AN ASSESSMENT REPORT ON INDUCED POLARIZATION AND GROUND MAGNETIC SURVEYS ON THE P.M.A. PROPERTY LAC LA HACHE PROJECT AREA CLINTON MINING DIVISION, BRITISH COLUMBIA



NOV 1 7 1995 Gold Commissioner's Office VANCOUVER, B.C. LATITUDE 51 • 59'NORTH LONGITUDE 121 • 17'WEST NTS 92P/14 W GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORTS

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FOR

REGIONAL RESOURCES LIMITED/ G.W.R. RESOURCES INC.

BY

Daniel A. Klit, B.Sc.

and

John Lloyd, M.Sc., P. Eng.

LLOYD GEOPHYSICS INC. VANCOUVER, BRITISH COLUMBIA

OCTOBER, 1995 OCTOBER, 1995 SSESSMENT REPOR SSESSMENT REPOR

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SUMMARY

During the period of June 27, 1995 to July 7, 1995 Lloyd Geophysics Inc. conducted Induced Polarization (IP) and ground magnetic surveys on the PMA option, near Lac La Hache, British Columbia for Regional Resources Ltd. and G.W.R. Resources Inc.

The IP survey delineated an anomaly which is believed to be the northwest portion of a much larger zone of increased chargeability which was outlined on previous surveys.

Drilling of this anomaly should be based on the results obtained from previous drilling in the surrounding area.



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1.0 INTRODUCTION

During the period of June 27, 1995 to July 7, 1995, Lloyd Geophysics Inc. conducted Induced Polarization (IP) and ground magnetometer surveys on the PMA property, which is north of Lac La Hache, British Columbia, and forms part of the Lac La Hache Project of Regional Resources Ltd. and G.W.R. Resources Inc.

The purpose of these surveys was to define sulphide zones associated with a copper porphyry system which could then be tested by drilling.

2.0 PROPERTY LOCATION AND ACCESS

The PMA property is located at about 51°59' North Latitude and 121°17' West Longitude in the Clinton Mining Division, N.T.S. 92P (Figure 1). Access to the property is by truck from Lac La Hache via the Rail Lake Road and from Forest Grove via the Bradley Creek Road and secondary logging roads.

3.0 PROPERTY STATUS AND CLAIM HOLDINGS

The PMA option comprises four contiguous mineral claims (Figure 2) as listed below:

<u>Claim Name</u>	Record No.			
Dora 2	313634			
Dora 3	313635			
Jack 1	313376			
Jack 2	313377			

4.0 REGIONAL GEOLOGY

The Lac La Hache Project is situated within the Upper Triassic to Lower Jurassic Nicola Group,







which forms part of the Quessnel trough, a volcanic and sedimentary arc sequence affected by Upper Triassic to Jurassic intrusions, and by volcanic activity continuing into the Quartnary. The Quesnel Trough extends for over one thousand kilometres from northern Washington State to north-central British Columbia, and hosts alkalic porphyry copper-gold deposits (Afton, Similco) and mine prospects (Mount Milligan, Mount Polley) as well as goldskarns, and numerous porphyry occurrences.

Northeast of Lac La Hache, Nicola Group sediments, basalts, andesites and breccias are intruded by coeval small stocks of syenitic to dioritic composition. A significant portion of the Nicola Group is covered by Tertiary flood basalts. The Lower Jurassic Takomkane batholith, a monzonitic intrusion measuring about 50 kilometres in diameter, is located with its centre 35 kilometres northeast of Lac La Hache.

A large annular aeromagnetic anomaly, which may have developed as the result of monozonite intruding Nicola Group to the north of Peach Lake and Spout Lake, was first delineated by a survey flown for the Geological Survey of Canada in 1967.

Hydrothermal alteration has affected Nicola Group intrusives and metavolcanic rocks and consists of K-feldspar flooding, development of magnetite, hematite and propylitic alteration. Porphyry and skarn-type chalcopyrite and pyrite mineralization is locally associated with these alteration zones and includes the Peach, Miracle, Tim occurrences and the WC magnetite-chalcopyrite zone.

5.0 INSTRUMENT SPECIFICATIONS

5.1 Induced Polarization Survey Equipment

The equipment used to carry out this survey was a time domain measuring system consisting of a Wagner Leland/Onan motor generator set and a Mark II transmitter manufactured by Huntec Limited, Toronto, Canada and a six channel IP-6 receiver manufactured by BRGM Instruments, Orleans, France.



The Wagner Leland/Onan motor generator supplies in excess of 7.5 kilowatts of 3 phase power to the ground at 400 hertz via the Mark II transmitter.

The transmitter was operated with a cycle time of 8 seconds and the duty cycle ratio: [(time on)/(time on + time off)] was 0.5. This means the cycling sequence of the transmitter was 2 seconds current "on" and 2 seconds current "off" with consecutive pulses reversed in polarity.

The IP-6 receiver can read up to 6 dipoles simultaneously. It is microprocessor controlled, featuring automatic calibration, gain setting, SP cancellation and fault diagnosis. To accommodate a wide range of geological conditions, the delay, the window widths and hence the total integration time is programmable via the keypad. Measurements are calculated automatically every 2 to 4 seconds from the averaged waveform which is accumulated in memory.

The window widths of the IP-6 receiver can be programmed arithmetically or logarithmically. For this particular survey the instrument was programmed arithmetically into 10 equal window widths or channels, Cho, Ch1, Ch2, Ch3, Ch4, Ch5, Ch6, Ch7, Ch8, Ch9 (see Figure 3). These may be recorded individually and summed up automatically to obtain the total chargeability. Similarly the resistivity (a) in ohm-metres is also calculated automatically. The instrument parameters chosen for this survey were as follows:

Cycle Time (Tc) = 8 seconds Ratio (<u>Time On</u>) = 1:1 (Time Off)

Duty Cycle Ratio

 $\frac{\text{(Time On)}}{\text{(Time On)} + \text{(Time Off)}} = 0.5$

Delay Time (T₄) = 120 milliseconds





BRGM IP-6 RECEIVER PARAMETERS

Figure 3

Window Width (t_p) = 90 milliseconds Total Integration = 900 milliseconds Time (T_p)

5.2 Ground Magnetometer Survey Equipment

The equipment used to carry out the survey was an OMNI PLUS/OMNI IV magnetometer system manufactured by EDA Instruments Inc., Toronto, Ontario.

The system is completely software and microprocessor controlled. A portable proton precession magnetometer measures and stores in memory the total earth's magnetic field at the touch of a key. It also identifies and stores the location and time of each measurement, computes the statistical error of the reading and stores the decay and strength of the signal being measured. Throughout each survey day a similar base station magnetometer measures and stores in memory the daily fluctuations of the earth's magnetic field. The use of two magnetometers eliminates the need for a network of base stations on the grid. At the end of each survey day the field data is merged with the base station data and automatic diurnal corrections are applied to correct the field data, resulting in a very accurate $(\pm 5 \text{ nT})$ measurement of the earth's total magnetic field.

6.0 SURVEY SPECIFICATIONS

The configuration of the pole-dipole array used for the survey is shown below:

POLE-DIPOLE ARRAY



x = 50 metres; n = 1, 2, 3, 4, 5 and 6



The dipole length (x) is the distance between P₁ and P₂ and determines mainly the sensitivity of the array. The electrode separation (nx) is the distance between C₁ and P₁ and determines mainly the depth of penetration of the array.

The Induced Polarization survey was carried out with the current electrode, C₁ South of the potential measuring dipole P₁P₂. Here the lines were 200 metres apart and measurements were taken for x = 50 metres and n = 1, 2, 3, 4, 5 and 6.

7.0 DATA PROCESSING

The data collected was processed in the field at the end of each survey day using a portable 486 computer and Fujitsu printer.

The IP pseudo-sections were plotted out in the field and contoured using in-house software based on the mathematical solution known as kriging.

In the office, the data was transferred to mylar using a PENTIUM P90 computer coupled to a Hewlett Packard Draftsmaster II Plotter for the preparation of the final pseudo-sections and to an HP Design Jet plotter for production of contour plan maps.

8.0 DATA PRESENTATION

The data obtained from the surveys described in this report are presented on 14 pseudo sections and 3 contour plan maps as outlined below:

Pseudo-Sections (Scale 1:2000)

Line No. Dwg. No. Line No. Dwg. No. **OE** 1400E 95364-P08 95364-P01 200E 95364-P02 1600E 95364-P09 400E 95364-P03 1800E 95364-P10



95364-P04	2000E	95364-P11
95364-P05	2200E	95364-P12
95364-P06	2400E	95364-P13
95364-P07	2600E	95364-P14
	95364-P04 95364-P05 95364-P06 95364-P07	95364-P042000E95364-P052200E95364-P062400E95364-P072600E

Plan Maps (Scale 1:5000)

Total Field Magnetic Contours	95364-P15
Chargeability 21 Point Triangular Filter Contours	95364-P16
Resistivity 21 Point Triangular Filter Contours	95364-P17

9.0 DISCUSSION OF RESULTS

An IP response depends largely on the following factors:

- 1. The volume content of sulphide minerals
- 2. The number of pore paths that are blocked by sulphide grains
- 3. The number of sulphide faces that are available for polarization
- 4. The absolute size and shape of the sulphide grains and the relationship of their size and shape to the size and shape of the available pore paths
- 5. The electrode array employed

6. The width, depth, thickness and strike length of the mineralized body and its location relative to the array.

7. The resistivity contrast between the mineralized body and the unmineralized host rock

The sulphide content of the underlying rocks is one of the critical factors that we would like to determine from field measurements. Experience has shown that this is both difficult and unreliable because of the large number of variables, described above, which contribute to an IP response. The problem is further complicated by the fact that rocks containing magnetite, graphite, clay minerals and variably altered rocks produce IP responses of varying amplitudes.

A detailed study has been made of the pseudo-sections which accompany this report. These pseudo-sections are not sections of the electrical properties of the sub-surface strata and cannot



be treated as such when determining the depth, width and thickness of a zone which produces an anomalous pattern. The anomalies are classified into 4 groups; definite, probable, and possible anomalies and anomalies which have a much deeper source. These latter anomalies are mostly related to deeper overburden cover.

This classification is based partly on the relative amplitudes of the chargeability and to a lesser degree on the resistivity response. In addition the overall anomaly pattern and the degree to which this pattern may be correlated from line to line is of equal importance.

Results of the surveys depicted one main anomaly with high chargeability values on the western portion of the grid which is worthy of further exploration by drilling. Chargeability values within this anomaly increase from about 6 milliseconds on line 800E to 22 milliseconds on line 0E. The anomaly is open to the west and south of line 800E within the present grid area and is believed to be the northwest portion of a larger anomaly that was delineated by previous IP surveys, (see reports by Lloyd Geophysics 1991 and 1994). The resistivity and magnetic responses over the anomaly suggest that it can be divided into two zones. One zone is indicated by moderate resistivity and Mag responses west of line 200E and chargeability values greater than 14 milliseconds. The second zone lies between lines 200E and 800E and is indicated by high resistivities, about a 750nT increase in the magnetic field and moderate chargeability values (6 to 14 milliseconds).

The eastern margin of the anomaly appears to be structurally controlled by either a contact or fault which trends northwest to southeast and is depicted by chargeability values dropping off to background (less than 5 milliseconds), a well defined resistivity break where resistivites are below about 400 ohm-metres and another increase in the magnetic response to the east with values greater than 5000nT.

Chargeability values over the remainder of the grid are low and show no significant responses.



10.0 CONCLUSIONS AND RECOMMENDATIONS

The IP survey described in this report delineated an anomaly on the western portion of the grid which is worthy of further exploration by drilling. The western and southern extentions of this anomaly have been outlined by previous geophysical surveys in 1991, and 1994. Drill testing of this anomaly should be based on drill results from previous holes in the surrounding area.

The eastern portion of the grid showed no significant geophysical response and is not recommended for drilling at this time based on the geophysical data collected to date.

Respectfully submitted, LLOYD GEOPHYSICS INC.

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Dan A. Klit, B.Sc. Geophysicist

John hlagd

John Lloyd, P.Eng. Geophysicist



APPENDICES



Appendix A

PERSONNEL EMPLOYED ON SURVEY

Name	Occupation	Address	Dates
J. Lloyd	Geophysicist	Lloyd Geophysics Inc. 455 - 409 Granville St. Vancouver, B.C. V6C 1T2	October 20/95
D. Klit	Geophysicist		June 27 - July 7/95 July 13 - 16/95 October 19/95
C. Bilquist	Geophysical Technician	**	June 27 - July 7/95
I. Campbell	Geophysical Technician	*	June 27 - July 7/95
A. Lloyd	Geophysical Technician		July 13 - 16/95
A. Savard	Geophysical Technician		June 27 - July 7/95
S. Garrett	Helper		June 27 - July 7/95



Appendix B

COST OF SURVEY

Lloyd Geophysics Inc. contracted the IP data acquisition on a per diem basis, and the ground magnetic data on a per kilometre basis. Mobilization/demobilization, room and board, truck charges, data processing, map reproduction, interpretation and report writing were additional costs:

Room & Board		\$ 3,494.52
Truck		2,097.59
Mag/IP Data Acquisition	16,907.85	
Data Processing and Com	1,543.57	
Interpretation and Report	775.00	
	Sub-Total	\$24,818.53
	GST	<u>1.737.30</u>
	TOTAL	<u>\$26,555.83</u>



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Appendix C

CERTIFICATION OF SENIOR AUTHOR

I, John Lloyd, of 455 - 409 Granville Street, in the City of Vancouver, in the Province of British Columbia, do hereby certify that:

- 1. I graduated from the university of Liverpool, England in 1960 with a B.Sc. in Physics and Geology, Geophysics Option.
- 2. I obtained the diploma of the Imperial College of Science and Technology (D.I.C.), in Applied Geophysics from the Royal School of Mines, London University in 1961.
- 3. I obtained the degree of M.Sc. in Geophysics from the Royal School of Mines, London University in 1962.
- 4. I am a member in good standing of the Association of Professional Engineers in the Province of British Columbia, the Society of Exploration Geophysicists of America, the European Association of Exploration Geophysicists and the Canadian Institute of Mining and Metallurgy.
- 5. I have been practising my profession for over twenty-five years.

Vancouver, B.C. October, 1995







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