1073

REPORT ON THE
INDUCED POLARIZATION
AND RESISTIVITY SURVEY
ON THE 93E/11E & 11W
TROITSA CLAIM GROUP 6W & 6E
COLE CREEK AREA, B. C.
FOR
KENNCO EXPLORATIONS (WESTERN) LTD.

BY

PHILIP G. HALLOF, Ph.D.

AND

ROBERT A. BELL, Ph.D.

NAME AND LOCATION OF PROPERTY:

TROITSA CLAIM GROUP, COLE CREEK AREA

OMINECA MINING DIVISION, B.C. 53°N/127°W, N.E.

DATE STARTED: JULY 29, 1967

DATE COMPLETED: AUGUST 6, 1967

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McPHAR GEOPHYSICS LIMITED

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE TROITSA CLAIM GROUP COLE CREEK AREA, B. C. FOR KENNCO EXPLORATIONS (WESTERN) LTD.

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1. INTRODUCTION

At the request of Mr. H. W. Fleming, geophysicist for the Company, an induced polarization and resistivity survey has been carried out on the Troitsa Claim Group, in the Cole Creek Area of British Columbia, on behalf of Kennco Explorations (Western) Ltd. The property is in the Omineca Mining Division, in the northeast quadrant of the one degree quadrilateral whose southeast corner is at 53°N - 127°W.

The area of the survey is underlain by an acid intrusive complex. In places the intrusives are in contact with, or partially covered by, Hazelton volcanics and/or sediments. The detailed geology of the area is not available. However, the area is of some geologic interest because of the widespread presence of disseminated pyrite with minor chalcopyrite.

The induced polarization and resistivity survey was planned in an attempt to locate, and outline, the zones of metallic mineralization 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 84+00E	200' electrode intervals	Dwg. IP 2732-1
Line 92+00E	200' electrode intervals	Dwg. IP 2732-2
Line 100+00E	200' electrode intervals	Dwg. IP 2732-3
Line 108+00E	200' electrode intervals	Dwg. IP 2732-4
Line 116+00E	200' electrode intervals	Dwg. IP 2732-5
Line 124+00E	200' electrode intervals	Dwg. IP 2732-6
Line 132+00E	200' electrode intervals	Dwg. IP 2732-7
Line 140+00E	200' electrode intervals	Dwg. IP 2732-8
Line 148+00E	200' electrode intervals	Dwg. IP 2732-9
Line 156+00E	200' electrode intervals	Dwg. IP 2732-10
Line 164+00E	200' electrode intervals	Dwg. IP 2732-11
Line 100+00N	200' electrode intervals	Dwg. IP 2732-12
Line A	200' electrode intervals	Dwg. IP 2732-13
Line 120+00N	200' electrode intervals	Dwg. IP 2732-14

Also enclosed with this report is Dwg. Misc. 3274, a plan map of the grid at the Troitsa Claim Group at a scale of 1" = 400'. 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 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.

3. DISCUSSION OF RESULTS

The limited geological information available for the Troitsa Claim Group suggests the possible presence of a large zone of disseminated sulphide mineralization. Our experience in other areas has shown that the induced polarization method can be used with great success in locating, and outlining, zones of disseminated sulphide mineralisation of the "porphyry copper" type. The results shown in Case History 23 and Case History 24 are typical.

The sources of these anomalous IP effects contain approximately 4% metallic mineralization. The IP anomalies in the two areas are very similar; it should be noted that IP effects in the "ore-grade" copper bearing zone in Quebec are the same as those from the almost barren pyrite zone in Arizona.

In the proper geologic environment, the method will detect even very low concentrations of metallic mineralization. The IP results shown in Figure 1 located the ore zone at the Brenda Property near Peachland, B. C. The zone contains 1.3 to 1.5 per cent metallic mineralization; however, the mineralization is "ore-grade" because only molybdenite, bornite and chalcopyrite are present.

The IP results from the brief survey on the Troitsa Claim Group have located anomalies that are very similar to those shown in the Case Histories above. The results suggest a large, irregular zone containing variable concentrations of metallic mineralization.

Some of the IP anomalies are low in magnitude, suggesting very weak concentrations of metallic mineralization; (Line 140+00E, 89+20N to 96+93N; Line 164E, 98+51N to 102+48N.) In other areas the anomalies are moderate in magnitude, suggesting sulphide concentrations in the range 2% to 4%; (Line 92+00E, 108+00N to 116+00N; Line 124E, 98+03N to 103+90N.) On Line A and Line 120N, the IP effects are large in magnitude, suggesting sulphide contents that might be as high as 10%.

The correlation of the IP anomalies is complicated by the fact that it was necessary to discontinue the north-south lines at the creek due to extremely sharp cliffs. In several places, the values at the north end of the lines are slightly anomalous but it was not possible to extend the lines to completely outline the anomalies.

The strong anomaly at the north end of the property is shallow, and it could be checked by repeating the measurements with shorter electrode intervals. However, the moderate anomaly centered at the intersection of Line 124+00E and Line 100+00N indicates some depth to the top of the source.

4. CONCLUSIONS AND RECOMMENDATIONS

The IP survey on the Troitsa Claim Group has indicated an anomalous zone of considerable lateral extent. Pyrite is known to be present, and there is not enough information to determine the relationship between the pyrite content and the chalcopyrite and/or molybdenite that might be present.

The geology in the vicinity of the IP anomalies should be examined in detail. If the mineralization causing the IP effects can not be observed, drilling would be warranted.

MCPHAR GEOPHYSICS LIMITED

Philip G. Hallof
Per. N.L.

Philip G. Hallof,
Geophysicist.

Robert A. Bell.

Robert A. Bell,
Geologist.

Dated: August 31, 1967

ASSESSMENT DETAILS

PROPERTY: Troitsa Claim Group

MINING DIVISION: Omineca

SPONSOR: Kennco Explorations (Western) Ltd.

PROVINCE: British Columbia

LOCATION: Cole Creek Area

TYPE OF SURVEY: Induced Polarization

OPERATING MAN DAYS:	30	DATE STARTED:	July 29, 1967
EQUIVALENT 8 HR. MAN DAYS:	45	DATE FINISHED:	August 6, 1967
CONSULTING MAN DAYS:	1.5	NUMBER OF STATIONS:	192
DRAUGHTING MAN DAYS:	5	NUMBER OF READINGS:	1021
TOTAL MAN DAYS:	51.5	MILES OF LINE SURVEYED:	6.74

CONSULTANTS:
P. G. Hallof, 5 Minorca Place, Don Mills, Ontario.
R. A. Bell, 50 Hemford Crescent, Don Mills, Ontario.

FIELD TECHNICIANS:
G. Trefananko, 651 Sheppard Avenue West, Toronto, Ontario.
T. Yeo, Box 355, Ft. Saskatchewan, Alberta.

3 Helpers - supplied by client.

DRAUGHTSMEN:
K. Bingham, 78 Hubbard Blvd., Toronto 13, Ontario.
N. Lade, Apt. 503, 35 Esterbrooke Avenue, Willowdale, Ontario.
V. Young, 320 Tweedsmuir Avenue, Apt. 507, Toronto 10, Ontario.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof

Philip G. Hallof,
Geophysicist.

Per M.L.

Dated: August 31, 1967

SUMMARY OF COSTS

Troitsa Claim Group

Crew

6 days Operating	@ $215.00/day	$1,290.00
2 days Travel	@ $ 75.00/day	150.00

Expenses

Transportation-Car	$115.50	
Meals and Accommodation	71.23	
Freight and Brokerage	30.01	
Telephone and Telegraph	.86	
Pro-rated portion of Travel Expense	200.00	
Estimate of costs not yet received	100.00	
	$517.60	517.60
		$1,957.60

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof

Philip G. Hallof,
Geophysicist.

Reg. N.Y.

Dated: August 31, 1967

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.Sc. 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 the 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 directly or indirectly, in the property or securities of Kennco Explorations (Western) Ltd. or any affiliate.

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

7. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

Dated at Toronto

This 31st day of August, 1967

Philip G. Hallof

Philip G. Hallof, Ph.D.

Per. N.L.

CERTIFICATE

I, Robert Alan Bell, of the City of Toronto, Province of Ontario, do hereby certify that:

1. I am a geologist residing at 50 Hemford Crescent, Don Mills, (Toronto) Ontario.

2. I am a graduate of the University of Toronto in Physics and Geology with the degree of Bachelor of Arts (1949); and a graduate of the University of Wisconsin in Economic Geology with the degree of Ph.D. (1953).

3. I am a member of the Society of Economic Geologists and a fellow of the Geological Association of Canada.

4. I have been practising my profession for over fifteen years.

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

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

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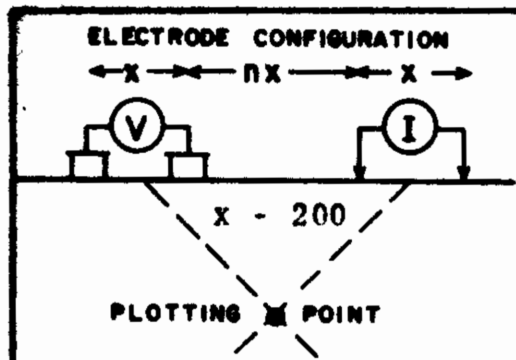
Dated at Toronto

This 31st day of August, 1967

Robert A. Bell

Robert A. Bell, Ph.D.

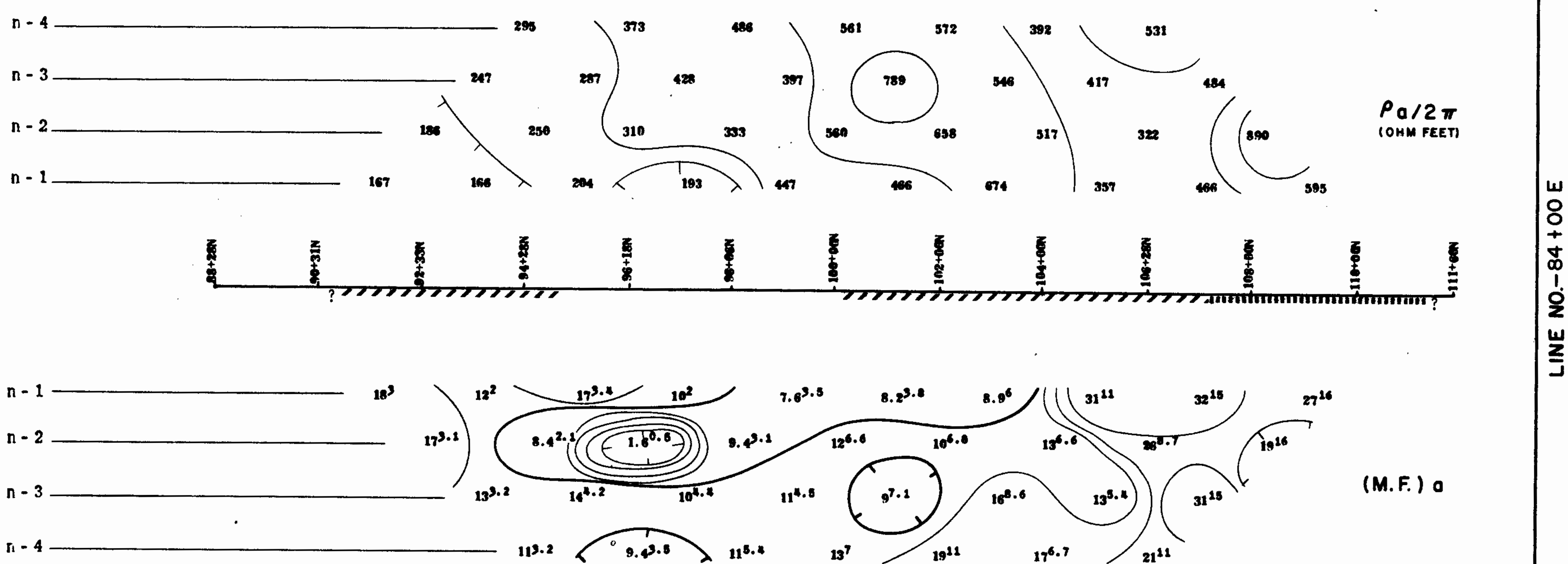
DWG. NO.-I.P.- 2732-I



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale-One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG. 1967

APPROVED

DATE Aug. 31, 1967

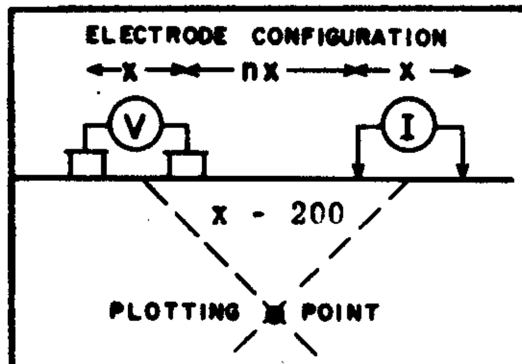
1073

DWG. NO.- I.P.- 2732-2

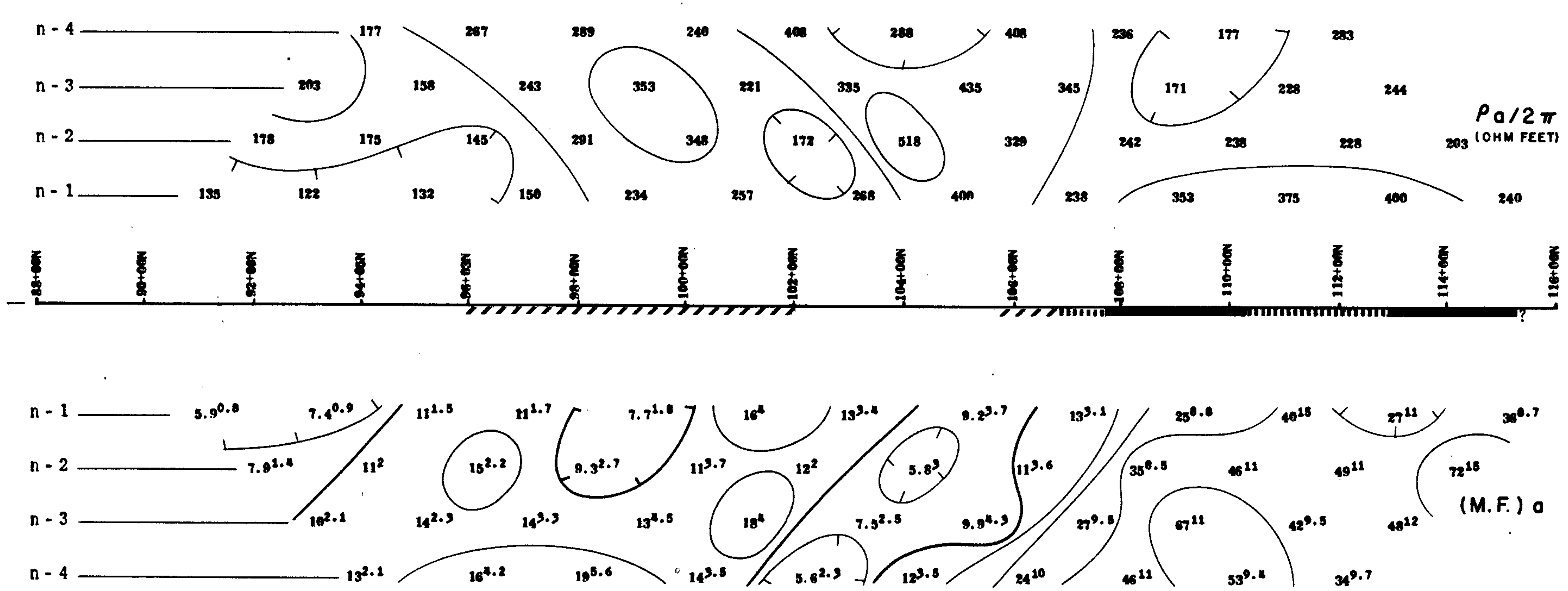
McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.-92+00E



KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

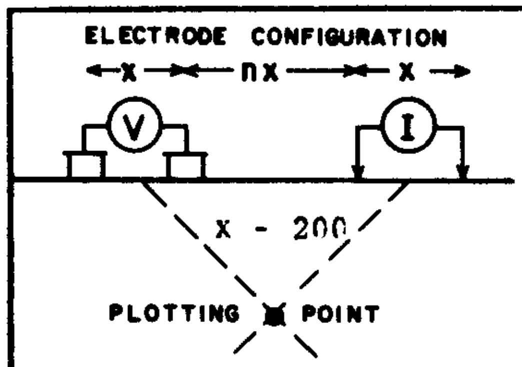
DATE SURVEYED AUG. 1967

APPROVED

DATE Aug. 31, 1967

1073

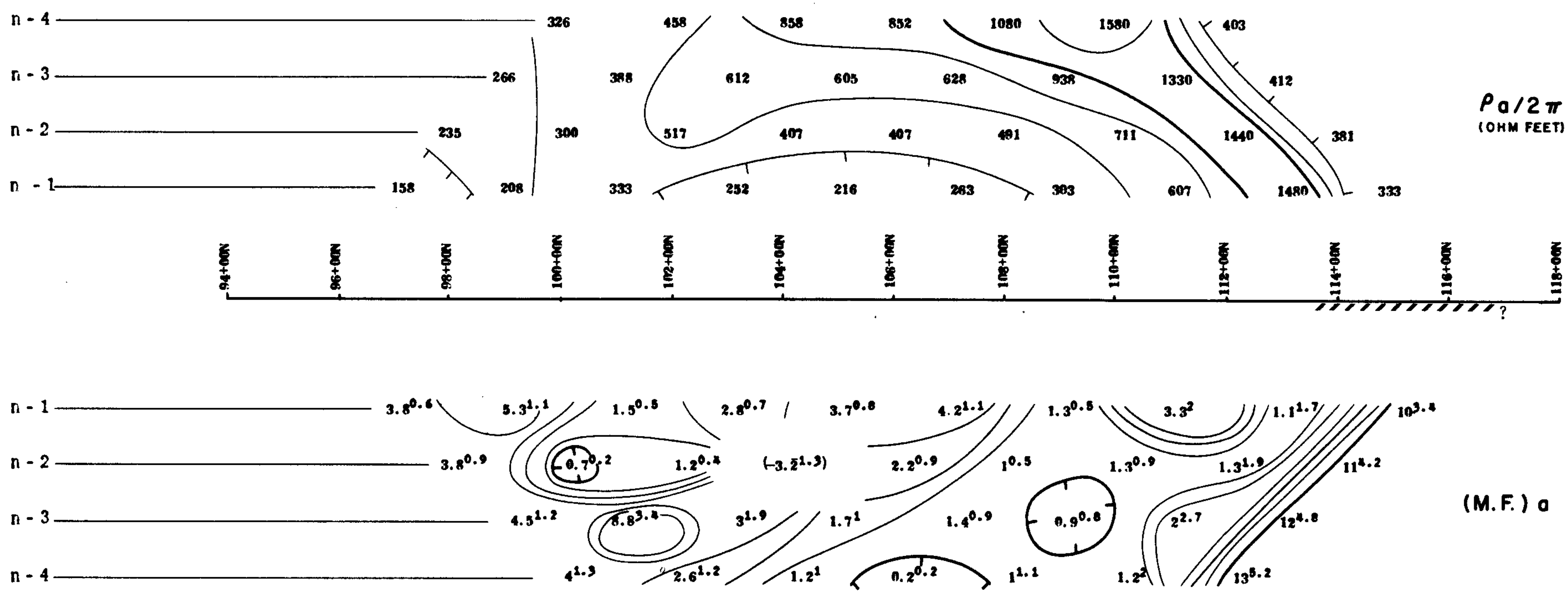
DWG. NO.- I.P.- 2732-3



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.-100+00E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG. 1967

APPROVED

DATE Aug. 31, 1967

1073

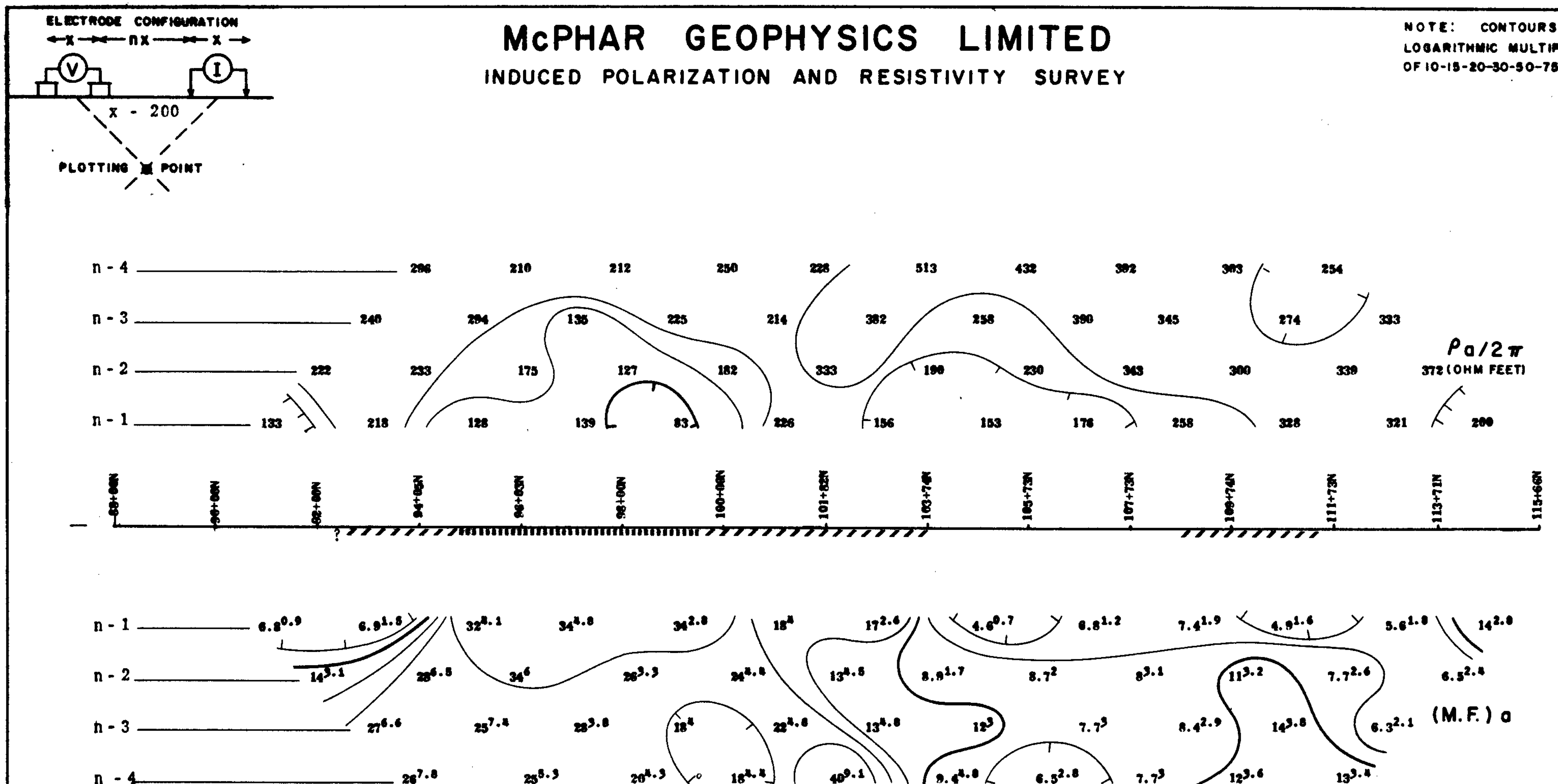
DWG. NO.-I.P.-2732-4

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

ELECTRODE CONFIGURATION

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.-108+00E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale-One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

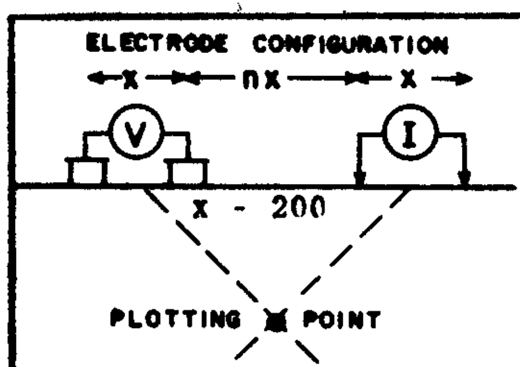
DATE SURVEYED AUG. 1961

APPROVED

DATE Aug. 31, 1961

1073

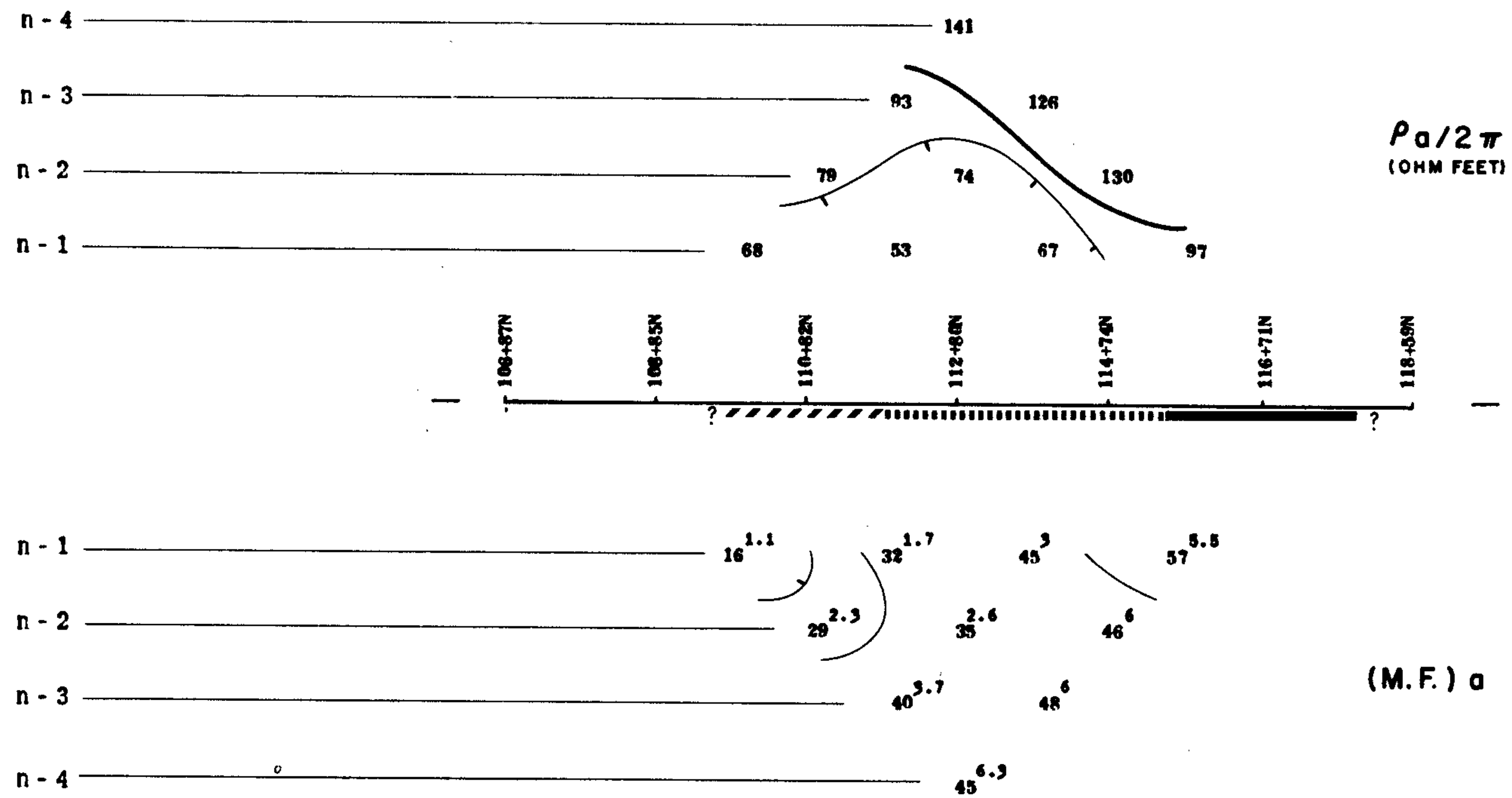
DWG. NO.–I.P.– 2732- 5



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.– 116+00 E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale – One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY 0·31 & 5·0 C.P.S

DATE SURVEYED AUG 1967

APPROVED

DATE Aug. 31, 1967

1073

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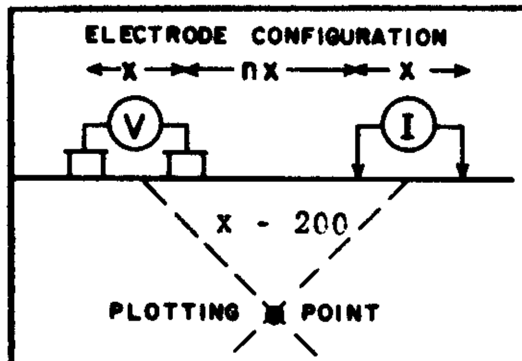
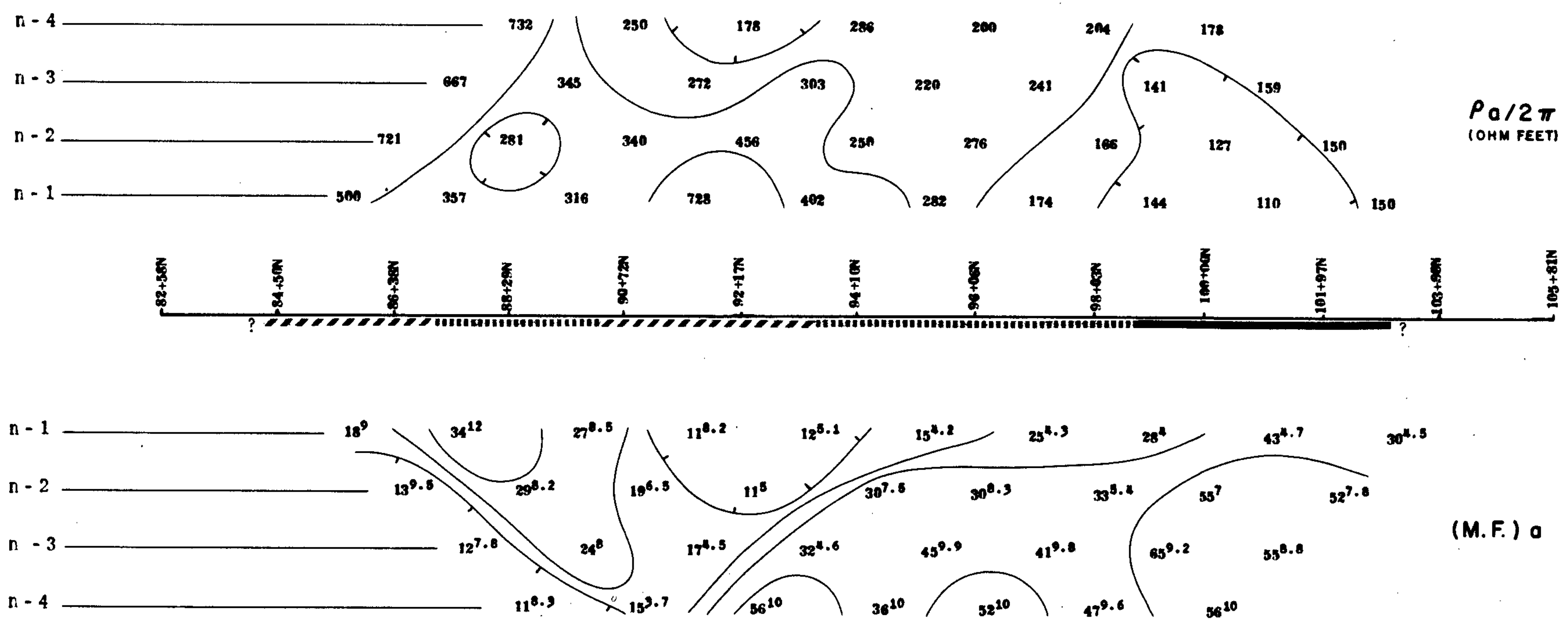


McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100

LINE NO.- 124+00N



KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG. 1968

APPROVED

DATE Aug. 31, 1969

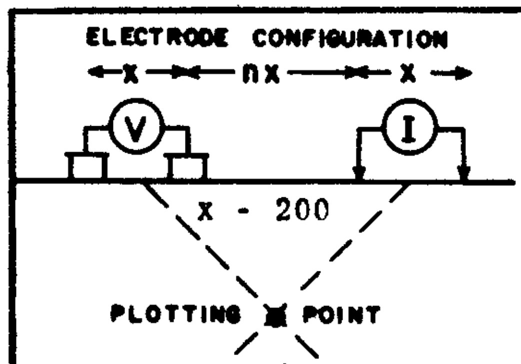
1073

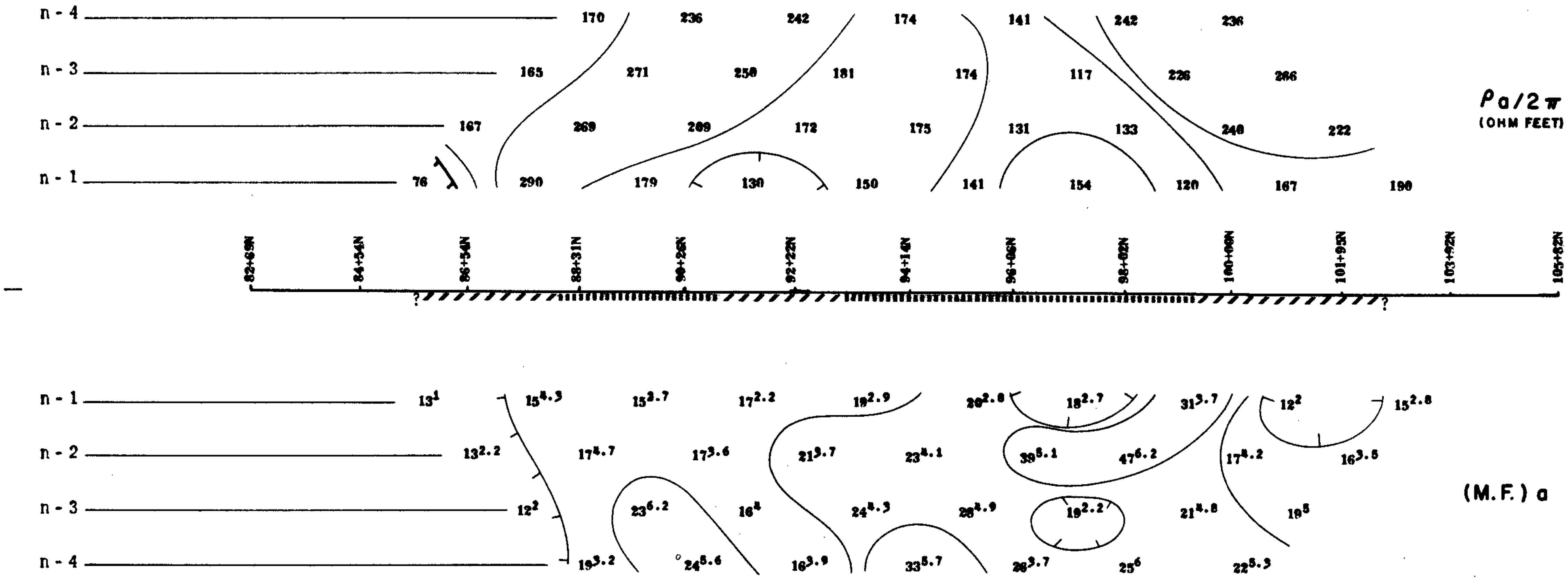
DWG. NO.-I.P.- 2732-7

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100





LINE NO.- 132+00 E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale—One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG 1967

APPROVED

DATE Aug. 31, 1967

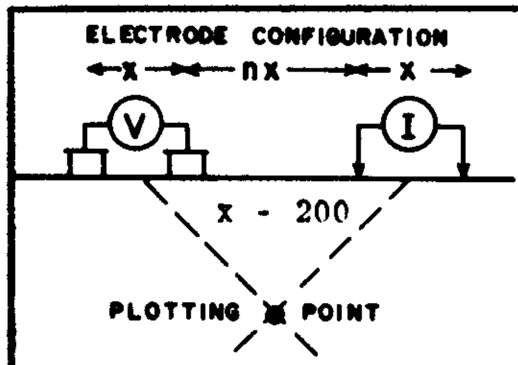
1073

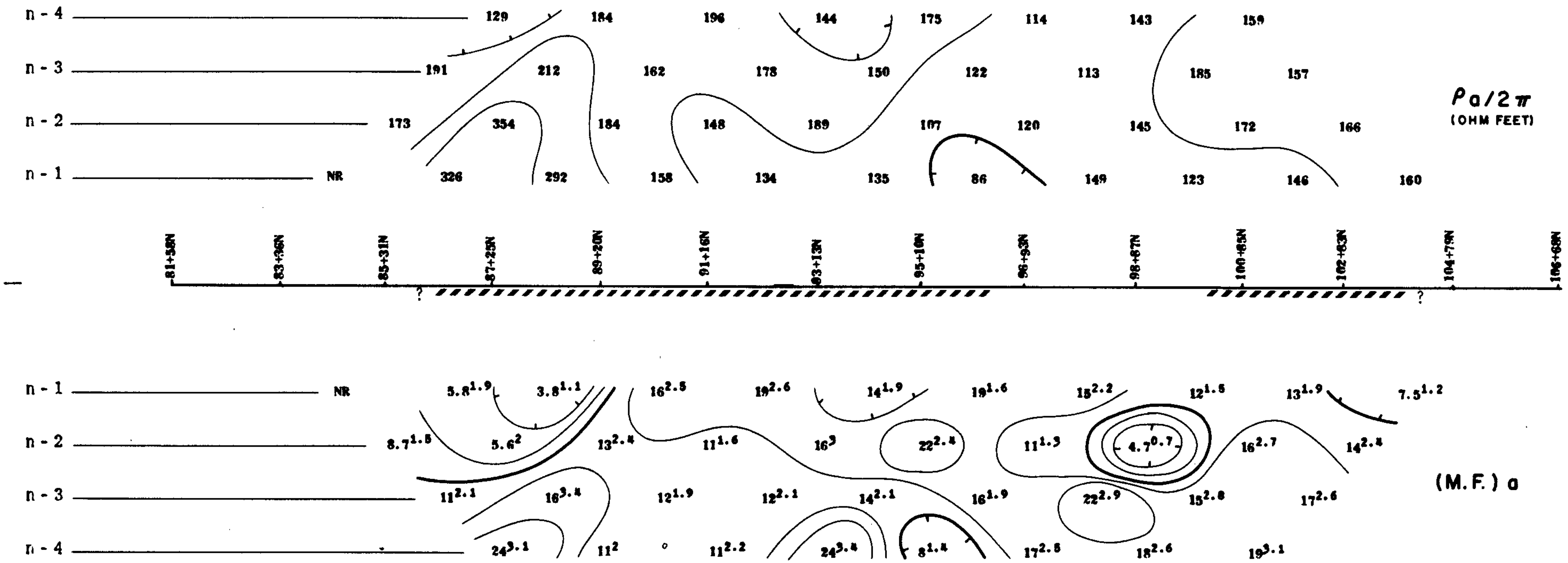
DWG. NO.-I.P.- 2732-8

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100





LINE NO.- 140 + 00E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG 1967

APPROVED

DATE Aug. 31, 1967

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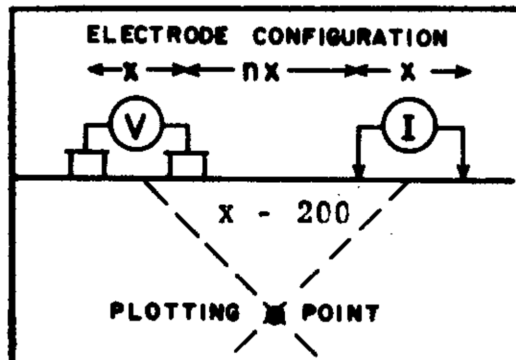
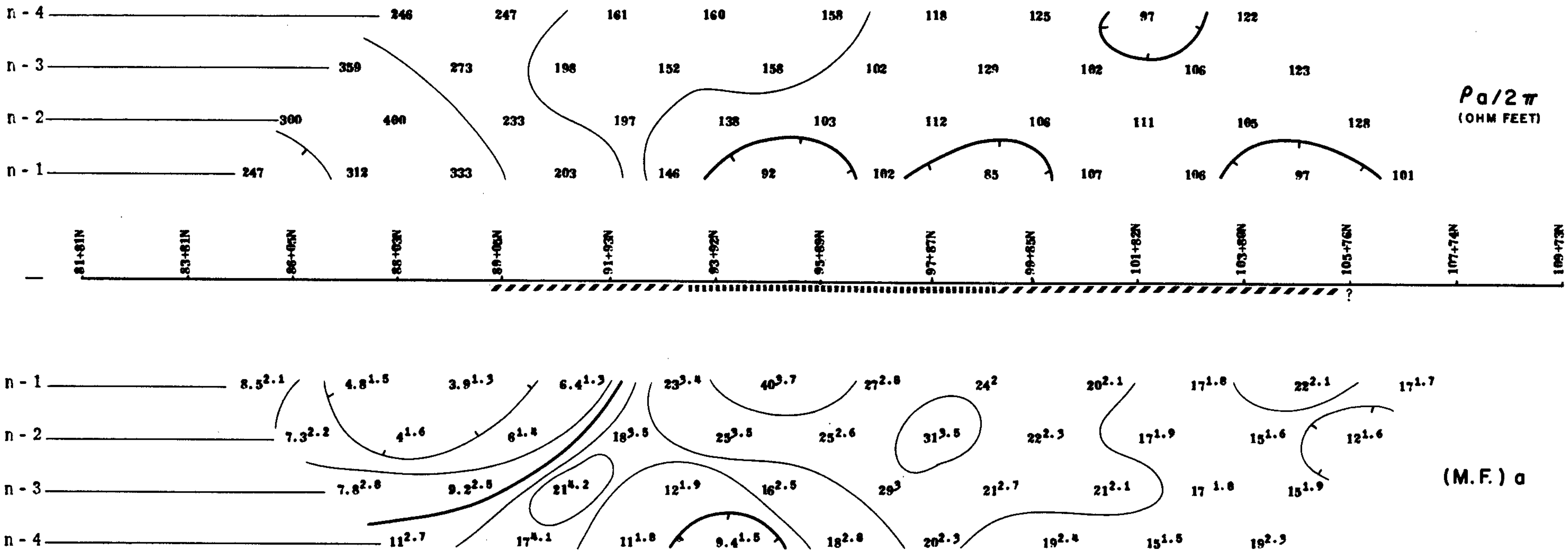
DWG. NO.- I.P.- 2732-9



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.- 148+00E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

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DATE SURVEYED AUG. 1961

APPROVED

DATE Aug. 31, 1961

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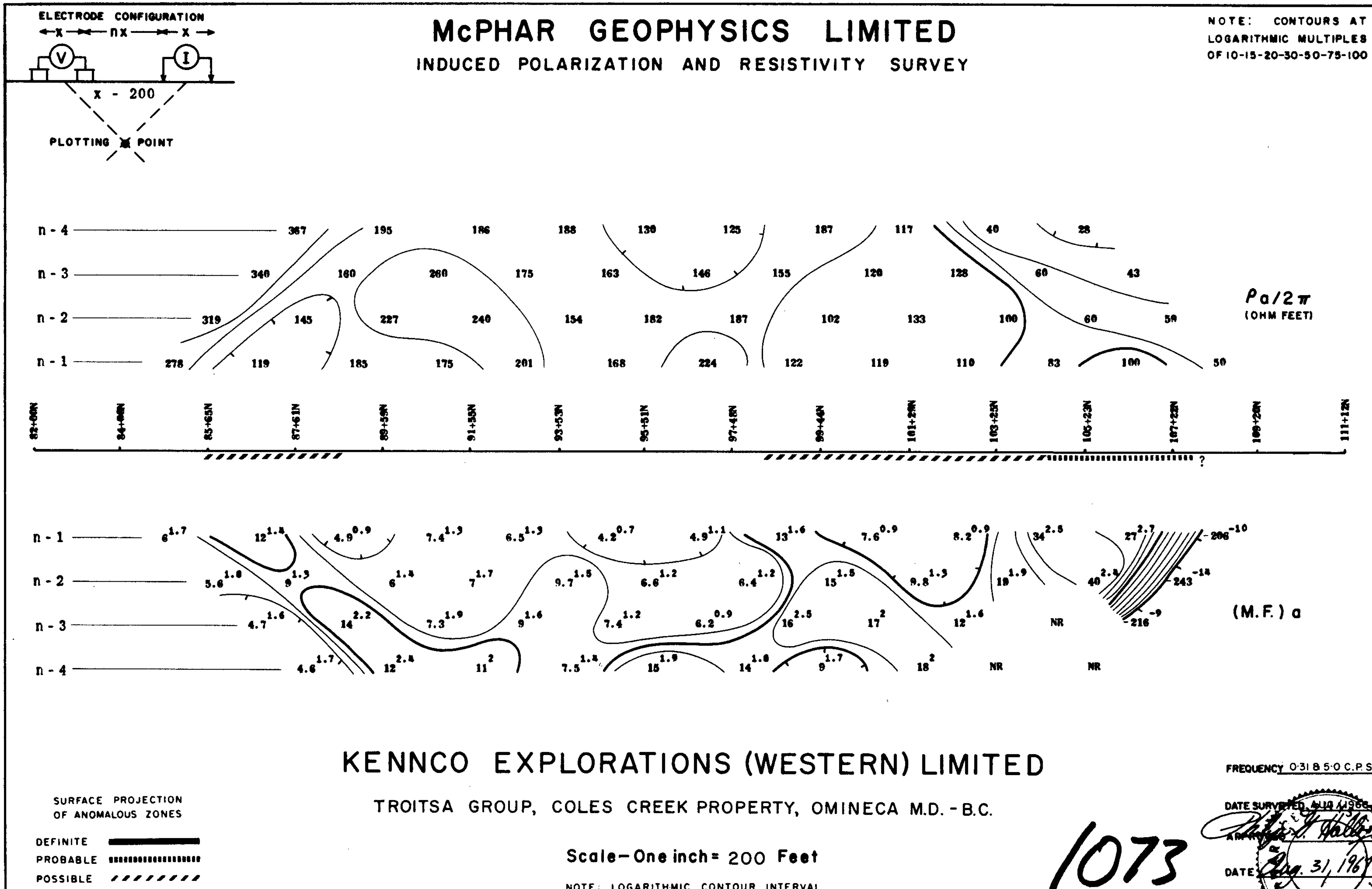
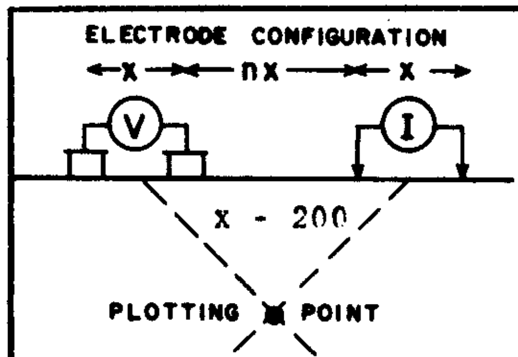
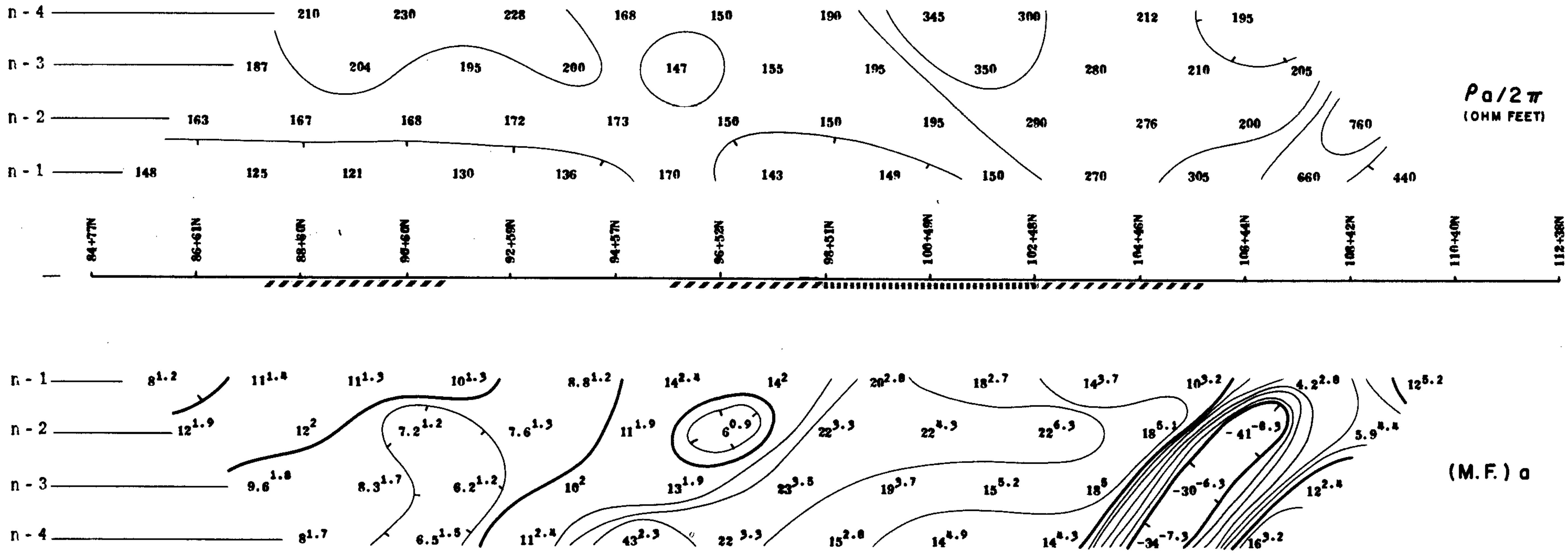




McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.- 164+00E

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

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FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG. 1967

APPROVED

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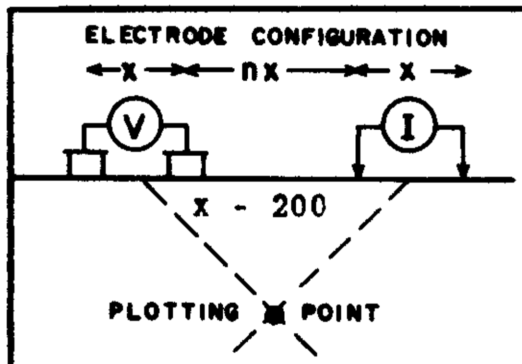
1073

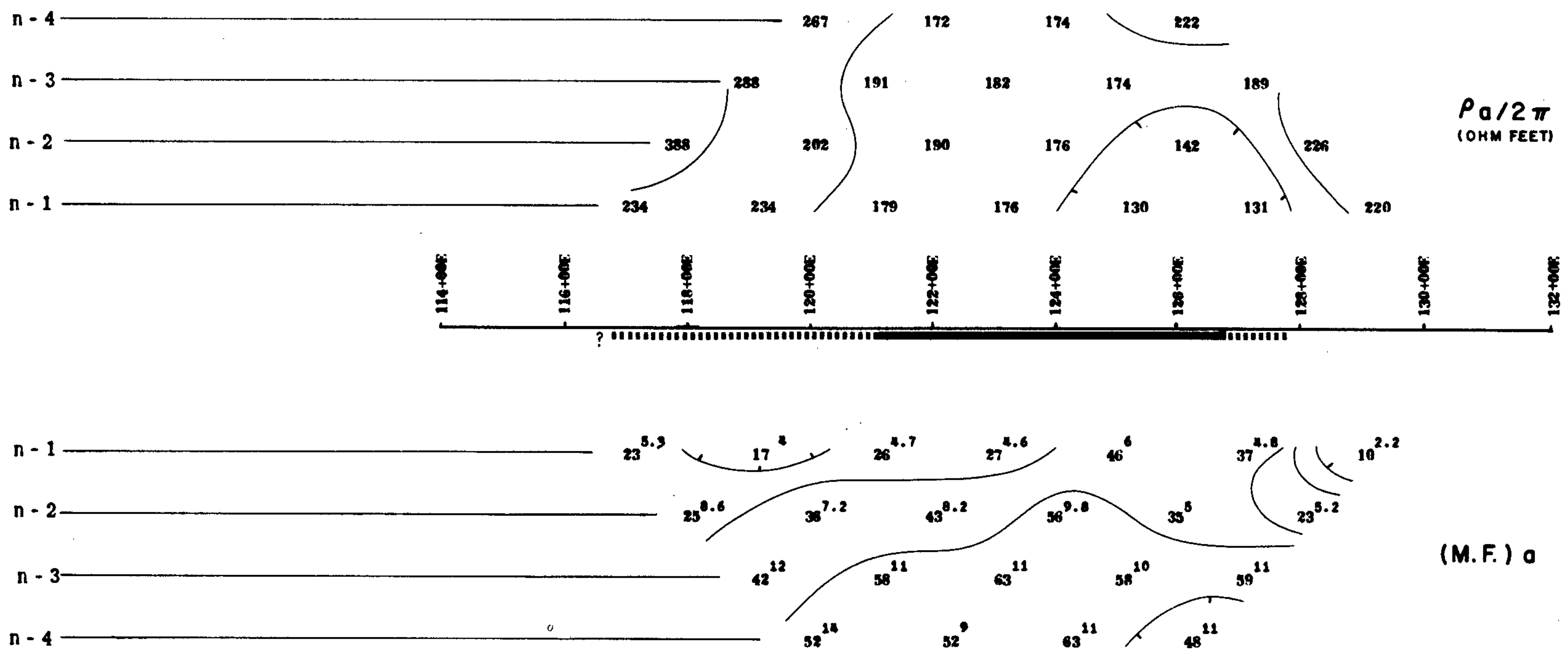
DWG. NO.-I.P.-2732-12

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100





LINE NO.-100+00N

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale-One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

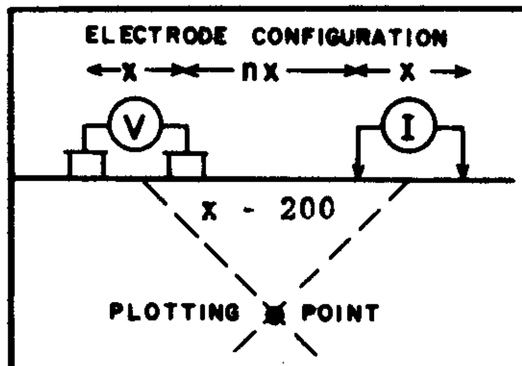
DATE SURVEYED AUG. 1967

APPROVED

DATE Aug. 31, 1967

1073

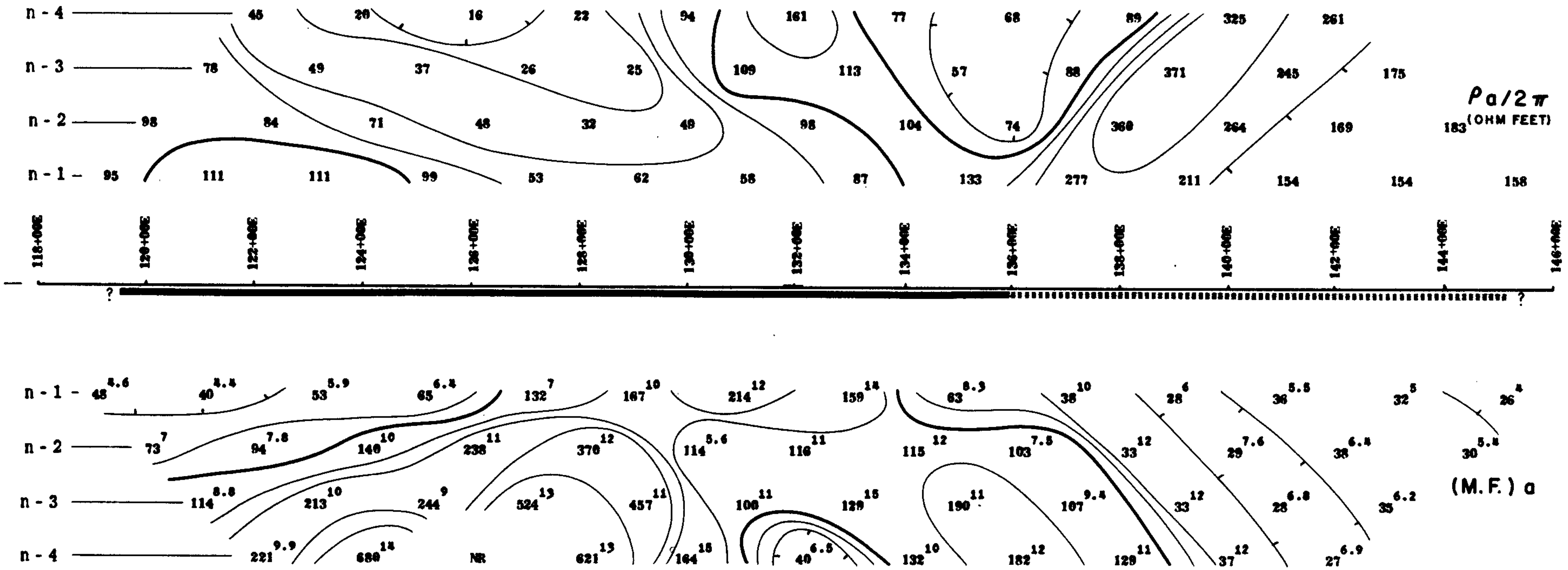
DWG. NO.- I.P.- 2732-13



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



LINE NO.- A

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

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POSSIBLE

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DATE Aug. 31, 1967

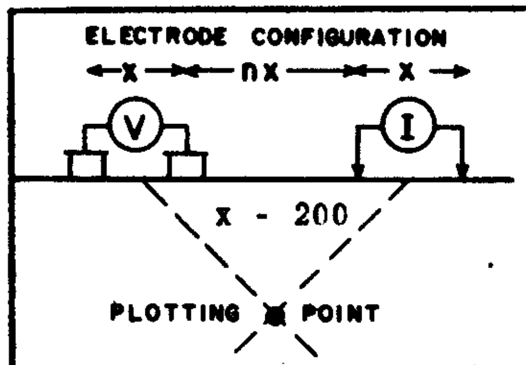
1073

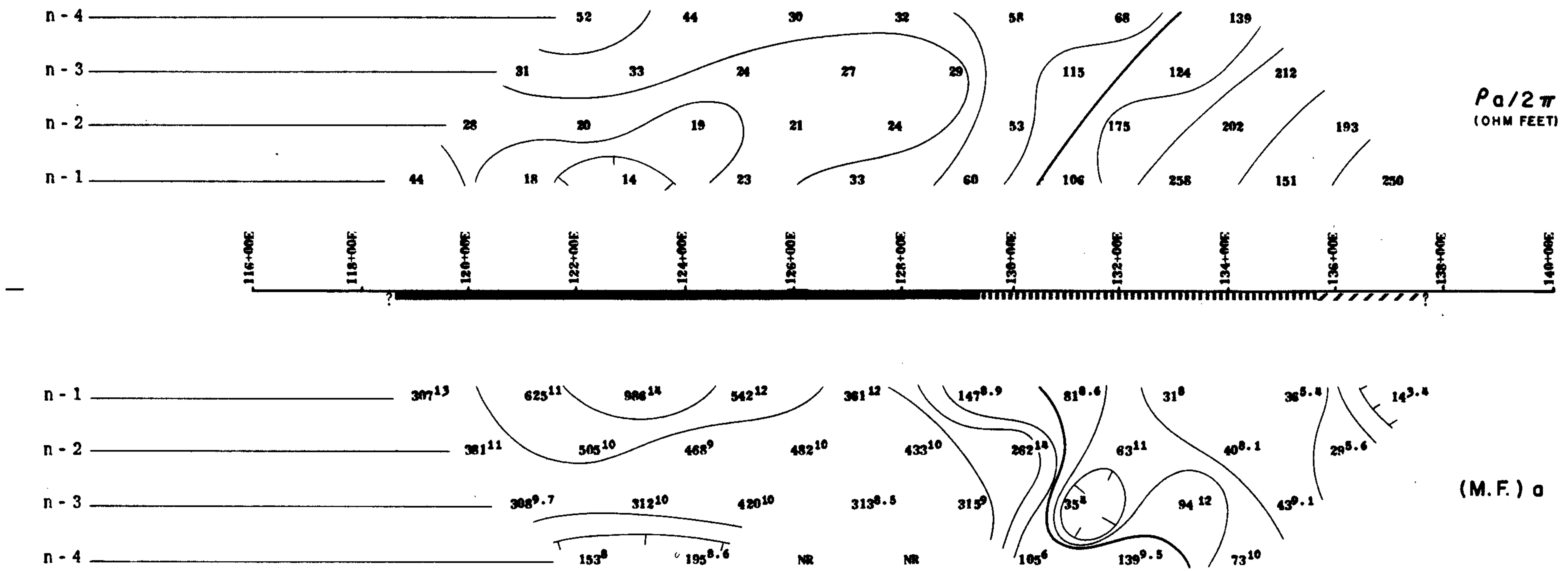
DWG. NO.-I.P.-2732-14

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100





LINE NO.-120+00N

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

Scale - One inch = 200 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY 0.31 & 5.0 C.P.S.

DATE SURVEYED AUG. 1967

APPROVED

DATE Aug. 31, 1967

1073

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

KENNCO EXPLORATIONS (WESTERN) LIMITED

TROITSA GROUP, COLES CREEK PROPERTY, OMINECA M.D. - B.C.

SCALE

ONE INCH EQUALS FOUR HUNDRED FEET

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 1073 MAP 1

1073

DRAWN: K.B.
DATE: AUG. 1967
APPROVED: R.A. Bell
DATE: Aug. 31/67

McPHAR GEOPHYSICS LIMITED

DWG. MISC. 3274

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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

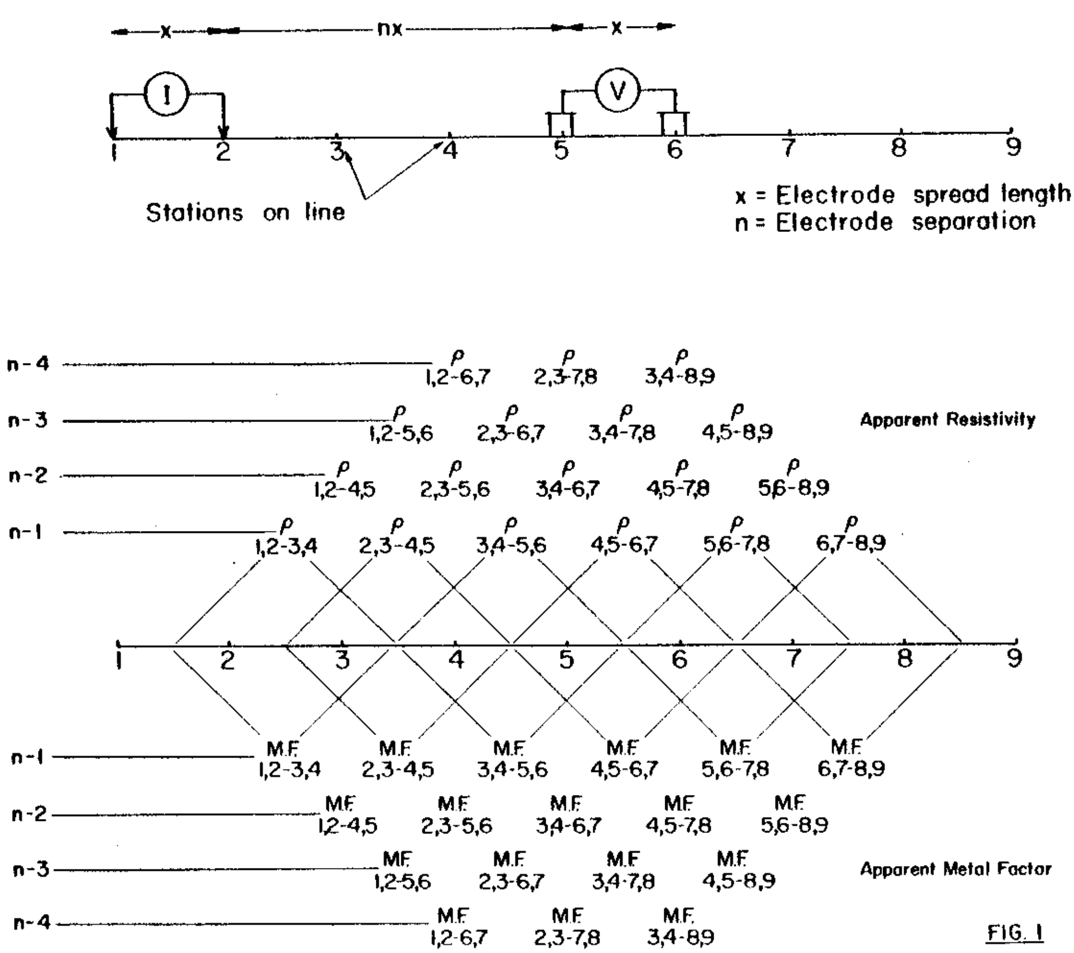

FIG. 1