n-3
n-2
n-1
78 36 705 129 950 1570 1700 1750 2250
21 930 550 347 2220 2800 4974 4400 2800
29 450 410 1520 685 6250 760 1230 5400 1600
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
286 11 20 5.2 10 1.3 9.5 6.2 1.2 3.9
400 13 23 18 3.6 3.8 16 2.3 2.3
208 267 20 68 7.0 5.7 6.8 5.7 4.9
F. E. in %
8.9 4.8 8.0 8.0 7.0 8.8 7.2 7.6 6.8 6.2
8.8 12 13 6.8 7.9 11 7.7 10 6.5
16 9.6 14 8.8 6.5 8.9 11 9.9 11

DWG NO - I P - 5145 - 17

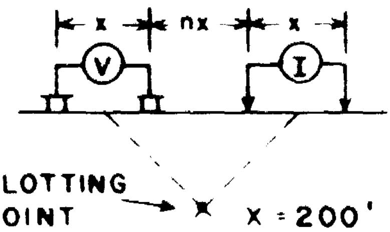
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 8W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31 68

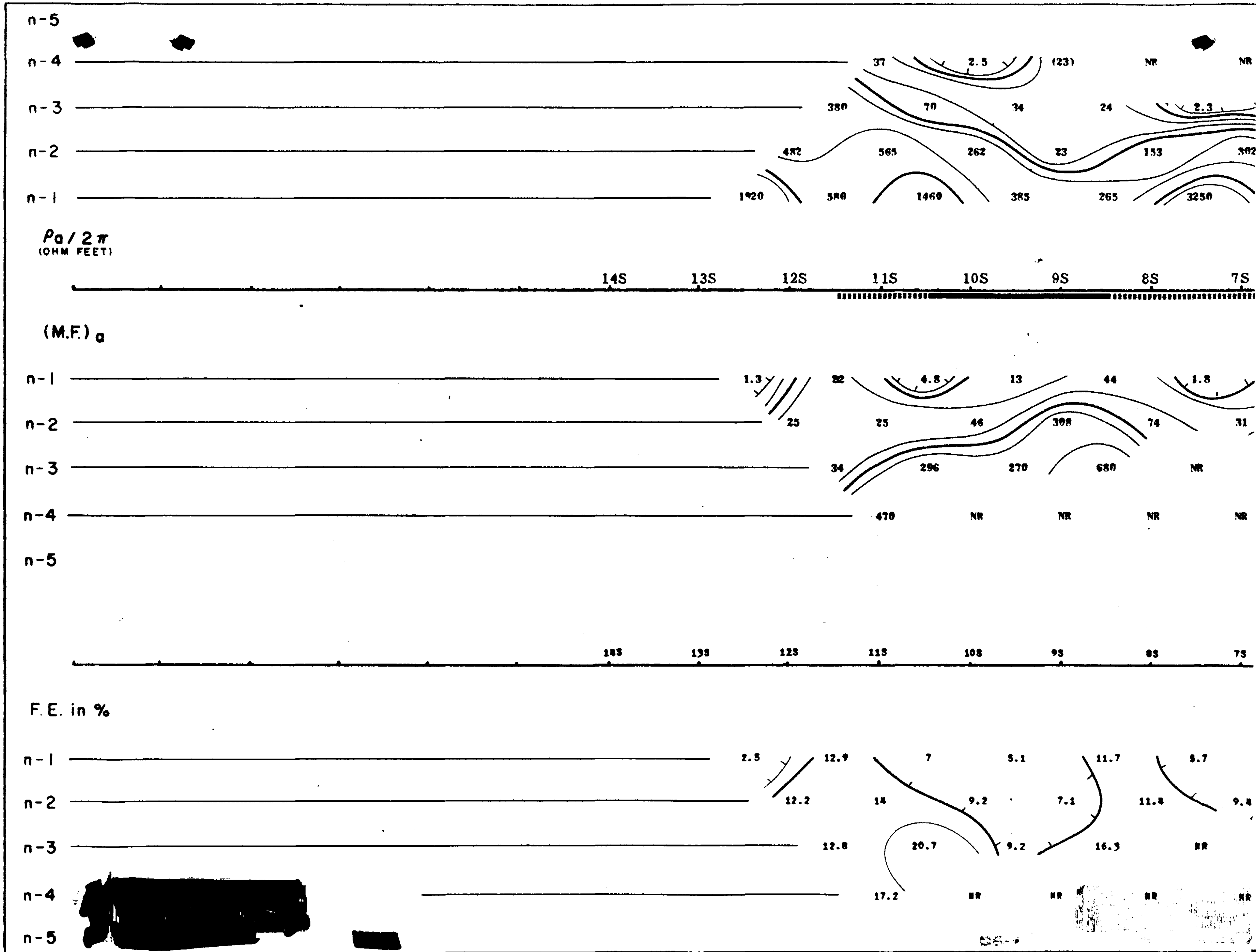
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

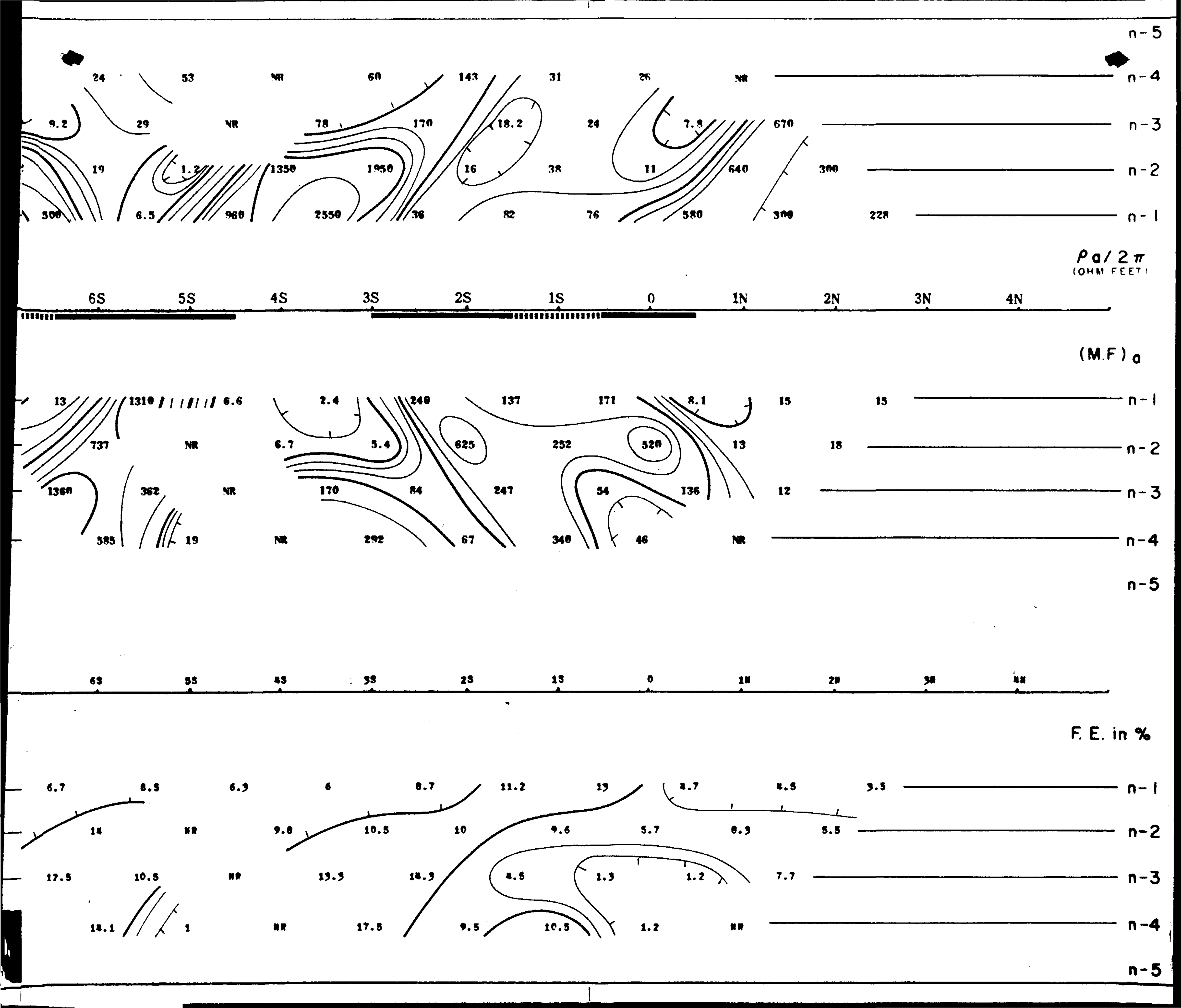
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
37 2.5 (23) NR NR
380 70 34 24 2.3
482 565 262 23 153 302
1920 580 1460 385 265 3250
ρa / 2π
(OHM FEET)
14S 13S 12S 11S 10S 9S 8S 7S
(M.F.)a
1.3 32 4.8 13 44 1.8
25 25 46 308 74 31
34 296 270 680 NR
470 NR NR NR NR
F.E. in %
2.5 12.9 7 5.1 11.7 9.7
12.2 14 9.2 7.1 11.8 9.8
12.8 20.7 9.2 16.5 NR
17.2 NR NR NR NR
[redacted]



n-5
n-4
n-3
n-2
n-1
ρa/2π
(OHM FEET)
6S 5S 4S 3S 2S 1S 0 1N 2N 3N 4N
(M.F)a
F. E. in %

DWG NO - I P - 5145 - 18

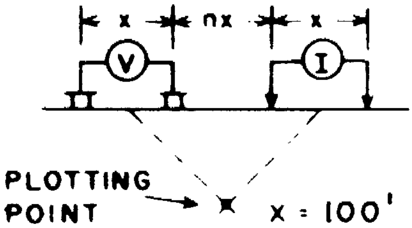
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 8 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31 68

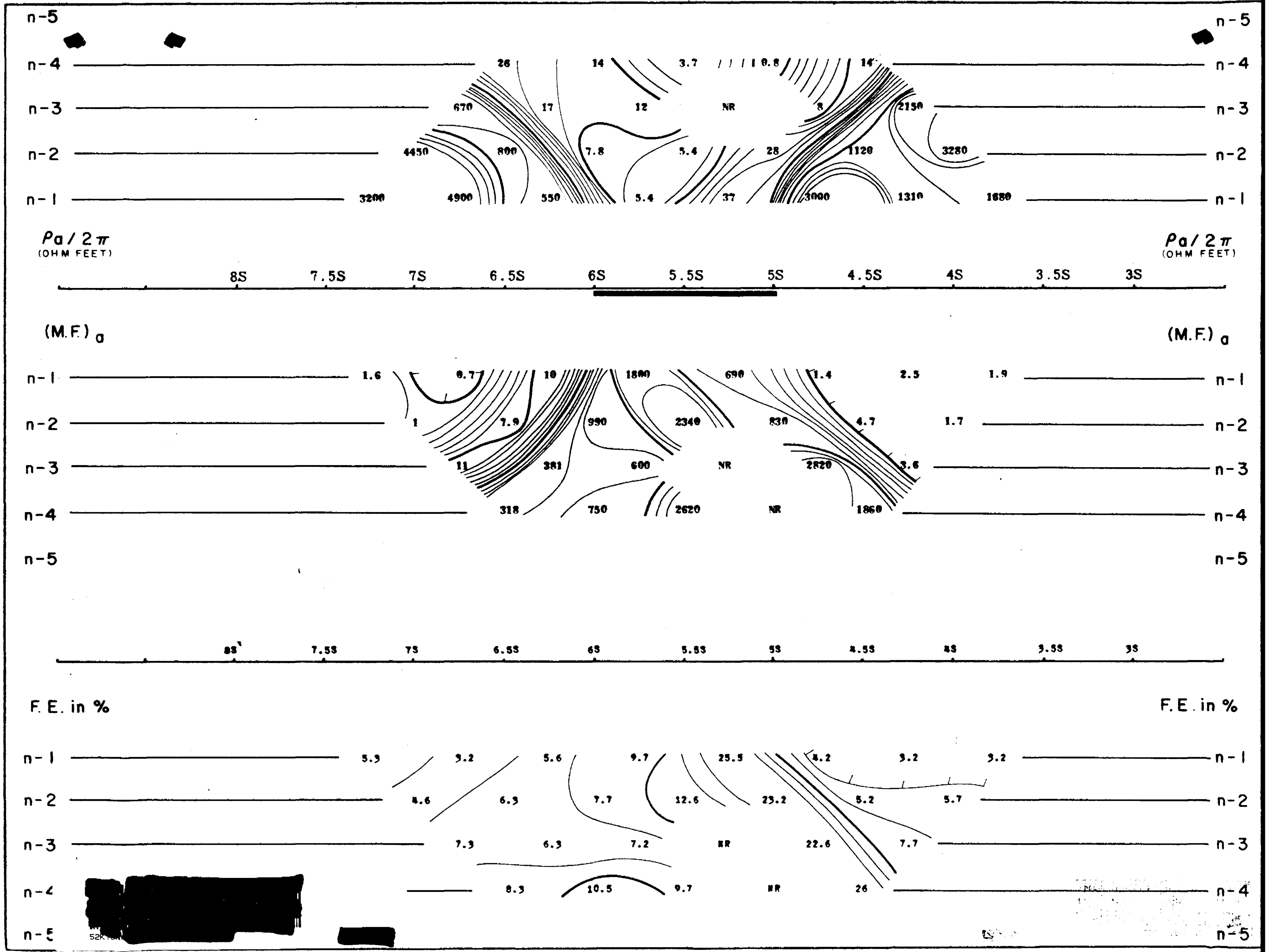
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 2 - 5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
26 14 3.7 0.8 14
670 17 12 NR 8 2150
4450 800 7.8 5.4 28 1120 3280
3200 4900 550 5.4 37 3000 1310 1880
ρa / 2π
(OHM FEET)
8S 7.5S 7S 6.5S 6S 5.5S 5S 4.5S 4S 3.5S 3S
(M.F.) a
1.6 0.7 10 1800 690 1.4 2.5 1.9
1 7.9 990 2340 830 4.7 1.7
11 381 600 NR 2820 3.6
318 750 2620 NR 1860
8S 7.5S 7S 6.5S 6S 5.5S 5S 4.5S 4S 3.5S 3S
F. E. in %
5.9 3.2 5.6 9.7 25.5 4.2 3.2 3.2
4.6 6.3 7.7 12.6 23.2 5.2 5.7
7.3 6.3 7.2 NR 22.6 7.7
8.3 10.5 9.7 NR 26
[redacted]

DWG. NO.– I.P. – 5145–19

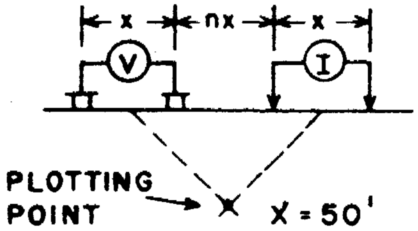
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.– 8 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬
PROBABLE ||||||||||||
POSSIBLE / / / / / / / /

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R. A. Bell

DATE: Jul 31/68

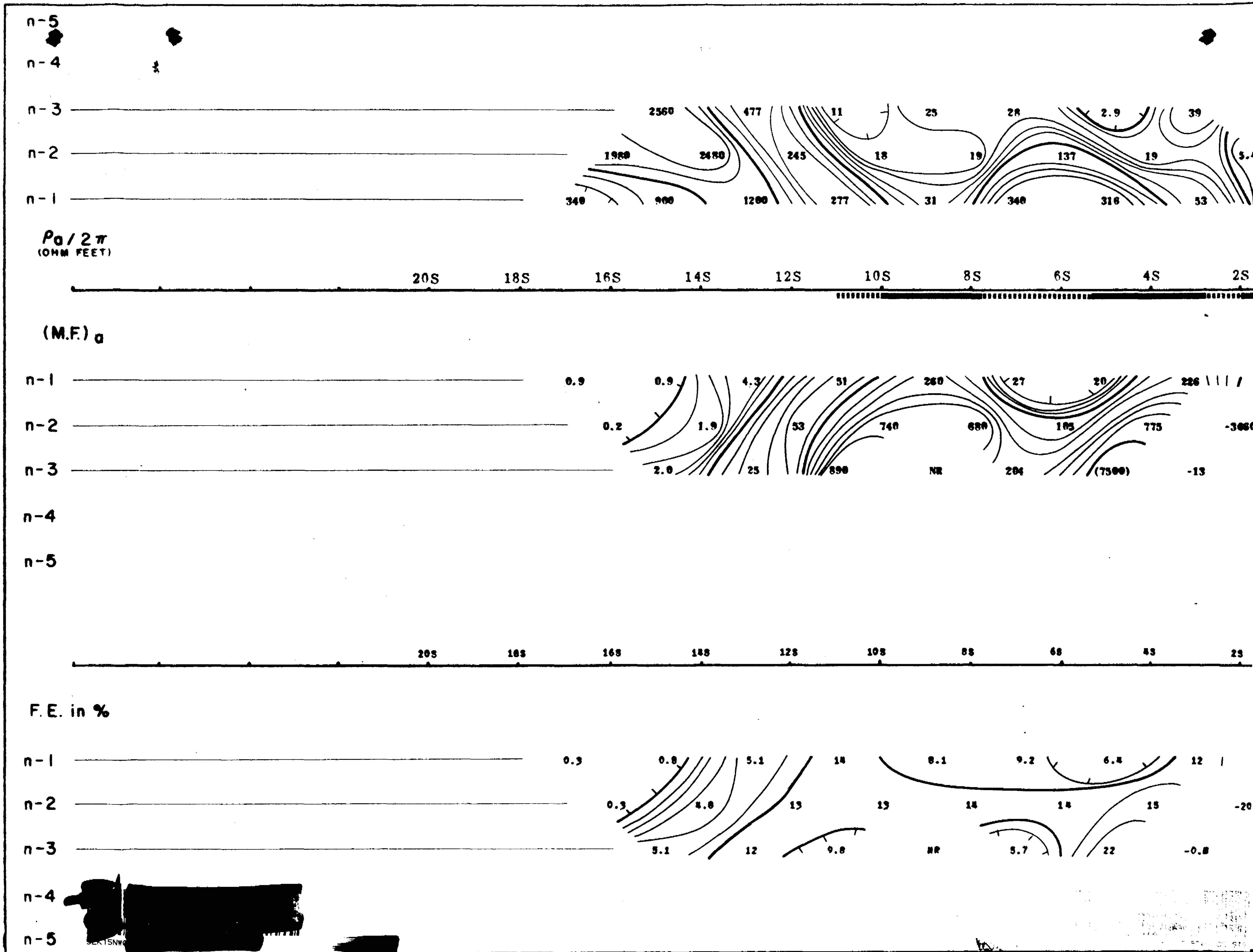
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1–1·5–2–3–5–7·5–10

McPHAR

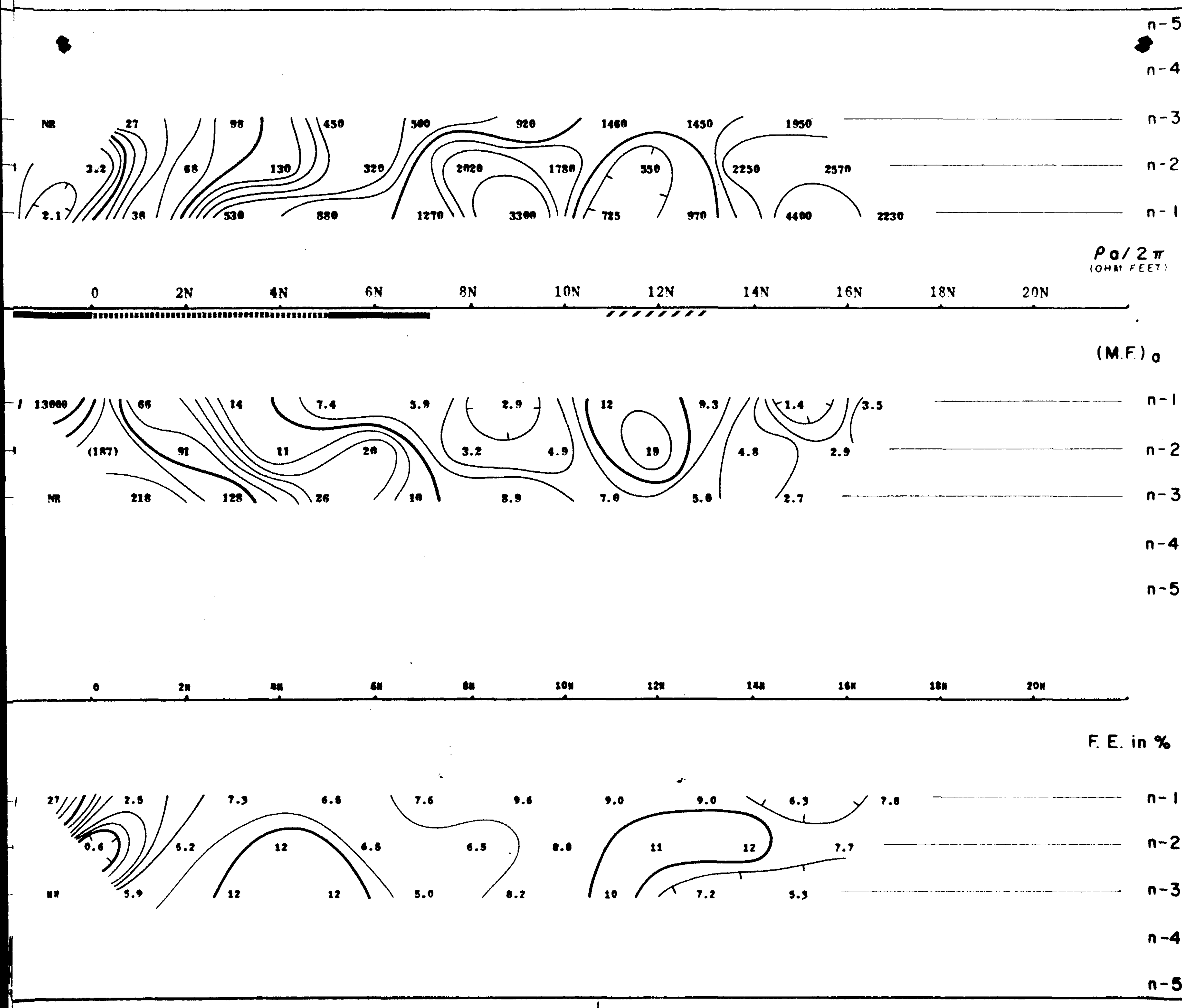
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
2560
477
11
25
28
2.9
39
1980
2480
245
18
19
137
19
5.4
340
900
1200
277
31
340
316
53
ρa / 2π
(OHM FEET)
20S
18S
16S
14S
12S
10S
8S
6S
4S
2S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
0.9
0.9
4.3
51
260
27
20
226
0.2
1.9
53
740
680
105
775
2.0
25
890
NR
204
(7500)
-13
20S
18S
16S
14S
12S
10S
8S
6S
4S
2S
F.E. in %
n-1
n-2
n-3
n-4
n-5
0.3
0.8
5.1
14
8.1
9.2
6.4
12
0.3
4.8
13
13
14
14
15
-20
5.1
12
9.8
NR
5.7
22
-0.8

[redacted]



n-5
n-4
n-3
n-2
n-1
NR 27 98 450 500 920 1460 1450 1950
3.2 68 130 320 2020 1780 550 2250 2570
2.1 38 530 880 1270 3300 725 970 4400 2230
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
13000 66 14 7.4 5.9 2.9 12 9.3 1.4 3.5
(187) 91 11 20 3.2 4.9 19 4.8 2.9
NR 218 128 26 10 8.9 7.0 5.0 2.7
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
27 2.5 7.3 6.8 7.6 9.6 9.0 9.0 6.3 7.8
0.6 6.2 12 6.5 6.5 8.8 11 12 7.7
NR 5.9 12 12 5.0 8.2 10 7.2 5.3
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-20

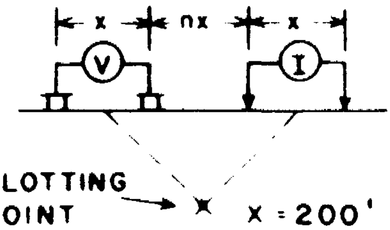
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 10W

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31 68

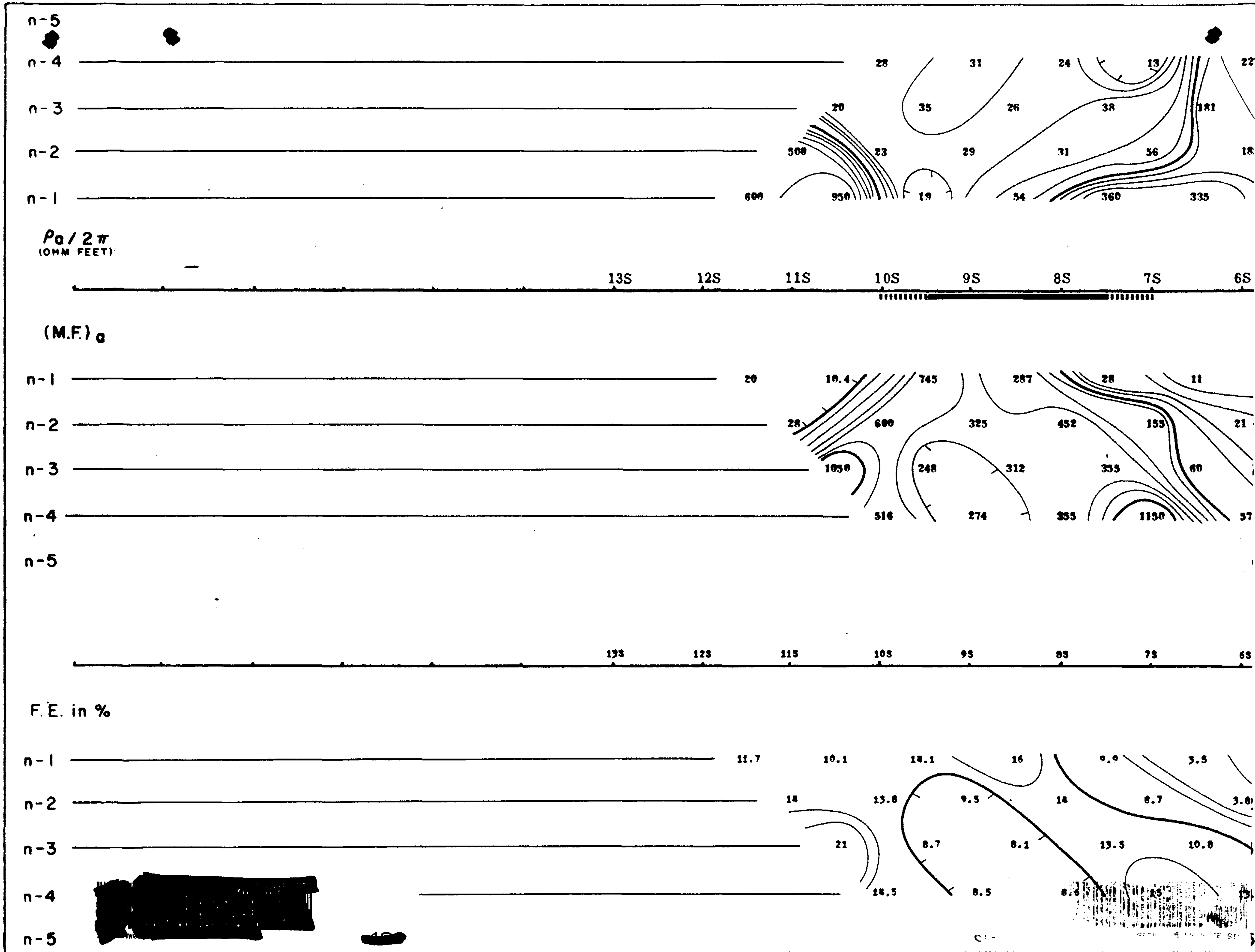
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

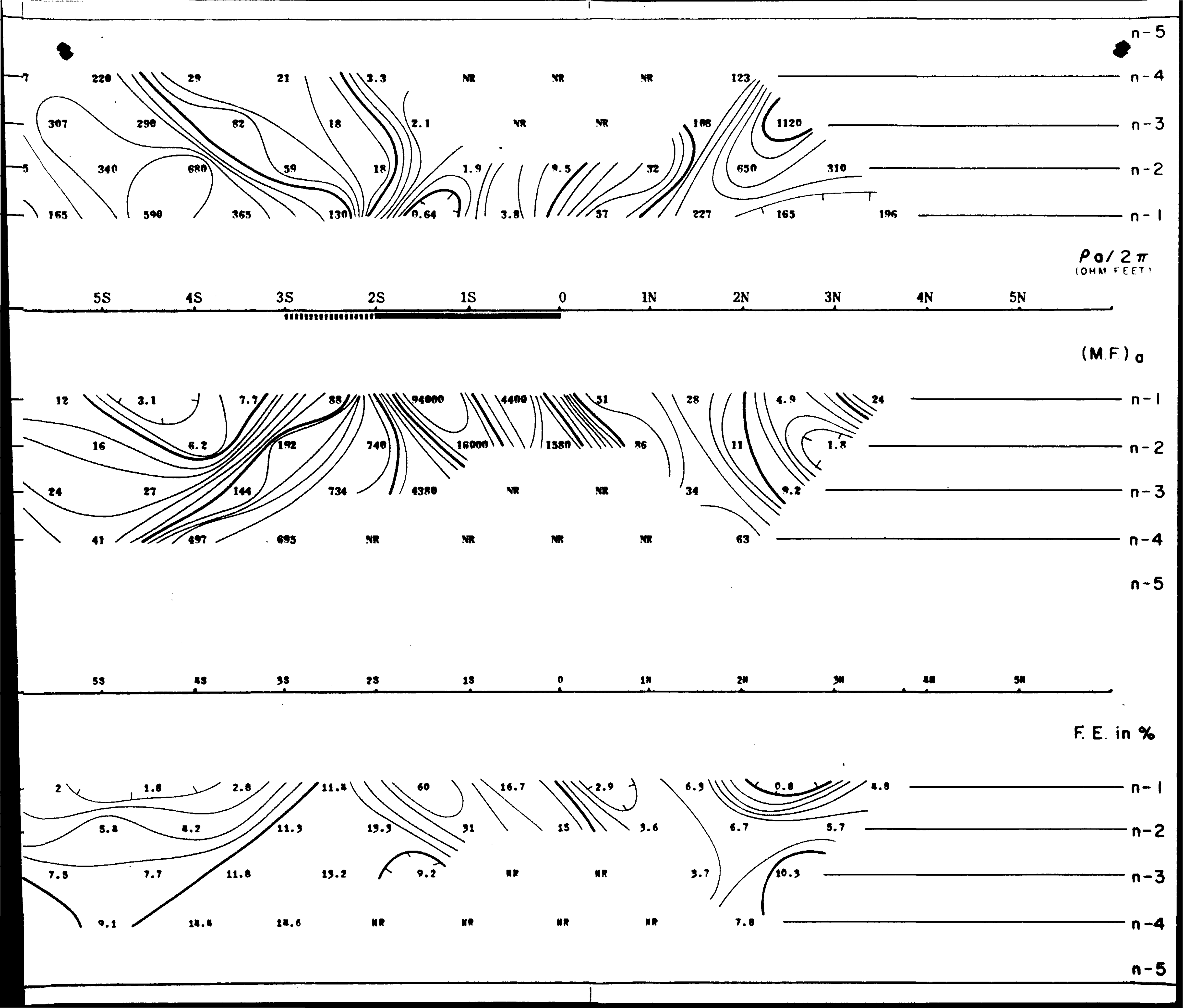
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4 28 31 24 13 22
n-3 20 35 26 38 181
n-2 500 23 29 31 56 18
n-1 600 950 19 54 360 335
ρa / 2π
(OHM FEET)
13S 12S 11S 10S 9S 8S 7S 6S
(M.F.)a
n-1 20 10.4 745 287 28 11
n-2 28 600 325 452 155 21
n-3 1050 248 312 355 60
n-4 516 274 355 1150 57
n-5
13S 12S 11S 10S 9S 8S 7S 6S
F.E. in %
n-1 11.7 10.1 14.1 16 9.9 3.5
n-2 14 13.8 9.5 14 8.7 3.8
n-3 21 8.7 8.1 13.5 10.8
n-4 14.5 8.5
n-5
[redacted]



n-5
n-4
n-3
n-2
n-1
7 220 29 21 3.3 NR NR NR 123
307 290 82 18 2.1 NR NR 108 1120
5 340 680 59 18 1.9 9.5 32 650 310
165 590 365 130 0.64 3.8 57 227 165 196
ρa/2π
(OHM FEET)
5S 4S 3S 2S 1S 0 1N 2N 3N 4N 5N
(M.F.)a
12 3.1 7.7 88 94000 4400 51 28 4.9 24
16 6.2 192 740 16000 1580 86 11 1.8
24 27 144 734 4380 NR NR 34 9.2
41 497 695 NR NR NR NR 63
5S 4S 3S 2S 1S 0 1N 2N 3N 4N 5N
F. E. in %
2 1.8 2.8 11.8 60 16.7 2.9 6.9 0.8 4.8
5.4 4.2 11.3 19.3 31 15 3.6 6.7 5.7
7.5 7.7 11.8 13.2 9.2 NR NR 3.7 10.3
9.1 18.4 18.6 NR NR NR NR 7.8

DWG NO - I P - 5145 - 21

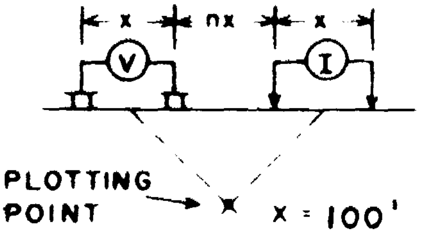
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 10 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31 '68

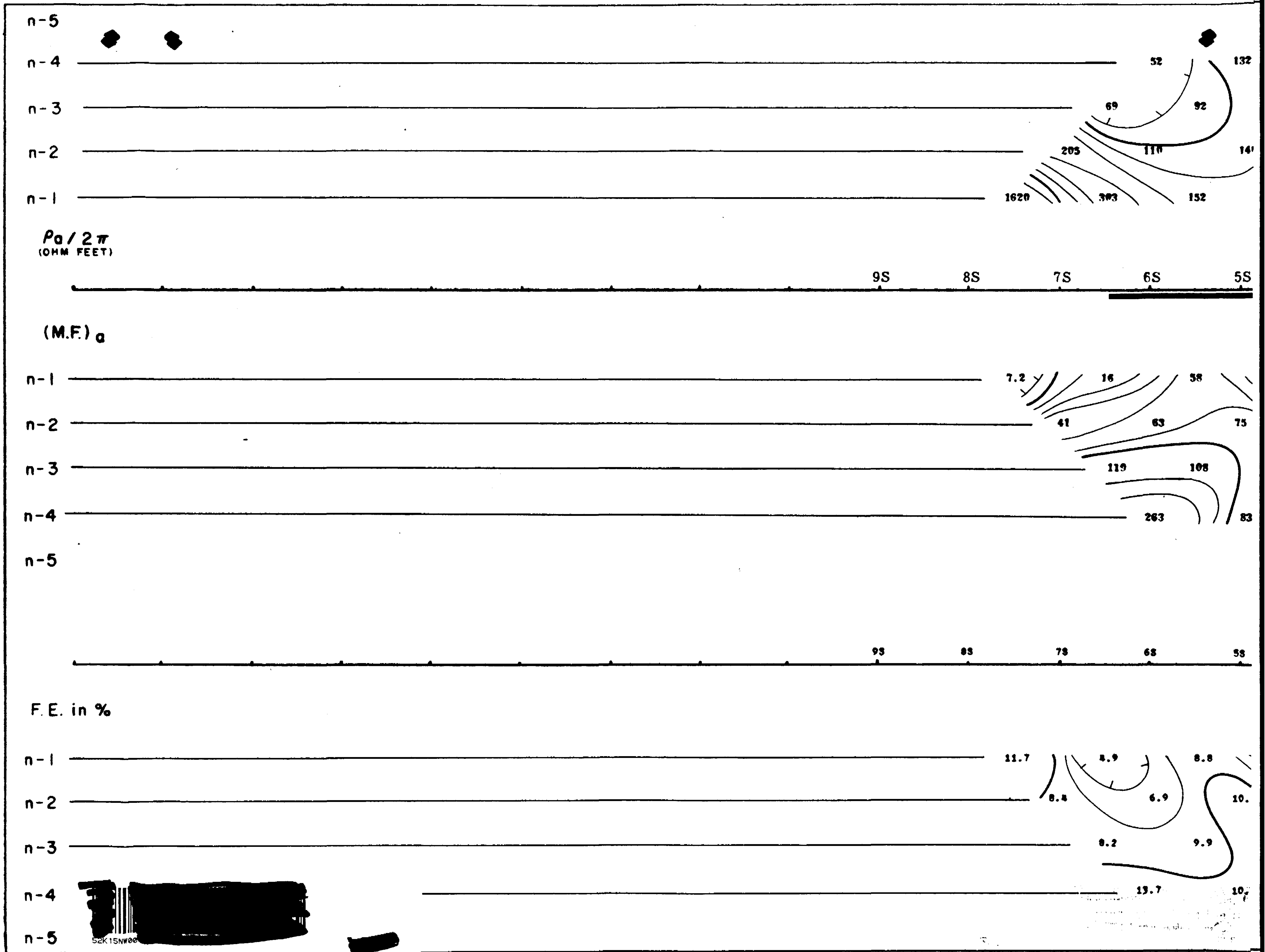
McPHAR GEOPHYSICS LIMITED

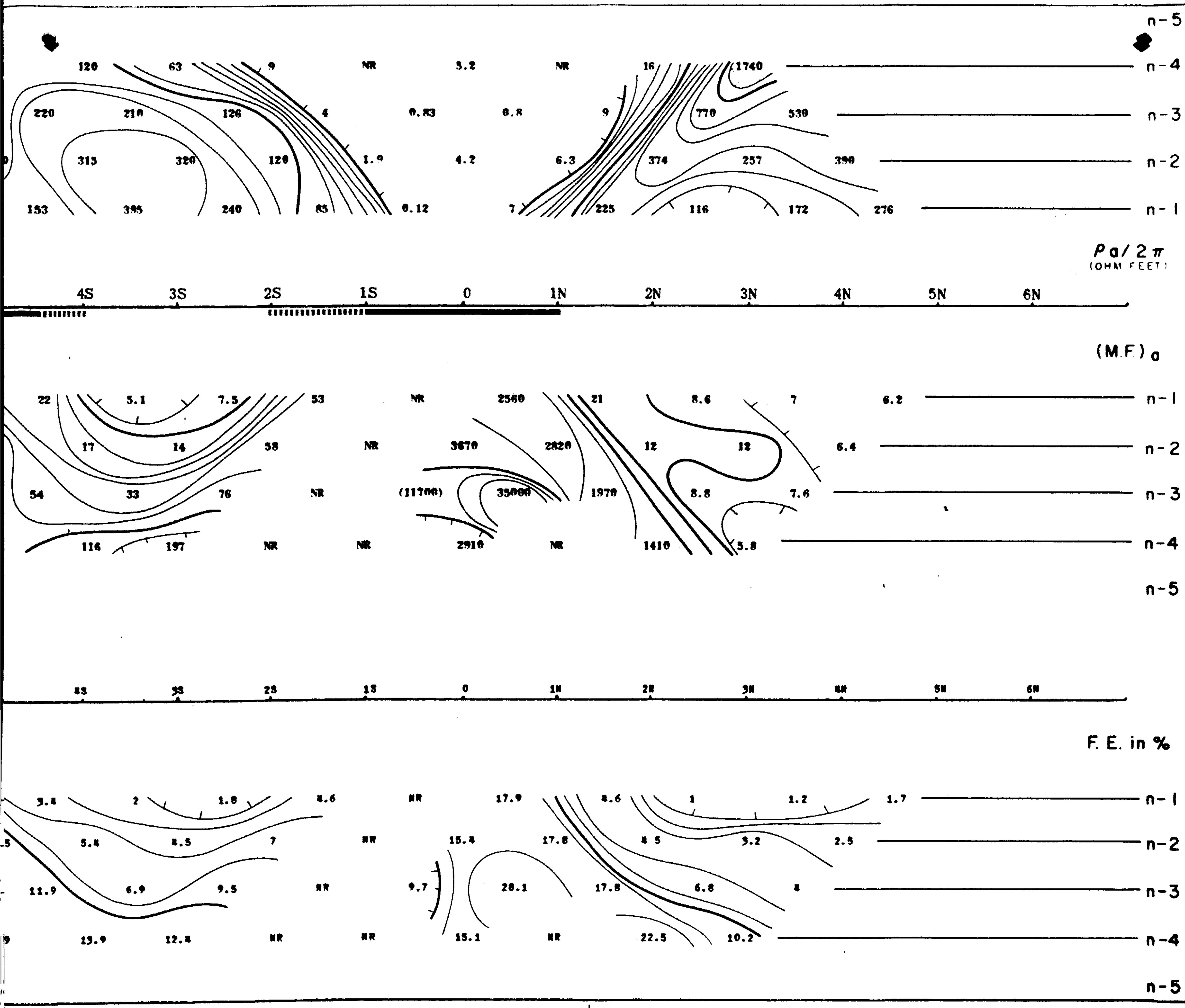
NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
52
132
69
92
205
110
14
1620
303
152
ρa / 2π
(OHM FEET)
9S
8S
7S
6S
5S
(M.F.) a
7.2
16
58
41
63
75
119
108
263
83
9S
8S
7S
6S
5S
F.E. in %
11.7
4.9
8.8
8.4
6.9
10.
8.2
9.9
13.7
10.
[redacted]



n-5
120 63 9 NR 3.2 NR 16 1740 n-4
220 210 126 4 0.83 0.8 9 770 530 n-3
315 320 120 1.9 4.2 6.3 374 257 390 n-2
153 395 240 85 0.12 7 225 116 172 276 n-1
Pa/2π
(OHM FEET)
4S 3S 2S 1S 0 1N 2N 3N 4N 5N 6N
(M.F.)a
22 5.1 7.5 53 NR 2560 21 8.6 7 6.2 n-1
17 14 58 NR 3670 2820 12 12 6.4 n-2
54 33 76 NR (11700) 35000 1970 8.8 7.6 n-3
116 197 NR NR 2910 NR 1410 5.8 n-4
n-5
4S 3S 2S 1S 0 1N 2N 3N 4N 5N 6N
F. E. in %
3.4 2 1.8 4.6 NR 17.9 4.6 1 1.2 1.7 n-1
5.4 4.5 7 NR 15.4 17.8 4.5 3.2 2.5 n-2
11.9 6.9 9.5 NR 9.7 20.1 17.8 6.8 4 n-3
13.9 12.4 NR NR 15.1 NR 22.5 10.2 n-4
n-5

DWG NO - I P - 5145-22

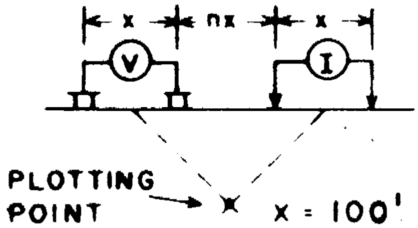
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 11 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ━━━━━━━━
PROBABLE ••••••••••••••••••
POSSIBLE ////////

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. a. Bell

DATE: July 31 68

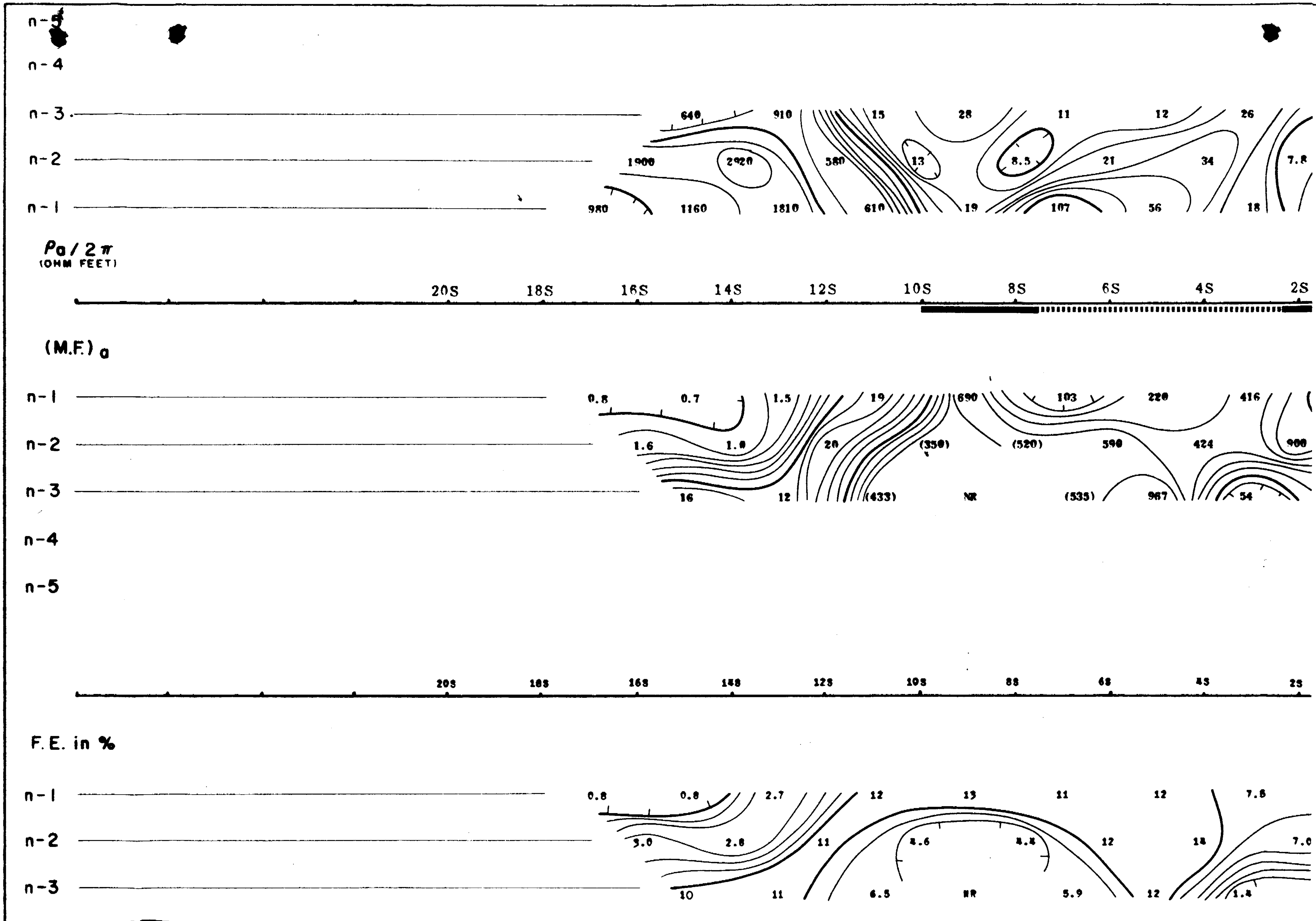
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

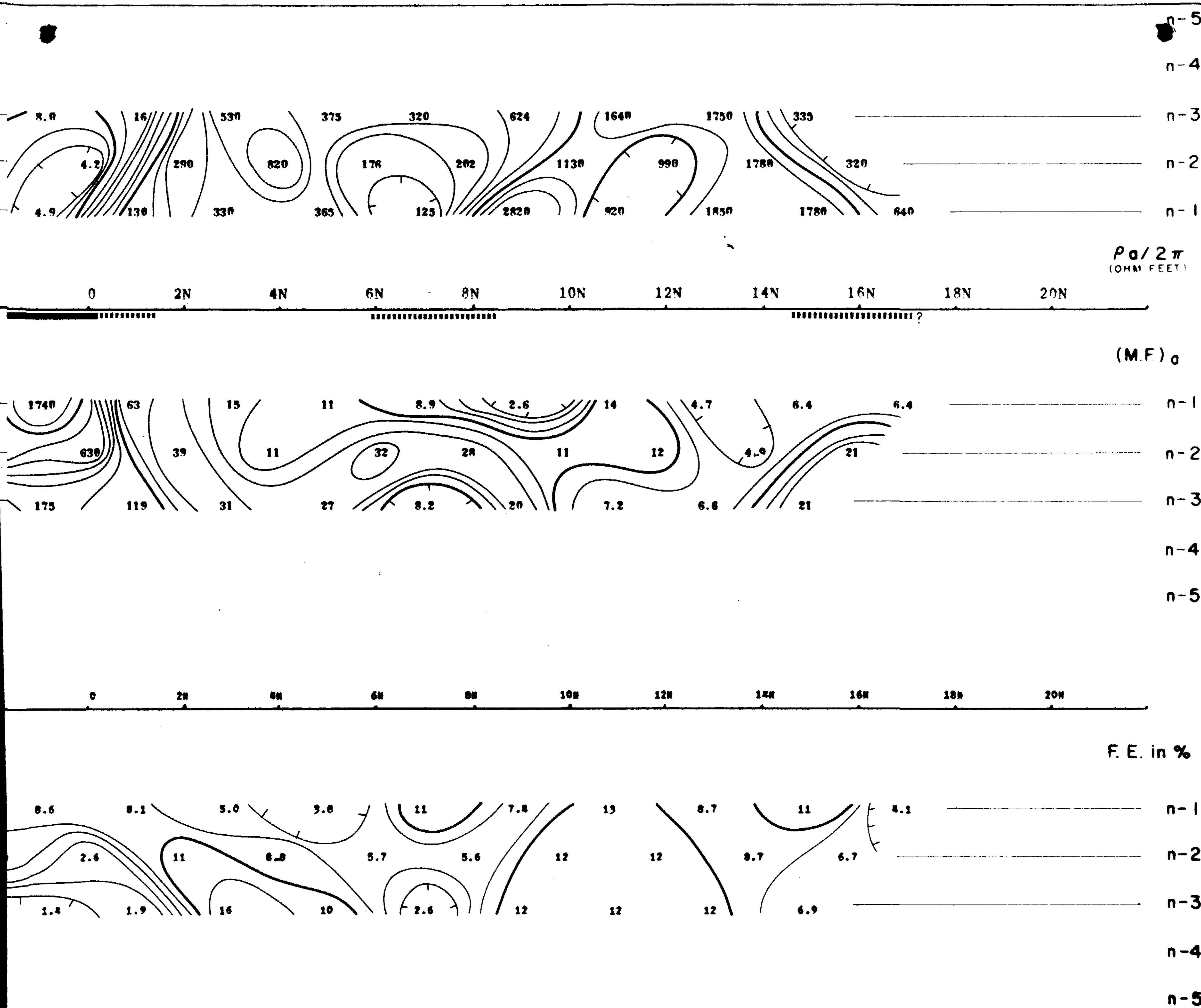
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



[redacted]
52K13NW0012 63.2[redacted]



ρa/2π
(OHM FEET)
(M.F.)a
F. E. in %
0
2N
4N
6N
8N
10N
12N
14N
16N
18N
20N
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145-23

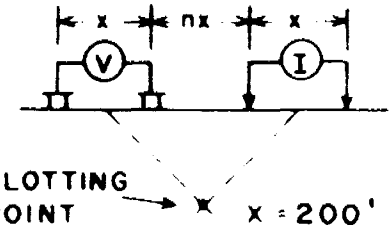
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 12W

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. a. Bell

DATE July 31 68

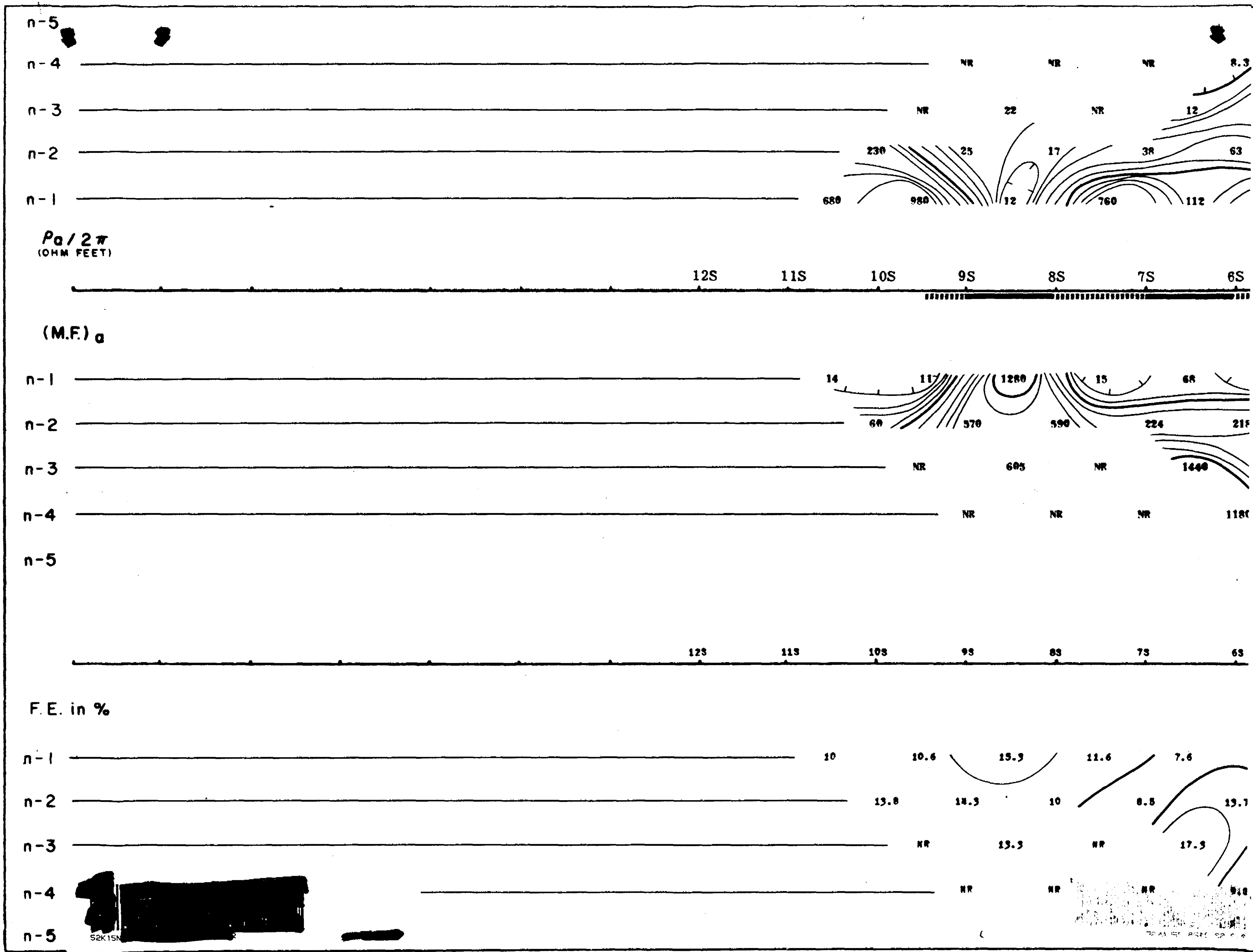
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

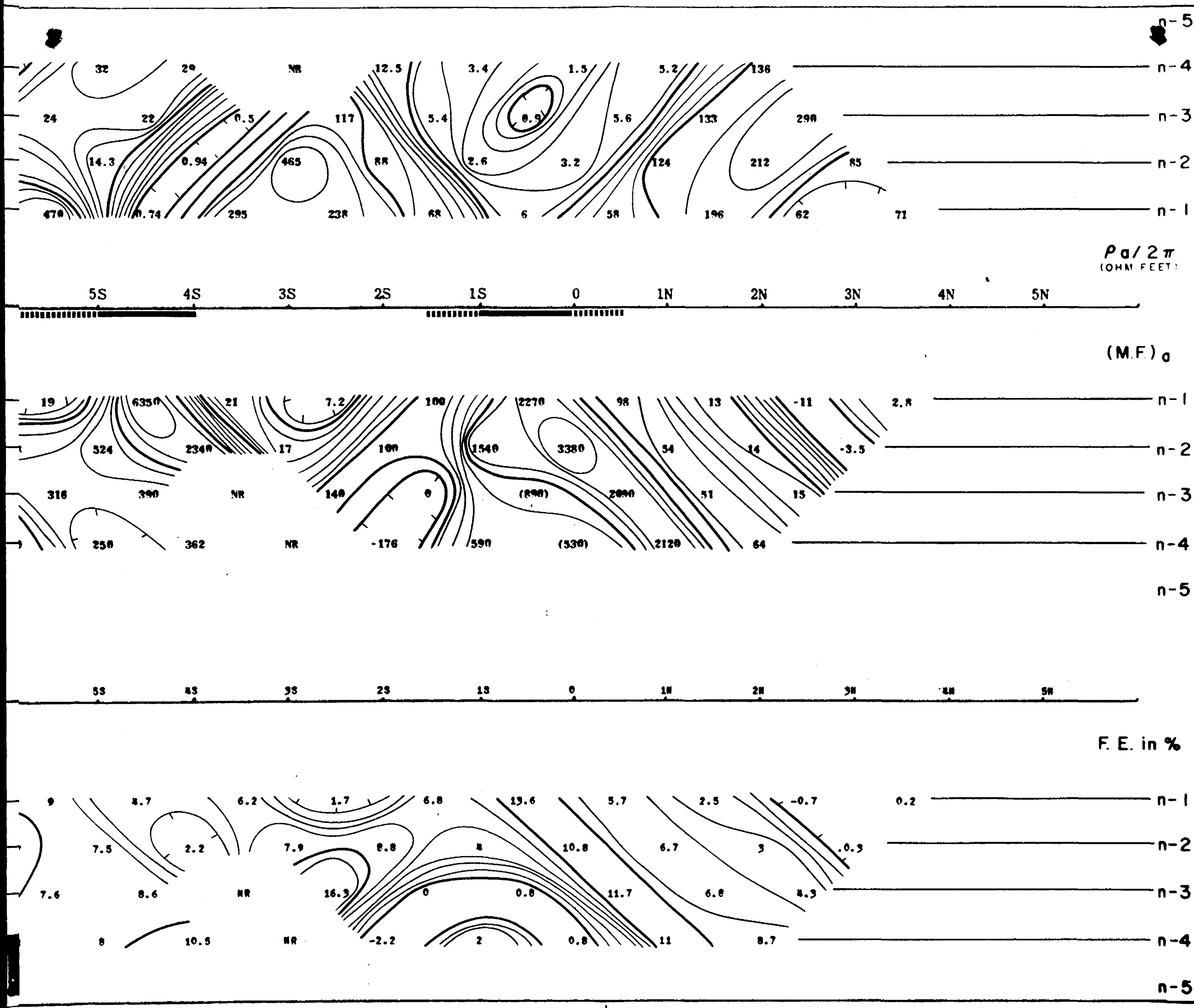
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
NR NR NR 8.3
NR 22 NR 12
230 25 17 38 63
680 980 12 760 112
Pa / 2π
(OHM FEET)
12S 11S 10S 9S 8S 7S 6S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
14 11 1280 15 68
60 570 590 224 215
NR 605 NR 1440
NR NR NR 1180
12S 11S 10S 9S 8S 7S 6S
F.E. in %
n-1
n-2
n-3
n-4
n-5
10 10.6 15.3 11.6 7.6
13.8 14.3 10 8.5 13.7
NR 13.3 NR 17.3
NR NR NR
[redacted]



ρa/2π
(OHM FEET)
n-1
n-2
n-3
n-4
n-5
32 29 NR 12.5 3.4 1.5 5.2 136
24 22 0.5 117 5.4 0.9 5.6 133 290
14.3 0.94 465 88 2.6 3.2 124 212 85
470 0.74 295 238 68 6 58 196 62 71
5S 4S 3S 2S 1S 0 1N 2N 3N 4N 5N
(M.F.)a
19 6350 21 7.2 100 2270 98 13 -11 2.8
524 2340 17 100 1540 3380 54 14 -3.5
316 390 NR 140 0 (890) 2090 51 15
250 362 NR -176 590 (530) 2120 64
5S 4S 3S 2S 1S 0 1N 2N 3N 4N 5N
F. E. in %
9 4.7 6.2 1.7 6.8 13.6 5.7 2.5 -0.7 0.2
7.5 2.2 7.9 8.8 8 10.8 6.7 3 0.3
7.6 8.6 NR 16.3 0 0.8 11.7 6.8 4.3
8 10.5 NR -2.2 2 0.8 11 8.7

DWG NO - I P - 5145- 24

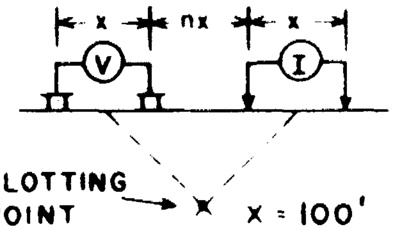
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 13 W

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 100'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬
PROBABLE ••••••••••••••••
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 — 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31

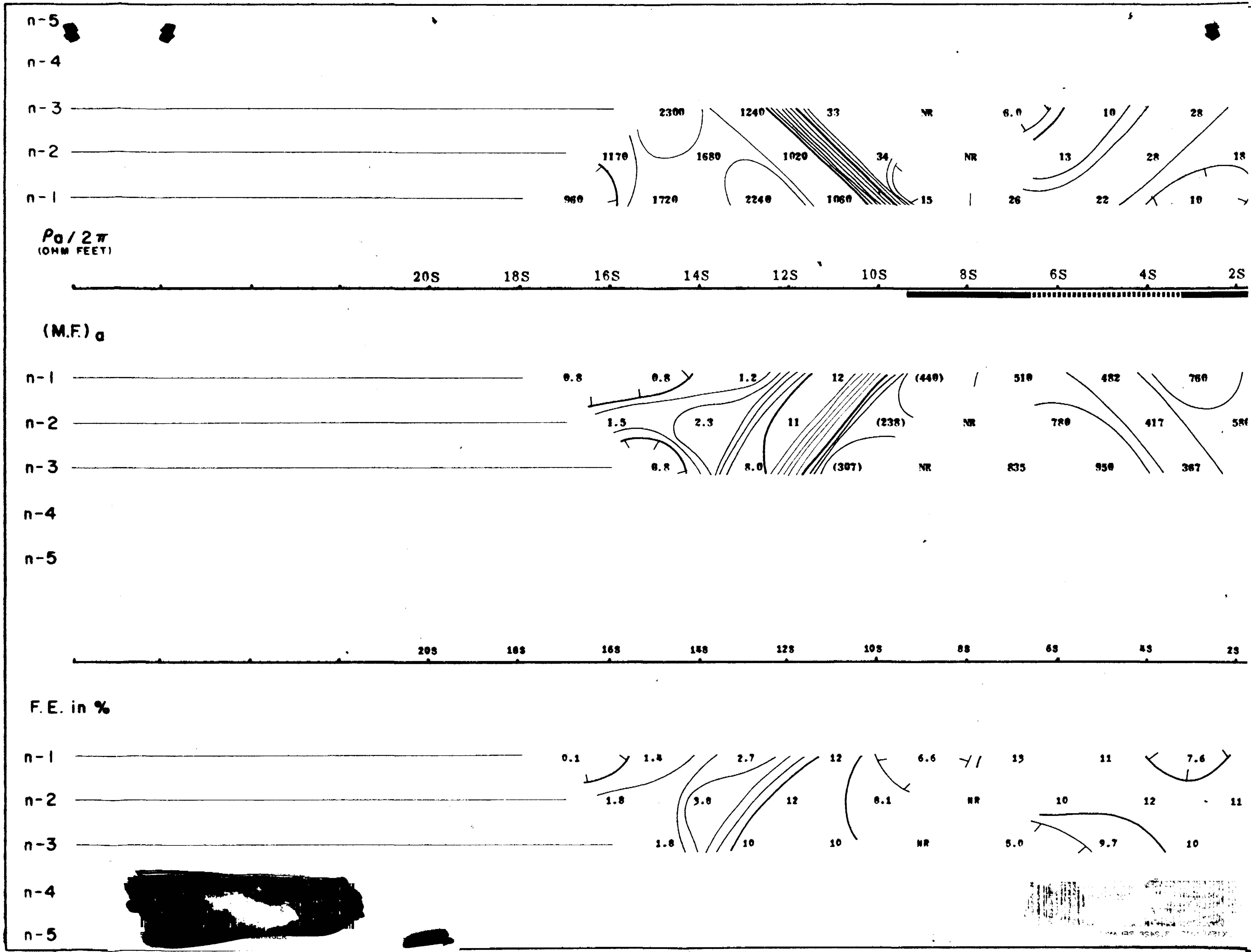
McPHAR GEOPHYSICS LIMITED

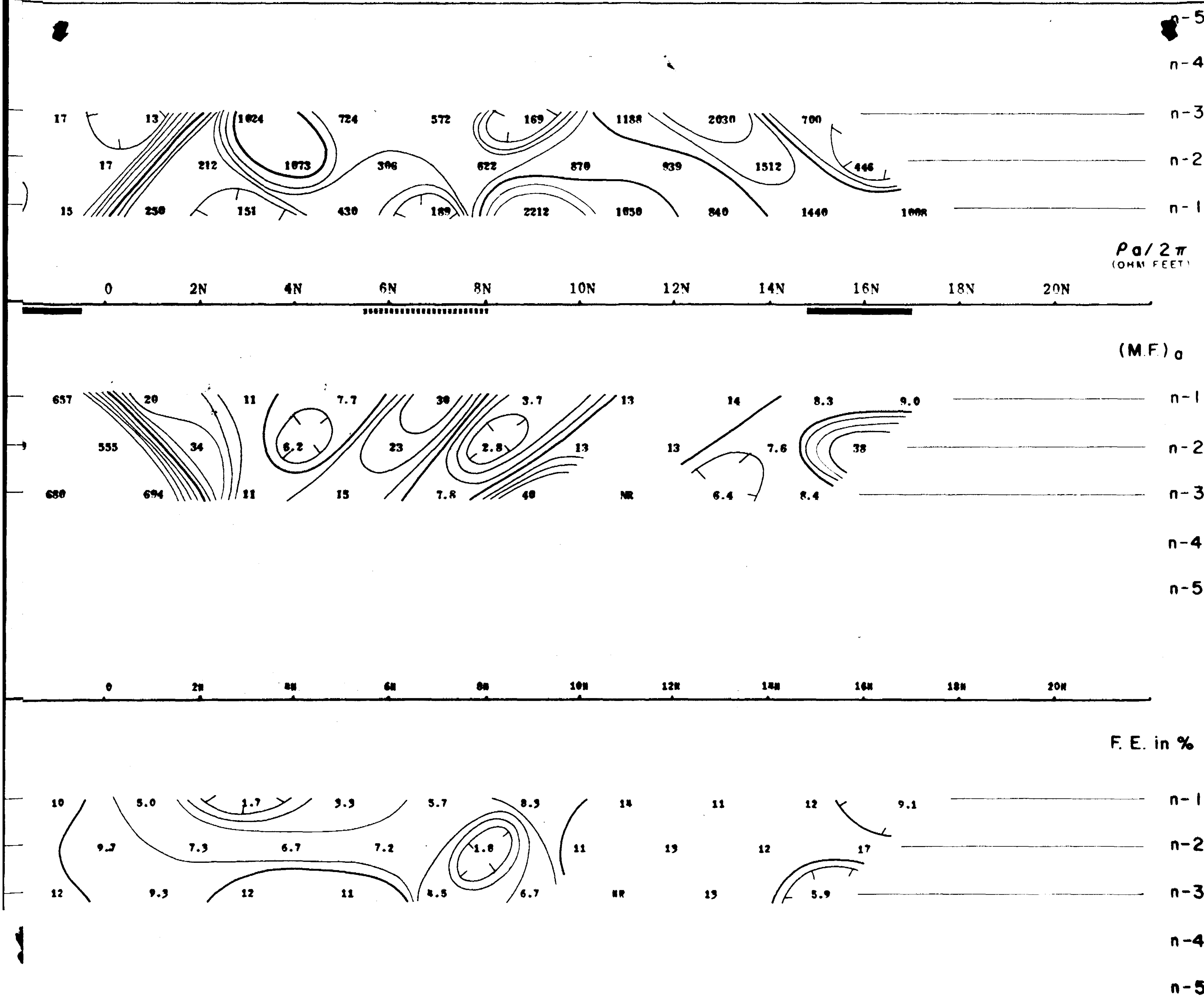
NOTE CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
2300
1240
33
NR
6.0
10
28
1170
1680
1020
34
NR
13
28
18
960
1720
2240
1060
15
26
22
10
Pa / 2π
(OHM FEET)
20S
18S
16S
14S
12S
10S
8S
6S
4S
2S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
0.8
0.8
1.2
12
(440)
510
482
760
1.5
2.3
11
(238)
NR
780
417
0.8
8.0
(307)
NR
835
950
387
F.E. in %
n-1
n-2
n-3
n-4
n-5
0.1
1.4
2.7
12
6.6
13
11
7.6
1.8
3.0
12
0.1
NR
10
12
11
1.8
10
10
NR
5.0
9.7
10



n-5
n-4
n-3
n-2
n-1
ρa/2π
(OHM FEET)
0
2N
4N
6N
8N
10N
12N
14N
16N
18N
20N
(M.F.)a
F. E. in %

DWG NO - I.P - 5145-25

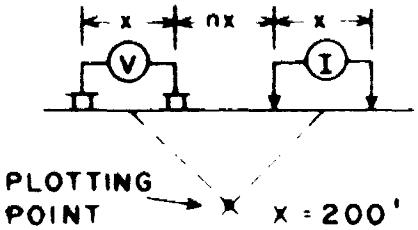
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 14W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31 68

McPHAR GEOPHYSICS LIMITED

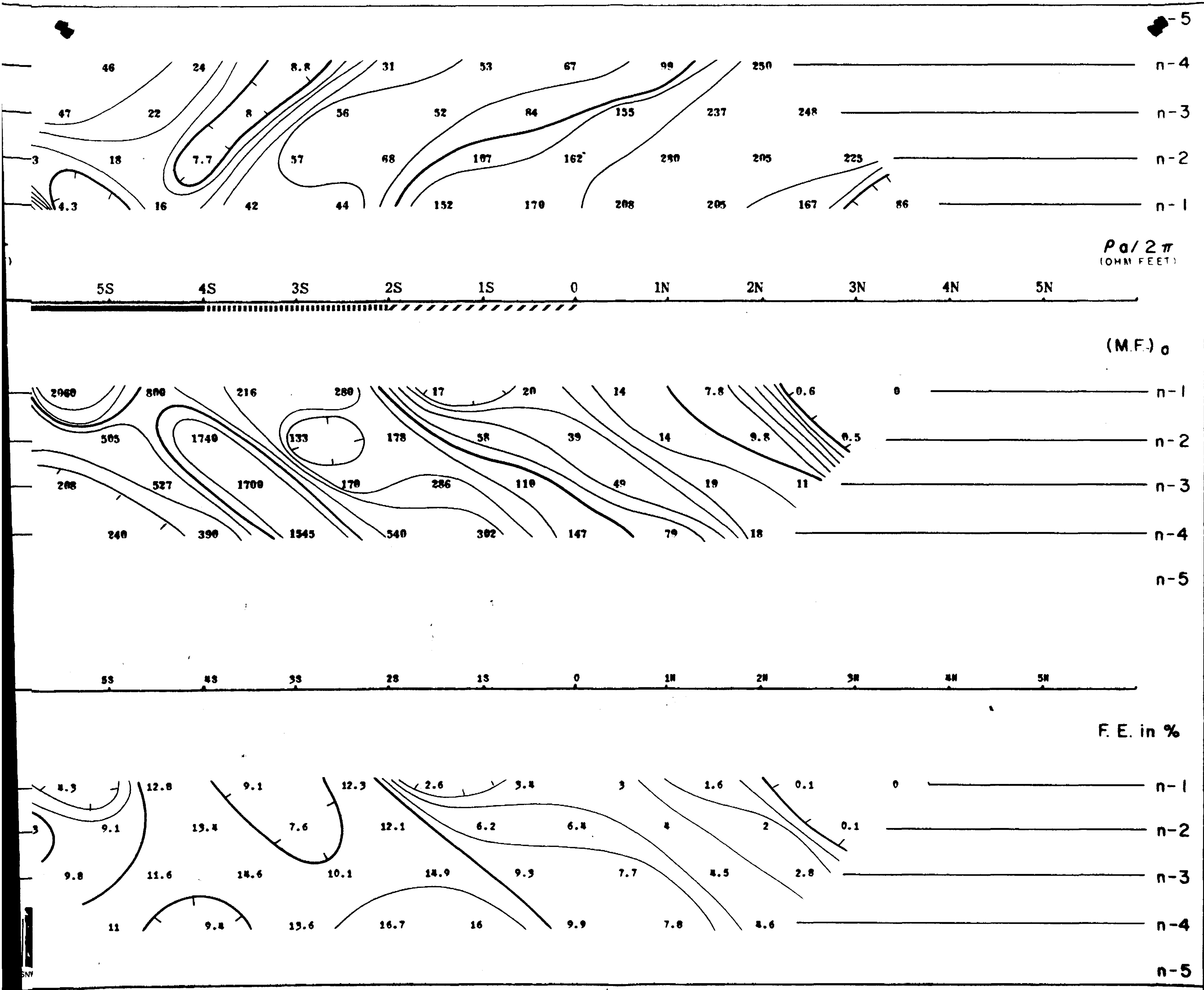
NOTE CONTOURS AT LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

n-5
n-4
n-3
n-2
n-1
NR NR NR NR
5 4.9 3.4 NR
585 6.4 28 33 10.
645 1450 8.8 385 290
Pa / 2π
(OHM FEET)
12S 11S 10S 9S 8S 7S 6S
(M.F.) a
17 7.8 1840 364 33
20 3850 572 550 660
(3800) (3470) (2090) NR
NR NR NR NR
F.E. in %
10.7 11.9 16.2 14 9.6
11.8 19.5 16 18.1 10.
19 17 7.1 NR
NR NR NR NR
82K15NW0012 63.2428 BELANGER


n-1
n-2
n-3
n-4
n-5
ρa/2π
(OHM FEET)
5S
4S
3S
2S
1S
0
1N
2N
3N
4N
5N
(M.F.)a
F. E. in %

DWG NO - I.P. - 5145-27

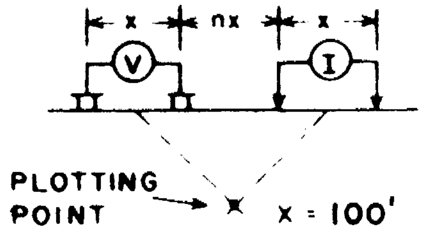
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 15 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ————
PROBABLE ••••••••••
POSSIBLE / / / / / / / /

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31/68

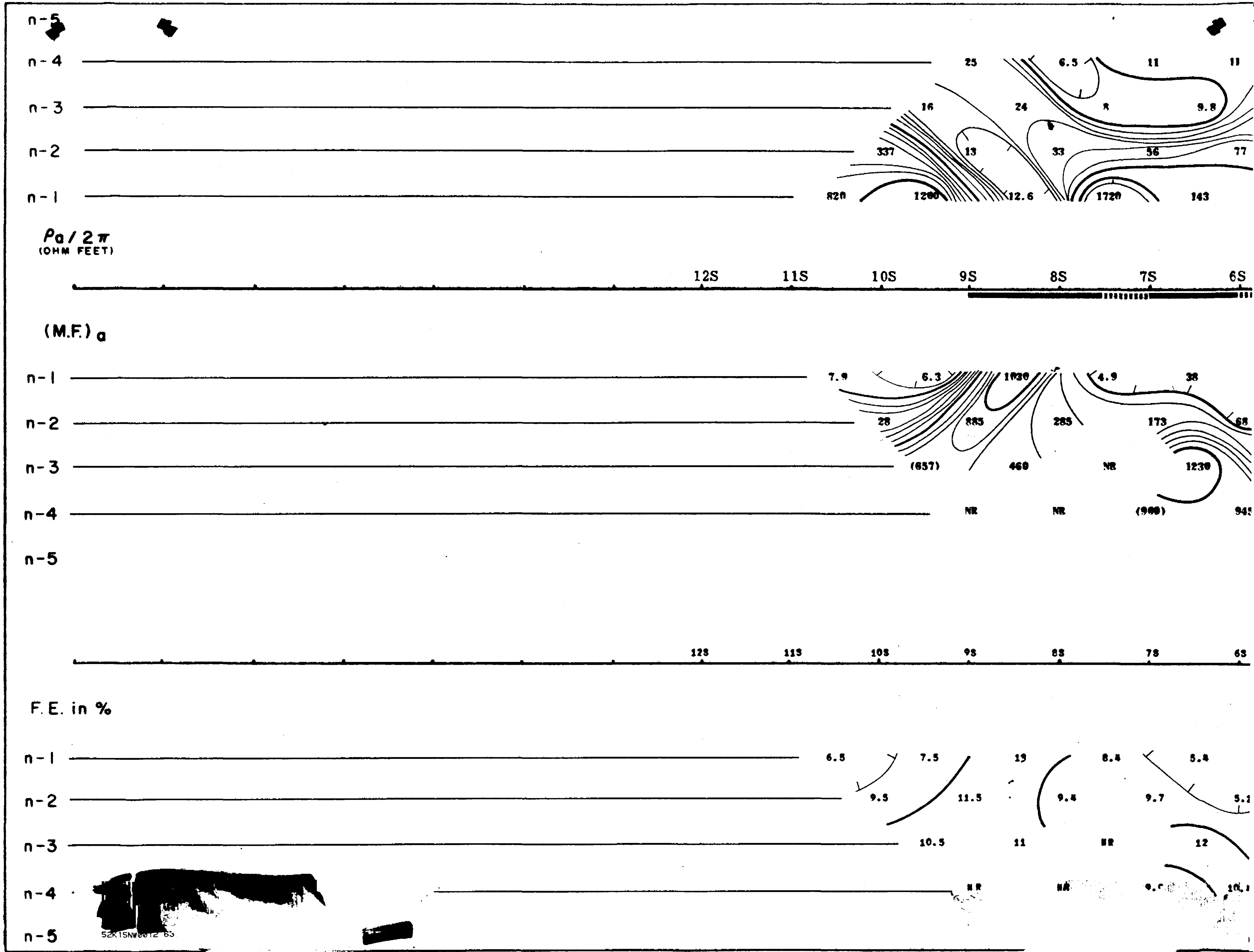
McPHAR GEOPHYSICS LIMITED

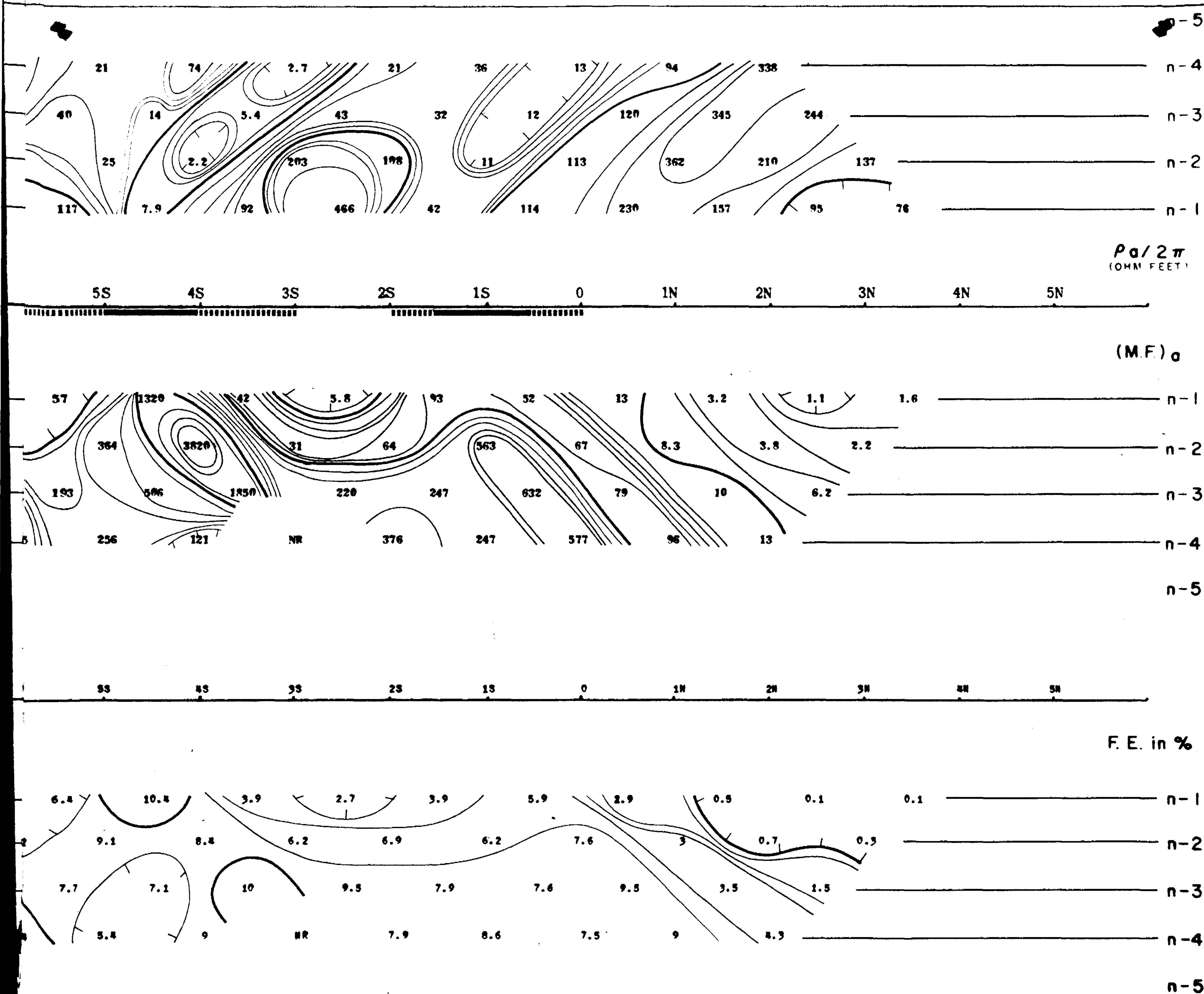
NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
25
6.5
11
11
16
24
9.8
337
13
33
56
77
820
1200
12.6
1720
143
ρa / 2π
(OHM FEET)
12S
11S
10S
9S
8S
7S
6S
(M.F.)a
7.9
6.3
1030
4.9
38
28
885
285
173
(657)
460
NR
1230
(900)
F.E. in %
6.5
7.5
13
8.4
5.4
9.5
11.5
9.4
9.7
10.5
11
12
52K15NW0012 63



n-5
n-4
n-3
n-2
n-1
ρa/2π
(OHM FEET)
5S
4S
3S
2S
1S
0
1N
2N
3N
4N
5N
(M.F.)a
n-1
n-2
n-3
n-4
n-5
5S
4S
3S
2S
1S
0
1N
2N
3N
4N
5N
F. E. in %
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 26

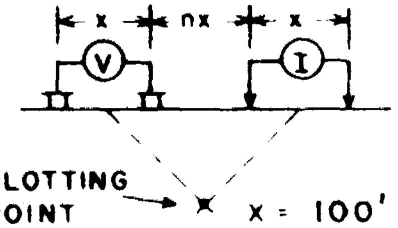
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO. - 14 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31 68

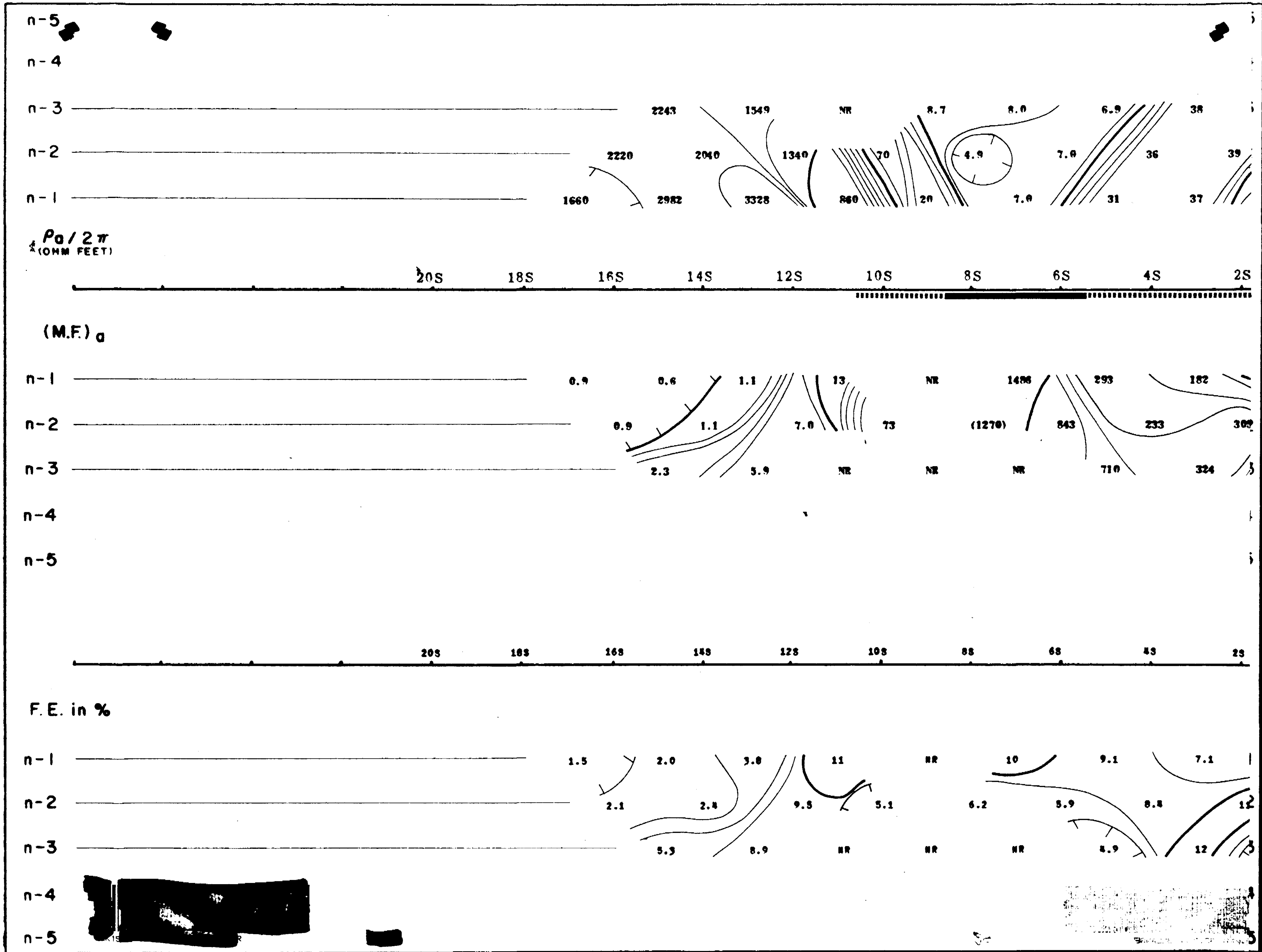
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
ρa / 2π (OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
n-1
n-2
n-3
n-4
n-5

[redacted]

n-5
n-4
38 32 120 1278 2268 486 277 1638 1322 n-3
132 94 300 1218 768 394 920 2016 526 n-2
199 308 235 226 369 580 1714 649 1250 990 n-1
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
?
(M.F.)a
37 16 8.9 7.5 4.0 2.9 4.6 17 9.1 10 n-1
84 62 15 4.0 3.1 9.6 12 5.8 16 n-2
(121) 338 76 5.0 1.9 13 28 6.0 2.1 n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
7.4 5.1 2.1 1.7 1.5 1.7 9.0 11 11 10 n-1
11 5.9 4.6 4.9 2.4 3.7 11 12 8.6 n-2
4.6 11 9.1 6.5 4.5 6.4 7.8 9.8 2.8 n-3
n-4
n-5

DWG NO - I P - 5145-28

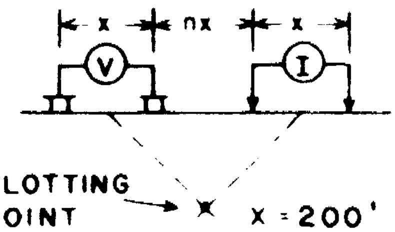
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO - 16W

ELECTRODE CONFIGURATION



PLOTTING POINT

x = 200'

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31/68

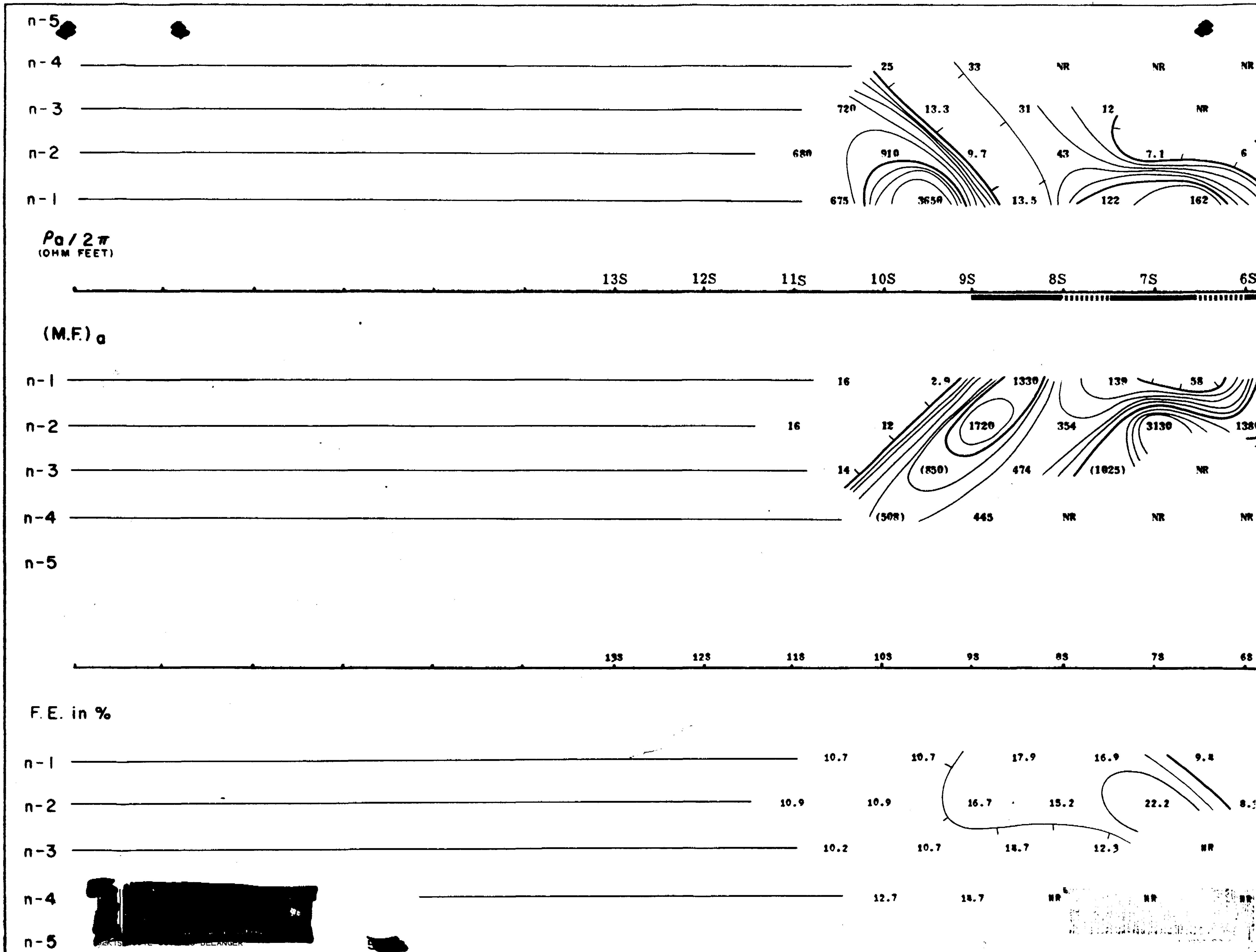
McPHAR GEOPHYSICS LIMITED

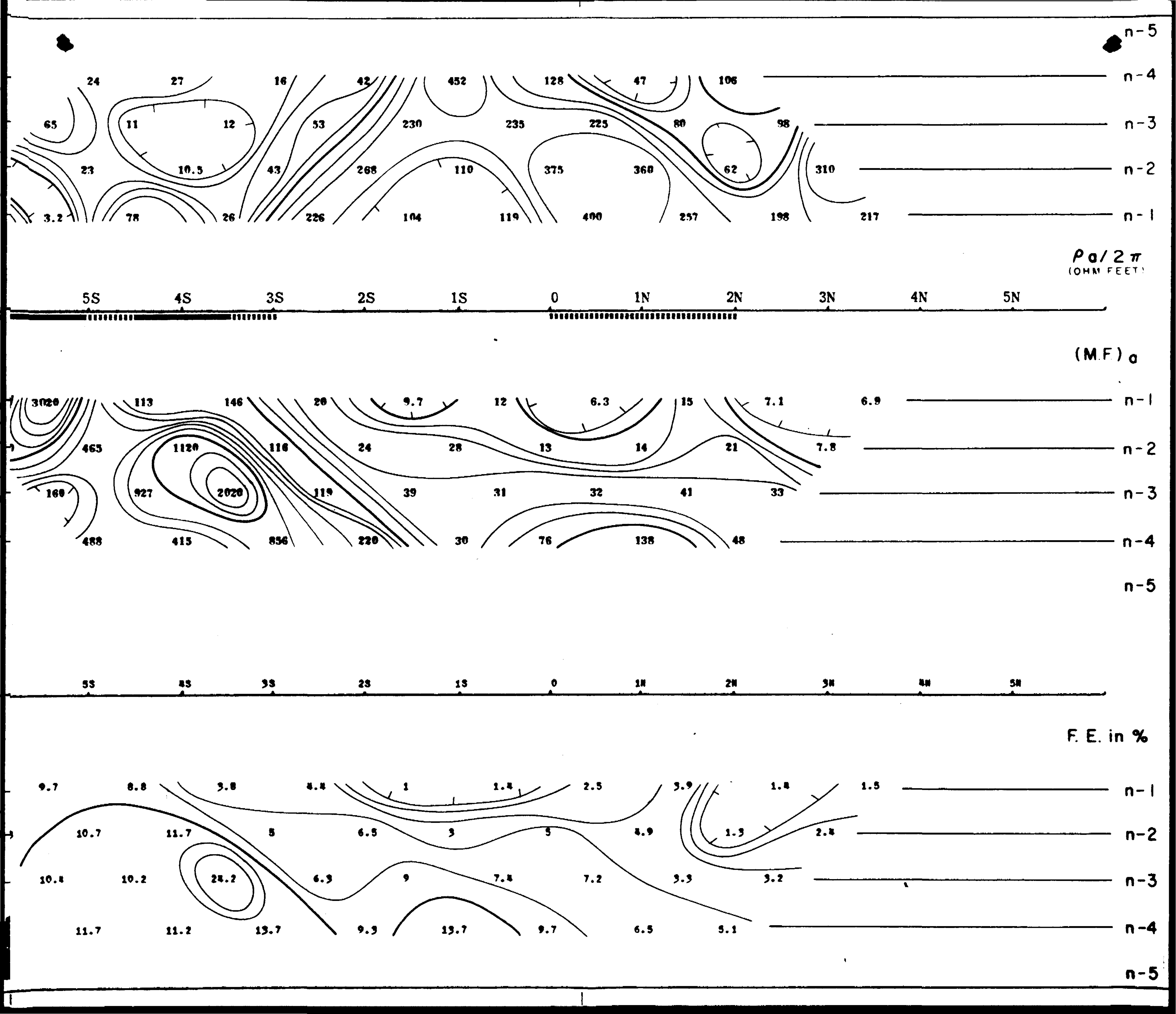
NOTE · CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
25 33 NR NR NR
720 13.3 31 12 NR
680 910 9.7 43 7.1 6
675 3650 13.5 122 162
ρa / 2π
(OHM FEET)
13S 12S 11S 10S 9S 8S 7S 6S
(M.F.)a
16 2.9 1330 139 58
16 12 1720 354 3130 138(
14 (850) 474 (1825) NR
(508) 445 NR NR NR
13S 12S 11S 10S 9S 8S 7S 6S
F.E. in %
10.7 10.7 17.9 16.9 9.4
10.9 10.9 16.7 15.2 22.2 8.:
10.2 10.7 14.7 12.3 NR
12.7 14.7 NR NR NR
[redacted]


ρa/2π
(OHM FEET)
(M.F.)a
F. E. in %
n-1
n-2
n-3
n-4
n-5
5S
4S
3S
2S
1S
0
1N
2N
3N
4N
5N

DWG NO - I P - 5145-29

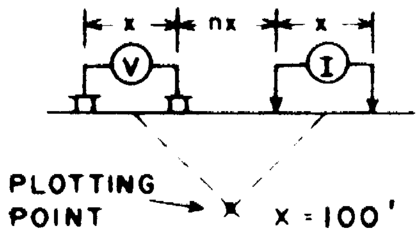
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 16 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬

PROBABLE ••••••••••••

POSSIBLE / / / / / / / /

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED: R. A. Bell

DATE: July 31/68

McPHAR GEOPHYSICS LIMITED

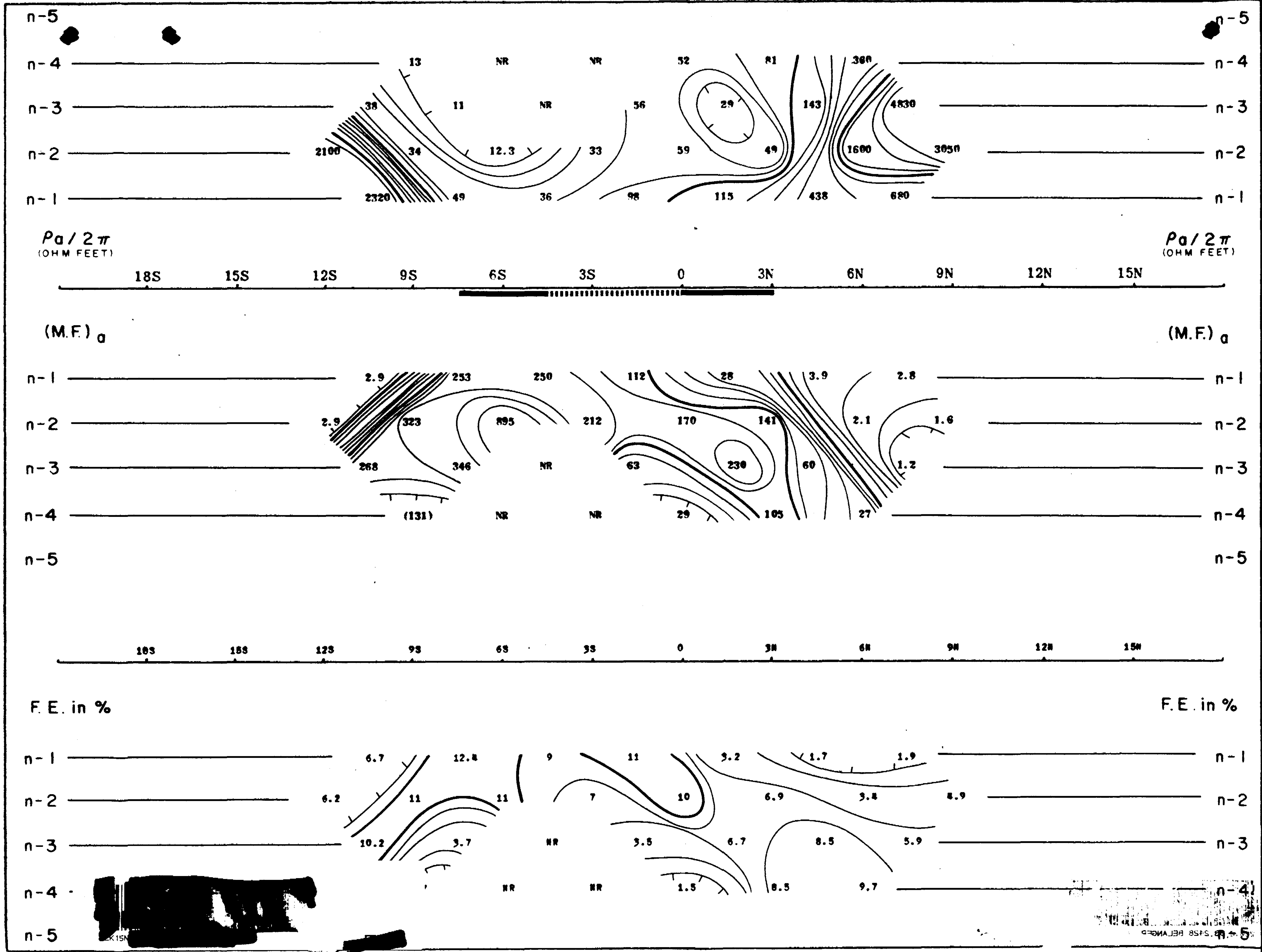
NOTE: CONTOURS AT LOGARITHMIC INTERVALS

1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
13 NR NR 52 81 300
38 11 NR 56 29 143 4830
2100 34 12.3 33 59 49 1600 3050
2320 49 36 98 115 438 680
Pa/2π
(OHM FEET)
18S 15S 12S 9S 6S 3S 0 3N 6N 9N 12N 15N
(M.F.) a
2.9 253 250 112 28 3.9 2.8
2.9 323 895 212 170 141 2.1 1.6
268 346 NR 63 230 60 1.2
(131) NR NR 29 105 27
18S 15S 12S 9S 6S 3S 0 3N 6N 9N 12N 15N
F.E. in %
6.7 12.4 9 11 5.2 1.7 1.9
6.2 11 11 7 10 6.9 5.4 4.9
10.2 3.7 NR 3.5 6.7 8.5 5.9
NR NR 1.5 8.5 9.7
[redacted]

DWG. NO.– I.P.– 5145-30

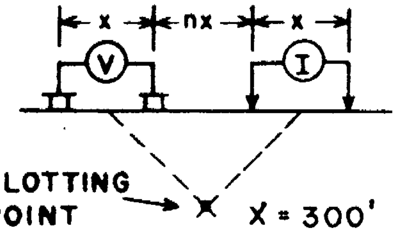
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.– 18 W

ELECTRODE CONFIGURATION



PLOTTING POINT

X = 300'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬

PROBABLE ||||||||||||||||

POSSIBLE ////////

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R. A. Bell

DATE: Jul 31/68

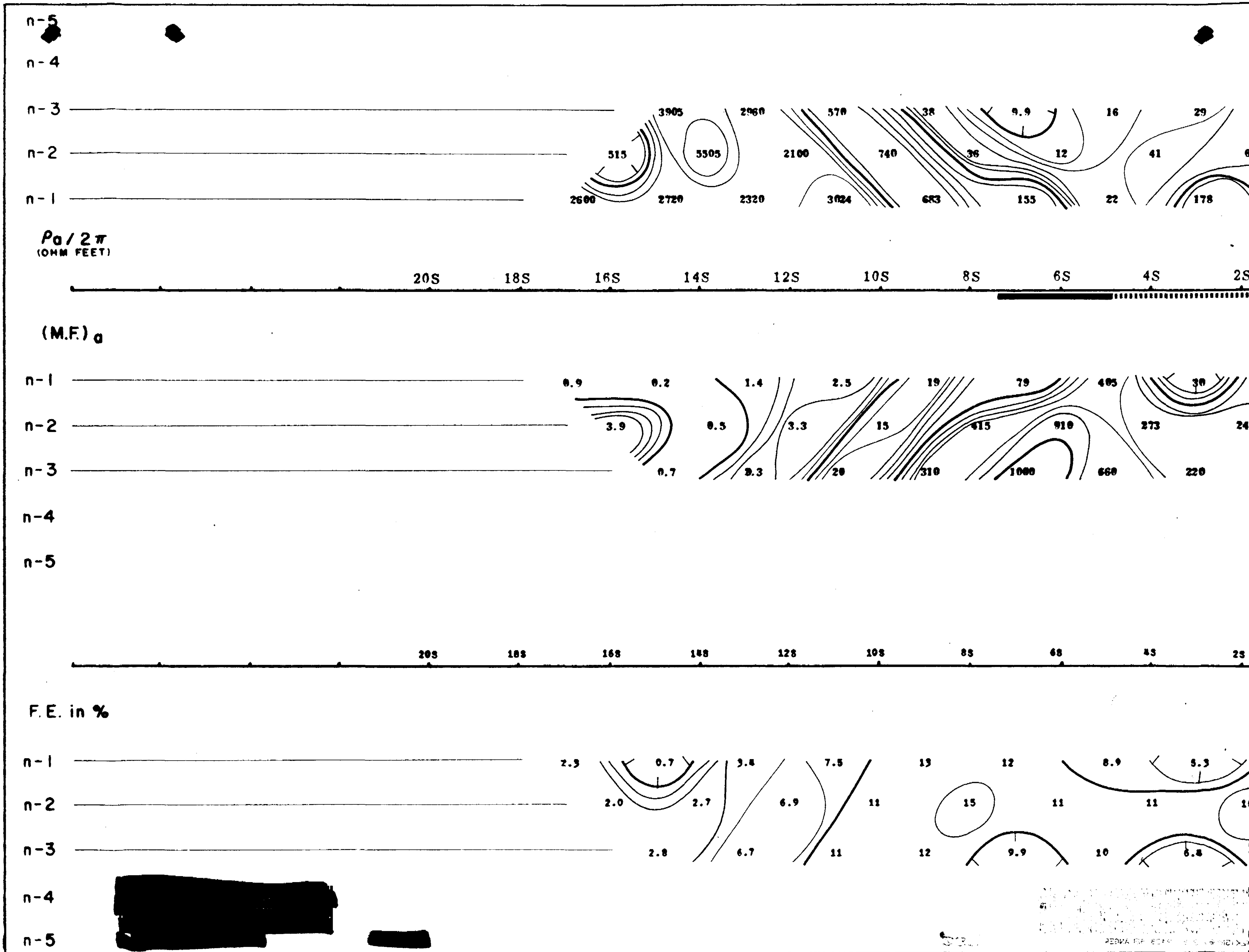
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1-1·5-2-3-5-7·5-10

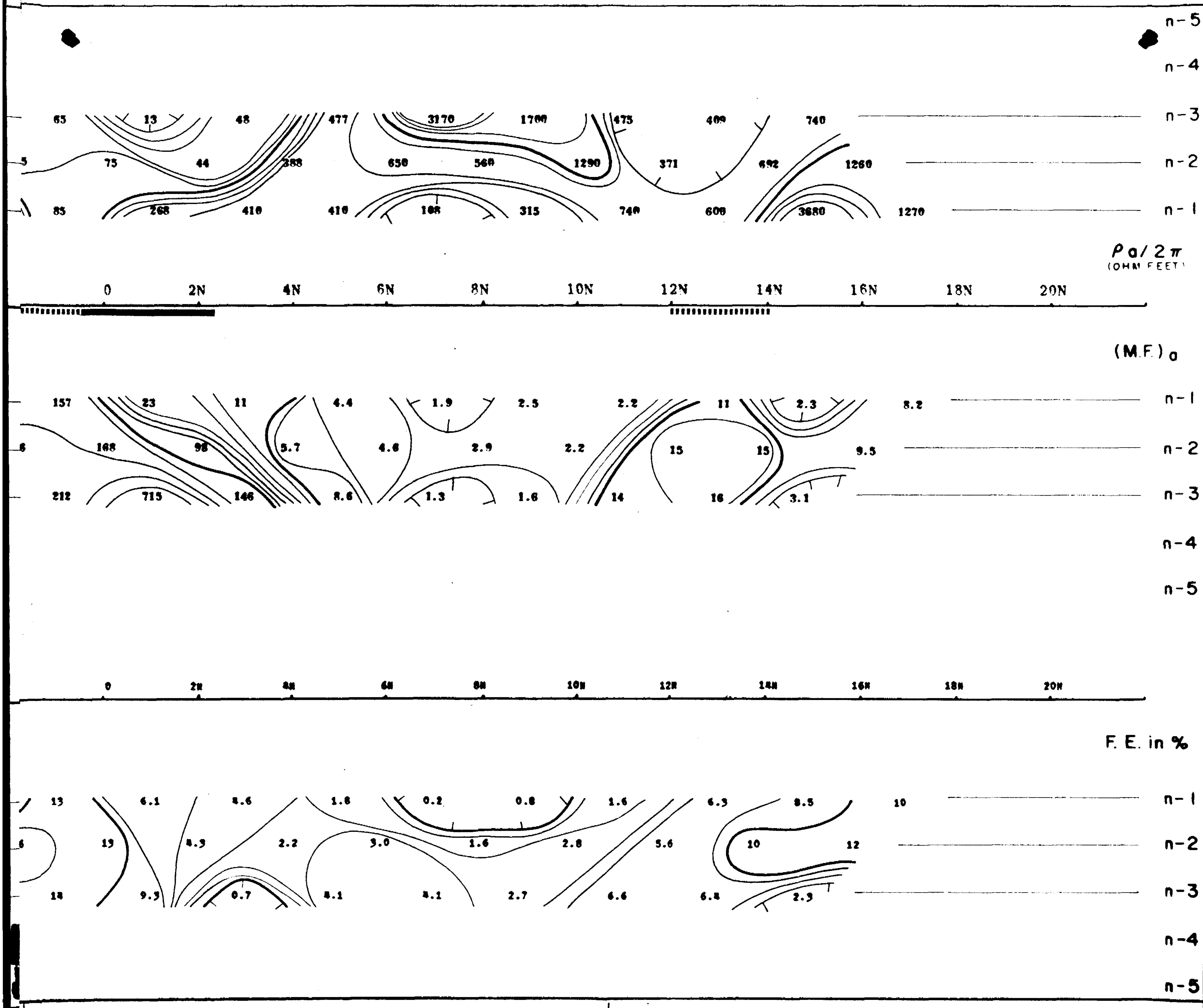
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
3905
2960
570
38
9.9
16
29
515
5505
2100
740
36
12
41
2600
2720
2320
3024
683
155
22
178
ρa / 2π
(OHM FEET)
20S
18S
16S
14S
12S
10S
8S
6S
4S
2S
(M.F.)a
0.9
0.2
1.4
2.5
19
79
405
30
3.9
0.5
3.3
15
415
910
273
0.7
9.3
20
310
1000
660
220
F.E. in %
2.3
0.7
3.8
7.5
13
12
8.9
5.3
2.0
2.7
6.9
11
15
11
11
2.8
6.7
11
12
9.9
10
6.8
[redacted]


n-5
n-4
n-3
n-2
n-1
65 13 48 477 3170 1700 475 400 740
75 44 388 650 560 1290 371 692 1260
85 268 410 410 188 315 740 600 3680 1270
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
157 23 11 4.4 1.9 2.5 2.2 11 2.3 8.2
168 98 5.7 4.6 2.9 2.2 15 15 9.5
212 715 146 8.6 1.3 1.6 14 16 3.1
n-1
n-2
n-3
n-4
n-5
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
13 6.1 4.6 1.8 0.2 0.8 1.6 6.3 8.5 10
19 4.3 2.2 3.0 1.6 2.8 5.6 10 12
14 9.3 0.7 4.1 4.1 2.7 6.6 6.8 2.3
n-1
n-2
n-3
n-4
n-5

DWG NO - I P - 5145 - 31

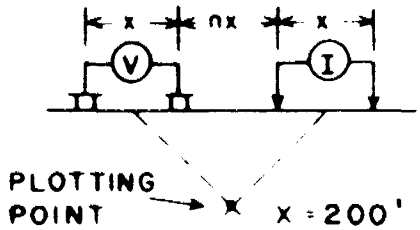
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 18W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬
PROBABLE ••••••••••••••
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED: JULY 68

APPROVED R. A. Bell

DATE July 31/68

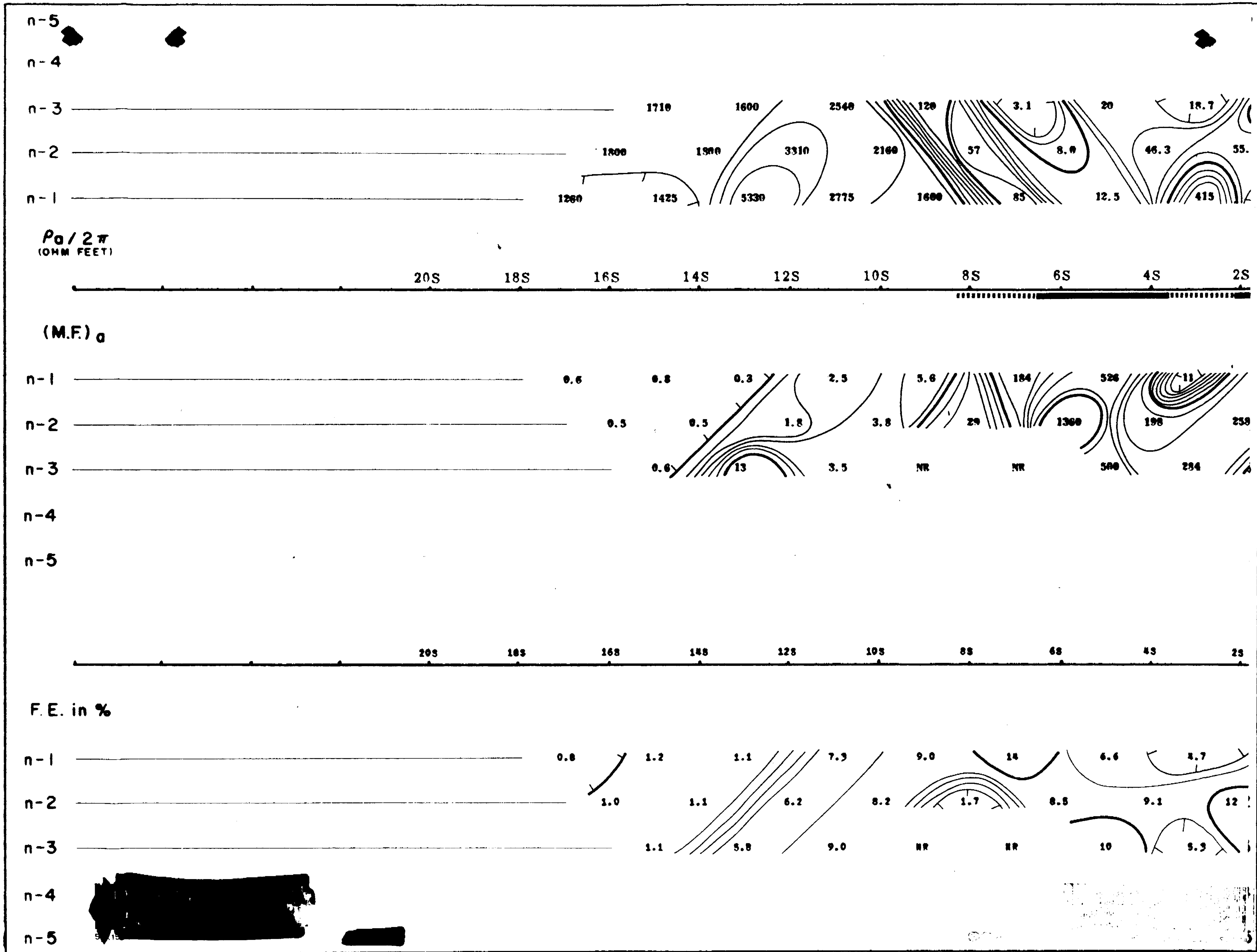
McPHAR GEOPHYSICS LIMITED

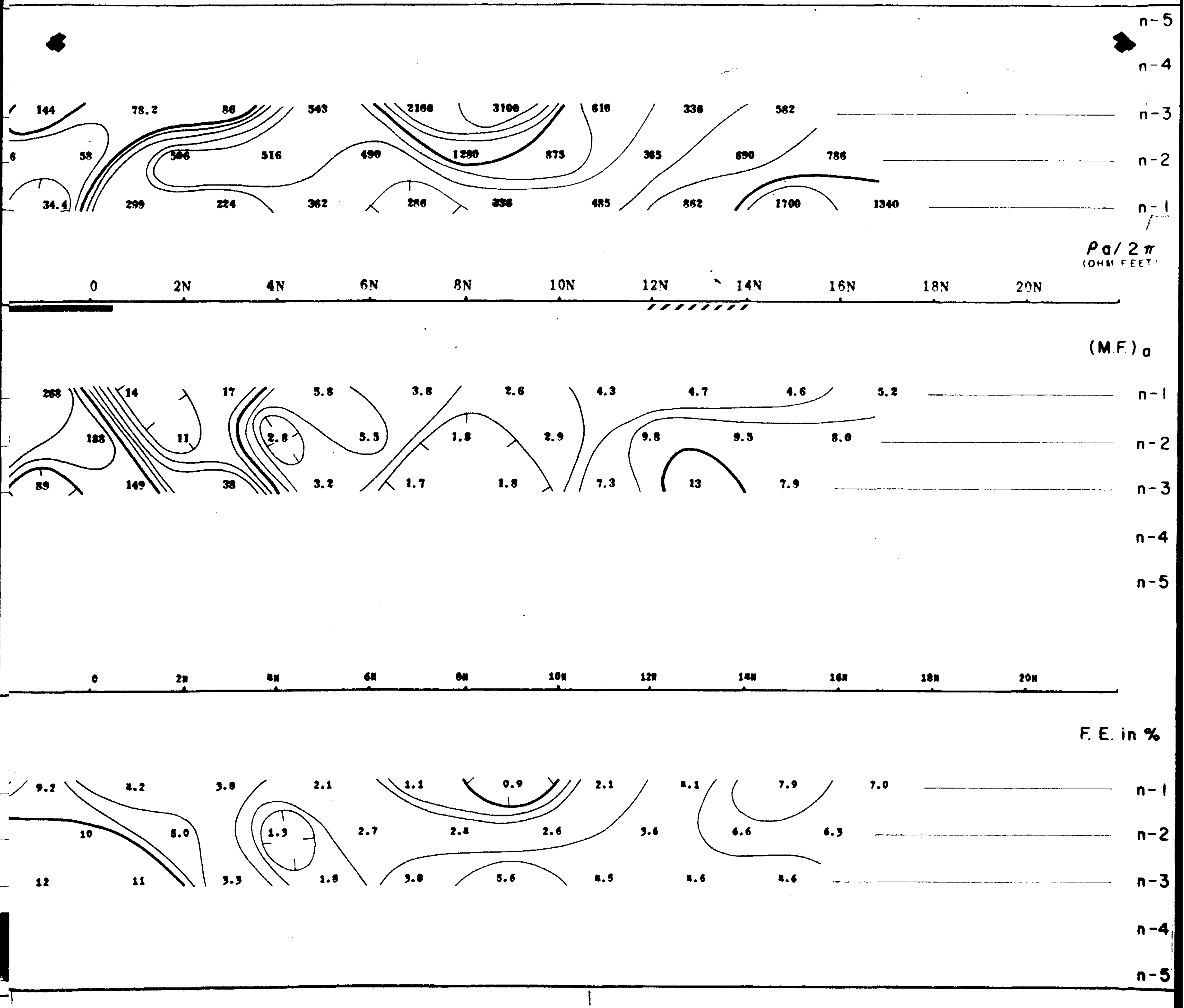
NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
ρa / 2π
(OHM FEET)
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
(M.F.)a
n-1
n-2
n-3
n-4
n-5
20S 18S 16S 14S 12S 10S 8S 6S 4S 2S
F.E. in %
n-1
n-2
n-3
n-4
n-5
[redacted]



n-5
n-4
n-3
n-2
n-1
144 78.2 86 543 2160 3100 610 336 582
6 58 506 516 490 1280 875 365 690 786
34.4 299 224 362 286 336 485 862 1700 1340
ρa/2π
(OHM FEET)
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
(M.F.)a
268 14 17 5.8 3.8 2.6 4.3 4.7 4.6 5.2
188 11 2.8 5.5 1.8 2.9 9.8 9.5 8.0
89 149 38 3.2 1.7 1.8 7.3 13 7.9
0 2N 4N 6N 8N 10N 12N 14N 16N 18N 20N
F. E. in %
9.2 8.2 3.8 2.1 1.1 0.9 2.1 8.1 7.9 7.0
10 8.0 1.3 2.7 2.8 2.6 3.6 6.6 6.3
12 11 3.3 1.8 3.8 5.6 4.5 4.6 4.6

DWG NO - I P - 5145 - 32

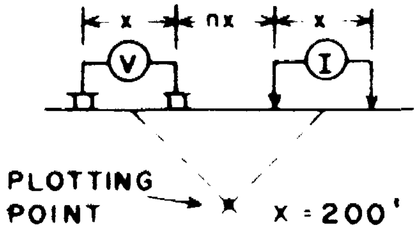
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 20W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬
PROBABLE ••••••••••••••••
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 – 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R.A. Bell

DATE July 31/68

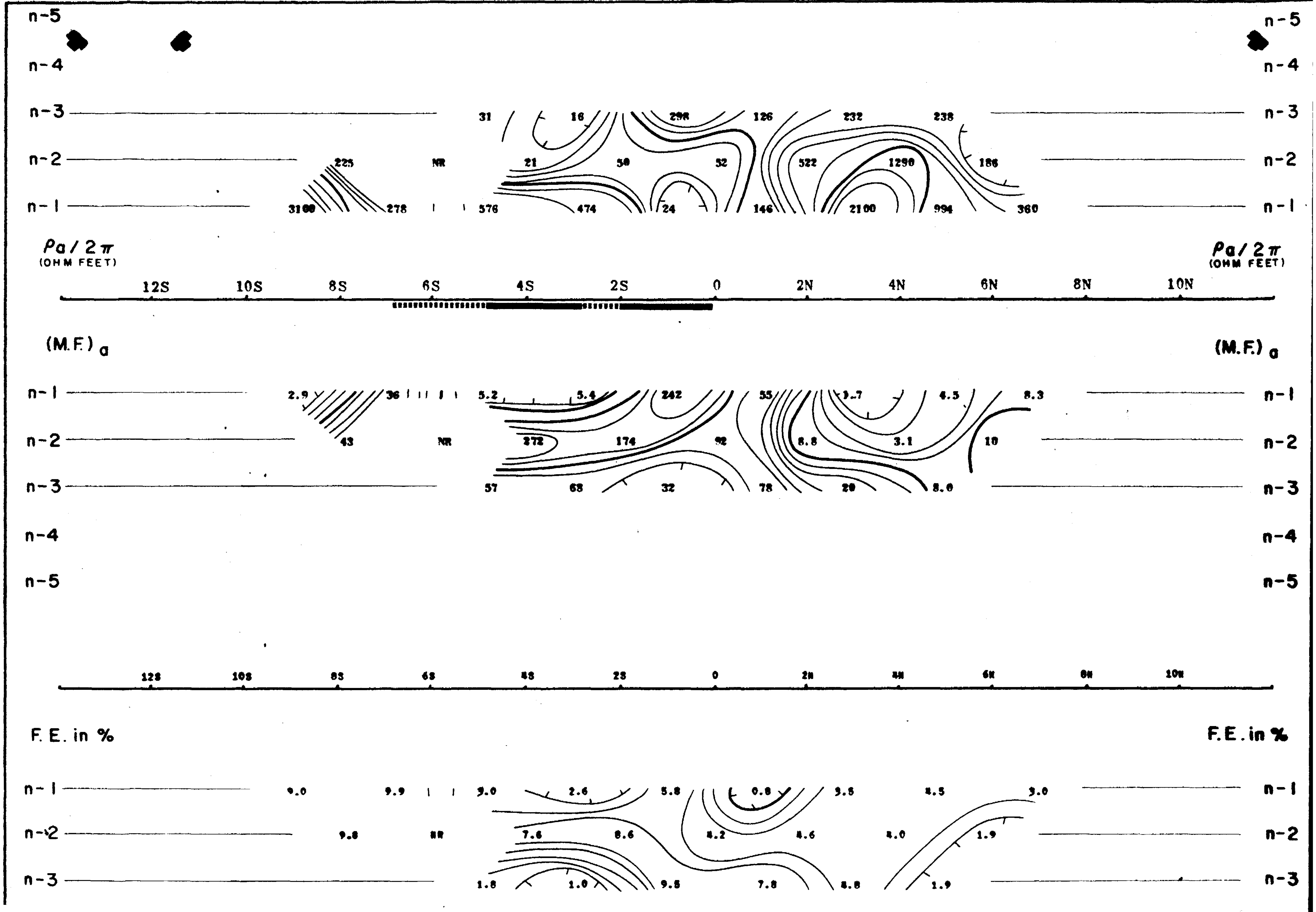
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT
LOGARITHMIC INTERVALS
1 - 1·5 - 2 - 3 - 5 - 7·5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
31 16 298 126 232 238
225 NR 21 50 52 522 1290 186
3100 278 576 474 24 146 2100 994 360
ρa / 2π
(OHM FEET)
12S 10S 8S 6S 4S 2S 0 2N 4N 6N 8N 10N
(M.F.) a
2.9 36 5.2 5.4 242 55 4.5 8.3
43 NR 272 174 92 8.8 3.1 10
57 68 32 78 20 8.0
12S 10S 8S 6S 4S 2S 0 2N 4N 6N 8N 10N
F.E. in %
9.9 9.0 2.6 5.8 0.8 3.5 4.5 3.0
9.8 NR 7.6 8.6 4.2 4.6 4.0 1.9
1.8 1.0 9.5 7.8 1.9

[redacted]

DWG. NO.-I.P -5145-33

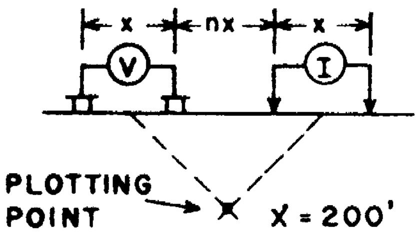
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 22W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬▬
PROBABLE ||||||||||||||||
POSSIBLE ////////

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R.A. Bell

DATE: Jul 31/68

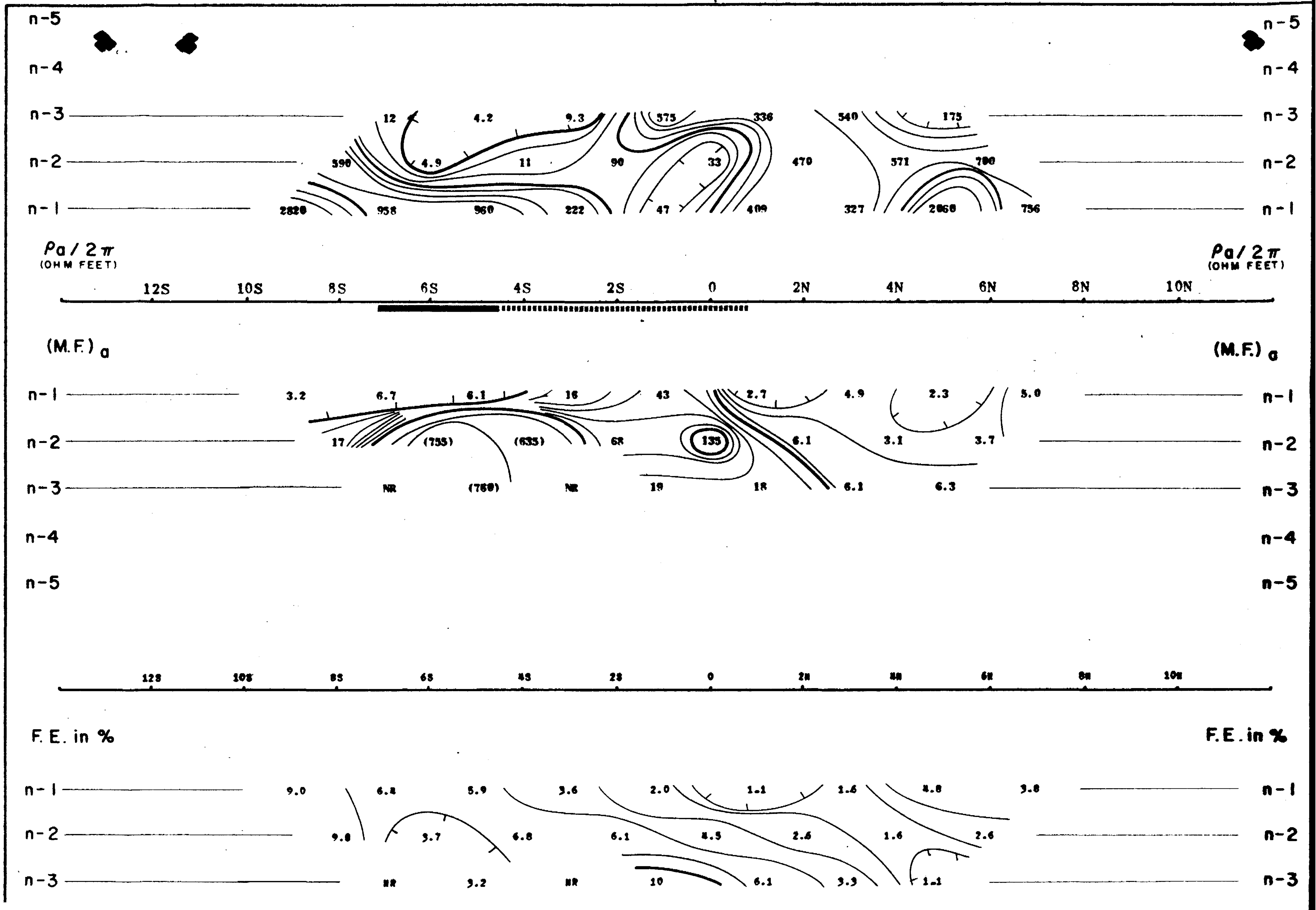
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



Pa / 2π (OHM FEET)
12S 10S 8S 6S 4S 2S 0 2N 4N 6N 8N 10N
(M.F.) a
F.E. in %
n-1
n-2
n-3
n-4
n-5

[redacted]

DWG. NO.- I.P.-5145-34

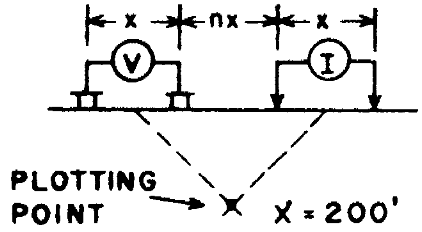
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 24W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R.A. Bell

DATE: Jul 31/68

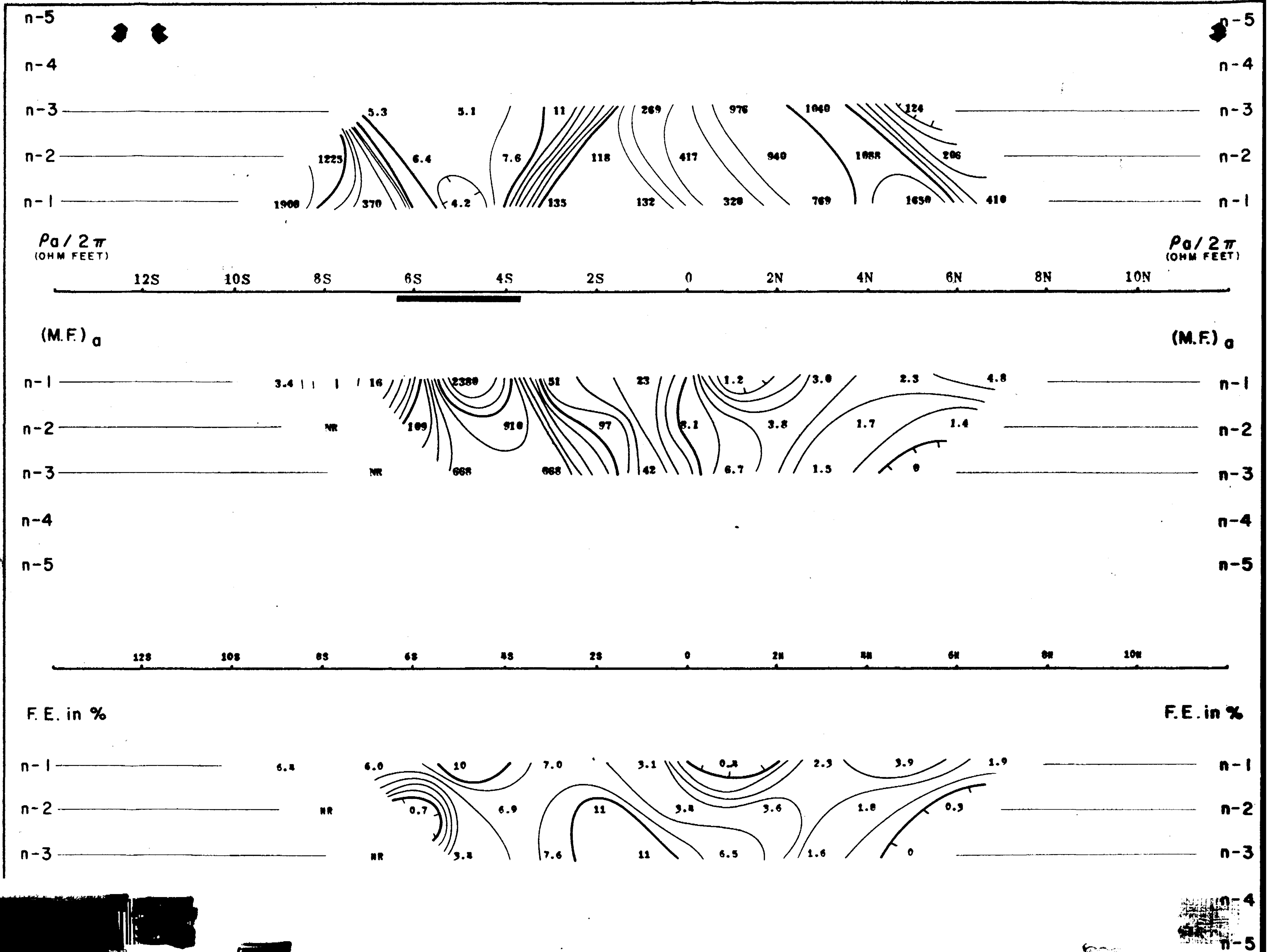
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-5
n-4
n-3
n-2
n-1
5.3
5.1
11
269
976
1040
124
1225
6.4
7.6
118
417
940
1088
286
1900
370
4.2
135
132
328
769
1650
410
ρa / 2π
(OHM FEET)
12S
10S
8S
6S
4S
2S
0
2N
4N
6N
8N
10N
(M.F.) a
3.4
16
2380
51
23
1.2
3.0
2.3
4.8
NR
109
910
97
3.8
1.7
1.4
668
42
6.7
1.5
0
F. E. in %
6.0
10
7.0
3.1
2.3
3.9
1.9
0.7
6.9
11
3.6
1.8
0.3
7.6
6.5
1.6

[redacted]

DWG. NO.-I.P-5145-35

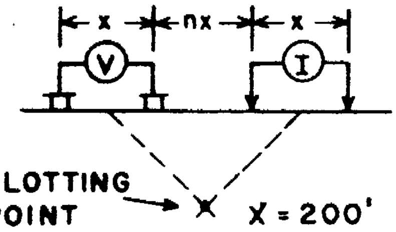
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 26W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0·31 – 5·0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R.A. Bell

DATE: Jul 31/68

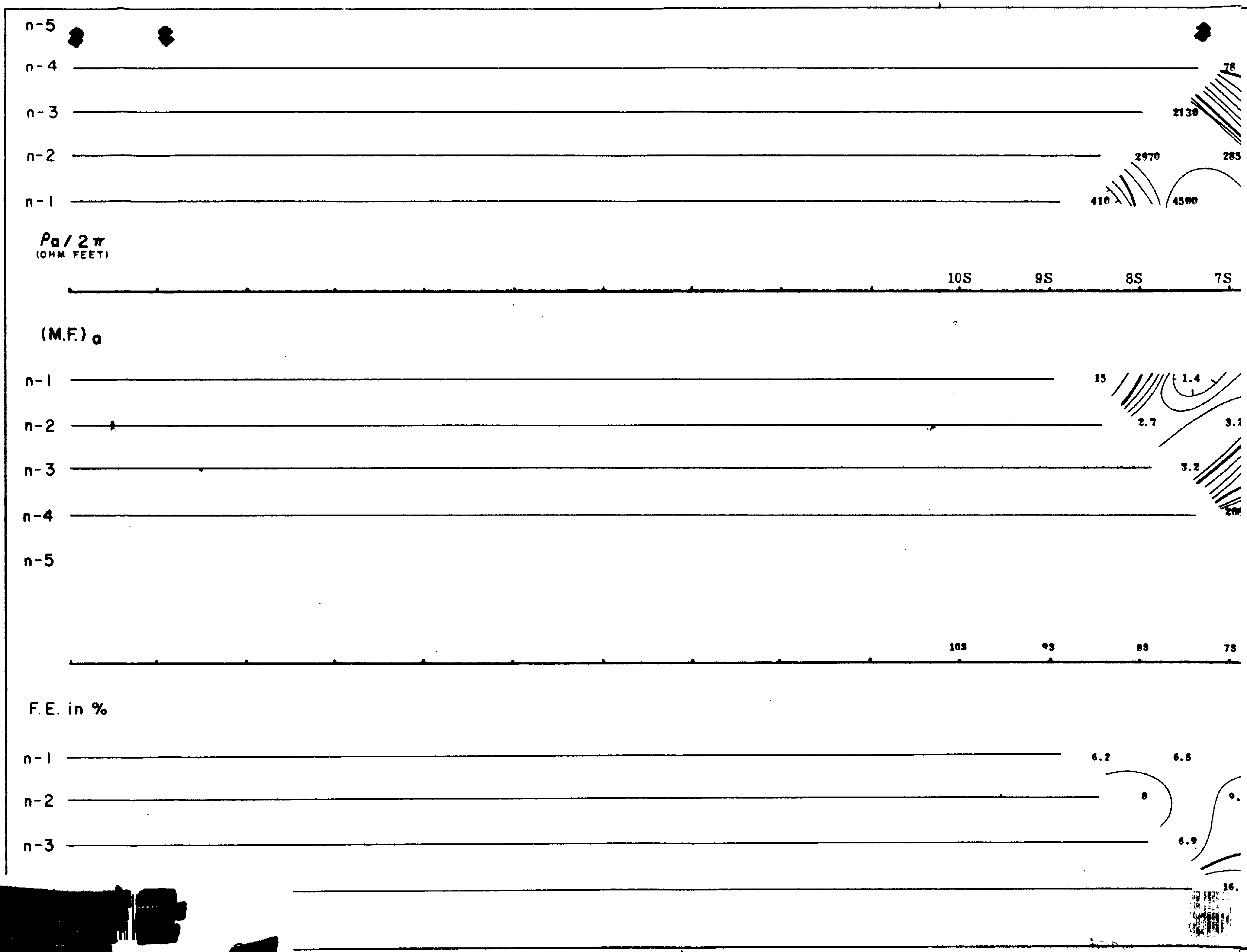
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

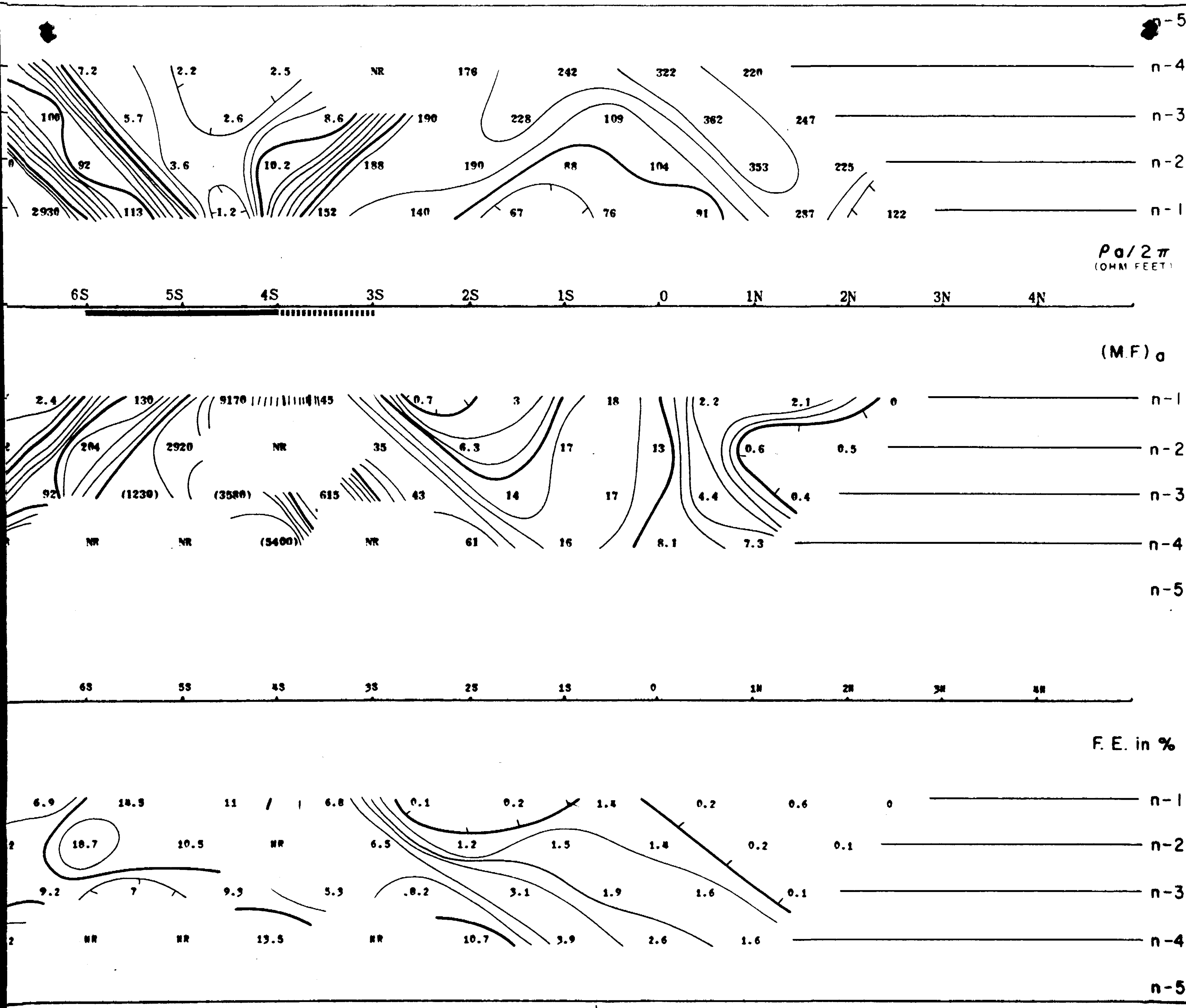
McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
78
2130
2970
285
410
4580
Pa / 2π
(OHM FEET)
10S
9S
8S
7S
(M.F.) a
n-1
n-2
n-3
n-4
n-5
15
1.4
2.7
3.2
10S
9S
8S
7S
F.E. in %
n-1
n-2
n-3
6.2
6.5
8
6.9
16.

[redacted]


n-1
n-2
n-3
n-4
n-5
7.2 2.2 2.5 NR 176 242 322 220
100 5.7 2.6 8.6 190 228 109 362 247
92 3.6 10.2 188 190 88 104 353 225
2930 113 1.2 152 140 67 76 91 287 122
ρa/2π
(OHM FEET)
6S 5S 4S 3S 2S 1S 0 1N 2N 3N 4N
(M.F)a
2.4 130 9170 145 0.7 3 18 2.2 2.1 0
204 2920 NR 35 6.3 17 13 0.6 0.5
92 (1230) (3580) 615 43 14 17 4.4 0.4
NR NR (5400) NR 61 16 8.1 7.3
6S 5S 4S 3S 2S 1S 0 1N 2N 3N 4N
F. E. in %
6.9 14.5 11 6.8 0.1 0.2 1.4 0.2 0.6 0
18.7 10.5 NR 6.5 1.2 1.5 1.4 0.2 0.1
9.2 7 9.3 5.3 8.2 3.1 1.9 1.6 0.1
NR NR 13.5 NR 10.7 3.9 2.6 1.6

DWG NO - I P - 5145 - 36

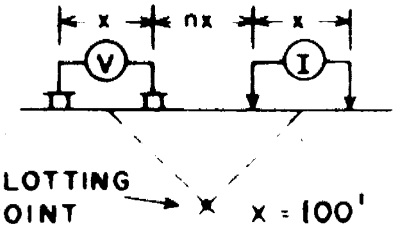
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 26 W

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ▬▬▬▬
PROBABLE ⋯⋯⋯
POSSIBLE / / / / / / / /

FREQUENCIES 0·31 — 5·0 CPS

DATE SURVEYED JULY 68

APPROVED R. A. Bell

DATE July 31

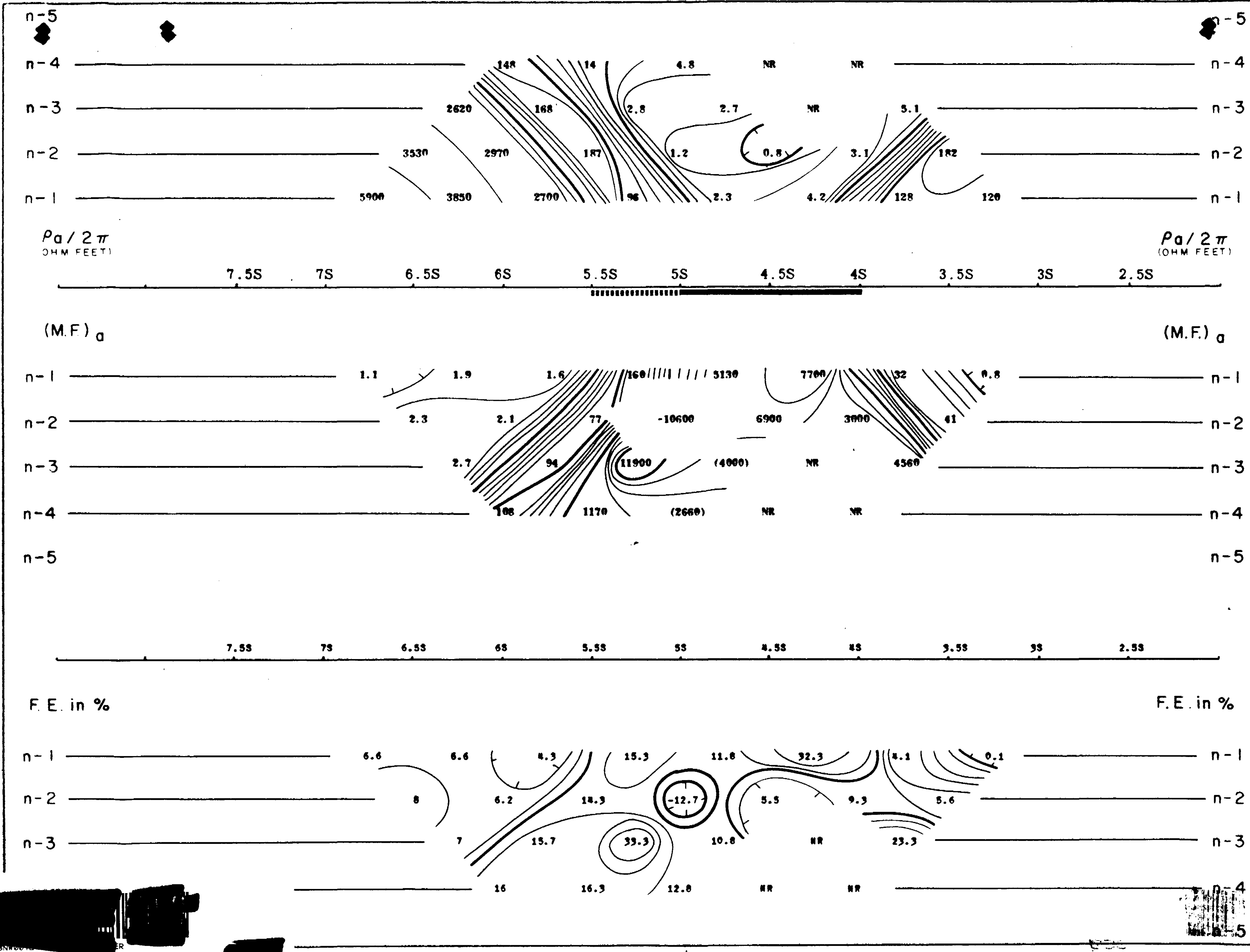
McPHAR GEOPHYSICS LIMITED

NOTE CONTOURS AT LOGARITHMIC INTERVALS
1-1·5-2-3-5-7·5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



n-1
n-2
n-3
n-4
n-5
148
14
4.8
NR
2620
168
2.8
2.7
5.1
3530
2970
187
1.2
0.8
3.1
182
5900
3850
2700
96
2.3
4.2
128
120
Pa / 2π
(OHM FEET)
7.5S
7S
6.5S
6S
5.5S
5S
4.5S
4S
3.5S
3S
2.5S
(M.F.)a
1.1
1.9
1.6
160
5130
7700
32
0.8
2.3
2.1
77
-10600
6900
3000
41
2.7
94
11900
(4000)
4560
108
1170
(2660)
F.E. in %
6.6
4.3
15.3
11.8
32.3
4.1
0.1
8
6.2
14.3
-12.7
5.5
9.3
5.6
7
15.7
33.3
10.8
23.3
16
16.3
12.8

[redacted]

DWG. NO.– I.P. – 5145–37

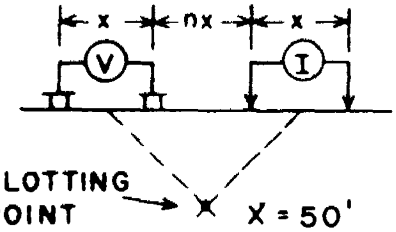
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.– 26 W

ELECTRODE CONFIGURATION



PLOTTING POINT

X = 50'

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE ━━━━━━
PROBABLE ||||||||||||||||
POSSIBLE ////////

FREQUENCIES: 0.31 – 5.0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R.A. Bell

DATE: Jul 31/68

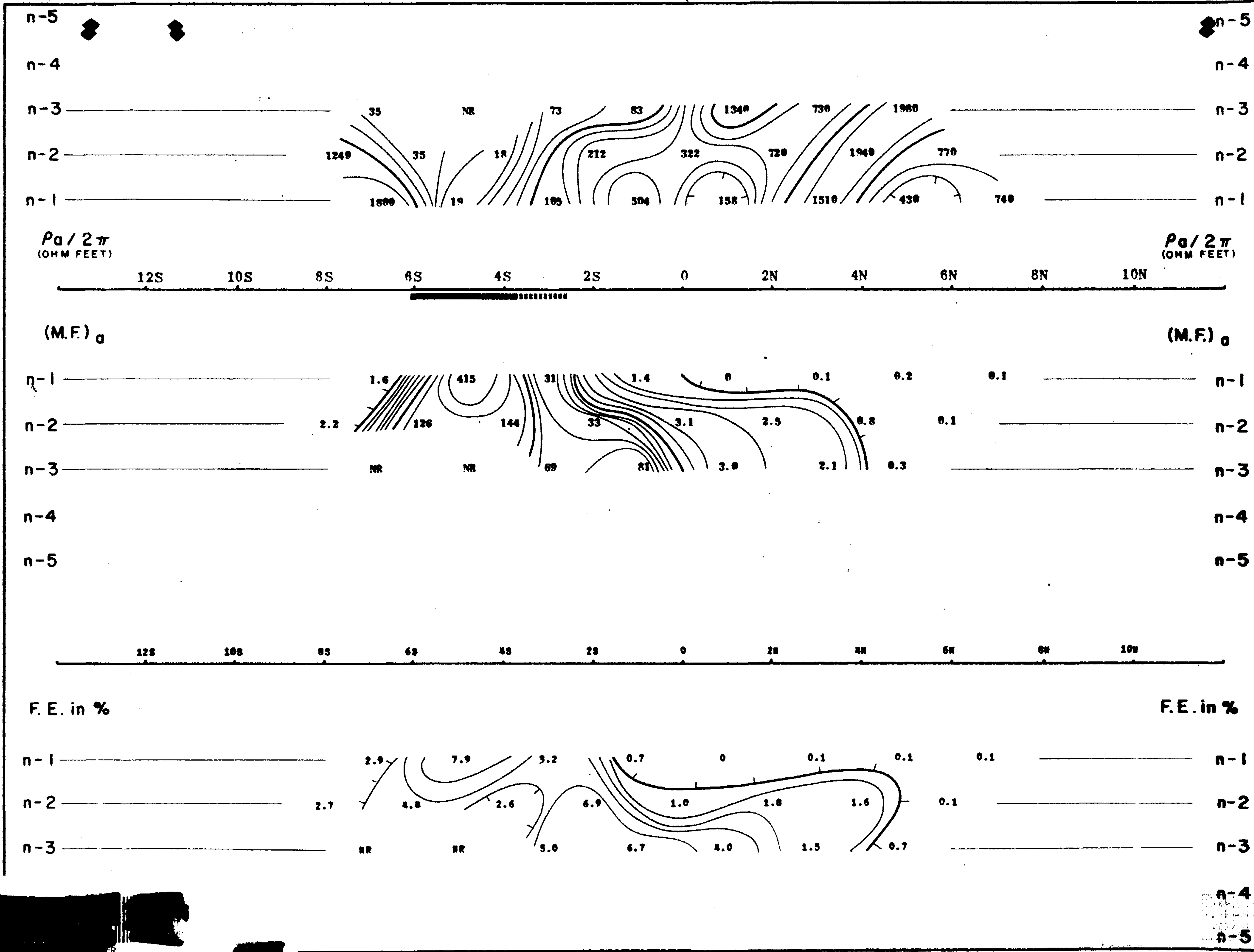
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1-1.5-2-3-5-7.5-10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY


n-5
n-4
n-3
n-2
n-1
35 NR 73 83 1340 730 1980
1240 35 18 212 322 720 1940 770
1800 19 105 504 158 1510 430 740
Pa / 2π (OHM FEET)
12S 10S 8S 6S 4S 2S 0 2N 4N 6N 8N 10N
(M.F.) a
1.6 415 31 1.4 0 0.1 0.2 0.1
2.2 126 144 33 3.1 2.5 0.8 0.1
NR NR 69 81 3.0 2.1 0.3
F. E. in %
2.9 7.9 3.2 0.7 0 0.1 0.1 0.1
2.7 2.6 6.9 1.0 1.8 1.6 0.1
NR NR 5.0 6.7 1.5 0.7

[redacted]

DWG. NO.- I.P.- 5145-38

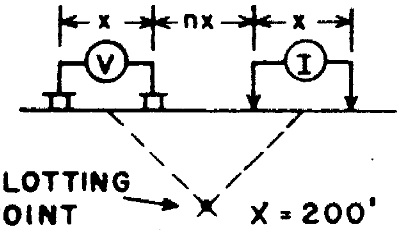
COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA,

RED LAKE M.D., ONTARIO.

LINE NO.- 28W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31 – 5.0 CPS

DATE SURVEYED: JULY 1968

APPROVED: R. A. Bell

DATE: Jul 31/68

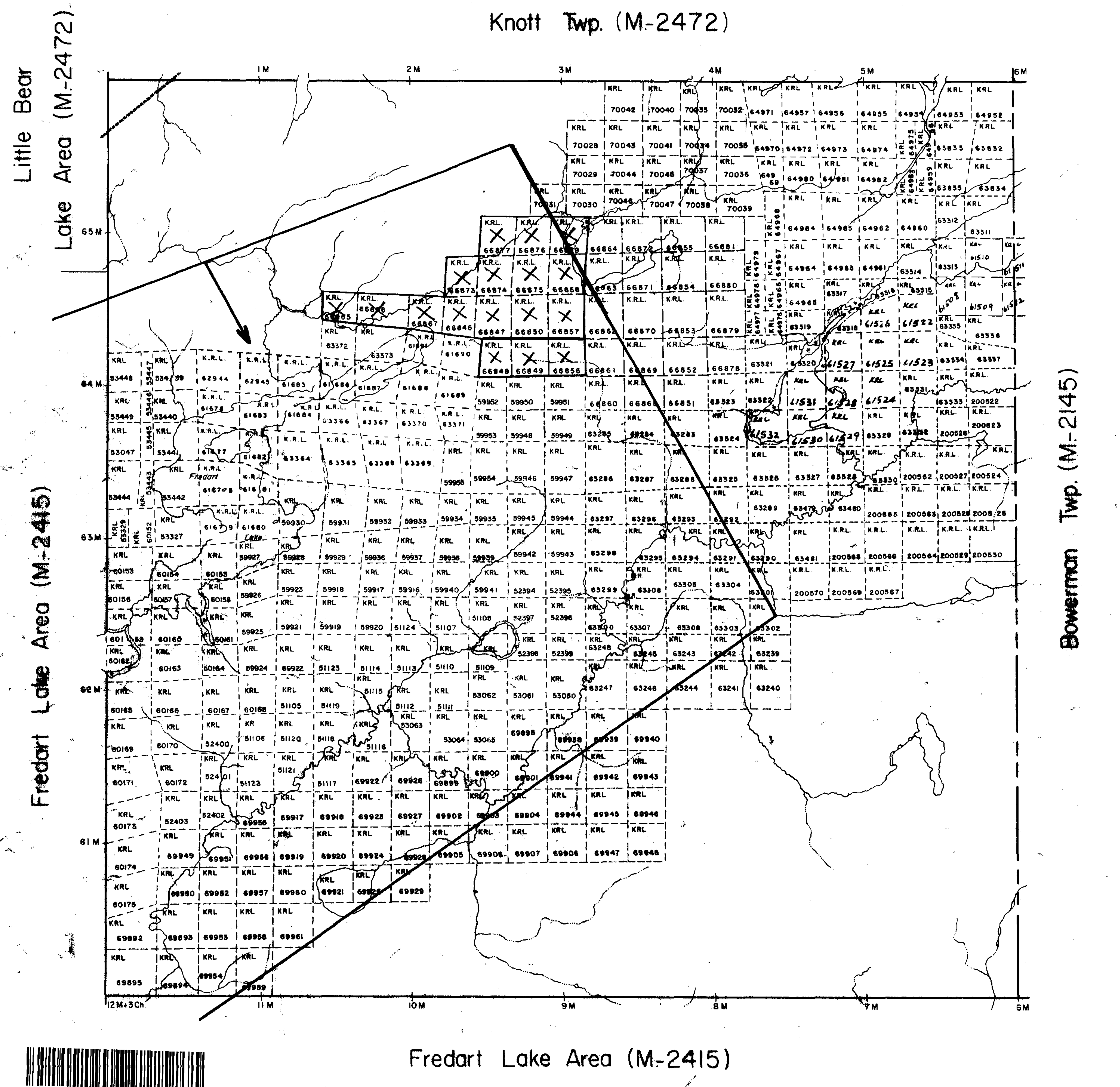
McPHAR GEOPHYSICS LIMITED

NOTE: CONTOURS AT LOGARITHMIC INTERVALS
1 - 1.5 - 2 - 3 - 5 - 7.5 - 10

McPHAR

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY



THE TOWNSHIP OF
"Claim Map"
BELANGER

DISTRICT OF
KENORA
(PATRICIA PORTION)

RED LAKE
MINING DIVISION

SCALE: 1-INCH=40 CHAINS

LEGEND

PATENTED LAND	Ⓟ
CROWN LAND SALE	C.S.
LEASES	Ⓛ
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
CANCELLED	C.

NOTES

100' R/W to Dept. of Highways & H.E.P.C. trans. line - Files: 119040 & 102046 shown thus:

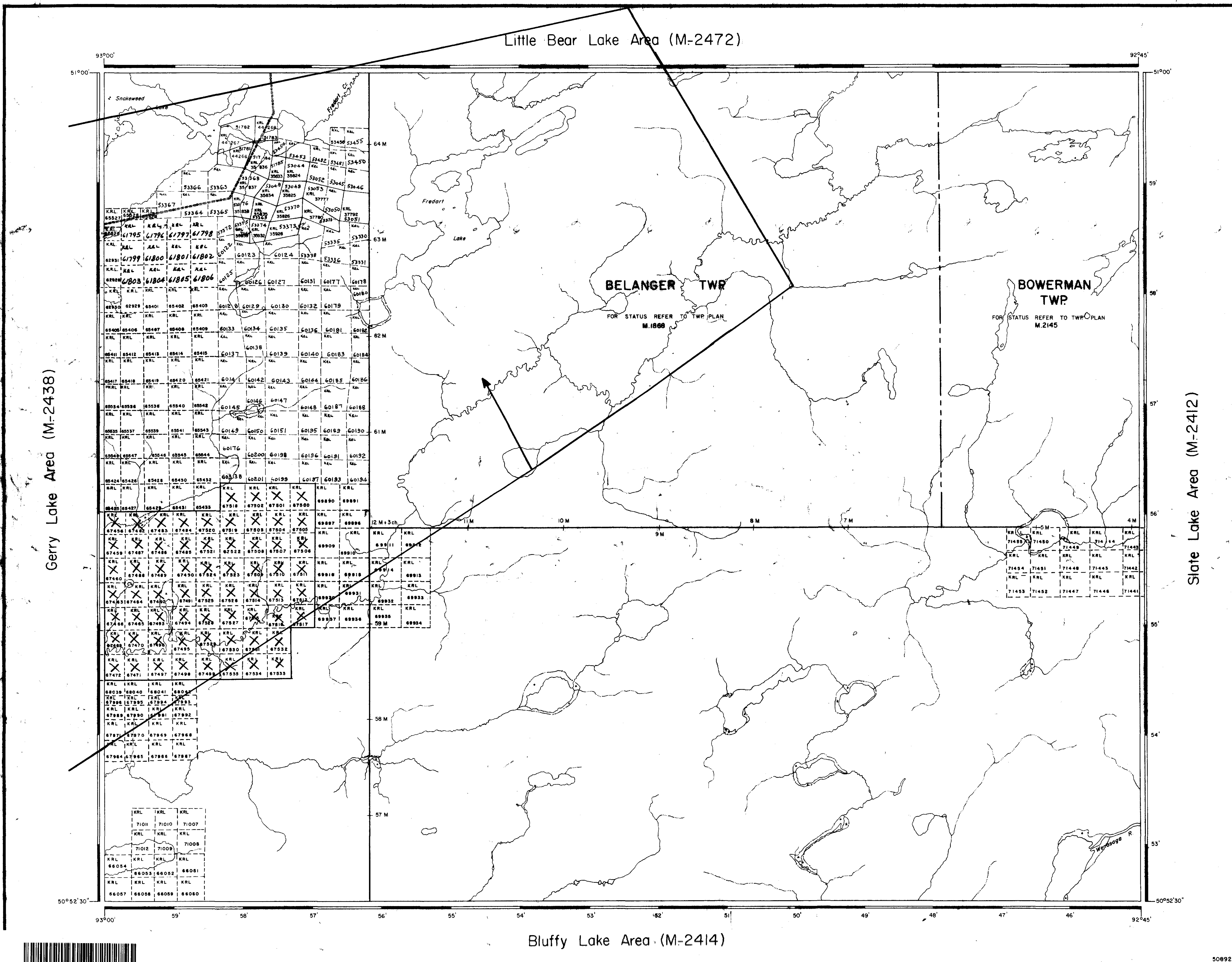
400' Surface Rights Reservation around all Lakes and Rivers.

PLAN NO.- M-1868

DEPARTMENT OF MINES
— ONTARIO —

52N02SW8908 63.2428 BELANGER

200



AREA OF
"Claim Map"
FREDART LAKE

DISTRICT OF
KENORA
(PATRICIA PORTION)

RED LAKE
MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	
CROWN LAND SALE	C.S.
LEASES	
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	

NOTES

100' R/W to Dept. of Highways & H.E.P.C. trans. line - File: 119040 shown thus:

400' Surface Rights Reservation around all Lakes and Rivers.

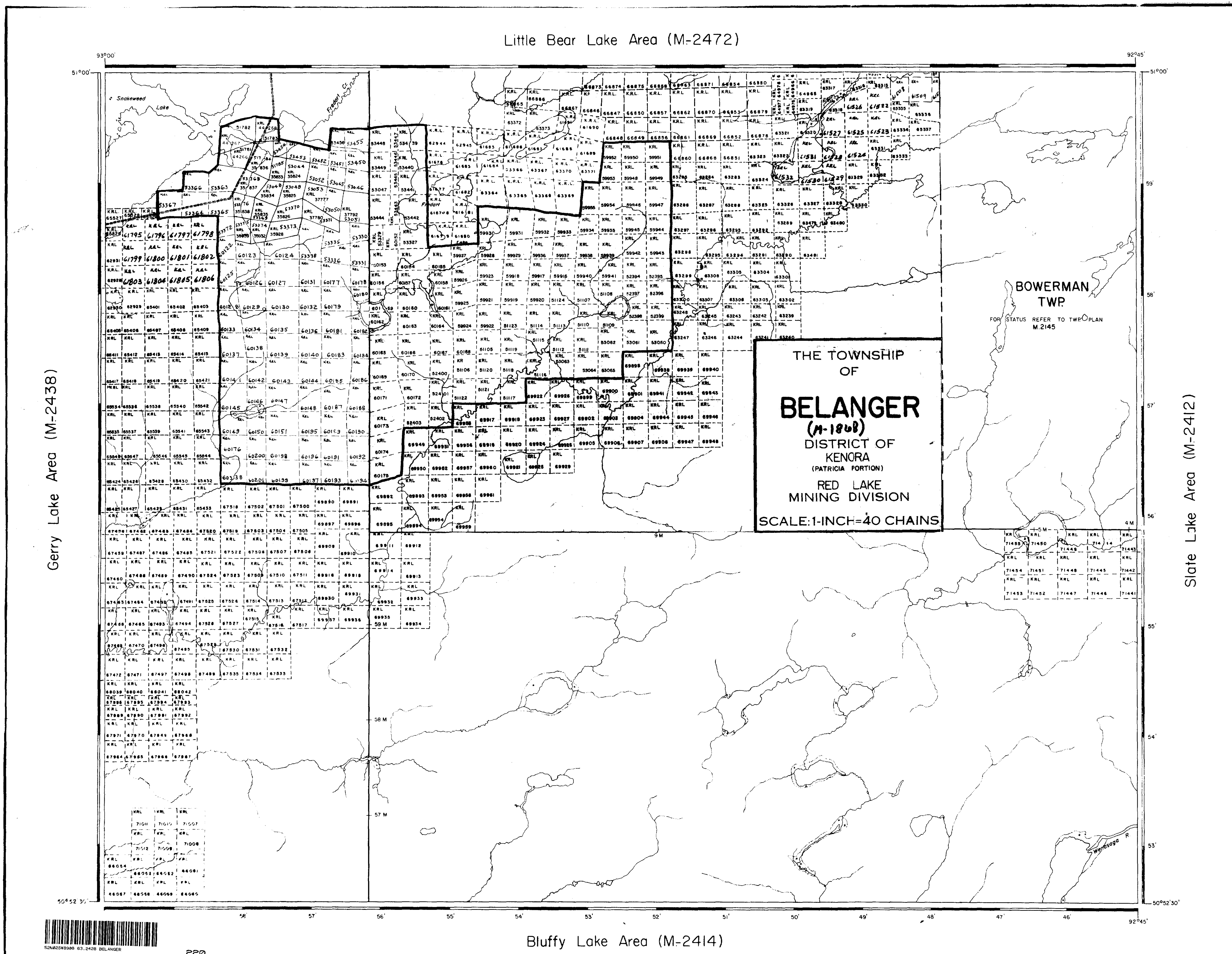
PLAN NO. M-2415

DEPARTMENT OF MINES
- ONTARIO -

508924

52N02SW8900 63.2428 BELANGER

210



AREA OF

FREDART LAKE

(INCLUDED: BELANGER TWP.)

DISTRICT OF KENORA

(PATRICIA PORTION)

RED LAKE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	Ⓟ
CROWN LAND SALE	C.S.
LEASES	Ⓛ
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	

NOTES

100' R/W to Dept. of Highways & H.E.P.C. trans. line - File: 119040 shown thus:

400' Surface Rights Reservation around all Lakes and Rivers.

DATE OF ISSUE

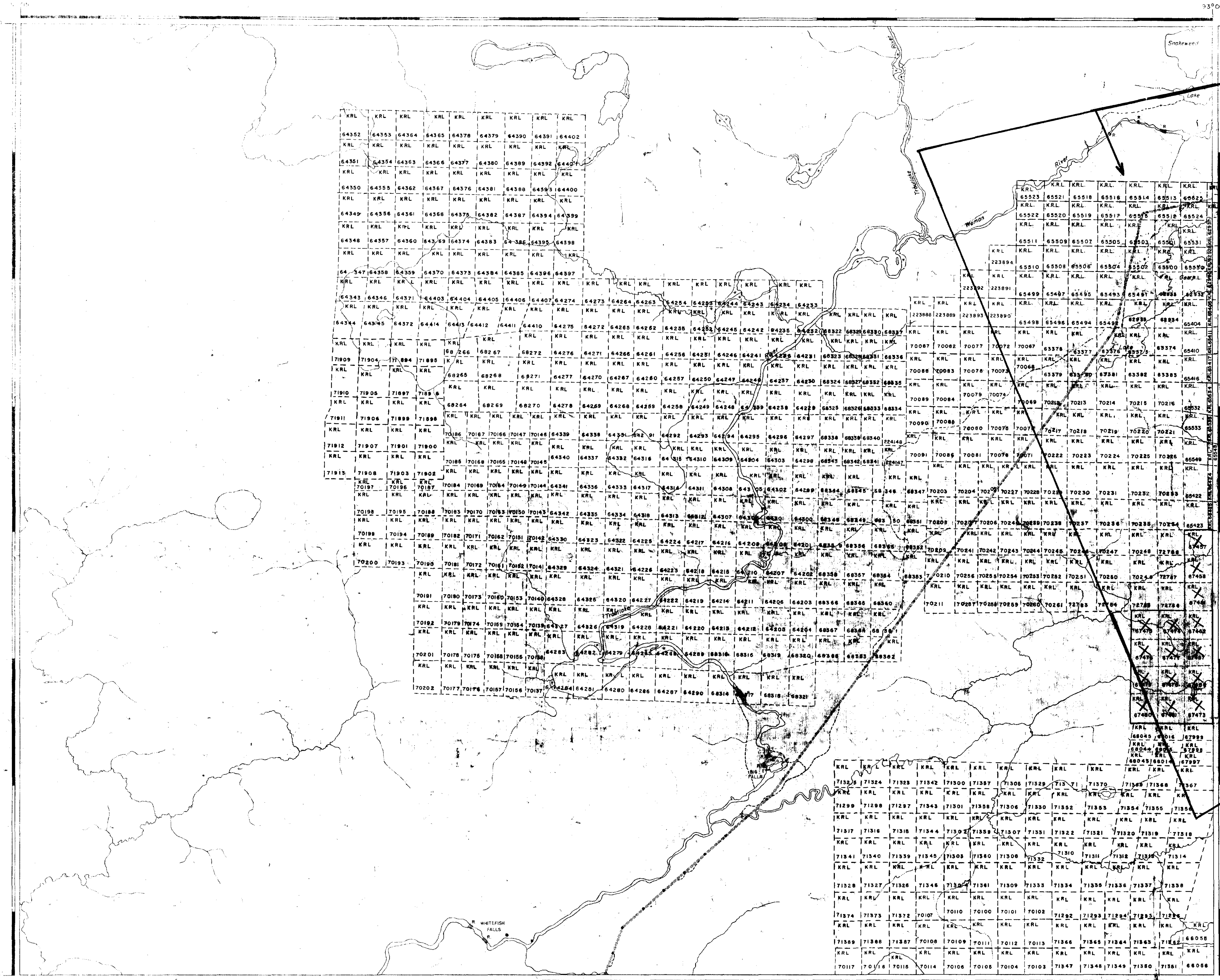
ONTARIO DEPT. OF MINES

PLAN NO. M-2415

DEPARTMENT OF MINES

- ONTARIO -

SOUTH OF OTTER LAKE AREA M - 1772



AREA OF
"Claim Map"
GERRY LAKE

DISTRICT OF
KENORA
(PATRICIA PORTION)

RED LAKE
MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S.
LEASES	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	

NOTES

100' R/W to Dept. of Highways & H.E.P.C. trans. line - Files: 119040 & 102046 shown thus:

400' Reserve around all lakes & rivers to Dept. of Lands & Forests.

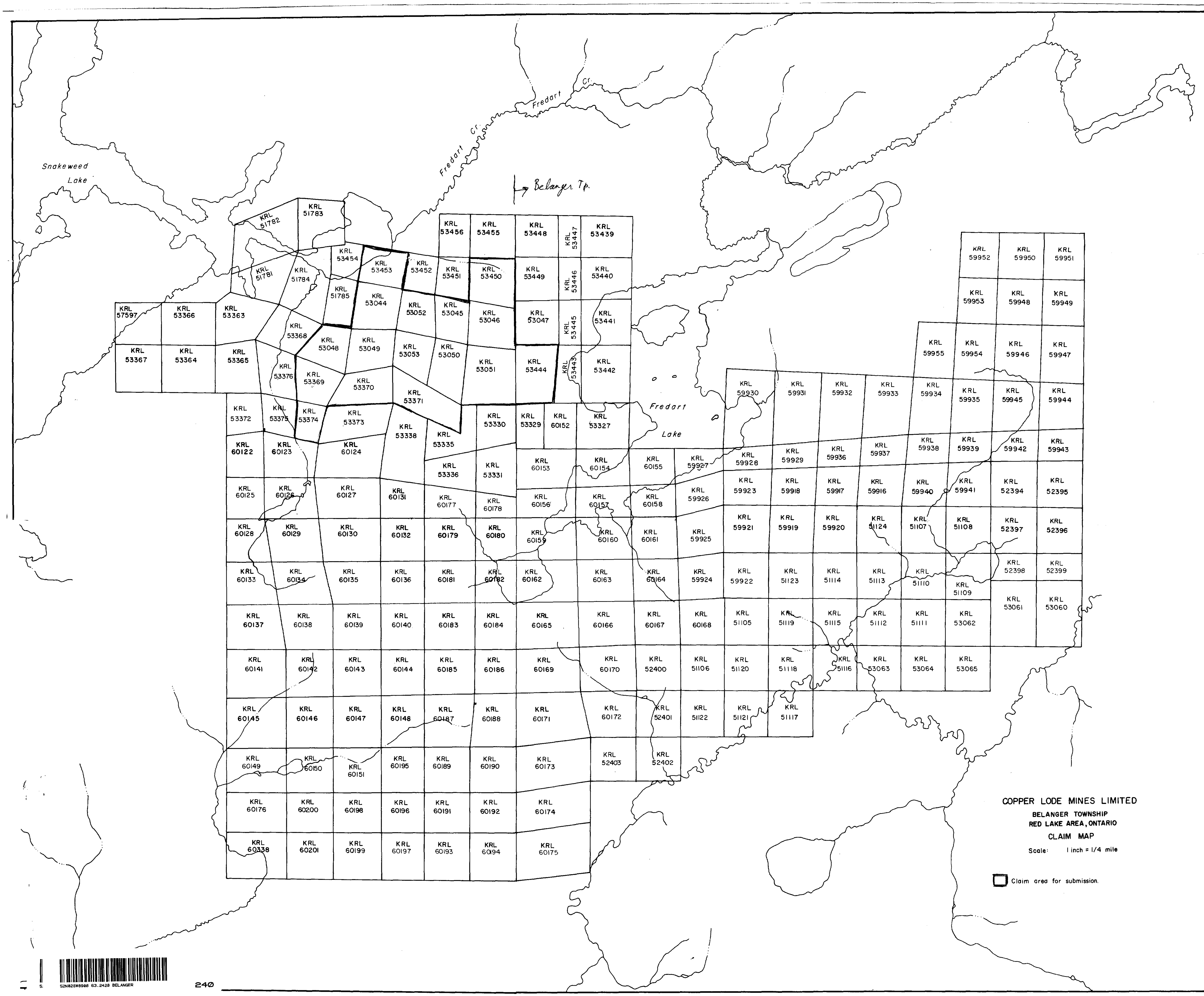
PLAN NO. M-2438

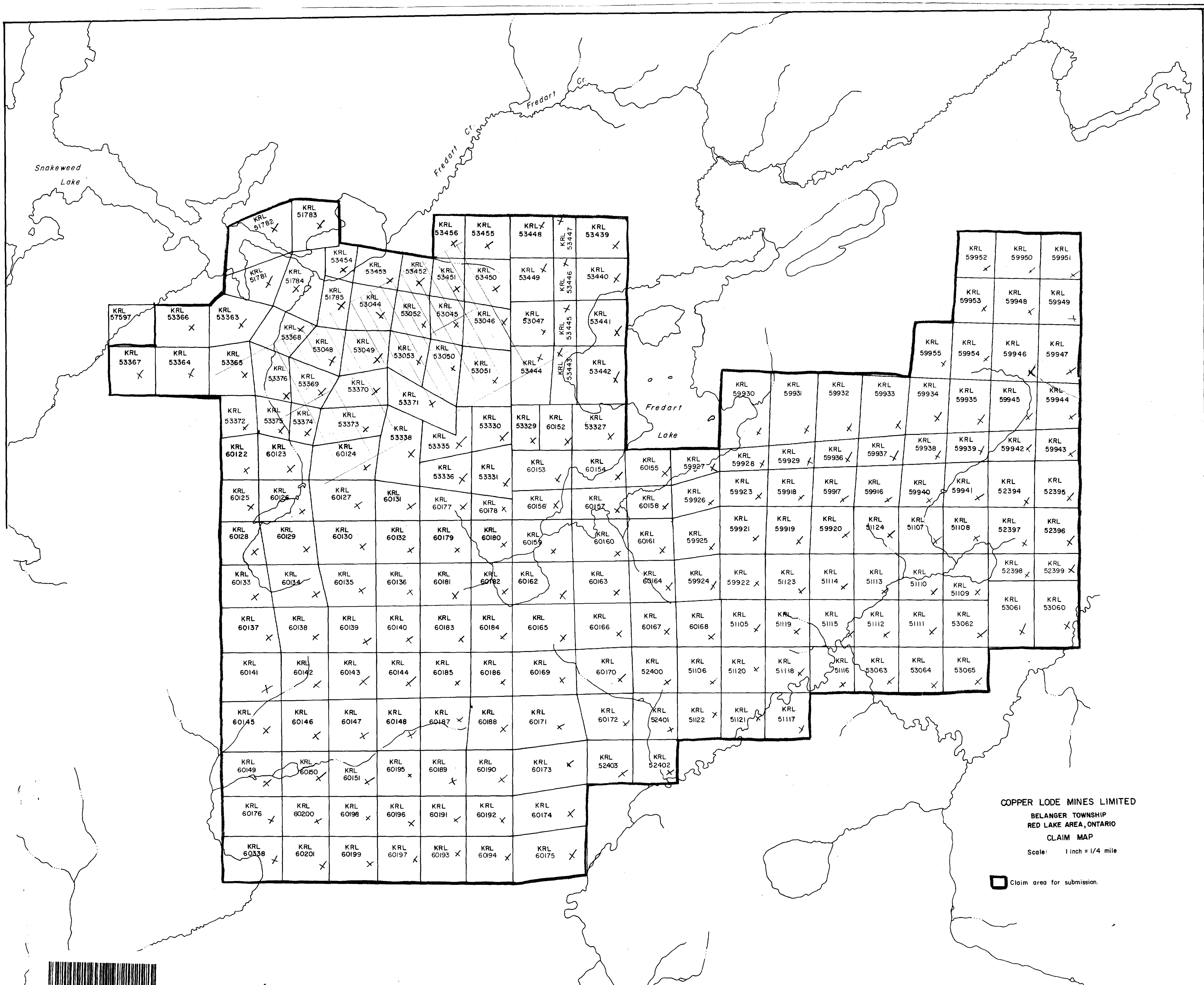
DEPARTMENT OF MINES
- ONTARIO -

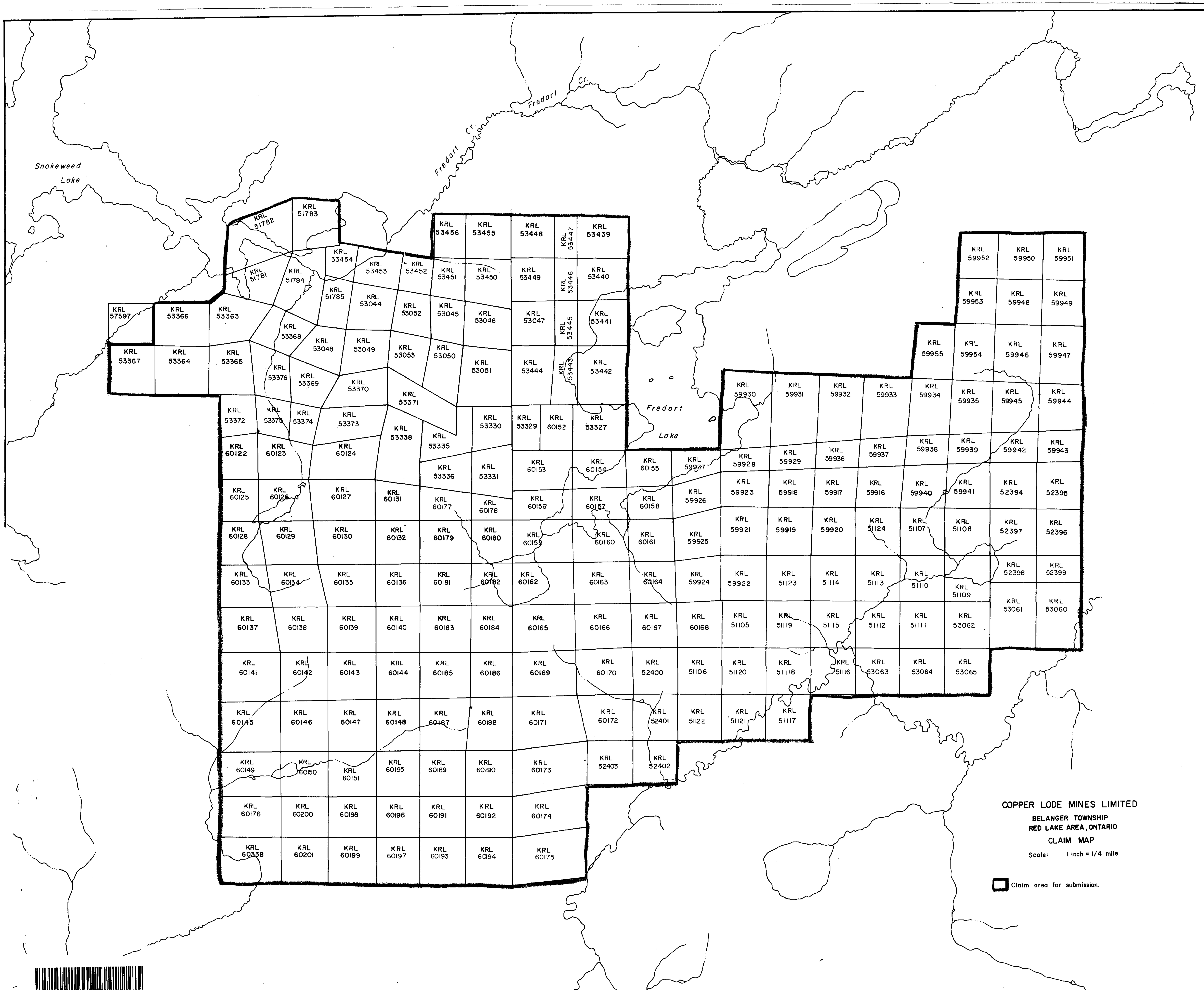
52N02SW0008 63.2438 BELANGER

230

50893

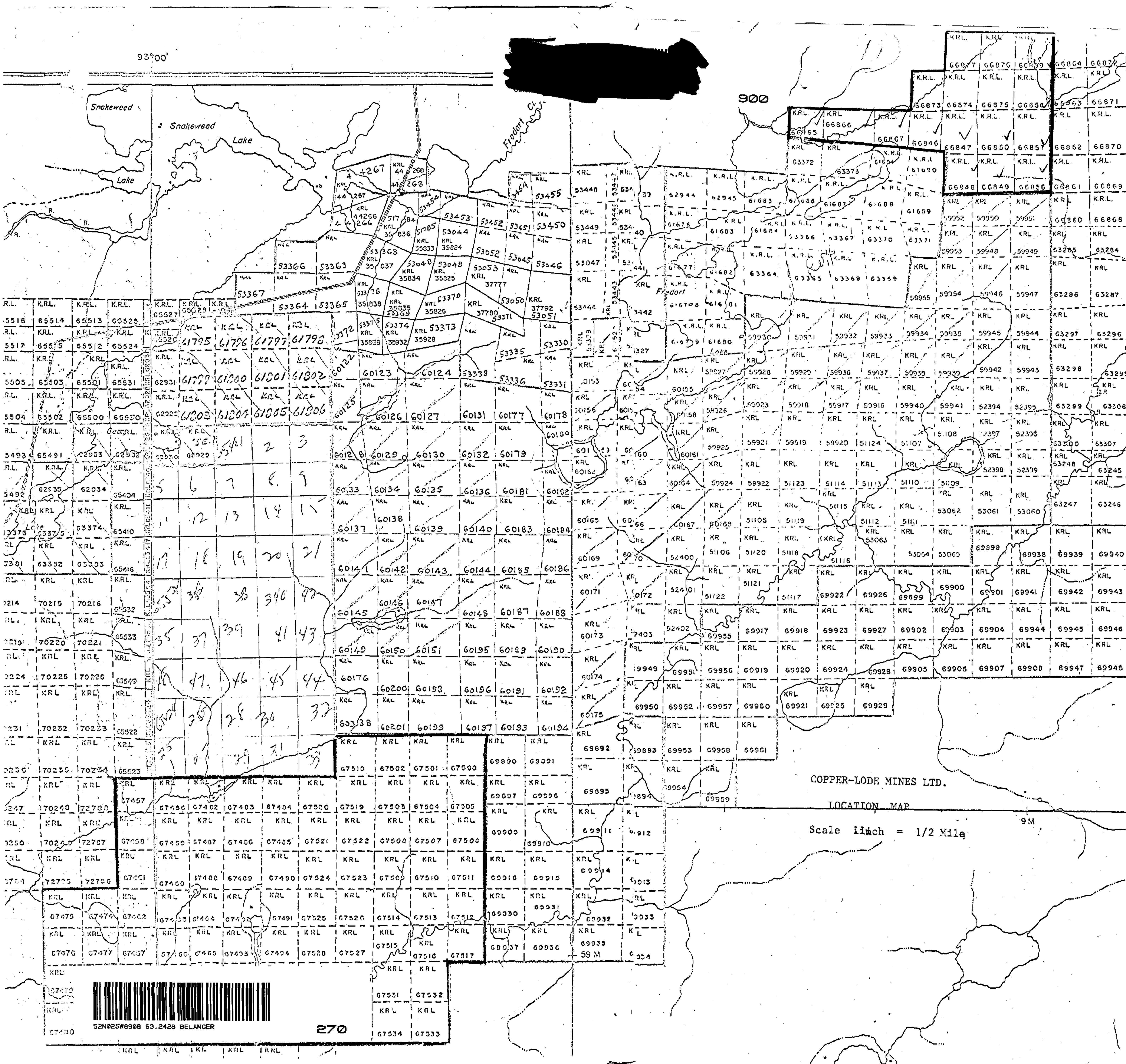

Snakeweed Lake
Fredart Cr.
Belanger Tp.
Fredart Lake
COPPER LODE MINES LIMITED
BELANGER TOWNSHIP
RED LAKE AREA, ONTARIO
CLAIM MAP
Scale: 1 inch = 1/4 mile
Claim area for submission.


COPPER LODE MINES LIMITED
BELANGER TOWNSHIP
RED LAKE AREA, ONTARIO
CLAIM MAP
Scale: 1 inch = 1/4 mile
Claim area for submission.
Snakeweed Lake
Fredart Cr.
Fredart Lake
52N02SW0008 63.2428 BELANGER



52N02SW8908 63.2428 BELANGER

260

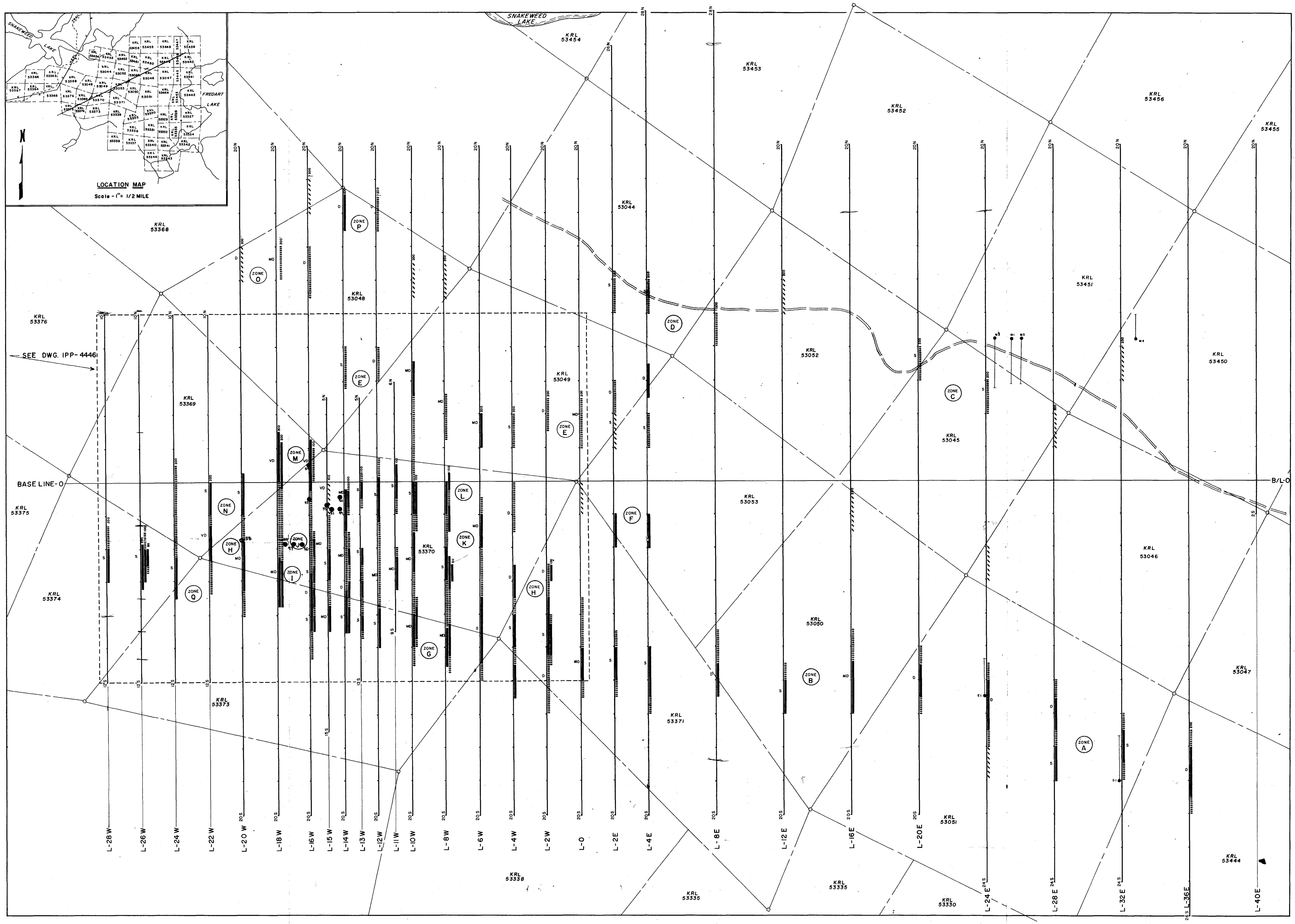


93°00'
[redacted]
900
Snakeweed
Snakeweed
Lake
Lake
Fredart Cr.
Fredart
Lake
59 M
9 M
COPPER-LODE MINES LTD.
LOCATION MAP
Scale 1 inch = 1/2 Mile

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE
Number at the end of anomaly indicates spread used.

CENTER OF STRONG, NARROW IP ANOMALY
S SHALLOW
MD MODERATE DEPTH
D DEEP
VD VERY DEEP

COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA, RED LAKE M.D., ONTARIO.

SCALE
ONE INCH EQUALS TWO HUNDRED FEET.

BROAD, STRONG MAGNETIC HIGH
NARROW, STRONG MAGNETIC HIGH
NARROW, WEAKER MAGNETIC HIGH

DRAWN: V.T.Y.
DATE: AUGUST 1968
APPROVED:

McPHAR GEOPHYSICS LIMITED

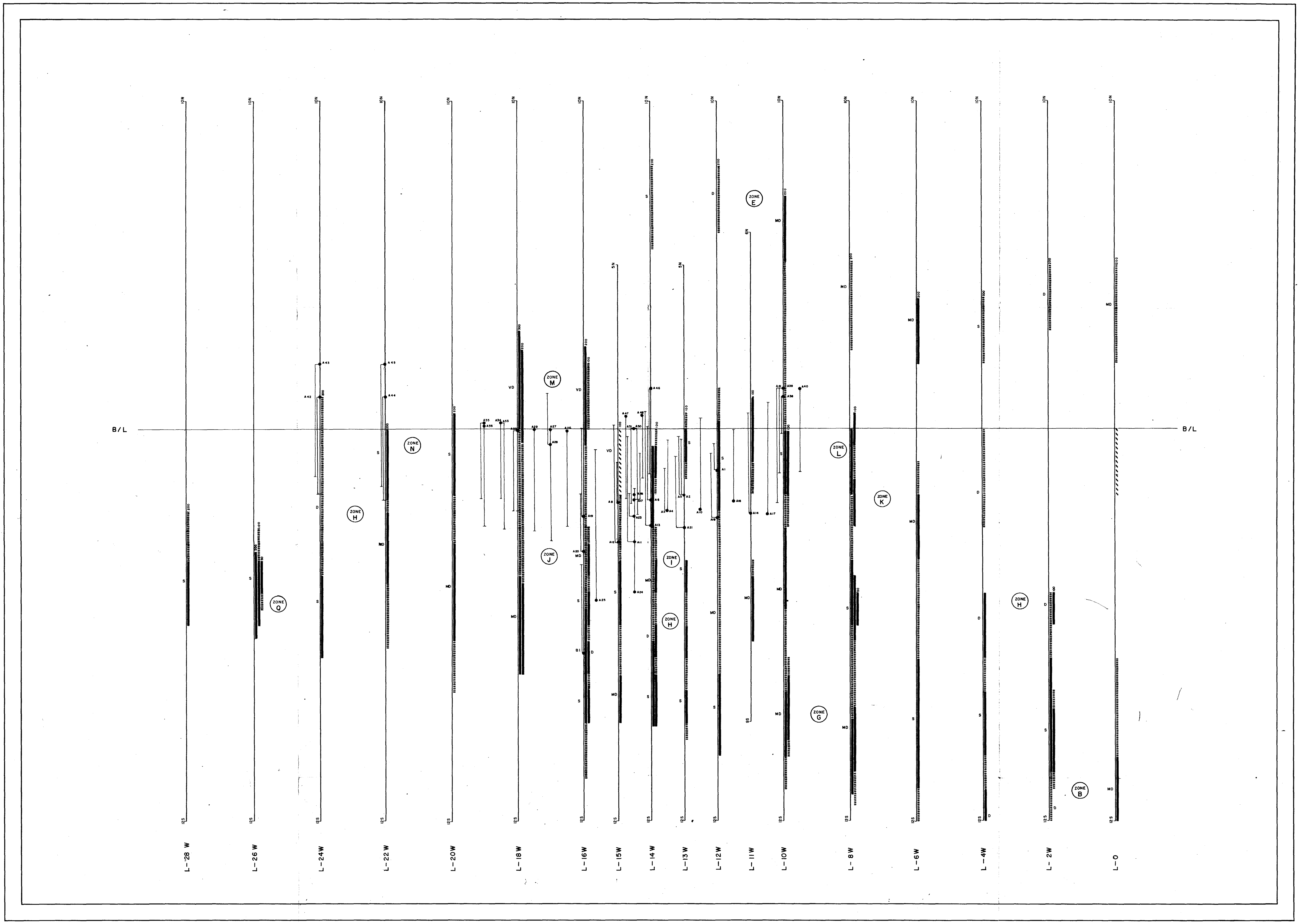
10/16/68

280

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

Number at the end of anomaly indicates spread used.

CENTER OF STRONG, NARROW IP ANOMALY

S SHALLOW

MD MODERATE DEPTH

D DEEP

VD VERY DEEP

COPPER LODE MINES LIMITED

REXDALE OPTION, FREDART LAKE AREA, RED LAKE M.D., ONTARIO

SCALE

ONE INCH EQUALS ONE HUNDRED FEET

BROAD, STRONG MAGNETIC HIGH

NARROW, STRONG MAGNETIC HIGH

NARROW, WEAKER MAGNETIC HIGH

DRAWN: F.H.

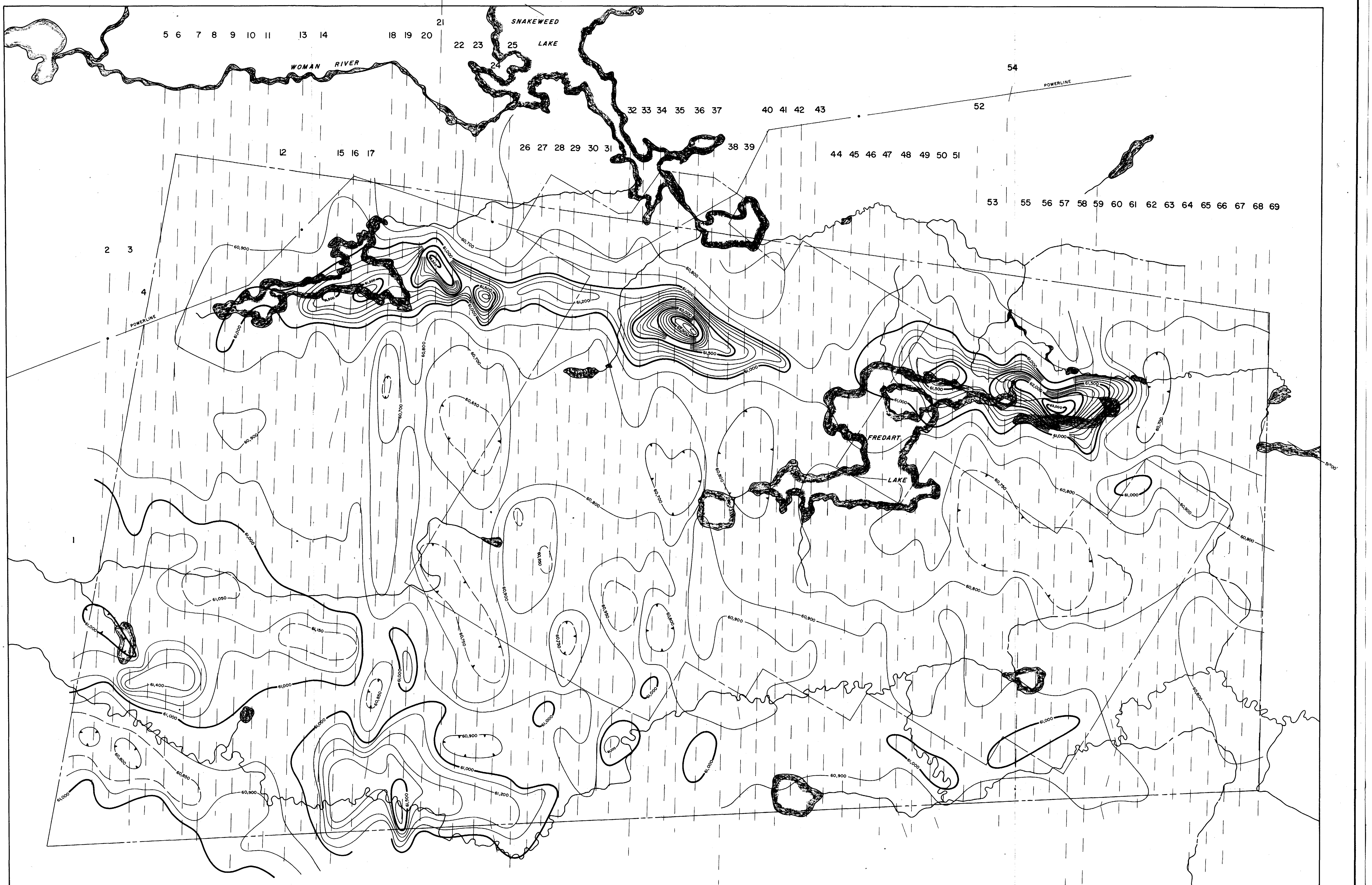
DATE:

DWG. IPP 4446

290

McPHAR GEOPHYSICS LIMITED

AIRBORNE MAGNETOMETER SURVEY



LEGEND

CONTOUR INTERVAL .... 100 GAMMA
MEAN FLIGHT LINE SPACING .... 660 FEET
MEAN TERRAIN CLEARANCE .... 500 FEET
500 GAMMA CONTOUR
100 GAMMA CONTOUR
MAGNETIC LOW
CLAIM BOUNDARY
SURVEY BOUNDARY

COPPER LODE MINES LIMITED

BELANGER TWP., RED LAKE AREA ONT.

SCALE

1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 INCH TO 1320 FEET

McPHAR GEOPHYSICS LIMITED

APPROVED

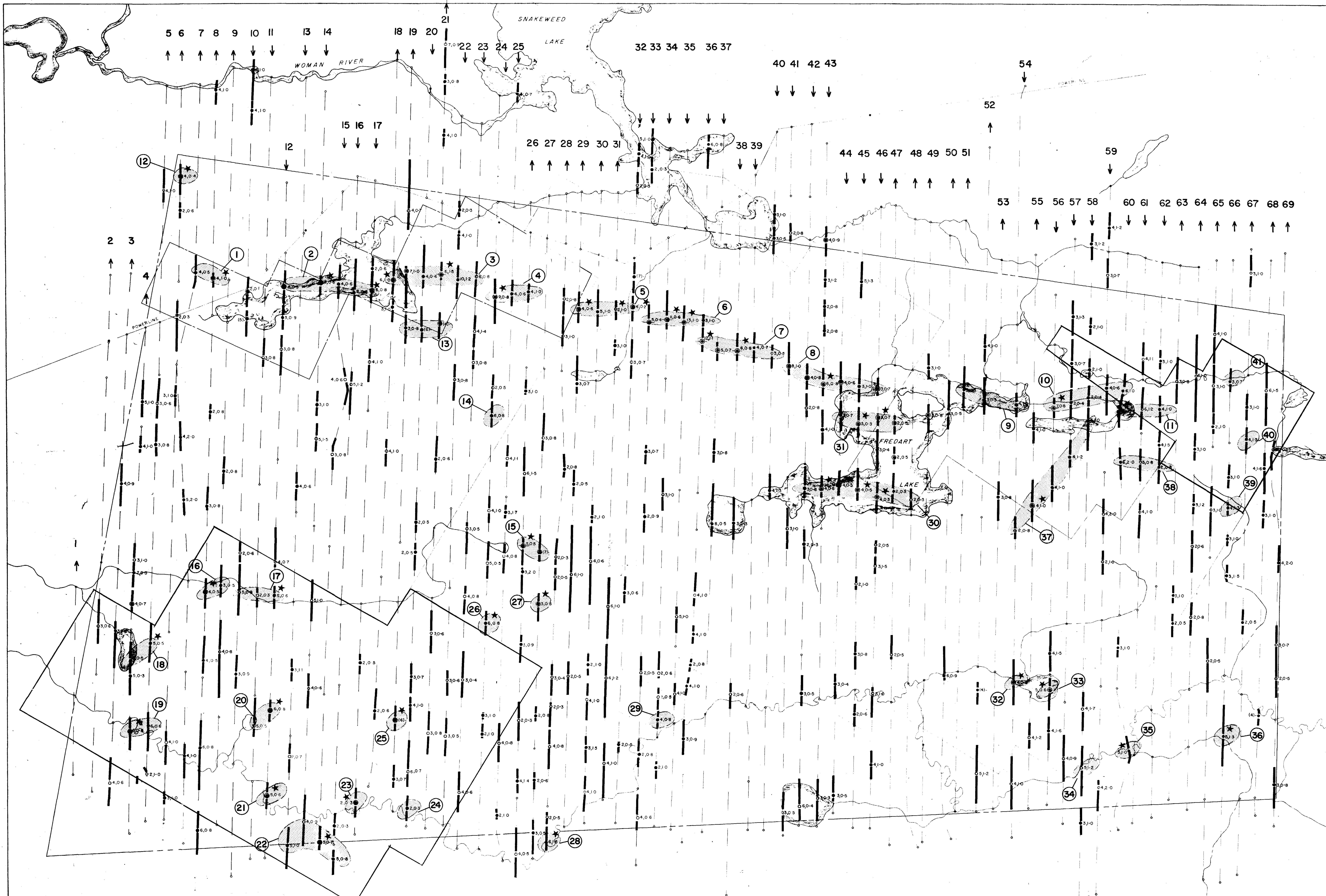
DATE: 15/11/68

300

AM-6821

McPHAR GEOPHYSICS LIMITED

AIRBORNE ELECTROMAGNETIC SURVEY



LEGEND

A	SYMBOLS SHOW LENGTH, SHAPE AND PEAK OF ANOMALY
B	
C	
D	

340 Hz. AMPLITUDE
ANOMALY SHAPE
RATIO 340 1070 Hz.

COPPER LODE MINES LIMITED

BELANGER TWP., RED LAKE AREA ONT.

SCALE
1 INCH TO 1320 FEET

CLAIM BOUNDARY
SURVEY BOUNDARY

DATE 15/11/68

310

AE-6822