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ELECTROMAGNETIC SURVEY

DENTON THORNELOE EAST GROUP

THORNELOE TOWNSHIP

HOLLINGER MINES LIMITED

INTRODUCTION

During the period June 23rd-August 18th, 1969, an electromagnetic survey was carried out on the following four claims held by Hollinger Mines Limited Timmins, Ontario.

P-94446 - P94449 Inclusive.

The claims are located 600 South and 1320' east of the 4 mile post in Thorneloe township.

ACCESS

The claim group can be reached from Timmins via highway 101, travelling West from Timmins and South along the New Sudbury Highway 144. A total distance of approximately sixteen miles.

PERSONNEL EMPLOYED ON THE SURVEY

R. C. Humphrey acted as instrument operator.

MILEAGE SURVEYED

A total of 6.3 miles of line was surveyed and 579 stations were read.

RESULTS OF SURVEY

The results of the survey are shown on the accompanying map, "Denton-Thorneloe Claims, Hollinger Mines Limited", Electromagnetic Survey, Scale 1" = 200. The conductors are identified by letters of the alphabet.

Conductor A appears to be a legitimate bedrock conductor caused by a weakly mineralized contact trending east west through the claim group.

Conductor B appears to be a contact effect and is parallel to conductor A.

Conductor C appears to be caused by the presence of sulphides in iron formation and appears to follow a magnetic high.

Conductor D appears to be due to "slope" effects between bedrock and conductive overburden.

CONCLUSIONS

Conductors A, B, and C are all interpreted as possible sulphide responses. A vertical loop and/or ronka Mark III survey is recommended to check these anomalies before drilling can be considered warranted:

Respectfully submitted,

HOLLINGER MINES LIMITED
TIMMINS, ONTARIO

C. D. MacKenzie
C. D. MacKenzie,
Exploration Geologist,
Hollinger Mines Limited.

TYPE OF INSTRUMENT USED - EM-16

The survey was performed using an EM-16 (electromagnetometer) receiver. The instrument has two receiving coils built into it (one coil has normally vertical axis and the other has normally horizontal axis). The signal from the vertical axis coil is read on an "in phase" inclinometer and the signal from the horizontal axis coil is read from a "quadrature" dial. The range of measurements are $\pm 150\%$ on the "in phase" inclinometer and $\pm 40\%$ on the "quadrature" dial.

Principle of Operation

The EM-16 uses very low frequency transmitting stations operating for communication with submarines for the transmitted signal. These V.L.F. stations have a vertical antenna which creates a concentric horizontal magnetic field around them. When these magnetic fields meet conductive bodies, there are secondary fields set up around these bodies. The EM-16 measures the vertical component of these secondary fields ("in phase" measures the vertical real component and the "quadrature" measures the vertical component shifted through 90°).

Three transmitting stations are used in performing surveys in central Canada. These stations are NAA Cutler, Maine, NPG Seattle, Washington, and NSS Annapolis, Maryland, with frequencies of 17.8 kc, 18.6 kc and 21.4 kc respectively.

The station selected should be the station whose direction is parallel to the strike of geological structure in the area being surveyed.

The station used in this survey was NAA

Operation

When the selection of the station to be used in a survey is made the proper selector unit is plugged in and the instrument is turned until the signal is minimum (this will occur when the instrument is pointing towards the station) and then the instrument is turned 90° (instrument is now oriented along the lines of the primary magnetic field).

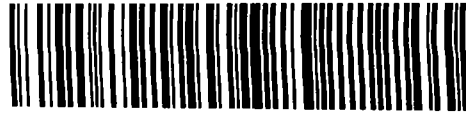
To take a reading the instrument is swung back and forth in a vertical plane to obtain minimum signal (sound) intensity in the earphone. When this position is obtained the "quadrature" dial is adjusted to obtain the minimum signal strength (null point). The readings on the inclinometer and the "quadrature" dial are recorded. Readings are normally taken at $100'$

stations with intermediate readings in conductive areas. The readings should always be taken with the instrument oriented in the same direction for one survey.

Interpretation

A conductor occurs when a cross-over from positive in phase to negative in phase occurs (or when in phase increases above background to a maximum and decreases below background to a minimum). The instrument is so constructed that in general the lower end of the vertical axis coil will point towards conductor. The axis of a conductor occurs at a point half way between the maximum and minimum points on the in phase measured along the profile line. The depth from ground surface to a point close to the upper edge of the conductive body is determined by measuring the horizontal distance between the maximum and minimum point on the in phase.

The quadrature profile is used in determining the characteristics of the conductive body. A quadrature profile which follows the in phase profile (relatively) indicates a poor conductor. A quadrature profile which follows the in phase profile with a small change in absolute values indicates a good conductor. A quadrature component which shows a reverse polarity indicates conductive overburden on top of a deeper (better) conductor.



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MAGNETOMETER SURVEY
DENTON-THORNELOE EAST GROUP
THORNELOE TOWNSHIP

HOLLINGER MINES LIMITED

During the period June 23rd-August 18th, 1969 a magnetometer survey was carried out on the following four claims held by Hollinger Mines Limited.

P-94446 - P94449 inclusive.

The claims are located 600 feet South and 1320 feet East of the four mile post in Thorneloe Township.

ACCESS

The claim group can be reached from the Town of Timmins travelling West via highway 101 and South along highway 144. A total distance of approximately sixteen miles.

PERSONNEL EMPLOYED ON THE SURVEY

R. C. Humphrey acted as instrument operator.

MILEAGE SURVEYED

A total of 6.8 miles of line was surveyed and a total of 663 stations were read. Lines were spaced at 200' intervals and stations were read at 100' intervals.

TYPE OF INSTRUMENT USED

The survey was carried out using two ABEM, MZ-4 magnetometers with sensitivities of 10.1 gammas per scale division and 9.6 gammas per scale division.

Type of Instrument Used - continued.

The main base station was established on XL 14E at O OON.

RESULTS OF THE SURVEY

The results of the survey are shown on the accompanying map "Hollinger Mines Limited, Denton-Thorneloe Group, Thorneloe Twp. Ontario, Geomagnetic Survey, East Block."

The magnetic anomalies are designated on the map by letter of the Alphabet.

Anomaly "A" partially outlines a large ultra basic sill trending east west through the claim group. Outcrops of highly magnetic ultra basic rocks were located along the river in the immediate vicinity of anomaly A.

Anomaly B appears to be caused by the presence of a narrow band of iron formation striking East West and dipping steeply North. Local highs of over 10,000 gammas were obtained within Anomaly B.

Anomaly C shows the trend of the formations as a low flanking the high magnetics existing over the whole claim group.

Anomaly D may be caused by the presence either iron formation or a narrow ultrabasic sill.

Anomaly E is an irregular magnetic low containing a few local highs and possible reflects minor variations in the magnetite content of the highly magnetic formations in this area.

CONCLUSIONS:

Presence of several ultrabasic sills in the area and known sulfide mineralization containing nickel in the general area point to the possibility of other occurrences. Further electromagnetic surveys appear warranted before allowing the claims to expire.

Respectfully submitted.

HOLLINGER MINES LIMITED
TIMMINS, ONTARIO

C. D. MacKenzie
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Exploration Geologist
Hollinger Mines Limited.

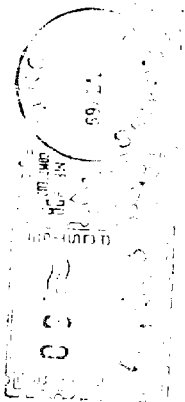
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TIMMINS, ONTARIO

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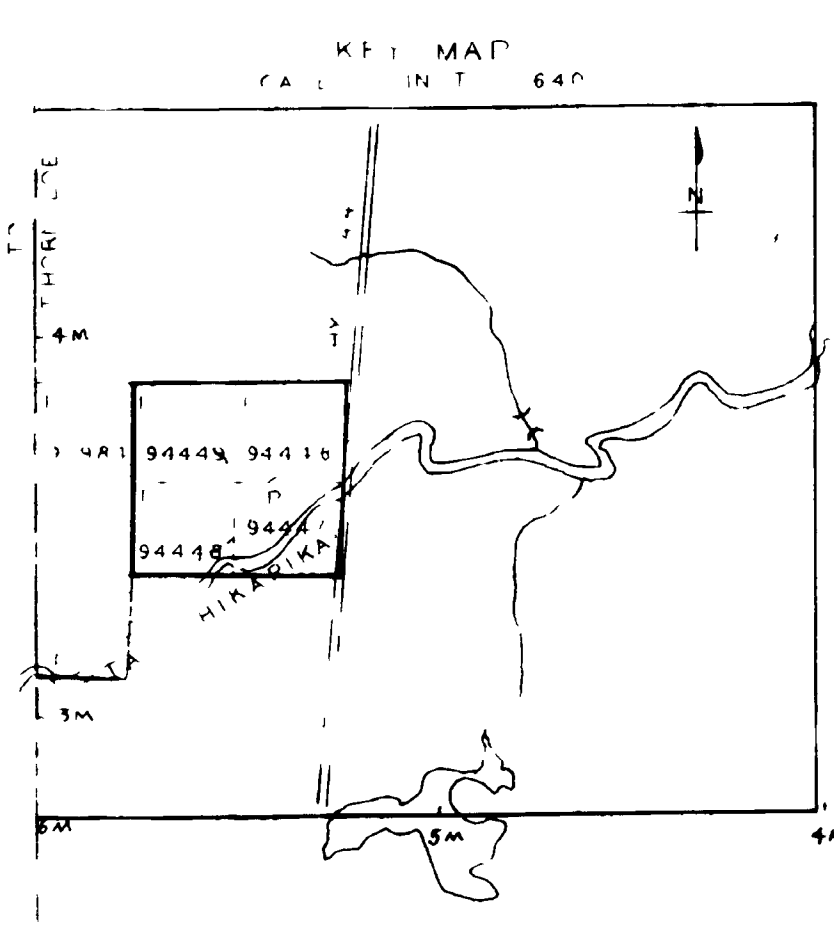
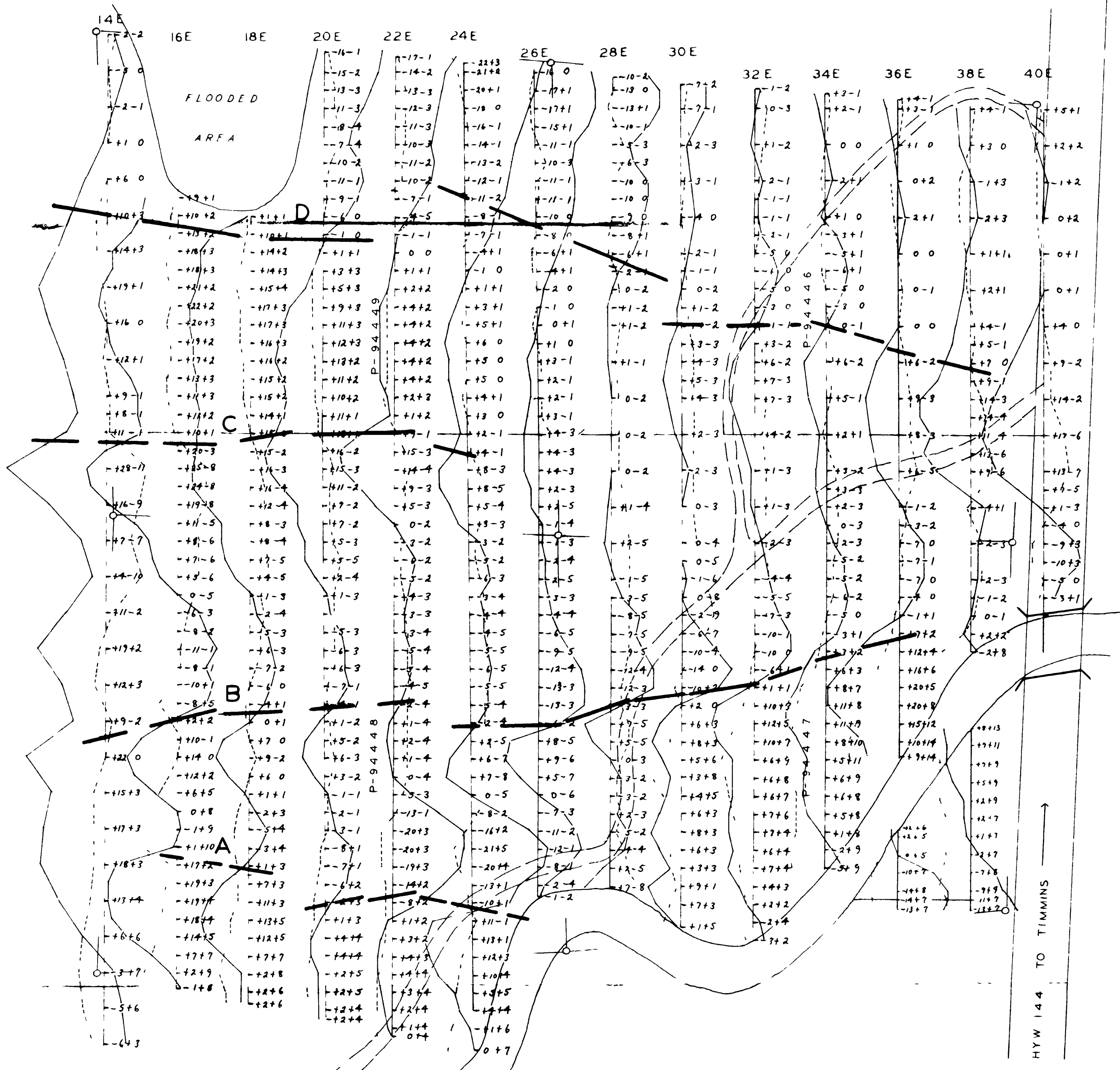


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Mr. Fred W. Matthews,
Mining Lands Division,
Ontario Department of Mines,
Parliament Buildings,
TORONTO, Ontario.



CENTON TWP
THORNELOE TWP



NOTES INSTRUMENT USED RONKA EM-16 NO 28
 STATION USED NAA FREQ 17.8 KHZ
 READINGS TAKEN USING EAST STA OPFR FACING NORTH
 PROFILE SCALE 1 INCH TO 20 PERCENT
 IN PHASE
 QUADRATURE

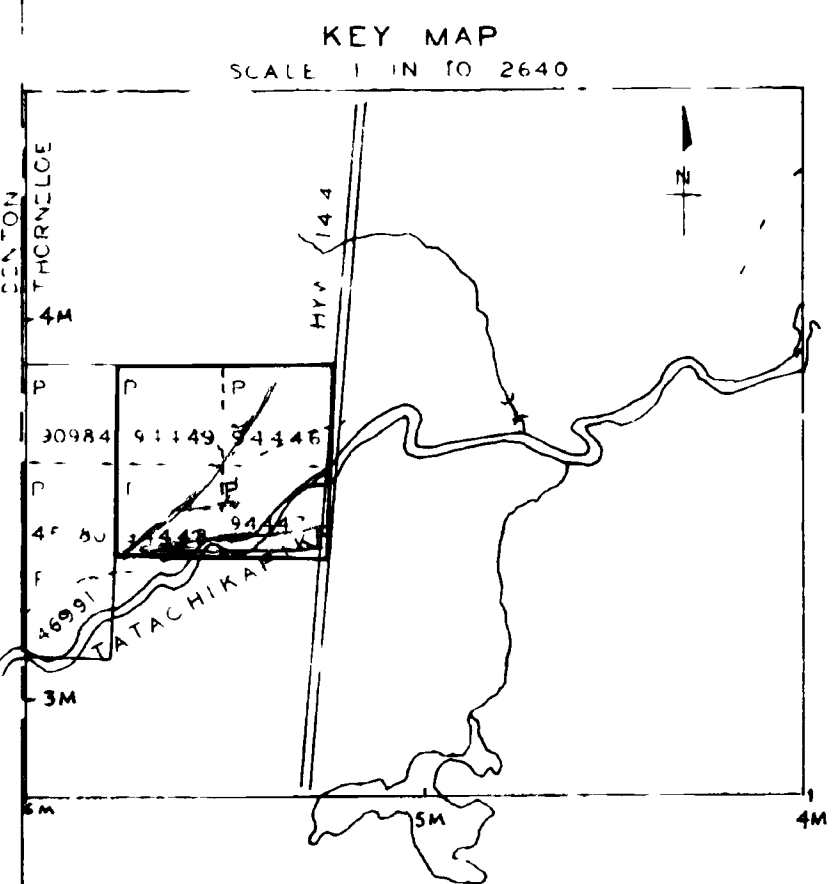
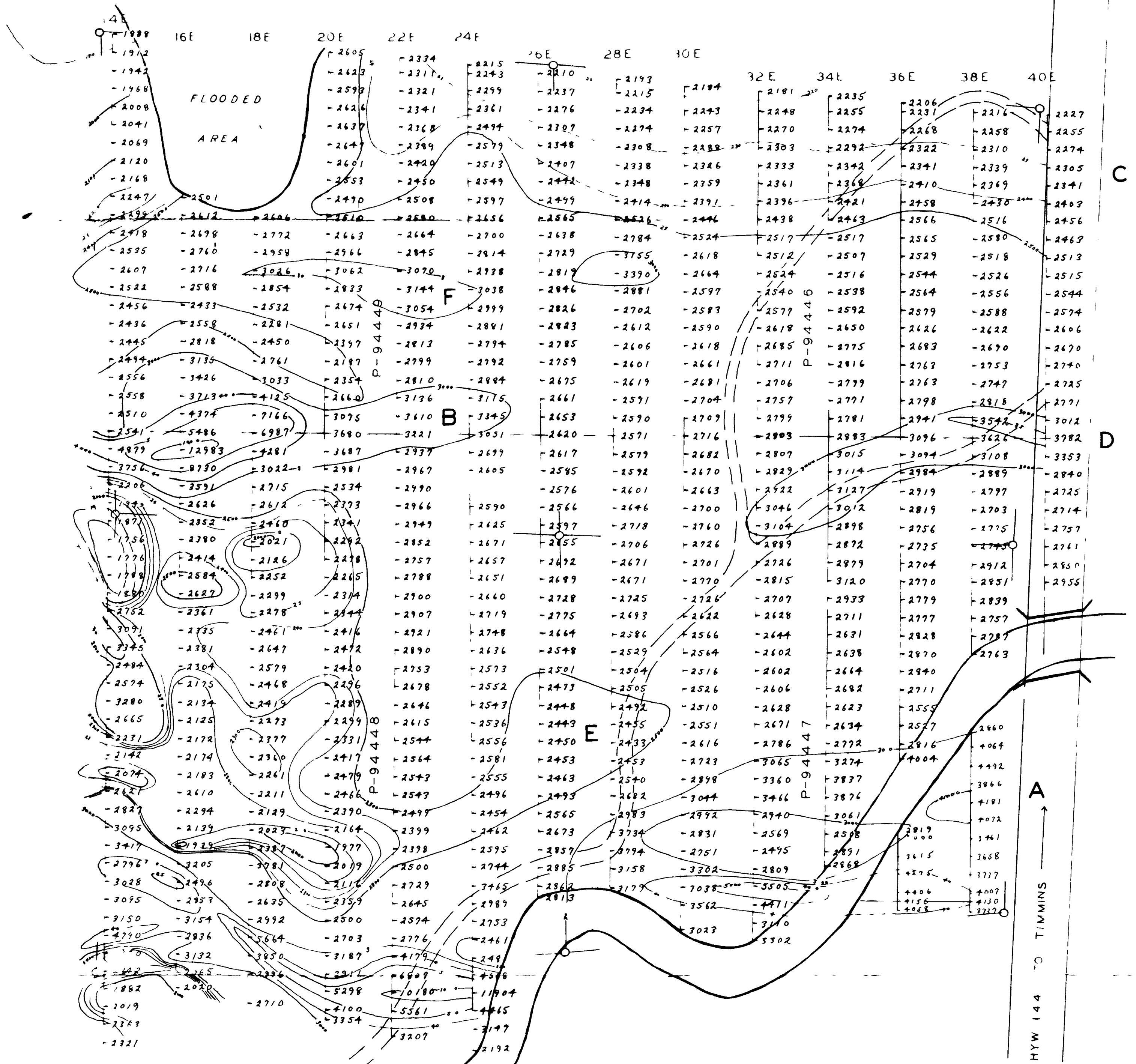
HOLLINGER MINES LTD
 DENTON-THORNELOE GROUP
 THORNELOE TWP ONT
 ELECTROMAGNETIC SURVEY
 EAST BLOCK
 SCALE 1 INCH TO 200 FEET

L.P. MacDonell
 HOLLINGER MINES LIMITED
 TIMMINS, ONTARIO

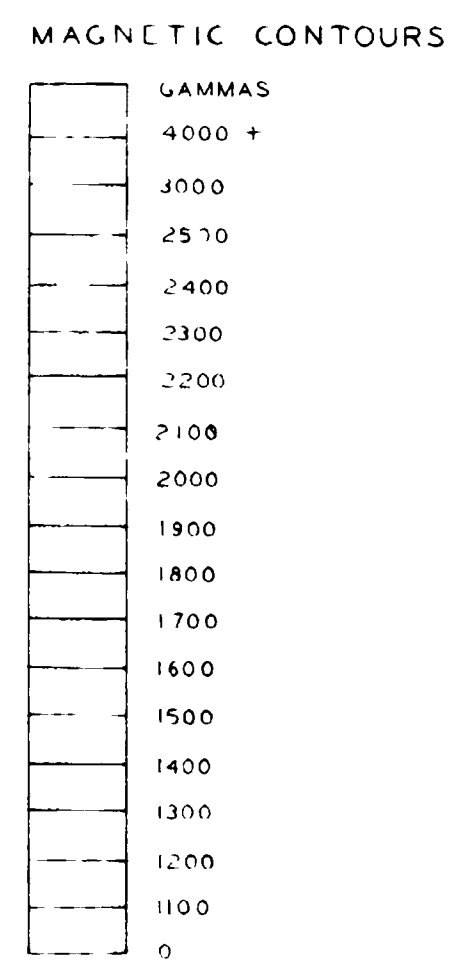


DENTON TWP
THORNELOE TWP

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NOTES INSTRUMENTS USED 2 ABEM MZ-4 MAGNETOMETERS
 SENSITIVITY AND SER NO A 4599 1018 SD
 B 4539 968 SD
 READINGS ARE IN GAMMAS
 MAIN BASE STATION 0+00 ON XL 14E



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 THORNELOE TWP ONT
 GEOMAGNETIC SURVEY
 EAST BLOCK
 SCALE 1 INCH TO 200 FEET

R.D. MacKinnon
 HOLLINGER MINES LIMITED
 TIMMINS, ONTARIO

