3

42A01SE8903 2.2023 OTTO

Ø1Ø

DETAILED GEOLOGY OVER NORTH GRID GOLD SOURCE AREAS INDICATED BY BASAL TILL SAMPLING, OTTO TOWNSHIP, ONTARIO (42A/1)

On behalf of

LEE-CANICO-TG JOINT VENTURE

By

Lee Geo-Indicators Limited
Susan A. Scott, M.Sc.
Hulbert A. Lee, Ph.D., P. Eng.

December, 1975

94 Alexander Street
Box 68
Stittsville, Ontario
KOA 3GO
Tel. (613) 836-1419

INTRODUCTION

During the period October 16th to 27th inclusive, 1975, geological mapping was carried out on the Otto Township Property of the Lee-Canico-TG Joint Venture. The survey was done to a scale of 1 inch=100 feet by S.A. Scott of Lee Geo-Indicators Limited who act as manager for the Joint Venture.

The areas selected for detailed mapping were indicated by a basal till sampling programme (Lee and Scott, 1975) as likely source areas in bedrock for gold clasts occurring in the basal till. The purpose of the mapping was to reveal the geological history of the area and to discover the mode of occurrence of the gold that is known to be present in the till "down-ice".

During the mapping, 43 rock samples were taken and assayed for gold; the assay sample positions and values are indicated on the accompanying maps and are listed in Appendix B. Also, nine thin sections were made and examined (see Appendix A).

A baseline and cross-lines at 800-foot intervals had been cut and chained in the spring of 1975 on both the north and south sections of the Property, for the basal till sampling programme. In addition to this, for the purpose of detailed mapping, 9 miles of cross-lines were flagged and chained at 200-foot intervals by Mr. Bryan McKenzie.

PROPERTY, DESCRIPTION AND LOCATION

The Otto Township Property of the Lee-Canico-TG Joint Venture consists of the following claims: L428690 to L428713 inclusive, L422253, L422256 to L422262 inclusive, L422644, L422645. The Property lies about 12 miles southwest of Kirkland Lake, Ontario. Highway 11 passes close to the southwest corner of the Property, which is accessible from the highway, from Rosegrove Road 1 on the south, or from Rosegrove Road 2 which crosses it from northwest to southeast. Boat access is also possible by means of the Blanche River which is navigable northward from Round Lake.

TOPOGRAPHY

The topography on the Property is varied, consisting of high hills with large expanses of outcrop interspersed with drift-filled valleys.

A broad, drift-filled valley bounds the property on the north. The Blanche River and its flood plain, bounded by a scarp on the west side, are the expression, likely, of a major north-south fault.

Another separate, deep, abrupt valley strikes approximately north-south in the southern half of the Property.

The two baselines shown on the accompanying maps cross the highest areas and are on outcrop along much of their length.

PREVIOUS WORK

The Otto area has been mapped previously by H.L. Lovell (1968 and 1972) on scales of 1 inch=¼ mile and 1 inch=½ mile. A Ph.D. thesis by K.D. Lawton (1954) includes a detailed petrographic study of some samples from the Otto syenite stock. W.J. Wolfe (19) has published maps showing the distribution of acid-soluble copper, lead and molybdenum within the Otto stock.

GENERAL GEOLOGY

This Property lies entirely within the Otto stock, a roughly circular body of syenite about 7 miles in diameter. A Rb-Sr whole-rock analysis gives its age as 1730 m.y. (Purdy and York, 19).

The stock has been offset by a fault zone in line with the Blanche River fault to the south, which is of Paleozoic age (Lovell and Caine, 1970). It contains lamprophyre, mafic syenite, and syenite porphyry dykes.

The Otto syenite intrudes metasediments and felsic and mafic metavolcanics of Archean age. On the south the syenite is partly in contact with granite of the Round Lake batholith.

GEOLOGY, NORTH GRID

SYENITE

Lawton (1959) from his petrographic study recognized three main phases of syenite in the Otto stock. The central and youngest phase - a very coarse-grained, pegmatitic syenite - is surrounded in turn by quartz syenite, and by the oldest phase, a medium-grained syenite. Boundaries between the types are gradational, and the syenite in any given area is variable. Because most of the syenite from the north grid contains free quartz, it would probably fall into Lawton's intermediate phase - quartz syenite.

The rock is a pink, medium- to coarse-grained syenite. Petrologically it is 85 to 90 percent sub-hedral zoned feldspar grains, 5 to 10 percent interstitial quartz, 3 to 10 percent interstitial ferromagnesian minerals, up to 1 percent magnetite, and a little apatite.

Of the feldspar, 75 percent is plagioclase (of oligoclase-andesine composition) and the rest potash feldspar (microcline). Many grains are zoned, and microperthite is common. Felspar rims are often stained with hematite. The potash feldspar has eroded plagioclase where they are in contact. There is a little sericitization.

In sheared syenite, quartz grains are fractured and strained. The ferromagnesian minerals are pyroxene, altering to amphibole and chlorite, and a little biotite.

Inclusions of mafic material are common throughout the syenite, and range in size from 1 cm. to several metres. A large mafic area in the western part of the stock (outside the area of the Property) is thought to be a roof pendant.

Quartz veining is very common in the syenite. The form varies from single white quartz veins up to 1 metre in width, to 30-metre zones of laminar grey quartz veinlets up to 0.5 cm in width.

The syenite is almost always jointed, often in two, or (rarely) three directions. Intensity of jointing is variable, ranging from weak to very strong. Shearing is less common and more localized. Hematite stain and a blue-grey sodic amphibole smear is often seen on joint and shear planes.

DYKES

Four types of syenite-derived dykes are recognized from the mapping, and are shown on the accompanying map (north grid). In the field the dykes were differentiated on the basis of size and abundance of feldspar phenocrysts. They show distinct cross-cutting relationships with one another. All dykes display chilled margins against the syenite, and against each other. Although the period of dyke intrusion could have been relatively short, there was evidently some cooling between phases. The dykes range in width from about 10 cm. to 10 metres, and some are continuous over several hundred metres.

"Common" porphyry dykes

"Common" porphyry dykes represent the highest volume of all the dyke types, being more numerous, generally wider, and traceable over a longer distance than any other type. "Common" porphyry dykes are recognized by their abundant feldspar phenocrysts up to 0.4 cm. in diameter, representing 40 to 60 percent of the rock volume. The matrix, of equal proportions mafic and felsic minerals, weathers dark in contrast to the pale pink phenocrysts and pink syenite country rock. The chilled margin of a dyke, up to 2 cm. wide, weathers greener than the matrix, probably due to a higher chlorite content.

Seventy-five percent of the feldspar phenocrysts are plagioclase (oligoclase-andesine) and the remainder are potash feldspar. Both types of feldspar are moderately sericitized. Crystal zoning, intergrowth of the two feldspars, and microperthite are common.

Matrix minerals are potash feldspar, biotite, hornblende, chlorite, a and up to 3 percent magnetite. The texture of the matrix is fluidal; that is, flakes of chlorite and biotite are oriented to flow around the phenocrysts in an observable direction.

All dykes show cooling jointing, usually in two directions, roughly parallel to and at right angles to their contacts. These directions seldom match the syenite jointing, implying that the dykes are post-syenite jointing.

"Type 1" porphyry dykes

"Type 1" porphyry dykes are distinguished by abundant small feldspar phenocrysts up to 0.1 cm. in diameter. The phenocrysts are sub-hedral and pale pink to white in colour. They appear to be in a "lattice" arrangement, forming a network of pink crystals against a more mafic, fine-grained matrix. Feldspar phenocrysts comprise 40 percent of the rock; phenocrysts of pyroxene altered to biotite, and a few of magnetite make up a further 5 percent. The feldspar of the phenocrysts is mainly zoned microperthite, moderately sericitized.

The matrix is composed of 30 percent fine-grained, highly sericitized feldspar, 23 percent medium- to fine-grained biotite, chlorite and saussurite, and 2 percent or more fine sub-hedral magnetite. There is no fluidal texture evident, either in the hand specimen or in thin section.

"Type 2" porphyry dykes

"Type 2" dykes are characterized by sparse, euhedral, zoned feldspar phenocrysts up to 0.5 cm. in diameter which make up only 2 percent of the volume of the rock. The feldspar of the phenocrysts is mainly microcline, some microperthite. Fractures along the cleavage are often filled with chlorite. A little sericite is present.

The matrix is fine-grained, and presents a more mafic appearance with 40 percent dark needles and laths of ferromagnesian minerals, 53 percent pinkish feldspar, and 5 percent fine-grained, euhedral magnetite. Magnetite appears to be concentrated around the phenocrysts. The main ferromagnesian mineral of the matrix is chlorite. Pyrite is present as medium-sized euhedral crystals in the matrix.

Strong fluidal texture shown by chlorite flakes in the matrix produces a weak foliation in the rock.

A grab sample of "Type 2" porphyry gave an assay value of 0.0005 oz./T. in gold.

"Type 3" syenite dykes

"Type 3" dykes are fine, even-grained and syenitic, though they have a higher percentage of mafic minerals than the country rock they cross.

Feldspar, making up 77 percent of the rock, is mainly potash feldspar, with some plagioclase, and is slightly sericitized. Occasionally the grains are clumped together, forming aggregate masses within the rock. Fine-grained biotite and chlorite make up 20 percent of the rock, and fine, subhedral, disseminated magnetite 3 percent. Fine-grained pyrite is an accessory mineral.

Alignment of biotite and chlorite in the "flow" direction produces weak foliation in the rock.

Miscellaneous dykes

Only two dykes other than those described above were mapped on the north grid.

At 18E, 40 feet north of baseline, and again on strike 300 feet to the southeast there is a 40-cm. wide grey-green lamprophyre-type dyke. It is medium-grained, with needles and laths of green pyroxene, potash feldspar, and a little finely disseminated pyrite.

At (26E, 6N) another lamprophyre-type dyke outcrops, different from the first described. It is 30 cm. wide, medium- to coarse-grained, containing 60 percent shiny black hornblende, green pyroxene and magnetite, and 40 percent dark pink potash feldspar. This dyke is strongly magnetic.

STRUCTURAL GEOLOGY

The north grid map area has been subjected to two generations of movement. Three east-west faults have divided the area into two blocks (see Fig. 3) which are successively down-dropped to the north. The northerly of these two blocks was later sheared in a north-south direction, producing north-trending outcrop ridges within the block. Both sets of movement may, in fact, be long-term cooling features of the syenite stock - a large-scale expression of the jointing which is so common throughout.

Early faulting

Early east-west faults in the map area are marked by three fault-line scarps; the terraces between the scarps are successively lower to the north. The most southerly scarp crosses the map area just north of the baseline, sub-parallel to it. (see Fig. 3 and map, north grid). Another scarp strikes 90° about 400 feet north of the first, and the third strikes 70° at about 1,500 feet north of baseline. This faulting was accompanied by the introduction of zones of narrow, grey laminar quartz veinlets.

Quartz veins, dykes

Early faulting was followed by a period of quartz veining and intense dyke activity. A profusion of dykes of all types occurs along the north margin of the north block, all roughly parallel to the margin (see map). Stronger quartz veining than the grey laminar type mentioned above is not common. One series of veining and stockwork has been interpolated to extend from 12E to 26E about 800 feet north of baseline. Its strike is sub-parallel to early faulting and to most dykes.

Late shearing

The north fault block has subjected to shearing, which affects the dykes as well as the syenite. This late shearing is in a north-south direction. It may be observed in outcrop, and is probably responsible for the abrupt valleys that strike across the dykes. Since the syenite of the country rock and of the dykes is relatively resistant to erosion, no other explanation except weakening by shearing seems valid to explain the abrupt valley topography.

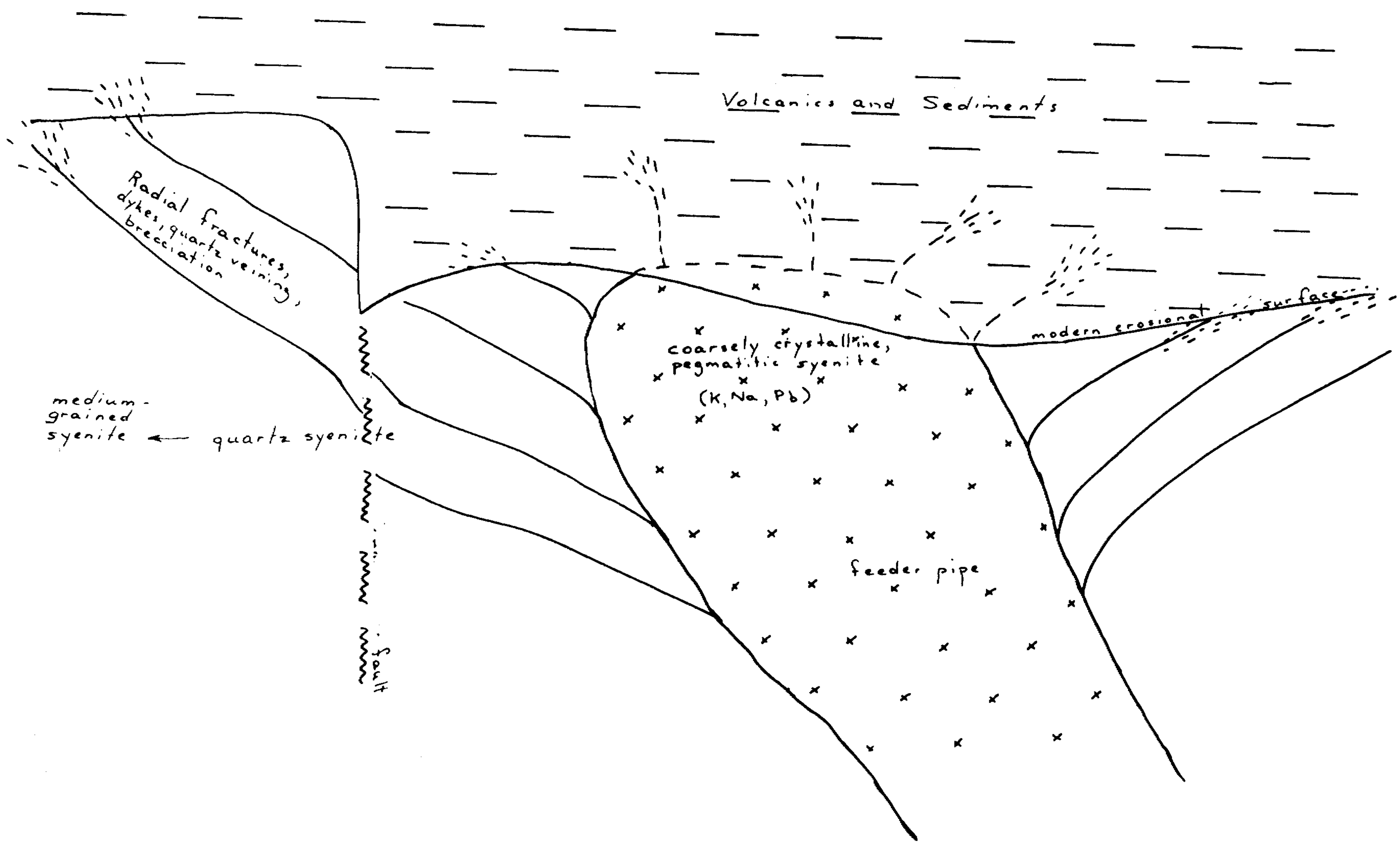


Figure 1 : Genetic model of the Otto stock – section looking north

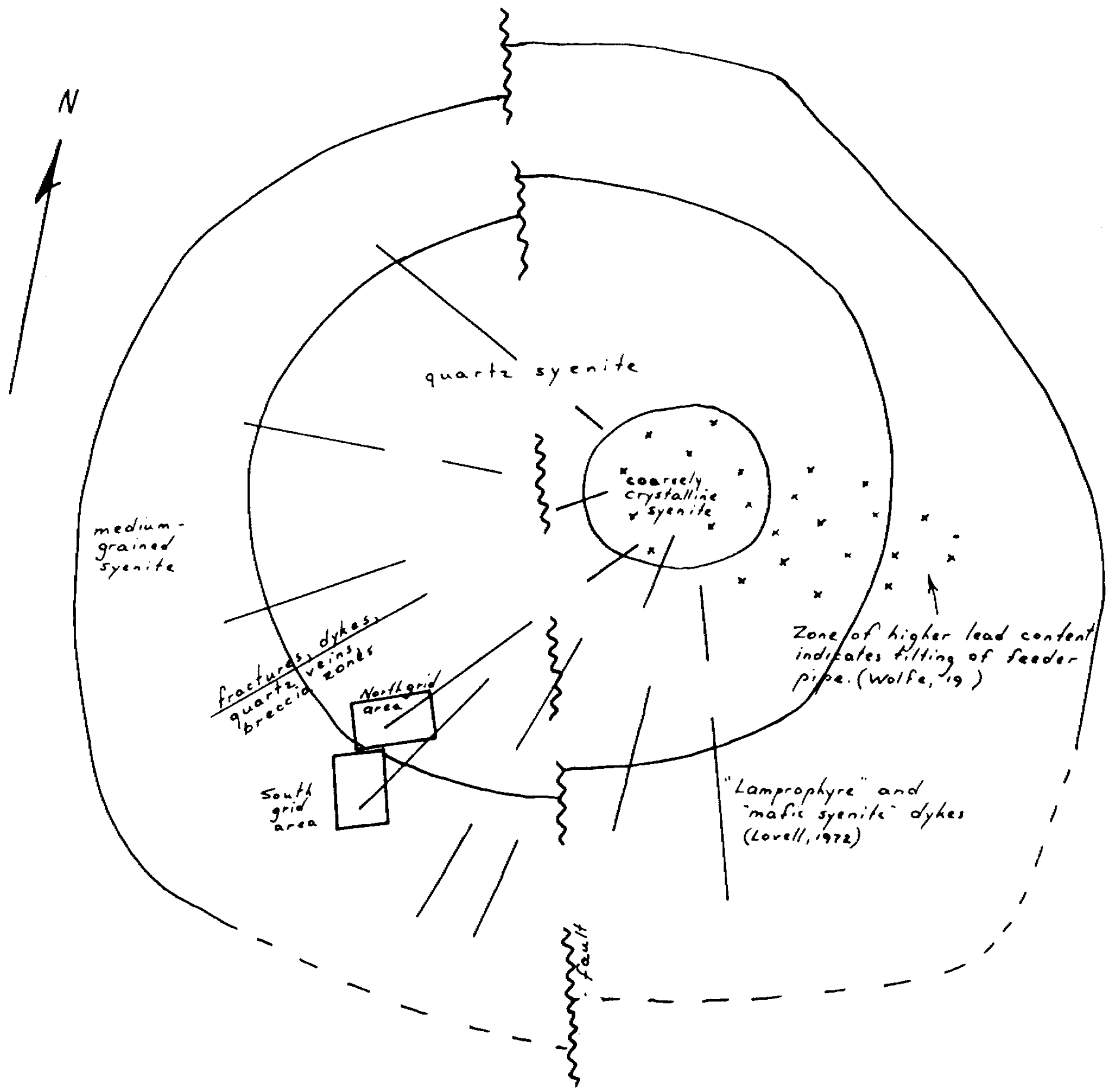


Figure 2: Schematic plan of structure of the Otto stock.

DISCUSSION

There has been, in the literature referred to earlier in this report, some question as to the relationship between the Otto syenite stock and the Round Lake batholith. Lawton (1954) thought that the Otto stock was genetically related to the Round Lake batholith. Lovell (1972) stated that in contrast with previous ideas, there are petrographic differences. In addition, the age of 1730 ± 50 m.y. for the stock as opposed to 2390 80 m.y. for the batholith (Purdy and York, 1968) supports the idea of separate origins. Another date of 2160 ± 80 m.y. for the stock (Pullaiah and Irving, 1975) is still statistically lower than the age of the batholith.

To aid in explaining the geological situation observed in the north grid map area, a model of the Otto stock (Fig. 1, 2) is proposed, which assumes that the coarsely porphyritic phase of Lawton's model occurs as a later renewal of activity. This renewal of activity was centred at the circular depression described by Lovell (1968 and 1972) in the eastern part of the stock. The renewal of activity was accompanied by fracturing, quartz veining and dyking in a radial pattern, the dykes, with a higher percentage of mafic minerals coming from a lower level on the feeder pipe than the syenite.

Two types of quartz veining occupy these radial fractures, represented in the north grid map area by the early east-west faults. The first type is grey laminar quartz, occurring as parallel veinlets up to 0.5 cm. wide in zones up to 30 metres wide. This type does not seem to be mineralized.

The second type of quartz veining observed is thought to have economic significance. It is a white quartz that forms single veins up to 30 cm. wide, and stockworks up to 3 metres as observed in outcrop. There are

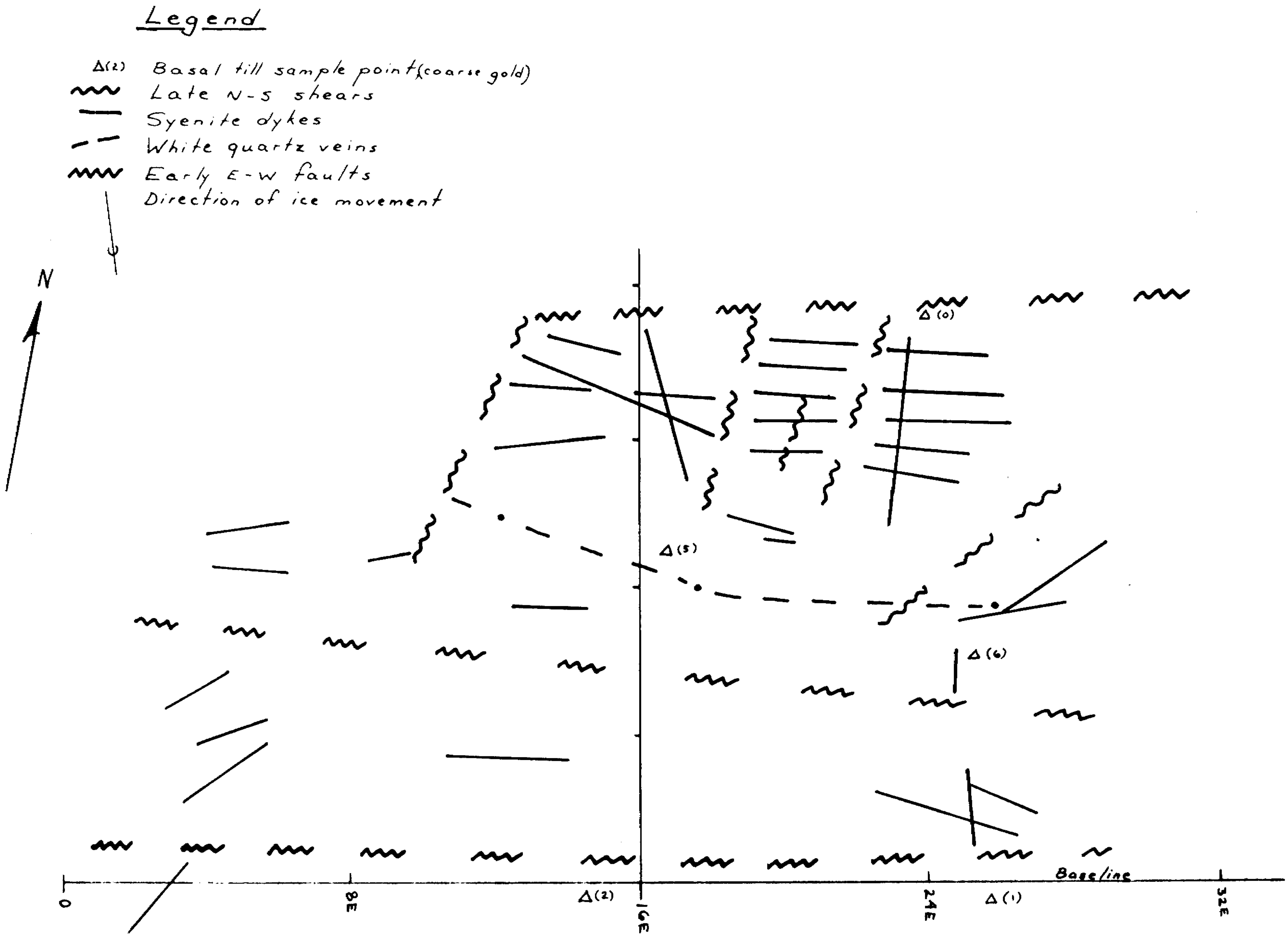


Figure 3: Schematic plan of structure for the north grid map-area, Otto Property. Scale (approx.): 1 inch = 400 feet

three such occurrences within the northerly fault block. They are in line, striking about 090°; at the east end a stockwork is 200 feet north ("up-ice") of till sample D779 containing chlorite clasts and six pieces of coarse gold (see map). The stockwork also lies at the intersection of two common porphyry dykes. The stockwork was channel-sampled, and no gold was detected; however, a recent statistical study (Koch et al, 1967) has shown that gold values even in a producing gold mine are commonly so erratic that normal sampling methods are inadequate, and bulk sampling is often the only way of obtaining values. When all of the gold in a major producing mine occurs in 3 percent of the samples (Koch et al, 1967), a nil sample from what might be an economic zone is not surprising.

The area of intense dyke activity lies along the north edge of the northerly fault block, and within 200 feet north ("up-ice") of till sample D744 (see map) containing 5 pieces of coarse gold and abundant sheared clasts. This sample point is also just south of one of the interpreted north-south shear zones. The four types of dykes were sampled for gold, and only Type 2 carried very low values (.0005 oz./T). However, for the reasons discussed above, grab sampling is probably not a valid method of sampling for gold.

The sequence of events that have taken place in the north grid map area is as follows:

Late N-S shearing (and mineralization?) - (Abundant large phenocrysts)

Syenite dykes: "common" porphyry
Type 1 (abundant small phenocrysts)
Type 3 (no phenocrysts)
Type 2 (sparse large phenocrysts)

White quartz veining (and mineralization ???)

Early E-W faults with laminar quartz veining.

It is expected that the intersection of two sets of fractures has produced a favourable environment for late gold mineralization following intense porphyry dyke activity in the northern zone. In the eastern zone, mineralization may have been earlier, associated with white quartz veining.

Hematite stain and a fibrous blue-grey sodic amphibole are very common throughout the Property. They are found plating joint planes and shear planes. Hematite also stains feldspar rims in both syenite and dykes. Hematite is a gold-associated alteration in the Kirkland Lake camp. However, on the Otto Property, it is disseminated rather than a local intense alteration.

During the basal till sampling programme, it was found that the samples that contained more gold clasts also contained a considerable quantity of magnetite (Lee and Scott, 1975). Since all of the dykes mapped contain two to five percent magnetite, the assumption may be made that the dykes are the source of magnetite in the samples, and that the bedrock gold source lies close to the dykes.

CONCLUSIONS AND RECOMMENDATIONS

The Otto stock has not previously been mapped in detail; regional mapping has given the impression of three gradational phases of syenite with a relatively simple history of emplacement. This impression is inaccurate. No previous mention has been made of shearing, intense dyke activity or quartz veining.

The Joint-Venture Property was staked as a bedrock source area for gold clasts in basal till (Lee, 1974). Till sampling on an 800-foot grid has confirmed the position of the source area (Lee and Scott, 1975). In the opinion of the writers, detailed geological mapping has revealed a favourable environment for gold mineralization, even though sampling has produced no high bedrock gold values.

1. Between 14E and 26E, and from 11N to 15N, a combination of intense syenite porphyry dyke activity and late shearing has produced an environment for gold that is consistent to the till clasts of sample D774. Four different types of syenite-derived dykes intrude the syenite and cut across each other, with an average strike of 080°. Shearing with a strike of 010° is observed in outcrop, with visible offsets of up to 10 metres; more intense shearing is interpreted to form abrupt valleys that run parallel to the observed shears.

   It is recommended that till sampling be carried out on a 200-foot grid over this location to outline the bedrock gold source. Additional sampling and bulk sampling of coutcrop might be successful in determining the mode of occurrence of gold, if it is exposed.

2. At (12E, 10N), at (18E, 8N) and at (26E, 7N), there are outcrops of white quartz veins and stockworks (see map). The individual strikes

indicate that they form a continuous zone, though separated by areas of no outcrop. The strike is sub-parallel to early east-west faulting. Samples from the east and west outcrops give no gold values. The east outcrop, however, is 150 feet north ("up-ice") of basal till sample D779 with chlorite clasts and six pieces of coarse gold. The quartz stockwork here occurs at the intersection of two "common" porphyry dykes; the quartz does not penetrate the dykes but stops at the margins.

It is recommended that the east outcrop stockwork be stripped and bulk-sampled for gold as far as is possible. Till sampling should be carried out on a 200-foot grid "down-ice" from the entire quartz vein zone to test for gold mineralization along strike.

3. It is suggested that unless mineralization is obvious, assays should be made on bulk samples, to take into account the common problem of erratic gold values.

LEE GEO-INDICATORS LIMITED

Susan A. Scott

Susan A. Scott, M.Sc.

Hulbert A. Lee

Hulbert A. Lee, Ph.D., P. Eng.

December, 1975

REFERENCES

Cochrane, W.M. and Savage, W.S. (1950): Report written by resident geologist at Kirkland Lake on showings held by Cochrane in Otto Township, O.D.M.N.A. Files, Kirkland Lake, Ontario.

Koch, Jr. G.S. and Link, R.F. (1967): Gold distribution in diamond-drill core from the Homestake Mine, Lead, S. Dakota, U.S. Dept. of the Interior, Bureau of Mines, Rept. of Investigations 6897, 27 p.

Lawton, K.D. (1954): The Round Lake batholith and its satellitic intrusions in the Kirkland Lake area; unpublished Ph.D. Thesis, University of Toronto, Toronto, Canada.

Lee, H.A. (1963): Glacial fans in till from the Kirkland Lake fault: A method of gold exploration; Geol. Surv. Canada Paper 63-75, 36 p.

Lee, H.A. and Scott, S.A. (1975): A basal till search for gold over the north grid (south grid), Otto Township, Ontario (42A/1); on behalf of Lee-Canico-TG Joint Venture, Company Reports.

Lovell, H.L. et al (1969): Map, Otto Township and northern part of Marquis Township; Ontario Dept. Mines, Preliminary Geological Map No. 501.

Lovell, H.L. and Caine, T.W. (1970): Lake Timiskaming Rift Valley; Ontario Dept. Mines Miscellaneous Paper 39, 16 p.

Lovell, H.L. (1972): Geology of the Eby-Otto area, District of Timiskaming; Ontario Dept. Mines Geological Report 99, 34 p.

Pullaiah, G. and Irving, E. (1975): Palaeomagnetism of the contact aureole and late dykes of the Otto stock, Ontario, and its application to early Palaeozoic apparent Polar Wandering; Can. J. Earth Sci., v.12, no. 9, pp. 1609-1618.

Purdy, J.W. and York, D. (1968): Rb-Sr mineral ages of rocks from the Superior Province near Kirkland Lake, Northeastern Ontario, Canada; Can. J. Earth Sci., vol. 5, pp. 699-705.

Wolfe, W.J. and Wright, G.E. (1971): Geochemical distribution of acid soluble copper (lead, molybdenum) in felsic plutonic rocks, Otto Township and parts of Eby, Marquis and Boston Townships, District of Timiskaming; Ontario Dept. Mines and Northern Affairs Preliminary Map, p. 717 (p. 718, p. 719).

APPENDIX "A"

Otto Township

Thin Sections - North Grid

No.: 1662
Location: 13 + 40N, 17 + 00E
Description: Porphyry dyke type 1 - abundant feldspar phenocrysts to 0.1 cm. comprise 40% of rock. Larger phenocrysts zoned, white centres, pink border; smaller phenocrysts form "lattice-work" of pink feldspar. Ferromagnesian minerals and magnetite form some phenocrysts (5%) up to 0.1 cm. Matrix interstitial to pink feldspar lattice - 30% fine-grained feldspar, 25% fine-medium grained amphibole needles. Slightly vesicular. Texture appears random, homogeneous. Strongly magnetic. Au $<$ .0005 oz./T

Microscopic: Feldspar phenocrysts subhedral, mainly zoned microperthite, somewhat sericitized. Sparse pyroxene phenocrysts completely altered to biotite, some chlorite appear to be a concentration site for fine subhedral magnetite (exsolved?). Matrix composed of medium-grained biotite and chlorite, fine-grained subhedral magnetite and highly sericitized feldspar. Any pyroxene or hornblende in matrix is completely altered to biotite and saussurite. Fluidal texture is not evident.

No.: 1663
Location: 13 + 40N, 17 + 00E
Description: Porphyry dyke Type 2. Sparse euhedral zoned feldspar phenocrysts up to 0.5 cm. (2%). Matrix - black needles and laths of amphibole (40%), fine-grained pinkish feldspar (53%), fine-grained magnetite (5%). Very weakly foliated, strongly magnetic. Au .0005 oz./T

Microscopic: Phenocrysts are mostly microcline, some microperthite and zoned; some sericitization; phenocrysts are commonly fractured along cleavage, then filled with chlorite. Fluidal texture is strong, with chlorite flakes oriented around phenocrysts. Rare medium-sized grains of biotite-chlorite after hornblende. Magnetite is fine-grained, euhedral, tends to be concentrated around feldspar phenocrysts and amphibole pseudomorphs. Accessory pyrite, medium euhedral grains. Matrix mainly fine-grained chlorite - feldspar-magnetite.

No.: 1664
Location: 13 + 40N, 17 + 00E
Description: Dyke Type 3. Fine-grained syenite derivative. Dark pink feldspar 77%, fine needles and aggregates of amphibole and biotite 20%, magnetite 3%. Trace fine-grained pyrite. Strongly magnetic. Weakly foliated. Weathers to lighter pink. Au $<$ .0005 oz./T

Microscopic: Most feldspar is potash feldspar, some plagioclase, sericitized, very fine-grained. Rare aggregates or clumping of grains observed. Biotite and chlorite fine-grained, 20% of rock, remaining 77% feldspar. Foliation is evident, caused by alignment of biotite and chlorite flakes. Magnetite is fine, subhedral, disseminated. Pyrite crystals surrounded by limonite.

No.: 1665
Location: 13 + 40N, 17 + 00E
Description: Sheared pink syenite, medium-grained. Zoned pink-white feldspar, 84%, rims stained by hematite. Biotite needles and amphibole, 10%.. Quartz 5%, magnetite 1%. Weakly magnetic. Au < .0005 oz./T

Microscopic: Feldspar mostly plagioclase (andesine), some microcline, often zoned, with perthitic intergrowth. Plagioclase margins attacked by microcline, only slightly sericitized. Feldspar crystals subhedral, dominant, quartz grains are large, fractured, anhedral and strained, but subordinate to feldspars. Biotite, chlorite, a little pyroxene are interstitial. Accessories are magnetite and apatite.

No.: WN-6B-74
Location: W side of Hwy 112, S of Dane side road.
Description: Collected by R.K. Wanless. Lamprophyre dyke about 1 m. wide. Massive, fine-medium-grained blackrock. Very shiny with biotite, slightly magnetic. Homogeneous, even-grained biotite-plagioclase-hornblende rock. "Minette"

Microscopic: Orthoclase 40%; chlorite 40%; biotite 20%; accessories magnetite, pyrite. Clumped aggregates of chlorite and biotite represent pseudomorphs after hornblende phenocrysts. Much original biotite probably altered to chlorite. Rock appears much fresher in hand specimen than in section. Dominant minerals are biotite and chlorite pseudomorphs; orthoclase is interstitial. A slightly layered look in section is produced in part by alighment of biotite flakes, more by slight variation in mineral concentration in the layers.

APPENDIX "B"

FIRE ASSAY RESULTS FOR GOLD

NORTH GRID, OTTO TOWNSHIP

GRID LOCATION		ASSAY (Au, Ag) 02/T	SAMPLE NO.
EAST	NORTH		
15 + 00	BL	nil, nil (f)	1618
5 + 00	BL	nil, nil	1619
3 + 50	BL	nil, tr. (f)	1920
3 + 50	BL	nil, .02	1621
18 + 75	BL	nil, nil (f)	1626
15 + 00	BL	nil, nil (f)	1628
15 + 00	BL	Cu 0.01, Ni 0.02 (f)	1629
24 + 00	4 + 90	nil, nil (f)	1630
12 + 40	9 + 80	< 0.005	1660
16 + 60	14 + 00	0.0010 (f)	1661
17 + 00	13 + 40	< 0.0005	1662
17 + 00	13 + 40	0.0005	1663
17 + 00	13 + 40	< 0.0005	1664
17 + 00	13 + 40	< 0.0005	1665
18 + 50	0 + 30	< 0.0005	1666
25 + 20	4 + 00	< 0.0005 (f)	1667
22 + 10	15 + 20	< 0.0005	1668
25 + 80	6 + 70	< 0.0005	1669
18 + 70	11 + 00	< 0.0005	1678
20 + 00	13 + 50	< 0.0005	1679
24 + 10	12 + 00	0.0005	1680
24 + 00	9 + 00	< 0.0005	1681

EAST	SOUTH		
24 + 75	5 + 75	nil, nil	1631

N.B: Fire assay only - non detected is reported as nil
- three places after the decimal; the third place is estimated

Fire assay + AA on bead - four places after the decimal (f) denotes sample of boulder float, not bedrock

CERTIFICATE

I, SUSAN A. SCOTT, of the City of Ottawa, Province of Ontario, do hereby certify that:

1. I am a geologist, residing at 15 Carola Street, Ottawa Ontario, K2G OX9.

2. I am a graduate of the University of Toronto (B.Sc. Geol. 1965) and of McGill University (M.Sc. Geol. 1969).

3. I am an associate member of the Geological Association of Canada.

4. I have practiced my profession for a total of three years, excluding academic studies, with the following organizations:

   University of Toronto, Division of Geophysics

   Geological Survey of Canada

   Geophysical Engineering and Surveys Limited

   McGill University, Department of Geology

   Lee Geo-Indicators Limited

5. The statements made in this report are based on geological data obtained by the authors in the field.

Susan A. Scott

Susan A. Scott, B.Sc., M.Sc.

Ottawa, Ontario
December 10, 1975

~~APPENDIX "B"~~

CERTIFICATE

I, HULBERT A. LEE, of the regional municipality of Ottawa-Carleton, Province of Ontario, do hereby certify that:

1. I am a geologist, residing at 94 Alexander Street, Stittsville, Ontario, KOA 3G0.
2. I am a graduate of Queen's University, with a B.Sc. degree in geology and mineralogy (1949) and a graduate of the University of Chicago with a Ph.D. in geology (1953).
3. I am a member of the Professional Engineers of Ontario, the Canadian Institute of Mining and Metallurgy, the Society of Exploration Geochemists, and a fellow of the Geological Society of America. I have been practicing my profession continuously since graduation with a B.Sc.
4. The statements made in this report are based on geological and petrological data obtained by Susan A. Scott unless otherwise noted by reference.

Hulbert A Lee

Hulbert A. Lee, P.Eng.

Stittsville, Ontario

December 12, 1975

RECEIVED
JAN 1 9 1976
PROJECTS UNIT

DETAILED GEOLOGY OVER SOUTH GRID GOLD SOURCE AREAS INDICATED BY BASAL TILL SAMPLING, OTTO TOWNSHIP, ONTARIO (42A/1)

On behalf of

LEE-CANICO-TG JOINT VENUTRE

Lee Geo-Indicators Limited
Susan A. Scott, M.Sc.
Hulbert A. Lee, Ph.D., P. Eng.

December, 1975

94 Alexandre Street
Box 68
Stittsville, Ontario
KOA 3GO
Tel. (613) 836-1419

INTRODUCTION

During the period October 16th to 27th inclusive, 1975, geological mapping was carried out on the Otto Township Property of the Lee-Canico-TG Joint Venture. The survey was done to a scale of 1 inch=100 feet by S.A. Scott of Lee Geo-Indicators Limited who act as manager for the Joint Venture.

The areas selected for detailed mapping were indicated by a basal till sampling programme (Lee and Scott, 1975) as likely source areas in bedrock for gold clasts occurring in the basal till. The purpose of the mapping was to reveal the geological history of the area and to discover the mode of occurrence of the gold that is known to be present in the till "down-ice".

During the mapping, 43 rock samples were taken and assayed for gold; the assay sample positions and values are indicated on the accompanying maps and are listed in Appendix B. Also, nine thin sections were made and examined (see Appendix A).

A baseline and cross-lines at 800-foot intervals had been cut and chained in the spring of 1975 on both the north and south sections of the Property, for the basal till sampling programme. In addition to this, for the purpose of detailed mapping, 9 miles of cross-lines were flagged and chained at 200-foot intervals by Mr. Bryan McKenzie.

PROPERTY, DESCRIPTION AND LOCATION

The Otto Township Property of the Lee-Canico-TG Joint Venture consists of the following claims: L428690 to L428713 inclusive, L422253, L422256 to L422262 inclusive, L422644, L422645. The Property lies about 12 miles southwest of Kirkland Lake, Ontario. Highway 11 passes close to the southwest corner of the Property, which is accessible from the highway, from Rosegrove Road 1 on the south, or from Rosegrove Road 2 which crosses it from northwest to southeast. Boat access is also possible by means of the Blanche River which is navigable northward from Round Lake.

TOPOGRAPHY

The topography on the Property is varied, consisting of high hills with large expanses of outcrop interspersed with drift-filled valleys.

A broad, drift-filled valley bounds the property on the north. The Blanche River and its flood plain, bounded by a scarp on the west side, are the expression, likely, of a major north-south fault.

Another separate, deep, abrupt valley strikes approximately north-south in the southern half of the Property.

The two baselines shown on the accompanying maps cross the highest areas and are on outcrop along much of their length.

PREVIOUS WORK

The Otto area has been mapped previously by H.L. Lovell (1968 and 1972) on scales of 1 inch=¼ mile and 1 inch=½ mile. A Ph.D. thesis by K.D. Lawton (1954) includes a detailed petrographic study of some samples from the Otto syenite stock. W.J. Wolfe (19) has published maps showing the distribution of acid-soluble copper, lead and molybdenum within the Otto stock.

GENERAL GEOLOGY

This Property lies entirely within the Otto stock, a roughly circular body of syenite about 7 miles in diameter. A Rb-Sr whole-rock analysis gives its age as 1730 m.y. (Purdy and York, 19).

The stock has been offset by a fault zone in line with the Blanche River fault to the south, which is of Paleozoic age (Lovell and Caine, 1970). It contains lamprophyre, mafic syenite, and syenite porphyry dykes.

The Otto syenite intrudes metasediments and felsic and mafic metavolcanics of Archean age. On the south the syenite is partly in contact with granite of the Round Lake batholith.

GEOLOGY, SOUTH GRID

SYENITE

Lawton (1954) from his petrographic study recognized three phases of syenite in the Otto stock. The central and youngest phase, a very coarse-grained, pegmatitic syenite, is surrounded in turn by quartz syenite, and by the oldest phase, a medium-grained syenite. Boundaries between the types are gradational, and the syenite in any given area is variable. No free quartz was observed in syenite from the south grid; therefore this area would probably be included in Lawton's oldest phase, medium-grained syenite.

The syenite is fresh-looking, pink, and often has a thin weathered surface layer of whitish, sugary material. Feldspar makes up 95 percent of the rock, and is mainly subhedral, zoned plagioclase, with a little potash feldspar. The plagioclase commonly contains microperthitic intergrowth and some sericite. Mafic minerals are usually 5 percent or less, and consist of biotite and amphibole needles. Apatite and magnetite are accessories.

The syenite on the south grid often contains areas of gneissic banding, where mafic minerals, locally more abundant, are segregated into bands or swirls. Where it is regular, the gneissic banding is gently north-dipping (20° to 30°). Lawton called these either primary flow-type bands, or metamorphic features, depending on their form.

Inclusions of mafic material are fairly common, and range in size from 1 cm. to several metres. Lawton has described these in some detail, mentioning their "reaction rim of brown felted biotite". Two larger inclusions or xenoliths up to 15 metres across, and with more gradational margins than most smaller inclusions, occur along the baseline at 8E and

14E (see map, south Grid).

Jointing is common in the syenite. It varies from weak to intense, usually in two directions, with the more north-easterly of the two predominating zones containing narrow, grey, laminar quartz veins are frequently seen filling the joint pattern in one direction. The zones may be up to 30 metres wide, as at baseline, 7E.

Joint planes are usually stained with hematite, which does not penetrate far into the rock. Small interstitial hematite blebs and red-rimmed feldspars have been observed in well-jointed syenite. Joint planes are often plated with fibrous, blue-grey sodic amphibole.

Around locality 14E, 9N, there appears to be a syenite breccia zone. Mafic inclusions are more numerous than elsewhere, to the point where they appear to be angular fragments in a syenitic matrix. A few other areas with numerous mafic inclusions are shown on the accompanying map (South Grid).

DYKES

The south grid shows dyke activity concentrations in the areas shown on the accompanying map.

"Common" porphyry dykes

The majority of dykes are syenite porphyry which, for the purpose of distinguishing them from other types on the Property, were called "common" porphyry dykes.

These dykes have a general strike of N45°E, and range in width from a few centimetres to several metres. Some are continuous over several hundred metres. The long porphyry dyke at the south end of the area mapped is probably the same as one mentioned in an early assessment file report (Cochrane and Savage, 1950) one quarter mile to the southeast.

In the field, "common" porphyry dykes present an obvious contrast with the pink syenite country rock. Pale pink feldspar phenocrysts up to 0.5 cm. in size stand out against a more mafic, dark-weathering matrix. Phenocrysts make up 25 to 60 percent of the rock.

In thin section, it is found that the feldspars are plagioclase (of approximately andesine composition), potash feldspar and microperthite. Zoning of the phenocrysts is common, and some sericite is present. Some are fractured and contain hematite in the fractures. A small proportion of the ferromagnesian minerals is present as phenocrysts, usually as biotite and amphibole pseudomorphs after pyroxene.

The matrix is fine-grained, containing about equal proportions of felsic (feldspar, minor apatite) and mafic minerals (biotite, bronzite pyroxene, amphibole, chlorite, and about 2 percent magnetite). Fluidal texture may sometimes be observed in the matrix, inferring that phenocrysts began forming in the magma prior to final emplacement of the dykes.

The dykes exhibit blocky cooling joints and chilled margins.

Porphyry "X"

At grid site 16E, 13N, there is a porphyry dyke which is different from all other dykes mapped. It has been called porphyry "X" to distinguish it. It has a higher mafic content than other dykes, contains more magnetite, and the matrix is coarser-grained.

Porphyry "X" is composed of fresh, white feldspar phenocrysts up to 0.5 cm. in diameter (40%) in a medium-grained matrix of feldspar (30%), biotite (20%), pyroxene (5%) and magnetite (5%). The phenocrysts are plagioclase (of approximately andesine composition) and microperthite; many are zoned, and show some sericitization. There are a few ferro-magnesian phenocrysts, some of biotite and amphibole, and some of unaltered pyroxenes. The clinopyroxene is thought to be aegerine-augite; bronzite (orthopyroxene) was observed in the hand specimen.

A grab sample of this dyke assayed for gold gave 0.0010 oz./T as determined by fire assay bead then atomic absorption.

Lamprophyre dykes

Two very small exposures of lamprophyre were mapped on the south grid (12 + 50E, 11 + 50N and 12E, 13N). They represent very narrow medium-grained dykes with the same general strike as the "common" porphyry dykes (N45°E).

Composition of the dyke is that of a hornblende-pyroxene lamprophyre. Hornblende and pyroxene (diopside?) form phenocrysts in a matrix of the same minerals with biotite, feldspar, and a little magnetite.

STRUCTURAL GEOLOGY

Early faulting

The major structural feature of the south grid is a fault-line scarp that strikes N15°E and crosses the baseline at 22E (see map and Fig. 3). The steep-sided cleft, about 25 metres deep by 70 metres wide at the baseline is eroded back considerably farther in the area south of the baseline.

It is thought that rock failure accompanying this early faulting has provided conduits that were subsequently occupied by syenite porphyry dykes.

At the northwest corner of the map-area, a low fault-line scarp strikes N15°E and is accompanied by shearing. This is probably the expression of another early fault zone.

Late shearing

Shear zones that affect porphyry dykes as well as syenite occur at several locations in the south grid map-area. One is at grid location 20-22E, 55; other zones of shearing cross the map-area at about 4N, 16N and 18N (see map).

All of these strike between N60E and due east, and are accompanied by hematite staining along the shear planes.

The shear zone at 18N is at the north edge of the map-area and outcrop area, and it differs from other shear zones in that the sheared material is a chlorite-carbonate schist. This material is unique in the area, and may be significant, though a grab sample yielded no gold values.

Quartz veining

Quartz veining is of two distinct types.

The more common occurence is as laminar grey quartz veinlets up to 1 cm. wide within zones occasionally up to 30 metres wide. The strike is variable from easterly to north-easterly. The laminar quartz veins do not appear to be mineralized. They are thought to have been introduced earlier in the time sequence than the dykes, since quartz veins have not been observed to enter dykes anywhere on the Property.

The less common, and possibly more significant occurrence of quartz is as stronger veins in syenite. At grid location 16-18E, 11N, a 2-metre zone striking about N75°E is composed of white quartz veins up to 10 cm. wide. Another narrower zone is found 50 feet north.

At location 23E, 11S, a white quartz vein 1 metre wide and striking N45°E is mentioned in an early assessment file report (Cochrane and Savage, 1950). It was said to carry galena and hematite; a gold assay value of 0.04 oz/T is reported. Grab samples by the writer of this vein and a 10-cm. vein 50 feet to the east yielded no gold values.

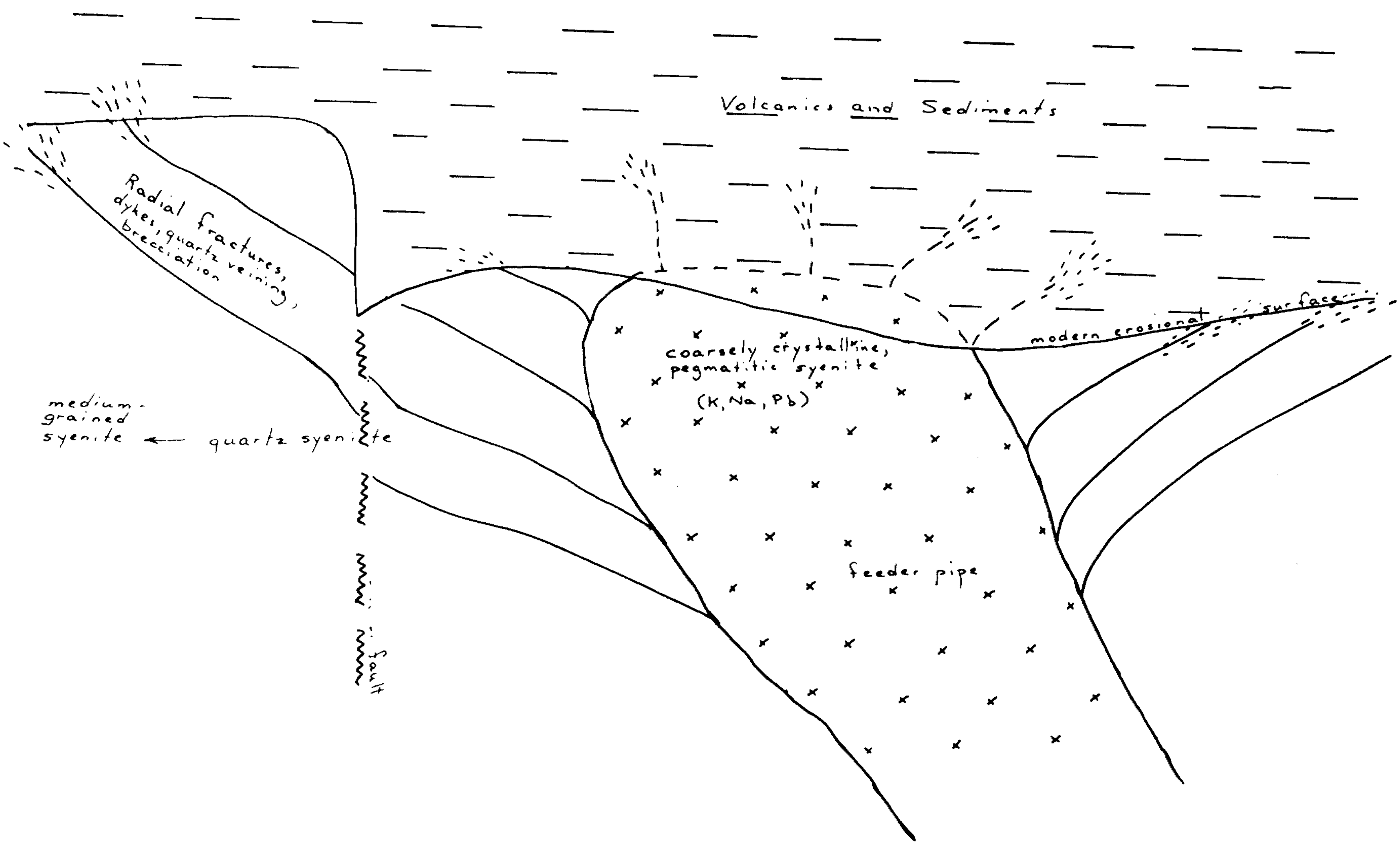


Figure 1 : Genetic model of the Otto stock - section looking north

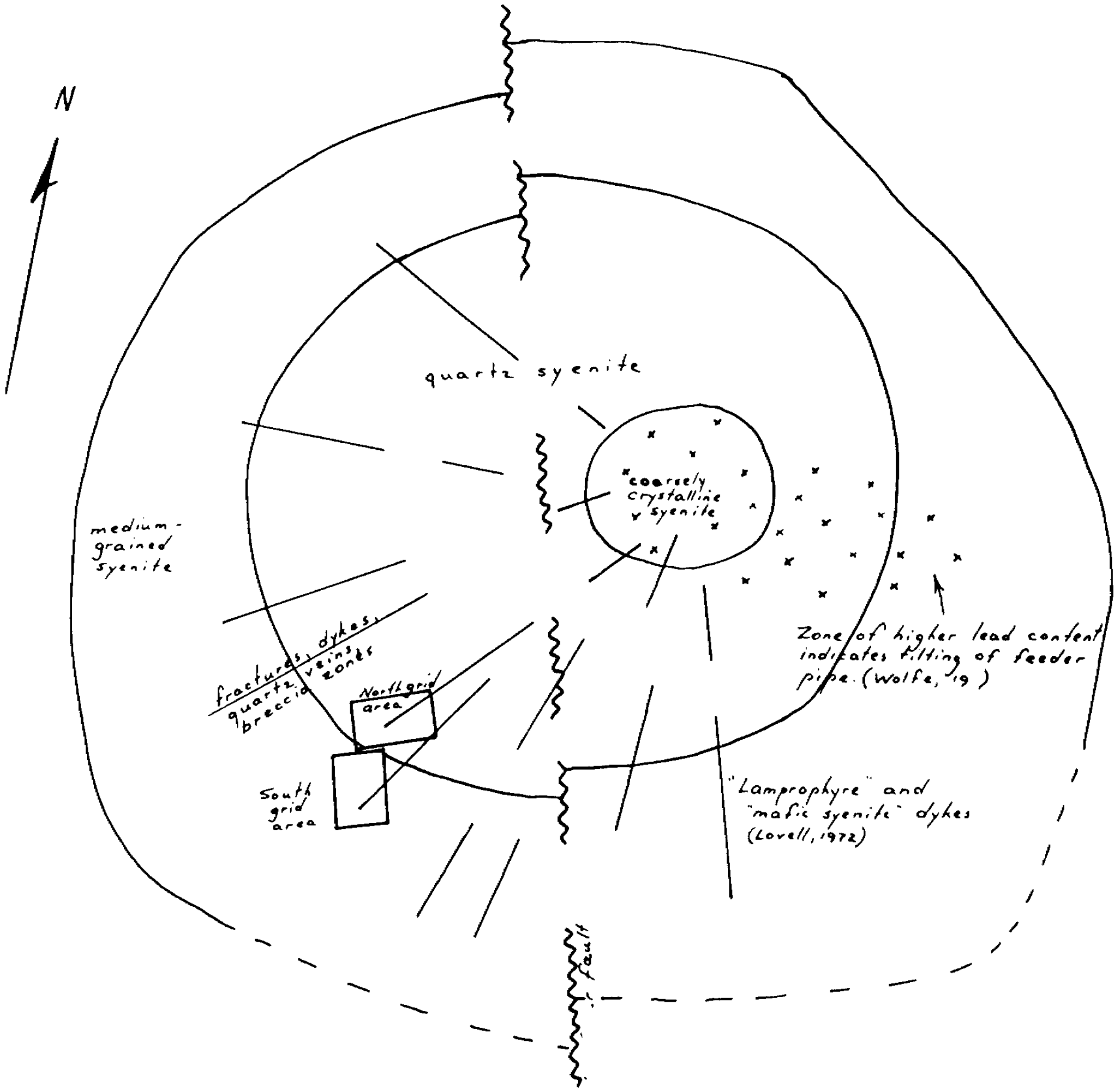


Figure 2: Schematic plan of structure of the Otto stock.

DISCUSSION

To illustrate geologic history as interpreted for this area, a model is suggested (Fig. 1). A schematic plan of the structural history of the south grid map-area has also been drawn (Fig. 3).

After emplacement of most of the syenite of Lawton (1954), a hiatus occurred. Following this, renewed activity centred at the circular depression noted by Lovell (1972). The renewed activity produced radial cracking of the previously emplaced syenite (Fig. 2). These radial cracks acted as conduits for silica-bearing material (producing quartz veining, and for porphyritic syenite dyke material, which originated at greater depth than the normal felsic syenite.

Late shearing has a markedly different strike from early faulting (Fig. 3). Mineralization, if present in the area, is possibly an even later event than the shearing.

Basal till sample points are shown in Fig. 3, as well as on the geological map. It will be noted that the till samples with the highest number of coarse gold clasts (sample D759 with 10, sample D756 with 7) lie immediately "down-ice" from the projected intersection of a dyke and strong quartz veining. In the northern case, the dyke is the unique porphyry "X" carrying low gold values. In the southern case, the quartz vein is the one mentioned previously (Cochrane and Savage, 1950) with reported low gold values.

In neither case does the intersection of dyke with quartz vein outcrop; however, in both cases overburden is shallow and stripping would be possible.

It is suggested, then, that geological conditions immediately "up-ice" from gold-bearing basal till are favourable for gold deposition.

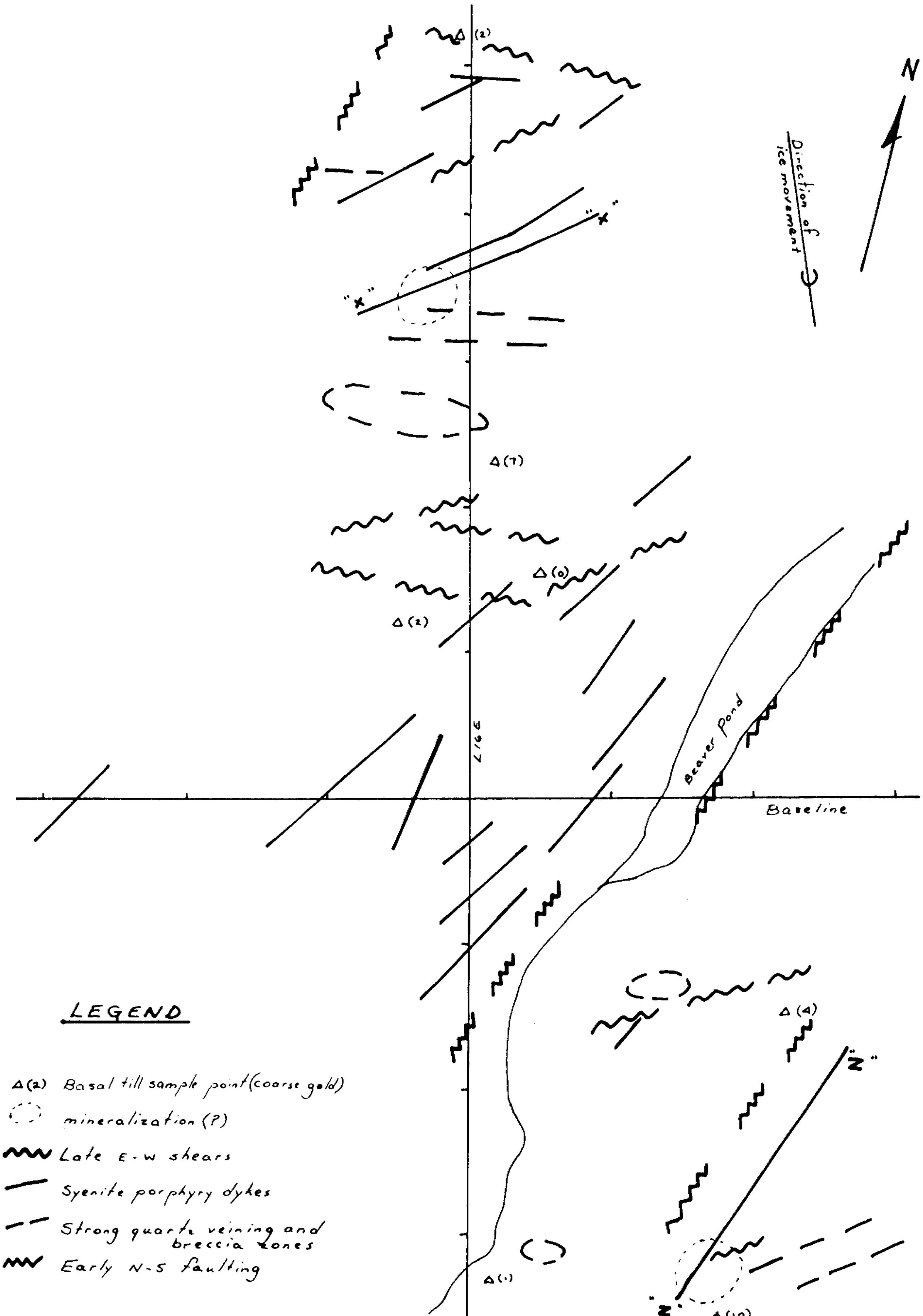


Figure 3: Schematic plan of structure for the south grid map-area, Otto Property. Scale (approx.): 1 inch = 400 feet.

The existence of gold in the basal till is known; the location of gold in the bedrock "up-ice" from the gold-bearing till samples has not been demonstrated by assay values. However, recent statistical studies on sampling methods for gold (Koch and Link, 1967) have shown that gold is extremely difficult to sample accurately, due to the erratic nature of its occurrence. It appears that bulk sampling is the only practical method of obtaining representative values.

CONCLUSIONS AND RECOMMENDATIONS

The Otto stock has, in the past, been regarded as a monotonous expanse of syenite with three smoothly gradational phases. This mapping project has demonstrated that considerable structural and igneous activity has taken place since the intrusion of the main syenite body.

It is concluded that this later structural and igneous activity has created an environment that would be favourable to mineralization. From the basal till sampling programme (Lee and Scott, 1975), it is known that gold, in values comparable to those in the Kirkland Lake camp (Lee, 1963), is present in the bedrock of the map-area. The problem is, therefore, to locate the bedrock source.

1. At grid location 23E, 11S, the projected intersection of a 1-metre white quartz vein with a very long, continuous porphyry dyke "Z", combined with late shearing creates a favourable environment for gold deposition. This location lies 150 feet "up-ice" from basal till sample D759 containing 10 pieces of coarse gold. The quartz vein is reported to carry 0.04 oz./T in gold (Cochrane and Savage, 1950).

   Stripping of shallow overburden is recommended to expose the actual intersection. Bulk sampling should be carried out to test adequately for gold values.

2. At grid location 14E, 12N, a zone of strong quartz veining intersects a 2-metre wide porphyry dyke. This porphyry "X" is unique for the area, being coarser-grained than other "common" porphyry dykes, being mineralized with pyrite, and carrying a low gold value (grab sample) of 0.001 oz/T . Stripping would be possible to reveal the intersection, since overburden is thin. Bulk sampling methods should be used to test for gold.

3. Basal till sampling on a 200-foot grid is recommended to outline more accurately areas of gold-bearing till. Such a programme could also be used to follow up other anomalously high gold values in till, discovered during the previous 800-foot grid programme (Lee and Scott, 1975).

4. Expanded geological mapping or a scale of 1 inch=100 feet should be used to follow up anomalous areas outlined by 3 above. The aim would be to provide either stripping targets or drill targets, depending on depth of overburden.

5. A chlorite-carbonate shear zone on the north margin of the map-area should be tested for gold by basal till sampling immediately "down-ice" The extent of the shear along strike should be explored by geological mapping.

LEE GEO-INDICATORS LIMITED

Susan Scott

Susan Scott, M.Sc.

Hulbert A. Lee

Hulbert A. Lee, Ph.D., P. Eng.

December, 1975

REFERENCES

Cochrane, W.M. and Savage, W.S. (1950): Report written by resident geologist at Kirkland Lake on showings held by Cochrane in Otto Township, O.D.M.N.A. Files, Kirkland Lake, Ontario.

Koch, Jr. G.S. and Link, R.F. (1967): Gold distribution in diamond-drill core from the Homestake Mine, Lead, S. Dakota, U.S. Dept. of the Interior, Bureau of Mines, Rept. of Investigations 6897, 27 p.

Lawton, K.D. (1954): The Round Lake batholith and its satellitic intrusions in the Kirkland Lake area; unpublished Ph.D. Thesis, University of Toronto, Toronto, Canada.

Lee, H.A. (1963): Glacial fans in till from the Kirkland Lake fault: A method of gold exploration; Geol. Surv. Canada Paper 63-75, 36 p.

Lee, H.A. and Scott, S.A. (1975): A basal till search for gold over the north grid (south grid), Otto Township, Ontario (42A/1); on behalf of Lee-Canico-TG Joint Venture, Company Reports.

Lovell, H.L. et al (1969): Map, Otto Township and northern part of Marquis Township; Ontario Dept. Mines, Preliminary Geological Map No. 501.

Lovell, H.L. and Caine, T.W. (1970): Lake Timiskaming Rift Valley; Ontario Dept. Mines Miscellaneous Paper 39, 16 p.

Lovell, H.L. (1972): Geology of the Eby-Otto area, District of Timiskaming; Ontario Dept. Mines Geological Report 99, 34 p.

Pullaiah, G. and Irving, E. (1975): Palaeomagnetism of the contact aureole and late dykes of the Otto stock, Ontario, and its application to early Palaeozoic apparent Polar Wandering; Can. J. Earth Sci., v.12, no. 9, pp. 1609-1618.

Purdy, J.W. and York, D. (1968): Rb-Sr mineral ages of rocks from the Superior Province near Kirkland Lake, Northeastern Ontario, Canada; Can. J. Earth Sci., vol. 5, pp. 699-705.

Wolfe, W.J. and Wright, G.E. (1971): Geochemical distribution of acid soluble copper (lead, molybdenum) in felsic plutonic rocks, Otto Township and parts of Eby, Marquis and Boston Townships, District of Timiskaming; Ontario Dept. Mines and Northern Affairs Preliminary Map, p. 717 (p. 718, p. 719).

APPENDIX "A"

Otto Township

Thin Sections - South Grid

No.: 1646
Location: 12 + 80N; 15 + 20E
Description: Porphyry dyke material, different from all other porphyry dykes mapped. Massive, blocky fracture. Abundant fresh euhedral (calcic?) feldspar phenocrysts 0.5 cm. in diameter (40%). Matrix more mafic, containing hematite, magnetite, pyroxene, feldspar, trace pyrite. Strongly magnetic. Grab sample gives low gold (Au 0.0010 oz./T).

Microscopic: Total feldspar 70%; biotite 20%; pyroxene 5%; magnetite 5%. Phenocrysts of plagioclase and microperthite, commonly composite, zoned. Common plagioclase twinning observed, also unusual cross-type twinning. Most feldspar phenocrysts show some sericitization. Plagioclase is of andesine composition, potash feldspar most likely microcline. A few large grains of biotite, amphibole and pyroxene, the former two in part alteration products of the latter. High colour of pyroxene indicates aegerine-augite and corresponding sodic amphibole. Magnetite occurs as very small subhedral grains in matrix. A few larger subhedral pyrite grains. Accessories apatite, hematite. Matrix composed of fine-grained potash feldspar, biotite, magnetite, apatite. Flow texture that is common in many dykes is not apparent.

No.: 1647
Location: 18+ 00N; 16 + 20E
Description: Chlorite-carbonate sheared material. Dark green with blebs and stringers of red-pink carbonate throughout. A little hematite stain, slightly magnetic. Au .0005 oz./T

Microscopic: Total feldspar 30%; chlorite-carbonate groundmass 69%; magnetite 1%. Remnant large feldspar phenocrysts are plagioclase and microcline, highly fractured, sericitized and carbonatized, appear as diffuse masses. Fine-grained groundmass is chlorite-carbonate, carrying anhedral magnetite, shows schistosity veinlets, a little hematite stain in fractures.

No.: 1649
Location: 15 + 80N, 14 + 30E
Description: "Common" porphyry dyke material. Pink-white feldspar phenocrysts 0.5 cm. in diameter - 25%. Matrix fine-grained with "bronzite" pyroxene, ferromagnesian minerals 40%, feldspar 35%. Very weakly magnetic. Au .0005 oz./T

Microscopic: Total feldspar 60%, ferromagnesian minerals 40%. Feldspar phenocrysts are intermediate plagioclase, potash feldspar, and microperthite, generally somewhat sericitized, often fractured, with hematite in fractures. A few phenocrysts are biotite and amphibole after pyroxene. Fine-grained groundmass contains biotite, feldspar, a little magnetite, chlorite and apatite. Biotite in matrix displays "fluidal" texture around phenocrysts.

No.: 1654
Location: 5 + 10S; 15 + 60E
Description: Syenite porphyry dyke. Feldspar phenocrysts white, rimmed with pink, average 0.2 cm. diameter 60%. A few ferro-magnesian phenocrysts - originally pyroxene up to 0.3 cm. diameter. Texture slightly layered - gneissic. Matric fine-grained, mafics 30%. Fairly magnetic. Au .0005 oz./T

Microscopic: Total feldspar 80%, biotite and amphibole 20%. Feldspar phenocrysts are plagioclase (andesine), orthoclase, and microperthite. A few phenocrysts of biotite and amphibole pseudomorphic after pyroxene. Matric is fine-grained feldspar with fine- and medium-grained biotite, a little magnetite. Fluidal texture is not pronounced.

APPENDIX "B"

FIRE ASSAY RESULTS FOR GOLD

SOUTH GRID, OTTO TOWNSHIP

Grid Location

East	North	Au assay (oz./T)	Sample Number
12 + 30	14 + 65	< 0.0005	1643
12 + 10	16 + 20	< 0.0005	1644
12 + 10	16 + 20	< 0.0005	1645
15 + 20	12 + 80	0.0010	1646
16 + 20	18 + 00	< 0.0005	1647
13 + 70	1 + 00	< 0.0005	1648
14 + 30	15 + 80	< 0.0005	1649
13 + 60	15 + 60	< 0.0005	1650
18 + 40	8 + 25	< 0.0005	1651
18 + 30	1 + 40	.0025	1652
17 + 90	3 + 90	< 0.0005	1653
14 + 10	9 + 60	< 0.0005	1670
15 + 00	12 + 50	< 0.0005	1671
16 + 10	11 + 60	< 0.0005	1672
16 + 80	11 + 70	< 0.0005	1673

East	South	Au assay (oz./T)	Sample Number
24 + 20	11 + 20	nil	1622
24 + 20	11 + 20	nil	1623
23 + 40	21 + 00	nil	1624
48 + 00	6 + 00	nil	1625
48 + 00	6 + 00	nil	1627
(D756)		< 0.0005	1639
(D756)		0.0005	1640
(D756)		0.0005	1641
(D759)		0.0005	1642
15 + 60	5 + 10	< 0.0005	1654
23 + 90	7 + 10	< 0.0005	1655
22 + 60	10 + 50S	< 0.0005	1656
23 + 20	11 + 40	< 0.0005	1657
21 + 90	3 + 30	< 0.0005	1658
19 + 80	4 + 90	< 0.0005	1659
24 + 00	3 + 10	< 0.0005	1674
24 + 20	5 + 10	< 0.0005	1675
21 + 60	4 + 50	< 0.0005	1676
22 + 50	10 + 30	< 0.0005	1677

N.B. - Fire assay only - non-detected is reported as nil.
- three places after decimal; the third place is estimated.

Fire assay + AA on bed. Four places after the decimal.

Ontario

Ministry of Na[illegible]

GEOPHYSICAL – GEOLO[illegible]
TECHNICAL DA[illegible]

42A01SE8903 2.2023 OTTO

900

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

RECEIVED
JAN 19 1976
PROJECTS UNIT

Type of Survey(s) Geological
Township or Area Otto Township
Claim Holder(s) Lee Geo-Indicators Limited (In Trust)
Survey Company Lee Geo-Indicators Limited
Author of Report S.A Scott, H.A. Lee
Address of Author 94 Alexander St ~~Box 68~~ Stittsville, Ont K0A3G0
Covering Dates of Survey June 15 to 30, October 16 to ~~27~~ Dec 31, 1975 (linecutting to office)
Total Miles of Line Cut cut & chained : 1.2 miles; flagged & chained : 4.1 miles

SPECIAL PROVISIONS CREDITS REQUESTED

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

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	
–Magnetometer	
–Radiometric	
–Other	
Geological	40
Geochemical	

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

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

DATE: Jan 16, 1976 SIGNATURE: S.A. Scott
Author of Report or Agent

L.D.

Scott 2.1544 also
Lee 2.1625 on this File

Res. Geol. ______ Qualifications ______

Previous Surveys

File No.	Type	Date	Claim Holder
no previous survey			

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
L	428690
L	428691
L	428694
L	428695

Area not covered : 1 claim
∴ 4×40 = 160 ÷ 5
∴ 32 days per cl.

If space insufficient, attach list

TOTAL CLAIMS 4

GEOPHYSICAL TECHNICAL DATA

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

Number of Stations ______ Number of Readings ______

Station interval ______ Line spacing ______

Profile scale ______

Contour interval ______

MAGNETIC

Instrument ______

Accuracy – Scale constant ______

Diurnal correction method ______

Base Station check-in interval (hours) ______

Base Station location and value ______

ELECTROMAGNETIC

Instrument ______

Coil configuration ______

Coil separation ______

Accuracy ______

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

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

Parameters measured ______

GRAVITY

Instrument ______

Scale constant ______

Corrections made ______

Base station value and location ______

Elevation accuracy ______

INDUCED POLARIZATION RESISTIVITY

Instrument ______

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time ______ Frequency ______

– Off time ______ Range ______

– Delay time ______

– Integration time ______

Power ______

Electrode array ______

Electrode spacing ______

Type of electrode ______

Ontario

Ministry of Natural Resources

File 2.2024

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

JAN 1 ? 1976

PROJECTS UNIT

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

Type of Survey(s) Geological

Township or Area Otto Township

Claim Holder(s) Lee Geo-Indicators Limited (In Trust)

Survey Company Lee Geo-Indicators Limited

Author of Report S.A. Scott, H.A. Lee

Address of Author 94 Alexander St ~~Box 68,~~ Stittsville, Ont K0A 3G0

Covering Dates of Survey June 15 to 30, October 16 to Dec 31, 1975 (linecutting to office)

Total Miles of Line Cut cut & chained: 1.3 miles
flagged & chained 4.9 miles

SPECIAL PROVISIONS CREDITS REQUESTED

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

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
--Electromagnetic	
--Magnetometer	
--Radiometric	
--Other	
Geological	40
Geochemical	

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

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

DATE: Jan 16, 1976 SIGNATURE: S.A. Scott
Author of Report or Agent

Scott 2.1544 also
Lee 2.1625 on this
File

Res. Geol. ______ Qualifications ______

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)	
L	422253	3/4
L	422256	3/4
L	422259	1/2
L	422260	
L	422644	3/4

Areas not covered: 2 3/4 claims
5 x 40 = 200 ÷ 7 = 28
days per claim
Am

If space insufficient, attach list

TOTAL CLAIMS 5

OFFICE USE ONLY

GEOPHYSICAL TECHNICAL DATA

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

Number of Stations ______________________ Number of Readings ______________

Station interval ______________________ Line spacing ______________

Profile scale ______________________

Contour interval ______________________

MAGNETIC

Instrument ______________________

Accuracy – Scale constant ______________________

Diurnal correction method ______________________

Base Station check-in interval (hours) ______________________

Base Station location and value ______________________

____

ELECTROMAGNETIC

Instrument ______________________

Coil configuration ______________________

Coil separation ______________________

Accuracy ______________________

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

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

Parameters measured ______________________

GRAVITY

Instrument ______________________

Scale constant ______________________

Corrections made ______________________

____

Base station value and location ______________________

____

Elevation accuracy ______________________

INDUCED POLARIZATION
RESISTIVITY

Instrument ______________________

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time ______________ Frequency ______________

– Off time ______________ Range ______________

– Delay time ______________

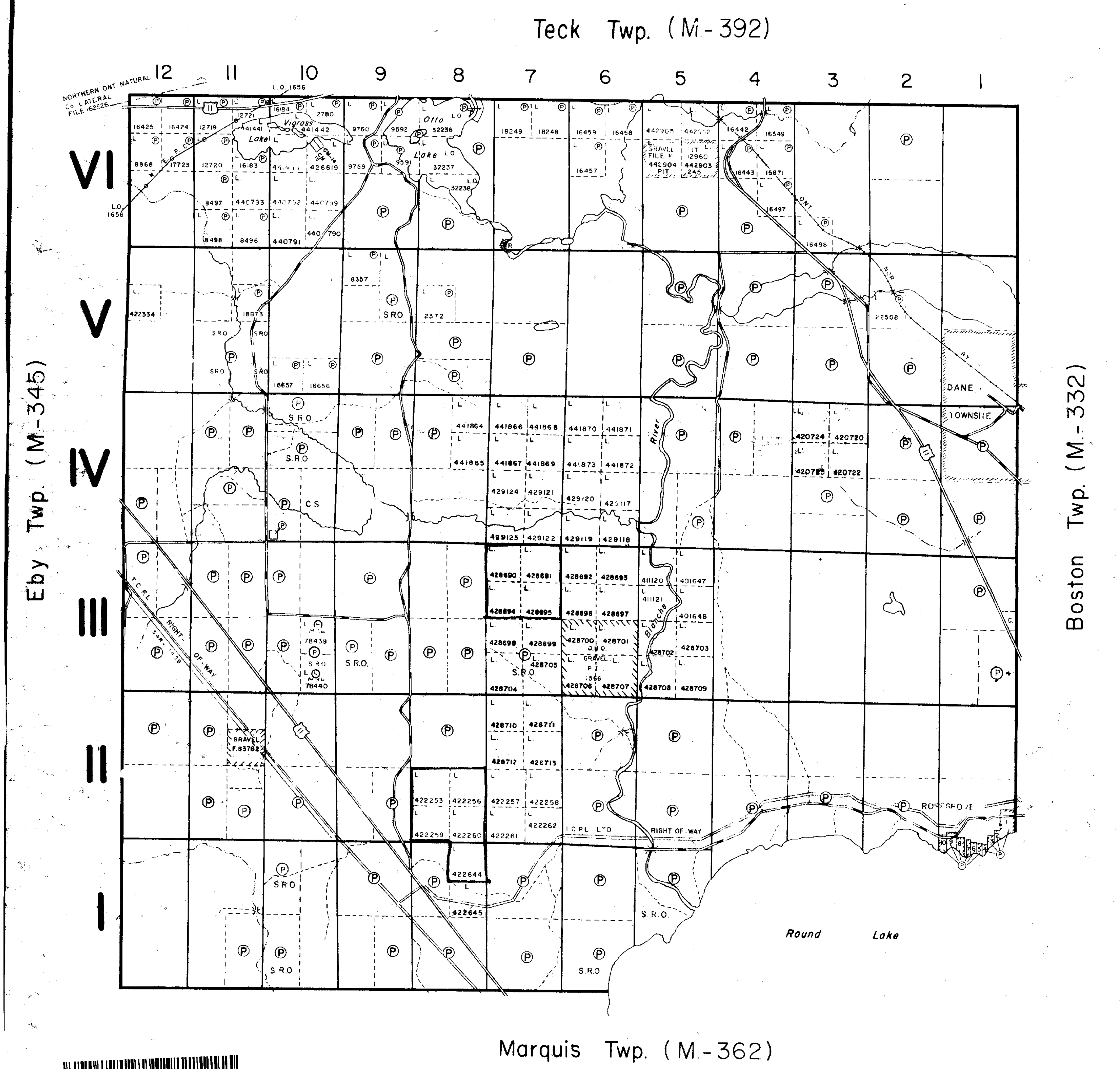
– Integration time ______________

Power ______________________

Electrode array ______________________

Electrode spacing ______________________

Type of electrode ______________________



2.2023

THE TOWNSHIP OF OTTO

DISTRICT OF TIMISKAMING

LARDER LAKE MINING DIVISION

SCALE: 1-INCH=40 CHAINS

LEGEND

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

NOTES

400' Surface Rights Reservation around all Lakes and Rivers

Dane Townsite shown thus

NOT OPEN for STAKING

O.C. Jan 10, 1911

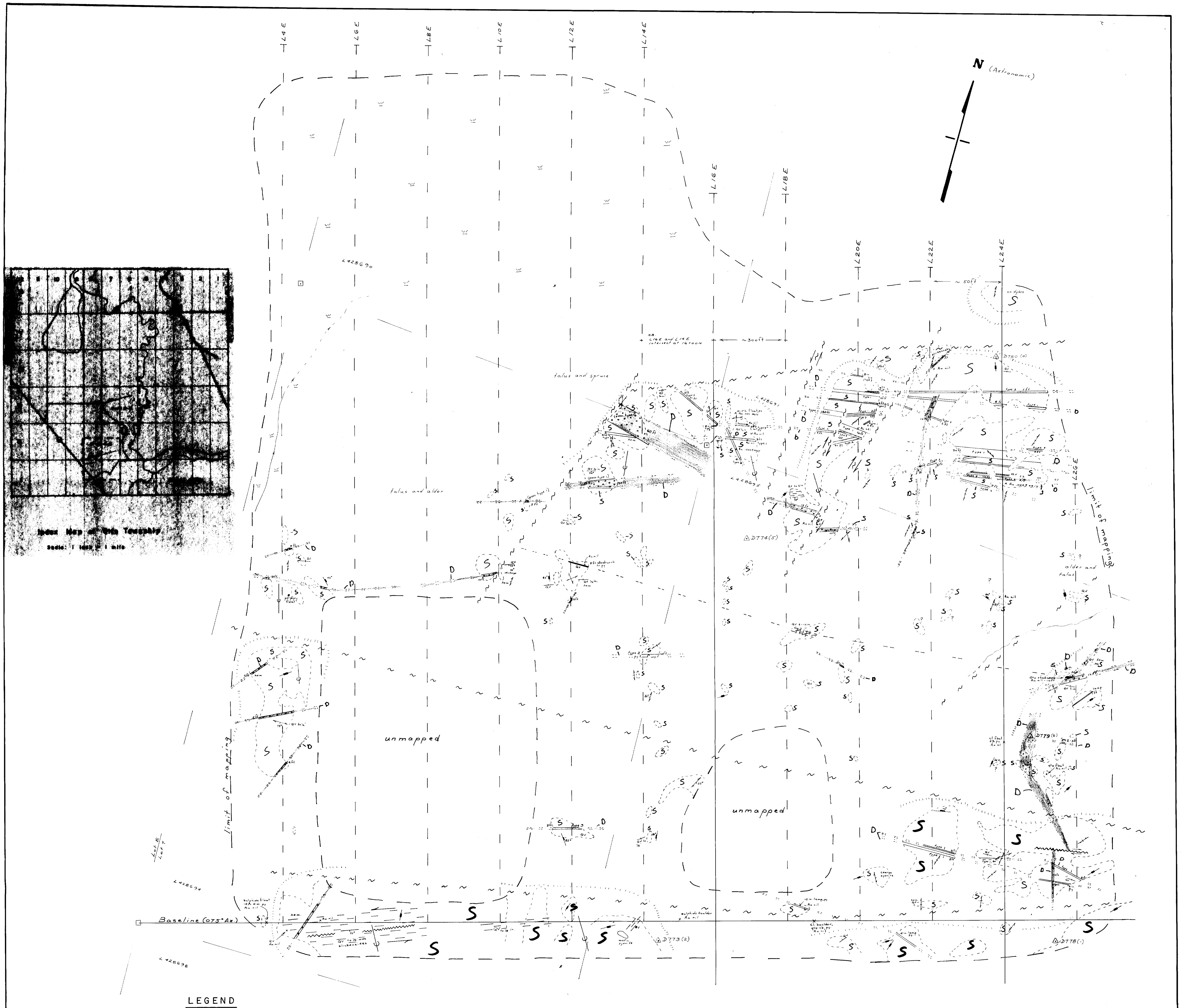
DATE OF ISSUE
JAN 20 1976
SURVEYS AND MAPPING BRANCH

PLAN NO.- M-379

MINISTRY OF NATURAL RESOURCES

42A01SE8903 2.2023 OTTO

200



LEGEND

- Syenite outcrop — S
- Syenite dyke: "common" porphyry, type 1, 2, or 3 — D
- Quartz veining
- Geological contact, assumed
- Sample site for gold assay — ×
- Shearing: vertical, inclined
- Joints: vertical, inclined
- Fault zone
- Glacial striation
- Basal till sample point — △D576
- Coarse gold clasts in 1 cubic foot of basal till — (4)
- Cut line
- Flagged line

Scale in feet

0 100 200 300

LEE-CANICO-TG JOINT VENTURE

DETAILED GEOLOGY OVER NORTH GRID

OTTO TOWNSHIP, ONTARIO (42A/1)

by

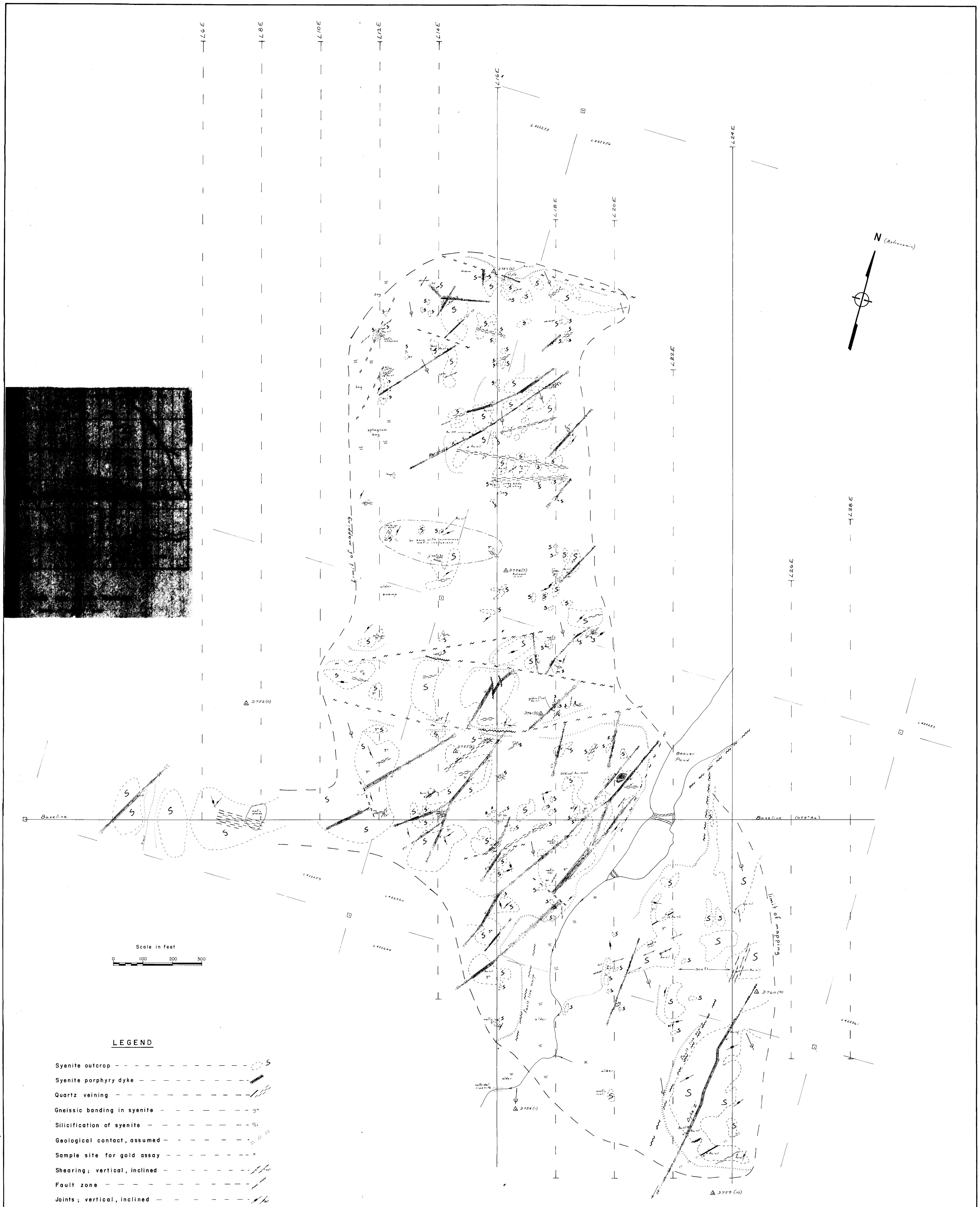
Lee Geo-Indicators Limited

Scale: 1 inch = 100 feet

Susan A. Scott	Susan A. Scott	December, 1975
Hulbert A. Lee	Hulbert A. Lee	

2.2023

210



LEGEND

- Syenite outcrop
- Syenite porphyry dyke
- Quartz veining
- Gneissic banding in syenite
- Silicification of syenite
- Geological contact, assumed
- Sample site for gold assay
- Shearing; vertical, inclined
- Fault zone
- Joints; vertical, inclined
- Glacial striation
- Basal till sample point
- Coarse gold clasts in 1 cubic foot of basal till
- Cut line
- Flagged line
- Beaver dam

LEE-CANICO-TG JOINT VENTURE

DETAILED GEOLOGY OVER SOUTH GRID

OTTO TOWNSHIP, ONTARIO (42A/1)

by

Lee Geo-Indicators Limited

Scale: 1 inch = 100 feet

Susan A. Scott *Susan A. Scott* Hulbert A. Lee *Hulbert A. Lee*	December, 1975

2.2023