REPORT ON THE

ELECTROMAGNETIC & MAGNETIC SURVEY

SUMMIT LAKE GROUP

NIPIGON PROJECT

FOR

MATTAGAMI LAKE MINES LIMITED
EXPLORATION DIVISION

BY

CONSULTING GEOPHYSICIST
INTRODUCTION:

The Summit Lake Group consists of 115 claims which were staked to cover an interesting band of rhyolites. Similar rhyolites to the adjoining claims to the south, have abundant Cu and Cu-Zn in showings and several drill holes. Three separate grids were used to cover portions of this extensive property. An 800 foot interval was used on the East grid, a 400 foot interval on the Central grid and an 800 foot on the West grid. The three grids totalled 43.7 miles of picket line and 5.1 miles of baseline. Magnetic surveying was carried out over 35.2 line miles while electromagnetic surveying with the horizontal loop technique covered 17.9 line miles.

The surveying was carried out by the crews of Mattagami Lake Mines Limited in the period from September 17 to October 15, 1977.
GEOLOGY:

Bedrock exposures are sparse and the majority are confined to the south-central area. The rock types encountered include granite, porphyritic granite, quartz porphyry, fine grained granite and acid metavolcanics.

The granite, porphyritic granite, quartz-porphyry and fine-grained granite are similar in composition and are believed to represent portions of the Summit Lake intrusive.

The south east portion of the area is underlain by acid volcanics similar to those on the Imperial Oil property to the south which contains important base metal mineralization.

LOCATION & ACCESS:

The west end of the claim group lies within one mile of Summit Lake. The northeast end of Summit Lake lies about 15 miles NNE of Auden on the C.N.R. railroad.

Access is best achieved by float or ski aircraft from Nakina or Armstrong on the C.N.R. railway or from Jellicoe on Highway 11.
SURVEY INSTRUMENTS:

A direct reading McPhar M-700 fluxgate instrument was used to measure the vertical field to an accuracy of 20 gammas.

A Geonics EM-17 electromagnetic unit was employed for the horizontal loop survey. A frequency of 1,600 Hz and a coil separation of 300 feet was used. The in-phase and quadrature components were measured to an accuracy of ± 1% of the primary field.

PRESENTATION OF RESULTS:

The accompanying maps, showing the results of the surveys, are at a scale of 1" = 400 feet.

<table>
<thead>
<tr>
<th>Method</th>
<th>Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetics</td>
<td>Map 1</td>
</tr>
<tr>
<td>Electromagnetics</td>
<td>Map 2</td>
</tr>
</tbody>
</table>

DISCUSSION OF RESULTS:

For convenience, each method will be discussed separately.

Magnetics:

Magnetic relief on the claims is generally less than a few hundred gammas and there are no strong trends to indicate geologic strike.
The small highs near 10S on 64E and 0 on 62E, may mark the granite-rhyolite contact but geological control is poor in this area.

A broad 1000 gamma high is centred near 31S on 60W might also occur on a rhyolite contact and could be of exploration interest.

A sharp 600 gamma closure occurs near 0 on 72W that is open both north and south. Detailing is recommended to evaluate this anomaly.

**Electromagnetics**

There are a few non-zero readings on the electromagnetic profiles but nearly all of these occur on the in-phase data and are not corroborated by quadrature effects. Such values can be attributed to cable shortening caused by topography and consequently can be ignored.

The lack of electromagnetic response is surprising in view of the favourable geology. However, similar results are reported on the claims to the south and induced polarization is indicated for the known mineralization in the Marshall Lake Area.

**SUMMARY & RECOMMENDATIONS:**

The magnetic survey has indicated four small highs that could be of further interest but there are no electromagnetic results to indicate associated conductivity.
The electromagnetic results are essentially negative and do not warrant further work.

Geological and geophysical work on the sulphide mineralization to the south indicates that it is usually discontinuous, often occurring in small pods or lenses, which are too small in area to respond to inductive (i.e. electromagnetic) methods. Such mineralization can often be detected by the induced polarization method which is essentially a volume measuring technique capable of summing up the effects of several discontinuous or disseminated bodies.

The Summit Lake Group covers an area of intensely interesting acid-volcanics (rhyolites) similar to those which contain important base metal mineralization on the adjoining property to the south. Induced polarization coverage of the rhyolite areas of the property, is recommended beginning with the southeast portion, where the geology is known.

Respectfully submitted

D. B. Sutherland
Consulting Geophysicist

GEOLOGY REPORT

ON THE

SUMMIT LAKE GROUP

THUNDER BAY MINING DIVISION
ONTARIO

FOR

MATTAGAMI LAKE MINES LIMITED
EXPLORATION DIVISION

July, 1978

By: J. Hinzer
District Geologist
INTRODUCTION:

Mattagami Lake Mines Limited, Exploration Division, staked 115 claims east of Summit Lake in August and September, 1977. The claim group adjoins to the north Imperial Oil Ltd.'s "NWT" Option at Gripp and Marshall Lakes. The presence of a favourable geological environment in this area was indicated from Mattagami's recent exploration on strike both to the east and west. This was further verified by recent government mapping and the discovery of a new mineralized zone 1000 feet south of Imperial's north boundary.

Subsequent staking activity (January, 1978) has seen Imperial stake ground completely encircling Mattagami's claims on the north-east side.

SUMMARY:

Mattagami Lake Mines Limited staked a block of 115 claims to cover a favourable geological environment on strike and adjacent to Imperial Oil Ltd.'s Gripp Lake - Marshall Lake holdings. Recent O.G.S. mapping, (Amukun, 1978), indicates the favourable mineralized Cu, Pb, Zn horizon to strike onto Mattagami's ground.

Geological mapping has indicated much of the south western and central portion of the group to be underlain by granite and gneissic rocks. However, the far eastern area is underlain by favourable felsic pyroclastic volcanic rocks.
Conventional geophysics EM-17 in the eastern area on 800 foot spaced lines has failed to find any conductors. However, the lenticular-podiform nature of the mineralization reported from the area to the south, is only detectable by I.P. methods.

Recommendations for further work include completion of detailed mapping in the eastern portion, completion of line cutting over uncut areas, and I.P. surveys at least over the eastern half of the property.

PROPERTY DESCRIPTION:

Location & Access:

The Summit Lake claim group is located (see Map 1) approximately one mile east of Summit Lake and one mile north of Gripp Lake, centered on NTS co-ordinates of Latitude 50°27'00" north, Longitude 87°39'00" west.

This area is approximately 50 air miles, north of Jellicoe, or north west of Nakina. Road access to Toronto Lake 15 miles to the west via Hwy 801 to Auden, from Beardmore on Hwy. 11, permits canoe access to Summit and Gripp Lakes. Imperial Oil Ltd. in their recent exploration work have made a winter road to Gripp Lake from Auden. A new forest access road is being built by Kimberly-Clarke and is expected to pass close to the north east corner of the claim group.
Topography:

Relief in the area is less than 50 feet. Bedrock exposures are sparse and limited to the south and south central portion of the claim group (Map #2). Swampy and low ground conditions prevail over most of the area north of the present base line. Extensive sand planes up to 75 feet thick are present in the eastern area.

Claims:

The group of 115 contiguous unpatented mining claims are in the Summit Lake (M.1406) area, Thunder Bay Mining Division. The present claims were recorded as follows:

- T.B.464312-345 incl. " 14, 1977 (34)
- T.B.455822-842 incl. Sept. 19, 1977 (21)
- T.B.455807-814 incl. Sept. 29, 1977 (8)

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HISTORY:

The area immediately south of the Summit Lake claim group has received extensive exploration since the discovery by Teck Exploration Ltd. in 1954 of Cu and Zn mineralization. Extensive ground geophysical, geological and diamond drilling
has been carried out by Teck, Giant Gripp Mines and now Imperial Oil on their recent NWT option (Amukun, 1978).

No assessment work has been recorded within the actual claim group, however evidence of previous staking is present in the east. Also Imperial Oil Ltd. has completed a Questor Mk VI Input survey (unreleased) over the entire area.

Following the staking of the ground in the fall of 1977, Mattagami started a program of linecutting, magnetometer and EM-17 surveying. Financial restrictions and later weather problems prevented the completion of the project as planned. Lines at 800' spacing have been cut over most of the property except where covered by lakes or swamps. Reports of Magnetometer and EM-17 surveys are presented under separate cover.

GENERAL GEOLOGY:

The entire Gripp Lake-Marshall Lake area geology has until recently, been considered sedimentary, belonging to the Marshall Lake series (Langford, 1958). However, recent mapping (Amukun, 1978) indicates this entire area to be underlain by felsic metavolcanic rocks.

The felsic metavolcanics occupy the centre of a major east plunging (35°) anticlinal fold structure. The felsics are overlain by a thin belt of metasediments containing
minor iron formations and a major belt of mixed metasediments and metavolcanics containing a major iron formation in the north. A large granite-trondhjemite body, the "Summit Lake Stock", intrudes the western extremity of the fold axis (Amukun, 1978).

Extensive base metal (Cu, Pb, Zn) mineralization, (some of ore grade), occupies a central stratiform zone of felsic tuffs to lapilli tuffs. The presence of alumina-silicates such as kyanite, staurolite, andalusite and sillimanite, indicate a high degree of metamorphism as well as a possible area of alkali depletion (Amukun, 1978).

Regional metamorphism increases from east to west as the Summit Lake stock is approached. Metamorphic grades ranging from green schist to upper amphibolite and possibly granulite adjacent to the stock is observed.

Several major northeast-southwest trending faults and minor related faults are present throughout. Minor drag folding is seen everywhere especially in the mineralized section.

PROPERTY GEOLOGY:

Geological mapping in 1977 was carried out by W. Corstorphine and assistant I. Morrison. Only one exposure of questionable bedrock was encountered on the western portion of the grid. Most of the bedrock was exposed east of 36+00W
and south of the base line. The absence of cut lines east of 16+00E at the time of mapping allowed only claim line coverage for this area.

The rocks exposed on the property (Map 2) can be broken into three major subdivisions. Granite rocks, fine grained granitic or gneissic rocks and metavolcanics.

Distinct volcanic rocks consisting of felsic tuffs and agglomerates are present along the southern boundary and within the extreme eastern part of the claim block. The agglomerates consist of a greenish-black hornblende rich matrix surrounding hornblende poor elongated fragments 12-15 cm long. Finer grained rocks termed hornfelsic metarhyodacite consist of black acicular hornblende needles randomly set in a white aphanitic quartz-felspathic matrix (Corstorphine, 1978).

North and west of the above rocks, fine grained gneissic rocks occur composed predominantly of quartz and felspar with minor mafic components and occasional porphyritic (quartz) zones. Although these rocks are intimately associated with the granitic rocks, it is possible that they may be metavolcanic tuffs or their shallow sub-extrusive equivalents.

Granite and porphyritic granite is found in the southwest and south central portions of the claim block (see Map 2). Porphyritic granite is distinguished by large 3 mm - 8 mm rounded quartz phenocrysts of up to 10% concentration in a medium to fine-grained hornblende/mica quartz-felspathic matrix (Corstorphine, 1978).
Strike of the rocks was found to be roughly east-west. Local foliation, banding and schistosity also was east-west in nature. Dips are vertical. Top determinations could not be made but regional data suggest tops to the north and north east.

South of the base line where bedrock is exposed, the western and southern portion of the group is underlain by granitic rocks. Immediately adjacent and in part intruded by the granites, are the fine grained granite gneisses of questionable origin.

The only truly recognizable felsic volcanics occur along the south boundary and east of a major northeast-southwest fault zone (see Map 1) in the far eastern portion of the map area.

**GEOCHEMISTRY:**

Rock geochemistry of the major rock types encountered (Table 1) shows only minor differences.

<table>
<thead>
<tr>
<th></th>
<th>Cu ppm</th>
<th>Zn ppm</th>
<th>Na₂O %</th>
<th>Fe %</th>
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</thead>
<tbody>
<tr>
<td>Granites</td>
<td>49</td>
<td>22</td>
<td>4.0</td>
<td>2.7</td>
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<tr>
<td>Fine grained granite-gneiss</td>
<td>56</td>
<td>27</td>
<td>4.0</td>
<td>2.9</td>
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<tr>
<td>Volcanics</td>
<td>68</td>
<td>21</td>
<td>2.5</td>
<td>2.8</td>
</tr>
</tbody>
</table>
Aside from the increasing copper content as the matrix becomes finer grained, no significant differences are noted. The common low Fe content however, does verify the felsic nature of all the rocks.

DISCUSSION & CONCLUSIONS:

Geological mapping and rock geochemical sampling has indicated that the Summit Lake group is underlain at least in part by extrusive and intrusive rocks of felsic composition (Map 2). Coarse grained felsic metavolcanic pyroclastic rocks have been identified in the extreme eastern portion of the claim block.

Recent geological mapping by Dr. S. Amukun of the O.G.S. (Map 1) has indicated the presence of a stratiform zone of mineralized felsic pyroclastic rocks centred about a major anticlinal axis. The northern limb of this zone strikes onto Mattagami's claims.

The absence of anomalous magnetic or electromagnetic areas in the eastern portion of the claims is not considered discouraging. The nature of the mineralization due to the high degree of structural deformation tends to be more disseminated (Amukun, 1978) and is thus not readily detected by standard electromagnetic methods.

Field surveys to date have established the presence of favourable rocks in the far eastern portion of the Summit Lake group.
Significant amounts of copper mineralization has been discovered within 1000 feet on adjacent ground along strike.

Geophysical surveys to date have been insufficient to properly test the mineral potential of the area.

RECOMMENDATIONS:

Geological mapping should be completed in detail especially over the eastern and most favourable area. Geophysical I.P. surveys should also be considered over this area because of the disseminated (remobilized) nature of the mineralization as reported from adjacent properties.

Respectfully submitted,

[Signature]

J. Hinzer
District Geologist

July, 1978
BIBLIOGRAPHY


Amukun, S.E., Foster, J.R. & MacDonald, J.A., 1978a


**Ontario - Ministry of Natural Resources**

**Technical Assessment Work Credits**

**Recorded Holder:** Mattagami Lake Mines Limited

**Township or Area:** Summit Lake Areas

<table>
<thead>
<tr>
<th>Type of survey and number of Assessment days credit per claim</th>
<th>Mining Claims Assessed</th>
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<tr>
<td>Geophysical</td>
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<tr>
<td>Electromagnetic</td>
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<td>days</td>
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<td>Section 86 (18)</td>
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<tr>
<td>Geological</td>
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<td>Geochemical</td>
<td>days</td>
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- Man days [X] Airborne [ ]
- Special provision [ ] Ground [ ]

☐ Credits have been reduced because of partial coverage of claims.

☐ Credits have been reduced because of corrections to work dates and figures of applicant.

**Special credits under section 86 (15a) for the following mining claims**

<table>
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<tr>
<th>Mining Claims Assessed</th>
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<tr>
<td>TB. 455772 to 74 inclusive</td>
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<tr>
<td>455778 to 80 &quot;</td>
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<tr>
<td>455787 to 89 &quot;</td>
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<tr>
<td>455791 to 93 &quot;</td>
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<tr>
<td>455795 to 803 &quot;</td>
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<tr>
<td>464328 to 33 &quot;</td>
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<td>464335 to 37 &quot;</td>
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<td>464340 to 42 &quot;</td>
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<td>464344 - 45</td>
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</table>

**No credits have been allowed for the following mining claims**

☐ not sufficiently covered by the survey ☐ Insufficient technical data filed

- TB. 455794 , 464327
- 464334 , 464338 - 39
- 464343

The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical — 80; Geological — 40; Geochemical — 40; Section 86(18)-60:
**Recorded Holder:** Mattagami Lake Mines Limited

**Township or Area:** Summit Lake Area

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<th>Type of survey and number of Assessment days credit per claim</th>
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<td>Magnetometer 3 days</td>
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<td>Induced polarization days</td>
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<td>Geological days</td>
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<tr>
<td>Geochemical days</td>
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<tr>
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<td>Special provision ☐ Ground ☑️</td>
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<td>☑️ Credits have been reduced because of partial coverage of claims.</td>
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<td>464312 to 14</td>
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<td>464316 - 17</td>
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<td>464321 to 32 inclusive</td>
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<td>464334 to 38</td>
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<td>464340 to 45</td>
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</tbody>
</table>

**No credits have been allowed for the following mining claims**

| ☐ not sufficiently covered by the survey | ☐ Insufficient technical data filed |

The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical — 80; Geological — 40; Geochemical — 40; Section 86(18)-60:
### Technical Assessment

#### Work Credits

**Recorded Holder**
Mattagami Lake Mines Limited

**Township or Area**
Summit Lake Area

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SUMMIT LAKE GROUP

MARSHALL LAKE - GRIPP LAKE REGIONAL GEOLOGY
(after S. Amuken, 1978)

SCALE 1" = 1 mile

1. Felsic Metavolcanics
2. Sediments IF minor mafic volcanics
3. Mafic Volcanics
4. Granite
5. Mafic Intrusives

Mafic Intrusives
Granite
Mafic Volcanics
Sediments IF minor mafic volcanics
Felsic Metavolcanics