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REPORT ON

AIRBORNE GEOPHYSICAL SURVEY

IN THE

CROTCH LAKE AREA OF ONTARIO

FOR

AGNES AND JENNIE MINING CO.

BY

KENTING EARTH SCIENCES LIMITED, OTTAWA

PROJECT NO. 79097

OTTAWA, CANADA,
NOVEMBER 26TH, 1979.

D.M. DARBHA, M.Sc.,
GEOPHYSICIST.

Kenting

REPORT ON AIRBORNE GEOPHYSICAL SURVEY IN THE CROTCH LAKE AREA OF ONTARIO FOR AGNES AND JENNIE MINING CO.

1. INTRODUCTION

This report pertains to the combined airborne radiometric and magnetic survey carried out in the Crotch Lake area (also called Cross Lake) of Ontario for Agnes and Jennie Mining Co. The survey was conducted on November 6th, 1979 by Kenting Earth Sciences Limited geophysically equipped Britten-Norman Islander aircraft (registration C-FYZT) based at Ottawa.

A mean terrain clearance of 150 feet was maintained throughout the survey at an average aircraft speed of 110 miles per hour. Flight lines were spaced at 1/8 mile intervals and oriented N 20° W.

The geophysical data acquired totalled approximately 90 line miles.

The following Kenting personnel were associated with this project:

N. Fjell	-	Pilot
K. Hall	-	Electronic Operator
H. Davidson	-	Navigator
G. Weston	-	Data Compiler
D. Fitzsimmons	-	Data Chief
D.M. Darbha	-	Geophysicist

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2. INSTRUMENTATION

A multi-channel differential gamma ray spectrometer (KDSS) manufactured by Kenting Earth Sciences Limited was employed for this survey. A technical description of specifications of this unit is appended to this report. A sensor array of thallium activated sodium iodide crystals was used providing a detector volume of approximately 1,500 cubic inches. All detectors were held at constant temperature throughout the survey to minimize drifting in the gain of the photo multiplier tubes.

The airborne magnetometer was a model G-803 proton precession instrument manufactured by Geometrics of California.

A Honeywell radar altimeter provided terrain clearance measurements.

An AS-5 35mm. continuous strip camera recorded the flight path.

As an aid to navigation, the aircraft was fitted with a Sperry C-11 gyro stabilized compass and a Bendix doppler navigation system.

A six channel Brush 260 unit recorded four radiometric channels, the altimeter and magnetic data in analogue form. All of the above data were recorded digitally on magnetic tape by the KDSS.

The quantities measured, format and scales used on the six channel analogue recording are as follows, with the chart oriented such that fiducial numbers increase to the left:

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	Channel No.	Parameter	Scale
Top of Chart	6	Altimeter	0 - 1000 feet
	5	Magnetometer	0 - 1000 gammas
	4	Thorium (Tl-208) 2.42 - 2.82 Mev	0 - 200 counts/sec.
	3	Uranium (Bi-214) 1.66 - 1.86 Mev	0 - 200 counts/sec.
	2	Potassium (K-40) 1.36 - 1.56 Mev	0 - 400 counts/sec.
	1	Total Count 0.4 - 2.82 Mev	0 - 4000 counts/sec.

All quantities increase upwards. Any changes from the above format are indicated on the records.

Analogue recordings, digital recording and film are flagged with numbered fiducial marks every 10 seconds to facilitate correlation.

Digital sampling is at 1.0 second intervals.

3. PRESENTATION OF RESULTS

One plan map sheet at a scale of 1 inch to ¼-mile covers the survey area. An uncontrolled air photo mosaic provided the base for this map. The magnetic and radiometric results are each presented on separate map sheets using the same base.

The magnetic results have been manually levelled, computer processed and machine contoured using a 25 gamma contour interval where gradients permit.

The radiometric plan map is a combination of corrected total count contours and significant anomaly peak values. The anomaly peaks list the total count, potassium, uranium and thorium values beside each

...4

anomaly. As well, the uranium to thorium ratio is indicated by the degree to which the anomaly symbol is shaded in (see map legend). The total count contour interval is 200 counts per second and the contours are computer generated.

The radiometric results have been corrected for atmospheric background, terrain clearance and Compton scattering.

Atmospheric background readings were determined by flying over a large body of water at survey altitude before and after the survey flight. The following average backgrounds (in counts/second) were recorded and used in the computations:

Flight	Total Count	Potassium	Uranium	Thorium
1	No Survey			
2	271	28	17	6

All count rates were normalized to an altitude of 150 feet using the following formula:

$$N = N_o e^{-\mu H}$$

Where N is the observed count rate

N_o is the normalized count rate at 150 feet

μ is the attenuation coefficient

H is the elevation difference from 150 feet

The attenuation coefficients (μ) used are as listed below:

TOTAL COUNT - 2.0×10^{-3}

POTASSIUM - 2.3×10^{-3}

URANIUM - 1.7×10^{-3}

THORIUM - 1.7×10^{-3}

The Compton scattering coefficients were determined prior to the

...5

survey using the special pads set up for this purpose by the Geological Survey of Canada at the Ottawa International Airport. The following results were obtained:

$$\alpha = 0.48$$

$$\beta = 0.52$$

$$\gamma = 0.80$$

4. GEOLOGY

The geological circular no. 12 by Ontario Department of Mines, entitled "Geological notes for Maps Nos. 2053 and 2054 Madoc-Gananoque Area by D.F. Hewitt, 1964" was used as a reference in this report. The survey area lies in the north-east corner of the map 2053 (scale 1" = 2 miles). The Precambrian Plutonic rocks are predominant in the area, with Cross Lake gneiss on the west side in contact with the granitic gneiss, in the southern section. Marble and Lime Silicate rocks are reported in the central portions of the area along with the meta-volcanic rocks. Map 2053 also shows two lineaments (or faults) running approximately E-W in the area.

5. DISCUSSION OF RESULTS

The main magnetic picture of the area shows low magnetic gradients, indicative of weakly magnetic granite gneisses predominant in the area. On the west side of the area, the Cross Lake gneiss appears to be least magnetic of all lithological units. N-E magnetic trend dominates the area. A N-S trend in the central section appears to be associated with the formational boundary between two types of Precambrian Plutonic rocks. The most striking magnetic feature in the northern part of the area, striking E-W, indicates

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high intensity magnetic units. This linear magnetic feature can be interpreted to be due to intrusives. We can also observe the reported (Map 2053) lineament (such as a fault), in NW - SE direction, intersecting the above mentioned magnetic feature.

The total count radiometric map shows specific contour trends in NE to N direction conforming with the magnetic and geological (reported) trends. In the northern corner of the survey area the total count contour trends seem to be associated with the combined structural and lithological features.

All the high total count areas contain excellent contributions from Uranium sources. The survey was very successful in detecting a large number of top priority Uranium prospects within the area. All anomalies with high uranium count rates and/or high Uranium to Thorium ratios should be considered significant. The strongest airborne Uranium responses were observed in the marked Zones 1, 2 and 3. Zones 4 and 5 contain good uranium signatures, probably along the intrusive contact between Precambrian Plutonic and Metavolcanics. The highest total counts were recorded at the anomaly 18A, with excellent Uranium content. The high Uranium signatures (>80cps) noted in the area appear similar to those observed in the Bancroft Uranium district. The anomalous zones 1, 2 and 3 appear to correlate well with the magnetic features such as appreciable changes in the magnetic gradients, representative of formational contacts and fault zones.

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6. RECOMMENDATIONS AND CONCLUSIONS

Although many good uranium anomalies were detected by the airborne survey, these should be carefully analyzed to determine the significance of the prospects. A detailed ground follow up is recommended in the Zones 1 - 5 to assess and delineate the Uranium mineralisation. In areas of special interest, the magnetic data used in conjunction with the detailed geological knowledge should provide information on the important lithological and structural associations of Uranium mineralisation.

Respectfully submitted,

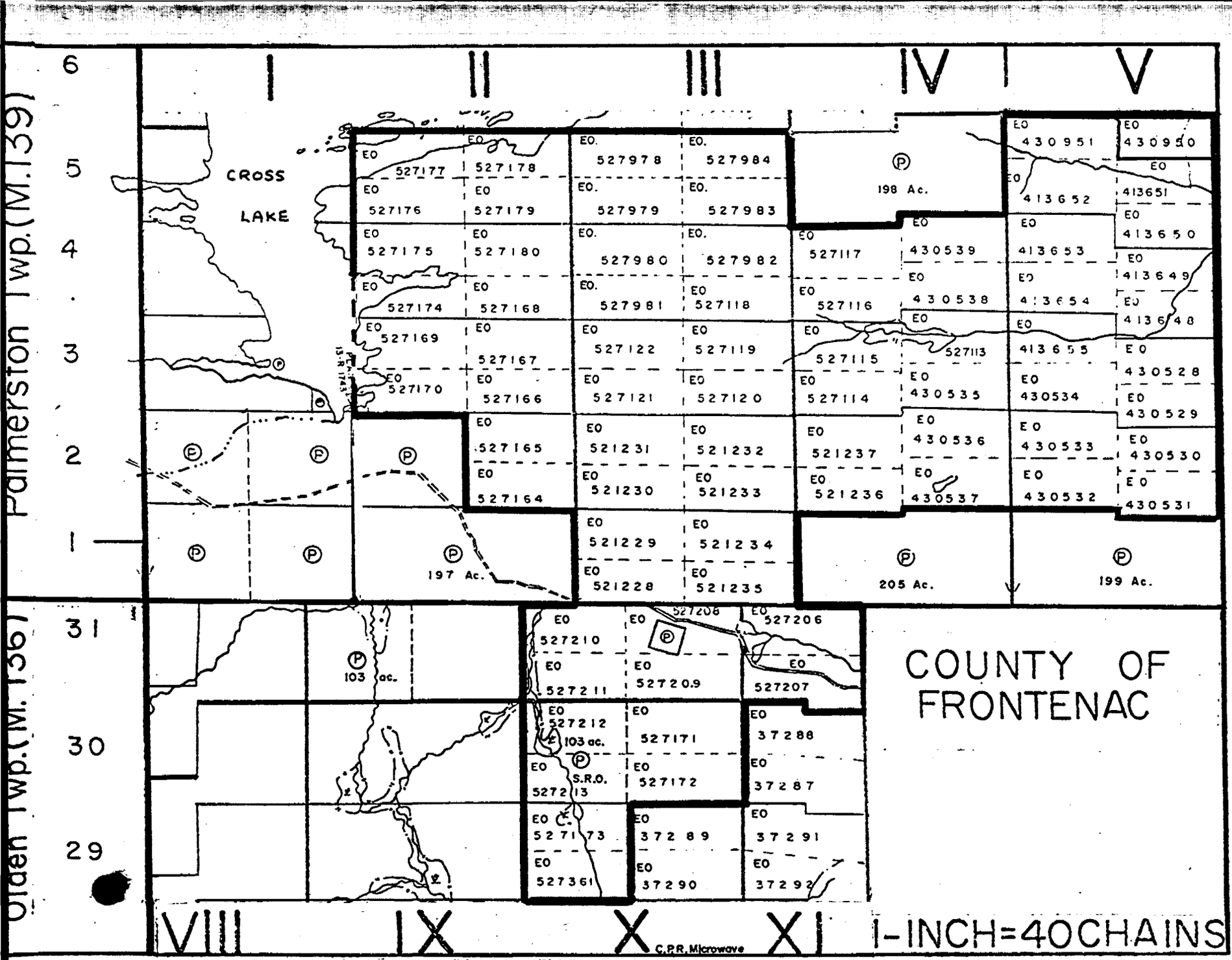
D.M. Darbha

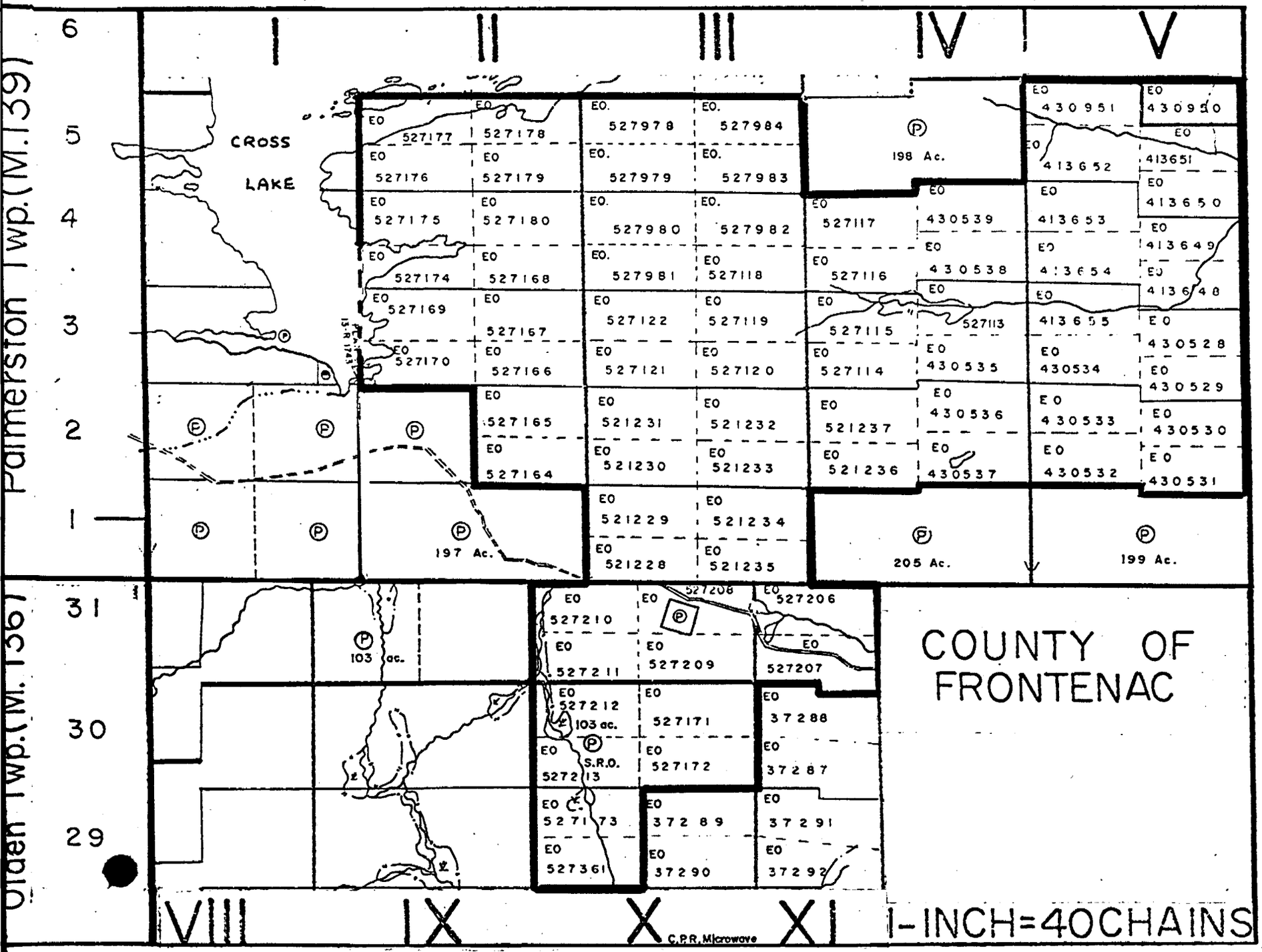
OTTAWA, Canada,
November 26, 1979.

D.M. Darbha, M.Sc.,
Geophysicist.

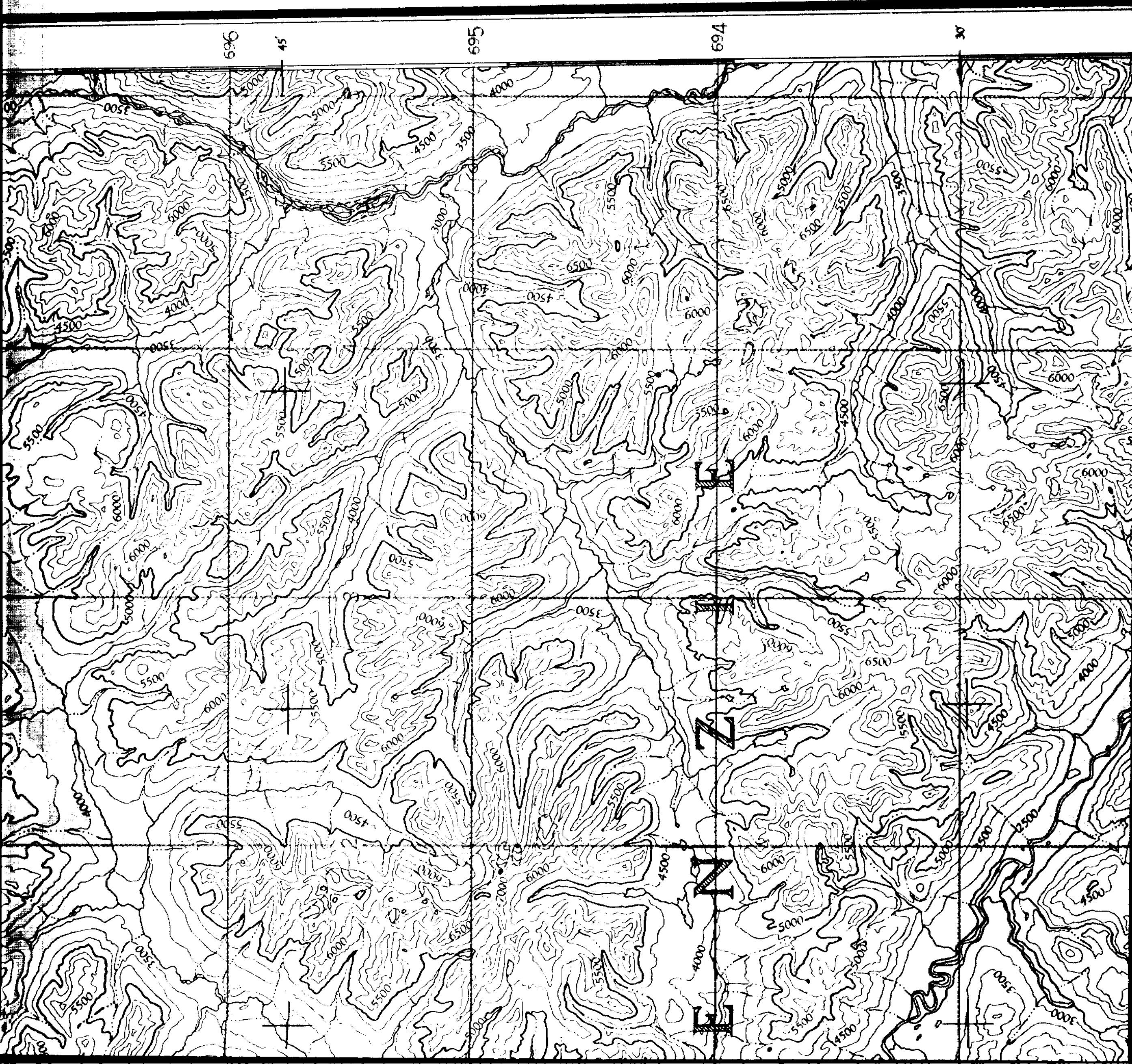
R.W. Stemp

R.W. STEMP, P.ENG.


Palmerston Twp.(M.139)
Olden Twp.(M.136)
I
II
III
IV
V
VIII
IX
X
XI
6
5
4
3
2
1
31
30
29
CROSS LAKE
198 Ac.
197 Ac.
205 Ac.
199 Ac.
103 ac.
103 ac.
S.R.O.
C.P.R. Microwave
COUNTY OF FRONTENAC
1-INCH=40CHAINS

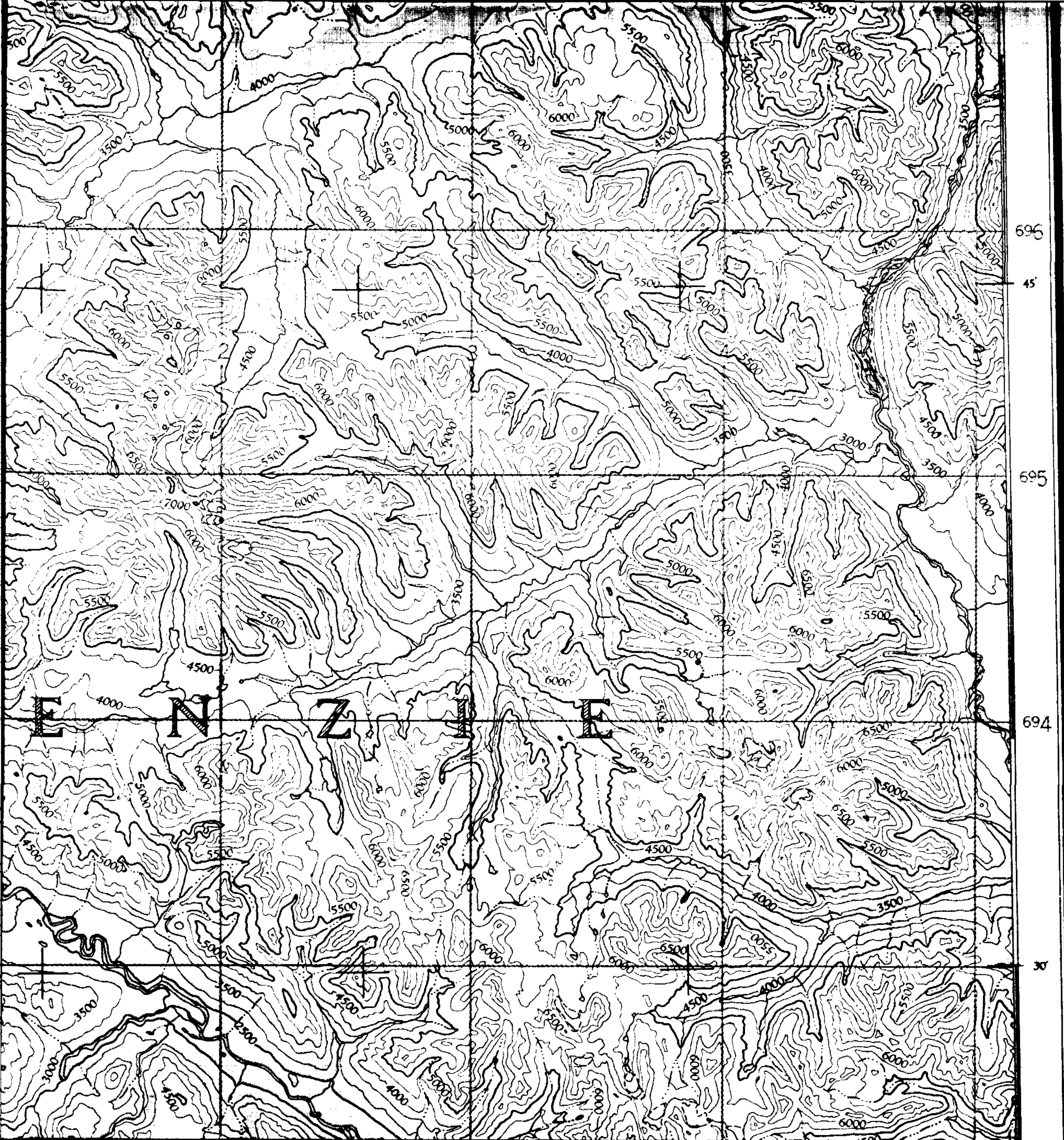

Palmerston Twp.(M.139)
Olden Twp.(M.136)
I
II
III
IV
V
VIII
IX
X
XI
6
5
4
3
2
1
31
30
29
CROSS
LAKE
198 Ac.
197 Ac.
205 Ac.
199 Ac.
103 ac.
103 ac.
S.R.O.
C.P.R. Microwave
COUNTY OF
FRONTENAC
1-INCH=40CHAINS


Property Location
Property Location
Scale 1:800,000



696
45'
695
694
30'


Property Location
Eganville
Renfrew
Arnprior
Almonte
Carleton Place
Perth
Smiths Falls
Merrickville
Kemptville
Lanark
Westport
Newboro
Athens
Gananoque
KINGSTON
Napanee
Tweed
BELLEVILLE
Picton
Bloomfield
Property Location
Scale 1:800,000


E N Z I E
696
45'
695
694
30'

Ontario

Ministry of Natural Resources

File

GEOPHYSICAL – G
TECHNICAL

900

TO BE ATTACHED AS A
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Airborne Radiometric & Aeromagnetic
Township or Area Palmerston - Olden Townships
Claim Holder(s) Clinton Kehoe Lic# A 42718
Douglas Riddell Lic# A 41819
Survey Company Kenting Earth Sciences Ltd, Ottawa
Author of Report D. M. Darbha
Address of Author 380 Hunt Club Rd, Ottawa K1G 3N3
Covering Dates of Survey Nov 6 - Nov 26 (linecutting to office)
Total Miles of Line Cut NONE

SPECIAL PROVISIONS CREDITS REQUESTED		DAYS per claim
ENTER 40 days (includes line cutting) for first survey.	Geophysical	
	–Electromagnetic	
	–Magnetometer	
	–Radiometric	
ENTER 20 days for each additional survey using same grid.	–Other	
	Geological	
	Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)
Magnetometer 20 Electromagnetic ____ Radiometric 20
(enter days per claim)

DATE: Dec 11/79 SIGNATURE: [signature] Eng.
Author of Report or Agent

I.D.
Res. Geol. ____ Qualifications New - on this file

Previous Surveys

File No.	Type	Date	Claim Holder

OFFICE USE ONLY

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
EO	527113
EO	527114
EO	527115
EO	527116
EO	527117
EO	527118
EO	527119
EO	527120
EO	527121
EO	527174
EO	527175
EO	527176
EO	527177
EO	527178
EO	527179
EO	527180
EO	527206
EO	527207
EO	527208
EO	527209
EO	527210

(continued)

TOTAL CLAIMS 21 + 31 = 52

If space insufficient, attach list

837 (5/79)

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS -- If more than one survey, specify data for each type of survey

Number of Stations _____ Number of Readings _____

Station interval _____ Line spacing _____

Profile scale _____

Contour interval _____

MAGNETIC

Instrument _____

Accuracy – Scale constant _____

Diurnal correction method _____

Base Station check-in interval (hours) _____

Base Station location and value _____

_____

ELECTROMAGNETIC

Instrument _____

Coil configuration _____

Coil separation _____

Accuracy _____

Method: ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line

Frequency _____
(specify V.L.F. station)

Parameters measured _____

GRAVITY

Instrument _____

Scale constant _____

Corrections made _____

_____

Base station value and location _____

_____

Elevation accuracy _____

INDUCED POLARIZATION
RESISTIVITY

Instrument _____

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time _____ Frequency _____

– Off time _____ Range _____

– Delay time _____

– Integration time _____

Power _____

Electrode array _____

Electrode spacing _____

Type of electrode _____

MINING CLAIM LIST (CONTINUED)

Prefix	Number
EO	527211
EO	527212
EO	527213
EO	527978
EO	527979
EO	527980
EO	527981
EO	527982
EO	527983
EO	527984
EO	527164
EO	527165
EO	527166
EO	527167
EO	527168
EO	527169
EO	527170
EO	527171
EO	527172
EO	527173

Prefix	Number
EO	521228
EO	521229
EO	521230
EO	521231
EO	521232
EO	521233
EO	521234
EO	521235
EO	521236
EO	521237
EO	527361

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) Airborne Radiometric Aeromagnetic

Instrument(s) Kenting's Gamma Ray Spectrometer Geometrics G-803 Proton Mag.
(specify for each type of survey)

Accuracy Detector Resolution: < 9.5% System: > 12% 0.1 gamma
(specify for each type of survey)

Aircraft used Britten-Norman Islander (registration # C-FYZT)

Sensor altitude 150 - 200'

Navigation and flight path recovery method AS-5 continuous strip camera

Sperry C-11 gyro compass Bendix doppler nav. system

Aircraft altitude 150 - 200' Line Spacing 1/8 Mile

Miles flown over total area 90 Over claims only ≈ 52 miles

52 miles x 20 = 1040 ÷ 52 = 40 days

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken_____

Total Number of Samples_____

Type of Sample_____
(Nature of Material)

Average Sample Weight_____

Method of Collection_____

Soil Horizon Sampled_____

Horizon Development_____

Sample Depth_____

Terrain_____

Drainage Development_____

Estimated Range of Overburden Thickness_____

SAMPLE PREPARATION
(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis_____

General_____

ANALYTICAL METHODS

Values expressed in: per cent ☐
p. p. m. ☐
p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others_____

Field Analysis (_____ tests)

Extraction Method_____

Analytical Method_____

Reagents Used_____

Field Laboratory Analysis

No. (_____ tests)

Extraction Method_____

Analytical Method_____

Reagents Used_____

Commercial Laboratory (_____ tests)

Name of Laboratory_____

Extraction Method_____

Analytical Method_____

Reagents Used_____

General_____

Clarendon Twp. (M.77)

Palmerston Twp. (M.139)

Kennebec Twp. (M.109)

Oso Twp. (M.138)

Hinchinbrooke Twp. (M.104)

Bedford Twp. (M.52)

THE TOWNSHIP OF OLDEN

2.3172

COUNTY OF FRONTENAC

EASTERN ONTARIO MINING DIVISION

SCALE: 1-INCH=40CHAINS

LEGEND

PATENTED LAND	P
CROWN LAND SALE	C.S.
LEASE	L
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	MR.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KINGS HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
CANCELLED	C.
TRAILS	
PATENTED for S.R.O.	

NOTES

This Map Is Not To Be Used FOR SURVEY PURPOSES

Lot And Concession Lines Shown Hereon 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 Records In the Ministry of Natural Resources

400' surface rights reservation along the shores of all lakes and rivers

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

RESERVES

(R1) Crown Reserve File 36526

(R2) withdrawn from staking " 71206

Areas withdrawn from staking under Section 43 of the Mining Act, [illegible]

	File	Date	Disposition
(R3)	29377		S.R.O.
(R4)	76853		S.R.O.
(R5)	15424		S.R.&M.R.
(R6)	W.27.76	71206 & 2	28/5/76 S.R.&M.R.

DATE OF ISSUE DEC 20 1979 SURVEYS AND MAPPING BRANCH

PLAN NO.-M.136

ONTARIO MINISTRY OF NATURAL RESOURCES SURVEYS AND MAPPING BRANCH

31C15NW0008 2.3172 PALMERSTON

200

2.3172

THE TOWNSHIP OF PALMERSTON

COUNTY OF FRONTENAC

EASTERN ONTARIO MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

South Canonto Twp. (M.68)

Lavant Twp.(M. 112)

Clarendon Twp.(M.77)

Sherbrooke Twp.

Olden Twp.(M. 136)

Oso Twp (M.138)

LEGEND

PATENTED LAND	P
CROWN LAND SALE	C. S.
LEASES	L
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.
PATENTED S.R.O.	

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400' surface rights reservation along the shores of 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.

Flooding Rights to 1105 elevation of Cross Lake File 126113

RESERVES

(R) S.R.O. Reserved for public use. File 51910

(R) M.N.R. Reserve

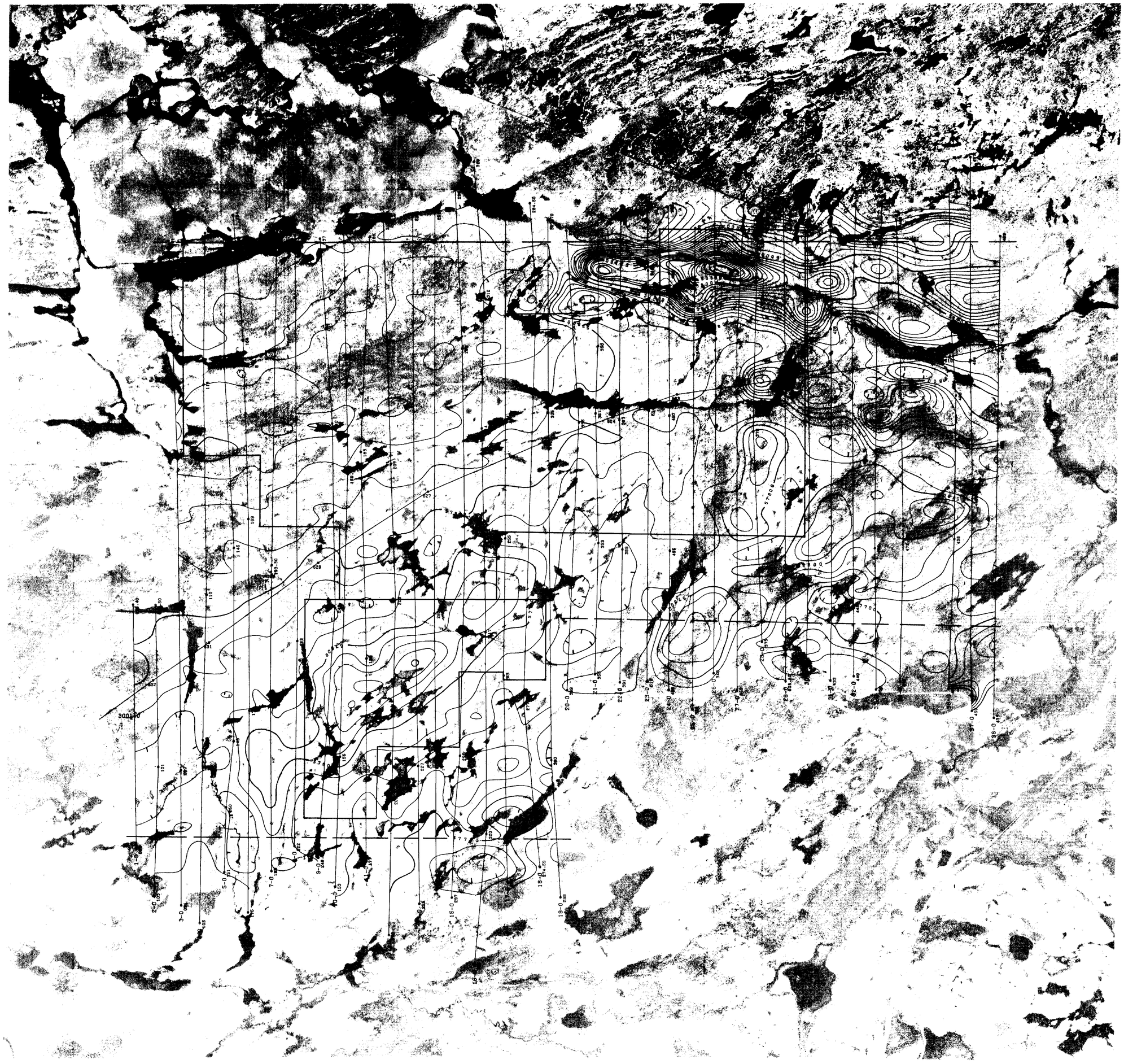
(R) S.R.O. Reserved sect 39(d) of Mining Act (R.S.O. '60)

DATE OF ISSUE
DEC 20 1979
SURVEYS AND MAPPING BRANCH

PLAN NO.- M.139

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

210



(APPROX.)

HORIZONTAL CONTROL . . . . . BASED ON PHOTO LAYDOWN

LEGEND

25 GAMMA CONTOUR . . . . . .

100 GAMMA CONTOUR . . . . . .

500 GAMMA CONTOUR . . . . . .

MAGNETIC LOW . . . . . .

CONTOUR INTERVAL . . . . . 25 GAMMA
MEAN TERRAIN CLEARANCE . . . 150-200 FEET
TRAVERSE INTERVAL . . . . . 660 FEET

AIRBORNE MAGNETOMETER SURVEY

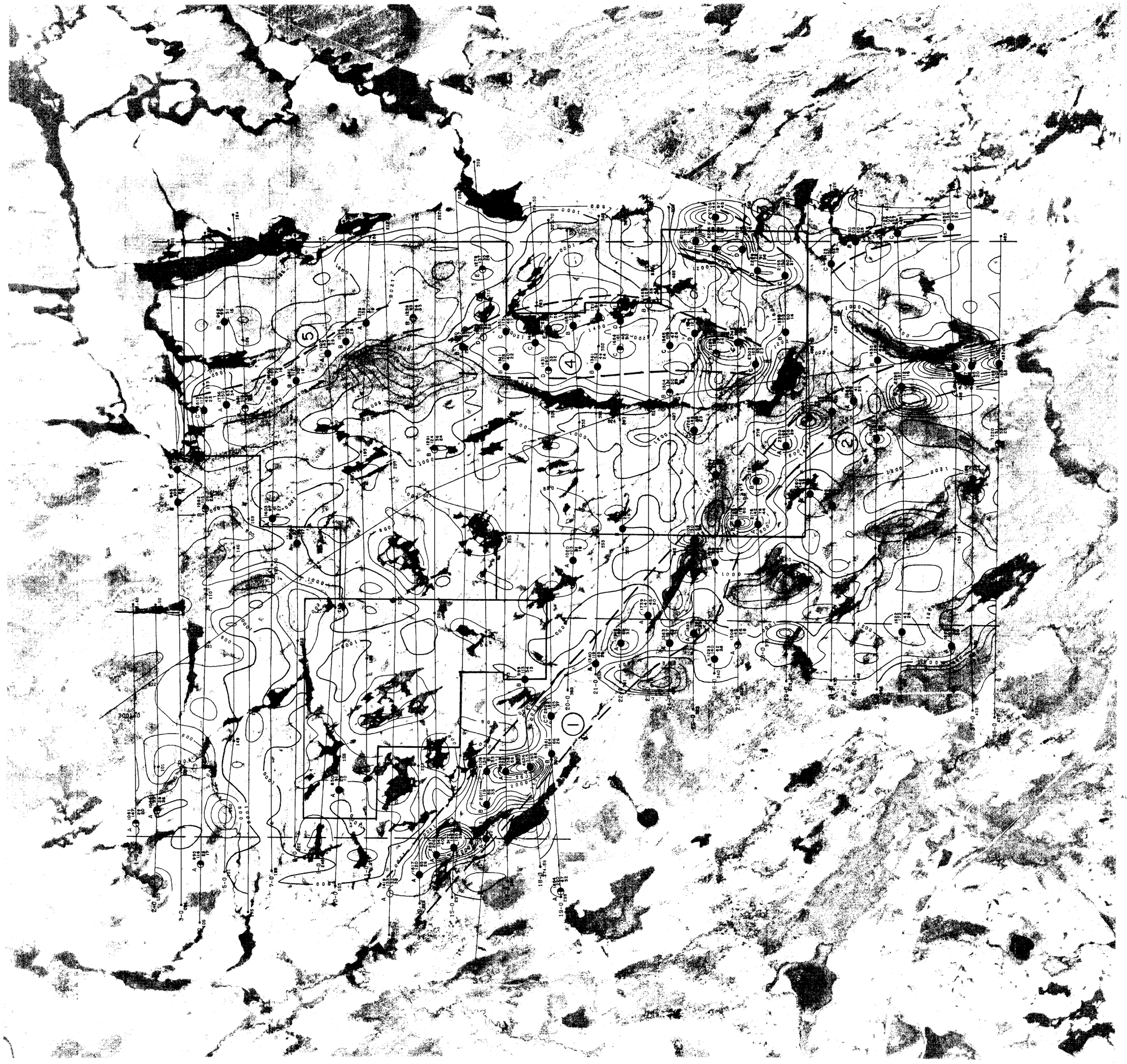
CROTCH LAKE AREA

ONTARIO

AGNES and JENNIE MINING CO.

SCALE 1" = 1320'

KENTING EARTH SCIENCES LIMITED, OTTAWA



(APPROX.)
HORIZONTAL CONTROL . . . . . BASED ON PHOTO LAYDOWN

LEGEND

VALUES CORRECTED FOR
ATMOSPHERIC BACKGROUND
ALTITUDE NORMALIZED TO 150 FEET
TERRAIN CLEARANCE
COMPTON EFFECT

	$\frac{U}{Th}$ RATIO
A TC K D Th	>1.5
A	1.0 — 1.5
A	<1.0

TOTAL COUNT CONTOUR INTERVAL 200 C.P.S.

MEAN TERRAIN CLEARANCE . . . . 150-200 FEET
TRAVERSE INTERVAL . . . . . 660 FEET

(TOTAL COUNT CONTOUR)
AIRBORNE RADIOMETRIC SURVEY

CROTCH LAKE AREA

ONTARIO

AGNES and JENNIE MINING CO.

SCALE 1" = 1320'

KENTING EARTH SCIENCES LIMITED, OTTAWA