428

REPORT ON GEOPHYSICAL SURVEY

(INDUCED POLARIZATION & RESISTIVITY)

ON THE KID CLAIM GROUP

Atlin ~~LIARD~~ MINING DIVISION, B. C.

FOR 104J/4W&5W

KENNCO EXPLORATIONS (WESTERN) LTD.

58° 131° SW

BY

P. G. HALLOF, PH. D.

NAME AND LOCATION OF PROPERTY:

KID CLAIM GROUP, SHESLAY RIVER AREA, 58°, 131° SW

DATE STARTED - JUNE 14, 1962

DATE COMPLETED - JUNE 25, 1962

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Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 428 MAP

McPHAR GEOPHYSICS LIMITED

NOTES ON THE THEORY OF INDUCED POLARIZATION AND THE METHOD OF FIELD OPERATION

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 effectively stop all 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 "metal factor" or "M. F. " are a measure of the amount of polarization present in the rock mass being surveyed. This parameter has been found to be very successful in mapping areas of sulphide mineralization, even those in which all other geophysical methods have been unsuccessful. The induced polarization measurement is more sensitive to sulphide content than other electrical measurements because it is much more dependent upon the sulphide content. As the sulphide content of a rock is increased, the "metal factor" of the rock increases much more rapidly than the resistivity decreases.

Because of this increased sensitivity, it is possible to locate and outline zones of less than 10% sulphides that can't be located by E. M. Methods. The method has been successful in locating the disseminated "porphyry copper" type mineralization in the Southwestern United States.

Measurements and experiments also indicate that it should be possible to locate most massive sulphide bodies at a greater depth with induced polarization than with E. M.

Since there is no I. P. effect from any conductor unless it is metallic, the method is useful in checking E. M. anomalies that are suspected of being due to water filled shear zones or other ionic conductors. There is also no effect from conductive overburden, which frequently confuses E. M. results. It would appear from scale model experiments and calculations that the apparent metal factors measured over a mineralized zone are larger if the material overlying the zone is of low resistivity.

Apropos of this, it should be stated that the induced polarization measurements indicate the total amount of metallic constituents in the rock. Thus all of the metallic minerals in the rock, such as pyrite, as well as the ore minerals chalcopyrite, chalcocite, galena, etc. are responsible for the induced polarization effect. Some oxides such as magnetite, pyrolusite, chromite, and some forms of hematite also conduct by electrons and are metallic. All of the metallic minerals in the rock will contribute to the induced polarization effect measured on the surface.

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 a distance (X) apart. The potentials are measured at two other points (X) feet apart, in line with the current electrodes. The distance between the nearest current and potential 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 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. The resistivity values are plotted above the line and the metal factor values below. 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. These 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, model and theoretical investigations. The position of the electrodes when anomalous values are measured must be used 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 100 feet to 1000 feet for (X). In each case, the decision as to the distance (X) and the values of (N) 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 1 below demonstrates the method used in plotting the results. Each value of the apparent resistivity and the apparent "Metal factor" 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.

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

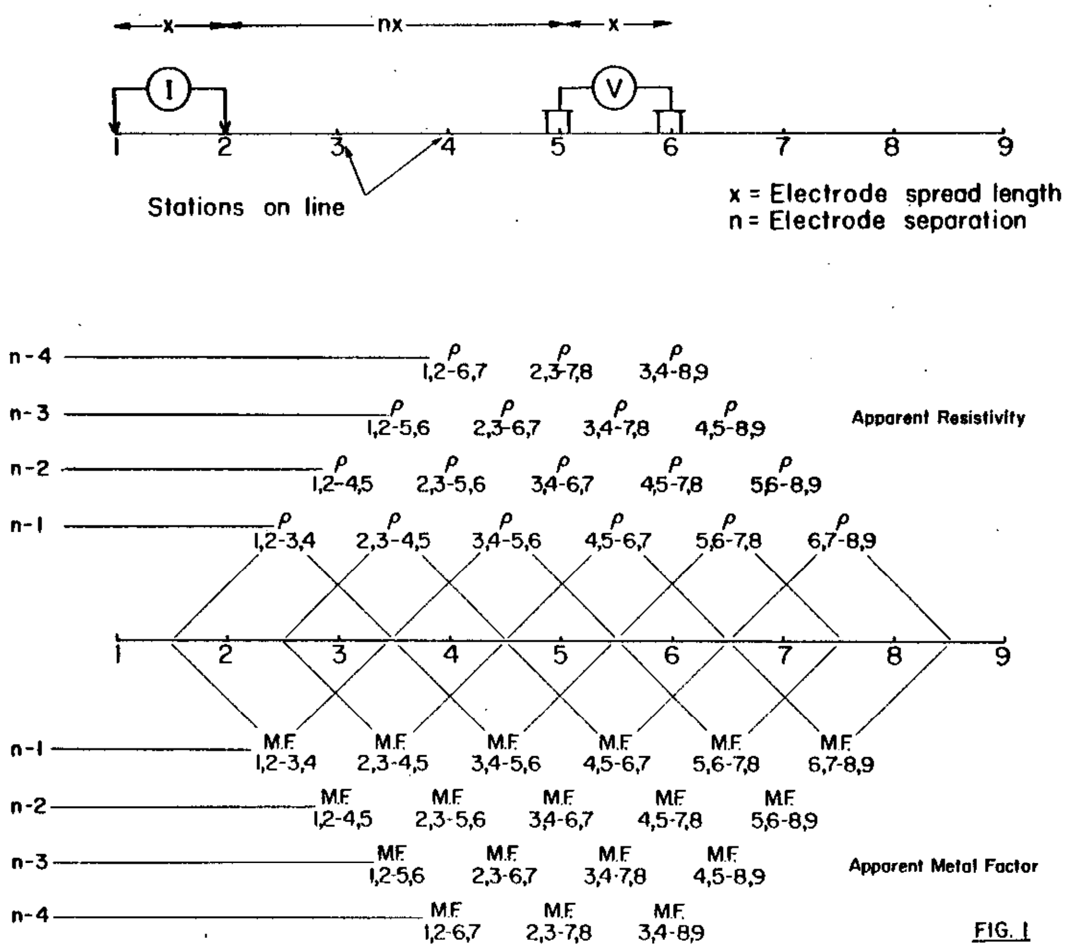

FIG. 1

McPHAR GEOPHYSICS LIMITED

REPORT ON THE

INDUCED POLARIZATION

AND RESISTIVITY SURVEY

ON THE KID CLAIM GROUP

~~LIARD~~ Atlin MINING DIVISION, B. C.

FOR

KENNCO EXPLORATIONS (WESTERN) LTD.

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1. INTRODUCTION

At the request of Mr. Hal Fleming, geophysicist for the company, an induced polarization and resistivity survey has been carried out on the Kid Claim Group, Sheslay River Area, B. C. on behalf of Kennco Explorations (Western) Limited. The property is in the ~~Liard~~ Atlin Mining Division, in the southwest corner of the one degree quadrilateral whose southeast corner is at 130°W, 58°N.

Several areas of high geochemical copper assays in the soil have been located on the claim group. The induced polarization survey was planned in order to locate any sub-surface copper mineralization that might have been the source of the geochemical high.

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 60N	200' spreads	Dwg. I. P. 2900-1
Line 70N	200' spreads	Dwg. I. P. 2900-2
Line 80N	200' spreads	Dwg. I. P. 2900-3
	100' spreads	Dwg. I. P. 2900-4
Line 90N	200' spreads	Dwg. I. P. 2900-5
Line 100N	200' spreads	Dwg. I. P. 2900-6

Also enclosed with this report is Dwg. Misc. 3357, a plan map of the Kid Claim Group. The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on this plan map 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' spreads the position of a narrow sulphide body can only be determined to lie between two stations 200' 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 outline of the zones containing more than 1000 ppm copper in the soil is also shown on this map.

3. DISCUSSION OF RESULTS

Line 60N

There are two zones on this line where the I. P. effects are slightly above background, but they are not large enough in magnitude to be of much interest.

Line 70N

There is a definite I. P. anomaly at 5W to 1W on this line. The source appears to be relatively shallow, and to have some width.

Line 80N

The strong anomaly is also measured on this line, at 2E to 6E. The source appears to be shallow when 200' spreads were used; but when the electrode separation was reduced to 100', the values increase with separation.

Line 90N

The apparent I. P. values measured for large separations in the region from 0 to 4E on this line were anomalous. This suggests the source is at some distance from the line, either at depth or off to the side. It could represent the end of the anomalous zone located to the south.

In addition to the source at depth, there are two places along the line where slightly anomalous values were measured for n = 1. These zones should be checked with shorter spreads.

Line 100N

There are only a few values above background on this line, and there is nothing of interest.

4. CONCLUSIONS AND RECOMMENDATIONS

As shown on Dwg. Misc. 3357, the I. P. anomalies on Line 70N, Line 80N, and Line 90N can be correlated into a zone which passes just to the west of the geochemical highs. The anomalies could be caused by mineralization which is also the source of the high copper values.

A hole should be drilled to test this anomaly, probably on Line 70N where it is strong and shallow. The pattern shows that there may be more mineralization on the western edge of the zone, so a hole collared at 6W and drilled at (-45°) to the east should test the source. If the hole intersects mineralization of economic interest, more I. P. work should be considered for the intermediate lines in order to better locate the zone.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

Dated: July 11, 1962.

ASSESSMENT DETAILS

PROPERTY: Kid Claim Group

SPONSOR: Kennco Explorations (Western) Ltd.

LOCATION: Sheslay River Area

TYPE OF SURVEY: Induced Polarization

OPERATING MAN DAYS: 41.0

EQUIVALENT 8 HR. MAN DAYS: 61.5

CONSULTING MAN DAYS: 2.0

DRAUGHTING MAN DAYS: 2.0

TOTAL MAN DAYS: 65.5

MINING DIVISION: ~~Liard~~ Atlin

PROVINCE: British Columbia

DATE STARTED: June 14, 1962

DATE FINISHED: June 25, 1962

NUMBER OF STATIONS OCCUPIED: 87

NUMBER OF READINGS TAKEN: 570

MILES OF LINE SURVEYED: 2.9

CONSULTANTS:
Philip G. Hallof, 5 Minorca Place, Don Mills, Ontario

FIELD TECHNICIANS:
J. Lee, 264 Oriole Parkway, Toronto 7, Ontario
G. MacKay, R.R. #3, Tiverton, Ontario
3 Helpers - supplied by client

DRAUGHTSMEN:
F. R. Peer, 38 Torrens Avenue, Toronto 6, Ontario
R. MacKenzie, 55 Shannon Drive, Scarborough, Ontario

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof

Philip G. Hallof,
Geophysicist.

Dated: July 17, 1962.

SUMMARY OF COST

Crew - June 14 - 25

7-3/4	days Operating		@ $170.00/day	$1,317.50
3	days Travel	)		
4-1/4	days Bad Weather	) 8-1/4	@ $ 50.00/day	412.50
1	day Standby	)		
16				

Expenses - 2 men

Airfare-Toronto-return	$566.00	
Airfreight and Excess Baggage	148.10	
Taxi	66.50	
Meals and Accommodation	98.45	
Telephone and Telegraph	13.75	
Supplies	22.56	915.36
		$2,645.36

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof

Philip G. Hallof,
Geophysicist.

Dated: July 17, 1962.

CERTIFICATE

I, Philip George Hallof, of the City of Toronto, Province of Ontario, do hereby certify that:

1. I am a geophysicist residing at 5 Minorca Place, Don Mills, (Toronto) Ontario.

2. I am a graduate of the Massachusetts Institute of Technology with a B. S. Degree (1952) in Geology and Geophysics, and a Ph. D. Degree (1957) in Geophysics.

3. I am a member of the Society of Exploration Geophysicists and the European Association of Exploration Geophysicists.

4. I have been practising my profession for ten years.

5. I have no direct or indirect interest, nor do I expect to receive any interest, direct or indirect, in the property or securities of Kennco Explorations (Western) Ltd.

6. The statements made in this report are based on a study of published literature and unpublished private reports and geophysical data.

Dated at Toronto

This 17th day of July 1962

Philip G. Hallof

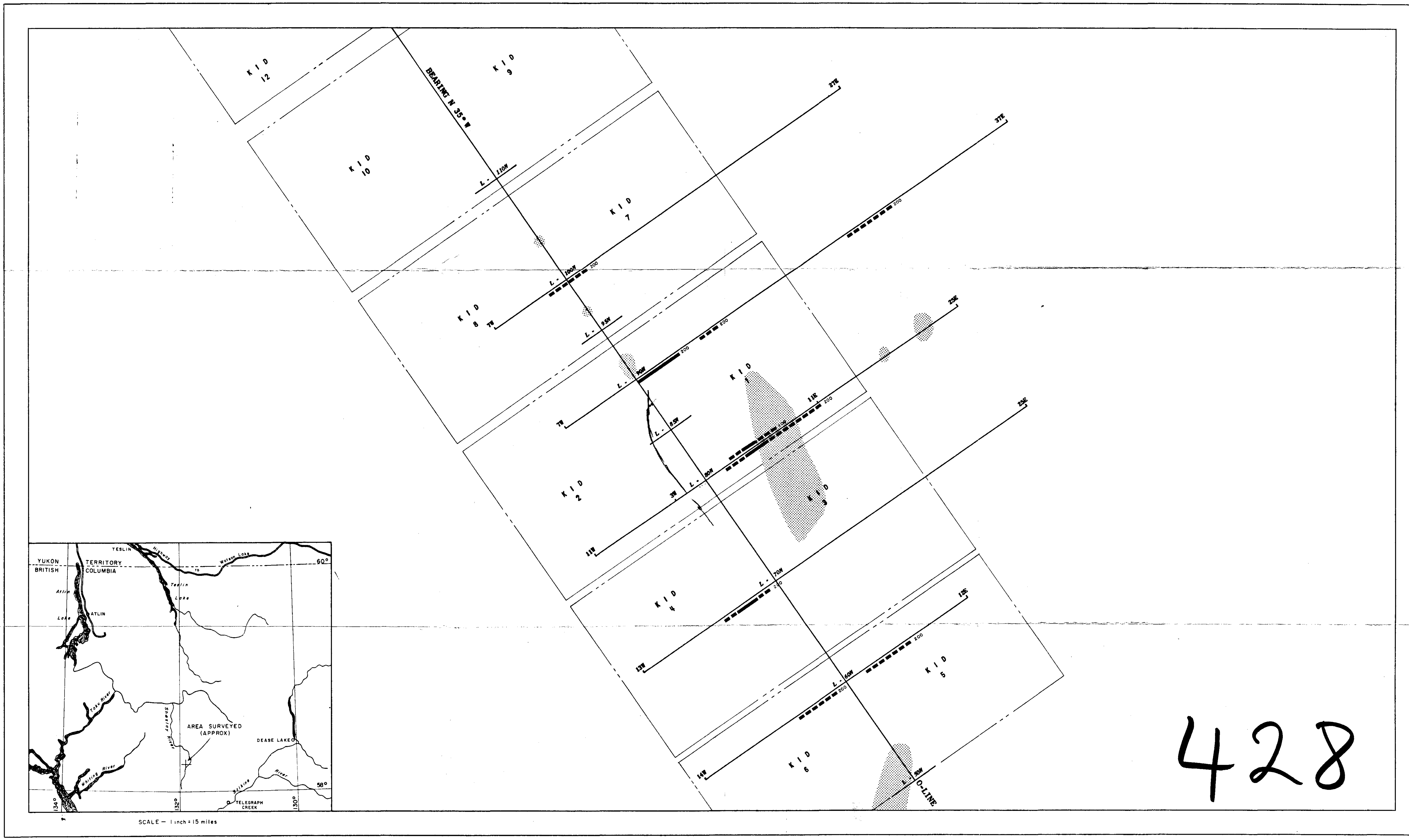
Philip G. Hallof, Ph. D.

DWG. MISC. 3357

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

LOCATION MAP



N

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NUMBERS AT END OF ANOMALIES INDICATE SPREAD USED

KENNCO EXPLORATIONS (WESTERN) LIMITED

KID CLAIM GROUP, SHESLAY RIVER AREA—~~LIARD~~ Atlin MINING DIVISION, B.C.

SCALE

400 200 0 400 800 1200 1600 2000 FEET

One Inch = Four Hundred Feet

>1000 ppm Cu.

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 428 MAP 1

DRAWN: F.R.P.
DATE: JUNE 1962
APPROVED:
DATE: 7/10/62

428

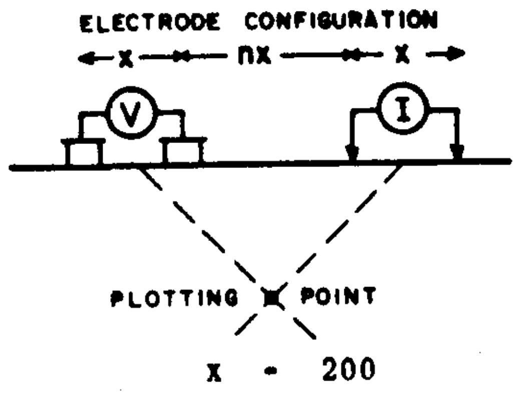
DWG. MISC. 3357

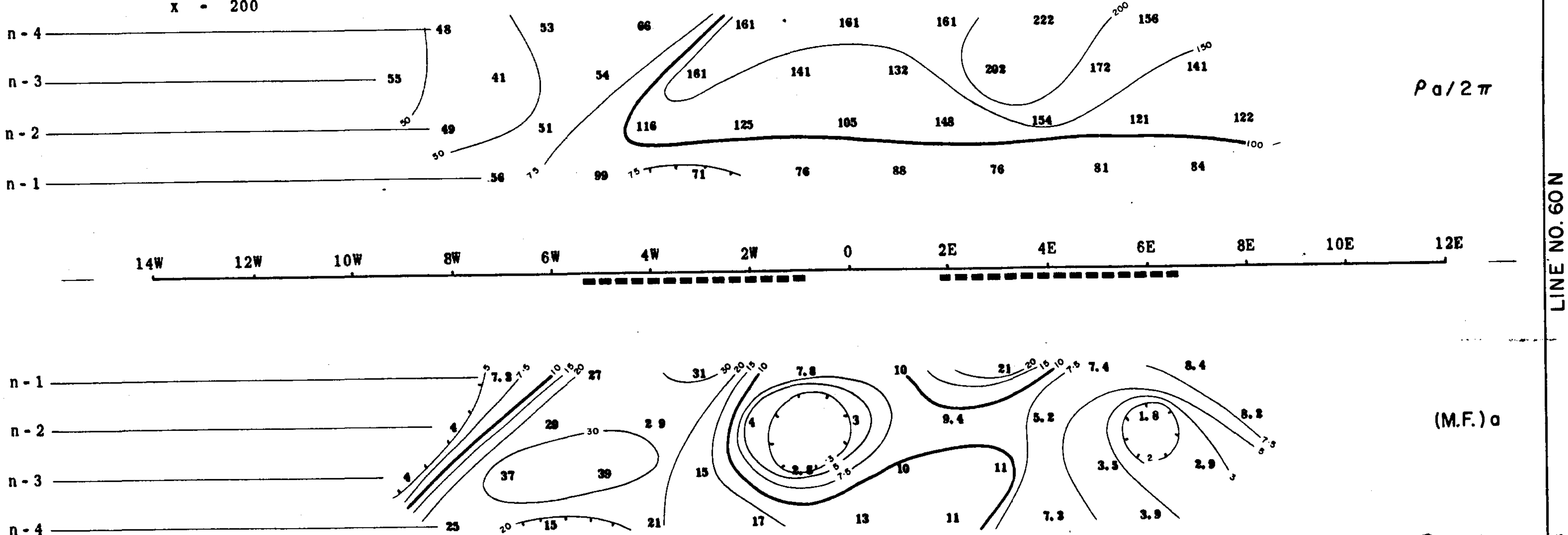
DWG. NO.-I.P.-2900-I

428

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY





FREQUENCY .31 - 5 CPS

DATE SURVEYED JUNE 1962

APPROVED PH

DATE 7/10/62

KENNCO EXPLORATIONS (WESTERN) LIMITED

KID CLAIM GROUP, SHESLAY RIVER AREA—~~LIARD~~ Atlin MINING DIVISION, B.C.

Scale - One inch = 200 Feet

ANOMALOUS ZONE

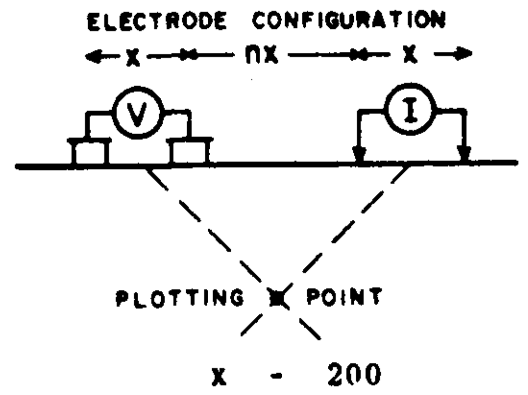
POSSIBLE ANOMALOUS ZONE

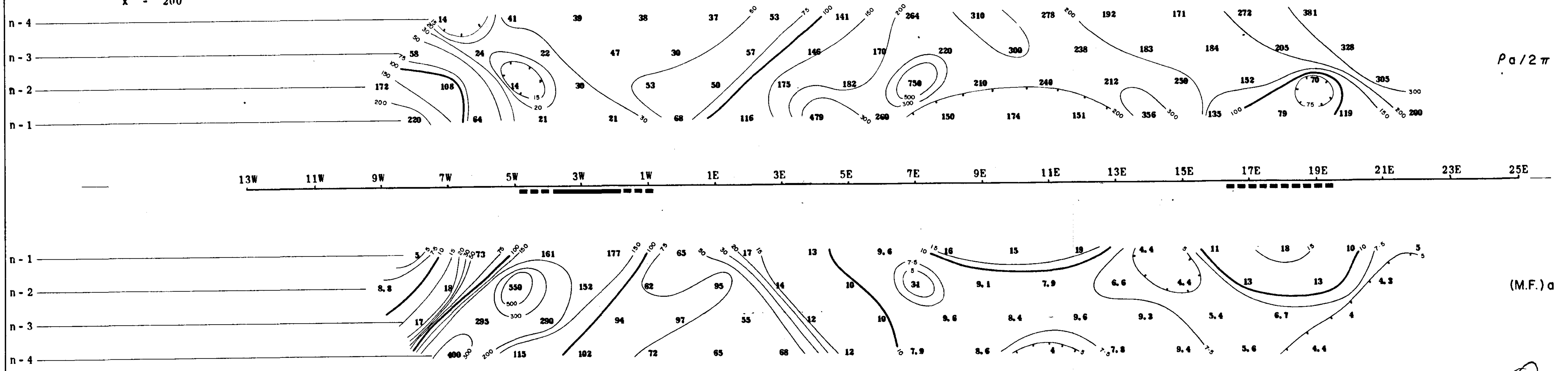
NOTE
LOGARITHMIC CONTOUR INTERVAL

DWG. NO.-I.P.-2900-2

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY





LINE NO. 70N

173

FREQUENCY 31-5 CPS

DATE SURVEYED JUNE 1962

APPROVED [signature]

DATE 7/10/62

KENNCO EXPLORATIONS (WESTERN) LIMITED

KID CLAIM GROUP, SHESLAY RIVER AREA- ~~LIARD~~ Atlin MINING DIVISION, B.C.

Scale- One inch= 200 Feet

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

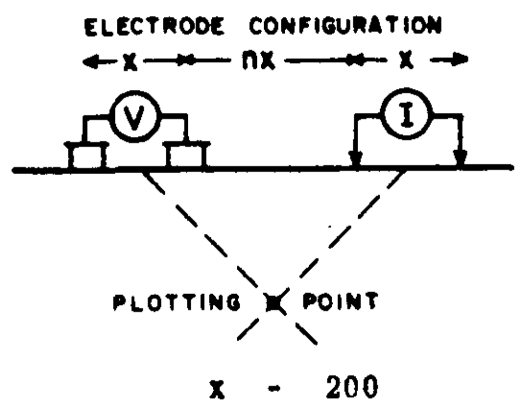
NOTE

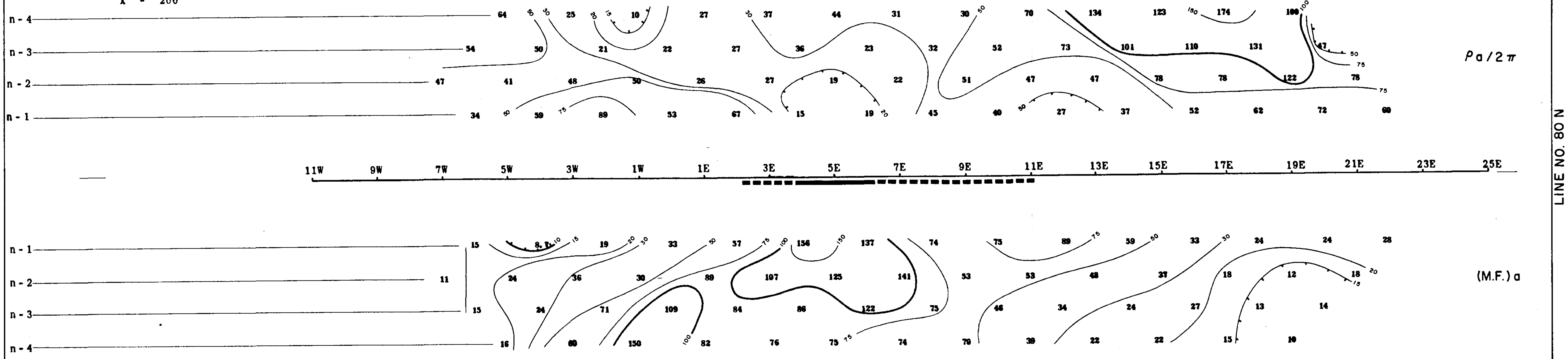
LOGARITHMIC CONTOUR INTERVAL

DWG. NO.-I.P.-2900-3

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY





M4

FREQUENCY 31-5 CPS

DATE SURVEYED JUNE 1962

APPROVED PH

DATE 7/10/62

KENNCO EXPLORATIONS (WESTERN) LIMITED

KID CLAIM GROUP, SHESLAY RIVER AREA—~~LIARD~~ Atlin MINING DIVISION, B.C.

Scale- One inch = 200 Feet

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

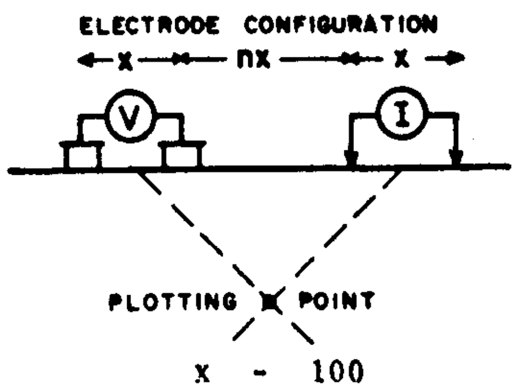
NOTE

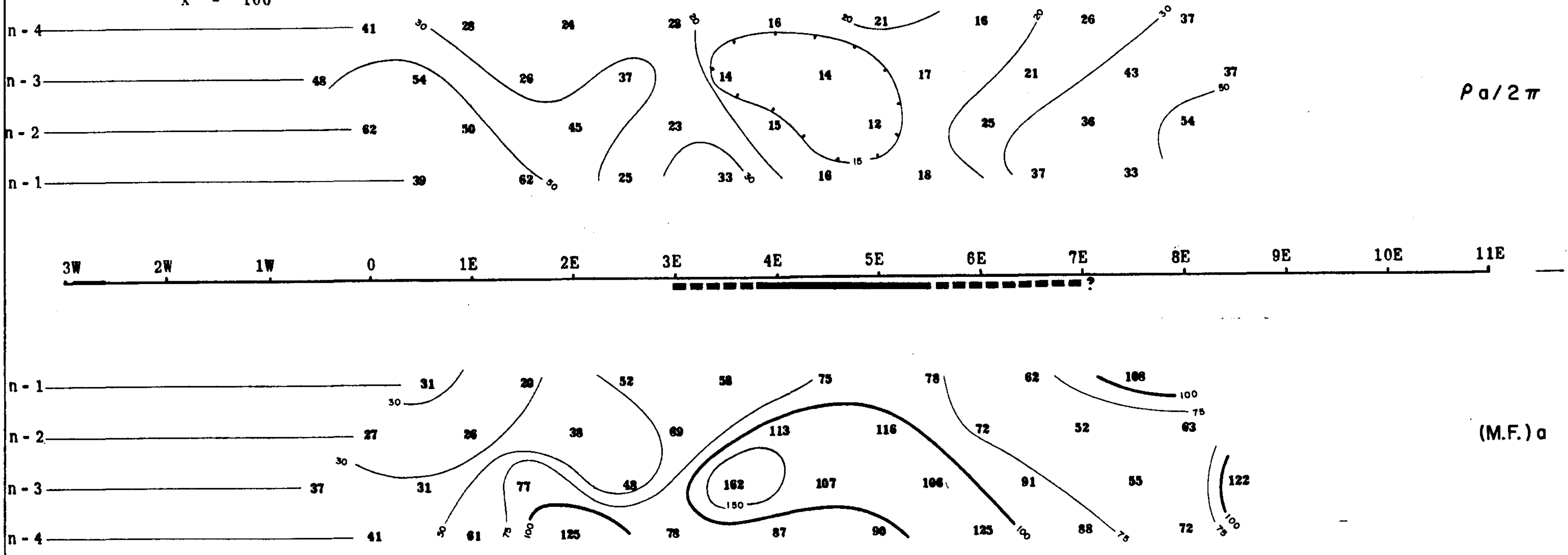
LOGARITHMIC CONTOUR INTERVAL

DWG. NO.-I.P.-2900-4

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY





LINE NO. 80 N

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KID CLAIM GROUP, SHESLAY RIVER AREA—~~LIARD~~ Atlin MINING DIVISION, B.C.

Scale-One inch = 100 Feet

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE
LOGARITHMIC CONTOUR INTERVAL

M5

FREQUENCY 31 - 5 CPS

DATE SURVEYED JUNE 1962

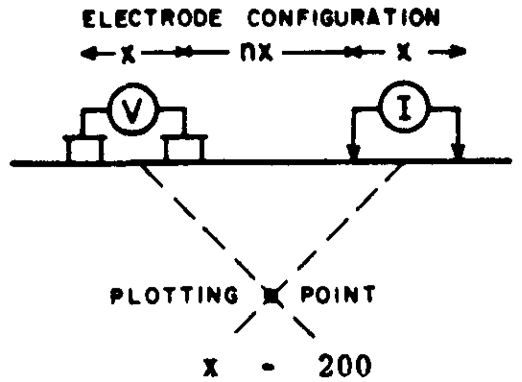
APPROVED PH

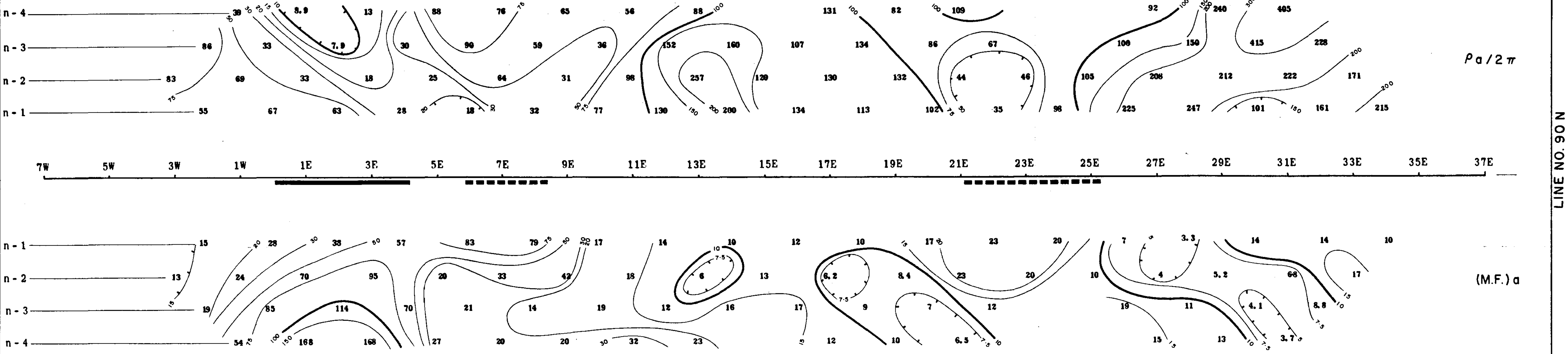
DATE 7/16/62

DWG. NO.-I.P.-2900-5

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY





ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE
LOGARITHMIC CONTOUR INTERVAL

KENNCO EXPLORATIONS (WESTERN) LIMITED

KID CLAIM GROUP, SHESLAY RIVER AREA— ~~LIARD~~ Atlin MINING DIVISION, B.C.

Scale - One inch = 200 Feet

FREQUENCY .31 — 5 CPS

DATE SURVEYED JUNE 1962

APPROVED PH

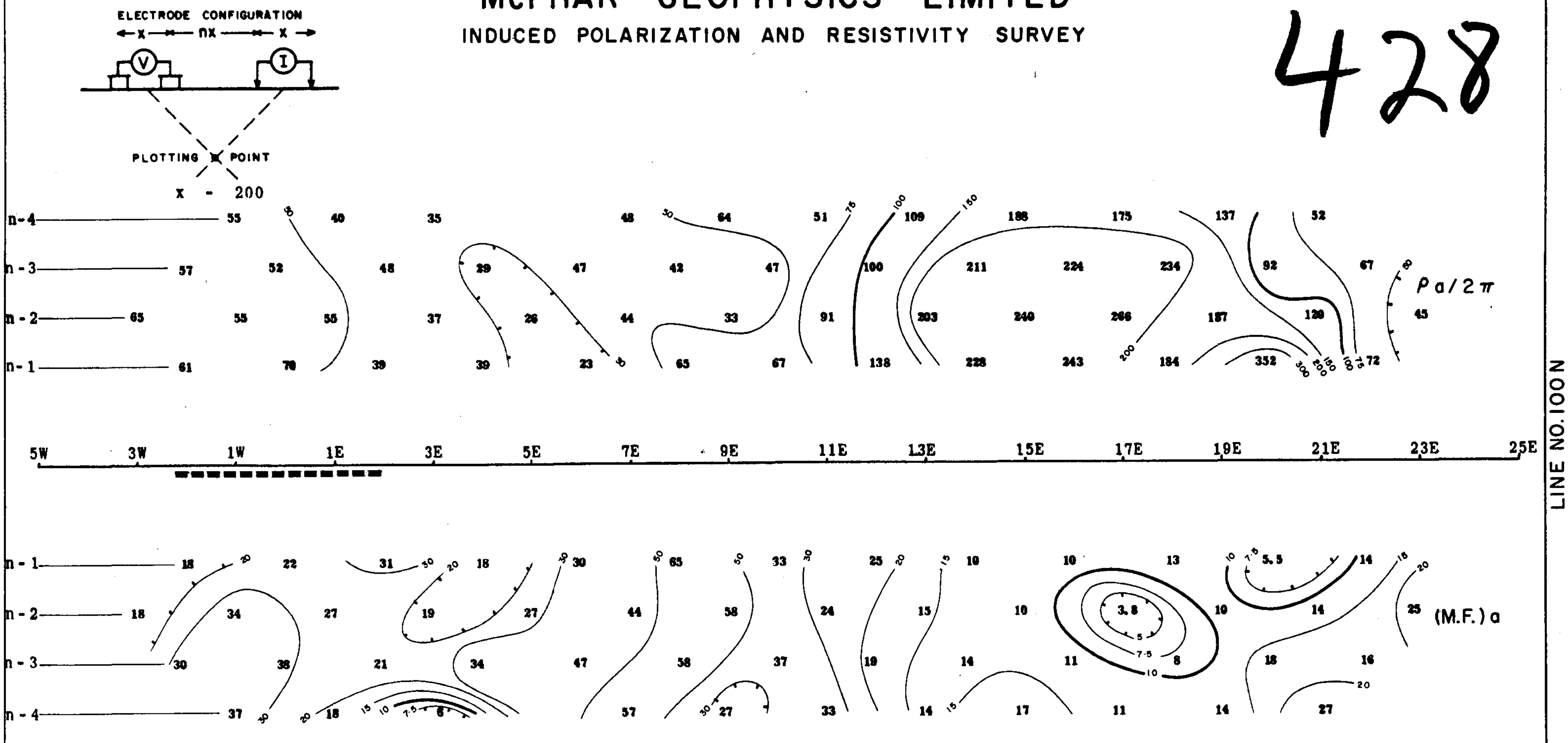
DATE 7/10/62

DWG. NO.-I.P.-2900-6

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

428



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KID CLAIM GROUP, SHESLAY RIVER AREA—~~LIARD~~ Atlin MINING DIVISION, B.C.

Scale— One inch = 200 Feet

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE
LOGARITHMIC CONTOUR INTERVAL

FREQUENCY 31 — 5 CPS

DATE SURVEYED JUNE 1962

APPROVED PH

DATE 7/10/62