GEOLOGY AND ZINC

GEOCHEMISTRY AND MINERALIZATION: CAVENDISH TOWNSHIP CLAIMS

ONTARIO NTS 31-D-9-16

Francis T. Manns
for
by Bernardine LeRoy
August 1989

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1.0 INTRODUCTION

The Cavendish property consists of a block of 20 contiguous claims (see Fig. 1) located in northwestern Cavendish Twp.

A program of geological mapping, prospecting, outcrop stripping and soil geochemistry was performed on the Cavendish Property between May 9 to June 6, 1989. The program was initiated on the basis of two zinc zap (dithiazone) anomalies obtained during the summer of 1988.

The purpose of this program was to delineate any possible targets of significant sphalerite (zinc) mineralization; produce a detailed geological map of the property; and determine the feasibility of doing further exploration work on the property.

2.0 RECOMMENDATIONS

The Cavendish property marbles appear favourable to host a polymetallic zinc deposit. The sites of greatest mineralization will be fold noses and the hanging walls of fault zones.

The following recommendations are proposed for the Cavendish Property:

(1) **GEOPHYSICS:** a winter program consisting of VLF-EM and ground magnetometer should be used to delineate targets of sphalerite mineralization containing minor pyrite, pyrrhotite, galena and possibly chalcopyrite. Certain aspects of subsurface structural geology may also be outlined by geophysics giving more detailed targets (such as folding and fault zones) for further work.

(2) **GEOCHEMISTRY:** a detailed soil sampling grid should provide geochemical targets especially in areas presently covered in overburden.

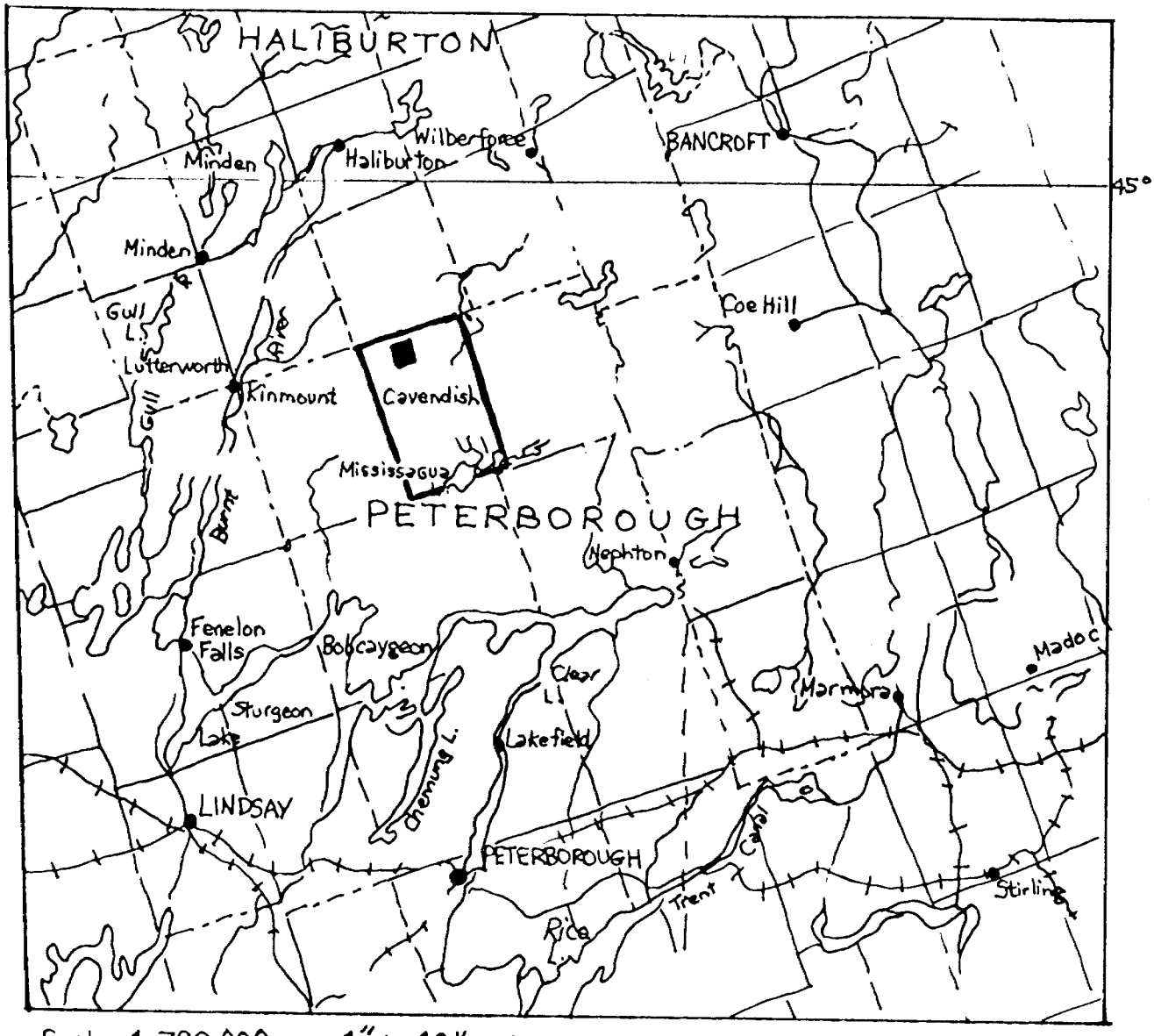
(3) **TRENCHING AND DRILLING:** trenching and stripping should be performed where shallow geophysical and geochemical anomalies are encountered, and exploration drilling should be performed on the deeper anomalies based upon an assessment of favourable structural geology.

3.0 TARGETS

Five significant target areas were obtained from soil geochemistry on a small grid located in the central portion of the property. These targets are located at the following locations (see Fig. 6 - back pocket) and are in descending order of significance.

Figure 1

LOCATION MAP



Scale: 1:792.000 cr 1" to 12½ mi.

CAVENDISH PROPERTY

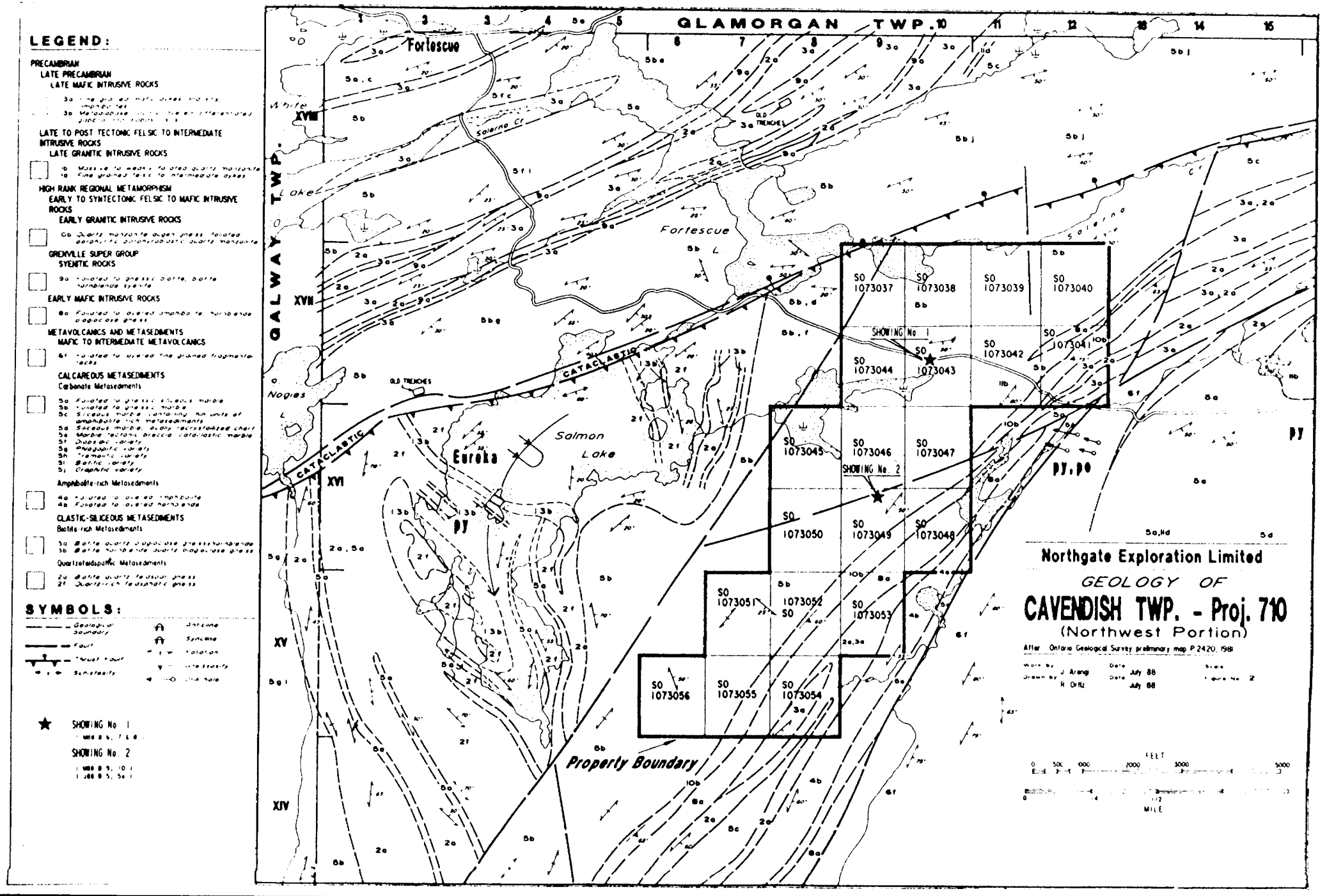

LEGEND:
PRECAMBRIAN
LATE PRECAMBRIAN
LATE MAFIC INTRUSIVE ROCKS
LATE TO POST TECTONIC FELSIC TO INTERMEDIATE INTRUSIVE ROCKS
LATE GRANITIC INTRUSIVE ROCKS
HIGH RANK REGIONAL METAMORPHISM
EARLY TO SYNTECTONIC FELSIC TO MAFIC INTRUSIVE ROCKS
EARLY GRANITIC INTRUSIVE ROCKS
GRENVILLE SUPER GROUP
SYENITIC ROCKS
EARLY MAFIC INTRUSIVE ROCKS
METAVOLCANICS AND METASEDIMENTS
MAFIC TO INTERMEDIATE METAVOLCANICS
CALCAREOUS METASEDIMENTS
Carbonate Metasediments
Amphibolite-rich Metasediments
CLASTIC-SILICEOUS METASEDIMENTS
Biotite-rich Metasediments
Quartzofeldspathic Metasediments
SYMBOLS:
Geological boundary
Fault
Thrust fault
Anticline
Syncline
Foliation
Vertical
Strike hole
SHOWING No. 1
SHOWING No. 2
GLAMORGAN TWP.
GALWAY TWP.
Fortescue
Eureka
Salmon Lake
Nogies
Solarno Cr.
CATACLASTIC
OLD TRENCHES
Property Boundary
SO 1073037
SO 1073038
SO 1073039
SO 1073040
SO 1073041
SO 1073042
SO 1073043
SO 1073044
SO 1073045
SO 1073046
SO 1073047
SO 1073048
SO 1073049
SO 1073050
SO 1073051
SO 1073052
SO 1073053
SO 1073054
SO 1073055
SO 1073056
Northgate Exploration Limited
GEOLOGY OF
CAVENDISH TWP. - Proj. 710
(Northwest Portion)
After Ontario Geological Survey preliminary map P.2420, 1981
Work by J. Arengi
Drawn by R. Ortiz
Date July 88
Date July 88
Figure No. 2
FEET
MILE

TABLE I: LOCATION AND RANKING OF ANOMALIES

ANOMALY	LOCATION	VALUE OF SIGNIFICANCE (l x w x av. value/ 1×10^{6})
1	L1+50S, 0+40E to L1+00S, 0+20W to 0+30E to L0±00, 0+00	239.4
2	L1+50S, 1+90W to L1+50S, 1+60W	4.7
3	L3+00S, 2+80W to 3+00W to L1+50S, 2+80W to 3+00W	2.2
4	L1+00S, 1+40W to L0+00, 1+60W to 1+50W	2.2
5	L1+00S, 1+40W to L0+00, 1+60W to 1+50W	1.8

If coincident geophysics anomalies are located over these areas, then exploratory drilling, trenching and stripping should be considered as the next phase of exploration.

4.0 LOCATION AND ACCESS

The Cavendish property is located 1.7 km east of Salmon Lake along Salmon Lake Road, in northwestern Cavendish Twp. (see location map, Fig. 1). The property is reached via Salmon Lake Road from Hwy. 507. Numerous trails, an MNR access road and the five-points snowmobile trail provide excellent access to claims north and south of Salmon Lake Road.

5.0 FACILITIES

The rental of the Round Lake Hunt Camp cabin (owned by D. Grylls; business phone 1-668-4455) provided lodging for a six-person crew. The cabin is located 50 m north of Salmon Lake Road on the eastern claim line of Claim S0.1073043.

Two vans were used for transportation of personnel, equipment and groceries. Equipment included cooking utensils, propane-powered stove and fridge, and various hand tools (picks, grubhoes, shovels, etc.).

Groceries and camp supplies were obtained from Gooderham and Haliburton (Fig. 2).

6.0 PREVIOUS WORK

The Cavendish property was staked during the summer of 1988 on the basis of strong zinc zap anomalies obtained on boulders at two showings (Arengi, 1988).

7.0 WORK PERFORMED

TABLE 2

WORK PERFORMED

WORK PERFORMED	CLAIMS	DATE
Geological Mapping and Prospecting	SO.207307-SO.1073056	May 10 - June 12/89
Outcrop Stripping	Northeast portion of Claim SO.1073050 Northwest portion of Claim SO.1073049	May 23 - May 25/89
Soil Sampling and Line Cutting	Eastern portion of Claim XO.1073050	May 28-June 3/89
	Northwestern portion of Claim SO.1073049 Southeast portion of Claim SO.1073045	May 28-June 3/89

TABLE 3

REGIONAL STRATIGRAPHIC SUCCESSION OF THE MIDDLE TO LATE PRECAMBRIAN GRENVILLE SUPERGROUP IN THE EELS LAKE AREA

GROUP	FORMATION	LITHOLOGY	THICKNESS
MAYO	Salerno	Arkosic sandstone and thick quartzite units	240 - 600 m (800 - 2000 feet)
	Apsley	Thinly interbedded feldspathic arenite and greywacke; subordinate ferruginous arenite and minor marble	300 - 600 m (1000 - 2000 feet)
	Dungannon	Dolostone and limestone; subordinate calcareous sandstone and siltstone; minor arkosic sandstone, chert and mafic tuff	300 - 1350 m (1000 - 4500 feet)
HERMON	Tory Hill	Thinly interbedded limestone, calcareous greywacke, arkosic sandstone, and chert; subordinate tuff	<30 - 1350 m (<100 - 4500 feet)
	Eels Lake	Thinly interbedded calcareous and feldspathic greywacke; subordinate tuff, marble and quartzite	150 - 300 m (500 - 1000 feet)
		Mafic to intermediate metavolcanics; subordinate felsic metavolcanics; minor metasediments and metasediments	600 - 1500 m (2000 - 5000 feet)
	Cavendish	Mafic to intermediate metavolcanics; subordinate felsic metavolcanics; minor metasediments and marble	600 - 1500 m (2000 - 5000 feet)
	Clanricarde	Arkosic sandstones and siltstones; subordinate feldspathic and calcareous greywacke	150 - 450 m (500 - 450 m
	Cathacoma	Interbedded feldspathic arenite and greywacke; subordinate calcareous greywacke; minor tuff	<150 - 600 m (<500 - 2000 feet)
	Monmouth	Limestone and dolostone; minor greywacke siltstone	<30 - 900 m (<100 - 3000 feet)
ANSTRUTHER LAKE	Upper Subunit	Interbedded feldspathic greywacke and arkosic sandstone and siltstone; minor calcareous mudstone	300 - 1500 m (1000 - 5000 feet)
	Lower Subunit	Arkose and arkosic sandstone and siltstone; subordinate greywacke	

8.0 GEOLOGY

8.1 Regional Geology

The Cavendish property is located within the central portion of the central metasedimentary belt of the Grenville Province. The precambrian lithologies which characterize this belt have been grouped by Bright (1977; Figure 5) into four, progressively younger, stratigraphic units: Middle Precambrian basement gneiss; Anstruther Lake group clastic metasediments; Hermon group clastic to carbonates metasediments with interbedded volcanics; and Mayo group calcareous and metasediments. Bright (1981, 1983) suggests that depositional environment for the precambrian sediments was a volcanic-carbonate rich basin, which covered most of the southern third of the Grenville Province in Ontario. This depositional basin is referred to as the Hastings Basin by Arengi (1988). The Cavendish property lies along the western margin of the Hastings volcano-sedimentary basin (Bright 1981). Due to the presence of extensive carbonates, a better designation would be Hasting's shelf 'platform'.

In the Bancroft Area, migmatitic basement gneisses outcrop as a series of mantled domes which lie along the axis of the NNE trending Harvey-Cardiff anticline and the NE plunging Sommerville-Monmouth anticline. Separating the two anticlines is a major SE trending overturn, isolinally to complexly folded synclinorium. Bright (1977) refers to the combination of these three structures as the Bancroft Anticlinorium, an intensely cross-folded structure. Lithological field relationships are further complicated by the three sets of regional faults present in the area.

The regional metamorphic grade of all the Grenville (800 - 1000 mya) age metasediments and intrusives is amphibolite facies rank.

8.2 Local Geology

The Grenville supergroup metasediments present on the property generally consist of arenites, wackes, feldspathic to calcareous arenites and wackes, and marbles. In all but the latter, the ratio of mafic (biotite and amphibole) to felsic minerals, and feldspar to quartz are the determining factors for arenites, wackes, feldspathic to calcareous arenites and wackes, and marbles. In all but the latter, the ratio of mafic (biotite and amphibole) to felsic minerals, and feldspar to quartz are the determining factors for lithological classification (Table 3, legend Fig 3. All these sediments were deposited on the western margin of the Hastings volcano-sedimentary basin. The intrusive

rocks in the area consist of a porphyritic quartz monzonite, gabbro and diabase. The quartz monzonite is a well foliated medium grained rock containing porphyritic crystals of plagioclase (up to 25%) in a matrix containing up to 10% biotite and hornblende. The gabbro is a medium to coarse grained, poorly to well-foliated, mesocratic to melonocratic, amphibole-rich rock. The diabase occurs as a small body. These intrusive bodies are late-stage and were most likely emplaced during the height of the Grenville Orogeny or soon after (Bright, 1983).

The western half of the property is predominantly covered in white to light grey marble containing less than 3% to 10% siliceous impurities. These marbles belong to the Dunganon formation of Bright, 1979. The area, encompassed by claim SO.1073046 and surrounding portions of claims SO.1073045, SO.1073044 and SO.2073047, displays very complex geology with extensive local faulting and folding. The rocks in this area include in situ migmitized clastic to calcareous metasediments of Bright's 1971 Salmon Lake Formation and gabbros. To the north of this area, extensive overburden coverage is present over most of the northwestern portion of the property. Marbles, again, outcrop at the northern periphery of the overburden coverage.

The geology of the eastern half of the property is dominated by porphyritic quartz monzonite and gabbro sills in interbedded siliceous to feldspathic arentites. A thinly bedded, ferrugineous biotite-quartz-feldspar gneiss (wacke), locally contains up to 5% cubic and massive pyrite, caps the upper Tory Hill formation and forms the boundary between the Mayo Group and Hermon Group (see Fig. 5 for a description of formations and names). Outcrops of this rock occur north and south of showings number 2 and 3, located 75 m south of post number 1 of claim number 1073050 and 120 m east-southeast of post 1 of claim number 2073053, (see Fig. 3 & 4 in back pocket for showing locations) along the MNR access road.

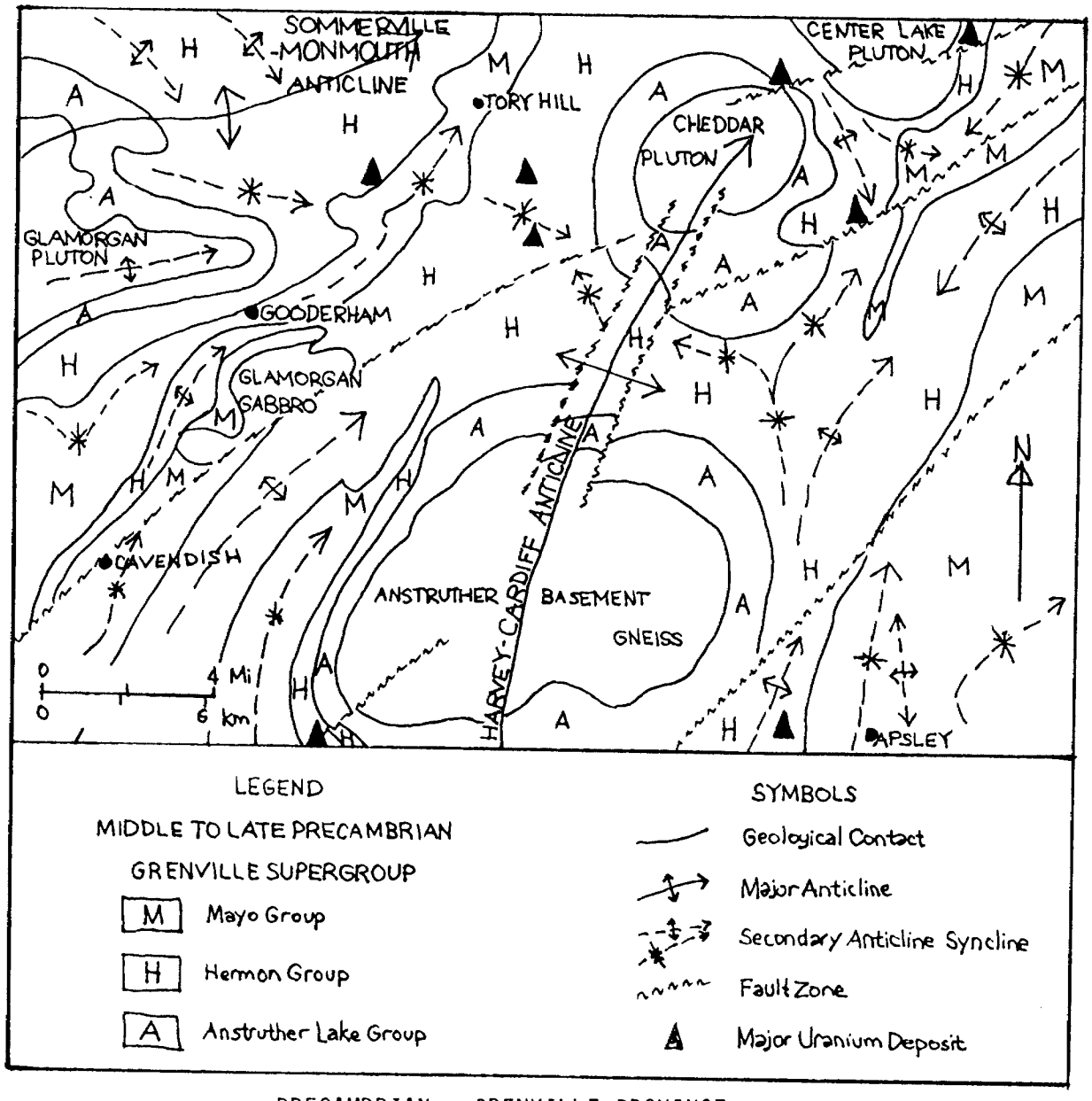
To the east and south of the property, a sequence of mafic to intermediate flows and fine-grained fragmental metavolcanics forms the upper portion of the Hermon Group. In southwestern Cavendish Twp., a substantial portion of coarse pyroclastics are located in this volcanic unit and has led Bright (1981) to suggest that volcanic centre is close to this area.

In eastern Anstruther Twp., marbles of the Dungannon Formation were observed by Bartlett and DeKemp, 1987, to contain stromatolitic bodies of the algal laminite type. This stromatolitic-bearing marble unit belongs to the same marble belt as the Cavendish marbles (Arengi, 1988). Bartlett and DeKemp (1987) suggest that these Grenville-age stromatolitic-bearing units were laid down in a shallow water (evaporitic sabkha) environment, probably on the flanks of volcanoes during times of acquiescence.

Figure 5

GENERAL REGIONAL STRATIGRAPHY & STRUCTURE

THE EELS LAKE AREA



PRECAMBRIAN - GRENVILLE PROVINCE Bright, 1977

8.3 Structural Geology

The general lithological trend observed on Cavendish Property is north-northeast. This trend is tangential to the outer boundary of the Anstruther Dome and is a direct result of the doming introduced during the uplift and intrusion of the migmatized basement gneiss which composes the complex.

Regionally, the Cavendish property is located within the southeast trending synclinorium which lies between the Harvey-Cardiff anticline and Sommerville-Monmouth anticline. Complex, local to small scale, isoclinal and overturned folding as well as extensive cataclastic and secondary faulting characterize this area. The older Hermon Group volcano-sedimentary packages are exposed along the axis of local anticlinal structures while the younger Mayo Group calcareous to clastic metasediments outcrop along the axis of local synclinal structures (Bright, 1977) (see Fig. 5). Along the north boundary of Cavendish Twp., the Solerno Creek fault is a Mayor northeast trending cataclastic fault zone and is downthrown on the northwest side.

The Cavendish property is located within one of the north-northeast trending local synclinal structures (see Fig. 5). On the property, a number of tight (3-10 cm's) and small scale (2-3m's) "S" and "Z" folds were observed within the marbles, metasediments, porphyritic quartz monzonite and gabbros along the MNR access road in the southern claims. The majority of this folding occurs proximal to the boundary of the Mayo and Hermon Groups.

9.0 MINERALIZATION

Three zinc-zap showings are present on the property; showings number 1 and 2 were discovered in the summer of 1988 (Arengi, 1988), while showing number 3 was found during the 1989 program. Showing number 1, located 80 m southeast of post 1 of claim SO.2073044 (see Fig. 3), consists of smithsonite coated boulders. The source of these boulders could not be traced either north or south of Salmon Lake due to extensive overburden coverage. Showing number 2 (see Fig. 3) consists of smithsonite coated boulders, boulders containing bands with up to 3% sphalerite (visual observation), and outcrop containing weathered out pyrite and sphalerite grains with black hematite fracture fillings. Showing number 3 consists of smithsonite coated boulders and boulders with bands containing up to 1% sphalerite (visual estimate).

Encouraging assay values (0.97% Zn and 3.00% Zn from showing number 2 and 1.07% from showing number 3 - see Appendix I)

obtained were from 2 to 3 cm wide bands containing sphalerite mineralization in marble boulders at showings number 2 and 3. These boulders appear to be local and do not appear to have been glacially transported. Samples taken from outcrop stripped using a 3" pump (see Fig. 4) at showing number 2 did not yield any significant zinc assay values (see Appendix I). The lack of abundant observed zinc mineralization in the marble should not be seen as very discouraging, as the marbles are in areas extensively covered in swamp and overburden. Also, the Cavendish marbles do appear favourable to host a polymetallic, Mississippi Valley Type (MVT) deposit based upon the model of Bartlett and DeKemp, 1987.

The model presented by Bartlett and DeKemp, 1987, for polymetallic (Zn, Pb, Cu, Ag and Au) MVT deposits, has the following characteristics:

1) these deposits occur proximal to volcanic centres (as opposed to monomineralic zinc deposits); and

2) they are hosted in stromatolitic-bearing shallow water carbonate units.

The mechanisms by which these host rocks become enriched in polymetallic elements is similar to that of MVT deposits. The salient points of the well accepted model for MVT deposits by Jackson and Beales, 1967 (in Anderson and MacQueen, 1987) include:

1) the formation of metalliferous brines in shales, at depth;

2) movement of the brines up to basin margins due to compaction;

3) passage of the brines through evaporitic beds, where the fluids acquire reduced sulphur;

4) entrapment of fluids in porous shall-water carbonate beds; and

5) precipitation of sulphides.

The source for the metallic elements within these deposits may have been erosion, oceanic water or volcanic exhalations (Bartlett & DeKemp, 1987).

The Cavendish marbles belong to a belt of stromatolitic-bearing carbonates and occur proximal to a possible volcanic centre (refer to section 7.2 for more details). A fine bedded pyrite-bearing wacke, underlying the marbles may have been a favourable lithology for the transportation of metalliferous brines.

Similarly, Bartlett and DeKemp (1987) note that stromatolites and evaporites have been found at the Balmat-Edwards deposit, consistent with the model for MVT deposits. Ore shoots at the Balmat-Edwards are structurally controlled with the greatest sulphide enrichment occurring in the fold noses of crossfolds and in the hanging walls of fault zones (Lea and Dill, 1967). The Cavendish property is similarly located in an intensely cross-folded synclinal structure and is heavily faulted. Therefore, the areas of greatest potential for mineralization would be fold noses and hanging walls.

10.0 GEOCHEMISTRY (SOIL SURVEY)

A soil grid was cut with 50 m line spacings and flagged with 10 m stations. The base line and tie line run north-south with east-west running lines. The zero point for the grid lies on the MNR access road at the location of the second showing (see Fig. 6). A total of 359 soil samples were taken.

B-horizon soil was collected using handtools to strip the humus layer. In areas of swamp, B-horizon soil was unobtainable and humus was sampled instead. The majority of the grid area is covered by a well-developed sandy to clay-rich B-horizon. Values derived from soil analysis for Zn in ppm, performed by Technical Services Laboratories in Timmins using AAS method), are located in Appendix A.

The 2 sigma threshold value for Zn in ppm is 601 and was obtained using statistical methods with a 10% duplicate sample population (see Appendix B). Five anomalous trends appear on the grid at the following locations (see Fig. 6):

1) L1+50S, 0+40E to L100S, 0+20W to 0+30E to L0+00, 0+00

2) L1+50S, 1+90W to L1+50S, 1+60W

3) L3+00S, 2+80W to 3+00W to L1+50S, 2+80W to 3+00W

4) L1+00S, 1+40W to L0+00, 1+60W to 1+50W

5) L1+00S, 1+40W to L0+00, 1+60W to 1+50W

These trends are subparallel to the general strike of the marble belt and should be explored in more detail using geophysics and stripping.

11.0 PERSONNEL

NAME	POSITION	DATE
Bernardine Leroy	Senior	May 9 - June 12, 1989
Robert Herfst	Intermediate	May 9 - June 12, 1989
Sonja Lednicky	Intermediate	May 9 - June 12, 1989
Mark Kolebaba	Intermediate	May 9 - June 12, 1989
Ken Cook	Intermediate	May 9 - June 12, 1989
Mark Cooper	Intermediate	May 13 - June 12, 1989
Gerry Ritchie	Junior	May 13 - June 12, 1989

12.0 REFERENCES

Anderson, G.M. and MacQueen, 1987:
Mississippi Valley Type Lead-Zinc Deposits; pg in Ore Deposit Models edited by R.G. Roberts and P.A. Sheaham. Geoscience reprint series 3.

Arengi, J.T. 1988:
Report on Reconnaissance Exploration of Grenville Marbles, Southeastern Ontario, Northgate Exploration Limited, Project 710

Lea, E.R. and Dill, D.B., 1968:
Zinc Deposits of the Balmat-Edwards District, New York; pg. 20-48 in Ore Deposits of the United States, 1933-1967; The Grton Sales Vol. 1; edited by J.D. Ridge, American Institute of Mining Engineering

MAPS

Bartlett, J.R. and DeKemp, E.A., 1987:
Lithofacies Stromatolite Localities, Metallic Mineral Occurrences and Geochemical Anomalies Associated with Carbonate Metasediments of the Burleigh Falls - Bancroft-Madoc Area, Southern Ontario; OGS Map P3079, Geol. Series-Preliminary Map
Scale: 1:126,720. Geol. 1981, 2982, 2985.

Bright, E.G., 1977:
Eels Lake Area, Southern Ontario
OGS Preliminary Map P2205; Geological Series
Scale: 1:63,360 / 1" to 1 mile
Geology 1975, 1976, 1977. Compilation 1978.

Bright, E.G., 1981(a)
Precambrian Geology of Cavendish Twp. (Northern Part), Peterborough County, Southern Ontario.
OGS Preliminary Map 2420, Geological Series
Scale: 1:15,840 1" to 1/4 mile
Geology 1975, 1976, 1977.

Bright, E.G., 1981(b)
Precambrian Geology of Anstruther Twp. (Northern Part), Peterborough County, Southern Ontario
OGS Preliminary Map 2422, Geological Series
Scale: 1:15,840 / 1" to 1/4 mile
Geology 1975, 1976, 1977.

APPENDIX A

ROCK AND SOIL

ASSAYS AND ANALYSES

*115.20

T S L LABORATORIES
DIVISION OF BURGENER TECHNICAL ENTERPRISES LIMITED
2031 RIVERSIDE DRIVE, UNIT #2
TIMMINS, ONTARIO
P4N 7C3
(705) 268-4441 FAX: (705) 268-4420

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Orofino Resources
Suite 2701, P.O. Box 143
Toronto, Ontario
M5X 1C7
Attention: Dr. F.T. Manns

REPORT No.
W2701

INVOICE #: 2622
P.O.:

SAMPLE(S) OF rock

B. LeRoy
project 710

	Zinc ppm	Zinc percent
6601	10000	0.97
6602	>10000	3.00
6603	>10000	1.07
6604	560	
6605	1000	
6606	900	
6607	4300	
8401	63	
8402	82	
8403	86	
8404	240	
8405	240	
8406	80	
8407	110	
8408	66	
8409	20	
8410	41	
8411	200	
8412	195	
8413	68	

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Jun 30/89

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Toronto, Ontario
M5X 1C7
Attention: Dr. F.T. Manns

REPORT No.
W2701

INVOICE #: 2622
P.O.:

SAMPLE(S) OF rock

B. LeRoy
project 710

	Zinc ppm	Zinc percent
8414	49	
8415	120	
8416	78	
8417	79	
8418	47	
8419	30	
8420	105	

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CERTIFICATE OF ANALYSIS

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Suite 2701
P.O.Box 143
Toronto, Ontario
M5X 1C7 Att. Dr. F.T. Manns

REPORT No.
W2703

INVOICE #: 2623
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
BL-1	120
BL-2	105
BL-3	240
BL-4	37
BL-5	47
BL-6	70
BL-7	410
BL-8	560
BL-9	560
BL-10	100
BL-11	69
BL-12	270
BL-13	180
BL-14	130
BL-15	460
BL-16	130
BL-17	77
BL-18	150
BL-19	98
BL-20	240

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SIGNED Evelyn White

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T S L LABORATORIES
DIVISION OF BURGENER TECHNICAL ENTERPRISES LIMITED
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TIMMINS, ONTARIO
P4N 7C3
(705) 268-4441 FAX: (705) 268-4420

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Orofino Resources Ltd.
Suite 2701
P.O.Box 143
Toronto, Ontario
M5X 1C7 Att. Dr. F.T. Manns

REPORT No. W2703

INVOICE #: 2623
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
BL-21	22
BL-22	20
BL-23	69
BL-24	110
BL-25	110
BL-26	54
BL-27	105
BL-28	44
BL-29	97
BL-30	110
BL-31	120
BL-32	47
BL-33	56
BL-34	36
BL-35	53
BL-36	200
BL-37	98
BL-38	58
BL-39	59
BL-40	170

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Jun 30/89

SIGNED Evelyn Lintz

T S L LABORATORIES
DIVISION OF BURGENER TECHNICAL ENTERPRISES LIMITED
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TIMMINS, ONTARIO
P4N 7C3
(705) 268-4441 FAX: (705) 268-4420

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Orofino Resources Ltd.
Suite 2701
P.O.Box 143
Toronto, Ontario
M5X 1C7 Att. Dr. F.T. Manns

REPORT No. W2703

SAMPLE(S) OF Soil/Humus

INVOICE #: 2623
P.O.:

B.LeRoy
710

	Zn ppm
BL-41	640
BL-42	220
BL-43	66
BL-44	180
BL-45	200
BL-46	140
BL-47	350
BL-48	220
BL-49	260
BL-50	150
BL-51	300
BL-52	165
BL-53	220
BL-54	51
BL-55	59
BL-56	53
BL-57	200
BL-58	74
BL-59	150
BL-60	240

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REPORT No. W2703

SAMPLE(S) OF Soil/Humus

INVOICE #: 2623
P.O.:

B.LeRoy
710

	Zn ppm
BL-61	195
BL-62	140
BL-63	98
BL-64	83
BL-65	93
BL-66	92
BL-67	92
BL-68	77
BL-69	250
BL-70	130
BL-71	100
BL-72	180
BL-73	60
BL-74	260
BL-75	350
BL-76	230
BL-77	130
BL-78	370
BL-79	530
BL-80	68

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REPORT No. W2703

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SAMPLE(S) OF Soil/Humus

B.LeRoy
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	Zn ppm
BL-81	47
BL-82	32
BL-83	50

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REPORT No. W2702

INVOICE #: 2624
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
GR-1	185
GR-2	270
GR-3	165
GR-4	240
GR-5	420
GR-6	400
GR-7	300
GR-8	195
GR-9	200
GR-10	530
GR-11	480
GR-12	350
GR-13	92
GR-14	400
GR-15	180
GR-16	1100
GR-17	410
GR-18	71
GR-19	240
GR-20	610

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REPORT No.
W2702

INVOICE #: 2624
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
GR-21	410
GR-22	470
GR-23	170
GR-24	360
GR-25	80
GR-26	300
GR-27	220
GR-28	620
GR-29	360
GR-30	270
GR-31	270
GR-32	90
GR-33	70
GR-34	300
GR-35	403
GR-36	115
GR-37	268
GR-38	130
GR-39	165
GR-40	81

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REPORT No. W2702

INVOICE #: 2624
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
GR-41	330
GR-42	110
GR-43	590
GR-44	560
GR-45	84
GR-46	95
GR-47	160
GR-48	160
GR-49	250
GR-50	470
GR-51	450
GR-52	1000
GR-53	660
GR-54	125
GR-55	115
GR-56	180
GR-57	820
GR-58	150
GR-59	140
GR-60	300

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REPORT No. W2702

SAMPLE(S) OF: Soil/Humus

INVOICE #: 2624
P.O.:

B.LeRoy
710

	Zn ppm
GR-61	260
GR-62	260
GR-63	550
GR-64	300
GR-65	540
GR-66	360
GR-67	310
GR-68	350
GR-69	630
GR-70	390
GR-71	240
GR-72	440
GR-73	510
GR-74	420
GR-75	135
GR-76	360
GR-77	580
GR-78	180
GR-79	340
GR-80	230

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REPORT No. W2702

INVOICE #: 2624
P.O.:

SAMPLE(S) OF: Soil/Humus

B.LeRoy
710

	Zn ppm
GR-81	79
GR-82	120
GR-83	195
GR-84	200
GR-85	195
GR-86	135
GR-87	460
GR-88	190
GR-89	155
GR-90	390
GR-91	1000
GR-92	330
GR-93	320
GR-94	360
GR-95	280
GR-96	300
GR-97	85
GR-98	83
GR-99	300
GR-100	31

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REPORT No. W2702

INVOICE #: 2624
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
GR-101	51
GR-102	690
GR-103	71
GR-104	48
GR-105	67
GR-106	84
GR-107	100
GR-108	83
GR-109	330
GR-110	120
GR-111	89
GR-112	200
GR-113	165
GR-114	290
GR-115	100
GR-116	450
GR-117	420
GR-118	165
GR-119	83
GR-120	89

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REPORT No. W2702

INVOICE #: 2624
P.O.:

SAMPLE(S) OF Soil/Humus

B.LeRoy
710

	Zn ppm
GR-121	175
GR-122	162
GR-123	599
GR-124	576
GR-125	414
GR-126	778
GR-127	185
GR-128	201
GR-129	126
GR-130	95
GR-131	103
GR-132	388
GR-133	364
GR-134	111
GR-135	174
GR-136	342
GR-137	837
GR-138	137
GR-139	164

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REPORT No. W2706

SAMPLE(S) OF Soil\Humus

INVOICE #: 2625
P.O.:

B.LeRoy
710

	Zn ppm
RAH-34	346
RAH-35	295
RAH-36	161
RAH-37	151
RAH-38	179
RAH-39	164
RAH-40	244
RAH-41	139
RAH-42	261
RAH-43	206
RAH-44	177
RAH-45	147
RAH-46	209
RAH-47	157
RAH-48	255
RAH-49	300
RAH-50	255
RAH-51	274
RAH-52	157

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REPORT No. W2704

SAMPLE(S) OF Soil\Humus

INVOICE #: 2626
P.O.:

B.LeRoy
710

	Zn ppm
M-1	360
M-2	57
M-3	25
M-4	46
M-5	46
M-6	300
M-7	37
M-8	250
M-9	290
M-10	270
M-11	240
M-12	87
M-13	680
M-14	99
M-15	83
M-16	130
M-17	150
M-18	105
M-19	200
M-20	720

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REPORT No.
W2704

INVOICE #: 2626
P.O.:

SAMPLE(S) OF Soil\Humus

B.LeRoy
710

	Zn ppm
M-21	120
M-22	120
M-23	92
M-24	530
M-25	320
M-26	260
M-27	220
M-28	380
M-29	270
M-30	140
M-31	210
M-32	160
M-33	140
M-34	200
M-35	58
M-36	63
M-37	360
M-38	280
M-39	290
M-40	350

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REPORT No. W2704

SAMPLE(S) OF Soil\Humus

INVOICE #: 2626
P.O.:

B.LeRoy
710

	Zn ppm
M-41	190
M-42	130
M-43	200
M-44	220
M-45	200
M-46	130
M-47	79
M-48	220
M-49	170
M-50	93
M-51	125
M-52	280
M-53	240
M-54	185
M-55	250
M-56	220
M-57	83
M-58	290
M-59	92
M-60	115

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REPORT No.
W2704

INVOICE #: 2626
P.O.:

SAMPLE(S) OF Soil\Humus

B.LeRoy
710

	Zn ppm
M-61	115
M-62	120
M-63	160
M-64	290
M-65	750
M-66	110
M-67	81
M-68	260

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REPORT No. W2705

SAMPLE(S) OF Soil\Humus

INVOICE #: 2627
P.O.:

B.LeRoy
710

	Zn ppm
MC-1	620
MC-2	40
MC-3	60
MC-4	390
MC-5	140
MC-6	180
MC-7	130
MC-8	230
MC-9	175
MC-10	190
MC-11	290
MC-12	270
MC-13	300
MC-14	93
MC-15	115
MC-16	890
MC-17	520
MC-18	350
MC-19	260
MC-20	200

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REPORT No. W2705

INVOICE #: 2627
P.O.:

SAMPLE(S) OF Soil\Humus

B.LeRoy
710

	Zn ppm
MC-21	185
MC-22	300
MC-23	63
MC-24	31
MC-25	54
MC-26	120
MC-27	300
MC-28	86
MC-29	240
MC-30	90
MC-31	195
MC-32	150
MC-33	145
MC-34	93
MC-35	140
MC-36	370
MC-37	330
MC-38	330
MC-39	320
MC-40	110

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REPORT No. W2705

SAMPLE(S) OF Soil\Humus

INVOICE #: 2627
P.O.:

B.LeRoy
710

	Zn ppm
MC-41	180
MC-42	88
MC-43	67
MC-44	650
MC-45	75
MC-46	45
MC-47	350
MC-48	870
MC-49	470
MC-50	460

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APPENDIX B

SOIL ZINC STATISTICS

Zinc geochemistry ppm - Cavendish Township - Project 710

1989

Sample #		RAH	MC	M	BL	GR
1	19 RAH		620	360	120	185
2	50 MC		40	57	105	270
3	68 M		60	25	240	165
4	83 BL		390	46	37	240
5	139 GR		140	46	47	420
6			180	300	70	400
7	359 Samples		130	37	410	300
8			230	250	560	195
9			175	290	560	200
10			190	270	100	530
11			290	240	69	480
12			270	87	270	350
13			300	680	180	92
14			93	99	130	400
15			115	83	460	180
16			890	130	130	1100
17			520	150	77	410
18			350	105	150	71
19			260	200	98	240
20			200	720	240	610
21			185	120	22	410
22			300	120	20	470
23			63	92	69	170
24			31	530	110	360
25			54	320	110	80
26			120	260	54	300
27			300	220	105	220
28			86	380	44	620
29			240	270	97	360
30			90	140	110	270
31			195	210	120	270
32			150	160	47	90
33			145	140	56	70
34		346	93	200	36	300
35		295	140	58	53	403
36		161	370	63	200	115
37		151	330	360	98	268
38		179	330	280	58	130
39		164	320	290	59	165
40		244	110	350	170	81
41		139	180	190	640	330
42		261	88	130	220	110
43		206	67	200	66	590
44		177	650	220	180	560
45		147	75	200	200	84
46		209	45	130	140	95
47		157	350	79	350	160
48		255	870	220	220	160
49		300	470	170	260	250
50		255	460	93	150	470
		274				
		157				

51	125	300	450
52	280	165	1000
53	240	220	660
54	185	51	125
55	250	59	115
56	220	53	180
57	83	200	820
58	290	74	150
59	92	150	140
60	115	240	300
61	115	195	260
62	120	140	260
63	160	98	550
64	290	83	300
65	750	93	540
66	110	92	360
67	81	92	310
68	260	77	350
69		250	630
70		130	390
71		100	240
72		180	440
73		60	510
74		260	420
75		350	135
76		230	360
77		130	580
78		370	180
79		530	340
80		68	230
81		47	79
82		32	120
83		50	195
84			200
85			195
86			135
87			460
88			190
89			155
90			390
91			1000
92			330
93			320
94			360
95			280
96			300
97			85
98			83
99			300
100			31
101			51
102			690

						71	103
						48	104
						67	105
						84	106
						100	107
						83	108
						330	109
						120	110
						89	111
						200	112
						165	113
						290	114
						100	115
						450	116
						420	117
						165	118
						83	119
						89	120
						175	121
						162	122
						599	123
						578	124
						414	125
						778	126
						185	127
						201	128
						126	129
						95	130
						103	131
						388	132
						364	133
						111	134
						174	135
						342	136
						837	137
						137	138
						164	139

Mean	215	247	208	180	295
Std. Deviation	62	198	148	132	208
Number	19	50	68	83	139

2 SIGMA	801 ppm	95 % ANOMALY	Grand mean	236
3 SIGMA	784 ppm	99 % ANOMALY	std. deviation	182
			Total number	359

APPENDIX C

STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

The following statements are true:

1. I am a graduate geologist of Brock University, St. Catharines, Ont., holding a BSc.(hon) degree in geology.

2. I have had three field seasons of work experience in geology.

3. I was present throughout the operation of the project for which this report is written and that the information presented in this report is factual and accurate, to the best of my knowledge.

Francis T. Manns (for)

Bernardine LeRoy

APPENDIX D

TECHNICAL DATA STATEMENT

Ontario

Ministry of Natural Resources

File _____

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

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

Proj. #710-C
Type of Survey(s) GEOLOGICAL, GEOCHEMICAL
Township or Area Cavendish Twp.
Claim Holder(s) NORTHGATE EXPLORATION LIMITED
P.O. Box 143, 1 First Cdn. Pl., Toronto, Ont. M5X 1C7
Survey Company NORTHGATE EXPLORATION LIMITED
Author of Report Bernardine LeRoy
Address of Author c/o Northgate Exploration Ltd., - as above
Covering Dates of Survey May 9/89 - August 21/89 (linecutting to office)
Total Miles of Line Cut N/A

~~SPECIAL PROVISIONS~~ CREDITS REQUESTED	MAN-DAYS	DAYS per claim
ENTER 40 days (includes line cutting) for first survey.	Geophysical	
	--Electromagnetic	
	--Magnetometer	
	--Radiometric	
ENTER 20 days for each additional survey using same grid.	--Other	
	Geological 40	
	Geochemical 29.4	

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

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

DATE: August 22/89 SIGNATURE: Bernardine LeRoy
Author of Report or Agent

Res. Geol. _____ Qualifications 2.8866

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
SO	1073037
	1073038
	1073039
	1073040
	1073041
	1073042
	1073043
	1073044
	1073045
	1073046
	1073047
	1073048
	1073049
	1073050
	1073051
	1073052
	1073053
	1073054
	1073055
	1073056

TOTAL CLAIMS 20

If space insufficient, attach list

OFFICE USE ONLY

837 (5/79)

GEOPHYSICAL TECHNICAL DATA

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

Number of Stations _____ Number of Readings _____

Station interval _____ Line spacing _____

Profile scale _____

Contour interval _____

MAGNETIC

Instrument _____

Accuracy – Scale constant _____

Diurnal correction method _____

Base Station check-in interval (hours) _____

Base Station location and value _____

_____

ELECTROMAGNETIC

Instrument _____

Coil configuration _____

Coil separation _____

Accuracy _____

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

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

Parameters measured _____

GRAVITY

Instrument _____

Scale constant _____

Corrections made _____

_____

Base station value and location _____

_____

Elevation accuracy _____

INDUCED POLARIZATION
RESISTIVITY

Instrument _____

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time _____ Frequency _____

– Off time _____ Range _____

– Delay time _____

– Integration time _____

Power _____

Electrode array _____

Electrode spacing _____

Type of electrode _____

SELF POTENTIAL

Instrument _____ Range _____

Survey Method _____

_____

Corrections made _____

_____

RADIOMETRIC

Instrument _____

Values measured _____

Energy windows (levels) _____

Height of instrument _____ Background Count _____

Size of detector _____

Overburden _____

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey _____

Instrument _____

Accuracy _____

Parameters measured _____

_____

Additional information (for understanding results) _____

_____

_____

AIRBORNE SURVEYS

Type of survey(s) _____

Instrument(s) _____

(specify for each type of survey)

Accuracy _____

(specify for each type of survey)

Aircraft used _____

Sensor altitude _____

Navigation and flight path recovery method _____

_____

Aircraft altitude _____ Line Spacing _____

Miles flown over total area _____ Over claims only _____

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken _____

_____

_____

Total Number of Samples _____

Type of Sample _____
(Nature of Material)

Average Sample Weight _____

Method of Collection _____

_____

Soil Horizon Sampled _____

Horizon Development _____

Sample Depth _____

Terrain _____

_____

Drainage Development _____

Estimated Range of Overburden Thickness _____

_____

_____

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

Mesh size of fraction used for analysis _____

_____

_____

_____

General _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ANALYTICAL METHODS

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

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

Others _____

Field Analysis (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Field Laboratory Analysis

No. (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Commercial Laboratory (_____ tests)

Name of Laboratory _____

Extraction Method _____

Analytical Method _____

Reagents Used _____

General _____

_____

_____

_____

_____

_____

_____

_____

_____

Ontario

900

Ministry of
Northern Development
and Mines

Ministère du
Développement du Nord
et des Mines

Mining Lands Section
880 Bay Street, 3rd Floor
Toronto, Ontario
M5S 1Z8

Telephone: (416) 965-4888

November 07, 1989

Your File: W8909-47
Our File: 2.12692

Mining Recorder
Ministry of Northern Development and Mines
10 Wellesley Street E.
1st Floor
Toronto, Ontario
M4Y 1G2

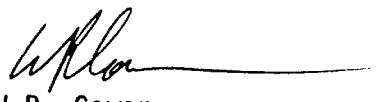
Dear Madam:

Re: Notice of Intent dated October 5, 1989 for Geological and Geochemical Survey submitted on Mining Claims SO 1073045 et al in Cavendish Township.

The assessment work credits, as listed with the above-mentioned Notice of Intent have been approved as of the above date.

Please inform the recorded holder of these mining claims and so indicate on your records.

Yours sincerely,



W.R. Cowan
Provincial Manager, Mining Lands
Mines & Minerals Division
RM
RM:eb
Enclosure

cc: Mr. G.H. Ferguson
Mining and Lands Commissioner
Toronto, Ontario

Resident Geologist
Toronto, Ontario

Northgate Exploration Ltd.
P.O. Box 143
1 First Canadian Place
Suite 2701
Toronto, Ontario
M5X 1C7

Ministry of Northern Development and Mines

Ontario

Technical Assessment Work Credits

File 2.12692

Date October 5, 1989

Mining Recorder's Report of Work No. W8909-47

AMENDED

Recorded Holder

NORTHGATE EXPLORATION LTD.

Township or Area

CAVENDISH TOWNSHIP.

Type of survey and number of Assessment days credit per claim	Mining Claims Assessed
Geophysical	
Electromagnetic _____ days	SO 1073045 1073049 to 052 incl.
Magnetometer _____ days	
Radiometric _____ days	
Induced polarization _____ days	
Other _____ days	
Section 77 (19) See "Mining Claims Assessed" column	
Geological 40 days	
Geochemical 29.4 days	
Man days ☒ Airborne ☐	
Special provision ☐ Ground ☒	
☒ Credits have been reduced because of partial coverage of claims.	
☐ Credits have been reduced because of corrections to work dates and figures of applicant.	

Special credits under section 77 (16) for the following mining claims

40 days Geological
0 days Gecchemical

SO 1073037 to 044 incl.
1073046 to 048 incl.
1073053 to 056 incl.

No credits have been allowed for the following mining claims

☐ not sufficiently covered by the survey ☐ insufficient technical data filed

The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical - 80; Geologocal - 40; Geochemical - 40; Section 77(19) - 60.

MLS Res. Geologist - Tweed

Aug. 12

Ministry of Northern Development and Mines
Ontario

Report of Work
(Geophysical, Geological, Geochemical and Expenditures)

DOCUMENT No. W8909•47

Instructions: – Please type or print.
– If number of mining claims traversed exceeds space on this form, attach a list.
Note: – Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns.
– Do not use shaded areas below.

Proj. #710-C

Mining Act

Type of Survey(s): GEOLOGICAL/GEOCHEMICAL/PROSPECTING 2.12692	Township or Area: Cavendish M-72 ✓
Claim Holder(s): NORTHGATE EXPLORATION LIMITED ✓	Prospector's Licence No.: T-835
Address: P.O. Box 143, 1 First Canadian Pl., Ste.2701, Toronto, Ontario M5X 1C7 ✓	
Survey Company: NORTHGATE EXPLORATION LIMITED ✓	Date of Survey (from & to): Day 09 Mo. 05 Yr. 89 / Day 12 Mo. 06 Yr. 89 — Total Miles of line Cut: -
Name and Address of Author (of Geo-Technical report): Bernardine LeRoy, c/o Northgate Exploration Limited - as above ✓	

Credits Requested per Each Claim in Columns at right

		Days per Claim
Special Provisions: For first survey: Enter 40 days. (This includes line cutting) For each additional survey: using the same grid: Enter 20 days (for each)	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	
Man Days: Complete reverse side and enter total(s) here	Geophysical	Days per Claim
	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other SP	
	Geological 40	~~58.8~~ /
	Geochemical	29.4
Airborne Credits: Note: Special provisions credits do not apply to Airborne Surveys.		Days per Claim
	Electromagnetic	
	Magnetometer	
	Radiometric	

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
SO	1073037	
	1073038	
	1073039	
	1073040	
	1073041	
	1073042	
	1073043	
	1073044	
	1073045	
	1073046	
	1073047	
	1073048	
	1073049	
	1073050	
	1073051	
	1073052	
	1073053	
	1073054	
	1073055	
	1073056	

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.

RECEIVED
JUL - 6 1989
MINING LANDS SECTION

SOUTHERN ONTARIO MINING DIVISION
RECEIVED
JUN 23 1989
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

Expenditures (excludes power stripping)

Type of Work Performed

Performed on Claim(s)

Calculation of Expenditure Days Credits
Total Expenditures $ ÷ 15 = Total Days Credits

Instructions
Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

claims covered by this report of work 21 — 20 ✓

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
1388	June 23/89	
	Date Approved as Recorded	Branch Director
	See memo attached	

Date	Recorded Holder or Agent (Signature)
June 23, 1989	

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Assessment Work Breakdown

Man Days are based on eight (8) hour Technical or Line-cutting days. Technical days include work performed by consultants, draftsmen, etc..

Type of Survey	Technical Days		7	=	Technical Days Credits	+	Line-cutting Days	=	Total Credits	÷	No. of Claims	=	Days per Claim
GEOLOGICAL	168	X	7	=	1,176	+	-	=	1,176	÷	20	=	58.8
GEOCHEMISTRY/PROSPECTING	84	X	7	=	588	+	-	=	588	÷	20	=	29.4
		X	7	=		+		=		÷		=	
		X	7	=		+		=		÷		=	

6 Person crew worked on property from May 9th until June 12th inclusive. They will produce a geological map and report, using trails, roads, claim lines and posts for control. They will also produce a small geochem grid and bedrock assay results from surface showings.

Glamorgan Twp. (M-95)

Galway Twp. (M-94)

Anstruther Twp. (M-45)

Harvey Twp. (M-101)

Burleigh Twp. (M-62)

THE TOWNSHIP
OF

CAVENDISH

COUNTY OF
PETERBOROUGH

SOUTHERN ONTARIO
MINING DIVISION

SCALE: 1 INCH = 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S.
LEASE	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	#
CANCELLED	C.
PATENTED FOR S.R.O.	

NOTES

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

400' Surface Rights Reservation along the shores of all lakes and rivers

For status of summer resort locations & islands please contact Ministry of Natural Resources

Original shoreline shown thus

FRI shoreline shown thus

Patents Map shoreline shown thus

Area shown thus - - - - reserved for proposed Provincial Park, withdrawn from staking Sec. 34(d) of Mining Act File 160708

Mining claims staked in this Tp. subject to Sec. 118 of Mining Act

SAND & GRAVEL

- (G1) Gravel File 154616
- (G2) Gravel " 21547
- (G3) M.N.R. Gravel Pit 76 File 21538
- (G4) Gravel File 40832
- (G6) Gravel " "
- (G7) Gravel " 73125
- (Q) QUARRY PERMIT

- (G5) M.N.R. Gravel Pit No. 138 File 152744
- (G8) Gravel File 104960
- (G9) Gravel File 40832

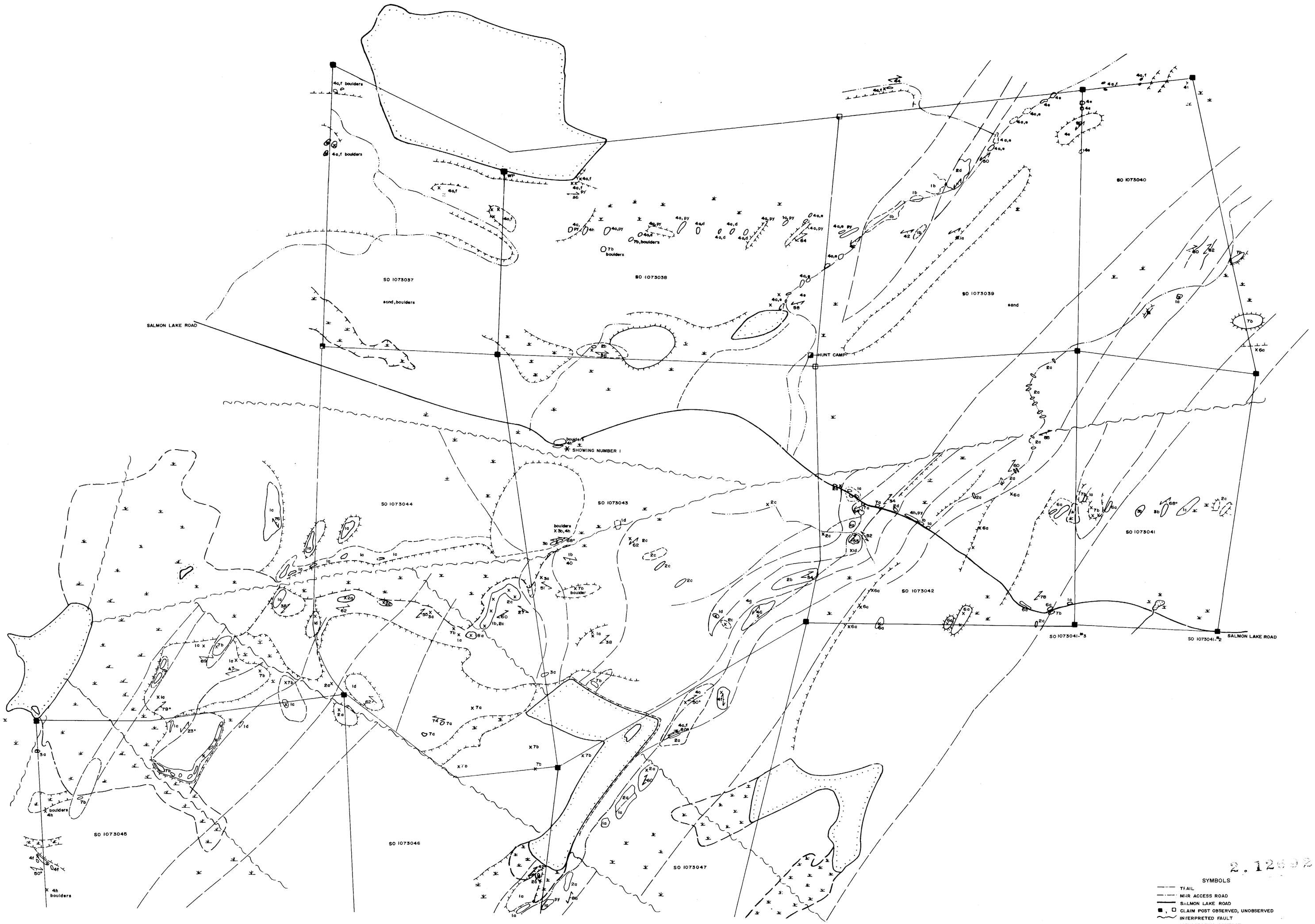
Areas withdrawn from staking under Section 5 of the Mining Act R.S.O.

		File	Date	Disposition
(R3 R2)	W.67/74	7598 v.4	19/12/74	S.R.&M.R.
(R1)	W.3/77	34261	1/1/77	S.R.&M.R.
(R2)	W.50/83	160708	25/8/83	S.R.&M.R.
	BEDS OF LAKES AND RIVERS WITHIN PARK LIMIT			
(R3)	W.11/83	73118	30/9/83 L	S.R.&M.R.

DATE OF ISSUE
JUL 17 1989
SOUTHERN ONTARIO
MINING DIVISION

PLAN NO. - M-72

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH



LEGEND

CLASTIC SILICEOUS METASEDIMENTS

QUARTZ FELDSPATHIC METASEDIMENTS

1a biotite-quartz-feldspar gneiss
<10 % biotite (arenite, feldspathic arenite)

1b hornblende-biotite-quartz-feldspar gneiss
<10 % mafics (calcareous arenite)

1c ferruginous quartz feldspathic gneiss
(rusty weathering)

1d quartz-rich feldspathic metasediments
(quartz arenite, feldspathic quartzite)
accessory mafics <1% (weak gneissosity)

BIOTITE-RICH METASEDIMENTS

2a biotite-quartz-plagioclase gneiss ± hornblende (minor)
10-30% biotite (psokite)± ferruginous

2b biotite-hornblende-quartz-plagioclase gneiss

2c hornblende-biotite-quartz-feldspar gneiss
<10 % mafics (feldspathic wacke)

2d biotite schist

CALCAREOUS METASEDIMENTS

AMPHIBOLE-RICH METASEDIMENTS

3a foliated to poorly foliated amphibolite, biotite-amphibolite, hornblende-plagioclase gneiss >30% hornblende (calcareous impure sandstone & mudstone)

3b foliated to layered hornblende-plagioclase ± quartz gneiss, <30% hornblende

CARBONATE METASEDIMENT

4a gneissic to layered/bedded siliceous marble, contains siliceous impurities

4b contains diopside

4c " " plagioclase

4d " " biotite

4e " " tremolite/actinolite

4f " " graphite

4g siliceous marble containing thin units of well foliated amphibolite/biotite/green/muscovite-rich gneiss±schist±mafic-poor arenite bands

4h clean white to light grey marbles, non-foliated (granoblastic)

INTRUSIVES

FELSIC INTRUSIVES

6a quartz monzonite, locally porphyritic, well foliated gneiss >0 <30 % mafics

MAFIC INTRUSIVES

7a gabbro, well foliated to massive, locally containing porphyritic material, melanocratic

7b gabbro massive to strongly gneissic, course to medium grained, locally intercalated with mafic-rich metasediments, mesocratic to melanocratic

8a non-foliated diabase

SYMBOLS

- TRAIL
- MINE ACCESS ROAD
- SALMON LAKE ROAD
- CLAIM POST OBSERVED, UNOBSERVED
- INTERPRETED FAULT
- LITHOGRAPHIC CONTACT
- OUTCROP BOUNDARIES OBSERVED, INTERPRETED
- FOLIATION
- GNEISSOSITY
- SWAMP
- ASSAY SITE, NUMBER & % ZINC VALUE
- ROUND LAKE HUNT CAMP

2.12592

Francis T. Manns & Remarkable McKay

NORTHGATE EXPLORATION LIMITED

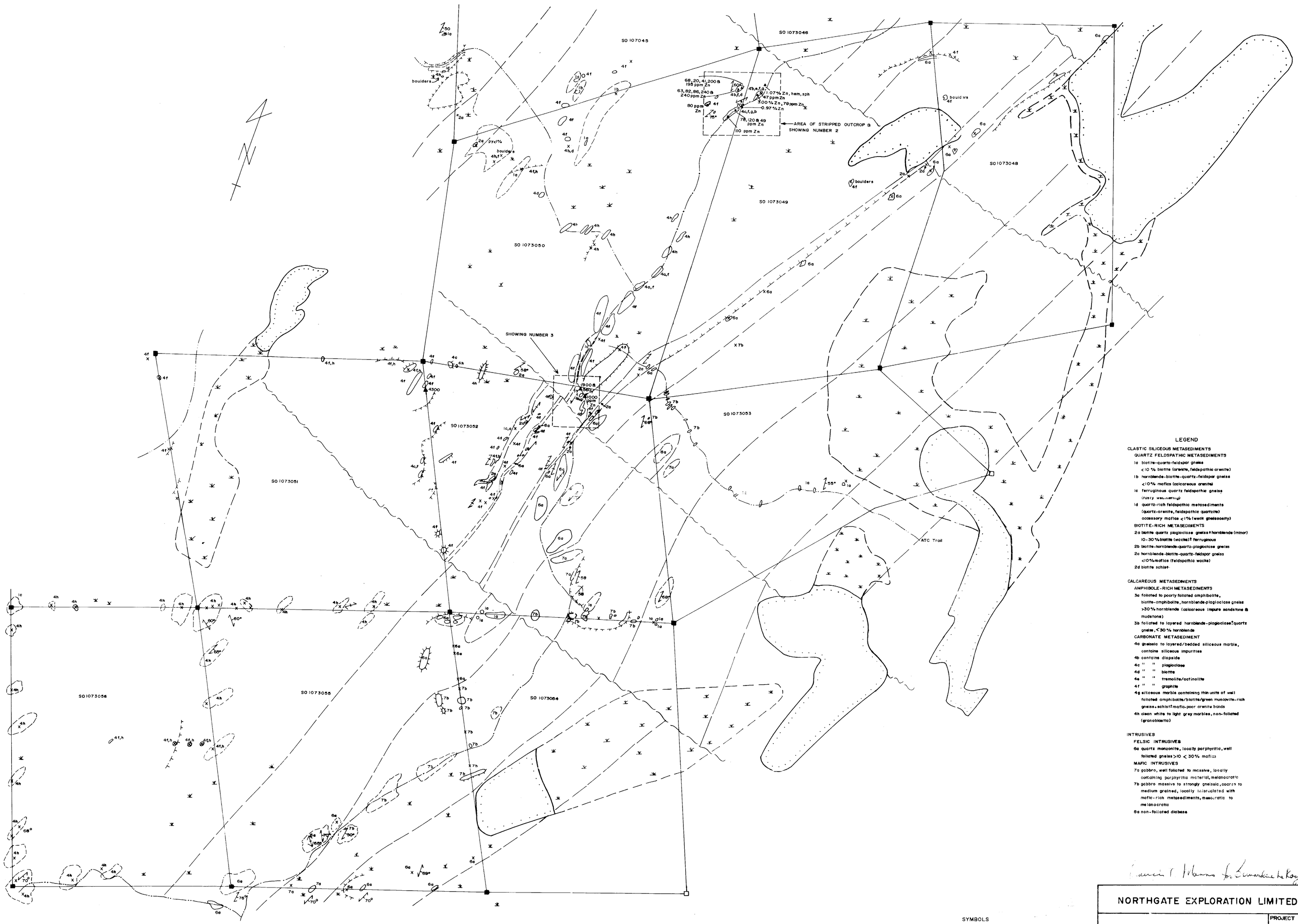
CAVENDISH PROJECT

GEOLOGY

FIGURE 2

PROJECT	710
SURVEY BY:	B. LEROY M. COOPER S. LEDNICKY
DRAWN BY:	S. BEAUCHAMP
DATE:	MAY 1989

FIGURE 2
SCALE 1:2500
0 100 250
metres



LEGEND

CLASTIC SILICEOUS METASEDIMENTS

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1c ferruginous quartz feldspathic gneiss (rusty weathering)

1d quartz-rich feldspathic metasediments (quartz-arenite, feldspathic quartzite) accessory mafics <1% (weak gneissosity)

BIOTITE-RICH METASEDIMENTS

2a biotite quartz plagioclase gneiss ± hornblende (minor) 10-30 % biotite (wacke) ± ferruginous

2b biotite-hornblende-quartz-plagioclase gneiss

2c hornblende-biotite-quartz-feldspar gneiss <10% mafics (feldspathic wacke)

2d biotite schist

CALCAREOUS METASEDIMENTS

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- INTERPRETED FAULT
- LITHOGRAPHIC CONTACT
- OUTCROP BOUNDARIES OBSERVED, INTERPRETED
- FOLIATION
- SWAMP
- ASSAY SITE, NUMBER & % ZINC VALUE
- OVERTURNED FOLD, DIP UNKNOWN
- LINEATION

Laurentian Hibernia for Cavendish de Kay

NORTHGATE EXPLORATION LIMITED

CAVENDISH PROJECT

GEOLOGY

FIGURE 3

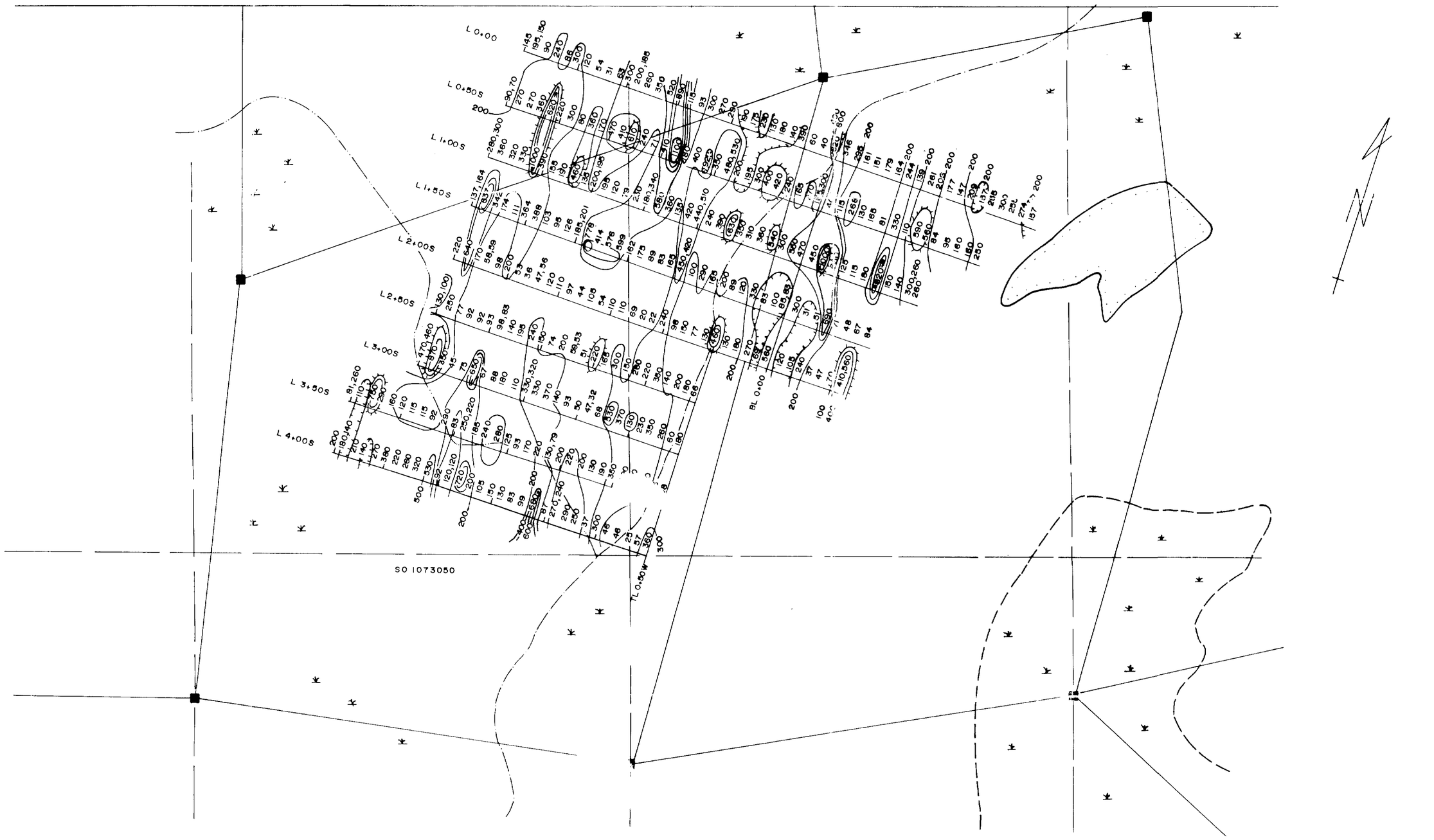
PROJECT 710

SURVEY BY: R. HERFST, M. KOLEBABA, S. LEDNICKY

DRAWN BY: S. BEAUCHAMP

SCALE: 1:2500 (0, 100, 250 metres)

DATE: MAY 1989



NORTHGATE EXPLORATION LIMITED

CAVENDISH PROJECT

SOIL GRID MAP
— B HORIZON —

SHOWING N°. 2
FIGURE 6

VALUES IN PPM ZINC

SCALE: 1:2500
0 100 250
metres

PROJECT: 710

SURVEY BY: M. COOPER, G. RITCHIE, M. KOLEBABA

DRAWN BY: S. BEAUCHAMP

DATE: MAY 1989