VLEM SURVEY REPORT

63.2511

INTRODUCTION

During the period February 16, 1969, to March 10, 1969, an electromagnetic survey was carried out over a group of ~~84~~ 80 contiguous unpatented mining claims recorded in the name of Hollinger Mines Limited, Timmins, Ontario. The survey was carried out by Shield Geophysics Limited, 26 Pine Street South, Timmins, Ontario.

The mining claims are designated P98491 to 98504 inclusive, P98521 to 98558 inclusive, P98591 to 98598 inclusive, P98610 to 98629 inclusive, ~~P99140 to 99143 inclusive.~~

LOCATION AND ACCESS

The property is located at the common corner of Loveland, Macdiarmid, Reid and Thorburn Townships (see Key Map).

Access under winter conditions is via snow vehicle from highway 576 near the Kam Kotia Mine in Robb Township. From Timmins, the distance is approximately 22 miles via highway and approximately 10 miles via winter bush trails.

Access during summer is via helicopter from Timmins a distance of approximately 23 miles.

PREVIOUS WORK

Airborne and ground geophysical surveys, geological mapping and diamond drilling has been carried out on various parts of the property by previous holders.

The Thorburn-Loveland sector of the property was held by Mespi Mines during the early 1960's. Airborne magnetometer and electromagnetic surveys were flown in a northeasterly direction. Ground follow-up work was carried out and six diamond drill holes (LT 1, 2, 6, 7, 8 and 9) were put down in the Loveland sector of the property.

Frobex held the Macdiarmid sector of the property and undertook horizontal loop electromagnetic surveys. Five diamond drill holes (F 1, 4, 5, 6 and 7) were put down.

Texas Gulf Sulphur drilled one hole (M-62) in the south-central part of the MacDiarmid sector of the property.

All of the above mentioned work is on file with the Ontario Department of Mines.

GEOLOGY OF THE PROPERTY

On the basis of the previous work done on the property, it can be inferred that much of the property is underlain by felsic metavolcanic rocks with some interbedded mafic volcanic rocks.

The drill hole by Texas Gulf Sulphur intersected graphitic shales in the south part of the Macdiarmid sector of the property.

Conductor axes and limited outcrop data would indicate that the rocks strike in an east to east-southeasterly direction.

North to northwesterly striking diabase dikes outcrop on the west part of the property.

On the basis of the regional geology, it is highly probable that the Mattagami River Fault System underlies the east part of the property.

INSTRUMENT USED AND SURVEY METHOD

The entire vertical loop electromagnetic survey was conducted using a dual frequency unit manufactured by Crone Geophysics Limited, Port Credit, Ontario. The unit operates at 480 and 1800 cycles per second.

The entire survey was conducted as a reconnaissance survey and no attempt was made to detail any of the indicated conductors. A total of 3869 stations were established.

The instrument used and survey method are fully described in the accompanying Appendix.

SURVEY RESULTS AND INTERPRETATION

Several strong conductive zones with fair to good, low to high frequency ratios were indicated.

Numerous weak cross-overs were obtained.

In general, two sets of conductive zones have been indicated. Set one apparently has a north strike and little or no magnetic expression. Usually the conductive zones with a north strike appear to be associated with either faults or diabase dikes.

Twelve obvious conductive zones are described as follows:

(A) WEST SHEET

Zone 1 is a north to northwesterly striking zone. The cross-overs are strong and the ratio between high and low frequency responses is fair. The zone lies to the north and east of an outcrop area so that the western portions of the profiles are probably attinuated due to edge effects from the horizontal conductive clay layers.

Zone 2 has a westerly strike, fair response and fair ratios on one line. The zone appears to terminate on the east at a diabase dike.

Zone 3 - Very strong dip angles from two set-ups indicate to a strongly conductive zone with a probable northerly strike located on line 64W at 43S. This may be a previously drilled graphitic zone.

Zone 4 appears to occur in a magnetic low; however, the responses have good ratios. The strongest cross-over occurs on line 52W.

Zone 5 is a strong, one-line high frequency cross-over occurring in a magnetic low. The low frequency profile is very weak and the ratios are very poor. It is probable that the strong dip angles on the southerly part of the profiles are largely due to topographic effects.

Zone 6 is a zone of weak conductivity with an indefinite magnetic association. One drill hole in this area previously encountered a graphitic conductor.

Zone 7 is a zone of weak conductivity occurring between two diabase dikes and is parallel to a postulated northwesterly striking fault. Indicated strike length is 800 feet.

Zone 8 is a weakly indicated zone of conductivity on only one line. The ratio is fair and the cross-over may be associated with a 100 gamma magnetic anomaly. This zone should be very carefully checked.

(B) EAST SHEET

Zone 9 has a strike length of about 800 feet. The response is very strong and the indicated conductivity is excellent. The zone appears to be terminated on the east by a diabase dike. This zone has probably been tested by Frobex holes F-4 and F-5.

Zone 10 has the strongest response recorded on the property. Indicated conductivity is excellent and the zone appears to be directly coincident with a strong magnetic anomaly. There is a strong probability that there is at least one parallel conductor in this area as indicated on line 28E at 9+50S.

Zone 11 has a possible strike length of 2200 feet. Response is fair and the indicated conductivity on lines 24 and 28E is excellent. The zone appears to be terminated on the east by the eastern boundary of the Mattagami River Fault. THis zone may have been tested by Frobex hole F-6.

Zone 12 is a poorly conductive zone with poor response characteristics. It correlates well with a postulated northwesterly striking fault zone. The indicated strike length is in excess of 4800 feet.

Besides the twelve zones discussed above, there are many more one-line cross-overs and indicated zones many of which probably have enortherly strike. Any one of these could be important; however, on a reconnaissance-type survey these zones are not readily interpretable. Follow-up work would be required to establish the authenticity of the remaining indicated zones. Undoubtedly, some of the indicated zones are due to transmitter-receiver misorientation or topographic effects.

SUMMARY AND CONCLUSIONS

Twelve separate definite zones of conductivity were indicated on the reconnaissance survey. Numerous other less definite zones of conductivity were indicated.

Some of the strongest conductive zones may have previously been drilled; however, at least seven of these zones have not been tested.

In general, the zones can be grouped in two classes according to strike direction.

The strongest zones appear to have a westerly or northwesterly strike while the weaker, more poorly conductive zones have a northerly strike and often appear to be associated with the edges of a diabase dike or a postulated fault. The northerly striking zones may not be weaker generally than the other zones but appear to be weaker simply because of poor transmitter-conductor coupling and unfavourable line direction.

RECOMMENDATIONS

(1) Careful field checks should be made in order to locate all previous drill locations as accurately as possible with the present grid.

(2) Where strike has definitely been established (Zones 1-12), detail grids should be cut and the zones detailed along 200 foot lines oriented perpendicular to established strike.

(3) Vertical loop transmitter set-ups should be made on the weaker indicated zones and search squares run in order to establish the authenticity of the cross-overs and the strike direction if authentic.

(4) As well as detail vertical loop work, in-line methods should be used on the detail grids in an attempt to establish the strongest portions of the zones and the direction of dip.

Because of the heavy, conductive overburden covering most of the area and the inherent limitations of vertical loop reconnaissance work even the weakest indications may well have significance.

The recommended detail and follow-up program will probably entail nearly as much work as the reconnaissance program. Since detail work is always considerably more expensive than reconnaissance work, $15,000 should be budgeted for the follow-up detail phase.

It is recommended that the detail work be performed during winter in order to take best advantage of the existing grid and minimize the survey costs.

Respectfully submitted,

SHIELD GEOPHYSICS LIMITED,

April 25, 1969,

Timmins, Ontario.

J. E. Steers,

Consulting Geologist.

A P P E N D I X

SURVEY METHOD AND INSTRUMENT DATA

Electromagnetic Survey

Any alternating magnetic field will induce an electrical eddy current in the medium through which the magnetic field passes. If a source of an alternating magnetic field is located near a conductive body, anomalously strong eddy currents will be induced in the deposit due to its high electrical conductivity. Electrical currents induced in the conductive body will produce a secondary magnetic field proportional to the intensity of current flow.

A receiver coil tuned to the frequency of the transmitting device will pick up both the directly transmitted signal and the eddy current signal.

A Crone VEM electromagnetic unit was used in this survey. The unit consists of a virtually mounted, battery powered transmitting coil operating at frequencies of 1800 and 480 cps. and a receiving coil tuned to the transmitting frequency, an inclinometer, an amplifier and a headset.

Throughout the survey, the transmitter and receiver were separated by distances of 400, 800 and 1200 feet. The plane of the transmitter coil was oriented so that the transmitter was vertical and pointed towards the receiver. Orientation was obtained using a platen on which predetermined receiver positions were plotted. Stations were read at one hundred foot intervals.

At all times, the receiver "faced" the transmitter. The results obtained are dip angles, measured in degrees. The dip angles are obtained by first orienting the receiving coil in the plane of the magnetic field by rotating the coil about a vertical axis until a null or minimum signal is obtained, and then rotating the coil about a horizontal axis until a null or minimum signal is obtained. The angle which the magnetic field makes with the horizontal is recorded as a "dip" or "tilt" angle. In the absence of a conductor the dip angle will be zero since no secondary field is present. In the presence of a conductor, the axis of the receiver coil points towards the conductor and the plane of the coil away from the conductor. In the presence of a conductor, the secondary magnetic field is usually displaced from the primary in phase as well as direction so that the total field is elliptically polarized. The receiver cannot then be nulled completely but a minimum signal can be obtained, the width of the minimum being an indication of the phase displacement.

The tilt angles are plotted as profiles, the zero or "cross-over" point indicating the focus of the conductor axis.

Once a conductor axis has been established, the transmitter is set up over the conductor and lines are read on both sides of the transmitter and the conductor axis is traced out by "leap frogging" from "cross-over" to "cross-over".

<u>Specifications</u>

<u>Operating Frequencies</u>: 480 and 1800 cycles per second

Maximum Range: Up to 2000 foot separation between transmitter and receiver on high power for a ±7° null width at both 480 and 1800 cps.

Depth of Exploration: Roughly half the distance between transmitter and receiver under optimum conditions.

Transmitter Power Supply: Rechargeable NiCad battery mounted on a packboard.

Weights:		
	Packboard mounted batteries	44 lbs.
	Transmitter coil	16 lbs.
	Transmitter mast	6 lbs.
	Transmitter control box	8 lbs.
	Receiver	13 lbs.

Mining Claims Traversed

P 98491, 98492, 98493, 98494, 98495, 98496, 98497, 98498, 98499, 98500, 98501, 98502, 98503, 98504.

P 98521, 98522, 98523, 98524, 98525, 98526, 98527, 98528, 98529, 98530, 98531, 98532, 98533, 98534, 98535, 98536, 98537, 98538, 98539, 98540, 98541, 98542, 98543, 98544, 98545, 98546, 98547, 98548, 98549, 98550, 98551, 98552, 98553, 98554, 98555, 98556, 98557, 98558.

P 98591, 98592, 98593, 98594, 98595, 98596, 98597, 98598.

P 98610, 98611, 98612, 98613, 98614, 98615, 98616, 98617, 98618, 98619, 98620, 98621, 98622, 98623, 98624, 98625, 98626, 98627, 98628, 98629.

~~P 99140, 99141, 99142, 99143.~~

20 days per claim

MAGNETOMETER SURVEY REPORT

INTRODUCTION

During the period December 21, 1968, to February 21, 1969, a magnetometer survey was carried out over a group of ~~84~~ 80 contiguous unpatented mining claims recorded in the name of Hollinger Mines Limited, Timmins, Ontario. The survey was carried out by Shield Geophysics Limited, 26 Pine Street South, Timmins, Ontario.

The mining claims are designated P98491 to 98504 inclusive P98521 to 98558 inclusive, P98591 to 98598 inclusive, P98610 to 98629 inclusive, ~~P99140 to 99143 inclusive~~.

LOCATION AND ACCESS

The property is located at the common corner of Loveland, Macdiarmid, Reid and Thorburn Townships (see Key Map in pocket).

Access under winter conditions is via snow vehicle from highway 576 near the Kam Kotia Mine in Robb Township. From Timmins, the distance is approximately 22 miles via highway and approximately 10 miles via winter bush trails.

Access during summer is via helicopter from Timmins, the distance is approximately 23 miles.

PREVIOUS WORK

Airborne and ground geophysical surveys, geological mapping and diamond drilling has been carried out on various parts of the property by previous holders.

The Thorburn-Loveland sector of the property was held by Maspi Mines during the early 1960's. Airborne magnetometer and electromagnetic surveys were flown in a northwesterly direction. Ground follow-up work was carried out and six diamond drill holes (LT 1, 2, 6, 7, 8 and 9) were put down in the Loveland sector of the property.

Frobex held the Macdiarmid sector of the property and undertook horizontal loop electromagnetic surveys. Five diamond drill holes (F 1, 4, 5, 6 and 7) were put down.

Texas Gulf Sulphur drilled one hole (M-62) in the south-central part of the Macdiarmid sector of the property.

All of the above mentioned work is on file with the Ontario Department of Mines.

GEOLOGY OF THE PROPERTY

On the basis of the previous work done on the property, it can be inferred that much of the property is underlain by felsic metavolcanic rocks with some interbedded mafic volcanic rocks.

The drill hole by Texas Gulf Sulphur intersected graphitic shales in the south part of the Macdiarmid sector of the property.

Conductor axes and limited outcrop data would indicate that the rocks strike in an east to east-southeasterly direction.

North to northwesterly striking diabase dikes outcrop on the west part of the property.

On the basis of the regional geology, it is highly probable that the Mattagami River Fault System underlies the east part of the property.

INSTRUMENT USED AND SURVEY METHOD

The magnetometer survey was carried out using a Sharpe M.F.-1-100 magnetometer with a sensitivity of ±1 gamma. Readings were taken at 100 foot intervals except in areas of high magnetic gradient where the station interval was fifty feet.

Base stations for the correction of diurnal variation were established at 100 foot intervals on all base and tie lines. The M.F.-1-100 unit with a tripod was used for establishing the base stations. All readings are tied to station 0N on line 32W which was arbitrarily assigned a value of 1000 gammas.

The survey results are presented in contour form on Maps 1 and 2 (in pocket). A total of 5220 stations were established.

SURVEY RESULTS AND INTERPRETATION

The magnetic results indicate that the underlying rocks are structurally very complex.

The maximum magnetic relief is 5132 gammas; however, the relief over most of the property is much less than this.

The most obvious features are the numerous north-northwesterly trending diabase dikes which appear to have been interrupted by at least three sets of faults.

In general, the central portion of the eastern area has a lower background than the remainder of the area. The eastern and western boundaries of this area are probably north striking faults which form the Mattagami River Fault System.

Two "spot highs" are located on the property which are probably not due to bedrock features but are more likely to be caused by drill casing left in the ground or a metal object left behind by a drill crew. These isolated highs of questionable character are as follows:

line 60W at 46S
line 20E at 14+50S

At several locations, strong dipolar effects are noted at or very near the edge of outcrops. These locations are as follows:

line 104W at 55S
line 64W at 25S
line 60W at 48S
line 60W at 30S
line 8E at 18S

Two sets of diabase dikes with parallel strikes appear to be present on the property.

Set one has a distinct anomaly pattern, appreciable width and an apparent steep westerly dip. This set occasionally outcrops and in general the depth to the top appears to be about one hundred feet or less.

Set two has a vague broad anomaly pattern, narrow width and in general these dikes appear to be relatively discontinuous. The apparent dip on most of these dikes is easterly. The anomaly patterns are so broad, however, that it is extremely difficult to separate the narrow dike anomalies from the wide dike and northerly trending fault anomalies so that dip estimations in this case must be highly suspect.

It is very difficult to attempt much interpretation of the general geology of the area. There appears to be little difference in magnetic susceptibility between the various units comprising the bulk of the underlying rocks.

It is thought that most of the underlying rocks are intermediate to felsic volcanic rocks with thin intercalated bands of sedimentary rocks.

Where outcrop and drill hole information is available, the individual units appear to have a general westerly strike, narrow thicknesses and a wide range in composition, texture and fabric.

Several westerly to northwesterly striking anomalous magnetic features appear to be of immediate interest since sulphide mineralization has been encountered within two of the features.

The anomalies of interest are numbered one to eight inclusive on the accompanying geological interpretation. Features one and seven have previously been drilled.

Two "bull's eye" anomalies occur in the area. The anomaly peaks are approximately five hundred gammas above background. These anomalies are probably caused by small diabasic or gabbroic plugs.

The anomalies are located on lines 116 west on the baseline and line 26 east at 10N.

SUMMARY AND CONCLUSIONS

The magnetic survey over this claim group indicates that the geology of the area is very complex.

Two distinct diabase dike swarms have a north-northwesterly strike and a steep dip were outlined.

Three separate directions of faulting are indicated.

The oldest faults appear to have a northeasterly strike.

The major fault set having a northerly strike and the set having a northwesterly strike appear to be related. It is likely that the north striking faults are part of the major Mattagami River Fault zone and that repeated movement over long periods of time have occurred in this zone.

It is believed that most of the rocks in the area are intermediate to felsic volcanic rocks having wide textural and compositional variation.

If any strike direction is predominant within the map area, the geological strike is approximately N70°W.

Eight short, lenticular westerly striking anomalies warrant careful investigation since sulphide mineralization has been found to be associated with two of these features.

It is recommended that each of the indicated previous drill holes be located in the field and tied in to the existing grid system and that careful detailed electromagnetic checks be carried out over the eight anomalous zones.

Respectfully submitted,

SHIELD GEOPHYSICS LIMITED,

J. E. Steers

Timmins, Ontario,
April 25, 1969.

J. E. Steers,
Consulting Geologist.

Mining Claims Traversed

P 98491, 98492, 98493, 98494, 98495, 98496, 98497, 98498, 98499, 98500, 98501, 98502, 98503, 98504.

P 98521, 98522, 98523, 98524, 98525, 98526, 98527, 98528, 98529, 98530, 98531, 98532, 98533, 98534, 98535, 98536, 98537, 98538, 98539, 98540, 98541, 98542, 98543, 98544, 98545, 98546, 98547, 98548, 98549, 98550, 98551, 98552, 98553, 98554, 98555, 98556, 98557, 98558.

P 98591, 98592, 98593, 98594, 98595, 98596, 98597, 98598.

P 98610, 98611, 98612, 98613, 98614, 98615, 98616, 98617, 98618, 98619, 98620, 98621, 98622, 98623, 98624, 98625, 98626, 98627, 98628, 98629.

~~P 99140, 99141, 99142, 99143.~~

40 days per claim

THORBURN

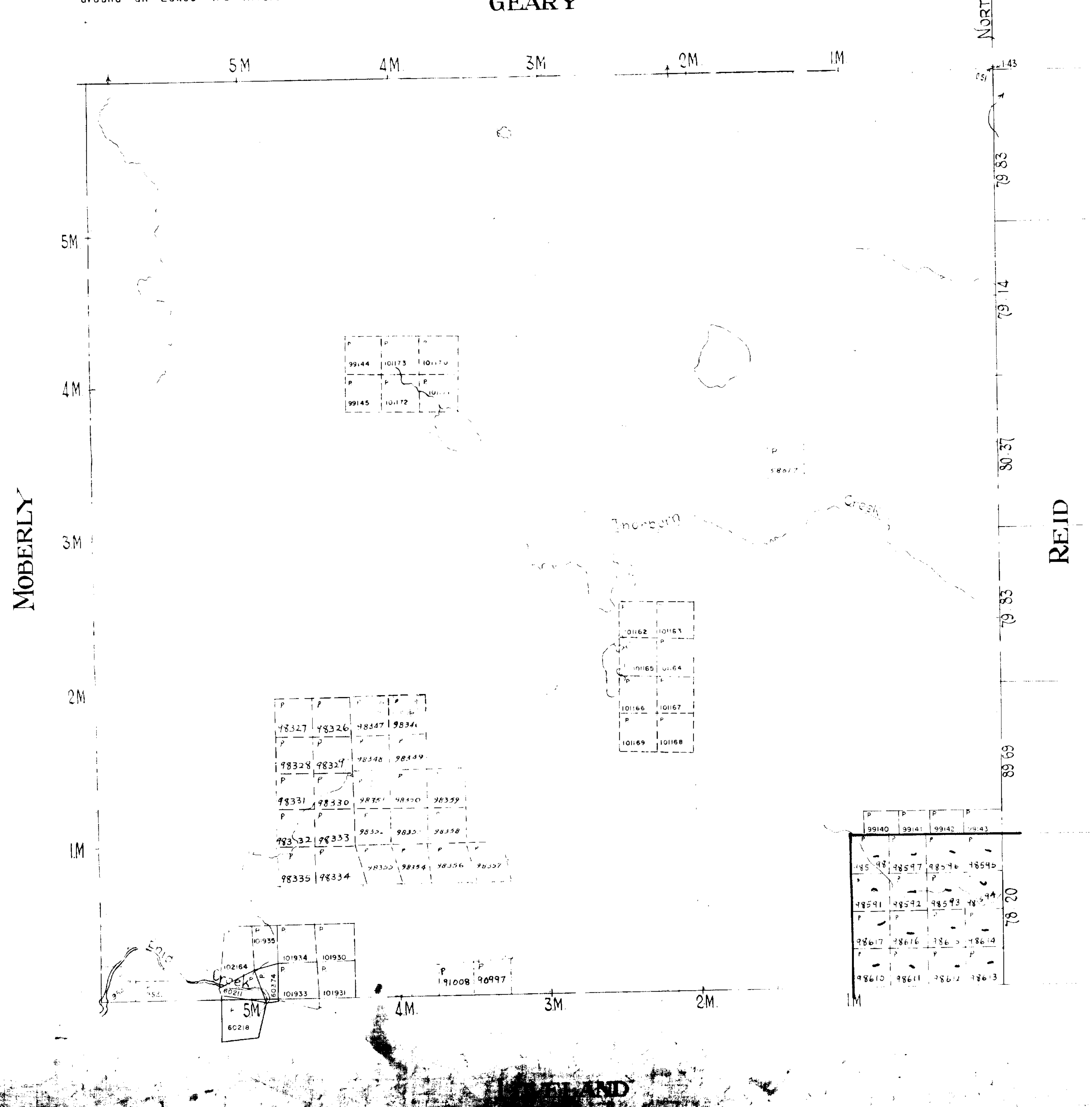
PORCUPINE MINING DIVISION

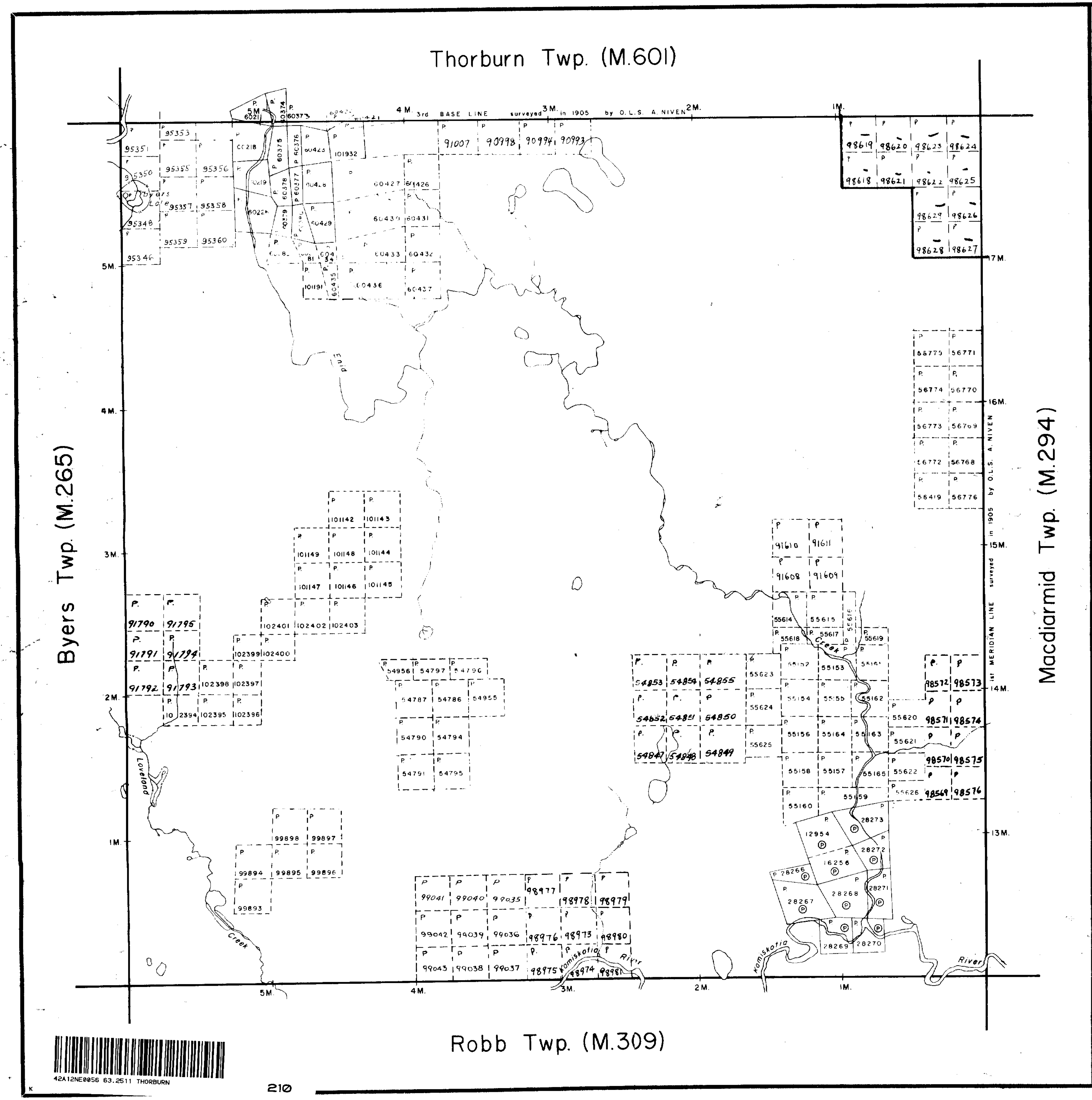
DISTRICT OF COCHRANE

Scale - 40 Chains = 1 Inch

NOTE

400' Surface Rights Reservation around all Lakes and Rivers.





THE TOWNSHIP OF

LOVELAND

DISTRICT OF COCHRANE

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

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

NOTES

400' Surface Rights Reservation around all lakes and rivers.

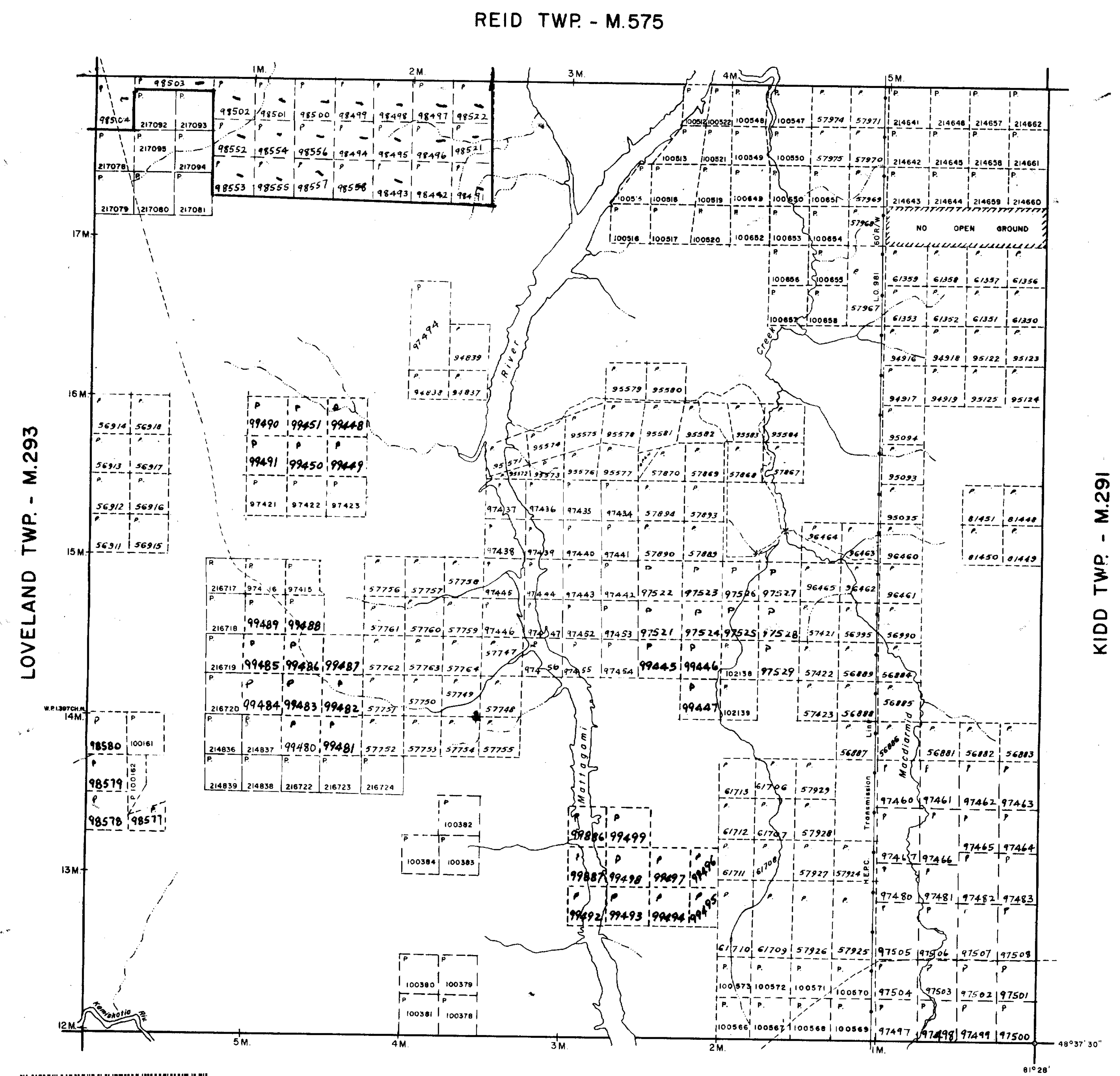
PLAN NO. M-293

DEPARTMENT OF MINES

— ONTARIO —

42A12NE0056 63.2511 THORBURN

210



42A12NE0056 63.2511 THORBURN

220

THE TOWNSHIP OF MACDIARMID

DISTRICT OF COCHRANE

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

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

NOTES

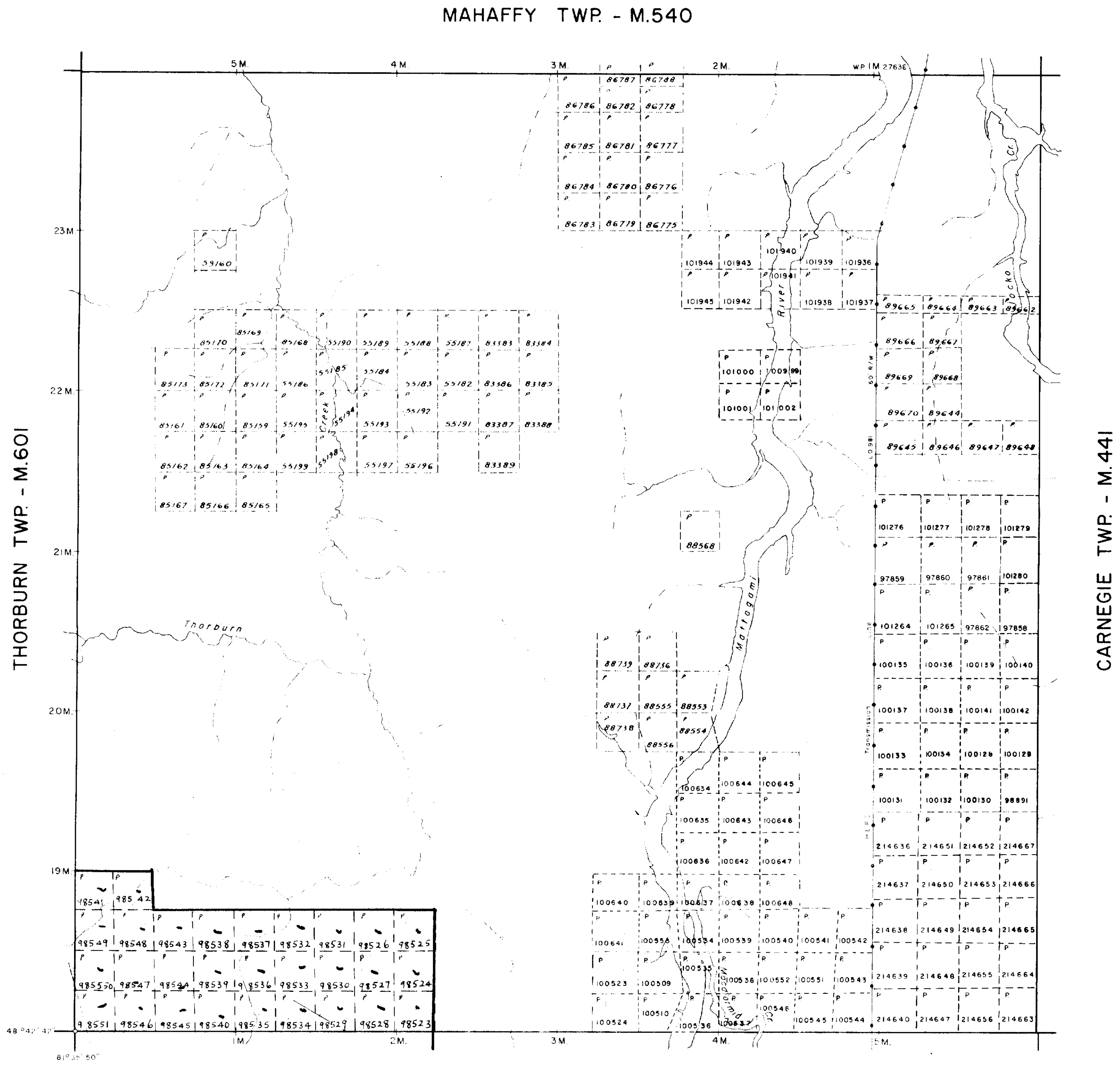
400' surface rights reservation around all lakes and rivers.

Flooding rights to areas along Mattagami River reserved to H.E.P.C. - L.O. 7085.

PLAN NO. M.294

DEPARTMENT OF MINES

— ONTARIO —



42A12NE0056 63.2511 THORBURN

230

THE TOWNSHIP OF REID

DISTRICT OF COCHRANE

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

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

NOTES

400' surface rights reservation around all lakes and rivers.

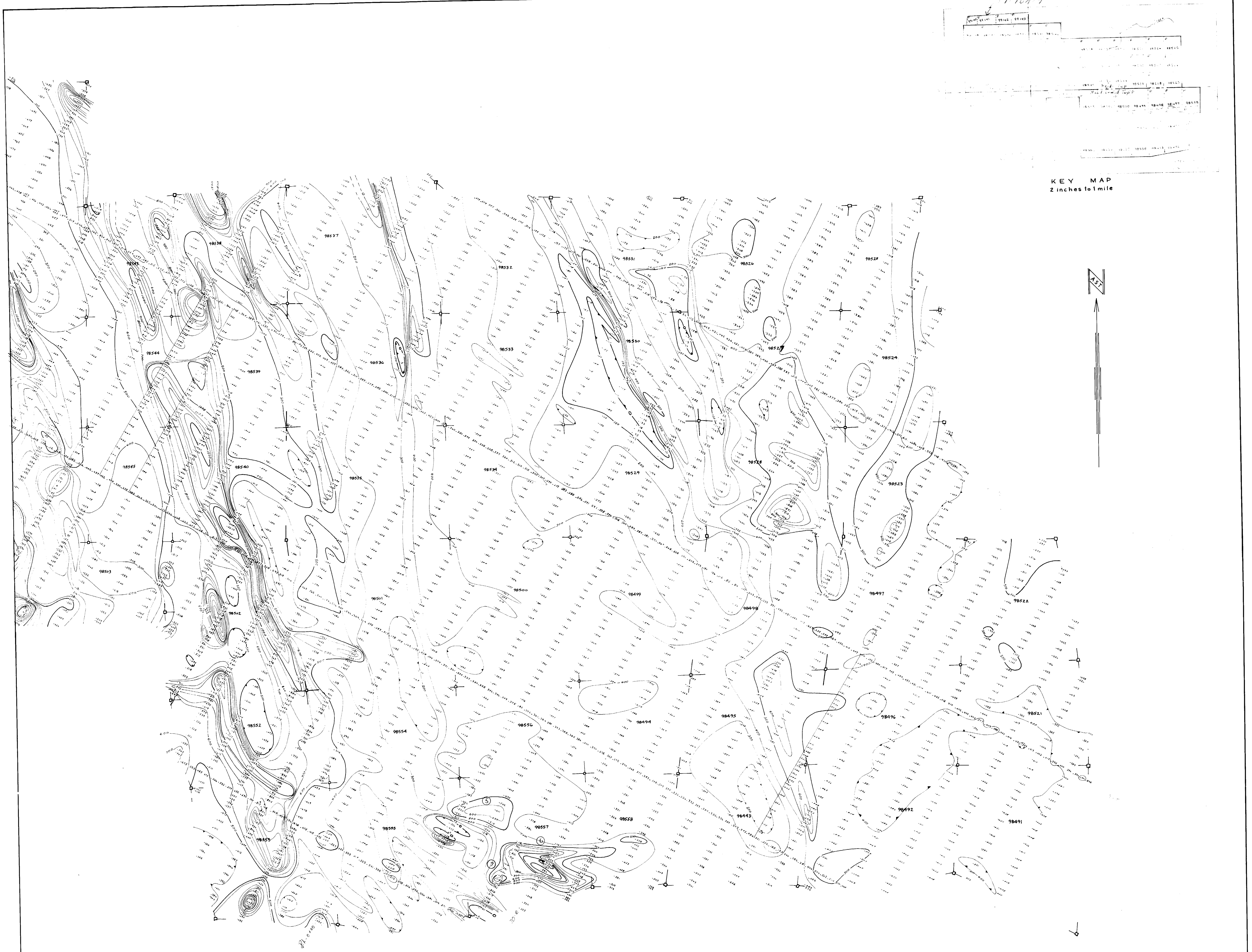
Subdivision of this twp. into lots and concessions annulled Aug. 19, 1953.

Flooding rights to areas along Mattagami River reserved to H.E.P.C. - L.O. 7085.

PLAN NO. M.575

DEPARTMENT OF MINES

ONTARIO



SYMBOLS

- / Measurement station along picket line
- / Relative value of the vertical component of the earth's magnetic field in gammas
- 500 Magnetic contour
- 300 Magnetic depression
- ▫ Claim post

INSTRUMENT: Sharpe MF-1-100 fluxgate magnetometer

MAGNETOMETER SURVEY

ON THE EAST HALF OF THE PROPERTY OF

HOLLINGER MINES LIMITED

REID & MACDIARMID TOWNSHIPS, ONT.

BY

SHIELD GEOPHYSICS LIMITED

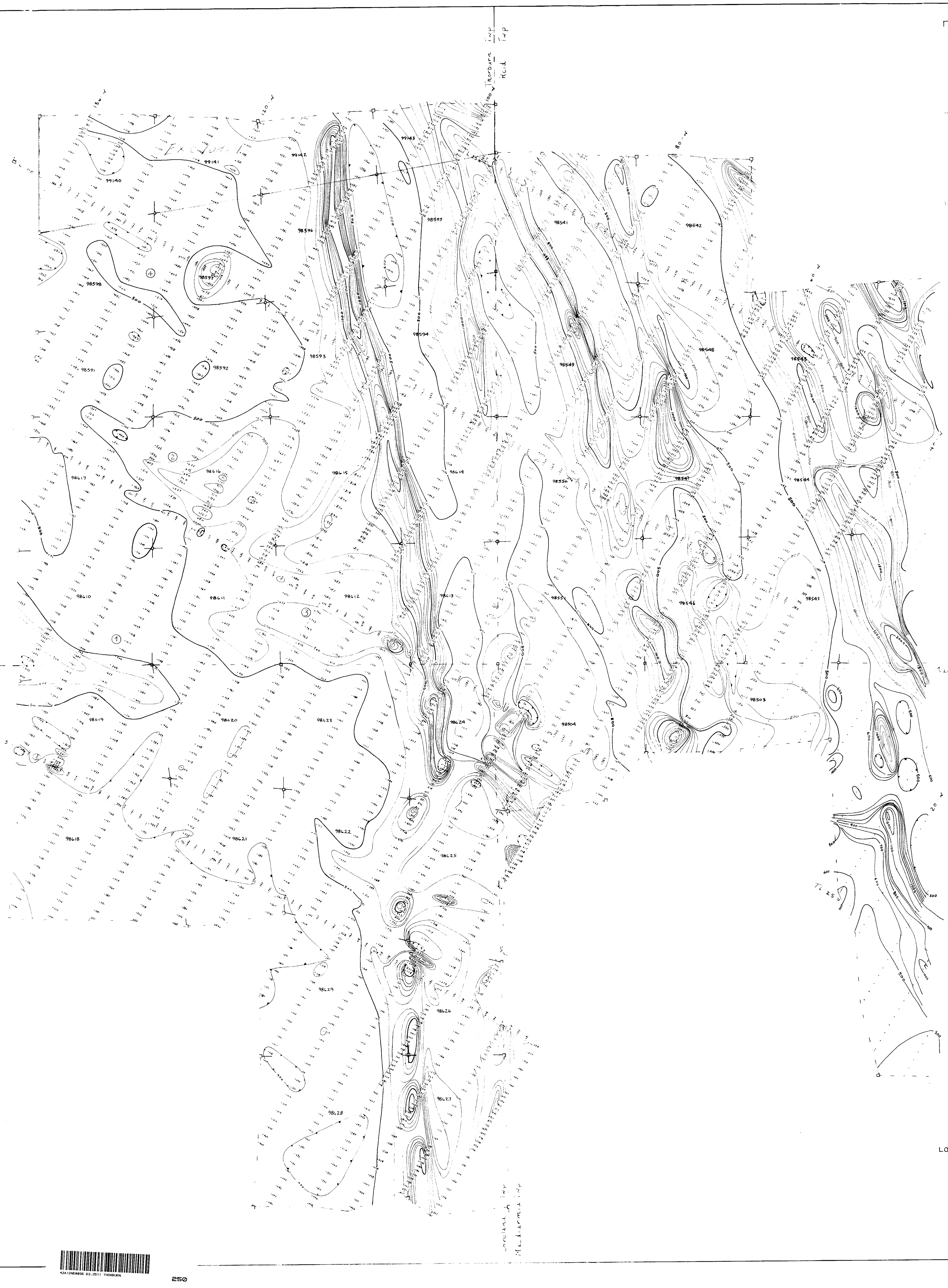
SCALE

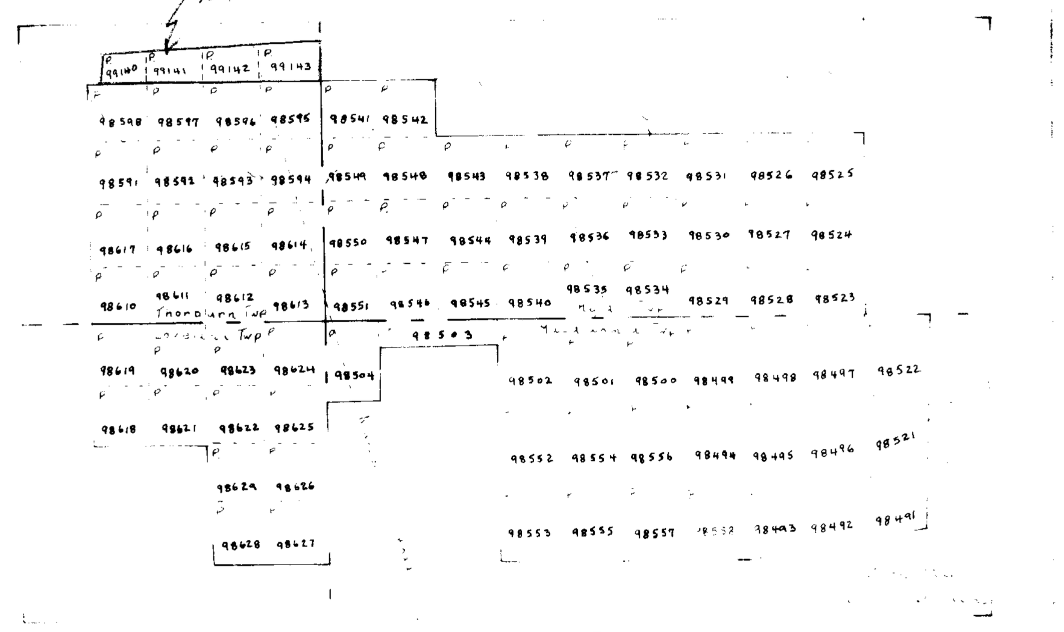
0 400 800 1200 1600 2000

MAY FEET 1969

63.2511

240





KEY MAP
2 inches to 1 mile

SYMBOLS

Measurement station along picket line

Relative value of the vertical component of the earths magnetic field in gammas

Magnetic contour

Magnetic depression

Claim post

INSTRUMENT Sharpe MF-1-100 fluxgate magnetometer

MAGNETOMETER SURVEY

ON THE WEST HALF OF THE PROPERTY OF

HOLLINGER MINES LIMITED

LOVELAND, THORBURN, REID & MACDIARMID TOWNSHIPS, ONT.

BY

SHIELD GEOPHYSICS LIMITED

SCALE

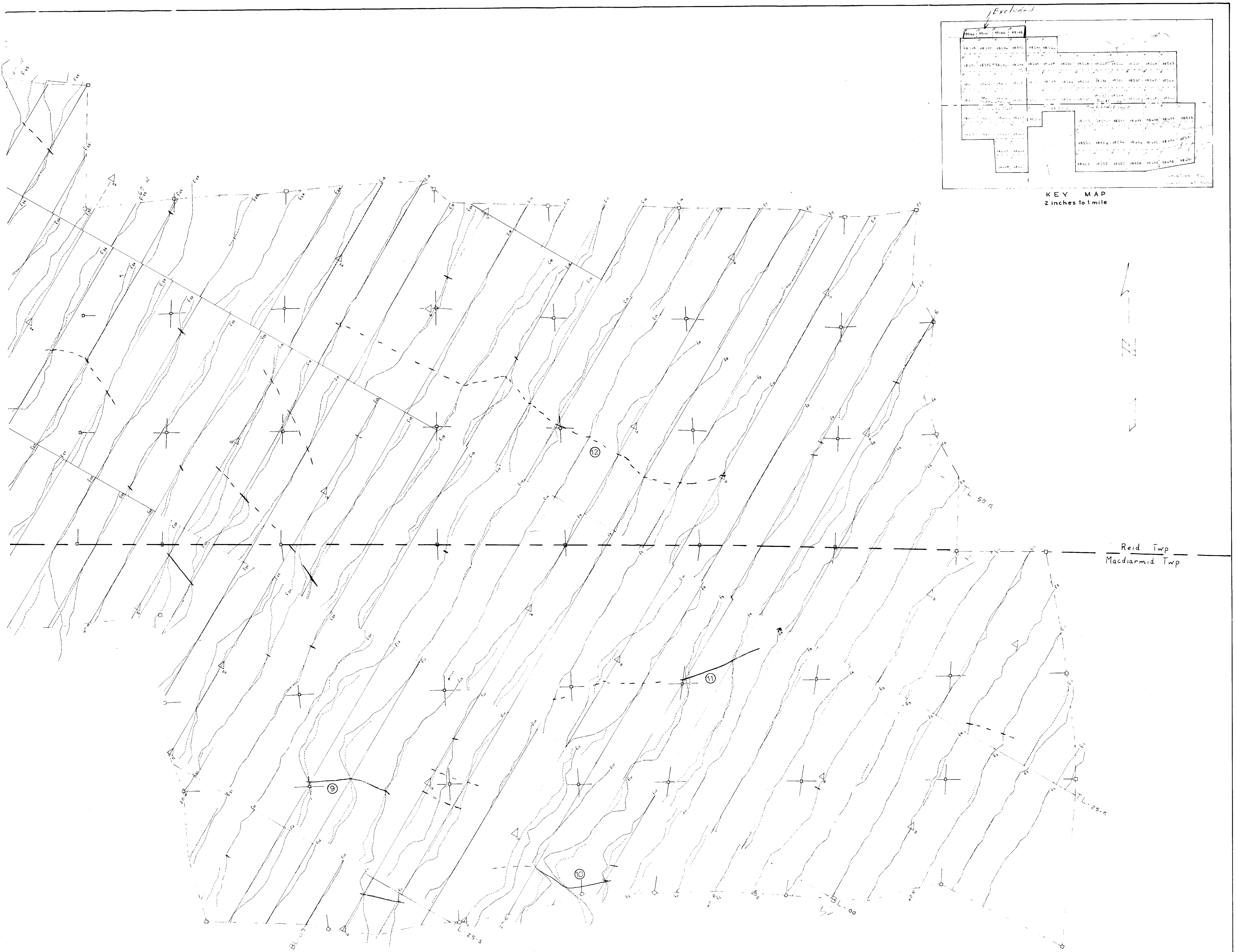
0 400 800 1200 1600 2000

FEET

MAY 1969

63.2511

250



SYMBOLS

- Measurement station along picket line
- Profile scale: 1" = 20°
- 1800 cps
- 480 cps
- $\triangle_2$ Transmitter location
- ▫ Claim post
- Conductor axis

INSTRUMENT: Crone VEM unit; 1800 & 480 cps

ELECTROMAGNETIC SURVEY

ON THE EAST HALF OF THE PROPERTY OF

HOLLINGER MINES LIMITED

REID & MACDIARMID TOWNSHIPS, ONT.

BY

SHIELD GEOPHYSICS LIMITED

SCALE

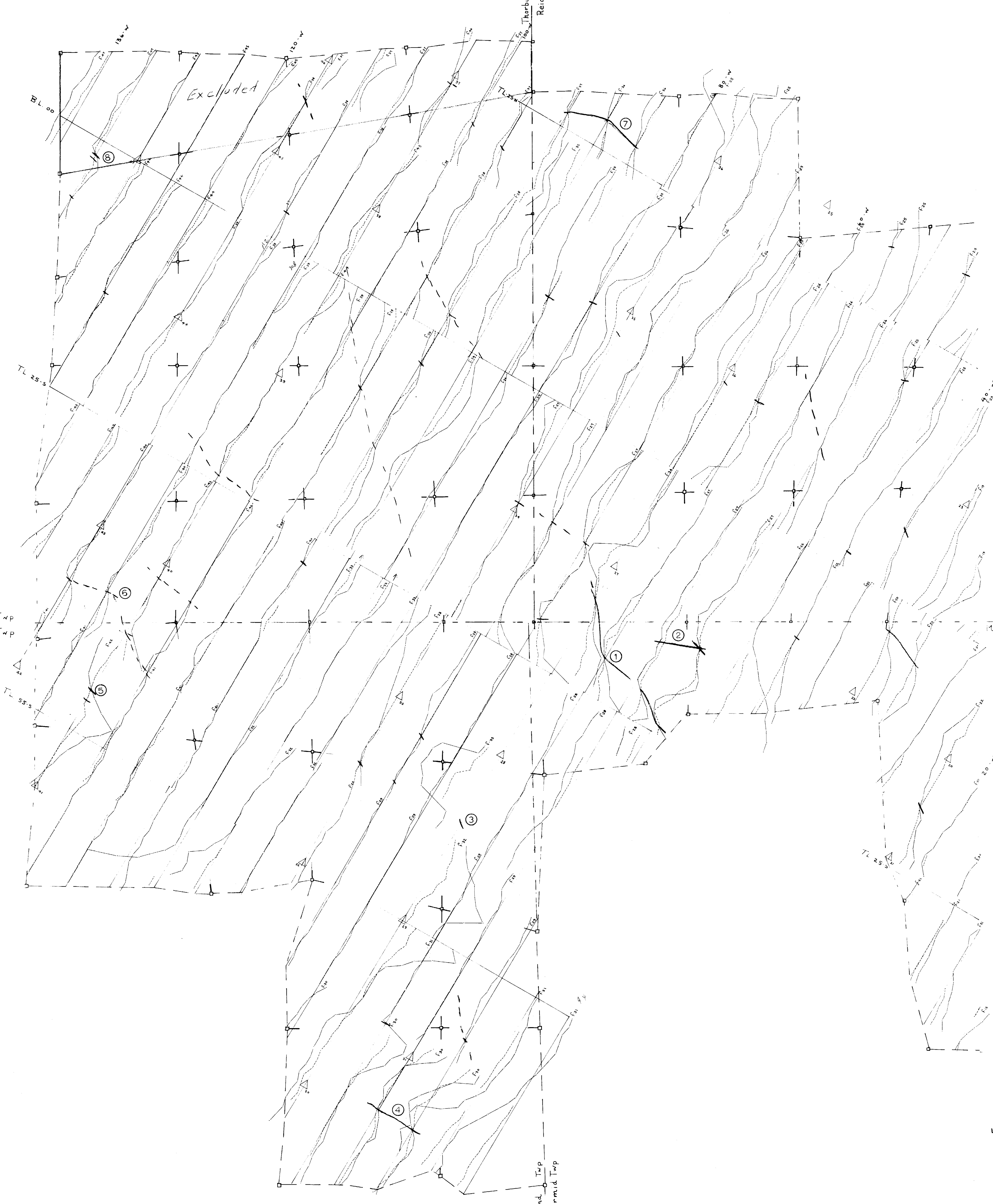
0 400 800 1200 1600 2000

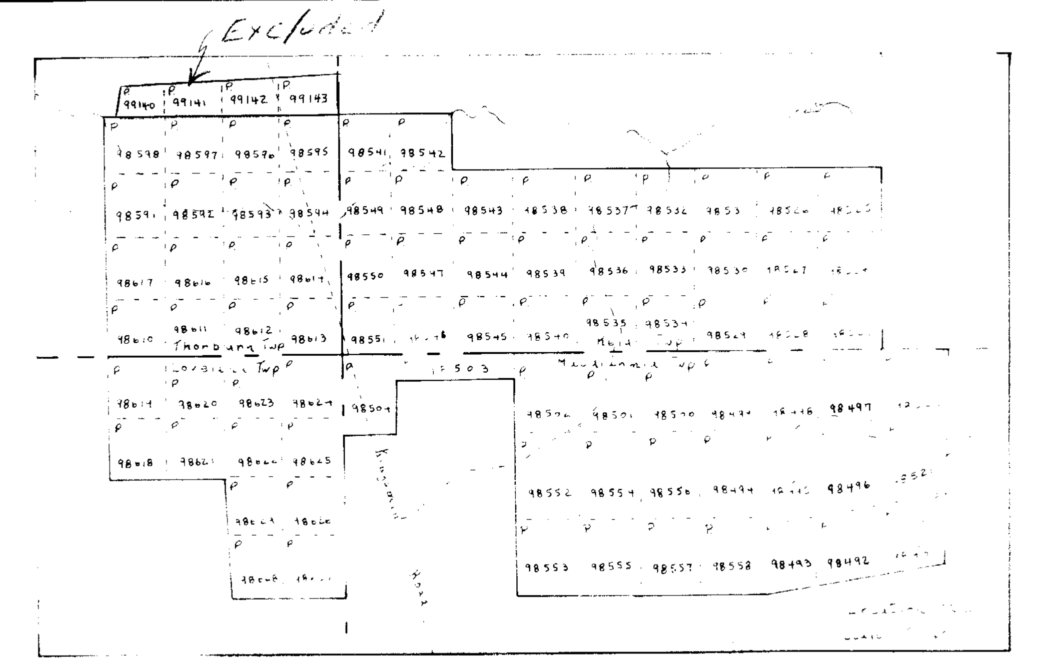
FEET

MAY 1969

63.2511

260





KEY MAP
2 inches to 1 mile

SYMBOLS

- Measurement station along picket line
- Profile scale: 1" = 20°
- 1800 cps
- 480 cps
- Transmitter location
- Claim post
- Conductor axis

INSTRUMENT: Crone VEM unit: 1800 & 480 cps

ELECTROMAGNETIC SURVEY

ON THE WEST HALF OF THE PROPERTY OF

HOLLINGER MINES LIMITED

LOVELAND, THORBURN, REID & MACDIARMID TOWNSHIPS, ONT.

BY
SHIELD GEOPHYSICS LIMITED

63.2511

SCALE
0 400 800 1200 1600 2000
FEET

MAY 1969

270

42A12NE8058 63.2511 THORBURN