

SCINTREX



31D15NW0003 2.2865 LUTTERWORTH

010

MINING TOWNSHIPS

DEC 13 1978

RECEIVED
T-1189

REPORT ON
AIRBORNE RADIOMETRIC SURVEY
LUTTERWORTH TOWNSHIP
ONTARIO
ON BEHALF OF
JOREX LIMITED

NKF:mb
2 October 1978



31D15NW0003 2.2865 LUTTERWORTH

010C

CONTENTS

	<u>Page</u>
SUMMARY	1
1. INTRODUCTION	2
2. SURVEY AREA	2
3. FLYING SPECIFICATIONS	3
4. SURVEY EQUIPMENT	3
5. SURVEY CREW	7
6. FIELD PROCEDURE	7
7. DATA RECORDING	9
8. DATA PROCESSING	11
9. PRESENTATION OF DATA	15

TABLES

Table 1 - Flying Specifications

Table 2 - Analog Chart Identification

Table 3 - Magnetic Tape Format

Appendix I Detailed Algorithms used for Data Processing

Appendix II Plate No. Identification

Figures

1) Location Map

2) Geophysical System

SUMMARY

An airborne radiometric survey was carried out over an area near Minden, Ontario. A total of 300 line miles were flown at a nominal altitude of 150' and a ground speed of 60 miles/hour.

The following geophysical parameters were measured during the survey: Total Count, Potassium, Uranium and Thorium. In addition, an altimeter measured the terrain clearance.

The data were continuously recorded on analogue charts and magnetic tapes.

Stacked profiles on overlays were made of the corrected data.

1. INTRODUCTION

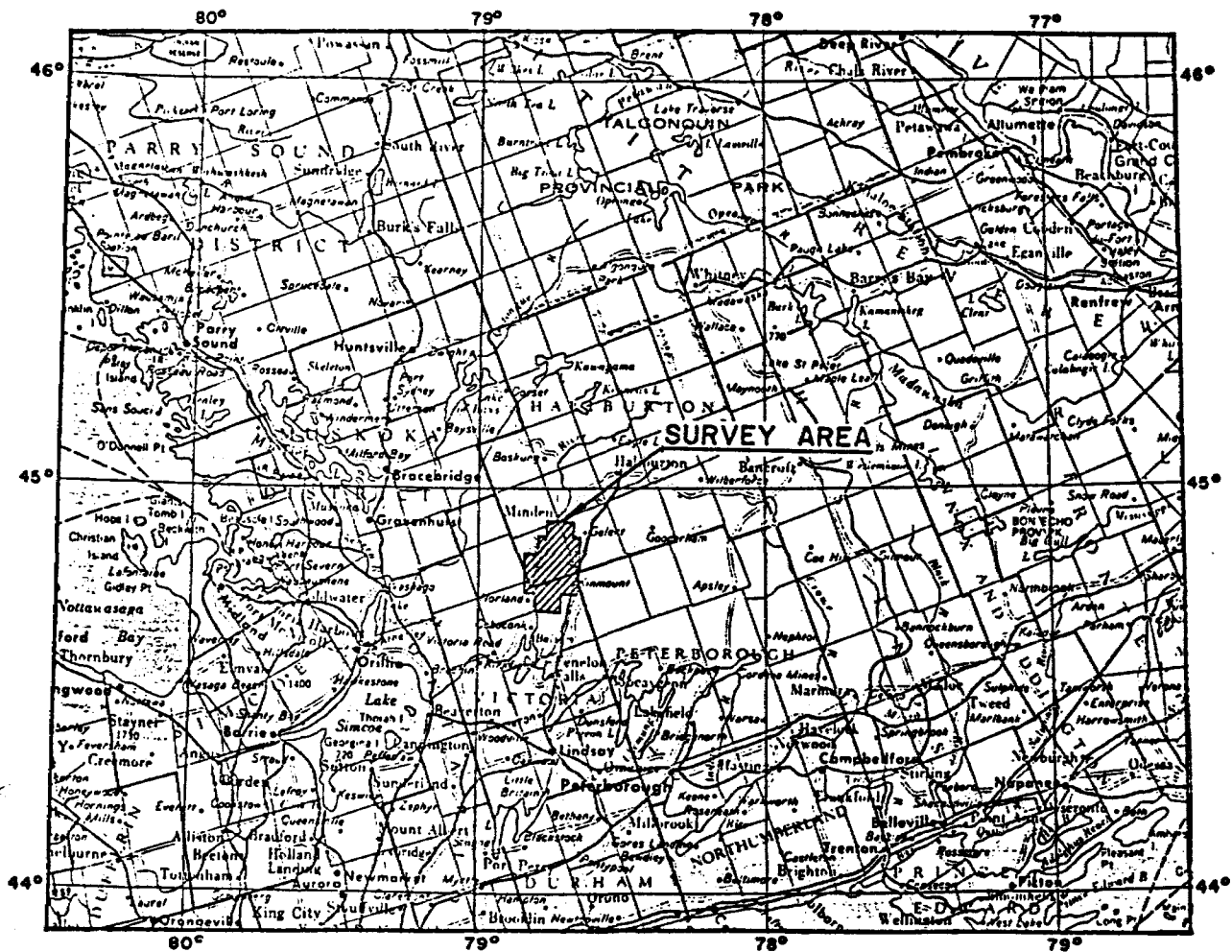
During the period August 31 - September 1, 1978, an airborne radiometrics survey was conducted by Scintrex Limited on behalf of Jorex Limited, in the Minden-Kinmount area of Ontario. A total of 300 line miles of survey were flown.

Simultaneous measurements of Uranium, Thorium, Potassium and Total gamma radiation counts were made at a count rate of one second. The data were recorded in analogue form on a chart recorder and in digital form on magnetic tapes. The geophysical instrumentation consisted of a four channel gamma-ray spectrometer and a gamma-ray sensor package. Ancillary equipment included an intervalometer, a flight path camera, a radar altimeter, a seven track digital recording system and a six channel analogue recorder.

The survey aircraft was a Bell 206B jetranger helicopter on charter from Dominion Pegasus Helicopters Ltd., King City.

2. SURVEY AREA

The survey embraced an area of approximately 85 sq. km., bounded by Highways 501, 123 and 35 near Minden, Ont. (Loc. map Fig.1).



LOCATION MAP

JOREX LIMITED

SOMERVILLE GRID AND SCURRY GRID

MINDEN AREA, ONTARIO

AIRBORNE GEOPHYSICAL SURVEY

Scale : 1 : 2,000,000



78-T1189

FIGURE I

The survey area was divided into two parts. The first section is located just south of the Lutterworth township line in Somerville township. The second section is north of this and is called Scurry.

In addition, test flights were flown over five mineralized showings in the same area.

3. FLYING SPECIFICATIONS

Table I lists the flying specifications applicable to the present survey.

Table I

Nominal Terrain Clearance:	150 feet
Helicopter ground speed:	60-70 mph.
Flight direction:	N120°E
(Somerville, Scurry Areas)	
Nominal line spacing:	1/8 mile (660 feet)

4. SURVEY EQUIPMENT

A brief description of the instrumentation used during the present survey is given below.

4.1 Geophysical Equipment

4.1.1 The gamma-ray detector system consisted of a single GSA-42 crystal assemblage. The GSA-42 contains two

4" x 4" x 16" thallium activated sodium iodide crystals representing a detector volume of 512 cu.inches (8,390 cm.³) The crystals are attached to thermally insulated, magnetically shielded, shock mounted capsules, which are temperature controlled by an internal heating unit for spectrum stabilization.

The capsule was mounted in the rear baggage compartment of the helicopter.

4.1.2 Gamma-ray Spectrometer

A Scintrex GAD-6 spectrometer was utilized on the survey. The GAD-6 is a four channel, differential and spectral-stabilized gamma-ray analyser, capable of providing both a digital and an analogue output. For the present survey the instrument was set up to provide three channels of output in the differential mode. The energy windows are centered on K^{40} - Potassium (1.461 MeV), Bi^{214} -Uranium (1.764 MeV) and Tl^{208} -Thorium (2.615 MeV). The fourth channel was set up in the broad-band integral mode (Total Count Threshold: 0.3 MeV).

The radiometric data was recorded unstripped or "raw".

4.2 Ancillary Equipment

4.2.1 Camera

A Vinten MK III 16 mm scientific camera, fitted with a 10 mm wide angle lens, was employed to record the survey flight path. The camera was mounted in the bubble of the helicopter. The film is characterized by overlapping frame exposures each corresponding to

one fiducial interval (i.e. 1 second).

4.2.2 Altimeter

A Bonzer Mark 10 radar altimeter was utilized on the survey. This is a direct reading instrument capable of measuring the terrain clearance from 40 to 2,000 feet with an accuracy of ± 5 percent. The altimeter was mounted at the front of the aircraft.

4.2.3 Scintrex IITC-2 Intervalometer

The instrument, mounted in the equipment rack, generates synchronization signals operating the fiducial counters and camera.

The unit also provides an on board communication system for the flight crew.

4.2.4 Scintrex Analogue Recorder

An RCM-6 analogue chart recorder was employed. This is a direct writing recorder capable of simultaneously recording six channels of data. Rectilinear traces are achieved by a rugged direct heated stylus writing across a knife edge on heat sensitive chart paper.

4.2.5 Incre-Data MK II Digital Recording System

The Incre-data unit digitally records data gathered by the on-board survey equipment on to 7-track magnetic tape. The following data are recorded incrementally at $\frac{1}{2}$ second intervals:

Fiducial numbers (1 per second)

Time (Hours, minutes, seconds, tenths of seconds)

Radiometrics (T.C., K, U, Th)

Altimeter.

In addition, a header block, containing flight number, survey mode, line number and area number is recorded every tenth fiducial or second.

The unit contains a digital clock controlled by a 10 MHz crystal oscillator. This is used to synchronize data recording, fiducial intervals, camera exposure and radiometric counting periods.

The Incre-Data unit accepts both analogue and digitally coded data converting the analogue data (Altimeter) into digital form before recording. Figure II describes the complete system and its interconnections in block diagram form.

4.3 Survey Aircraft

The aircraft employed on the present survey was a Bell 206B Jet Ranger helicopter on charter from Dominion-Pegasus Helicopters Ltd.

5. SURVEY CREW

The following personnel were employed on the survey:

- 5.1 Neil Fiset - Geophysicist/Dataman, responsible for overall supervision of the survey, client liaison, quality control of data, film processing and final presentation.
- 5.2 Jim Quance - Operator/Navigator, operated and maintained the equipment and was responsible for directing the pilot during the survey along previously selected flight lines.
- 5.3 Len MacTaggart, Pilot, Dominion-Pegasus Helicopters.

6. FIELD PROCEDURES

6.1 Survey flight and Ground Procedures.

The main sequence of events occurring before, during and after each survey flight is illustrated below.

- 1) Switch on for warm-up of spectrometer.
- 2) Calibrate spectrometer.
- 3) Calibrate chart recorder.
- 4) Take off.
- 5) Survey lines.
- 6) Land
- 7) Calibrate spectrometer.
- 8) Calibrate chart recorder.
- 9) Check data quality.
- 10) Develop film.

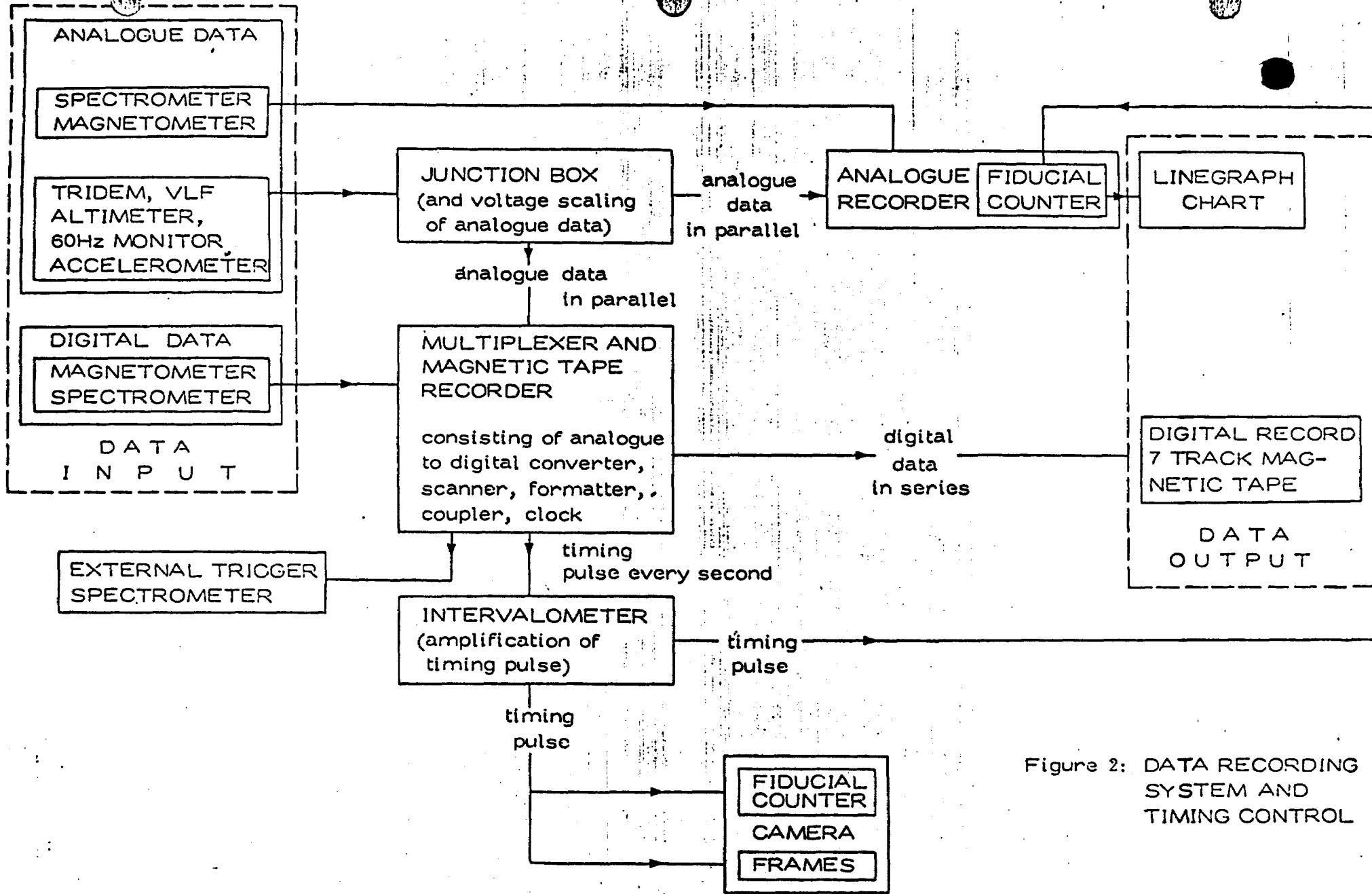


Figure 2: DATA RECORDING SYSTEM AND TIMING CONTROL

6.2 Navigation and Flight Path Recovery

6.2.1 During each survey flight, the aircraft course was directed by the navigator by identifying ground features on a photomosaic on which the proposed flight lines had been drawn.

Appropriate fiducial numbers were marked on the photomosaic as the aircraft passed over recognizable features. The photomosaics used on the present survey were at a scale of 1" = $\frac{1}{4}$ mile.

6.2.2 A flight log was maintained by the operator during each survey flight. The flight log contains all information pertaining to the weather, date, flight times, etc. Also, it lists the beginning and ending fiducial numbers for each survey line.

6.2.3 While each line was being surveyed a continuous film record of the flight path was made. After each roll of film was exposed it was developed. This was used in conjunction with the navigator's mosaic and the flight logs, to accurately record the actual flight path for each survey line. Recognizable features on the film were marked on a recovery mosaic identical to the navigator's mosaic. At each of these picked points a corresponding fiducial number was noted. The survey lines were reconstructed by joining picked points, assuming straight flight between each two points.

7. DATA RECORDING

7.1 Analogue Chart Record.

Data were recorded in analogue form on heat sensitive chart paper. The complete system was time synchronized by the intervalometer. Fiducial marks were recorded on the chart paper by means of an event pen in the recorder. Each mark corresponds to a one second interval. At normal survey speeds each fiducial corresponds to a distance of approximately 150' on the ground. Each trace can be identified by the following table.

Table II

Analogue Chart Identification

Parameter	Trace No.		
	Showings Somerville	Scurry	Vert.Nom.Scale
Thorium	2	1	100 counts/sec
Uranium	3	2	100 "
Potassium	4	3	100 "
Total Count	5	5	10,000 "
Altimeter	6	6	1 cm = 100'
#1 → top			

7.2 Digital Record

In addition to an analogue record, the data was recorded on 7-track magnetic tape. The magnetic tape is a 200 B.P.I., B.C.D. record. Track 1, 2, 3 and 4 record the numerical data, tracks 5 and 6 express "end of line"

and "abort line". Track 7 is used for parity check. A complete scan occurs every half second. The data are recorded in blocks of 20 scans (corresponding to 10 fiducials). A header is recorded at the start of each block. Table III displays the various parameters and their appropriate characters, in order, for the first scan of a block.

TABLE III
Magnetic Tape Format

<u>Character</u>	<u>Parameter</u>
1, 2, 3	Flight number
4	Mode 1 = Survey Line 5 = Calibration
5, 6, 7	Line Number
8	Area 1 → 5 = showings 1 → 5 6 = Somerville 7 = Scurry
9, 10, 11, 12	Fiducial number
13, 14	Time, hours
15, 16	Time, minutes
17, 18	Time, second
19	Time, tenth of second
20 → 27	Blank
28 → 32	Total Count
33 → 37	Potassium
38 → 42	Uranium
43 → 47	Thorium
48, 39, 50, 51	Blank
52, 53, 54	Altimeter (zero level = 500)

8. DATA PROCESSING

8.1 Analogue Charts

Processing of the charts was carried out as follows:

8.1.1 Each line was labelled with line numbers, direction of flight and fiducial numbers.

8.1.2 The charts were edited and bound in book form. Aborted lines were removed.

8.1.3 The chart recorder calibrations were labelled and placed in the book.

8.2 Flight Path

The final flight path map was digitized.

8.3 Digital Record

Processing of the digital data was done by Data Plotting Services Ltd., and consisted of the following steps 8:

8.3.1 The digital data was transferred from the original 7-track Incredata magnetic tapes to a 9-track computer compatible tape.

8.3.2 Computer processing of the data was performed in the following order:

a) The natural background radiation obtained over lakes was subtracted.

b) Correction for the Compton scattering effect, based on the following stripping factors:

$$\alpha = 0.5, \beta = 0.5, \gamma = 0.5$$

c) Normalization of the radiometrics to a constant terrain clearance of 150'.

d) The data, both radiometric and altimeter, were smoothed by a five point, weighted, low pass filter to remove any statistical aberrations.

The detailed processing procedure is illustrated in Appendix I below.

8.3.3 The corrected data were then plotted on a flatbed plotter.

8.3.4 Lastly, two archive magnetic tapes were made. The first contains all the raw data, edited and with aborted sections removed. The second tape contains all the processed and plotted data.

9. PRESENTATION OF DATA

9.1 Overlays and Greyflex

Stacked profiles of corrected Total count Potassium Uranium and Thorium and altimeter were plotted on overlays by a computer plotter. These profiles can be merged with the greyflex flight path map displaying flight lines and fiducials.

9.2 Analogue Charts

Analogue charts, edited, labelled and bound in a book line by line.

9.3 Magnetic Tapes

The following tapes were submitted:

9.3.1 The original 7-track Incre-data tapes containing all raw data

9.3.2 A 9-track magnetic tape containing raw data edited and checked with aborted sections removed.

9.3.3 A final 9-track tape containing all of the processed and plotted data.

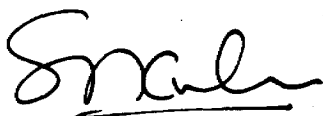
9.4 Other Materials

All flight logs, films, line summaries, recovery and flight mosaics and other materials employed on the survey.

Any questions regarding the survey should be addressed to
Scintrex Limited, 222 Snidercroft Road, Concord, Ontario,
Canada, L4K 1B5.

Respectfully submitted,
SCINTREX SURVEYS LIMITED

Neil K. Fiset, B.Sc.,
Geophysicist.



for

Michael Lewis, M.Sc., P. Eng.,
Manager - Geophysical Surveys Division.



LEWIS
(63-2558) qualification

NKF:mb

APPENDIX I

DETAILED ALGORITHMS USED FOR DATA PROCESSING

1. The constants given apply to GSA-42 with a GAD-6 spectrometer.

A. DEFINITIONS:

A0 = Averaging option 5 was used.

Nxy = Count numbers per given sampling interval

x = Processing step

1 = Raw number

2 = After background correction

3 = After altitude correction

4 = After stripping

5 = After Filter, Final Value

Y = Channels BB, Th, U, K.

BB = Broadband

Th = Thorium

U = Uranium

K = Potassium

C = Standard distance above ground for normalization of data (150 feet).

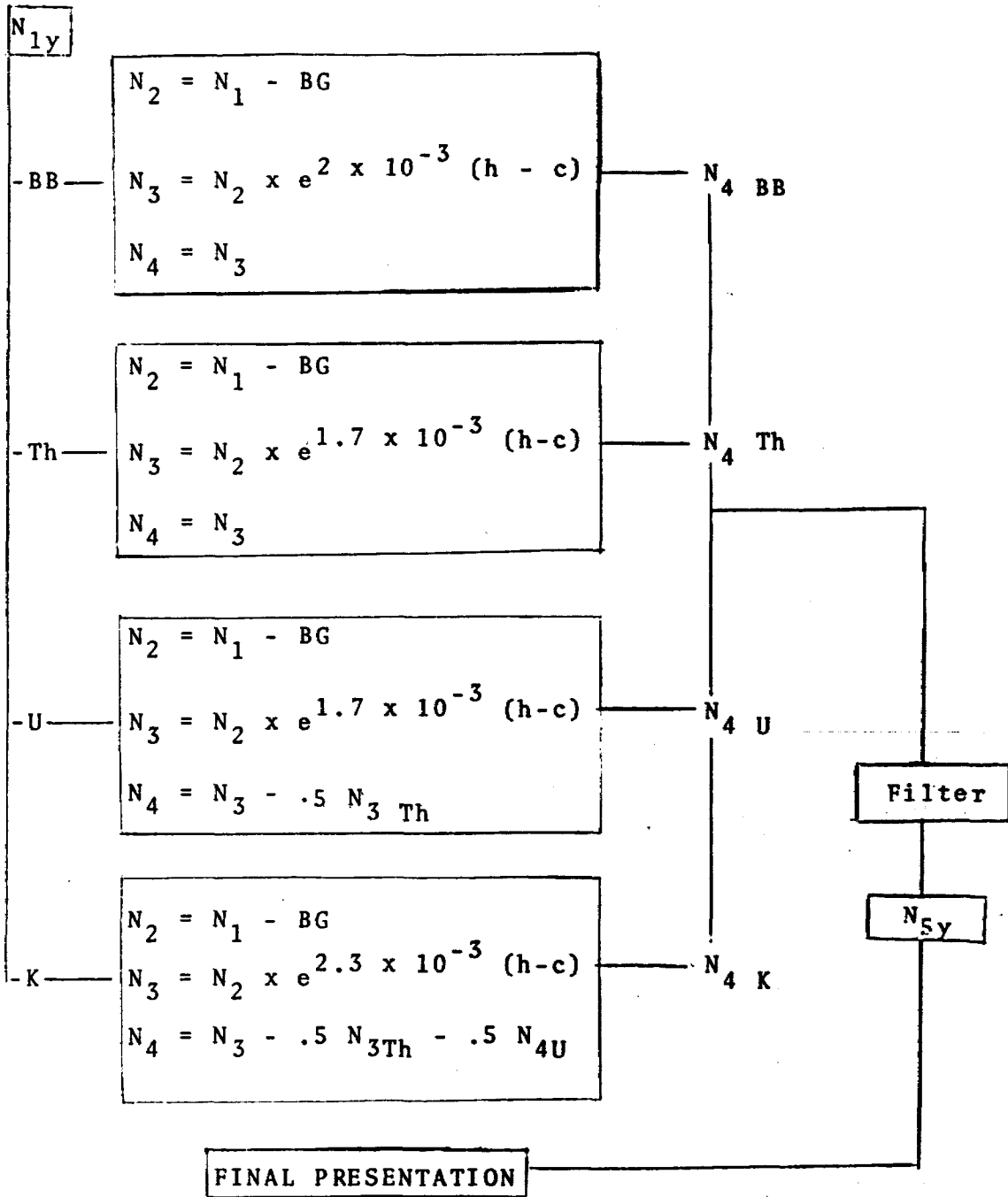
B. Filter

$$h = \frac{.06 \text{ ALT}(X_i-2) + .26 \text{ ALT}(X_i-1) + .36 \text{ ALT}(X_i) + .26 \text{ ALT}(X_i+1) + .06 \text{ ALT}(X_i+2)}{A0 = 5}$$

$$A0 = 5$$

$$N_{5y} = \frac{.06 N_{4y}(X_i-2) + .26 N_{4y}(X_i-1) + .36 N_{4y}(X_i) + .26 N_{4y}(X_i+1) + .06 N_{4y}(X_i+2)}{A0 = 5}$$

C. ALTITUDE CORRECTION AND COMPTON SCATTERING



APPENDIX II

Plate No. Identification

Parameters	Area	
Total Count and Uranium	Sommerville	Scurry and showings
Potassium and Thorium	IA	IIA
Altimeter	IB	IIB
	IC	IIC



31015NW0003 2.2885 LUTTERWORTH

900

JOREX LIMITED

SUITE 800 . 85 RICHMOND STREET WEST

TORONTO, CANADA

M5H 2E8

TEL: 363-8431

AREA CODE: 416

Mining Claim Numbers

- 463366-367 inclusive *see file 22924*
- 503705-730 inclusive
- 503929-938 inclusive
- 505025-036 inclusive
- 506855-869 inclusive
- 506944-963 inclusive
- 507042-050 inclusive
- 507052-063 inclusive
- 507064-091 inclusive
- 507201
- 507203-724 inclusive *22924*
- 507263-266 inclusive

161 claims

$87.5 \times 40 = 3500 = 159 \text{ } \approx 22 \text{ days}$

Anson Twp. (M. 44)

THE TOWNSHIP OF
OF
LUTTERWORTH

COUNTY OF
HALIBURTON

EASTERN ONTARIO
MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

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

NOTES

**This Map Is Not To Be Used
FOR SURVEY PURPOSES.**

Lot And Concession Lines Shown Herein Are Projected From The Best Information Available But Their True Position Is Not Guaranteed For Official Survey Purposes Consult The Original Survey Plans And Field Notes Of Record In The Dept. Of Lands & Forests

400' Surface Rights Reservation Around All Lakes And Rivers.

The Acreages Shown Are The Amount That Were Patented And Do Not Necessarily Represent The True Surveyed Area Of The Parcel.

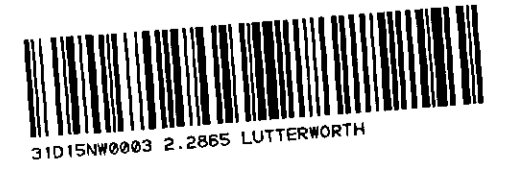
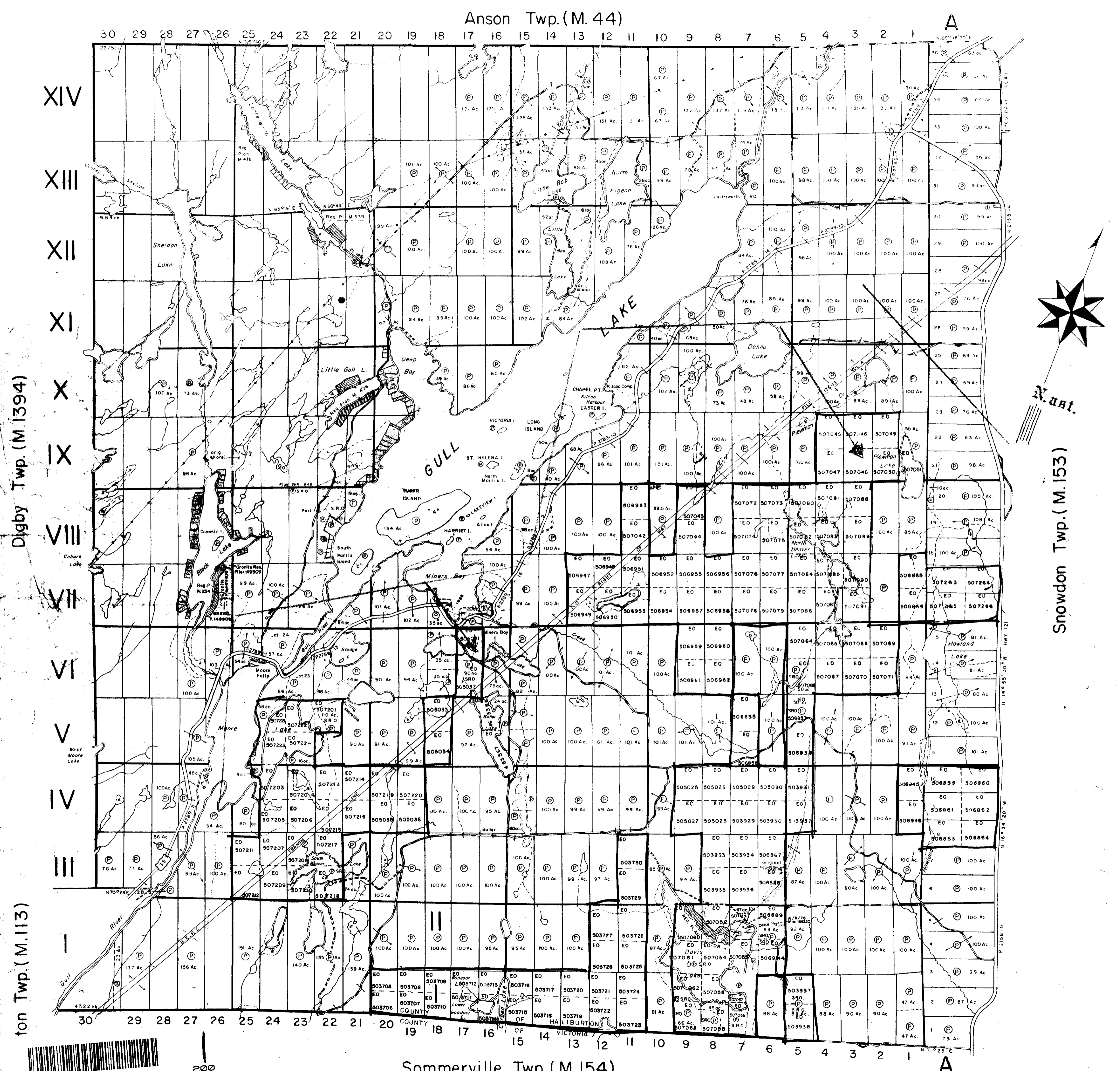
For Status Of Summer Resort Locations Shown Thus: Please Contact Dept. Lands And Forests.

Flooding Rights Reserved To The Government Of The Dominion Of Canada By Order In Council Dated July 22, 1905

DATE OF ISSUE
DEC 2 1978
SURVEYS AND MAPPING
BRANCH

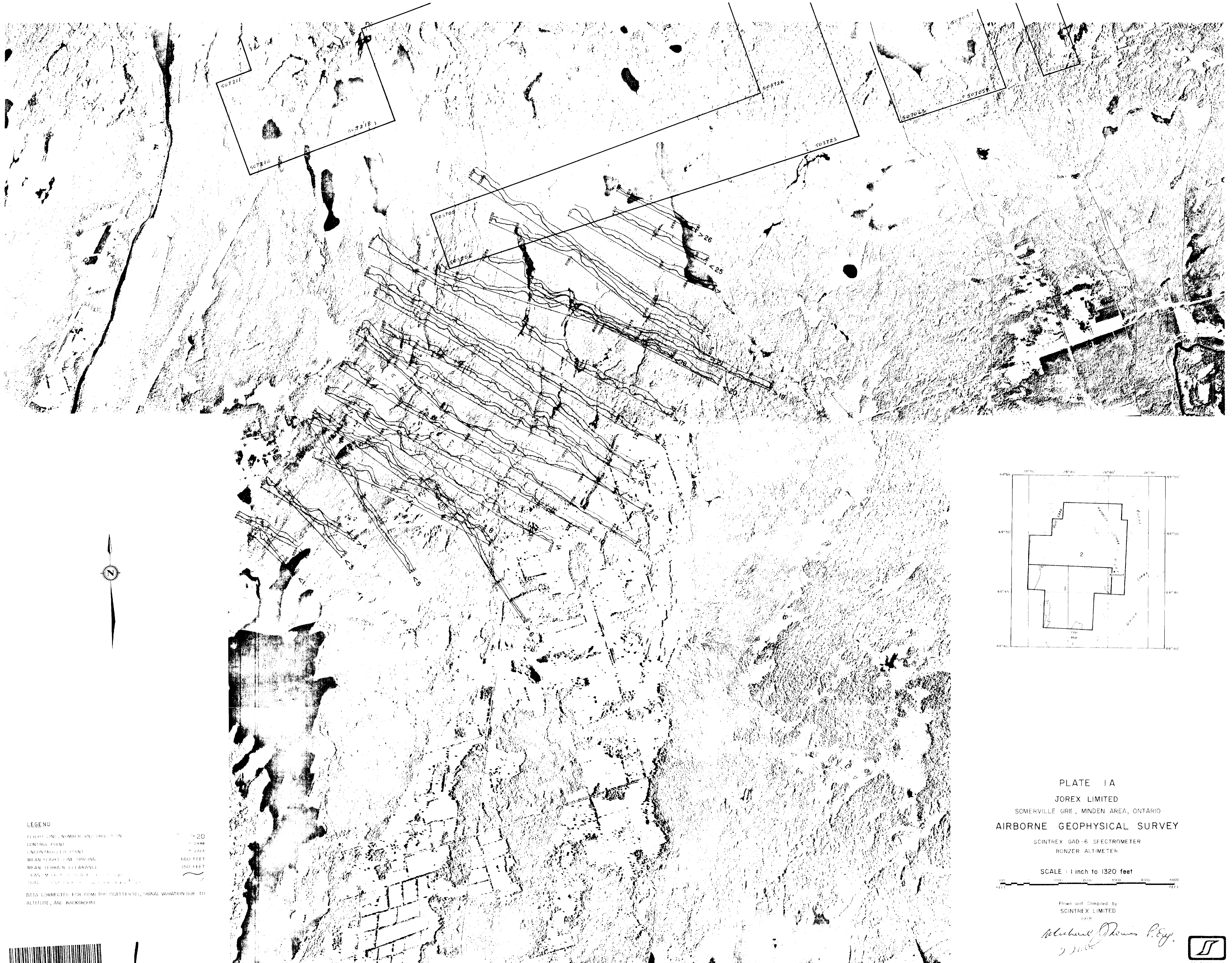
PLAN NO. **M.117**

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH



200

Sommerville Twp. (M. 154)



LEGEND

ELEVATION LINE, NUMBER AND DIRECTION
 CONTROL POINT
 UNCONTROLLED POINT
 MEAN HEIGHT LINE SPACING
 MEAN TERRAIN ELEVATION
 DATA CORRECTED FOR GROUND SCATTERING, SIGNAL VARIATION DUE TO ALTITUDE, AND BACKGROUND

20
 25
 26
 150 FEET
 150 FEET

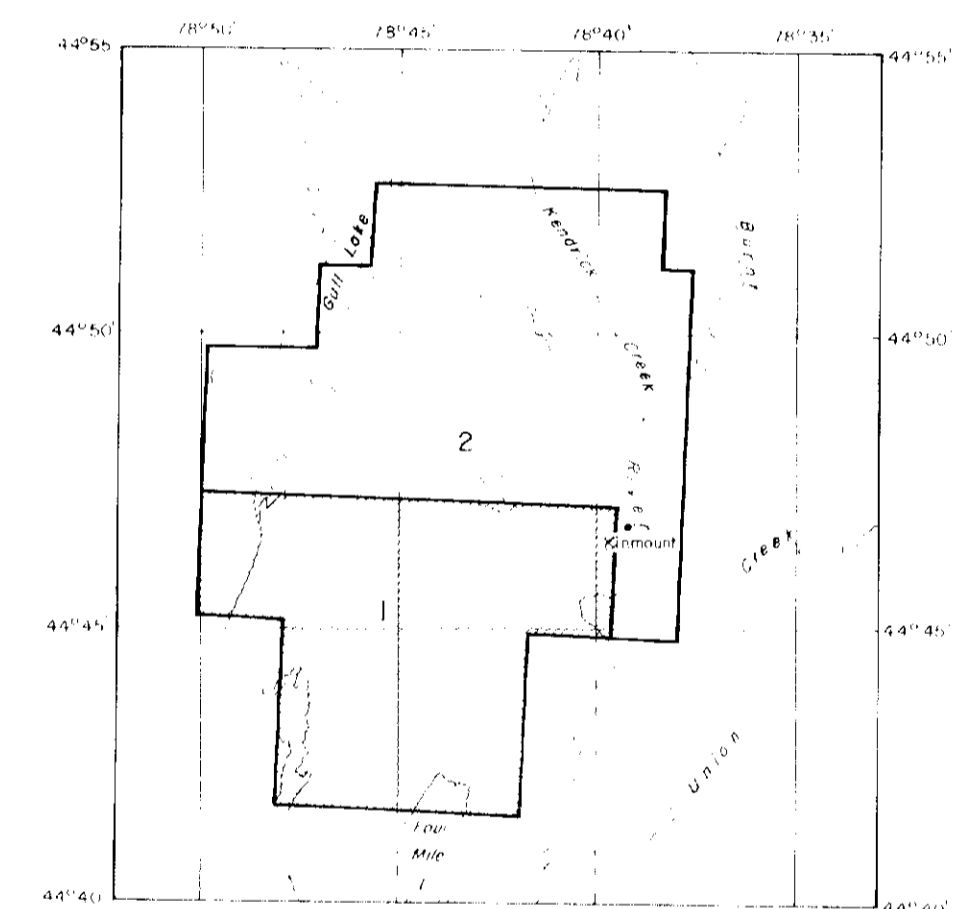
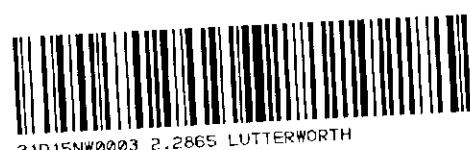
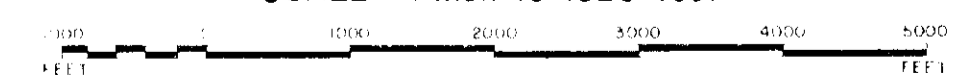


PLATE 1A
JOREX LIMITED
 SOMERVILLE GRILL, MINDEN AREA, ONTARIO
AIRBORNE GEOPHYSICAL SURVEY

SCINTREX GAD-6 SPECTROMETER
 BONZER ALTIMETER

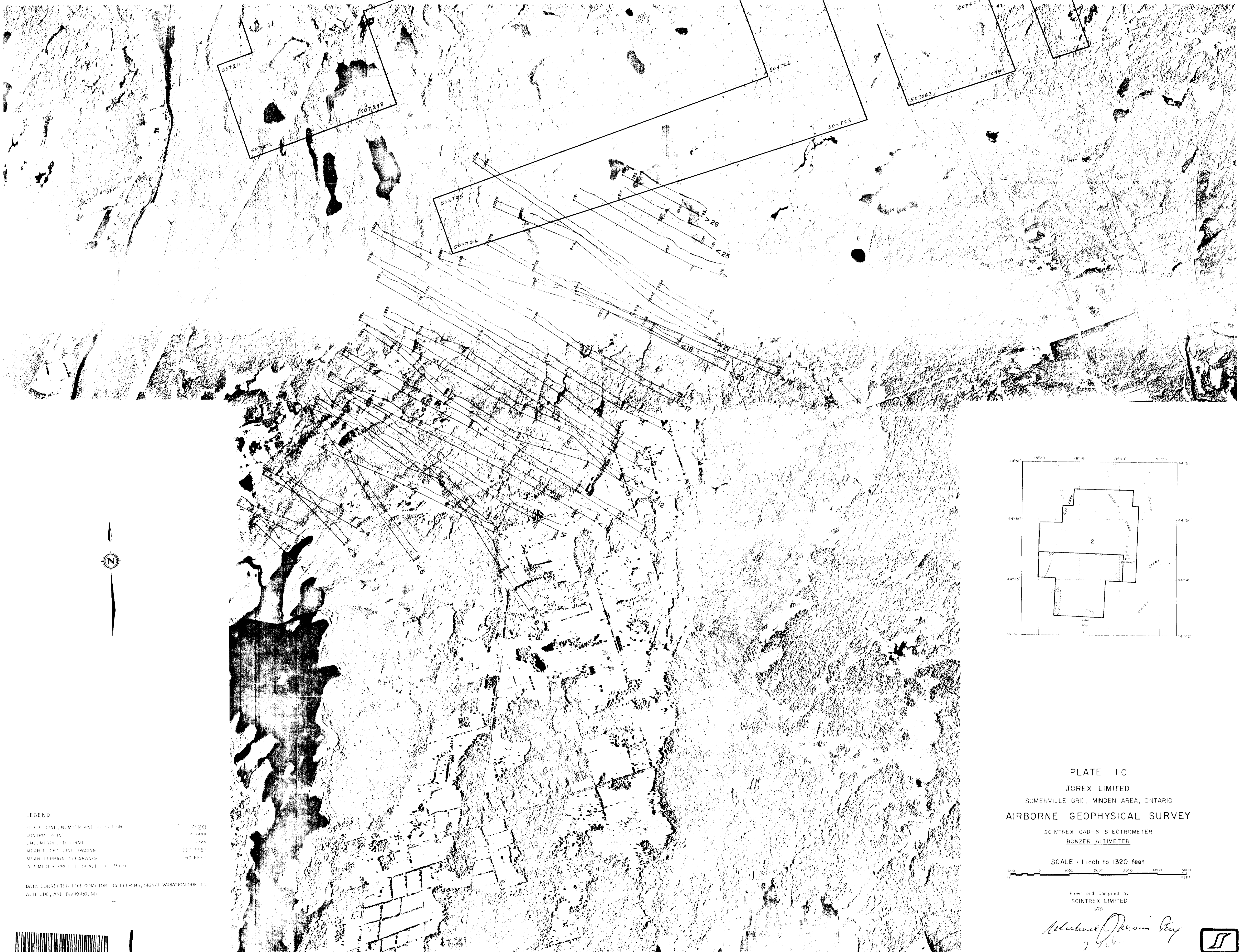
SCALE: 1 inch to 1320 feet



Flown and Compiled by
 SCINTREX LIMITED
 1976

Richard Dennis P. Eng.
 2/10/76





LEGEND

1.00 FT LINE, NUMBER AND DIRECTION	> 20
CENTRE POINT	2489
UNCONTROLLED POINT	2773
MEAN HEIGHT (M) SPRING	660 FEET
MEAN TERRAIN CLEARANCE	150 FEET
5.0 METRE PROFILE SCALE 1:1000	

DATA CORRECTED FOR COMMON SCATTERING, SIGNAL VARIATION DUE TO ALTITUDE, AND BACKGROUND.

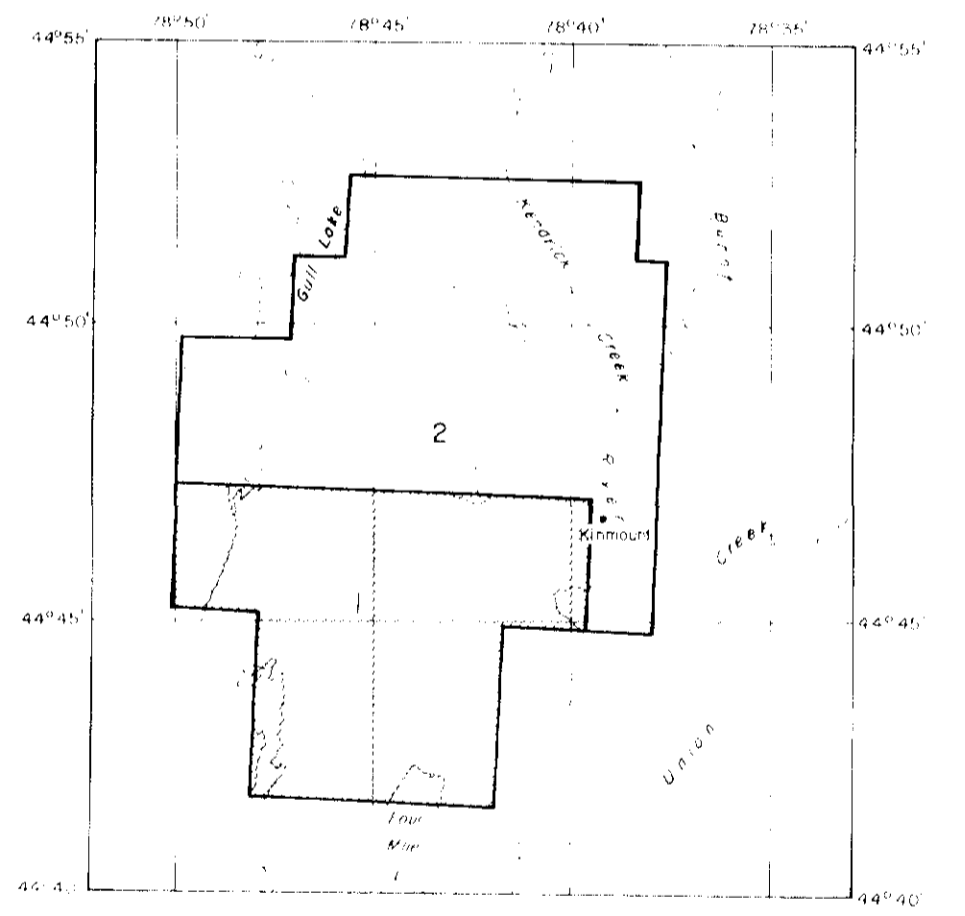
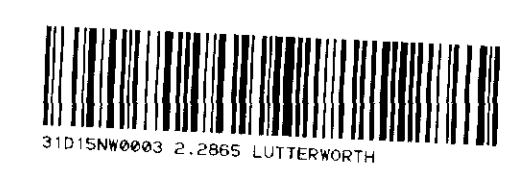
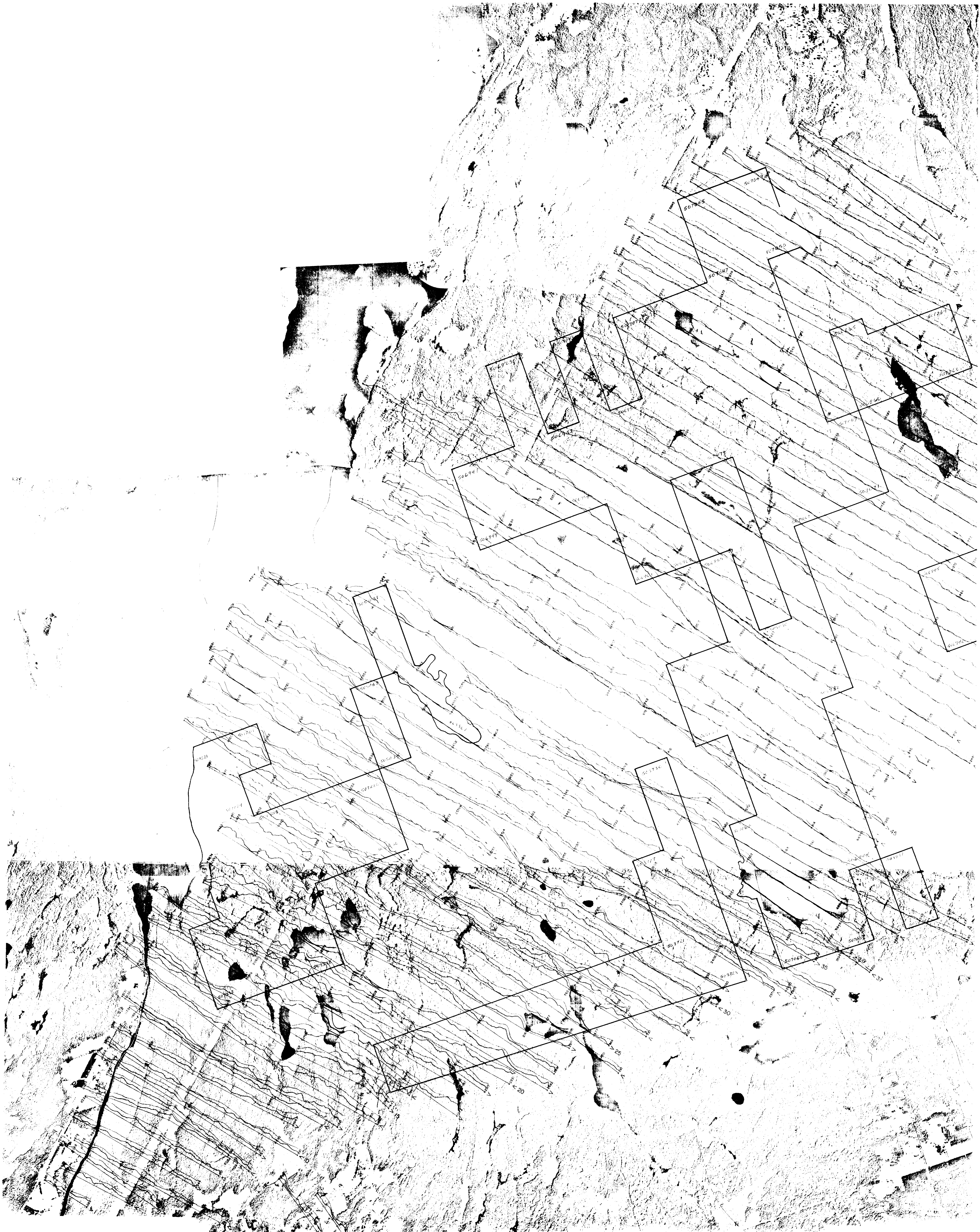


PLATE 1C
 JOREX LIMITED
 SUMERVILLE GRID, MINDEN AREA, ONTARIO
 AIRBORNE GEOPHYSICAL SURVEY
 SCINTREX GAD-6 SPECTROMETER
 BONZER ALTIMETER
 SCALE: 1 inch to 1320 feet

Drawn and Compiled by
 SCINTREX LIMITED
 1978

Richard Dennis Perry

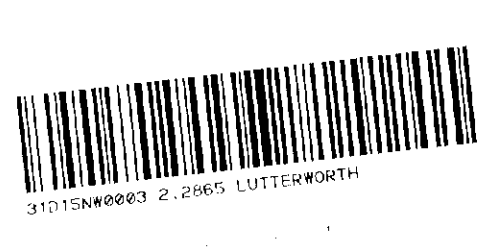




LEGEND

1:50,000	1:25,000
2:50,000	3:50,000
4:50,000	5:50,000
6:50,000	7:50,000
8:50,000	9:50,000
10:50,000	11:50,000
12:50,000	13:50,000
14:50,000	15:50,000
16:50,000	17:50,000
18:50,000	19:50,000
20:50,000	21:50,000
22:50,000	23:50,000
24:50,000	25:50,000
26:50,000	27:50,000
28:50,000	29:50,000
30:50,000	31:50,000
32:50,000	33:50,000
34:50,000	35:50,000
36:50,000	37:50,000
38:50,000	39:50,000
40:50,000	41:50,000
42:50,000	43:50,000
44:50,000	45:50,000
46:50,000	47:50,000
48:50,000	49:50,000
50:50,000	51:50,000
52:50,000	53:50,000
54:50,000	55:50,000
56:50,000	57:50,000
58:50,000	59:50,000
60:50,000	61:50,000
62:50,000	63:50,000
64:50,000	65:50,000
66:50,000	67:50,000
68:50,000	69:50,000
70:50,000	71:50,000
72:50,000	73:50,000
74:50,000	75:50,000
76:50,000	77:50,000
78:50,000	79:50,000
80:50,000	81:50,000
82:50,000	83:50,000
84:50,000	85:50,000
86:50,000	87:50,000
88:50,000	89:50,000
90:50,000	91:50,000
92:50,000	93:50,000
94:50,000	95:50,000
96:50,000	97:50,000
98:50,000	99:50,000
100:50,000	

NOTE: THIS MAP IS A REPRODUCTION OF THE ORIGINAL MAP AND IS NOT TO BE USED FOR ANY OTHER PURPOSE.





LEGEND
ELEVATION
CONTOUR LINES
WATER
ROADS
RAILROADS
BUILT-UP AREAS
UNCULTIVATED LAND
CULTIVATED LAND
DATA SOURCE: U.S. GEOLOGICAL SURVEY
DATE: 1988





LEGEND
 1-100' AND 200' AND 300' AND 400' AND 500' AND 600' AND 700' AND 800' AND 900' AND 1000' AND 1100' AND 1200' AND 1300' AND 1400' AND 1500' AND 1600' AND 1700' AND 1800' AND 1900' AND 2000' AND 2100' AND 2200' AND 2300' AND 2400' AND 2500' AND 2600' AND 2700' AND 2800' AND 2900' AND 3000' AND 3100' AND 3200' AND 3300' AND 3400' AND 3500' AND 3600' AND 3700' AND 3800' AND 3900' AND 4000' AND 4100' AND 4200' AND 4300' AND 4400' AND 4500' AND 4600' AND 4700' AND 4800' AND 4900' AND 5000' AND 5100' AND 5200' AND 5300' AND 5400' AND 5500' AND 5600' AND 5700' AND 5800' AND 5900' AND 6000' AND 6100' AND 6200' AND 6300' AND 6400' AND 6500' AND 6600' AND 6700' AND 6800' AND 6900' AND 7000' AND 7100' AND 7200' AND 7300' AND 7400' AND 7500' AND 7600' AND 7700' AND 7800' AND 7900' AND 8000' AND 8100' AND 8200' AND 8300' AND 8400' AND 8500' AND 8600' AND 8700' AND 8800' AND 8900' AND 9000' AND 9100' AND 9200' AND 9300' AND 9400' AND 9500' AND 9600' AND 9700' AND 9800' AND 9900' AND 10000'

DATA COLLECTED FOR LUMPHIN SCATTERING THRU UNRESOLVED
 TO ALL FILE, AND BACKGROUND



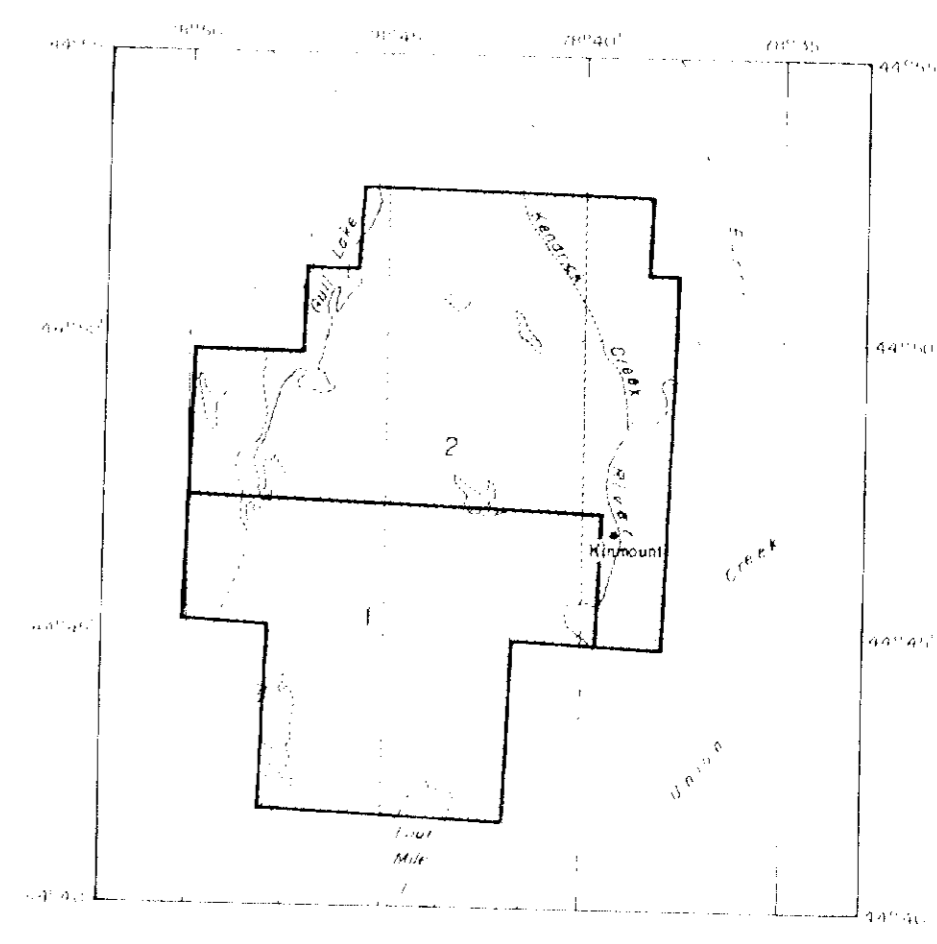
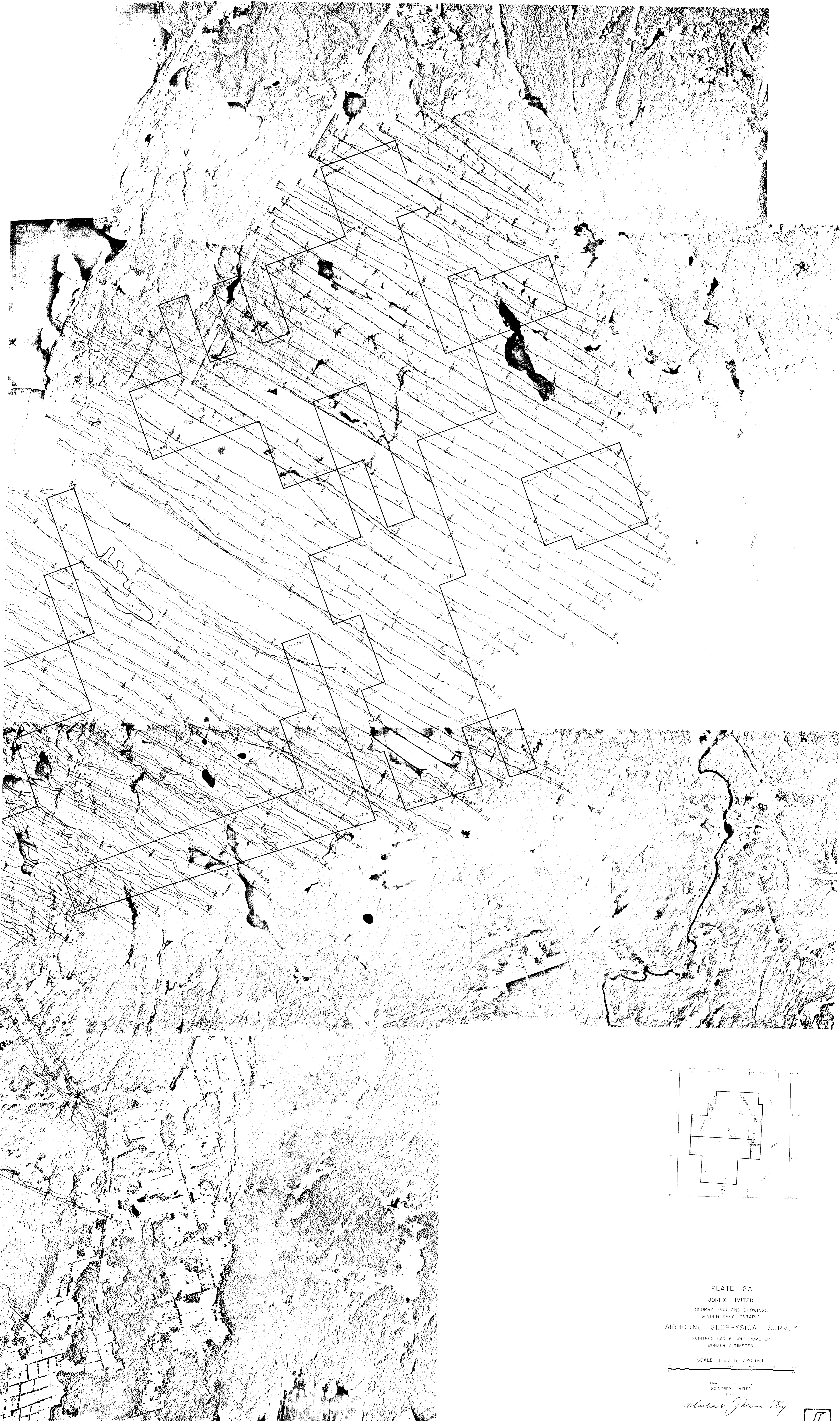


PLATE 2A
JOREX LIMITED
SCURRY GRID AND SHOWINGS
MINDEN AREA, ONTARIO
AIRBORNE GEOPHYSICAL SURVEY
SCINTRIX GAD 6 SPECTROMETER
BONZER ALTIMETER
SCALE 1 inch to 1320 feet

Printed and Compiled by
SCINTRIX LIMITED
1970
Michael James King



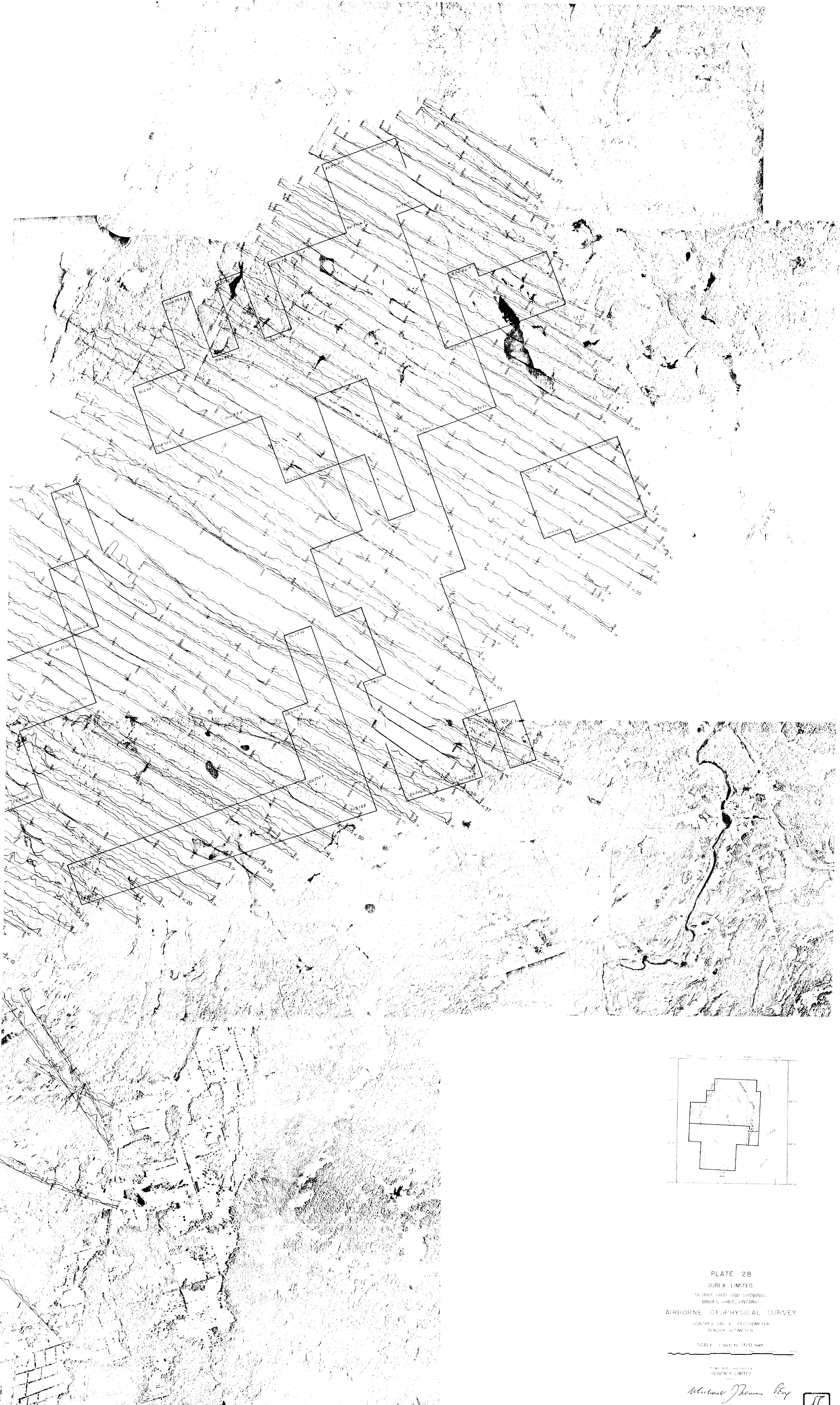



PLATE 2B
 JUREX LIMITED
 SCORRY GRID AND SHOWING
 MINERAL AREA, ONTARIO
 AIRBORNE GEOPHYSICAL SURVEY
 SCORRY & GARDNER INC. GEOPHYSICAL
 SURVEYING DIVISION
 SCALE 1 inch to 1500 feet

Prepared and Published by
 JUREX LIMITED
 Montreal, Quebec, Canada


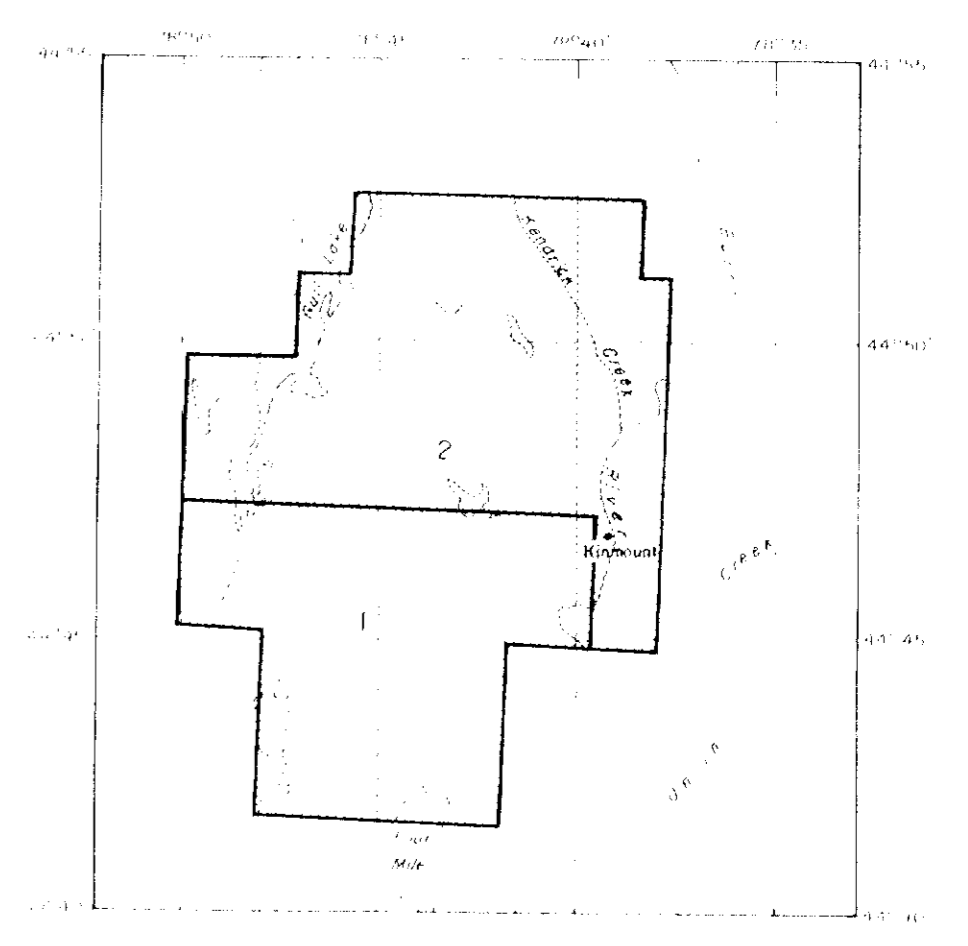


PLATE 2C
 JOREX LIMITED
 SURVEY GRID AND SHOWINGS
 MINDEN AREA, ONTARIO
 AIRBORNE GEOPHYSICAL SURVEY
 SCINTREX (M) 6 SPECTROMETER
 BONZER ALTIMETER
 SCALE 1 inch to 1320 feet