SILICA SAND RESOURCE AT ADAM CREEK ONTARIO

by

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Author's Note:

The Author is a Registered Professional Engineer in Ontario and a Registered Engineer in Quebec and is a Member of the Engineering Institute of Canada.

The Author is a graduate of Princeton University (Aerospace and Mechanical Sciences, Ph.D., 1974, M.A., 1971) and the University of Toronto (Mechanical Engineering, B.A.Sc., Honours, 1969).

The Author holds the position of tenured Assistant Professor of Engineering at Concordia University, Montreal, Quebec.

The Author has drawn freely from the following:

1. Boyd, B.W. "Silica," Individual review of Canadian minerals industry, Government Publishing Centre, Supply and Services Canada, Hull, Quebec K1A 0S9, 1980.

2. Guillet, G.R., "Lignite and Industrial Mineral Resources of the oose River Basin Property of Lignasco Resources Limited," Project G1-7, April 1981.

3. Guillet, G.R., "Fossil Fuel Program, Moose River Basin Drilling Project, District of Cochrane," Ontario Geological Survey OFR 5276, 1979.

The samples were prepared on 11 and 12 May 1982, at the Selco, Inc. laboratory, 1173 Roland, Thunder Bay, Ontario. Chemical analyses of the silica content were made at the analytical chemistry laboratory at Concordia University, Montreal, Quebec.

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ABSTRACT

Silica sand recovered in cores from a sonic drill program conducted near Adam Creek in 1982 has a high (up to 98%) silica content with low (less than 0.12%) iron oxide content. The material is suitable as a raw material for the production of glass. The market for the material is presented. At $11.80 per tonne, the deposit, estimated at half a billion tonnes, is evaluated at $5.9 billion. The cost of production is about $9.00 per tonne. Additional drilling is needed to delineate the extent of the deposit.

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1. Introduction - A Silica Sand Resource Project.

Silica occurs in nature as quartz in a variety of rocks and sediments. However, the value of a deposit depends on its purity and accessibility to markets. Indeed, commercial sources are limited only to those supplies which have very high purity and which can provide the material to a market at a competitive price. Such sources are rare.

Some Canadian suppliers, as of 1978, are listed by Province in Table I. However, these suppliers do not provide all the silica requirements of Canada. In 1980, 1,177,306 metric tonnes of silica sand were imported into Canada (valued at $17,336,000 or $14.73 per tonne). This is approximately the same quantity as the domestic Ontario production of 967,000 tonnes (valued at $9,100,000 or $9.41 per tonne) over the same period.

Most of the imported silica sand is imported from a sole supplier at Ottawa, Illinois. However, it is reported that the Illinois supply is not maintaining the level of suitability that the market demands. Furthermore, both Ontario and Quebec are experiencing shortages of silica supply, today. This is not only because of the high cost of imports, but also because of the apparent decreased quality of the imported supply. Ontario, alone, consumes more than 1 million tonnes of silica annually. This silica has been valued at $31 million (i.e., 31 $/tonne), F.O.B. the user site. Of this 1 million tonnes, nearly 600,000 tonnes were used for glassmaking. Only 230,000 tonnes used for glassmaking were purchased in Ontario, the balance (370,000 tonnes) were purchased from the United States. Indeed, almost 70% of total silica requirements in the provinces of Ontario and Quebec are imported.

A silica sand supply, one that can meet the stringent raw material specifications, appears to be available in the Adam Creek area of northeastern Ontario, on lands that have been licenced for exploration by the Government of Ontario to Lignasco Resources Limited, of Toronto.

During February and March 1982, a sonic drilling program was conducted on a portion of the 92,745 acre tract licenced to Lignasco Resources Limited. The site is located approximately 60 km north of Kapuskasing, Ontario near the Kipling Dam, at Adam Creek. The effort falls under a Joint Venture program with Selco, Inc, Toronto, Canada.

Six drill holes were sunk as part of the project. Each drilling operation recovered a relatively undisturbed core about 10 cm diameter. Although all cores show silica sand of various grades and sizes, In that drlling program silica sand of exceptional purity was obtained. The silica sand, of 125 micron to 1 mm in mean size, is found below approximately 60 feet (18 metres) of overburden.

In order to review the competitive nature of the Adam Creek silica sand in the marketplace, attention if focussed here on the existing Ontario supplier, Indusmin Limited. Indusmin Limited quarries a high-grade silica deposit on Badgeley Island in Geogian Bay. The deposit is reported to contain 12.6 million metric tonnes of very pure Precambrian Lorraine quartzite. The primary crushing plant is located about 190 km north of Midland, across Georgian Bay. Midland is approximately 120 km north of Toronto. The Badgely Island operation has a capacity of 1 million tonnes per year, while the Midland plant capacity is half that.

The recoverable silica sand at Adam Creek includes 103,000 tonnes per acre (66 million tonnes per square mile) which appears to be of glass grade purity. The total deposit of glass grade silica sand may exceed half a billion tonnes, over an area of 5000 acres (8 square miles). The value of such a glass grade deposit, at $11.80 per tonne F.O.B. Adam Creek, is over $1,200,000 per acre or over $770,000,000 per square mile.

Supplying the Ontario demand for silica sand that is imported from the United States, approximately 370,000 tonnes per annum, requires a production cost of approximately $9 per tonne. The profit, then, is 370,000(11.8-9) = $1,040,000 per annum. The cost of the necessary preliminary work before mining, that is, drilling to delineate the deposit, planning including financial arrangements, and contract definition is approximately $465,000.

2. Silica and Silica Sand and Their Use.

Silica sand is a naturally occuring silicone dioxide crystal solid appearing as granules, or may be fabriacted by crushing quartzite or sandstone. Depending on the size of the granules and the proportions of "impurities" such as iron oxide, aluminum oxide and oxides of other metals, silica sand has a variety of uses. These uses are listed in Table II.

3. Silica Sand at Adam Creek.

Quartz Sand of high natural purity is located on the Lignasco Resources Limited licence lands. These sands, according to Guillet, G.R., (Reference 2), coming from the Moose River Basin consist predominately of clear, colourless, subgranular grains, in the size range of 8 to 140 mesh.

The area has been drilled and the sands analysed at the Analytical Chemistry Laboratory of Concordia University, Montreal, Quebec. Samples subjected to dry magnetic separation have given analyses as shown in Table III. The high silica content, low iron content and chromium-free nature of the silica sand, coupled with its physical size in the natural state make this medium ideal for glass-making, including the production of fibre-optic grade products.

4. The Site at Adam Creek.

The site of the silica sand deposit is located in the James Bay Lowlands area of Ontario. The site, at Adam Creek, lies approximately 100 km north of Kapuskasing, is serviced by an all-weather road, lies approximately 40 km west of the Ontario Northland Railway, and is about 100 km from the Trans-Canada Highway and the Canadian National Railway through Kapuskasing. The site is serviced by Ontario Hydro, since the Kipling Generating Station is surrounded by the licence area.

The area falls within the Pre-Cambrian escarpment, and largely within the limits of the District of Cochrane. The area is drained by the Missinaibi, Mattagami and Opasatika rivers, which converge to the north-east to form the Moose River.

The area was studied in a 1978 drilling program conducted by the Ontario Geological Survey, in a program involving a total of eight drillholes. Six of the 1978 drill holes lie in an east-west line, at 8 to 14 km spacing. The two remaining drillholes lies approximately 5 to 10 km north of the east-west baseline. In all, the drillingwas 1177 metres (3862 feet), with the deepest hole drilled to 189 metres (620 feet).

Only drill hole 78-07, located in Hecla Township, to the west of the Pike River, failed to locate a silica sand deposit.

The most accessable deposit formation, in terms of transporation, lies in Emerson, Kipling and Sanborn Townships.

5. Exploration Completed by Lignasco Resources Limited.

Lignasco Resources Limited has conducted a winter drilling program to detail the deposits observed in the 1978 drilling program conducted by the Ontario Geological Survey. The program centres on drill holes located in Sanborn, Kipling and Emerson Townships.

The drilling was done using a sonic drill. This drill provides a continuous lozenge core approximately 10 cm diameter. This core is relatively undisturbed and provides samples of material sufficiently large that they can be analysed in detail.

The core for one of the holes, J1-2, located in the eastern half of Kipling Township, has been examined by this author and is discussed in the appendices.

The drilling program is valuated at approximately half a million dollars.

Appendix A - Drillhole Logs.

Drill logs have been prepared by H. Verma, the site geologist for the drilling program. These logs are tabulated in Table V.

Appendix B - Visual Observation of Cores.

The core from drillhole J1-2, located in the eastern half of Kipling Township has been examined visually. The locations along the core of the samplings is given in Table IV.

The core is essentially undifferentiated until 55 feet (17 metres), where the quaternary/cretaceous boundary is intersected. The demarcation is determined by the chemical activity of the calcareous content of the core down to the boundary: a drop of acid causes chemical reaction to occur until suddenly, at 55 feet, the activity ceases. The core examination begins at this point.

The core contains various sizes and grades of silica, powdered to a greater or lesser degree by kaolin, china clay. For example, at 60 feet (18 metres), a view under a 16X magnifying lens reveals apparently clear, colourless silica sand crystals coated in a light-grey, whitish powder. There are a few black or brown coloured particles, but these are few and far between.

Observing the sample under a 20X glass reveals a few brown-coloured units dispersed in a granular matrix of 0.5 to 1 mm sized particles.

A discussion of the structure of the samples is given in Table VI.

Appendix C - Water Content.

The water content of the core is estimated using a sample from the 58 foot depth location. A portion of sample designation J1-2-1, with a total mass of about 70 grams, was heated in an electric oven at 150 C for about 1 hour. The mass decreased to 61 grams, indicating that the water content of the core is about 12.86 per cent.

TABLE I

Some 1978 Canadian Suppliers of Silica

Newfoundland	Newfoundland Enterprises Limited, subsidiary of Armand Sicotte & Sons Limited; at Villa Marie
Quebec	Indusmin Limited; near Saint-Canut and near Saint-Donat
	Union Carbide Canada Mining Ltd; near Melocheville
	Baskatong Quartz products Ltd; near La Galette
	Montreal Siica Mines Ltd; near Ormstown
Ontario	Indusmin Limited; on Badgeley Island
Manitoba	Steel Brothers Canada Limited; at Black Island
Saskatchewan	Hudson Bay Mining and Smelting Co Limited; in the vicinity of Flin Flon
Alberta	Sil Silica Ltd; at Bruderheim
British Columbia	Pacifica Silica Limited; near Oliver.

TABLE II

Uses of Silica Sand

Glass:	High-purity, naturally-occurring sand or material produced by crushing quartzite or sandstone is used in the maufacture of glass. minor amounts of certain elements are particularly objectionable because they act as powerful colourants. For example, chromium should not exceed six parts per million and cobalt not over two parts per million. Glass fibre optics technology, developing over the last few years, promises to become important in communications, an area in which Canada is an acknowledged world leader, as glass fibre replaces copper cable in several applications.
Silicon Carbide:	Silica sand used in the manufacture of silicon carbide should have a silica content of at least 99 per cent. Iron and alumina should be less than 0.1 per cent each; lime, magnesia and phosphorous should be absent. Sand should be 100 mesh with the bulk of it plus 35 mesh.
Hydraulic Fracturing:	Sand is used in the hydraulic fracturing of oil-bearing strata to increase open pore spaces, thus increasing the productivity of the oil well. Sand used for this purpose should be clean and dry, have a high compressive strength, be free of acid consuming constituents and have a grain size of between 20 and 35 mesh. Grains should be well-rounded to facilitate placement in the formation in order to provide maximum permeability.
Foundary Sand:	Naturally occurring sand or material produced by crushing friable sandstone is used in the foundary industry for moulding. For foundary purposes, the chemical

composition of the sand is not as important as its phyical properties. For the end-use, a highly refractory sand, having well-rounded grains with frosted or pitted surfaces, is preferred. Grain sizes vary between 20 and 200 mesh. Rounded grains are preferable to angular fragments because they allow maximum escape of gas during casting.

Sodium Silicate: Sand for the manufacture of sodium silicate should contain more than 99 per cent silica, less than 0.25 per cent alumins, less than 0.05 per cent lime and magnesia combined, and less than 0.03 per cent iron (III) oxide. All sand should be between 20 and 100 mesh.

Silica Flour: Slilica flour, produced by fine-grinding quartzite, sandstone, or lump quartz; or as a by-product in sand sifting, is used in the ceramics industry for enamels, frits, and pottery flint. For use in enamels, the silica four must be over 97.5 per cent silica with less than 0.5 per cent alumina, and less than 0.2 per cent ferric oxide. Silica flour is also used as an inert filler in rubber and asbestos cement products, as an extender in paints and as an abrasive agent in soaps and scouring pads. It is used increasingly in autoclave-cured concrete products such as building blocks and panels, where approximately 25 kg of silica flour is used for every 100 kg of Portland cement.

Quartz Crystal: Quartz crystal with desirable piezoelectric properties is being used in the Canadian electronics industry. Natural crystal must be perfectly transparent and free from all impurities and other flaws. The individual crystals should have a mass of 100 g or more and measure at least 5 cm in length and 2.5 cm in girth. There is no production of quartz crystal in Canada.

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Domestic requirements are met by imports from the United States and to a lesser extent Brazil.

Other Uses:

Coarsely ground, closely sized quartz, quartzite, sandstone and sand are used as abrasive grit in sandblasting and in the maufacture of sandpaper. Various grades of sand are used as filtering media in water-treatment plants. Silica is also required in Portland Cement maufacture if there is insufficient silica in the limestone or in other raw materials used in the process.

TABLE III

Analysis of Adam Creek Silica Sand(%)

Sample	SiO_2	Fe_2O_3	Al_2O_3	Cr_2O_3	Residual
J1-2-1	97.05	0.031	0.75	0.002	2.167 %
J1-2-2	94.20	0.101	1.21	0.008	4.571
J1-2-3	97.67	0.131	0.68	0.001	1.518
J1-2-4	98.07	0.032	0.64	<0.001	1.258
J1-2-5	98.27	0.025	0.47	<0.001	1.235
J1-2-6	94.13	0.111	1.18	0.003	4.576
J1-2-7	97.65	0.028	0.90	0.001	1.421
J1-2-8	98.16	0.161	0.61	0.002	1.067
J1-2-9	96.89	0.026	0.65	0.001	2.433
J1-2-10	93.06	0.034	1.05	0.002	5.854

Notes: (1) error on silica +0.1,-0
(2) contents of residual may include silica, calcium and clay

TABLE IV

Sample Depths and Designations, J1-2 Drill Hole

Sample Designation	Depth (Feet)	Thickness (Feet)	Dry Silica (125 microns - 1mm) (%)
J1-2-1	58	5	58.3
J1-2-2	61	10	30.3
J1-2-3	83	10	66.2
J1-2-4	92	3.5	53.7
J1-2-5	107	5	52.3
J1-2-6	117	6	67.8
J1-2-7	137	5	50.6
J1-2-8	148	15	58.7
J1-2-9	168	15	25.0
J1-2-10	183	14	10.4

TABLE V

Drill Hole Logs.

A typical cross-section with multiple holes ?

(a) 55-60 Non-cacareous coarse silica sand - kaolin matrix with increasing kaolin toward the bottom (J1-2-1, 58 feet);

(b) 60-65 Medium to coarse greyish-white silica sand - kaolin matrix (J1-2-2, 61 feet);

(c) 65-70 Medium to coarse silica sand - kaolin matrix;

(d) 70-73 Fine silica sand - kaolin matrix;

(e) 73-75 Brown, hard fireclay;

(f) 75-80 Whitish grey fine to medium-grained silica sand - kaolin matrix;

(g) 80-85 White, fine-grained silica sand - kaolin matrix, with abundant kaolin (J1-2-3, 83 feet);

(h) 85-90 Same as above (g). However, the core box was lost during transit from the site to camp. The box was later recovered, but the core is likely disturbed;

(i) 90-93 Medium to coarse, grey to greyish-white silica sand - kaolin matrix with lesser amounts of kaolin (J1-2-4, 92 feet);

(j) 93-93.5 Greyish-white, medium-grained silica sand - kaolin matrix;

(k) 93.5-96 Grey to yellowish-brown fireclay;

(l) 96-100 Reddish-brown fireclay;

(m) 100-105 Greyish, medium-grained silica sand - kaolin matrix;

(n) 105-110 White, fine to medium-grained silica sand - kaolin matrix (J1-2-5, 107 feet);

(o) 110-114 Grey, medium to fine-grained silica sand - kaolin matrix, with only some kaolin;

(p) 114-117 Grey to white, fine to medium-grained silica sand - kaolin matrix (J1-2-6, 117 feet);

(q) 117-120 Fine, white silica sand - kaolin matrix;

(r) 120-125 Coarse silica sand with some heavy minerals. Minor amounts of kaolin;

(s) 125-127.5 Grey, fine silica sand - kaolin matrix;

(t) 127.5-130 Grey fireclay;

(u) 130-134 Grey, fine, sandy clay;

(v) 134-135 Grey, coarse silica sand - kaolin matrix with very little kaolin;

(w) 135-140 Fine to medium-grained silica sand - kaolin matrix with grey rim observed around the perimeter of the core (J1-2-7, 137 feet);

(x) 140-185 Greyish-white, medium to coarse-grained silica sand - kaolin matrix (J1-2-8, 148 feet) (J1-2-9, 168 feet) (J1-2-10, 183 feet);

(y) 185-194 Medium to coarse-grained silica sand - kaolin matrix;

TABLE VI

Visual Observation of Cores.

J1-2-1	Some large-grained particles, generally beige in colour. Some grey particles.
J1-2-2	More coarse-grained particles, generally beige in colour. Some grey particles.
J1-2-3	Whiter colour here than the previous two samples, with fewer of the large-grained particles.
J1-2-4	Generally white in colour, with some small black dust-like elements.
J1-2-5	Does not have the same small black dots of dust observed in J1-2-4.
J1-2-6	The vast majority of this material has a fine-grained nature: the coarse grained fraction appears to be very small.
J1-2-7	The fine-grained material represents most of the mass of the sample. The remainder is deemed to be of relatively coarse grain.
J1-2-8	The fine-grained material comprises most of the sample. There are plasticky lumps that are separated as part of the coarse grained mass in a Sewco wet separator. This plasticky material appears to be the agglomeration of smaller solid fragments held together in a fine wet clay powder matrix. There appear to be some shiny flake-like material which may be mica.
J1-2-9	Most of this material is course-grained, with a small fraction fine-grained. The quyantity of the plastick material observed earlier appears to have increased. There also appear to be mica fines in the sediment.
J1-2-10	A small fraction is fine-grained, the balance course. The quantity of mica-like material has decreased. In the coarse fraction, chirt and jasper have been found, although the majority of particles are coarse-grained silica sand globules of various colour.

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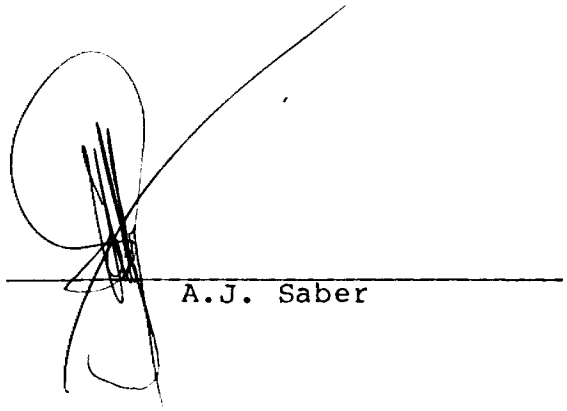
31 May 1982



A.J. Saber

LIGNASCO RESOURCES LIMITED
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Toronto, Ontario

PROGRESS REPORT ON ACTIVITIES
TO 30 APRIL 1982
EXPLORATORY LICENCE OF OCCUPATION NUMBER 14890

7 September 1982

TABLE OF CONTENT

1.0 INTRODUCTION

1.1 Purpose of Report

This report summarizes the results of exploration activities conducted on Exploratory Licence of Occupation No. 14890, to 30 April, 1982.

1.2 Location and Access

The area is located about 200km north northwest of Timmins and includes parts of the Townships of Sanborn, Kipling and Emerson.

Access to the centre of the area is possible via gravel roads from either Kapuskasing or Abitibi Canyon. The roads provide service routes to several dams on the Mattagami River.

Beyond the dam sites heavy mobile equipment can only be moved in winter along packed winter roads. Movement of personnel between work sites is best achieved using helicopter support.

For the program described here, a drill camp was established near Kipling Dam. The helicopter crew and geophysical crew stayed at the town of Smoky Falls, about 5km south of the property. Officials of Ontario Hydro, and especially the staff of Spruce Falls Power at Smoky Falls were very helpful.

2.0 DESCRIPTION OF PROGRAM

The program being conducted is designed to search for lignite and, along with Selco, Inc. to look for economic diamondiferous kimberlite pipes.

Airborne magnetometer surveys provide potential kimberlite targets for detailed ground geophysical definition. Evaluation of the ground geophysics leads to selection of anomalies for drill testing. A single hole is collared on a target, with the objective being to identify the anomaly source, and if of interest, provide sufficient drill core (≈50kg) for mineralogical and chemical investigation. No determination of any diamond - bearing potential

of a kimberlite is possible at this stage. If a given anomaly meets both the size and mineralogical criteria, a further bulk test, requiring 10 tonnes or more will be used for processing to establish the presence of diamonds. If diamonds were found in a particular pipe, a quantitative assessment of grade would require the extraction of some thousands of tonnes.

REGIONAL GEOLOGY

The Licence covers a small portion of the southern flank of the Moose River Basin. Roughly the southern third of the property is underlain by Precambrian rocks.

Outcrops are very few and limited to water courses, but drilling by the Ontario Government, and various companies in the area has established a good stratigraphic framework for the Moose River Basin. Most of the Licence area is underlain by an extensive and thick till cover, which mantles a sequence of unconsolidated Lower Cretaceous beds of the Mattagami Formation. The latter unit is comprised of silica sands, varicolored clays and silts, and occasional lignite seams. (Telford et al 1975). Much of the previous work in the region has been directed toward the industrial minerals and lignite deposits. (Op. cit.)

DESCRIPTION OF RESULTS

Geophysical Surveys

In 1981 the property was covered by an airborne magnetometer survey as part of a larger regional program. Coverage on the Licence consisted of flight lines at a nominal spacing of 250m and terrain clearance of 60m. Total volume was about 1500 line-km.

Nine geophysical grids were cut and surveyed in the area. All grids were surveyed using a nuclear precession magnetometer. Line and station separation were a maximum of 100m and 25m respectively. Diurnal variations were removed from the results. One grid (I4-6) was surveyed the previous winter in the follow-up work of another program. The costs of this work are not included in the expenditure statement. Total surveying in 1982 was 157km.

Following is a brief commentary on results.

Grid I4-6

A good small target is centered at 00/050S, and extends off the west end of the grid. Drill testing should await the results of drilling adjacent anomaly I4-200.

Grid I4-200

A good small target is centered at 500W/200N. Diamond drilling is recommended.

Grid J1-1

A large strong positive response with an amplitude of about 700nT is centered at 200E/400S. Diamond drilling is recommended.

Grid J1-2

A very large lobate anomaly is located in the centre of the grid. A drill hole collared at 100S/300W was abandoned at 147m (482'). The anomaly source was not intersected. No further work is warranted at present.

Grid J1-3

Several sharp but low amplitude anomalies are present in the east half of the survey. The grid is underlain by basement rocks and the responses seem typical of this setting. No further work is warranted pending additional studies.

Grid J1-5

All anomalies detected have either a cultural or basement source. No further work is warranted.

Grid J1-6

Two anomalies of possible interest appear at 800W/200S and 400W/300S. The grid is underlain by Precambrian rocks, and while anomaly patterns on the grid confirm this setting, the land should be retained pending further study.

Grid J8-100

A single good circular anomaly is centered at 700W/450N. The source is likely deep (>150m) and therefore drill-testing is not recommended, pending the results of other regional drilling.

Grid J8-101

A small circular positive anomaly is centered at 200N/300E. The anomaly was drilled (see below).

2 Drilling

The winter drilling program was conducted using a Sonic drill operated by Midwest Drilling of Winnipeg. The rig was modified to include a Longyear 150 drill head, so that regular diamond drilling (NQ) could follow Sonic coring. The Sonic drill was chosen for the job so that good core recovery would be achieved in the unconsolidated units.

The drill rig was mounted on a Nodwell carrier accompanied by a trailer. Unfortunately very poor frost conditions in the extensive muskeg cover necessitated long meandering drill moves, and very expensive site preparation. The rig proved to be very successful (but at great cost) in recovering Lower Cretaceous and Quaternary tills.

Four holes totalling 439m were drilled for Lignasco in the vicinity of O.G.S. hole 78 - 06. Copies of drill logs are appended.

Two holes were completed on geophysical anomalies.

Hole J8-101 was drilled to a depth 73m. A dark massive ultramafic intrusive was intersected under a till cover of 55m. Laboratory-testing of the core remains to be completed, but early petrographic work indicates the rock consists of olivine phenocrysts set in a groundmass of lath-like pyroxenes. The rock is not likely a true kimberlite, but final classification must await further studies.

A hole was drilled on J1-2, which was finally abandoned at 147m. Bedrock was never reached. After passing through about 16m of tills, a long interval of largely silica sands (to 59m) was encountered. This was followed by intercalated sands and clays, and some lignite beds. Given the depth of cover on this grid, additional drilling on this anomaly is not warranted.

5.0 SECOND PROGRAM

If the ground conditions had permitted the Sonic drill to be more "mobile" two other holes had been planned for the past winter. Instead, the two holes (on I4-200 and J1-1) will be completed with a helicopter supported diamond drill in the next Commitment Period. The balance of proposed expenditures cover related laboratory studies. A listing of the proposed budget is set out below.

DIAMOND DRILLING		$50,000
Contract Chgs. 250m @ $140,	= 35,000	
Helicopter Chgs. 30 hrs. @ 500	= 15,000	
GEOCHEMICAL STUDIES		10,000
SUPPORT		10,000
SUPERVISION		15,000
	TOTAL	$85,000

CONTINGENCY - $250,000

Depending upon the geochemical studies and the regional program results, one bulk test could be initiated in this area, and this is estimated to cost about $250,000.

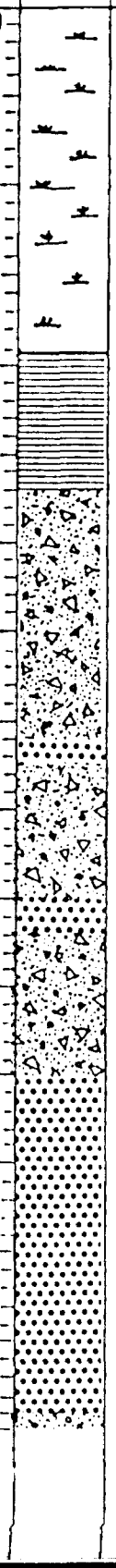
Lignasco Resources Limited

January-April 1982
Drilling Program

Drill Logs

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program
Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. SL 82-01.
Location: 800 metres south of OGS
Drillhole 78-06 (Long.
82°13'43"W, Lat.50°15'30"N)
Sanborn Township
Started March 16, Finished March 20, 1982



Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
		Sonic	0' - 19' Muskeg
			19' - 27' Greenish grey. highly calcareous plastic clay
			27' - 33' Grey, very dense, coarse, silty and dry till
			33' - 35' Very dense, sandy calcareous till
			35' - 36' Grey, calcareous clay till
			36' - 41' Grey. ca;careous coarse sand with pebbles (? sandy till)
			41' - 42' Grey, coarse, calcareous sand
			42' - 50' Grey, coarse, very sandy, highly calcareous till with large cobbles
			50' - 52' Grey, gravelly sand, highly calcareous
			52' - 56' Grey, sandy, gravel rich till
			56' - 58' Grey, very sandy, coarse till
			58' - 60' Grey, clay till
			60' - 65' Grey, sandy gravel with large pebbles and cobbles
			65' - 72' Same as above
			72' - 76' Grey, calcareous gravel, mostly pebble size
			76' - 79' Grey, coarse, sandy gravel with big cobbles
			79' - 80' Dark grey coarse till with muddy matrix

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. S1 82 - 01.
Sheet 2 of 5.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		Sonic	80' - 85' Grey, calcareous silty till
			85' - 87' Sandy gravel with large cobbles
			87' - 90' Grey, calcareous silty till
90			90' - 92' Grey, medium grained sand
			92' - 95' Dark grey, coarse, very sandy, highly calcareous till
			95' -100' Grey, very sandy till
100			100'-102' Grey, medium to coarse grained sand
			102'-106' Grey, coarse sand with pebbles
			106'-110' Dark grey coarse, very sandy, highly calcareous till
110			110'-112' Grey, coarse sand with pebbles
			112'-114' Grey, sandy till
			114'-116' Grey clay till
			116'-120' Dark grey, coarse sandy till
120			120'-127' Dark grey to brown coarse hard muddy till
			127'-141' Same as above with large clasts
130			
140			141'-144.5' Grey, coarse, calcareous clay till
144.5			-------QUATERNARY-CRETACEOUS CONTACT----------
			144.5'-147.5' Dark grey, non calcareous clay
			147.5'-148.5' Red fireclay
150			148.5'-160' White to light grey, medium grained silica sand kaolin matrix with some sections showing coarse grained matrix
160			

DRILL LOG

LIGNA[redacted]CO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

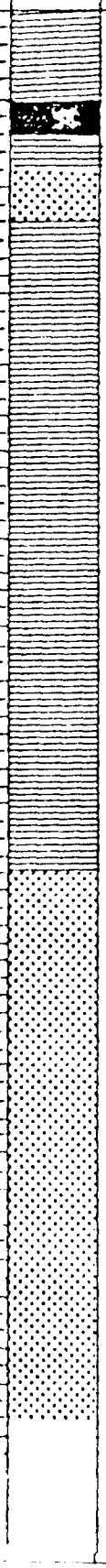
DRILLHOLE NO. SL 82-01
Sheet 3 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-166' Greyish white, medium grained silica sand kaolin matrix
			166'-168' Same as above but getting coarser
			168'-171' Brown fireclay
170			171'-173' Grey, sandy clay
			173'-174' White to light grey coarse silica sand kaolin matrix
			174'-178' Fine grained silica sand kaolin matrix
			178'-182' Fine grained silica sand kaolin matrix-richer in kaolin
180			182'-186' Medium grained, white silica sand kaolin matrix
			186'-188' Fine grained white silica sand kaolin matrix
			188'-195' Medium to coarse grained silica sand kaolin matrix - many coarse quatrz grains
190			
			195'-220' Predominantly medium grained slilica sand kaolin matrix - some sections showing coarser quartz grains
200			
210			
220			220'-233' Medium grained white silica sand kaolin matrix
230			
			233'-234' Medium grained, greyish silica sand kaolin matrix - lesser amount of kaolin
			234'-235' Dark grey clay
			235'-236' Light to dark brown fireclay
240			236'-240' Dark brown carbonaceous clay

DRILL LOG

LIGNITE CO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-01.
Sheet 4 of 5.



pth t.)	Lith. Log	Sample	Field Description and Remarks
240		Sonic	240'-242' Dark brown to black carbonaceous clay
			242'-245' Clay as above but becoming sandy
			245'-247' LIGNITE
			247'-249' Brown fireclay
			249'-251' Grey sand
250			251'-252' Grey, medium grained sand
			252'-256' Grey to brown carbonaceous clay with fragments of lignite
			256'-264' Dark brown, tan brown, grey stiff, plastic clay
260			
			264'-278' Grey, highly silty, micaceous clay
270			
			278'-285.5' Brown dense clay
280			
			285.5'-289' Dense brown clay-somewhat sandy below 287'
			289'-290' Grey, fine grained clayey sand
290			290'-293' Micaceous sand with high clay content
			293'-296' Grey, fine grained clayey sand
			296'-299' Grey sand with abundant clay content
			299'-301' Fine to medium grained, grey sand
300			301'-305' Grey, fine grained, clayey sand
			305'-309' Mostly grey to greyish white sand
310			309'-321' Fine to medium grained grey sand
320			

DRILL LOG

LIGNITE RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-01.
Sheet 5 of 5.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
321		Sonic	321'-322' Grey clay 322'-325' Reddish brown to grey fireclay
			325'-329' Bright red to grey, varicoloured clay
			329'-330' Reddish brown fireclay
330			330'-333' Reddish to grey clay 333'-335' Grey clay
			335'-353' Grey, plastic, dense, clay
340			
350			
			353'-354' Light grey clay with dolomite cobble 354'-355' Dark, grey clay 355'-358' Grey to red brown clay 358'-361' Grey clay
360			361'-370' Grey to reddish brown fireclay
370			370'-376' Red fireclay with grey streaks
			376'-383' Red fireclay
380			
383			Drilling terminated at 383'. PVC pipe inserted in the hole

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

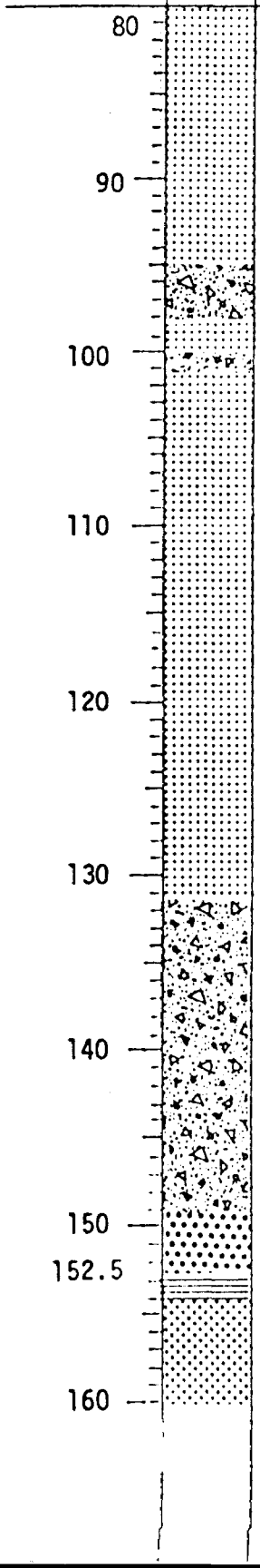
DRILL LOG: DRILL HOLE NO: SL 82-02
LOCATION: 800 metres southeast of OGS drillhole No. 78-06(Long. 82°13'43" W: Lat. 50°15'30" N)
Sanborn Township
Started: March 29, Finished April 1, 1982

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
0		Sonic	0' - 20' Muskeg
10			
20			20' - 25' Light grey, calcareous clayey till
			25' - 30' Greyish brown sandy silt till
30			30' - 33' Coarse to medium gravelly sand
			33' - 35' Light greyish to brown sandy silt till
			35' - 38' Light grey sand
			38' - 43' Coarse, grey, gravelly sand
40			
			43' - 44' Gravel
			44' - 45' Grey, coarse sand and some sandy till
			45' - 47' Grey, coarse sand and sandy till - more clasts
			47' - 50' Light grey, fine sandy till
50			51' - 55' Dark grey, sandy, calcareous till
			55' - 60' Grey, fine grained sand with grey clay laminations
60			60' - 67' Light grey, fine grained sand
			67' - 79' Dark grey, fine grained sand
70			
80			79' - 80' Very fine grained, somewhat clayey sand

DRILL LOG

LIGNITECO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02 .
Sheet 2 of 5 .



Depth (Ft.)	Sample	Field Description and Remarks
80	Sonic	80' - 89' Very fine, somewhat clayey sand
		89' - 90' Same as above, getting coarser
90		90' - 95' Very fine grained calcareous sand
		95' - 98' Olive grey sandy till with clasts
		98' - 100' Grey, fine grained calcareous sand
100		100'-101' Fine grained, sandy till
		101'-109' Light grey, fine grained sand
		109'-113' Light frey, fine grained sand with darker zone at 110'-110.5'.
110		113'-122' Light grey fine grained sand
120		122'-123' Grey, coarse, gravelly sand
		123'-131' Grey, fine grained sand
		131'-132' Dark grey, calcareous clay till
		132'-140' Olive grey, calcareous clay till with large clasts
130		
140		140'-142' Dark olive grey sandy till
		142'-145' Same as above but getting clayey
		145'-149' Olive grey calcareous very sandy till
150		149'-152.5' Coarse, gravelly sand with large pebbles
152.5		------QUATERNARY-CRETACEOUS CONTACT---------- -------
		152.5'-154' Tan fireclay
		154'-156' Dark grey coarse silica sand kaolin matrix non-calcareous- reduced kaolin
160		156'-160' Fine to medium grained silica sand kaolin matrix with abundant kaolin

DRILL LOG

LIGNECO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02 .
Sheet 3 of 5 .

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-161' Dirty grey sandy gravel with large pebble and cobble
			161'-165' Dark greyish green fine grained calcareous sand
			165'-168' Dark olive grey sandy calcareous till
			168'-173' Coarse dark grey gravel - calcareous
170			Note: From 160' to 173', the sediments appear to be Quaternary deposits. These may have been deposited in an underground channel.
			173'-183.5 Very fine grained greyish white silica sand kaolin matrix with abundant kaolin
180			
			183.5'-185' Medium to coarse grained greyish white silica sand kaolin matrix with kaolin
			185'-190' Medium to coarse grained greyish white silica sand akolin matrix with increased kaolin
190			190'-191' Fine grained light grey sand - little kaolin
			191'-195' Greyish white, coarse to medium grained silica sand kaolin matrix
			195'-200' Dark grey, carbonaceous hard clay
			200'-206' Grey, fine grained sand
			206'-213' Greyish white, fine grained silica sand-
200			213'-231' Medium grained, greyish white silica sand-kaolin matrix
210			
220			
230			231'-234' Coarse grained, grey quartz sand
			234'-236' Tan to grey coarse grained sand
			236'-238' Dark grey sand with detrital lignite
			238'-240' Light grey to tan brown coarse sand
240			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02
Sheet 4 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
240		SONIC	240'-242' Light grey to tan brown coarse sand
			242'-244' Coarse grained grey sand with detrital lignite
			244'-246' Tan grey, fine grained sand
			246'-252' Light grey fine grained sand
250			252'-256' Grey, fine grained sand
			256'-260' Fan grey, fine grained sand
260			260'-264' Dark grey, medium grained sand
			264'-268' Grey, fine grained sand
270			268'-276' Coarse grained dark grey sand
			276'-280' Medium grained grey sand
280			280'-282' Fine grained grey sand
			282'-288' Medium grained grey sand
290			288'-289' Dark grey, coarse sand
			289'-292' Dark grey, fine sand
			292'-300' Dark grey, medium grained sand
300			300'-310' Dark grey plastic clay
310			310'-320' Dark grey to black, plastic, hard carbonaceous clay with fragments of detrital lignite increasing towards the bottom
320			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02
Sheet 5 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
320		SONIC	320'-332' Dark grey, plastic, very hard slightly sandy clay
330		NQ	332'-336' Dark brown plastic very hard non calcareous clay
			336'-344' Dark grey plastic hard non calcareous clay
340			344'-346' Dark brown plastic, partly laminated clay
			346'-356' Darker clay as above, calcareous
350			------?CRETACEOUS -DEVONIAN CONTACT----------
			356'-364' Grey calcareous shale and argillaceous limestone
360			
364			Drilling terminated at 364' PVC pipe inserted in the hole

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. SL 82-03
LOCATION: 1600 metres southeast of OGS drillhole 78-06(Long. 82°13'43" W: Lat. 50°15'30" N)
Started March 24, Finished March 29, 1982

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
0		SONIC	0' - 17' Muskeg
10			
			17' - 25' Greyish brown calcareous coarse till
20			
			25' - 27' Brownish grey, clayey, calcareous coarse till
			27' - 32' Olive grey, coarse calcareous clay till with large clasts
30			32' - 36' Grey, calcareous sandy till
			36' - 40' Till as above changing to coarse sand
40			40' - 41' Grey, coarse sand
			41' - 46' Grey, coarse, very sandy calcareous till
			46' - 49' Grey, gravelly sand - calcareous
			49' - 52' Dark grey, gravelly sand
50			52' - 54' Grey, alluvial sand
			54' - 56' Olive grey, calcareous coarse till
			56' - 58' Fine grained grey sand
			58' - 60' Grey, coarse grained calcareous gravelly sand
60			60' - 62' Olive grey, coarse calcareous clay till
			62' - 66' Dark grey coarse calcareous gravelly sand to sandy till
			66' - 70' Olive grey sandy clay till
70			70' - 75' Olive grey calcareous clay till
			75' - 78' Same as above with abunadant clasts
			78' - 80' Dark grey to olive grey calcareous clay till with small scattered clasts
80			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

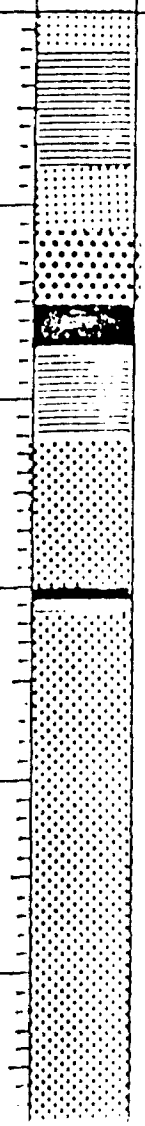
DRILLHOLE NO. SL 82-03
Sheet 2 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		SONIC	80' - 96' Dark grey to olive grey calcareous clay till with small scattered clasts
90			
			96' - 100' Darker olive grey to brown hard calcareous till with increasing clasts
100			100'- 108' Fine grained calcareous grey sand
			108' -109 Gravel
109			---------QUATERNARY CRETACEOUS CONTACT----- -------- ------
110			109-110 Coarse, greyish white, non calcareous silica sand-kaolin matrix
			110'-115' Grey quartz sand, little kaolin
			115'-130' Greyish white, medium grained silica sand - kaolin matrix
120			
130			130'-136' Grey, medium grained silica sand-kaolin matrix with lesser amount of kaolin
			136'-141' Same as above with increased amount of kaolin
140			141'-146' Same as above with a darker heavy mineral zone at 145'
			146'-151' Medium to coarse grained silica sand-kaolin matrix - greyish white
150			151'-155' Black carbonaceous clay with lignite fragments and some sandy sections
			155'-157' Dark grey sandy carbonaceous clay
			157'-158' Tan sandy clay
			158'-159' Dark grey sandy carbonaceous clay
160			159'-160 Tan coloured sandy clay

DRILL LOG

[redacted]NASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 3 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-162' Grey to tan grey fine grained sand 162'-168' Grey, plastic sandy clay
170			168'-171' Fine grained grey sand - very little kaolin 171'-173' Coarse grained, greyish white silica sand-kaolin matrix 175'-177.5' LIGNITE
180			177.5'- 178' Carbonaceous clay 178'-179' Coarse grained sand with detrital lignite 179'-181' Tan brown fireclay 181'-182' Tan to tan-grey sandy clay 182'-183' Dirty brown clayey sand 183'-185' Dirty grey quartz sand without kaolin 185'-190' Tan to grey micaceous clay with fine grained sand
190			190'-190.5' LIGNITE 190.5'-191' Sandy clay 191'-193' Grey, fine grained sand- little kaolin 193'-195' Medium grained silica sand-kaolin matrix with reduced kaolin 195'-210' Greyish white, coarse to medium grained silica sand-kaolin matrix
200			
210			210'-225' Greyish white silica sand with reduced amount of kaolin

DRILL LOG

MAGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 4 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
240		SONIC	240'-262' Light grey sand Note: The sample from 236'-262' was drilled in one run and was accidentally dropped in the hole while being retreived. It was later picked up but may have been contaminated with sluffing from the hole
250			
260			262'-266.5 Dark grey sand, probable sluff from the hole
			266.5'-270' light brown and grey, very hard, plastic dense clay
270			270'-286' Light brown to dark grey plastic, very dense clay with some red clay intercalations
280			
			--------CRETACEOUS-DEVONIAN CONTACT ?----------
			286'-294' Dark brown laminated clay with disseminated pyrite - clay is non-calcareous
290			
		NQ	294'-303' Dark brown pyritiferous non-calcareous clay
300			
			303'-304' Lighter brown clay as above - no pyrite
			304'-305' Harder dark brown laminated clay (Shale?) with pyrite
			305'-315' Dark brown laminated clay as above
310			
			315'-319' Grey calcareous shale
			319'-320' Grey calcareous shale with argillaceous limestone
320			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 5 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
320		NQ	320'-326' Grey calcareous shale with argillaceous limestone
			Drilling terminated at 326'
330			PVC pipe inserted in the hole.

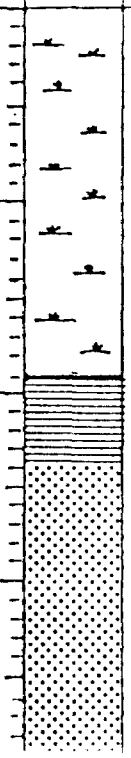
LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

ling - Midwest Drilling

ogy: Harish M. Verma

DRILL LOG: DRILLHOLE NO. SL 82-04
LOCATION: 1400 metres SSE of OGS
Drillhole No. 78-06 (Long: 82°13'43"W;
Lat.50°15'30 N") Sanborn Township
Started March 20, Finished March 24, 1982

Sheet 1 of 5 .

pth t.)	Lith. Log	Sample	Field Description and Remarks
0		SONIC	0' - 19' Muskeg
10			
			19'- 21' Grey clay - sample washed out
20			21' - 24' Fine grained grey calcareous sand with some clay
			24' - 36' Fine to medium grained grey calcareous sand
30			
			36' - 40' Coarse grained, grey, calcareous sand

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-04.
Sheet 2 of 5.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		Sonic	80' - 83' Grey, coarse, sandy clay till with abundant clasts
			83' - 86' More sandy, grey, coarse, calcarecus clay till
			86' - 89' Clay till as above with large cobbles at 88'
90			89' - 90' Grey, calcareous clay till
			90' - 95' Grey, calcareous clay till with numerous clasts
			95' -100' Grey calcareous, sandy till with abundant clay content
100			100'-103' Coarse gravel with many rounded pebbles and cobble
103			----------QUATERNARY-CRETACEOUS CONTACT----------
			103'-106' Fine grained, greyish white silica sand-kaolin matrix-non calcareous
			106'-108' White to tan coloured fireclay
110			108'-111' Interlaminated orange, red and grey fireclay - plastic, non calcareous
			111'-115.5 Light grey, fine grained, micaceous sand with very little kaolin
			115.5'-116 Darker, heavy mineral zone with hematite and magnetite
120			116'-118' Light grey, micaceous, fine grained sand with very little kaolin content
			118'-125' Fine grained silica sand-kaolin matrix with abundant kaolin
			125'-138' Medium grained silica sand- kaolin matrix with abundant kaolin
130			
			138'-142' Red, coarse grained sand
140			142'-146' Greyish white, coarse grained silica sand-kaolin matrix
			146'-159' Medium grained to coarse grained greyish white silica sand-kaolin matrix
150			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

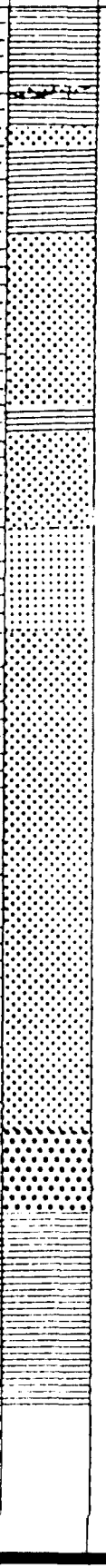
DRILLHOLE NO. SL 82-04.
Sheet 3 of 5.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		SONIC	160'-165' Fine grained, white silica sand-kaolin matrix
			165'-168' Light brown to tan coloured fireclay
			168'-170' Greyish white silica sand-kaolin matrix
170			170'-174' Medium grained silica sand-little kaolin
			174'-177' Fine to medium grained greyish white silica sand with some kaolin. Yellowish rim around perimeter of the core
			177'-180' Greyish white, medium grained silica sand-kaolin matrix
180			180'-190' Greyish white, fine grained silica sand - kaolin matrix
190			190'-201.5' Medium to fine grained silica sand kaolin matrix
200			201.5'-203.5' MIXED WOODY AND EARTHY LIGNITE
			203.5'-205' Tan to light brown fireclay
			205'-209' Coarse, grey sand - no kaolin
210			209'-212.5' Dark grey medium grained sand - no kaolin
			212.5'-214 Dark grey, coarse grained muddy sand
			214'-217' Dark brown fireclay
			217'-221' Grey, medium grained sand - very little kaolin
220			221'-222' Grey, fine grained sand with darker rim around core
			222'-226' Dark grey, clayey sand
			226'-230' Grey, coarse grained sand
230			230'-234' Same as above with some clayey sections
			234'-235' Dark grey sandy clay
			235'-238' Grey, medium grained sand
			238'-240' Fine grained sand with some clay
240			

DRILL LOG

SIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-04
Sheet 4 of 5



Depth (Ft.)	Sample	Field Description and Remarks
	SONIC	240'-242' Grey clay
		242'-244.5' Tan to light brown fireclay
		244.5'-245 Grey sand, fine grained
		245'-247' Dark grey clay with some fine sand
		247'-248' Dark grey Dark grey muddy sand
		248'-251' Dark grey to brown clay with fine grained sand
		251'-253' Tan to grey clay with fine grained sand
		253'-256' Light grey sand - little kaolin
		256'-259' Light grey to dark grey medium grained sand - no clay
		259'-261' Light grey sand as above
		261'-263' Dark grey fine grained sand - no kaolin
		263'-264' Dark grey sandy clay
		264'-270' Tan to light grey, medium grained sand
		270'-274' Light grey, fine grained clayey sand
		274'-276' Greyish white, fine grained silica sand-kaolin matrix
		276'-278' Same as above - medium grained
		278'-282- Dark grey, fine to medium grained sand - core loss
		282'-289' Dark grey, medium to coarse grained sand
		289'-290' Fine grained silica sand-kaolin matrix
		290'-300' Same as above but getting medium grained
		300'-304' Same as above but with reduced kaolin
		304'-305' Greyish white, medium grained silica sand-kaolin matrix
		305'-309' Dark grey, coarse sand
		309'-312' Dark grey, plastic, carbonaceous clay
		312'-319' Red and grey fireclay
		319'-320' Grey plastic fireclay

DRILL LOG

GNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-04 .
Sheet 5 of 5 .

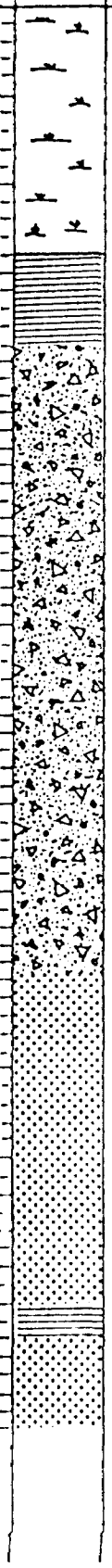
Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
320		SONIC	320'-320.5' Grey plastic fireclay
			320.5'-321' Grey, medium grained sand-no kaolin
			321'-324.5' Light grey, plastic sandy clay
			324.5'-325' Tan coloured sandy clay
			325'-326' Dark brown plastic sandy clay
330			326'-330' Dark brown to dark grey carbonaceous plastic clay
			330'-351' Dark brown to dark grey carbonaceous partly lamainated clay
340			
350		NQ	351'-352' Dark brown laminated clay with grey clay intercalations
			352'-355' Dark brown laminated to dark grey clay
			----------CRETACEOUS DEVONIAN CONTACT ? ---------- ---
			355'-355.5' Bluish light grey calcareous shale & limestone
			355.5'-357' Bluish to light grey calcareous shale with argillaceous limestone
360			357'-360' Dark brown and light grey to bluish shale with argillaceous limestone. Brown portions are non calcareous, grey portions are calcareous
367			360'-364' Calcareous greyish blue shale with ? argillaceous limestone
			364'-367' Same shale as above with broken up pieces of limestone included
			Drilling terminated at 367'
			PVC pipe inserted in the hole

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. J-1-2
Location: Grid J-1-2; 100S/300W)
Kipling Township
Started: March 6, Finished March 11,1982

Sheet 1 of 6 .



Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
		SONIC	0'-14' Core Loss - bottom part has calcareous grey till. Upper part is Muskeg.
			14'-19' Calcareous grey clay with very few small clasts
			19'-22.5' Greyish to greyish brown coarse calcareous till
			22.5'-26' Very dense, coarse, calcareous grey till with clasts
			26'-30' Greyish to greyish brown coarse till
			30'-55' Very coarse and dense calcareous grey till with numerous clasts
			---------QUATERNARY-CRETACEOUS CONTACT----------
			55'-60' Non calcareous coarse silica sand - kaolin matrix with increasing kaolin towards the bottom
			60'-65' Medium to coarse grained greyish white silica sand-kaolin matrix
			65'-70' Medium to coarse grained silica sand-kaolin matrix
			70'-73' Fine grained silica sand - kaolin matrix
			73'-75' Brown hard fireclay
			75'-80' Greyish white fine to medium grained silica sand kaolin matrix

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

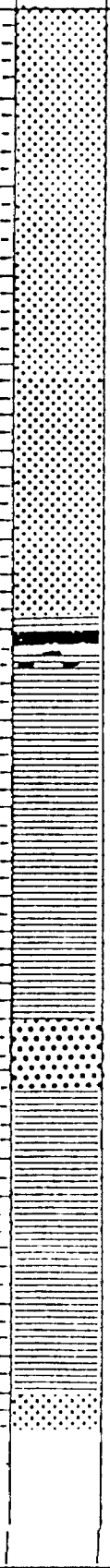
DRILLHOLE NO. J-1-2.
Sheet 2 of 6.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80			80'-85' White, fine grained silica sand-kaolin matrix with abundant kaolin
			85'-90' Same as above (Box with sample lost during transit from site to camp, but was later recovered - sample may be disturbed)
90			90'-93' Medium to coarse grained, grey to greyish white silica sand - kaolin matrix - lesser amount of kaolin
			93'-93.5' Greyish white, medium grained silica sand kaolin matrix
			93.5'-96' Grey to yellowish brown fireclay
100			96'-100' Reddish brown fireclay
			100'-105' Greyish, medium grained silica sand-kaolin matrix
			105'-110' Same as above but fine to medium grained
110			110'-114' Same as above but grey in colour and with lesser amount of kaolin
			114'-117' Same as above but colour changes to greyish white
			117'-120' Fine grained, white silica sand-kaolin matrix
120			120'-125' Coarse grained silica sand with some heavy minerals - minor amounts of kaolin
			125'-127.5' Grey, fine grained silica sand-kaolin matrix
			127.5'-130' Grey fireclay
130			130'-134' Grey, fine sandy clay
			134'-135' Grey, coarse grained silica sand - kaolin matrix with very little kaolin
			135--140' Fine to medium grained white silica sand - kaolin matrix with grey rim around the perimeter of the core
140			140'-160' Greyish white, medium to coarse grained silica sand-kaolin matrix
150			
160			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2
Sheet 3 of 6

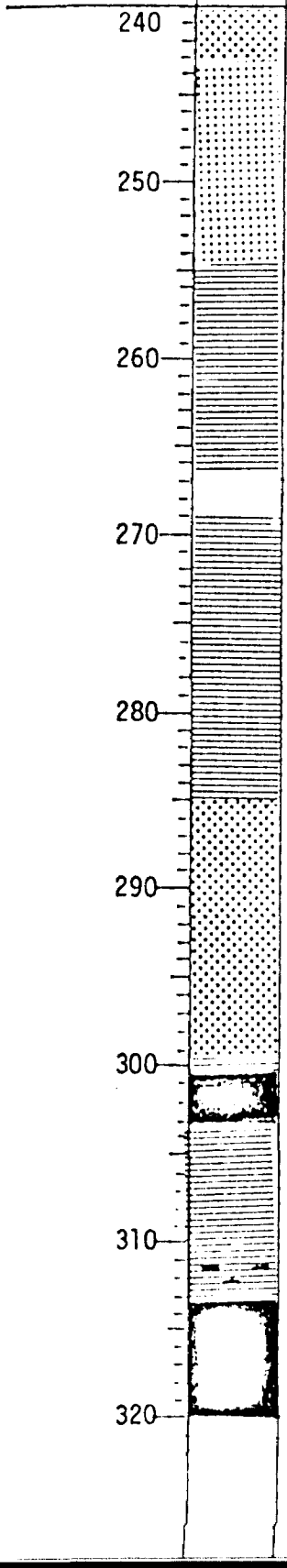


Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
		Sonic	160'-194' Greyish white, medium to coarse grained silica sand - kaolin matrix
			194'-195' Black, plastic carbonaceous clay
			195'-195.5' WOODY LIGNITE
			195.5'-197' Black to brown carbonaceous clay with some lignite fragments
			197'-203' Black to brown carbonaceous clay
			203'-206' Reddish to dark brown carbonaceous clay (?fireclay)
			206'-214' Black carbonaceous clay
			214'-217' Silty, sandy, grey to dark brown clay
			217'-221' Grey, coarse sand - little kaolin
			221'-222' Light brown clay (?Fireclay)
			222'-227' Black carbonaceous clay
			227'-230' Grey to dark brown sandy clay - transition zone between the zone above and the zone below
			230'-235' Black carbonaceous clay
			235'-238' Highly carbonaceous black clay approaching earthy lignite
			238'-240' Medium to coarse grained silica sand - kaolin matrix

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2
Sheet 4 of 6



Depth (Ft.)	Lith. Log	Sample		Field Description and Remarks
240		Sonic	240'-243'	Medium to coarse grained silica sand - kaolin matrix
			243'-248'	Fine grained silica sand - kaolin matrix
250			248'-254'	Same as above but getting coarse grained
			254'-258'	Brown fireclay
260			258'-262'	left in the core barrel and could not be retreived, but is most probably the brown fireclay as above and below
			262'-266'	Brown fireclay
			266'-269'	Lost due to washing
			269'-273'	Dark grey to brown plastic fireclay
270			273'-278'	Very dense, grey to brown clay
			278'-281'	Grey, plastic fireclay
280			281'-285'	Grey, plastic fireclay with brown inclusions
			285'-290'	White, fine to medium grained silica sand-kaolin matrix
290			290'-295'	Same as above but mostly medium grained
			295'-299'	Whitish (turning grey towards the bottom) silica sand kaolin matrix - also getting coarser towards the bottom
			299'-300'	Highly carbonaceous clay bordering on earthy lignite
300			300'-303'	Woody lignite - almost no water
			303'-305'	Black carbonaceous clay
			305'-307'	Black carbonaceous clay - some sand at the top
			307'-310'	Dark brown to black carbonaceous clay
310			310'-313'	Mixture of coarse sand, black carbonaceous clay and lignite fragments
			313'-320'	WOODY LIGNITE
320				

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

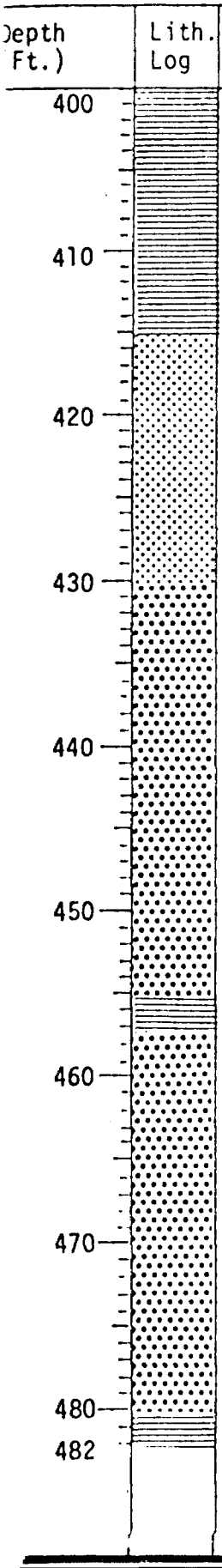
DRILLHOLE NO. J-1-2
Sheet 5 of 6

pth t.)	Lith. Log	Sample	Field Description and Remarks
320		SONIC	320'-324' WOODY LIGNITE
			324'-325' Highly lignitic black carbonaceous clay
			325'-326' Same as above, probable sluffing
			326'-329' Brown to black carbonaceous clay, somewhat sandy at the bottom and within this run
330			329'-332' Black carbonaceous clay
			332'-335' Black to brown carbonaceous clay with some sand
			335'-337' Black to brown carbonaceous clay - plastic in places
340			337'-340' Black highly carbonaceous clay with thin (1"-2") lignite seam at 339'
			340'-341' Black carbonaceous clay
			341'-343.5' LIGNITE
			343.5-345' Black, carbonaceous clay
			345'-346.5' Black to greyish black clay with some coarse sand
350			346.5'-347' Grey clay with some fine sand
			347'-352' Grey, fine to medium grained sand
			352'-357' Fine to medium grained, grey sand
			357'-371' Grey,fine to medium grained sand with angular quartz grains
360			
370			371'-377' Sand as above, but getting medium to coarse grained
			377'-382' Same as above, mixed with clay at the bottom
380			382'-387' Medium to coarse grained, grey sand
			387'-392' Same as above but getting coarser
390			392'-396' Greyish black, sandy clay
			396'-397' Grey, fine grained sand
			397'-397.5' Coarse sand, mixed with dark grey clay
			397.5'-400' Grey to black, very hard, sandy clay
400			

DRILL LOG

LI[redacted]SCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2.
Sheet 6 of 6.

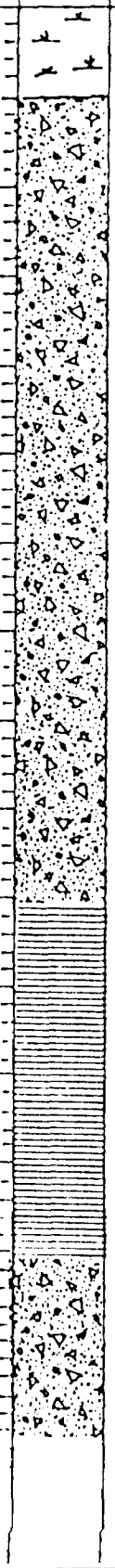


Depth Ft.)	Lith. Log	Sample	Field Description and Remarks
		SONIC	400'-402' Grey to black, very hard, sandy clay
			402'-415' Sample mixed because of difficulties in retreiving it. Mostly dark coarse sand with some clay mixed in it
			415'-430' Greyish yellow, medium to coarse sand
		NQ	430'-435' Grey to dark grey, medium to coarse sand
			435'-455' Core washed out, probably coarse sand
			455'-457' Black, highly carbonaceous clay with fragments of lignite
			457'-480' Sample washed out - coarse sand
		Sonic	
			480'-482' Probably hard clay - no sample retreived
			Drilling terminated at 482'
			PVC pipe inserted in the hole

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. J-8-101
LOCATION: Grid J-8-101 (200N/300E)
Sanborn Township
Started: Feb 22, Finished Feb 26, 1982

Depth (Ft.)	Lith. Log	Sample		Field Description and Remarks
0		SONIC	0'-5'	Black organic clay mixed with twigs
			5'-20'	Light brown weathered gritty till with interlayers of grey plastic clay, sandy at places
10				
20			20'-32.5'	Light brown to greyish brown very dense till with small (5-10mm) clasts. Matrix is silt to clay size. Till is highly calcareous
30			32.5'-40'	Same as above but slightly greyer in colour Clasts are bigger and matrix is coarser
40			40'-50'	Grey till with reduced number of clasts Matrix is silty clay increasing sand towards the bottom
50			50'-70'	Mixture of grey clay and silt as above, only a few clasts
60				
70			70'-80'	Same as above with increasing number of clasts- large limestone clast at 70'- Pegmatite boulder at 74'.
80				

DRILL LOG

[redacted]NASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

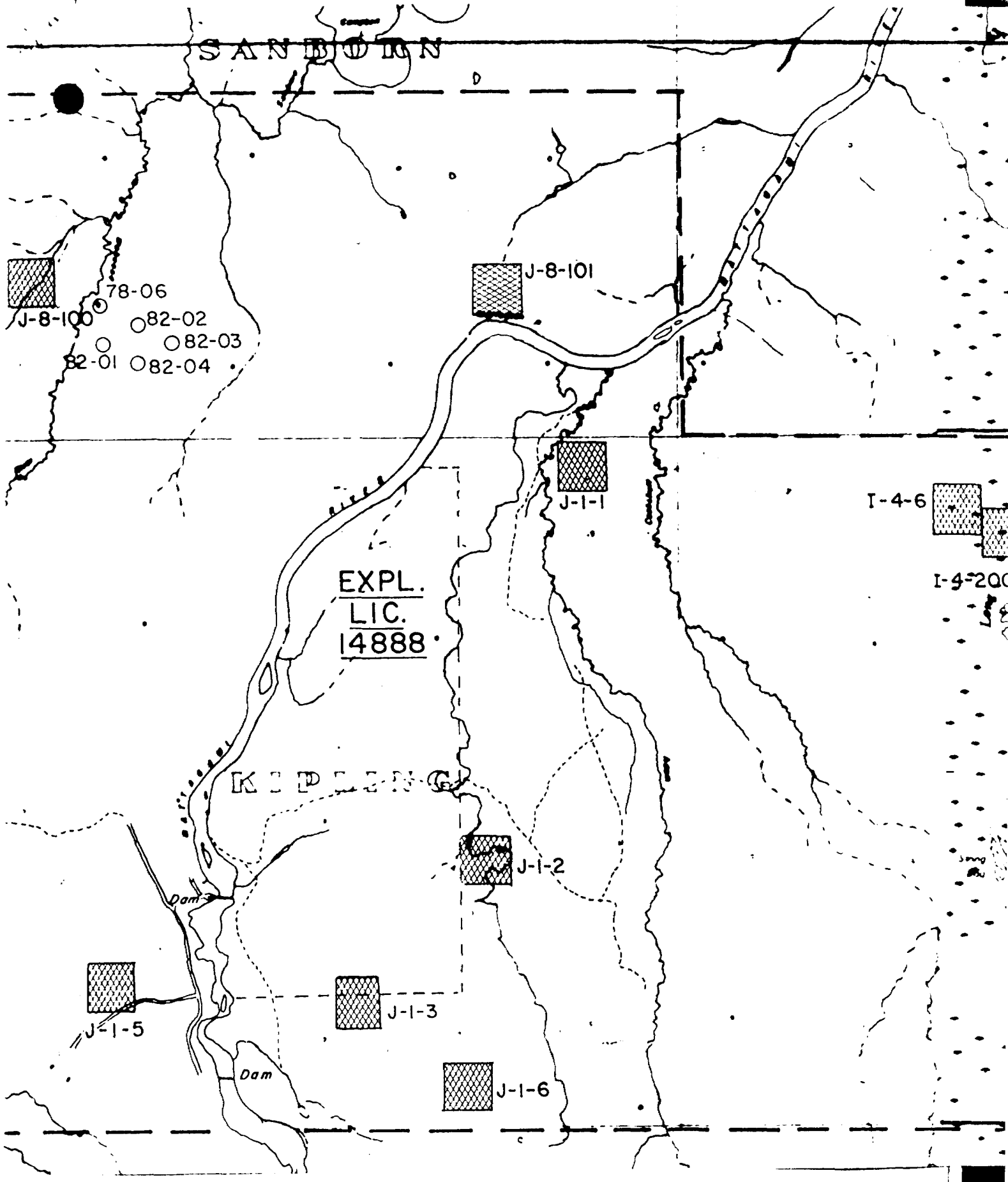
DRILLHOLE NO. J-8-101
Sheet 2 of 3

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks	
80		Sonic	80'-90'	Grey, fine grained till with increasing number of clasts
90			90'-100'	Grey, clayey, silt till, fairly friable
100			100'-102'	Coarse gravel
			102'-110'	Dark brown organic silt till - calcareous
110			110'-120'	Blackish brown, highly organic gritty clay till getting harder down section with subangular quartzitic clasts. At the bottom is a much harder till with very large highly calcareous limestone clasts
120			120'-132'	Dark brown clay till with larger clasts than above and also some lignite fragments
130			132'-135'	Grey, finer grained till with lesser number of clasts - highly calcareous
			135'-140'	Very dense dark brown till with numerous large (upto 10 mm) rounded clasts - mostly quartzite- matrix is fine grained
140			140'-160'	Same as above but the colour changes to somewhat greener
150				
160				

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J - 8 - 101
Sheet 3 of 3.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		SONIC	160'-178' Very dense dark brown to brownish green till with numerous rounded clasts- matrix is fine grained
170			
			178'-185' Ground ultra mafic - medium grained blocks and fragments with rock powder magnetic with minor sulphides - first two feet is highly altered
180		NQ	185'-240' Fine to medium grained ultramafic (magnetic) greenish black to greyish black -serpentinized rock - quite soft with seams of green clay and soft altered material - fractured sections alternate with massive sections Minor sulphides (Pyrite and Pyrhotite) disseminated throughout the section). Some relict olivine laths visible as small dark, euhedral to subhedral crystals - fine calcite stringers common
190			
200			
210			
220			
230			
240			Drilling terminated at 240' PVC pipe inserted in the hole


SANDOVAL
J-8-101
78-06
J-8-100
82-02
82-03
82-01
82-04
J-1-1
I-4-6
I-4-200
EXPL.
LIC.
14888
KERR-MCGEE
J-1-2
Dam
J-1-5
J-1-3
Dam
J-1-6

2/....

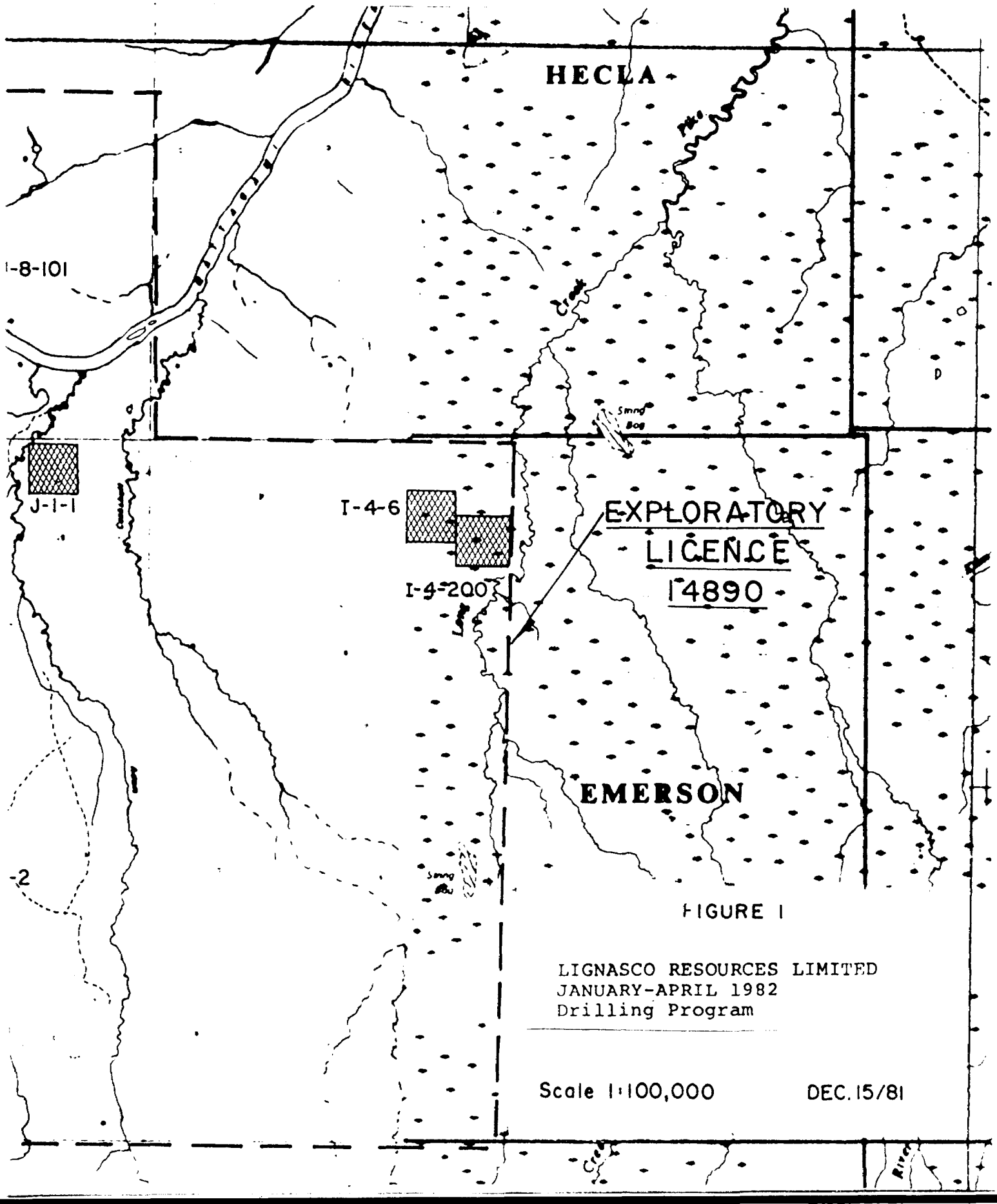


FIGURE 1

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Scale 1:100,000 DEC. 15/81

LIGNASCO RESOURCES LIMITED
OMEP DESIGNATED PROGRAMME
REGISTRATION NUMBER OM81-5-C-132

Final Report

by

Aaron Jaan Saber, Ph.D.,
P.Eng.(Ontario),Eng.(Quebec)

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1

Tel: (416) 781-4798

15 November 1982

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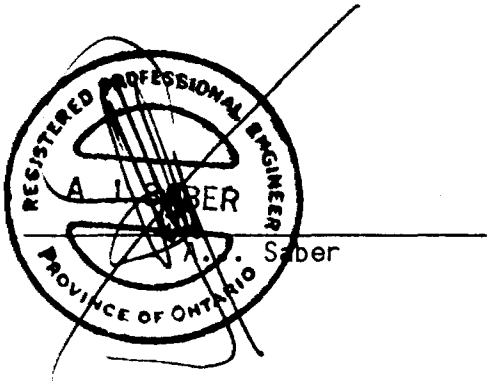

A. J. Saber

This report has been prepared on behalf of Lignasco Resources Limited for the Ministry of Natural Resources of the Province of Ontario, with respect to the Ontario Mineral Exploration Program (OMEP) for Designated Program OM-5-C-132: Attn: Mr. B. Gordon, OMEP Administrator, Mining Tax Assessment Branch, Toronto.

> Saber, A.J., "Lignasco Resources Limited OMEP Designated Program, Registration Number OM81-5-C-132 (Final Report)," prepared for the Ministry of Natural Resources on behalf of Lignasco Resources Limited, Toronto, Ontario, Canada, 15 November 1982.

Author's Note:

The Author is a Registered Professional Engineer in Ontario and a Registered Engineer in Quebec and is a Member of the Engineering Institute of Canada and the Canadian Institute of Mining and Metallurgy.

The Author is a graduate of Princeton University (Aerospace and Mechanical Sciences, Ph.D., 1974, M.A., 1971) and the University of Toronto (Mechanical Engineering, B.A.Sc., Honours, 1969).

The Author holds the position of tenured Assistant Professor of Engineering at Concordia University, Montreal, Quebec.

Samples for testing were prepared on 11 and 12 May 1982, at the Selco, Inc. laboratory, 1173 Roland, Thunder Bay, Ontario. Chemical analyses of the silica content were made at the analytical chemistry laboratory at Concordia University, Montreal, Quebec.

ABSTRACT

Exploration work conducted by Lignasco Resources Limited, on its licence area (Number 14890) in Kipling, Emerson and Sanborn Townships in Northeastern Ontario, has been designated by the Ontario Mineral Exploration Program (OM81-5-C-132). The work conducted between 1 January 1982 and 30 June 1982 is discussed. The material presented includes the drilling program and logs; silica sand, kaolin, and lignite discoveries; dimaondiferous kimberlite potential; expenditures of $343,417; a claim for $82,344; value of the silica sand; and future work plans.

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030C

List of Tables.

List of Figures.

1. Introduction.

This report covers exploration work conducted in the James Bay Lowlands of Northeastern Ontario. The region explored includes portions of Kipling, Sanborn and Emerson Townships, licenced to Lignasco Resources Limited under Exploratory Licence of Occupation Number 14890.

The period covered in this report is from 1 January 1981 to 30 June 1982. The work has been considered a "Designated Program" under the "Ontario Mineral Exploration Program," (OMEP) and issued the Registration Number OM81-5-C-132 on 25 March 1982.

This reports discusses the location and surface conditions of the site; geophysical surveys; drilling, including drill hole locations and logs; lignite discoveries, silica sand; and kaolin. The expenditures are also discussed. Finally, conclusions based on the findings are presented, and future plans are shown.

2. Index and Location Maps.

The exploration program is conducted in the region which was designated by this author as the "Adam Creek Area of the James Bay Lowlands."[1] The region, shown in Figure 1, a map of the Province of Ontario, is located in the southern part of the Moose River Basin, in the southernly part of the lowlands. The area falls north of the Precambrian Escarpment, and largely within the limits of the District of Cochrane. The area is drained by the Missinaibi, Mattagami and Opasatika Rivers, which converge to the northeast to form the Moose River.

The specific region of interest is shown in Figure 2. The region covers approximately 92,745 acres in the Townships of Kipling, Emerson and Sanborn.

The site, at Adam Creek, lies approximately 100 km north of Kapuskasing, is serviced by an all-weather road, lies approximately 40 km west of the Ontario Northland Railway, and is about 100 km from the Trans-Canada Highway and the Canadian National Railway through Kapuskasing. The site is serviced by Ontario Hydro, since the Kipling Generating Station is surrounded by the licence area.

The surface features of these regions are shown in Department of Mines and Technical Surveys Canada, Surveys and Mapping Branch, Maps 42-I (Moose River) and 42-J (Smoky Falls). They are detailed in maps 42-J/1, 42-J/8 and 42-I/4.

High Resoultion Aeromagnetic Survey data are shown in Maps 1, 2 and 3, enclosed; and Grid are shown in Maps 4 to 13, enclosed.

3. Previous Work.

The region is generally flat, featureless terrain and has been described by Guillet as follows:[2]

> Variegated (red, brown, grey) clay and silt marks the top of the Mattagami Type B unit ..., in direct contatct with Adam till at a depth of 43 metres. Type B sediments comprise a section 22 metres thick that is predominantly medium to coarse grained kaolinite-rich quartz sand with several thick sections of quartz gravel. At a depth of 65 metres, a layer of black carbonaceous clay marks the top of the Type A sediments which continue to a depth of 119 metres. At or about this depth is the top of the Devonian Long Rapids formation, a grey clay-shale, difficult to distinguish from some of the Mattagami clay beds. A lignite seam 1 metre thick occurs at a depth of 71 metres, and a 6 metre seam occurs at a depth of 96 metres.

The region was explored as part of the 1978 Ontario Geological Survey (OGS) drilling program in the Moose River Basin.[2] That program involved drilling a total of eight holes, using a reverse circulation approach in a summer drilling program. The locations of those holes is shown in Figure 3. Six of those holes lie in line in the east-west direction, at 8 to 14 km (5 to 9 mile) spacing along a line at approximately 50 degrees, 10 minutes North, centred at approximately 82 degrees, 35 minutes West. The wto remaining drill holes lie approximately 5 to 10 km (3 to 6 miles) north of the east-west baseline. In all, the total drilling was 1177 metres (3862 feet), with the deepest hole drilled to 189 metres (620 feet).

One of the OGS drill holes, number 78-06, was reported to have located a previously unrecorded lignite seam. This newly discovered reserve was presumed to consist of two main seams: The first a metre (3 feet) thick at the 71 metre (233 feet) depth and the second 6 metres (20 feet) thick at the 96 metre (300 feet) level. The coal is bounded from above by a refractory clay layer and from below by a carbonaceous clay layer. This structure encourages the formation of a natural reactor cavity for underground coal conversion.[3]

In addition to the lignite deposit, the OGS drilling reported finding quartz sands, refractory clays and kaolitic clays. Furthermore, holes 78-01 and 78-08 show coal reserves, quartz sands and clays.

In addition to the OGS exploration program, work by SELCO, Inc, reveals the promise of diamondiferous kimberlites on the same area.[4]

The previous drilling program, conducted by the Ontario Geological Survey reported:

> Any drilling in muskeg terrain can be expected to be hampered to some extent by the wettness of the land. The excessive use of drilling water, particularly when operating by reverse circulation, added to the wettness of the site. Once off the drilling platform, it was not uncommon to flounder knww-deep in the boggy terrain. While these conditions caused some discomfort, they impeded very little the progress of the drilling program... The benefit of a summer drilling program serviced by helicopter, verses a winter program using a winter road are partly reflectde in the difference in cost between the helicopter and the estimate for road construction and maintenance. The estimate for the winter road was $150,000 to $165,000, whereas the actual cost for helicopter servicing was half that amount. Additionally, the use of helicopters minimizes the environmental impact, whereas the trace of winter roads creates a long-lasting impact on the muskeg terrain. As to winter drilling, it is generally conceded to be perhaps 20% more costly than summer drilling whatever access in used, simply because of the increased problems of working in freezing conditions.

The total cost for the 1978 OGS drilling program was reported to be $263,347.41, or a cost per foot drilled of $68.19. Overall average recovery was reported to be 57.4 per cent, using triple-tube coring operations.

The three holes (78-01, -06 and -08) lie within 10 km (6 miles) miles of existing all-weather roads, and so are close to transportation routes. The driving time to the site, from Smooth Rock Falls, is approximately 2 hours.

4. Geophysical Surveys.

Airborne magnetometer surveys have provided potential kimberlite targets for detailed ground geophysical definition. As was mentioned above, the geomagnetic data from the geophysical surveys is summarized in Maps 1 to 12.

Evaluation of the ground geophysics led to a selection of anomalies for drill testing. A single hole is directed to a target, with the object of the drilling to identify the anomaly source and to provide sufficient drill core (50 kg) for mineralogical and chemical testing.

Coverage of the area was conducted by air in 1981. That work consisted of flight lines 250 metres nominal spacing with a surface terrain clearance of 60 metres. Total coverage was about 1500 line-km.

Nine geophysical grids were cut and surveyed. All grids were surveyed using a nuclear precession magnetometer. Line and station separation were a maximum of 100 and 25 metres respectively. Diurnal variations were removed from the results. Total surveying from 8 January to 30 June 1982 was 157 km.

The results are referred to the map locations shown in Figure [4], where the grid locations are referenced. The grids are discussed in Table I.

TABLE I

Grid Locations.

Grid 14-6 This grid is a good, small target, entred at 00/050S, and extends off the west end of the grid. Drill testing waits the results of drilling adjacent anomaly 14-200.

Grid 14-200 A good drilling target is centred at 500W/200N.

Grid J1-1 A large strong positive response with an amplitude of about 700nT is centred at 200E/400S.

Grid J1-2 A very large lobate anomaly is located at the centre of the grid.

Grid J1-3 Several sharp but low amplitude anomalies are present in the east half of the survey. The grid is underlain by basement rocks and the responses seem typical of this setting.

Grid J1-5 All anomalies detected have either a cultural of basement source.

Grid J1-6 Two anomalies of possible interest appear at 800W/200S and 400W/300S. The grid is underlain by Precambrian rocks, and while anomaly patterns on the grid confirm this setting, the land is considered retained pending further study.

Grid J8-100 A single good circular anomaly is centres at 700W/450N. The source is likely deep (over 150 metres).

Grid J8-101 A small circular positive anomaly is centred at 200N/300E.

5. Drilling Program.

Drilling was planned on the basis of the anomalies discussed above, and on the basis of the 6 metre lignite seam reported by the Ontario Geological Survey.

A winter drilling program was planned in order to take advantage of a Hawker-Siddeley Sonic Drill, operated by Midwest Drilling of Winnipeg. The drill rig was mounted on a Nodwell carrier accomapnied by a trailer.

The rig was modified to include a Longyear 150 drill head, so that regular NQ diamond drilling could follow sonic coring. The sonic drill was chosen for the job since its 15 cm diameter core provides a relatively undisturbed sample, and since recovery is both large and good. The sonic drill is particularly applicable in unconsolidated wet units as found at Adam Creek.

The drilling was planned for January to April 1982. Unfortunatly, the weather conditions in the James Bay Lowlands in the Fall of 1981, led to a snowfall prior to the winter freeze. This made the construction of winter roads uncertain and difficult. As a result, conditions in the extensive muskeg cover necessitated long, meandering rig moves, and very expensive site preparation. In any event, the rig proved to be successful in recovering Lower Cretaceous and Quaternary tills with a recovery and retention factor better than 95 per cent. This vastly exceeds the recovery reported by the OGS with triple tube boring. Furthermore, the use of the sonic drill allowed a relatively undisturbed sample to be recovered, yielding unquestionable raw data for logging and analysis.

Four holes were drilled in the vicinity of OGS hole 78-06 (82 degrees 13 minutes 43 seconds West longitude, and 50 degrees 15 minutes 30 seconds North latitude). Holes were drilled on an equilateral triangle grid pattern and the sides of each triangle are 800 metres long, as shown in the diagram.(Figure 5) Using such an equilateral triangle pattern allows maximum geological coverage with a predetermined number of drillholes.

The lignite search drill hole locations on site are shown in Figure 6. These locations are based on existing drillhole 78-06 having shown a 6 metre lignite seam. Based on Campbell Lake (1948), holes are drilled no further NORTH than the location of 78-06. And based on 78-01 and 78-08, the general direction of drilling may appear to swing to the south-east. With those considerations, a set of 4 or more drillholes are sited as indicated here.

The first hole drilled was 82-01, 800 metres due south of the site of 78-06. Hole 82-01 is located at station 'a' in the diagram.

Hole 82-02 was located at station 'b', 800 metres from station 'a', along a line 30 degrees declination of the east-west horizon through 78-06.

Hole 82-03 was located dependant on the results of 78-06, 82-01 and 82-02. With 82-01 and 82-02 showing lignite occurance equal to or less than 6 metres at approximately 100 metres depth or deeper, then 82-03 was to be located at station 'c'. If the overburden is shallower than 100 metres, or if the seam is thicker than 6 metres, then 82-03 is to be drilled at station 'd'. In general the siting of drillholes was to be in the direction in which the lignite seam appears to be increasing. This siting is illustrated for the case of drillhole 82-04:

> Drillhole 82-04 is to be drilled dependant on the locations of 82-01, 82-02, and 82-03. If stations 'a', 'b' and 'c' have been drilled, then 82-04 is to be located at 'g' if the seams at 'a' and 'c' have a larger average thickness than those at 'a' and 'b'. Likewise, if the average depth of lignite at 'a' and 'b' exceeds that at 'a' and 'c', then 82-04 is to be drilled at station 'd'. If the average lignite thickness of stations 'c' and 'b' exceeds either of those two averages above, then, drillhole 82-04 is to be executed at 'i' if 'c' shows the largest seam, at 'e' if 'a' shows the largest seam and at 'k' if the largest seam is at 'b'.
>
> If stations 'a', 'b' and 'd' have been drilled, Then 82-04 is to be located by averaging the the seam hicknesses in pairs: viz, 'a'-'b', 'b'-d', and 'a'-'d' and drilling along the line that shows the highest average lignite thickness in the direction in which the thickness is increasing. For example, performing the avaraging in pairs may show that the 'b'-'d' pair has revealed the largest portion of a lignite lens. In that case, 82-04 is located at 'k' if 'b''s seam is larger than 'a''s or at 'g' if the opposite is true.
>
> Should there be occasion to make additional drilling, such drilling is to proceed in the direction of increasing lignite appearance.
>
> If holes cannot be drilled to within 80 metres of the stations on the grid, then a new station point should be located as close as possible to 800 metres from already-drilled sites. If it is necessary to drill at distances over 100 metres from the specified site, then, a new grid must be established with its first hole no closer than 720 metres from any already-drilled hole, and no further than 880 metres from such holes.

Two holes were completed for geophysical anomaly examination. The locations of all six holes drilled in the January to April 1982 period are listed in Table II. The total drilling was 659 metres (2162 feet), providing 15 cm (6 inch) diameter core, logged, and boxed, relatively undisturbed.

TABLE II

Lignasco Resources Limited
Drillhole Data
January to April 1982

Drill Hole (Design.)	Longitude (d-m-s)	Latitude (d-m-s)	Depth (ft)	Depth (m)	Dates (1982)
82-01	82-13-43	50-15-30	383	116.7	16/3 - 20/3
82-02	82-13-43	50-15-30	364	110.9	29/3 - 1/4
82-03	82-13-43	50-15-30	326	99.4	24/3 - 29/3
82-04	82-13-43	50-15-30	367	111.9	20/3 - 24/3
J1-2	Grid J1-2	100S/300W	482	146.9	6/3 - 11/3
J8-101	Grid J8-101	200N/300E	240	73.2	22/2 - 26/2
TOTAL			2162	659.0	22/2 - 1/4

6. Drill Logs.

The drill logs derived from the drilling program discussed above are provided in Appendix A. The drill logs have been prepared by H. Verma, the site geologist for the drilling program. A protion of the log for drill hole J1-2 is discussed in Tables III to V.

Table III discusses a portion of the log for drill hole J1-2. The core shows silica sand/kaolin matrices extending from approximately 50 feet (16 metres) to over 200 feet (65 metres).

The silica sand was washed in a SWECO wet separater and dried to give the results shown in Table IV. Table IV gives sample depths and designations, it shows the thickness of 10 selected sequences ranging from 3.5 feet (1 metre) to 10 feet (3 metres), and also provides the dry silica sand fraction for the sequence.

The core from drillhole J1-2, located in the eastern half of Kipling Township has been examined visually. The locations along the core of the samplings is given in Table IV. The core is essentially undifferentiated until 55 feet (17 metres), where the quaternary/cretaceous boundary is intersected. The demarcation is determined by the chemical activity of the calcareous content of the core down to the boundary: a drop of acid causes chemical reaction to occur until suddenly, at 55 feet, the activity ceases. The core examination begins at this point.

The core contains various sizes and grades of silica, powdered to a greater or lesser degree by kaolin, china clay. For example, at 60 feet (18 metres), a view under a 16X magnifying lens reveals apparently clear, colourless silica sand crystals coated in a light-grey, whitish powder. There are a few black or brown coloured particles, but these are few and far between.

Observing the sample under a 20X glass reveals a few brown-coloured units dispersed in a granular matrix of 0.5 to 1 mm sized particles.

A discussion of the appearance of the samples is given in Table V.

The water content of the core is estimated using a sample from the 58 foot depth location. A portion of sample designation J1-2-1, with a total mass of about 70 grams, was heated in an electric oven at 150 C for about 1 hour. The mass decreased to 61 grams, indicating that the water content of the core is about 12.86 per cent.

TABLE III

Drill Hole Logs.

(a)	55-60	Non-cacareous coarse silica sand - kaolin matrix with increasing kaolin toward the bottom (J1-2-1, 58 feet);
(b)	60-65	Medium to coarse greyish-white silica sand - kaolin matrix (J1-2-2, 61 feet);
(c)	65-70	Medium to coarse silica sand - kaolin matrix;
(d)	70-73	Fine silica sand - kaolin matrix;
(e)	73-75	Brown, hard fireclay;
(f)	75-80	Whitish grey fine to medium-grained silica sand - kaolin matrix;
(g)	80-85	White, fine-grained silica sand - kaolin matrix, with abundant kaolin (J1-2-3, 83 feet);
(h)	85-90	Same as above (g). However, the core box was lost during transit from the site to camp. The box was later recovered, but the core is likely disturbed;
(i)	90-93	Medium to coarse, grey to greyish-white silica sand - kaolin matrix with lesser amounts of kaolin (J1-2-4, 92 feet);
(j)	93-93.5	Greyish-white, medium-grained silica sand - kaolin matrix;
(k)	93.5-96	Grey to yellowish-brown fireclay;
(l)	96-100	Reddish-brown fireclay;
(m)	100-105	Greyish, medium-grained silica sand - kaolin matrix;
(n)	105-110	White, fine to medium-grained silica sand - kaolin matrix (J1-2-5, 107 feet);
(o)	110-114	Grey, medium to fine-grained silica sand - kaolin matrix, with only some kaolin;
(p)	114-117	Grey to white, fine to medium-grained silica sand - kaolin matrix (J1-2-6, 117 feet);
(q)	117-120	Fine, white silica sand - kaolin matrix;
(r)	120-125	Coarse silica sand with some heavy minerals. Minor amounts of kaolin;
(s)	125-127.5	Grey, fine silica sand - kaolin matrix;

(t) 127.5-130 Grey fireclay;

(u) 130-134 Grey, fine, sandy clay;

(v) 134-135 Grey, coarse silica sand - kaolin matrix with very little kaolin;

(w) 135-140 Fine to medium-grained silica sand - kaolin matrix with grey rim observed around the perimeter of the core (J1-2-7, 137 feet);

(x) 140-185 Greyish-white, medium to coarse-grained silica sand - kaolin matrix (J1-2-8, 148 feet) (J1-2-9, 166 feet) (J1-2-10, 183 feet);

(y) 185-194 Medium to coarse-grained silica sand - kaolin matrix;

TABLE IV

Sample Depths and Designations, J1-2 Drill Hole

Sample Designation	Depth (Feet)	Thickness (Feet)	Dry Silica (125 microns - 1mm) (%)
J1-2-1	58	5	56.3
J1-2-2	61	10	30.3
J1-2-3	83	10	66.2
J1-2-4	92	3.5	53.7
J1-2-5	107	5	52.3
J1-2-6	117	6	67.8
J1-2-7	137	5	50.6
J1-2-8	148	15	58.7
J1-2-9	168	15	25.0
J1-2-10	183	14	10.4

TABLE V

Visual Observation of Cores.

J1-2-1	Some large-grained particles, generally beige in colour. Some grey particles.
J1-2-2	More coarse-grained particles, generally beige in colour. Some grey particles.
J1-2-3	Whiter colour here than the previous two samples, with fewer of the large-grained particles.
J1-2-4	Generally white in colour, with some small black dust-like elements.
J1-2-5	Does not have the same small black dots of dust observed in J1-2-4.
J1-2-6	The vast majority of this material has a fine-grained nature: the coarse grained fraction appears to be very small.
J1-2-7	The fine-grained material represents most of the mass of the sample. The remainder is deemed to be of relatively coarse grain.
J1-2-8	The fine-grained material comprises most of the sample. There are plasticky lumps that are separated as part of the coarse grained mass in a Sewco wet separator. This plasticky material appears to be the agglomeration of smaller solid fragments held together in a fine wet clay powder matrix. There appear to be some shiny flake-like material which may be mica.
J1-2-9	Most of this material is course-grained, with a small fraction fine-grained. The quantity of the plastick material observed earlier appears to have increased. There also appear to be mica fines in the sediment.
J1-2-10	A small fraction is fine-grained, the balance course. The quantity of mica-like material has decreased. In the coarse fraction, cnirt and jasper have been found, although the majority of the particles are coarse-grained silica sand globules of various colour.

7. Lignite at Adam Creek.

Lignite of 6 metres thickness observed by the Ontario Geological Survey at their station 78-06, was not observed by Lignasco Resources Limited in the January to April 1982 program. Nevertheless, other sequences were recorded.

First, in the case of the four holes at 82 degrees 13 minutes 43 seconds West longitude and 50 degrees 15 minutes 30 seconds North latitude, lignite was observed in all of the four holes. Also, only hole J8-101 did not provide a lignitic intersection.

As the map (Figure 4) illustrates, only J8-101 lies near a river, the Mattagami. Furthermore, correlation with the Cretaceous Tyrell Sea, suggests that lignite could only be expected at the ancient shore.

This leads to identification of the source lignite field for Ontario at the border of the shore of the Tyrell Sea. The deposit in this case, over the 92,745 acres of Lignasco Resources Limited licence lands exceeds 1 million tonnes. In any event, further exploration for lignite must be undertaken for evaluation.

TABLE VI

Lignite Sequences
Observed at Adam Creek

Drill Hole (Designation)	Depth (Feet)	Lignite Thickness (- - -)
82-01	245	2 feet
82-02	315	fragments
82-03	153	fragments
	175	2 feet
	190	1 foot
82-04	202	2 feet
J1-2	190	0.5 feet
	300	5 feet
	313	11 feet
	341	2 feet
J8-101	---	---

8. Silica Sand at Adam Creek.

The exploration and subsequent analyses show that quartz sand of high natural purity is located on the Lignasco Resources Limited licence lands. The sands have been analysed at the Analytical Chemistry Laboratory of Concordia University, Montreal, Quebec. Samples subjected to dry magnetic separation have given analyses as shown in Table VII. The high silica content, low iron content and chromium-free nature of the silica sand, coupled with its physical size in the natural state make this medium ideal for glass-making, including the production of fibre-optic grade products.

TABLE VII

Analysis of Adam Creek Silica Sand(%)

Sample	SiO2	Fe2O3	Al2O3	Cr2O3	Residual
J1-2-1	97.05	0.031	0.75	0.002	2.167 %
J1-2-2	94.20	0.101	1.21	0.008	4.571
J1-2-3	97.67	0.131	0.68	0.001	1.518
J1-2-4	98.07	0.032	0.64	$0.001	1.258
J1-2-5	98.27	0.025	0.47	$0.001	1.235
J1-2-6	94.13	0.111	1.18	0.003	4.576
J1-2-7	97.65	0.028	0.90	0.001	1.421
J1-2-8	98.16	0.161	0.61	0.002	1.067
J1-2-9	96.89	0.026	0.65	0.001	2.433
J1-2-10	93.06	0.034	1.05	0.002	5.854

Notes: (1) error on silica +0.1,-0
(2) contents of residual may include silica, calcium and clay

9. Kaolin at Adam Creek.

In addition to the observed lignite and silica sand, the site at Adam Creek shows high quality kaolin as part of the silica sand / kaolin matrix. Indeed, for drill hole J1-2, the kaolin observed at approximately 140 feet (40 metres) below the overburden, reveals plasticky white globules of significant reflectivity.

It is the opinion of this author that these globules represent competition for the kaolin currently imported into Canada.

10. Diamondiferous Kimberlites.

The magnetic anomalies have suggested drilling at grid locations J1-2 and J8-101.

Hole J8-101 was drilled to a depth of 73 metres. A dark massive ultramafic intrusive was intersected under a till cover of 55 mtres. Laboratory testing of the core remains to be completed, but early petrographic work indicates the rock consists of oviline phenocrysts set in a groundmass of lath-like pyroxenes. The rock is not likely a true kimberlite, but a final classification demands further study.

A hole was also drilled on J1-2. This hole was abandoned at 147 metres. Bedrock was not reached. After passing through about 16 metres of till, a long interval of silica sand (to 59 metres) was encountered. This was followed by intercalated sands and clays, and some lignite beds as indicated above. Given the depth of cover, additional drilling is not warranted.

11. Expenditures and Claim.

Expenditures are based on the actual work done on site due to the drilling program and to direct analyses of cores. The actual claims are based on the 50% of a Joint Venture between Lignasco Resources Limited and Selco, Inc. in the search for diamondiferous kimberlites, and 100% of the lignite program.

The expenditures for the program are itemized in Table VIII. This expenditure exceeds the Proposed Budget of $329,377 by $14,040 (4%). The ACTUAL CLAIM is therefore only $329,377.

The grant requested is therefore $82,344.

TABLE VIII

Expenditures.

Ground Geophysics:

157 kilometres of magnetometer surveys, by S. Bosum Contracting, Cibougamau, Quebec 12 January 1982 to 10 March 1982 $9,206

Direct Expense (50%): $4,603

Contract Draughting and Contouring by Dataplotting Services, Don Mills, Ontario, $1,672

Direct Expense (50%): $836

Line Cutting:

8 grids, total 157 kilometres, by S. Bosum Contracting, Chibougamau, Quebec, $18,072.

Direct Expense (50%): $9,036

Diamond Drilling:

4 holes, 438.9 metres by Midwest Diamond Drilling, Winnipeg, Manitoba, at $458.43 per metre.

Direct Expense (100%): $201,204

2 holes, 221.1 metres by Midwest Diamond Drilling, Winnipeg, Manitoba, at $458.43 per metre.

Direct Expense (50%): $50,450.22

Ground Support:

Camp Operation, including food supplies ($10,225), Accomodation ($2,846), vehicle rental and operation ($1,755), draughting ($818), other ($711), $16,355.

Direct Expense (100% of 4/6 ths and 50% of 2/6 ths): $13,629

Helicopter Services:

North Star Helicopters, Hearst, Ontario, A-Star Charter, $430 per hour, $33,370.

Direct Expense (100% of 4/6 ths and 50% of 2/6 ths): $27,808

Supervision:

On site ($10,742), general ($12,609), $23,351.

Direct Expense (100% of 4/6 ths and 50% of 2/6 ths): $19,459.

Testing:

Silica Sand Testing ($2,500)

Direct Expense (100%): $2,500

Report Production:

Direct Expense (100%): $10,000

TOTAL CLAIM: $343,417

12. Discussion and Conclusions.

Hydrocarbon fuels are supplied to the Province of Ontario from outside its borders. This supply is argued to be satisfactory. Consequently, lignite development as a substitute source of fuel may be delayed. Nevertheless, silica sand and kaolin are in demand.

Silica occurs in nature as quartz in a variety of rocks and sediments. However, the value of a deposit depends on its purity and accessibility to markets. Indeed, commercial sources are limited only to those supplies which have very high purity and which can provide the material to a market at a competitive price. Such sources are rare.

Some Canadian suppliers, as of 1978, are listed by Province in Table IX. However, these suppliers do not provide all the silica requirements of Canada. In 1980, 1,177,306 metric tonnes of silica sand were imported into Canada (valued at $17,336,000 or $14.73 per tonne). This is approximately the same quantity as the domestic Ontario production of 967,000 tonnes (valued at $9,100,000 or $9.41 per tonne) over the same period.

Most of the imported silica sand is imported from a sole supplier at Ottawa, Illinois. However, it is reported that the Illinois supply is not maintaining the level of suitability that the market demands. Furthermore, both Ontario and Quebec are experiencing shortages of silica supply, today. This is not only because of the high cost of imports, but also because of the apparent decreased quality of the imported supply. Ontario, alone, consumes more than 1 million tonnes of silica annually. This silica has been valued at $31 million (i.e., 31 $/tonne), F.O.B. the user site. Of this 1 million tonnes, nearly 600,000 tonnes were used for glassmaking. Only 230,000 tonnes used for glassmaking were purchased in Ontario, the balance (370,000 tonnes) were purchased from the United States. Indeed, almost 70% of total silica requirements in the provinces of Ontario and Quebec are imported. The silica sand supply at Adam Creek can meet the stringent raw material specifications the Ontario market demands.

Although all cores show silica sand of various grades and sizes, the drilling program found silica sand of exceptional purity. The silica sand, of 125 micron to 1 mm in mean size, is found below approximately 60 feet (18 metres) of overburden.

In order to review the competitive nature of the Adam Creek silica sand in the marketplace, attention is focussed here on the existing Ontario supplier, Indusmin Limited. Indusmin Limited quarries a high-grade silica deposit on Badgeley Island in Geogian Bay. The deposit is reported to contain 12.6 million metric tonnes of very pure Precambrian Lorraine quartzite. The primary crushing plant is located about 190 km north of Midland, across Georgian Bay. Midland is approximately 120 km north of Toronto. The Badgely Island operation has a capacity of 1 million tonnes per year, while the Midland plant capacity is half that.

The recoverable silica sand at Adam Creek includes 103,000 tonnes per acre (66 million tonnes per square mile) which appears to be of glass grade purity. The total deposit of glass grade silica sand may exceed half a billion tonnes, over an area of 5000 acres (8 square miles). The value of such a glass grade deposit, at $11.80 per tonne F.O.B. Adam Creek, is over $1,200,000 per acre or over $770,000,000 per square mile.

Supplying the Ontario demand for silica sand that is imported from the United States, approximately 370,000 tonnes per annum, requires a production cost of approximately $9 per tonne. The profit, then, is 370,000(11.8-9) = $1,040,000 per annum. The cost of the necessary preliminary work before mining, that is, drilling to delineate the deposit, planning including financial arrangements, and contract definition is approximately $465,000.

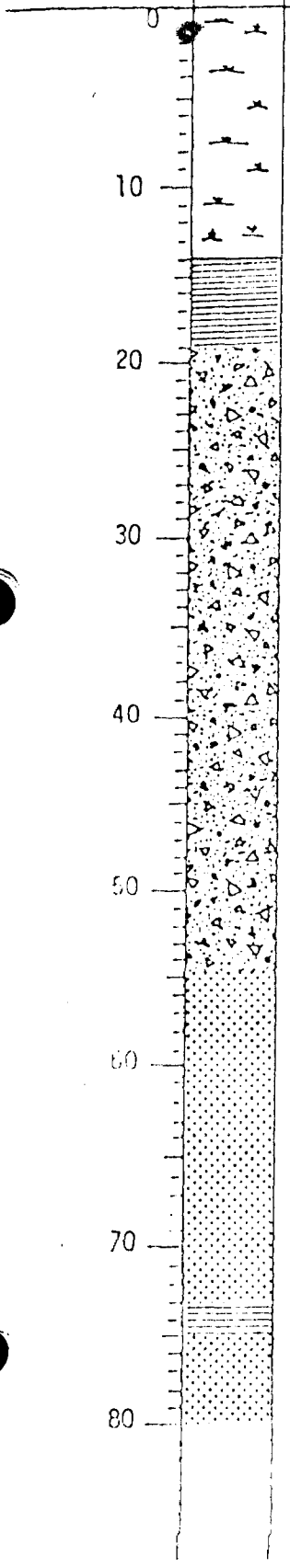
Depending on the size of the granules and the proportions of "impurities" such as iron oxide, aluminum oxide and oxides of other metals, silica sand has a variety of uses. These uses are listed in Table X.

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. J-1-2
Location: Grid J-1-2; 100S/300W)
Kipling Township
Started: March 6, Finished March 11,1982

Sheet 1 of 6 .

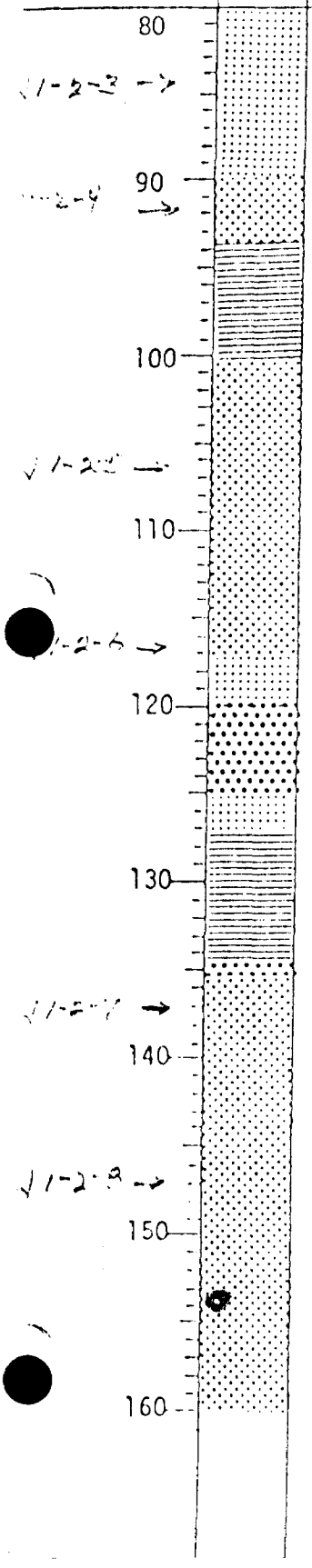


Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
		SONIC	0'-14' Core Loss - bottom part has calcareous grey till. Upper part is Muskeg.
			14'-19' Calcareous grey clay with very few small clasts
			19'-22.5' Greyish to greyish brown coarse calcareous till
			22.5'-26' Very dense, coarse, calcareous grey till with clasts
			26'-30' Greyish to greyish brown coarse till
			30'-55' Very coarse and dense calcareous grey till with numerous clasts
			---------QUATERNARY-CRETACEOUS CONTACT----------
			55'-60' Non calcareous coarse silica sand - kaolin matrix with increasing kaolin towards the bottom
			60'-65' Medium to coarse grained greyish white silica sand-kaolin matrix
			65'-70' Medium to coarse grained silica sand-kaolin matrix
			70'-73' Fine grained silica sand - kaolin matrix
			73'-75' Brown hard fireclay
			75'-80' Greyish white fine to medium grained silica sand kaolin matrix

DRILL LOG

GNASCO RESOURCES LIMITED
NUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2
Sheet 2 of 6

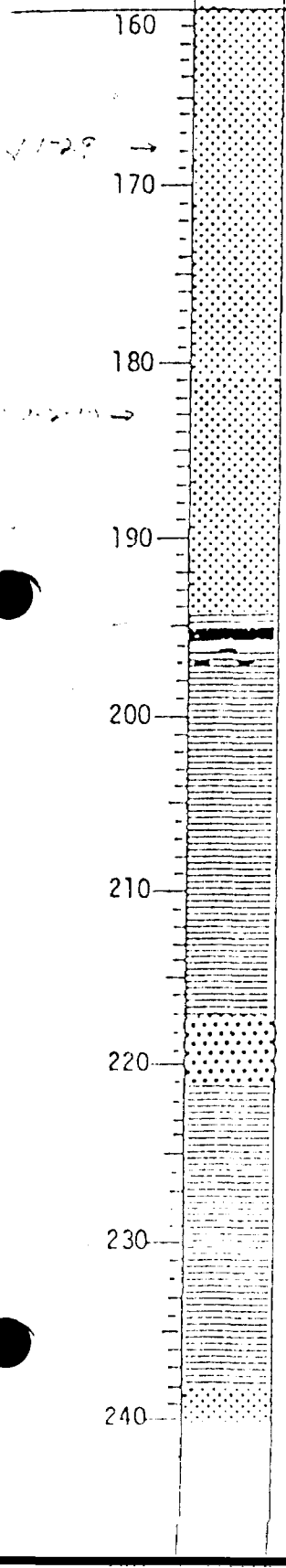


Depth	Field Description and Remarks
80'-85'	White, fine grained silica sand-kaolin matrix with abundant kaolin
85'-90'	Same as above (Box with sample lost during transit from site to camp, but was later recovered - sample may be disturbed)
90'-93'	Medium to coarse grained, grey to greyish white silica sand - kaolin matrix - lesser amount of kaolin
93'-93.5'	Greyish white, medium grained silica sand kaolin matrix
93.5'-96'	Grey to yellowish brown fireclay
96'-100'	Reddish brown fireclay
100'-105'	Greyish, medium grained silica sand-kaolin matrix
105'-110'	Same as above but fine to medium grained
110'-114'	Same as above but grey in colour and with lesser amount of kaolin
114'-117'	Same as above but colour changes to greyish white
117'-120'	Fine grained, white silica sand-kaolin matrix
120'-125'	Coarse grained silica sand with some heavy minerals - minor amounts of kaolin
125'-127.5'	Grey, fine grained silica sand-kaolin matrix
127.5'-130'	Grey fireclay
130'-134'	Grey, fine sandy clay
134'-135'	Grey, coarse grained silica sand - kaolin matrix with very little kaolin
135--140'	Fine to medium grained white silica sand - kaolin matrix with grey rim around the perimeter of the core
140'-160'	Greyish white, medium to coarse grained silica sand-kaolin matrix

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2
Sheet 3 of 6

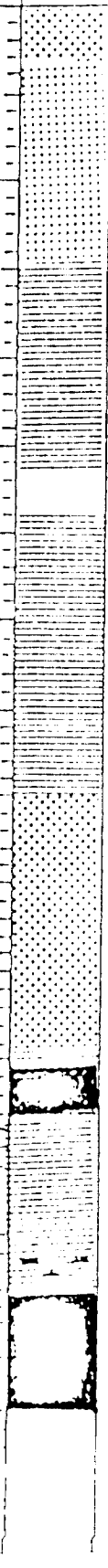


Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-194' Greyish white, medium to coarse grained silica sand - kaolin matrix
170			
180			
190			
			194'-195' Black, plastic carbonaceous clay
			195'-195.5' WOODY LIGNITE
			195.5'-197' Black to brown carbonaceous clay with some lignite fragments
200			197'-203' Black to brown carbonaceous clay
			203'-206' Reddish to dark brown carbonaceous clay (?fireclay)
			206'-214' Black carbonaceous clay
210			
			214'-217' Silty, sandy, grey to dark brown clay
			217'-221' Grey, coarse sand - little kaolin
220			221'-222' Light brown clay (?Fireclay)
			222'-227' Black carbonaceous clay
			227'-230' Grey to dark brown sandy clay - transition zone between the zone above and the zone below
230			230'-235' Black carbonaceous clay
			235'-238' Highly carbonaceous black clay approaching earthy lignite
			238'-240' Medium to coarse-grained silica sand - kaolin matrix
240			

DRILL LOG

LANASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2
Sheet 4 of 6



Depth (Ft.)	Lith. Log	Sample		Field Description and Remarks
		Sonic	240'-243'	Medium to coarse grained silica sand - kaolin matrix
			243'-248'	Fine grained silica sand - kaolin matrix
			248'-254'	Same as above but getting coarse grained
			254'-258'	Brown fireclay
			258'-262'	left in the core barrel and could not be retreived, but is most probably the brown fireclay as above and below
			262'-266'	Brown fireclay
			266'-269'	Lost due to washing
			269'-273'	Dark grey to brown plastic fireclay
			273'-278'	Very dense, grey to brown clay
			278'-281'	Grey, plastic fireclay
			281'-285'	Grey, plastic fireclay with brown inclusions
			285'-290'	White, fine to medium grained silica sand-kaolin matrix
			290'-295'	Same as above but mostly medium grained
			295'-299'	Whitish (turning grey towards the bottom) silica sand kaolin matrix - also getting coarser towards the bottom
			299'-300'	Highly carbonaceous clay bordering on earthy lignite
			300'-303'	Woody lignite - almost no water
			303'-305'	Black carbonaceous clay
			305'-307'	Black carbonaceous clay - some sand at the top
			307'-310'	Dark brown to black carbonaceous clay
			310'-313'	Mixture of coarse sand, black carbonaceous clay and lignite fragments
			313'-320'	WOODY LIGNITE

DRILL LOG

LASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2
Sheet 5 of 6

Depth (ft.)	Lith. Log	Sample	Field Description and Remarks
320		SONIC	320'-324' WOODY LIGNITE
			324'-325' Highly lignitic black carbonaceous clay
			325'-326' Same as above, probable sluffing
			326'-329' Brown to black carbonaceous clay, somewhat sandy at the bottom and within this run
330			329'-332' Black carbonaceous clay
			332'-335' Black to brown carbonaceous clay with some sand
			335'-337' Black to brown carbonaceous clay - plastic in places
340			337'-340' Black highly carbonaceous clay with thin (1"-2") lignite seam at 339'
			340'-341' Black carbonaceous clay
			341'-343.5' LIGNITE
			343.5-345' Black, carbonaceous clay
			345'-346.5' Black to greyish black clay with some coarse sand
350			346.5'-347' Grey clay with some fine sand
			347'-352' Grey, fine to medium grained sand
			352'-357' Fine to medium grained, grey sand
			357'-371' Grey, fine to medium grained sand with angular quartz grains
360			
370			371'-377' Sand as above, but getting medium to coarse grained
			377'-382' Same as above, mixed with clay at the bottom
380			382'-387' Medium to coarse grained, grey sand
			387'-392' Same as above but getting coarser
390			392'-396' Greyish black, sandy clay
			396'-397' Grey, fine grained sand
			397'-397.5' Coarse sand, mixed with dark grey clay
			397.5'-400' Grey to black, very hard, sandy clay
400			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J-1-2.
Sheet 6 of 6.

Depth Ft.)	Lith. Log	Sample	Field Description and Remarks
400		SONIC	400'-402' Grey to black, very hard, sandy clay
			402'-415' Sample mixed because of difficulties in retreiving it. Mostly dark coarse sand with some clay mixed in it
410			
			415'-430' Greyish yellow, medium to coarse sand
420			
430		NQ	430'-435' Grey to dark grey, medium to coarse sand
			435'-455' Core washed out, probably coarse sand
440			
450			
			455'-457' Black, highly carbonaceous clay with fragments of lignite
			457'-480' Sample washed out - coarse sand
460		Sonic	
470			
480			480'-482' Probably hard clay - no sample retreived
482			Drilling terminated at 482'
			PVC pipe inserted in the hole

TABLE IX

Some 1978 Canadian Suppliers of Silica

Newfoundland	Newfoundland Enterprises Limited, subsidiary of Armand Sicotte & Sons Limited; at Villa Marie
Quebec	Indusmin Limited; near Saint-Canut and near Saint-Donat
	Union Carbide Canada Mining Ltd; near Melocheville
	Baskatong Quartz products Ltd; near La Galette
	Montreal Siica Mines Ltd; near Ormstown
Ontario	Indusmin Limited; on Badgeley Island
Manitoba	Steel Brothers Canada Limited; at Black Island
Saskatchewan	Hudson Bay Mining and Smelting Co Limited; in the vicinity of Flin Flon
Alberta	Sil Silica Ltd; at Bruderheim
British Columbia	Pacifica Silica Limited; near Oliver.

TABLE X

Uses of Silica Sand

Glass:	High-purity, naturally-occurring sand or material produced by crushing quartzite or sandstone is used in the maufacture of glass. minor amounts of certain elements are particularly objectionable because they act as powerful colourants. For example, chromium should not exceed six parts per million and cobalt not over two parts per million. Glass fibre optics technology, developing over the last few years, promises to become important in communications, an area in which Canada is an acknowledged world leader, as glass fibre replaces copper cable in several applications.
Silicon Carbide:	Silica sand used in the manufacture of silicon carbide should have a silica content of at least 99 per cent. Iron and alumina should be less than 0.1 per cent each; lime, magnesia and phosphorous should be absent. Sand should be 100 mesh with the bulk of it plus 35 mesh.
Hydraulic Fracturing:	Sand is used in the hydraulic fracturing of oil-bearing strata to increase open pore spaces, thus increasing the productivity of the oil well. Sand used for this purpose should be clean and dry, have a high compressive strength, be free of acid consuming constituents and have a grain size of between 20 and 35 mesh. Grains should be well-rounded to facilitate placement in the formation in order to provide maximum permeability.
Foundary Sand:	Naturally occurring sand or material produced by crushing friable sandstone is used in the foundary industry for moulding. For foundary purposes, the chemical composition of the sand is not as important as its phyical properties. For the end-use, a highly refractory sand, having well-rounded grains with frosted or pitted surfaces, is preferred. Grain sizes vary between 20 and 200 mesh. Rounded grains are preferable to angular fragments because they allow maximum escape of gas during casting.
Sodium Silicate:	Sand for the manufacture of sodium silicate should contain more than 99 per cent silica, less than 0.25 per cent alumins, less than 0.05 per cent lime and magnesia combined, and less than 0.03 per cent iron (III) oxide. All sand should be between

20 and 100 mesh.

Silica Flour: Silica flour, produced by fine-grinding quartzite, sandstone, or lump quartz; or as a by-product in sand sifting, is used in the ceramics industry for enamels, frits, and pottery flint. For use in enamels, the silica four must be over 97.5 per cent silica with less than 0.5 per cent alumina, and less than 0.2 per cent ferric oxide. Silica flour is also used as an inert filler in rubber and asbestos cement products, as an extender in paints and as an abrasive agent in soaps and scouring pads. It is used increasingly in autoclave-cured concrete products such as building blocks and panels, where approximately 25 kg of silica flour is used for every 100 kg of Portland cement.

Quartz Crystal: Quartz crystal with desirable piezoelectric properties is being used in the Canadian electronics industry. Natural crystal must be perfectly transparent and free from all impurities and other flaws. The individual crystals should have a mass of 100 g or more and measure at least 5 cm in length and 2.5 cm in girth. There is no production of quartz crystal in Canada. Domestic requirements are met by imports from the United States and to a lesser extent Brazil.

Other Uses: Coarsely ground, closely sized quartz, quartzite, sandstone and sand are used as abrasive grit in sandblasting and in the maufacture of sandpaper. Various grades of sand are used as filtering media in water-treatment plants. Silica is also required in Portland Cement maufacture if there is insufficient silica in the limestone or in other raw materials used in the process.

13. Future Work.

Future work focusses on two types of area designation. The first is associated with the gomagnetic anomalies, while the second is associated with the balance of the land area.

Associated with the first area are two more sites, on I4-200 and J1-1. These holes are being examined using helicopted supported drilling. The balance of the land, approximately 88,845 acres, is to be explored using a portable vibra-core drill.

The program proposed is designed to delineate kaolin, silica sand, refractory clay and lignite resources that were found during the 1981-1982 drilling program.

In the past program, one hole was drilled in Kipling Township and five holes were drilled in Emerson Township. The future program is to be planned to have 50 holes drilled throughout the area. Each hole is scheduled to be cast to a depth of at least 300 feet, for total drilling of 15,000 feet (4570 metres).

The corer is fitted with a BQ rod, approximately 1.81 inches I.D., to allow for the extraction of standard size core. The device has been used elsewhere in the Province of Ontario as well as abroad. Nevertheless, this type of drilling is new to the area. However, the extraction of a relatively undisturbed core centre warrants exploration with this device.

The drilling program presented below is aimed at mapping a large portion of the region, in a regular manner. However, it is necessary to point out that flexibility is required in order to mount an effective program. First, the generally wet terrain may make accessibility to map-sited locations difficult. Consequently, leeway is allowed in mobilization of the drill rig to allow drilling at a site that may be more accessible and/or less hazardous than the ones map-sited. In addition, no drilling is planned in the vicinity of rivers, allowing a margin of at least 1000 feet (300 metres) from the river centre to the region of drilling interest. Next, in some cases, loss or casing or other drilling encumbrances may suggest movement of the drilling away from the sited location entirely. In that case, the geologist on site, in consultation with the drill manager and the drill team members may elect to abandon a specific grid region. This latter case will be made up by the selection of an alternative site. Finally, drilling in this region, an area that has not been heavily explored, may show trends of geology or resources that the geologist may find suggest changes of the drill plan. Lignasco requests, prior to commencement, that allowances for such suggested variations be made. Drill sites are shown on the attached map (Figure 7). In the illustration, the exploration area is divided into rectangles on a grid pattern, approximately 1.6 miles (2.6 km) on a side. Grid locations which have previously been drilled by Lignasco Resources Limited are excluded from enumeration. Also excluded from enumeration are sites earmarked for drilling or otherwise drilled on the portion of the licence area not covered by the 88,845 tract discussed here.

Surface feature maps indicate that some zones are boggy, with string bogs in particular. Consequently, "precise" locations for drillholes can not be established at this time. In any event, the drill team will note the location of each drillhole within the designated grid location.

In the event that a drill hole cannot be placed within a drill location, a suitable alternate site will be discussed.

Drilling is planned to commence in the region of the Kipling Dam, in Kipling Township.

It is noted here that the enumeration of the drill hole grid is not meant to suggest the order of drilling.

14. References.

[1] Saber, A.J., "A Canadian Program for In-Situ Coal Conversion," Paper Number 82-33-32, 33rd Annual Technical Meeting of the Petroleum Society of the Canadian Institute of Mining and Metallurgy, Calgary, Alberta, 6-9 June 1982.

[2] Guillet, G.R., "Fossil Fuel Program, Moose River Drilling Project, District of Cochrane," Ontario Geological Survey, Open File Report (OFR) 5276, 121 pages, 8 tables, 4 figures, 16 photos (xerox copies), two figures in back pocket, 1979.

[3] Saber, A.J., "Unsolicited Proposal for In-Situ Coal Conversion of Adam Creek Ontario Lignite," submitted to the Ministry of Energy, Government of Ontario, dated 16 February 1982, 120 pages.

[4] Anderson, W.J., "Smoky Falls Project, Progress Report on Activities," Report NTS 42J8,J1,I4, undated, Selco, Inc., Toronto, Ontario, 1982.

. Appendix A - Drill Logs.

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program
Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. SL 82-01.
Location: 800 metres south of OGS
Drillhole 78-06 (Long. 82°13'43"W, Lat. 50°15'30"N)
Sanborn Township
Started March 16, Finished March 20, 1982
Sheet 1 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
0		Sonic	0' - 19' Muskeg
19			19' - 27' Greenish grey. highly calcareous plastic clay
27			27' - 33' Grey, very dense, coarse, silty and dry till
33			33' - 35' Very dense, sandy calcareous till
35			35' - 36' Grey, calcareous clay till
36			36' - 41' Grey. ca;careous coarse sand with pebbles (? sandy till)
41			41' - 42' Grey, coarse, calcareous sand
42			42' - 50' Grey, coarse, very sandy, highly calcareous till with large cobbles
50			50' - 52' Grey, gravelly sand, highly calcareous
52			52' - 56' Grey, sandy, gravel rich till
56			56' - 58' Grey, very sandy, coarse till
58			58' - 60' Grey, clay till
60			60' - 65' Grey, sandy gravel with large pebbles and cobbles
65			65' - 72' Same as above
72			72' - 76' Grey, calcareous gravel, mostly pebble size
76			76' - 79' Grey, coarse, sandy gravel with big cobbles
79			79' - 80' Dark grey coarse till with muddy matrix
80			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. S1 82 - 01
Sheet 2 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		Sonic	80' - 85' Grey, calcareous silty till
			85' - 87' Sandy gravel with large cobbles
			87' - 90' Grey, calcareous silty till
90			90' - 92' Grey, medium grained sand
			92' - 95' Dark grey, coarse, very sandy, highly calcareous till
			95' -100' Grey, very sandy till
100			100'-102' Grey, medium to coarse grained sand
			102'-106' Grey, coarse sand with pebbles
			106'-110' Dark grey coarse, very sandy, highly calcareous till
110			110'-112' Grey, coarse sand with pebbles
			112'-114' Grey, sandy till
			114'-116' Grey clay till
			116'-120' Dark grey, coarse sandy till
120			120'-127' Dark grey to brown coarse hard muddy till
			127'-141' Same as above with large clasts
130			
140			141'-144.5' Grey, coarse, calcareous clay till
144.5			-------QUATERNARY-CRETACEOUS CONTACT----------
			144.5'-147.5' Dark grey, non calcareous clay
			147.5'-148.5' Red fireclay
150			148.5'-160' White to light grey, medium grained silica sand kaolin matrix with some sections showing coarse grained matrix
160			

DRILL LOG

LIC[illegible]SCO RESOURCES LIMITED
[illegible]NUARY-APRIL 1982
[illegible]illing Program

DRILLHOLE NO. SL 82-01
Sheet 3 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-166' Greyish white, medium grained silica sand kaolin matrix
			166'-168' Same as above but getting coarser
			168'-171' Brown fireclay
170			171'-173' Grey, sandy clay
			173'-174' White to light grey coarse silica sand kaolin matrix
			174'-178' Fine grained silica sand kaolin matrix
			178'-182' Fine grained silica sand kaolin matrix-richer in kaolin
180			182'-186' Medium grained, white silica sand kaolin matrix
			186'-188' Fine grained white silica sand kaolin matrix
			188'-195' Medium to coarse grained silica sand kaolin matrix - many coarse quatrz grains
190			
			195'-220' Predominantly medium grained slilica sand kaolin matrix - some sections showing coarser quartz grains
200			
210			
220			220'-233' Medium grained white silica sand kaolin matrix
230			
			233'-234' Medium grained, greyish silica sand kaolin matrix - lesser amount of kaolin
			234'-235' Dark grey clay
			235'-236' Light to dark brown fireclay
240			236'-240' Dark brown carbonaceous clay

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-01.
Sheet 4 of 5.

Depth (ft.)	Lith. Log	Sample	Field Description and Remarks
240		Sonic	240'-242' Dark brown to black carbonaceous clay 242'-245' Clay as above but becoming sandy 245'-247' LIGNITE 247'-249' Brown fireclay 249'-251' Grey sand
250			251'-252' Grey, medium grained sand 252'-256' Grey to brown carbonaceous clay with fragments of lignite 256'-264' Dark brown, tan brown, grey stiff, plastic clay
260			264'-278' Grey, highly silty, micaceous clay
270			
280			278'-285.5' Brown dense clay
290			285.5'-289' Dense brown clay-somewhat sandy below 287' 289'-290' Grey, fine grained clayey sand 290'-293' Micaceous sand with high clay content 293'-296' Grey, fine grained clayey sand
300			296'-299' Grey sand with abundant clay content 299'-301' Fine to medium grained, grey sand 301'-305' Grey, fine grained, clayey sand
310			305'-309' Mostly grey to greyish white sand 309'-321' Fine to medium grained grey sand
320			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

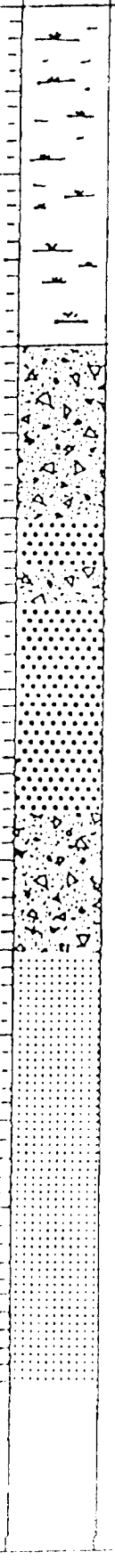
DRILLHOLE NO. SL 82-01
Sheet 5 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
321		Sonic	321'-322' Grey clay 322'-325' Reddish brown to grey fireclay
			325'-329' Bright red to grey, varicoloured clay
330			329'-330' Reddish brown fireclay 330'-333' Reddish to grey clay 333'-335' Grey clay
			335'-353' Grey, plastic, dense, clay
340			
350			
			353'-354' Light grey clay with dolomite cobble 354'-355' Dark, grey clay 355'-358' Grey to red brown clay 358'-361' Grey clay
360			361'-370' Grey to reddish brown fireclay
370			370'-376' Red fireclay with grey streaks
			376'-383' Red fireclay
380			
383			Drilling terminated at 383'. PVC pipe inserted in the hole

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILL HOLE NO: SL 82-02
LOCATION: 800 metres southeast of OBS drillhole No. 78-06 (Long. 82°13'43" W; Lat. 50°15'30" N)
Sanborn Township
Started: March 29, Finished April 1, 1982



Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
0		Sonic	0' - 20' Muskeg
20			20' - 25' Light grey, calcareous clayey till
			25' - 30' Greyish brown sandy silt till
30			30' - 33' Coarse to medium gravelly sand
			33' - 35' Light greyish to brown sandy silt till
			35' - 38' Light grey sand
			38' - 43' Coarse, grey, gravelly sand
40			43' - 44' Gravel
			44' - 45' Grey, coarse sand and some sandy till
			45' - 47' Grey, coarse sand and sandy till - more clasts
			47' - 50' Light grey, fine sandy till
50			51' - 55' Dark grey, sandy, calcareous till
			55' - 60' Grey, fine grained sand with grey clay laminations
60			60' - 67' Light grey, fine grained sand
			67' - 79' Dark grey, fine grained sand
70			
80			79' - 80' Very fine grained, somewhat clayey sand

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02
Sheet 2 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		Sonic	80' - 89' Very fine, somewhat clayey sand
90			89' - 90' Same as above, getting coarser 90' - 95' Very fine grained calcareous sand 95' - 98' Olive grey sandy till with clasts 98' - 100' Grey, fine grained calcareous sand
100			100'-101' Fine grained, sandy till 101'-109' Light grey, fine grained sand
110			109'-113' Light frey, fine grained sand with darker zone at 110'-110.5'. 113'-122' Light grey fine grained sand
120			122'-123' Grey, coarse, gravelly sand 123'-131' Grey, fine grained sand 131'-132' Dark grey, calcareous clay till 132'-140' Olive grey, calcareous clay till with large clasts
130			
140			140'-142' Dark olive grey sandy till 142'-145' Same as above but getting clayey 145'-149' Olive grey calcareous very sandy till
150			149'-152.5' Coarse, gravelly sand with large pebbles
152.5			------QUATERNARY-CRETACEOUS CONTACT---------- ------- 152.5'-154' Tan fireclay 154'-156' Dark grey coarse silica sand kaolin matrix non-calcareous- reduced kaolin 156'-160' Fine to medium grained silica sand kaolin matrix with abundant kaolin
160			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02
Sheet 3 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-161' Dirty grey sandy gravel with large pebble and cobble
			161'-165' Dark greyish green fine grained calcareous sand
			165'-168' Dark olive grey sandy calcareous till
			168'-173' Coarse dark grey gravel - calcareous
170			Note: From 160' to 173', the sediments appear to be Quaternary deposits. These may have been deposited in an underground channel.
			173'-183.5 Very fine grained greyish white silica sand kaolin matrix with abundant kaolin
180			
			183.5'-185' Medium to coarse grained greyish white silica sand kaolin matrix with kaolin
			185'-190' Medium to coarse grained greyish white silica sand akolin matrix with increased kaolin
190			190'-191' Fine grained light grey sand - little kaolin
			191'-195' Greyish white, coarse to medium grained silica sand kaolin matrix
			195'-200' Dark grey, carbonaceous hard clay
			200'-206' Grey, fine grained sand
			206'-213' Greyish white, fine grained silica sand-
200			213'-231' Medium grained, greyish white silica sand-kaolin matrix
210			
220			
230			231'-234' Coarse grained, grey quartz sand
			234'-236' Tan to grey coarse grained sand
			236'-238' Dark grey sand with detrital lignite
			238'-240' Light grey to tan brown coarse sand
240			

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02
Sheet 4 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
240		SONIC	240'-242' Light grey to tan brown coarse sand
			242'-244' Coarse grained grey sand with detrital lignite
			244'-246' Tan grey, fine grained sand
			246'-252' Light grey fine grained sand
250			252'-256' Grey, fine grained sand
			256'-260' Fan grey, fine grained sand
260			260'-264' Dark grey, medium grained sand
			264'-268' Grey, fine grained sand
270			268'-276' Coarse grained dark grey sand
			276'-280' Medium grained grey sand
280			280'-282' Fine grained grey sand
			282'-288' Medium grained grey sand
290			288'-289' Dark grey, coarse sand
			289'-292' Dark grey, fine sand
			292'-300' Dark grey, medium grained sand
300			300'-310' Dark grey plastic clay
310			310'-320' Dark grey to black, plastic, hard carbonaceous clay with fragments of detrital lignite increasing towards the bottom
320			

DRILL LOG

[illegible]GNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-02
Sheet 5 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
320		SONIC	320'-332' Dark grey, plastic, very hard slightly sandy clay
330		NQ	332'-336' Dark brown plastic very hard non calcareous clay
			336'-344' Dark grey plastic hard non calcareous clay
340			344'-346' Dark brown plastic, partly laminated clay
			346'-356' Darker clay as above, calcareous
350			------?CRETACEOUS -DEVONIAN CONTACT----------
			356'-364' Grey calcareous shale and argillaceous limestone
360			
364			Drilling terminated at 364' PVC pipe inserted in the hole

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. SL 82-03
LOCATION: 1600 metres southeast of OGS drillhole 78-06(Long. 82°13'43" W: Lat. 50°15'30" N)
Started March 24, Finished March 29, 1982

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
0		SONIC	0' - 17' Muskeg
10			
			17' - 25' Greyish brown calcareous coarse till
20			
			25' - 27' Brownish grey, clayey, calcareous coarse till
			27' - 32' Olive grey, coarse calcareous clay till with large clasts
30			32' - 36' Grey, calcareous sandy till
			36' - 40' Till as above changing to coarse sand
40			40' - 41' Grey, coarse sand
			41' - 46' Grey, coarse, very sandy calcareous till
			46' - 49' Grey, gravelly sand - calcareous
			49' - 52' Dark grey, gravelly sand
50			52' - 54' Grey, alluvial sand
			54' - 56' Olive grey, calcareous coarse till
			56' - 58' Fine grained grey sand
			58' - 60' Grey, coarse grained calcareous gravelly sand
60			60' - 62' Olive grey, coarse calcareous clay till
			62' - 66' Dark grey coarse calcareous gravelly sand to sandy till
			66' - 70' Olive grey sandy clay till
			70' - 75' Olive grey calcareous clay till
70			75' - 78' Same as above with abunadant clasts
			78' - 80' Dark grey to olive grey calcareous clay till with small scattered clasts
80			

DRILL LOG

NASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 2 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		SONIC	80' - 96' Dark grey to olive grey calcareous clay till with small scattered clasts
90			
			96' - 100' Darker olive grey to brown hard calcareous till with increasing clasts
100			100'- 108' Fine grained calcareous grey sand
			108' -109 Gravel
109			---------QUATERNARY CRETACEOUS CONTACT----- -------- ------
110			109-110 Coarse, greyish white, non calcareous silica sand-kaolin matrix
			110'-115' Grey quartz sand, little kaolin
			115'-130' Greyish white, medium grained silica sand - kaolin matrix
120			
130			130'-136' Grey, medium grained silica sand-kaolin matrix with lesser amount of kaolin
			136'-141' Same as above with increased amount of kaolin
140			141'-146' Same as above with a darker heavy mineral zone at 145'
			146'-151' Medium to coarse grained silica sand-kaolin matrix - greyish white
150			151'-155' Black carbonaceous clay with lignite fragments and some sandy sections
			155'-157' Dark grey sandy carbonaceous clay
			157'-158' Tan sandy clay
			158'-159' Dark grey sandy carbonaceous clay
160			159'-160 Tan coloured sandy clay

DRILL LOG

LIGNASCO RESOURCES LIMITED
[illegible]RUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 3 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		Sonic	160'-162' Grey to tan grey fine grained sand 162'-168' Grey, plastic sandy clay
170			168'-171' Fine grained grey sand - very little kaolin 171'-173' Coarse grained, greyish white silica sand-kaolin matrix 175'-177.5' LIGNITE
180			177.5'- 178' Carbonaceous clay 178'-179' Coarse grained sand with detrital lignite 179'-181' Tan brown fireclay 181'-182' Tan to tan-grey sandy clay 182'-183' Dirty brown clayey sand 183'-185' Dirty grey quartz sand without kaolin 185'-190' Tan to grey micaceous clay with fine grained sand
190			190'-190.5' LIGNITE 190.5'-191' Sandy clay 191'-193' Grey, fine grained sand- little kaolin 193'-195' Medium grained silica sand-kaolin matrix with reduced kaolin
200			195'-210' Greyish white, coarse to medium grained silica sand-kaolin matrix
210			210'-225' Greyish white silica sand with reduced amount of kaolin
220			[illegible]' Greyish white silica sand with reduced kaolin
230			[illegible]' Light brown plastic clay
240			[illegible]' Light grey sand

DRILL LOG

[redacted]NASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 4 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
240		SONIC	240'-262' Light grey sand Note: The sample from 236'-262' was drilled in one run and was accidentally dropped in the hole while being retreived. It was later picked up but may have been contaminated with sluffing from the hole
250			
260			262'-266.5 Dark grey sand, probable sluff from the hole
			266.5'-270' light brown and grey, very hard, plastic dense clay
270			270'-286' Light brown to dark grey plastic, very dense clay with some red clay intercalations
280			
			--------CRETACEOUS-DEVONIAN CONTACT ?----------
			286'-294' Dark brown laminated clay with disseminated pyrite - clay is non-calcareous
290			
		NQ	294'-303' Dark brown pyritiferous non-calcareous clay
300			
			303'-304' Lighter brown clay as above - no pyrite
			304'-305' Harder dark brown laminated clay (Shale?) with pyrite
			305'-315' Dark brown laminated clay as above
310			
			315'-319' Grey calcareous shale
			319'-320' Grey calcareous shale with argillaceous limestone
320			

DRILL LOG

GNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-03
Sheet 5 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
320		NQ	320'-326' Grey calcareous shale with argillaceous limestone
330			Drilling terminated at 326' PVC pipe inserted in the hole.

IGNASCO RESOURCES LIMITED
ANUARY-APRIL 1982
rilling Program

ing - Midwest Drilling

y: Harish M. Verma

DRILL LOG: DRILLHOLE NO. SL 82-04
LOCATION: 1400 metres SSE of OGS
Drillhole No. 78-06 (Long: 82°13'43"W;
Lat. 50°15'30 N") Sanborn Township
Started March 20, Finished March 24, 1982

Sheet 1 of 5 .

th .)	Lith. Log	Sample	Field Description and Remarks
0		SONIC	0' - 19' Muskeg
10			
			19' - 21' Grey clay - sample washed out
20			21' - 24' Fine grained grey calcareous sand with some clay
			24' - 36' Fine to medium grained grey calcareous sand
30			
			36' - 40' Coarse grained, grey, calcareous sand
40			40' - 47' Grey, medium grained calcareous sand
			47' - 50' Grey calcareous clay till with clasts
50			50' - 52' Grey, medium grained calcareous and clayey sand
			52' - 53' Grey clay till
			53' - 56' Grey, coarse grained calcareous sand
			56' - 58' Grey, coarse calcareous clay till with large clasts
60			58' - 59.5' PEAT BED (Pleistocene Peat)
			59.5' - 60' Grey, coarse calcareous till with clasts
			60' - 62' Grey calcareous clay
			62' - 63' Grey, calcareous clay till
			63' - 66' Grey, coarse, clayey and sandy till with numerous clasts
70			66' - 71' Dry, grey, coarse calcareous clay till
			72' - 74' Grey, clay till
			74' - 80' Grey coarse clay till with many clasts
80			

DRILL LOG

LITHASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

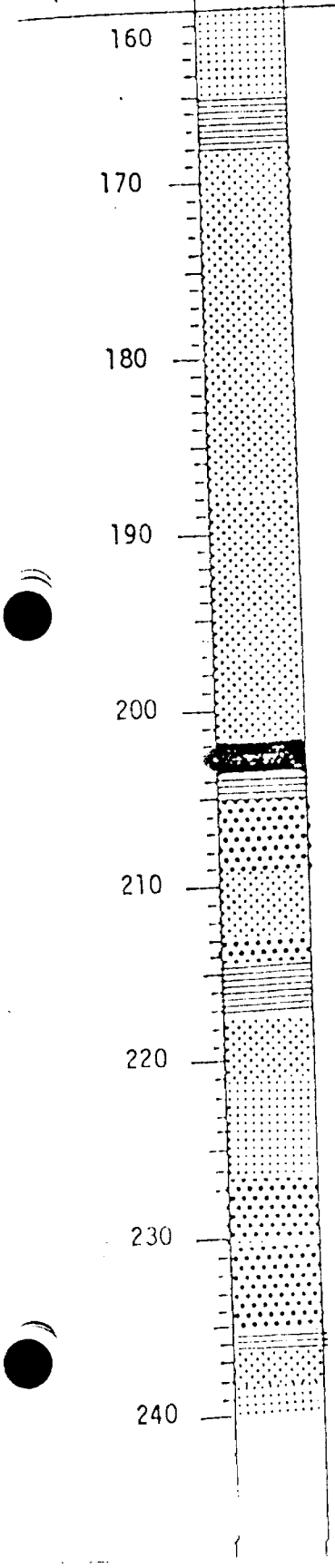
DRILLHOLE NO. SL 82-04
Sheet 2 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
80		Sonic	80' - 83' Grey, coarse, sandy clay till with abundant clasts
			83' - 86' More sandy, grey, coarse, calcarecus clay till
			86' - 89' Clay till as above with large cobbles at 88'
90			89' - 90' Grey, calcareous clay till
			90' - 95' Grey, calcareous clay till with numerous clasts
			95' -100' Grey calcareous, sandy till with abundant clay content
100			100'-103' Coarse gravel with many rounded pebbles and cobbl
103			----------QUATERNARY-CRETACEOUS CONTACT----------
			103'-106' Fine grained, greyish white silica sand-kaolin matrix-non calcareous
			106'-108' White to tan coloured fireclay
110			108'-111' Interlaminated orange, red and grey fireclay - plastic, non calcareous
			111'-115.5' Light grey, fine grained, micaceous sand with very little kaolin
			115.5'-116 Darker, heavy mineral zone with hematite and magnetite
120			116'-118' Light grey, micaceous, fine grained sand with ver little kaolin content
			118'-125' Fine grained silica sand-kaolin matrix with abundant kaolin
			125'-138' Medium grained silica sand- kaolin matrix with abundant kaolin
130			
			138'-142' Red, coarse grained sand
140			142'-146' Greyish white, coarse grained silica sand-kaolin matrix
			146'-159' Medium grained to coarse grained greyish white silica sand-kaolin matrix
150			
			159'-160' Fine grained, white, silica sand-kaolin matrix
160			

DRILL LOG

GNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-04.
Sheet 3 of 5.



Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
160		SONIC	160'-165' Fine grained, white silica sand-kaolin matrix
			165'-168' Light brown to tan coloured fireclay
			168'-170' Greyish white silica sand-kaolin matrix
170			170'-174' Medium grained silica sand-little kaolin
			174'-177' Fine to medium grained greyish white silica sand with some kaolin. Yellowish rim around perimeter of the core
			177'-180' Greyish white, medium grained silica sand-kaolin matrix
180			180'-190' Greyish white, fine grained silica sand - kaolin matrix
190			190'-201.5' Medium to fine grained silica sand kaolin matrix
			201.5'-203.5' MIXED WOODY AND EARTHY LIGNITE
200			203.5'-205' Tan to light brown fireclay
			205'-209' Coarse, grey sand - no kaolin
			209'-212.5' Dark grey medium grained sand - no kaolin
210			212.5'-214 Dark grey, coarse grained muddy sand
			214'-217' Dark brown fireclay
			217'-221' Grey, medium grained sand - very little kaolin
220			221'-222' Grey, fine grained sand with darker rim around core
			222'-226' Dark grey, clayey sand
			226'-230' Grey, coarse grained sand
230			230'-234' Same as above with some clayey sections
			234'-235' Dark grey sandy clay
			235'-238' Grey, medium grained sand
			238'-240' Fine grained sand with some clay
240			

DRILL LOG

IGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-04.
Sheet 4 of 5.

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
240		SONIC	240'-242' Grey clay
			242'-244.5' Tan to light brown fireclay
			244.5'-245 Grey sand, fine grained
			245'-247' Dark grey clay with some fine sand
			247'-248' Dark grey Dark grey muddy sand
			248'-251' Dark grey to brown clay with fine grained sand
250			251'-253' Tan to grey clay with fine grained sand
			253'-256' Light grey sand - little kaolin
			256'-259' Light grey to dark grey medium grained sand - no clay
			259'-261' Light grey sand as above
260			261'-263' Dark grey fine grained sand - no kaolin
			263'-264' Dark grey sandy clay
			264'-270' Tan to light grey, medium grained sand
270			270'-274' Light grey, fine grained clayey sand
			274'-276' Greyish white, fine grained silica sand-kaolin matrix
			276'-278' Same as above - medium grained
			278'-282- Dark grey, fine to medium grained sand - core loss
280			282'-289' Dark grey, medium to coarse grained sand
			289'-290' Fine grained silica sand-kaolin matrix
290			290'-300' Same as above but getting medium grained
300			300'-304' Same as above but with reduced kaolin
			304'-305' Greyish white, medium grained silica sand-kaolin matrix
			305'-309' Dark grey, coarse sand
			309'-312' Dark grey, plastic, carbonaceous clay
310			312'-319' Red and grey fireclay
			319'-320' Grey plastic fireclay
320			

DRILL LOG

GNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. SL 82-04
Sheet 5 of 5

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
320		SONIC	320'-320.5' Grey plastic fireclay 320.5'-321' Grey, medium grained sand-no kaolin 321'-324.5' Light grey, plastic sandy clay 324.5'-325' Tan coloured sandy clay 325'-326' Dark brown plastic sandy clay 326'-330' Dark brown to dark grey carbonaceous plastic clay 330'-351' Dark brown to dark grey carbonaceous partly lamainated clay
330			
340			
350		NQ	351'-352' Dark brown laminated clay with grey clay intercalations 352'-355' Dark brown laminated to dark grey clay ----------CRETACEOUS DEVONIAN CONTACT ? ---------- --- 355'-355.5' Bluish light grey calcareous shale & limestone 355.5'-357' Bluish to light grey calcareous shale with argillaceous limestone 357'-360' Dark brown and light grey to bluish shale with argillaceous limestone. Brown portions are non calcareous, grey portions are calcareous 360'-364' Calcareous greyish blue shale with ? argillaceous limestone 364'-367' Same shale as above with broken up pieces of limestone included Drilling terminated at 367' PVC pipe inserted in the hole
360			
367			

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

Drilling: Midwest Drilling, Winnipeg
Geology: Harish M. Verma

DRILL LOG: DRILLHOLE NO. J-8-101
LOCATION: Grid J-8-101 (200N/300E)
Sanborn Township
Started: Feb 22, Finished Feb 26, 1982

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks
		SONIC	
		0'-5'	Black organic clay mixed with twigs
		5'-20'	Light brown weathered gritty till with interlayers of grey plastic clay, sandy at places
		20'-32.5'	Light brown to greyish brown very dense till with small (5-10mm) clasts. Matrix is silt to clay size. Till is highly calcareous
		32.5'-40'	Same as above but slightly greyer in colour Clasts are bigger and matrix is coarser
		40'-50'	Grey till with reduced number of clasts Matrix is silty clay increasing sand towards the bottom
		50'-70'	Mixture of grey clay and silt as above, only a few clasts
		70'-80'	Same as above with increasing number of clasts- large limestone clast at 70'- Pegmatite boulder at 74'.

DRILL LOG

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

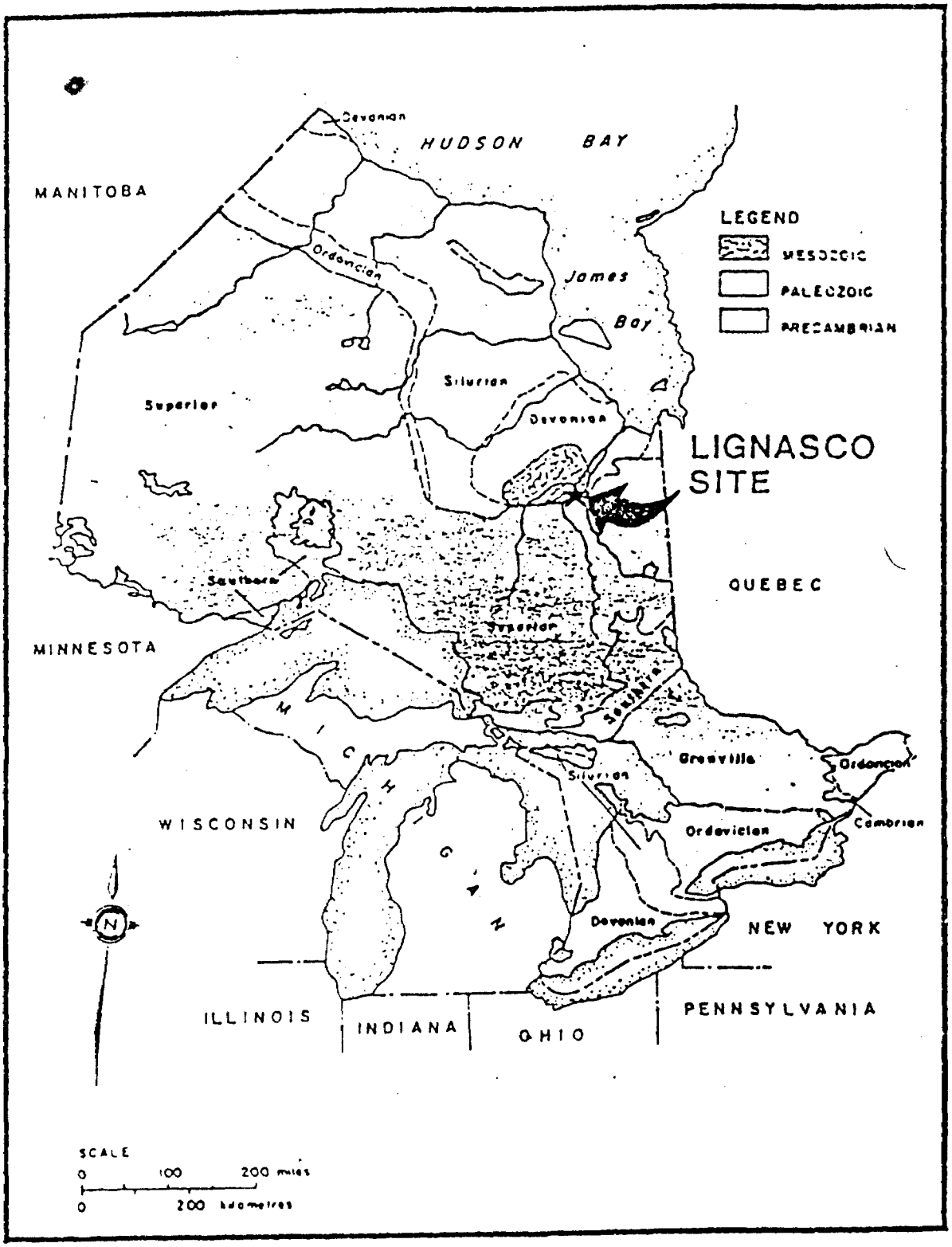
DRILLHOLE NO. J-8-101
Sheet 2 of 3

Depth (Ft.)	Lith. Log	Sample	Field Description and Remarks	
80		Sonic	80'-90'	Grey, fine grained till with increasing number of clasts
90			90'-100'	Grey, clayey, silt till, fairly friable
100			100'-102'	Coarse gravel
			102'-110'	Dark brown organic silt till - calcareous
110			110'-120'	Blackish brown, highly organic gritty clay till getting harder down section with subangular quartzitic clasts. At the bottom is a much harder till with very large highly calcareous limestone clasts
120			120'-132'	Dark brown clay till with larger clasts than above and also some lignite fragments
130			132'-135'	Grey, finer grained till with lesser number of clasts - highly calcareous
			135'-140'	Very dense dark brown till with numerous large (upto 10 mm) rounded clasts - mostly quartzite- matrix is fine grained
140			140'-160'	Same as above but the colour changes to somewhat greener
150				
160				

LIGNASCO RESOURCES LIMITED
JANUARY-APRIL 1982
Drilling Program

DRILLHOLE NO. J - 8 - 101
Sheet 3 of 13

Depth (Ft.)	Lith. Log	Sample		Field Description and Remarks
160		SONIC	160'-178'	Very dense dark brown to brownish green till with numerous rounded clasts- matrix is fine grained
170				
			178'-185'	Ground ultra mafic - medium grained blocks and fragments with rock powder magnetic with minor sulphides - first two feet is highly altered
180		NQ	185'-240'	Fine to medium grained ultramafic (magnetic) greenish black to greyish black -serpentinized rock - quite soft with seams of green clay and soft altered material - fractured sections alternate with massive sections Minor sulphides (Pyrite and Pyrhotite) disseminated throughout the section). Some relict olivine laths visible as small dark, euhedral to subhedral crystals - fine calcite stringers common
190				
200				
210				
220				
230				
240				Drilling terminated at 240' PVC pipe inserted in the hole



igure 1 - Ontario Geology and the Lignasco Resources Limited Area.

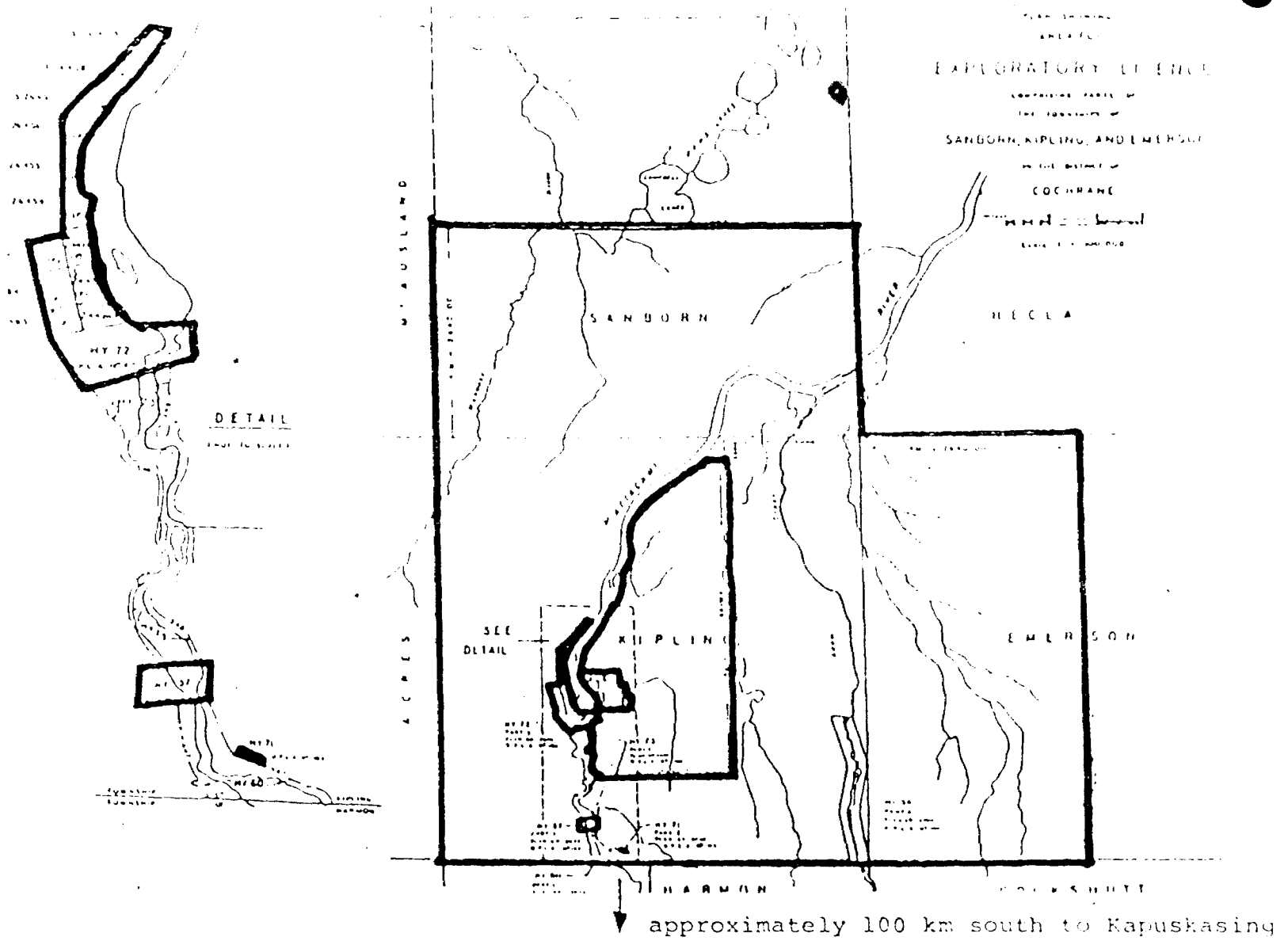


Figure 2 The Lignasco Resources Limited Area.

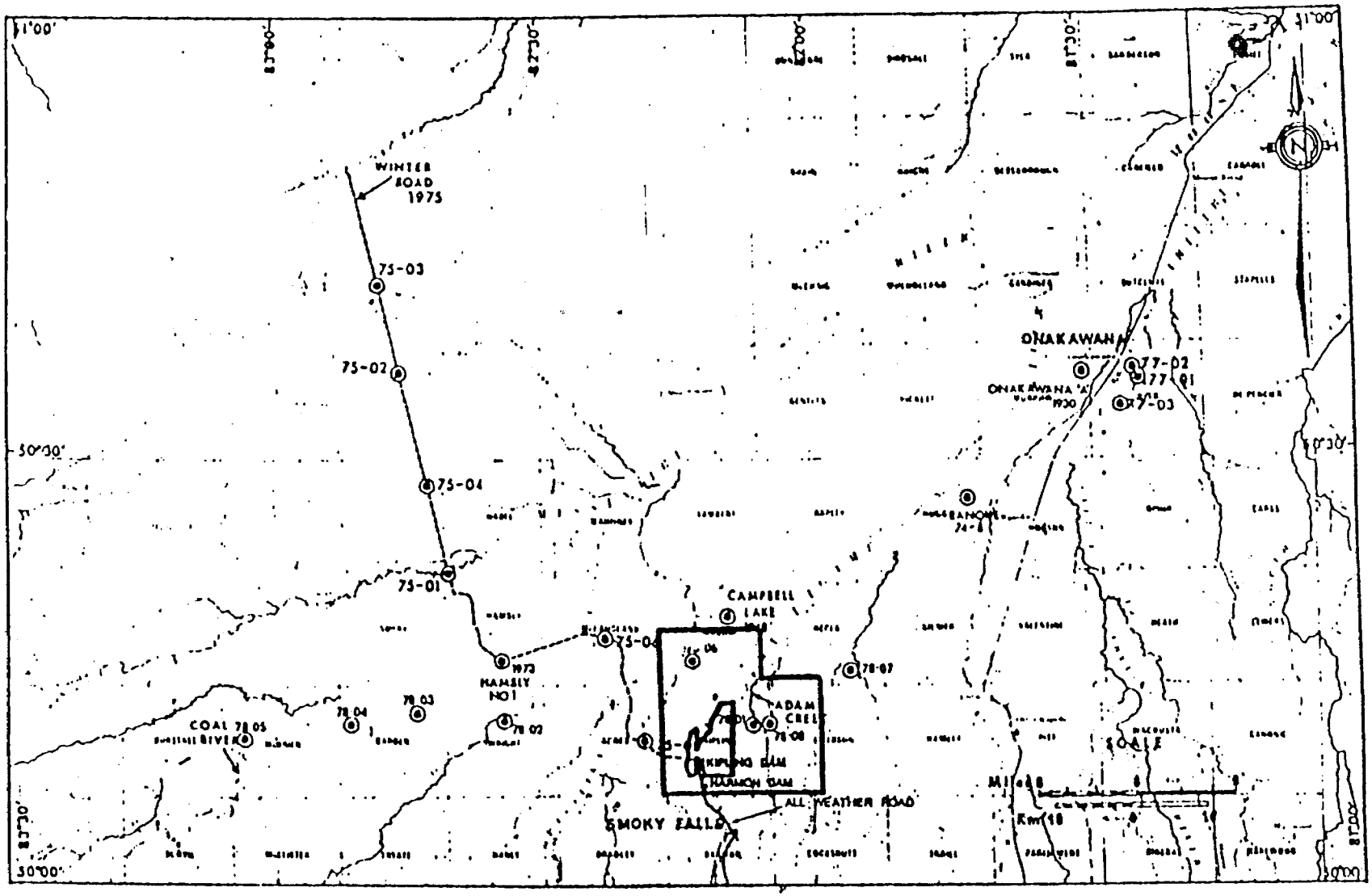


Figure 3 Ontario Geological Survey 1978 Drill Hole Locations.

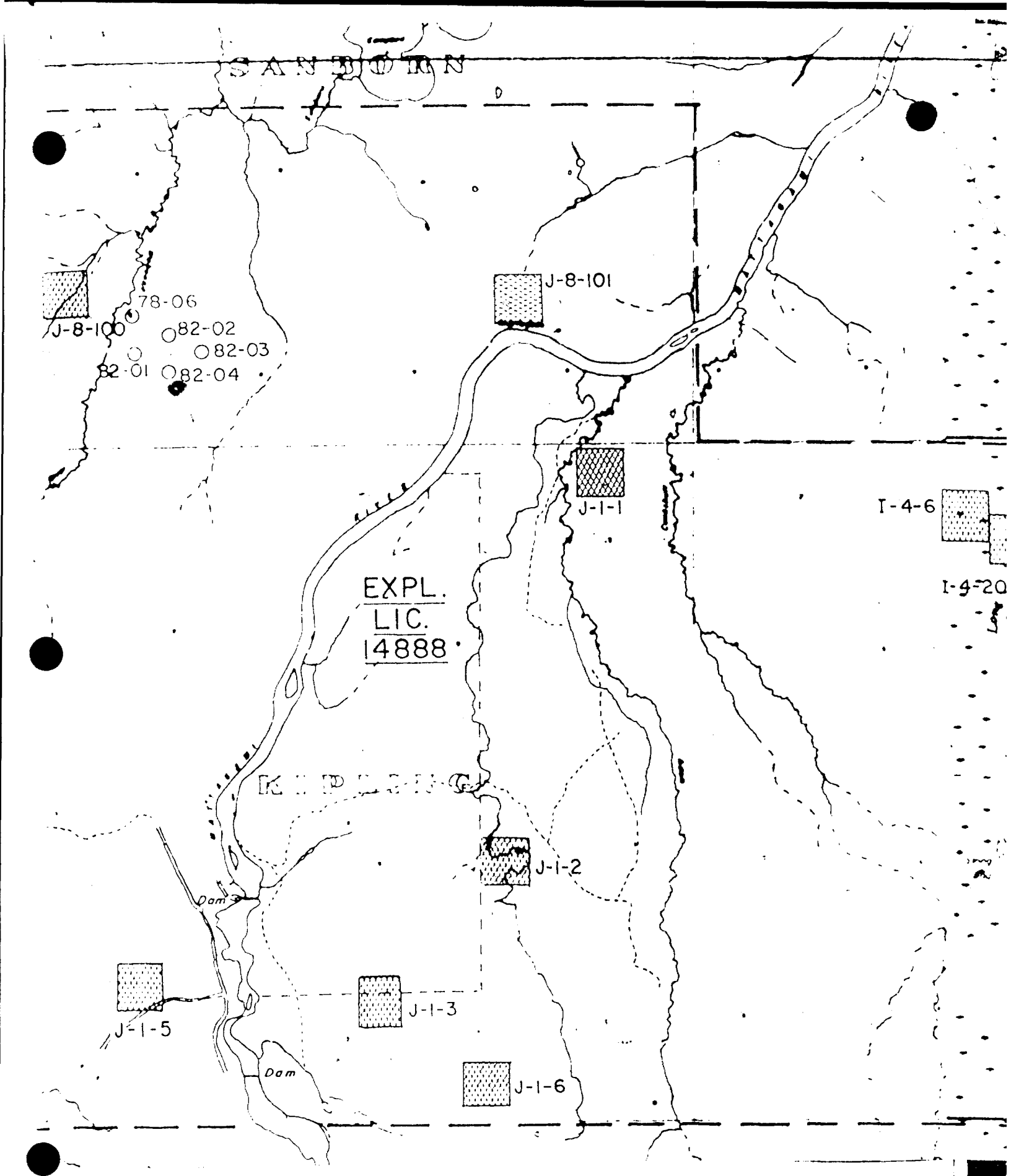


Figure 4 Lignasco 1982 Drill Hole Locations.

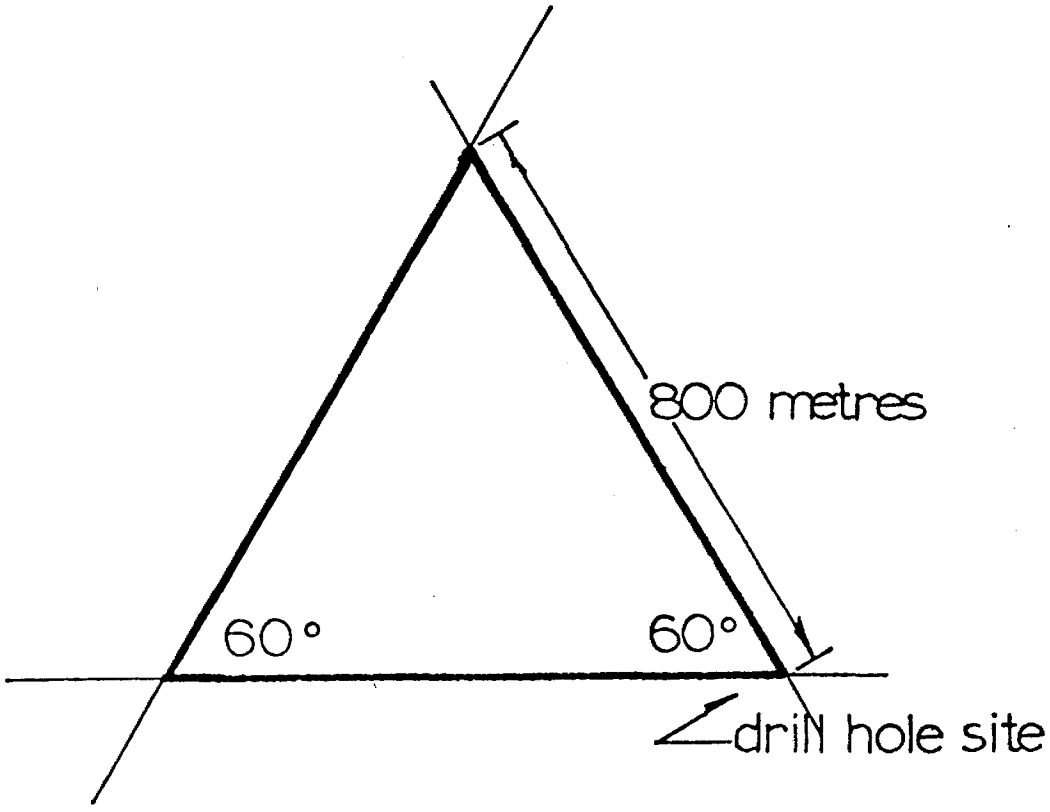


Figure 5 Equilateral Drill Hole Locations.

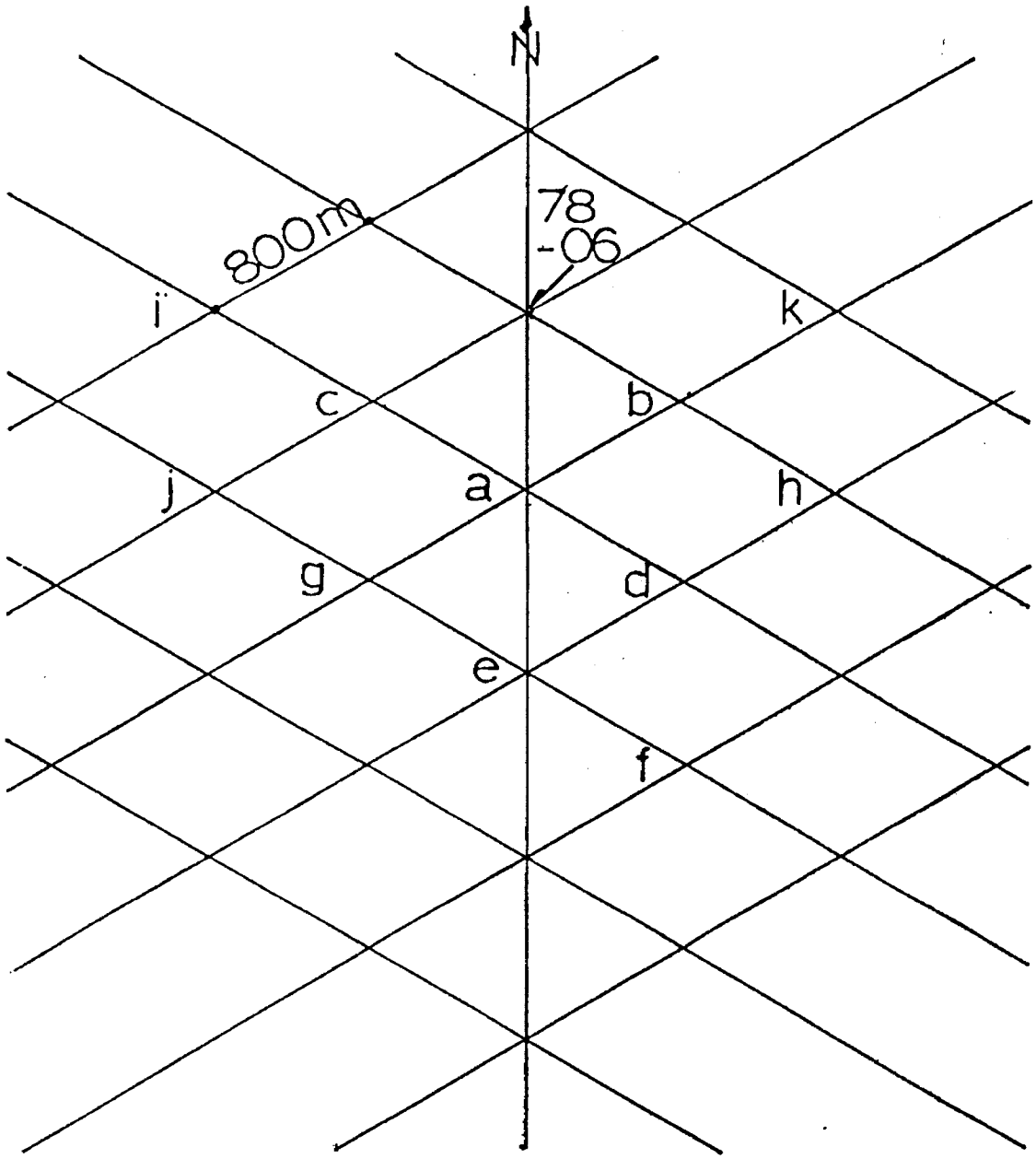


Figure 6 Site Drill Hole Rosette.

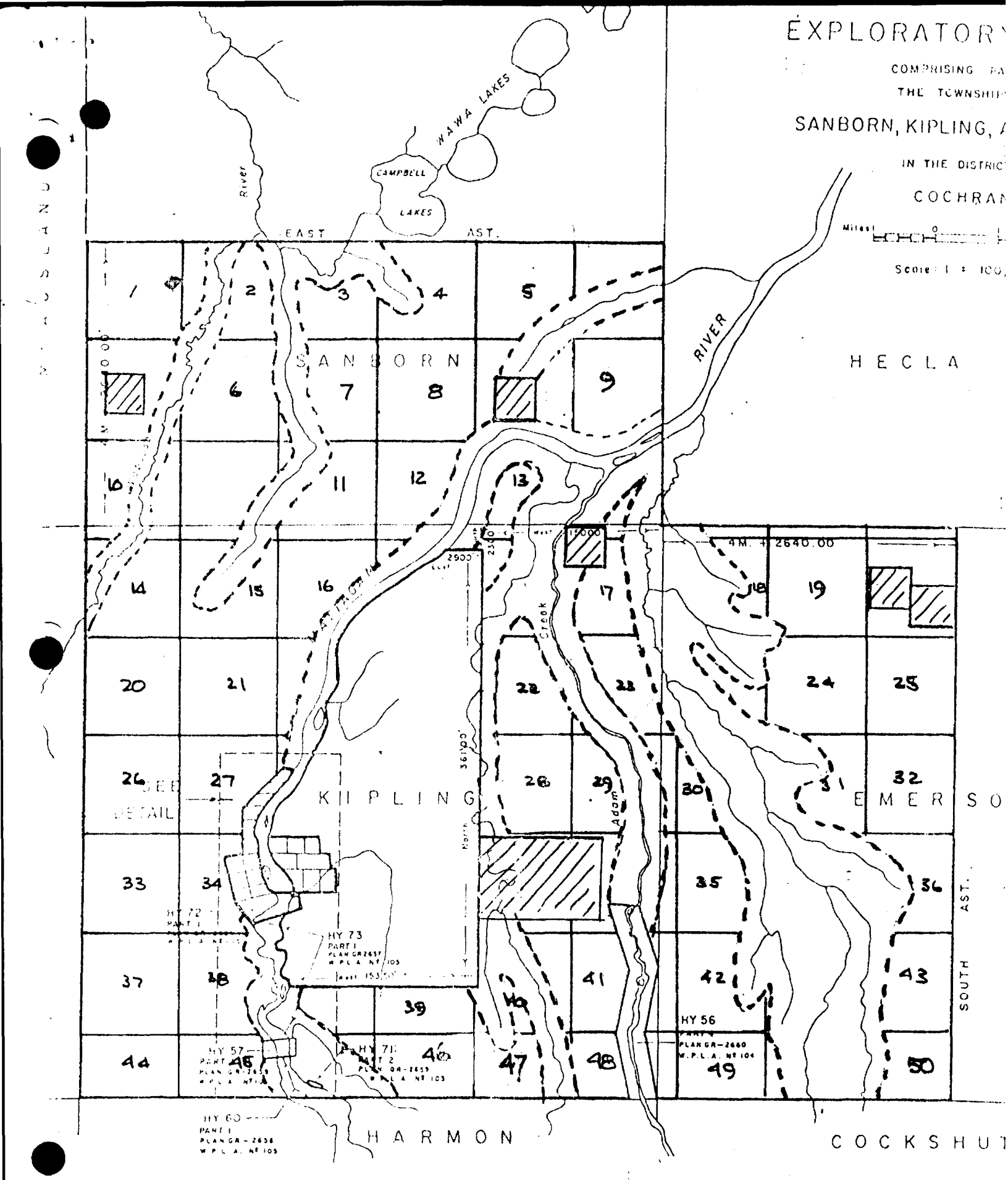


Figure 7 Proposed 50 Drill Hole Grid.

Dr. A.J. Saber, prc
800 Eglinton Ave
Toronto, Ontario
Tel. 781-4798

900

15 November 1982

Ref: ome15no2/s7

Mr. J.B. Gordon
Evaluator
OMEP
Queen's Park
Room 4651
Whitney Block
99 Wellesley Street West
Toronto, Ontario

Dear Mr. Gordon:

Enclosed in my report "Lignasco Resources Limited, OMEP Designated Programme, Registration Number OM81-5-C-132," dated 15 November 1982.

This consitutes the final report for the program period ending 30 June 1982.

Sincerely,

Aaron Jaan Saber, Ph.D.,P.Eng.,Eng.

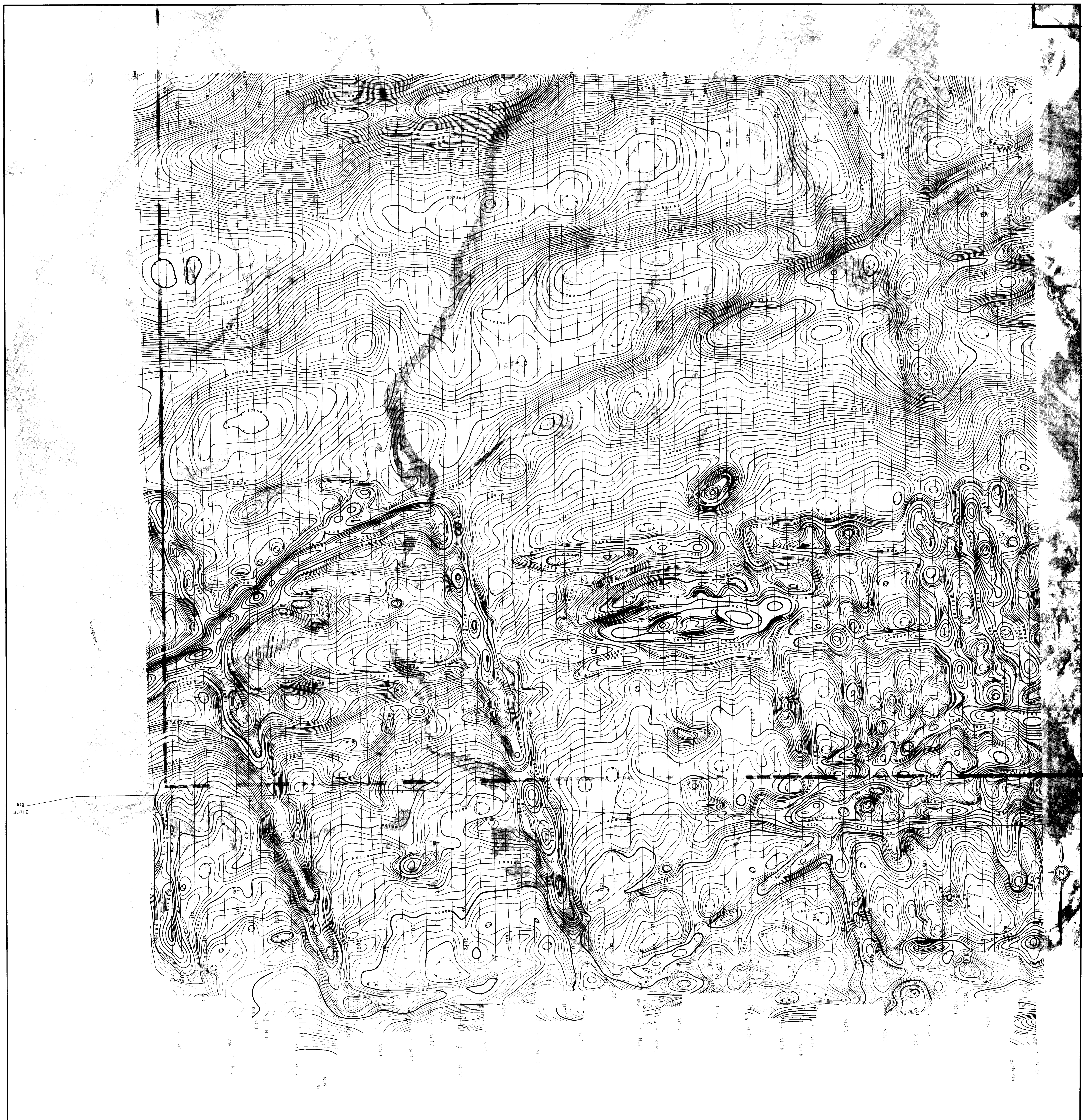
EXPLORATORY LICENCE OF OCCUPATION NO. 14890

STATEMENT OF EXPENDITURES - MAY 1, 1981 TO APRIL 30, 1982

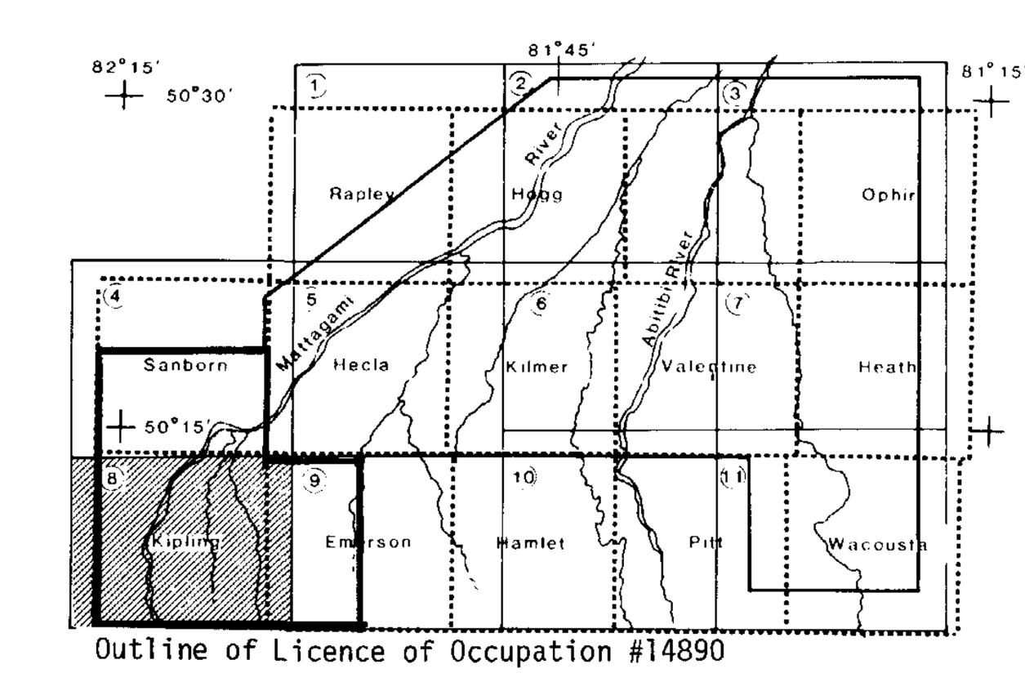
Support		
Camp Operation		
Food and Supplies	$ 10,225	
Accomodation	2,846	
Vehicle Rental and Operation	1,755	
Draughting	818	
Other	711	
Periods Covered: January 10 to April 5, 1981 approx. 3 working months servicing 3 to 10 men	16,355	
Helicopter Charters		
North Star Helicopters, Hearst, Ontario		
A-Star Charter		
$430 per hour plus fuel	33,370	$ 49,725
Airborne Survey		
Approximately 1,500 line kilometres of magnetics and data compilation		
Surveys by Questor Surveys Inc.		
Toronto, Ontario - June, 1981		30,664
Line Cutting		
8 grids - total 157 kilometres		
by S. Bosum Contracting, Chibougamau, P.Q.		
January 12 to March 10, 1982		18,072
(1 grid - I4-6 not included)		
Ground Geophysics		
157 kilometres of magnetometer surveys		
by S. Bosum Contracting, Chibougamau, P.Q.		
January 12 to March 10, 1982	9,206	
Contract draughting and contouring		
by Dataplotting Services, Don Mills, Ontario	1,672	10,878
Diamond Drilling		
6 holes - 659 metres		
by Midwest Diamond Drilling, Winnipeg, Manitoba		
February 22 to April 1, 1982	209,652	
Helicopter Support		
North Star Helicopter - A-Star	92,454	302,106

2/....

Supervision		
Geophysical	$ 302	$
General (includes expediter)	12,609	
Drill	10,742	23,653
TOTAL		$435,098



10 GAMMA CONTOUR LINE
50 GAMMA CONTOUR LINE
500 GAMMA CONTOUR LINE
(1 GAMMA = 1 NANOTESLA IN SI UNITS)
MAGNETIC DEPRESSION



Outline of Licence of Occupation #14890

Scale 1:25000

HIGH RESOLUTION AEROMAGNETIC SURVEY

CORAL RAPIDS

PROVINCE of ONTARIO

FILE NO.	SHEET NO.	DATE	DRAWN BY
9W032	8 of 11	JUNE '81	Dataplotting Services Inc

Questor Surveys Limited
Mississauga, Ontario Canada

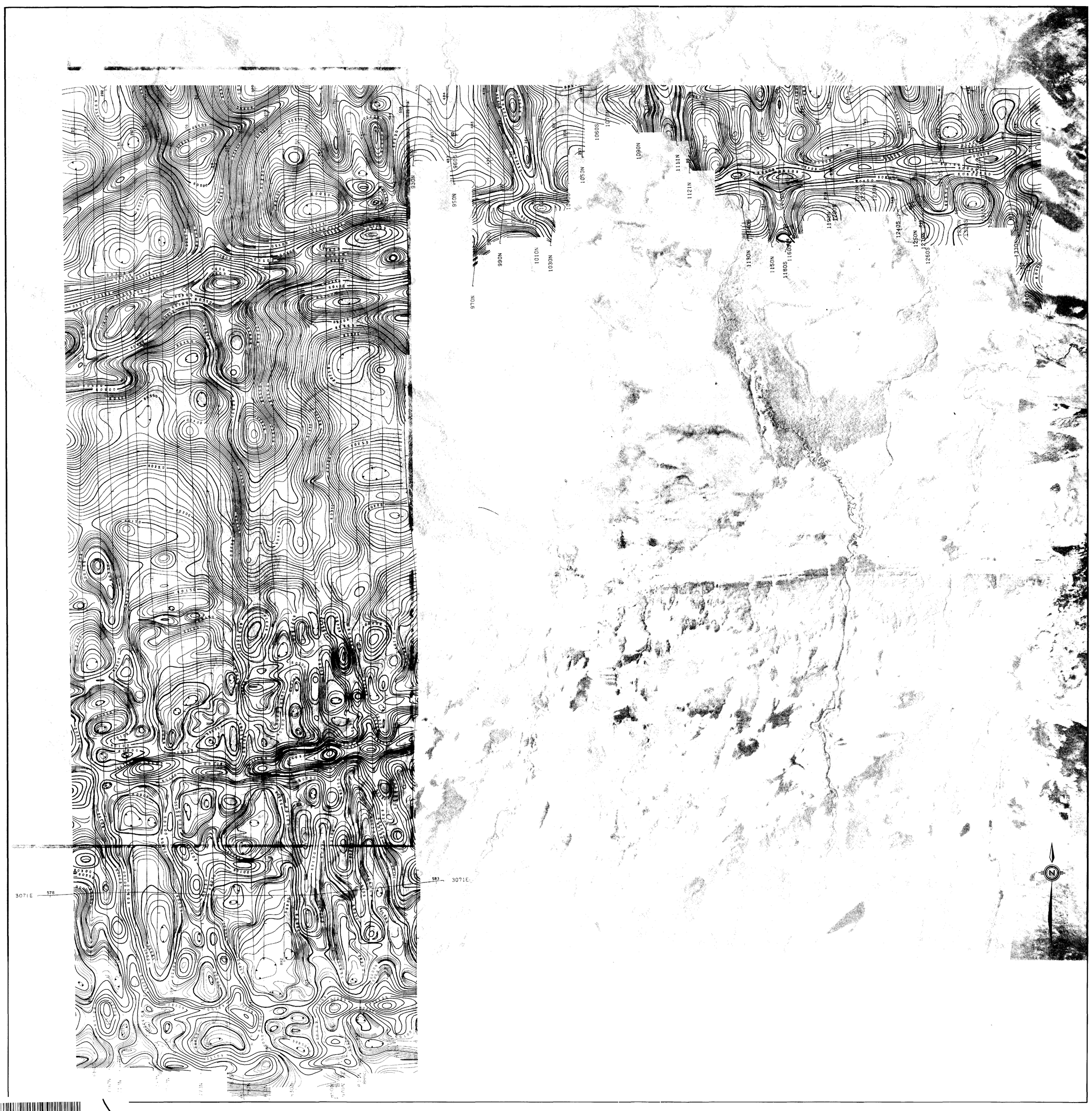
63.4114
OM 81-5-C-132

MAP 1

AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada

200



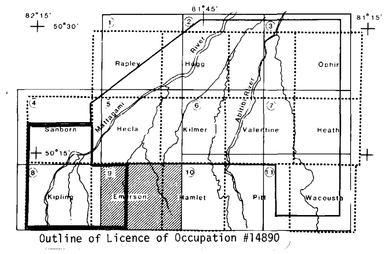
10 GAMMA CONTOUR LINE

50 GAMMA CONTOUR LINE

500 GAMMA CONTOUR LINE

(1 GAMMA = 1 NANOTESLA IN SI UNITS)

MAGNETIC DEPRESSION



Outline of Licence of Occupation #14890

Scale 1: 25 000

2000 0 6000 ft

500 0 1000 2000 M

HIGH RESOLUTION AEROMAGNETIC SURVEY

CORAL RAPIDS

PROVINCE of ONTARIO

FILE NO.	SHEET NO.	DATE	DRAWN BY
9W032	9 of 11	JUNE '81	Dataplotting Services Inc

Questor Surveys Limited

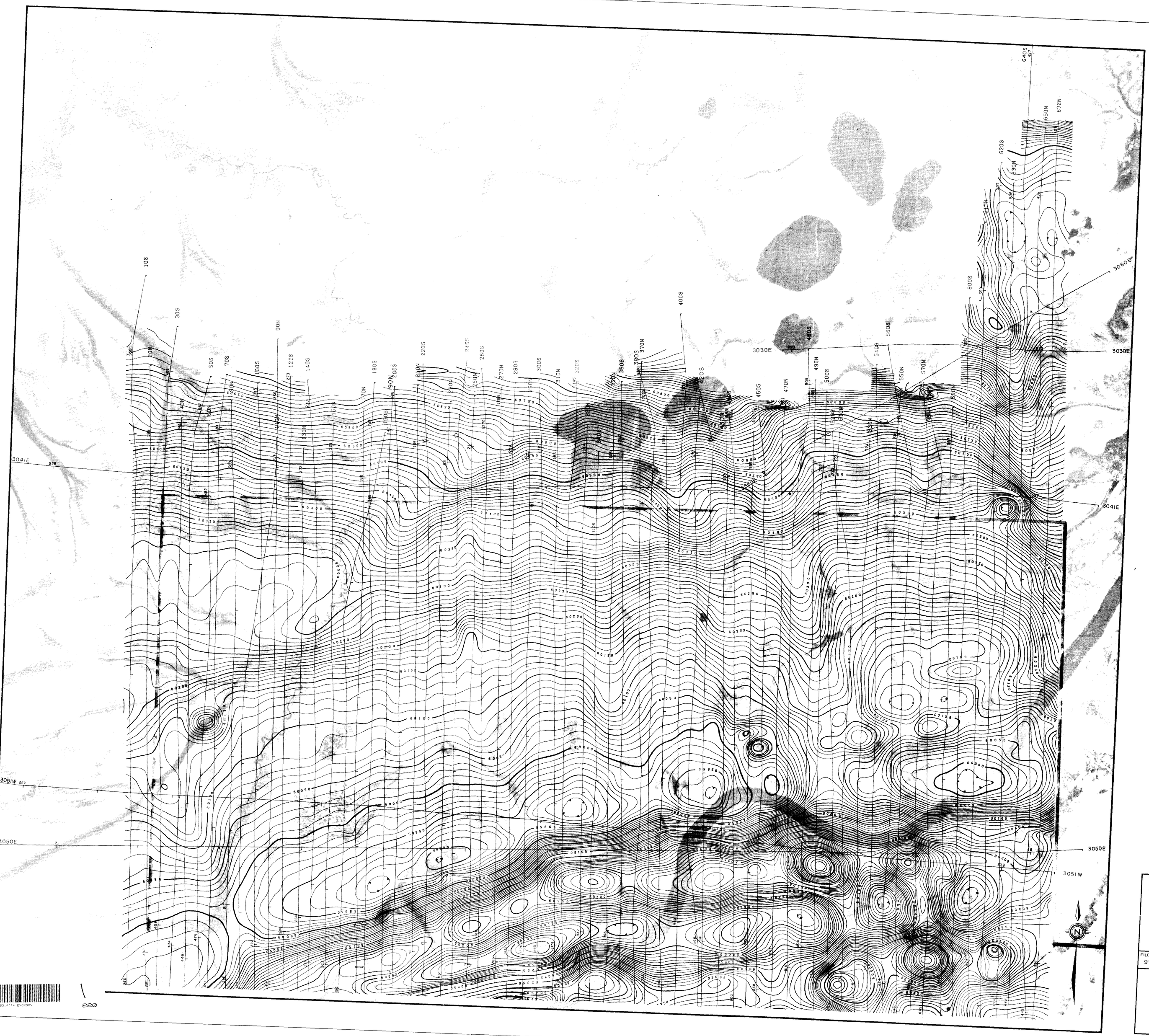
Mississauga, Ontario, Canada

OM81-5-C-132

MAP 2 63.4114

AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada



AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada

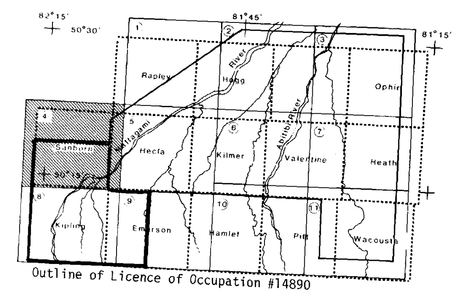
10 GAMMA CONTOUR LINE

50 GAMMA CONTOUR LINE

500 GAMMA CONTOUR LINE

(1 GAMMA = 1 NANOTESLA IN SI UNITS)

MAGNETIC DEPRESSION



Outline of Licence of Occupation #14890

Scale 1: 25000

6000 ft
2000 m

HIGH RESOLUTION AEROMAGNETIC SURVEY

CORAL RAPIDS
PROVINCE of ONTARIO

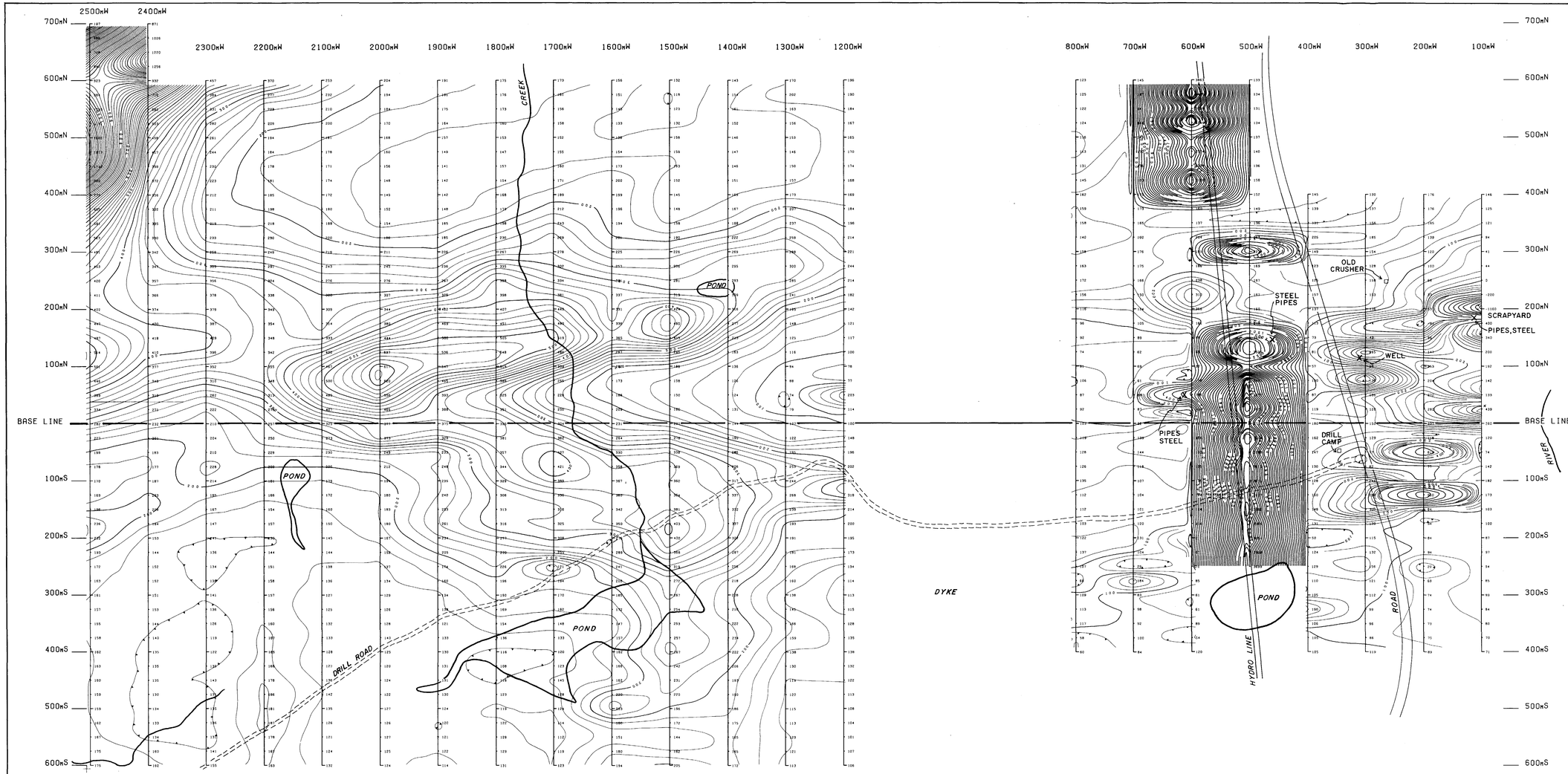
FILE NO.	SHEET NO.	DATE	DRAWN BY
9W032	4 of 11	JUNE '81	Dataplotting Services Inc

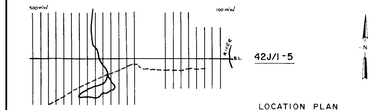
63.4114
Questor Surveys Limited
Mississauga, Ontario Canada

OM81-5-C-132

MAP 3

220





LOCATION PLAN
CLAIM MAP M.522 — ONT.
Scale 1 : 25,000

MAGNETOMETER INSTRUMENT
TYPE: GEOMETRICS G-816
Readings in Gammas: 94 / 85
Base: 59,000
Profile:
Contour Interval: Every 20 Gammas

Scale 1:2500
0 50 100 150m

AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada

MAP 4

N

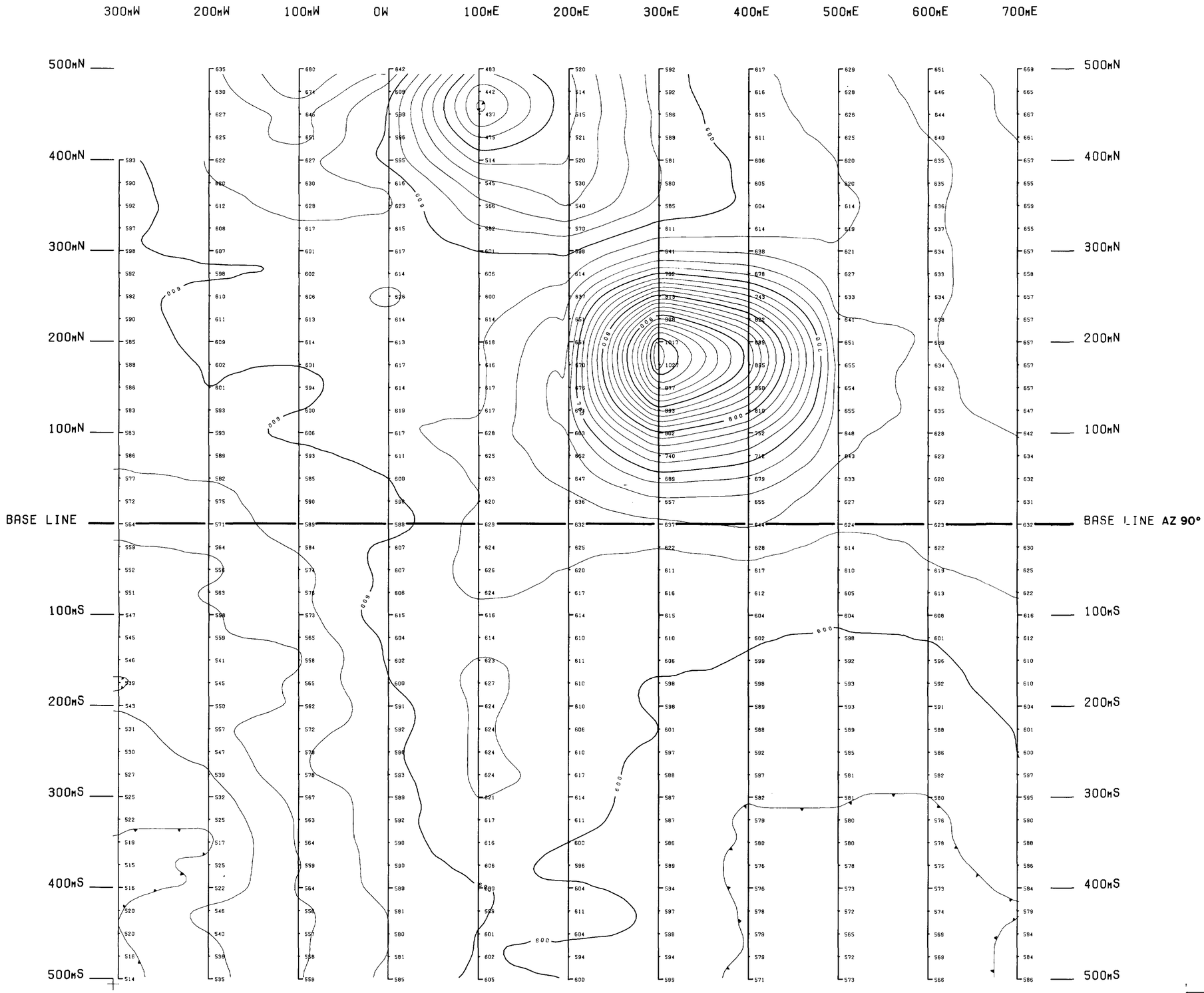
SELCO INC. EXPLORATION

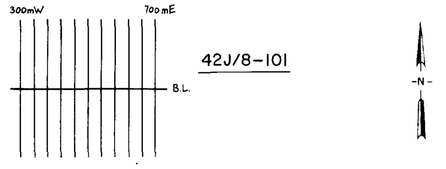
SMOKY FALLS PROJECT

N.T.S. 42J/1 — GRID 5 — MAG. SURVEY

63.4114
GRP-37-5-C-1982

DRAWN BY:	DATE:	SCALE:	FILE:
PLOTTED BY: Dataplot Plc	DATE: March 1982		SF. 3374





42J/8-101

LOCATION PLAN

CLAIM MAP M.1088—ONT.

Scale 1 : 25,000

MAGNETOMETER INSTRUMENT

TYPE: GEOMETRICS G-816

Readings in Gammas: 579 / 584

Base: 59,000

Profile:

Contour Interval: Every 20 Gammas

-N-

MAP 5

AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada

Scale 1:2500

0 50 100 150m

SELCO INC. EXPLORATION

SMOKY FALLS PROJECT

63.4114

N.T.S. 42J/8 — GRID 101 — MAG. SURVEY

010 81-5-C-132

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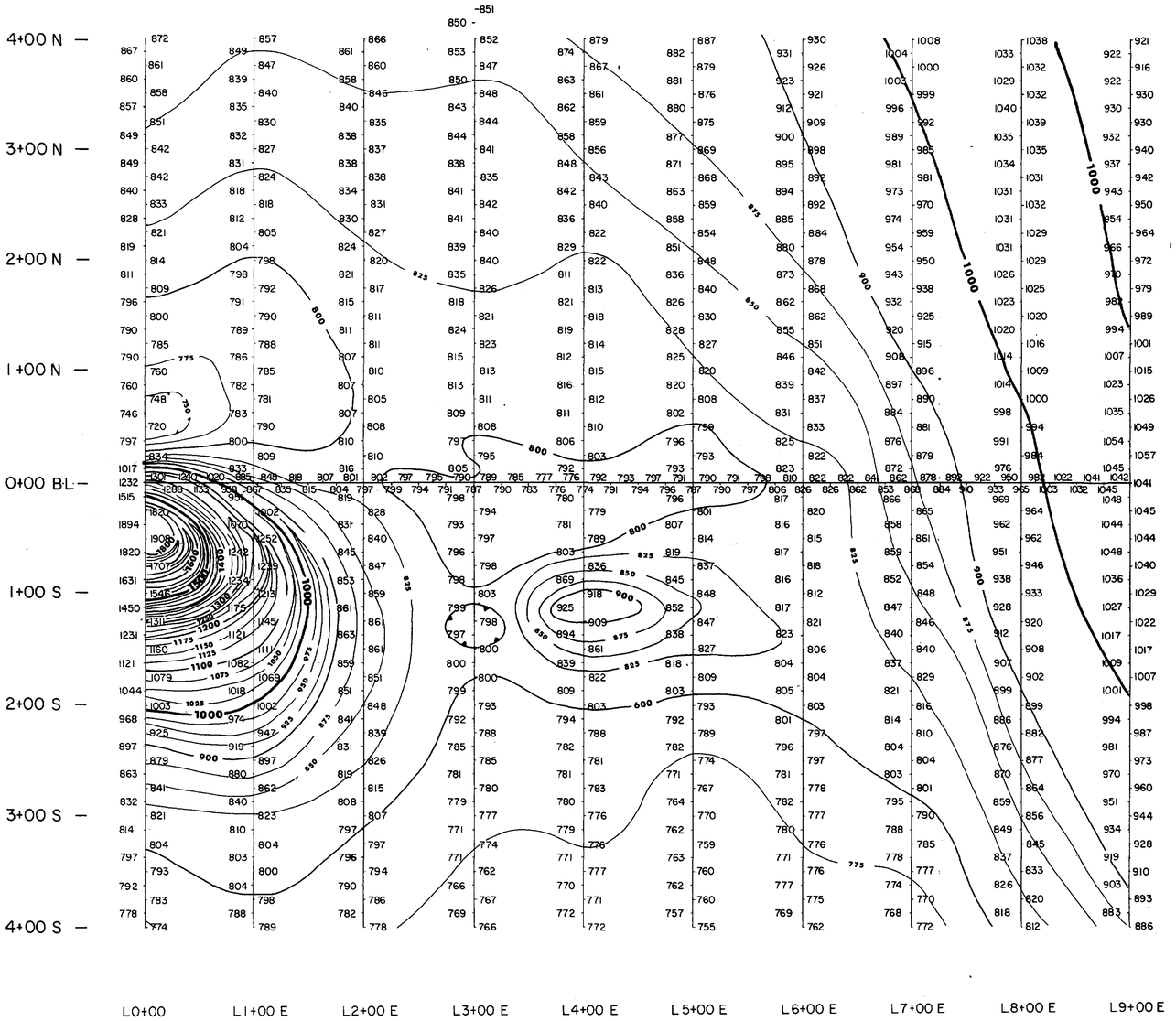
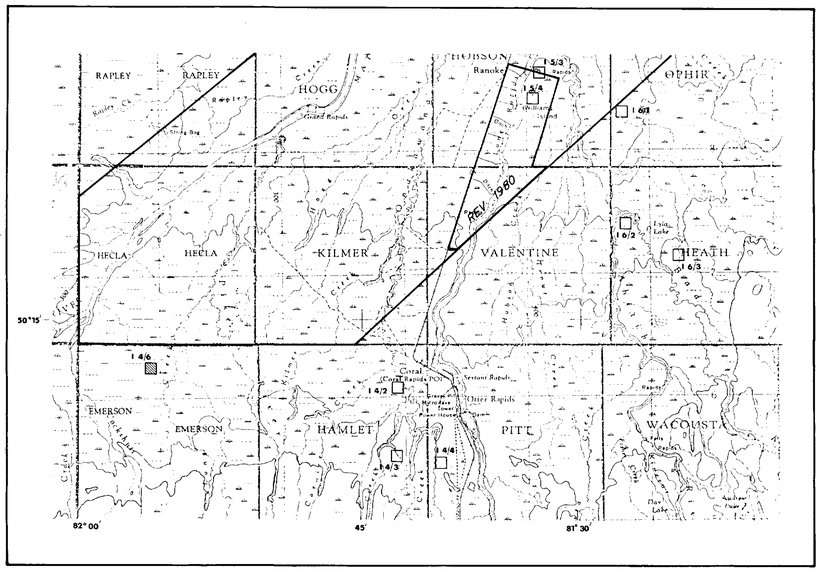
TRACED BY DATAPLOT F.S.	DATE MARCH 1982	SF. 3371





INDEX MAP

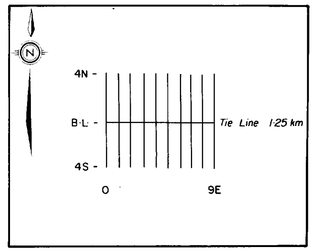
SCALE 1:250,000

LEGEND

- HELICOPTER PAD
- LAKE or POND
- RIVER, STREAM or BROOK
- OBSERVED CLAIM POST
- ASSUMED CLAIM POST

CONTOUR INTERVAL

- 25 nT.
- 100 nT.
- 500 nT.



LOCATION MAP

SCALE 1:25,000

BAR SCALE (METERS)

0 50 100 150 200 250 300

BACKGROUND

59,000 nT.

BASE STATION: 59,600 nT.

AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada

SELCO MINING CORPORATION LIMITED

REGISTERED PROFESSIONAL ENGINEER D. G. WAHL PROVINCE OF ONTARIO

SMOKY FALLS PROJECT

MAGNETOMETER SURVEY

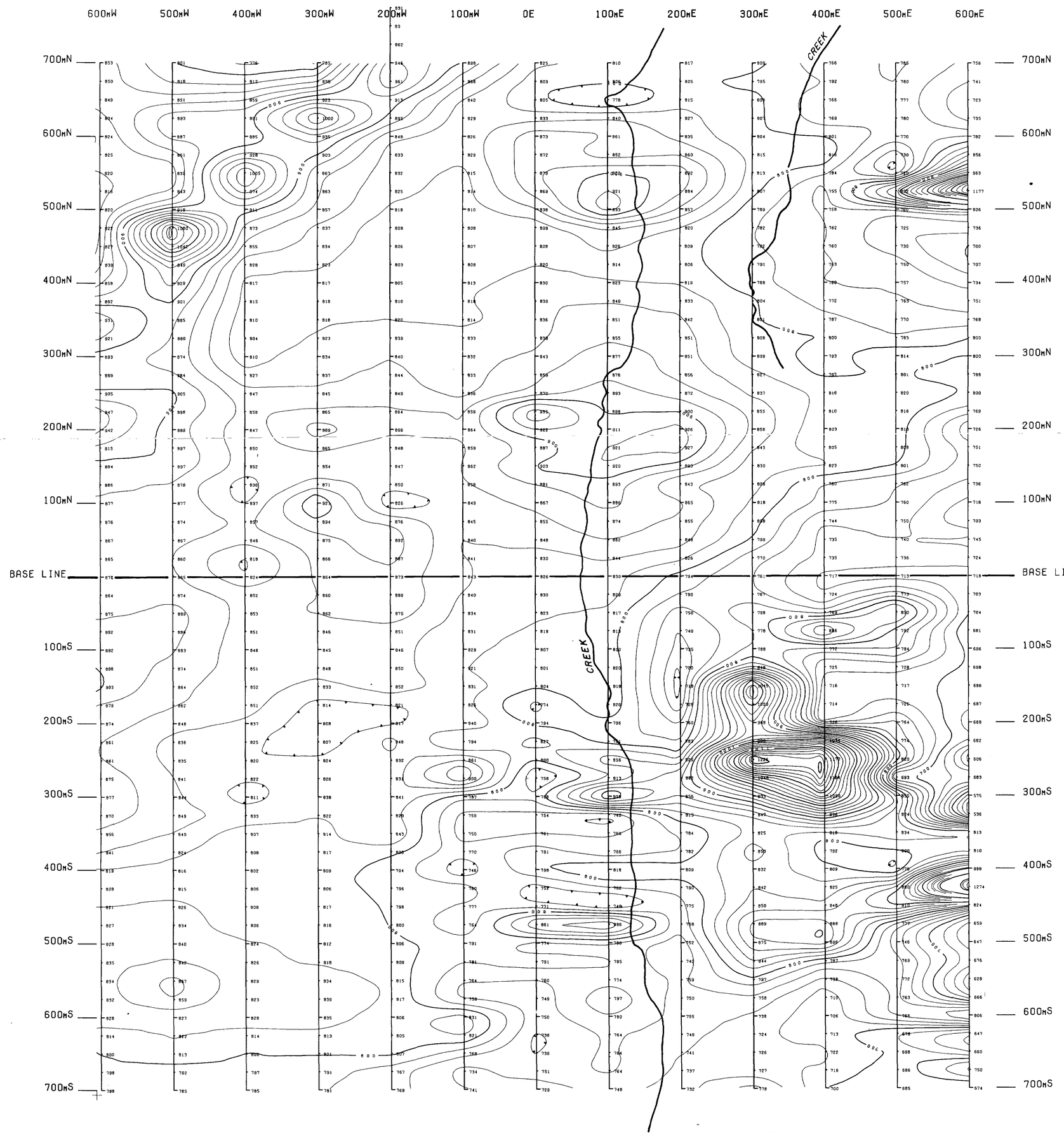
GRID

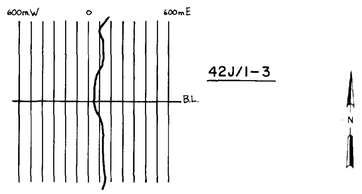
I 4-6

63.4114

81-81-5-C-132

DRAWN BY J.P.P.	REV. OCT. 1980	
TRACED BY J.P.P.	REV.	
APPROVED	REV.	
N.T.S. 42-I/4	REV.	
W.G. WAHL LIMITED	SCALE: 1:2,500	DWG. NO. SF.3088





LOCATION PLAN
CLAIM MAP M.522 — ONT.
Scale 1:25,000

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Readings in Gammas: 425 – 666
Base: 59,000
Profile:
Contour Interval: Every 20 Gammas

Scale 1:2500
0 50 100 150m

N

AARON JAAN SABER, Ph.D.,
Professional Engineer

Suite 406
800 Eglinton Avenue West
Toronto, Ontario M5N 1G1
Canada

MAP 7

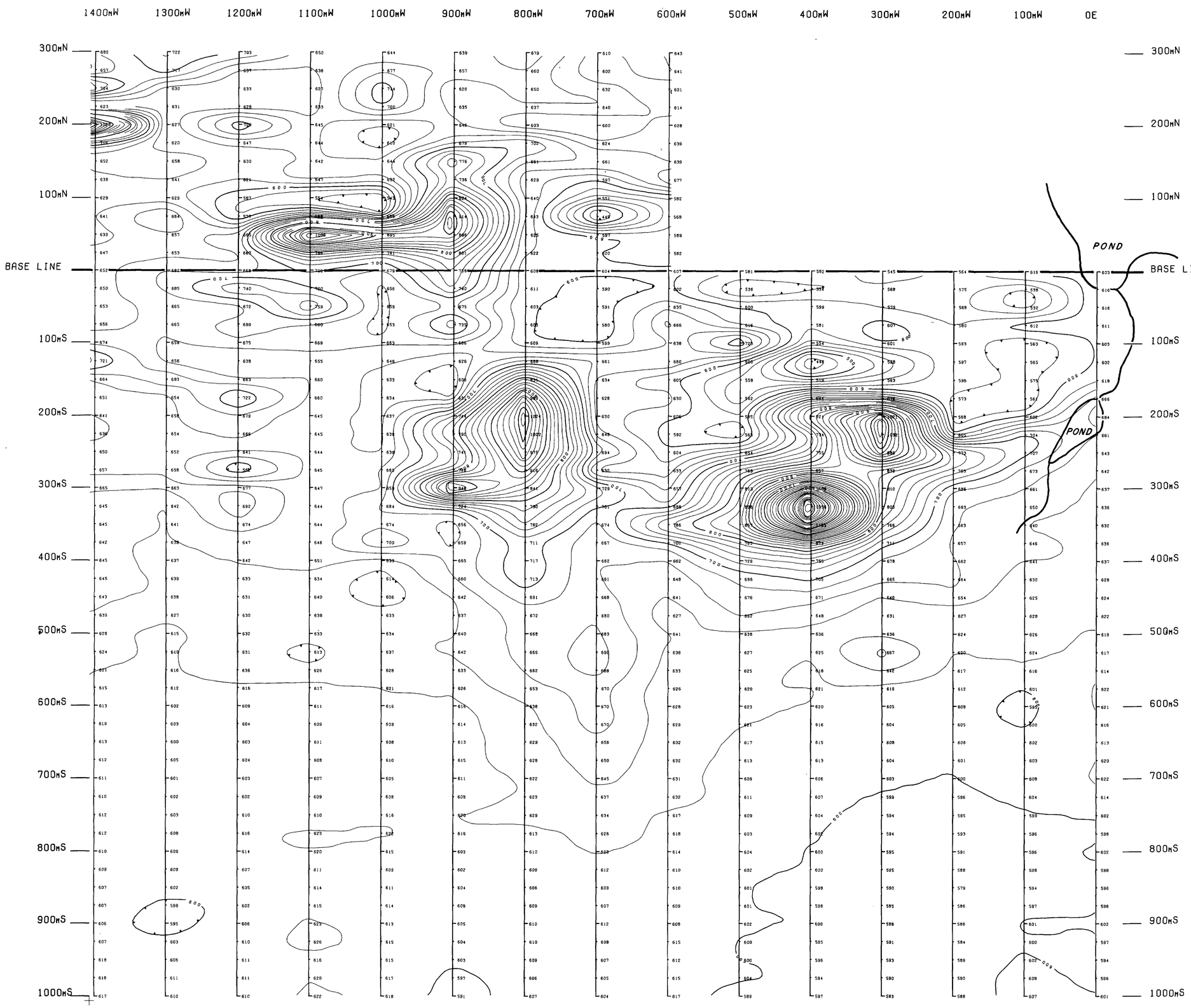
SELCO INC. EXPLORATION

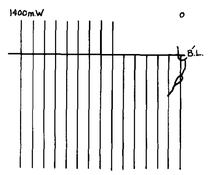
SMOKY FALLS PROJECT

N.T.S. 42J/1 — GRID 3 — MAG. SURVEY

63.4114
OMEI-S-C-132

DRAWN BY	DATE	N.T.S.	PLAN
TRACED BY Dataplot FS.	DATE February, 1982		ST. 3383





LOCATION PLAN
CLAIM MAP M.522 — ONT.
Scale 1 : 25,000

MAGNETOMETER INSTRUMENT
TYPE: GEOMETRICS G-816
Readings in Gammas: 59B / 60Z
Base: 59,000
Profile:
Contour Interval: Every 20 Gammas

Scale 1:2500
0 50 100 150m

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MAP 8

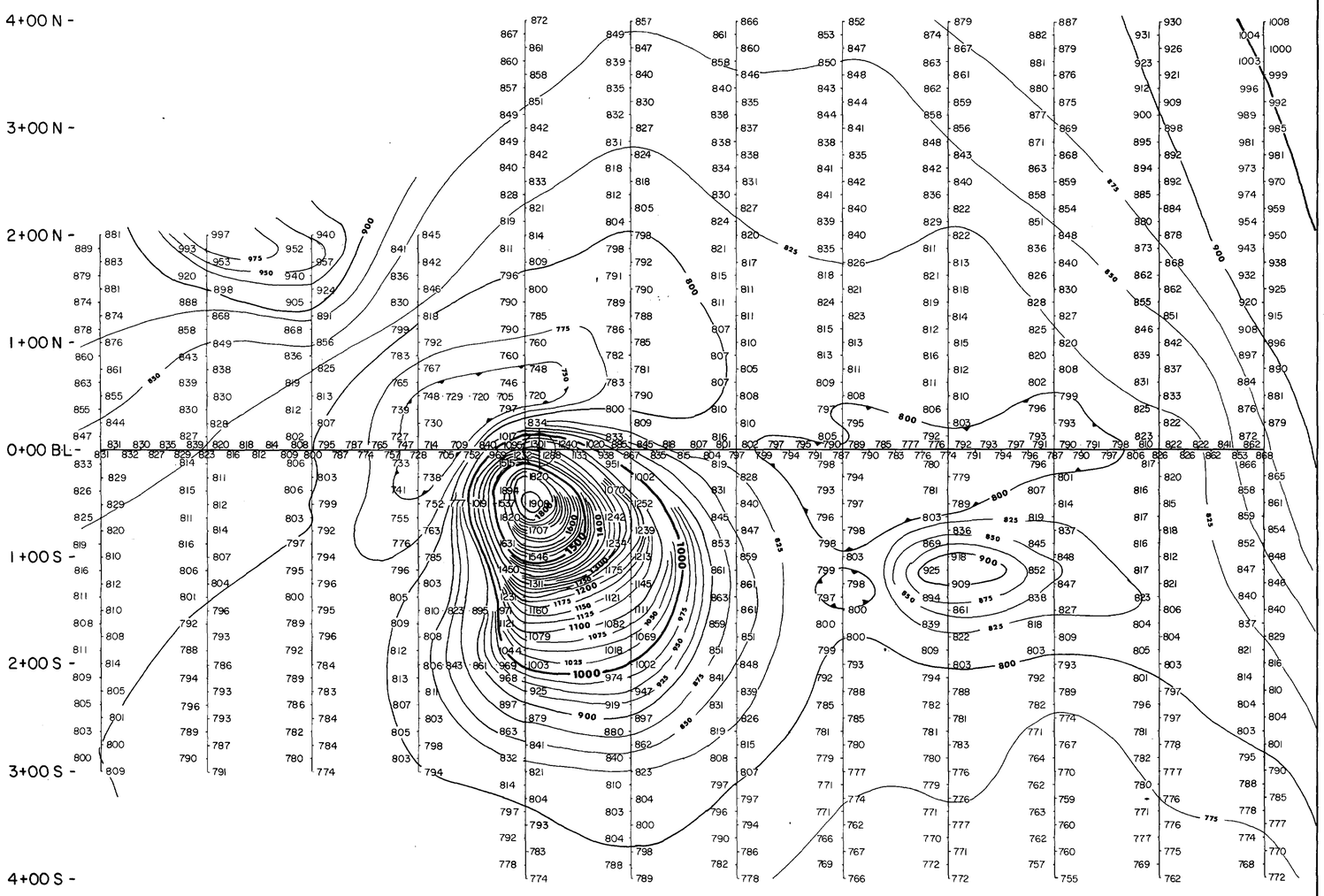
SELCO INC. EXPLORATION

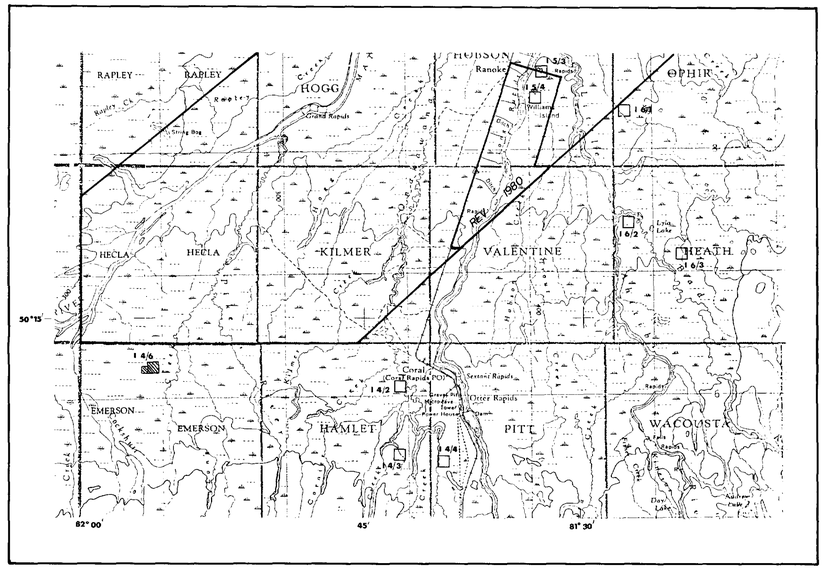
SMOKY FALLS PROJECT

N.T.S. 42J/1 — GRID 6 — MAG. SURVEY

63.4114
ONT 81-5-C-132

DRAWN BY:	SCALE		PLAN
TRACED BY: Dataplot F.S.	DATE: February, 1982		SF. 3384





INDEX MAP

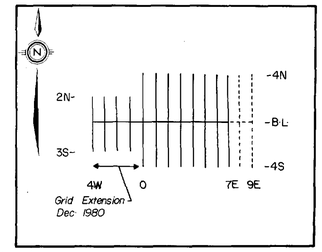
SCALE 1:250,000

LEGEND

- HELICOPTER PAD
- LAKE or POND
- RIVER, STREAM or BROOK
- OBSERVED CLAIM POST
- ASSUMED CLAIM POST

CONTOUR INTERVAL

- 25 nT.
- 100 nT.
- 500 nT.



LOCATION MAP

SCALE 1:25,000

BAR SCALE (METERS)

0 50 100 150 200 250 300

NOTE: REFER TO MS.3088 – MAG.

MAP 9

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BACKGROUND
59,000 nT.

BASE STATION: 59,600 nT.

SELCO MINING CORPORATION LIMITED

SMOKY FALLS PROJECT

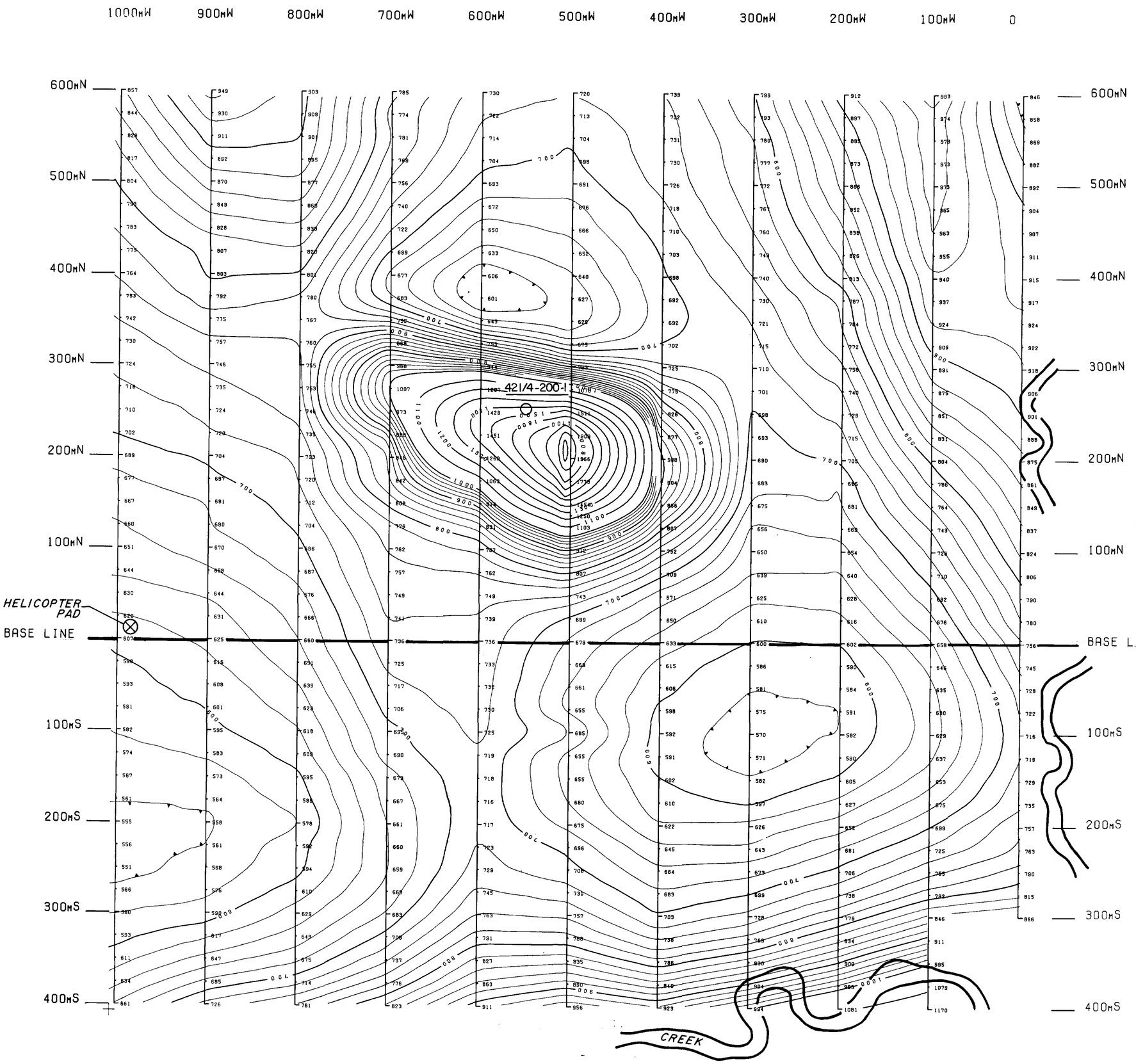
MAGNETOMETER SURVEY
GRID
1 4-6

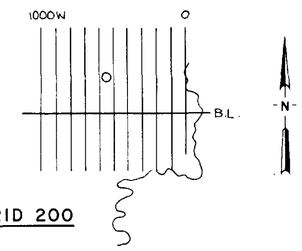
63.4114
OMGI-S-C-132

W.G. WAHL LIMITED

SCALE: 1:2,500

DRAWN BY J.P.P.	REV. OCT. 1980
TRACED BY J.P.P.	REV. DEC. 1980
APPROVED	REV.
N.T.S. 42-1/4	REV.
DWG. NO. SF.3109	





421/4 - GRID 200

LOCATION PLAN
CLAIM MAP M.417-ONTARIO
Scale 1:25,000

MAGNETOMETER INSTRUMENT

TYPE: GEOMETRICS G.816/826
Readings in Gammas: [705 / 685]
Base: 59,000
Profile:
Contour Interval: Every 20 Gammas

-N-

Scale 1:2500
0 50 100 150m

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MAP 10

Oct. '82	Added: D.D.H. 421/4-200-1

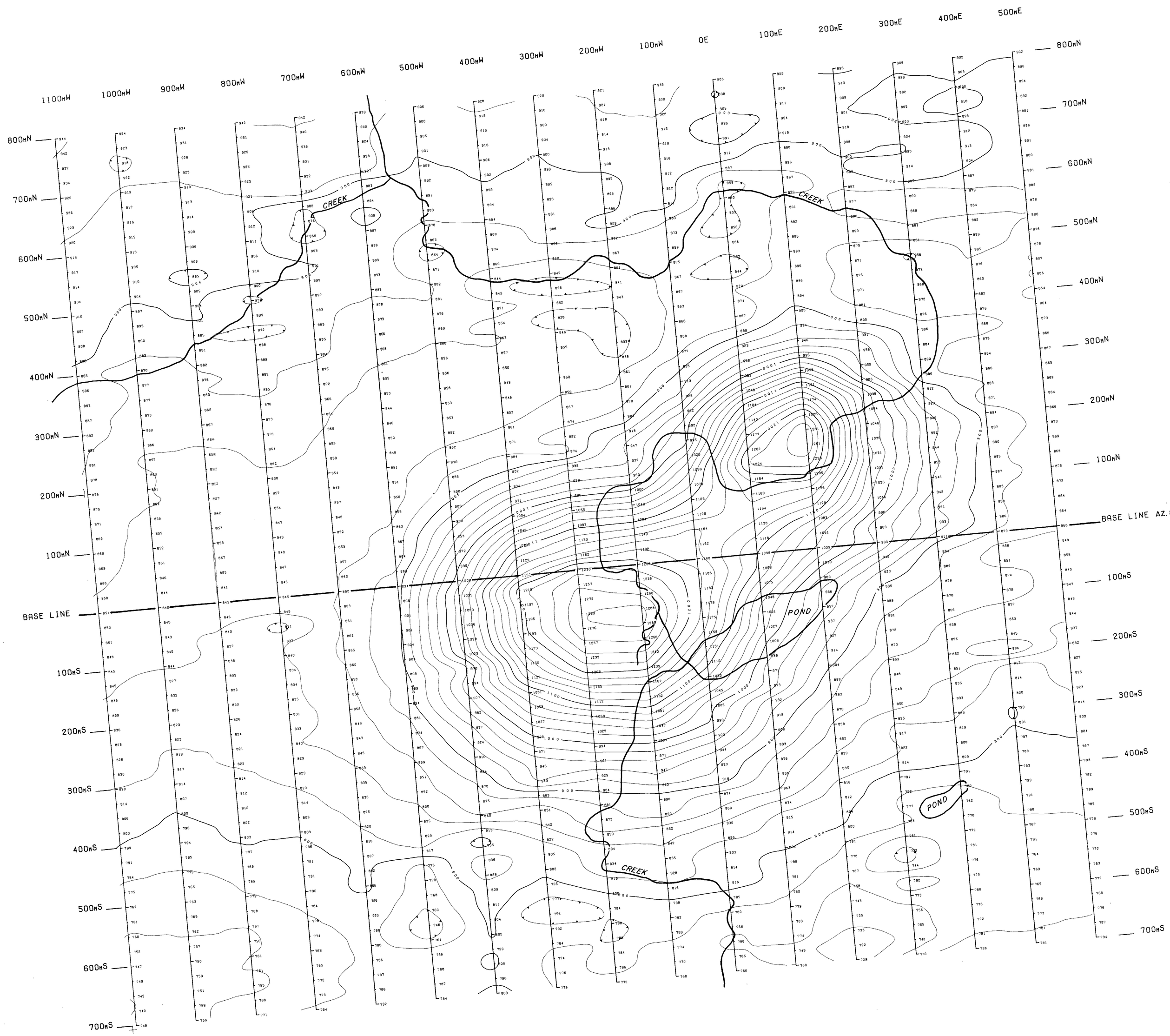
SELCO INC. EXPLORATION

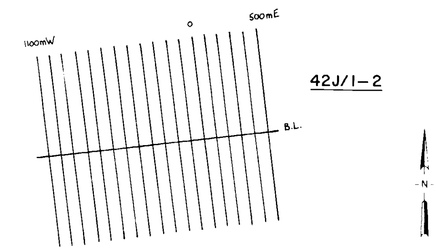
SMOKY FALLS PROJECT

421/4 - GRID 200 — MAG. SURVEY

63.4114
OM81-5-C-132

DRAWN BY S.R.B.	DATE March 1982	N.T.S. 421/4	PLAN SF.3404
TRACED BY Data Plot	DATE April 1982		





LOCATION PLAN
CLAIM MAP M.522 ONT.
Scale 1 : 25,000

MAGNETOMETER INSTRUMENT
TYPE: GEOMETRICS G-816
Readings in Gammas: [730 / 765]
Base: 59,000
Profile:
Contour Interval: Every 20 Gammas

N

Scale 1:2500
0 50 100 150m

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MAP 11

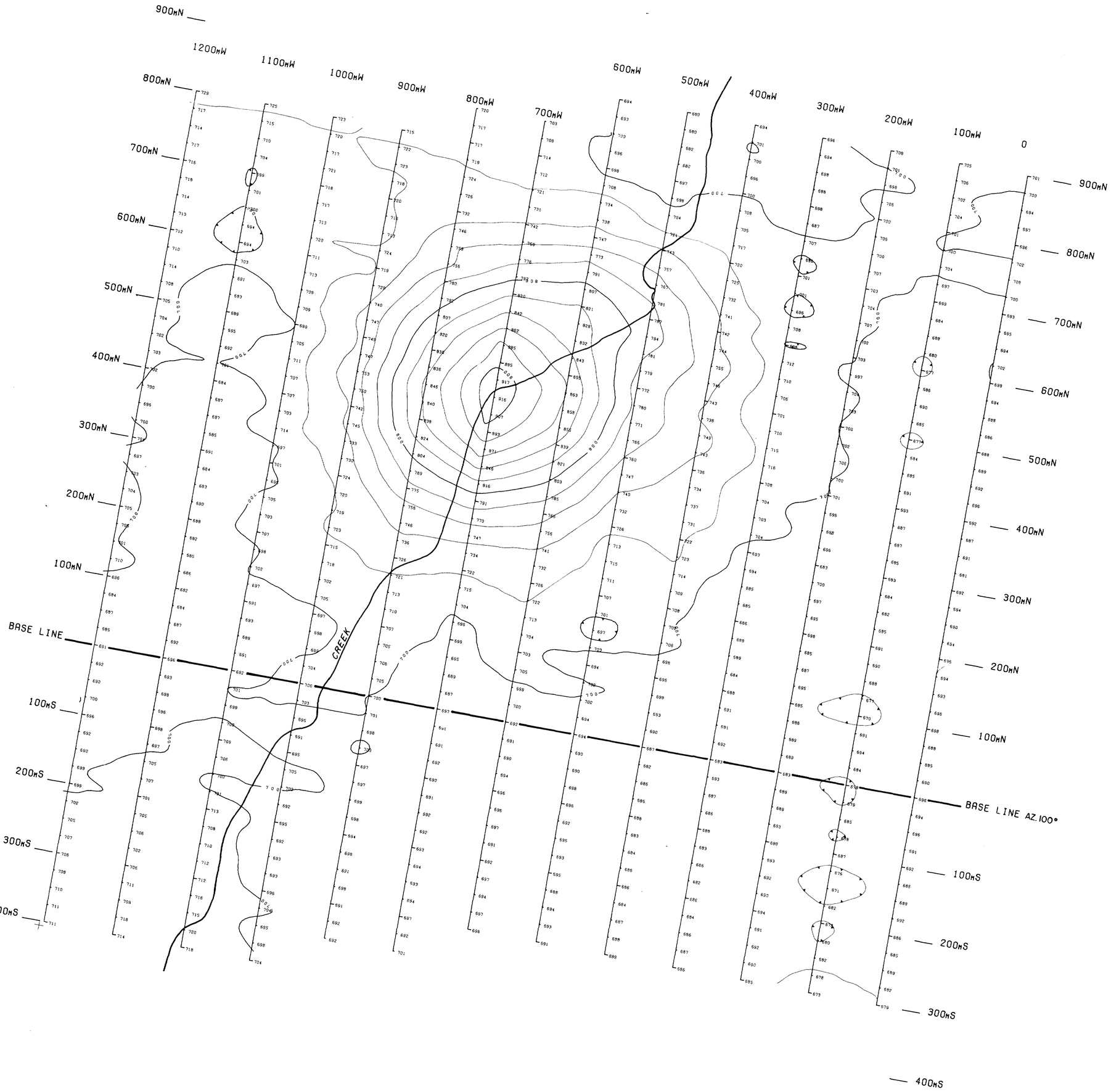
SELCO INC. EXPLORATION

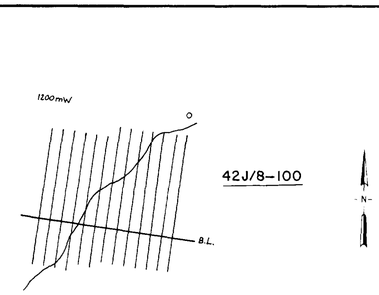
SMOKY FALLS PROJECT

N.T.S. 42J/1 — GRID 2 — MAG. SURVEY

63.4114
42J/1-S-C-132

DRAWN BY	DATE	N.T.S.	PLAN
TRACED BY Dataplot Fs.	DATE February, 1982		SF. 3382





LOCATION PLAN

CLAIM MAP M.1088—ONT.

Scale 1 : 25,000

MAGNETOMETER INSTRUMENT

TYPE: GEOMETRICS G-816

Readings in Gammas:

Base: 59,000

Profile:

Contour Interval: Every 20 Gammas

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MAP 12

Scale 1:2500

0 50 100 150m

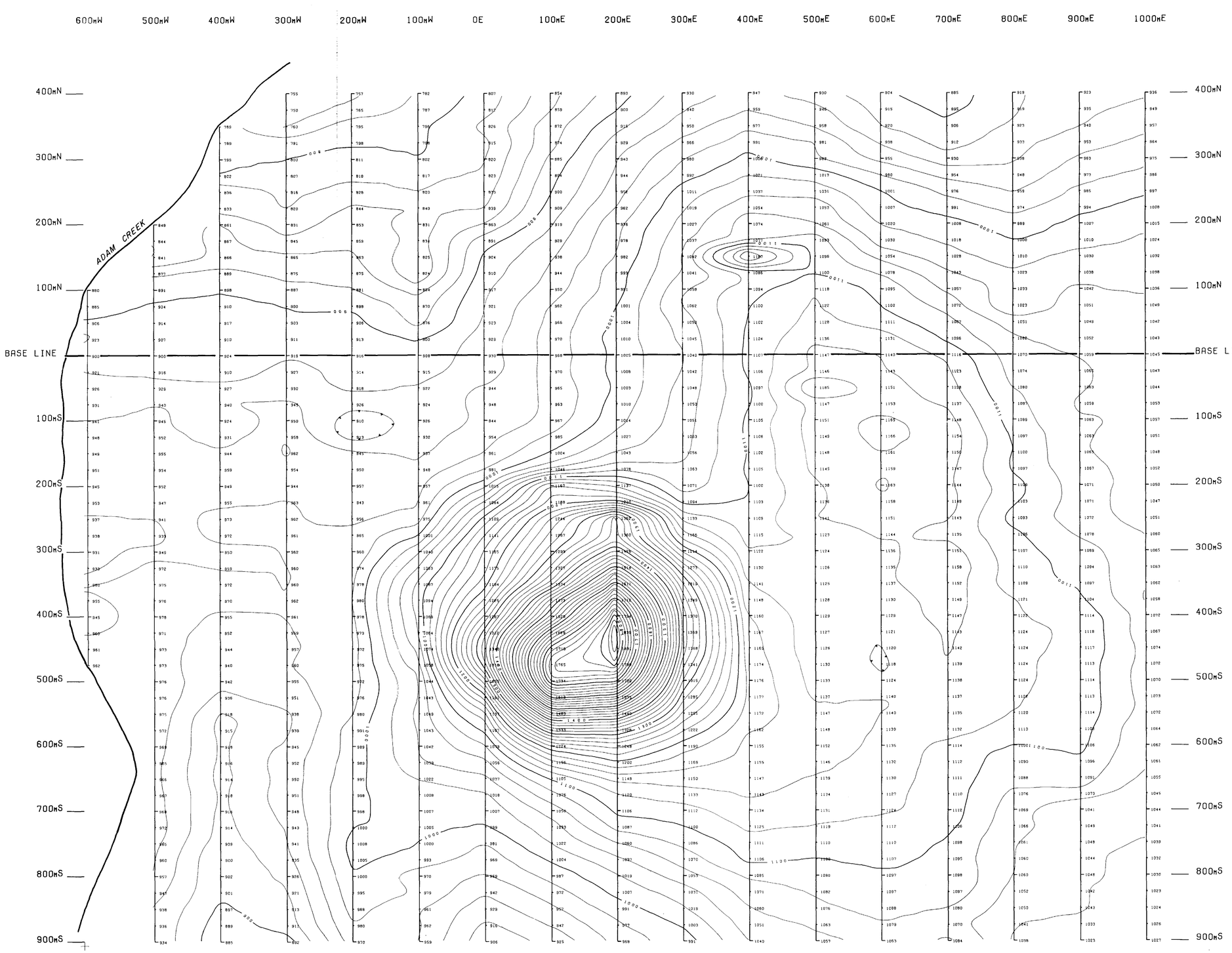
SELCO INC. EXPLORATION

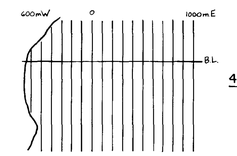
SMOKY FALLS PROJECT

N.T.S. 42J/8 — GRID 100 — MAG. SURVEY 63.4114

OTT 81-5-C-132

DRAWN BY	DATE	PLAN No SF. 3370
TRACED BY DATAPLOT ES	DATE MARCH 1982	





LOCATION PLAN

CLAIM MAP M.522 — ONT.

Scale 1:25,000

MAGNETOMETER INSTRUMENT

TYPE: GEOMETRICS G-816

Readings in Gammas: 1030 / 1025

Base: 59,000

Profile:

Contour Interval: Every 20 Gammas

Scale 1:2500

0 50 100 150m

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MAP 13

SELCO INC. EXPLORATION

SMOKY FALLS PROJECT

N.T.S. 42J/1 — GRID 1 — MAG. SURVEY

63.4114

CM81-5-C-132

DRAWN BY	DATE	N.T.S.	PLAN
TRACED by Dataplot F.S.	DATE February, 1982		SF. 3381

ONTARIO ENERGY CORP.

M.1008

M.1088

M.924

M.619

M.522

M.917

MCCAUSLAND

SANBORN

KIPLING

ACRES

SMOKY FALLS
LIGNASCO
MAG. (1981)
(37,424 ha)

AIRBORNE
SURVEY
BOUNDARY

J/8-100
SL 82-02 110.9 m
SL 82-03 99.4 m
SL 82-01 116.7 m
SL 82-04 111.9 m

J-8-101 73.2 m
J/8-101

J/1-1

I/4 -6

I/4 -200

421/4 -200

J/1-2
J-1-2 146.9m

J/1-3

J/1-5

J/1-6

Smoky Falls

DOUGLAS /
TAYLOR
(PERMIT Nº 14888)

1:50,000
0 2000 4000
METRES

NOTE: ALL DRILLHOLES ARE VERTICAL

ONTARIO ENERGY CORP.

M.1008

M.1088

M.924

SANBORN

USLAND

SMOKY FALLS
LIGNASCO
MAG. (1981)
(37,424 ha)

J/8-100
SL 82-02 110.9 m
SL 82-03 99.4 m
SL 82-01 116.7 m
SL 82-04 111.9 m

J-8-101 73.2 m
J/8-101

M. 619

M.522

J/1-1

M.471

I/4 -6

I/4 -200

421/4-200

KIPLING

J/1-2
J-1-2 146.9m

J/1-3

J/1-5

J/1-6

String Bog

AIRBORNE
SURVEY
BOUNDARY

M. 917

Smoky Falls

DOUGLAS/
TAYLOR
(PERMIT Nº 14888)

N

1: 50,000

0 2000 4000

METRES

NOTE: ALL DRILLHOLES ARE VERTICAL

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FEB 15 1983

Feb. '83	Added: Drillholes J-8-101, J-1-2, 82-01, 82-02, 82-03 & 82-04
Oct '82	Added: D.D.H. 421/4-200-1
Sept '82	Deleted: Block 421/4 P15
July '82	Deleted: Smoky Falls permit area

SELCO INC. EXPLORATION

SMOKY FALLS – DOUGLAS/TAYLOR

PROGRESS MAP

63.4114
OM81-5-C-132

DRAWN BY	DATE	N.T.S.	PLAN
TRACED BY J.G.	DATE Feb. 1982		SF. 3373