GEOPHYSICAL-GEOCHEMICAL REPORT

ON

INDUCED POLARIZATION & SOIL GEOCHEMISTRY SURVEYS

LAM CLAIMS

AFTON MINES AREA, KAMLOOPS, M.D., B.C.

LAM CLAIM

: 12 km SW of Kamloops, B.C.

: 50° 120° NW

: N.T.S. 92I/9W

WRITTEN FOR

: RICHPORT RESOURCES LTD.
250-625 Howe Street
Vancouver, B.C.
V6C 2T6

BY

: Michael H. Rogers
GEOTRONICS SURVEYS LTD.
403-750 West Pender Street
Vancouver, B.C., V6C 2T7

DATED

: March 12, 1981
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td>i</td>
</tr>
<tr>
<td>CONCLUSIONS</td>
<td>i</td>
</tr>
<tr>
<td>RECOMMENDATIONS</td>
<td>ii</td>
</tr>
<tr>
<td>INTRODUCTIONS AND GENERAL REMARKS</td>
<td>1</td>
</tr>
<tr>
<td>PROPERTY AND OWNERSHIP</td>
<td>1</td>
</tr>
<tr>
<td>LOCATION AND ACCESS</td>
<td>2</td>
</tr>
<tr>
<td>PHYSIOGRAPHY</td>
<td>2</td>
</tr>
<tr>
<td>HISTORY OF PREVIOUS WORK</td>
<td>3</td>
</tr>
<tr>
<td>GEOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>SOIL GEOCHEMISTRY SURVEY</td>
<td>4</td>
</tr>
<tr>
<td>1. Survey Procedure</td>
<td>4</td>
</tr>
<tr>
<td>2. Testing Procedure</td>
<td>4</td>
</tr>
<tr>
<td>3. Treatment of Data</td>
<td>4</td>
</tr>
<tr>
<td>INDUCED POLARIZATION SURVEY</td>
<td>5</td>
</tr>
<tr>
<td>1. Instrumentation and Theory</td>
<td>5</td>
</tr>
<tr>
<td>2. Survey Procedure</td>
<td>6</td>
</tr>
<tr>
<td>COMPILATION OF DATA</td>
<td>7</td>
</tr>
<tr>
<td>DISCUSSION OF RESULTS</td>
<td>7</td>
</tr>
<tr>
<td>1. Soil Geochemistry</td>
<td>7</td>
</tr>
<tr>
<td>2. Induced Polarization</td>
<td>8</td>
</tr>
<tr>
<td>3. Correlation With Other Surveys</td>
<td>8</td>
</tr>
<tr>
<td>a) Induced Polarization With Soil Geochemistry</td>
<td>8</td>
</tr>
<tr>
<td>b) Induced Polarization With VLF-EM</td>
<td>9</td>
</tr>
<tr>
<td>c) Induced Polarization With Magnetics</td>
<td>9</td>
</tr>
<tr>
<td>SELECTED BIBLIOGRAPHY</td>
<td>11</td>
</tr>
<tr>
<td>GEOPHYSICIST'S CERTIFICATE</td>
<td>12</td>
</tr>
<tr>
<td>AFFIDAVIT OF EXPENSES #1</td>
<td>13</td>
</tr>
<tr>
<td>AFFIDAVIT OF EXPENSES #2</td>
<td>14</td>
</tr>
</tbody>
</table>
### LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>MAPS - At End of Report</th>
<th>FIGURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Map</td>
<td>1:50,000</td>
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<tr>
<td>Claim Map</td>
<td>1:50,000</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>MAPS - In Pocket</th>
<th>SHEET</th>
</tr>
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<tbody>
<tr>
<td>Soil Geochemistry Survey</td>
<td></td>
</tr>
<tr>
<td>Copper &amp; Silver</td>
<td></td>
</tr>
<tr>
<td>Data &amp; Contours</td>
<td>1:3,000</td>
</tr>
<tr>
<td>Induced Polarization Survey</td>
<td></td>
</tr>
<tr>
<td>Pseudo-sections</td>
<td>1:3,000</td>
</tr>
</tbody>
</table>
SUMMARY

During September, 1980, soil sampling and induced polarization surveys were carried out over the LAM Claims in the Kamloops M.D. The property is located 12 km SW of Kamloops and access is easily gained by 2-wheel drive vehicle along Lac Le Juene road. The terrain is mainly flat or undulating hill country with some swamps. These surveys are an extension of two previous surveys using a VLF-EM and a magnetometer and the results of all four surveys are co-related in this report.

The property is underlain by volcanics and metavolcanics of the Nicola group and covers a contact zone between volcanics (mainly andesite) and a series of schists.

The soil sampling survey covered the grid at intervals of 30 meters while the I.P. survey at dipole length of 60 meters and separations of $n = 1, 2, 3,$ was conducted on selected lines that have anomalous VLF-EM and magnetic results.

CONCLUSIONS

1. The soil geochemistry did not give any really positive results from which the presence of sulphide mineralization could be construed.

2. The induced polarization showed poor correlation and the most probable cause of low resistivity is the presence of swamps.

3. Between the VLF-EM and induced polarization surveys, limited correlation was observed. Some EM anomalies had corresponding resistivity lows and this means definite mineralization possibilities.
4. Between the magnetic and induced polarization surveys little correspondence was found. This is in part due to the fact that only background magnetics occur on the lines that underwent the I.P. survey.

5. The co-relation was large enough to reinforce the evidence of faults and fractures caused many of the sub-anomalous results. With the presence of intrusives on the property, mineralization along the geological structures is possible.

RECOMMENDATIONS

1. Locating good drill sites from the geophysical surveys carried out to date is not possible. If proper co-relation between the geophysical results and the geological mapping was done diamond drill sites could be pinpointed.

2. The only geophysical survey that could yield useful information that hasn't been attempted is a MaxMin II electromagnetic survey. It could locate and give attitudes of possible sulphide mineralization as well as produce an idea of the VLF-EM anomaly's conductivity.
INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of data and interpretation of the results of soil sample and induced polarization surveys done over the LAM Claim near Kamloops in the Kamloops Mining District during September, 1980, under the supervision of David G. Mark, geophysicist.

718 soil samples were picked up and subsequently tested for copper and silver mineralization, and 7.0 line km of induced polarization work was completed.

The purpose of these surveys was to locate possible sulphide mineralization since the previous VLF-EM and magnetic surveys were found to be detecting geological structures rather than mineralization. All four surveys are integrated into the discussion of results contained in this report.

PROPERTY AND OWNERSHIP

The LAM Claim consists of one claim of 16 units as described below:
<table>
<thead>
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<th>No. Units</th>
<th>Record No.</th>
<th>Expiry Date</th>
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<tbody>
<tr>
<td>LAM</td>
<td>16</td>
<td>1740</td>
<td>March 7, 1980</td>
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The property is owned by Richport Resources Ltd. of Vancouver, British Columbia.

**LOCATION AND ACCESS**

The claim is located 12 km SW of Kamloops within the Kamloops Mining Division. The property is adjacent to the east end of the Lac Le Juene highway 1.5 km south of Jacko Lake.

Access is 10 km south along the Lac Le Juene road from Highway 97. A peripheral secondary road along the south and east side would provide access to that part of the property.

The geographic co-ordinates are $50^\circ 35' \text{ N}$ latitude, and $120^\circ 25' \text{ W}$ longitude.

**PHYSIOGRAPHY**

The LAM Claim lies within the southern portion of the Thompson Plateau which is a physiographic division of the Interior Plateau System. The Thompson Plateau is characterized by gently rolling upland of low relief, lying for the most part between 1200 and 1500 meters.

The LAM Claim conforms to the above description consisting mainly of flat to rolling hills over most of the property with some swamp. The southern portion of Peterson Creek meets the extreme southwest corner of the property.

Sufficient water for all phases of the exploration is available from water courses on the property.
HISTORY OF PREVIOUS WORK

Copper, gold and silver mineralization has been known in the Kamloops area since the early part of the century. Recently, Afton Mines has begun production of a property 8 km northwest of the LAM Claim. Afton Mines has reportedly blocked out 30 million tons of 1% copper.

VLF-EM and magnetic surveys were carried out on the LAM Claim in December, 1979 by Geotronics Surveys Ltd. under the supervision of David G. Mark, geophysicist.

GEOLOGY

The LAM Claim lies within a north-south trending Nicola Group which is of Upper Triassic and Low Jurassic age. The Upper Triassic rocks are predominantly dark grey to dark green mafic andesite and basalt flows with augite phenocrysts, pyroclastics, and volcanic conglomerate and arenite. Intercalated within the volcanics are minor sedimentary rocks.

On the property two rock types occur. The northern unit is described by L. Sookochoff as a "greenstone". The greenstone is a feldspar porphyry volcanic which has been metamorphosed into an amphibolite schist on the west and to a chlorite-sericite schist on the east. The grading from amphibolite to chlorite-sericite schist is continuous, west to east, and indicates an increasing degree to schistosity in that direction. Alteration and silification is extensive throughout the greenstone with epidote being prominent in the altered schist. The quartz veining in the amphibolite schist and adjacent to it ranges up to 30 cm wide.

The second rock unit on the property is the andesite to the south.
Two major fault structures are indicated to intersect within the central portion of the property and moderate fracturing occurs through the rock of the claim area.

SOIL GEOCHEMISTRY SURVEY

1. Survey Procedure
The soil samples were taken at each station (30 m apart) over the entire grid area. The samples were taken with an auger and the horizon sampled was b, the colour of which varied from dark brown to light brown to red. The depth the sample was taken from was about 30 cm. Samples were placed in brown wet-strength paper bags with grid co-ordinates marked thereon. A total of 718 samples were taken.

2. Testing Procedure
All samples were tested by Acme Analytical Laboratories Ltd. of Vancouver, B.C. The sample is first thoroughly dried and then sifted through a -80 mesh screen. A measured amount of the sifted material is then put into a test tube with subsequent measured additions of a solution of perchloric and nitric acid. This mixture is next heated for a certain length of time. The parts per million (ppm) copper or silver is then measured by atomic absorption.

3. Treatment of Data
The parts per million were plotted on a 1:3,000 scale map of the grid and contouring of the copper values was done. The contours were made at 75 ppm and 100 ppm. Since the silver values were so unimpressive they were not contoured but compared to the copper values visually as the interpretation was formulated.
INDUCED POLARIZATION SURVEY

1. Instrumentation and Theory

The induced polarization equipment used was frequency-domain type manufactured by Sabre Electronic Instruments Ltd. of Burnaby, B.C. A 12-volt lead-acid battery was used for a power source to give a power potential of 500 watts.

The transmitter output voltage is 125, 250, 375 or 500 volts with selection by a switch. The transmitter current varies up to 1,000 milliamperes. The self-potential buckout is operated manually by a 10-turn precision pot with a range of ± 1 volt.

There are basically two methods of I.P. surveying, frequency-domain and time-domain. Both methods are dependent upon a current flowing across an electrolyte-electrode interface or an electrolyte-clay particle interface, the former being called electrode polarization and the latter, membrane polarization.

In time-domain electrode polarization, a current is caused to flow along electrolyte-filling capillaries within the rock. If the capillaries are blocked by certain mineral particles that transport current by electrons (most sulphides, some oxides and graphite) ionic charges build up at the particle-electrolyte interface, positive ones where the current enters the particle, and negative ones where it leaves. This accumulation of charge creates a voltage that tends to oppose the current flow across the interface. When this current is stopped the created voltage slowly decreases as the accumulated ions diffuse back into the electrolyte. Thus is produced the induced polarization effect.

In membrane polarization a similar effect occurs. A charged
clay particle attracts opposite charged ions from the electrolyte in the capillary around the particle. If a current is forced through the capillary, the charged ions are displaced. When the current is stopped, the ions slowly diffuse back to the same equilibrium state as before the current flow. This explains I.P. anomalies where no metallic-type minerals exist.

Frequency-domain I.P. is based on the fact that the resistance produced at the electrolyte-charged particle interface decreases with increasing frequency. Two parameters commonly used for measuring frequency-domain induced polarization are frequency effect and metal factor. The one used for time-domain measurements is chargeability.

In the process of carrying out an I.P. survey, two other geological methods are used and measured. These are self-potential (S.P.) and resistivity. The S.P. must be nulled by the I.P. receiver in order to obtain accurate I.P. measurements and is a measure of the 'battery action' of the ground. The resistivity value is calculated from the voltage and current readings obtained while measuring the I.P. effect and therefore can be utilized to determine how resistivity (or conductive) the ground is.

2. Survey Procedure

The dipole-dipole array was used with an electrode spread (or dipole length) of 60 meters at three separations (n = 1, 2, 3). The two frequencies used were 0.3 Hz and 10 Hz.

Non-polarizing, unglazed porcelain pots with copper electrode and copper sulphate electrolyte were used for the potential
electrodes. Stainless steel stakes were used for the current electrodes.

Readings were taken every 60 meters on lines 60 N, 84 N, 120 N, 144 N and 168 N for a total of 7.0 line km of survey worked.

**COMPILATION OF DATA**

1. **Percent frequency effect (P.F.E.)** - this is the actual measure of the induced polarization effect in a frequency-domain survey. The term is derived from the percentage change in the electrode-electrolyte transfer impedance at the two different frequencies. A disseminated sulphide body would cause a large change. This property is measured directly in the field.

2. **Resistivity** - this is a measure of how resistive or inversely, how conductive the overburden and/or bedrock is. Most often a disseminated sulphide body is expressed by a resistivity low. The resistivity values in ohm-meters/2π were arrived at by dividing the receiving voltage by the transmitter current.

The percent frequency effect and resistivity were plotted in a pseudo-section on the same sheet (Sheet 4) with the resistivity above the line in a mirror-image style as compared to the % frequency effect below the line. Contouring was then done on both pseudo-sections in a logarithmic interval, the resistivity at 15, 20, 30, 50, 70 and 100 ohm/meters/2π and the % frequency effect at 3% and 5%.

**DISCUSSION OF RESULTS**

1. **Soil Geochemistry**

In general the survey produced no startling results
although a few of the samples were anomalous. The anomalous copper values do not have corresponding silver highs except on L 36 N, 1+20 E where a 0.4 ppm Ag is accompanied by a 120 ppm Cu value. The northern part of the grid have consistently higher copper values than in the south. This is probably due to the compositional differences between the andesite and the amphibolite and chlorite-sericite schists.

2. **Induced Polarization**

There was poor correlation between the frequency effect and resistivity results. Areas of low resistivity (and therefore high conductivity) are mainly surface effects. Some examples of this are L 120 N from 0+90 E to 3+90 E, L 144 N from 0+30 E to 2+10 E and L 168 N from 5+70 W to 2+70 W. Although no swamps are indicated in these areas, the low % frequency effect at these sections along with the clearly surface nature of the anomaly suggests swamps as the most likely cause.

A very few anomalous I.P. results exist on this property. The % frequency effect is sub-anomalous in two areas, both on L 168 N. These locations are at some depth from 8+00 W to 7+00 W and 2+40 E to 5+00 E and have no corresponding low resistivity. It seems most likely that these sub-anomalous results are due to the rock type (amphibolite and chlorite-sericite schist).

3. **Correlation With Other Surveys**
a) **Induced Polarization With Soil Geochemistry**

Unfortunately the most northerly line of the I.P. survey did not have any soil samples taken but comparing the results on Line 144 N, it was noticed that the low resistivity values from 0+30 E to 2+10 E corresponds to a generally sub-anomalous
zone of copper. This is also true on L 120 N where the low resistivity values are found. Here very slightly higher copper values are concentrated.

b) Induced Polarization With VLF-EM
Correlation line by line is as follows:

i  L 60 N, slight low resistivity at 3+60 E where a minor EM anomaly is found.

ii  L 84 N, no correlation with VLF-EM anomaly on extreme end of line (9+40 E) is noted although to be sure of this both surveys would have to be extended eastward 4 or 5 stations.

iii  L 120 N, no correlation with VLF-EM anomalies at 9+00 W and 5+80 W but the VLF-EM anomaly at 8+00 E has a corresponding resistivity low.

iv  L 144 N, no correlation with VLF-EM anomalies at 5+70 W and 5+40 E but the broad VLF-EM anomaly centered at 0+30 W is in an open area where the resistivity is variable and it is postulated that this anomaly dips to the east.

v  L 168 N, no correlation with VLF-EM anomalies at 6+90 W and 0+30 W. The VLF-EM anomaly at 3+75 W corresponds to a resistivity low.

In general the correlation is about as expected considering the rather unexciting results that these surveys show.

c) Induced Polarization With Magnetics
Correlation line by line is as follows:
i  L 60 N, the magnetics response was flat.

ii L 84 N, the magnetics response was flat over the section of the line on which the I.P. survey was carried out.

iii L 120 N, a magnetic depression centered at 575 W has no correspondence in the I.P. results.

iv L 144 N, a magnetic depression at 630 E has no correspondence in the I.P. results.

v L 168 N, the magnetic response was flat.

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

Michael H. Rogers,
Geophysicist

March 12, 1981
SELECTED BIBLIOGRAPHY

Aeromagnetic Map, Kamloops, B.C. Paper 5216G, Sheet 921/9
B.C. Department of Mines.

Jackish, I., Geophysical Report on VLF-EM and Magnetometer
Surveys, LAM Claim for Panorama Energy Corp.
January, 1980

Mark, D., Report on a Geophysical Survey on the LAM Claim

Sookochoff, L., Geological report on LAM Mineral Claim for
GEOPHYSICIST'S CERTIFICATE

I, MICHAEL H. ROGERS, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

THAT I am a Consulting Geophysicist of Geotronics Surveys Ltd., with offices at 403-750 West Pender Street, Vancouver, British Columbia.

I further certify:

1. I am a graduate of the University of Western Ontario, (1972) and hold a B.Sc., degree in Geophysics.

2. I have practised my profession for five years both in Canada and overseas.

3. This report is compiled from data obtained from an induced polarization and soil geochemistry survey carried out under the supervision of David G. Mark, geophysicist, during September, 1980 on the LAM Claim.

4. I have no direct or indirect interest in the properties or securities of Richport Resources Ltd., nor do I expect to receive any interest therein as a result of writing this report.

Michael H. Rogers
Geophysicist

March 12, 1981
AFFIDAVIT OF EXPENSES #1
Soil Geochemistry Survey

This is to certify that the soil geochemistry survey carried out on the LAM Claim, Jacko Lake Area, Kamloops M.D., B.C. from September 6th to 12th, 1980, was done to the value of the following:

FIELD:
- 5-man field crew, 7 days at $600/day: $4,200.00
- Room and board: $1,350.00
- Truck rental, gas and freight costs: $382.00
- Survey supplies: $108.00

Total Field Costs: $6,040.00

Laboratory analysis: $1,468.00

REPORT:
- Geophysicist, 10 hours at $40/hour: $400.00
- Geophysical Technician, 20 hours at $25/hour: $500.00
- Drafting and printing: $450.00
- Typing, photocopying and compilation: $150.00

Total Report Costs: $1,500.00

GRAND TOTAL: $9,026.00

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

[Signature]
David G. Mark, Manager
AFFIDAVIT OF EXPENSES #2
Linecutting and Induced Polarization Survey

This is to certify that linecutting and an induced polarization survey was done on the LAM Claim, Jacko Lake Area, Kamloops M.D., B.C. from September 30th to October 11th, 1980, to the value of the following:

FIELD:

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OFFICE:

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GRAND TOTAL $14,074.00

Respectfully submitted,
GEOTRONIC SURVEYS LTD.

David G. Mark, Manager