84-#378-122.90

#### PHOENIX GEOPHYSICS LIMITED

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY

ON THE

ALLENDALE LAKE PROPERTY GREENWOOD & OSOYOOS MINING DIVISIONS BRITISH COLUMBIA

FOR

ALLENDALE RESOURCES CORPORATION

LATITUDE: 49°23'N LONGITUDE: 119°21'W N.T.S. 82E/6

CLAIMS: Lynx 1-4, Fox 1-6

OWNER: R. BECHTEL, F. BECHTEL, ALLENDALE RESOURCE CORP.

BY

Paul A. Cartwright, B.Sc., Geophysicist

Dated: 16 December 1983

# GEOLOGICAL BRANCH ASSESSMENT REPORT

ART

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#### 1) INTRODUCTION

An Induced Polarization and Resistivity Survey has been completed on the Allendale Lake Property, Greenwood & Osoyoos Mining Divisions, British Columbia, on behalf of Allendale Resources Corp., property operators.

The property is located 18 kilometers east of the community of Okanagan Falls, B.C. Access is via 25 kilometers of gravel road from Highway # 97 at Okanagan Falls.

The following geological description of the project area has been provided by Kerr, Dawson and Associates Ltd., consultants to Allendale Resource Corp.

"The principal rock type on the property is a coarsegrained, porphyritic, mafic-rich Tertiary Syenite Stock. Geological mapping and interpretation indicates that the northern portion of the stock is very fresh, massive and unaltered, with minimal structural features. The southern portion of the stock is altered, with evidence of increasing structural features, and intrusive activity. Geological interpretation suggests that the basin of the broad arcuate valley, located on Line 4+00N at 1+00W, may be the center of later structural and/or intrusive activity."

Previous work included drilling in the area of known copper-silver showings, with no significant results. During 1983 Kerr, Dawson and Associates Ltd. completed a comprehensive program of soil sampling, ground magnetometer surveying and geological mapping over the property.

Objective of the present IP and Resistivity Survey was to investigate areas of interest in the southcentral area of the claim block, as outlined by the geochemistry, geological mapping and magnetics.

A Phoenix Model IPV-1 IP and Resistivity receiver unit was used in conjunction with a Phoenix Model IPT-1 IP and Resistivity transmitter powered by a 2.0 kw motor generator. IP effect is recorded directly as Percent Frequency Effect (P.F.E.) at operating frequencies of 4.0 Hz and 0.25 Hz. Apparent resistivity values are normalized in units of ohmmeters, while Metal Factor values are calculated according to the formula: M.F.= (P.F.E. x 1000) / Apparent Resistivity.

Dipole-dipole array was utilized to make all of the measurements, with a basic interelectrode distance of 50 meters. Four dipole separations were recorded in every case. Number of line kilometres surveyed during the present survey was 13.4 line kilometers.

Field work was carried out during late September and early October 1983, under the supervision of D. Labrecque, geophysicist crew leader. His certificate of qualification is included with this report.

PART A



#### 2) DESCRIPTION OF CLAIMS

The following claim information was provided by Mr. John Kerr of Kerr, Dawson and Associates Ltd.

"The property consists of ten mineral claims, four located by the twopost method, and six located by the Modified Grid System (MGS) of staking. The following provides information regarding legal description of each claim:

Name	Type of Claim	Rec. No.	No. Units	Mining Div.	Expiry Date
Lynx 1	2-post	15423	1	Osoyoos	10 June 1986
Lynx 2	2-post	15424	1	Osoyoos	10 June 1986
Lynx 3	2-post	1422	1	Osoyoos	16 July 1986
Lynx 4	2-post	1423	1	Osoyoos	16 July 1986
Fox 1	M.G.S.	31.03	20	Greenwood	21 June 1987
Fox 2	M.G.S.	3104	20	Greenwood	21 June 1987
Fox 3	M.G.S.	3105	20	Greenwood	21 June 1987
Fox 4	M.G.S.	3106	20	Greenwood	21 June 1987
Fox 5	M.G.S.	1892	20	Osoyoos	20 Sept. 1984
Fox 6	M.G.S.	1893	20	Osoyoos	20 Sept.1984

The Lynx 1 & 2 claims are recorded in the name of Robert Bechtel, and the Lynx 3 & 4 are recorded in the name of Florence Bechtel (nee Niddery). These claims are under agreement to Allendale Resource Corp. The Fox 1-6 claims are recorded in the name of Allendale Resource Corp.

The Moon and Dick claims were located after location of the Lynx claims, and prior to location of the Fox claims. These claims are in good standing, and are recorded in the name of Knie Resources Ltd. Therefore, the portion of these claims falling within the Fox claims will take precedence over that portion of the Fox claims. The Cameron, Shelley, Kam, and P.W. claims were staked after location of the Fox 1-4 claims, and prior to location of the Fox 5 & 6 claims. Therefore, the portion of these claims falling within the Fox 5 & 6 claims will take precedence over that portion of the Fox 5 & 6 claims. Therefore, the portion of these claims falling within the Fox 5 & 6 claims will take precedence over that portion of the Fox 5 & 6 claims. At the time of my title search (Sept., 30,1983), the Cameron, Shelley, Kam and P.W. claims were in good standing and were located in the name of individuals. Many of the claim posts have been located in the field, having been tied into the grid system; therefore, the accompanying representation of the claims is considered relatively accurate (Fig. 282-2)."



#### 3) PRESENTATION OF DATA

The Induced Polarization and Resistivity results are shown on the following data plots in the manner described in the notes accompanying this report. (Part B)

LINE		ELECTRODE INTERVAL	DWG. NO.
11+00N		50 meters	5836-1
10+00N	(B)	50 meters	5836-2
10+00N		50 meters	5836-3
8+00N		50 meters	5836-4
7+00N		50 meters	5836-5
6+00N		50 meters	5836-6
5+00N		50 meters	5836-7
4+00N		50 meters	5836-8
3+00N		50 meters	5836-9

Also enclosed with this report is 1wg. I.P.P.-B-3031, a plan map of the Allendale Lake Property Grid at a scale of 1:5000. The definite, probable and possible Induced Polarization anomalies are indicated by bars, in the manner shown on the legend, on this plan map as well as on 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 electrode interval length; i.e., when using 50 meter electrode intervals the position of a narrow sulphide body can only be determined to lie between two stations 50 meters apart. In order to definitely locate, and fully evaluate, a narrow, shallow source it is necessary to use shorter eletrode intervals. In order to locate sources at some depth, larger electrode intervals 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 topographic, claim and grid information shown on Dwg. I.P.P.-B-3031 has been taken from maps made available by the staff of Kerr, Dawson and Associates Ltd.

#### 4) DISCUSSION OF RESULTS

The Induced Polarizaton and Resistivity data collected over the Allendale Lake grid are characteized by high magnitude background IP effects, combined with relatively high magnitude apparent resistivity values. This indicates that the grid is generally underlain by rock types which contain some disseminated sulphides, and/or magnetite. A number of zones of more concentrated mineralization are interpreted to lie within this mineralized matrix, and these zones are shown on Plan Map DWG No.-I.P.P.-B-3031. Each of the zones is discussed separately below.

#### ZONE A

This anomalous IP zone is outlined striking across the western portion of all of the grid lines, although the feature is wider and displays higher magnitude IP effects over the more northerly lines. The trend is open both towards the north and south. Substantialy higher than background TP effects mark the presence of the zone, particularly at its northern end. As high apparent resistivity values are noted coincident with the interesting IP effects, the source of the zone appears to be disseminated mineralization, buried less than 50 meters sub-surface.

#### ZONE B

Moderately anomalous IP effects coincident with lower than background resistivity values constitute Zone B. The source of the response is indicated to be in the order of 50 meters sub-surface. Like Zone A, this zone is undefined north of Line 11+00N.

Previous drilling may have already tested Zone B, in the vicinity of Line 10+00N (B), Station 2+00W.

ZONE C

This short anomalous IP zone is best outlined by the data recorded on Line 6+00N, between Station 3+50W and Station 2+50W, where higher than background IP readings are evident, together with somewhat lower resistivity measurements. The source is probably quite shallow, certainly less than 50 meters sub-surface, and is less than 50 meters in width.

#### ZONE D, ZONE E

These features strike parallel to each other, in a north-south direction, across the eastern portion of the grid lines. The two zones are interpreted to merge into a single trend on the most southerly three lines surveyed. The limits of the anomalous material are undefined towards the north, east and south. Data recorded on Line 7 + 00N, displays anomalous results eastward to the vicinity of Station 8+50E, where the response is still open to the east.

Zone D and Zone E are made up of broad regions of disseminated material, as indicated by the relatively high apparent resistivity values measured; however, narrower zones of lower resistivity, i.e., more conductive material, are indicated to lie within the confines of the zones. The northern end of Zone D appears to display the most anomalous results.

#### 5) SUMMARY AND RECOMMENDATIONS

The Induced Polarization and Resistivity survey on the Allendale Lake Property has detected five zones of anomalous IP effects. Drilling is recommended to test the sources of all five zones, at the locations noted below. Priority for drilling, as well as final collar locations, should be established after correlating the positons of the IP zones with other geological, geochemical and geophysical information.

#### ZONE A

A drill hole located so as to pass approximately 50 meters below Line 10+00N (B), Station 6+00W, would test one of the more anomalous responses seen in IP Zone A.

#### ZONE B

Diamond drill hole #5, a previously completed hole, may have already tested this IP zone, especially if the hole was drilled towardsthe west. If it is felt the source of IP Zone B was not intersected by DDH #5, a drill hole located so as to pass approximately 100 meters beneath Line 10+00N (B), Station 2+50 W would be recommended.

ZONE C

The most anomalous signature recorded within IP Zone C is evident on Line 6+00N. A drill hole collared so as to pass approximately 25 meters beneath Station 3+00W on Line 6+00N is recommended.

#### ZONE D

A drill hole located to pass approximately 50 meters beneath line 11+00N, Station 0+25E is recommended to test one of the more definitely anomalous features of IP Zone D.

#### ZONE E

It is recommended that this zone be tested by a drill hole spotted to pass approximately 50 meters beneath Line 7+00N, Station 1+90E.

PHOENIX GEOPHYSICS LIMITED

PAUL A. CARTWRIGHT, B.Sc., Geophysicist.

Dated: 16 December 1983

#### ASSESSMENT DETAILS

PROPERTY: Allendale Lake MINING DIVISION: Greenwood & Osoyoos SPONSOR: Allendale Resources Corp. PROVINCE: British Columbia LOCATION: 14 kilometers east of Okanagan Falls, B.C. TYPE OF SURVEY: Induced Polarization and Resistivity OPERATING MAN DAYS: 11 DATE STARTED: 25 Sept/1983 EQUIVALENT 8 HR. MAN DAYS: 33 DATE FINISHED: 9 Oct/1983 NUMBER OF STATIONS: 280 CONSULTING MAN DAYS: 4 DRAFTING MAN DAYS: 5 NUMBER OF READINGS: 1554 TOTAL MAN DAYS: 42 KILOMETERS OF LINE SURVEYED: 13.4

CONSULTANTS:

Paul A. Cartwright, 4238 W. 11th Avenue, Vancouver, B.C.

FIELD TECHNICIANS:

D.Labrecque, 524 Rue Taschereau, Rouyn, Ouebec.

Y.Nadeau, 2873 W.13th Avenue, Vancouver, B.C.

DRAUGHTSMEN:

R. Wakaluk, 7886 Vivian Drive, Vancouver, B.C.

PHOENIX GEOPHYSICS LIMITED

Paul A. Cartwright, B.Sc. Geophysicist.

Dated: 16 December 1983

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#### STATEMENT OF COST

#### ALLENDALE RESOURCES LTD. ALLENDALE LAKE PROPERTY, GREENWOOD & OSOYOOS M.D., B.C. INDUCED POLARIZATION AND RESISTIVITY SURVEY

CREW:	D. LABRECOUE, Y. NADEAU	
PERIOD:	Sept. 25,1983 to October 9,1983	
	11 Operating Days @ \$675.00	\$ 7,425.00
	1 Travel Standby Day @ \$350.00	350.00
	the the start of the	

# 1 Travel Standby Day @ \$350.00 350.00 1 Sick Day @ N.C. NC 1.5 Standby Days @ N.C. NC

#### EXPENSES:

Airfares (	pro-rated)	\$ 202.00	
Air Frt. (	pro-rated)	112.50	
Meals		630.0	
Fue1		34.35	
Salt for e	lectrodes	4.80	
		\$ 983.65	
+1 5%		147.55	1,131.20
			\$ 8,906.20

### PHOENIX GEOPHYSICS LIMITED

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Paul A.Cartwright, B.Sc. Geophysicist

Dated:

16 December 1983

#### CERTIFICATE

I, Paul A. Cartwright, of the City of Vancouver, Province of British Columbia, do hereby certify:

- 1. I am a geophysicist residing at 4238 W. 11th Avenue, Vancouver, B.C.
- I am a graduate of the University of British Columbia, B.C., with B.Sc. Degree.
- 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 13 years.
- I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Allendale Resources Corp. or any affiliate.
- The statements made in this report are based on a study of published geological literature and unpublished geological literature and unpublished private reports.
- Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

DATED AT VANCOUVER, B.C. this 16th day of December 1983.

Paul A. Cartwright, B.Sc.

#### CERTIFICATE

I, Doris Labrecque, of the City of Rouyn, Province of Quebec, do hereby certify that:

- 1. I am a geophysical crew leader residing at 524 Rue Taschereau, Rouyn, P.Q.
- 2. I have been practising my vocation about six yers.
- I am presently employed as a geophysical crew leader by Phoenix Geophysics Limited, of 200 Yorkland Blvd., Willowdale, Ontario.

Doris Labracque. Pupper

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DATED AT VANCOUVER, B.C. this 16th day of December 1983.

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ALLENDALE LAKE L11+00N X+50M RHO (OHM-N)	
DIPOLE NUMBER 2 3 4 5 6 7 9 9 10 11 12 13 14 15 16 17 16 13 28 21 22 3 COORDINATE 558H 858H 750H 658H 558H 458H 358H 258H 158H 56H 58H 58E 158E	3 24 25 1 26 250E 35
N=1       1858       2562       2238       1820       3638       2772       524       317       848       2228       2995       1818       1121       1745       873       856       1172       874       3246       1689       1267       2159       3696       11         N=2       2811       1852       2918       2214       1809       1978       808       TN       855       707       2565       2812       1085       1151       1786       672       1252       714       1462       4792       0488       1192       3307       2414         N=3       3376       1881       2435       2687       3759       1772       1305       789       1225       689       618       1748       1782       1064       1312       1555       1018       624       913       2389       1759       1275       2344       2115       2         N=4       3589       2582       2193       2276       3896       1143       1369       851       575       TN       1397       1749       1129       1257       2197       TN       711       1432       2209       3375       1617       1007       2076	1982 1561 342 1857 1159
N=5	
N=6	19

X=SON PFE ALLENDALE LAKE L11+99N 9 10 11 550H 450U DIPOLE NUMBER COORDINATE 950W INTERPRETATION 17 8 1 6 26 27 350E 2 8594 7504 6584 2.9 5.4 3.5 2.9 4.2 3.1 1 2.6 2.1 3.7 5.5 4.3 6 4.2 3.6 3.6 9.2 13.7 H=1 6,7 3.7 4.3 3.5 4 TN (2.6) 3.2 2.1 2.4 2.9 / 6.9 5.7 6.3 / 3.9 4.7 4.1 3 (91) 3.2 5.3 4.1 3.1 H=2 7.5) 4.7 4.8 T.N. 4 4.9 7 4.7 3.2 (1.8 2.8 15.2 TN. 5.1 4.6 4 3.2 4.5 5) 3.9 3.3 H=3 7.8/ 5.8 3.8 4.8 4.1 6.1 6.8 .5 3.5 3.4 6 5.7 7.9 3.5 5.9 4,6 3.5 3.6 11 3.7 T.N. T.N. 5.9 5.9 3,4 TN: TN 5 5.3 5 4,8 N=4 3.5 7.6 4 4.4 4.1 4,4 6 H=5 N=5

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	ALLENDALE LAKE LI1+00N X=50M METAL FACTOR
DIP	ADLE NUMBER 2 3 4 5 6 7 6 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
000	<u>JPDINATE 950H 850H 750H 650H 550H 450H 350H 250H 150H 50H 50E 150E 250E 35</u>
1.1.1	
H=1 H=2	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
-N=4	TN 1.6 2 1.5 2 3.6 5.1 3.5 3.2 4.7 6.4 TN TN. 3.4 5.2 2.7 1.6 TN TN. 3.5 2.4 1.5 3 5.9 2.2 1.9 3.1
H=5	
H=6	

DHG NO -1 P-5036-1 27 50E N=1 ALLENDALE RESOURCES CORP N=2 N=3 ALLENDALE LAKE PROPERTY N=4DEDYOOS AND GREENHOOD N.D. IB C. N=5 N=6 -LINE NO -11+80H ~x->>-— N X — > × -> -10-1 H=1 N=2 PLOTTING POINT X=SON 11=3 H=4 SURFACE PROJECTION OF ANOMALOUS ZONE N=5 DEFINITE -PROBABLE ..... H=6 POSSIBLE ..... DATE SURVEYED OCT 1983 APPROVED 27 16 PAC NOTE- CONTOURS RT LOGARITHMIC INTERVALS 1.-1 5 H=1 DATE DEC 12 183 -2,-3.-5,-7 5.-18 N=2 H=3 PHOENIX GEOPHYSICS LTD H=4 INDUCED POLARIZATION N=5 N=6 -AND RESISTIVITY SURVEY

ALLENDALE LAKE LIG+00H(8) X=30H PHO (OHH-H)	
DIFOLE NURBER 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 COORDINATE 750H 650H 550H 450H 350H 350H 150H 50H 50E 150E 250E 350E	458E
H+1 1673/ 755 1011 3029 3705 1805 2090 1458 1622 1662 1170 899 12622 1278 4736 1172 835 5225 3061 1311 1577 1157	H=1
H+2 1590 (849 909) 1310 3656 2475 1776 1508 2122 1837 (181 628 (1155 1308 2352 3464) 556 (1620 4575 (1717 1560 1101 64	N=2
H=3 1887 1110 1185 1129 1484 2175 2180 1296 2152 2956 1566 630 609 554 2443 2714 1710 825 1649 2992 1757 1130 702 706	11=3
H=4 2556 1120 1345 1260 1113 906 1748 1443 1609 2777 2612 181 631 TN 951 2029 1170 2078 772 1108 2916 1160 754 702 1160	N=4
H=5	N=5
H=6	N=6

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ALLENDALE LAKE LIG+COH(8) X=SON PFE	
DIPOLE NUMBER 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 10 19 20 21 22 23 24 COORDINATE 7504 6504 5504 4504 3504 2504 1504 504 504 508 506 150E 250E 350E 4 INTERPRETATION	1 25 50E
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	H=1 -
11+3 4.7 3.4 5.5 2.6 3.1 5.5 7.3 (4.1 (2.5 (3.6 3.4 3.5 3.6 3.8 3.6 <u>2.6</u> ) 4.4 5.2) 3.8 3.7 2.9 2.8 3.8 3.4 11+4 5 12 5.4 5.3 12 13 3.6 6.8 7.7 4.7 2.3 4.1 3.6 2.7 TN 3.7 3.5 4 4.9 4.5 3.1 4 2.8 3 3.9 4	H=3 -
N=5	N=S -

Control and an and a state of the state of t	
ALLENDALE LAKE LIG+GGN(B) X=50H HETAL FACTOR	
DIFOLE NUMBER 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 10 19 20 21 22 23 2	4 1 25
COORDINATE 756N 656N 550N 450N 356N 250N 150N 50N 50E 150E 250E 350E	450E
N=1 4.7 2.9 4.6 2.3 1.6 2.2 2 1.9 1.7 1.2 1.5 2.7 1 2.3 1.8 1.3 1.5 2.1 1.8 2.3	11=1 -
H=2 43 42 32 3.5 (15 25 3 23) 13 17 15 59 24 27 (11 1) (9 (3) 1 (19) 22 23 20	N=2 -
H+2 25 3 46 (23 21 23 33 32) (12 12) (22 (56 52 63) (15) 1 26 63 (23 12) (22 25 (54 40	N=3 -
HAR 2 11 4 42 12 4 39 55 27 8 16 3 59 TH 29 12 34 23 58 14 24 4 5 34	14=4 -
N=5	H=5 -
N=6	N=6 -

DHG NO -1 P-5836-2

## ALLENDALE RESOURCES CORP.

ALLENDALE LAKE PROPERTY DS0Y005 AND GREENHOOD M D (B.C.

LINE NO .- 10+00N(E)



SUFFACE PROJECTION OF ANOMALOUS ZONE

PROBABLE POSSIBLE

> DATE SURVEYED-OCT 1993 APPROVED

NOTE- CONTOURS AT LOGARITHMIC INTERVALS 1.-1 5 -2.-3.-5.-7.5.=10

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PAC DATE DEC 12/83

# PHOENIX GEOPHYSICS LTD.

INDUCED POLARIZATION

AND RESISTIVITY SURVEY

ALLENDALE LAKE LIG+OON X=50M RHG (DHM-M)	
DIFOLE NUMBER 2 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 COORDINATE 750H 650H 550H 450H 350H 250H 150H 50H 50H 50E 150E 250E 350E INTERPRETATION	24 25 450E
H*1 463 364 709 3167 3008 517 1979 835 2772 3300 1151 1147 724 609 1045 716 1316 1590 3291 754 765 834 H=2 1812 366 TN 1885 4594 2346 2129 660 1181 5528 2389 661 978 412 652 1815 456 961 2518 1583 666 923 1245 N=3 2232 1383 TN TN 1357 4044 3017 765 763 7349 5392 1114 465 848 445 868 712 377 1389 2117 (1249 796 1188 1600 H=4 3690 1771 1215 TN TN 1960 4488 1807 746 2367 4153 2540 666 353 406 696 759 619 1038 1368 1594 1311 870 1346 2118	H=1 N=2 H=3 N=4
N=5	N=5
11=6	Ne6

ALLENDALE LAKE LIG+DON	(=SON PFE
DIPOLE NUMBER 2 3 4 5 1 COORDINATE 7584 6584 5584 INTERFRETATION	6 7 8 9 10 11 12 13 14 15 16 17 16 19 20 21 22 23 24 2 450H 350H 250H 150H 50H 50E 150E 250E 350E 450E
N=1         2.1         2.4         2.6         6.8         9.2         TN           N=2         3.9         TN         TN         2.8         5.3         6.1           N=3         4.6         3.5         TN         TN         1.5         3.7         5.2           N=4         4.9         4.3         5.1         TN         TN         2         3.9         5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
H=5	80
N=6	N

RLLENDRLE LAKE LIG+GON X=30N METAL FACTOR	
DIPOLE NUMBER 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 COORDINATE 7584 6564 5584 4564 3584 2564 1584 584 586 1586 2586 3586 7	24 [ 25 458E
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	H=I - N=2 - N=3 - N=4 -
N=5	N=5 -
N=6	H = 6

DHG NO -1 P-5836-3

# ALLENDALE RESOURCES CORP.

ALLENDALE LAKE PROPERTY

OSOYOOS AND GREENHOOD M D. . . . C.

LINE NO -LIG+OON



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE PROBABLE POSSIBLE

> DATE SURVEYED OCT 1983 APPROVED

NOTE- CONTOURS AT LOGARITHNIC INTERVALS, 1,-1.5 -2.-3,-5.-7 5,-10

PAC DATE DEC 12/83

### PHOENIX GEOPHYSICS LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

ALLENDALE LAKE L6+88N X=50M PHO (OHM-M)	
OIPOLE NUMBER         2         3         4         5         6         7         8         9         10         11         12         13         14         15         16         17         18         19         20         21         22         23           COORDINATE         750H         650H         550H         450H         350H         250H         150H         50H         50E         150E         250E         350E           INTERPRETATION         650H         550H         450H         350H         250H         150H         50H         50E         150E         250E         350E	24 25 450E
N=1       1103       3997       2243       1879       2107       2760       1372       2375       2550       1686       463       443       260       545       580       1891       2146       1350       1193       1455       2450       1893         N=2       TN       948       3667       2348       1704       2008       1145       2304       2326       1283       602       313       391       653       632       475       1496       1586       1227       1235       2062       2443       1679         H=3       1051       TN       855       3635       1572       777       1642       2434       1466       507       451       334       753       719       665       559       1366       1721       1106       1596       1922       2119       1696         H=4       1654       637       TN       745       4773       3358       586       1680       617       719       780       1816       1296       1296       1260       1456       1592         H=4       1654       637       TN       745       4773       3358       580       1698       818       328	N= N= N=
N=5 N=6	1(= H=

ALLENDALE LAKE L8+88N	X+SON PFE	
DIPOLE NUMBER         2         3         4         5           COORDINATE         750W         650W         550W           INTERPRETATION	1 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 450м 350м 250м 150м 50м 50е 150е 250е 350е	24 25 458E
N=1 H=2 N=3 N=4 TN 1.7 4.8 4.4 4.4 4.4 4.4 4.5 5.2 3.6 4.4 4.4 4.5 5.2 3.6 4.4 4.8 4.4 3.6 5.2 3.6 4.4 4.8 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.4 3.6 5.2 3.6 4.8 4.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N=1 - N=2 - N=3 - N=4 - N=5 -
H=6		N=6 -

ALLENDALE LAKE L8+88H X=50M METAL FACTOR	
DIFOLE NUMBER 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 2 COORDINATE 750N 650N 550N 450N 350N 250N 150N 50N 50E 150E 250E 350E	3   24   25 458E
N=1 13 1 12 33 13 14 18 1 3 14 12 52 69 128 29 18 15 19 23 27 19 24	N=1 -
11=2 TN L8 L3 L9 2.1 2.6 2.9 L5 1 L9 3.5 5.1 9 3.1 3 4.2 L7 L4 (2.2 3 (1.9 2.3 (3.4	N=2 -
11=3 4 IN 2.7 1.2 L2 $((5 5.7)$ 2.3 1.2 L6 (4.3 6.4 5.7 4.5 3.9 3.6 3.9) (1.2 (1.5) (3.3) 2.2 2.1 2.4 3.5	N=3 -
H=4 TN 9.6 TN 2.7 1.6 1.6 TN 4.9 2.2 1.8 2.9 5.8 7.7 (2.2) 6.9 5.7 3.8 2.7 1.4 2.9 2.5 2.9 2.5 2.8 3	N=4 -
-N=5	N=5 -
11=6	N=6 -

DNG NO -1 P-5836-4

# ALLENDALE RESOURCES CORP.

#### ALLENDALE LAKE PROPERTY

GROYDOS AND GREENWOOD M.D. IB.C.

LINE NO -8+00N



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE PROBABLE POSSIBLE

> DATE SURVEYED OCT 1993 Approved

NOTE- CONTOURS AT LOGRRITHMIC INTERVALS. 1,-1.5 -2,-3,-5,-7.5,-10

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INDUCED POLARIZATION AND RESISTIVITY SURVEY

ALLENDRLE LAKE L7+00H X=30H HETAL FACTOR	
ис новее 2 3 4 5 6 7 6 9 10 11 12 17 14 15 16 17 18 12 20 21 22 23 24 25 26 27 26 29 30 31 32 3 ФЛИНЕТЕ 7504 6504 5504 4504 7504 2504 1504 504 505 150E 250E 350E 450E 550E 650E 750E 250E	3
LS 7 & LS 14 15 26 18 13 44 52 35 22 4 16 18 18 19 22 25 25 12 13 11 12 12 15 16 18 18 19 20 22 12 12 12 12 12 12 12 12 12 12 12 12	

ALLENDALE LAVE L7+00H	X*SOM PFE			
OLE NUMBER 2 3 4 5 RDINATE 250M 650M 550M ERPRETATION	6 7 8 9 10 11 4500 3500 2500	12 13 14 15 16 1 150H 50H 50H 50E	7 18 15 20 21 22 23 150E 250E 350E	450E 558E 658E 758E 250E
4.8 2.3 3.6 8.1 4.1 5.5 3.8 2.6 1.9 4.3 3.3 2.6 4.9 3.2 2.8 2.4 4.5 (1.9) 7 TN TN 2.7 3.2 2.6 3.7 2.1	$\begin{array}{c} 3.5 \\ 2.6 \\ 3.2 \\ 4.5 \\ 2.3 \\ 2.6 \\ 2.5 \\ 2.6 \\ 2.5 \\$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

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S D T M M I E	1.26	2M 8550H	5.5.6.6		8.00.00	5.099			to be been as a second se		and the second se					and the second se
RPPETR	TION															
	4445	3574 1659 2199	-3245/ 2119	1377 2273	883 / 403	335 1013	574 2891	2009 1304	1353 1810	2166 175	4 2419 137	3 4437 822	1019 2444	2311 3523	4570 1985	942 2775
258	5362	3 3398 2868 23	1755//99	7 (1735 (962	581/ 30	1037 909	525 22	198/ 1527 157	2 1983 20	63/1445/	1996 1855	2542 1165 1	147 1589 2006	2668) 4875	1619 1261	2843 2464
722 8	1876	3538 4978 2762	1189 / 751	(1312 1101)	750 (400)	791 917	642) (394	1598 1662 4	2125 2346	1270 (162	2 / 1418 ( 282	18 (712) (1566	1349 1239	2291 / 4485 /	2468 1686 1	632 2825 (1956
850 T	4 177	4922 4022	515 66	1876 117	1 351 /2	598 729	599 2	97 1397 178	1 2147 /12	55 1310	1037 1911	822 1821 1	29 623 1494	4528 /2324	2340 1818	1316 2172 1637

ALLENDALE L	AKE 17+8	<b>8</b> H	-	×=50	-	0 (044	-117										3				-
DE NUMBER	12	1 2	14	1.1	1 3 1	71	8	2 1 19	1 11	1 12 1 13	14 1 13	116.11	7   18   19	20 21	22 1 23	24 25	26 27	20 1 25 1	30 31	32 33	
DINGTE 780	N.	65.01/		5.64	45.0	a Li	25.00	21	5.64	1504	508	585	158E	258E	358E	458E	558E	658E	7565	SSOF	





N=5

Heel

He1 11=2

DATE SURVEYED OCT 1963 Approved

2=50H

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INDUCED POLARIZATION HHD RESISTIVITY SURVEY

12290 Port 1 of 2

RELENDALE LAVE LE+BON X=50N RHO (OHH-H)	
OTPOLE NUMBER         2         3         4         5         6         7         8         9         16         11         12         13         14         15         16         17         18         15         20         21         22         27           COORDINATE         750H         650H         550H         450H         350H         250H         150H         50H         50E         150E         250E         <	24 25 450E
11=1 2159 2090 1953 5740 1714 1149 614 520 482 712 827 988 782 977 743 893 897 1133 659 995 1088 2307 11=2 5753 2070 2496 2009 3672 1261 658 502 632 612 553 772 934 872 717 634 624 1384 1113 906 1248 1307 1223	N=1 N=2
11-3 730 5584 2199 3416 1581 2329 (741 616 1878 784 594 439 750 1045 876 741 530 941 1268 (1556 1195 (1595 1327) 1938 11+4 598 738 4673 2616 1642 562 1272 682 1306 665 589 334 367 872 964 907 1170 881 816 1471 1692 1306 1449 1559 1448	N=3 N=4
11=5	H=5
N=6	N=6

1

91

ALLENDALE LAKE LE+00N X=50M PFE	
DIPOLE NUMBER 2 3 4 5 6 7 P 9 10 11 12 13 14 15 16 17 18 19 20 21 22 COORDINATE 750H 650N 550H 450H 350H 250H 150H 50H 50E 150E 250E 35 INTERPRETATION	23 1 24 1 25 DE 450E
Nel 24 27 24 44 19 18 13 11/23 39 34 27 23 26 2 29 21 25 27 2 29 31	ti = 1 -
11+2 25 31 26 23 34 28 25 12 24 22 TA 22 TA 23 26 16 21 2 24 (31 (17) 31 35 (25)	11+2 -
11+3 2 2.2 4.9 2.5 (10 3.2) 2.7 (17 2.7 2.7 2.3 1.1) 2.9 2.7 2.1 2.2 2.3 2.7 3 2.4 3.9 3.6 4.5	N=3 -
11 + 4 4.6 2.5 2.4 5.6 1 1.8 1.9 2.6 3.7 2.5 1.9 2 1.7 2.3 2.6 2.7 2.1 2.5 2.8 2.6 4.8 3.9 3.7 4.9 4	.5 11=4 -
11=5	H=5 -
Neg	H = 6 -

ALLENDALE LAVE L6+00H X=50H HETAL FACTOR	
DIFOLE NUMBER 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 COORDINATE 7504 650N 550H 450H 350H 250H 150H 50H 50H 50E 150E 250E 350E INTERPRETATION	24   25 450E
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N = 1 N = 1
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	11 = 11 =
N=5 N=6	H= 1 H= 1

DHG NO -1 P-5836-8

# ALLENDALE RESOURCES CORP.

ALLENDALE LAFE PROPERTY

OSOYOOS AND GPEENHOOD H D . D C

LINE NO -6+00H



SURFACE FROJECTION OF ANOMALOUS ZONE

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HOTE- CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5 -2.-3.-5.-7 5.-10

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# PHOENIX GEOPHYSICS LTD.

INDUCED POLARIZATION RND RESISTIVITY SURVEY

ALLENDALE LAVE LS+00N S+50N RH0 (OHN-H)	
DIPOLE NUMBER         2         3         4         5         6         7         8         9         10         11         12         13         14         15         16         17         18         19         20         21         22         23           COORDINATE         7500         6500         5500         4500         3500         2500         1500         500         1500         2500         3500           INTERPRETATION         500         5500         4500         3500         2500         1500         2500         3500	24 25 450E
H=1 676 3325, 2211 2326, 828 377 641 164 2047 421 362 1122 1891 2658 3034 2785	H = 1
·H=2 1755 2004 2018 1354 955 533 960 629 665 372 528 1514 2847 2284 1934 1536	H = 2
11+1 947 (2211 /1415 1117 651 971 /1531 064) (387 /164) (667 9808 2893 (1375 1301 1548	11 = 3 -
H=4 827 978 1457 774 638 841 2242 1192 555 109 309	H = 4
-11=5	14=5
N#6	N=6

X=50H PFE ALLENDALE LAKE 15+00N 30 14 15 16 13 564 568 56E DIPOLE NUMBER 24 25 450E 7 8 6 1.10 13 20 21 22 111 1.8 7598 COORDINATE 7 INTERFRETATION 4564 H=1 1.9 1.9 61 6 1.4 2.4 3.1 2.4 1.9 H=1 141 2.4 4.2 3.4 3.4 3.9 4 2.1 1.8 1.5 2.6 2.9 H=2 (14 < 2 ) 12 1.4 1.5 > 2.2 3,4 3.7 3.1 3.8 3.8 11=2 2.6 2.7 2.5 (1.4 TN 1.8 3.1 N=3 1.0 2.5 3.2 (5.1) 4.3 2.9 3.3 3.7 3.6 N=3 11=4 3.1 2.2 2.4 2.2 2.7 4.1 3.7 3 1.7 TN. TN 3,5 4.7 4.3 4.8 2 11=4 H=5 N=5 11=6 N=6

ALLENDALE LA	NE L5+00N X=50N	HETAL FACTOR					
DIPOLE NUMBER COORDINATE 750	1 2 1 3 1 4 1 5 1 н 650н 550н	6 7 8 9 3 450W 350N	0 11 12 13 250M 150M SwamP	14 15 16 56H 5 3WAMP ?	0E 150E	20 21 22 250E 350	23 24 25 E 450E
H=1 2.1//	.7 .9 .8 1.3 1.6	2.2 2.1 1.5 1 5.7 1	3.2		3.7 1.8 / 1.3	1.3 1.4	. #=1 -
H=2 .8 .7	1.1 1 .7 2.3 2.4	2.9 2.3 7 5.5			2.2) 1.3	19/2 2.5	N=2 -
N=3 7.1) 8	1.8 2.8 5.1 2.8 1.8	2.9 7.6 T.N. 2.7			1 1.2	2.3 3.9 2.8	N=3 -
N=4 3.7 2.2 1.6	2.8 4.3 4.9 1.7 2.5	13.1 TN. TN.			1.8	1.9 54 3.2 2.8	N×4 -
H=5							H=5 -
H=6		1 - 10 - 11 - 12 - 11 - 12 - 11 - 12 - 12	and the second		1	4 14 W- 14	N=6 -

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DNG NO -1 P-5836-1

## ALLENDALE RESOURCES CORP.

ALLENDALE LAVE PROPERTY

DSOVODS AND GREENNOOD M D. B C

LINE NO .- 5+00H



SURFACE PROJECTION OF ANOMALOUS JONE

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INDUCED POLARIZATION

AND RESISTIVITY SURVEY

ALLENDALE LAKE L4+00N X=50M PHO (OHN-M)		
DIFOLE NUMBER 2 3 4 5 6 7 8 5 10 11 12 13 14 15 1 COORDINATE 750N 650N 550N 450N 350N 250N 150N 50N INTERPRETATION	18 17 18 19 20 21 22 23 50E 150E 250E 350E	24   25 450E
N=1 1854/1623 450/ 877 1507/ 1125// 230/ 438/ 1000	2153 2079 2681 2192 1995	H = 1
H=2 1189 1205 964 594 973 1041 332 508 733	2651 1719 3000 3173 1656	H=2
N=3 528 1895 2002 928 749 595 528 682 955	1873 1928 3757 2755 2824	N=3
N=4 568 487 1723 1606 1013 453 385 966 1072	1847 2866 2668 2958 1628	H=4
-N=5		11=5
N=6		N = 6

ALLENDALE LAKE L4+80N X=50M PFE 250H 150H 50H 50E 150E DIPOLE NUMBER 24 25 450E 20 21 22 250E 250W 550W COORDINATE ? 650W 4504 H=1 1.7 2.2/ 1 / 2.2 2.7 3.2/// 1.2 / 1.7 / 2.2 2.8 3 3 3.5 3.2 H=1 1.6 1.6 1.6 1.6 2.6 (1.3 1.7 / 2.4 N=2 3.4 / 2.7 (1.8) 3.9 1.9 3 N=2 1.8 2.1 3.8 N=3 12 1.9 2.4 3) (3 1.2 1.6 2.5 3.6 3.5 3.4 N=3 N=4 2.2 2.1 2.3 2.4 2.7 2.1 1.9 / 2.5 2.8 3,2 3,8 3,4 N=4 4.5 N=5 N=5 Hat NEE

ALLENDALE LAKE L4+00N X=30N HETAL FACTOR	
DIPOLE NUMBER         2         3         4         5         6         7         8         9         10         11         12         13         14         15           COORDINATE         7504         6504         5504         4504         3504         2504         1504         504           INTERFRETATION         SWAMP         5         4504         3504         5         5         5	16 17 18 19 20 21 22 23 24 25 50E 150E 250E 350E 450E 7
H=1 9/ 3.5/ 2.2 2.5 / 1.7 / 2.8 5.2 3.9 2.2	1.3 1.4 1.1 1.6 1.6 N=1 -
H=2 16 13 17 27 16 25 3.9 3.3 2.3	1.3 (1.6 (.6) 1.2 1.8 H=2-
11=3 2.3 1.8 (3) (2.3 ( 5.1 5 3 2.8 2.5	L3 L6 1 1.3 1.7 H=3.
H=4 3.9 4.1 1.2 1.4 2.4 6 5.5 1.9 2.3	1.5 1.5 1.9 1.3 /2.1 H=4-
tr=5	N=5-
N=6	N=6-

DHG NO -1 P-5836-1

# ALLENDALE RESOURCES CORP.

ALLENDALE LAKE PROPERTY OSOVOOS AND GREENHOOD M.D./D.C.

LINE NO .- L4+00N



SURFACE PROJECTION OF ANOMALOUS ZONE

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> DATE SURVEYED OCT 1983 Approved

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# PHOENIX GEOPHYSICS LTD.

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RLLENDALE LAVE L3+00H X+50H RH0 (0HH-H)	
DIPOLE NUMBER 2 3 4 5 6 7 8 9 10 11 12 15 14 15 16 17 18 19 20 21 2 COORDINATE 750M 650M 550W 450H 750H 250H 150H 50H 50H 50E 150E 250E	2   23   24   25 350E 450E
H=1 725 1452 1140 705 362 398 1339 1544 2498 1748 1470 2741 2550 2962 1850 2003	fi=1
H=2 866 \$73 917 1161 717 464 493 1477 2842 1641 1642 1921 2973 2018 (3505) (1345 1681	11=2
H=3 730 632 400 (1031 1150 622 605 692) (2372 2114 2036 2734 2355 2366 1366 14	199 H=3
H=4 655 466 440 456 995 152 883 763 936 187 187	/2160 11=4
H=5	H=5
11+5	H= 6

ALLENDALE LAKE L3+00H X=50H PFE		
DIFOLE NUMBER 2 3 4 5 6 7 6 9 10 11 12 13 1 COORDINATE 750H 650H 550H 450H 350H 250H 150H	14 15 16 17 18 19 20 21 22 23 2 500 50E 150E 250E 350E	4   25 450E
H=1 2,2 2,1 2,3 2,7 / 1,3 / (2,2 2,7 2,7 2,8	2.5 2.5 3.6 3 3.2 2.1 3.1	N=1 -
H=2 2.4 (1.0 1.7) 2.7 (1.0 1.6 (1.4)) (3.1 4.1	27 35 34 24 32 21 2	N=2
H=3 2 2.1 L8 2.2 2.4 2.3 (1.3 (2 ) 3.6	3.6 3 2.6 2.7 3.3 2 2.6	N=3 -
H=4 3.1 2.5 2 2.5 2.1 2.5 1.6 1.8 2.5	3 25 22 53 42 35 27	N=4 -
- 14 = 5		11=5 -
N=6		N=6 -

ALLENDALE LAKE L3+00N X=50M METAL FACTOR	
DIPOLE NUMBER         2         3         4         5         6         7         8         9         10         11           COORDINATE         750H         650H         550H         450H         350H         250H           INTERPRETATION         SwAm	2 13 14 15 16 17 18 19 20 21 22 23 24 25 150H 50H 50E 150E 250E 350E 450E P
N=1 3 14 2 3.8 3.6 55 2 1.7 1.1	L4 / L7 13 L2 L1 L1 /L5 N=1
N=2 2.8 3.1 1.9 2.3 2.6 3.4 2.8 2.1 (14	16 L8 L1 L2 (3) (L6 ( 12 H=2
H=7 2.7 3.3 4.5 2.1 2.1 - 2.8 2.1 23 (15	1.7 1.5 1 L1 L4 1.5 L7 N=3
H=4 4.7 5.4 4.5 5.5 2.1 2.1 2 2.3 3.1	1.6 1.2 .0 1.0 3.8 1.8 3.3 1.3 1.4
N=5	11=5
N=6	N=6

DHG H0 -1 P-5836-:

# ALLENDALE RESOURCES CORP.

ALLENDALE LAKE PROPERTY DSOVDOS AND GREENNOOD M D (E C

LINE NO -7+8011



PLOTTING N=50H

SURFACE FROJECTION OF ANOMALOUS ZONE

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# PHOENIX GEOPHYSICS LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

#### PART B

#### PHOENIX GEOPHYSICS LIMITED

# 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. can be useful values

-2-

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 cannot 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

-3-

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 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 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 at the top of the data profile, above the metal factor values. On a third line, below the metal factor values, are plotted the values of the percent frequency effect. The lateral displacement of a given value is determined by the location along the survey line of the center

-4-

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 the 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.

-5-

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.

The IP measurement is basically obtained by measuring the difference in potential or voltage ( $\Delta V$ ) obtained at two operating frequencies. The voltage is the product of the current through the ground and the apparent resistivity of the ground. Therefore, in field situations where the current is very low due to poor electrode contact, or the apparent resistivity is very low, or a combination of the two effects; the value of ( $\Delta V$ ) the change is potential will be too small to be measurable. The symbol "TL" on the data plots indicates this situation.

In some situations spurious noise, either man-made or natural, will render it impossible to obtain a reading. The symbol "N" on the data plots indicates a station at which it is too noisy to record a reading. If a reading can be obtained, but for reasons of noise there is some doubt as to its accuracy, the reading is bracketed in the data plot ( ).

In certain situations negative values of Apparent Frequency Effect are recorded. This may be due to the geologic

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environment or spurious electrical effects. The actual negative frequency effect value recorded is indicated on the data plot; however, the symbol "NEG" is indicated for the corresponding value of Apparent Metal Factor. In contouring negative values the contour lines are indicated to the nearest positive value in the immediate vicinity of the negative value.

The symbol "NR" indicates that for some reason the operator did not attempt to record a reading, although normal survey procedures would suggest that one was required. This may be due to inaccessible topography or other similar reasons. Any symbol other than those discussed above is unique to a particular situation and is described within the body of the report.

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