

31M13NW0112 2.12846 PACAUD

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OCT 31 1989

MINING LANDS SECTION

REPORT ON THE  
COMBINED AIRBORNE MAGNETIC AND  
VLF-ELECTROMAGNETIC SURVEY  
ON THE PROPERTY OF  
RAVEN RESOURCES INC.  
PACAUD TOWNSHIP  
LARDER LAKE MINING DIVISION, ONTARIO.

BY

H. FERDERBER GEOPHYSICS LTD.

**2.12846**

October 24, 1989  
Val d'Or, Quebec

R.A. Campbell, B.Sc.,  
Geologist.

REPORT ON THE  
COMBINED AIRBORNE MAGNETIC AND  
VLF-ELECTROMAGNETIC SURVEY  
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RAVEN RESOURCES INC.  
PACAUD TOWNSHIP  
LARDER LAKE MINING DIVISION, ONTARIO.

INTRODUCTION

On October 7, 1988, a combined magnetic and VLF-electromagnetic survey was carried out on the property of Raven Resources Inc. in the Township of Pacaud, Larder Lake Mining Division, Ontario. Magnetic and VLF-electromagnetic data was collected by the airborne division of H. Ferderber Geophysics Ltd. The survey was flown from a base at Wawa, Ontario. A total of 420 miles of data was collected.

The magnetic survey provides data which outlines the underlying geological structures and identifies any potential economic concentrations which may contain variations in accessory magnetic minerals. The VLF-electromagnetic survey helps define conductive zones which may represent shear zones and/or metallic sulphide deposits containing gold and/or base metal mineralization.

PROPERTY DESCRIPTION, LOCATION AND ACCESS

The Raven Resources Inc. property is comprised of 10 claims, covering approximately 160 hectares in lots 5 and 6, concessions IV and V, Pacaud Township, Ontario. The claims are registered with the Office of the Mining Recorder in Kirkland Lake, and are listed in Appendix I.

The property is located 11 miles south-southwest of the town of Kirkland Lake and 1 mile south of the village of Boston Creek. Roads east from Highway 112 join, 1.5 miles east of the property. The northern road, Highway 564, lies within .75 miles of the northern claims, and a bush road, northwest from the southern road ends to within 0.20 miles east of the southeastern-most claim. The Northland Railway and a Northern Ontario Transmission Line trend south-southeast through claim 1048788.

The claim group is forested. The Boston Creek and a tributary flow through the property.

Supplies, services and qualified manpower can be found in the Kirkland Lake area.

GEOLOGY

The claim block is located near the south-central portion of the Abitibi Volcanic Belt of the Superior Province of the Canadian Shield. The Abitibi Volcanic Belt extends for nearly

350 miles in a west-east direction from Timmins to Chibougamau. It is host to a variety of precious and base metal deposits including the Timmins, Kirkland Lake, Noranda, Val d'Or and Chibougamau mining camps.

The Abitibi Volcanic Belt is composed of a complex assemblage of interbedded volcanic and sedimentary rocks intruded by a variety of intrusives, from ultrabasic to granitic in composition. The rocks are Archean in age and have been metamorphosed to the greenschist facies. Numerous late Precambrian diabase dykes cut formations of the belt. The rocks generally strike east-west, have a vertical dip and are highly folded and faulted. Geological interpretation of the Abitibi Volcanic Belt is complicated by both the wide scattering of outcrops and the complex structural relationships.

The Ontario Division of Mines, Map 2205, the Timmins-Kirkland Lake Geological Compilation Series, describes the property geology. This map indicates that the claims are underlain by felsic intrusive rocks (trondhjemite, granodiorite and quartz monzonite) of the Round Lake Batholith. A fault strikes south-southeast through the eastern claims and two small diabase dykes trend northeast and north-northwest, just west of the northern-most claims.

The northeastern contact between the rocks of batholith and felsic metavolcanic rocks of the Abitibi Volcanic Belt lies 0.5 miles northeast of the property. Numerous past producing Cu and Au-Ag mines (Amity Mine, Barry-Hollinger Mine, Patterson Copper Mine and Tretheway-Ossian Mine) occurrences and prospects lie within metavolcanic rocks, near the northeastern edge of the batholith.

#### INSTRUMENTATION AND SURVEY METHODS

The survey was completed using a 1972 Cessna 172, fixed-wing aircraft, call letters CF-EWK, owned and operated by H. Ferderber Geophysics Ltd. The pilot and navigator/operator were Y. Saucier and F. Longpre, respectively, of Val d'Or.

Geophysical sensors were mounted in modified wing tips. The geophysical, navigation and data acquisition systems are described in the following pages.

#### Magnetometer

The magnetometer used was GEM systems GSM-11, high sensitivity airborne proton (Overhauser) magnetometer. The instrument continuously measures the Earth's magnetic field at a 0.01 gamma sensitivity for 1 reading per second or 0.05 gamma to 10 readings per second at a 0.1 gamma absolute accuracy. For

this survey four readings per second were collected. The analog output is on 3 channels, from 1 to 10,000 gammas full scale.

#### VLF-EM System

A Herz Totem 2A VLF-EM System was used to measure the changes in the total field and in the vertical quadrature field on two frequencies simultaneously, with an accuracy of 1%. The primary transmitting station of Seattle, Washington, (NLK) frequency 24.8 kHz was employed in the survey.

#### Radar Altimeter

The ground clearance was measured with a King 10/10 A radar altimeter. The survey was flown at a mean clearance of 300 feet with the altimeter producing an accuracy of 5% (15 feet) at this altitude.

#### Tracking Camera and Video Centre

A RCA TC-200 colour video camera and Galaxy 200 video centre was used to record the flight path on standard VHS type video tapes. Manual fiducials were indicated on the picture frames for reference with digital printout. Flight path recovery was aided using a Panasonic Colour Video Monitor-S1300 and Video Cassette Recorder AG-2500.

### Data Acquisition System

A Picodas Group Inc., PDAS 1100 data acquisition system featuring seven analog inputs with two frequency inputs and external interfacing was used. A Termiflex Corp. ST/32 Keyboard control unit and Sharp Corp. LCD display unit are connected to the data acquisition system. At present this system stores the altimeter VLF-1 inphase, VLF-1 quadrature, VLF-2 inphase, VLF-2 quadrature, magnetic field (coarse), magnetic field (fine), and the fourth difference (noise), and fiducials on 3.5 inch floppy disk drive. The data is then printed out in digital and profile form.

The survey was conducted on lines at 40 degrees and 220 degrees, flown at an average aircraft altitude of 300 feet. The lines were flown at spacings of 440 feet at a speed of approximately 90 miles per hour. Navigation was visual using airphoto mosaics, at a scale of one inch to 1320 feet, manual fiducials and the flight path recovery system as references.

### DATA PRESENTATION

Flight lines, fiducial points and geophysical responses were reproduced from the airphoto mosaics at a scale of one inch to 1320 feet (1:15,840). The outline of the claim block and claim map are shown on each map sheet.

-7-

The aeromagnetic data was corrected for diurnal variations by using a base line as reference. The data was then reduced to a base level of 58,000 gammas, contoured at 25 and 100 gamma intervals and presented on Map MG-1.

The VLF-EM was transferred from the Totem 2AG memory to profiled form. A base value was determined for the VLF-EM profiled data. These values were used to correct for variations in transmitter strength and the corrected values were plotted on Map EM-1. The positive values were contoured at intervals of 2%. The conductor axes were determined and labelled A, B, C, etc. No priority was attached to the labelling system.

#### SURVEY RESULTS AND INTERPRETATION

##### Magnetic Survey

The results of the magnetic survey indicate that the claim group is underlain by homogeneous rocks of low magnetic relief and susceptibility, probably felsic intrusive rocks of the Round Lake Batholith. The magnetic relief is less than 125 gammas, generally increasing westward. The small north-northwest trending high over claim 1048801 defines the southern end of a diabase dyke.



The magnetic contour pattern is distorted over the eastern claims defining the location of the north-northwest trending fault shown on geology map 2205.

#### VLF-Electromagnetic Survey

Three conductive zones were outlined by the VLF-EM survey. Zone A, a two-line, northwest striking conductor, lies in the southwestern-most claim. It's trend is roughly parallel to the direction of the magnetic contours and it could delineate a small shear within rocks of the batholith.

Conductor B strikes southeast, on line 56, towards the northwestern boundary. The conductor lies along a creek and a magnetic high, representing a diabase dyke. Conductive Zone B appears to be caused by conductive overburden, following a possible bedrock feature, a small shear, associated with the emplacement of the diabase dyke.

Zone C is a 0.25 mile long, north striking conductor, situated in claim 1048783. The conductor is located over distortions in the magnetic contour pattern, representing a fault zone in the felsic intrusive rocks.

CONCLUSIONS AND RECOMMENDATIONS

The combined airborne magnetic and VLF-EM survey was successful in confirming that the geology underlying the Raven Resources property conforms with the results presented on the government geology map 2205. The claims are underlain by felsic intrusive rocks of the Round Lake Batholith, with a south end of a north-northwest striking diabase dyke intruding the rocks of the batholith in the northwestern claims.

A north-northwest trending fault zone is defined by distortions in the magnetic contour pattern and by the position of conductive Zone C. Conductors A and B delineate the positions of small, possible shear zones in felsic intrusive rocks and diabase, respectively.

The positions of the fault and shear zones should be outlined on the ground by performing magnetic and horizontal loop-electromagnetic surveys. The geophysical data should then be supplemented by conducting a program of geological mapping and sampling in an attempt to better classify anomalous zones prior to contemplating a phase III exploration program.

-10-

Respectfully submitted,

H. Ferderber Geophysics Ltd.

A handwritten signature in black ink, appearing to read "RAC" followed by a flourish.

October 24, 1989  
Val d'Or, Quebec

R. A. Campbell, B.Sc.,  
Geologist.

APPENDIX I - CLAIM LIST

L 1048783

1048784

1048785

1048786

1048787

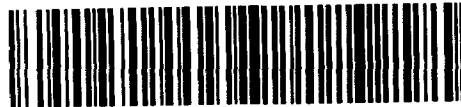
1048788

1048798

1048799

1048800

1048801



31M13NW0112 2.12846 PACAUD

900

#329

Mining Act

Type of Survey: **Airborne magnetic and VLF-electromagnetic**

Claim Holder(s): **(Michel Leahy) Raven Resources Inc.** **2.12846**

Address: **139 Carter Vaenue, Kirkland Lake, Ontario P2N 2A1**

Survey Company: **H. Ferderber Geophysics Ltd.** **2.12846** Date of Survey (from & to): **07 10 88** to **07 10 88** Total Miles of line Cut: **420**

Name and Address of Author (of Geo-Technical report): **R.A. Campbell, 169 Perreault Avenue, Val d'Or, Quebec J9P 2H1**

Credits Requested per Each Claim in Columns at right

| Special Provisions  | Geophysical       | Days per Claim |
|---|-------------------|----------------|
| For first survey:<br>Enter 40 days. (This includes line cutting)                | - Electromagnetic |                |
|   | - Magnetometer    |                |
|   | - Radiometric     |                |
| For each additional survey:<br>using the same grid:<br>Enter 20 days (for each) | - Other           |                |
|   | Geological        |                |
|   | Geochemical       |                |
| Man Days  | Geophysical       | Days per Claim |
| Complete reverse side   | - Electromagnetic |                |
|   | - Magnetometer    |                |
|   | - Radiometric     |                |
|   | - Other           |                |
|   | Geological        |                |
|   | Geochemical       |                |
| Airborne Credits  |                   | Days per Claim |
| Note: Special provisions credits do not apply to Airborne Surveys.              | Electromagnetic   | 35             |
|   | Magnetometer      | 35             |
|   | Radiometric       |                |

Mining Claims Traversed (List in numerical sequence)

| Mining Claim |         |                  | Mining Claim |        |                  |
|--------------|---------|------------------|--------------|--------|------------------|
| Prefix       | Number  | Expend. Days Cr. | Prefix       | Number | Expend. Days Cr. |
| L            | 1048783 |                  |              |        |                  |
|              | 1048784 |                  |              |        |                  |
|              | 1048785 |                  |              |        |                  |
|              | 1048786 |                  |              |        |                  |
|              | 1048787 |                  |              |        |                  |
|              | 1048788 |                  |              |        |                  |
|              | 1048798 |                  |              |        |                  |
|              | 1048799 |                  |              |        |                  |
|              | 1048800 |                  |              |        |                  |
|              | 1048801 |                  |              |        |                  |

**RECEIVED**  
SEP 12 1989  
9:50am

**RECEIVED**  
NOV 06 1989  
MINING LANDS SECTION

ONTARIO GEOLOGICAL SURVEY  
ASSESSMENT FILES  
OFFICE  
NOV 24 1989  
**RECEIVED**

Expenditures (excludes power stripping)

Type of Work Performed

Performed on Claim(s)

Calculation of Expenditure Days Credits

Total Expenditures \$  + 15 =  Total Days Credits

Instructions: Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

Total number of mining claims covered by this report of work. **10**

Date: **Sept. 6/89** Recorded Holder or Agent (Signature): *RA Campbell*

For Office Use Only

Total Days Cr. Recorded: **700** Date Recorded: **Sept. 12/89** Mining Recorder: *J. Butterfield*

Date Approved or Recorded: **15 Nov 89** Branch Director: *[Signature]*

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying: **R.A. Campbell, 169 Perreault Avenue, Val d'Or, Quebec J9P 2H1**

Date Certified: **Sept. 6/89** Certified by (Signature): *RA Campbell*



Ontario

Ministry of Northern Development and Mines

Geophysical-Geological-Geochemical Technical Data Statement

2.12846

File \_\_\_\_\_

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.

Type of Survey(s) Airborne magnetic and VLF-electromagnetic

Township or Area Pacuad

Claim Holder(s) M. Leahy

Survey Company H. Ferderber Geophysics Ltd.

Author of Report R.A. Campbell

Address of Author 169 Perreault Avenue
Val d'Or, Quebec

Covering Dates of Survey October 7, 1988
(linecutting to office)

Total Miles of Line Cut Flown: 420

MINING CLAIMS TRAVERSED
List numerically

Table with 2 columns: (prefix) and (number). Rows include L 1048783, L 1048784, L 1048785, L 1048786, L 1048787, L 1048788, L 1048798, L 1048799, L 1048800, L 1048801.

SPECIAL PROVISIONS
CREDITS REQUESTED

DAYS per claim

- Geophysical
-Electromagnetic
-Magnetometer
-Radiometric
-Other
Geological
Geochemical

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

ENTER 20 days for each additional survey using same grid.

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

Magnetometer 35 Electromagnetic 35 Radiometric
(enter days per claim)

DATE: Oct. 24/89 SIGNATURE: RA Campbell
Author of Report or Agent

Res. Geol. \_\_\_\_\_ Qualifications 2.6609

Previous Surveys

Table with 4 columns: File No., Type, Date, Claim Holder. Multiple empty rows.

TOTAL CLAIMS 10

OFFICE USE ONLY

**SELF POTENTIAL**

Instrument \_\_\_\_\_ Range \_\_\_\_\_

Survey Method \_\_\_\_\_

Corrections made \_\_\_\_\_

**RADIOMETRIC**

Instrument \_\_\_\_\_

Values measured \_\_\_\_\_

Energy windows (levels) \_\_\_\_\_

Height of instrument \_\_\_\_\_ Background Count \_\_\_\_\_

Size of detector \_\_\_\_\_

Overburden \_\_\_\_\_

(type, depth -- include outcrop map)

**OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)**

Type of survey \_\_\_\_\_

Instrument \_\_\_\_\_

Accuracy \_\_\_\_\_

Parameters measured \_\_\_\_\_

Additional information (for understanding results) \_\_\_\_\_

**AIRBORNE SURVEYS**

Type of survey(s) Magnetic and VLF-Electromagnetic

Instrument(s) GEM GSM-11 magnetometer and Herz Totem 2A VLF-EM  
(specify for each type of survey)

Accuracy 0.04 gammas and 1%  
(specify for each type of survey)

Aircraft used Cessna 172 Fixed-wing

Sensor altitude 300 feet

Navigation and flight path recovery method Navigation was visual on airphoto mosaics. Flight path recovery was obtained with a RCA colour video camera, <sup>and a</sup> Panasonic colour video

Aircraft altitude Monitor. 300 feet Line Spacing 440 feet

Miles flown over total area 420 miles Over claims only 8.75 miles

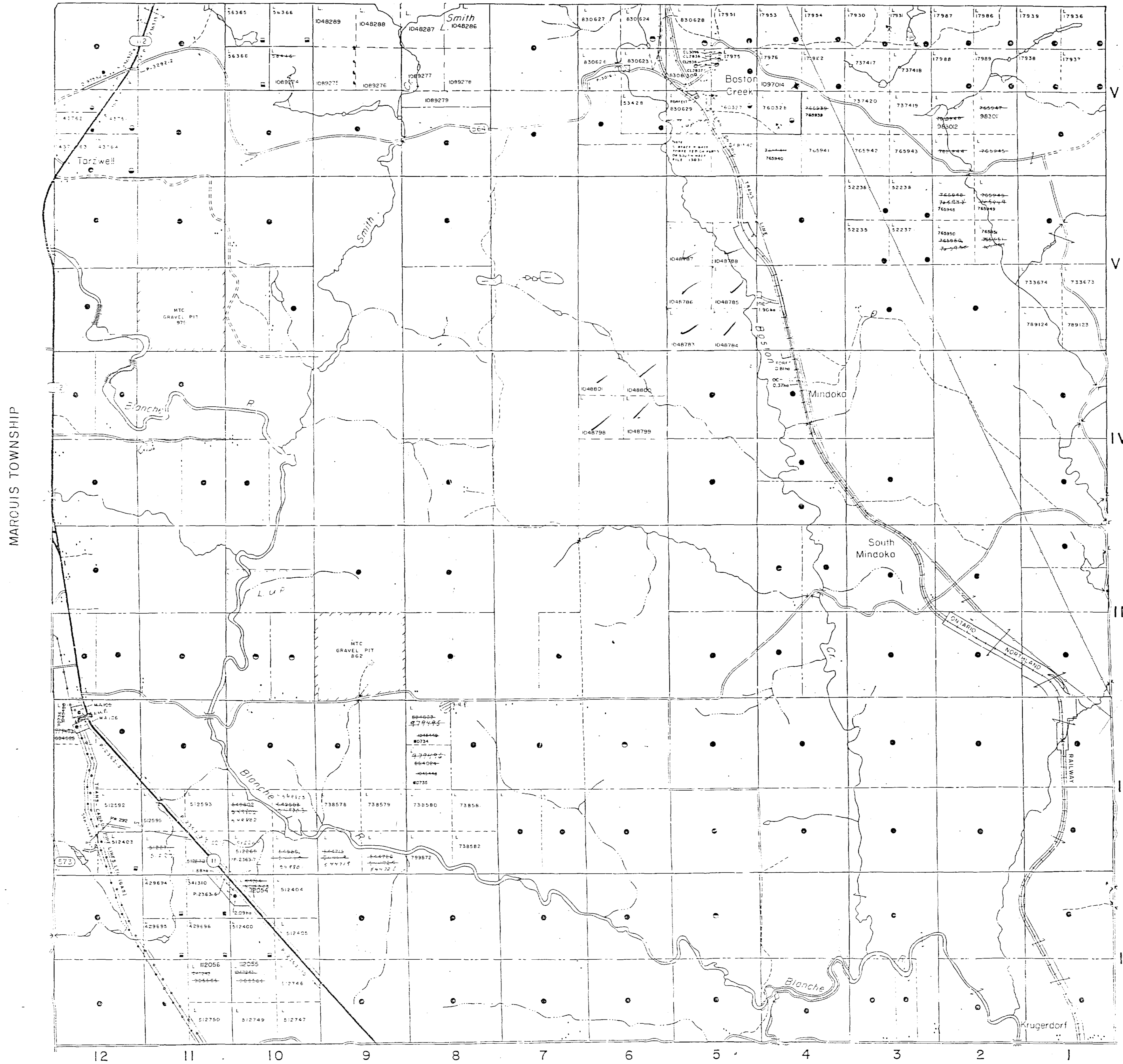
FROM DISPOSITION

W.R.O. - MINING RIGHTS ONLY  
 S.R.O. - SURFACE RIGHTS ONLY  
 M+S - MINING AND SURFACE RIGHTS

Description Order No. Date Disposition File

HW292 - DISPOSITION - OF - CROWN LANDS

BOSTON TOWNSHIP



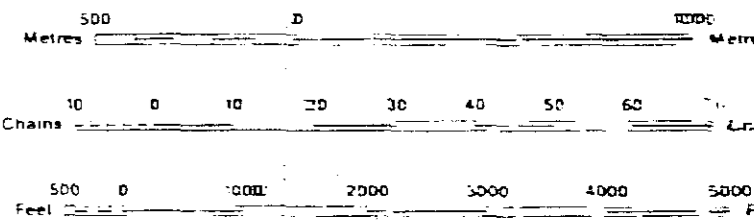
LEGEND

- HIGHWAY AND ROUTE NO.
- OTHER ROADS
- TRAILS
- SURVEYED LINES
- TOWNSHIP, BARRIERS, ETC.
- LOTS, MINING CLAIMS, ETC.
- UNSURVEYED LINES
- LOT LINES
- PARCEL BOUNDARIES
- MINING CLAIMS, ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OF PERENNIAL STREAM
- SUBDIVISION OF PERENNIAL STREAM
- RESERVATION
- ORIGINAL SURFACE
- MARSH OR WETLAND
- MINES
- TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

| TYPE OF DOCUMENT               | SYMBOL |
|--------------------------------|--------|
| PATENT SURFACE & MINING RIGHTS | ●      |
| SURFACE RIGHTS ONLY            | ○      |
| MINING RIGHTS ONLY             | ◐      |
| LEASE SURFACE & MINING RIGHTS  | ■      |
| SURFACE RIGHTS ONLY            | □      |
| MINING RIGHTS ONLY             | ◑      |
| LICENCE OF OCCUPATION          | ▼      |
| ORDER-IN-COUNCIL               | ○      |
| RESERVATION                    | ○      |
| CANCELLED                      | ○      |
| SAND & GRAVEL                  | ○      |

NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6 1913 VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT (R.S.O. 1910 CHAP. 380, SEC. 63, SUB-SEC. 1)



SCALE 1:20 000

**TOWNSHIP SUBJECT TO FORESTRY OPERATIONS**

DATE OF ISSUE  
 AUG 18 1989  
 LARDER LAKE  
 MINING RECORDERS OFFICE

TOWNSHIP  
**PACAUD**  
 M.N.R. ADMINISTRATIVE DISTRICT  
 KIRKLAND LAKE  
 MINING DIVISION  
 LARDER LAKE  
 LAND TITLES / REGISTRY DIVISION  
 TIMISKAMING

Ministry of Natural Resources Ontario  
 Ministry of Northern Development and Mines

DATE OCTOBER, 1988

G-3697

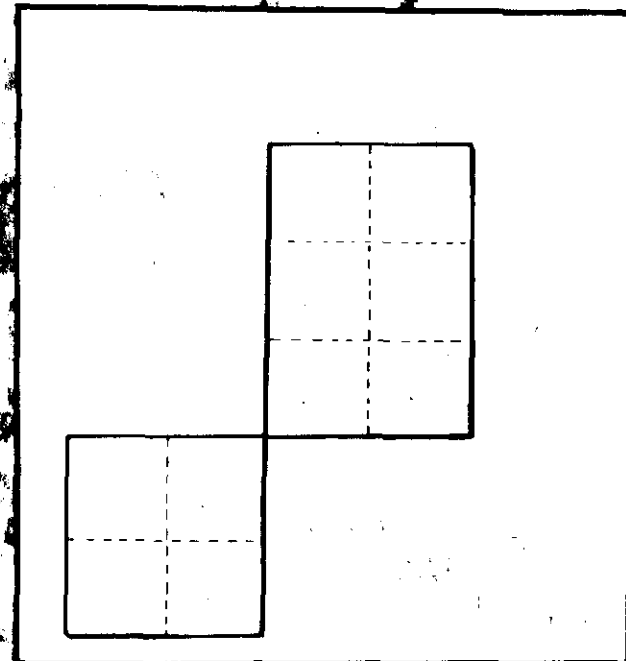
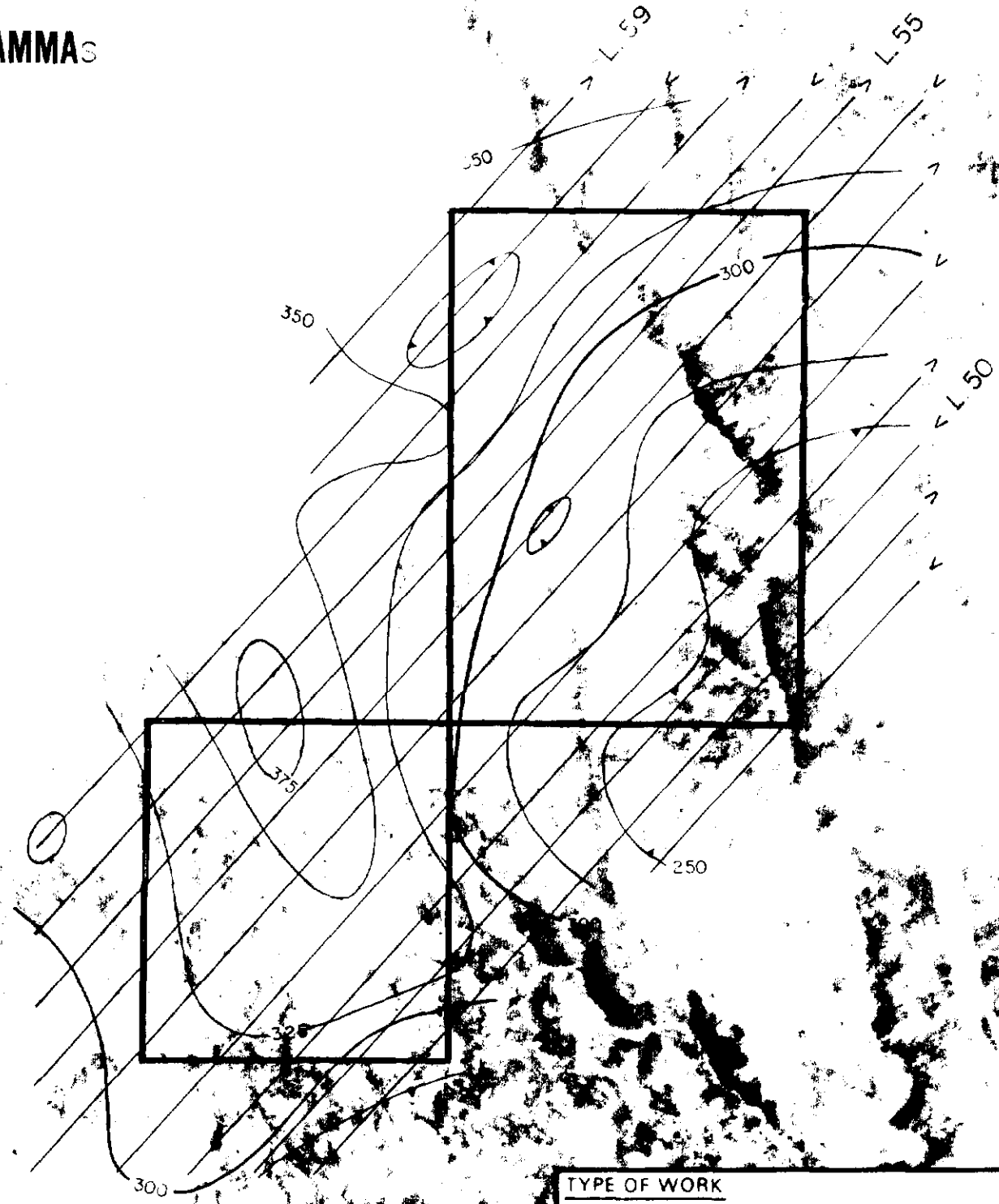
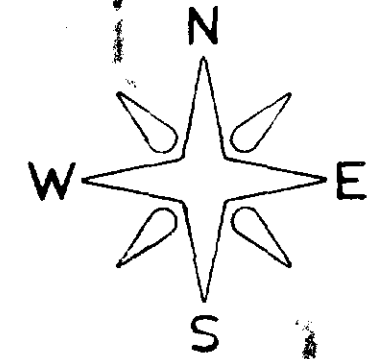
NOTICE OF FORESTRY ACTIVITY  
 THIS TOWNSHIP / AREA FALLS WITHIN THE \_\_\_\_\_






# LEGEND







- TOTAL FIELD CONTOUR INTERVAL 25 GAMMAS
- FIDUCIAL POINT
- > LINE DIRECTION
- BASE VALUE 58700 GAMMAS
- ⊖ MAGNETIC LOW

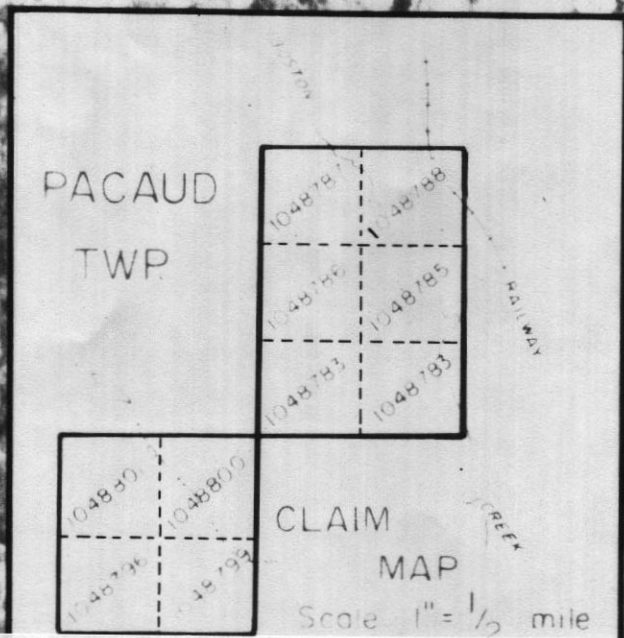
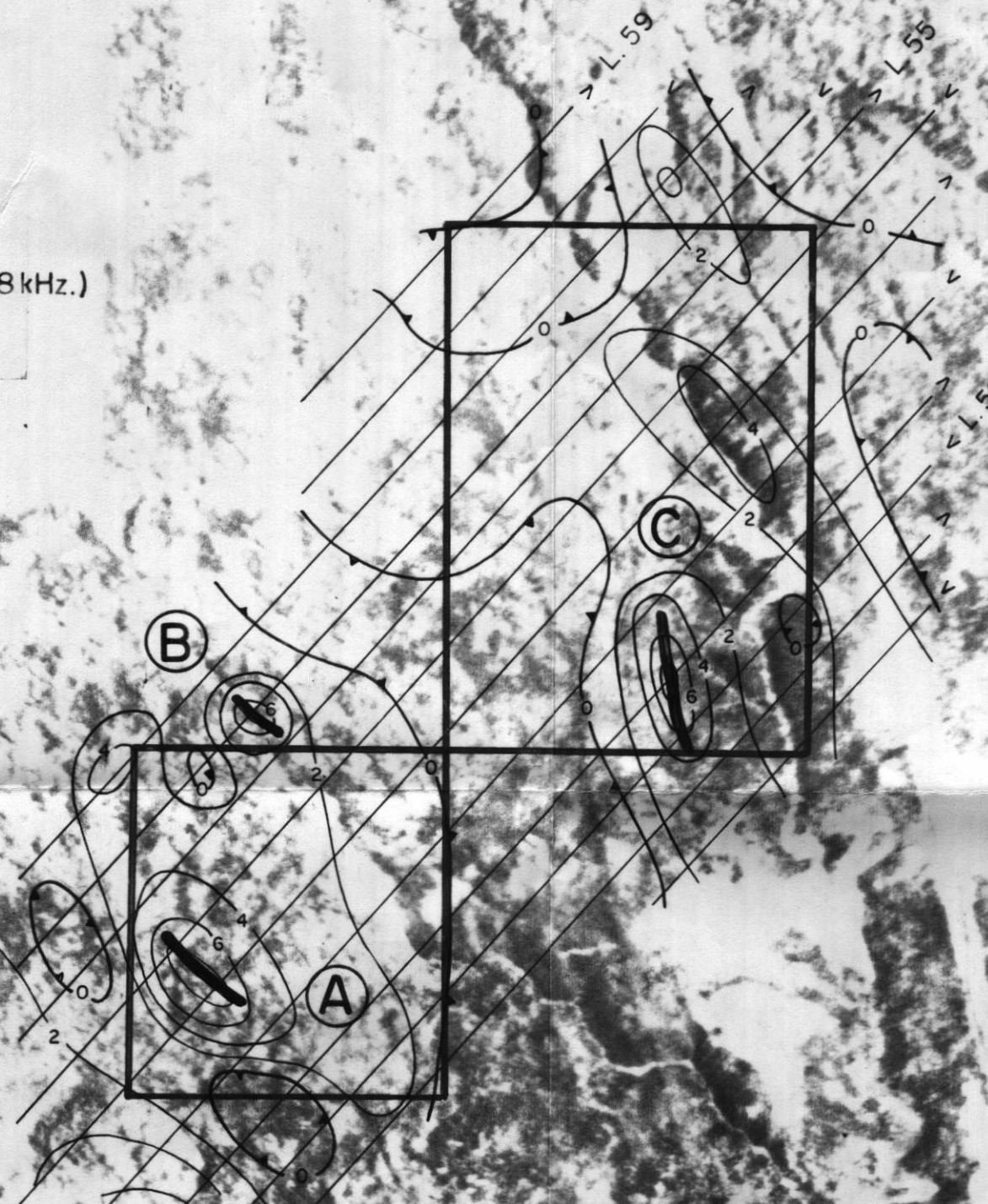
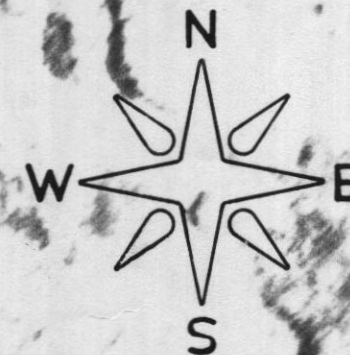



|  |          |                          |                 |
|--|----------|--------------------------|-----------------|
| TYPE OF WORK   |          | AIRBORNE MAGNETIC SURVEY |                 |
| CLIENT   |          | RAVEN RESOURCES INC.     |                 |
| PROJECT  | 2.12846  | AREA                     | PACAUD TWP ONT. |
|  H. Ferderber Geophysics Ltd.<br><i>RAC</i> | SCALE    | 1" = 1/4 mile            | DATE            |
|  | DRAWN BY | <i>W.M.</i>              | NOV. 1988       |
|  |          | MAP OR SHEET NO.         |                 |
|  |          | MG-1                     |                 |



# LEGEND

-  TOTAL FIELD CONTOUR INTERVAL 2 %
-  CONDUCTOR AXIS
-  FIDUCIAL POINT
-  LINE DIRECTION
-  STATION USED: Seattle, Washington, USA. (24.8 kHz.)
-  LESS THAN ZERO



|   |                      |                                  |                         |
|---|----------------------|----------------------------------|-------------------------|
| <b>TYPE OF WORK</b>   |                      | <b>AIRBORNE V.L.F.-EM SURVEY</b> |                         |
| <b>CLIENT</b>   |                      | <b>RAVEN RESOURCES INC.</b>      |                         |
| <b>PROJECT</b>  | <b>2.12846</b>       | <b>AREA</b>                      | <b>PACAUD TWP. ONT.</b> |
| <br><b>H. Ferderber Geophysics Ltd.</b><br><i>AA</i> | <b>SCALE</b>         | <b>DATE</b>                      |                         |
|   | <i>1" = 1/4 mile</i> | <b>NOV. 1988</b>                 |                         |
| <b>DRAWN BY</b>   | <i>W.M.</i>          | <b>MAP OR SHEET NO.</b>          |                         |
|   |                      | <b>EM-1</b>                      |                         |

