REPORT ON

AIRBORNE GEOPHYSICAL SURVEY

~~PILGRIM CREEK AND~~ STOBIE TOWNSHIP AREA

ONTARIO

FOR

CANADIAN JOHNS—MANVILLE CO., LIMITED

BY

HUNTEC LIMITED
TORONTO, ONTARIO

OCTOBER, 1967

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I INTRODUCTION

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Between June 29th and July 6th, 1967, an airborne geophysical survey comprising in-phase and out-of-phase electromagnetometer, total field fluxgate magnetometer, scintillometer, and spectrometer was carried out by Lockwood Survey Corporation for Canadian Johns-Manville Co., Limited over 583 claims, in ~~two~~ ONE irregular shaped block~~s~~.

The airborne survey was over two areas including the claim blocks; about 36 miles north and 15 miles east of Sudbury. Included are parts of the Townships of Grigg, Fraleck, Stobie & Marconi; Mining District of Sudbury.

Traverse lines were spaced at 1/4 mile, on a bearing approximately 30° east of north, and north-south respectively in the two blocks. Appropriate tie-lines were flown.

The mean terrain clearance for the E.M. and magnetometer bird was 100 ft.; and 200 ft. for the scintillometer and spectrometer housed in the helicopter.

Photographs of the terrain below the aircraft were exposed at intervals of 1.5 secs. throughout the survey on 35 mm. film. This photography was used to establish the actual flight path of the aircraft whilst on survey.

The area has been subdivided into ~~three~~ TWO map sheets at a scale of 1 inch to 1320 ft., with planimetry traced from uncontrolled mosaics.

The survey was undertaken by the following personnel:

- R. Boyd, Pilot
- Smith, Engineer

- H. Sandau, Navigator
- T. Pederson, Operator
- D. Fenwick, Data Reduction

The aircraft used for the survey was a Sikorsky S-55, registration GF—GHV.

II THE ELECTROMAGNETIC SURVEY

II.1 The Electromagnetic System

The helicopter-borne E.M. system used for this survey was developed by Hunting Survey Corporation and was described by Dr. N. R. Paterson in "Helicopter E.M. Test, Mobrun Ore Body, Noranda," in Canadian Mining Journal, November, 1961. The system measures the in-phase and out-of-phase components of the secondary electromagnetic field, in terms of the primary field at the receiver. Receiving and transmitting coils are held vertical and coaxial in a towed "bird", a distance of 30 feet apart and 100 feet below the helicopter. The sensitivity of the measuring system is such that the minimum recognizable in-phase anomaly is about 8 parts per million. Noise on the in-phase profile should be less than 5 parts per million. The frequency of the alternating electromagnetic field is 4000 cycles per second.

The system so designed is sensitive to large bodies at a depth of up to 250 feet below the "bird". Anomalies in the range 8 to 100 parts per million are commonly obtained over sulphide bodies when this equipment is operated at a "bird" height of 100 feet. The anomaly amplitude decreases with increasing depth (and increasing height) at a roughly 3.8 power. Consequently, an anomaly of 8 parts per million could be caused by a large body buried 150 feet below ground or a very small body at surface.

The ambiguity is to some extent resolved by studying the shape of the anomaly.

II.2 Effect of Magnetic Bodies on Electromagnetic Response

The survey area is characterized by high magnetic relief; therefore, in assessing the significance of any particular anomaly it is essential to note the correlation with strong magnetic relief, as well as geological structural correlation.

The effect of a strong magnetic field on the electromagnetic response is to degrade, to a variable extent, the in-phase component only; the out-of-phase component is unaffected. Therefore, anomalies in areas of low magnetic relief cannot have been degraded, whereas anomalies in areas of high magnetic relief may have had their in-phase response degraded, resulting in an apparently low ratio, hence, low apparent conductivity. The extreme case is where the magnetic field due to the causative body is considerably stronger than the secondary field being measured at the receiving coil, resulting in a negative in-phase anomaly.

II.3 Presentation of Data

The electromagnetic data is presented as contours of the anomaly in the inphase component relative to the local background level at an interval of 10 ppm of the primary field and with ratios of in-phase to out-of-phase components at the peaks of the anomalies.

II.4 Comments on Electromagnetic Data

The electromagnetic maps are characterised by many anomalies which occur on only one flight line. These anomalies in general are of low amplitude, poor ratio, and relatively wide, suggesting a relationship with conductive overburden rather than bedrock conductor.

Many negative anomalies are noted on the maps; some are considered to be real whilst others are probably due to instrumental defects. The genuine negative anomaly therefore reflects the presence of a low conductivity but highly magnetic causative body. The test for genuineness is to check the exact correlation between the electromagnetic and magnetic records.

A rapid investigation of the records reveals several anomalies which merit further investigation. These anomalies are: on Line 13, on the township boundary between Stobie and Marconi, ratio 4.5/0.5; Line 15, Grigg Township, ratio 3.8/1.5, a rather wide anomaly; Line 18, Fraleck Township, ratio 2.5/0.8, a small anomaly observed over 3 lines, correlates with a pronounced east-west magnetic feature; Line 30, ratio 2.0/1.4, may be part of broad zone. Several rather wide anomalies occur on Line 40(2), 43(2) and 44; these anomalies have good amplitude, up to 90 ppm inphase anomaly, but their widths are relatively high which would result in a very low conductivity - width factor. These may prove to be of graphitic origin or occurring in shear zones.

Probably the most significant anaomly in the area is on Line 46 with an indicated ratio of 8.7/4.0. Since this anomaly is overriding a regional high, the amplitude as shown is too great; nevertheless, the anomaly has good shape, reasonable amplitude and good ratio and should be checked on the ground.

III THE SCINTILLOMETER SURVEY

III.1 The Scintillometer and Spectrometer

The scintillometer used for the survey was the Harwell Model 1531B, with a 200 cps zero suppression and full scale deflection of 2000 cps; the integrating time was 1 second, chart speed 6 inches per minute. This equipment was mounted on the floor of the helicopter. The scintillometer was used in conjunction with an APN-1 radio altimeter which recorded the clearance of the helicopter above the ground; the APN-1 was calibrated at 100 ft., 200 ft., 300 ft., and 400 ft. ground clearance. An examination of the records show that the APN-1 has a relatively slow response, hence, the APN-1 slightly lags the scintillometer.

The Spectrometer used for the survey was the Sharpe Instruments Model GIS-2, a solid state scintillation counter. It has seven ranges from 10 to 10,000 cps, with energy level discrimination. This equipment was modified for airborne use and adjusted to discriminate against potassium The integration time was adjusted to 1 second.

III.2 Data Reduction

The maps have been prepared with a contour interval of 100 cps with respect to a background level of 500 cps of total radiation (1531B) and at intervals of 1 cps above a background of 5 cps in the thorium-uranium energy level (GIS-2).

The records are uncorrected for variation in elevation or any other effects and record the sum total radiation as detected at the instrument head; the topographic effects are not removed.

III.3 Source of Radioactivity

In airborne radioactivity surveys only three naturally occurring radioactive elements and their daughter products are important. They are uranium, thorium and potassium 40. Only those radionuclides that decay by gamma-ray emission are detected and measured with scintillation equipment.

Radioactivity measured at survey altitude has three natural components:

1. Gamma-ray activity from radionuclides in and on the ground.
2. Gamma-ray activity from radionuclides in the air.
3. Gamma-ray activity produced by cosmic rays.

The ground component comes from the surface and upper few inches of the ground and consists of gamma rays from natural radionuclides and fission products in fallout. The radionuclides in air are very variable and their effects cannot be entirely separated. For good scintillometer resolution, therefore, it is necessary to have considerable areas of outcrop or residual soils; conversely, water covered areas, extensive glacial or alluvial deposits or swamp provide an effective cover, thus masking any gamma ray emission from the bedrock.

III.4 Comments on Scintillation Data

The total radiation count as shown by the 1531B instrument is contoured above the 500 cps level; at this level the contours outline the Algoman silicic intrusive rocks in the west half of Marconi Township, and through Stobie and Grigg Townships.

The major anomaly other than in the above mentioned belt is on the south end of Line 47 and attains a level of 900 cps; this is a known mineral occurrence of uranium shown on Preliminary Geological Map No. P. 301, "Maple Mountain Sheet".

The Sharpe Instrument had a very fast response rate and the record is very irregular with many "spike-like" anomalies; all those over 5 cps have been mapped. Many of these "spikes" just exceed the 5 cps level and as such do not always appear to correlate from line to line; these anomalies may correlate if the records are examined in more detail. The major anomalies of 10 cps or more generally correlate well over several lines, particularly in the vicinity of Stobie Lake where the radiometric strike appears to be broken in crossing the lake, suggesting that Stobie Creek and Stobie Lake may be structurally controlled. Several other major, wide anomalies are noted throughout the survey area but are not known to correlate with geologic features.

IV THE MAGNETIC SURVEY

IV.1 The Airborne Magnetometer

The instrument used for this survey was the Gulf MK.III Fluxgate Magnetometer which measures the strength of the earth's total magnetic field in the direction of maximum force. The instrument was housed in the centre section of the towed bird, the controls and recorder being housed in the helicopter.

The instrument was used with full scale deflection of 600 gamma with a noise level of ± 2 gamma.

IV.2 Presentation of Data

The magnetic data is presented as contours of the total magnetic field at a basic interval of 10 gamma with multiple intervals where the gradient warrants.

The diurnal variation was removed by the standard procedure of closing the loop and distributing the mis-closure.

The contour map has been reduced for convenience to an arbitrary datum of 5000 gamma; the 5000 gamma reading on the map represents a true reading of about 59,500 gamma.

IV.3 Magnetic Constants

The relevant magnetic constants for the area are:

Total field strength	-	0.594 oersted: 59,400 gamma
Declination	-	8° West
Inclination	-	76° North

IV.4 Comments on the Magnetic Data

The magnetic maps show contouring which is generally sympathetic to the geological contacts shown on Preliminary Geological Map No. P. 301.

The area mapped as Silicic Intrusive Rocks (Algoman), unit 6,are represented by relatively low amplitude regional gradients and variations in the magnetic field. In contrast to this the Mafic Volcanic Rocks (Keewatin), unit 2,and the areas mapped as Gowganda Formation, unit 12, are characterised by very narrow, large amplitude anomalies with very steep gradients; the anomalies are up to 2000 gamma amplitude. The trend of the magnetic anomalies in general follow the predominant strike,being essentially north-south in Marconi Township, east-west in the north of Stobie Township,and south-east through Grigg Township.

The magnetic map of Turner Township reflects the presence of the mapped iron formation with a prominent anomaly of 3000 gamma with a northeast-southwest trend over about 2 miles with the maximum anomaly over Bull Lake.

A circular boss-like feature is noted approximately mid-way between Hazel and Bull Lakes.

Many faults and dyke-like features are discernible from the magnetic contour map, especially in the south west and north east of the area.

V RECOMMENDATIONS

The interpretation of the survey embodied in this report is essentially a rapid geophysical appraisal of the survey area; as such it can incorporate only as much geological information as the interpreter has available. It should be judicously used, therefore, as a guideline by geologists thoroughly familiar with the area and who are in a better position to have a "feel" for the geological significance of any particular feature.

The electromagnetic system used for this survey detects electrically continuous conductors, especially massive sulphides, at relatively shallow depths; therefore, any anomalous situation of further interest should be accurately located on the ground by a comparable E.M. system. It would be extremely advantageous for a geologist to accompany this crew, who, as soon as the peak response is located, could make a rapid geological appraisal of the site and if necessary call off further work if a graphitic or other non metalliferous conductor is found. If all factors are favourable, a magnetometer traverse may assist in determining further parameters of the causative body; the airborne magnetics should be a guide in this. Depending on the local geological detail,a decision then must be made to either drill or trench the anomaly in order to define the exact nature of the conductor.

VI INSTRUMENT SPECIFICATIONS

VI.1 ELECTROMAGNETIC SYSTEM:

Manufacturer:	Lockwood Survey Corporation Ltd. (formerly Hunting Survey Corporation Ltd.)
Type:	In-phase/Out-of-phase System.
Serial No.:	Unit 3.
Frequency:	4000 cycle per second.
Power Source:	28 volts.
Coil Size:	18 inches.
Coil Separation:	30 feet - vertical, co-axial.
Power Output:	10 watt.
Sensitivity:	400 parts per million (0.04%).
Calibration:	100 parts per million step.
Noise Level:	± 6 parts per million.
Recorder:	Texas Instrument.
Chart Speed:	3 inches per minute.
In Phase:	Red ink.
Out-of-Phase:	Blue ink.

VI.2 SCINTILLOMETER SYSTEM:

a) Manufacturer:	"Harwell".
Type:	1531B (modified for 28 volt operation).
Crystal Size:	5 inch by 1 inch: Thallium-activated Sodium. Iodide: three detector heads.

	Power Source:	28 volt.
	Sensitivity:	2000 counts per second.
	Zero Suppression:	200 counts per second.
	Integrating Time:	1 second.
	Calibration:	200 counts per second per micro roengten per hour.
	Calibration Source:	Thin radium sheet; 5 micro curie.
	Recorder:	Mosely, zero at centre scale, per working left to right (red ink).
	Chart Speed:	2 inches per minute.
b)	Manufacturer:	"Sharpe Instruments"
	Type:	G.1.S—2.
	Crystal:	2 inch by 2 inch: Sodium Iodine crystal, Thallium-activated.
	Sensitivity:	30 counts per second.
	Noise Envelope:	2.5 counts per second.
	Average Background:	1.5 counts per second.
	Integrating Time:	1 second.
	Discrimination:	Against Potassium.
	Recorder:	Mosely, zero on bottom edge of chart paper (blue ink) (Shared with 1531B).

VI.3 MAGNETOMETER SYSTEM:

Manufacturer:	Gulf Research & Development Corporation.
Type:	Mark III Fluxgate.
Unit No.	6.
Power Source:	28 volt.
Sensitivity:	600 gamma.
Step:	500 gamma.
Noise envelope:	2 gamma.
Recorder:	Gulf.
Chart Speed:	3 inches per minute.

VI.4 ELEVATION CONTROL:

Type:	APN-1.
Serial No.:	29663.
Power Source:	28 volt.
Calibration Range:	0-400 feet.
Power Output:	1/10 Watt.
Operating Frequency:	400 mega cycle.
Chart Speed:	6 inches per minute.

VI.5 CAMERA:

Manufacturer:	Canadian Applied Research.
Model:	MK8.
Serial No.:	8106.
Exposure interval:	1.5 second.

VI.5 Camera - (cont'd)

Film Size:	35 mm.
Shutter:	Focal Plane.

VII SURVEY PROCEDURE

All instrument calibrations were checked and adjusted immediately before and/or after take-off, and checked for normal function, e.g., pen alignment, automatic stepping, standardization and degree of noise Assuming all systems were functioning satisfactorily, the flight would proceed following predetermined flight lines marked on uncontrolled mosaics at a scale of 1 inch to 600 ft., at the predetermined separation.

The helicopter followed a systematic predetermined pattern of flight lines and tie lines at an average elevation of 200 ft.

The position of the helicopter was recorded by a vertically mounted camera; there was no significant lag between any instrument and the recorded position. Every time the camera fired, a reference mark was printed on all records and numbered to correspond with the film frame number.

The magnetometer and electromagnetic system detector heads were in the bird, the controls and recorder being mounted in the helicopter with the scintillometers, camera and APN-1.

VIII DATA REDUCTION AND PRESENTATION

The flight produces positioning film, duly processed, magnetometer, scintillometer, electromagnetic and APN-1 continuous records with appropriate frame numbers and field annotations, plus an operator's Daily Flight Report.

The track of the helicopter is recovered on the photographic mosaics by examination of the film; prominent features, i.e., roads, lake-shore etc. are used for the transposition.

The intersections of tie and flight lines are accurately determined on film and transferred to the records. The frame numbers of the individual plotted points relocated on the mosaic are identified on each record.

The flight line network is divided into conveniently sized circuits and from one intersection as reference, the magnetic closure error around each circuit is determined and distributed uniformly around each circuit such that the correction applied to the magnetic baseline results in a uniform datum of all these magnetometer records throughout the area; this is the datum used for contouring.

The electromagnetic record is baselined with respect to the local background level.

The scintillometer record is baselined with respect to an appropriate count level.

The data for each survey are individually transferred to separate intercept tapes; the data transferred consist of the plotted fiducial point and the intercept of the predetermined contour interval with the trace, and the position and values of high and lows.

The intercepted data are transferred to the flight line plot by linearly interpolating between plotted fiducial points. The transferred data are then contoured, and subsequently fair drawn.

HUNTEC LIMITED

per J. W. Prior, M.Sc., F.G.S.,
Geophysicist

Norman R. Paterson, Ph.D.,
P. Eng.,
Geophysicist

PERSONNEL

Pilot: R. Boyd,
c/o Dominion Helicopters,
Maple, Ontario.

Engineer:
Smith,
c/o Dominion Helicopter,
Maple, Ontario.

Navigator:
H. Sandau (Lockwood Survey Corp).,
527 Kennedy Road,
Scarborough.

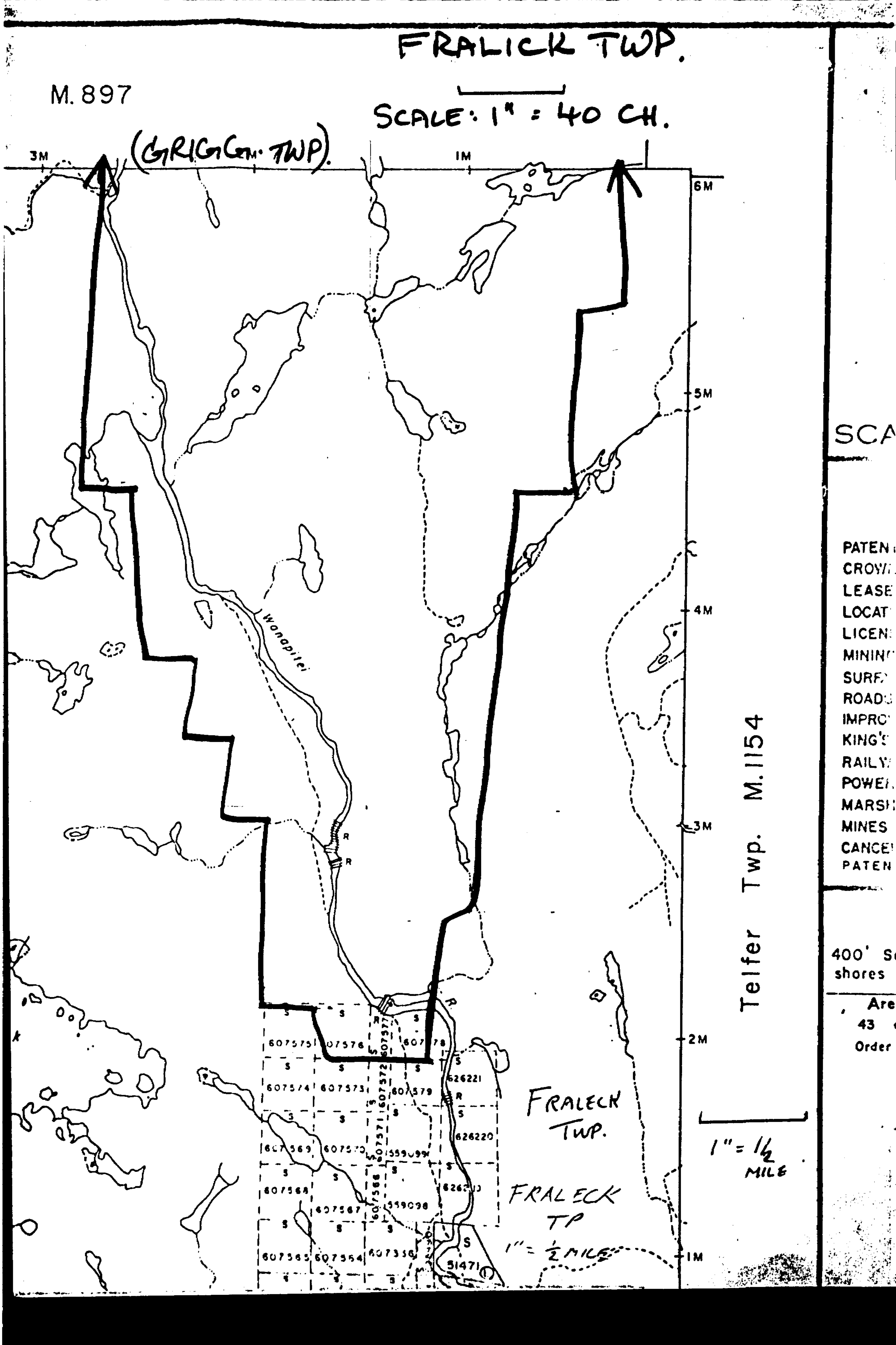
Operator:
T. Pedersen (L.S.C.),
135 Tyndall Ave.,
Apt. 316,
Toronto 3.

Data Reduction:

D. Fenwick (L.S.C.),
2035 Victoria Park Ave.,
Apt. 7, Scarborough.

Geophysicist:

J. W. Prior, M.Sc., F.G.S., (Huntec Ltd.),
78 Gatesview Avenue,
Scarborough.


FRALICK TWP.
M. 897
SCALE: 1" = 40 CH.
(GRIGG TWP).
3M
1M
6M
5M
4M
3M
2M
1M
Wonapitei
Telfer Twp. M.1154
SCA
PATEN
CROW
LEASE
LOCAT
LICEN
MININ
SURF
ROAD
IMPRO
KING'
RAIL
POWE
MARS
MINES
CANCE
PATEN
400' S
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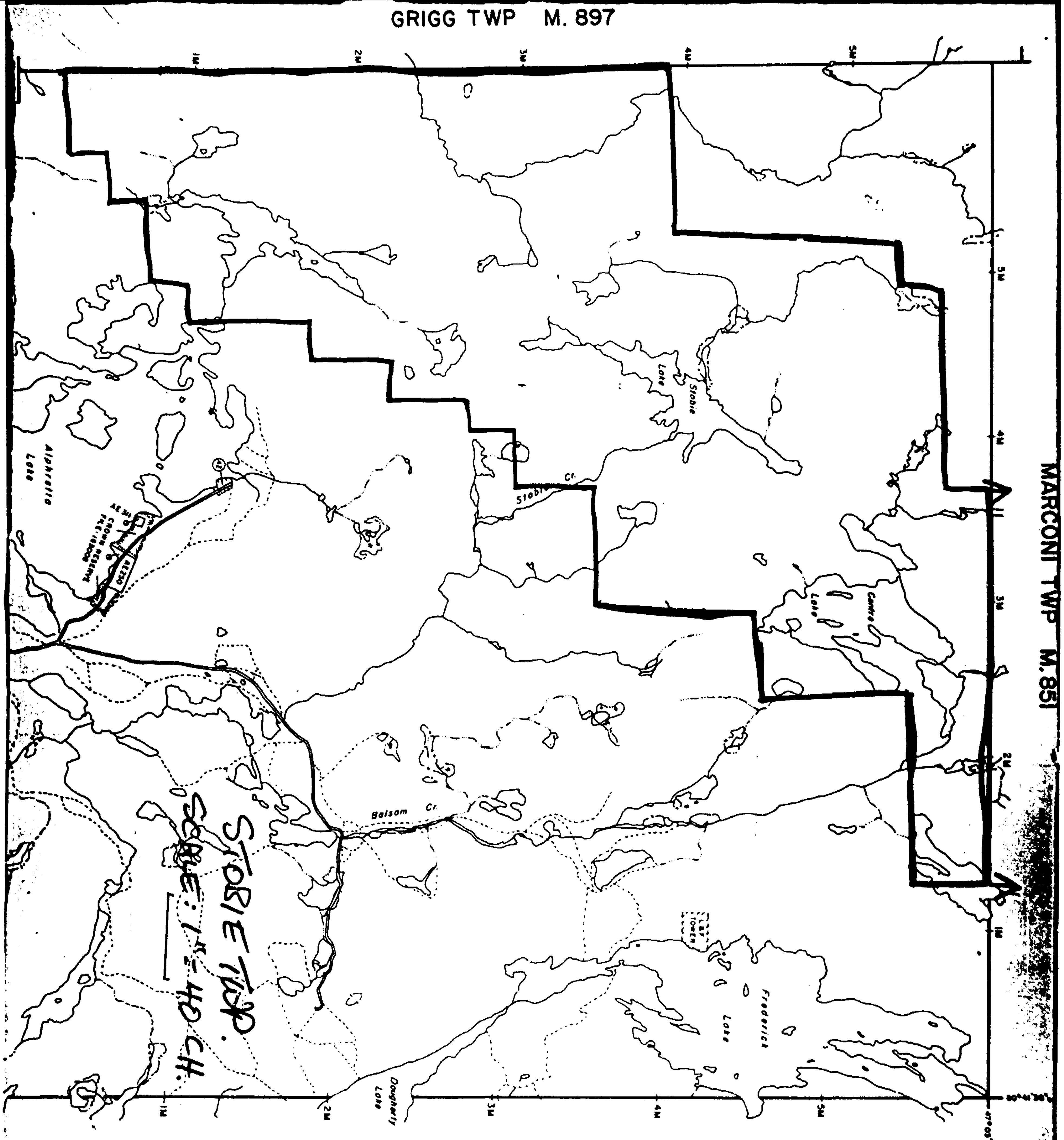
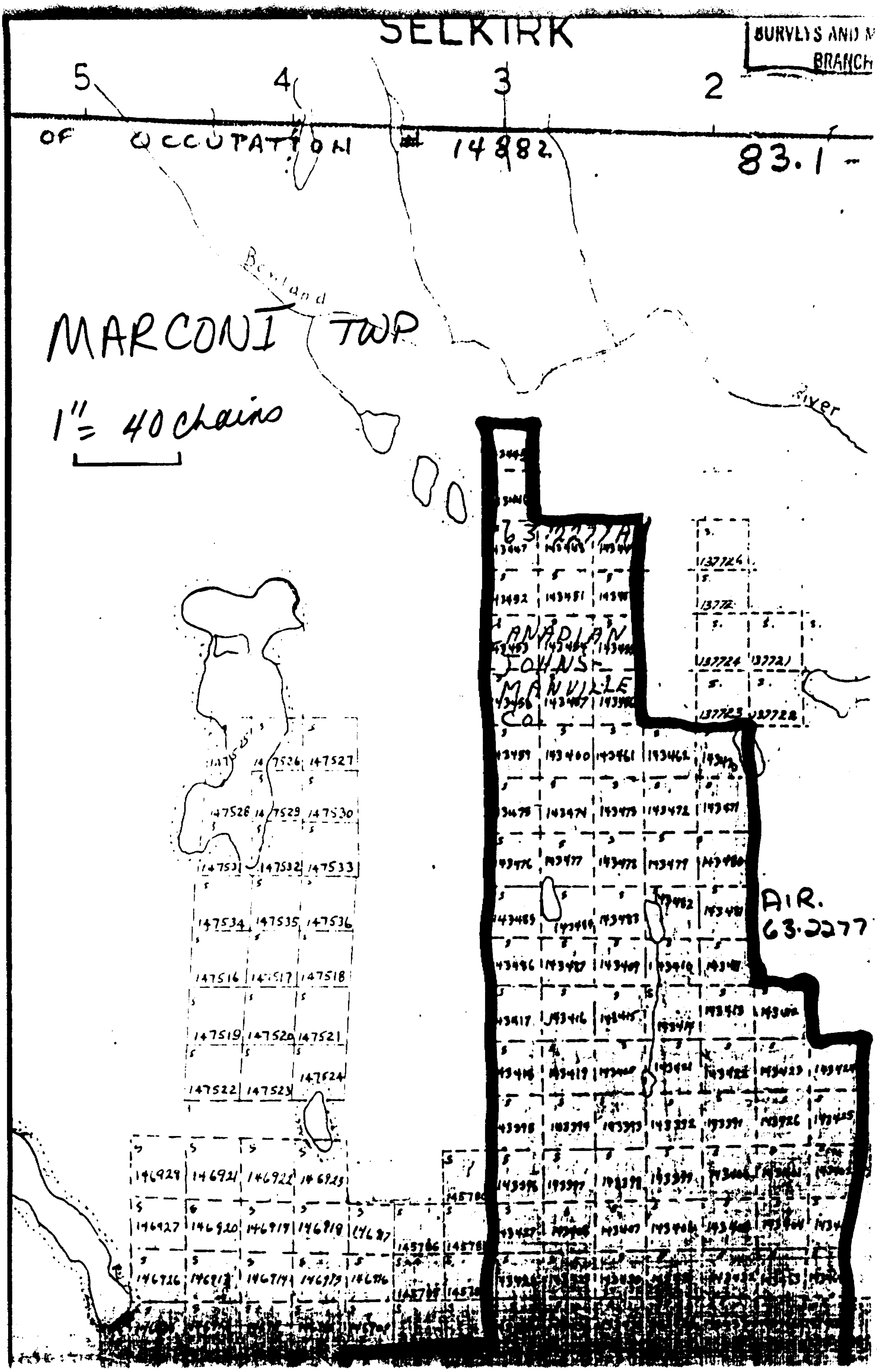
43
Order
607575
607576
607577
626221
607574
607573
607572
607579
626220
607569
607570
607571
559099
607568
607567
607566
559098
607565
607564
607330
51471
FRALECK TWP.
1" = 1/2 MILE
FRALECK TP
1" = 1/2 MILE


GRIGG TWP M. 897
MARCONI TWP M. 851
Alphretta Lake
Stobie Lake
Stobie Cr.
Centre Lake
Balsam Cr.
Frederick Lake
Dougherty Lake
CROWN RESERVE
STOBIE TWP.
SCALE: 1" = 40 CH.



SELKIRK
SURVEYS AND M
BRANCH
5
4
3
2
OF OCCUPATION
14882
83.1
MARCONI TWP
1" = 40 chains
CANADIAN
JOHNS-
MANVILLE
Co.
AIR.
63.2277

SEE ACCOMPANYING

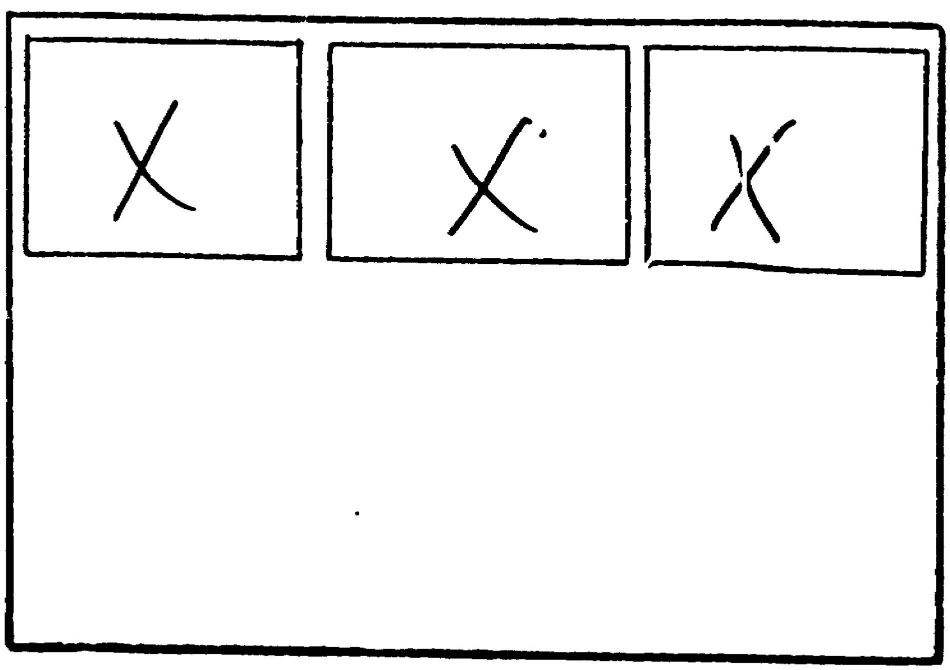
MAP(S) IDENTIFIED AS

FRALECK - 0012 #1

2

3

LOCATED IN THE MAP CHANNEL IN THE FOLLOWING SEQUENCE (X)



FOR ADDITIONAL

INFORMATION

SEE MAPS:

FRALECK-0012 # 4

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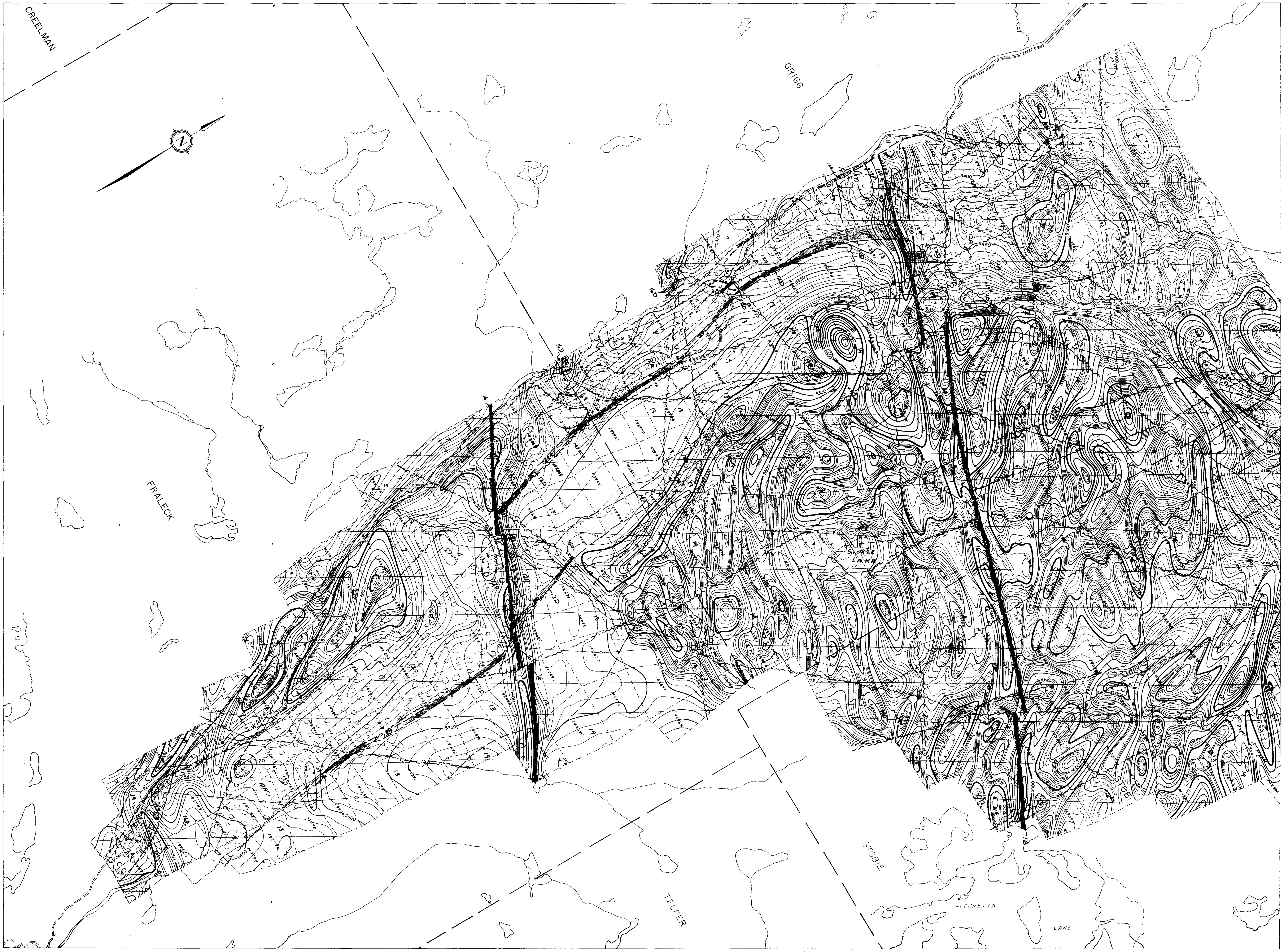
7

CANADIAN JOHNS MANVILLE COMPANY
AIRBORNE GEOPHYSICAL SURVEY



CONTOUR INTERVAL .... 10 GAMMA
MEAN FLIGHT LINE SPACING .... 1320 FEET
MEAN TERRAIN CLEARANCE .... 200 FEET
250 GAMMA CONTOUR
50, 100 GAMMA CONTOUR
10 GAMMA CONTOUR
MAGNETIC LOW
FIDUCIAL POINTS 3690
FLIGHT LINES

FRALECK-0012,#[redacted].1

STOBIE TOWNSHIP AREA
MAGNETIC MAP

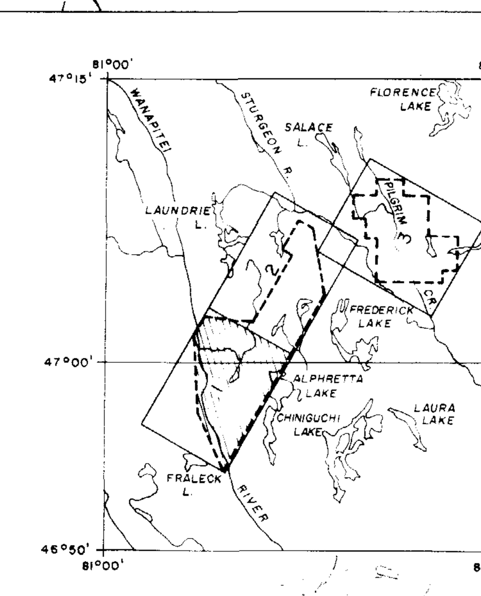
SCALE

1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 Inch to 1320 Feet

63.2277

Flown and Compiled by
LOCKWOOD SURVEY CORPORATION LIMITED
TORONTO, CANADA
1967



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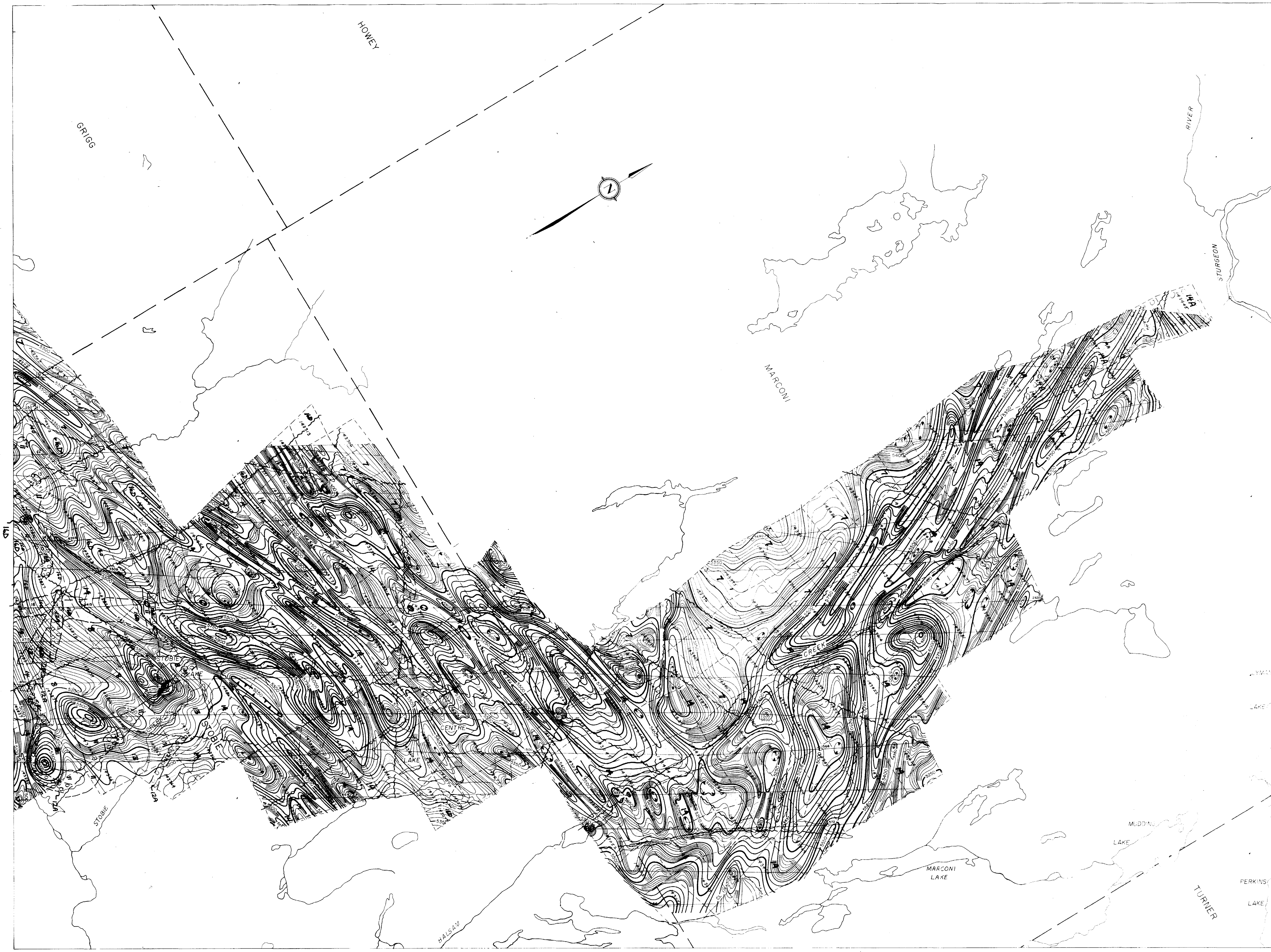
AIRBORNE GEOPHYSICAL SURVEY



CONTOUR INTERVAL .... 10 GAMMA
MEAN FLIGHT LINE SPACING .... 1320 FEET
MEAN TERRAIN CLEARANCE .... 200 FEET
250 GAMMA CONTOUR
50, 00 GAMMA CONTOUR
10 GAMMA CONTOUR
MAGNETIC LOW
FIDUCIAL POINTS
FLIGHT LINES

FRALECK-0012, #[redacted]
2

STOBIE TOWNSHIP AREA
MAGNETIC MAP

SCALE
1000 FEET 0 1000 2000 3000 4000 5000 FEET
1 Inch to 1320 Feet

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TORONTO, CANADA
1967

63.2277

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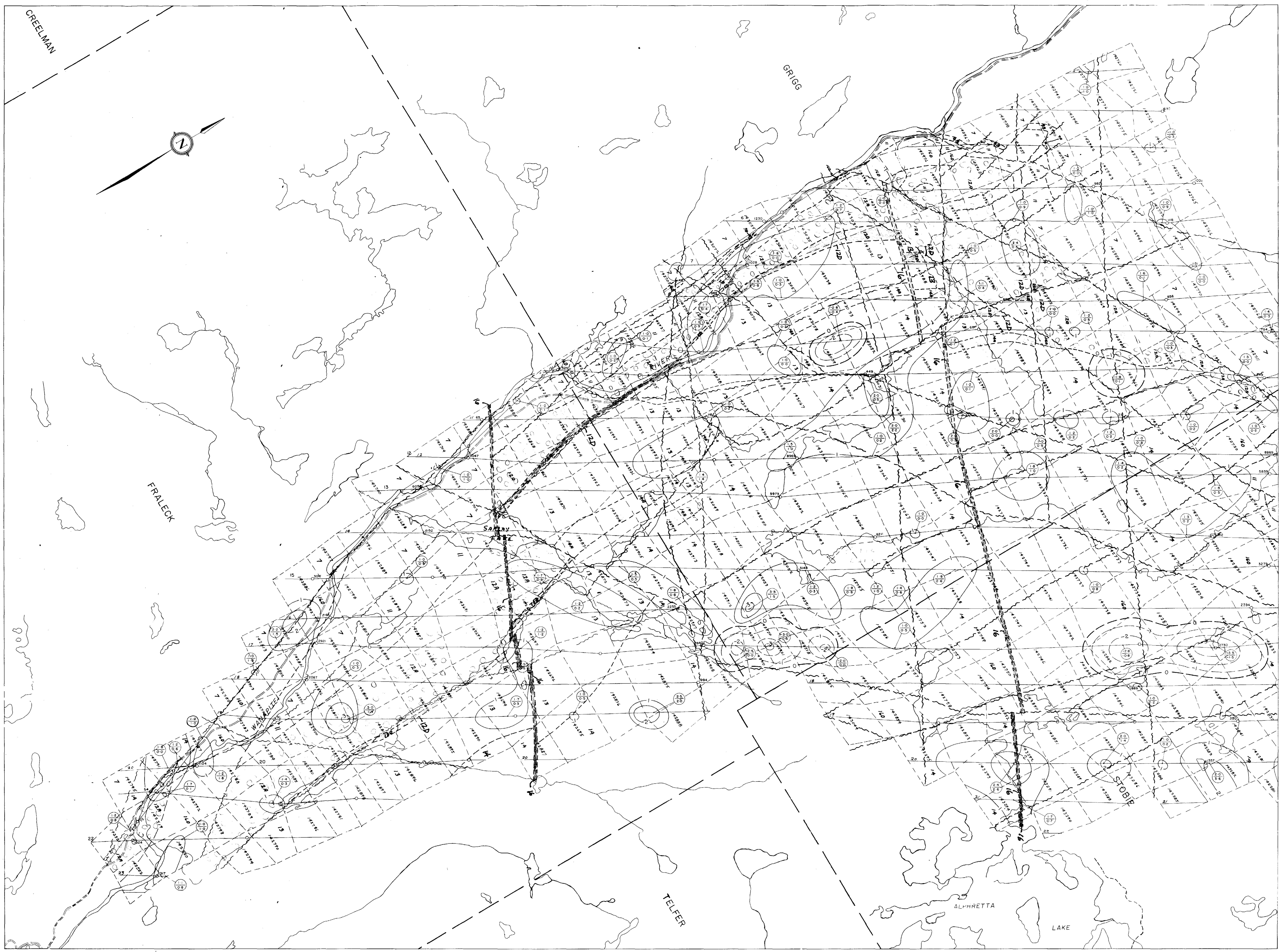
210

CANADIAN JOHNS MANVILLE COMPANY
AIRBORNE GEOPHYSICAL SURVEY



MEAN FLIGHT LINE SPACING — 1320 FEET
MEAN TERRAIN CLEARANCE — 200 FEET
ELECTROMAGNETIC CONTOURS 5, 10, 15 etc.
1, 2, 3, 4 etc.
NEGATIVE CONTOURS 0, −5, −10 etc.
−1, −2, −3, −4 etc.
FIDUCIAL POINTS — 3690
FLIGHT LINES

The contours represent amplitude of in phase response of the resultant field expressed in parts per million of the primary.
The figures (2·3 / 0·2) represent amplitude $\frac{\text{in phase component}}{\text{quadrature component}}$
The frequency of the primary current is 4000 cycles per second.

STOBIE TOWNSHIP AREA
ELECTROMAGNETIC MAP

SCALE
1000 0 1000 2000 3000 4000 5000
FEET FEET
1 Inch to 1320 Feet

Flown and Compiled by
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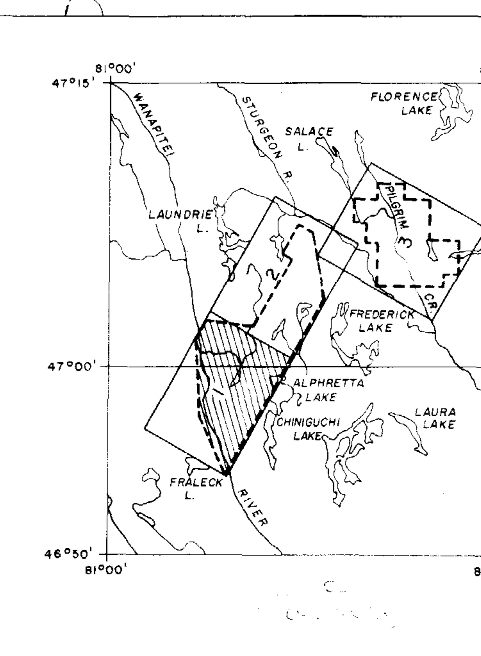
TORONTO, CANADA
1967



FRALECK-0012, #[redacted] 3

1
220

CANADIAN JOHNS MANVILLE COMPANY
AIRBORNE GEOPHYSICAL SURVEY

MEAN FLIGHT LINE SPACING .... 1320 FEET
MEAN TERRAIN CLEARANCE .... 200 FEET
ELECTROMAGNETIC CONTOURS 5, 10, 15 etc.
1, 2, 3, 4 etc.
NEGATIVE CONTOURS 0, -5, -10 etc.
-1, -2, -3, -4 etc.
FIDUCIAL POINTS 3690
FLIGHT LINES ....

The contours represent amplitude of in phase response of the resultant field expressed in parts per million of the primary.
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The frequency of the primary current is 4000 cycles per second.

STOBIE TOWNSHIP AREA
ELECTROMAGNETIC MAP

SCALE
1000 FEET 0 1000 2000 3000 4000 5000 FEET
1 Inch to 1320 Feet

Flown and Compiled by
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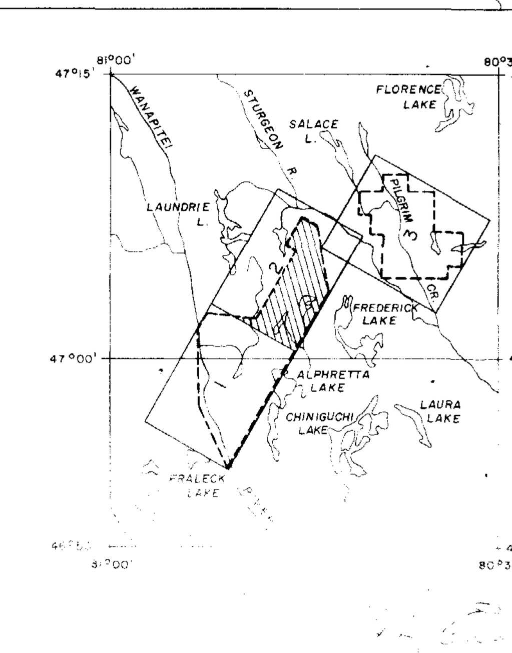
TORONTO, CANADA
1967



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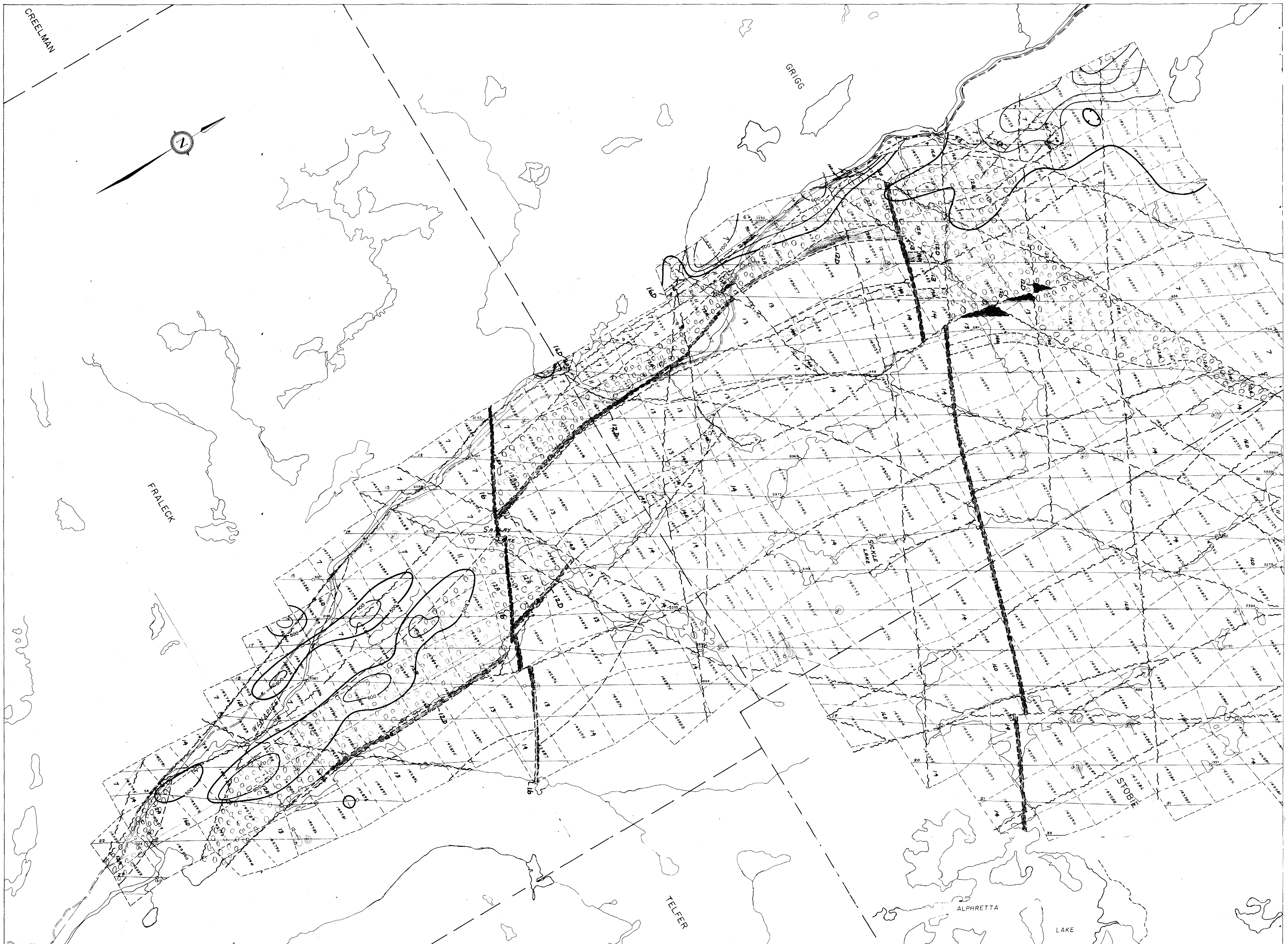
230

CANADIAN JOHNS MANVILLE COMPANY
AIRBORNE GEOPHYSICAL SURVEY



MEAN FLIGHT LINE SPACING .... 1320 FEET
MEAN TERRAIN CLEARANCE .... 200 FEET
RADIOMETRIC LOW
FIDUCIAL POINTS 3490
FLIGHT LINES

Total Radioactivity Contour Interval .... 100 C.P.S.
500 C.P.S. Contour
100 C.P.S. Contour
Partial Radioactivity Contour Interval
(Threshold Value 1.65 MeV) .... 1 C.P.S.
Partial Radioactivity Contour

STOBIE TOWNSHIP AREA
RADIOMETRIC MAP

SCALE
1000 FEET 0 1000 2000 3000 4000 5000 FEET
1 Inch to 1320 Feet

Flown and Compiled by
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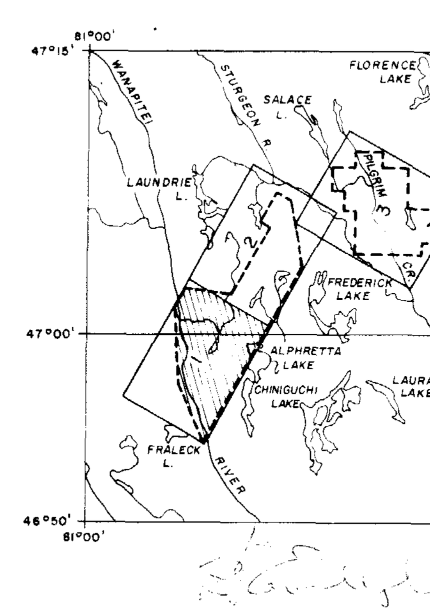
TORONTO, CANADA
1967



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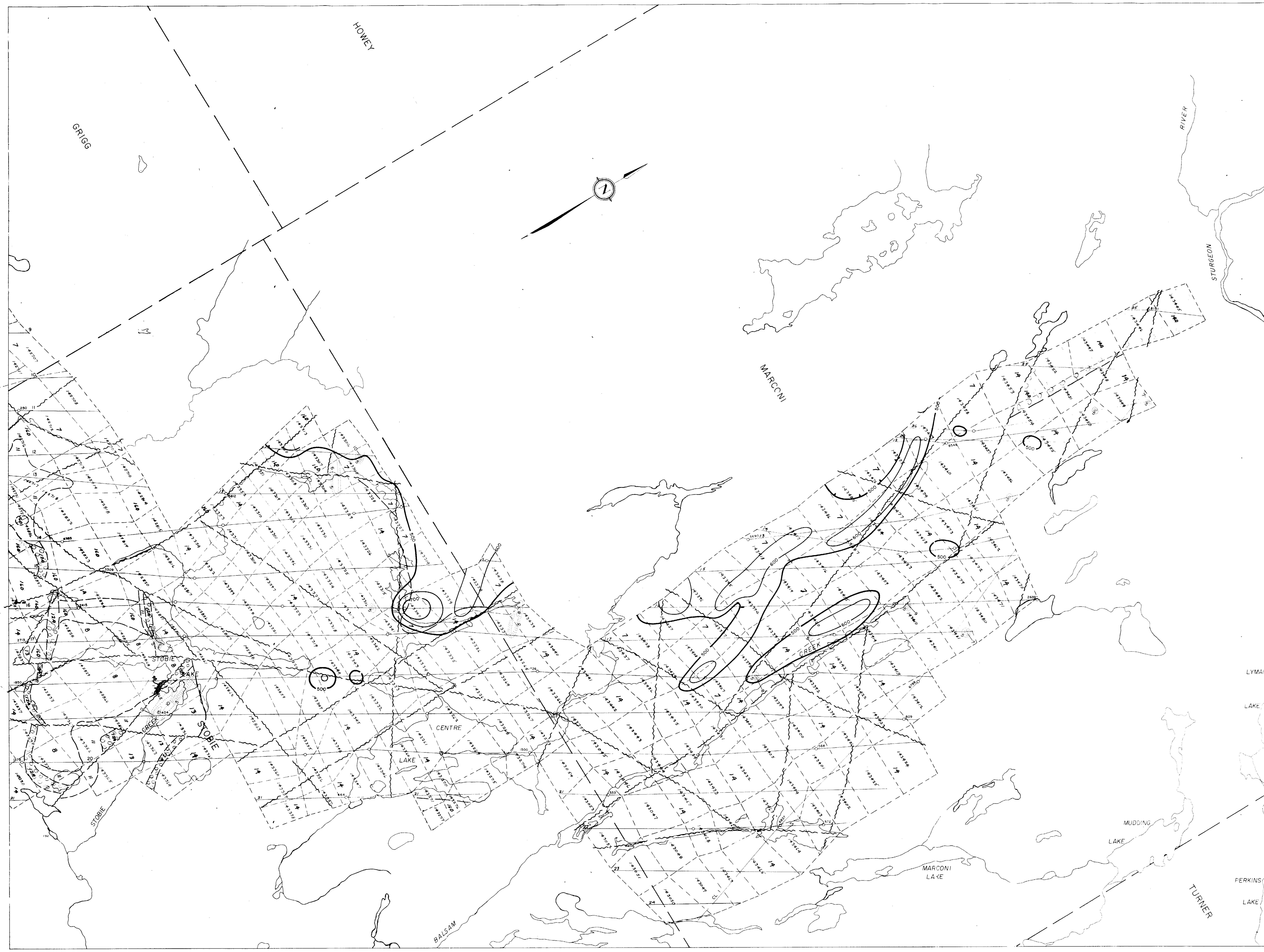
CANADIAN JOHNS MANVILLE COMPANY
AIRBORNE GEOPHYSICAL SURVEY



MEAN FLIGHT LINE SPACING............1320 FEET
MEAN TERRAIN CLEARANCE..............200 FEET
RADIOMETRIC LOW
FIDUCIAL POINTS..............3690
FLIGHT LINES

Total Radioactivity Contour Interval..........100 C.P.S.
500 C.P.S. Contour
100 C.P.S. Contour
Partial Radioactivity Contour Interval
(Threshold Value 1.65 MeV)..........1 C.P.S.
Partial Radioactivity Contour

STOBIE TOWNSHIP AREA
RADIOMETRIC MAP

SCALE

1000 0 1000 2000 3000 4000 5000
FEET FEET

1 Inch to 1320 Feet

63.2277

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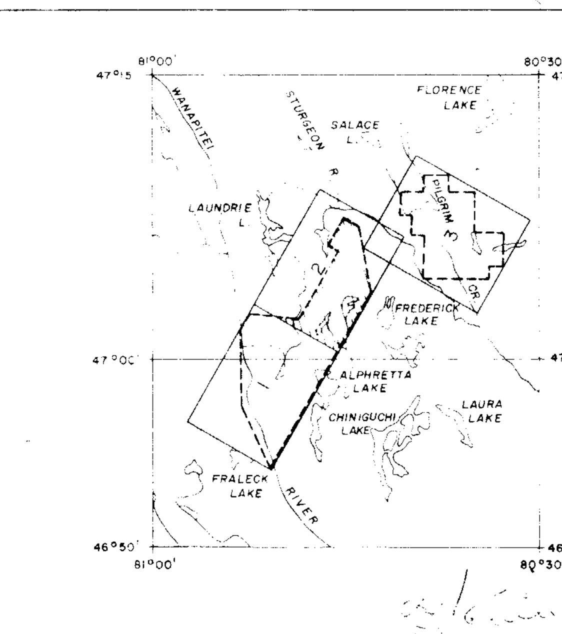
TORONTO, CANADA
1967



FRALECK-0012, #[redacted].
6

1
250


MARCONI
FRALECK-0012, #1
DISTRICT OF SUDBURY
Scale 40 Chains = 1 Inch
ONT. DEPT. OF MINES MINING LANDS BR. THIS MAP FOR CHECKING PURPOSES ONLY - MUST NOT BE SOLD.
JUL 22 1968
SELKIRK
Bowland River
Luman Lakes
TURNER
DEMORES
STOBIE TWP
TELFER
FRALECK - 0012, # 1
ONT. DEPT OF MINES MINING LANDS BR THIS MAP FOR CHECKING PURPOSES ONLY - MUST NOT BE SOLD
GRIGG
DISTRICT OF SUDBURY
HOWEY
Fraleck Lake
FRALECK TWP
Telfer Twp. M.1154
FRALECK 0012,#7
Parkin Twp. M.1049

LEGEND SHEET

GEOLOGICAL SYMBOLS

Strike and dip of bedding; vertical, inclined.

Strike and dip of foliation

Strike and dip of gneissosity

Strike and dip of jointing; vertical, inclined.

Outcrop (with number of litholigic unit)

Geologic contact; observed, assumed

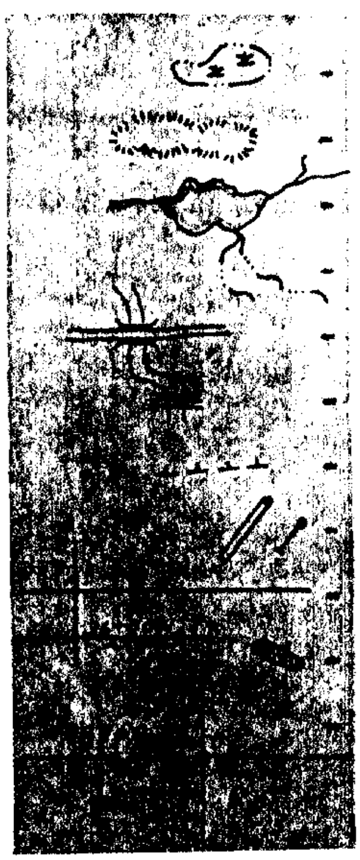
Fault, observed, assumed.

Anticline with plunge

Syncline with plunge

breccia.

GEOGRAPHIC SYMBOLS



Swamp or muskeg

Hill

Stream with pond or lake

Intermittent stream

River crossed by bridge and road

River with rapids or falls

Escarpment

Symbols for diamond drill holes

Cut lines

Trench

Claim Post, lines, and number.

41P02NE0017 0012 FRALECK

Legend Sheet - Wanapitei - Turner Areas

	16	Meta Gabbro or Olivine Gabbro
	16D	Nippissing Diabase
746	16E	Basic Intrusives
739	15	Lorraine Quartzite
	16F	Olivine Diabase
	14E	Gowganda Greywacke - Varved or Laminated
	14B	Gowganda Greywacke - Massive
745½	14A	Gowganda Conglomerate
745½	14C	Gowganda Quartzite
745½	14D	Gowganda Mud Stone Conglomerate
	13	Espanala Greywacke
741½	13A	Serpent Quartzite
	12D	Bruce Limestone
740	12A	Bruce Conglomerate
738	11	Mississagi Formation
737	9A	Basal Conglomerate
	9B	Radioactive Conglomerate
743	8	Migmatite
743	7	Basement Complex
739½	6	Meta Sediments
740	1F	Iron Formation
738½	2	Acid Volcanics Rhyolite
739	1	Andesite etc.