REPORT ON

AIRBORNE GEOPHYSICAL SURVEY

IN THE

MONMOUTH TOWNSHIP AREA OF ONTARIO

FOR

WESTERN MINES LTD.

BY

KENTING EARTH SCIENCES LIMITED, OTTAWA

PROJECT NO. 79076

OTTAWA, CANADA,
OCTOBER 5, 1979.

R.W. STEMP, P.ENG.,
GEOPHYSICIST.

KENTING

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1. INTRODUCTION

This report pertains to the combined airborne radiometric, magnetic and VLF-EM survey carried out in the Monmouth Township area of Ontario for Western Mines Limited. The survey was conducted on July 27th, 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 255 line miles.

The following Kenting personnel were associated with this project:

N. Fjell	-	Pilot
J. Hurda	-	Electronic Operator
A. Makris	-	Aircraft Engineer
G. Weston	-	Data Compiler
D. Fitzsimmons	-	Data Chief
R.W. Stemp	-	Geophysicist

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.

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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.

The VLF-EM system employed was the McPhar KEM model. It was tuned to the transmitter station at Jim Creek, Washington, A description of the system is appended to this report.

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. The VLF-EM data was recorded on a separate ten inch Gould 110 analogue recorder. 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.

The ten inch Gould 110 chart is oriented with the fiducials on the bottom and increasing to the left. The bottom trace is the VLF-EM field strength and the top trace is the dip angle of the total field. One major division on the chart paper represents a dip angle of ten degrees. Field strength increases upwards.

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, radiometric and VLF-EM results are each presented on separate map sheets using the same base.

The magnetic results have been manually levelled, computer processed

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and machine contoured using a 25 gamma contour interval where gradients permit.

On the EM map, the position of each VLF-EM anomaly is represented by an "X" symbol with the peak-to-peak amplitude of the dip angle listed in degrees beside each anomaly. Anomalies are listed alphabetically from south to north along each line. Conductor axes (interpreted) are indicated by heavy dashed lines.

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 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 backgrounds (in counts/second) were recorded and used in the computations:

Flight	Total Count	Potassium	Uranium	Thorium
1	457	37	21	20

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

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

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

$$\alpha = 0.48$$

$$\beta = 0.52$$

$$\gamma = 0.80$$

4. GEOLOGY

The following preliminary geological maps published by the Ontario Ministry of Natural Resources are used as references in this report:

(1) Map P.59 - Glamorgan Township

(2) Map P.60 - Monmouth Township

- both at scale 1 inch to ½ mile.

The survey block lies in the Bancroft uranium district and numerous uranium prospects are reported within the area.

5. DISCUSSION OF RESULTS

Magnetic trends and patterns are quite variable with a northeast strike direction most dominant. The mafic intrusive rocks mapped in the area show up as high intensity magnetic units on the map sheet. These contrast with the weakly magnetic granitic intrusives and metasediments.

The VLF-EM results were quite active. This is not unusual as the system responds to a wide variety of resistivity contrasts. This includes surficial conductivity, massive sulphides and graphitic bedrock conductors, fault and shear zones, geological contacts, etc. The method does not discriminate between conductor sources with any reliability and thus the results should be analyzed in conjunction with other geophysical and geological data.

In the survey block, a number of the conductors are associated with roads and appear to be man-made features, probably power lines.

The radimetric portion of 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 obtained from anomalies 40A, 40B, 44C, 49A, 50A, 50B, 51A and 55A.

Anomaly 43B gave the highest total count reading but this is primarily due to a high thorium content. In fact, thorium values are generally higher in the northern part of the survey block.

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6. RECOMMENDATIONS AND CONCLUSIONS

Although many uranium anomalies were detected by the airborne survey, it is assumed that the majority of these have already been investigated in the past. Thus the anomalies should be carefully analyzed to determine if any new prospects have been uncovered.

In areas of special interest, the magnetic and VLF-EM data should be used to provide additional detailed lithological and structural information.

Respectfully submitted,

R.W. Stemp

OTTAWA, Canada,
October 5, 1979.

R.W. Stemp, P.Eng.,
Geophysicist.

Ontario

Ministry of Natural R...

File

G

900

TO ... TECHNICAL REPORT

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

Type of Survey(s) Airborne; Radimetric, Electromagnetic, Magnetic

Township or Area Monmouth

Claim Holder(s) T.R.Gledhill (E.23645)
21 Sandalwood Place, Don Mills

Survey Company Kenting Earth Sciences Limited

Author of Report R.W.Stemp

Address of Author 380 Hunt Club Rd., Ottawa, Ont.

Covering Dates of Survey July 27,1979
(linecutting to office)

Total Miles of Line Cut 255

SPECIAL PROVISIONS CREDITS REQUESTED

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

ENTER 20 days for each additional survey using same grid.

DAYS per claim

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

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

Magnetometer 20 Electromagnetic 20 Radiometric 20
(enter days per claim)

DATE: Oct. 25,1979 SIGNATURE: [signature]
Author of Report or Agent

L.D.

Res. Geol. _____ Qualifications 63.1989

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
EO 520655	
EO 520656	EO 504229
EO 520657	EO 500717
EO 520658	
EO 520659	EO 500718
EO 520660	
EO 520661	EO 500719
EO 520662	
EO 520663	EO 500720
EO 520664	
EO 520665	EO 500721
EO 520666	
EO 520667	EO 500722
EO 520668	
EO 520669	EO 500723
EO 520670	
EO 520671	EO 495485
EO 520672	
EO 520673	EO 495486
EO 520674	
EO 520675	EO 495487
EO 520676	
EO 520677	EO 495488
EO 520678	
EO 520679	EO 495489
EO 520680	
EO 520681	EO 495490
EO 520682	
EO 520683	EO 495491
EO 520684	
EO 520685	
EO 520686	
EO 504005	
EO 504006	
EO 504007	
EO 504008	
EO 504009	
EO 504010	
EO 504011	
EO 504012	
EO 504013	

If space insufficient, attach list

TOTAL CLAIMS 56

OFFICE USE ONLY

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 _____

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) RADIOMETRIC , MAGNETIC, ELECTROMAGNETIC

Instrument(s) KDSS G-803 KEM

(specify for each type of survey)

Accuracy 1 %

(specify for each type of survey)

Aircraft used BRITTEN-Norman Islander Aircraft (C-FYZT)

Sensor altitude 150 feet

Navigation and flight path recovery method Navigation by visual means aided with a Sperry C-11 gyro stabilized compass and a Bendix doppler system. Flight pat recovery by AS-5 35mm strip film with air photo mosaics.

Aircraft altitude 150 feet Line Spacing 1/8 mile

Miles flown over total area 255 Over claims only 28

28 x 40 = 1120 ÷ 56 = 20

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 _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

2.3081

THE TOWNSHIP OF MONMOUTH

PROVISIONAL COUNTY OF HALIBURTON

EASTERN ONTARIO MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

Dudley Twp. M.84

Glamorgan Twp. M.95

Cardiff Twp. M.69

Anstruther Twp. M.45

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	
KINGS HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	

NOTES

This Map Is Not To Be Used —FOR SURVEY PURPOSES—

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

Original shoreline shown thus:

F.R.I. shoreline shown thus:

Patents Map shoreline shown thus:

For status of summer resort locations shown thus

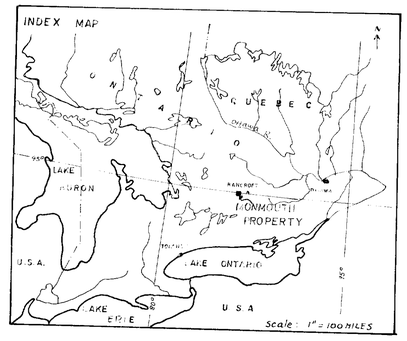
Please contact Ministry of Natural Resources.

GRAVEL AND SAND

(S) QUARRY PERMIT

PLAN NO.-M.164

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH



(APPROX.)

HORIZONTAL CONTROL BASED ON PHOTO LAYDOWN

MEAN TERRAIN CLEARANCE 150 FEET

TRAVERSE INTERVAL 660 FEET

AIRBORNE ELECTROMAGNETIC SURVEY

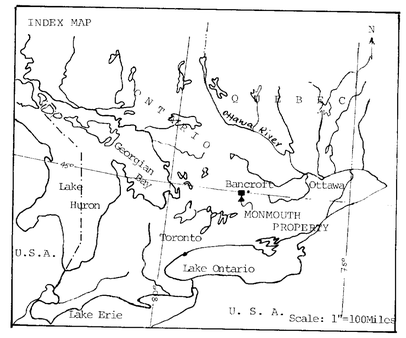
MONMOUTH TOWNSHIP AREA

ONTARIO

WESTERN MINES LIMITED

SCALE 1" = 220' (APPROX.)

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

TOTAL COUNT CONTOUR INTERVAL 200 C.P.S.

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

(TOTAL COUNT CONTOUR)

AIRBORNE RADIOMETRIC SURVEY

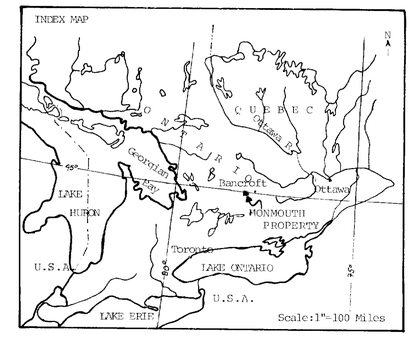
MONMOUTH TOWNSHIP AREA

ONTARIO

WESTERN MINES LIMITED

SCALE 1"=1320'(APPROX.)

KENTING EARTH SCIENCES LIMITED, OTTAWA



(APPENDIX)
HORIZONTAL CONTROL BASED ON PHOTO TAYDOWN

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

MONMOUTH TOWNSHIP AREA

ONTARIO

WESTERN MINES LIMITED

SCALE 1"=1320'(APPROX.)

KENTING EARTH SCIENCES LIMITED, OTTAWA