

GM 42824

1984 REPORT OF ACTIVITIES REPORT #941-85-01, EASTERN TOWNSHIPS PROJECT

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Énergie et Ressources
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Québec 

EASTERN TOWNSHIPS PROJECT, QUEBEC

1984 REPORT OF ACTIVITIES

REPORT #941-85-01



Ministère de l'Énergie et des Ressources

Service de la Géoinformation

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June, 1985

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1.0 INTRODUCTION

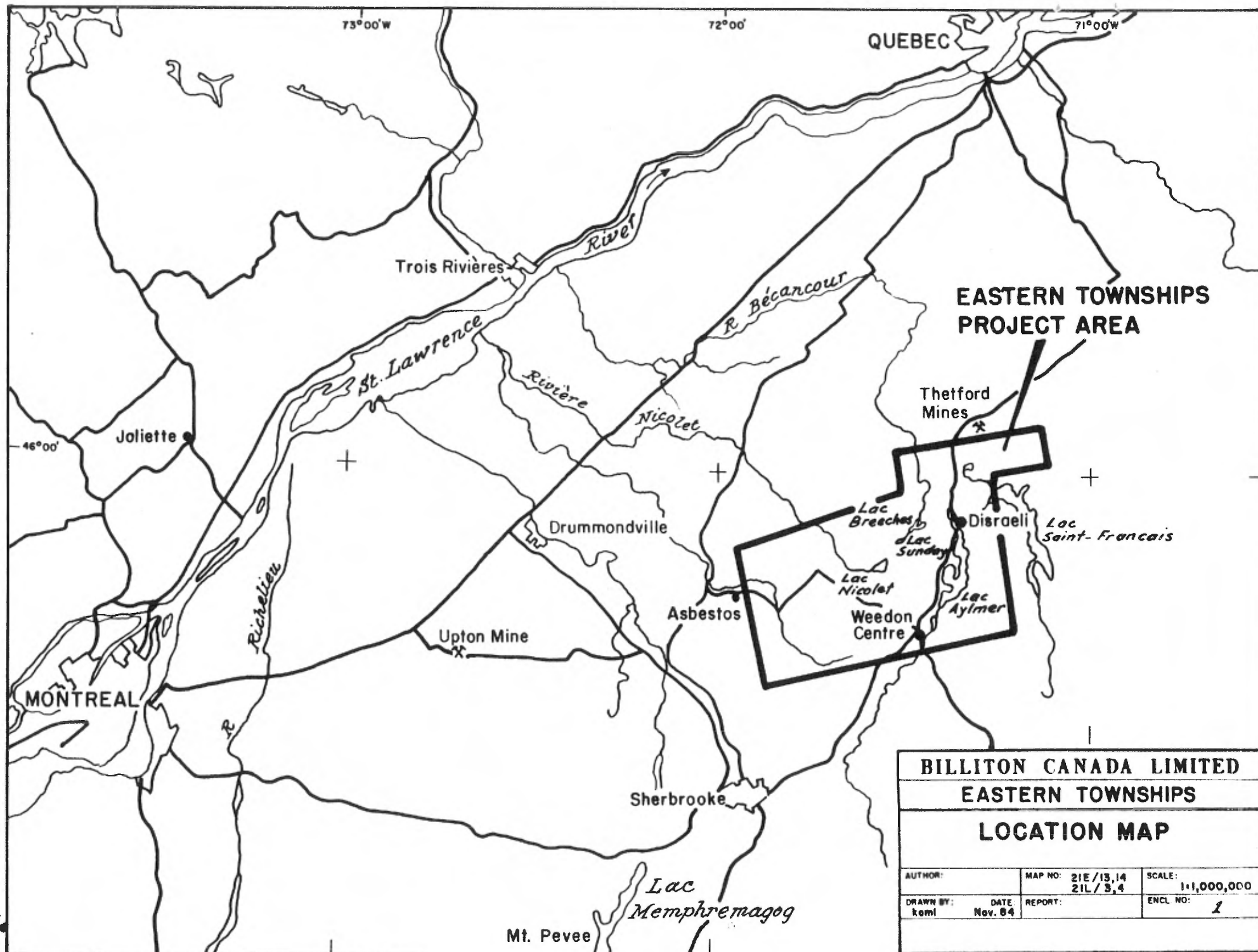
1.1 Summary

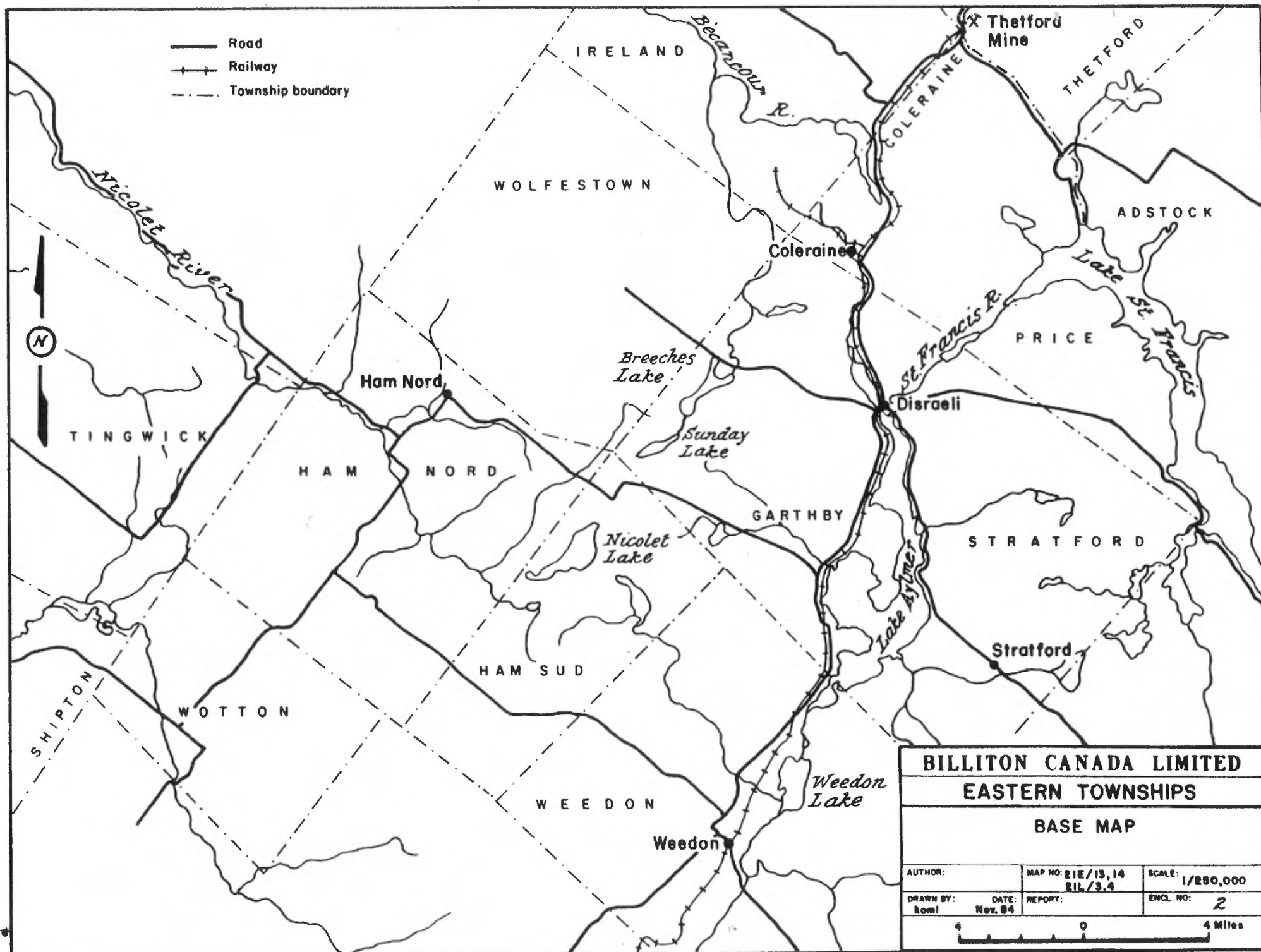
This report details the work undertaken in 1984 as follow up to the 1983 AEM survey conducted by DIGHEM over 1700 line kilometers in the Thetford Mines Ophiolitic Complex in the Disraeli-Coleraine area of the Eastern Townships.

Nine grids were established covering 33 diverse AEM conductor systems. Detailed geological mapping and geophysical surveying (Magnetics/Max-Min II) were carried out resulting in a recommendation for eleven first priority drill targets for the 1985 programme. Reconnaissance stream sediment geochemistry was used to test for Au and soil grid geochemistry for Cu, Zn and Ni in three areas.

1.2 Location, Access & Infrastructure (Map 1, 2)

The project area lies between Thetford and Asbestos, northeast of Sherbrooke in the Eastern Townships of Quebec. It covers an area approximately 60 x 16 km trending northeast and is well serviced by both paved and gravel roads, rail and power. Ocean going vessels can be accessed at Montreal and Quebec City (200 km west and 150 km north). Skilled mining labour is readily available and smelters exist at East Montreal (Noranda - Cu) and Valleyfield (Noranda - Zn) 250 km west.





1.3 Land Holdings/Mining Rights (Map 3)

Bill C 59 provided for the expropriation of the mineral rights, held by individuals through land grants and vesting of those rights with the Crown. They were then made available to companies and individuals on an application basis for special exploration permits covering individual lots. BCL applied for and received title to 399 S.E.P.'s covering 18522 hectares. Rental fees are \$1.20 per ha. for the first two years and \$1.20 per ha. for each subsequent two year period. In addition assessment work to the value of \$15.00 per ha. is due after the first two years and \$35.00 per ha. for the next two years. A 5% net profits interest is payable, to the former mineral rights holder or to the Quebec government in the absence of the holder, on production.

Where land is required for a mine the surface rights may be expropriated, at a fair market price, under the Mining Act.

Surface and passage rights for exploration are not covered by the Act. However, BCL has successfully negotiated such rights with the various land holders, generally for a three year period.

1.4 Geological Model

Research into the controls on mineralization in typical ophiolitic assemblages (Cyprus, Oman, Newfoundland) shows that all economic deposits occur in the extrusive volcanic phase at various horizons between the base and the top. While mineralization is known in the sheeted dike complex and in the underlying gabbroic rocks such mineralization is generally of limited extent and probably represents the feeder systems for the extrusive volcanic associated deposits. The location of the mineralization in the extrusive pile appears to be controlled by structural features such as faulting or depressions in the lava surface caused by channel collapse i.e. a mechanism to restrain the hydrothermal fluids from spreading widely and mixing freely with seawater leading to oxidation and loss of the deposit. Similarly the accumulation of ore size/grade deposits requires a stratigraphic break to permit a build up of sulphide material rather than a dissemination of sulphides in pillow selvages. This is clearly shown in Cyprus where Skouriotissa lies at the top of the Upper Lavas, Kokkinopezoula at the base of the Lower Lavas and Mathiatis, Mousoulos, Kokkinoyia and Agrokippia lie at the stratigraphic break between the Lower and Upper Lavas. This stratigraphic break may be further reflected by the existence of umbers and ochres as sediments representing the last gasp of this phase of the hydrothermal activity.

Assuming that the mineralization is not remobilized (Skouriotissa?) and does not travel far from its feeder zones then there should be an underlying zone of stockwork mineralization and

hydrothermal alteration with the development of quartz, chlorite, epidote, kaolinite mineralization. This stockwork may be traceable through the lavas for some considerable distance.

In summary the diagnostic features required for an economic deposit to form are:

- (1) An extrusive volcanic host i.e. hydrothermal activity depositing sulphides on the sea floor.
- (2) A structural trap to capture the fluids i.e. fault, basin control.
- (3) A stratigraphic break to permit accumulations of fluid to ore grades. This may be shown by sedimentation.

Table 1 gives grade/tonnage figures for some of the known ophiolitic deposits from various locations.

TABLE 1, OPHIOLITE HOSTED DEPOSITS

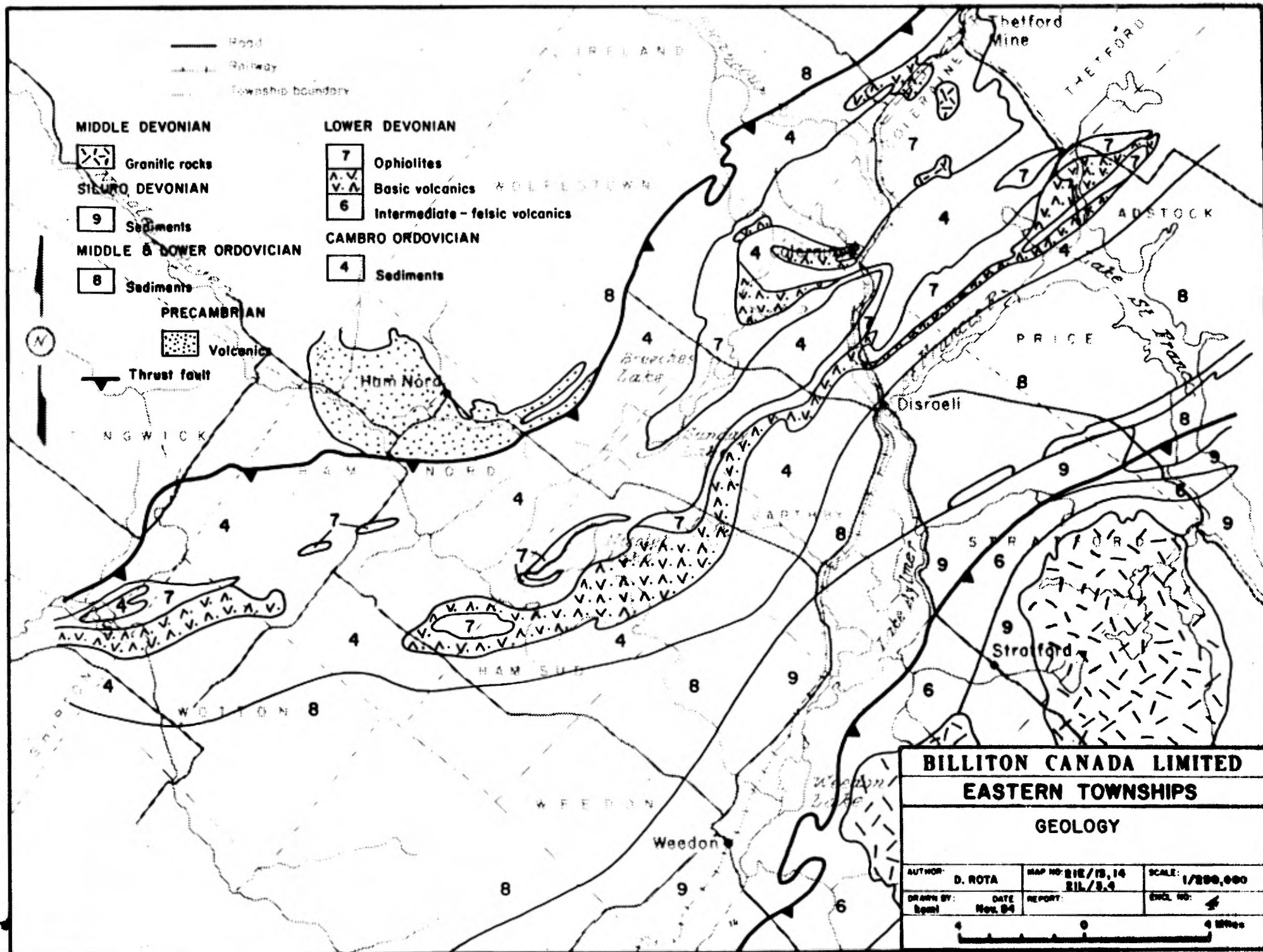
<u>Location</u>	<u>Name</u>	<u>Tonnage</u> (M tonnes)	<u>Grade (%)</u>	
			Cu	Zn
<u>Cyprus</u>	Mathiatis	3	0.24	
	Kokkinoyia	1	1.5	
	Agrokipia A	0.75	0.6	
	Agrokipia B	4.5		
	Skouriotissa	6	2.35	
	Mavrovouni	15	4	0.5
	Limni	4.0	1.37	0.29
	Kalavasos	2.3	1.5	0.7
<u>Newfoundland</u>	Tilt Cove	7.5	3.0	
	York Harbour	0.25	2.3	5.1
<u>Oman</u>	Lasa'il	8)		
	Aarja	3)	2.4	
	Bayda	0.75)		
	Rakah)			
	Tawi Rakah)	0.5		
	Darus	0.6	3.0	

2.0 GEOLOGY

2.1 Regional Geology (Map 4)

The Thetford Mines Ophiolitic Complex is situated in southwest Quebec, within the external zone of the Appalachians and is limited on the north side by a narrow northeast-southwest trending structural zone known as the Baie Verte Brompton line, extending from Newfoundland to the Quebec/USA border. The south end is limited by the St. Victor synclinorium, comprising a Middle to Upper Ordovician flysch sequence resting unconformably over the Ophiolitic rocks. Table 2 provides a list of the units.

The tectonic contacts of the ophiolite occupy a well defined stratigraphic horizon situated between the Cambrian Volcano-Sedimentary Caldwell Group, at the base, and the Upper Cambrian/Lower Ordovician blocky phyllites of the St. Daniel Formation at the top. Locally this belt of igneous rocks and associated sediments comprises a complete Ophiolite Suite. Generally only dunite with ultramafic to felsic volcanic rock are present. In the Thetford Mines area the ophiolite reaches its maximum development and consists of a sequence of serpentized peridotite and dunite at the base progressing upward through pyroxenite, gabbro, diorite and felsic bodies to a mafic, and intermediate volcanic zone at the top. The volcanic rocks are capped by black slate, minor limestone and flysch rocks of the Magog Group belonging to the Beauceville and St. Daniel Formations.



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GEOLOGY

AUTHOR: D. ROTA		MAP NO: 818/15, 14		SCALE: 1/200,000	
DRAWN BY: [Signature]		DATE: Nov. 84		REV. NO: 4	
REPORT:		EVAL. NO:		[Signature]	

TABLE 2-FORMATIONS

MIDDLE ORDOVICIAN

Magog Group

8. Slaty Schist and Acid Tuff

LOWER ORDOVICIAN

St. Daniel Formation

- 7.A Phyllites with Sedimentary Boulders
B Phyllites with Sedimentary and Ophiolitic Boulders

THETFORD MINES OPHIOLITIC COMPLEX

Upper Volcanic Sedimentary Formation

- 6.A Argillite, Green and Red Chert
B Volcanic Breccias
C Meta-Basalt, Pillowed Meta-Andesites and Pyroclastics

5. Pillowed Meta-Basalt and Red Argillites

Hypabyssal Rocks

4. Homogeneous Meta-Gabbro, Diabase Dykes and Sills

Cumulate

- 3.A Diorite
B Bedded Hornblende Gabbro
C Pyroxenite
D Dunite

Tectonic Peridotite

- 2.A Harzburgite
B Amphibolite
C Dunite
D Pyroxenite
E Dioritic and Granitic Intrusions

CAMBRIAN

Caldwell Group

- 1.A Greywacke and Shale Metamorphosed
B Greywacke and Shale Weakly Metamorphosed
C Basaltic Lavas Metamorphosed
D Basaltic Lavas Weakly Metamorphosed

2.2 District Geology (Maps 5, 6, 7)

The project area lies on the Baie Verte Brompton line and is underlain by weakly metamorphosed Cambrian sediments of the Caldwell Group. The Ophiolitic Suite is overlain by the Lower Ordovician St. Daniel Formation.

The Caldwell Group (Unit 1) is composed of interbedded metawacke, gnarly pelitic schist, slate and fine grained, laminated amphibolite. These rocks have undergone repeated deformation and have been thrown into gently plunging tight folds. Bedding and metamorphic foliation commonly diverge. The Caldwell Group is polymetamorphic and a strong retrograde overprint is evident.

The Ophiolitic Complexes (Units 2 to 6) of Asbestos and Thetford are situated southeast of the anticlinorium of the Sutton Notre Dame Mountains. They occur deep inside the Cambro-Ordovician inner zone along the axis of the synclinorium of Notre Dame, forming the backbone of a narrow belt 250 kilometers along, known as the serpentine zone. Three main ophiolite occurrences may be distinguished:

1. Stratified sheets of complete Ophiolite
2. Peridotite sheets
3. Peridotite lenses (fragmented ophiolite).

The stratified sheets consist of ophiolitic sequences divisible into upper and lower structural and petrologic units. The lower unit is homogeneous consisting of serpentized harzburgite with

tectonized dunite and orthopyroxenite. The upper unit occupies a larger surface area, is thicker, stratiform and consists of ultramafic layered cumulate pyroxenite and chromite bearing dunite at the base which is overlain by banded gabbro, diabase, metabasaltic pillow lava and green cherty argillites. Diabase and felsic dykes are common in the volcanic cap. The surrounding Cambrian rocks lie structurally under the Ophiolitic Complex.

The Thetford Mine Ophiolitic Complex, in spite of pronounced folding and faulting, is more complete and better preserved than the Asbestos Complex.

The peridotite sheets are less than 1,000 meters thick and consist of serpentized Alpine peridotites, mainly harzburgite with tectonic fabric. Ultramafic cumulates, gabbros, diabases, pillow lava and cherty argillities are generally absent.

The peridotite lenses have sharp discordant contacts with the enclosing rocks but none of the observed contacts are primary. These Alpine peridotites are bounded by fault and thrust planes.

In the ophiolitic sequence the intrusive phase and the extrusive phase are in fault contact which is expressed as a topographic low. On either side of the fault the rocks are sheared showing a distinct cataclastic foliation and contain abundant quartz veins. Hence, it is not possible to follow the numerous diabase dykes from the

gabbroic rocks into the base of the volcanic sequence although the dykes are presumably the feeders of the overlying lava flows.

The volcanic and sedimentary sequence is divided into two groups: 1) mainly metabasaltic lavas, tuffs and breccias; and 2) an upper group more heterogeneous in composition and consisting of basaltic and andesitic lavas, pyroclastic agglomerates and breccias, and siliceous volcanic tuffs. The total thickness of the two groups and their sedimentary cover is 1,000 to 1,200 meters. The gross lithologic units have a regional extent despite the fact that their thickness changes rapidly from one locality to another. The most complete section known is visible along the north shore of Lac de l'Est and the hills to the north.

The uppermost unit, the St. Daniel Formation (Unit 7), occurs east and south of the Ophiolitic Complex and consists of laminated and chaotically deformed black and grey slate. The St. Daniel Formation occurs throughout the Eastern Townships and appear to be a consistent horizon along the entire length of the Baie Verte Brompton Line. The age and origin of this unit is uncertain but it unconformably underlies the fossiliferous Middle Ordovician Magog Group. The brecciated nature of these rocks is derived from an unstable depositional environment disrupting argillite, shale and greywacke, and from tectonic imbrication which dismembered the ophiolites. In the Thetford Mines area, the St. Daniel Formation, has been observed as a chaotic grey and black slate with an olistostromal horizon and is the most widespread unit throughout the Quebec Eastern Townships. Small to

very large fragments of greywacke, argillite, shale and impure quartzite are commonly found in the olistostrome. Locally, large blocks of serpentinite, presumably derived from the ophiolite, are also found.

Numerous granite intrusives of unknown origin are present within the Quebec Appalachian Ophiolitic Complex. These granites often occur in the peridotite at the base of the ophiolitic sequence and are seldom observed or are completely absent from the overlying units (gabbro, diabases, volcanic rocks). Field observations suggest that these granites have been tectonically enclosed in a solid state in the Ophiolitic peridotites which had been previously serpentinized. The granites are separated from their roots and their origin, environment and emplacement are obscured by the tectonic evolution of the area during the Ordovician.

2.3 Economic Geology

Over eighty showings are known throughout the ophiolite belt with five past producers, see Table 3. Only one of these was a significant producer but the absence of other major deposits probably reflects the lack of exploration caused by the previous mineral ownership problems rather than the actual lack of any deposits.

TABLE 3

Quebec Ophiolite Deposits

	<u>MINE</u>	<u>TONNAGE</u>	<u>GRADE</u>
(1)	Huntingdon	1.9M	0.90% Cu - produced - 3000 oz Au 30000 oz Ag
(2)	Ives	600	12.00% Cu
		200	13.00% Cu
		2,000	4.00% Cu
(3)	L. Mephramagog --		--
(4)	Eastern Metal		
	N. 317,000		1.05% Ni
	S. 956,000		1.50% Cu, 0.30% Zn, 0.20% Ni
(5)	Brompton Copper		
	700,000		1.80% Cu

3.0 GEOCHEMISTRY

3.1 Introduction

Geochemistry has not been used as a major exploration tool in the Eastern Townships as geophysical methods and geology are considered to be adequate in this area and the glacial history has led to a complex till profile being preserved. The Early Appalachian radial icecap was succeeded by the Laurentian override and a late Appalachian radial glaciation with some remobilization of earlier tills. Consequently the geochemical approach presents severe difficulties in interpretation. However, a regional stream sediment survey for gold was undertaken covering both the ophiolite and the surrounding units and grid geochemistry was carried out for some of Cu, Ni, Zn and Au on three grids.

3.2 Regional Geochemistry

A reconnaissance gold stream sediment survey using standard -80 mesh samples covered most of the accessible stream locations in the region. Some -200 mesh samples were run for comparative purposes and were generally lower in values than the -80 mesh samples. The locations, numbers and -80 mesh results are plotted on Maps 8 through 16. Figure 1 is a histogram of sample values and clearly shows two peaks at 3 ppb and 10 ppb. The lower peak is presumed to represent batch 84-09-21 a group of 84 samples whose values are lower than the other groups and this peak is therefore a laboratory effect and can be discounted. The second peak at 10 ppb. is presumed to be a realistic background value. The population of 260 samples has a mean value of 12

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REGIONAL GOLD VALUES**

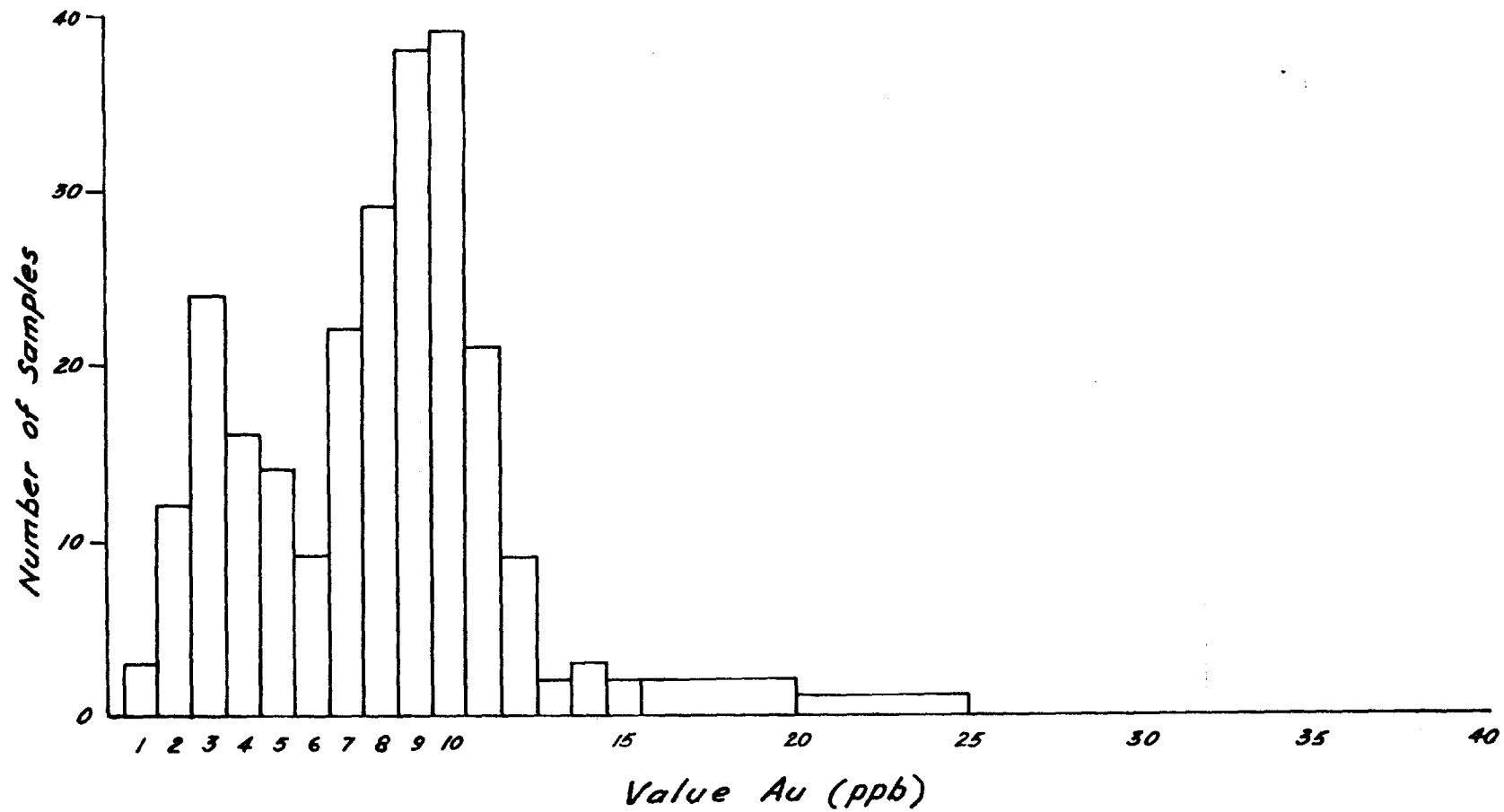


Figure 1.

and a standard deviation of 32. Values above 76 (mean plus 2 x S.D.) are considered to be potentially anomalous and worthy of further field checking. These values are listed on Table 4.

TABLE 4, Anomalous Stream Sediment Values

<u>Sample No. Au (p.p.b.)</u>	
941-55	79
941-36	181 (check)
941-72	132 (-200 mesh) (check)
941-100	455
941-290	118
941-488	80

3.3 Grid Geochemistry

Grids 17-J (North Bisby), 19-A (East Lake) and 21-A (Disraeli) were used as test grids for soil geochemistry. The details given below outline the type of material sampled and elements analyzed on the three grids.

17-J	Ni 'C' horizon
	Cu 'C' horizon
19-A	Ni 'C' horizon
	Cu 'C' horizon
21-A	Zn 'C' horizon
	Cu 'C' horizon
	Au 'Ao' horizon

Standard soil samples were collected at 25/50 m. centers on 100m spaced lines and subjected to the usual geochemical preparation and analysis. Results are plotted on the attached Maps 17 through 23 and are discussed below.

Grid 17-J

(a) Nickel

n = 112 x = 233 Sx = 331

The grid covers a section low in the ophiolite where peridotitic rocks predominate. The range of values from below 50 to over 2000 probably represents inaccuracies in the sampling procedures given that ophiolitic peridotites have a background Ni value in the 1800-2000 ppm range and the more fractionated part of the sequence (gabbros) 800-1200 ppm. It is considered likely that true 'C' samples were not always collected and this combined with the various rock types explains the range of values. None are considered to be anomalous.

(b) Copper

n = 112 x = 6 Sx = 4

The extremely low copper values appear to reflect an almost total absence of this commodity in the grid area. This is not surprising given the underlying geology and confirms that the hypabyssal rocks are not a valid exploration target.

Grid 19-A (East Lake)

(a) Nickel

n = 111 x = 234 Sx = 318

The same comments apply to this grid as to grid 17-J with the variability being considered as due to the sample collection procedure. There are no anomalous samples.

(b) Copper

n = 111 x = 12 Sx = 11

This grid is similar to 17-J and the same comments apply.

Grid 21-A (Disraeli)

(a) Zinc

n = 59 x = 55 Sx = 32

Grid 21-A also covers units low in the ophiolite sequence. It would not be expected to contain high zinc values and this is shown by the results with only 3 samples having values marginally higher than $x + 2Sx$. None of these isolated highs are considered to be anomalous.

(b) Copper

___ = 59 ___ = 9 ___ = 10

As above re zinc.

(c) Gold

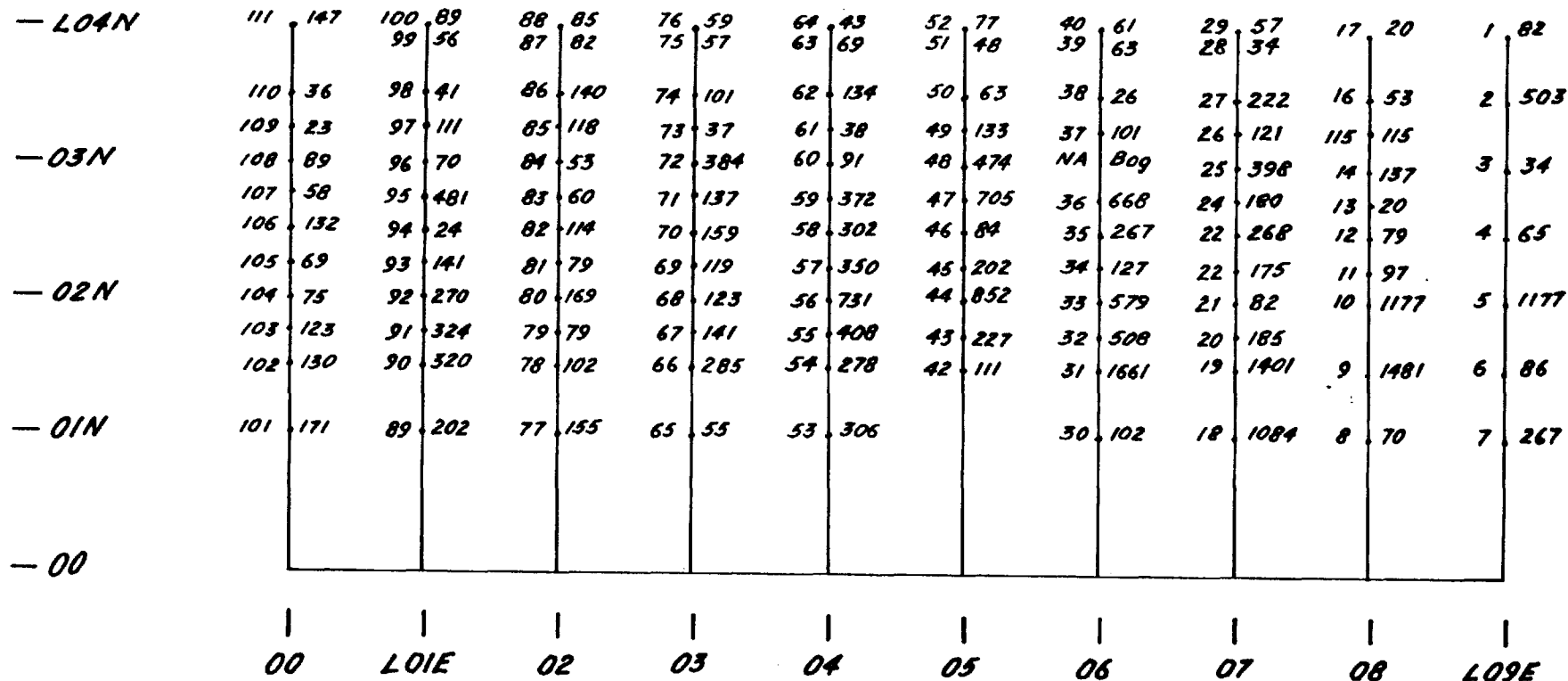
___ = 168 ___ = 8.7 ___ = 18.4

Gold values are low except for three spot highs (221, 57, 92) which probably warrant checking in the field and resampling. The association of gold with this part of the ophiolite sequence is considered to be unlikely and the results may be spurious. However, a check on the sample media used, lab results and geological association will require little time and effort.

3.4 Conclusions

The regional geochemical programme for gold showed six locations where check sampling and prospecting is required. The lack of geological control in the survey and the wide diversity of rock types means that subtle anomalies may exist in the data set. These however cannot be isolated.

The grid geochemistry for Cu, Zn, Ni, was carried out on rocks low in the ophiolitic sequence and therefore the lack of anomalous values is not surprising. Further work on the extrusive horizons may be more useful but the geological and geophysical signatures of mineralization at this level may render geochemistry unnecessary. Spot gold highs on the grids are worthy of checking although their significance is questionable.



BILLITON CANADA LTD

**EASTERN TOWNSHIPS
GRID 19A (EAST LAKE)
Ni Geochemistry, 1984**

metres 0 200

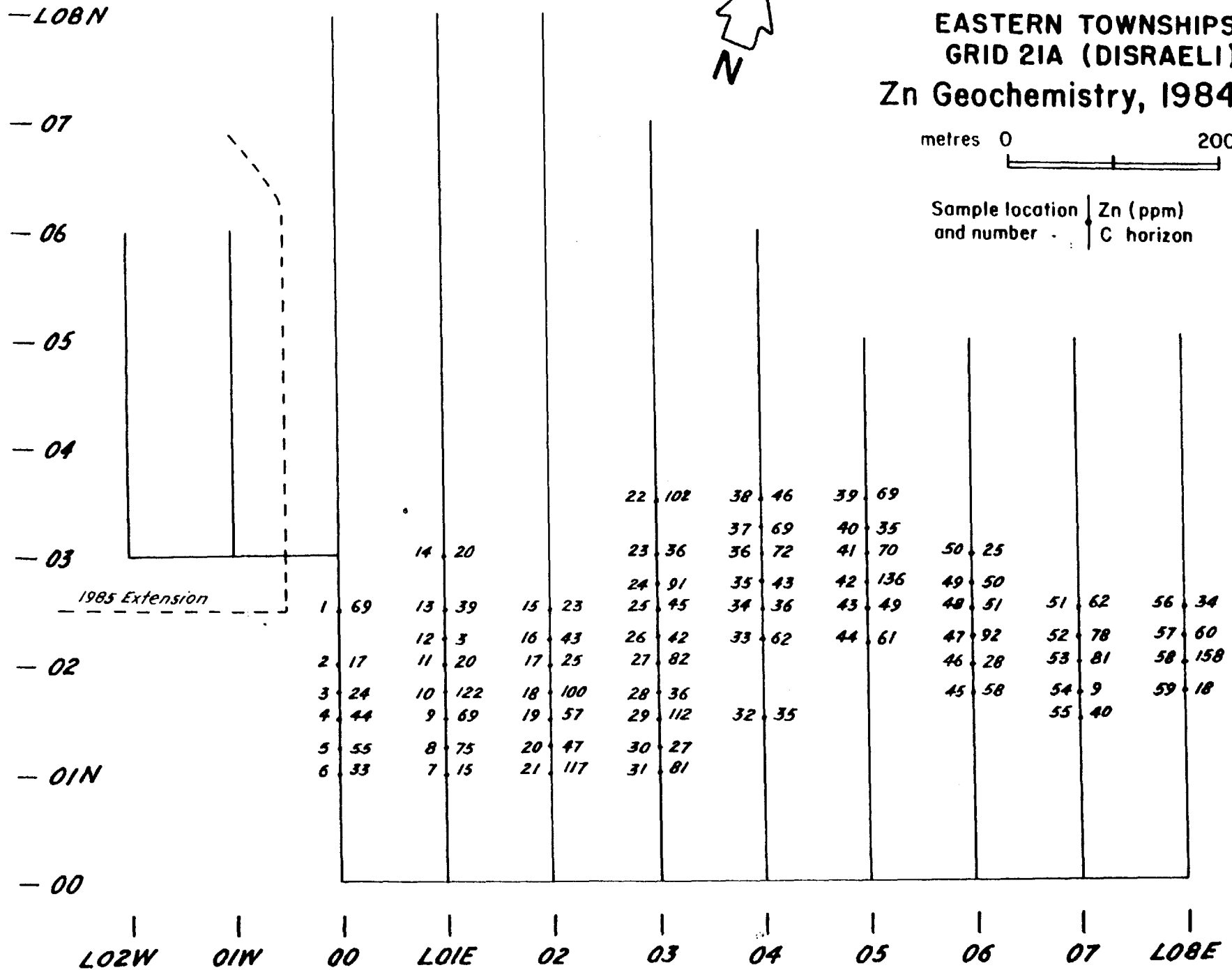
Sample location | Ni (ppm)
and number | C horizon

BILLITON CANADA LTD

**EASTERN TOWNSHIPS
GRID 21A (DISRAELI)
Zn Geochemistry, 1984**

metres 0 200

Sample location and number	Zn (ppm) C horizon
-------------------------------	-----------------------



Map 21

BILLITON CANADA LTD

EASTERN TOWNSHIPS GRID 21A (DISRAELI)

Cu Geochemistry, 1984

metres 0 200

Sample location
and number | Cu (ppm)
C horizon



— L08N

— 07

— 06

— 05

— 04

— 03

1985 Extension

— 02

— 01N

— 00

L02W

01W

00

L01E

02

03

04

05

06

07

L08E

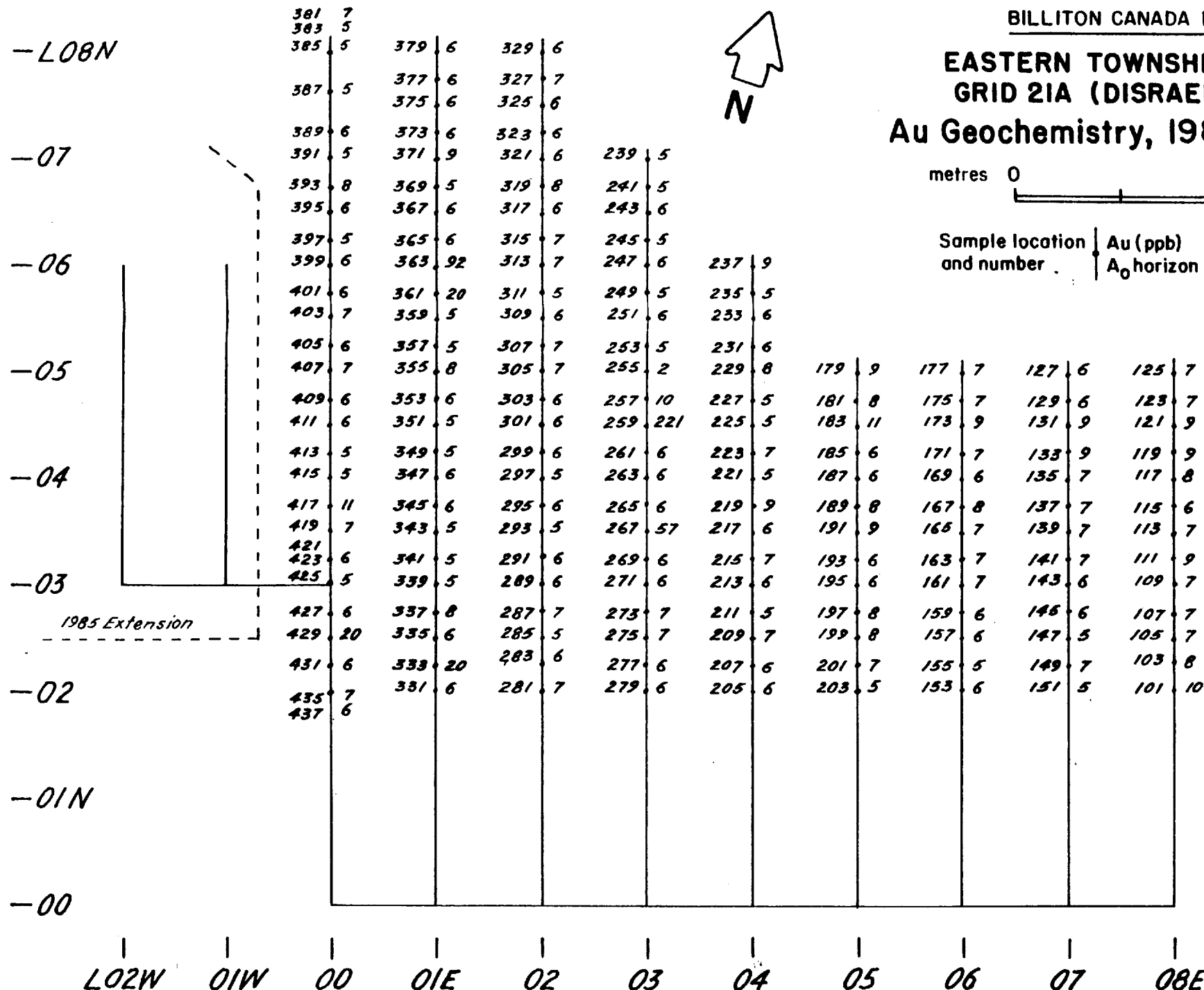
Map 22

				22	40	38	7	39	5				
						37	11	40	8				
		14	3	23	10	36	11	41	4	50	2		
				24	6	35	6	42	4	49	4		
				25	8	34	2	43	7	48	3	51	7
												56	15
				26	3	33	6	44	26	47	6	52	8
				27	14					46	4	53	3
												58	37
				28	13					45	3	54	3
				29	10	32	3					55	2
				30	7								
				31	5								
1	23	13	64	15	0.5								
		12	1	16	1								
2	8	11	10	17	8								
3	7	10	10	18	10								
4	4	9	10	19	11								
5	5	8	12	20	13								
6	6	7	6	21	17								

BILLITON CANADA LTD
EASTERN TOWNSHIPS
GRID 21A (DISRAELI)
Au Geochemistry, 1984

metres 0 200

Sample location | Au (ppb)
and number | A₀ horizon



4.0 GEOPHYSICAL APPROACH

4.1 Anomaly Selection Criteria

Because of the very large number of separate conductor systems identified by the DIGHEM survey it was essential to form a rational basis for priority rating them with regards to ground follow-up. From the results of a test survey flown over the Lake Memphramagog Mine an economic target is likely to exhibit good conductivity and may demonstrate a magnetic response (although absence of magnetic correlation was not used to screen out anomalies). These properties were used to upgrade the priority of conductors. In addition, those conductors lying entirely within, or close to, the ophiolite-sediment contact were given special consideration as several of the mines in the area are located close to this boundary. Furthermore, anomalies detected close to, or along strike, from known mineralization were regarded as high priority for follow-up. For a more detailed account of the test survey results and anomaly selection criteria the reader is referred to the "Preliminary Report on the Eastern Townships Airborne Geophysical Survey" by D.R.B. Rainsford (1984).

For logistical reasons it was decided that the initial work would be concentrated in the northeast sector of the project area. It was also decided that the anomalies, followed-up during this initial phase of work, should be situated in several different geological environments in order to obtain as much information as possible on the geology of the region from the detailed mapping carried out on

the gridded areas. As a result, nine grids were established which covered 33 DIGHEM conductor systems.

4.2 Instrumentation and Survey Procedures

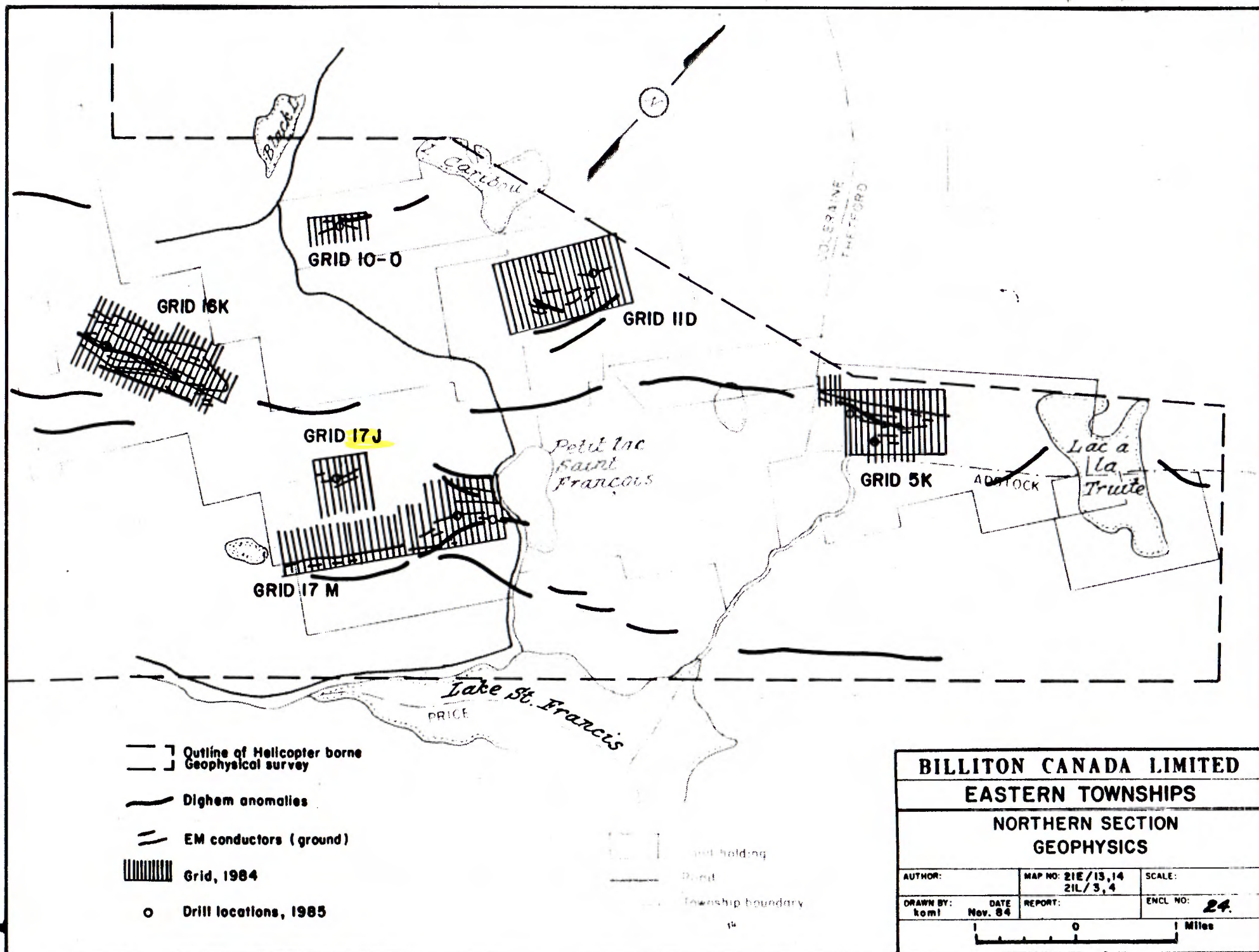
4.21 Magnetic Survey

The magnetic surveys were carried out using an EDA OMNI IV (ppm 300) proton precession field magnetometer. This instrument measures the earth's total magnetic field to an accuracy of ± 0.1 nanoteslas (nT). Measurements were made at least every 25 metres along grid lines, baselines and tielines. In areas of rapidly changing field the measurement interval was stepped-down to 12.5 metres. Some grids, as a result, were covered entirely with a 12.5 metre measurement interval. The data were corrected with the aid of an identical magnetometer set up in a cycling base-station mode.

4.22 Horizontal Loop EM Survey

The HLEM surveys were performed using a Max-Min II system, manufactured by Apex Parametrics of Toronto. Measurements of the In-Phase and Out-of-Phase components of the secondary EM field were made at two frequencies (444 Hz and 1777 Hz). A coil separation of 100 metres and a 25 metre station interval were used on all grids. A 200 metre intercoil distance was employed on selected lines of four grids in order to establish whether certain responses could be caused by conductive overburden.

Inclinometer data were collected concurrently with a HLEM survey using a Suunto PH5/SPC inclinometer. The data were used to orient the coils parallel to the ground surface and thereby reduce coupling errors. As the In-Phase noise due to topographic irregularities was not significant over most of the grids, no correction was been applied to the data.



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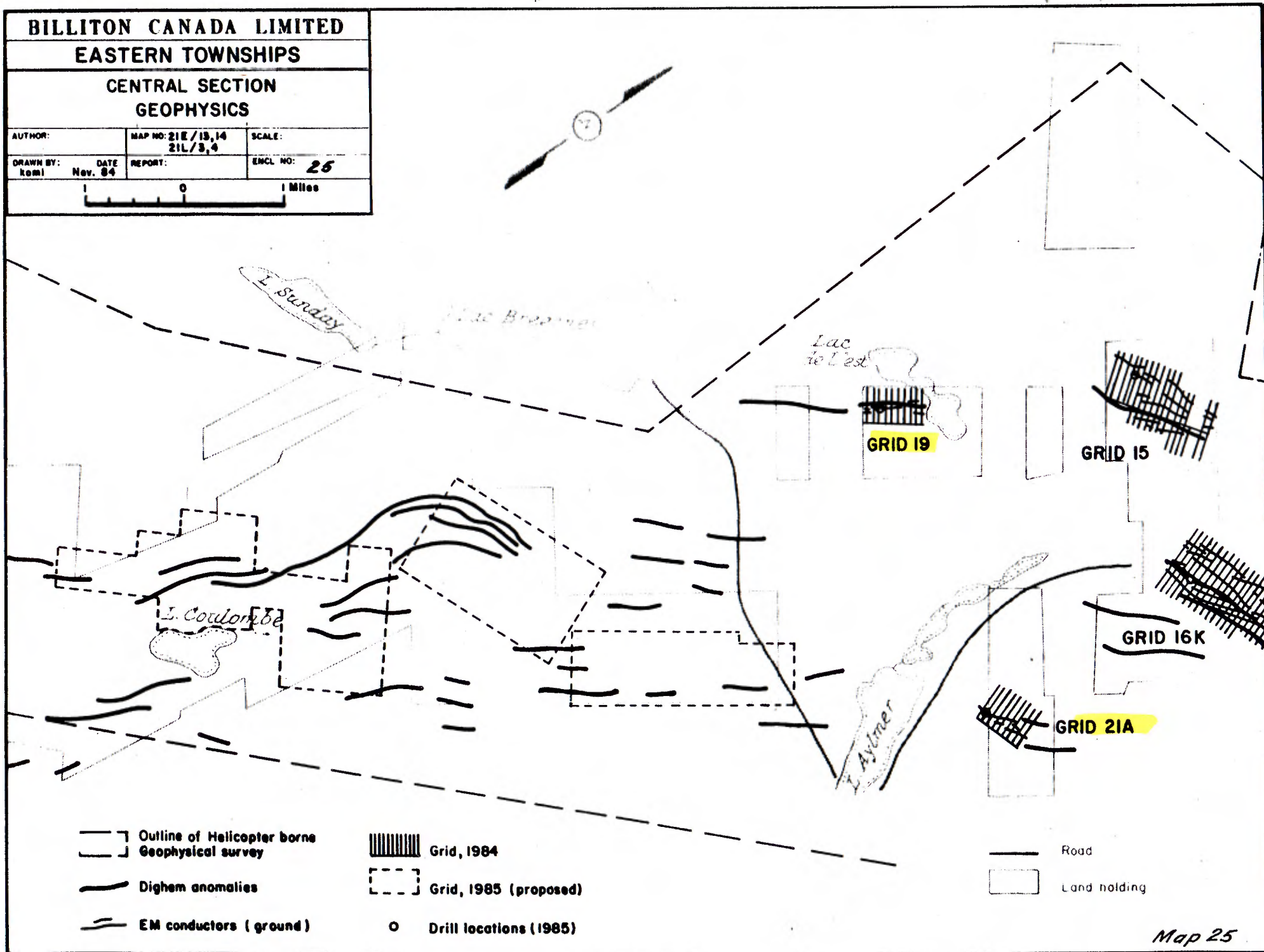
EASTERN TOWNSHIPS

CENTRAL SECTION

GEOPHYSICS

AUTHOR:	MAP NO: 21 E / 13, 14 21 L / 3, 4	SCALE:
DRAWN BY: komi	DATE Nov. 84	REPORT: EMCL NO: 26

1 0 1 Miles



Outline of Helicopter borne
Geophysical survey

Dighem anomalies

EM conductors (ground)

Grid, 1984

Grid, 1985 (proposed)

Drill locations (1985)

Road

Land holding

Map 25

5.0 DISCUSSION OF RESULTS

5.1 Grid 5-K

5.11 Location and Access

Highway 267, connecting Thetford Mines to St. Daniel, intersect the western end of the grid and a paved road branching off from the same Highway 267 roughly follows its northern edge (Map 24).

5.12 Geological Setting (Map 32)

The grid area is covered by a thick till blanket which may be observed along the road cuts, drainage ditches and the Lac a la Truite shore line. The glacial deposits consist of a wide variety of boulders of various sizes buried within a blueish limy matrix. Outcrops are very scarce and bedrock is exposed only along the previously mentioned roadways.

The area is located on the edge of the Mount Adstock Complex which, with a few exceptions, is lithologically identical to the Thetford Mines Complex. The grid is principally underlain by northeast-southwest striking Cambro-Ordovician pyroclastic rocks of intermediate and acid composition and pillows and sediments of the Caldwell Group. Caldwell outcrops consisting of graphitic sediments have been observed along Highway 267. A major thrust fault separates the metasediments from the Ophiolitic Complex and dunite may be seen near this contact.

One band of peridotite and serpentinite, entirely consistent with the magnetic and EM magnetite highs noted from the airborne data, is indicated through the southern margin of the grid.

5.13 Airborne Geophysics

Grid 5-K was established in order to test AEM conductor systems 5-A, B, C and K. The AEM responses range from strong through to weak and strike lengths are interpreted between 200 metres and 1500 metres. The responses have been classified as either "sheet-like" bedrock conductors or "edge-type" anomalies. Of these, anomaly 5-K is of particular interest as a 40nT magnetic response is coincident with it. In addition, several AEM anomalies which have been classed as questionable cultural effects are covered by the grid. A poorly defined VLF trend is associated with this group of conductors but appears to be mainly related to the cultural-type responses. A strong magnetic feature passing through the southern margin of the grid is evident from the total field map. An EM magnetite anomaly is coincident with the elevated magnetic field. The AEM responses themselves lie to the north of the magnetic anomaly in a magnetically quiescent area. Examination of the airborne resistivity data indicates that the grid 5-K anomalies occupy the northeastern end of a linear resistivity low that extends southwest for at least 5 km. It seems very likely that, as conductor systems 4-I, 11-N and 11-O lie along the same resistivity feature as the grid 5-K anomalies, they probably occupy the same geological setting.

5.14 Ground Geophysics
 Magnetic Survey (Maps 26, 27)

The ground magnetics demonstrate a generally subdued field over most of the grid indicating that it is mainly underlain by poorly susceptible rocks. Although outcrop is scarce a few exposures of quartzite have been mapped on the grid which when considered along with the magnetic response, suggests that the grid is situated on a predominantly sedimentary sequence. The southern sector of the grid between line 5E and line 10E is dominated by a strong NE-SW trending magnetic "high". The anomaly is terminated abruptly between line 10E and line 11E. A north-south fault, closely following a stream for part of its length, is interpreted to give rise to the termination of the magnetic feature. This is consistent with offsets and terminations of some of the detected E.M. anomalies. The magnetic anomaly is explained, by outcrop, to be due to dunite.

Horizontal Loop EM Survey (Maps 28, 29, 30, 31)

A total of sixteen separate conductive trends were detected by the Max-Min survey. The conductors are all oriented NE-SW and have strike lengths between 100 metres and 2200 metres. Observed conductivities range from very weak (less than 1 Siemen) to moderate (maximum 16.9 Siemens). In many cases it is evident that several closely spaced conductors give rise to a single EM response and it is not possible to quantitatively interpret each one. Many of the conductors (e.g. E-1, E-6) have long strike lengths and would appear to be formational features. This is in agreement with the outcrops of

sediments and graphitic sediments noted on the grid. The conductors (e.g. E-13, E-15) in the southeastern part of the grid are more discontinuous and may have been disrupted by faulting. The highest conductivities of all the conductors are noted in this area. It is noted that EM responses E-13 and E-15 may be reinterpreted so that the anomaly axis runs parallel to the inferred fault and close to the contact of the ultramafic and sedimentary unit. This interpretation is supported by the similarity of apparent conductivities of both conductor systems which is substantially higher than those detected elsewhere on the grid. A small magnetic correlation is noted with conductor E-13 on line 11+00E.

5.15 Conclusions

It seems probable, from the ground follow-up of the DIGHEM anomalies, that most of the EM conductors lie within the sediments of the Caldwell group. Those conductors lying closest to the ultramafics present the most favourable potential for economic mineralization. Those conductors lying further away from the sediment/ultramafic contact represent less favourable targets. As a result, it is recommended that the two zones be tested by drilling. A single diamond drill hole should be cored on line 7E to test conductors E-3, E-4 and E-5. These conductors appear to be representative of the majority of those on the grid. A second hole should be drilled to test conductor E-15 which is of particular interest due to its conductivity and proximity to the ultramafics.

5.2 Grid 10-0

5.21 Location and Access

The grid is located along Highway 112, at the intersection with the Petit Lac St. Francois Road (Map 24).

5.22 Geology (Map 37)

No bedrock has been seen in the area which is covered by glacial till. The entire grid lies within the Cambro-Ordovician pyroclastic rocks of intermediate and acid composition (Riordon, 1954). These rocks coincide with the subdued magnetic expression of the locality. The high magnetic gradients are will explained by the presence of ultramafics indicated 500 meters northwest of the grid.

5.23 Airborne Geophysics

Grid 10-0 was cut in order to follow-up a single three-line AEM anomaly. The conductor is oriented northeast-southwest and gives rise to weak or moderate anomalies. The responses are characterized as being of questionable "sheet-like" geometry.

A moderate VLF trend correlates well with the AEM responses and extends eastward to the shore of Lac Caribou. The airborne magnetics are dominated by steep gradients caused by the ultramafics to the north. A narrow northeast-southwest trending anomaly is observed immediately to the southwest of, a long strike from, conductor system

10-0. The gridded area itself does not appear to give rise to any strong magnetic feature nor is any EM magnetite response observed in the vicinity. a moderate resistivity "low" is developed in the region of conductor system 10-0. This low extended eastward and includes conductor systems 10-L, K and I. It seems probable therefore that all these anomalies constitute a single discontinuous trend.

5.24 Ground Geophysics
 Magnetic Survey (Maps 33, 34)

A relatively quiescent field is observed from the ground magnetic data. A gentle increase in field values to the northwest is observed across the whole grid. At the southwestern end a broad 500nT anomaly, trending northeast-southwest has been detected. A sharp reduction in the width of the anomaly between 1+00E and 2+00E is interpreted to be due to faulting. The smoothness of the anomaly profile suggests a buried magnetic source (possibly a gabbroic body). The eastern part of the grid exhibits an essentially featureless magnetic field.

Horizontal Loop EM Survey (Maps 35, 36, 37)

Two EM conductors have been detected by the Max-Min survey. Both are oriented subparallel to the baseline and have strike lengths of 200 metres and 700 metres. The interpreted conductivities are weak to moderate and a southeasterly dip is inferred for conductor E-2. The response of conductor E-1 is only partially developed due to the

interference of anomaly E-2. E-2, on the other hand, can be traced over seven lines and an apparent width of up to 10 metres is observed. The conductor is inferred to be buried at a depth of 20 to 25 metres at its western end, increasing to 40 metres at the eastern extremity. Similarly the conductivity appears to increase towards the east, No magnetic response is associated with either conductor.

5.25 Conclusions

No outcrop has been located on the grid and the conductors appear to be buried under a large thickness of cover. On a regional scale, however, the conductors appear to be situated in a favourable environment for massive sulphide mineralization. Efforts should therefore be made to explain these conductors. Thus it is recommended that conductor E-2 be tested by drilling a single hole on line 6+00E.

5.3 Grid 11-D

5.31 Location and Access

The grid is located along Highway 112, connecting Lac Caribou to Petit lac St. Francois (See Map 24). One gravel road intersects the grid roughly along the 3+00E cut line. The gridded area is covered by a thick till blanket and no exposures could be seen in the western half of the grid.

5.32 Geology (Map 42)

The western half of grid 11-D is underlain by sediments of the St. Daniel series, consisting of phyllites composed of angular blocks buried within a dark grey limy matrix. Some of these clasts may reach several meters in diameter. Numerous phyllite outcrops line between 3+00N and 5+00N. Numerous outcrops testify to the existence of ultramafic rocks within the grid and two bands of dunite have been observed. The first band of dunite is black saccharoidal and strongly serpentized in places following roughly the baseline between 13+00E and 20+00E section lines. The second dunite band is intermixed with deformed pyroxenite and is present in the northwest section of the grid between 9+00E and 19+00E, and between 6+00N and 8+50N.

One strongly altered zone, approximately 700 meters long and 100 meters wide, has been identified between the 13+00E and 19+00E section lines. The altered zone is strongly silicified, serpentized and contained significant amounts of pyrite, up to five percent in places. Evidence of shearing and faulting have been observed along the altered dunite zone.

The interpretation of the magnetic data indicates that the grid 11-D has been deformed by several east/west and north/south faults.

5.33 Airborne Geophysics

Grid 11-D was emplaced in order to test AEM conductor systems 11-A, B, C, D, E, F, G, I, J. The responses range from strong through to weak and are classified mainly as "sheet-like" or "edge-type"

bedrock conductors. Some anomalies ascribed to surficial sources have also been detected over the grid area though they have not been assigned identification codes. Apparent strike lengths vary from 1000 metres to under 250 metres (one line intercepts), giving rise to a discontinuous pattern of conductors oriented approximately NE-SW. Anomaly 11-D is identified as being of particular interest due to its high conductivity and apparent thickness.

The VLF-EM data indicates a moderate amplitude anomaly correlating with conductor system 11-D. Although weaker VLF trends are present in the vicinity, they do not form a coherent pattern and little information may be derived from them. Conductor 11-D is observed to occupy a linear magnetic low bounded by two magnetic highs to the northwest and the southeast. To the southwest, a number of short conductors flank a circular magnetic high. The southern part of the grid area exhibits an unperturbed field with a steadily decreasing gradient southward. Clarification of the magnetic responses is provided by the EM magnetite map which indicates that the majority of the AEM responses lie within a region of low magnetite content, suggesting that they are unrelated to the rock units (presumably ultramafics) which give rise to high EM magnetite and magnetic responses. It is noted that the circular magnetic anomaly described in the southwestern part of the grid area has a more subdued EM magnetite expression than the other anomalies and may therefore represent a different source. The 11-D anomalies appear, from the apparent resistivity data, to form an isolated system which cannot be traced more than 2000 metres along strike. This is in

contrast to the 5-K anomalies which appear to be part of a much longer feature.

5.34 Ground Geophysics
 Magnetic Survey (Maps 38 & 39)

The ground magnetics are relatively unperturbed over the majority of the grid. Two strong magnetic provinces are, however, apparent in the northwestern and southeastern sectors of the grid. The features are consistent with outcrops of pyroxenite and dunite mapped on the grid. The magnetically quiescent province which separates the two zones of high field is narrowest at the northeastern end of the grid and flares outward to the southwest. Sediments of the St. Daniel formation have been mapped within this province in the northeastern part of the grid and, on the basis of the magnetics, would appear to dominate most of the western half of the grid. As no outcrop has been located on the grid west of line 12+00E this interpretation should be viewed with some caution because, from the work done on grid 17-M, little susceptibility contrast is apparent, between the St. Daniel sediments and intermediate or felsic volcanics. Thus, the area underlain by the undisturbed magnetic field may also contain rocks other than of the St. Daniel formation although there is insufficient outcrop to determine whether this in fact is the case. Three NW-SE trending faults have been interpreted from terminations of magnetic features and dislocations in conductor axes.

Horizontal Loom E.M. Survey (Maps 40, 41, 42)

The results of the Max-Min survey delineated many complex, high amplitude responses which can be resolved into ten separate conductive trends. The conductors which are oriented predominantly subparallel to the baseline range in length from 100 metres up to 600 metres. A progressive change in conductor orientation, from east-west in the western part of the grid to NE-SW in the eastern sector of the grid, implies gentle folding. Strong conductivities and shallow to moderate depths of burial have been interpreted from the E.M. responses.

It appears likely that many of the conductors are terminated by the NW-SE trending faults inferred from the magnetic data. By examining the location of the EM anomalies with respect to the magnetic responses it is probable that some of the conductors represent a single trend that has been subjected to considerable offsets (e.g. E-3, E-1 and E-10). The second feature of note is the fact that conductor widths were, in some cases, greater when determined using 1777 Hz than those inferred from the 444 Hz data. This phenomenon suggests that some of the sources have gradational conductivities at their margins rather than sharply defined contacts. Due to the high degree of interference between anomalies the 444 Hz profiles were used to interpret conductor parameters.

None of the conductors exhibit magnetic correlation and they are all observed to lie within magnetically quiescent areas.

5.35 Conclusions

Although outcrop on the grid is limited, the strong magnetic responses appear to be explained by the presence of ultramafics which are exposed in places. Some outcrops of sedimentary rocks have been mapped in the eastern part of the grid. The sediments occupy an area of low magnetic field. However, due to the paucity of outcrop, it is not possible to determine whether the whole of the low magnetic field area is underlain entirely by sediments and thus whether the conductors are all sediment hosted.

It is recommended that the "best" conductor on the grid be tested by a single drill hole on line 15+00E. Conductor E-10 has been selected due to its high conductivity, width, length and proximity to the ultramafics. Encouragement from this hole will warrant the drilling of conductors E-1 and E-3 on a second priority basis.

5.4 Grid 15

5.41 Location and Access

The grid is located within the Coleraine City limits and may be reached by either the Saint Julien or the Vimy Ridge roads. The area is covered by fields and grazing land and the topographic anomaly consists of one very steep hill located on the northwest extremity of the grid (Map 25).

5.42 Geology (Map 47)

Glacial deposits and muskeg cover most of the area. Only a few graphitic schist outcrops of the St. Daniel Formation are exposed, mainly along the road ditches. The hill consists of andesitic breccia. Their contact with volcanic metabasalts of the lower volcanic formation could be the most attractive economical target.

5.43 Airborne Geophysics

Grid 15 was established to follow-up AEM conductor systems 15-D, E, I and J. The interpreted conductor lengths range from a one line (250 metres) intercept up to 2500 metres. A southerly dip is interpreted for conductor 15-E. The responses may be characterized as good to moderate and are mostly attributed to "sheet-like", wide "conductive" or "edge-type" sources. These anomalies are of particular interest as conductors 15-D, E and I are observed to show some degree of magnetic correlation.

Moderately strong VLF trends correlate with conductors 15-D and E. The VLF pattern is somewhat confused and may reflect either conductor discontinuities or cultural influences. The magnetics in the region of the grid are dominated by a steady gradient created by large ultramafic bodies to the north. It would appear that the grid area itself is relatively quiescent apart from a small inflection noted at the western end of conductor 15-D. EM magnetite responses are absent apart from a minimal anomaly in the area of the magnetic inflection just described. The resistivity data defines a pronounced "low" which encompasses almost the whole gridded area. This feature appears to extend westward in a less well developed form to surround conductor systems 14-G, H, K, J and O. These conductors, although weaker, may be similar in origin to those followed-up on grid 15.

5.44

Ground Geophysics

Magnetic Survey (Maps 43, 44)

The magnetic data defines a fairly subdued field with a steady increase in values towards the northwest margin of the grid. The predominant orientation of contours is ENE-WSW which reflects geological strike. An approximately oval high field region centred about the baseline at 7+00 may denote the presence of a mafic intrusive body (possibly a gabbro). No outcrop is observed in this area although it is noted that the zone of the anomaly is devoid of sediment hosted conductors prevalent elsewhere on the grid.

No geological contacts are evident from the magnetic data

and it would appear from limited outcrop that the sediments underlie most of the grid. Sheared andesite mapped in the northwest corner of the grid is similarly not expressed by the magnetics.

Horizontal Loop EM survey (Maps 45, 46, 47)

The Max-Min results have identified 23 separate conductive trends. In many cases the conductors are closely spaced and are not completely resolved. Strike lengths range from 100 metres to 800 metres and conductivities are generally moderate or weak. Conductor axes are oriented ENE-WSW and a southward dip has been inferred from some responses.

Cultural features have, in some cases, interfered with the proper definition of the anomalies. With the exception of E-1, no magnetic expression is associated with any of the conductors. A 140 nT anomaly is, however, coincident with conductor E-1 on line 2+00E. Black schists, in places graphitic, have been mapped on the grid and it is likely that many of the conductors are caused by graphite.

5.45 Conclusions

It appears that the multitude of conductors detected on this grid are sediment hosted. The pyroclastic unit indicated from the regional mapping of P.H. Riordon (1954) to occupy the northern part of the grid has been determined to be, in fact, brecciated sediments. The potential for massive sulphide mineralization on this particular grid

does not appear to be very good. However, conductor E-1 does warrant further attention due to its magnetic correlation and its proximity to sheared andesite in which 2-3% pyrite was observed. A single hole should, therefore, be drilled on line 2+00E in order to intersect conductor E-1.

5.5 Grid 16-K

5.51 Grid 16-K lies immediately southwest of the Municipality of Coleraine and may be reached via the Chemin Drouin (Map 25).

5.52 Geology (Map 54)

Glacial deposits cover most of the area, however, the southwest corner of the grid is underlain by dunite-pyroxenite lying subparallel to the base line while southeast dipping graphitic schists belonging to the St. Daniel Group cover the central section. The origin and the interpretation of the volcanic breccia accompanied by a bedded gabbro outcropping in the northwest of the grid is, at this stage, not very well understood. The volcanic breccia belongs to the volcano-sedimentary series and, according to the latest interpretations, would be of the wildflysch type rather than igneous. According to St. Julien (1984) the gabbro could represent one megablock inserted within the clayey matrix of the St. Daniel Formation which also contains numerous smaller blocks of ophiolitic material.

5.53 Airborne Geophysics

Grid 16-K was cut in order to follow-up AEM conductor systems 16B,C,D,F and K. The anomalies, which are oriented NNE-SSW, range in length from 250 metres (one line intercept) to 2.5 km. Anomaly strengths vary from moderate to good and are mainly classified as "broad conductive" or "sheet-like" responses. Some "edge-type" anomalies are also apparent. Conductor system 16-K has, unlike the other conductors, a moderate magnetic correlation.

The VLF data defines two moderately developed trends which are coincident with the 16-B and C conductor systems. A weaker anomalous trend appears to follow the 16-K anomaly. The magnetic map defines a strong east-west anomaly passing through the southern margin of the grid. The anomaly would appear to terminate conductor 16-0 to the south and may therefore represent an intrusive body. Examination of the EM magnetite data reveals no response over most of the grid except for a very minor effect over the magnetic high. It would seem unlikely that the grid is underlain by significant amounts of ultramafic rocks. The airborne resistivity defines a broad zone of low resistivity which incorporates all the anomalies covered by grid 16-K. This zone does not appear to be contiguous with any other similar features and the width of the low resistivity feature is suggestive of a wide conductive rock unit rather than discreet conductive zones.

5.54 Ground Geophysics

Magnetic Survey (Maps 48, 49)

The magnetic data exhibits an ENE-WSW trending texture. The field is generally unperturbed except for the southwestern margin of the grid and a spot high anomaly at 4+50N on line 4E. The spot high is readily explained by the presence of a now defunct public garbage dump. Although outcrop is generally scarce, exposures of pyroxenite and dunite have been mapped in the southwestern corner of the grid. This would appear to explain the anomalous magnetic field detected in the area.

A steady gradient of decreasing field from south to north is observed across the entire grid. The gradient appears to express a steady fall-off in field away from the ultramafics to the south. Outcrops of gabbro mapped in the northwestern part of the grid appear to give rise to small residual highs. The response is such that the gabbro appears to be only weakly susceptible and limited in extent.

Shaley sediments outcropping in the western sector of the grid are inferred, from the magnetics, to underlie almost the whole of the eastern grid area.

HLEM Survey (Maps 50, 51, 53, 54)

A total of 25 separate conductor systems were detected by the Max-Min survey. The conductors were characterized by generally long strike lengths ranging from 100 metres to 1600 metres. Conductivities are inferred to be moderate, where it has been possible to calculate these parameters. It is clear, however, that in many cases discreet

conductor axes cannot be uniquely identified but that instead broad zones of high conductivity exist which consist of two or more conductive bands. The resolution of these zones is limited by the coil separation of the equipment. The responses that were detected could either be interpreted as bedrock phenomena or could alternatively be the result of non uniform thicknesses of conductive overburden. In order to establish whether the anomalies are indeed spurious and caused by bedrock ridges and depressions three lines were re-surveyed using an intercoil spacing of 200 metres. Although the resolution of the 200 metre cable data is much lower than that of the 100 metre cable data it is quite evident that the axes of the major conductors remain unchanged. As a result, the responses can only be ascribed to bedrock sources.

The apparent widths of the conductors range from less than 10 metres up to 100 metres. In the case of the wide responses, it is very likely that they are composed of several conductive horizons. The trend of the conductors is WNW-ESE to NW-SE. A convergence of conductor axes at the eastern end of the grid suggests that the conductive sequence may be folded. Such a conclusion is supported by the presence of a syncline in the vicinity interpreted by P.H. Riordon (1954). No magnetic expression is observed associated with any of the conductors. Narrower conductor widths (interpreted from the 444Hz data) than those inferred from the 1777Hz data suggests that the sources may have gradational margins rather than a sharply defined edges.

5.55 Conclusions

It appears from the limited geology observed on the ground and extrapolated from magnetics that the conductors are hosted by shales and black shales. Many of the EM responses are therefore probably due to graphitic horizons within the sediments. The geological environment would appear, from the field work carried out, to be very similar to that of grid 5-K.

Those conductors located well within the sediments probably do not represent favourable economic targets and should only be tested if drilling of other targets gives encouragement. However, those conductors lying along, or close to, the contact of the sediments and ultramafics do present a favourable setting for massive sulphide mineralization. It is recommended, therefore, that a single hole be drilled on line 1+00E to test conductors E-17 and E-18.

5.6 Grid 17-J

5.61 Location and Access

Grid 17-J may be reached by only one road, the road connecting Highway 112 to the Petite Lac St. Francois (Map 24).

5.62 Geology (Map 61)

A cumulate series consisting of strongly magnetized, serpentized locally pyritized dunite underlie grids 17-J and 17-M. The dunite is interfingered with pyroxenite which is becoming the most

prominent rock type to the south. Diabase and aplite dykes oriented roughly northeasterly intrude the ultramafic rocks.

Minor faulting between the pyroxenite and the dunite has been observed mainly along line 1+00E between stations 6+00S and 6+50S.

5.63 Mineralization

The grid area was explored previously to assess its asbestos potential. Several trenches and old workings may be visited along line 1+00E. One 200 foot vertical drill hole completed by Aylmer Mines Ltd., 300 meters east of the grid, intersected 80 meters yielding 1% to 3% pyrite. Informal communications with Aylmer drill geologist indicated copper/nickel mineralization was also present.

5.64 Airborne Geophysics

Work was undertaken on this grid in order to test two one-line AEM responses, 17-J and K. Both responses are weak but have magnetic correlation. One anomaly is classified as a possible "sheet-like" bedrock response. The other anomaly has an "edge-type" designation. Two weak AEM responses which are interpreted as being of surficial origin are also covered by the gridded area.

A well defined VLF trend extending for about 1500 metres links conductor 17-K with 17-I. A slight inflection of the VLF total field is observed around 17-J. The grid lies in a highly disturbed

magnetic field area which is defined by a NE-SW trending band of anomalous EM magnetite response about 1 km wide. The EM magnetite anomaly is suggestive of ultramafics. A linear resistivity "low" oriented NE-SW runs between conductors 17-J and 17-K. The conductors themselves lie on the edges of the resistivity anomaly. Several surficial-type responses occupy the resistivity low which implies that weakly conductive overburden may be the cause of this feature.

5.65 Ground Geophysics
 Magnetic Survey (Maps 55, 56)

The magnetic data defines a highly disturbed and complex field over the grid. The southeastern portion of the grid has a particularly anomalous expression and residual amplitudes of up to 7000 nT are observed. This region terminates abruptly along an imaginary line running from 7+50S on line 0+00 to 5+50S on line 8+00E. The northern limit of the pyroxenites mapped on the grid appears to be defined by this line. To the north of the region, just described, the magnetic field is less violently disturbed although still quite anomalous. Outcropping dunite has been mapped in this area and appears to give rise to a less perturbed field than the pyroxenite which is contrary to the situation observed in several of the other grids. In the

northeastern sector of the grid the dunite appears to be responsible for a more disturbed field than elsewhere. The differences in the magnetic signature of the dunite and pyroxenite on this grid are unexplained and without field susceptibility measurements it can only be concluded that

the magnetite content of the ultramafics is variable and is not necessarily characteristic of a particular lithology. Indeed there is evidence that magnetic susceptibility may reflect the degree of alteration of the ultramafics (S.V. Moskaleva and I.F. Zotova, 1965).

Horizontal Loop EM Survey (Maps 55, 56, 57, 58, 59, 60, 61)

The Max-Min results delineate five weak conductors consistent with the AEM anomalies. The conductors are not properly detected by the 444Hz data and only poorly defined at 1777Hz. The anomalies trend northeast-southwest and range in length from 150 metres to 600 metres.

It is noted that a high positive background 1777Hz in-phase response dominates the central portion of the grid. The background response is not expressed, to the same degree, at 444Hz. Such a feature is indicative of a weakly conductive near-surface layer. The response is also noted to be confined to an overburden filled valley. It was not clear, at this stage, whether the EM anomalies are bedrock responses or are simply caused by irregularities in the conductive overburden. Data collected on lines 5+00E, 6+00E and 7+00E using a 200 metre intercoil spacing showed a good correlation with the 100 metre cable survey. Complete coverage was only obtained on line 5+00E due to the presence of a cliff elsewhere. A very broad out-of-phase response representing a conductive source extending from 3+00S to 7+00S is observed at 1777Hz on line 5+00E. This feature is probably caused by thick overburden in the valley bottom. Conductor E-3 appears to be associated with the northern

edge of the out of phase response suggesting that it is probably surficial. Conductor E-4, on the other hand, is expressed by a well developed in-phase anomaly at 1777Hz on Line 5+00E. This conductor is probably located in bedrock. It is noted that E-4 is better expressed by the 200 metre cable data rather than the 100 metre cable results, suggesting that the conductor is deeply buried. However interpretation of the 200 metre cable profiles suggests that the conductor is, in fact, shallow. The contradiction between the two data sets may be due to the effect of conductive overburden.

5.66 Conclusions

As the repetition of HLEM surveying using a large coil separation on selected lines has substantiated conductor E-4 but called into question E-3 it is proposed that a single drill hole be cored to test E-4 on line 5+00E. The drill hole could be extended to test E-4 at the same time. Field susceptibility tests should also be undertaken in order to characterize the magnetic properties of the pyroxenite and dunite units that underlie the grid.

5.7 Grid 17-M

5.71 Location and Access

Grid 17-M may be reached via the road connecting the Town of Disraeli to Highway 267S or the Range V and VI gravel road to Garthby Township (Map 24).

5.72 Geology (Map 68)

Grid 17-M displays the entire Mount Adstock Ophiolitic Complex which is in contact between lines 18+00S and 3+00E with the St. Daniel sedimentary rocks consisting of black pyritic graphitic fissile phyllites.

A fault contact separates the volcanic rocks of the upper volcano-sedimentary formation from the pyritized schists. The volcanic rocks consist essentially of agglomeratic brecciated spilitic meta-andesite accompanied by brecciated pyroclastic rhyolite. Between 9+00E and 10+00E of the baseline acidic volcanic breccia has been observed in contact with a higher unit consisting of metabasalt.

Tectonically in contact north of the volcanic rocks a sequence of cumulate begins with bedded gabbro, associated with a microdiorite. The only difference between the two units is the texture progression from microcrystalline to crystalline. The sequence continues with coarse pyroxenite, consisting of clinopyroxene. Toward the east end of the grid near the Petit Lac St. Francois interfingering between the dunite and the pyroxenite is prominent. The fractional differentiation of the magma chamber created some interpretation problems, however the strong magnetic signature of the dunite enabled this unit to be separated from the remaining cumulate pile.

5.73 Structure

The bulk of the formations are striking northeast-southwest and dipping southeast. A fault system separates the bedded gabbro from

the upper and lower volcanic rocks directly in contact with the pyroxenite and the dunite. This contact is illustrated by a strong alteration zone which may be observed along the Lac Clay forestry road.

5.74 Airborne Geophysics

Work was undertaken on grid 17-M in order to follow-up AEM conductor systems 17-L,M,N,O. The anomalies range in strength from strong through to weak and strike lengths from 250 metres (one line intercepts) to 2000 metres are observed. The majority of the responses are classified as "sheet-like" bedrock sources and, in places, a southeasterly dip has been interpreted. Two "edge-type" conductors are also covered by this grid. Conductor system 17-M is distinguished by a strong magnetic correlation (580 nT) on one flight-line and an interpreted thickness greater than 10 metres on the next line.

The results of the VLF survey indicate a strong linear anomaly correlating with conductor 17-M. A weaker trend is also associated with conductor 17-O. The gridded area appears, from the aeromagnetic data, to lie along the southeastern flank of a NE-SW trending anomaly. The magnetic anomaly is suggestive of a narrow, linear body at the northeastern end but is less well defined at the southwestern end. The EM magnetite data indicates that the AEM anomalies lie about 500 metres southeast of the main magnetic trend. Conductor 17-M extends into the anomalous EM magnetite trend west of Petit Lac St. Francois. The resistivity data shows that conductor 17-M occupies a distinct low zone that is bounded by Lac Bisby in the

southwest and Petit Lac St. Francois in the northeast. A high resistivity zone flanks the conductor to the northwest while to the southeast a linear zone of moderate resistivity is observed. Following this trend to the southwest it is likely that anomalies 21-D and 21-I are in the same geological environment.

5.75 Ground Geophysics
 Magnetic Survey (Maps 62, 63)

The magnetic data obtained over the southwestern part of the grid is characterized by gentle gradients and a generally subdued field whereas the northeastern half of the grid is distinguished by highly anomalous trends and sharply varying fields. It is clear, from the limited outcrop mapped on the grid, that the high magnetics define the extent of the ultramafics that underlie the area. The contacts between the volcanic units themselves and between the volcanics and the Beauceville sediments are not well defined in the western part of the grid and it would appear that there is little susceptibility contrast between these units. However, in the central portion of the grid the response of andesites mapped at surface appears to give a distinctive magnetic "high". The eastern half of the grid exhibits a very complex magnetic field pattern. The responses are dominated by the ultramafics which underlie the area. It appears that these magnetic units also exhibit remnant magnetization as it is evident from a profile of the line 10E data that a deep magnetic depression at the northern end of the line is too great to be consistent with the preceeding peak if the anomaly is due solely to induced magnetization.

As a result of the complexity of the geology and the corresponding magnetic data the survey results can only be interpreted in the most general manner. Efforts should be made to measure, in the field, susceptibilities of all the rock units covered by this grid in order to understand better the magnetic character and variability of the rock types in the area. Grid 17-M is particularly important in this regard as most of the lithologies encountered in the project area are represented here.

Horizontal Loop E.M. Survey (Maps 64, 65, 66, 67, 68)

Eleven separate conductors have been detected by the Max-Min survey. The conductors strike ENE-WSW to East-West and range in length from one line responses up to 1900 metres. Conductivities are characterized as good to moderate.

Conductor E-1 is the longest of the detected anomalies and exhibits widths up to 70 metres. It is likely that E-2 is part of the same conductor system which is probably composed of multiple sources. The conductor appears to be located in slately sediments at the western end of the grid. No outcrop is observed around the eastern end of the conductor. The magnetics, however, suggest the presence of mafic volcanics and magnetic correlation with the conductor is observed on at least four lines (6w, 5w, 3w and 2w). If the host rock to the interpreted conductor is different at both ends it implies that two separate conductive bodies exist rather than one single source. Such an inference is supported by the fact that the conductivity of the anomaly is greater at the eastern end. Any discontinuities in the conductor

axis would be hard to detect because of its proximity to the edge of the grid.

Conductors E-8 and E-9 are similar in character with apparent widths up to 50 metres. Both anomalies are interpreted to dip steeply to the south. A possible magnetic association is noted with conductor E-8. From the limited outcrop observed in this area it would appear that they are both hosted by andesites.

Two weak out-of-phase anomalies (E-10 and E-11) are detected in the northeastern sector of the grid. The anomalies are located in an area in which conductive overburden responses are prevalent. The anomalies may simply reflect a resistive bedrock ridge running between the two features. This uncertainty is resolved by the 200 metre intercoil data which was subsequently obtained over lines 12+00E, 13+00E and 14+00E. The conductor axes are clearly shifted in the 200 metre profiles. Such a shift is indicative of conductive overburden with variable thickness and anomalies E-10 and E-11 should therefore be discounted.

5.76 Conclusions

The geology of this grid is particularly complex and a number of inconsistencies between the mapped geology and magnetics remain to be explained. A comprehensive measurement of magnetic susceptibilities of outcrops on the grid will assist in the interpretation of the magnetics for the whole project area.

Drill holes are proposed to test two conductors on the grid. Drilling of conductor E-1 on Line 6W is recommended because of its high conductivity, magnetic correlation and proximity to the volcanic-sediment contact. A second hole should be cored on line 8+00E in order to test conductor E-8 which exhibits high conductivity and a possible magnetic correlation. Should either of these drill holes intersect economically significant mineralization conductors E-3 and E-9 should be tested as secondary targets.

5.8 Grid 19-B

5.81 Location and Access

Grid 19-B has been laid out along the western shore of Lac de l'Est and may be reached via a paved road connecting to the St. Julien Coleraine Highway (Map 25).

5.82 Geology (Map 73)

The baseline follows the strike length of the Caldwell sediments consisting of strongly metamorphosed quartzites which have been injected by numerous quartz veins, reaching up to several meters in width.

A faulted contact separates the Caldwell sediments from the strongly sheared and serpentized dunite exposed immediately to the north.

Pyroxenite covers the northern portion of the grid and interfingering of this pyroxenite with the dunite may be seen occasionally.

5.83 Airborne Geophysics

This grid was established in order to follow-up a single four line AEM anomaly. The northeast-southwest trending anomaly, which is interpreted to be 1100 metres in length, comprises weak responses attributed to possible "sheet-like" bodies and one response of questionable surficial origin with a strong magnetic correlation.

A well developed trend extending southwest from conductor system 19-B to link-up with 19-C is defined by the VLF-EM data. A small discontinuity in the trend is observed between the two conductor systems. The magnetic data reveals that the AEM anomaly is intimately associated with a very strong narrow magnetic feature which extends for a distance of 8 km. An intense EM magnetite trend correlates directly with the magnetic anomaly and is suggestive of a narrow band of ultramafic rocks.

A narrow, low resistivity zone is associated with conductor system 19-B which extends southwest, in a somewhat discontinuous manner, to conductor system 19-C. The similarities between anomalies 19-B and 19-C are such that they are almost certainly in the same geological environment and they are probably caused by the same type of source.

5.84

Ground Geophysics

Magnetic Survey (Maps 69, 70)

The grid is dominated by highly anomalous magnetic fields which trend subparallel to the baseline. Two strongly magnetic zones may be identified from the data. The first of these is centred at about 2+00N and extends right across the grid. The anomaly has the characteristics of a broad near-surface body and displays a residual amplitude of about 6000nT. A unit of dunite which is mapped on surface is the likely cause of the anomaly. To the north of this trend at about 4+50N, a narrower and more rapidly varying anomaly is defined.

Amplitudes up to 9,000 nT are recorded on this trend which appears, from the geology, to lie within pyroxenites. It is not clear whether the northern anomaly is caused by an uneven distribution of magnetite within the pyroxenite itself or whether it is the result of narrow dunite bodies hosted by the pyroxenite. Dunite has not been observed, from the limited exposure, to lie within the pyroxenite.

Greywacke of the Caldwell group which has been mapped in the southern part of the grid is not expressed in the magnetic field data. This is to be expected as the sediments are essentially non-magnetic when compared to the adjoining ultramafics.

Horizontal Loop E.M. Survey (Maps 71, 72, 73)

A total of eight weak E.M. anomalies were detected by the Max-Min survey and range in length from 100 metres to about 400 metres. The discontinuous nature of the anomalies which have been detected may be partly the result of faulting that is interpreted to pass through the gridded area. A northerly dip has been interpreted from conductor E-4. All the conductors appear to be shallowly buried and are associated with the dunite unit that has been mapped on the grid. Conductor E-4 is of particular interest as it has an apparent width of up to 20 metres and is the most continuous of all the responses. The conductor is coincidentally located very close to the northern edge of the southern magnetic trend discussed in the previous section. A pyritiferous rock sample taken about 25 metres north of E-4 close to line 3+00E ran 1680 ppm nickel. Due to the intensely disturbed nature of the magnetic field it is not possible to determine whether magnetic correlation is associated with any of the conductors.

5.85 Conclusions

The weak E.M. anomalies that have been delineated remain unexplained by surface mapping. The best of these responses is close to where a sample of pyritiferous serpentinite was taken. Conductor E-4 is, therefore, a valid target for testing in spite of its low conductivity. A single hole should be drilled on line 3+00E. Should the results from this hole prove encouraging E-6 should also be tested and ground follow-up of AEM conductor systems 19-C and 15-P be undertaken.

5.9 Grid 21-A

5.91 Location and Access

Grid 21-A may be reached from Disraeli by the Range V and Range VI roads. It is intersected by several north-south forestry roads (Map 25).

5.92 Geology

Graphitic sediments of the St. Daniel Formation cover the southwest corner of the grid and are exposed along a narrow creek bed.

A complex faulted contact separates the St. Daniel Formation from the adjoining dunite to the south and, to the north, metabasalt and meta-andesite.

Intrusives consisting of trondhjemite and bedded gabbro intersect the ultramafic and cover most of the northern portion of the grid.

5.93 Economic Geology

The volcanic rocks exposed at the center of the grid are weakly mineralized. One diamond drill hole completed by Sullivan Mining in 1960 intersected 0.23% copper/15 feet about 200 meters west of the present grid.

5.94 Airborne Geophysics

Work on grid 21-A was undertaken in order to follow-up two northeast-southwest trending anomalies 21-A and 21-B. The anomalies have short strike-length features that are detected on only one and two flight-lines. Apparent conductivities range from good to weak and the responses are classified as possible "sheet-like" sources or possible "wide conductive" units. No magnetic correlation is associated with either anomaly.

A well developed VLF trend is associated with conductor systems 21-A and 21-B. The trend extends southwest to the shore of Lac Aylmer and may continue northeast where a weaker trend displaced southward is observed. The AEM anomalies lie immediately to the northwest of a strong magnetic feature which is oriented northeast-southwest. The AEM responses, themselves, lie within a narrow magnetic "low" trend. A strong EM magnetite anomaly is observed over the magnetic trend which borders the gridded area. Such a response is suggestive of an ultramafic body. The resistivity data demonstrates that the AEM responses are directly associated with a conductive trend extending west to Lac Aylmer. It is likely that conductor system 20-1, which also lies along this trend, is related to conductor system 20-A and 20-B. Resistive areas on either side of the low resistivity feature are indicative of the presence of crystalline rocks.

5.95 Ground Geophysics

Magnetic Survey (Maps 74, 75)

The results of the magnetic survey are characterized by very high amplitude anomalies along the southern extremity of the grid followed by a pronounced magnetic "low" to the north which dissipates steadily northwards. It is quite evident from the magnetic profiles that the magnetic "low" is simply the negative lobe of the pronounced anomaly to the south and does not reflect the underlying geology. The northern part of the grid has very little magnetic character. The strong magnetic anomaly appears to be caused by ultramafics in the southern part of the grid. However, outcrops of dunite are mapped further north than the magnetic anomaly. The discrepancy may be explained by the fact that dunite in this area is silicified and may therefore be poor in ferro magnetic minerals. The metamorphosed sediments, rhyolite, basalt, gabbro and granite mapped to the north of the ultramafics are not well defined by the magnetics and it would appear that little susceptibility contrast exists between these units.

Horizontal Loop E.M. Survey (Maps 76, 77, 78)

Three near-surface conductors were detected by the Max-Min survey. The conductor axes strike ENE-WSW and have defined lengths between 300 metres and 600 metres (E-1 and E-3 are both open at one end). Conductivities of all three trends are low. However, apparent widths of up to ten metres are interpreted for conductors E-1 and E-2. No magnetic correlation is noted with any of the E.M. responses. Little outcrop is seen in the vicinity of the conductors although black schists

of the St. Daniel formation have been mapped, on surface, 50 metres south of E-1. The contact of the metasediments with the metavolcanics to the north is not well defined and it is uncertain in which unit this conductor lies. However, a small magnetic inflection that is observed in the profiles suggests that the contact may lie to the north of E-1 and that it is therefore hosted by sediments. From the little outcrop that has been observed conductors E-2 and E-3 are thought to lie within metavolcanics.

5.96 Conclusions

The geology mapped on the grid during the course of the summer indicates a favourable environment for massive sulphide mineralization. None of the E.M. conductors are explained at surface. It is recommended that conductor E-2 be tested by drilling on line 5+00E. This anomaly has the highest conductivity of those detected on the grid and is located close to an interpreted rhyolite-mafic volcanic contact. Any encouragement obtained from the drilling of the conductor warrants the testing of the remaining two anomalies.

6.0 Geophysical Conclusions and Recommendations

Nine grids, totalling 167 km of cut line, were established in order to follow-up 33 DIGHEM AEM conductor systems located in the northeastern sector of the project area. Ground geophysical work comprising horizontal loop E.M. and magnetic surveys delineated a total of 103 conductors.

Based on the interpreted physical characteristics of the conductors and the geology determined from the grid mapping eleven targets are recommended for drilling on a first priority basis. An outline of the proposed drilling is to be found in Table 5.

As a result of studies undertaken on comparable ophiolitic sequences (Cyprus, Oman, Newfoundland) it is further recommended that the proposed drill targets be checked for their geological setting prior to drilling and be screened on that basis. An extensive series of magnetic susceptibility measurements should be made in the field, particularly on grids 17-J and 17-M, with the purpose of quantitatively determining the magnetic characteristics of the rock units within the project area. The results of such an undertaking will assist in the interpretation of both ground and aeromagnetic data.

TABLE 5
EASTERN TOWNSHIPS PROJECT
PROPOSED DRILLING

GRID	CONDUCTOR	LINE	LENGTH OF		JUSTIFICATION
			DDH (M)		
5-K	E-3/4/5	6+00E	100		Conductors representative of majority of those on this grid.
5-K	E-15	10+00E	70		Close to sediment-ultramafic contact, high conductivity.
10-O	E-2	6+00E	80		No outcrop on grid, conductors completely unexplained.
11-D	E-10	15+00E	80		High conductivity, large width and proximity to the ultramafics.
15	E-1	2+00E	70		Magnetic correlation, close to sediment volcanic contact.
16-K	E-17/18	1+00E	90		Good conductors, close to sediment volcanic-contact.
17-J	E-3/4	5+00E	110		Best conductor on grid, lies within ultramafics
17-M	E-1	6+00W	80		High conductivity, magnetic correlation, close to sediment-volcanic contact.
17-M	E-8	8+00E	80		High conductivity possible magnetic correlation, hosted by volcanics.
19-B	E-4	3+00E	70		Close to location of pyritiferous serpentinite, hosted by ultramafics
21-A	E-2	5+00E	70		Best conductor on grid close to interpreted rhyolite-mafic volcanic contact.
TOTAL			<u>900</u>		

Table 5 E.M. anomalies recommended for drilling.

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APPENDIX I

Summary of Eastern Township Land Holdings

SUMMARY OF EASTERN TOWNSHIP SPECIAL EXPLORATION PERMITS

TOWNSHIP	SURFACE (hectares)	DATE	SURFACE (hectares)	DATE	SURFACE (hectares)	DATE	SURFACE (hectares)	DATE
Adstock	513	Dec 84	513	Jan 85	513	Feb 85		
Ascot	82	Dec 84	82	Jan 85	82	Feb 85		
Coleraine	4,118	Dec 84	4,118	Jan 85	4,118	Feb 85		
Garthby	3,978	Dec 84	3,978	Jan 85	3,978	Feb 85		
Ham Nord	3,327	Dec 84	3,327	Jan 85	3,327	Feb 85		
Ham Sud	3,333	Dec 84	3,493	Jan 85	3,653	Feb 85		
Lambton	96	Dec 84	96	Jan 85	96	Feb 85		
Thetford	642	Dec 84	642	Jan 85	642	Feb 85		
Wolfestow	320	Dec 84	320	Jan 85	320	Feb 85		
Wotton	1,793	Dec 84	1,793	Jan 85	1,793	Feb 85		
Total	18,202	Dec 84	18,362	Jan 85	18,522	Feb 85		

ADSTOCK TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00697	VI	042	40.00	Feb. 21/86
P00698	VI	043	48.00	Feb. 21/86
P00699	VII	039	40.00	Feb. 21/86
P00700	VII	049	40.00	Feb. 21/86
P00701	VII	041 + the lake	40.00	Feb. 21/86
P00702	VIII	039 + the lake	40.00	Feb. 21/86
P00703	VIII	040 + the lake	40.00	Feb. 21/86
P00704	VIII	041 + the lake	40.00	Feb. 21/86
P00705	VIII	042 + the lake	40.00	Feb. 21/86
P00974	04	043	40.00	June 14/86
P00975	04	044	25.00	June 14/86
P00976	04	045	22.00	June 14/86
P00977	05	044	58.00	June 14/86

ASCOT TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00959	11	008	82.00	June 14/86

COLERAINE TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00782	A	005	17.00	Feb. 21/86
P00783	A	006	24.00	Feb. 21/86
P00784	A	007	30.00	Feb. 21/86
P00785	B	005	40.00	Feb. 21/86
P00786	B	006	40.00	Feb. 21/86
P00787	B	007	40.00	Feb. 21/86
P00788	B	013	37.00	Feb. 21/86
P00789	B	014	37.00	Feb. 21/86
P00790	B	015	37.00	Feb. 21/86
P00791	B	016	37.00	Feb. 21/86
P00792	I	020 - lake front lots	25.00	Feb. 21/86
P00793	I	021 - lake front lots	32.00	Feb. 21/86
P00794	I	022 - lake front lots	36.00	Feb. 21/86
P00795	I	023 - lake front lots	55.00	Feb. 21/86
P00796	I	024 - lake front lots	57.00	Feb. 21/86
P00797	I	025 - lake front lots	51.00	Feb. 21/86
P00798	I	026 - lake front lots	44.00	Feb. 21/86
P00799	I	027	49.00	Feb. 21/86
P00800	I	028	37.00	Feb. 21/86
P00801	XIII	001	61.00	Feb. 21/86
P00802	XIII	008	34.00	Feb. 21/86
P00803	XIII	009	40.00	Feb. 21/86
P00804	XIII	010	41.00	Feb. 21/86
P00805	XIII	013	45.00	Feb. 21/86
P00806	XIII	014	45.00	Feb. 21/86
P00807	XIII	015	45.00	Feb. 21/86

COLERAINE TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00808	II	011	40.00	Feb. 21/86
P00809	II	012	40.00	Feb. 21/86
P00810	II	013	40.00	Feb. 21/86
P00811	II	014	40.00	Feb. 21/86
P00812	II	015	40.00	Feb. 21/86
P00813	II	016	42.00	Feb. 21/86
P00814	II	017	42.00	Feb. 21/86
P00815	II	018	42.00	Feb. 21/86
P00816	II	019	42.00	Feb. 21/86
P00817	II	020	24.00	Feb. 21/86
P00818	III	010	40.00	Feb. 21/86
P00819	III	011	40.00	Feb. 21/86
P00820	III	012	40.00	Feb. 21/86
P00821	III	013	40.00	Feb. 21/86
P00822	III	014	40.00	Feb. 21/86
P00823	III	015	40.00	Feb. 21/86
P00824	IV	007	40.00	Feb. 21/86
P00825	IV	008	40.00	Feb. 21/86
P00826	IV	009	40.00	Feb. 21/86
P00827	IV	010	40.00	Feb. 21/86
P00828	IV	011	40.00	Feb. 21/86
P00829	IV	012	40.00	Feb. 21/86
P00830	V	006	40.00	Feb. 21/86
P00831	V	007	40.00	Feb. 21/86
P00832	V	008	40.00	Feb. 21/86
P00833	V	009	40.00	Feb. 21/86
P00834	V	010	40.00	Feb. 21/86
P00835	X	004	57.00	Feb. 21/86
P00836	X	005	53.00	Feb. 21/86
P00837	X	006	64.00	Feb. 21/86

COLERAINE TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00838	X	007	99.00	Feb. 21/86
P00839	X	008	90.00	Feb. 21/86
P00840	X	009	69.00	Feb. 21/86
P00841	X	016	45.00	Feb. 21/86
P00842	X	017	44.00	Feb. 21/86
P00843	X	018	52.00	Feb. 21/86
P00844	XI	016	33.00	Feb. 21/86
P00845	XI	017	35.00	Feb. 21/86
P00846	XI	018	27.00	Feb. 21/86
P00847	XII	016	32.00	Feb. 21/86
P00848	XII	017	30.00	Feb. 21/86
P00849	XII	018	31.00	Feb. 21/86
P00960	13	012	43.00	June 14/86
P00961	02	032	37.00	June 14/86
P00962	02	033	68.00	June 14/86
P00963	05	001	40.00	June 14/86
P00964	05	002	40.00	June 14/86
P00965	05	003	40.00	June 14/86
P00966	05	004	40.00	June 14/86
P00967	05	005	40.00	June 14/86
P00968	08	001	35.00	June 14/86
P00969	08	002	31.00	June 14/86
P00970	08	003	31.00	June 14/86
P00971	08	004	31.00	June 14/86
P00972	08	005	31.00	June 14/86
P01076	B	011	37.00	July 5/86
P01077	B	012	37.00	July 5/86
P01078	06	006	42.00	July 5/86
P01079	06	007	42.00	July 5/86
P01080	06	008	42.00	July 5/86

COLERAINE TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P01081	07	002	38.00	July 5/86
P01082	07	003	38.00	July 5/86
P01083	07	004	25.00	July 5/86
P01084	12	011	40.00	July 5/86
P01085	12	012	40.00	July 5/86
P01086	12	013	40.00	July 5/86
P01087	12	014	40.00	July 5/86
P01088	13	011	41.00	July 5/86
P01094	12	009	40.00	July 23/86
P01095	12	010	40.00	July 23/86
P01119	06	002	40.00	July 26/86
P01120	06	003	40.00	July 26/86
P01121	06	004	40.00	July 26/86
P01122	06	005	40.00	July 26/86

GARTHBY TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00595	II	028	40.00	Feb. 21/86
P00596	II	029	40.00	Feb. 21/86
P00597	II	030	40.00	Feb. 21/86
P00598	II	031 + the lake	40.00	Feb. 21/86
P00599	II	032 + the lake	40.00	Feb. 21/86
P00600	II	033 + the lake	40.00	Feb. 21/86
P00601	II	034	40.00	Feb. 21/86
P00602	III	001	40.00	Feb. 21/86
P00603	III	002	40.00	Feb. 21/86
P00604	III	003	40.00	Feb. 21/86
P00605	III	004	40.00	Feb. 21/86
P00606	III	005	40.00	Feb. 21/86
P00607	III	006	40.00	Feb. 21/86
P00608	III	007	40.00	Feb. 21/86
P00609	III	008	40.00	Feb. 21/86
P00610	III	009	40.00	Feb. 21/86
P00611	IV	001	40.00	Feb. 21/86
P00612	IV	002	40.00	Feb. 21/86
P00613	IV	003	40.00	Feb. 21/86
P00614	IV	004	40.00	Feb. 21/86
P00615	IV	005	40.00	Feb. 21/86
P00616	IV	006	40.00	Feb. 21/86
P00617	IV	007	40.00	Feb. 21/86
P00618	IV	008	40.00	Feb. 21/86
P00619	IV	009	40.00	Feb. 21/86
P00620	IV	010	40.00	Feb. 21/86
P00621	IV	011	40.00	Feb. 21/86
P00622	IV	012	40.00	Feb. 21/86

GARTHBY TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00623	IV	013	40.00	Feb. 21/86
P00624	IV	014	40.00	Feb. 21/86
P00625	IV	015	40.00	Feb. 21/86
P00626	IV	016	40.00	Feb. 21/86
P00627	IV	017	40.00	Feb. 21/86
P00628	IV	018	40.00	Feb. 21/86
P00629	IV	019	40.00	Feb. 21/86
P00630	IV	020	40.00	Feb. 21/86
P00631	I-S	015	21.00	Feb. 21/86
P00632	I-S	016	21.00	Feb. 21/86
P00633	I-S	017	20.00	Feb. 21/86
P00634	I-S	018	20.00	Feb. 21/86
P00635	I-S	019	20.00	Feb. 21/86
P00636	I-S	020	20.00	Feb. 21/86
P00637	I-S	021	20.00	Feb. 21/86
P00638	I-S	022 + the lake	20.00	Feb. 21/86
P00639	I-S	023 + the lake	20.00	Feb. 21/86
P00640	I-S	024	20.00	Feb. 21/86
P00641	I-S	025	20.00	Feb. 21/86
P00642	I-S	026	20.00	Feb. 21/86
P00643	I-S	027	20.00	Feb. 21/86
P00644	II-S	015	19.00	Feb. 21/86
P00645	II-S	016	20.00	Feb. 21/86
P00646	II-S	017	20.00	Feb. 21/86
P00647	II-S	018	21.00	Feb. 21/86
P00648	II-S	019	22.00	Feb. 21/86
P00649	II-S	020	22.00	Feb. 21/86
P00650	II-S	021	22.00	Feb. 21/86
P00651	II-S	022 + the lake	23.00	Feb. 21/86

GARTHBY TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00652	II-S	023 + the lake	23.00	Feb. 21/86
P00653	II-S	024 + the lake	24.00	Feb. 21/86
P00654	II-S	025 + the lake	24.00	Feb. 21/86
P00655	II-S	026	25.00	Feb. 21/86
P00656	II-S	027	26.00	Feb. 21/86
P00657	I-N	015	19.00	Feb. 21/86
P00658	I-N	016	20.00	Feb. 21/86
P00659	I-N	017	20.00	Feb. 21/86
P00660	I-N	018	20.00	Feb. 21/86
P00661	I-N	019	20.00	Feb. 21/86
P00662	I-N	020	20.00	Feb. 21/86
P00663	I-N	021	20.00	Feb. 21/86
P00664	I-N	023	20.00	Feb. 21/86
P00665	I-N	024	24.00	Feb. 21/86
P00666	I-N	025	24.00	Feb. 21/86
P00667	I-N	026	23.00	Feb. 21/86
P00668	I-N	027	20.00	Feb. 21/86
P00669	I-N	028	20.00	Feb. 21/86
P00670	I-N	029	20.00	Feb. 21/86
P00671	I-N	030	20.00	Feb. 21/86
P00672	II-N	015	35.00	Feb. 21/86
P00673	II-N	016	34.00	Feb. 21/86
P00674	II-N	017	34.00	Feb. 21/86
P00675	II-N	018	33.00	Feb. 21/86
P00676	II-N	019	32.00	Feb. 21/86
P00677	II-N	020	32.00	Feb. 21/86
P00678	II-N	021	31.00	Feb. 21/86
P00679	II-N	022	31.00	Feb. 21/86

GARTHBY TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00680	II-N	023	30.00	Feb. 21/86
P00681	II-N	024	29.00	Feb. 21/86
P00682	II-N	025	28.00	Feb. 21/86
P00683	II-N	026	28.00	Feb. 21/86
P00684	II-N	027	26.00	Feb. 21/86
P00685	II-N	028	28.00	Feb. 21/86
P00686	II-N	029	26.00	Feb. 21/86
P00687	II-N	030	30.00	Feb. 21/86
P00978	01	008	20.00	June 14/86
P00979	01	009	13.00	June 14/86
P00980	01	010	20.00	June 14/86
P00981	01	014	31.00	June 14/86
P00982	02	008	31.00	June 14/86
P00983	02	009	39.00	June 14/86
P00984	02	010	38.00	June 14/86
P00985	02	013	37.00	June 14/86
P00986	02	014	36.00	June 14/86
P00987	02	001	60.00	June 14/86
P00988	02	002	60.00	June 14/86
P00989	02	003	58.00	June 14/86
P00990	02	004	58.00	June 14/86
P00991	02	023	40.00	June 14/86
P00992	02	024	40.00	June 14/86
P00993	02	038	40.00	June 14/86
P00994	02	039	40.00	June 14/86
P00995	04	022	40.00	June 14/86
P00996	04	036	40.00	June 14/86
P00997	04	037	40.00	June 14/86
P00998	04	038	40.00	June 14/86
P00999	04	042	40.00	June 14/86

GARTHBY TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P01000	04	043	47.00	June 14/86
P01001	05	036	40.00	June 14/86
P01002	05	038	40.00	June 14/86
P01003	05	039	40.00	June 14/86
P01092	05	037	40.00	July 23/86
P01093	04	021	40.00	July 23/86
P01117	01	043	40.00	July 26/86
P01118	02	043	40.00	July 26/86

HAM NORD TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00728	IV	001	76.00	Feb. 21/86
P00729	IV	002	76.00	Feb. 21/86
P00730	IV	003	71.00	Feb. 21/86
P00731	IV	004	71.00	Feb. 21/86
P00732	IV	005	72.00	Feb. 21/86
P00733	IV	006	72.00	Feb. 21/86
P00734	V	001	79.00	Feb. 21/86
P00735	V	002	79.00	Feb. 21/86
P00736	V	003	79.00	Feb. 21/86
P00737	V	004	80.00	Feb. 21/86
P00738	V	005	80.00	Feb. 21/86
P00739	V	006	80.00	Feb. 21/86
P00740	XI	012	87.00	Feb. 21/86
P00741	XI	013	87.00	Feb. 21/86
P00742	XI	014	87.00	Feb. 21/86
P00743	XI	022	71.00	Feb. 21/86
P00744	XI	023	73.00	Feb. 21/86
P00745	XI	024	74.00	Feb. 21/86
P00746	X	012	80.00	Feb. 21/86
P00747	X	013	80.00	Feb. 21/86
P00748	X	014	80.00	Feb. 21/86
P01004	03	001	77.00	June 14/86
P01005	03	002	80.00	June 14/86
P01006	03	003	80.00	June 14/86
P01007	03	004	80.00	June 14/86
P01008	03	005	80.00	June 14/86
P01009	03	006	80.00	June 14/86
P01010	10	006	80.00	June 14/86
P01011	10	007	80.00	June 14/86
P01012	10	008	80.00	June 14/86

HAM NORD TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P01013	10	009	80.00	June 14/86
P01014	10	010	80.00	June 14/86
P01015	10	011	80.00	June 14/86
P01016	10	015	72.00	June 14/86
P01017	10	016	65.00	June 14/86
P01018	11	008	82.00	June 14/86
P01019	11	009	85.00	June 14/86
P01020	11	A	37.00	June 14/86
P01021	11	015	48.00	June 14/86
P01022	11	016	49.00	June 14/86
P01023	11	017	52.00	June 14/86
P01024	11	018	56.00	June 14/86
P01025	11	019	60.00	June 14/86
P01026	11	020	63.00	June 14/86
P01027	11	021	67.00	June 14/86

HAM SUD TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00749	I	013	46.00	Feb. 21/86
P00750	I	014	48.00	Feb. 21/86
P00751	I	015	51.00	Feb. 21/86
P00752	I	016	53.00	Feb. 21/86
P00753	IA	013	41.00	Feb. 21/86
P00754	IA	014	40.00	Feb. 21/86
P00755	IA	015	40.00	Feb. 21/86
P00756	IA	016	40.00	Feb. 21/86
P00757	III	107	80.00	Feb. 21/86
P00758	III	018	80.00	Feb. 21/86
P00759	III	019	80.00	Feb. 21/86
P00760	III	020	80.00	Feb. 21/86
P00761	III	021	80.00	Feb. 21/86
P00762	III	022 + the lake	80.00	Feb. 21/86
P00763	III	023 + the lake	80.00	Feb. 21/86
P00764	III	024 + the lake	80.00	Feb. 21/86
P00765	III	025	80.00	Feb. 21/86
P00766	III	026 + the lake	80.00	Feb. 21/86
P00767	III	027 + the lake	80.00	Feb. 21/86
P00768	III	028 + the lake	80.00	Feb. 21/86
P00769	IV	016	106.00	Feb. 21/86
P00770	IV	017	109.00	Feb. 21/86
P00771	IV	018	113.00	Feb. 21/86
P00772	IV	019	117.00	Feb. 21/86
P00773	IV	020 + the lake	121.00	Feb. 21/86

HAM SUD TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00774	IV	021 + the lake	123.00	Feb. 21/86
P00775	IV	022 + the lake	127.00	Feb. 21/86
P00776	IV	023 + the lake	131.00	Feb. 21/86
P00777	IV	024 + the lake	136.00	Feb. 21/86
P00778	IV	025	140.00	Feb. 21/86
P00779	IV	026	144.00	Feb. 21/86
P00780	IV	027	148.00	Feb. 21/86
P00781	IV	028	149.00	Feb. 21/86
P01028	02	022	40.00	June 14/86
P01029	West of Gosford Rd	017	40.00	June 14/86
P01030	West of Gosford Rd	018	40.00	June 14/86
P01031	West of Gosford Rd	019	40.00	June 14/86
P01032	East of Gosford Rd	020	40.00	June 14/86
P01033	East of Gosford Rd	021	40.00	June 14/86
P01034	East of Gosford Rd	022	40.00	June 14/86
P00548	II	017	30.00	Oct. 26/86
P00550	East of Gosford Rd	017	40.00	Oct. 26/86
P01453	III	015	80.00	Feb. 3/87
P01454	III	016	80.00	Feb. 3/87

LAMBTON TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00957	A	007	48.00	June 14/86
P00958	A	009	48.00	June 14/86

THETFORD TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00688	XI	020 + the lake	90.00	Feb. 21/86
P00689	XI	021 + the lake	87.00	Feb. 21/86
P00690	XI	022	75.00	Feb. 21/86
P00691	XI	023	85.00	Feb. 21/86
P00692	A	001	61.00	Feb. 21/86
P00693	A	002	61.00	Feb. 21/86
P00694	A	003	61.00	Feb. 21/86
P00695	A	004	61.00	Feb. 21/86
P00696	A	005	61.00	Feb. 21/86

WOLFESTOWN TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00725	I	002	80.00	Feb. 21/86
P00726	I	023	80.00	Feb. 21/86
P00727	I	024	80.00	Feb. 21/86
P00973	01	025	80.00	June 14/86

WOTTON TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P00706	B	001	34.00	Feb. 21/86
P00707	B	002	34.00	Feb. 21/86
P00708	B	003	34.00	Feb. 21/86
P00709	B	004	34.00	Feb. 21/86
P00710	B	005	34.00	Feb. 21/86
P00711	B	006	34.00	Feb. 21/86
P00712	B	007	34.00	Feb. 21/86
P00713	B	008	34.00	Feb. 21/86
P00714	B	009	34.00	Feb. 21/86
P00715	B	010	34.00	Feb. 21/86
P00716	B	011	34.00	Feb. 21/86
P00717	B	012	34.00	Feb. 21/86
P00718	B	013	34.00	Feb. 21/86
P00719	B	014	34.00	Feb. 21/86
P00720	B	015	34.00	Feb. 21/86
P00721	B	016	34.00	Feb. 21/86
P00722	B	017	34.00	Feb. 21/86
P00723	C	012	27.00	Feb. 21/86
P00724	C	013	27.00	Feb. 21/86
P01035	01	011	103.00	June 14/86
P01036	01	012	102.00	June 14/86
P01037	01	013	98.00	June 14/86
P01038	04	D	20.00	June 14/86
P01039	04	E	20.00	June 14/86
P01040	04	F	20.00	June 14/86
P01041	04	G	20.00	June 14/86
P01042	05	D	20.00	June 14/86
P01043	05	E	20.00	June 14/86
P01044	05	F	20.00	June 14/86
P01045	05	G	20.00	June 14/86

WOTTON TOWNSHIP

Special Exploration Permit Number	Range	Lot	Hectares	Expiry Date
P01046	07	001	20.00	June 14/86
P01047	07	002	20.00	June 14/86
P01048	07	003	20.00	June 14/86
P01049	07	004	20.00	June 14/86
P01050	07	005	20.00	June 14/86
P01051	07	006	20.00	June 14/86
P01052	07	007	20.00	June 14/86
P01053	07	008	20.00	June 14/86
P01054	07	009	20.00	June 14/86
P01055	07	010	18.00	June 14/86
P01056	08	004	33.00	June 14/86
P01057	08	005	33.00	June 14/86
P01058	08	006	34.00	June 14/86
P01059	08	007	34.00	June 14/86
P01060	08	008	34.00	June 14/86
P01061	08	009	33.00	June 14/86
P01062	08	010	32.00	June 14/86
P01063	08	011	30.00	June 14/86
P01064	08	012	30.00	June 14/86
P01065	08	013	30.00	June 14/86
P01066	C	004	21.00	June 14/86
P01067	C	005	22.00	June 14/86
P01068	C	006	22.00	June 14/86
P01069	C	007	21.00	June 14/86
P01070	C	008	22.00	June 14/86
P01071	C	009	22.00	June 14/86
P01072	C	010	22.00	June 14/86
P01073	C	011	25.00	June 14/86