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PROJECTS UNIT.

ST. JOSEPH EXPLORATIONS LIMITED

ELECTROMAGNETIC AND MAGNETIC SURVEYS

ON THE SAS LAKE PROPERTY

COLEMAN & BUCKE TOWNSHIPS

DISTRICT OF TIMISKAMING

Cobalt, Ontario

Douglas R. Robinson



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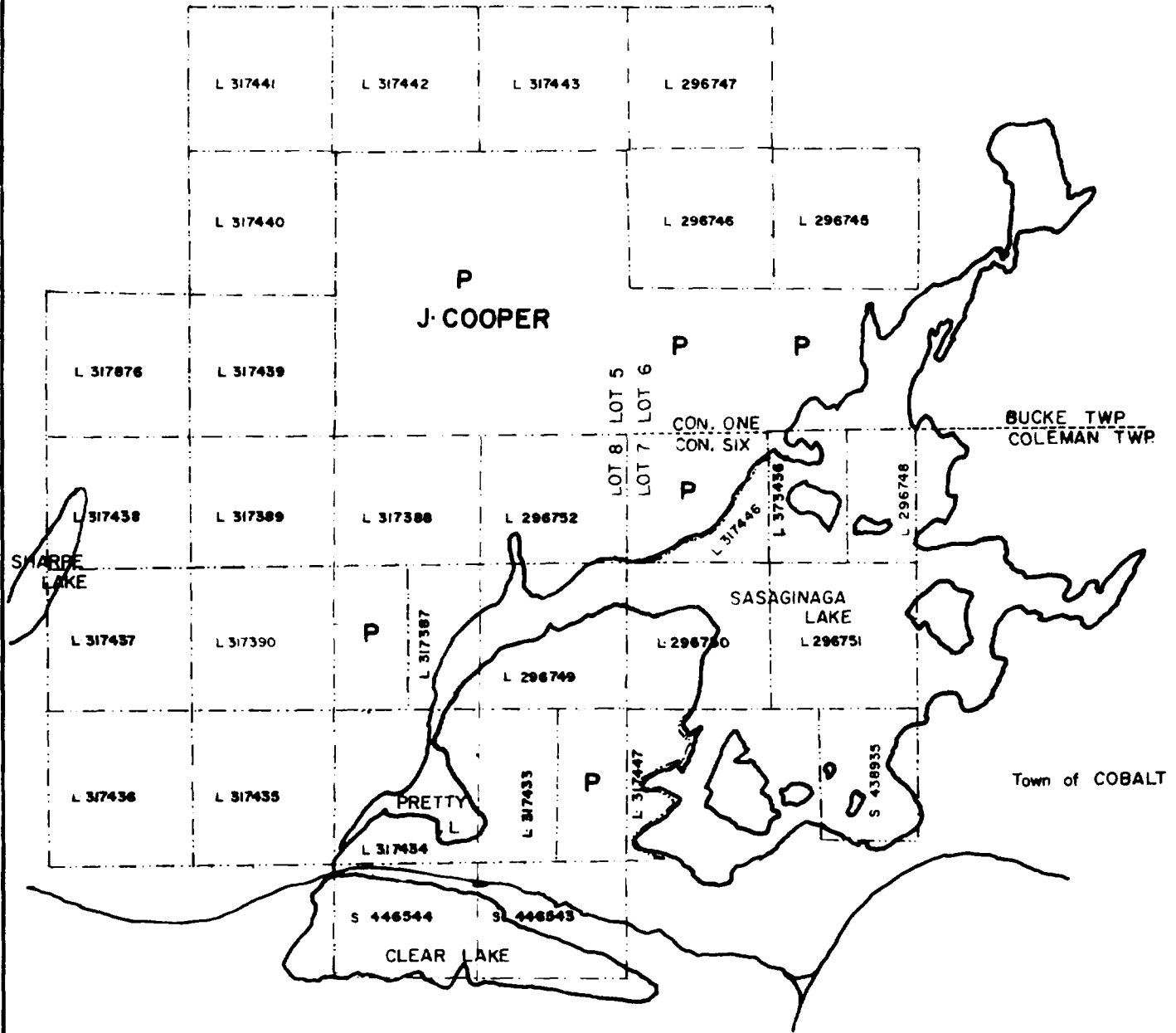
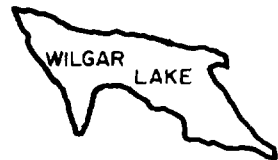
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LIST OF ILLUSTRATIONS

CLAIM GROUP INDEX MAP

HORIZONTAL LOOP EM CONDUCTOR INDEX MAP

**CLAIM GROUP INDEX MAP**



**RECORDING DATES**

|                     |              |                     |              |
|---------------------|--------------|---------------------|--------------|
| L 296745 - L 296752 | June 4 / 71  | L 317876            | July 23 / 71 |
| L 317387 - L 317390 | June 4 / 71  | L 373436            | June 1 / 73  |
| L 317433 - L 317443 | June 21 / 71 | S 438935            | Nov. 25 / 75 |
| L 317446 - L 317447 | June 29 / 71 | S 446543 - S 446544 | Dec. 22 / 75 |

## INTRODUCTION

Pine cutting and re chaining of lines, a horizontal loop EM survey, and proton magnetometer survey of part of the area were performed during the period of October 27, 1975, to May 26, 1976. Pertinent data regarding the surveys are presented on maps accompanying this report.

## PROPERTY AND CLAIM STATUS

This property consists of 51 claims held by St. Joseph Explorations Limited, 5th Floor, 90 Eglinton Avenue, Toronto, Ontario, M4R 2E4.

This report is filed to fulfil assessment requirements, on the following claims in Coleman and Bucke Townships:

L 296745 to L 296752 inclusive  
L 317387 to L 317390 inclusive  
L 317433 to L 317443 inclusive  
L 317446 and L 317447  
L 317876  
L 373436  
S 438935  
S 446543 to S 446544

## LOCATION AND ACCESS

The Sas Lake Property is located west of Cobalt at  $47^{\circ} 24'N$  and  $79^{\circ} 41'W$ . Access to the property is by the West Cobalt road along the south east edge of the property and by a summer road on the north shore of Clear Lake.

## PREVIOUS WORK

The majority of the claims were recorded in June and July of 1971. Vanquif Explorations performed a fluxgate magnetometer survey in 1971 using a 400 foot line spacing and 50 foot station intervals. Dave Fisher mapped the geology at 1" to 400 feet during June to September, 1971. Diamond drill holes SL-1 (started Nov.28,1971) to SL-3 (completed Dec.5, 1971) were drilled

for Vangulf Explorations and logged by Dave Fisher.

The claim group was transferred to St. Joseph Explorations Limited on May 30, 1972. Diamond drill holes SL-4 (started Nov. 24, 1973) to SL-15 (completed Feb. 6, 1974) were drilled for St. Joseph Explorations and logged by P.T. George.

CURRENT GEOPHYSICAL WORK

Instrument Data and Survey Method

Horizontal Loop Electromagnetic Survey

An Apex Parametrics 'Max Min' horizontal loop EM unit was used.

23 claims were surveyed, using a 400 foot coil separation and a frequency of 1777 hz. The survey was performed on 100 foot stations on lines

|      |                 |
|------|-----------------|
| 26W  | 16S to 26S      |
| 28W  | 8N to 25S       |
| 30W  | 12S to 24S      |
| 32W  | 16N to 27 * 57S |
| 34W  | 12S to 24S      |
| 36W  | 11N to 26S      |
| 40W  | 4N to 14S       |
| 44W  | 2N to 14S       |
| 48W  | 2S to 28S       |
| 52W  | 1S to 19S       |
| 56W  | 13N to 8S       |
| 60W  | 13N to 0N       |
| 61W  | 0N to 43S       |
| 64W  | 13N to 0N       |
| 65W  | 0N to 42S       |
| 68W  | 13N to 42S      |
| 72W  | 13N to 33S      |
| 76W  | 13N to 19S      |
| 76W  | 29S to 40S      |
| 80W  | 38N to 0N       |
| 80W  | 14S to 42S      |
| 84W  | 38N to 26S      |
| 88W  | 37N to 28S      |
| 92W  | 25N to 27S      |
| 96W  | 20N to 28S      |
| 100W | 6N to 26S       |

A 600 foot coil separation 1777 hz. survey was performed to detect deeply buried conductors in an area with Huronian conglomerate cover. The lines surveyed include

|     |            |
|-----|------------|
| 68W | 13N to 2S  |
| 72W | 13N to 8S  |
| 76W | 13N to 0N  |
| 80W | 38N to 13S |

A 400 foot coil separation 222 hz survey was performed on lines

|     |               |
|-----|---------------|
| 30W | 15+50S to 26S |
| 31W | 14S to 27+50S |
| 32W | 21S to 26+50S |
| 61W | 16S to 36S    |

This 222 hz frequency survey was performed to determine if the conductors on these lines were due to overburden effects or conductive bedrock.

Claim S-438935 was surveyed using a coil separation of 200 feet to provide coverage close up to power lines along the south shore of Sasaginaga Lake, and to accurately locate the conductor axes. This survey was critical to define the southeast extension of the conductor (i) at 23S on line 28W and to confirm the anomaly (j) at 26S on line 32W. A diagonal line perpendicular to the conductor axes (i) was surveyed to determine the probable dip of conductors (i) and (j).

This 200 foot coil separation survey was performed on lines

|     |            |
|-----|------------|
| 26W | 16S to 27S |
| 28W | 16S to 27S |
| 33W | 14S to 27S |
| 34W | 13S to 27S |
| 35W | 12S to 27S |
| 36W | 12S to 26S |

Magnetometer Survey

Claim 438935 and the area south of base line #2 between lines 61W and 80W were surveyed using a Barringer proton magnetometer (GM-122) to locate magnetic anomalies, and to determine bedrock structures by tracing magnetic trends. Base stations were established at

| Co-ordinates |          | Reading in Gauss |
|--------------|----------|------------------|
| 26 + 00W     | 15 + 00S | 59277            |
| 48 + 00W     | 14 + 00S | 58963            |
| 64 + 00W     | 0 + 00N  | 59102            |
| 72 + 40W     | 14 + 00S | 59190            |

Base stations 48 + 00W and 64 + 00W were established using base station 72 + 40W as 59190 gammas. Base station 26 + 00W was established using base station 48 + 00W as 58963 gammas. The base stations were established by taking five readings at one minute intervals at the known base station, then taking five readings in similar manner at the unknown station. Several loops were completed. The five readings for each set were averaged and the variation with time was calculated to correct the readings of the unknown base station.

Base station 48 is in an area of high magnetic relief and should not be used for future survey work because the picket may have moved in the spring. An error of a couple of inches may produce a significant error. Readings at this base station were consistent during this survey.

Base station readings were taken hourly and linear drift corrections were made to all survey readings. The corrected magnetometer survey readings and contour maps were plotted separately to allow future addition of data and re-interpretation of the data.

### Survey Results and Interpretation

#### Horizontal Loop Electromagnetic Survey

The following EM anomalies were located by horizontal loop EM

- |    |        |         |     |
|----|--------|---------|-----|
| a) | 4S     | on line | 72W |
|    | 4S     | on line | 70W |
|    | 4S     | on line | 68W |
|    | 6S     | on line | 64W |
| b) | 10S    | on line | 70W |
|    | 17S    | on line | 68W |
| c) | 18S    | on line | 80W |
|    | 18S    | on line | 76W |
|    | 18S    | on line | 72W |
|    | 18+50S | on line | 70W |
| d) | 24S    | on line | 72W |
|    | 26S    | on line | 70W |
|    | 27+50S | on line | 68W |

|    |          |         |     |
|----|----------|---------|-----|
| e) | 26 + 57S | on line | 65W |
|    | 30 + 50S | on line | 61W |
| f) | 47S      | on line | 80W |
| g) | 6S       | on line | 56W |
|    | 5 + 50S  | on line | 52W |
|    | 4S       | on line | 48W |
| h) | 2N       | on line | 28W |
| i) | 14 + 50S | on line | 34W |
|    | 16 + 50S | on line | 32W |
|    | 17 + 50S | on line | 31W |
|    | 19S      | on line | 30W |
|    | 23 + 50S | on line | 28W |
|    | 25 + 50S | on line | 26W |
| j) | 26S      | on line | 32W |

The lines south of Base Line #2 have erratic background response due to the widespread brecciated andesites and rhyolites with graphitic argillite matrix that often does not form a distinct conductive zone. The conductors are caused by graphitic argillite and breccia zones with a continuous network of graphitic argillite matrix.

Anomaly (a) is caused by graphitic rhyolite and rhyolite breccia with graphitic argillite matrix. This is indicated by surface mapping and hole SL - 20. There was no magnetic response to this EM anomaly indicating the absence of pyrrhotite and magnetite.

Outcrops at 19S, 71W and hole SL-12 indicate anomaly (b) is due to graphitic argillite and dacite breccia with a graphitic argillite matrix.

Hole SL-1 indicates anomaly (c) is due to graphitic argillite and rhyolite breccia with a graphitic argillite matrix.

Anomaly (d) has not been explained but it may be an extension of anomaly (e).

Anomaly (e) had a strong magnetic response on line 65W. Hole SL-19 indicates the EM response was due to sulphide-carbonate (exhalite?) beds and



andesite breccia with a graphitic argillite matrix. The magnetic response was due to concentrations of pyrrholite indicated throughout Hole SL-19. This anomaly should be detailed with lines at 63W and 66 + 50W to confirm it is a continuous anomaly between 61W and 65W and to define its strike length to the west.

Anomaly (f) has not been explained but it may be caused by graphite in the rhyolite tuffs and sedimentary rocks along the south shore of Clear Lake.

Anomaly (g) has not been explained but it may be an extension of anomaly (a) or (b).

Anomaly (h) is the extension of an east-west slate horizon from the east shore of Sasagina Lake.

Anomaly (i) is a strong continuous anomaly. The north-west end may be masked by deep water and overburden. This anomaly may extend to the south-east into the Town of Cobalt. The 222 hz survey proved this conductor was due to conductive bedrock and not overburden effects. The diagonal line indicates a southerly dip. Holes SL-17 and SL-18 indicate this anomaly is due to graphitic argillite and rhyolite breccia with a graphitic argillite matrix.

Conductor (j) was indicated by the 400 foot coil separation survey but power line effects prevented a complete profile. The 200 foot coil separation survey (including the diagonal line) confirmed and accurately located this anomaly. This conductor had a coincident magnetic response. Hole SL-16 indicated this anomaly is due to graphitic argillite and disseminated to stringer pyrrholite.

#### Magnetometer Survey

Lakes tend to have low magnetic profiles relative to land areas. This may be, in part, a function of water depth, but rock type and pyrrhotite concentrations are also major controls of magnetic relief. Andesites tend to

have high magnetic relief relative to rhyolites but this is often caused because pyrrholite is concentrated in the andesites.

EM conductor (i) marks the contact between andesites to the north-east with a magnetic field greater than 59,200 gammas and rhyolites to the south-west with a magnetic field less than 59,200 gammas.

EM conductor (j) has a coincident magnetic response caused by pyrrhotite.

The area south of the west arm of Sasaginaga Lake has strong complex magnetic relief due to erratic pyrrholite mineralization in brecciated andesites, and because of folding. A magnetic survey on a series of pace and compass controlled east-west lines, at 200 foot intervals and 50 foot stations, might help solve the structure in this area.

EM conductor (e) had a strong coincident magnetic response on Line 65W, which was due to pyrrhotite. The other conductors west of Line 65W have no obvious magnetic response directly related to them. EM conductor (a) was detailed with 25 foot stations but no significant magnetic response was detected along this conductor.

#### RECOMMENDATIONS AND CONCLUSIONS

The EM conductors are due to graphitic argillites and breccias with a graphitic argillite matrix. There appear to be 10 conductors but these probably represent only a few horizons which are repeated by folding and interrupted by faults and dikes. Fill in tracing of the conductors with a 200 foot coil separation and 1777 hz frequency combined with a detailed magnetic survey could help solve the structure without further diamond drilling.

The magnetic survey could be on a line spacing of 200 feet with both north-south and east-west lines. 50 foot stations would be required. In this area all further geophysical work should be completed during the winter due to lake coverage in the area of most of the EM anomalies.

C E R T I F I C A T E

This is to certify that I, Douglas R. Robinson,

- 1) Graduated in 1970, from Haileybury School of Mines, Haileybury, Ontario, with a 2 year Diploma in Mining Technology
- 2) Graduated in 1975 from Queen's University, Kingston, Ontario, with an Honours B.Sc. in Geological Sciences (Faculty of Applied Science)
- 3) Have been employed in mineral exploration by St. Joseph Explorations Limited for a full year.

Respectfully submitted,

*Douglas R. Robinson*

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Douglas R. Robinson

Cobalt, Ontario  
May 27, 1976



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PROJECTS UNIT

COBALT PROJECT (1120)

SAS LAKE PROPERTY - PROGRESS REPORT

by

David F. Fisher

Toronto, Ontario

January 18, 1972

ABSTRACT

The Sas Lake property is situated near Cobalt, Ontario. Geology and geophysics have shown that the claims cover part of a Archean felsic volcano, which may host a base metal orebody. A few specific targets have been tested by drilling, without detecting economic mineralization.

Further evaluation of the property is advised. This includes additional geophysical surveying, a programme of geochemical sampling, and possible drilling.



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|                              |  |
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|                              |  |
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## COBALT PROJECT (1120)

### SAS LAKE PROPERTY - PROGRESS REPORT

#### INTRODUCTION

The claim group covers part of Sasaginaga Lake, adjacent to the western limit of the town of Cobalt, and extends west and north from the lake, in Coleman and Bucke Townships. The property was acquired by staking (43 claims) in June and July of 1971 and by an agreement with Mr. Jack Cooper in July 1971.

Access to the property is very good, by means of the lake and several bush roads. An all-weather gravel road passes along the south boundary. A control grid, with lines at 400 feet, covers most of the claims.

The terrain is generally favourable to exploration work. It is dominated by an irregular, incised cuesta up to 200 feet in height, dipping gently westward; its escarpment marks the eastern outcrop limit of the Gowganda Formation. Mature second-growth mixed forest covers almost the entire area, with a few swamps. Rock exposure is generally good, with intervening areas covered by boulder till.

#### COMPILATION

The available data on the Cobalt camp were compiled last winter, and presented in a report of March 1971 along with a map of the pre-Huronian geology at a scale of 1 inch to 1,000 feet. The report describes the geological setting and rock units encountered on the Sas Lake group.

FIELD WORK - GEOLOGY

Geological mapping of the Sas Lake group was conducted by Fisher during June to September 1971, at a scale of 1 inch to 400 feet. Detailed mapping was confined to the Archean volcanic rocks which outcrop in the southeastern part of the group; these rocks are the prime target for our exploration. Specific mapping of the volcanics beneath the Huronian cover is chiefly limited to geophysical methods and drilling (although geochemistry and study of pebbles in the conglomerate may assist).

Interpretation of the geology suggests that the Sas Lake group covers one flank of an Archean felsic volcanic centre. The silver mines of Cobalt, just east of the group, occur just beyond the edge of the felsic rocks, in a volcano-sedimentary environment characterized by graphitic and cherty interflow bands (often with iron and base metal sulphides), within mafic lavas.

A weak to moderate foliation ( $S_0$ ) is evident in most of the outcrops. In addition, those at the north end of Sas Lake show one or more prominent sets of joints in generally southerly directions. These two structural features tend to obscure primary bedding, but there are sufficient data to state that the strike of the rocks is slightly south of east. No folding has been recognized. The direction of pillow tops near the southeast shore of Sas Lake is southward, and there is no evidence that the entire sequence is not homoclinal.

The felsic rocks have been mapped as rhyolites. They are generally fine grained to very fine grained, feldspathic and siliceous. Primary textures are rarely



evident. The fresh surface is usually light grey to light brown, and the weathered surface is generally almost white, with a powdery rim up to 1/4 inch thick. Thin sections reveal that phenocrysts of albite are common, with a groundmass of quartz, feldspar and sericite.

A distinctive breccia consisting of massive rhyolite fragments in a dark matrix is here termed the "Adit Breccia". It has been mapped in 3 separate areas of the Sas Lake group. Its characteristic features are:

- 1) The fragments are of light brown, very fine grained rhyolite.
- 2) The fragments are generally angular, commonly with sizes to 6 inches.
- 3) The matrix is dark blue-black, very fine grained, and in part slightly graphitic; thin sections show it to be a fine comminution of the same material as the fragments..
- 4) The breccia is stratigraphically conformable, and intercalated with beds(?) or large blocks (several feet or more in thickness) of massive to strongly fractured rhyolite identical to that of the fragments.
- 5) Some fragments appear to have broken from adjacent fragments, giving a lination to the rock.

The stratigraphic distribution of the Adit Breccia indicates that it is not a vent breccia, as had been previously speculated. The evidence presently favours an interpretation of this rock as a pyroclastic flow deposit (glowing avalanche or gravity flow).

FIELD WORK - GEOLOGY ..... continued

The Adit Breccia therefore represents a time of explosive volcanism, with the centre of activity further west. It should be noted, however, that there is no evidence to correlate the 3 exposed areas of Adit Breccia as one stratigraphic horizon, so it must not be considered a marker bed.

Mafic to intermediate volcanic rocks (mapped as "andesite"), outcrop along the southern side of the claim group. Pillow lava occurs near the east shore of Sas Lake (tops southwest); the pillows become poorly developed and more deformed to the west. Iron sulphides are ubiquitous in these rocks, but rarely approach 1%. Drilling near the west end of Clear Lake reportedly encountered several graphitic bands within "andesite". Vangulf hole SL-3 also cut graphitic sections.

The field recognition of massive andesite lava, as distinct from volcanic-derived clastic sediments (e.g. greywacke), is very difficult because of the similarity of composition, and the greenschist metamorphism which has obliterated most primary textures. Nevertheless, the limit of the felsic rocks can be clearly defined.

One area of outcrops east of Sas Lake was mapped as medium-grained, massive andesite. Dark slate and cherty beds occur along both contacts. This unit is probably a sill.

Several distinctly sedimentary units occur within the felsic sequence, particularly on the east side of Sas Lake. The dark slate referred to above shows good bedding, with light and dark grey bands. Some soft-

FIELD WORK - GEOLOGY ..... continued

sediment deformation is evident, but attempts to interpret "tops" were inconclusive. The slate contains a few lenses of banded chert and only minor pyrite. A moderate foliation ( $S_0$ ) is apparent.

A cherty unit outcropping across several hundred feet near the north end of Sas Lake shows well-developed banding, attributed to alternating light and dark grey siliceous beds. Most of the unit contains considerable altered feldspar (visible in thin section and indicated by the weathered rim) and is considered a siliceous ash-fall tuff rather than a true chert (chemical sediment).

Small dikes and irregular pods of diorite and dikes of diabase, olivine diabase and lamprophyre intrude the volcanics, but are not common.

The structural deformation of the Archean cannot be determined in detail. An interpretation based on outcrop mapping, topographic lineaments and geophysics is presented on the geological map of the Sas Lake group (enclosed).

The Archean is overlain unconformably by the early Proterozoic Gowganda Formation, which consists of a lower member of conglomerate and greywacke and an upper member of bedded argillite. These have been locally termed the Coleman and Firstbrook formations, respectively, but their limited areal distribution within the extensive Gowganda Formation precludes the rank of "formation" according to Article 7 of the Code of Stratigraphic Nomenclature.

It appears that the Gowganda Formation on the Sas Lake group was deposited by valley glaciers and subsequent

FIELD WORK - GEOLOGY ..... continued

continental sheets. The outcrops along the escarpment west of Sas Lake expose the unconformity, and in most places the basal conglomerate closely reflects the lithology of the subjacent basement. It may represent, in part, talus along the valley slopes. At one point, about 50 feet above the base, a pebble of Adit Breccia similar to that of the basement was found. It may have been derived from the valley wall above the glacier. Differential erosion later removed the valley wall of Adit Breccia; the Gowganda conglomerate is thus a cast of the glaciated valley, standing in relief above the eroded Archean terrain. The important implication is that the basal conglomerate should be representative of the basement in this area.

In other locations where the base of the Gowganda is exposed, paraconglomerate, tillite (with boulders of granite, etc., not of local derivation) and arkose have been observed. This is indicative of varying depositional environments; continental glaciation may have obliterated the talus and moraines in the valleys.

Valley glaciation is also indicated for the area east of Sas Lake. The dip of the exposed contact near the Hudson Bay workings is about 40° east, swinging to the south as one traces it north for a couple of hundred feet along the cliff. This may have been the wall of a cirque, whose glacier flowed south and east. The narrow bay at the outlet of Sas Lake separates outcrops of andesite (west) and conglomerate (east); it lies along a topographic lineament trending slightly east of north and interpreted

FIELD WORK - GEOLOGY ..... continued

by Thomson to be a normal fault. However, evidence of faulting is absent at the exposed contact described above, and the hill of conglomerate may be the cast of a glaciated valley.

The extent of the felsic volcanics beneath the Huronian cover is now known, but several clues are available. The area of exposed volcanics is not large enough to account for an entire Archean volcanic centre (by comparison with Noranda, Timmins, etc.). Its limits have already been defined by mapping to the south and east. A regional magnetic high lies just north of the property, and probably limits the extent of the rhyolites in this direction. Therefore, one may assume it continues to the west, unless cut off by structural complexities or batholithic intrusion. An inlier of rhyolitic rocks, in part pyroclastic, was recently discovered in Firstbrook Township about 6 miles west of the volcanics exposed at Sas Lake; it may be on the west side of the same centre. (Keevil interests presently hold claims covering about 3 square miles in this area). Several exploration techniques, to be discussed later, may be useful in tracing the extent of the favourable rocks.

FIELD WORK - GEOPHYSICS

During the summer of 1971, a magnetometer survey was conducted over the entire land portion of the Sas Lake claim group. In addition, several electromagnetic surveys were made on parts of the group: vertical loop, horizontal

FIELD WORK - GEOPHYSICS ..... continued

shootback (CEM) and VLF-EM (RADEM). One representative line was surveyed by I.P., to test the application of this method. Completion of the surveys is planned for January 1972.

The geophysical data are presented and evaluated in a report by D.A. MacLean, dated December 15, 1971.

Three targets were selected for drilling in November, 1971. Conductors A and B are referred to in MacLean's report (Dec.15/71). Conductor A' (located by detailed CEM) was also drilled; it is situated at or near a rhyolite/andesite contact, about 150 feet north of A. The drilling was done before MacLean's report was available: this timing was determined by extenuating corporate factors.

DRILLING RESULTS

Hole SL-1 identified conductor B as a few bands of graphitic slate with lenses of pyrite. The enclosing Adit Breccia contained enough graphite on fracture planes to explain the I.P. anomaly.

Hole SL-2 located the rhyolite/andesite contact, occupied by a large lamprophyre dike. The andesite locally resembles the Adit Breccia in texture, although the fragments are andesitic. Disseminated pyrrhotite and a few specks of chalcopyrite were noted, but no definite conductor was found. It is concluded that the CEM anomaly is false.

Hole SL-3 cut several thin graphitic bands within the andesite, at the location of conductor A. The magnetic

DRILLING RESULTS ..... continued

anomaly is attributed to disseminated pyrrhotite.

The 3 holes totalled 1,155 feet of drilling.

CONCLUSIONS FROM DRILLING

1) The andesite/rhyolite contact occurs somewhat north of its speculated position. The lamprophyre dike along the contact makes the precise location impossible here.

2) The considerable and widespread amounts of graphite suggests that the more favourable sites for orebodies lie to the west or north.

3) The particular Adit Breccia unit tested here has a prominent I.P. signature which would enable geophysical mapping to the west, below the Gowganda Formation. A similar I.P. response was not obtained over the extrapolated location of the Adit Breccia unit near 10N on L80W.

EVALUATION OF PRESENT STATUS

Geology and geophysics have shown that the Sas Lake group covers part of a felsic volcanic centre which may host an orebody. A few specific geophysical anomalies have been tested by drilling, without detecting economic mineralization.

At present, therefore, we know generally where we are situated with reference to an Archean volcano, we have

THE NEXT STAGE ..... continued

7. A collection of papers dealing with recent research on the nature and origin of the Cobalt ores is to be published in the Canadian Mineralogist early in 1972. The working theory which is partially responsible for our exploration approach in the Cobalt area should be examined in the light of these new contributions. The possibility of silver veins occurring on the Sas Lake property should be critically examined in this theoretical context before any specific silver exploration programme is developed. If warranted, biogeochemistry, soil sampling and Radem surveys should be undertaken.

January 18, 1972

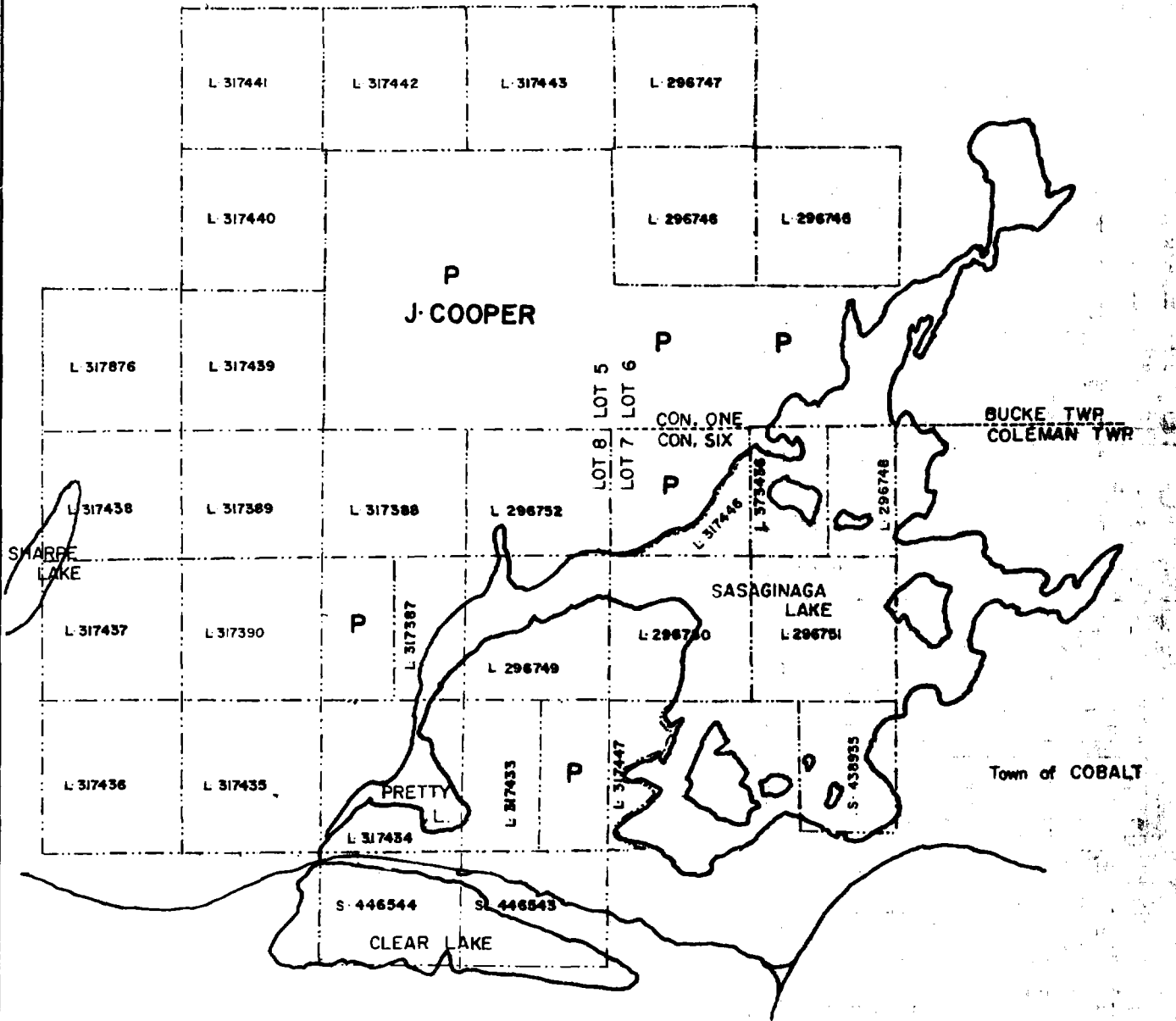
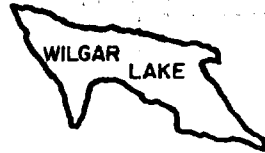


David F. Fisher

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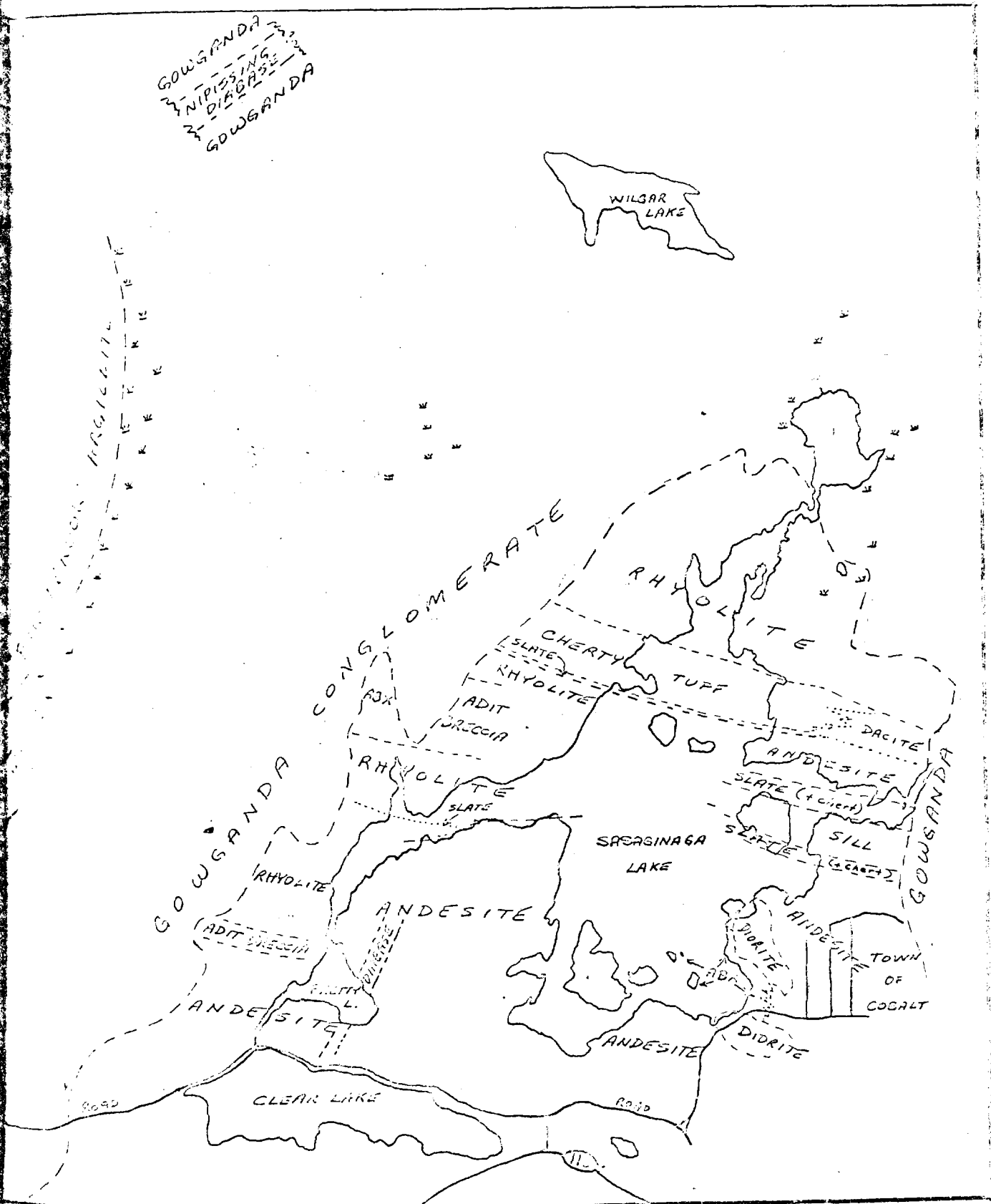


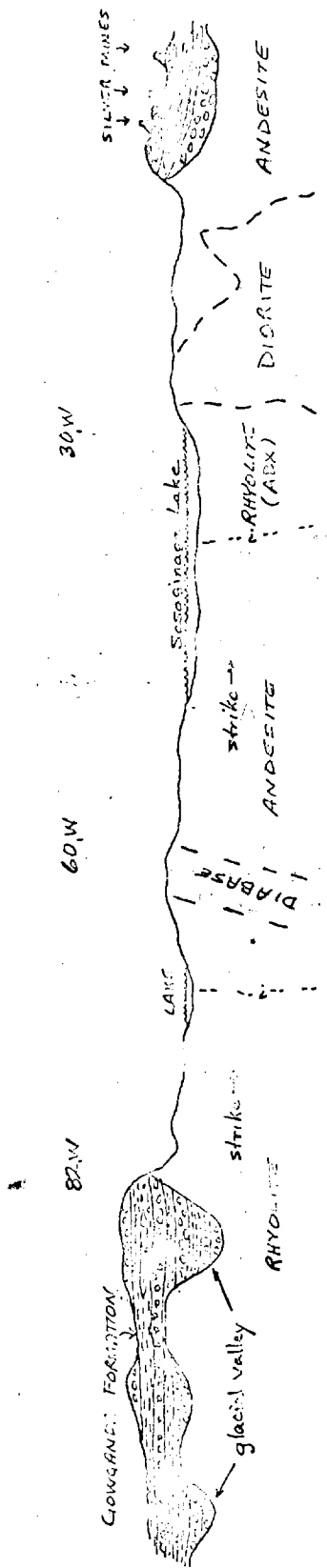
**CLAIM GROUP INDEX MAP**



**RECORDING DATES**

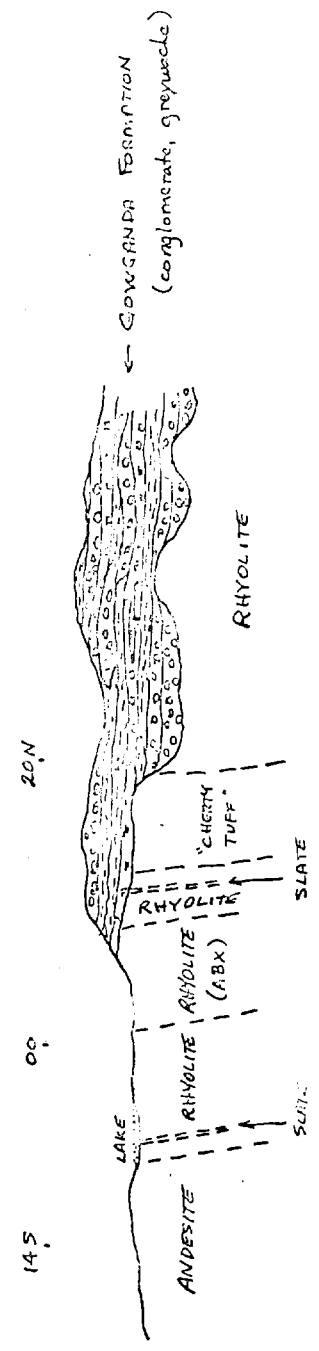
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|---------------------|------------|---------------------|------------|
| L 296745 - L 296752 | June 4/71  | L 317876            | July 23/71 |
| L 317387 - L 317390 | June 4/71  | L 373436            | June 1/73  |
| L 317433 - L 317443 | June 21/71 | S 438935            | Nov. 25/75 |
| L 317446 - L 317447 | June 29/71 | S 446543 - S 446544 | Dec. 22/75 |





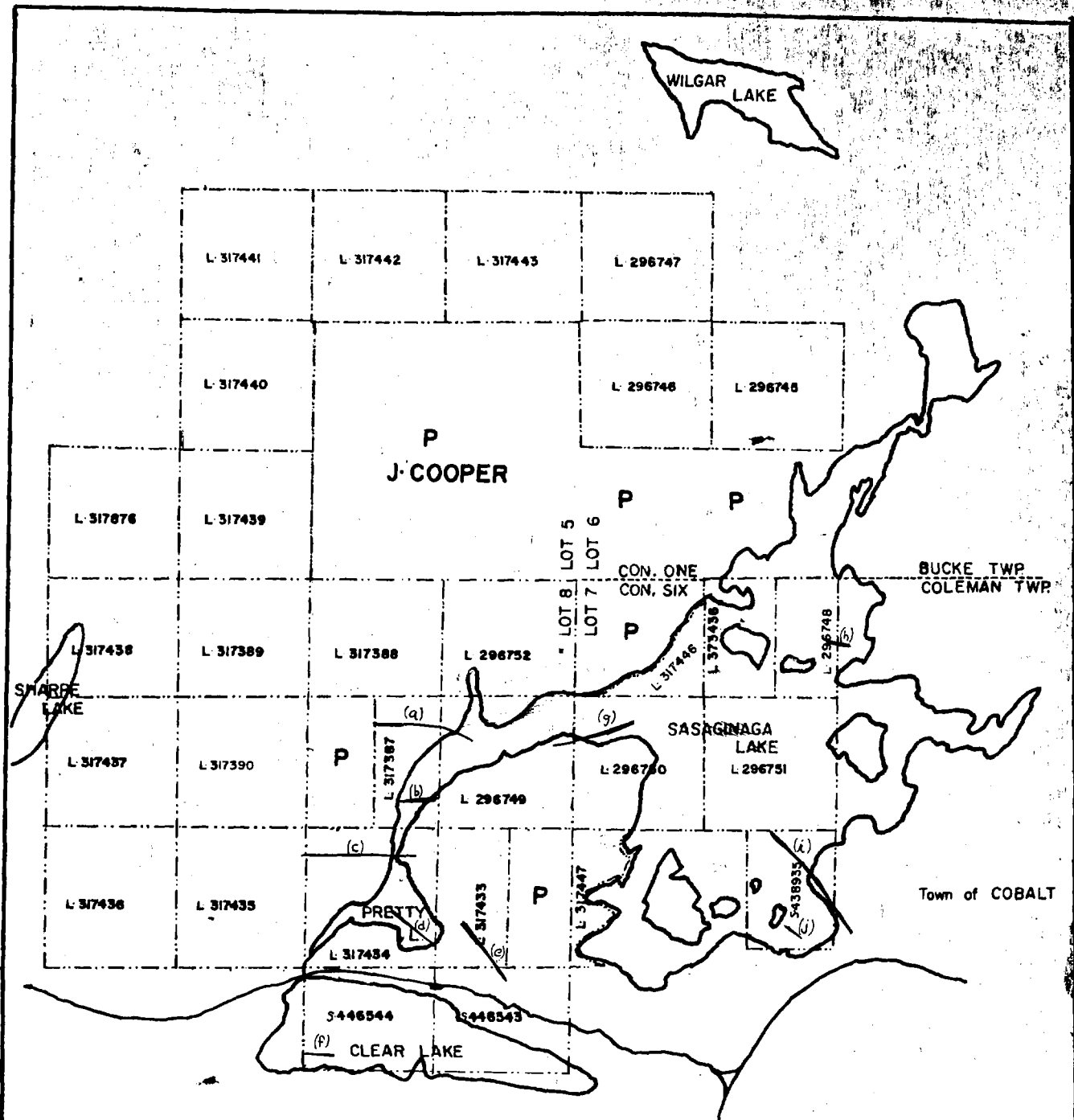
EAST-WEST SECTION (14S)

HORIZONTAL SCALE 1/4 mile  
 VERTICAL SCALE : ?



NORTH-SOUTH SECTION (60W)

FIGURE 3



ST. JOSEPH EXPLORATIONS LIMITED  
 SAS. LAKE CLAIM GROUP INDEX MAP  
 HORIZONTAL LOOP EM SURVEY

scale: 1" = 1/4 mile

(a) H-Loop EM conductor



GEOPHYSICAL - GEOL  
TECHNICAL D



31M05NE0079 2.2146 BUCKE

900

TO BE ATTACHED AS AN API  
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT  
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Geological  
Township or Area Coleman and Bucke  
Claim Holder(s) St. Joseph Explorations Ltd.  
5th Floor, 90 Eglinton Ave. W.,  
Toronto, Ont.  
Survey Company As Above  
\* Author of Report David F. Fisher  
Address of Author 23 Longford Cres., Agincourt, Ont.  
Covering Dates of Survey June 1971 to Jan. 1972  
(linecutting to office)  
Total Miles of Line Cut 24.3 Miles

MINING CLAIMS TRAVERSED  
List numerically

See Attached Schedule  
(prefix) (number)

SPECIAL PROVISIONS  
CREDITS REQUESTED

DAYS  
per claim

ENTER 40 days (includes  
line cutting) for first  
survey.

ENTER 20 days for each  
additional survey using  
same grid.

Geophysical

-Electromagnetic

-Magnetometer

-Radiometric

-Other

Geological 15

Geochemical

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer \_\_\_\_\_ Electromagnetic \_\_\_\_\_ Radiometric \_\_\_\_\_  
(enter days per claim)

DATE: 25 June 1976 SIGNATURE [Signature]  
Author of Report or Agent

Res. Geol. \_\_\_\_\_ \* Qualifications Senior Geologist  
St. Joseph Explorations  
2.1163 & also on Ltd  
this file -

Previous Surveys

| File No. | Type | Date | Claim Holder |
|----------|------|------|--------------|
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |
|          |      |      |              |

TOTAL CLAIMS 30

If space insufficient, attach list

**GEOPHYSICAL TECHNICAL DATA**

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations \_\_\_\_\_ Number of Readings \_\_\_\_\_  
Station interval \_\_\_\_\_ Line spacing \_\_\_\_\_  
Profile scale \_\_\_\_\_  
Contour interval \_\_\_\_\_

MAGNETIC

Instrument \_\_\_\_\_  
Accuracy – Scale constant \_\_\_\_\_  
Diurnal correction method \_\_\_\_\_  
Base Station check-in interval (hours) \_\_\_\_\_  
Base Station location and value \_\_\_\_\_  
\_\_\_\_\_

ELECTROMAGNETIC

Instrument \_\_\_\_\_  
Coil configuration \_\_\_\_\_  
Coil separation \_\_\_\_\_  
Accuracy \_\_\_\_\_  
Method:  Fixed transmitter  Shoot back  In line  Parallel line  
Frequency \_\_\_\_\_  
(specify V.L.F. station)  
Parameters measured \_\_\_\_\_

GRAVITY

Instrument \_\_\_\_\_  
Scale constant \_\_\_\_\_  
Corrections made \_\_\_\_\_  
\_\_\_\_\_  
Base station value and location \_\_\_\_\_  
\_\_\_\_\_  
Elevation accuracy \_\_\_\_\_

INDUCED POLARIZATION  
RESISTIVITY

Instrument \_\_\_\_\_  
Method  Time Domain  Frequency Domain  
Parameters – On time \_\_\_\_\_ Frequency \_\_\_\_\_  
– Off time \_\_\_\_\_ Range \_\_\_\_\_  
– Delay time \_\_\_\_\_  
– Integration time \_\_\_\_\_  
Power \_\_\_\_\_  
Electrode array \_\_\_\_\_  
Electrode spacing \_\_\_\_\_  
Type of electrode \_\_\_\_\_

GEOLOGICAL TECHNICAL DATA STATEMENT

SCHEDULE OF CLAIMS

- L 296745 ✓
- L 296746 ✓
- L 296747 ✓
- L 296748 ✓
- L 296749 ✓
- L 296750 ✓
- L 296751 ✓
- L 296752 ✓
  
- L 317387 ✓
- L 317388 ✓
- L 317389 ✓
- L 317390 ✓
  
- L 317433 ✓
- L 317434 ✓
- L 317435 ✓
- L 317436 ✓
- L 317437 ✓
- L 317438 ✓
- L 317439 ✓
- L 317440 ✓
- L 317441 ✓
- L 317442 ✓
- L 317443 ✓
  
- L 317446 ✓
- L 317447 ✓
  
- L 317876
- L 373436 ✓
- S 438935 ✓
- S 446543 ✓
- S 446544 ✓

*circled claims no credit*

Total 30 Claims



GEOPHYSICAL - GEOLOGICAL - GEOCHEMICAL  
TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT  
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT  
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Horizontal Loop EM, 1777Hz., 400 Ft. Coil Separation and  
Type of Survey(s) Proton Magnetometer (Total Field)  
Township or Area Coleman and Bucke  
Claim Holder(s) St. Joseph Explorations Ltd.  
5th Floor, 90 Eglinton Ave. W., Toronto, Ont  
Survey Company As Above  
Author of Report Douglas R. Robinson  
Address of Author 15 Refinery Rd., R.R.#1, Cobalt, Ont.  
Covering Dates of Survey October 27, 1975 to May 26, 1976  
(linecutting to office)  
Total Miles of Line Cut 24.3 Miles

MINING CLAIMS TRAVERSED  
List numerically

|              |            |          |     |
|--------------|------------|----------|-----|
| L            | <u>MAG</u> | 296748   | ✓   |
|              | (prefix)   | (number) |     |
| L            |            | 296749   | 1/4 |
| L            |            | 296750   | ✓   |
| L            |            | 296751   | ✓   |
| L            |            | 296752   | ✓   |
| L            |            | 317387   | 1/2 |
| L            |            | 317388   | ✓   |
| L            |            | 317389   | ✓   |
| L            |            | 317390   | 1/3 |
| L            |            | 317433   | ✓   |
| L            |            | 317434   | 1/4 |
| L            |            | 317435   | ✓   |
| L            |            | 317436   | 1/3 |
| L            |            | 317437   | 1/3 |
| L            |            | 317438   | 1/4 |
| L            |            | 317439   | ✓   |
| L            |            | 317440   | ✓   |
| L            |            | 317446   | ✓   |
| L            |            | 317447   | 2/3 |
| L            |            | 373436   | 1/3 |
| S            |            | 438935   | ✓   |
| S            |            | 446543   | 1/3 |
| S            |            | 446544   | 1/4 |
| TOTAL CLAIMS |            | 23       |     |

If space insufficient, attach list

SPECIAL PROVISIONS  
CREDITS REQUESTED

ENTER 40 days (includes  
line cutting) for first  
survey.

ENTER 20 days for each  
additional survey using  
same grid.

Geophysical

- Electromagnetic 40
- Magnetometer \_\_\_\_\_
- Radiometric \_\_\_\_\_
- Other \_\_\_\_\_

Geological \_\_\_\_\_

Geochemical \_\_\_\_\_

DAYS  
per claim

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer \_\_\_\_\_ Electromagnetic \_\_\_\_\_ Radiometric \_\_\_\_\_  
(enter days per claim)

DATE: May 27/76 SIGNATURE: Douglas R. Robinson  
Author of Report or Agent

Res. Geol. \_\_\_\_\_ Qualifications New - on this file

Previous Surveys

| File No.                       | Type                 | Date | Claim Holder          |
|--------------------------------|----------------------|------|-----------------------|
| 63.34                          | 36 and 63.32 39 both |      |                       |
| are not for assessment credits |                      |      |                       |
| 63A318                         | Geological           | 1961 |                       |
| 2.1163                         | Mag.                 | 1971 | St. Joseph Expl. Ltd. |
|                                |                      |      |                       |
|                                |                      |      |                       |
|                                |                      |      |                       |
|                                |                      |      |                       |

underlined claims 1/2 credits



**GEOPHYSICAL TECHNICAL DATA**

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations 680 Number of Readings 680  
Station interval 50' & 25' Line spacing \_\_\_\_\_  
Profile scale \_\_\_\_\_  
Contour interval 100 gammas

MAGNETIC

Instrument Proton Magnetometer - Barringer GM-122  
Accuracy – Scale constant Direct Reading (Digital)  
Diurnal correction method Straight Line Variation by Time  
Base Station check-in interval (hours) 1 hour  
Base Station location and value 72 / 40W, 14S (591908); 64W, 0N (59102);  
48W, 14S, (58963); 26W, 15S, (59277)

ELECTROMAGNETIC

Instrument Max Min Horizontal Loop EM  
Coil configuration Coplanar  
Coil separation 600 ft, 400 ft, and 200 ft  
Accuracy ± 1%  
Method:  Fixed transmitter  Shoot back  In line  Parallel line  
Frequency 1777 hz & 222 hz  
(specify V.L.F. station)  
Parameters measured %age of Field Distortion

GRAVITY

Instrument \_\_\_\_\_  
Scale constant \_\_\_\_\_  
Corrections made \_\_\_\_\_  
Base station value and location \_\_\_\_\_  
Elevation accuracy \_\_\_\_\_

INDUCED POLARIZATION  
RESISTIVITY

Instrument \_\_\_\_\_  
Method  Time Domain  Frequency Domain  
Parameters – On time \_\_\_\_\_ Frequency \_\_\_\_\_  
– Off time \_\_\_\_\_ Range \_\_\_\_\_  
– Delay time \_\_\_\_\_  
– Integration time \_\_\_\_\_  
Power \_\_\_\_\_  
Electrode array \_\_\_\_\_  
Electrode spacing \_\_\_\_\_  
Type of electrode \_\_\_\_\_

Dymond Twp. (M.468)

THE TOWNSHIP

OF 2.2146

BUCKE

DISTRICT OF TIMISKAMING

SUDBURY MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

- PATENTED LAND or P
- CROWN LAND SALE CS
- LEASES L
- LOCATED LAND Loc.
- LICENSE OF OCCUPATION L.O.
- MINING RIGHTS ONLY M.R.O.
- SURFACE RIGHTS ONLY S.R.O.
- ROADS
- IMPROVED ROADS
- KINGS HIGHWAYS
- RAILWAYS
- POWER LINES
- MARSH OR MUSKEG
- MINES
- CANCELLED C.

NOTES

- 400' surface rights reservation along the shores of all lakes and rivers.
- Staking of mining claims within Townships shown thus ~~only~~ only with consent of the Minister.
- Flooding rights to elevation 595' above sea level in Lake Timiskaming
- Proposed Natural Gas Pipeline along Hwy 11 through this township
- Half Lot 8, Con 2 subject to sanitary control of Constance Lake for Town of Haileybury.

DATE OF ISSUE

JUL - 9 1976

Areas shown in this plan under Section 43 of the Mining Act, R.S.O. 1970 (Sec. 42, R.S.O. '60).  
 Order No. File Date Disposition  
 160707 S.R.O.

PLAN NO - M. 432

ONTARIO  
 MINISTRY OF NATURAL RESOURCES  
 SURVEYS AND MAPPING BRANCH

VI

V

IV

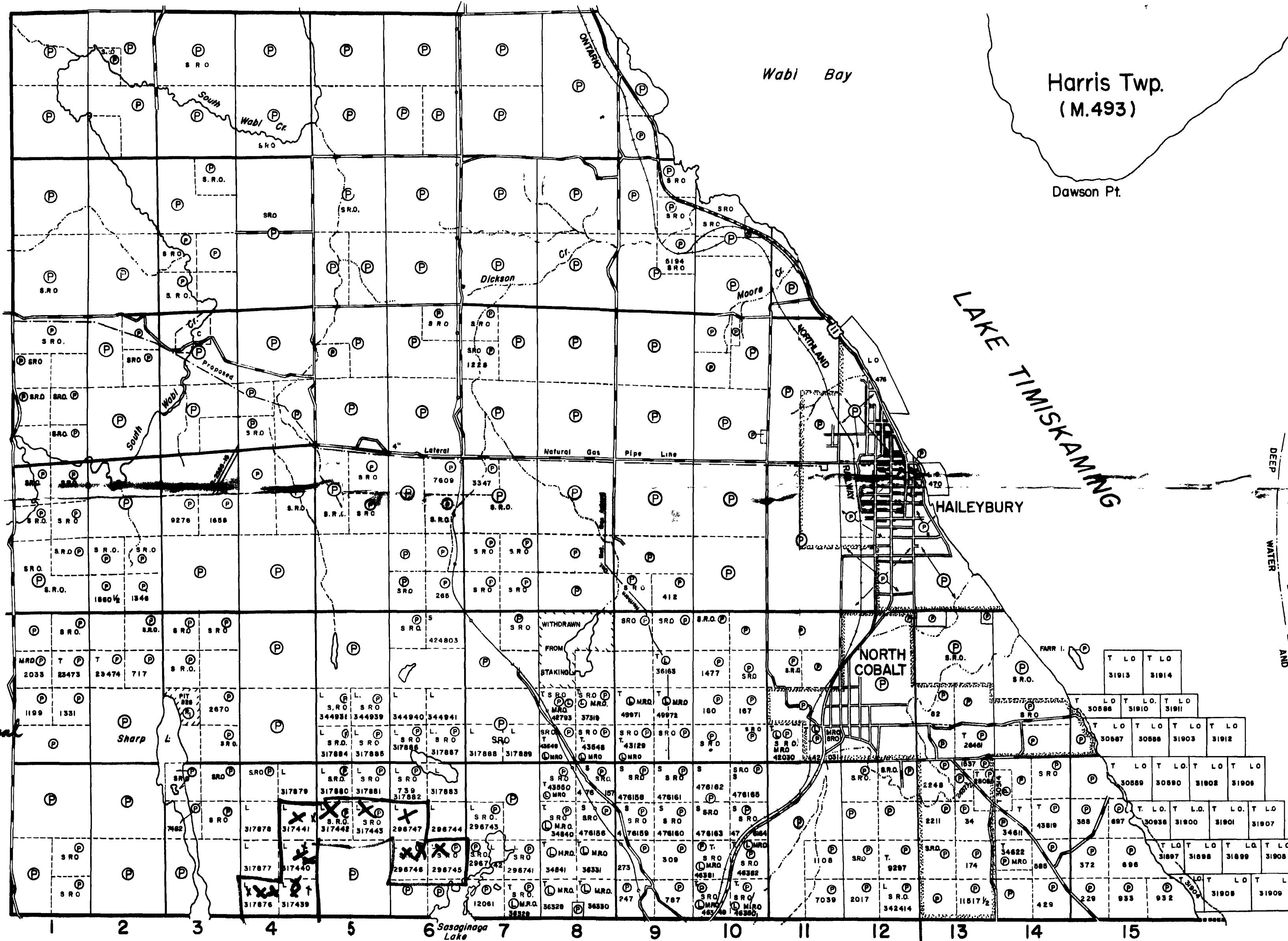
III

II

I

Firstbrook Twp. (M.475)

X = geological



Coleman Twp. (M.454)

Lorrain Twp. (M.536)



Barr Twp. (M-411)

Firstbrook Twp. (M-475)

Bucke Twp. (M-432)

THE TOWNSHIP OF 22146  
**COLEMAN**  
DISTRICT OF TIMSKAMING  
SUBURBY MINING DIVISION  
SCALE: 1-INCH=20 CHAINS

**LEGEND**  
PATENTED LAND  
CROWN LAND SALE  
LEASES  
LOCATED LAND  
LICENSE OF OCCUPATION  
MINING RIGHTS ONLY  
SURFACE RIGHTS ONLY  
ROADS  
IMPROVED ROADS  
KINGS HIGHWAYS  
RAILWAYS  
POWER LINES  
MARSH OR MUSKOG  
MINES  
PATENTED S.R.O  
CANCELLED

**NOTES**  
400' surface rights reservation along the shores of all lakes and rivers  
L.O. 7181 Covers Flooding Rights on Montreal River to H.E.P.C.  
Mining claims on Clear Lake etc. subject to mining reservation to the Town of Cobalt Statutes of Ontario (1917) Chapter 67

Lorrain Twp. (M-536)

27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Kittson Twp. (M-524)

Gillies Limit (M-484)

Brigstocke Twp. (M-429)

B

A

VI  
X  
= geological  
X-E.M.  
X-MAC  
V

IV

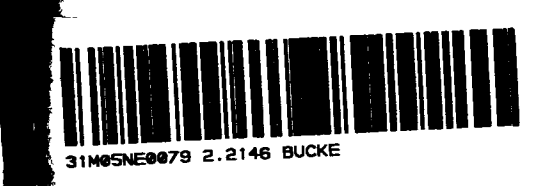
III

II

DATE OF ISSUE  
JUL - 9 1976  
SURVEYS AND MAPPING  
BRANCH

PLAN NO-454

ONTARIO  
MINISTRY OF NATURAL RESOURCES  
SURVEYS AND MAPPING BRANCH





NOTE - ALL THREE DIT  
NUMBERS PRECEDED  
BY '98

○ CLAIM POST  
○ CLAIM POST APPROXIMATE  
LOCATION

| DRAWING STATUS |                     |
|----------------|---------------------|
| NSN            | BASE MAP            |
| DWR            | MAGNETOMETER SURVEY |
| D.R.R.         | CLAIM POSTS         |
|                | 24/7/72             |
|                | 6/4/76              |
|                | 6/4/76              |

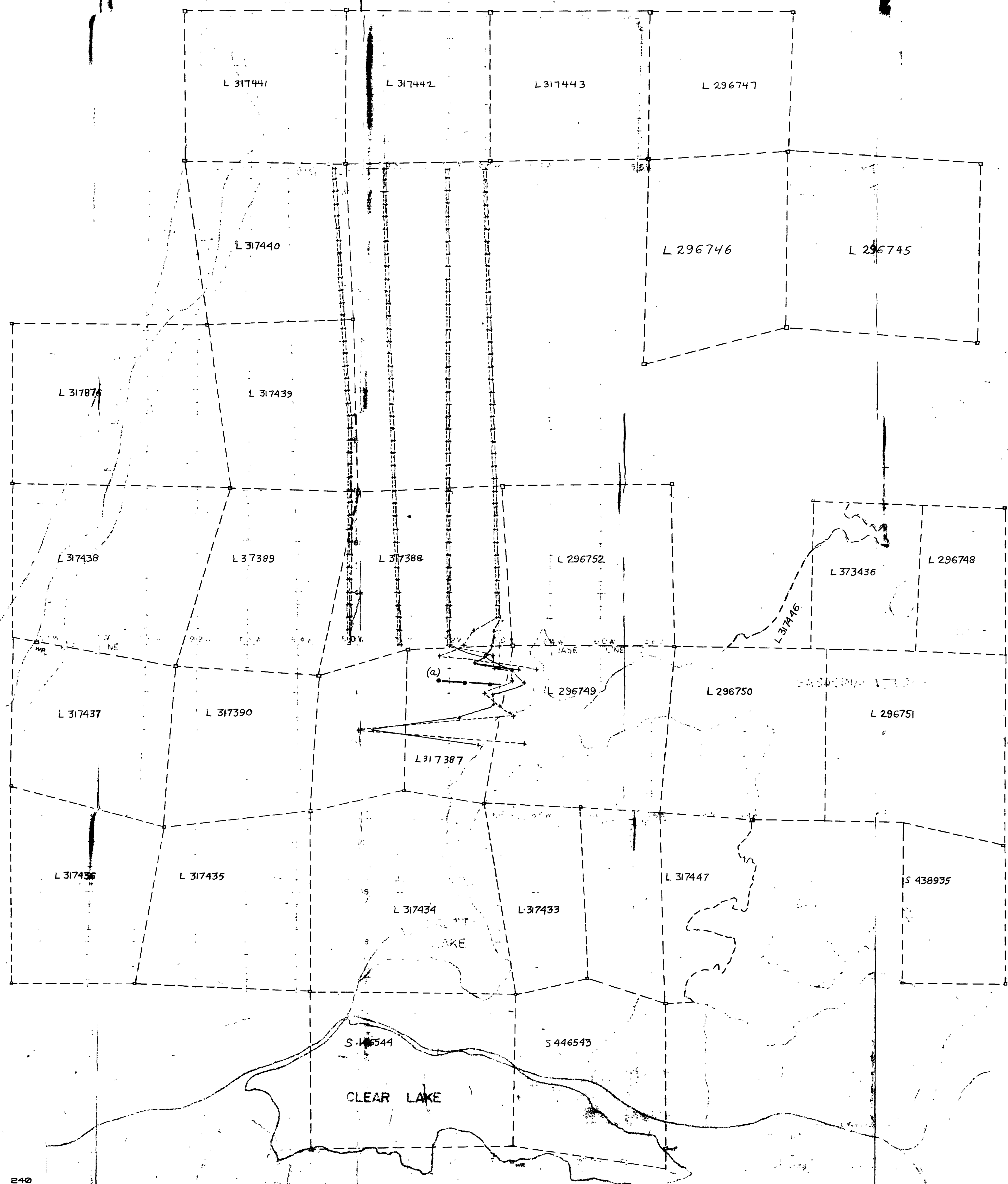
*Douglas Robinson*  
Jan 19, 1977

2-2146

SASAGINAGA LAKE PROPERTY  
(SOUTH SHEET)  
PROTON MAGNETOMETER SURVEY  
MODEL - BARRINGER GM 122

|    |    |    |     |   |       |
|----|----|----|-----|---|-------|
| 47 | 23 | 30 | 120 | 1 | 2     |
| 79 | 41 |    |     |   | 318/5 |

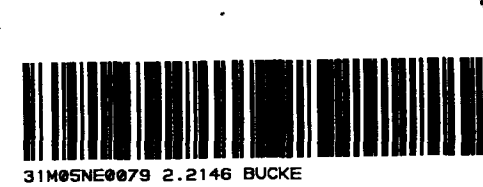




Douglas Robinson  
 Jan 20, 1977  
 1st Supplement  
 2nd Supplement  
 3rd Supplement  
 4th Supplement  
 5th Supplement  
 6th Supplement  
 7th Supplement  
 8th Supplement  
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 91st Supplement  
 92nd Supplement  
 93rd Supplement  
 94th Supplement  
 95th Supplement  
 96th Supplement  
 97th Supplement  
 98th Supplement  
 99th Supplement  
 100th Supplement

MAP #1

Horizontal Loop EM





Douglas Robinson  
Jan 20, 1977

MAP #2  
2.2146

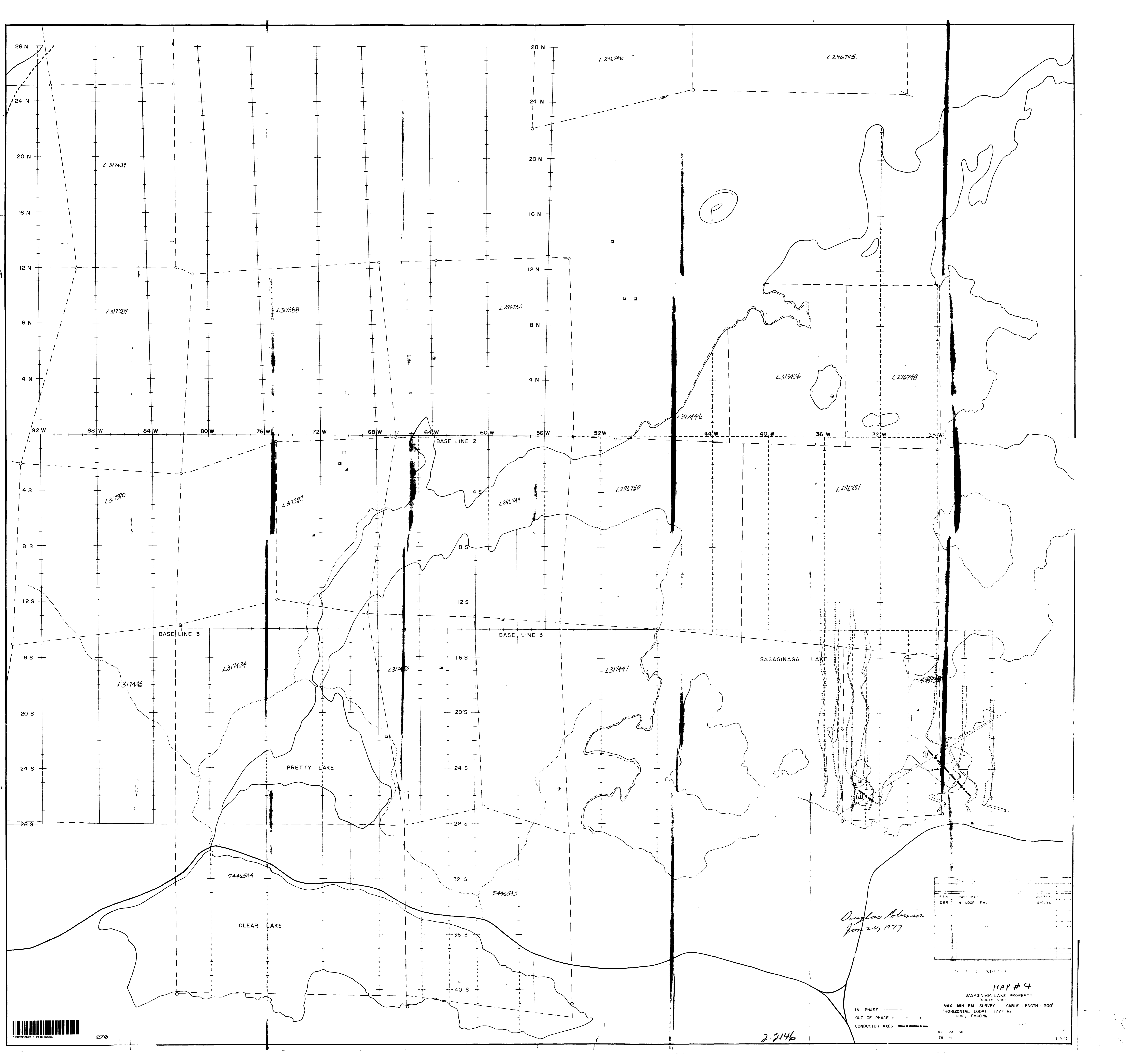
INSTRUMENT  
 ANY - ANY  
 COIL SEPARATE  
 ACCT.  
 H. PLING  
 out of phase  
 conducty axis  
 Scale 1" = 20'

SAS LAKE AREA - COBALT  
 BASE MAP  
 HORIZONTAL LOOP E









28 N  
24 N  
20 N  
16 N  
12 N  
8 N  
4 N  
92 W 88 W 84 W 80 W 76 W 72 W 68 W 64 W 60 W 56 W 52 W 48 W 44 W 40 W 36 W 32 W 28 W

4 S  
8 S  
12 S  
16 S  
20 S  
24 S  
28 S  
32 S  
36 S  
40 S

BASE LINE 2  
BASE LINE 3

PRETTY LAKE  
CLEAR LAKE  
SASAGINAGA LAKE

L317439  
L317387  
L317388  
L296752  
L317446  
L317436  
L296748  
L317446  
L296750  
L296751  
L317434  
L317435  
L317434  
L317435  
L317436  
L317437  
L317447  
S446544  
S446543

(P)

Douglas Robinson  
Jan 20, 1977

|     |            |         |
|-----|------------|---------|
| 45N | BASE MAP   | 24/7/72 |
| DRR | H LOOP EM. | 5/4/76  |

MAP # 4  
SASAGINAGA LAKE PROPERTY  
(SOUTH SHEET)  
MAX MIN EM SURVEY CABLE LENGTH = 200'  
(HORIZONTAL LOOP) 1777 Hz  
200', 1"=40'

IN PHASE ———  
OUT OF PHASE - - - -  
CONDUCTOR AXES - - - -

47 23 30  
79 41 - -  
3/1/75

2-2146



| DRAWING RECORD AND STATUS |         |      |           |
|---------------------------|---------|------|-----------|
| NO.                       | DATE    | BY   | REVISION  |
| 1                         | 24/7/72 | RSAL | BASE MAP  |
| 2                         | 5/4/76  | DRR  | H LOOP EM |
|                           |         |      |           |
|                           |         |      |           |
|                           |         |      |           |
|                           |         |      |           |
|                           |         |      |           |
|                           |         |      |           |
|                           |         |      |           |
|                           |         |      |           |

Douglas Robinson  
 Jan 20, 1977  
 ST. JOSEPH EXPLOREXIONS LIMITED  
 MAP #5 2.2146  
 SASAGINAGA LAKE PROPERTY  
 (SOUTH SHEET)  
 MAX MIN SURVEY CABLE LENGTH +400'  
 (HORIZONTAL LOOP) 222 HZ  
 200' ± 40%  
 1120  
 47 23 30  
 79 41  
 31 M/S

**LEGEND, GEOPHYSICAL**

- E.M. Conductor (un)-defined, suggested
- 250 □ Depth of conductor (in feet)
- Area of positive magnetic anomaly
- 0-200 Depth to top of body (in feet)

**LEGEND, GEOLOGIC**

- PROTEROZOIC**
- KEWEEKAMUN**
- 24 □ Olivine diabase, quartz diabase
  - 21 □ Quartz diabase (dikes and sills)
- MURDOGAN**
- BOYBANDA FORMATION**
- 16 □ 16a Siltstone (Firstbrook Fm.)
  - 16b Greywacke (Coleman Fm.)
  - 16c Conglomerate (Coleman Fm.)
- ARCHEAN**
- MAFIC INTRUSIVE ROCKS**
- 9 □ 9a Diabase (Marchevan)
  - 9b Lamprophyre
- MAFIC & ULTRAMAFIC INTRUSIVE ROCKS**
- 6 □ 6a Gabbro, Diorite
  - 6b Peridotite
- KEEWATIN**
- CLASTIC SEDIMENTS**
- 5 □ 5a Greywacke
  - 5b Slate
- CHEMICAL SEDIMENTS**
- 4 □ 4a Chert
  - 4b Iron formation
- FELSIC EXTRUSIVES**
- 3 □ 3a Rhyolite
  - 3b Ryholite
  - 3c Quartz-feldspar porphyry (dikes)
- INTERMEDIATE EXTRUSIVES**
- 2 □ 2a Dacite
  - 2b Intrusive equivalents
- MAFIC EXTRUSIVES**
- 1 □ 1a Andesite
  - 1d Intrusive equivalents

**SYMBOLS, GEOLOGIC**

- Rock outcrop (large/small)
- Strike and dip of bed
- Strike and dip of foliation
- Strike and dip of jointing
- Strike of fragment lineation
- Direction of pillow tops
- Geologic contact: defined, assumed, suggested
- Fault
- Shaft and dump
- Pit
- Drill hole and projection to horizontal

**ABBREVIATIONS**

- ax "axit breccia" unit
- ag agglomerate
- br breccia
- col calcareous
- g graphite
- m massive
- pl pillowed
- py pyrrhotite
- py pyrite
- ser sericitic
- sil siliceous
- vg very fine grained
- tr tuff
- u/g geology from underground workings - O.D.M. Reports
- T geological mapping by R. Thompson - O.D.M. Map #97
- G geology interpreted from geophysics

| BASE MAP | DATE     | TITLE                   | SCALE |
|----------|----------|-------------------------|-------|
| DEF/RSN  | 11/1/77  | GEOLOGY/LEGEND          | 1:400 |
| RSN      | 11/1/72  | GEOLOGICAL LEGEND       | 1:400 |
| RSN      | 08/17/72 | SHARP L., ROADS, TRAILS | 1:400 |

VANGULF EXPLORATION COMPANY  
TORONTO, CANADA

**SAS. LAKE AREA - COBALT  
GEOLOGY**

Scale: 1 inch = 400 feet

| NO. | DATE     | BY  | REVISION |
|-----|----------|-----|----------|
| 47  | 11/1/77  | DEF | 1        |
| 48  | 11/1/77  | DEF | 2        |
| 78  | 08/17/72 | RSN | 1        |

2-2146

