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ONTARIO PROSPECTORS ASSISTANCE PROGRAM

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FINAL SUBMISSION 1998

prepared by

DENIS CHARTRE AND ROGER DUFRESNE

Prospectors

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Eby Township

Claim Block #1

Patented claims: L-16679, L-14099 and L-14098
Unpatented claims: 1214384, 1225485, 1186492

Claim Block #2

Patented claim: L-18958

Unpatented claims: 1205843, 1214382, 1214385

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SUMMARY

Eby Township is part of "The base of Huronian-covered channelways in the 'downvalley' direction from the Matachewan-Kirkland Lake-Larder Lake Gold camps which has not been adequately tested for paleoplacer gold deposits" (by G. Meyer, Kirkland Lake Resident Geologist, in Report of Activities 1990 O G S Misc. Paper 152 . There appears to be no reason (says G. Meyer) why concentrations of heavy metals, including gold, could not have formed at the base of these ancient river valleys.

GOLD IN EBY TOWNSHIP

P R O P E R T Y	T Y P E O F R O C K
Baldwin	Ore shoot
Rogick-Clark- Elliot	Pyrite and visible gold found in a contact between carbonate rocks and a small syenite body cut by numerous quartz stringers
Walters Prospect	Finely-divided gold is associated with narrow quartz stringers in a carbonate body
The Dominion Gulf	Sheared rock containing quartz stringers
Johnson	Porphyry dike cutting Keewatin metalvolcanic
Lemu	Pink quartz vein in a red porphyry dike cutting Keewatin mafic volcanics
The Mundy	Quartz stringers cutting Keewatin metavolcanics and syenite
Preston	Narrow mineralized shear zone containing minor quartz and concentrated pyrite
Sylvanite	30-foot wide shear zone which strikes east, dips steeply south and contains quartz-veined green carbonate rock cutting Keewatin metavolcanics

Hemlo Reef Resources	cherty banded pyritic mudstones on the hanging wall of the northern sedimenary sequence
F. Rivard	Anomalous gold in association with bleaching of the syenite and perhaps shearing
Queenston Property	Green carbonate combined with felsic dykes is the source of the mineralization

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CHARTRE - DUFRESNE EBY PROPERTY

Claim Block A (Property # 1)

No significant gold values - 25 m wide altered, carbonated and rusty zone (fractured and sheared) trending NE

- 1 to 8 meter wide felsic breccia unit bounded to northwest by fault zone
- non altered pillowed and massive basalt to the northeast
- diorite to southeast

No significant gold values - diorite intrusive

- fine grained, massive diorite containing a few narrow quartz veins, a few shear zones and occasional patches of disseminated pyrite

Summary (continued)

Claim Block B (Property #2)

No significant gold values - pillowed basalts containing occasional rusted shear zone

- felsic volcanic unit containing approximately 15% disseminated pyrite

Recommendation:

Areas 5, 6 and 7 in claim block A (Property #2) do contain rusty areas. The pyrite content of the rock type of "Area 7" (felsic volcanic) indicates the presence of a favourable environment for copper, zinc and gold.

Note:

Columnar jointing is located in Area # 3 of Claim Block A (Property #1).

Enclosed with this package you will find a rough cut sample taken from the brecciated zone; please bring it to the attention of Myra Gerou (670-5828), Industrial Minerals Section, M N D M. (unfortunately it has a few rust stains) Also, a case of samples is provided for your convenience.

ACKNOWLEDGEMENT

Denis Chartre and Roger Dufresne wish to express our appreciation to Edouard Chartre, Geologist with Service Exploration and his staff for their part in the preparation of this report.

Denis Chartre and Roger Dufresne wish also to express our appreciation to Gerhard Meyer, Resident Geologist for his property visit and his excellent photographs of the major dike located along strike.

We would like to thank Howard Lovell, MNDM Staff Geologist (retired) for your visit to our Eby Township property. Your comments and advice are very appreciated.

We would also like to express our thanks to Ray Zalnieriunas, Geologist with Globex Mining Enterprises Inc., for his advice, your precise geological descriptions. (SEE ANNEX "D-6")

We would also like to express our thanks to Gary Grabowski, Staff Geologist with MNDM in Kirkland Lake, for his explations re: columnar jointing. We were also made aware of two papers: Structural Geology by L. U. De Sitter, Professor of Structural and Applied Geology of the University of Leiden and Outlines of Physical Geology by C. R. Longwell, H. B. Davis, A. Knopf, R. F. Flint, of Yale University (See annexes "D - 1", "D - 2" and "D - 3" respectively.

Columnar jointing is also discussed in the text Geology, Second Edition, by W. C.Putnam (revised by A. B. Bassett. (See annex "D - 4")

Denis Chartre and Roger Dufresne would also like to thank Dale Alexander, Geologist with Queenston Mining Inc., and his staff especially M. McGill) for their examination, description and analysis of rock samples taken from the Eby Township Property. (See annex "D - 5")

J O I N T S A N D F A U L T S

In this part of the final report we propose to simply re-ask the question: Is there a relationship between joints and faults?

L. U. De Sitter, Professor of Structural and Applied Geology of the University of Leiden, in his book Structural geology states that "it has nevertheless been assumed in general that there exists a certain relationship between joints and faults. Both joints and faults are believed to have a common origin in deformative stress acting during a folding phase, and therefore be closely related. The nature of this relation, however, has seldom been ascertained. (See annex "D-1")

W. C. Putman, Professor of Geology in the Geology Department of the University of California and A. B. Bassett of the same University states that "a rock structure typical of basaltic rocks is the development of geometrically regular columns having five or six sides nested closely together"; a photo of columnar structure in basalt lava flow is shown on page 101 of his book. "The hexagonal pattern is the most efficient pattern" he continues. (See annex "D-4")

C. R. Longwell, Professor of Geology, A. Knopf, Professor of Physical Geology and R. F. Flint, Associate Professor of Geology, all of Yale University in the second edition of Outlines of Physical Geology say: "The most striking kind of contraction-jointing in an igneous rock results in development of columnar-jointing. These form at right angles to the chief cooling surface."
(See Annexes "D-2" and "D-3")

Description of Property

The 1998 Chartre-Dufresne Eby Township Property #1 consists of 3 patented claims: (L-16679, L-14099, L-14098) and 3 unpatented mining claims (1214384, 1225485, 1186492 outlined in green). These claims are described as the South West 1/4 of the North 1/2 Lot 4 Con IV, South East 1/4 of the North 1/2 Lot 4 Con IV, South West 1/4 of the North 1/2 Lot 3 Con IV, South West 1/4 of South 1/2 Lot 4 Con V, South East 1/4 of South 1/2 Lot 4 Con V, North East 1/4 of North 1/2 Lot 4 Con IV, respectively.
(See Annexes "A" and "AA - 1")

The 1998 Chartre-Dufresne Eby Township Property #2 consists of one patented claim: (L-18958) and 3 unpatented claims: (1205843, 1214382, 1214385 outlined in green). These claims are described as the North West 1/4 of the South 1/2 Lot 1 Con IV, the North East 1/4 of the South 1/2 of Lot 1 Con IV, the South East 1/4 of the South 1/2 of Lot 1 Con IV and the South West 1/4 of the South 1/2 of Lot 1 Con IV, respectively. (See Annexes "A" and "AA - 1")

The complete list of unpatented claims is provided at annex "A-3".

LOCATION

The 1998 Chartre-Dufresne Eby Township Property #1 is located about eleven miles (17.6 K) west of Kirkland Lake and one and 1/2 miles (2.4 K)on the Matachewan Highway (Highway 66 West); this property is located in the Larder Lake Mining Division in the District of Temiskaming. Highway No. 66, Highway No. 11, concessions and logging roads provide good access. Electric power transmission lines, the Trans Canada natural gas pipeline and the Ontario Northland Railway pass through the township. (See Annexes "A-1","A-1A", "A-1B" and "A-4")

The Mineral Deposit Inventory (annex "B") data sheets give us the following for the Angus Johnson Property in Eby Township (this property is the nearest listed property to the Chartre-Dufresne 1998 Eby Property): Lalitude 48 degrees 3' 50''; Longitude: 80 degrees 10' 8''; U T M Zone: 17; Northing: 5323516; Easting: 561921 in the Kirkland Lake Resident Geologist Area. (The Lemu Occurrence (Claims 17609 and 17610, also known as Lumsden Property) , N 1/2, S 1/2, Lot 4, Con V Eby Twp. Lat. 48.08 degrees, Long. 80.19 degrees)

LOCATION (continued)

The 1998 Chartre-Dufresne Eby Township Property #2 is located about eleven miles (17.6 K) west of Kirkland Lake and 2 miles south-easterly along Highway 11 where this same highway traverses Lot 1 Con IV in Eby Township. This Property is also located in the Larder Lake Mining Division in the District of Temiskaming. The TransCanada natural gas pipeline crosses the South West 1/4 of the South 1/2 Lot 1 Con IV in Eby Township.

GENERAL GEOLOGY

Howard Lovell reported (in Summary of Field Work, 1967 by the Geological Branch, Miscellaneous Paper 11 p. 64 and p. 65) all bedrock in Eby Township is Precambrian. From oldest to youngest, the rocks are Keewatin-type mafic and felsic flows, tuffs, agglomerates, and iron formation; amphibolite gneiss; Timiskaming-type felsic intrusive rocks; Matachewan-type mafic intrusive dikes, and Cobalt sedimentary rocks. Some of the area formerly mapped as "greenstone" is rhyolite tuff.

Howard Lovell reported (in Geology of the Eby and Otto Area District of Timiskaming 1972, by the Ontario Department of Mines and Northern Affairs Geological Report 99) the map-area (Map 2239) (See annex " ") is in the "Abitibi" belt (Goodwin 1966) of Precambrian volcanic, sedimentary, and intrusive rocks that extend from southwest of Timmins, Ontario, to Chibougamau, Quebec. There are representatives in the map-area (See annex " ") (Map 2239) of every major division of rocks of the Precambrian stratigraphic column for the northern part of northeastern Ontario. Keewatin-type metavolcanic rocks underlie about two-thirds of Eby Township and one-quarter of Otto Township. They range in composition from basalt to rhyolite, and in metamorphic grade from lower greenschist facies to almandine-amphibolite facies.

L. S. Jensen and F. F. Langford reported (in Geology and Petrogenesis of the Archean Abitibi Belt in the Kirkland Lake Area 1985 by the Ontario Geological Survey, Miscellaneous Paper 123. The Kirkland Lake area is underlain by Archean volcanic, sedimentary, and intrusive rocks which are part of the Abitibi Greenstone Belt (approx. 800km long and 240 km wide). In places, the belt is cut by swarms of the north-trending Matachewan dikes. In the southern part of the Kirkland Lake area, the Archean rocks are unconformably overlain by Proterozoic sedimentary rocks of the Cobalt Group. Several diabase dikes of Keweenawan age cut all the above rocks. Also, in the Kirkland Lake area, the volcanic rocks of the Abitibi Greenstone Belt are preserved in a synclinorium located between the Lake Abitibi Batholith and the Round Lake Batholith. The axis of the synclinorium occurs midway between the 2 batholiths and plunges to the east. The northern and southern limbs of the synclinorium are cut by 2 large east-striking fault zones: the Destor - Porcupine Fault Zone, and the Kirkland Lake - Larder Lake Fault Zone, respectively.
(See annexes "B-3" and "B-4")

STRUCTURAL GEOLOGY

Howard Lovell continues by saying (page 65 Misc. paper #11) that the Keewatin-type rocks form a northwest-plunging synclinorium has been re-folded. The younger syncline strikes northeast, approximately parallel to the belt of Timiskaming-type rocks.

Strong faults and lineaments strike northwest and northeast. The most important northeast-striking feature is the Larder Lake fault zone, which extends through the northern part of Eby township.

Howard Lovell continues by saying (page 15 Geological Report #99) the Archean metavolcanics and metasediments are folded steeply, with attitudes conforming roughly to the nearest contacts of the Round Lake Batholith and the Otto Stock.

ECONOMIC GEOLOGY

Howard Lovell continues by saying (page 65 Misc. Paper 11) that iron formation is present as long narrow zones interbedded with tuff and agglomerate of rhyolitic, dacitic, and andesitic composition. Much of the iron formation consists of banded magnetite and chert, some areas of which cause high aeromatic anomalies. Also present are large zones of pyrite-pyrrhotite-magnetite iron formation containing low percentages of copper and nickel. The greatest known concentrations of sulphides are in concession III, lots 1, 2, 3, and 4, and in concession IV, lots 1 and 2.

Exploration for gold should be concentrated in the two northern concessions, in syenite, trachyte, and carbonate rocks.

Howard Lovell continues by saying (page 16 Geological Report 99) that three facies of iron formation are present in the map-area (Map 2239) (See Annex " "): magnetite-chert, graphite-pyrite-pyrrhotite, and carbonate. Most of the exploration for gold has been concentrated in syenite, trachyte, and carbonate rocks along the Larder lake Fault, so most of the carbonate rocks have not been thoroughly explored. He recommends: surface prospecting, soil and bedrock geochemistry, and greater use of geology during interpretation of geophysical work; this would provide more rewarding drill targets.

ECONOMIC GEOLOGY (continued)

Howard Lovell reported (in Annual Report of the Regional and Resident Geologists 1974, Miscellaneous Paper 60, 1975) that most of the gold probably originated from ultramafic rocks, syenitic rocks and clastic and chemically precipitated sedimentary rocks, most of which built up from the sea bottom to form an island arc. The principal host rocks of the gold mineralization are:

a) syenite and trachyte (some of the trachyte is tuffaceous), and related porphyritic rocks;
b) low grade Algoma-type iron formation of the sulphide and carbonate facies, with some of the carbonate rocks having a spatial and possibly genetic relationship to ultramafic rocks; and
c) Timiskaming-type metasediments, which additionally form the bulk of the country rocks.

T. L. Wells, Engineer with Erie Canadian Mines reported in 1938 that gold was found on claim L-17404 (North East 1/4 of North 1/2 Lot 5 Con V) (1/2 mile North of Chartre-Dufresne Eby Property #1) in a quartz stringer. Two samples yielded 2.74 oz/ton Au and 0.06 oz/ton Au, respectively. (See Annex "H-2") This information is also reported in Mineral Resources and Mining Properties in the Kirkland Lake-Larder Lake Area in the Ontario Department of Mines Mineral Resources 1964 Circular #3 on page 72.

Unofficial reports were provided re: patented claim L-17609 (Northeast 1/4 of South 1/2 Lot 4 Con 5) (one claim distance to the North of the Chartre-Dufresne Eby-Property #1). A shaft is located in the south west corner of this claim. (See annex "H-7") (See "Lemu Investments" page 2 of Geological Report #99 1972). One report gives $5.00 gold; another report gives 0.12 Au oz/ton from the rock pile near the shaft (verbal report from a local prospector)

Gold was also discovered on the Baldwin Consolidated Mines Property in the Northeastern corner of Eby Township. G. L. Holbrooke reported that several small but rich gold ore-bodies lying in the zone are associated with the more easily fractured syenite rocks. The only gold values of economic importance found on the property to date occur where the N. 20 degrees East set of faults cut the vein system. (See Ontario Department of Mines Vol. LVII, Part I, 1948 at Annex "B-1") (Special note from Annual Report for the Kirkland Lake Resident Geologist's District 1992 and Ontario Geological Survey Miscellaneous Paper 161 81 tons of ore were milled yielding 43 oz of gold and 81 oz of Silver at a average grade of 0.531 oz Au/t.

ECONMIC GEOLOGY (continued)

It has been reported that there were favourable environments for gold in the Kirkland Lake-Larder Lake Camp. In the Larder Lake sector, gold mineralization is associated with carbonatized ultramafic rocks along the Larder Lake Fault, whereas around Kirkland Lake gold mineralization occurs in sheared syenitic intrusions, trachytic flows and sedimentary rocks along the Kirkland Lake Fault. The Larder Lake Fault zone can be traced across the camp where it generally marks the boundary between the Temiskaming sediments and Larder Lake Group. This same structure continues below the cover of Cobalt Group sedimentary rocks along the Kirkland Lake Fault. Carbonatized komatiitic ultramafic and mafic levels would be expected along this whole area immediately south of the Larder Lake Fault. Also, there are subsidiary faults that parallel the major structure.

L. S. Jensen reported (page 119 Ontario Geological Survey Miscellaneous Paper 126 1985) that gold mineralization in the area mainly occurs in the Larder Lake and Temiskaming Groups. The gold mineralization closely follows the stratigraphy of the sedimentary rocks. Secondary and tertiary concentration of the gold is likely to have occurred in volcanic rocks which incorporated sedimentary material, and in quartz-carbonate veins, syenitic intrusions, in fractures and alteration zones.

L. S. Jensen continues by saying that in the Temiskaming Group, the gold in the Kirkland Lake camp occurs in quartz-filled fractures and alteration zones associated with the Kirkland Lake 'Break' and in the feldspar porphyries which cut the Timiskaming Group trachytes and sedimentary rocks.

LOCAL GEOLOGY

L. S. Jensen reported in Genesis of Archean, Volcanic Hosted Gold Deposits 1980 (in the Ontario Geological Survey Miscellaneous Paper 97) that the dominant feature of the Kirkland Lake-Larder Lake area is the major fault system that appears to extend from Matachewan in the west through Noranda towards Val d'Or. In many places this fault system is obscured by only slight displacement of the younger Proterozoic rocks. The older the rocks, the greater is the displacement. This suggests that the fault system has been active since the initial deposition of volcanic and sedimentary rocks in the area without a doubt this same fault system has influenced the deposition of these rocks and their alteration along its length. (See annex "B-2")

LOCAL GEOLOGY (continued)

Gold mineralization is found in several rock types: gold-bearing ultramafic intrusions, laval flows (komatiites), debris flows, felsic tuff, chert, iron formation, carbonaceous sedimentary rocks, argillite, conglomerate, porphyritic intrusions and granitic intrusions. The range of mineralization is much greater than that associated with massive suphide deposits. L. S. Jensen continues by saying that gold exploration should be concentrated near major fault zones which mark the tectonic boundary between volcanic piles or between volcanic piles and gneissic terrains which have sedimentary aprons.

W. S. Savage in Mineral resources and Mining Properties in the Kirkland Lake-Larder Lake Area (Mineral Resources Circular No. 3 (See Annex "H - 13C") reported that the formations of economic interest belong to the earlier Precambrian era: volcanics, sediments and intrusives. The Break is a strong wide carbonized shear zone, characterized by the presence of green mica and quartz stockworks. The Break or its branches appear to have had some influence on the localization of most of the ore bodies. From the southern part of Teck township the Break has been traced southwestward to where it is overlain by the later Cobalt series in Eby Township. The amount of displacement along the Break could be hundreds of feet or in miles says W. S. Savage. The Keewatin and Timiskaming series were then invaded by Algoman intrusives: stocks, dikes, irregular-shaped bodies of granite to diorite or lamprophyre. In Teck Township the most important of the intrusives are the syenite, augite syenite and syenite porphyry.

W. S. Savage continues by saying that following the emplacement of the intrusives, hot circulating solutions produced carbonate replacements along pre-existing faulted zones. This carbonatization was followed by the faulting which opened up channelways for the later solutions that produced the gold-bearing veins in the Kirland Lake camp. The Kirkland Lake Fault branches away from the Larder Lake Break in the vicinity of Kenogami Lake. Minor faults which branch off the "MAIN BREAK' have been important sources of ore.

HISTORY

1924 - Walter Little staked 3 claims (L-14098, SW 1/4 N 1/2 Lot 3 Con IV; L-14099, SE 1/4 N 1/2 Lot 4 Con IV, L-16679, SW 1/4 N 1/2 Lot 4 Con IV) in Eby Township. These claims were patented between April, 1930 and May, 1933. 200 man-days of labour was performed on each of these claims. (See annex "H - 1")

1935 - V. Jordan for Erie Canadian Mines reported that, re: Walters Claims in Eby Township (L-17402, L-17403, L-17404, L-19129, L-16740, L-9846, L-9848, L-17715 and L-16750, located in lot 5 Con 5 and Con 6) some gold (Au $6.00 per ton) was found in a 30" quartz vein also carrying iron sulphides and molybdenite on claim L-17402. M.D.I. says that quartz vein is nearest the SE-end of Kenogami Lake. (See annex "H - 2")

1935 - W. S. Dyer reported in Ontario Department of Mines Vol. XLIV, Part II, 1935 Geology of the Matachewan-Kenogami Area that the Keewatin greenstones and Timiskaming sediments extend eastward from the Matachewan area through the townships of Holmes, Flavelle, Burt, and Eby, to the Kirkland Lake area. Numerous stocks and dikes of igneous rocks of varied type, including red syenite porphyry, pink syenite, and dark-grey diorite, cut through the greenstones in various places, and coarse-grained granites are found on the flanks of the syncline. Such an assemblage of rocks constitutes in general good prospecting territory, especially when the territory lies between such important gold camps as Kirkland Lake and Matachewan. (See annex "H - 2B")

1938 - A. Johnson reported work on three claims (# 18845, SE 1/4 of S 1/2 of Lot 3 Con 4; # 24935, NW 1/4 of N 1/2 Lot Con 3; # 18506, NE 1/4 of N 1/2 of Lot 3 Con 3) in Eby Twp. Gold was found in pits and trenches (0.1 to 0.3 oz. Au/ton). (See annex "H - 3") M.D.I. says that other minerals available are quartz and pyrite.

1938 - Erie Canadian Mines reported on a group of 5 claims (Mundy Group: L-12980, L-15640, L-14992, L-14989 and L-15641 located 1 1/2 miles south of Kenogami Lake, described by H. L. Lovell as the NE 1/4 of N 1/2 of lot 11 Con IV. Stripping and trenching was done. Results reported were trace, $0.40 and $0.80 cents worth of gold per ton (gold at about $35 U.S. per ounce). (See Annex "H - 4") M.D.I. says other minerals available are quartz and pyrite.

1939 - D. K. Burke representing Sylvanite Gold Mines, Limited reported that, re: Rogick-Elliot-Clark group of claims (claims 18837, 18227, 8803) located in the NW 1/4 of the south 1/2 Lot 5 Con 6 and NE 1/4 of the south 1/2 Lot 5 Con 6 and NW 1/4 of the south 1/2 Lot 4 Con 6, respectively in Eby Twp., a feldspar-porphyry dyke containing quartz streaks with some showing visible gold in a 40 ft trench. (See Annex "H - 5") M.D.I. says that other minerals available are quartz and pyrite.

1941 - Sylvanite Gold Mines Ltd. reported on claims located in Lot 2 Con IV and V in Eby Township. In a 10' to 20' quartz vein, part of a shear zone on claim # 32352 (NE 1/4 N 1/2 Lot 2 Con IV) samples indicated trace to $0.80 worth of gold per ton. (See annex "H - 6")

1944 - J. A. Lumsden reported that claims L-17609 and L-17610 located in the NW 1/4 of the south 1/2 Lot 4 Con 5 and the NE 1/4 of the south 1/2 Lot 4 Con 5, respectively in Eby Twp. have a 40 ft prospector's shaft in the southwest corner where $5.00 gold was found. (See annex "H - 7") M.D.I. says that other minerals available are quartz and pyrite.

1944 - W. S. Savage, Resident Geologist, reported re: Todora Kirkland Prospecting Syndicate (9 unpatented and 2 patented claims: 52417, 52418, 52419, 52426 in the S 1/4 of lots 1 and 2 Con VI Eby Twp.; 52430, 52427, 52428, 52429, 16010, 9465 in the N of Lot 1 Con V and one claim in Otto Twp: 39855 in the SW 1/4 of the N 1/2 of lot 12 Con V). Old pits and trenches were found. Cpy, Mo and Au was found in quartz, up to 13.39 Cu (See annex "H - 8")

1945 - G. L. Holbrooke for the Sylvanite Gold Mines, Limited reported on the Sylvanite Eby Claims: 9 claims (L-42150, L-42151, L-42152, L-42153, L-42154, L-42155, L-42156, L-42157, L-42158 in lots 7 and 8 Con V) such claims are underlain by a series of Keewatin greenstone lava flows cut by occasional sheer zones. Sylvanite found trace up to 0.023 oz. Au/ton in trenches. (See annex "H - 9")

1945 - G. L. Holbrooke for Sylvanite Gold Mines, Limited reported on the Rosa Brown Claim # L-17990 located in the NW 1\4 of N 1/2 of Lot 1 Con 6 in Eby Township. He reported that the greenstone contact of the area crosses the northern part of this claim. Several quartz veins and numerous quartz stringer zones were also found in the carbonate areas. (See annex "H - 10") M.D.I. says Quartz and pyrite are also found.

1946 - G. L. Holbrooke reported for Baldwin Consolidated Mines Limited re: property located in the Northeast corner of Eby Township (All of N 1/2 lot 2 Con VI, NW 1/4 N 1/2 Lot 1 Con VI, NW 1/4 N 1/2 Lot 3 Con VI). Surface trenching and 12,000 feet of surface and underground drilling were performed. The lavas to the south exibit definite evidence of broad folding and some faulting. The main contact itself trends east-west across the N 1/2 of Lot 2 Con VI and NW 1/4 of Lot 1 Con VI. In this area the main contact is strongly sheared and altered over widths of 30' to 200'. A 50' wide zone of intense carbonization and silification is cut by later quartz-filled fractures. Several small but rich gold ore-bodies lying in the zone are associated with the more easily fractured syenite rocks. (See annex "H - 11") M.D.I. says shaft is located in the NE corner of the township.

1948 - G. L. Holbrooke's report is repeated with the addition of information re: cross-veins that show a general north-south trending direction. (See annex "H-11B")

1950 - R. E. Jones for Preston East Dome Mines, Limited reported on a 4 claim group (L-54861, L-54862, L-54863 and L-54864 located in N 1/2 of lot 8 Con III of Eby Twp. He found narrow mineralized shears: one of these shears contains gold values (no assay values are reported). (See annex "H - 12") M.D.I. says other minerals available are quartz and pyrite.

1952 - Dominion Gulf Company completed: line cutting, a ground magnetometer survey and a geological survey on 13 claims (L-57598-L57610) located in lots 7, 8, 9, 10, 11, Concession 5 in Eby Twp. C. G. MacIntosh found evidence of faulting and weak shearing. J. H. Ratcliffe in his interpretation of the ground magnetometer survey found a magnetic anomaly (diabase dike) striking northeasterly; faulting in three main directions is identified: northeast, northwest and north. (See annex " H - 13")

1663 - W. S. Savage reported re: Kelly Kirkland Mines Limited Property located in Eby Township (Northeast 1/4 of the North 1/2 Lot one Con VI, claim L-16423) that an east-west trending ridge of syenite porphyry is located south of the Larder Lake Break. Gold was found on this ridge of syenite porphyry. (See annex "H - 13B")

1963 - W. S. Savage reported in Mineral Resources and Mining Properties in the Kirkland Lake-Larder Lake Area (Mineral Resources Circular No. 3). W. S. Savage, Resident Geologist, Ontario Department of Mines, Kirkland Lake. He says that his experience gained from widespread exploration throughout the Kirkland Lake-Larder Lake gold belt has shown that ore bodies have a closer relationship to structures than rock types. Ore is found in all rock types of the camp with the exception of a few late diabase dikes. (See Annex " H - 13C")

1965 - Keevil Mining Limited completed work in NW 1/4 of the N 1/2 of Lot 3 Con III and S 1/2 of Lot 4 Con III in Eby Township. Work consisted of geological, magnetometer, and vertical loop surveys and diamond drilling. 4 strong conductors and 4 weak conductors were found. The strong anomalies have excellent magnetic correlation. Drilling found iron sulphides and 0.005 oz Au/ton in sludge. (See annex "H - 14") M.D.I. says copper, zinc, pyrite, pyrrhotite, magnetite and chlorite are also found.

1966 - H. D. McLeod reported on the magnetometer survey on claims L-90284, L-90285, L-90286 and L-90287 (Taylor Gold Mines Ltd.) located in the NW 1/4 of S 1/2 Lot 3 Con 5 and the NE 1/4 of the South 1/2 Lot 3 Con 5 and the SE 1/4 of the N 1/2 of Lot 3 Con 5 and NE 1/4 of N 1/2 of Lot 3 Con 5 respectively in Eby Twp where East-West trending high magnetic anomalies were outlined. (See Annex "H - 15")

1969 - M. Fishkin reported on a block of claims (213461, 102051, 102108, 102149, 101998, 1022052, 102107, 102148, 102050, 101999, 102106 and 102150 in lot 2 Con III, Con IV and Con V) located in Eby Twp. Diamond drilling was performed on claim 213461 and and claim 102106. Quartz, epidote and pyrite with a little chalcopyrite and sphalerite were detected. (See Annex "H - 16")

1981 - John Britton reported for Noranda Exploration Company re: an electromagnetic and magnetometer survey completed on a group of 7 unpatented claims which covers the N 1/2 of Lot 2 Con III and S 1/2 of Lot 2 Con IV except the Northwest 1/4 of South 1/2 Lot 2 Con IV. Conductors B-B, C-C and D-D should be carefully prospected. Conductor A-A is close to an old pit in which there was pyrite and pyrrhotite with a low copper content. (See Annex "H - 16B")

1983 - S. J. Carmichael reported for Hemlo Reef Resources on work performed on 57 mining claims and 16 optioned patents located Lots 5-11 Con IV and Con V in the northwest quarter of Eby Township. The purpose of the work was to delineate a possible zone of sediments which may be conductive to syngenetic gold mineralization. The work consisted of geological mapping and a proton magnetometer survey. Mineralization occurs in quartz and quartz\carbonate veins in basalt, interflow pyritic cherty sediments and in carbonates. The best gold values (0.08 oz /ton Au) occur in cherty banded pyritic mudstones on the hanging wall of the northern sedimentary sequence. (See Annex "H - 17")

1985 - S. J. Carmichael reported on the Eby Township Gold Property, Larder Lake Mining Division of Mary Ellen Resources (58 contiguous unpatented and 25 patented claims) (See map at the back of Annex "H - 17B") The work consisted of ground magnetometer, V.L.F., geological and selected humus geochemical surveys. The claim block is located in north-west Eby Township, concessions 4 and 5, lots 5-11. Gold was found in quartz veins, stringers, high iron tholeiitic basalt, iron formation, possible carbonate horizon, quartz-sulfide mineralization. Volcanics and interflow sediments of the Larder Lake Group occupy the northeast quarter of the property and offer the highest potential to host economical gold deposits. Interflow units include green fuchsite-rich chemical carbonates, magnetite-hematite iron formation and pyritic cherts. (See annex "H - 17B")

1985 - Mary Greer for A. H. Perron completed a geological survey, a geophysical and mag survey on three claims (739256, 799559 and 799560; SW 1/4 of S 1/2 Lot 4 Con V, SE 1/4 of S 1/2 Lot 4 Con V and NE 1/4 of N 1/2 of Lot 4 Con IV, respectively) in Eby Twp. A north east west conductor may be associated with a magnetic anomaly crossing the property. Old trenches were found. (See Annex "H - 18")

1988 - J. R. Lawton and I. D. Trinder for Butte Canyon Resources Inc. completed geological mapping, lithogeochemical sampling program, VLF and horizontal loop electromagnetic surveys on 31 claims (in lots 1, 2 and 3 Con III, Con IV and Con V in Eby Township). The highest gold value returned was 81 ppb Au (trace to 0.002 oz. /ton) which, while slightly anomalous, is not significant. Platinum-palladium analytical results are quite interesting and indicate a couple of anomalous zones. The HLE Survey indicates several parallel conductive trends having very high conductivity characteristics, suggesting cross-faulting. (See annex "H - 19")

1988 - S. J. Carmichael reported for Mary Ellen Resources on claims L-980369 and L-980368 in Eby Twp. (NW 1/4 of N 1/2 Lot 3 Con V and NE 1/4 of N 1/2 Lot 3 Con V) A V.L.F. survey, trench work and sampling were completed on the property. A weak anomaly was detected. Trenching indicated that anomally is a north-east trending fault. See annex "H - 20")

1990 - S. J. Carmichael reported on the work performed on the Eby Township claim group held by F. Rivard (15 claims: L-735598, L-738544, L-738545, L-738546, L-735597, L-735596, L-735464, L-842693, L-980065, L-980067, L-891900, L-980069, L-980066, L-891905, L-980068 located in lots 1, 2 and 3 Con III and Con IV). Two holes were drilled for a total of 1016.5 ft. Anomalous gold was discovered in association with bleaching of the syenite, perhaps related to shearing. Some selected stripping was performed. (See annex "H - 21")

1992 - W. Benham and K. Barron of Battle Mountain (Canada) Inc. reported re: Vigrass Lake Property located in Teck, Otto, Eby and Grenfell Townships. Geological mapping, stripping, channel sampling and drilling were completed. The property is underlain by Timiskaming Group trachytic volcanics and sediments and Larder Lake Group mafic to ultramafic volcanics with interbedded graphitic sediments. The larder Lake and Blanche River Fault Zones cross the property. Sub-parallel and splay faults, altered pyritic syenites, volcanics and sediments associated with these structures are present on the property. (See Annex "H - 21B")

1992 - J. Roth of Stratagex Ltd. reported on behalf of Battle Mountain (Canada) Inc. re: magnetic and HLEM Surveys on the Vigrass Lake Property (see above) that the structural regime is dominated by a network of faults and / or shear zones trending east-west to east-northeast, comparable to those recognized as important in controlling known gold mineralization. (See annex "H - 21B" above)

1994 - D. Robinson completed geological mapping, magnetic total field-gradient survey and MaxMin survey on two claim groups in Eby Twp. The SE Group represents 6 claim units (# 1186976 - NW 1/4 of S 1/2 Lot 2 Con V and NE 1/4 of S 1/2 Lot 3 Con V, # 1200893 - S 1/2 of S 1/2 Lot 2 Con V, # 1200894 - N 1/2 of N 1/2 Lot 2 Con IV). Two strong alteration zones were identified in the north half of the SE Group. These two zones appear to have an east northeast trend. (See annex "H - 22")

1995 - D. Robinson reported re: a property (26 claim units located in the north west quarter of Eby Township) where geological mapping, magnetometer survey and a MaxMin EM survey were completed. Possible presence of strong structures within alteration zones is detected. (See annex "H - 23")

1997 - J. Whyte reported re: Queenston's Property in the Kirkland Lake Camp (See map at Annex "A - 6") that Queenston has concentrated much of its effort along downplunge extension of the McBean which operated on mineralization in a felsic dyke. Below the pit a much wider altered and deformed zone was found with typical green carbonate in its footwall and more gold mineralization hosted in volcanics and dyke rocks in the hangingwall. The green carbonate combined with felsic dykes is the source of the mineralization. (See annex "H - 24")

Statistical Report - 1998

Job-Creation Summary

Type of work	# of days	Money expended
Backhoe operator (float, excavator travel)		$4,090.08 (tax inc)
Power Stripping (water pump operator)	24	2,610.00
Assayer (lab tech) etc		701.93
Geological report and preparation of maps etc.		1,712.00
Total money paid to contractors		$9,114.01

ONTARIO PROSPECTORS ASSISTANCE PROGRAM (OPAP)
FINAL SUBMISSION FORM 1998

P. 18

INSTRUCTIONS : Please read the guidebook before completing form
Please type or print
Submit completed form and supporting documentation by February 1, 1999 to:
OPAP, Mines Group
Ministry of Northern Development and Mines
4th floor, 933 Ramsey Lake Road, Sudbury, Ontario P3E 6B5

To be completed by successful grantees after completion of project(s) and accompanied by 2 copies of all reports and maps for each project including recent copies of claim maps with area(s) of work outlined.

****Attach your receipts to this form when you have completed it. Submit this form and attached receipts separately from your technical reports.****

Applicant DENIS CHARTRÉ File Number OP98-132

Proposed project area(s) (Twp. or claim name, latitude and longitude)
SEE PAGE 4 FOR LAT. & LONG. PROPERTY #1

		Completed?
1.	EBY TWP. CHARTRÉ-DUFRESNE SEE ANNEX "A"	Yes ✓ No
2.	EBY TWP. CHARTRÉ-DUFRESNE SEE ANNEX "A"	Yes ✓ No

SEE PAGE 4 & 4A FOR LAT & LONG. PROPERTY #2

Changes to proposed project(s) (if any) N/A

List other co-owners of the property with OPAP grants that worked on project
ROGER DUFRESNE OP98-131

I. WORK PERFORMED BY APPLICANT (Summary of Section IV)

1. Project #1 area/name CHARTRÉ DUFRESNE EBY #1

		No. days worked by applicant
Traditional prospecting	No. of samples 52 ÷ 2	3
Geological surveys	~~Scale~~ HELP MAPPING	2
~~Geophysical surveys~~	Type PROPERTY VISIT Miles/km	2
Geochemical surveys	Type # of samples	
Drilling	Type Ft./m	
Stripping/Trenching	Method EXCAVATOR + MANUAL	
Other	Type HIGH PRESSURE WATER	34
	TOTAL	41

Form filled out by ☒ Applicant ☐ Other (please specify) _____

Report filled out by ☒ Applicant ☒ Other (please specify) SERVICE EXPLORATION

I. WORK PERFORMED BY APPLICANT (continued))

2. Project #2 area/name CHARTRE-DUFRESNE EBY #2 — No. days worked by applicant

Traditional prospecting	No. of samples 4	1
Geological surveys	~~Scale~~ HELP MAPPING	
Geophysical surveys	Type ____ Miles/km ____	
Geochemical surveys	Type ____ # of samples ____	
Drilling	Type ____ Ft./m ____	
Stripping/Trenching	Method EXCAVATOR + MANUAL	
Other	Type + HIGH PRESSURE WATER	11
	TOTAL	12

TOTAL DAYS (ALL PROJECTS) A. 53
(Attach additional sheets for additional project areas as required)

II. EXPENDITURES (total of all projects) – Summary of I and II

1. Number of working days by applicant
(A) x $100/day ..... 53 ..... $ 5300.00

2. Number of report preparation days by applicant
x $100/day ..... 3 ..... $ 300.00

3. Analyses/Assay costs $ 701.93 ÷ 2 = ... $ 350.97

4. Equipment rentals WATER PUMP $ 1350.00
..... $ ____ — $ 1350.00

5. Consumable Supplies ..... $ ____

6. Contract services (state type)
EXCAVATOR $ 4090.08 ÷ 2 — $ 2045.04
SERVICE EXPLORATION $ 1712.00 ÷ 2 — $ 856.00

# of workers ____ # of mandays worked ____

7. Travel (state method: road, air, etc.)
PROJECT #1 16 km X 0.30 X 41 ..... $ 196.80 — $ 196.80
PROJECT #2 16 km X 0.30 X 12 ..... $ 57.60 — $ 57.60

8. Food and Accommodation ..... 56 X $ 20.00 ..... $ 1120.00

9. Other expenses (specify, e.g. typing, printing, shipping of supplies)
OIL-GAS-PROPANE ETC $ 729.11
SUPPLIES ..... $ 474.84 — $ 1203.95

10. Helpers

# of helpers ____ # of mandays worked ____ $ ____

TOTAL EXPENDITURES ..... $ 12780.36

Dennis

SUPPLIES P.1

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount
MAY 1/98	GRANT HOME HARDWARE	BOLTS	$1.49
"	"	WASHERS	1.29
"	"	GLUE	0.99
"	"	SCRAPER	4.19
MAY 22/98	MINDY	MAPS	10.80
JUNE 1/98	GRANT HOME HARDWARE	BATTERY'S	3.19
"	"	SCREWS	1.09
"	"	SCREWS	1.19
"	"	WASHERS	1.19
"	"	SCREWS	2.79
"	"	BOLTS	0.74
JUNE 6/98	KENOGAMI GARAGE	CHAIN SAW REPAIR	155.70
JUNE 15/98	CANADIAN TIRE	POLAROID FILM	15.99
JUNE 29/98	NORTHERN AUTO SUPLY	SPARK PLUGS (6)	32.71
JULY 7/98	DUMA'S INDEPENDANT	TYLENOL CAPSULES	2.19
JULY 14/98	CANADIAN TIRE	BRUSH	6.99
"	"	TRAILER HITCH	18.99
"	"	HAND BILGE PUMP	24.99
JULY 17/98	DUMAS' INDEPENDENT	GRAVOL CAPSULES	7.39
JULY 23/98	CANADIAN TIRE	PAINT THINNER	4.59
JULY 29/98	ZELLERS	WORK SHIRT	19.97
AUG. 1/98	GRANT HOME HARDWARE	SCREWS	2.99
		BATTERYS	3.59
		SAFETY SNAP	2.58
		QUICK LINK	1.27
		SHACKLE	2.24
		PADLOCK	5.62

Mileage rate claimed _____ km at 30¢/km for use of own vehicle 337.15 SUB-TOTAL

TOTAL _____

(Attach additional sheets as required)

SUPPLIES P.2

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount
AUG 5/98	CANADIAN TIRE	WORK GLOVES	$ 3.99
AUG 6/98	KENOGAMI GARAGE	STARTER ASSEMBLY FOR CHAIN SAW + SPARK PLUG	56.13
AUG 8/98	R & R TOWING	SPARK PLUGS + LUBE	17.17
AUG 9/98	GOLD BELT	WORK GLOVES + PENETRATING OIL	27.37
AUG 14	DUMAS' INDEPENDENT	ALCAN FOIL	3.49
AUG 14	CANNADIAN TIRE	C.R.L. REMOVER + KLEENEX	8.57
AUG 19	WALL MART	CALCULATOR + PAD	9.98
SEPT 10	KIRKLAND PHARMACY	ROBAXISAL MUSCLE RELAXANT	10.99

Mileage rate claimed _____ km at 30¢/km for use of own vehicle ..... 137.69 SUB-TOTAL

TOTAL $ 474.84

Attach additional sheets as required.

OIL - GAS - PROPANE FOR PUMP - CHAINSAW - BIKE

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount
MAY 6/98	CANADIAN TIRE	GAS	27.00
MAY 14/98	SUPERIOR PROPANE	PROPANE	93.19
JUNE 11/98	MAC PHERSON'S	GAS	52.93
JUNE 30/98	CANADIAN TIRE	CHAINSAW OIL	12.39
JULY 9/98	CANADIAN TIRE	GAS	77.58
JULY 11/98	MAC PHERSONS	GAS	28.00
JULY 17/98	MAC PHERSONS	GAS	52.00
JULY 21/98	MACPHERSONS	GAS	46.00
JULY 24/98	MAC PHERSONS	GAS	28.75
JULY 31/98	MAC PHERSONS	GAS	25.00
AUG 7/98	MAC PHERSONS	GAS	93.83
AUG 9/98	MAC PHERSONS	GAS	30.00
AUG 13/98	MAC PHERSONS	GAS	14.00
AUG 25/98	CANADIAN TIRE	GAS	21.00
SEPT 9/98	SUPERIOR PROPANE	PROPANE	77.04

Mileage rate claimed _____ km at 30¢/km for use of own vehicle ..... _____

TOTAL $ 729.11

Attach additional sheets as required.

IV. DAILY REPORTS (Summarize work activity in Section I)

Day	Project Area	Date	Work Performed
1	ALL AREAS	MAY 2/98	LOCATING AND MARKING AREAS
2	"	3	LOCATING AND MARKING AREAS
3	"	9	BRUSHING AROUND PITS AND TRENCHES
4	"	10	BRUSHING AROUND PITS AND TRENCHES
5	"	JUNE 26	SUPERVISING CONTRACTOR + MANUAL STRIPPING
6	"	29	"
7	"	30	"
8	"	JULY 1	" EXCAVATOR
9	CLAIM 1186492	10	CUTTING TRAIL TO CREEK
10	"	11	"
11	CL-1225485 + 1186492	12	SETTING UP PUMP + HOSE ECT
12	CL-1121434 + 1225485 +	JULY 15	MANUAL & POWER STRIPPING
13	+ 1186492	16	"
14	"	17	"
15	"	18	"
16	"	25	"
17	"	26	"
18	"	27	"
19	"	28	"
20	"	31	"
21	"	32	"
22	"	33	"
23	"	AUG 1	"
24	"	2	"
25	"	3	"
26	"	4	"
27	"	7	"
28	"	8	"
29	"	9	"
30	"	10	"
31	"	11	"
32	"	15	"
33	"	16	"
34	"	17	"
35	"	18	"
36	"	21	"
37	"	22	"
38	"	23	"
39	"	24	"
40	"	25	"
41	ALL AREAS	26	TAKING OUT EQUIPMENT
42	ALL AREAS	27	PROPERTY VISIT BY GERHARD MEYER

(Attach additional sheets as required)

Demi

IV. DAILY REPORTS (Summarize work activity in Section I)

Day	Project Area	Date	Work Performed
43	ALL AREAS	AUG 29	ESTABLISHING GRID LINES
44	"	30	"
45	"	31	CHANNEL SAMPLING
46	"	SEPT 6	"
47	"	9	VISIT BY GLOBIEX
48	"	12	TAKING SAMPLES
49	"	16	TAKING SAMPLES
50	"	19	DOING GRIDS FOR MAPPING
51	"	20	"
52	"	OCT 3	HELP MAP WITH SERVICE EXPL.
53	"	4	"
54	"	JAN 15	REPORT PREPARATION
55	"	16	"
56	"	17	"
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			

(Attach additional sheets as required)

V. SIGNIFICANT RESULTS (please complete)

Project Area	New Showings and/or Anomalies	Commodity	Best Analyses
PROPERTY #1	COLUMNAR JOINTING + BRECCIATED ZONE		POSSIBLE INDUSTRIAL MINERAL
#2	GOOD ENVIRONMENT FOR BASE METALS AND AU		

VI. CLAIMS STAKED DURING/AFTER PROSPECTING ACTIVITY (please complete)

Project Area	Claim Numbers	Number of Claim Units
	N/A	

VII. OPTION AGREEMENT RESULTING FROM OPAP PROJECT (please complete)

Optionee	Property/Claims	Work Commitment
	N/A	

The Ministry of Northern Development and Mines may verify all statements related to and made herein this application.

1. I am the person named in the Final Submission form under the Ontario Prospectors Assistance Program.
2. I am ordinarily a resident of Canada.
3. I have complied with all requirements of the said program.
4. I understand that it is an offence under the Ontario Mineral Exploration Program Act, R.S.O. 1990, to make a false or misleading statement and that all statements and all other information submitted in support of the said application are true and correct.
5. I was not employed by the Mines and Minerals Division of the Ministry while in receipt of an OPAP grant.
6. I am aware that any other Provincial or Federal Government financial assistance received for the said application will be deducted from the amount of incurred "Total Eligible Expenses".

It is an Offence under subsection 8(1)(A) of the Ontario Mineral Exploration Program Act, R.S.O. 1990 to knowingly furnish false or misleading information.

Personal information collected on this form is obtained under the authority of the Ontario Mineral Exploration Program Act, R.S.O. 1990, Sections 2, 3 and 4 and the Ontario Prospectors Assistance Program Regulation, sections 4, 5 and 6. It will be used for the purpose of determining the eligibility of the applicant to have a program designated for financial assistance. It may be disclosed for this purpose and I consent to its disclosure for such a purpose. Questions about this collection should be directed to Senior Manager, Mines Group, Ministry of Northern Development and Mines, 4th floor, 933 Ramsey Lake Road, Sudbury, Ontario P3E 6B5, Toll free 1-800-265-0834.

Signature of Applicant Denis Chartre Date Jan 17/95

Name (print) DENIS CHARTRÉ

ONTARIO PROSPECTORS ASSISTANCE PROGRAM (OPAP)
FINAL SUBMISSION FORM 1998

P. 26

INSTRUCTIONS : Please read the guidebook before completing form
Please type or print
Submit completed form and supporting documentation by February 1, 1999 to:
OPAP, Mines Group
Ministry of Northern Development and Mines
4th floor, 933 Ramsey Lake Road, Sudbury, Ontario P3E 6B5

To be completed by successful grantees after completion of project(s) and accompanied by 2 copies of all reports and maps for each project including recent copies of claim maps with area(s) of work outlined.

****Attach your receipts to this form when you have completed it. Submit this form and attached receipts separately from your technical reports.****

Applicant ROGER DUFRESNE File Number OP 98-131

Proposed project area(s) (Twp. or claim name, latitude and longitude) (SEE PAGE 4) ("SEE ANNEX A") Completed?

1. EBY TWP CHARTRE-DUFRESNE PROPERTY #1 Yes ✓ No
2. EBY TWP CHARTRE-DUFRESNE PROPERTY #2 Yes ✓ No

(SEE PAGE 4&4A) SEE ANNEX "A"

Changes to proposed project(s) (if any)

N/A

List other co-owners of the property with OPAP grants that worked on project

DENIS CHARTRE OP. 98-132

I. WORK PERFORMED BY APPLICANT (Summary of Section IV)

1. Project #1 area/name CHARTE-DUFRESNE PROP. #1

		No. days worked by applicant
✓ Traditional prospecting	No. of samples 52	3
✓ Geological surveys	Scale HELP MAPPING	2
~~Geophysical surveys~~	Type ____ Miles/km ____	
~~Geochemical surveys~~	Type ____ # of samples ____	
~~Drilling~~	Type ____ Ft./m ____	
✓ Stripping/Trenching	Method EXCAVATOR / MANUAL	34
~~Other~~	~~Type~~ HIGH PRESSURE WATER	
✓ PROPERTY	visits	3
	TOTAL	42

Form filled out by ☒ Applicant ☐ Other (please specify) ____

Report filled out by ☒ Applicant ☒ Other (please specify) SERVICE EXPLORATION

I. WORK PERFORMED BY APPLICANT (continued))

2. Project #2 area/name CHARTRE-DUFRESNE EBX #2 — No. days worked by applicant

✓ Traditional prospecting	No. of samples	4	1
✓ Geological surveys	Scale	HELP MAPPING	
~~Geophysical surveys~~	Type	Miles/km	
~~Geochemical surveys~~	Type	# of samples	
~~Drilling~~	Type	Ft./m	
✓ Stripping/Trenching	Method	EXCAVATOR / MANUAL	11
Other	Type	~~HIGH~~ PRESSURE WATER	
		TOTAL	12

TOTAL DAYS (ALL PROJECTS) A. 54
(Attach additional sheets for additional project areas as required)

II. EXPENDITURES (total of all projects) – Summary of I and II

1. Number of working days by applicant 54
(A) x $100/day ..... $ 5400.00

2. Number of report preparation days by applicant 3
x $100/day ..... $ 300.00

3. Analyses/Assay costs 701.93 ÷ 2 ..... $ 350.96

4. Equipment rentals EXCAVATOR $ 4090.08 ÷ 2 $ 2045.04
HIGH PRESSURE WATER PUMP $ _____ $ 1260.00

5. Consumable Supplies ..... $ ~~1241.61~~

6. Contract services (state type)
SERVICE EXPLORATION $ 1712 ÷ 2 $ 856.00
..... $ _____ $ _____

# of workers _____ # of mandays worked _____

7. Travel (state method: road, air, etc.)
PROJECT #2 20 X .30X12 $ 72.00] $ 324.00
PROJECT #1 20 X .30X42 $ 252.00 $ _____

8. Food and Accommodation 57 X @20.00 ..... $ 1140.00

9. Other expenses (specify, e.g. typing, printing, shipping of supplies)
PROPANE $ 259.24
GAS/OIL FOR PUMP $ 461.97 $ 721.21

10. Helpers

# of helpers _____ # of mandays worked _____ $ _____

TOTAL EXPENDITURES ..... $ 13,638.82

ROGER

PAPER SUPPLIES

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount	SUB-TOTAL
1998 JAN 5	CARL'S OFFICE	PAPER FASTNERS	$ 9.32	
9	"	GLUE	2.33	
17	BIWAY	CARDS	1.14	
29	CARL'S OFFICE	CASE OF PAPER	52.90	
FEB 05	"	LABELS	3.05	
05	"	MAP STICKERS	1.13	
26	GIANT TIGER	NOTE PADER	1.71	
MAR 13	CARL'S OFFICE	BINDER CASE	14.14	
25	A/P	REF. PAPER	1.82	
APRIL 02	CARL'S OFFICE	CASE & ½ PAPER	79.35	$177.23
03	LOEB'S	NOTE PAPER	10.34	
MAY 16	BIWAY	STICKERS	4.59	
25	BARGAIN SHOP	CARDS & NOTE PAPER	1.71	
27	WAL-MART	PAPER	17.15	23.45
29	PAROISSE ASSOMPTION	COPIES	27.50	
SEPT 12	BARGAIN SHOP	CARD	.98	
OCT 23	CARL'S OFFICE	F. FOLDERS	11.49	
NOV 15	WAL-MART	KLEENEX	22.94	

Mileage rate claimed _____ km at 30¢/km for use of own vehicle .....

TOTAL $263.59

Attach additional sheets as required.

ROGER FIRST AID SUPPLIES

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount	
1998 FEB 8	KIRKLAND PHARMACY	BAND AIDS	19.51	SUB-TOTA
27	"	ANTISEPTIC OINTMENT	2.06	
APRIL 16	"	PORTABLE F/A KIT	9.48	31.05
MAR 28	BODY SHOP	HAND CREAM	14.83	14.83
MAY 1	BDR. DRUG MART	PAIN KILLERS	6.00	
JULY 10	K.L. PHARMACY	Q-TIPS	8.11	
NOV 12	BDR DRUGS	Q-TIPS	5.87	

Mileage rate claimed _____ km at 30¢/km for use of own vehicle ..... _____

TOTAL $ 65.86

Attach additional sheets as required.

ROGER WHITE PRINTS & MAPS

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount	SUB-TOTAL
1998 JAN 11	M NDM KIRKLAND	COPY	2.04	
MAR 23	"	WHITE PRINTS	12.65	
APR. 01	MNDM SUDBURY	"	1.15	
01	"	ERLIS MAPS	4.60	20.44
MAY 08	M. N. D. M. KIRKLAND	REPORTS	10.80	
15	"	AFFADUIT	5.10	15.90
AUG. 07	"	COPIES	1.73	
27	"	COPIES	1.73	
SEPT. 15	"	"	12.87	
15	"	"	1.73	
15	"	"	1.62	
22	"	"	4.31	
OCT 1	"	"	1.73	
06	"	"	1.73	
23	"	"	5.18	
23	"	"	5.48	
23	"	"	27.65	
24	"	"	1.73	
24	"	"	3.45	
27	"	"	6.90	
27	"	"	3.45	
28	"	"	1.84	
28	"	"	.86	

Mileage rate claimed _____ km at 30¢/km for use of own vehicle .....

TOTAL $120.33

Attach additional sheets as required.

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount	SUB-TOTAL
1998				
MARCH 13	RADIO SHACK	DELUXE BOX	20.69	
18	SPEEDY AUTO	FILTER	10.14	
25	RADIO SHACK	SCANNER HOLDER	11.49	
28	BUSINESS DEPOT	REF. BOOK	13.64	55.96
APRIL 06	ALGAR'S	BATHERY	5.75	
05	K.L. HOME CARE	PADLOCK	15.28	
17	GRANT HOME CARE	CHAIN LINKS	5.87	26.90
MAY 5	"	GLAZIER POINTS	4.98	
16	MCLENAGHAN	CLUTCH DOGS	16.64	
JUNE 04	NORTHERN AUTO	SPARK PLUGS	7.04	
06	MCNAULLS	OIL AND FILTER	62.91	
13	ROBERTSON'S	TOOLS	12.65	
26	PAUL'S NEW & USED	FILES	13.63	
26	MCLENAGHAN	PULL CORD	6.33	
26	SPEEDY AUTO	HOSE FITINGS & CLAMPS	63.59	
28	WILDFIRE	HOSE FITINGS	55.50	
JULY 10	BARGAIN SHOP	SAFETY PINS	3.44	
14	GUILLEVIN	BATHERIES	21.32	
21	MCLENAGHAN	SPRING PINS	6.00	
21	TRUCK STOP	"	3.31	
23	GRANT'S	NUTS	1.93	
24	CANADIAN TIRE	OIL ETC.	27.57	
24	GRANT'S	WASP SPRAY	5.45	
24	BARGAIN SHOP	BATHERIES	4.44	
28	PHOTO METRO	PHOTOS	16.95	
AUG 7	MCLENAGHAN	PULL CORDS	6.90	
10	GUILLEVIN	REEL OF ROPE	57.52	
13	MCLENAGHAN	PULL CORDS	6.85	
13	CANADIAN TIRE	BULB	9.19	
19	"	BUSHING AND PULLEY	14.34	
20	"	KEYS	4.48	
21	KIRKLAKE HOME CARE	MASONARY NAILS	6.38	
22	CANADIAN TIRE	ROPE STARTER 60"	2.29	
22	NORTHERN AUTO	NGK PLUGS	10.90	
26	CANADIAN TIRE	PANSELF TAP	1.37	
28	"	LOPPER - B	7.58	
30	PHOTO METRO	PITURES	11.49	
31	CANADIAN TIRE	OIL	20.70	
SEPT. 8	DUMAS' INDEPENDENT	BULBS AND GARBAGE BAGS	9.75	

Mileage rate claimed _____ km at 30¢/km for use of own vehicle .....

TOTAL $586.28

Attach additional sheets as required.

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount
1998			
SEPT 24	FERN RIVARD	ROCK SAMPLE CUTTING	$30.00
28	GRANT HOME B/C	PUMP LEATHER	7.70
OCT 9	CANADIAN TIRE	3/8 RATCHET	31.60
"	"	PULLER	
15	GRANT HOME	EAR PROTECTION	21.30
23	CANADIAN TIRE	STORAGE BOX	19.54
24	U.A.P. AUTO PARTS	HOOK + PACKING TAPE	21.29
"	"	+ HEAT SHRINK	
28	CANADIAN TIRE	NON-DET JOINTROIL	2.63
NOV. 24	PAUL'S NEW & USED	CHAIN FOR SAW	35.99
27	GRANT HOME B/C	SILICONE	14.61
DEC 03	GORDON'S STATIONERY	PENS	8.01
04	CANADIAN TIRE	LOCKEASE LOCK FL.	5.40
04	K.L. HOME CARE	PADLOCK	7.48

Mileage rate claimed _____ km at 30¢/km for use of own vehicle .....

TOTAL $205.55

Attach additional sheets as required.

ROGER **PROPANE**

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount
1998 APRIL 11	C+G GAS BAR	PROPANE	12.84
MAY 10	DELEAN'S	"	45.00
10	GOLDBELT	RENTAL	41.40
JUNE 05	DELEAN'S	PROPANE	57.00
AUG. 08	"	"	58.00
NOV. 10	"	"	45.00

Mileage rate claimed _____ km at 30¢/km for use of own vehicle .....

TOTAL $259.24

Attach additional sheets as required.

ROGER GAS AND OIL (PUMP AND ATV)

III. DETAILED LIST OF EXPENDITURES (Summarize in Section II)

Date	Recipient of Payment	Explanation	Amount
1998			
JUNE 11	PETRO-CANADA	GAS / OIL	$ 11.90
24	〃	〃	44.37
29	〃	〃	28.00
30	〃	〃	40.00
JULY 03	〃	〃	38.38
09	〃	〃	35.87
15	〃	〃	23.77
16	〃	〃	8.30
17	〃	〃	39.00
17	〃	〃	11.90
20	〃	〃	36.89
20	〃	〃	36.84
AUG. 05	〃	〃	12.00
06	〃	〃	12.00
22	〃	〃	52.44
26	〃	〃	8.25
SEPT 07	〃	〃	30.31

Mileage rate claimed _____ km at 30¢/km for use of own vehicle .....

TOTAL $461.97

Attach additional sheets as required.

IV. DAILY REPORTS (Summarize work activity in Section I)

Day	Project Area	Date	Work Performed
1	ALL AREAS	MAY 2/88	LOCATING AND MARKING AREAS
2	"	3	LOCATING AND MARKING AREAS
3	"	9	BRUSHING AROUND PITS AND TRENCHES
4	"	10	BRUSHING AROUND PITS AND TRENCHES
5	"	JUNE 26	SUPERVISING CONTRACTOR + MANUAL STRIPPING
6	"	29	"
7	"	30	" EXCAVATOR
8	"	JULY 1	"
9	CLAIM 1186492	10	CUTTING TRAIL TO CREEK
10	"	11	"
11	CL-1225485 + 1186492	12	SETTING PUMP + HOSE ECT.
12	CL 1121438 + 1186492 +	JULY 15	MANUAL & POWER STRIPPING
13	+ 1225485	16	"
14	"	17	"
15	"	18	"
16	"	25	"
17	"	26	"
18	"	27	"
19	"	28	"
20	"	31	"
21	"	32	"
22	"	33	"
23	"	AUG 1	"
24	"	2	"
25	"	3	"
26	"	4	"
27	"	7	"
28	"	8	"
29	"	9	"
30	"	10	"
31	"	11	"
32	ALL AREAS	12	VISIT BY HOWARD LOVELL
33	CL-1225485 + 1186492 +	15	MANUAL & POWER STRIPPING
34	+ 1225485	16	" " "
35	"	17	"
36	"	18	"
37	"	21	"
38	"	22	"
39	"	23	"
40	"	24	"
41	"	25	"
42	ALL AREAS	26	TAKING OUT EQUIPMENT

(Attach additional sheets as required)

IV. DAILY REPORTS (Summarize work activity in Section I)

Day	Project Area	Date	Work Performed
43	ALL AREAS	AUG 27/98	PROPERTY VISIT BY GERHARD MEYER
44	"	AUG 29	ESTABLISHING GRID LINES
45	"	30	"
46	"	31	CHANNEL SAMPLING
47	"	SEPT 6	"
48	"	9	VISIT BY GLOBEX
49	"	12	TAKING SAMPLES
50	"	16	TAKING SAMPLES
51	"	19	DOING GRIDS FOR MAPPING
52	"	20	"
53	"	OCT 3	HELP MAP WITH SERVICE EXPL.
54	"	4	"
55	"	JAN 15	REPORT PREPARATION
56	"	" 16	"
57	"	" 17	"
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			

(Attach additional sheets as required)

V. SIGNIFICANT RESULTS (please complete)

Project Area	New Showings and/or Anomalies	Commodity	Best Analyses
PROPERTY #1	COLUMNAR JOINTING AND		BRECCIATED ZONE (POSSIBLE INDUSTRIAL MINERAL)
PROPERTY #2	FAVOURABLE ENVIRONMENT FOR COPPER, ZINC AND GOLD		

VI. CLAIMS STAKED DURING/AFTER PROSPECTING ACTIVITY (please complete)

Project Area	Claim Numbers	Number of Claim Units
N/A		

VII. OPTION AGREEMENT RESULTING FROM OPAP PROJECT (please complete)

Optionee	Property/Claims	Work Commitment
N/A AT THIS TIME		

The Ministry of Northern Development and Mines may verify all statements related to and made herein this application.

1. I am the person named in the Final Submission form under the Ontario Prospectors Assistance Program.
2. I am ordinarily a resident of Canada.
3. I have complied with all requirements of the said program.
4. I understand that it is an offence under the Ontario Mineral Exploration Program Act, R.S.O. 1990, to make a false or misleading statement and that all statements and all other information submitted in support of the said application are true and correct.
5. I was not employed by the Mines and Minerals Division of the Ministry while in receipt of an OPAP grant.
6. I am aware that any other Provincial or Federal Government financial assistance received for the said application will be deducted from the amount of incurred "Total Eligible Expenses".

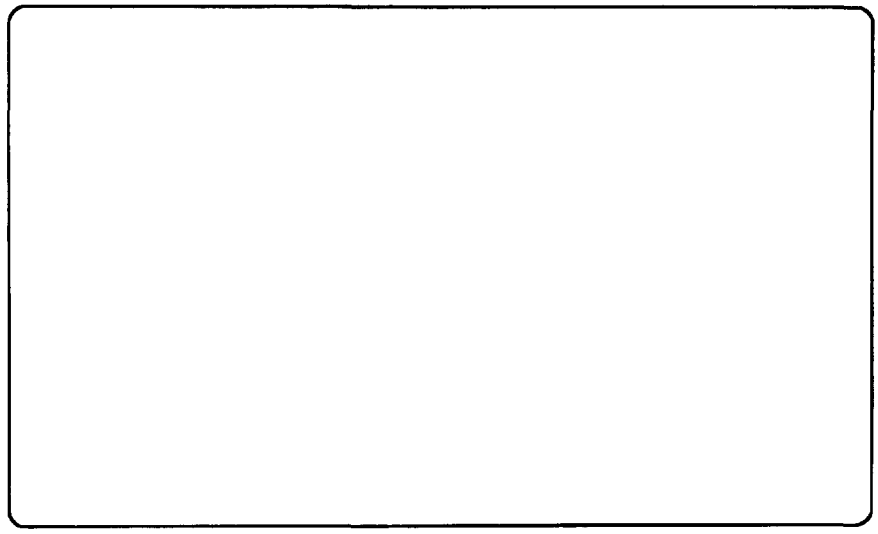
It is an Offence under subsection 8(1)(A) of the Ontario Mineral Exploration Program Act, R.S.O. 1990 to knowingly furnish false or misleading information.

Personal information collected on this form is obtained under the authority of the Ontario Mineral Exploration Program Act, R.S.O. 1990, Sections 2, 3 and 4 and the Ontario Prospectors Assistance Program Regulation, sections 4, 5 and 6. It will be used for the purpose of determining the eligibility of the applicant to have a program designated for financial assistance. It may be disclosed for this purpose and I consent to its disclosure for such a purpose. Questions about this collection should be directed to Senior Manager, Mines Group, Ministry of Northern Development and Mines, 4th floor, 933 Ramsey Lake Road, Sudbury, Ontario P3E 6B5, Toll free 1-800-265-0834.

Signature of Applicant Roger Dufresne Date JANUARY 17, 1999

Name (print) ROGER DUFRESNE

P.31



SERVICES EXPLORATION ENR.

765, Boul. Québec, Rouyn-Noranda, Qué. J9X 7A9. Tél. (819) 797-0853
SANS FRAIS: Tél. 1-800-567-6053 Fax: 1-800-661-1848

PROSPECTING PROGRAM

CHARTRE-DUFRESNE OPAP PROJECT

EBY TOWNSHIP

December 1998

TABLE OF CONTENTS

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MAPS

1 – Claim Map	1 : 12 500
2 – Geology Map	1 : 31 680
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4 – Location Map	1 : 1 000 000

I – INTRODUCTION:

This report, written at the request of D. Chartré and R. Dufresne, describes the PROSPECTING program carried out on two blocks of claims located in the eastern area of Eby township, Ontario.

The prospecting project was undertaken within the framework of a 1998 OPAP program. The stripping, trenching and sampling was carried out along rusty and carbonated zones which had been previously identified by the early prospectors in their search for GOLD.

II – PROPERTY:

Prospecting was carried out on two claim blocks which are briefly described as folllows:

Claim block (A): 6 sixteen hectare claims.

Claim number	Concession no.	Lot no.
14098	IV – N ½	3 – SW ¼
14099	IV – N ½	4 – SE ¼
16679	IV – N ½	4 – SW ¼
1186492	IV – N ½	4 – NE ¼
1225485	V – S ½	4 – SE ¼
1214384	V – S ½	4 – SW ¼

Claim block (B): 4 sixteen hectare claims

Claim number	Concession no.	Lot no.
18958	IV – S ½	1 – NW ¼
1205843	IV – S ½	1 – NE ¼
1214382	IV – S ½	1 – SE ¼
1214385	IV – S ½	1 – SW ¼

III – LOCATION & ACCESSIBILITY:

The CHARTRE-DUFRESNE claim blocks are located in the eastern area of EBY twp. at an approximate distance of 13 Km southwest of Kirkland Lake, Ontario.

From Kirkland Lake, claim block (A) may be reached by driving south-westwards along highway 66 for a distance of 12 Km to the intersection of highways 11 and 66, then southwards for an additional distance of 2 Km.

Claim block (B) may be reached by driving southeastwards along highway 11 for a distance of 4 Km, from the intersection of highways 66 and 11.

IV – GEOLOGICAL SETTING:

Both claim blocks are located within a 5 – 6 Km wide volcanic belt trending east – northeast bordering the west and northern limits of the Round Lake intrusive. Basalt is the dominant rock type of the area; other volcanic units

And minor iron formations are also present. These have been intruded by a number of small bodies of diorite and syenite.

The Larder Lake fault zone is presumed to cross the northern part of Eby township, in the vicinity of highway 66.

V – ECONOMIC GEOLOGY :

The general area south of the railroad hosts a number of GOLD occurrences which have been discovered by the early prospectors, including two former producers, namely the Baldwin Consolidated Mines Ltd. and the Crescent Kirkland Gold Mines Ltd.

VI – PROSPECTING PROGRAM :

Seven « areas » have been prospected within the framework of the 1998 OPAP program; the prospecting was carried out during the months of July to October, 1998 on two claim blocks located in the eastern area of EBY township.

The prospecting consisted of stripping and trenching with a mechanical shovel; exposed outcrops and « showings » were then cleaned by a fire hose. Zones of interest were then sampled and assayed. The « areas » prospected are briefly described as follows :

AREA 1 : (Claim Block A)

A total length of 500 meters was exposed by stripping within « area 1 ». This area was prospected to expose a 25 m wide carbonated and rusty zone trending northeasterly.

The altered pillowed basalt hosts a 1 to 8 meter wide felsic breccia unit which is bounded to the northwest by a narrow but definite fault zone. The stripping has also exposed non altered pillowed and massive basalt To the northwest and diorite to the southeast.

The rocks within the altered and carbonated zone are rusty, fractured and sheared. Even though the surface exposures are rusty, pyrite is relatively rare. Of the 52 samples assayed in this area, no significant GOLD values have been obtained.

AREAS 2, 3 & 4 : (Claim block A)

The local diorite intrusive located south of « area 1 » has also been exposed along stripped « areas 2 & 3 » in the northern part of claim 14099 and also along « area 4 » located in the southern part of claim 1186492.

A total of 150 meters have been stripped exposing fine grained, massive diorite containing a few narrow quartz veins, a few shear zones and occasional patches of disseminated pyrite.

No significant GOLD values were obtained from the 5 samples taken.

AREAS 5, 6 & 7 : (Claim Block B)

Three outcrop areas have been stripped along an access road located in the northwestern part of claim 18958. The stripping along « areas 5 and 6 » exposed pillowed basalts containing occasional rusted shear zones.

Stripped « area 7 » exposed a felsic volcanic unit containing approximately 15% disseminated pyrite.

No significant GOLD values were obtained from the 4 samples assayed.

VII – CONCLUSIONS & RECOMMENDATIONS :

Even though « AREA 1 » consists of a relatively large zone of alteration, a pronounced fault zone and minor quartz and pyrite, the area seems to be devoid of GOLD mineralization.

AREAS 2, 3 and 4 appear to host no significant mineralization – the diorite exposed is massive and contains only a few non-mineralized quartz veins

AREAS 5, 6 and 7 do contain rusty areas. The pyrite content and the rock type of « area 7 » (felsic volcanic) indicates the presence of a favourable environment for COPPER, ZINC and GOLD.

Of all the « areas » prospected, « area 7 » appears to be the most promissing for further exploration. It is recommended that an Induced Polarization survey be carried out, along strike, in a NE-SW direction; this area, which is mostly covered by overburden, has not been the object of past exploration.

Respectfully submitted :

E. A. Chartré, B.A., B. Sc. : _____ **December 30,1998**

APPENDIX (A)

ASSAY CERTIFICATES

Swastika Laboratories

A Division of TSL/Assayers Inc.

Assaying - Consulting - Representation

Established 1928

Geochemical Analysis Certificate

8W-2150-RG1

Company: **QUEENSTON MINING INC**

Date: AUG-04-98

Project:

Attn: M.McGill

We hereby certify the following Geochemical Analysis of 6 Rock samples submitted JUL-29-98 by .

Sample Number	Au PPB	Au Check PPB	Cu PPM
53238	Nil	2	-
53239	Nil	-	-
53240	Nil	-	187
53241	Nil	-	-
53242	Nil	-	-
53243	14	12	-
Blank	Nil	-	-
STD TT-15	665	-	-

One assay ton portion used.

Certified by _____

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

Swastika Laboratories

A Division of TSL/Assayers Inc.

Assaying - Consulting - Representation

Established 1928

Geochemical Analysis Certificate

8W-2666-RG1

Company: **R. DUFRESNE**
Project: OPAP-98
Attn: R. Dufresne

Date: SEP-15-98

We hereby certify the following Geochemical Analysis of 46 Rock/Channel samples submitted SEP-10-98 by .

Sample Number	Au PPB	Au Check PPB	Au oz/ton	Au Check oz/ton
201	9	-	<0.001	-
202	Nil	-	<0.001	-
203	12	-	<0.001	-
204	Nil	2	<0.001	<0.001
205	Nil	-	<0.001	-
206	21	-	<0.001	-
207	10	3	<0.001	<0.001
208	5	-	<0.001	-
209	19	-	<0.001	-
210	9	-	<0.001	-
211	10	-	<0.001	-
212	2	-	<0.001	-
213	5	-	<0.001	-
214	7	-	<0.001	-
215	2	-	<0.001	-
216	2	-	<0.001	-
217	2	-	<0.001	-
218	7	5	<0.001	<0.001
219	12	-	<0.001	-
220	2	-	<0.001	-
221	Nil	-	<0.001	-
222	Nil	-	<0.001	-
223	7	-	<0.001	-
224	2	-	<0.001	-
225	9	Nil	<0.001	<0.001
226	Nil	-	<0.001	-
227	2	-	<0.001	-
228	2	-	<0.001	-
229	Nil	-	<0.001	-
230	Nil	-	<0.001	-

One assay ton portion used.

Certified by G. Leboss

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

Established 1928

Swastika Laboratories

A Division of TSL/Assayers Inc.

Assaying - Consulting - Representation

Geochemical Analysis Certificate

8W-2666-RG1

Company: **R. DUFRESNE**
Project: OPAP-98
Attn: R. Dufresne

Date: SEP-15-98

We hereby certify the following Geochemical Analysis of 46 Rock/Channel samples submitted SEP-10-98 by .

Sample Number	Au PPB	Au Check PPB	Au oz/ton	Au Check oz/ton
231	3	-	<0.001	-
232	3	-	<0.001	-
233	5	-	<0.001	-
234	3	-	<0.001	-
235	2	-	<0.001	-
236	Nil	-	<0.001	-
237	Nil	5	<0.001	<0.001
238	2	-	<0.001	-
239	Nil	-	<0.001	-
240	2	-	<0.001	-
241	Nil	-	<0.001	-
242	7	-	<0.001	-
243	Nil	Nil	<0.001	<0.001
244	2	-	<0.001	-
245	3	-	<0.001	-
246	2	-	<0.001	-

One assay ton portion used.

Certified by G. Leboss

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

Swastika Laboratories

A Division of TSL/Assayers Inc.

Established 1928

Assaying - Consulting - Representation

Geochemical Analysis Certificate

8W-2768-RG1

Company: **R. DUFRESNE**
Project: OPAP-98
Attn: R. Dufresne

Date: SEP-22-98

We hereby certify the following Geochemical Analysis of 9 Rock/Channel samples submitted SEP-17-98 by .

Sample Number	Au PPB	Au Check PPB	Au oz/ton	Au Check oz/ton	Rare Earth	WRA -
247	2	-	<0.001	-	Results	Results
248	3	2	<0.001	<0.001	to	to
249	2	-	<0.001	-	follow	follow
250	3	-	<0.001	-		
251	2	5	<0.001	<0.001		
252	Nil	-	<0.001	-		
253	2	-	<0.001	-		
254	7	-	<0.001	-		
255	7	-	<0.001	-		

One assay ton portion used.

Certified by G. Leboss

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

Swastika Laboratories
1 Cameron Ave., Swastika, Ontario
PHONE (705) 642-3244 FAX (705) 642-3300

R. DUFRESNE
Attention: R. Dufresne
Project: OPAP-98
Sample: Rock

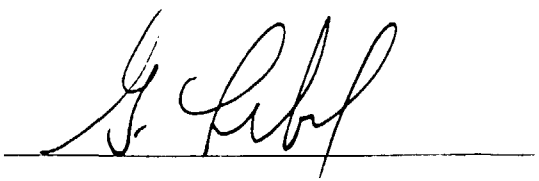
Report No : 8W2920 RL
Date : Oct-09-98

ICP Whole Rock Assay

Fusion Analysis

Sample Number	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	Na_2O %	TiO_2 %	K_2O %	MnO %	P_2O_5 %	LOI %	Ba ppm	Sr ppm	Zr ppm	Sc ppm	Y ppm	Be ppm	Co ppm	Cr ppm	Cu ppm	Ni ppm	V ppm	Zn ppm	Rb %	Nb ppm	Total %
56	63.34	8.91	6.93	6.11	3.75	0.59	0.40	0.05	0.14	0.16	9.22	10	80	40	10	10	5	15	515	35	85	315	125	<0.01	20	99.72

Sample is fused with Lithium Metaborate or Sodium Peroxide and dissolved with either HNO3 or HCl respectively

Signed 

Swastika Laboratories
1 Cameron Ave., Swastika, Ontario
PHONE (705) 642-3244 FAX (705) 642-3300

R. DUFRESNE
Attention: R. Dufresne
Project: OPAP-98
Sample: Rock/Channel

Report No : 8W2768 RL
Date : Sep-25-98

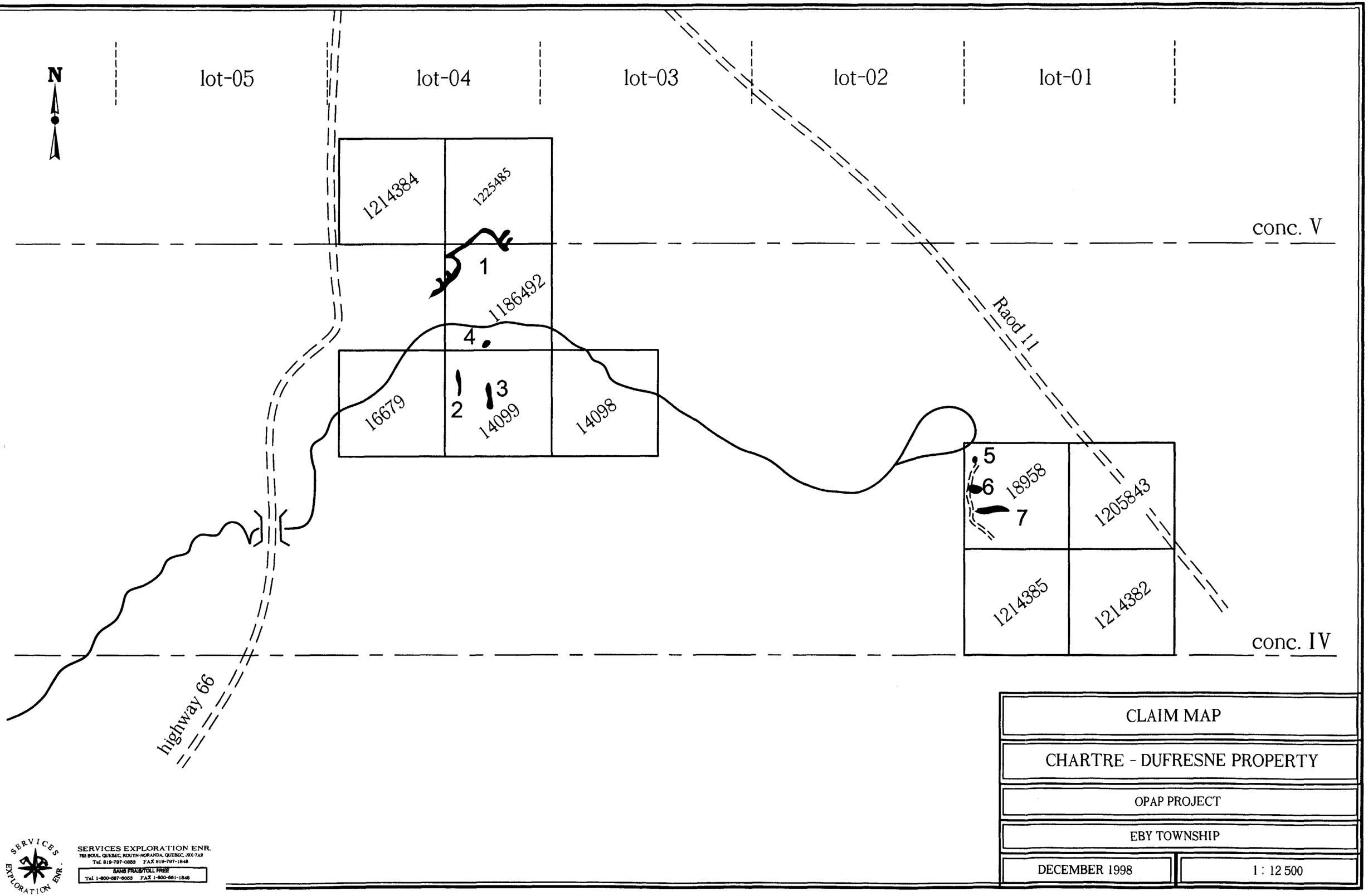
ICP Whole Rock Assay

Fusion Analysis

Sample Number	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	Na_2O %	TiO_2 %	K_2O %	MnO %	P_2O_5 %	LOI %	Ba ppm	Sr ppm	Zr ppm	Sc ppm	Y ppm	Be ppm	Co ppm	Cr ppm	Cu ppm	Ni ppm	V ppm	Zn ppm	Rb %	Nb ppm	Total %
252	43.23	11.79	11.57	8.70	4.85	3.86	0.88	0.73	0.20	0.10	13.47	1040	130	60	25	20	5	30	300	80	55	205	70	<0.01	<10	99.59

Sample is fused with Lithium Metaborate or Sodium Peroxide and dissolved with either HNO3 or HCl respectively

Signed



SERVICES EXPLORATION ENR.
785 BOUL. QUEBEC, ROUYN-NORANDA, QUEBEC, J9X-7A9
Tel. 819-797-0853 FAX 819-797-1848
SANS FRAIS/TOLL FREE
Tel. 1-800-567-6053 FAX 1-800-561-1848

CLAIM MAP

CHARTRE - DUFRESNE PROPERTY

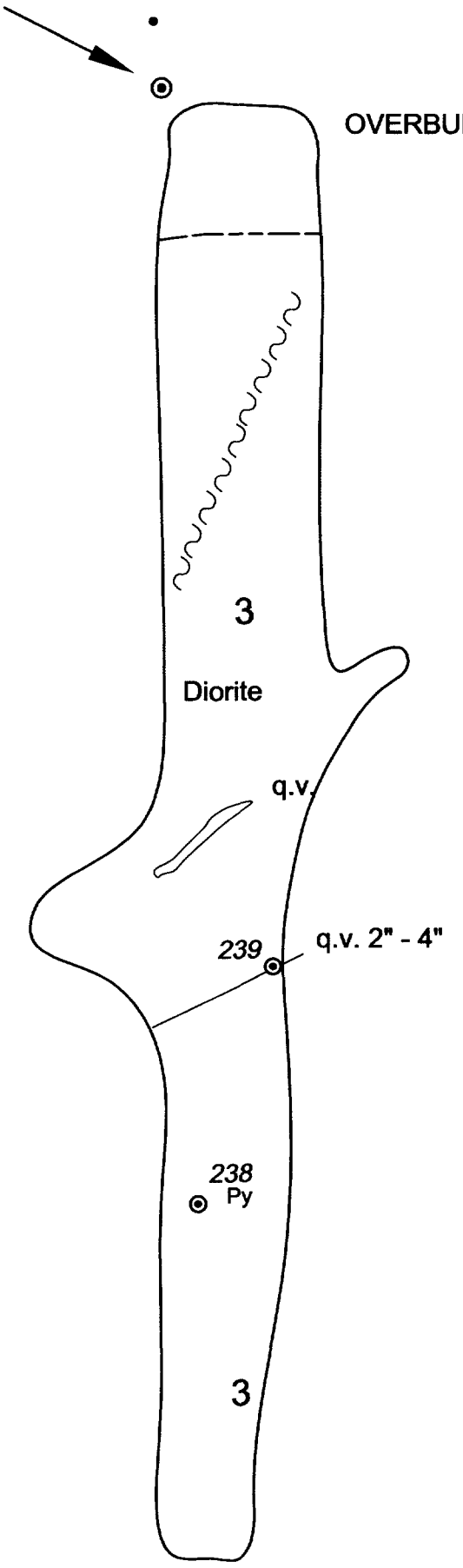
OPAP PROJECT

EBY TOWNSHIP

DECEMBER 1998 | 1 : 12 500

N

This point is at 26 m east
and 61 m south of picket #4
claim 14099



Area # 2

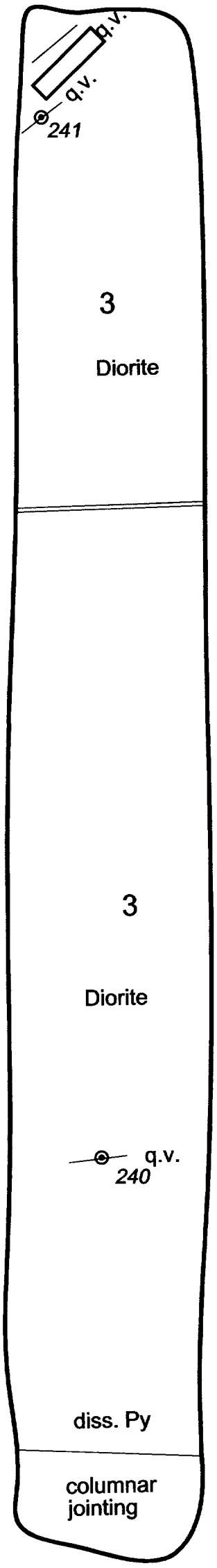
LEGEND

∿∿∿∿	Fault zone
⊙ 246	Samples
= = =	Road
Py	Pyrite
———	Stripped area

AREA OF STRIPPING & TRENCHING AREA 2
CHARTRE - DUFRESNE PROPERTY
OPAP PROJECT
EBY TOWNSHIP
DECEMBER 1998 | 1: 250

N

This point is at 149 m east and 124 m south of # post claim 14099

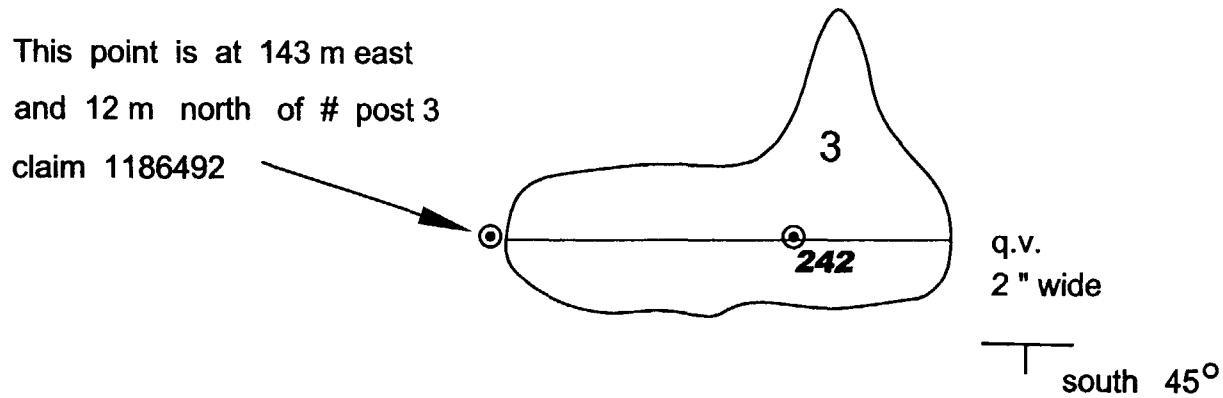


LEGEND

- Fault zone
- 246 Samples
- Road
- Py Pyrite
- Stripped area

Area # 3

AREA OF STRIPPING & TRENCHING AREA 3
CHARTRE - DUFRESNE PROPERTY
OPAP PROJECT
EBY TOWNSHIP
DECEMBER 1998 | 1: 250





Area # 4

LEGEND

∿∿∿∿	Fault zone
⊙ 246	Samples
= = =	Road
Py	Pyrite
———	Stripped area

AREA OF STRIPPING & TRENCHING AREA 4	
CHARTRE - DUFRESNE PROPERTY	
OPAP PROJECT	
EBY TOWNSHIP	
DECEMBER 1998	1: 250



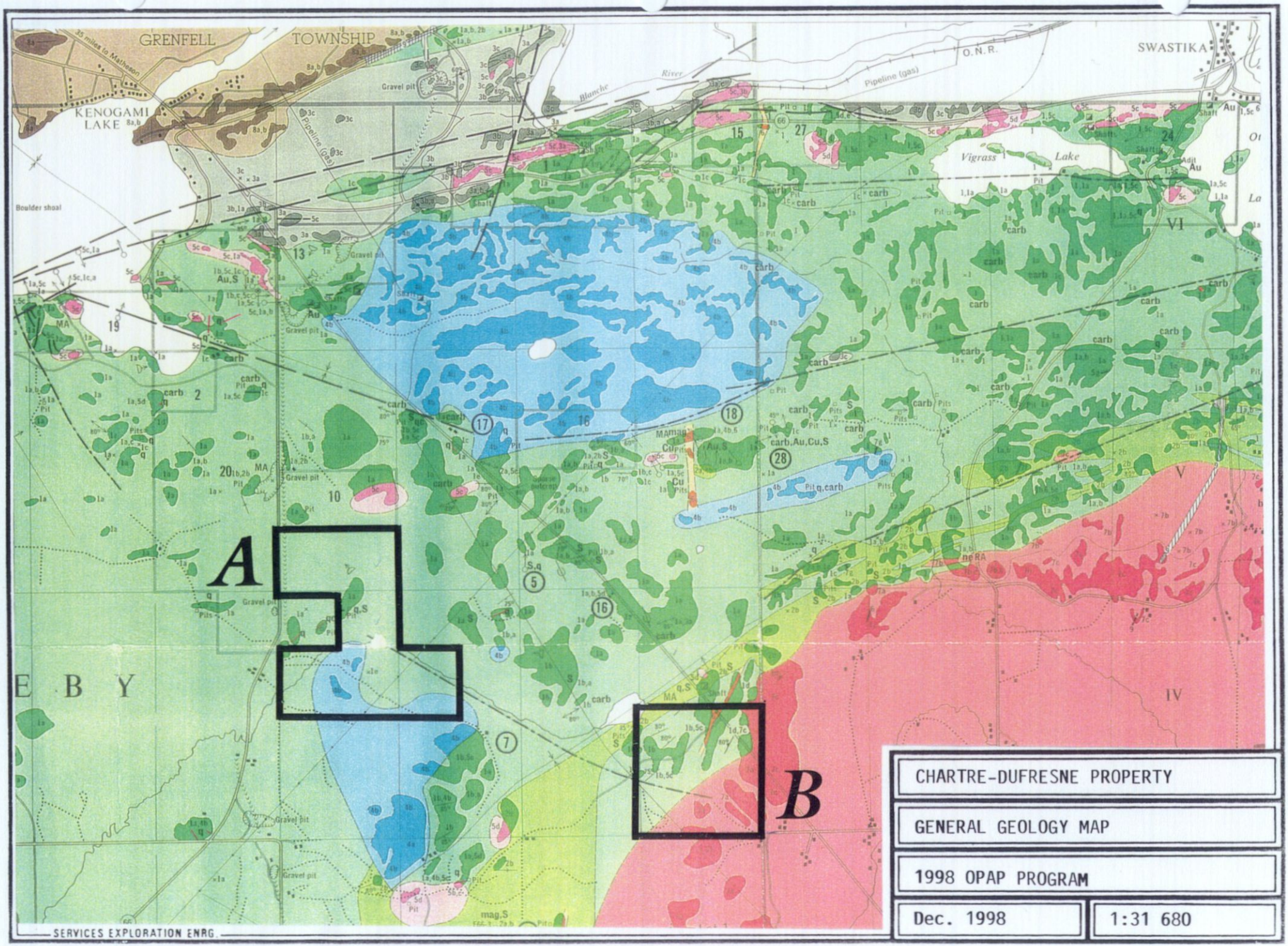
FELSIC BRECCIA (fresh exposure)

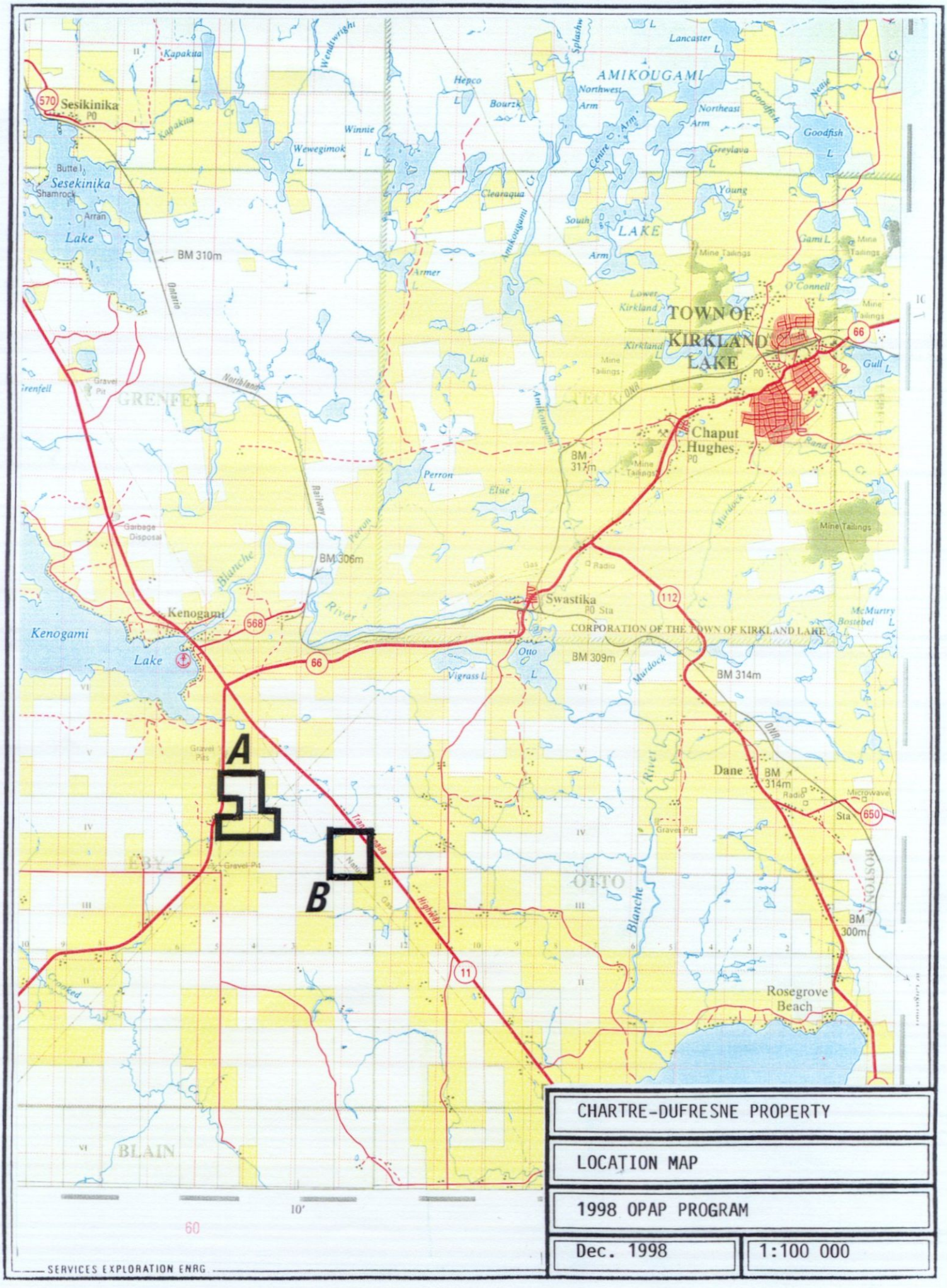


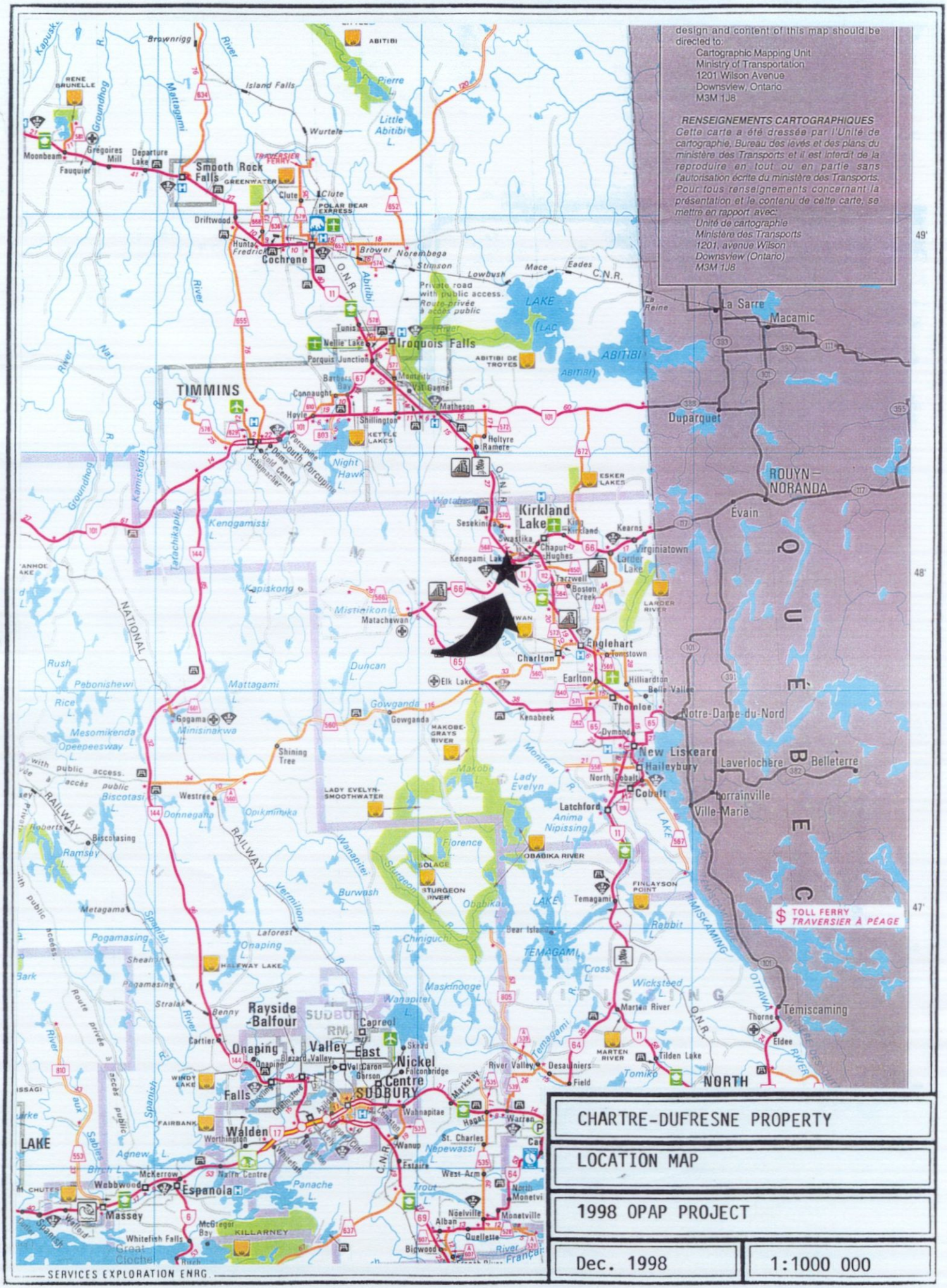
FELSIC BRECCIA (rusty,carbonated)

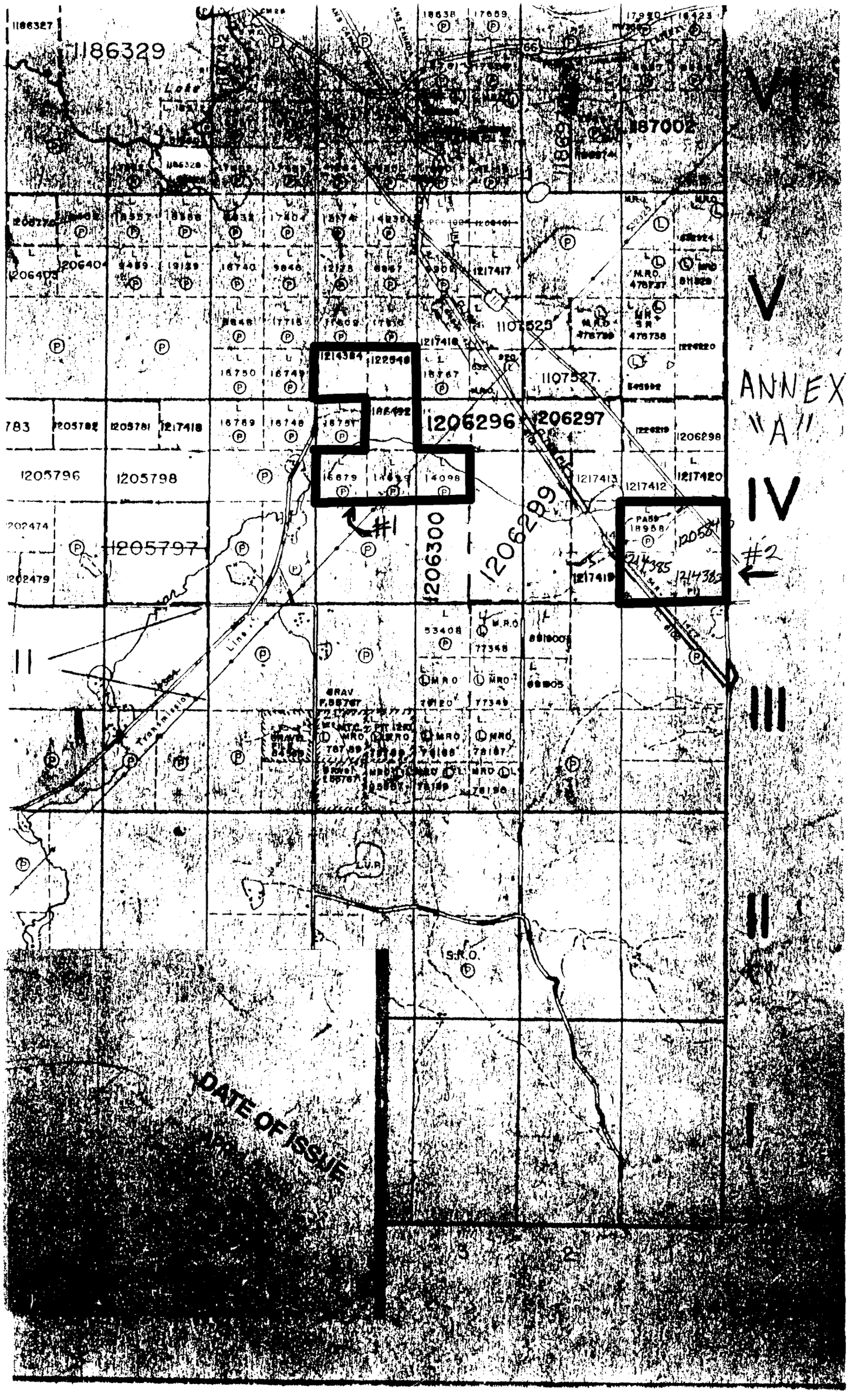


NARROW FAULT ADJACENT TO BRECCIA


GRENFELL TOWNSHIP
35 miles to Matheson
KENOGAMI LAKE
Gravel pit
Pipeline (gas)
Blanche River
O.N.R.
SWASTIKA
Vigrass Lake
Boulder shoal
A
B
E B Y
SERVICES EXPLORATION ENRG.
CHARTRE-DUFRESNE PROPERTY
GENERAL GEOLOGY MAP
1998 OPAP PROGRAM
Dec. 1998
1:31 680


CHARTRE-DUFRESNE PROPERTY
LOCATION MAP
1998 OPAP PROGRAM
Dec. 1998
1:100 000
A
B
TOWN OF KIRKLAND LAKE
CORPORATION OF THE TOWN OF KIRKLAND LAKE
Sesikinika
Kenogami Lake
Swastika
Chaput Hughes
Dane
Rosegrove Beach
AMIKOUGAMI
LAKE
OTTO
BLAIN
GRENFELL
BM 310m
BM 306m
BM 317m
BM 309m
BM 314m
BM 314m
BM 300m
Ontario Northland Railway
Trans-Canada Highway
Blanche River
Perron
Amikougami Cr.
Kapakua
Wendlwright
Hepco
Bourzk
Winnie
Wewegimok L.
Clearaqua
Armer
Lois L.
Else L.
Vigrass L.
Otto L.
Lancaster L.
Splashw
Goodfish L.
Greylava L.
Young L.
Gami L.
O'Connell L.
Gull L.
Lower Kirkland L.
Kirkland L.
Mine Tailings
Garbage Disposal
Gravel Pit
Microwave Sta
Radio
Natural Gas
Crooked
Butte I.
Shamrock
Arran
Rand
Murdock
McMurtry
Bostebel L.
Northwest Arm
Northeast Arm
Centre Arm
South Arm
570
568
66
112
650
11
10'
60
SERVICES EXPLORATION ENRG


design and content of this map should be directed to:
Cartographic Mapping Unit
Ministry of Transportation
1201 Wilson Avenue
Downsview, Ontario
M3M 1J8
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Ministère des Transports
1201, avenue Wilson
Downsview (Ontario)
M3M 1J8
TIMMINS
Kirkland Lake
Iroquois Falls
Cochrane
Smooth Rock Falls
Englehart
Charlton
Matachewan
Kenogami Lake
Swastika
Chaput-Hughes
Tarzwell
Boston Creek
Virginiatown
Kearns
Larder Lake
Sesekinika
Val Gagné
Matheson
Shillington
Heaslip
Connaught
Porquis Junction
Tunis
Nellie Lake
Driftwood
Clute
Moonbeam
Gregoires Mill
Departure Lake
Fauquier
Island Falls
Wurtele
Little Abitibi L.
Pierre L.
Brownrigg
Groundhog R.
Mattagami River
Abitibi River
Night Hawk L.
Kamiskotia
Tatachikapika
Kapiskong L.
Mistinikon L.
Rush L.
Pebonishewi
Rice L.
Mesomikenda L.
Opeepeesway L.
Biscotasi L.
Ramsay L.
Roberts
Biscotasing
Sark
Metagama
Pogamasing L.
Onaping L.
Shearer
Stralak
Benny
Cartier
Rayside-Balfour
Onaping
Valley East
Capreol
Skead
Nickel Centre
Falconbridge
Val Caron
Gerson
Blezard Valley
Hanmer
Chelmsford
Dowling
Azilda
Lively
Coniston
Wahnapitae
Hagar
Warren
St. Charles
Nepewassi
Wanup
Estaire
West Arm
Monetville
Noelville
Alban
Quellette
Bigwood
Field
Desaulniers
River Valley
Tomiko
Marten River
Tilden Lake
Temagami
Cross L.
Wicksteed L.
Rabbit L.
Bear Island
Thorne
Eldee
Témiscaming
Ville-Marie
Lorrainville
Belleterre
Laverlochère
Notre-Dame-du-Nord
Haileybury
New Liskeard
North Cobalt
Cobalt
Latchford
Dymond
Thornloe
Earlton
Elk Lake
Hilliardton
Belle Vallee
Tomstown
Englehart
Gowganda
Kenabeek
Matachewan
Duparquet
La Sarre
Macamic
Rouyn-Noranda
Évain
Val-d'Or
Malartic
Amos
Barraute
Senneterre
Lebel-sur-Quévillon
Chibougamau
Chapais
Chibougamau
Matagami
Joutel
Gogama
Minisinakwa
Westree
Donnegana L.
Opikiminika
Shining Tree
Lady Evelyn-Smoothwater
Makobe-Grays River
Obabika River
Sturgeon River
Solace
Florence L.
Anima Nipissing L.
Finlayson Point
Temagami
Lake Temiskaming
Ottawa River
Montreal River
Wanapitei L.
Maskinonge L.
Burwash
Vermillion R.
Onaping R.
Chiniguchi R.
Obabika L.
Halfway Lake
Laforest
Whitefish Falls
Great Clochet
Killarney
McGregor Bay
Massey
Webbwood
McKerrow
Espanola
Nairn Centre
Panache L.
Trout L.
Agnew L.
Birch L.
Sabine L.
Fairbank
Walden
Worthington
Windy Lake
Falconbridge
Centre
Sudbury
Sudbury RM
Lake Nipissing
Nipissing
Temagami
Marten River
Tomiko
North
Lake
Issagi
Spanish River
Route privée
Private road with public access.
Route privée à accès public
Polar Bear Express
Traversier Ferry
Abitibi de Troyes
Kettle Lakes
Esker Lakes
Larder River
Makobe-Grays River
Lady Evelyn-Smoothwater
Halfway Lake
Finlayson Point
$ TOLL FERRY
$ TRAVERSIER À PÉAGE
Québec
Ontario
C.N.R.
O.N.R.
National Railway
Railway
Services Exploration Enrg.
CHARTRE-DUFRESNE PROPERTY
LOCATION MAP
1998 OPAP PROJECT
Dec. 1998
1:1000 000
49'
48'
47'


1186329
1186327
1187002
1107525
1107527
1206296
1206297
1206299
1206300
1214384
1214385
1214382
1205796
1205798
1205797
1217412
1217413
1217420
1217419
ANNEX "A"
#1
#2
I
II
III
IV
V
DATE OF ISSUE
APR.

Ontario Ministry of Northern Development and Mines
Mines and Minerals Division

M-0345 - EBY - LARDER LAKE Division

Zoom Tools
help

PAN

Zoom Level GO

help

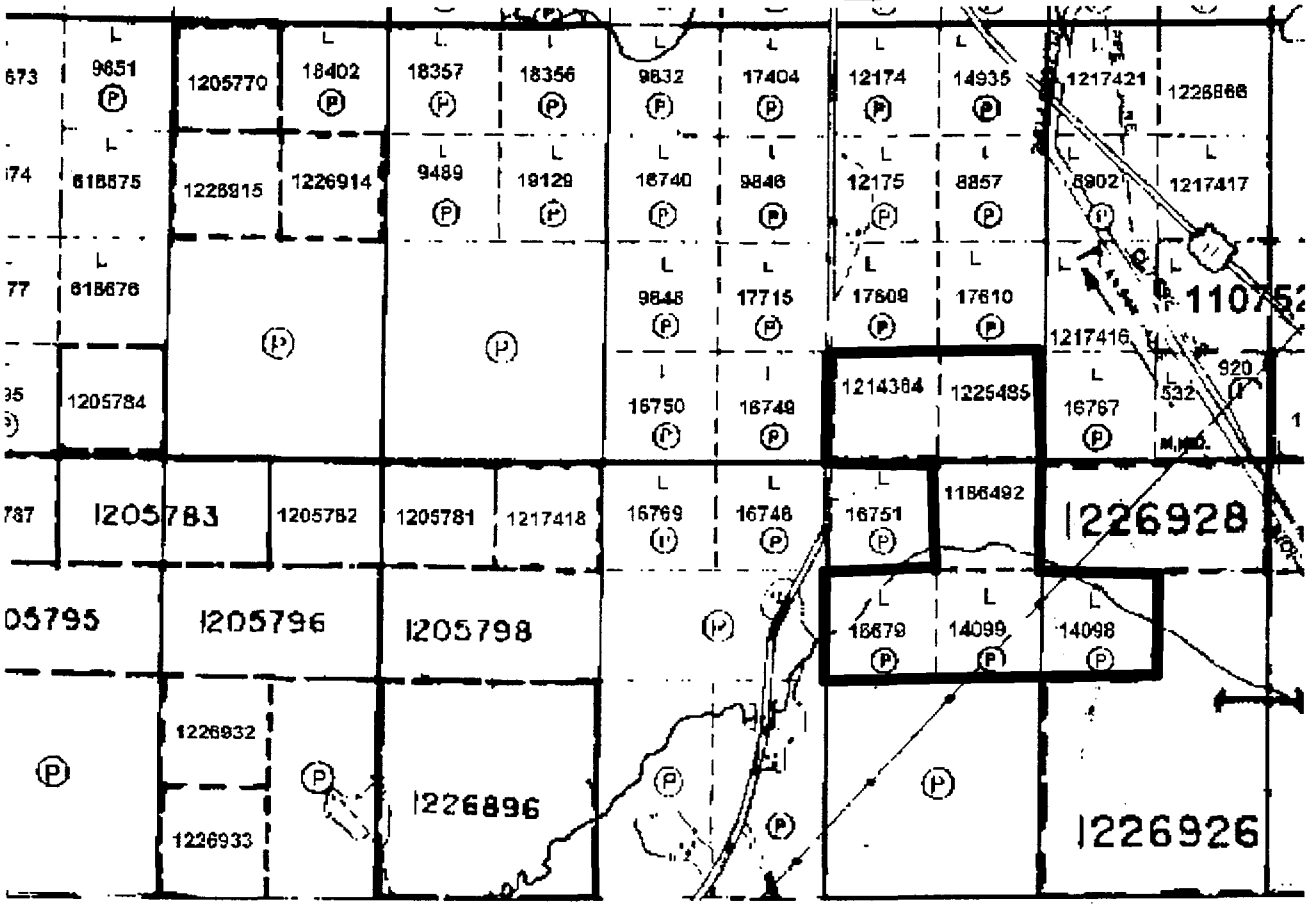
Adjacent Map

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Ontario

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ANNEX "A"

Ontario Ministry of Northern Development and Mines
Mines and Minerals Division

M-0345 - EBY - LARDER LAKE Division

Zoom Tools
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PAN

Zoom Level GO

help

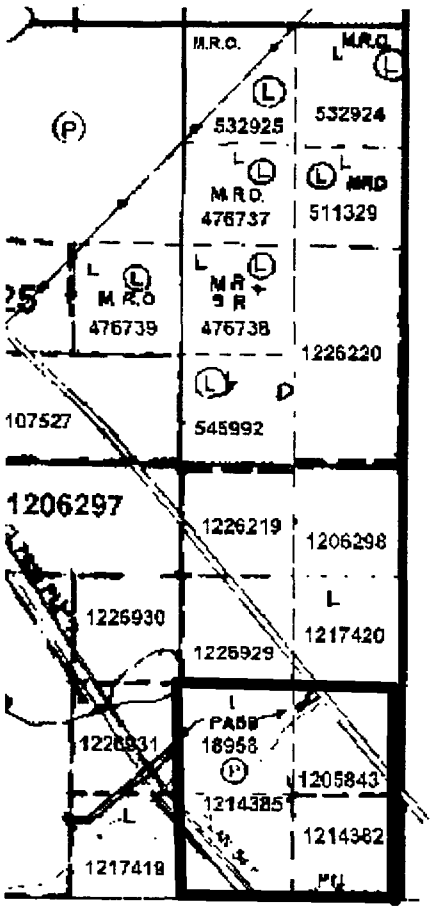
Adjacent Map

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Downl Scale i Do



V

IV

Twp. M.379

SCALE: 1-INCH

LEGI

PATENTED LAND
CROWN LAND SALE
LEASES
LOCATED LAND
LICENSE OF OCCUPATIC
MINING RIGHTS ONLY
SURFACE RIGHTS ONLY
ROADS
IMPROVED ROADS
KING'S HIGHWAYS
RAILWAYS
POWER LINES
MARSH OR MUSKEG
MINES

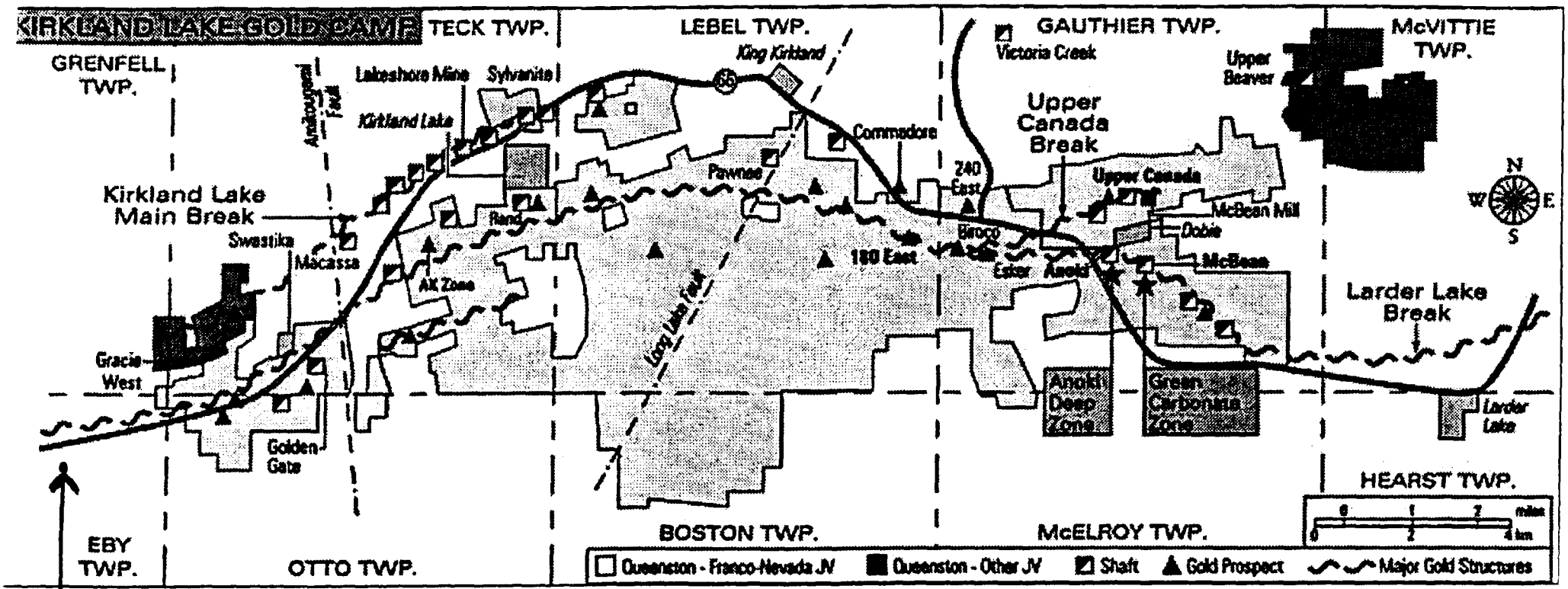
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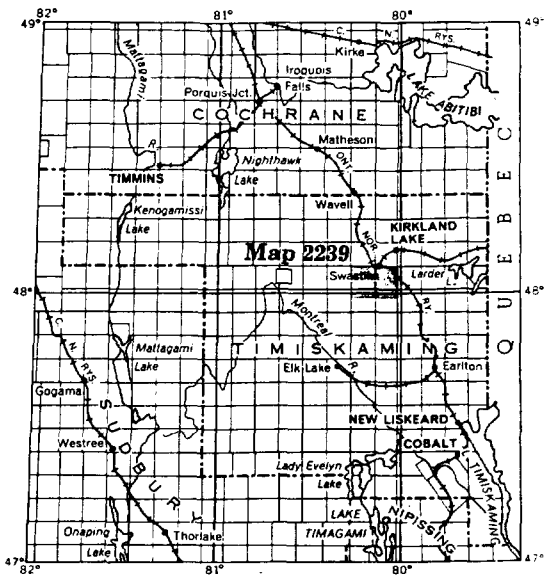


CHARTRE-DUFRESNE 1998 PROPERTY

ANNEX "A-1"

Map 2239
Eby—Otto Area

ANNEX "A-1A"



Scale, 1 inch to 50 miles

N. T. S. reference 41P/16, 42A/1

LEGEND

CENOZOIC[a]

PLEISTOCENE AND RECENT

Silt, clay, sand, gravel.

UNCONFORMITY

PRECAMBRIAN[b]

PROTEROZOIC

LATE MAFIC INTRUSIVE ROCKS (NIPISSING OR KEWEENAWAN)

9 Diabase.

INTRUSIVE CONTACT

HURONIAN

COBALT GROUP

GOWGANDA FORMATION

8a Conglomerate.
8b Arkose, greywacke, argillite.

UNCONFORMITY

ALKALIC INTRUSIVE ROCKS

7a Coarse-grained syenite, syenite porphyry, pegmatite.
7b Mafic syenite, syenite contaminated by country rocks.
7c Medium-grained syenite, aplite dikes.
7d Syenite with numerous xenoliths and autoliths.
7e Lamprophyre.
7f Quartz syenite, granite.
7g Diorite.

INTRUSIVE CONTACT

MAFIC INTRUSIVE ROCKS (MATACHEWAN OR NIPISSING)

6 Diabase.

INTRUSIVE CONTACT

FELSIC INTRUSIVE ROCKS (ALGOMAN)

5a Granite, porphyritic granite, granodiorite.
5b Granodioritic gneiss.
5c Syenite and trachyte.
5d Mafic syenite and mafic trachyte.

INTRUSIVE CONTACT

EARLY MAFIC AND ULTRAMAFIC ROCKS (HAILEYBURIAN, EARLY ALGOMAN, AND KEEWATIN)

4a Serpentinite, peridotite.
4b Gabbro, diorite.

INTRUSIVE CONTACT

METASEDIMENTS (TIMISKAMING AND KEEWATIN)

3a Conglomerate.
3b Quartzite, greywacke.
3c Tuff, agglomerate, minor amounts of trachyte agglomerate, breccia.

UNCONFORMITY AND INTERBEDDING

FELSIC METAVOLCANICS (KEEWATIN)

2a Rhyolite, dacite.
2b Iron formation, silicic tuff, agglomerate.
2c Dacite porphyry, amygdaloidal and spherulitic dacite.

MAFIC METAVOLCANICS AND METASEDIMENTS

1 Unsubdivided mafic volcanics.
1a Basalt, andesite.
1b Chloritic mafic tuff, agglomerate.
1c Altered (bleached, carbonatized) volcanic and sedimentary rocks.
1d Amphibolite, garnet-epidote amphibolite, amphibolite gneiss.
1e Andesite porphyry, amygdaloidal and spherulitic dacite.
1g Biotite-garnet-pyroxene amphibolite.

Au	*Gold*
carb	*Carbonate*
Cu	*Copper*
gf	*Graphite*
hem	*Hematite*
mag	*Magnetite*
ne	*Nepheline*
q	*Quartz*
qc	*Quartz-carbonate*
S	*Sulphide mineralization*
Zn	*Zinc*

---

[a] *Unconsolidated deposits. Cenozoic deposits are represented by the lighter coloured parts on the map.*

[b] *Bedrock geology. Outcrops and inferred extensions of each rock map unit are shown. Where in places a formation is too narrow to show colour and must be represented in black, a short black bar appears in the appropriate block.*

LIST OF PROPERTIES

EBY TOWNSHIP

1. *Baldwin Consolidated Mines Limited.*
2. *Barker, Mrs. Cora K.*
3. *Cain, Mrs. Donna.*
4. *Dominion Gulf Company [circa 1952].*
5. *Fishkin, Morris.*
6. *Hansen, Aage.*
7. *Johnson, Angus [circa 1938].*
8. *Kaplan, M., and Hahn, R. J.*
9. *Keevil Mining Group Limited.*
10. *Lemu Investments.*
11. *Mundy [circa 1938].*
12. *Preston Mines Limited.*
13. *Rogick, Martin; Clark, Amelia; and Elliott, Richard.*
14. *Stewart, W.*
15. *Strome, Diane C.*
16. *Sylvanite Gold Mines Limited [circa 1945].*
17. *Taylor Gold Mines Limited.*
18. *Todora Kirkland Prospecting Syndicate [circa 1948].*
19. *Vagolaide, Ago and Ellen.*
20. *Walters, George W.*

OTTO TOWNSHIP

21. *Bottrell, Mrs. Helen.*
22. *Chavigny Gold Mines Limited.*
23. *Cochrane, W. M.*
24. *Gateford Mines Limited.*
25. *International Nickel Company of Canada Limited, The.*
26. *Simpson, William.*
27. *Strome, Diane C.*
28. *Todora Kirkland Prospecting Syndicate [circa 1948].*

Date in square brackets, refers to last major work.

SOURCES OF INFORMATION

Geology of Eby Township, the three southern concessions of Otto Township and the northern part of Marquis Township by H. L. Lovell and assistants, 1967 and 1968.

Geology of the northern halves of lots 8, 9, 10, 11 and 12, concession VI, Otto Township from O.D.M. Map No. 1945-1, Township of Teck.

Geology of concession V and remainder of concession VI, Otto Township by K. D. Lawton and assistants, 1955; field maps and notes compiled by John Ramsden and H. L. Lovell, 1965.

Geology of concession IV, Otto Township, by John Ramsden, 1965.

Geology is not tied to surveyed lines.

Geological and geophysical maps and reports of mining companies.

Geological Survey of Canada Aeromagnetic maps 289G and 1506G.

Preliminary maps P. 448 Eby Township and P. 501 Otto Township and northern part of Marquis Township. Scale 1 inch to ¼ mile issued 1968 and 1969 respectively.

Cartography by C. A. Love and assistants, Ontario Department of Mines and Northern Affairs, 1971.

Base map derived from maps of the Forest Resources Inventory, Ontario Department of Lands and Forests, with revisions by H. L. Lovell.

Magnetic declination in the area was approximately 9°27'W in 1969.

SYMBOLS

Glacial striae.

Esker.

Small bedrock outcrop.

Area of bedrock outcrop.

Bedding, top unknown; (inclined, vertical).

Lava flow; top (arrow) from pillows sha and packing.

Schistosity; (horizontal, inclined, vertical).

Gneissosity, (horizontal, inclined, vertical).

Geological boundary, observed.

Geological boundary, position interpreted.

Fault; (observed, assumed). Spot ind cates down throw side, arrows indica horizontal movement.

Lineament.

Jointing; (horizontal, inclined, vertica

Drag folds with plunge.

Anticline, syncline, with plunge.

Drill hole; (vertical, inclined).

Vein, vein network. Width in inches.

Shaft; depth in feet.

MA *Magnetic attraction.*

RA *Radioactivity.*

Motor road. Provincial highway number encircled where applicable.

Other road.

Trail, portage or winter road.

Building.

Township boundary, approximate position only.

Surveyed line, approximate position only.

Property boundary, approximate position only.

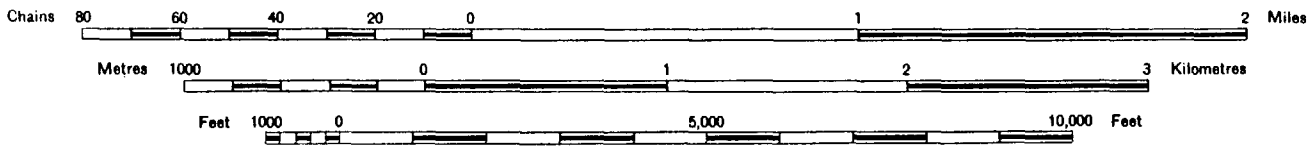
6 (12) *Mining property; (surveyed, unsurveyed). See list of properties.*

Map 2239

EBY-OTTO AREA

TIMISKAMING DISTRICT

Scale 1:31,680 or 1 Inch to ½ Mile



ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

HONOURABLE LEO BERNIER, *Minister*

D. P. Douglass, *Deputy Minister* J. E. Thomson, *Director, Geological Branch*

Adjoins Map 2060

80° 15'

80° 10'

80° 05'

GRENFELL TOWNSHIP

KENOGAMI LAKE

KENOGAMI LAKE

35 miles to Matheson

Boulder shoal

Gravel pit

Pipeline (gas)

Blanche River

O.N.R.

SWASTIKA

TECK

Vigrass Lake

Otto Lake

Clay

Sparse outcrop

Clay plain

Lot 1

Lot 12

E B Y

O T T

Roads

Trails

Power lines

Railways

Buildings

Mines

Pits and quarries

Gravel roads

Drainage

Rapids

Swamp

Marsh

Sand

Rock outcrop

Sand and gravel

Clay

Bedrock geology

Geological boundary

Strike and dip of beds

Strike of vertical beds

Horizontal beds

Strike and dip of foliation

Strike of vertical foliation

Horizontal foliation

Strike and dip of joints

Strike of vertical joints

Horizontal joints

Geological boundary, interpreted

Fault, interpreted

Fault, observed

Shear zone

Geological boundary, approximately located

Geological boundary, assumed

Fault, assumed

Fault, approximately located

Shear zone, approximately located

Shear zone, assumed

Contact, gradational

Contact, intrusive

Contact, unconformable

Contact, faulted

Contact, sheared

Contact, intrusive, approximately located

Contact, unconformable, approximately located

Contact, faulted, approximately located

Contact, sheared, approximately located

Contact, intrusive, assumed

Contact, unconformable, assumed

Contact, faulted, assumed

Contact, sheared, assumed

Geological boundary, gradational

Geological boundary, intrusive

Geological boundary, unconformable

Geological boundary, faulted

Geological boundary, sheared

Geological boundary, intrusive, approximately located

Geological boundary, unconformable, approximately located

Geological boundary, faulted, approximately located

Geological boundary, sheared, approximately located

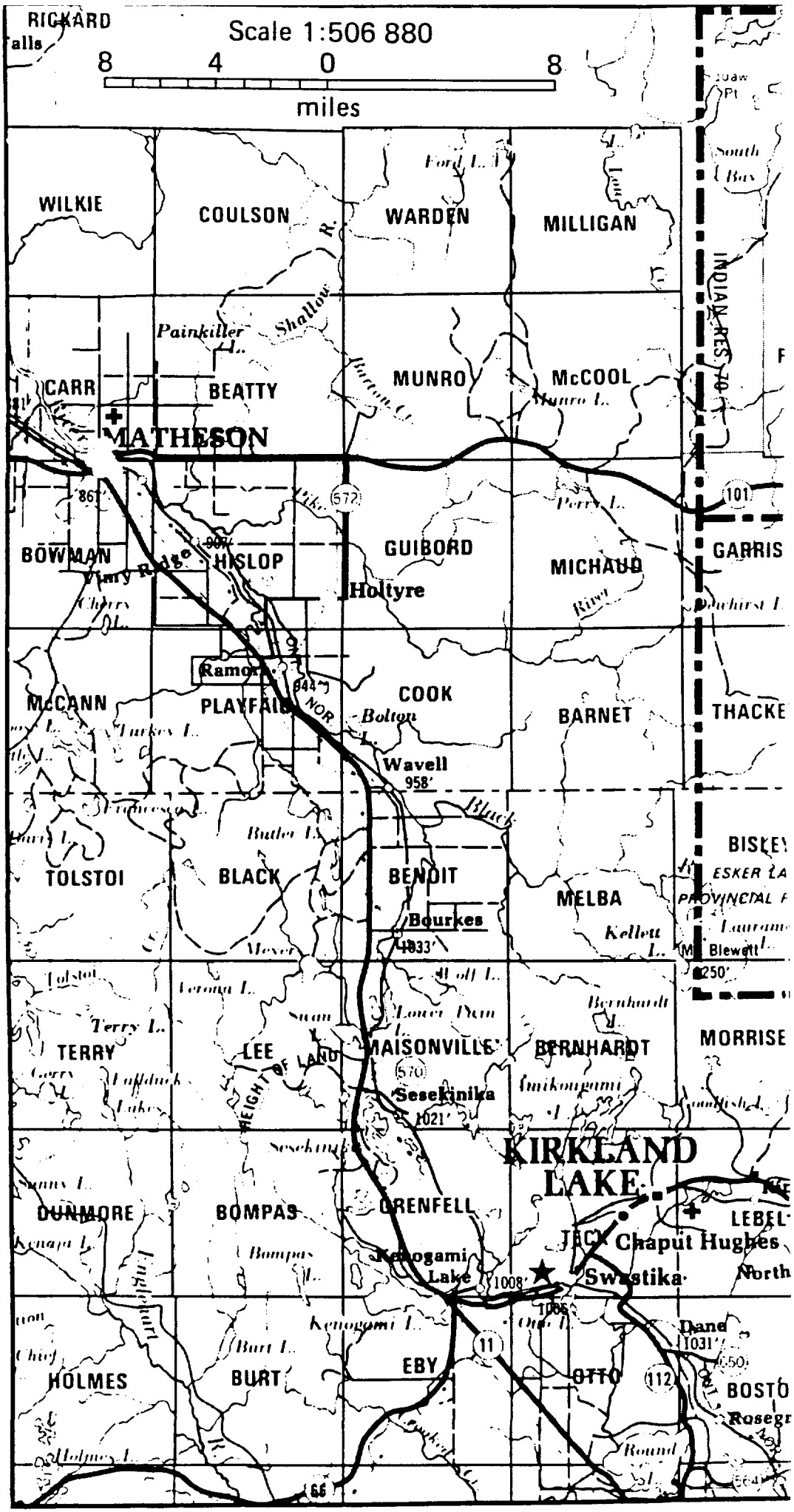
Geological boundary, intrusive, assumed

Geological boundary, unconformable, assumed

Geological boundary, faulted, assumed

Geological boundary, sheared, assumed

ANNEX
"A-1B"


Scale 1:506 880
8 4 0 8
miles
WILKIE
COULSON
WARDEN
MILLIGAN
CARR
BEATTY
MUNRO
McCOOL
MATHESON
BOWMAN
HISLOP
GUIBORD
MICHAUD
Holtyre
GARRIS
Ramore
McCANN
PLAYFAIR
COOK
BARNET
THACKE
Wavell
958'
TOLSTOI
BLACK
BENDIT
MELBA
Bourkes
1033'
TERRY
LEE
MAISONVILLE
BERNHARDT
MORRISE
Sesekinika
1021'
KIRKLAND LAKE
DUNMORE
BOMPAS
GRENFELL
LEBEL
Chaput Hughes
Kenogami Lake
1008'
Swastika
HOLMES
BURT
EBY
OTTO
Dane
1031'
BOSTO
INDIAN RES. 70
Painkiller L.
Shallow L.
Burnt L.
Ford L.
Hunro L.
Perry L.
Duchart L.
Cherry L.
Bolton L.
Wavell L.
Butler L.
Black R.
Tolstoi L.
Terry L.
Lower Dam
Bernhardt L.
Kellett L.
Mt. Blewett
Meyer
Seseginaga L.
Smoothstone L.
Kenogami L.
Burt L.
Holmes L.
Round L.
Height of Land
Englehart R.
Montreal R.
Kenogami R.
Ontario
Quebec
11
66
101
112
570
572
944
NOR

ANNEX "A-2A"

ONTARIO DEPARTMENT OF MINES

PRELIMINARY GEOLOGICAL MAP No. P.448

EBY TOWNSHIP

DISTRICT OF TIMISKAMING

Scale 1 inch to 1/4 mile

N.T.S. Reference: 42 A/1W and 1E
G.S.C. Aeromagnetic Map: 289G

LEGEND

CENOZOIC
PLEISTOCENE AND RECENT
Sand, gravel, and clay
UNCONFORMITY

PRECAMBRIAN
PROTEROZOIC
MAFIC INTRUSIVE ROCKS (NIPISSING OR KEWEENAWAN)

[8] 8 Diabase
INTRUSIVE CONTACT

HURONIAN
COBALT GROUP
GOWGANDA FORMATION

[7]
7a Conglomerate
7b Arkose
7c Quartzite and greywacke
7d Argillite and slate
UNCONFORMITY

ARCHEAN
MAFIC INTRUSIVE ROCKS (MATACHEWAN)

[6] 6 Diabase
INTRUSIVE CONTACT

FELSIC INTRUSIVE ROCKS (ALGOMAN)

[5]
5a Granite and granodiorite
5b Granite gneiss
5c Syenite and syenite porphyry
5d Mafic syenite, lamprophyre, and hybrid syenite and country rocks
INTRUSIVE CONTACT

MAFIC AND ULTRAMAFIC INTRUSIVE ROCKS
(HAILEYBURIAN, EARLY ALGOMAN, AND SOME KEEWATIN)

[4]
4a Serpentinite and peridotite
4b Gabbro and diorite
INTRUSIVE CONTACT

METASEDIMENTS (TIMISKAMING OR KEEWATIN)

[3]
3a Conglomerate
3b Arkose
3c Quartzite and greywacke
3d Argillite and slate
3e Tuff and agglomerate; minor amounts of trachyte, trachytic agglomerate, and breccia
UNCONFORMITY

FELSIC VOLCANIC ROCKS (KEEWATIN)

[2]
2a Rhyolite and dacite
2b Iron formation; silicic tuff and agglomerate
2c Dacite porphyry, amygdaloidal dacite, and spherulitic dacite

MAFIC VOLCANIC ROCKS (KEEWATIN)

[1]
1a Basalt and andesite (pillowed and massive)
1b Mafic agglomerate and tuff
1c Altered (bleached, carbonatized) volcanic and sedimentary rocks
1d Amphibolite and amphibolite (quartz-diorite) gneiss
1e Andesite porphyry, amygdaloidal andesite, and variolitic mafic volcanic rocks

MINERAL REFERENCE

Au	Gold	po	Pyrrhotite
carb.....	Carbonate	py	Pyrite
cp	Chalcopyrite	qcv.....	quartz-carbonate vein
Cu	Copper	qv	quartz vein
gn	Galena	S	Sulphides
mag	Magnetite	sp	Sphalerite

MARGINAL NOTES

Location and Access: The northeast corner of Eby, a township six miles square, is about five miles southwest of Kirkland Lake, and the southern part of Kenogami Lake is in the northern concession. Highways 66 and 11, and concession, lot line, and logging roads provide good access. Electric power transmission lines, the Trans Canada natural gas pipeline, and the Ontario Northland Railway pass through the township.

Mineral Exploration: The belt of Timiskaming-type rocks in the northern part of Eby township was prospected intensively for gold, and minor production was obtained from the Baldwin property in the north half of lot 2, concession VI.

Limited prospecting, geophysical surveys, and diamond drilling have been done on small areas of the large zone of iron formation.

General Geology: All bedrock in the map-area is Precambrian. From oldest to youngest, the rocks are Keewatin-type mafic and felsic flows, tuffs, agglomerates, and iron formation; amphibolite gneiss; Timiskaming-type sedimentary and volcanic rocks; Haileyburian-type mafic to ultramafic bosses; Algoman-type felsic intrusive rocks; Matachewan mafic intrusive dikes, and Cobalt sedimentary rocks. Some of the area formerly mapped as "greenstone" is rhyolitic tuff and agglomerate.

Structural Geology: The Keewatin-type rocks form a northwest-plunging synclinorium that has been re-folded. The younger syncline strikes northeast, approximately parallel to the belt of Timiskaming-type rocks.

Strong faults and lineaments strike northwest and northeast. The most important northeast-striking feature is the Larder Lake fault zone, which extends through the northern part of Eby township.

Economic Geology: Iron formation is present as long narrow zones interbedded with tuff and agglomerate of rhyolitic, dacitic, and andesitic composition. Much of the iron formation consists of banded magnetite and chert, some areas of which cause high aeromagnetic anomalies. Also present are large zones of electromagnetically conductive pyrite-pyrrhotite-magnetite iron formation containing low percentages of copper and nickel. The greatest known concentrations of sulphides are in lots 2, 3, and 4, concession III, and in lots 1 and 2, concession IV. Concentrations of base metals might be found by soil and stream sediment geochemistry, but clay and deep sand overburden reduce the usefulness of geochemical techniques in much of the area. The bedrock causing the high aeromagnetic anomaly in lot 5, concession III, should be drill-tested to ascertain its content of magnetite and possible base metals.

Exploration for gold should be concentrated in the two northern concessions, in syenite, trachyte, and carbonate rocks.

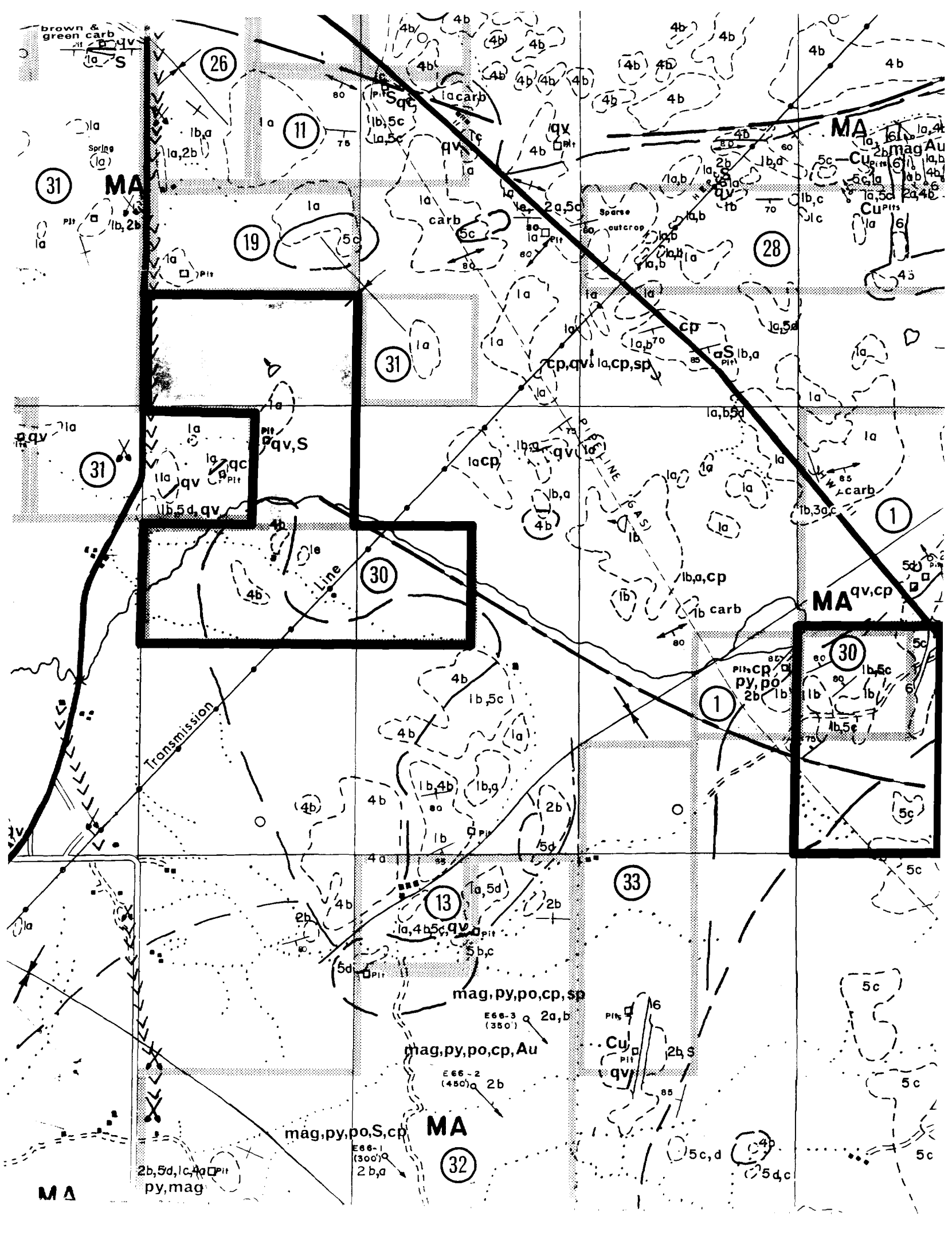
NOTES

Geological mapping was tied to lakes, roads, and other landmarks recognizable on air photographs.
The geology is not tied to surveyed lines.
Claim maps may be obtained from the Mining Recorder, Kirkland Lake, or Publications Office, Ontario Department of Mines, Parliament Buildings, Toronto 2.

SOURCES OF INFORMATION

Geology by H.L. Lovell and assistants, 1967.
Geological and geophysical maps and reports of mining companies.
Base map derived from maps of the Forest Resources Inventory, Ontario Department of Lands and Forests, with revisions by H.L. Lovell.
Magnetic declination is approximately 9°27'W.
Drafting by Brian Cutt, 1967.

Issued 1968.


brown & green carb
qv
S
26
Sqc
1a carb
1b,5c
1a,5c
qv
11
MA
31
Spring
1a,2b
1b,2b
19
5c
carb
2a,5c
Sparse outcrop
28
MA
mag
Au
Cu
Pits
cp
cp,qv
1a,cp,sp
aS
1b,a
1a,b5d
qv,S
qc
1b,5d,qv
30
Line
1a cp
qv
Gas Line
1b,a,cp
1b carb
1b,3a,c
1
MA
qv,cp
py, po
2b
1b,5c
Transmission
4b
1b,4b
1b,a
2b
5d
33
13
1a,4b5c,qv
5b,c
mag,py,po,cp,sp
E66-3 (350')
2a,b
mag,py,po,cp,Au
Cu
2b,S
E66-2 (450')
2b
MA
mag,py,po,S,cp
E66-1 (300')
2b,a
32
2b,5d,1c,4a
py,mag
MA
5c,d
5d,c

ANNEX
"2-2A"

Mynd.
2608

Dominion Gulf Co.
714 2605

Hurd, D.F.
1231

Gren-Teck Kirkland Resources Ltd.
"Kenogami Lake Group"
1051

Burtho G.M.L.
304

Rogick-Elliot-Clarke
2409

Caibbe Otto Township Property
2980

Baldwin Cons.
179

Rosa Brown 2608

Billiton Canada Ltd.
222

1943

Graff; Kaplan, M; Hana, R...
2608

Preston East Dome
2303

Noranda Exploration Co. Ltd
2043

Kelly Kirkland
1355

Noranda Expl'n (OLH) "Ottol-79"
2045

Taylor Gold Mines
2626

Lumsden 2068

Noranda 2043

Pain, S.A.
2168

2701

Todora 1635
Kirkland

Harrington 10

Luke
1658

Gudrie, T
1056

Sylvanite
2605 714

Reed, J.D.
2349

Fishkin
850

Walters
2804

Johnson
2608

Noranda Expln Co. Ltd. EBY 1-7
2044

Hansen, A.
1083

1231

Keevil
1348

M Corr.

1-71

AM
AEM

AEM, AM

GBM, S2

EM, M

GRC

GR

G

A

M

EM

Re

sTr

3DH

M, EM
G, Re

M, G, EM

64

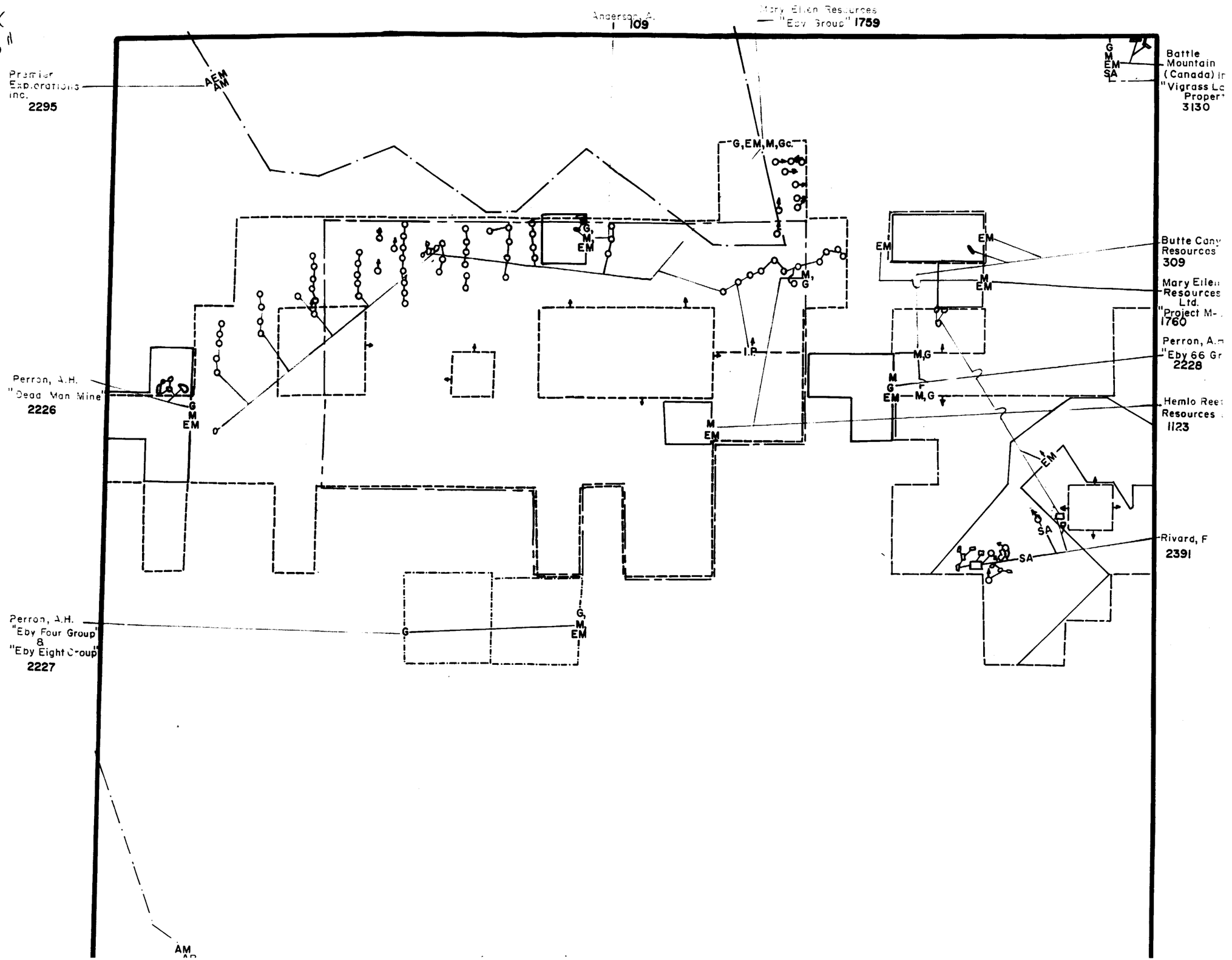
65

3-71

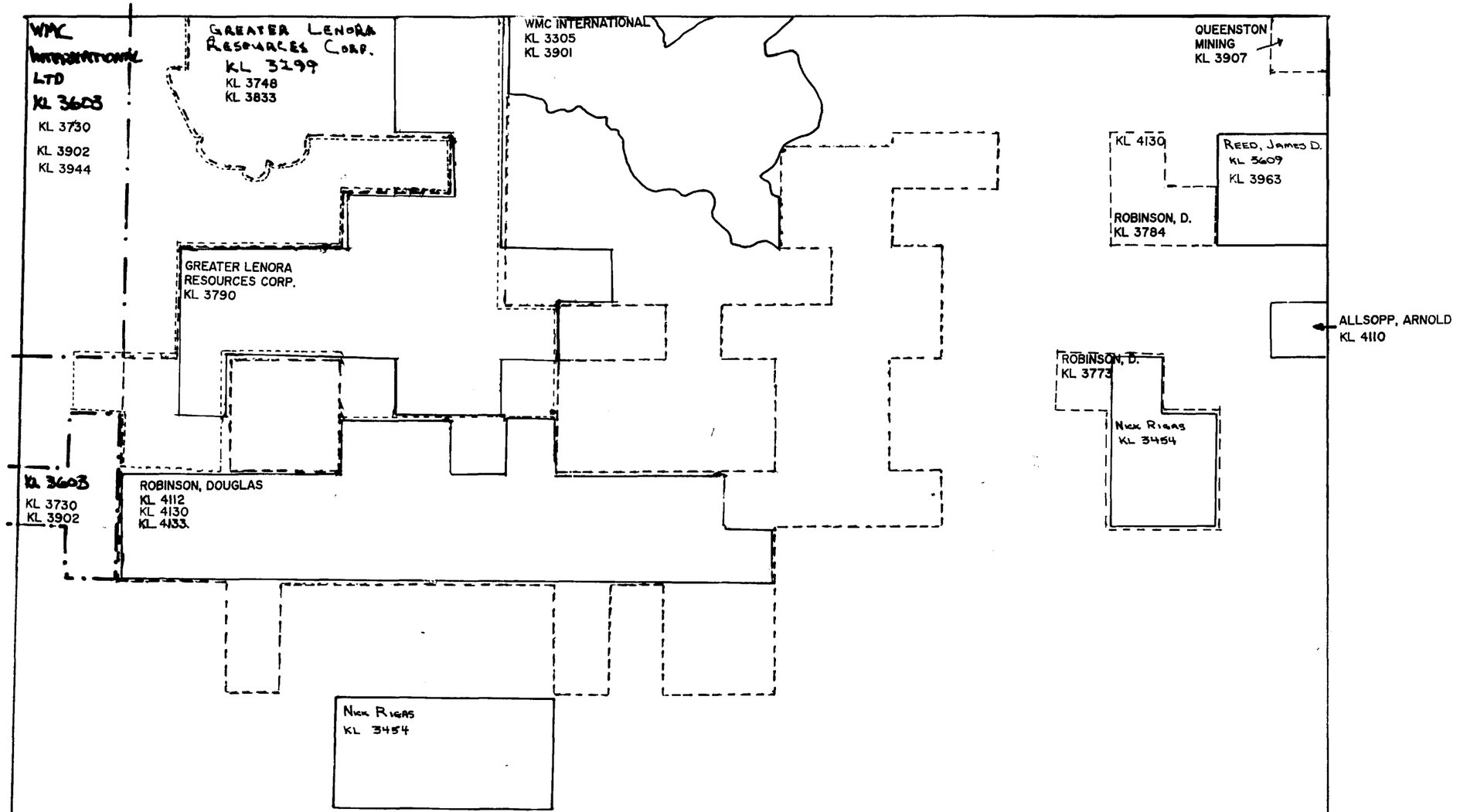
EM
M

G, Gc

ANNEX
"A-2B"


Premier Explorations Inc. 2295
AEM AM
Anderson, A. 109
Mary Ellen Resources "Eby Group" 1759
G M EM SA
Battle Mountain (Canada) In "Vigrass La Proper" 3130
G, EM, M, Gc.
G, M, EM
M, G
I.P.
EM
M, G
Butte Cany Resources 309
Mary Ellen Resources Ltd. "Project M- 1760
Perron, A.H. "Eby 66 Gr 2228
Hemlo Reef Resources 1123
Perron, A.H. "Dead Man Mine" 2226
G M EM
SA
Rivard, F 2391
Perron, A.H. "Eby Four Group" & "Eby Eight Group" 2227
AM

ANNEX
"A-2C"


WMC INTERNATIONAL LTD
KL 3603
KL 3730
KL 3902
KL 3944
GREATER LENORA RESOURCES CORP.
KL 3299
KL 3748
KL 3833
WMC INTERNATIONAL
KL 3305
KL 3901
QUEENSTON MINING
KL 3907
KL 4130
REED, JAMES D.
KL 3609
KL 3963
ROBINSON, D.
KL 3784
GREATER LENORA RESOURCES CORP.
KL 3790
ALLSOPP, ARNOLD
KL 4110
ROBINSON, D.
KL 3773
NICK RIGAS
KL 3454
KL 3603
KL 3730
KL 3902
ROBINSON, DOUGLAS
KL 4112
KL 4130
KL 4133
NICK RIGAS
KL 3454

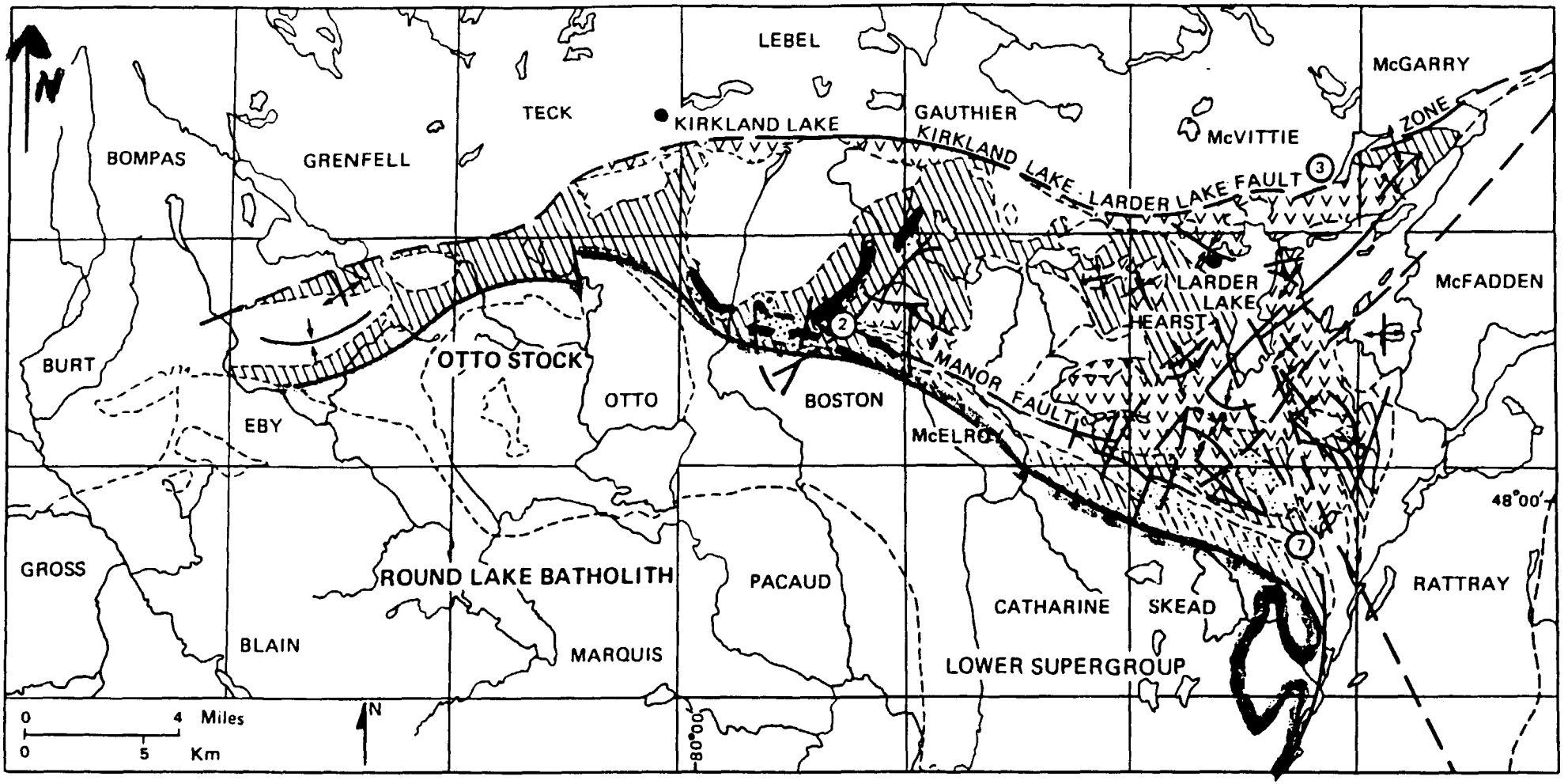
ANNEX "A-3"

Mining Lands - Mining Claims Client Report

Larder Lake - Division 80

CLIENT: 127749 - DUFRESNE ROGER J.

TOWNSHIP / AREA	Claim Number	Recording Date	Claim Due Date	Status	Percent Option	Work Required	Total Applied	Total Reserve	Claim Bank
ALMA	L 1096959	1989-JUL-31	2004-JUL-31	A	100 % N	400	5600	9044	1600
CAIRO	L 1179885	1991-SEP-05	2002-SEP-05	A	100 % N	400	3600	0	0
CAIRO	L 1179886	1991-OCT-17	2003-OCT-17	A	100 % N	400	4000	0	0
CAIRO	L 1179887	1991-OCT-17	2001-OCT-17	A	100 % N	130	3470	0	0
CAIRO	L 1179888	1991-OCT-17	2001-OCT-17	A	100 % N	400	3200	0	0
CAIRO	L 1179889	1991-OCT-17	2001-OCT-17	A	100 % N	400	3200	0	0
CAIRO	L 1179890	1991-OCT-17	2001-OCT-17	A	100 % N	400	3200	0	0
CAIRO	L 1185634	1991-OCT-17	2001-OCT-17	A	100 % N	400	3200	0	0
CAIRO	L 1185635	1992-JUN-09	2002-JUN-09	A	100 % N	400	3200	0	0
CAIRO	L 1185636	1992-JUN-09	2001-JUN-09	A	100 % N	400	2800	0	0
EBY	L 1186492	1997-NOV-25	1999-NOV-25	A	100 % N	400	0	0	0
EBY	L 1205843	1998-APR-28	2000-APR-28	A	100 % N	400	0	0	0
EBY	L 1214382	1998-APR-28	2000-APR-28	A	100 % N	400	0	0	0
EBY	L 1214384	1997-NOV-25	1999-NOV-25	A	100 % N	400	0	0	0
EBY	L 1214385	1998-APR-28	2000-APR-28	A	100 % N	400	0	0	0
EBY	L 1225485	1997-NOV-25	1999-NOV-25	A	100 % N	400	0	0	0
FARR	L 1214380	1996-JUN-05	2001-JUN-05	A	100 % N	400	1200	13263	0
FARR	L 1214381	1996-JUN-05	2001-JUN-05	A	100 % N	400	1200	13263	0



LEGEND

Fault | Syncline | Anticline | Geological Boundary | (2) Location

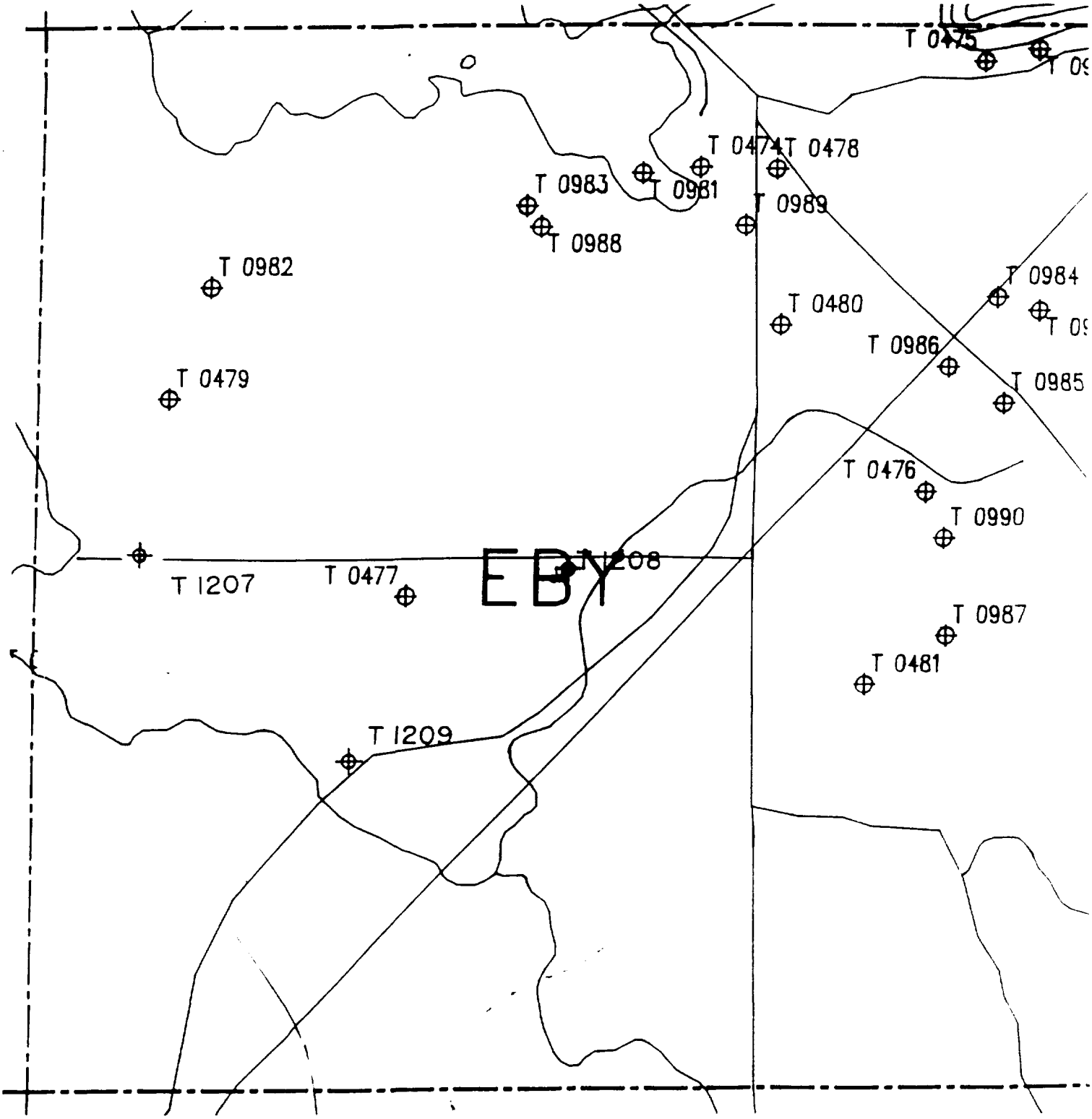
LARDER LAKE GROUP

Iron Formation | Turbiditic sedimentary rocks | Calc - alkalic felsic tuffs & tuff - breccia | Komatiitic & tholeiitic lavas

Figure 50. Map showing the distribution of the rock types of the Larder Lake Group.

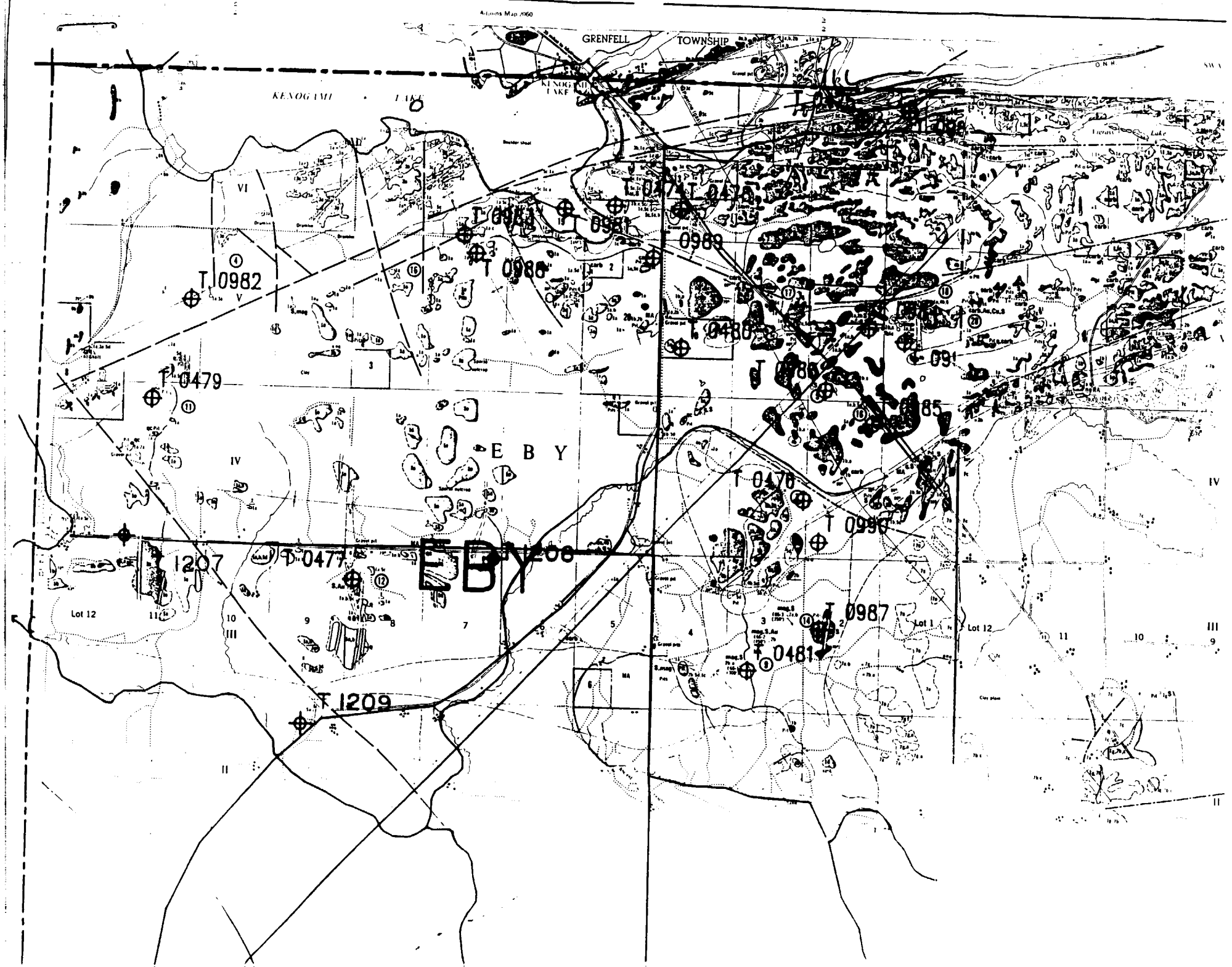
ANNEX 14-4

ANNEX "B"


T 0475
T 0474
T 0478
T 0983
T 0981
T 0989
T 0988
T 0982
T 0984
T 0480
T 0986
T 0985
T 0479
T 0476
T 0990
T 1207
T 0477
EBY
T 1208
T 0987
T 0481
T 1209

EBY

D. P. Douglass, Deputy Minister | J. E. Thomson, Director, Geological Branch



---------- Window #1 ----------

Deposit Name: WALTERS, C. J.

Compiled Date: 1983121

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0474
SMDR#:
UTM Zone: 17
Northing: 5326275
Easting: 559926
Mining Area:
Resident Geologist Area: KL

Update Date: 1991012

Latitude: 48 5 20
Longitude: 80 11 43

Entity Code: S
How Located: P

Point Located: QUARTZ VEIN NEAREST SE-END OF KENOGAMI LAKE ON PROPERTY 20

Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99

Deposit Status Code: F
Compiler: JK
Map Scale Code: C

---------- Window #2 ----------

	Commodity	Qualifier	Stat	ComGrp	
1.	MO	MINOR	F	M	Molybdenum
2.	AU	PRINCIPAL	F	M	Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1979, MDC 18, P130
2	OGS 1972, GR 99, P25-26
3	OGS 1948, AR VOL 57 PT 5, P52-53
4	OGS 1983, OFR 5467 #G0279
5	AFRO WORK RPT KL #1759,2804
6	RES/REG PROP RPT KL #305

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension | Concession | Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name | Class | Group | Era | Relation to Deposi
Supergroup | Group | Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. CRBN Carbonate
3. PYRT Pyrite

---------- Window #10 ----------

Depth of Working | Mill Capacity | Mining Method | Reserves

---------- Window #11 ----------

Contiguous SMDR# | Contiguous Deposit

---------- Window #12 ----------

Subject | Comments

---------- Window #1 ----------

Deposit Name: BALDWIN

Compiled Date: 19831214

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0475
SMDR#:
UTM Zone: 17
Northing: 5327446
Easting: 562379
Mining Area:
Resident Geologist Area: KL
How Located: P

Update Date: 19910126

Latitude: 48 5 57
Longitude: 80 9 44

Entity Code: S
Point Located: SHAFT JUST NE OF PROPERTY SYMBOL 1 IN NE CORNER OF TOWNSHIP
Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99
Deposit Status Code: D Compiler: JK Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp	
1. AU	PRINCIPAL	D	M	Gold
2. CU	MINOR	F	MB	Copper
3. MO	MINOR	F	M	Molybdenum

---------- Window #3 ----------

Ref#	References
1	OGS 1979, MDC 18, P129-130
2	NMI FILE, 42A/01 AU 16
3	OGS 1948, AR VOL 57 PT 5, P36-37
4	OGS 1972, GR 99, P18-20
5	OGS 1968, MDC 7 P81
6	OGS 1983, OFR 5467 #G0276
7	AFRO WORK RPT KL #179

---------- Window #4 ----------

Alternate Names
1. BROWN, ROSA
2. LUCKY KIRKLAND

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposi
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. CRBN Carbonate
3. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

CA

---------- Window #1 ----------

Deposit Name: JOHNSON, ANGUS

Compiled Date: 19831214

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0476
SMDR#:
UTM Zone: 17
Northing: 5323516
Easting: 561921
Mining Area:
Resident Geologist Area: KL

Latitude: 48 3 50
Longitude: 80 10 8

Update Date: 19910126

Entity Code: S
How Located: G
Point Located: PROPERTY SYMBOL 7, 3.2 KM SE OF KENOGAMI LAKE

Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99
Deposit Status Code: F
Compiler: JK
Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp	
1. AU	PRINCIPAL	F	M	Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1979, MDC 18, P199
2	OGS 1972, GR 99, P21
3	OGS 1983, OFR 5467 #G0275
4	AFRO WORK RPT KL #2391,2608

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposi
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

C4

---------- Window #1 ----------

Deposit Name: PRESTON

Compiled Date: 19810526

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0477
SMDR#:
UTM Zone: 17
Northing: 5322479
Easting: 557306
Mining Area:
Resident Geologist Area: KL

Update Date: 19910126

Latitude: 48 3 18
Longitude: 80 13 52

Entity Code: S
How Located: P

Point Located: DDH JUST W OF PROPERTY 12 NEAR CENTRE OF TOWNSHIP

Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99

Deposit Status Code: F
Compiler: JK
Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. AU	PRINCIPAL	F	M Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1979, MDC 18, P199
2	OGS 1972, GR 99, P22
3	OGS 1983, OFR 5467 #G0281
4	AFRO WORK RPT KL #2227,2303

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name	Class	Group	Era	Relation to Deposi
Supergroup	Group	Formation		

---------- Window #9 ----------

Minerals

1. QRTZ Quartz
2. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: ROGICK-ELLIOT-CLARK

Compiled Date: 19830915

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0478
SMDR#:
UTM Zone: 17
Northing: 5326404
Easting: 560618
Mining Area:
Resident Geologist Area: KL

Update Date: 19910126

Latitude: 48 5 24
Longitude: 80 11 10

Entity Code: S
How Located: P

Point Located: SHAFT 300 M SSE OF AND NEAREST TO PROPERTY SYMB OL 13, N CENTRAL PART OF TOWNSHIP

Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99

Deposit Status Code: F
Compiler: JK
Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp	
1. AU	PRINCIPAL	F	M	Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1979, MDC 18, P130
2	OGS 1972, GR 99, P22-23
3	OGS 1948, AR VOL 57 PT 5, P51
4	OGS 1983, OFR 5467 #G0277
5	AFRO WORK RPT KL #1759,2409

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name	Class	Group	Era	Relation to Deposi
Supergroup	Group	Formation		

---------- Window #9 ----------

Minerals

1. QRTZ Quartz
2. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

C.

---------- Window #1 ----------

Deposit Name: MUNDAY

Compiled Date: 1983091

District: T
NTS: 42A01SW
Township: EBY

MDI#: T 0479
SMDR#:
UTM Zone: 17
Northing: 5324315
Easting: 555268
Mining Area:
Resident Geologist Area: KL
How Located: P

Latitude: 48 4 18
Longitude: 80 15 29

Entity Code: S
Point Located: PIT NW AND NEAREST PROPERTY SYMBOL 11,S OF KENO GAMI LAKE W END
Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99
Deposit Status Code: F Compiler: JK Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL F M Gold

---------- Window #3 ----------

Ref# References
1 OGS 1972, GR 99, P22
2 OGS 1979, MDC 18, P199
3 OGS 1983, OFR 5467 #G0282
4 AFRO WORK RPT KL #2608

---------- Window #4 ----------

Alternate Names
1. MUNDY

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposi
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: LUMSDEN

Compiled Date: 19810526

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0480
SMDR#:
UTM Zone: 17
Northing: 5324958
Easting: 560558
Mining Area:
Resident Geologist Area: KL

Update Date: 19910126

Latitude: 48 4 37
Longitude: 80 11 13

Entity Code: S
How Located: P
Point Located: PIT JUST SW OF PROPERTY 10 IN NE CENTRAL PART OF TOWNSHIP
Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99
Deposit Status Code: F
Compiler: JK
Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. AU	PRINCIPAL	F	M Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1972, GR 99, P22
2	OGS 1979, MDC 18, P199
3	OGS 1983, OFR 5467 #G0278
4	AFRO WORK RPT KL #2068

---------- Window #4 ----------

Alternate Names
1. LEMU

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension | Concession | Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name | Class | Group | Era | Relation to Deposit | Supergroup | Group | Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. PYRT Pyrite

---------- Window #10 ----------

Depth of Working | Mill Capacity | Mining Method | Reserves

---------- Window #11 ----------

Contiguous SMDR# | Contiguous Deposit

---------- Window #12 ----------

Subject | Comments

---------- Window #1 ----------

Deposit Name: EBY

Compiled Date: 1981052

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0481
SMDR#:
UTM Zone: 17
Northing: 5321742
Easting: 561338
Mining Area:
Resident Geologist Area: KL
How Located: P

Update Date: 1991012

Latitude: 48 2 53
Longitude: 80 10 37

Entity Code: S
Point Located: DDH JUST W OF PROPERTY 9, SE CENTRAL PART OF TOWNSHIP
Map Reference: OGS 1972, MAP 2239 EBY-OTTO AREA IN GR 99
Deposit Status Code: F Compiler: JK Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp	
1. CU	MINOR	F	MB	Copper
2. FE	PRINCIPAL	F	M	Iron
3. ZN	MINOR	F	M	Zinc

---------- Window #3 ----------

Ref#	References
1	OGS 1972, GR 99, P21
2	OGS 1968, MRC 11, P462-463
3	AFRO WORK RPT KL #850,1348

---------- Window #4 ----------

Alternate Names
1. KEEVIL
2. BELCHER

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Depos
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. PYRT Pyrite
2. PYTT Pyrrhotite
3. MGNT Magnetite
4. CLRT Chlorite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: BROWN, ROSA

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0980
SMDR#:
UTM Zone: 17
Northing: 5327548
Easting: 562838
Mining Area:
Resident Geologist Area: KL

Latitude: 48 6 0
Longitude: 80 9 22

Update Date: 19950602

Entity Code: S
How Located: P
Point Located: CENTER OF CLAIM 17990 IN NW1/4 N1/2
LOT 1 CON VI EBY TP
Map Reference: OGS 1972 GR 99 MAP 2239
Deposit Status Code: G
Compiler: JM
Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL G Gold

---------- Window #3 ----------

Ref# References
1 OGS 1972, GR 99 P18
2 AFRO WORK RPT KL #2608

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: BURTHO

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0981
SMDR#:
UTM Zone: 17
Northing: 5326389
Easting: 559315
Mining Area:
Resident Geologist Area: KL

Update Date: 19950602

Latitude: 48 5 24
Longitude: 80 12 13

Entity Code: S
How Located: P

Point Located: DDH ABOVE NUMBER SYMBOL 19 IN SOUTH BAY KENOGAMI LAKE

Map Reference: OGS 1972 GR 99 MAP 2239

Deposit Status Code: G
Compiler: JM
Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp

1. AU PRINCIPAL G Gold

---------- Window #3 ----------

Ref# References

1 OGS 1948, AR VOL 57 PT5 P38-39
2 OGS 1979, GR 99 P25
3 AFRO WORK RPT KL #304,1051

---------- Window #4 ----------

Alternate Names

1. VAGOLAIDE

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals

1. QRTZ Quartz
2. PYRT Pyrite
3. CRBN Carbonate

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: DOMINION GULF

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0982
SMDR#:
UTM Zone: 17
Northing: 5325350
Easting: 555496
Mining Area:
Resident Geologist Area: KL
How Located: P

Update Date: 19950602

Latitude: 48 4 52
Longitude: 80 15 18

Entity Code: S
Point Located: DDH #55-1 SW1/4 N1/2 LOT 10 CON V EBY TP

Map Reference: OGS 1972 GR 99 MAP 2239
Deposit Status Code: F Compiler: JM Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL F Gold

---------- Window #3 ----------

Ref# References
1 OGS 1972, GR 99 P20
2 OGS 1979, MDC 18 P199
3 AFRO WORK RPT KL #714,1759

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. CRBN Carbonate
2. JSPR Jasper
3. QRTZ Quartz
4. CLRT Chlorite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: SYLVANITE-1

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0983
SMDR#:
UTM Zone: 17
Northing: 5326089
Easting: 558289
Mining Area:
Resident Geologist Area: KL
How Located: P

Latitude: 48 5 15
Longitude: 80 13 2

Entity Code: S
Point Located: PIT IN NW CORNER CLAIM 18402 IN NE1/4 N1/2 LOT 7 CON V
Map Reference: OGS 1972 GR 99 MAP 2239
Deposit Status Code: F

Compiler: JM

Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. AU	PRINCIPAL	F	Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1972, GR 99 P24
2	OGS 1979, MDC 18 P199
3	OGS 1983, OFR 5467 #G0280
4	AFRO WORK RPT KL #1759,2605

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. CRBN Carbonate

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: SYLVANITE-2

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0984
SMDR#:
UTM Zone: 17
Northing: 5325301
Easting: 562499
Mining Area:
Resident Geologist Area: KL

Latitude: 48 4 48
Longitude: 80 9 39

Entity Code: S
How Located: P

Point Located: QRTZ SYMBOL IN SE1/4 N1/2 LOT 2 CON V

Map Reference: OGS 1972 GR 99 2239
Deposit Status Code: F
Compiler: JM
Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL F Gold

---------- Window #3 ----------

Ref#	References
1	OGS 1972, GR 99 P24
2	OGS 1983, OFR 5467 #G0280
3	AFRO WORK RPT KL #2605

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. CRBN Carbonate

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: SYLVANITE-3

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0985
SMDR#:
UTM Zone: 17
Northing: 5324325
Easting: 562568
Mining Area:
Resident Geologist Area: KL
How Located: P

Update Date: 19950602

Latitude: 48 4 16
Longitude: 80 9 36

Entity Code: S
Point Located: IN CENTER OF NE1/4 N1/2 LOT 2 CON IV

Map Reference: OGS 1972 GR 99 MAP 2239
Deposit Status Code: F Compiler: JM Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL F Gold

---------- Window #3 ----------

Ref# References
1 OGS 1972, GR 99 P24
2 OGS 1983, OFR 5467 #G0280
3 AFRO WORK RPT KL #2605

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: FISHKIN, M.

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0986
SMDR#:
UTM Zone: 17
Northing: 5324659
Easting: 562072
Mining Area:
Resident Geologist Area: KL
How Located: P

Update Date: 19950602

Latitude: 48 4 27
Longitude: 80 10 0

Entity Code: S
Point Located: DDH #1 SHOWN AS NUMBER SYMBOL 5

Map Reference: OGS 1972 GR 99 MAP 2239
Deposit Status Code: F Compiler: JM Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. CU	PRINCIPAL	F	Copper
2. ZN	MINOR	F	Zinc

---------- Window #3 ----------

Ref#	References
1	OGS 1972, GR 99 P20
2	RES/REG PROP RPT KL #307
3	AFRO WORK RPT KL #2349

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. EPDT Epidote
3. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: STEWART, W.

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0987
SMDR#:
UTM Zone: 17
Northing: 5322224
Easting: 562090
Mining Area:
Resident Geologist Area: KL

Update Date: 19950602

Latitude: 48 3 8
Longitude: 80 10 1

Entity Code: S
How Located: P
Point Located: CU SYMBOL BELOW NUMBER SYMBOL 14

Map Reference: OGS 1972 GR 99 MAP 2239
Deposit Status Code: F
Compiler: JM
Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. CU	PRINCIPAL	F	Copper
2. ZN	MINOR	F	Zinc

---------- Window #3 ----------

Ref#	References
1	OGS 1972, GR 99 P23
2	AFRO WORK RPT KL #850,2044

---------- Window #4 ----------

Alternate Names
1. FISHKIN

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension | Concession | Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name | Class | Group | Era | Relation to Deposit
Supergroup | Group | Formation

---------- Window #9 ----------

Minerals
1. PYTT Pyrrhotite
2. GRPT Graphite
3. PYRT Pyrite
4. QRTZ Quartz

---------- Window #10 ----------

Depth of Working | Mill Capacity | Mining Method | Reserves

---------- Window #11 ----------

Contiguous SMDR# | Contiguous Deposit

---------- Window #12 ----------

Subject | Comments

---------- Window #1 ----------

Deposit Name: MARY ELLEN

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0988
SMDR#:
UTM Zone: 17
Northing: 5325905
Easting: 558420
Mining Area:
Resident Geologist Area: KL

Update Date: 19950602

Latitude: 48 5 9
Longitude: 80 12 56

Entity Code: S
How Located: P

Point Located: OVB DRILL HOLE 87-48-01 IN CENTER OF CLAIM 18402 NE1/4 N1/2 LOT 7 CON V

Map Reference: AFRO WORK RPT KL #1759 OVB DH LOC MAP

Deposit Status Code: F
Compiler: JM
Map Scale Code: A

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. AU	PRINCIPAL	F	Gold
2. CU	MINOR	F	Copper

---------- Window #3 ----------

Ref#	References
1	RES/REG PROP RPT KL #304,305,311
2	AFRO WORK RPT KL #1759

---------- Window #4 ----------

Alternate Names

1. LENORA

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension | Concession | Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name | Class | Group | Era | Relation to Deposit
Supergroup | Group | Formation

---------- Window #9 ----------

Minerals

1. QRTZ Quartz
2. PYRT Pyrite
3. CRBN Carbonate

---------- Window #10 ----------

Depth of Working | Mill Capacity | Mining Method | Reserves

---------- Window #11 ----------

Contiguous SMDR# | Contiguous Deposit

---------- Window #12 ----------

Subject | Comments

---------- Window #1 ----------

Deposit Name: HEMLO REEF

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0989
SMDR#:
UTM Zone: 17
Northing: 5325923
Easting: 560243
Mining Area:
Resident Geologist Area: KL

Latitude: 48 5 9
Longitude: 80 11 28

Update Date: 19950602

Entity Code: S
How Located: P
Point Located: PIT IN NE1/4 N1/2 LOT 5 CON V

Map Reference: AFRO WORK RPT KL #1123 MAP 1123-4
Deposit Status Code: F
Compiler: JM
Map Scale Code: C

---------- Window #2 ----------

Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL F Gold

---------- Window #3 ----------

Ref# References
1 RES/REG PROP RPT KL #304,305
2 AFRO WORK RPT KL #1123

---------- Window #4 ----------

Alternate Names
1. MARY ELLEN

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. CRBN Carbonate
3. PYRT Pyrite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: BUTTE CANYON

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0990
SMDR#:
UTM Zone: 17
Northing: 5323106
Easting: 562053
Mining Area:
Resident Geologist Area: KL

Update Date: 19950602

Latitude: 48 3 37
Longitude: 80 10 2

Entity Code: S
How Located: P
Point Located: DDH #85-1 SW1/4 S1/2 LOT 2 CON IV

Map Reference: AFRO WORK RPT KL #309 PROP GEOLOGY MAP
Deposit Status Code: F
Compiler: JM
Map Scale Code: C

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. AU	PRINCIPAL	F	Gold
2. CU	MINOR	F	Copper
3. PB	MINOR	F	Lead

---------- Window #3 ----------

Ref#	References
1	RES/REG PROP RPT KL #222
2	AFRO WORK RPT KL #309,239

---------- Window #4 ----------

Alternate Names
1. RIVARD, F.

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. MGNT Magnetite
2. PYRT Pyrite
3. CLRT Chlorite
4. PYTT Pyrrhotite
5. CRBN Carbonate
6. QRTZ Quartz

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------

Deposit Name: HARRINGTON, P.

Compiled Date: 19910126

District: T
NTS: 42A01SE
Township: EBY

MDI#: T 0991
SMDR#:
UTM Zone: 17
Northing: 5325176
Easting: 562871
Mining Area:
Resident Geologist Area: KL

Latitude: 48 4 44
Longitude: 80 9 21

Update Date: 19950602

Entity Code: S
How Located: P
Point Located: DDH #79-3 NW1/4 S1/2 LOT 1 CON V

Map Reference: AFRO WORK RPT KL #1095 DDH LOC MAP
Deposit Status Code: F
Compiler: JM
Map Scale Code: A

---------- Window #2 ----------

Commodity	Qualifier	Stat	ComGrp
1. CU	PRINCIPAL	F	Copper
2. AU	MINOR	F	Gold

---------- Window #3 ----------

Ref#	References
1	RES/REG PROP RPT KL #129
2	AFRO WOR RPT KL #1095

---------- Window #4 ----------

Alternate Names

---------- Window #5 ----------

NTS Extension

---------- Window #6 ----------

Township Extension Concession Lot

---------- Window #7 ----------

Geological Province:

---------- Window #8 ----------

Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation

---------- Window #9 ----------

Minerals
1. QRTZ Quartz
2. CRBN Carbonate
3. PYRT Pyrite
4. CLRT Chlorite

---------- Window #10 ----------

Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------

Contiguous SMDR# Contiguous Deposit

---------- Window #12 ----------

Subject Comments

---------- Window #1 ----------
Deposit Name: OVERBURDEN DRILL HOLE 80-25
Compiled Date: 19930227
District: T MDI#: T 1207 Update Date: 19930227
NTS: 42A01SE SMDR#:
Township: EBY UTM Zone: 17
Northing: 5322900
Latitude: 48 3 32 Easting: 554940
Longitude: 80 15 46 Mining Area:
Resident Geologist Area: KL
Entity Code: S How Located: P
Point Located: DRILL HOLE SYMBOL 80-25 IN W CENTRAL EBY TP

Map Reference: OGS 1990 OFR 5737 OVERBURDEN DRILL HOLE LOC MAP
Deposit Status Code: G Compiler: JK Map Scale Code: E
---------- Window #2 ----------
Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL G Gold
---------- Window #3 ----------
Ref# References
1 OGS 1981 OFR 5356
2 OGS 1990 OFR 5737
---------- Window #4 ----------
Alternate Names
---------- Window #5 ----------
NTS Extension
---------- Window #6 ----------
Township Extension Concession Lot
---------- Window #7 ----------
Geological Province:
---------- Window #8 ----------
Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation
---------- Window #9 ----------
Minerals
---------- Window #10 ----------
Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------
Contiguous SMDR# Contiguous Deposit
---------- Window #12 ----------
Subject Comments

---------- Window #1 ----------
Deposit Name: OVERBURDEN DRILL HOLE 80-24
Compiled Date: 19930227
District: T MDI#: T 1208 Update Date: 19930227
NTS: 42A01SE SMDR#:
Township: EBY UTM Zone: 17
Northing: 5322900
Latitude: 48 3 31 Easting: 558750
Longitude: 80 12 42 Mining Area:
Resident Geologist Area: KL
Entity Code: S How Located: P
Point Located: DRILL HOLE SYMBOL 80-24 IN CENTER OF EBY TP

Map Reference: OGS 1990 OFR 5737 OVERBURDEN DRILL HOLE LOC MAP
Deposit Status Code: G Compiler: JK Map Scale Code: E
---------- Window #2 ----------
Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL G Gold
---------- Window #3 ----------
Ref# References
1 OGS 1981 OFR 5356
2 OGS 1990 OFR 5737
---------- Window #4 ----------
Alternate Names
---------- Window #5 ----------
NTS Extension
---------- Window #6 ----------
Township Extension Concession Lot
---------- Window #7 ----------
Geological Province:
---------- Window #8 ----------
Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation
---------- Window #9 ----------
Minerals
---------- Window #10 ----------
Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------
Contiguous SMDR# Contiguous Deposit
---------- Window #12 ----------
Subject Comments

---------- Window #1 ----------
Deposit Name: OVERBURDEN DRILL HOLE 80-26
Compiled Date: 19930227

District: T	MDI#: T 1209	Update Date: 19930227
NTS: 42A01SE	SMDR#:	
Township: EBY	UTM Zone: 17	
	Northing: 5321150	
Latitude: 48 2 36	Easting: 554925	
Longitude: 80 15 47	Mining Area:	
	Resident Geologist Area: KL	

Entity Code: S How Located: P
Point Located: DRILL HOLE SYMBOL 80-26 IN SW EBY TP

Map Reference: OGS 1990 OFR 5737 OVERBURDEN DRILL HOLE LOC MAP
Deposit Status Code: G Compiler: JK Map Scale Code: E
---------- Window #2 ----------
Commodity Qualifier Stat ComGrp
1. AU PRINCIPAL G Gold
---------- Window #3 ----------
Ref# References
1 OGS 1981 OFR 5356
2 OGS 1990 OFR 5737
---------- Window #4 ----------
Alternate Names
---------- Window #5 ----------
NTS Extension
---------- Window #6 ----------
Township Extension Concession Lot
---------- Window #7 ----------
Geological Province:
---------- Window #8 ----------
Rock Name Class Group Era Relation to Deposit
Supergroup Group Formation
---------- Window #9 ----------
Minerals
---------- Window #10 ----------
Depth of Working Mill Capacity Mining Method Reserves

---------- Window #11 ----------
Contiguous SMDR# Contiguous Deposit
---------- Window #12 ----------
Subject Comments

ANNEX
1/B-1 17

ONTARIO GEOLOGICAL SURVEY
MINERAL DEPOSITS CIRCULAR 18

Gold Deposits of Ontario

PART 2

Part of District of Cochrane, Districts of Muskoka, Nipissing, Parry Sound, Sudbury, Timiskaming, and Counties of Southern Ontario

by

J. B. Gordon, H. L. Lovell, Jan de Grijs, and R. F. Davie

1979

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Ontario Ministry of Northern Development and Mines

Sean Conway, Minister of Mines

Baldwin Prospect

MAIN METALS: Au

LOCATION: Approximately 7 miles west-southwest of Kirkland Lake, in NW¼, N½, lot 1, N½, lot 2, and NW¼, NE¼, SE¼, N½, lot 3, concession VI, Eby Township. Shaft in N½, lot 2, concession VI. Latitude 48.10°, Longitude 80.16°.

Map reference: ODMNA 2239, Eby-Otto Area.

GEOLOGY: The property lies on the contact between Keewatin metavolcanics and Timiskaming conglomerate, greywacke, and tuffaceous sediment. The contact is erratically carbonatized and lenticular bodies of syenite and syenite porphyry are intruded along it. In the vicinity of the mine workings the rocks are folded and overturned. Various sets of shear zones and faults cut across the rock formations on surface and underground.

There are two ages of vein material. The later veins form a system approximately 250 feet in length which trends N65°E and dips 70°S, individual veins range from a few inches to more than 2 feet in width and are mineralized with pyrite. The best gold values occur where this system is intersected by a zone of fracturing and faulting which trends N20°E.

ECONOMIC FEATURES: One ore shoot was outlined between the 200- and 300-foot levels. "Indicated" ore was reported to be 5,040 tons averaging 0.64 ounce of Au per ton (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake).

HISTORY: 1911: Gold found by Baldwin.

1917-1919: Two-compartment shaft to 200 feet, with 340 feet of lateral development on the 100- and 200-foot levels.

1922-1924: Shaft dewatered and deepened to 300 feet, and 1,100 feet of lateral development done on 100- and 200-foot levels by Baldwin Gold Mining Company Limited.

1929: Shaft deepened to 415 feet, with new levels at 300 and 400 feet, and 2,760 feet of lateral de-

velopment on all four levels by Baldwin Kirkland Gold Mines Limited.

1934: Shaft dewatered and resampled, and 100 feet of drifting done on 400-foot level by Lucky Kirkland Gold Mines Limited.

Circa 1944: Eight diamond-drill holes (1,897 feet) on Rosa Brown property by Sylvanite Gold Mines Limited; this property became part of the Baldwin Prospect.

1946: Up to this date, a total of 12,000 feet of surface and underground diamond-drilling had been done by previous owners. Dewatering and resampling of shaft, surface and underground geological surveys, and 1,300 feet of diamond-drilling by Baldwin Consolidated Mines Limited.

PRODUCTION:

Year	Gold (ounces)	Ore Milled (tons)	Recovered Grade (ounce of Au per ton)
1929, 1938	43	81	0.53

REFERENCES: ODM 1964, MRC3, p.13, 14.
ODMNA 1972, GR99, p.18-20.
Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake: Eby Township, Erie Consolidated Mines Limited (1946).

Rogick-Clark-Elliot Prospect

MAIN METALS: Au

LOCATION: Approximately 8½ miles west-southwest of Kirkland Lake, in N½, S½, lots 4 and 5, concession VI, Eby Township. Latitude 48.09°, Longitude 80.19°.
Map reference: ODMNA 2239, Eby-Otto Area.

GEOLOGY: A contact between carbonate rocks and a small syenite body is cut by numerous quartz stringers containing pyrite and visible gold. Assays of grab samples from trenches ranged from 0.06 to 0.49 ounce of Au per ton. The best diamond-drill core intersections were 0.64 ounce of Au per ton over 2.0 feet and 0.70 ounce of Au per ton over 10.0 feet.

HISTORY: 1938: Discovery of several large angular pieces of gold-bearing float.
1939: 14 diamond-drill holes (footage unknown) by Pioneer Gold Mines Limited. Geological survey and trenching by Sylvanite Gold Mines Limited. Nine diamond-drill holes (footage unknown) by Beaucoeur.
1944-1945: Four diamond-drill holes (1,878 feet) by Siscoe Gold Mines Limited.

REFERENCES: ODMNA 1972, GR99, p.22, 23.
Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake: Eby Township, Rogick-Clarke-Elliot (1939, 1945).

Walters Prospect

MAIN METALS: Au

LOCATION: Approximately 8½ miles west-southwest of Kirkland Lake, in S½, S½, lot 5, concession VI and lot 5, concession V, Eby Township. Main showings in S½, S½, lot 5, concession VI and NE¼, N½, lot 5, concession V. Latitude 48.08°, Longitude 80.19°.
Map reference: ODMNA 2239, Eby-Otto Area (Walters, George W; Barker, Mrs. Cora K.).

GEOLOGY: Keewatin metavolcanics and metasediments are cut by several gabbro-diorite stocks, numerous small syenite bodies, and north-trending diabase dikes.
Two quartz veins cut basalt in S½, S½, lot 5, concession VI. A sample taken across a 2.5-foot width of one of the veins assayed 0.17 ounce of Au per ton. Seven hundred feet to the south, finely-divided gold is associated with narrow quartz stringers in a carbonate body. Bulk samples from the east end of the body assayed 0.06 ounce and 2.74 ounces of Au per ton.

HISTORY: 1935: Geological survey and sampling by Sylvanite Gold Mines Limited.
1938: Surface work, bulk sampling, and eight diamond-drill holes (approximately 3,000 feet) by D.M. Hogarth and associates.

REFERENCES: ODM 1964, MRC3, p.72, 73.
ODMNA 1972, GR99, p.25, 26.
Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake.

Name and Location	References	Metals	Remarks
	EBY TOWNSHIP (NTS 42A/1E)		
Dominion Gulf Occurrence: Parts of lots 9-11, con. V, Eby Tp. Showing in claim L57608. Lat. 48.08°, Long. 80.24°.	ODMNA 1972, GR99, p.20. Resident Geologist's Files, OMNR, Kirkland Lake. ODMNA Map 2239, Eby-Otto Area.	Au	Property underlain by Keewatin metavolcanics (andesite and gabbro). Showing consists of sheared carbonate rock containing quartz stringers. A diamond-drill core intersection assayed 0.02 oz. Au/ton over 1.3 feet. Circa 1945: 4 diamond-drill holes (1,360 feet). 1952: Geological and magnetic surveys and 2 diamond-drill holes by Dominion Gulf Co.
Johnson Occurrence: E½, S½, lot 3, con. IV, Eby Tp. Lat. 48.06°, Long. 80.17°.	ODMNA 1972, GR99, p.21. Resident Geologist's Files, OMNR, Kirkland Lake. ODMNA Map 2239, Eby-Otto Area.	Au	A porphyry dike cutting Keewatin metavolcanics yielded values ranging from 0.1 to 0.3 oz. Au/ton. 1938: Surface work and pitting by A. Johnson.
Lemu Occurrence: N½, S½, lot 4, con. V, Eby Tp. Lat. 48.08°, Long. 80.19°.	ODMNA 1972, GR99, p.22. Resident Geologist's Files, OMNR, Kirkland Lake: Eby Tp., Lumsden (1944). ODMNA Map 2239, Eby-Otto Area.	Au	Keewatin mafic metavolcanics cut by red porphyry dike. Pink quartz vein in the dike assayed 0.14 oz. Au/ton. Pre-1944: 40-foot shaft by Lumsden.
Mundy Occurrence: NE¼, N½, lot 11, con. IV, Eby Tp. Lat. 48.08°, Long. 80.19°.	ODMNA 1972, GR99, p.22. Resident Geologist's Files, OMNR, Kirkland Lake: Eby Tp., Sylvanite Misc. (1938). ODMNA Map 2239, Eby-Otto Area.	Au	Keewatin metavolcanics and syenite are cut by quartz stringers. Assays of 3 grab samples ranged from trace to 0.02 oz. Au/ton. Circa 1928: Stripping, trenching, and pitting by Mundy.
Preston Occurrence: N½, lot 8, con. III, Eby Tp. Lat. 48.05°, Long. 80.23°.	ODMNA 1972, GR99, p.22. Resident Geologist's Files, OMNR, Kirkland Lake: Eby Tp., Preston East Dome Mines Ltd. (1950). ODMNA Map 2239, Eby-Otto Area.	Au	Keewatin metavolcanics cut by feldspar porphyry and north-trending diabase dikes. A narrow mineralized shear zone contains minor quartz and concentrated pyrite across a width of 2 feet and for an exposed length of 25 feet. Assays of diamond-drill core ranged from 0.01 to 0.10 oz. Au/ton over lengths of 0.5 to 1.0 foot. 1949: Geological survey. 1950: 3 diamond-drill holes (588 feet) by Preston East Dome Mines Ltd.
Sylvanite Occurrence: W½, N½, lot 7, con. V and lot 8, con. V, Eby Tp. Lat. 48.08°, Long. 80.23°.	ODMNA 1972, GR99, p.20. Resident Geologist's Files, OMNR, Kirkland Lake: Eby Tp., Sylvanite Gold Mines Ltd. (1949). ODMNA Map 2239, Eby-Otto Area.	Au	Keewatin metavolcanics are cut by diabase and syenite dikes and by a 30-foot wide shear zone which strikes east, dips steeply south, and contains quartz-veined green carbonate rock. Assays ranged from trace to 0.18 oz. Au/ton. 1944-1945: Geological survey and 4 diamond-drill holes (1,360 feet) by Sylvanite Gold Mines Ltd. 1952: Geological and magnetic surveys over northern half of property by Dominion Gulf Co. Ltd.

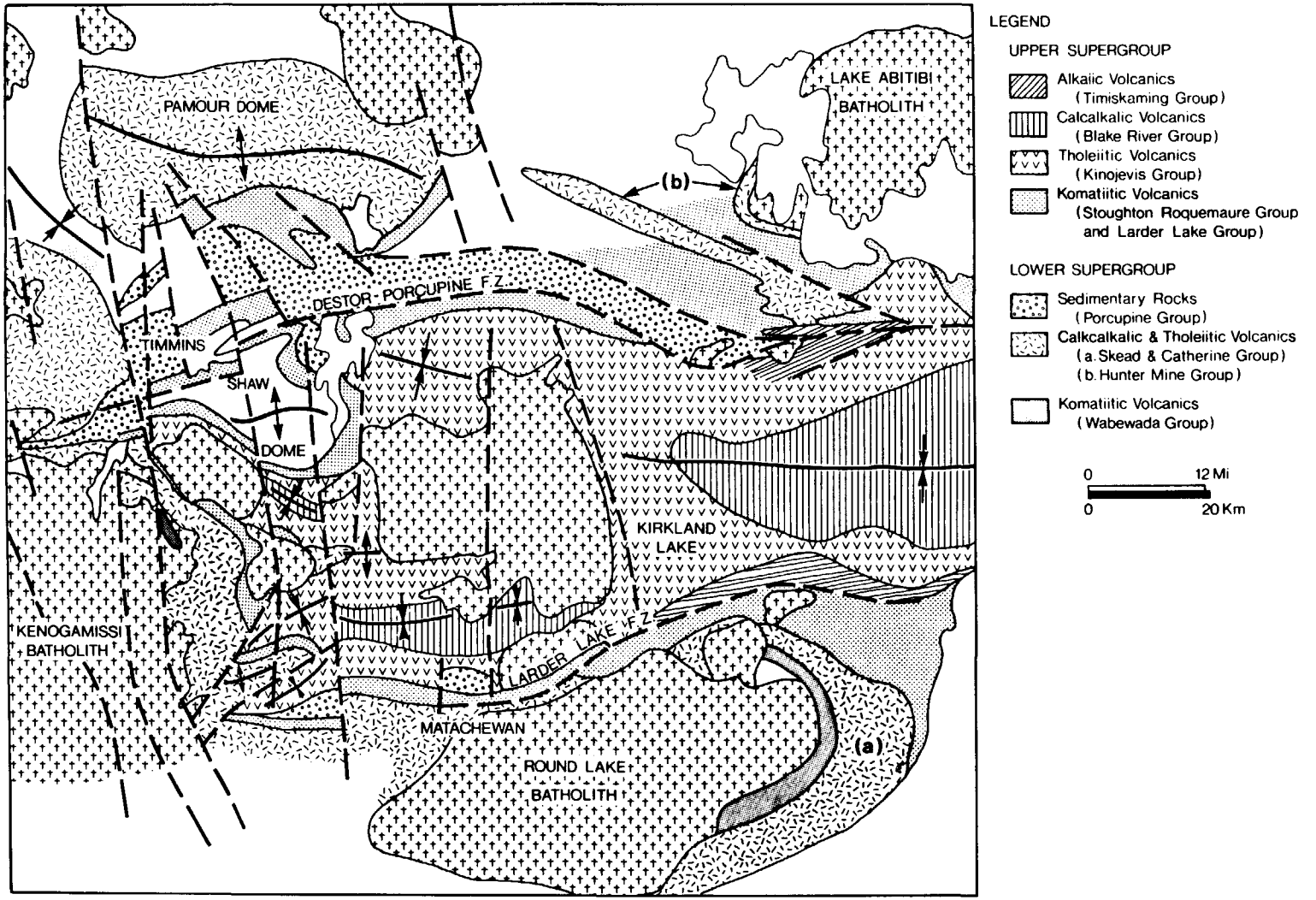
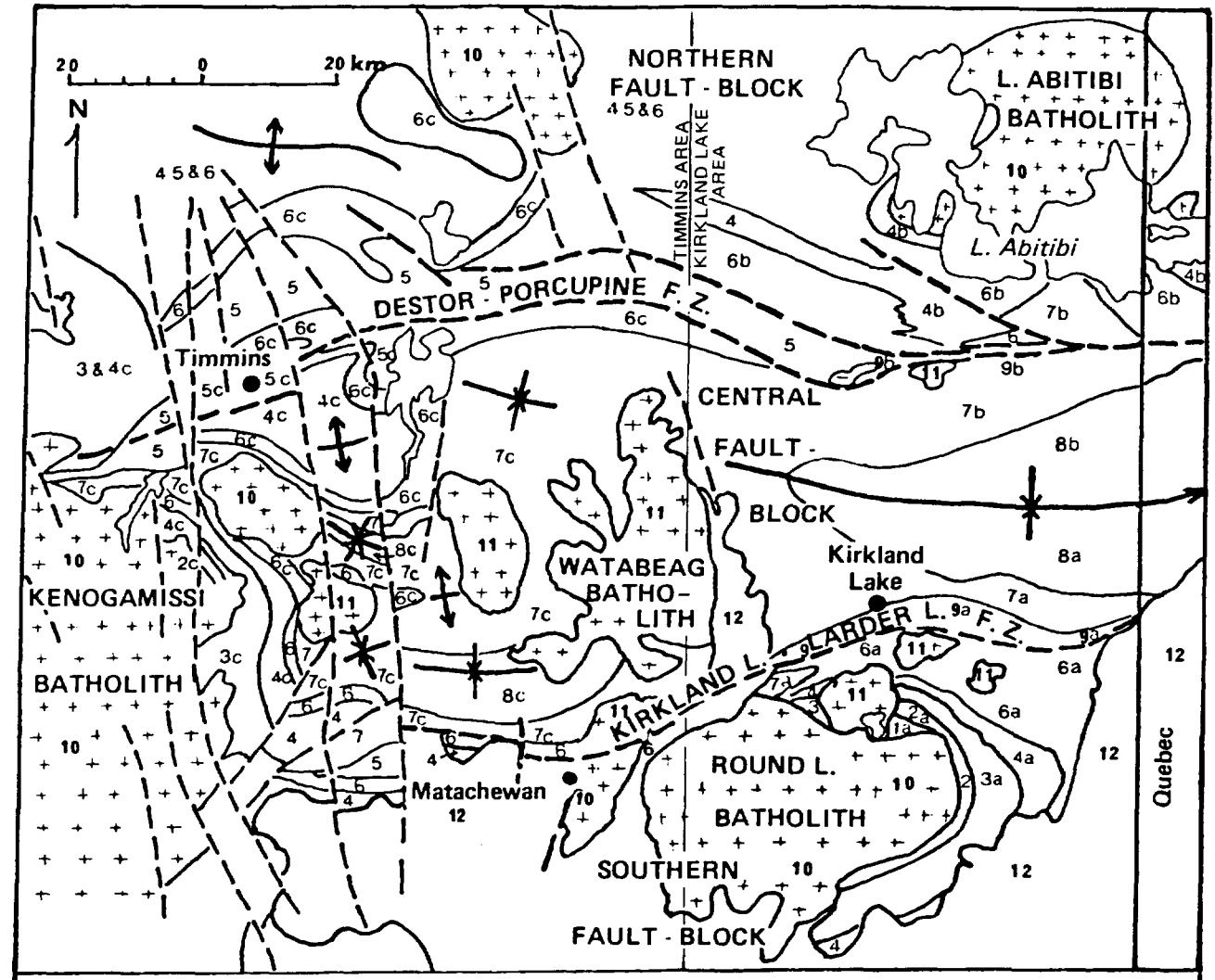


Figure 5-1—Stratigraphy and structural geology of the Timmins-Kirkland Lake area.

ANNEX
B-21

ANNEX "B-3"



LEGEND

Proterozoic

Keeweenawan diabase (not shown)

12 Cobalt Group

Archean

Matachewan diabase (not shown)

Granitic rocks

11 Granodiorite, monzonite, quartz monzonite, *syenite*

10 Massive to gneissic quartz diorite, tonalite, trondhjemite

Upper Supergroup

9 9a* Timiskaming Group, 9b** Destor - Porcupine Complex

8 8a, 8n, Blake River Group, 8c*** Blake River (Upper Fm., Tisdale Group)

7 7a, 7b, Kinojevis Group, 7c Kinojevis Group, (Middle Fm., Tisdale Group)

6 6a Larder Lake Group, 6b Stoughton-*Roquemaure Group*, 6c Lower Fm., Tisdale Group

5 5c Porcupine Group

Lower Supergroups

4 4a Skead Group, 4b Hunter Mine Group, 4c Upper Fm., Deloro Group

3 3a Catherine Group, 3c Middle Fm., Deloro Group

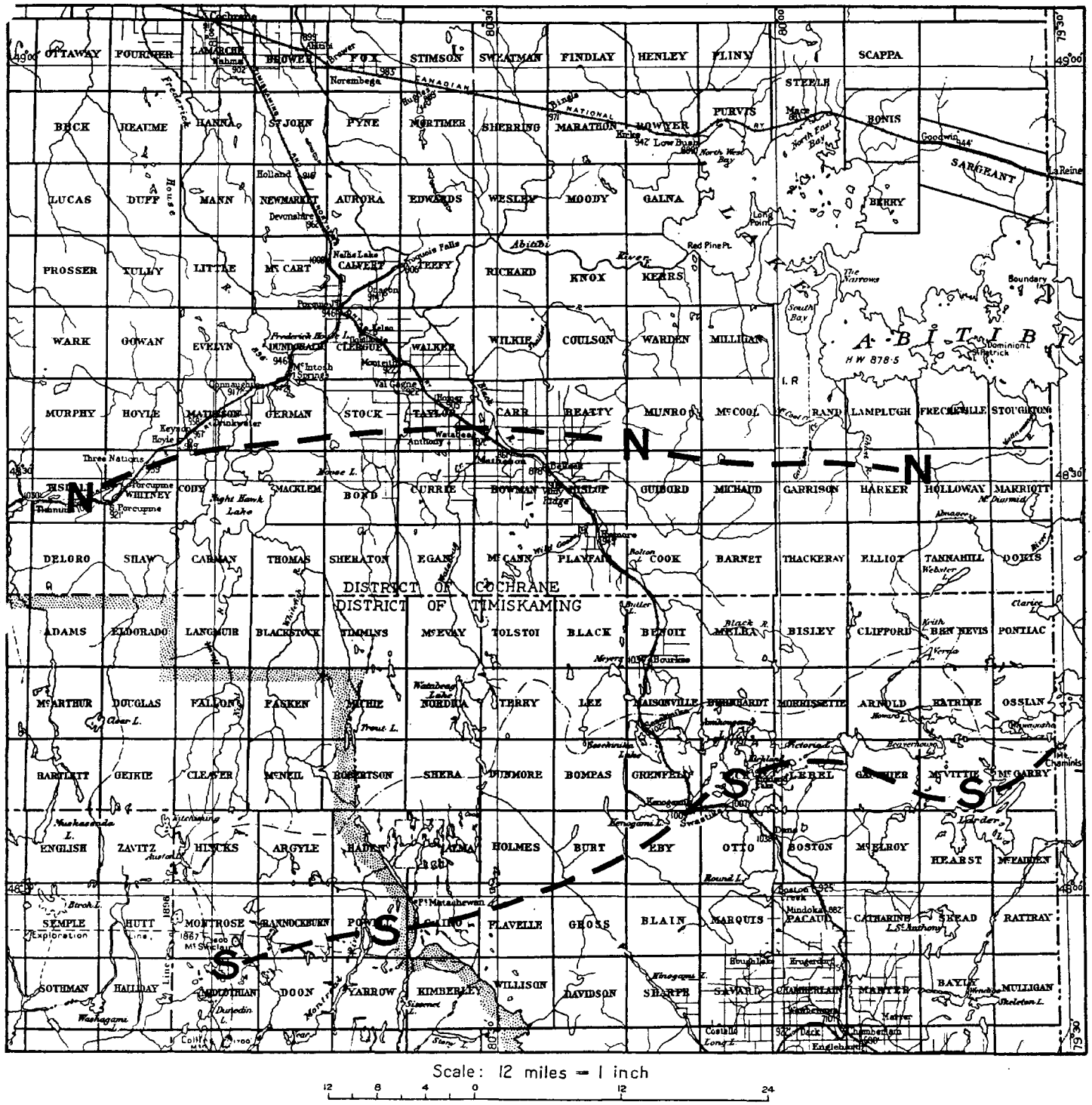
2 2a Wabewawa Group, 2c Lower Fm., Deloro Group

1 1a Pacaud tuffs ****

*a refers to Kirkland Lake Area, south limb of synclinorium (Jensen 1978c, 1979).
**b refers to Kirkland Lake Area, north limb of synclinorium (Jensen 1976, 1978b).
***c refers to Timmins Area (Pyke 1980)
**** (Goodwin 1965).

Figure 5. Geological map of the Timmins - Kirkland Lake area.

ANNEX "B-3A"



Key map of part of Northern Ontario extending westerly from the Quebec boundary and showing general position of the northern and southern gold belts. The letter "N" appears for the Porcupine, Munro, and Lightning River areas, and "S" for Midlothian, Matachewan, Kirkland Lake, and Larder Lake.

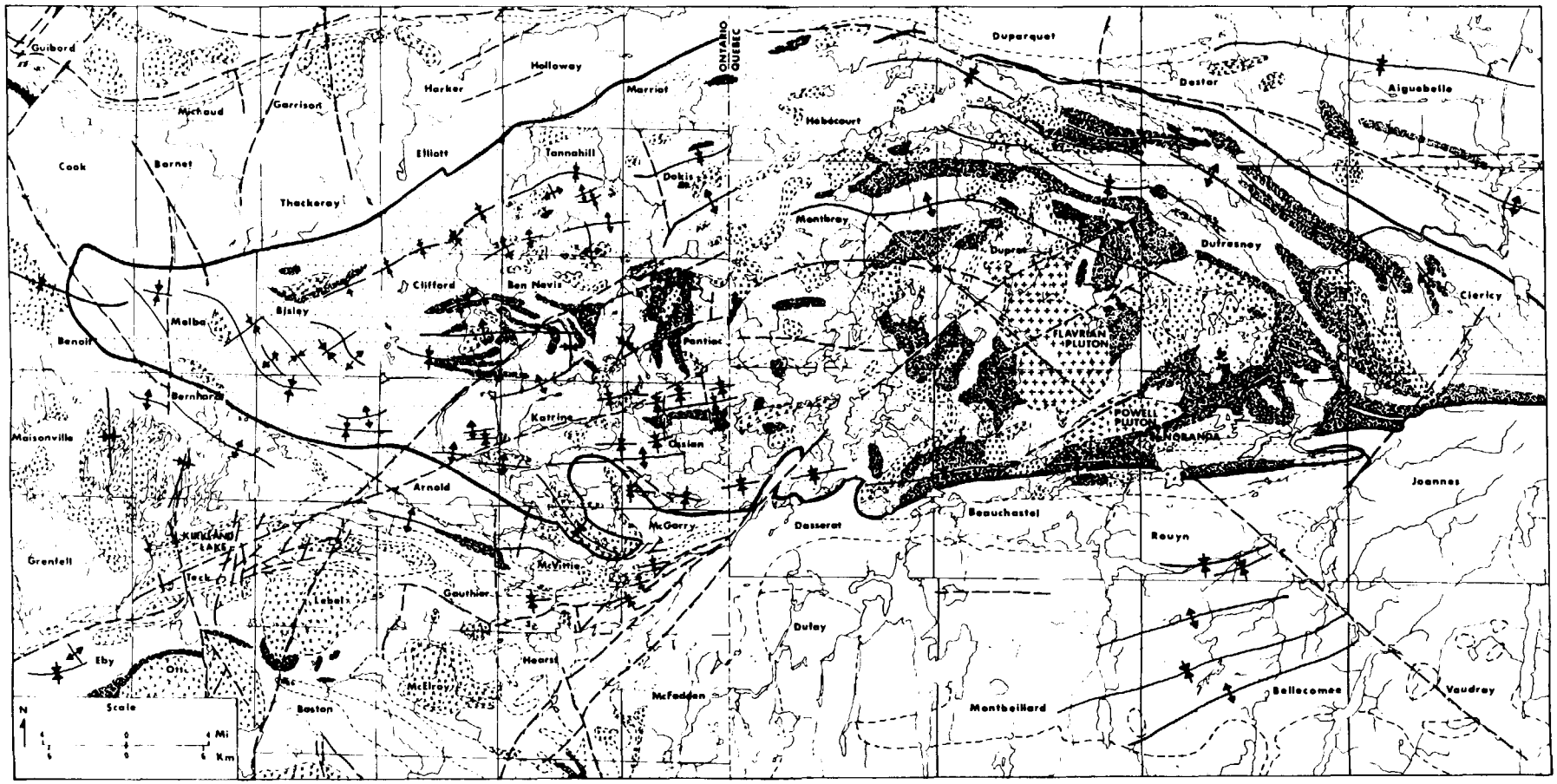


Figure 64. Map of the Blake River Group in Ontario and Quebec (Quebec part of the Blake River Group after Grenier 1967). Note type section of the Blake River Group occurs in Cadillac Township, 20 km east of Joannes Township.

ANNEX "B-41"

ERLIS DATABASES

Assessment Files

- Airborne Geophysics
- Ground Geophysics
- Geology
- Geochemistry
- Diamond Drilling

Physical

- Other
- Selected Feature

Publications

- Bedrock Geology
- Energy
- Geochemistry
- Geophysics
- Mineral Deposits
- Surficial Geology
- Miscellaneous
- Selected Feature

Mineral Deposits

- Discretionary Occurence
- Occurence
- Prospect
- Developed Prospect Without Reserves
- Past Producing Mine Without Reserves
- Developed Prospect With Reserves
- Past Producing Mine With Reserves
- Producing Mine

Drill Holes

- Diamond Drill Hole
- Wedged Diamond Drill Hole
- Overburden Drill Hole (Auger, Wacker)
- Percussion Drill Hole
- Reverse Circulation (Sonic)
- Underground Drilling
- Other
- Rotation of Symbol Denotes Azimuth (e.g. 90)

Topographic

- Levee/Dyke
- Inland Water
- Rivers and Streams
- Major roads
- Minor roads
- Rail Line

Lithogeochemistry

- Station Samples = 1
- Station Samples > 1

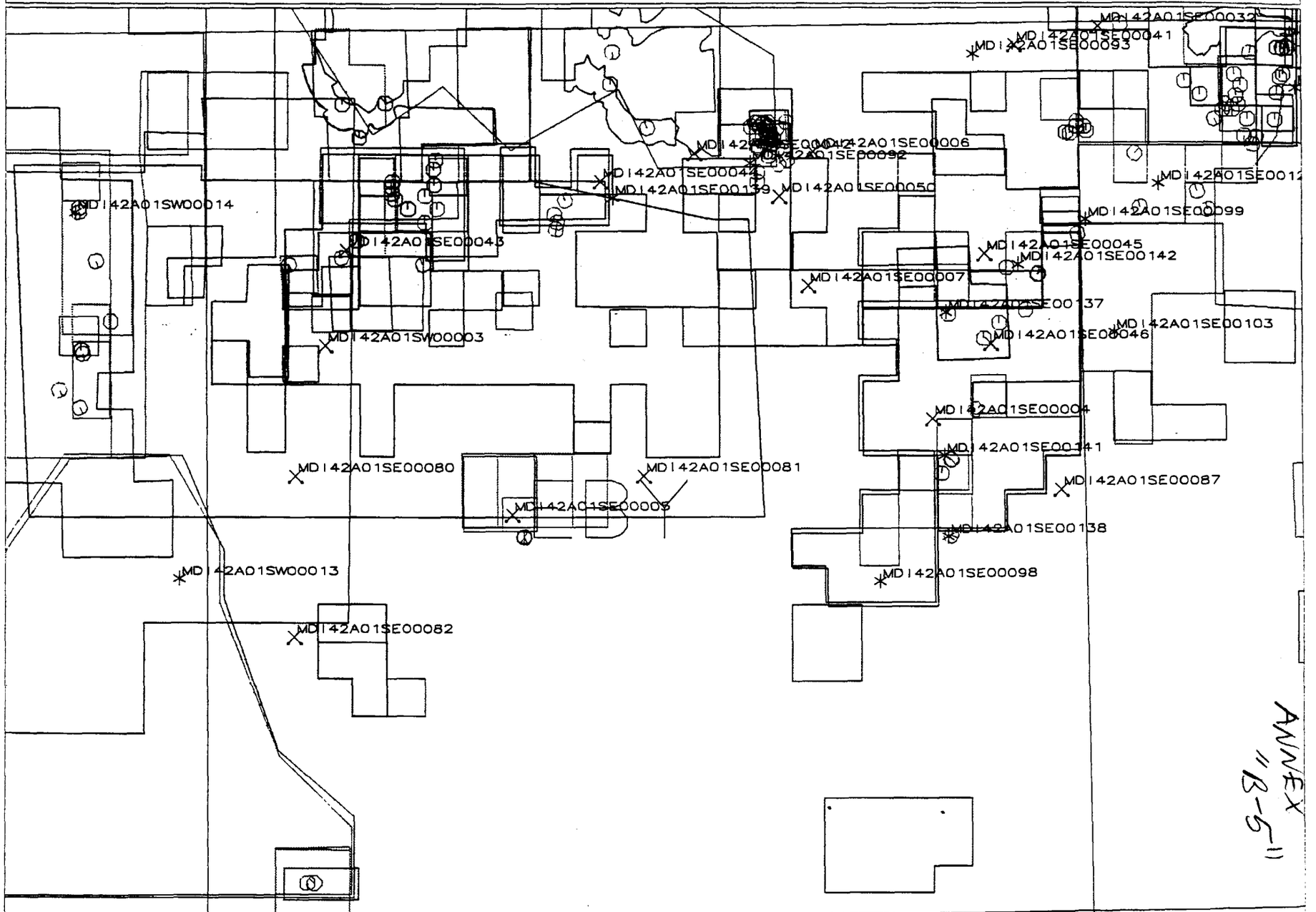
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ANNEX "B-5"

Ontario Ministry of Northern Development and Mines
Earth Resource & Land Information System (ERLIS)
MINERAL DEPOSIT INVENTORY SUMMARY REPORT

MDI Num	Deposit Name	Status	Principal Commodity	Reserve?	Production?	Visit?	Assays?
MDI-42A01SE-00004	JOHNSON, ANGUS	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00005	PRESTON	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00006	ROGICK-ELLIOT-CLARK	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00007	LEMU LUMSDEN	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00032	KELLY-KIRKLAND STROME, D.	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00041	BROWN, ROSA	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00042	BURTHO VAGOLAIDE	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00043	DOMINION GULF	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00044	SYLVANITE-1	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00045	SYLVANITE-2	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00046	SYLVANITE-3	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00050	HEMLO REEF	DISCRETIONARY OCCURRENCE	GOLD				
MDI-42A01SE-00080	OVERBURDEN DRILL HOLE 80-25	DISCRETIONARY OCCURRENCE					
MDI-42A01SE-00081	OVERBURDEN DRILL HOLE 80-24	DISCRETIONARY OCCURRENCE					
MDI-42A01SE-00082	OVERBURDEN DRILL HOLE 80-26	DISCRETIONARY OCCURRENCE					
MDI-42A01SE-00092	WALTERS, C.J.	OCCURRENCE	GOLD				
MDI-42A01SE-00093	BALDWIN	OCCURRENCE	GOLD				
MDI-42A01SE-00098	EBY	OCCURRENCE	IRON				
MDI-42A01SE-00099	SELECTED INTERNATIONAL TODORA	OCCURRENCE	GOLD				
MDI-42A01SE-00103	OTTO-PT	OCCURRENCE	PLATINUM				

MDI Num	Deposit Name	Status	Principal Commodity	Reserve?	Production?	Visit?	Assays?
MDI-42A01SE-00137	FISHKIN, M.	OCCURRENCE	COPPER				
MDI-42A01SE-00138	FISHKIN STEWART, W.	OCCURRENCE	COPPER				
MDI-42A01SE-00139	MARY ELLEN	OCCURRENCE	GOLD				
MDI-42A01SE-00141	BUTTE CANYON RIVARD, F.	OCCURRENCE	GOLD				
MDI-42A01SE-00142	HARRINGTON, P.	OCCURRENCE	COPPER				
MDI-42A01SW-00003	MUNDAY MUNDY	DISCRETIONARY OCCURRENCE	GOLD				

Total Mineral Deposits: 26

ERLIS DATABASES

Assessment Files

- Airborne Geophysics
- Ground Geophysics
- Geology
- Geochemistry
- Diamond Drilling

Physical

- Other

Selected Feature

Publications

- ¶ Bedrock Geology
- ¶ Energy
- ¶ Geochemistry
- ¶ Geophysics
- ¶ Mineral Deposits
- ¶ Surficial Geology
- ¶ Miscellaneous

Selected Feature

Mineral Deposits

- Discretionary Occurence
- Occurence
- Prospect
- Developed Prospect Without Reserves
- Past Producing Mine Without Reserves
- Developed Prospect With Reserves
- Past Producing Mine With Reserves
- Producing Mine

Drill Holes

- Diamond Drill Hole
- Wedged Diamond Drill Hole
- Overburden Drill Hole (Auger, Wacker)
- Percussion Drill Hole
- Reverse Circulation (Sonic)
- Underground Drilling
- Other
- Rotation of Symbol Denotes Azimuth (e.g. 90)

Topographic

- Levee/Dyke
- Inland Water
- Rivers and Streams
- Major roads
- Minor roads
- Rail Line

Lithogeochemistry

- Station Samples = 1
- Station Samples > 1

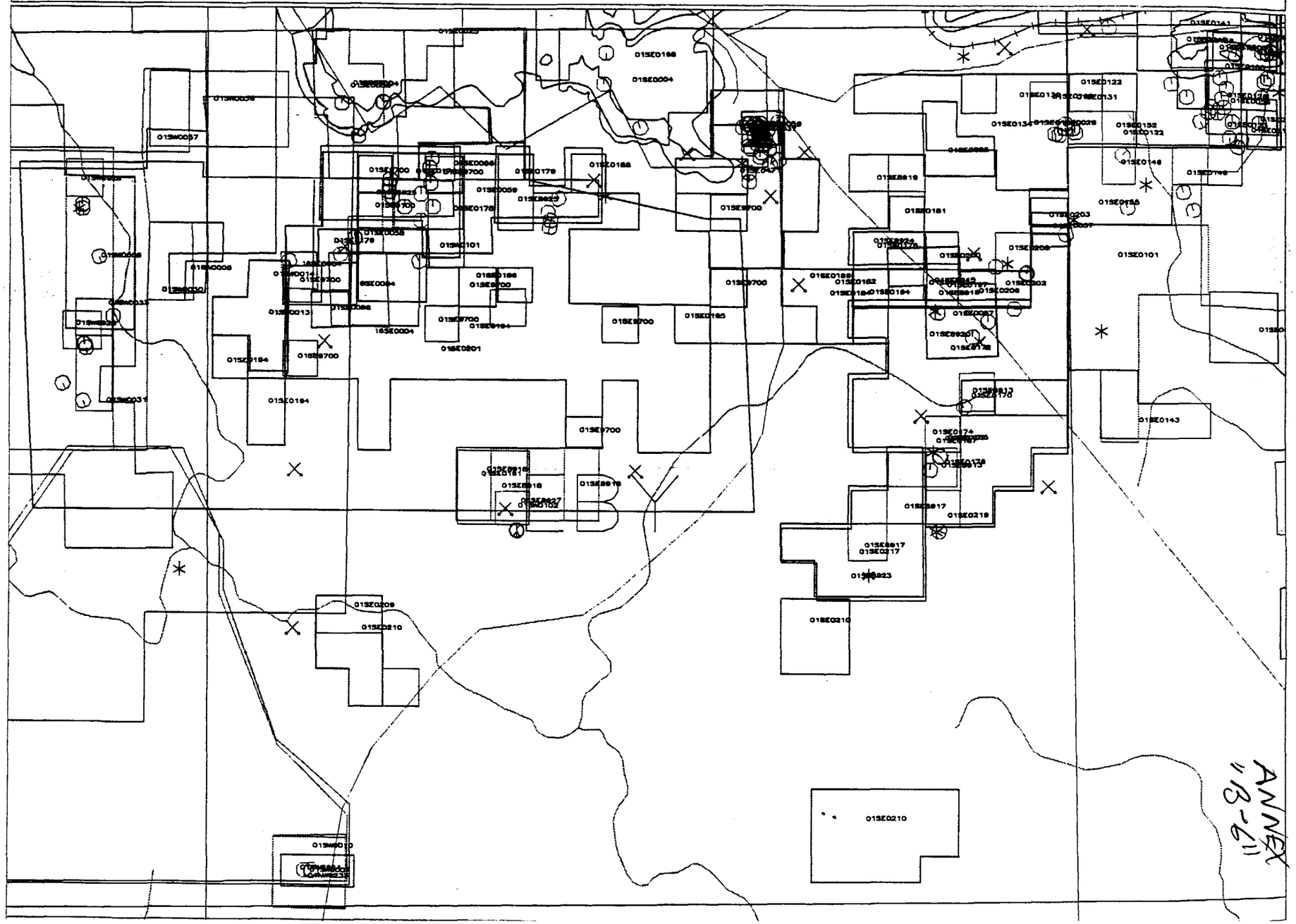
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UTM zone 17 NAD 27



ANNEX "B-11"

Ontario Ministry of Northern Development and Mines
Earth Resources and Land Information System (ERLIS)
ASSESSMENT FILE INDEX SUMMARY REPORT

AFRI FILE	Township/Area Name	Work Type Group	Performed For	Year	Maps	Pages
32D04NE0091	EBY MAISONVILLE MCVITTIE	GROUND GEOPHYSICS	NORANDA EXPL CO LTD	1980	6	16
32D04NW0233	BLAIN BOMPAS EBY GAUTHIER HINCKS LEBEL ZAVITZ	DIAMOND DRILLING GEOLOGY GROUND GEOPHYSICS OTHER PHYSICAL	A BLACK M LEAHY	1991	6	62
42A01NE0100	EBY GRENFELL OTTO TECK	DIAMOND DRILLING GEOCHEMISTRY GEOLOGY GROUND GEOPHYSICS OTHER PHYSICAL	BATTLE MOUNTAIN (CAN) INC	1990	106	445
42A01SE0004	EBY GRENFELL	DIAMOND DRILLING OTHER	WESTMINER CAN LTD	1994	4	54
42A01SE0025	EBY GRENFELL	GROUND GEOPHYSICS PHYSICAL	GREATER LENORA RESC CORP	1994	3	18
42A01SE0028	EBY OTTO	GROUND GEOPHYSICS PHYSICAL	J REED	1995	2	68
42A01SE0037	EBY	DIAMOND DRILLING OTHER	GREATER LENORA RESC CORP	1995	7	54
42A01SE0057	EBY OTTO	GEOCHEMISTRY PHYSICAL	A ALLSOPP	1991	1	21
42A01SE0058	EBY GRENFELL	OTHER PHYSICAL	GREATER LENORA RESC CORP	1994	4	49
42A01SE0059	EBY GRENFELL	GROUND GEOPHYSICS	GREATER LENORA RESC CORP RJK EXPL	1995	5	31
42A01SE0071	EBY	AIRBORNE GEOPHYSICS	PREMIER EXPL INC	1987	4	17
42A01SE0085	EBY	GEOCHEMISTRY GEOLOGY GROUND GEOPHYSICS PHYSICAL	D ROBINSON	1995	3	106
42A01SE0086	EBY	GEOLOGY OTHER PHYSICAL	GREATER LENORA RESC CORP	1995	1	28
42A01SE0087	EBY	GEOCHEMISTRY GEOLOGY GROUND GEOPHYSICS	D ROBINSON	1996	3	96

Ontario Ministry of Northern Development and Mines
Earth Resources and Land Information System (ERLIS)
ASSESSMENT FILE INDEX SUMMARY REPORT

AFRI FILE	Township/Area Name	Work Type Group	Performed For	Year	Maps	Pages
42A01SE0087		PHYSICAL				
42A01SE0122	EBY OTTO	PHYSICAL	JAMES REED	1983		4
42A01SE0128	EBY OTTO	GEOLOGY	J D REED	1984	3	15
42A01SE0134	EBY OTTO	GROUND GEOPHYSICS OTHER	J D REED	1982	5	12
42A01SE0139	EBY OTTO	GROUND GEOPHYSICS	J REED	1982	5	20
42A01SE0170	EBY	DIAMOND DRILLING GEOCHEMISTRY	F RIVARD	1990	1	30
42A01SE0171	EBY	DIAMOND DRILLING GEOCHEMISTRY GROUND GEOPHYSICS	MARY ELLEN RESC LTD	1985	2	133
42A01SE0172	EBY	GEOCHEMISTRY GEOLOGY	BUTTE CANYON RESC INC	1988	5	75
42A01SE0174	EBY	GROUND GEOPHYSICS	BUTTE CANYON RESC INC	1988	3	22
42A01SE0175	EBY	DIAMOND DRILLING OTHER	MARY ELLEN RESC INC	1988	1	15
42A01SE0176	EBY EBY	GROUND GEOPHYSICS	BUTTE CANYON RESC INC	1987	4	21
42A01SE0177	EBY	DIAMOND DRILLING	F RIVARD	1990		9
42A01SE0179	EBY EBY EBY	GEOLOGY OTHER PHYSICAL	MARY ELLEN RESC LTD	1987	3	226
42A01SE0181	EBY	GROUND GEOPHYSICS	MARY ELLEN RESC LTD	1987	2	12
42A01SE0182	EBY	GROUND GEOPHYSICS	M GREER	1987	2	18
42A01SE0184	EBY	GROUND GEOPHYSICS	PERRONS	1986	3	20
42A01SE0185	EBY	DIAMOND DRILLING	F RIVARD	1985		8
42A01SE0186	EBY	GEOCHEMISTRY GEOLOGY GROUND GEOPHYSICS	MARY ELLEN RESC	1985	16	69
42A01SE0187	EBY	DIAMOND DRILLING	F RIVARD	1986		10
42A01SE0188	EBY	GEOLOGY GROUND GEOPHYSICS	ANDY ANDERSON	1986	1	26
42A01SE0189	EBY	GEOLOGY	PERRONS	1985	1	19
42A01SE0190	EBY OTTO	OTHER	J D REED	1984		15
42A01SE0191	EBY	GEOLOGY	A PERRON	1985	2	20

AFRI FILE	Township/Area Name	Work Type Group	Performed For	Year	Maps	Pages
42A01SE0193	EBY	GEOLOGY	J REED	1984	1	14
42A01SE0194	EBY	GEOCHEMISTRY GEOLOGY GROUND GEOPHYSICS	HEMLO REEF RESC	1983	4	17
42A01SE0195	EBY	GROUND GEOPHYSICS	HEMLO REEF RESC LTD	1984	1	12
42A01SE0196	EBY	DIAMOND DRILLING OTHER	J D REED	1984		18
42A01SE0197	EBY	DIAMOND DRILLING OTHER	J D REED	1984		8
42A01SE0198	EBY	GROUND GEOPHYSICS	GREN-TECK KIRKLAND RESC LTD	1983	4	14
42A01SE0200	EBY	GROUND GEOPHYSICS	J D REED	1982	3	17
42A01SE0201	EBY	GEOLOGY	R J KASNER	1983	8	26
42A01SE0202	EBY	GROUND GEOPHYSICS	JOMI MINERALS & EXPEDITING LTD	1981	4	11
42A01SE0203	EBY	DIAMOND DRILLING	A ALLSOP	1980	1	4
42A01SE0206	EBY	DIAMOND DRILLING	J REED	1980		4
42A01SE0207	EBY	GROUND GEOPHYSICS	LACANA MINING CORP	1980	2	6
42A01SE0208	EBY	DIAMOND DRILLING	P HARRINGTON	1980		12
42A01SE0209	EBY	GEOCHEMISTRY GEOLOGY	NORANDA EXPL CO LTD	1974	4	8
42A01SE0210	EBY EBY	GROUND GEOPHYSICS	NORANDA EXPL CO LTD	1972	5	25
42A01SE0217	EBY	GROUND GEOPHYSICS	KEEVIL CONSULTANTS LTD	1964	1	12
42A01SE0219	EBY	DIAMOND DRILLING	M FISHKIN	1968		7
42A01SE8908	EBY OTTO	AIRBORNE GEOPHYSICS	LENORA EXPL LTD	1983	16	63
42A01SE8913	EBY OTTO	DIAMOND DRILLING	F RIVARD	1990		5
42A01SE8915	EBY	DIAMOND DRILLING	UNKNOWN	1965		3
42A01SE8916	EBY	DIAMOND DRILLING	M FISHKIN	1969		2
42A01SE8917	EBY	DIAMOND DRILLING	KEEVIL CONSULTANTS	1966		9
42A01SE8918	EBY	GEOLOGY GROUND GEOPHYSICS	A H PERRON	1987	4	25
42A01SE8919	EBY	GROUND GEOPHYSICS	MARY ELLEN RESC LTD	1988	2	15
42A01SE8920	EBY	GEOCHEMISTRY	F RIVARD	1990	1	32
42A01SE8923	EBY	GEOLOGY GROUND GEOPHYSICS	KEEVIL CONSULTANTS LTD	1964	2	4
42A01SE8924	EBY	GROUND GEOPHYSICS	TAYLOR GOLD MINES LTD	1966	1	4
42A01SE8925	EBY	GEOLOGY	DOMINION GULF CO	1953	5	25

AFRI FILE	Township/Area Name	Work Type Group	Performed For	Year	Maps	Pages
42A01SE8925		GROUND GEOPHYSICS OTHER				
42A01SE8927	EBY	GEOLOGY	PRESTON E DOME MINES LTD	1949	1	9
42A01SE9700	EBY	DIAMOND DRILLING GEOCHEMISTRY GROUND GEOPHYSICS OTHER	GREATER LENORA RESOURCES CORP	1993	7	24
42A01SW0005	BOMPAS BURT BURT BURT BURT BURT BURT EBY GRENFELL	GROUND GEOPHYSICS PHYSICAL	WMC INTL LTD	1994	13	57
42A01SW0007	BLAIN BOMPAS EBY	DIAMOND DRILLING OTHER PHYSICAL	A BLACK	1992	1	10
42A01SW0010	EBY	PHYSICAL	A BLACK	1991		11
42A01SW0012	BURT BURT EBY GROSS	AIRBORNE GEOPHYSICS	LES RESSOURCES HALEX INC	1988	11	69
42A01SW0013	EBY	GROUND GEOPHYSICS	A PERRON	1987	3	19
42A01SW0014	EBY	GEOLOGY	PERRONS	1985	1	19
42A01SW0036	BURT EBY HOLMES	AIRBORNE GEOPHYSICS	BILLITON CAN LTD	1984	11	36
42A01SW0100	EBY	DIAMOND DRILLING	DOMINION GULF COMPANY	1955	1	5
42A01SW0101	EBY	DIAMOND DRILLING	DOMINION GULF COMPANY	1955		6
42A01SW0102	EBY	DIAMOND DRILLING OTHER	PRESTON EAST DOME MINES LTD	1950	1	4
42A01SW8921	EBY	DIAMOND DRILLING GEOLOGY PHYSICAL	A BLACK	1992	1	22
42A01SW8922	BURT EBY HOLMES	AIRBORNE GEOPHYSICS	BILLITON CANADA LTD	1985	6	34
42A01SW8926	BURT	AIRBORNE GEOPHYSICS	LES RESC HALEX INC	1988	7	54

Ontario Ministry of Northern Development and Mines
Earth Resources and Land Information System (ERLIS)
ASSESSMENT FILE INDEX SUMMARY REPORT

AFRI FILE	Township/Area Name	Work Type Group	Performed For	Year	Maps	Pages
42A01SW8926	EBY					
	GROSS					
42A16SE0004	BURT	AIRBORNE GEOPHYSICS	GREATER LENORA RESC CORP	1993	27	152
	EBY	DIAMOND DRILLING				
	GRENFELL	GEOCHEMISTRY				
	KNOX	GEOLOGY				
	RICKARD	GROUND GEOPHYSICS				
	TEEFY	OTHER				
	WESLEY	PHYSICAL				
	WILKIE					

Total Assessment Files : 80

ANNEX "C"

PROVINCE OF ONTARIO
DEPARTMENT OF MINES

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Geology of Teck Township and the Kenogami Lake Area, Kirkland Lake Gold Belt, by Jas. E. Thomson - - - - - 1-53

Geology of the Main Ore Zone at Kirkland Lake, by Jas. E. Thomson and G. H. Charlewood, K. Griffin, J. E. Hawley, Harold Hopkins, C. G. MacIntosh, S. P. Ogrizlo, O. S. Perry, Wm. Ward - - - - - - - - - - - - - - 54-188

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Post-Algoman Intrusives

Dikes of diabase and lamprophyre intrude all the rock types with which they are associated. In the southern part of Grenfell township diabase also cuts the sediments of the Cobalt series. In most cases the age relationships of these later basic dikes to the Cobalt series is not known, and they can only be classified as post-Algoman in age. The diabase dikes in the Kirkland Lake camp are described[1] in the second report in this volume covering the main ore zone at Kirkland Lake.

Wm. Gerrie has traced a number of true lamprophyre dikes in the western part of Teck township. Unlike the so-called "lamprophyre" in the Kirkland Lake camp, these are clean-cut, dark-coloured dikes characterized by a high content of black biotite.

Cobalt Series

The relatively flat-lying strata of the Cobalt series occur east and west of Kenogami lake. The rocks are quite resistant to erosion and tend to show steep scarps and bluffs. The rocks of the Cobalt series consist of conglomerate, greywacke, arkose, and slate.

Excellent exposures of coarse boulder conglomerate may be seen in a road cut on highway No. 11 immediately southeast of the bridge over the Blanche river. Where bedding is found in the finer-grained clastics of the Cobalt series, the dip never exceeds 25 degrees from the horizontal. The dip of the beds provides the best criterion for distinguishing the Cobalt series from the older Timiskaming series. Compared with the Timiskaming strata, the sediments of the Cobalt series are fresh, massive, unsheared, and unaltered. Pebbles of jasper and iron formation, which are so characteristic of the Timiskaming conglomerate, are very rare in the conglomerate of the Cobalt series.

Pleistocene and Recent

The accompanying geological maps show the drift-covered and swamp-covered portions of the map areas. The drift consists of clay, sand, and gravel, all of which are products of the Pleistocene continental glaciation. Glacial striae and grooves show that the general trend of the ice-sheet was between S. 15° E. and S. 35° E.

STRUCTURAL GEOLOGY

All the data by which the geological structures of the area are determined have been shown on the accompanying geological maps. The strikes, dips, and tops of beds in the sediments and of the lava flows in the volcanics indicate the nature of the folding. Faults, sheared zones, and vein fractures are also marked on the map-sheets. The general interpretation of the regional and local structures is indicated by the lighter tints, which show the assumed extension and boundaries of formations under overburden. Sheet A (in map case) shows three generalized structure sections across the sedimentary belt in Teck township; two of these are located along long crosscuts on the 3,000-foot horizon at the Macassa and Lake Shore mines and therefore show the downward extension of structures and rock formations.

Fig. 2 (facing page 8) gives a simple picture of the main structural features within the map areas and their relationship to the entire Kirkland Lake-Larder

[1]Pages 71-72.

Lake gold belt. It has been pointed out in a previous section of this report[1] that the Keewatin series is separated from the Timiskaming series by a great unconformity and that the two series are largely separate and independent structural units. In the northeastern part of Teck township the Keewatin series is, in part, buckled into east-west trending folds, but to the west the flows gradually swing around until in the vicinity of Kenogami lake they strike in a north-south direction and consistently face east and northeast. The Timiskaming series represents only the north limb of a syncline and for the most part is cut off along its south margin by a fault of regional extent. A small portion of the south limb of the syncline has been preserved south of the fault in concession VI, Eby township. The lavas south of the regional fault generally face south or southwest. A study of the accompanying geological maps will show that there are two main sets of faults. The older consists mainly of east-west trending shears, whereas the later faults frequently strike in a north-south or northeast-southwest direction. In the vicinity of the town of Kirkland Lake the faulting is very complex.

Methods of Studying Structure

Any attempt to solve the structure of the area requires that special attention be paid to (1) the tracing out of reliable marker horizons, (2) accurate determinations of the tops of lava flows and sedimentary beds, and (3) the location of sheared zones and cross-faults. The relative ages of the faults with respect to ore is most important because some are favourable pre-ore structures whereas others only displace the ore bodies; certain faults may show both pre-ore and post-ore movement.

Within the Keewatin volcanics individual flows could not be traced for any distance, although large bodies of diorite that are interbanded with the flows could readily be followed in certain parts of the area. A few narrow bands of tuff and iron formation are found locally in the volcanics and serve as excellent marker horizons. In the Timiskaming series the most reliable marker horizons are the bands of tuffs that are interbedded with the normal sediments.

The Keewatin and Timiskaming strata have been so closely folded that flows and beds generally have a very steep or vertical dip and in some cases are overturned. The direction of dip is thus useless in locating fold axes. In this report the interpretation of the folding and stratigraphy is based primarily on the determination of the tops of beds and flows. In the finer-grained sediments the tops of beds are determined by gradation in grain size across individual beds from the coarse-grained sand at the bottom to fine-grained clay at the top. Cross-bedding is developed in certain places throughout the tuffs. In the Keewatin lavas the tops of the flows were determined almost entirely by the shape of the pillowed structures. Throughout the map area large, well-developed pillows, up to 15 feet in length, are found in the basic volcanics, and the direction of the top of the flow is clearly marked although the error in determining the strike and dip of the flows by the average elongation of the pillows may be as great as 10 to 15 degrees.

For the sake of clarity folding, faulting, shearing, and fracturing are discussed here under separate headings, but it should be remembered that undoubtedly some of these structures were formed simultaneously, although adjustments on them probably continued throughout a long period of geological time.

[1]Pages 11-15.

Folding

As pointed out previously in this report,[1] the folding of the Keewatin series is largely independent of the Timiskaming series; that is, much of the folding of the Keewatin series took place before the Timiskaming series was laid down. But as the Timiskaming series is also closely folded and faulted, the Keewatin series must have been affected by the deformation of Timiskamian time. The two periods of folding are discussed separately.

Keewatin Folding

Structural studies in the northeastern part of Teck township show that the volcanics have been closely folded into a central anticline flanked on either side by a syncline. The approximate positions of the fold axes are indicated on map No. 1945-1. At Gami lake, evidence of doming or cross-folding of the anticline shows that it pitches to the west on the west side of the lake. The anticlinal axis can be traced westward to the southeast arm of Amikougami lake; it may possibly continue eastward to McGarry township (see Fig. 2 facing page 8). The south syncline extends eastward off the nose of an elongated mass of basic intrusives. East of the Teck-Hughes slimes basin, the synclinal axis cannot be very accurately located. Near the Goodfish road south-facing flows are found, but the south limb of the fold was not found in Teck township. Immediately to the east in Lebel township, however, north-facing flows are found in an inlier of Keewatin lavas in the Timiskaming series on claim L. S. 121; consequently, the synclinal axis either passes beneath the Timiskaming series or follows near its north margin in Lebel township. The north syncline is a broad, open, westward-plunging fold lying east of Young lake.

The above-mentioned folds disappear to the west. In the northwestern part of Teck township the regional structure seems roughly to swing around parallel to the margin of the Winnie Lake batholith, and the flows uniformly face northwest and north. In the southern part of Grenfell township, the flows again swing around until the strike is west of north, but the tops are uniformly to the northeast.

In the southern part of Teck township the Keewatin lava flows strike about parallel to the margin of the adjacent intrusives. Thus, in the southeastern part of Teck township they fold around from an east-west strike to a northwest strike and face south or southwest. In a rock cut on the railway on claim L. 5,890, located on the south boundary of Teck township east of Swastika, the flows are very flat. They dip about 20 degrees to the north and plunge to the east at about 20 degrees. This point may be close to a synclinal axis. Around Vigrass lake in the northwestern part of Otto township, the flows strike northwest and face southwest. As the flows in this vicinity lie between two strong east-west trending fault zones, it is difficult to say whether the strike of the flows represents the normal regional trend or whether there has been some local folding associated with fault movements. Only a few top determinations have been made in the volcanics in the northern part of Eby township; they indicate a south- or southwest-facing structure.

Timiskaming Folding

Top determinations in the sediments and tuffs show that throughout Teck township the Timiskaming strata with few exceptions face south across the full width of the belt. On their north margin, they lie unconformably on Keewatin

[1]Pages 11-15.

volcanics, whereas the south margin is greatly sheared and carbonated and is the locus of extensive faulting movements. In Teck township, therefore, the Timiskaming series represents only part of the north limb of a major synclinal fold. The remainder of the fold has presumably been removed by faulting.

There is one exception to the usual south-facing attitude of the Timiskaming series in Teck township. This is found east of the town of Kirkland Lake in a fault block lying south of Murdock creek on the property of Black Gold Mines. Here the beds face north. North-facing strata are also found along the continuation of this fault block south of the west end of Gull lake in Lebel township, but near the north shore of the lake the strata face south. There is thus a small synclinal fold within the narrow fault block that is not found elsewhere. The complexity of the faulting in this vicinity may in some way account for this unusual condition.

Few top determinations have been secured in the strata of the Timiskaming series in the Kenogami Lake area. This is particularly unfortunate in the case of that part of the Timiskaming series lying south of Kenogami lake because in this vicinity the sedimentary belt lies a short distance north of the assumed regional fault. Top determinations here could definitely establish the true nature of the regional folding in the Timiskaming series. The rocks, however, are mostly massive conglomerate and tuffs, and despite special efforts, no trustworthy top determinations could be found.

In lots 2 to 5, concession VI, Eby township, a small area of conglomerate and greywacke lies south of the regional fault. Much attention was paid to this area by the writer, and after a considerable search north-facing tops were located about 15 feet from the lava contact at a point where there is not much chance of faulting but considerable evidence of unconformity. The predominant rock along the margin of the Timiskaming series in this vicinity is a type of basal conglomerate very similar to that found along the north margin of the belt. It would therefore appear that a small remnant of the south limb of the major syncline of Timiskaming sediments has been preserved here.

Faulting

The known and assumed faults are indicated on the accompanying geological maps; some of the more important faults are also indicated and named on Fig. 2 (facing page 8). They may be roughly divided into three sets according to their trend with respect to the enclosing formations. These three groups are usually referred to as strike faults, diagonal faults, and cross faults. The terminology, however, is somewhat loose because a strike fault may swing around and become a diagonal or cross fault.

Faults are of great economic importance owing to the fact that the ore bodies in the seven producing mines at Kirkland Lake are located along a fault system. It is also very important to know the relative age of the faults with respect to the time of ore formation, but this information is not always readily obtained. It is known that certain faults with post-ore movement have the same strike as pre-ore faults. It is also known that different periods of movement may have taken place along the same fault plane both before and after the deposition of ore. Generally speaking, the strike faults are more liable to be pre-ore, and thus of economic interest, while many of the cross faults are known to be post-ore. The strike faults have a thrust displacement and probably originated during the long period of regional folding and igneous intrusion. In some places they are represented by a wide zone of shearing or brecciation, depending upon the type of rock traversed. In some instances the faulting has been followed by carbonatiz-

ation, silicification, and vein formation, all of which have tended to mask the original evidence of movement. The Kirkland Lake fault and the Larder Lake fault are examples of strike faults in the area.

The diagonal faults angle across the strike of the different rock formations. The Murdock Creek fault system would be classified with this group. There is evidence that this fault has post-ore movements and intersects the older Kirkland Lake fault. The cross faults have a general north-south strike and are definitely post-ore. These are most readily recognized by the way in which they offset marker rock horizons, older faults, veins, etc. In some cases diagonal and cross faults may be part of one post-ore fault system. For example, the Lake Shore cross fault merges with the diagonal Murdock Creek fault south of the town of Kirkland Lake.

CAUSE OF THE FAULTING

In the past the folding and faulting in the Kirkland Lake area has been attributed to a thrust movement from the vicinity of the syenitic batholith to the south.[1] Studies in recent years, however, have shown that this folding and faulting is not a local feature but is distributed over a belt more than 150 miles in length across Ontario and Quebec. This belt represents the roots of a range of ancient tectonic mountains. The fault pattern has been produced by crustal shortening on a grand scale in a great geosyncline during the mountain-building processes of early Precambrian time. The major line of weakness developed at that time was the Larder Lake–Cadillac fault system. Adjustments on this structure were recurrent over a long period of time resulting in the different ages of faults in the system. The south side of the geosyncline was elevated by the thrust movements, and a series of more or less parallel, southward-dipping overthrusts were developed subsidiary to the main plane of movement.

In the area under discussion the main thrust movements were developed along the Larder Lake fault, which generally follows the south contact of the Timiskaming series, as presently exposed. On the other hand the ground in the vicinity of the north contact of the sedimentary series acted as a fairly stable buttress. Under these conditions the intervening area was cut into a series of slices by faulting, and each successive fault block rode upward over the block immediately to the north. The Kirkland Lake fault system, which was formed after the emplacement of an elongated stock of Algoman intrusives, may be an exception to this rule. The origin of the Kirkland Lake fault system is described elsewhere in this volume.[2]

Like most of the great thrust-fault systems throughout the world, the thrust faults are accompanied and displaced by normal faults. The normal faults run in almost every direction with relation to the strike of the thrust faults, but the majority tend to be at about right angles to the older structures. The usual explanation for this association is that thrust-faulting, under compression, has been followed by a relaxational period, during which the masses settled under gravity in order to regain the equilibrium disturbed by the compressive horizontal stresses.

STRIKE FAULTS

Kirkland Lake Fault System

The seven producing mines of the Kirkland Lake camp lie astride the Kirkland Lake fault system for a distance of more than 3 miles in the eastern

[1]E. W. Todd, Ont. Dept. Mines, op. cit., p. 41.
[2]Pages 86-91.

part of Teck township. West of the Macassa property the Kirkland Lake fault has been traced across the Tegren property by surface-trenching and shallow drill-holes. It has been displaced 900 feet to the south by the Amikougami Creek fault and then continues westward across the Kirkland Gateway and Murphy properties. The location of the fault has been fairly well established by diamond-drilling westward to the Teck-Grenfell township boundary. The structure has not been recognized in Grenfell township, although there is always a possibility that it might have been offset by cross-faulting near the Teck boundary and the western continuation thus lost under overburden and the Cobalt series.

The Kirkland Lake fault system strikes N. 60°–70° E. and dips to the south at 75 to 80 degrees. It is generally marked by a narrow zone of gouge accompanied by adjacent fracturing and rock alteration; vein-filling commonly follows the fault, especially in the eastern part of Teck township. It is a thrust fault with the south side being displaced upwards in a rotational movement. The Kirkland Lake fault system is described in greater detail in the accompanying report on the main ore zone at Kirkland Lake.[1]

Amalgamated Kirkland–Blanche River Fault

It is assumed on the accompanying geological maps that the Amalgamated Kirkland–Blanche River fault is a continuous fault zone extending from a point near the northeast boundary of the property of Amalgamated Kirkland Mines westward to Kenogami lake, where it may merge with the Larder Lake fault (see Fig. 2 facing page 8). The fault has been recognized at several points, but there has not been sufficient drilling to establish complete continuity across the country.

On Amalgamated Kirkland ground the fault has been traced out by surface-trenching and diamond-drilling. In the northwest corner of claim T. 16,621 a diabase dike has been offset about 200 feet by the fault. The fault was intersected by drilling near the east boundary of claim T. 16,480 (Sahtram Gold Mines) in 1945-46 by Toburn Gold Mines. The structure is offset to the south by the Amikougami Creek fault and extends through the underground workings at the old Trout Creek shaft in the southwest corner of claim T. 16,477. The fault has also been traced across the Ventura-Kirkland claims by diamond-drilling. From this property it is believed to extend westward under the bed of the Blanche river, thus accounting for the divergence in strike of the Timiskaming strata on either side of the river valley. Up to 1947 this section of the fault had been cut in only one drill-hole, which was put down beneath the river immediately north of the shaft on Baldwin Consolidated ground. According to G. L. Holbrooke,[2] it was indicated in the drill-hole by a zone of strong shearing, carbonatization, silicification, mineralization, and low gold values.

Wherever information is available this fault is known to have a southerly dip. It is probably a thrust fault, but the amount of the displacement is unknown. The drag of the beds and the displacement of the diabase in the southwestern part of Teck township shows that the south side probably moved west in post-diabase time, but an opposite direction of movement is indicated by the offset of a diabase dike at the east end of Amalgamated Kirkland ground.

Larder Lake Fault

A zone of intense shearing, frequently accompanied by silicification and carbonatization, is found along the south margin of the Timiskaming series.

[1]Pages 74-81, 84.

[2]Preliminary Report on Baldwin Consolidated Mines, issued by Brewis and White, Toronto, 1946.

This represents a faulted contact between the sediments and Keewatin volcanics. The fault extends across Teck township and probably continues westward through Eby township, but there is a great deal of low ground along its assumed position in the vicinity of Kenogami lake. As indicated in Fig. 2 (facing page 8), this fault is probably the westerly continuation of a structure named the Larder Lake "break" in McGarry, McVittie, and Gauthier townships.[1] The latter, in turn, is probably the continuation of the Malartic-Cadillac–Bouzan Lake fault in Quebec. There may thus be a continuous fault for more than 150 miles from a point beyond Louvicourt township in northwestern Quebec to Kenogami lake and possibly extending even to the Matachewan or Midlothian areas.[2]

In the Larder Lake area the Larder Lake fault is a strong sheared zone, along which the rocks have been altered to talc-chlorite schist over widths up to 700 feet; siliceous carbonate material has replaced the schist at many places. This condition is also found along the south boundary of the Timiskaming series in Teck township and part of Eby township. The Larder Lake fault has been traced westward from a point near the Quebec boundary to the edge of the syenite batholith in Lebel township, where it is cut out by the intrusives. At the west end of the Lebel syenite batholith the shearing and carbonatization are first found on claim L. 6,187, about half a mile south of the town of Kirkland Lake in Teck township. In the eastern part of this claim the structure disappears into a long narrow valley that trends southeastward into Lebel township to a dam on the Lake Shore slimes basin on claim L. 26,908.[3] East of the slimes basin the syenite cuts out all the older structures.

Large bodies of green carbonates with quartz stockworks occur between claims L. 6,187 and T. 15,753 south of Kirkland Lake. Dikes and irregular offshoots of acid intrusives from the syenite body to the south invade the carbonate bodies. In the northeast corner of claim T. 15,754 the contact between the sediments and carbonates is exposed. It shows that the sediments have been much folded and contorted at the contact. In the vicinity of claim T. 15,752 the syenites have cut out all but small remnants of the carbonate bodies. The structure is thrown southwest about 600 feet by cross-faulting along Murdock creek. West of the creek there is a pronounced valley along the supposed location of the sheared zone. Carbonates were encountered in the underground workings at the old Highland-Kirkland shaft on claim L. 16,555. West of this shaft the ground is largely drift- and swamp-covered for a width of three claims, but strong shearing is found in the tuffs near the assumed position of the sheared zone in the northeast corner of claim L. 15,396. Immediately south of the highway on claim L. 2,634 a narrow valley separates the sediments from the lavas, and the sediments along the valley's edge are heavily carbonated.

A geophysical survey, made by A. A. Brant for the Department in 1945, indicated that the contact bends southwest through the Kirkland cemetery as indicated on map No. 1945-1. This location was checked by drilling in 1946 under the direction of Toburn Gold Mines on the property of Sahtram Gold Mines. Two sections drilled across the lava-sediments contact east of Amikougami creek indicated a sheared zone about 100 feet in width. This contains talc schist and green carbonates, both of which are cut by narrow syenite dikes.

A horizontal displacement of 700 feet on the Amikougami Creek fault would bring the Larder Lake sheared zone in line with a heavy fault containing green

[1]Jas. E. Thomson, Ont. Dept. Mines, Vol. L, 1941, pt. 7, pp. 36-37.
[2]G. W. H. Norman, Bull. Can. Inst. Min. Met., No. 406, Feb., 1946, pp. 137-140.
M. E. Wilson, Trans. Roy. Soc. Can., 3rd series, Vol. 37, pt. 1, sect. 4, 1943, p. 131.
Jas. E. Thomson, op. cit., pp. 36-37.
[3]Ont. Dept. Mines, map No. 53a.

carbonates that has been traced along the southwestward-trending part of the same creek. It was located by diamond-drilling on claim L. 4,486 by Ventura Kirkland Mines. This fault dips at 60°S. at the Golden Gate mine and comes into the workings on the 975-foot level (see Fig. 4 on page 46). The faulting and carbonatization have been cut out by the porphyry intrusives at Swastika, but west of the intrusive body the carbonated schists are well exposed a few hundred feet north of highway No. 11 on the Crescent section of the property of Kirkland Golden Gate Mines.

Shearing and carbonatization are found in surface exposures along the lava-sediments contact from Swastika westward to the Kelmac shaft of Baldwin Consolidated Mines in Eby township. The fault appears to leave the contact at this point, and there is less certainty of its exact location to the west. Green carbonates outcrop north of No. 11 highway in lot 4, concession VI, and shearing and carbonatization are found in a road cut a little over half a mile southeast of the Blanche river bridge. This may mark the position of the main fault or it may lie slightly to the north.

A possible location for the continuation of the fault southwest of Kenogami lake is shown on map No. 1946-1, but at the time the map was prepared there had been no drilling to check its existence. Early in 1948 Burtho Gold Mines drilled four holes along the assumed fault zone on the south half of lots 6 and 7, concession VI, Eby township. This work confirmed the presence of the fault on lot 7 approximately in the position shown on map No. 1946-1. The fault was traced northeastward across Kenogami lake, where its surface projection would lie about 100 feet south of the northwest corner of claim L. 18,312. In this vicinity the drilling revealed only one fault instead of the two indicated on map No. 1946-1. The fault zone consisted of a 50- to 75-foot width of strongly sheared, brecciated, and carbonated greenstone with local "mud seams" and quartz stringers. Where it passed through syenite porphyry, the rock was brecciated and veined with quartz.

The actual amount of displacement on the Larder Lake fault is unknown. The vertical component must have been sufficient to elevate most of the south limb of the syncline in the Timiskaming series above the present erosion level. The evidence of the direction of horizontal displacement is obscure. The drag of the beds adjacent to the fault in Teck township suggests that the south side moved east. This checks with a possible 1,500-foot displacement of conglomerate by the fault near the Kelmac shaft on the Baldwin Consolidated property. The only reliable information on the dip of the fault is found in the Golden Gate mine workings, where the inclination is 60°S. between the surface and the 1,000-foot horizon. In summary, this would mean that the structure is a thrust fault of great vertical displacement, along which the south side moved up and possibly to the east. This would agree with the information on the displacement in the Larder Lake country.[1]

Vigrass Lake Fault

The Vigrass Lake fault strikes in an east-west direction across the northwestern corner of Otto township and extends into Eby township. It is a zone of intense shearing with green siliceous carbonate alteration along certain sections. Diamond-drilling by Kirkland Golden Gate Mines along the creek that drains Vigrass lake into Otto lake has indicated a strong fault with a southerly dip. There is a pronounced scarp immediately south of the east end of Vigrass lake, which probably has been produced by the faulting movements. This strikes

[1]Jas. E. Thomson, op. cit., p. 38.

directly towards a zone of shearing and green carbonate, which has been traced westward to the boundary of the Baldwin Consolidated property in Eby township. At this point the carbonate zone ends abruptly at a southwestward-striking sheared zone.

The Vigrass Lake fault lies about 1,500 feet south of the Larder Lake fault, contains the same type of carbonate alteration, and has a similar dip to the south. It is presumed to be another thrust fault in the regional fault system.

South Bay Fault

Shearing with attendant green carbonate alteration is found along a zone striking S.70° E. through the southeast bay of Kenogami lake. Drilling on the Walters claims has indicated a zone of talc schist underlying the creek bed on claim L. 17,402. A hole was drilled across the assumed northwest extension of this fault 1,600 feet from shore in the bay by Burtho Gold Mines in 1948, but only weak shearing and a narrow mud seam were found. Strong shearing has been noted adjacent to the highway on lot 3, concession V of Eby township.

DIAGONAL FAULTS

Murdock Creek Fault

The term Murdock Creek fault is applied to a system of faults that underlie and run parallel to the valley of Murdock creek, south of the town of Kirkland Lake. The fault system has been traced northeastward across Lebel township. The main fault underlies Murdock creek on the property of Black Gold Mines and extends across the southern part of the town of Kirkland Lake. It is indicated on the surface by a marked topographical depression and the variation in character and strike of the adjoining formations. Drilling on the Black property shows that the fault dips from 70° to 75° N.W. The fault zone is indicated in the cores by broken rock replaced by quartz and calcite over widths of as much as 39 feet. Mylonite is developed in the fault zone, and in this respect the Murdock Creek fault resembles both the Kirkland Lake fault and the No. 5 strike fault of the Wright-Hargreaves and Sylvanite mines.

Assays up to $2.65 per ton in gold are reported from the fault zone material. Hopkins[1] shows that this fault extends into the underground workings of the Wright-Hargreaves mine below the 4,000-foot level. Here, it is named the No. 5 strike fault. According to Hopkins, this structure has post-ore movement and displaces the productive veins as much as 700 feet. He believes that it is an underthrust with the southeast side moving downward. This fault is described in greater detail in the following report on the main ore zone at Kirkland Lake.[2] The available information suggests that the Murdock Creek fault may have undergone both pre-ore and post-ore movement.

From 700 to 1,000 feet southeast of the above-mentioned fault in Teck township, there is evidence of a more or less parallel fault. In Lebel township this is regarded as part of the Murdock Creek fault zone.[3] On the Black property there is a marked change in strike and offset of tuff and sedimentary beds along it. The ground between these two faults constitutes a fault block, in which the strata face north in contrast to the east- and south-facing beds outside of it.

North Harvey Fault

The North Harvey fault is indicated near the Teck-Lebel boundary by the

[1]See page 173.
[2]Pages 86,173.
[3]Ont. Dept. Mines, map No. 53a.

abrupt change in strike of adjoining formations. A prominent horizon of tuffs on claim L. 1,534 is cut off sharply by this structure. The drag of formations adjacent to the fault would indicate that the south side moved east; the schistosity adjacent to it dips to the south. It is possible that the wedge-shaped block between the North Harvey fault and the main Murdock Creek fault moved southwest.

Middle Harvey Fault

The Middle Harvey fault follows a marked topographical depression immediately north of the Harvey Kirkland shaft on claim L. 1,873 in Lebel township.[1] Its extension west into Teck township is assumed. There is strong shearing in conglomerate outcrops in the southwest corner of claim L. 6,682 on the Hudson-Rand (Kirkland Gold Rand) property. This may mark the position of the merging Middle and South Harvey fault zones. North of the Harvey Kirkland shaft the drag on the formations would suggest that the south side of the Middle Harvey fault moved west. In other words, the fault block between the North and Middle Harvey faults moved to the east.

South Harvey Fault

The South Harvey fault has been traced across the western part of Lebel township and is projected across the eastern part of Teck, where it may join the Middle Harvey fault. East of the merged Sylvanite and K cross faults, the South Harvey fault lies at or near the lava-sediments contact. This is an unusual condition, for the Larder Lake fault usually occupies such a position.

TRANSVERSE OR CROSS FAULTS

Transverse or cross faults strike in a general north-south direction and are normal faults produced by tensional adjustments following the regional folding and injection of the Algoman intrusives. They are the latest expression of faulting in the area and are thus post-ore. The position of the cross faults is indicated by the offset of marker horizons, contacts, older faults, veins, etc. They are often expressed topographically by narrow linear valleys. Hopkins[2] has pointed out that the movement on the fault plane on certain of the cross faults has been rotational with the axis of rotation somewhere north of the Kirkland Lake fault. Some of these faults are discussed in greater detail in the accompanying report on the main ore zone at Kirkland Lake.[3]

Shearing and Fracturing

Outcrops on which shearing has been observed are marked with the appropriate symbol on maps Nos. 1945-1 and 1946-1. Shearing with accompanying carbonatization is indicated by the colour for the carbonate rocks, and less intense alteration is shown by the V-shaped pattern in red. Study of the distribution of shearing on these maps will show that it is mainly concentrated along definite zones, which strike about parallel with the rock formations. The shearing may be limited to only a few feet in width, as in the case of the Kirkland Lake fault, or it may extend across hundreds of feet, as in certain sections along the Larder Lake fault. Subsidiary zones of shearing sometimes angle off the main sheared zones. In addition, there may be broad zones of moderate shearing that cannot be identified with any known faults but rather

[1]See map No. 53a.
[2]Harold Hopkins, Trans. Can. Inst. Min. Met., Vol. 43, 1940, p. 698.
[3]Pages 85, 86, 171, 174, 176.

lie in the contact zone where intrusives and intruded rocks are intermingled. The shearing is largely confined to certain zones in the volcanic and sedimentary rocks. Intrusive stocks, such as that along which the main ore zone of Kirkland Lake is located, are generally massive, except in the immediate vicinity of "breaks."

There is little information on rock fracturing and vein-fracture patterns except in the vicinity of the mine workings. These vein-fracture patterns are indicated on the geological plans and sections of the various mines described in this volume. A feature of the fracturing in the Golden Gate and Crescent workings of Kirkland Golden Gate Mines is that the vein fractures cut indiscriminately across intermingled massive lavas and syenite porphyry, each rock type being about equally competent. At the Baldwin Consolidated mine, gold values obtained to date are reported to be confined to those areas where cross-faulting and fracturing intersects the vein system. The fracturing along the main ore zone at Kirkland Lake is described in another part of this volume.[1]

ECONOMIC GEOLOGY

During the past thirty years successful development of mines in Teck township and the Kenogami Lake area has been limited to the seven producing properties located on the main ore zone at Kirkland Lake. The large amount of exploration on many other properties has located only a few relatively small ore shoots. The Kirkland Golden Gate, with a gold production of approximately $1,000,000, has the best record amongst these to date. Exploration has indicated that gold is widespread in occurrence; as interesting geological structures have been found at certain places, there is reason to believe that further development may reveal new gold ore bodies.

It should be noted that there is one small base metal occurrence (Winnie Lake) in the northwestern part of Teck township. The association of lavas and basic intrusives in the northern parts of Teck and Grenfell townships is suggestive of the possibility of finding base metal occurrences.

General Character of the Gold Occurrences

Gold-bearing veins have been found on more than half of the 24 properties describedi n this report, but, in most cases, the size and grade are below the current commercial level. In practically all the occurrences, gold is found in quartz veins or stringer zones. The veins lie in a variety of rock types, but syenite porphyry is almost invariably one of the rocks in the vein zone. A definite structure (break) such as a sheared zone or fault with gouge is generally present. Occasionally multiple structures form a structural pattern. Carbonate alteration adjacent to the structure is often noticeable.

The mineralization consists mainly of pyrite, but lesser amounts of chalcopyrite, galena, molybdenite, and specularite are sometimes found. In some places, high gold values are associated with patches of heavy sulphide mineralization in the veins. Native gold is reported at several of the occurrences.

Complex post-ore faulting adds to the exploration problems in certain parts of the area. This is particularly noticeable in the ground near the Larder Lake fault zone and at the east end of the Kirkland Lake camp.

Considerations in Future Exploration

Experience gained from widespread exploration throughout the Kirkland Lake–Larder Lake gold belt has shown that ore bodies have a closer relationship

[1]Pages 82-83.

to structures than to rock types. The main ore zone of the Kirkland Lake camp is an outstanding example of the close association between ore and a fault system. Emphasis has thus been placed on the tracing out and investigation of pre-ore fault structures. In the country under discussion there are three main strike faults or breaks of economic interest and several other lesser known parallel structures. From north to south the stronger faults are (1) the Kirkland Lake fault system, (2) the Amalgamated Kirkland–Blanche River fault, and (3) the Larder Lake fault. Possibly the Narrows break (see Fig. 7 facing page 82 and sheet D in map case) might be regarded as a separate gold-bearing structure from the Kirkland Lake fault system, especially to the west.

Naturally, the close association between the productive veins along the main ore zone and the Kirkland Lake fault system has focused attention on its extension westward across the country as an exploration "bet." The bulk of future exploration along this structure will probably have to be at considerable depth because near-surface probing to date has failed to indicate any ore. The development of important subsidiary veins on the south side of the Kirkland Lake fault in the west end of the camp suggests that similar interesting conditions might be found at other places along the fault system west of the Macassa mine.

The Amalgamated Kirkland–Blanche River fault zone has had some attention in recent years, and gold is known to occur at a few points along it. The structure has been traced across the western part of Teck township, but its possible continuation east of the Lake Shore cross-fault has not been definitely recognized. Considerable portions of this fault have not yet been drilled.

The Larder Lake fault is the most persistent strike fault in the country and generally follows the south margin of the Timiskaming series, although in the vicinity of Kenogami lake it appears to leave this horizon. Its importance lies in the fact that ore bodies have been found along and adjacent to it in the Larder Lake country to the east and gold is known to occur in its vicinity in the area under discussion. The Larder Lake fault is a very ancient structure, antedating the syenite and porphyry intrusives, but it appears to have been the main line of weakness across 150 or more miles along the Ontario-Quebec gold belt. In and adjacent to this structure, faults and fractures of different ages were formed as recurring adjustments took place over a long period of time. Some of these faults and fractures coincided with the period of gold mineralization and are ore-bearing, whereas others were formed at other times and are barren.

The Larder Lake fault zone has attracted the attention of prospectors for a long time. As early as 1920, Burrows and Hopkins described it as follows:[1]—

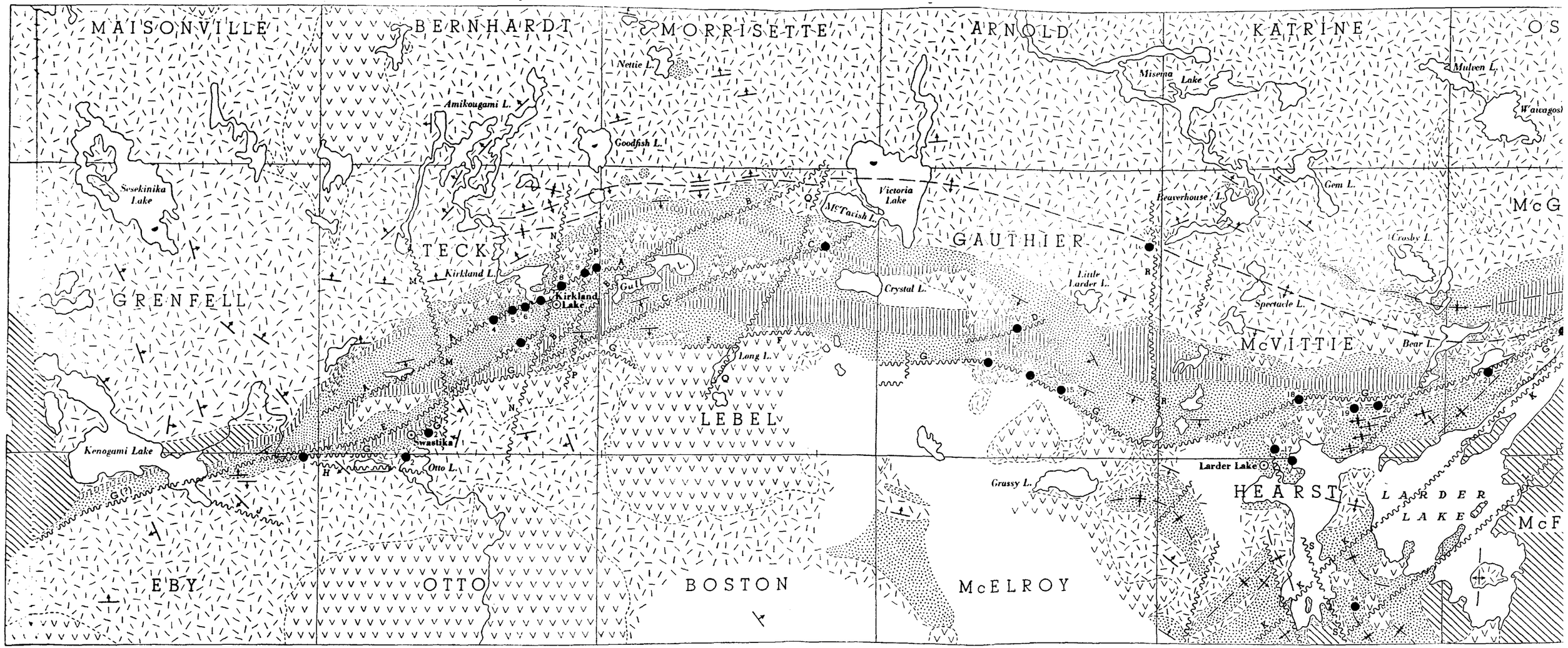
> In the southerly part of the sediments there is a band of carbonate rock traceable at intervals for several miles, which has been differentiated on the map. It is not definitely known whether the rock belongs to the Keewatin or Timiskaming. The rock is cut by numerous irregular veinlets of white quartz, and resembles the carbonate or ankerite bands frequently observed in the Porcupine and Larder Lake areas. Some of the material mineralized with iron pyrites and copper pyrites was found to yield traces and up to $2.00 of gold to the ton.

Drilling and underground exploration have been done along or near the Larder Lake fault in recent years on the Florena, Sahtram, Kirkland Golden Gate, and Baldwin Consolidated properties. West of the Baldwin Consolidated, drilling at Kenogami lake by Burtho Gold Mines in 1948 along the assumed extension of this structure in the south half of lots 6 and 7, concession VI, Eby township, located the fault zone, but gold values were lacking. The Vigrass Lake fault and the South Bay fault at Kenogami lake are structures similar to the Larder Lake fault and have had only a limited amount of attention. Any un-

[1] A. G. Burrows and P. E. Hopkins, Ont. Dept. Mines, Vol. XXIX, 1920, pt. 4, p. 12.

explored areas in the vicinity of the strike faults throughout the country might prove to be interesting ground for further investigation.

The experience gained from thirty years of mining operations along the main ore zone in the Kirkland Lake camp shows that intrusive stocks have a profound influence on ore localization. This fact should be considered in the exploration of the surrounding country. As pointed out in the second part of this volume,[1] the ore bodies of the Kirkland Lake camp are confined to an elongated, composite intrusive body and to the sediments in the contact zone. The combined intrusive body and fault system has controlled the strike, dip, pitch, and limitations of the ore zone. This was not the result of any known genetic relationship between the intrusives and the ore but was rather the result of some delicate difference in the physical nature of the intrusive body, which provided and maintained the necessary openings at the strategic time of gold deposition. The presence of intrusive stocks in the general vicinity of pre-ore faults in the area under discussion provides a theoretically ideal combination, but, of course, the vagaries of commercial gold deposition are so well known that only systematic exploration can reveal whether such areas contain any ore.



LIST OF PROPERTIES

1. Baldwin Consolidated.
2. Golden Gate.
3. Amalgamated Kirkland.
4. Macassa.
5. Kirkland Lake Gold.
6. Teck-Hughes.
7. Lake Shore.
8. Wright-Hargreaves.
9. Sylvanite.
10. Toburn.
11. Bidgood Kirkland.
12. Upper Canada.
13. Anoki.
14. Queenston
15. Ritoria.
16. Beaverhouse Lake (Argonaut).
17. Laguerre.
18. Omega.
19. Amalgamated Larder (Fernland)..
20. Amalgamated Larder (Cheminis).
21. Amalgamated Larder (Barber Larder).
22. Karr-Addison.
23. Chesterville.
24. Martin-Bird.

LIST OF FAULTS

A. Kirkland Lake Fault.
B. Murdock Creek Fault.
C. Bidgood Fault.
D. Upper Canada Fault.
E. Amalgamated Kirkland-Blanche River Fault.
F. Tuttle Lake Fault.
G. Larder Lake Fault.
H. Vigras Lake Fault.
J. South Bay Fault.
K. Northeast Arm Benson Creek Fault.
L. Milky Creek Fault.
M. Amikougami Creek Fault.
N. Lake Shore Fault.
P. Sylvanite Fault.
Q. Long Lake Fault.
R. Misema River Fault.
S. Sharp Creek Fault.

Scale of Miles

1 ½ 0 1 2 3 4

LEGEND

- Cobalt series (sediments).
- Intrusives.
- Older sediments.
- Trachytes and tuffs.
- Basic volcanics and diorites.

SYMBO

- Strike of flows direction in wh
- Synclinal axis.
- Anticlinal axis
- Fault.
- 12 Mine location.

FIG. 2—GENERALIZED GEOLOGICAL MAP OF THE KIRKLAND LAKE–LARDER LAKE GOLD BELT.

Scale, 1 inch = 2 miles

ANNEX
D-1

STRUCTURAL GEOLOGY

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Chapter 9

Joint-Patterns and Fault Patterns

The relation between joint-patterns and stress-direction has often been investigated, but that between joints and faults has received much less attention. It has nevertheless been assumed in general that there exists a certain relationship.

Both joints and faults are believed to have a common origin in deformative stress acting during a folding phase, and must therefore be closely related. The nature of this relation, however, has seldom been ascertained. In general the belief prevails that there exists a gradual transition from joints with no motion along their faces, through joints with a small motion, to small faults, and then to large faults.

THE RELATION BETWEEN JOINT AND FAULT PATTERNS

The Heidelberg school of joint investigation,* for instance, tried originally to prove the compressive origin of the great Upper Rhine rift valley by extensive joint surveys on both its sides. It failed completely in its purpose but gave us valuable general data. In the later surveys of this group the original purpose was abandoned. Most of the joints proved to be vertical, one group with horizontal and another with vertical striation, but there were none consistently dipping away from the rift and showing dip-striation. This extensive survey, therefore, more or less proved that there is no relation between the great rift faults, which have since been proved to be normal faults heading towards the rift valley, and the joints on both sides of the trough.

Another instance in which this relation was the subject of a survey is work by Kwantes (in Sax, 1946), in the South Limburg coalfield of the Netherlands.

* Salomon, 1911, 1925, 1927; Dinu, 1912; Engstler, 1913; Hillebrand, 1934; Lind, 1910; Pfannenstiel, 1927; Roehrer, 1916, 1922; Voelcker, 1927.

This report tells us that the NW direction of the major post-Carboniferous faults (Fig. 101) is *not* represented in the joint diagrams of the Carboniferous rocks, and that several maxima of the tension-joints diagrams, in particular the E–W one, are *not* represented in the fault pattern (Fig. 80). Other directions, noticeably of N60° W and N55° E, are maxima in both the fault and shear-joint patterns. The survey was extremely extensive. The faults were measured from the colliery production maps and the joint survey was carried out in several mines by trained geologists. We may conclude that the shear-joints and the majority of the fault-directions are both due to the folding-stress of late Carboniferous origin. Some tension-joint directions, probably of the same age, are not duplicated by a corresponding set of faults, however, and the Mesozoic stress or tension, causing the major NW–SE trending faults, although active at several distinct periods from the Triassic onward to recent times, did not cause a joint-pattern in the older rocks. This result accords with the negative result of the Heidelberg survey.

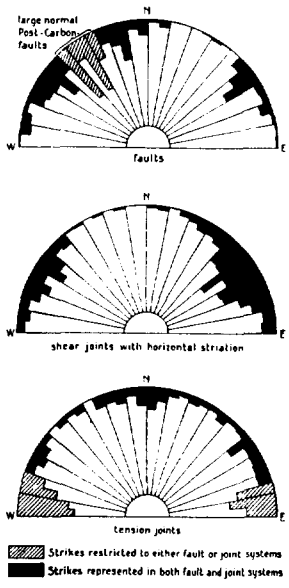


Fig. 80. Strike frequency diagrams of faults and joints in the South Limburg Coalfield. *(After Sax. Published by permission of Geologisch Bureau voor het Mijngebied, Heerlen.)*

Another set of observations may contribute to the solution of our problem. In vertical aerial photographs of an adjoining anticline and syncline in eastern Algeria, a pattern of very small faults, which can be compared to a joint-pattern, can be observed in two limestones which respectively form the axial arc of two adjacent and parallel structures. The synclinal limestone is obviously much younger (Eocene in fact) than the anticlinal limestone, which is of a Middle-Cretaceous age. In the syncline the foraminiferal limestones form the top of a table in a reversed relief; in the anticline a hard limestone crops out. Their stratigraphical distance is some 1,500 m (Fig. 81). The most striking feature of the fault patterns is that both show a double maximum, with an intervening angle of 20° in the anticline and 35° in the syncline, but orientated differently in relation to the axis.

From these examples of fault and joint-patterns it follows that, on

the one hand, small faults discernible in favourable circumstances on aerial photographs are almost certainly orientated in some way in relation to the direction of the principle folding-stresses; and, on the other hand, that not all deformative stresses result in joint systems or even in fault systems.

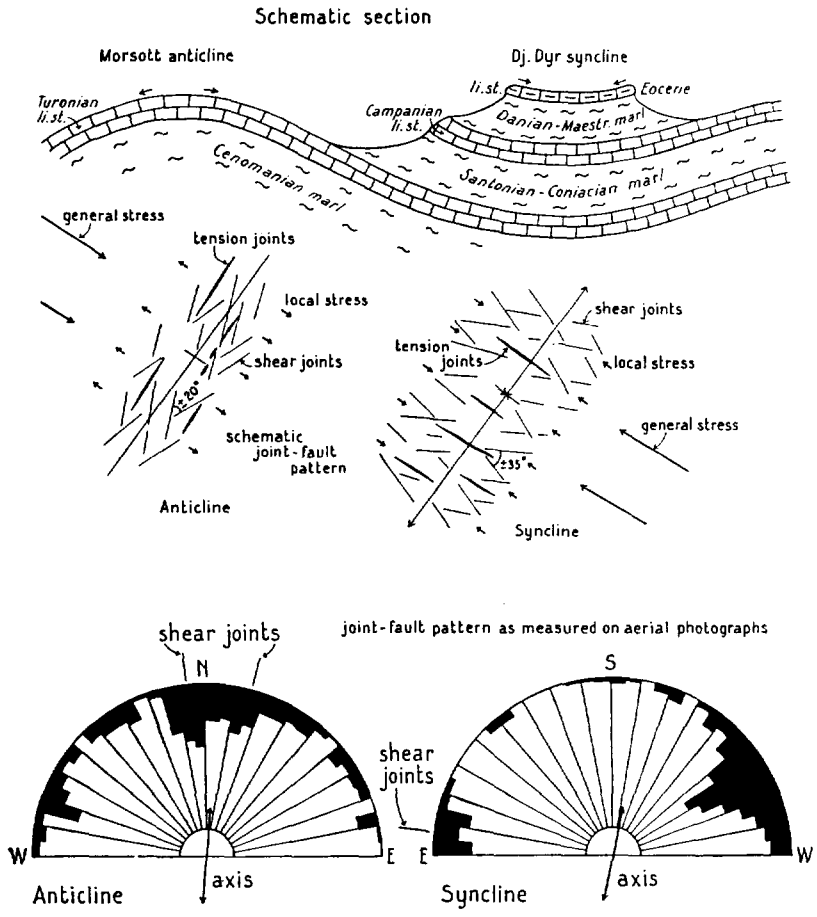


Fig. 81. Origin of fault patterns in adjoining anticline and syncline adopted from aerial photographs of adjacent structures in south-east Algeria with fault strike frequency diagrams.

According to the theory of Mohr and Anderson, shearing-planes, either faults or joints, may develop in planes parallel to the median stress-direction and making an acute angle bisected by the largest stress-direction, whereas tension-joints or fissures will be orientated

parallel to this largest stress and perpendicular to the smallest stress.

This theory gives us a ready answer to the question of why sets of differently orientated small faults developed in the anticline and syncline mentioned above. In the anticlinal arch of a competent limestone layer we may expect a local tensional stress in the outer arc perpendicular to the axis. This would therefore be the direction of smallest stress, with the overburden constituting the median stress, and the largest stress parallel to the axis (Fig. 81). In the syncline we may expect, on the contrary, a local compression in the direction perpendicular to the axis. In both cases a set of shear-joints develops, at an acute angle bisected by the largest stress, but differently orientated

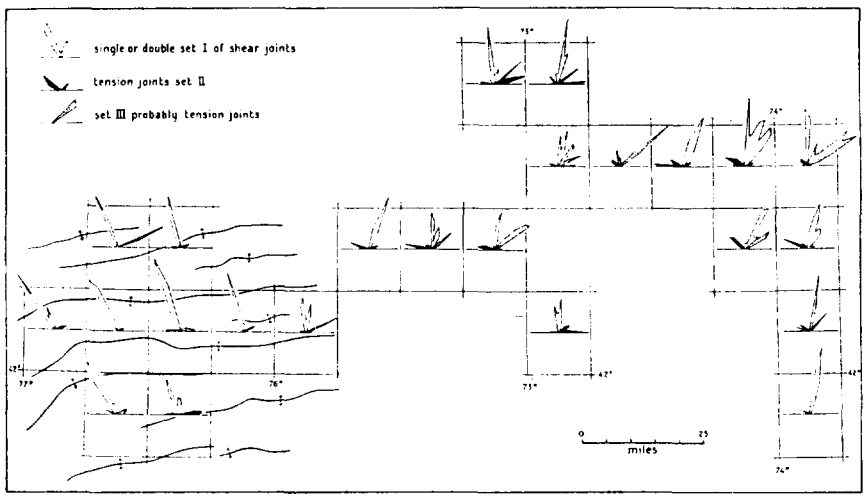


Fig. 82. Map of strike frequency of joints in central and north New York and north Pennsylvania. *(After Parker. Published by permission of the Geological Society of America.)*

in relation to the axis direction. In this very simple case in Algeria we found remarkably good agreement between theory and practice, but in general the agreement is much less obvious and the joint-pattern or fault pattern much more complicated. Joint surveys from tectonically complicated areas are mostly far too complex to allow any trustworthy interpretation, although this has often been attempted. But when we consider regions which are almost unfolded, the patterns are much more simple and show obvious relations to known tectonic features. The survey by Parker (1942) in central and northern New York and northern Pennsylvania (Fig. 82), shows a very marked consistency

of pattern, slowly swinging from the NNW in the central portion of the surveyed area to the NNE in the eastern portion, in close relation with the bend of the Appalachian fold axes but independent of local variations in the individual folds. Parker distinguishes three sets of joints, all of them perpendicular to the bedding plane. Set I is a double set with an average intervening angle of 19° (varying from 13° to 26°) swinging round from N 30° W in the west to N 10° E in the East. Set II is somewhat less regular, but perpendicular to the median line of Set I. Set III seems to be independent of the other two as it does not follow the swinging motion clearly exhibited by Sets I and II, and it has an average direction of N 60° E with a very small deviation of the median value. (It varies only from N 50° to 65° E.) The joints of the compound Set I are remarkably plane; they slice clearly through hard concretions in weak strata, and pass without deviation through extreme cross-bedding etc. They are obviously shear-joints.

The surfaces of the joints of Set II are, on the contrary, curved and irregular with a rough, torn appearance, and must be regarded as tension-joints.

Tentatively, I would explain the compound Set I of shear-joints as normal shears caused by the main stress-direction which bisects the very small angle of 20° between the two components. Set II, being perpendicular to this stress-direction, cannot be a normal set of tension-joints (which ought to be parallel to the main stress-direction), but may perhaps be regarded as due to tensional stress produced by an elastic release of the compression. Set III may be due to a later (or earlier) stress-direction of unknown quality. The main conclusions which may be drawn from this survey are:

1. the angle between the two components of a compound set of shear-joints may be very small (20°) and is intersected by the main stress-direction.

2. a set of tension-joints perpendicular to the main stress may develop as an effect of elastic release of the compression.

In the survey by Wager (1931) on the Great Scar limestone of Craven, we have another valuable contribution to our knowledge of the relation between regular joint-patterns and tectonic features. The limestone is cut by two sets of joints which are nearly at right angles to each other; one of them is parallel to lead-veins, which are common in this region. The sets of joints again perform a swinging motion in the field of observation (Fig. 83). The frequency diagrams of different parts of the region all show the same two perpendicular sets. In some

places the joints, which are generally straight and perpendicular to the bedding-plane, are joined by "en échelon" gash (tension) joints, filled by calcite. The gash-joints make an angle of 45° with the main joint sets. The whole area is limited in the south by the North Craven fault and in the west by the Dent fault, the latter being a thrust. The compressional stress direction of N 55° W is fixed by this Dent fault thrust. This direction bisects one of the angles between the joints,

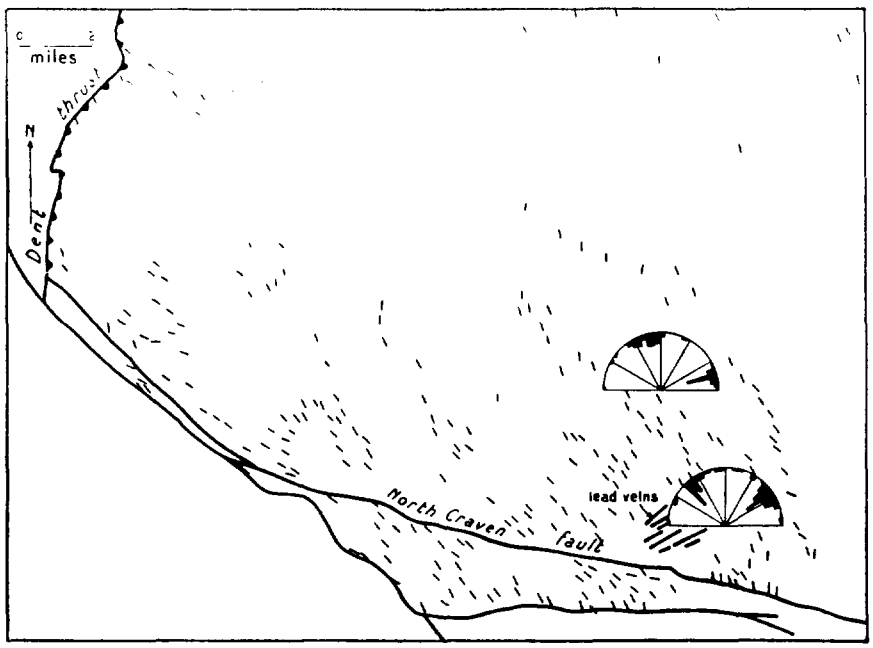


Fig. 83. Joint patterns in the Great Scar limestone. *(After Wager, Q.J.G.S., vol. 87, 1931. Published by permission of the Geological Society of London.)*

which can therefore be regarded as normal shear-joints. The western portion of the North Craven fault, parallel to one of the joint-sets, is most probably a tear-fault.

In this example of joint-pattern we again find a close relation between compressional stress and shear-joint direction, but we notice a rigorously perpendicular system of two sets and not the acute angle found in many other instances.

A joint survey of the lignite field of Cologne by Wölk (1937), gives quite another picture (Fig. 84). The Miocene lignite layer, more than 30 m in thickness, is exploited in open-cast pits and shows excellently

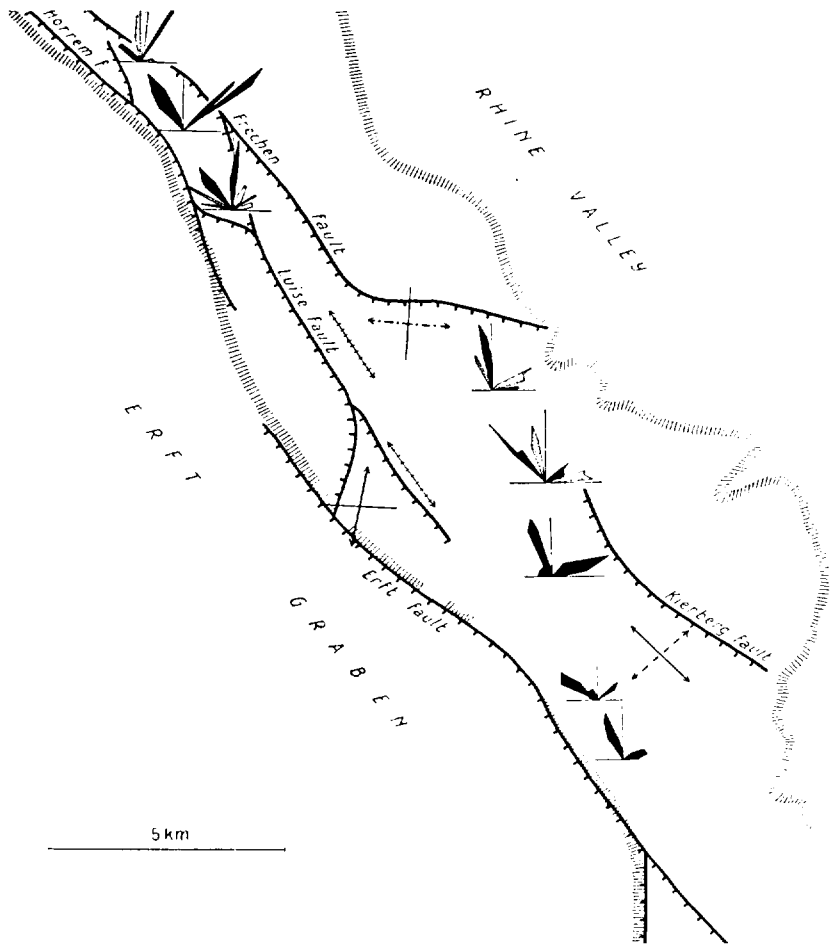


Fig. 84. Joints parallel to normal faults in Miocene lignite of the Ville lignite field near Cologne. *(After Wölk, Zeitschrift der Deutschen Geologischen Gesellschaft, vol.* 91/1, 1937.)

developed and very long joints in regular sets. The general geology is very well known, thanks to the numerous bore holes and open workings of the lignite, and shows a pattern of normal faults which have a general NW–SE trend but often deviate from this direction, thus joining and then separating again. The general result of the survey showed that the joints are very consistently parallel to the nearest normal fault whatever its strike may be. When the field of observation is situated between two main faults of different direction, both direc-

tions are represented in the joint-pattern. The joint surfaces are plane, and cut through irregularities of the strata. Their hade is steep and they usually occur in two perpendicular sets of which one is predominant and parallel to the nearest fault. It is a curious fact that the number of joints does not increase near the fault.

There can be no doubt about the conclusion that the joints are due to the same stress conditions as the normal faults. During the faulting the lignite layer carried very little overburden and this fact may possibly explain the steep dip of the joints. The other member of the conjugate set, perpendicular to the joints parallel to the faults, indicates that a tensional stress parallel to the faults also existed. As the joint frequency is independent of the faulting it seems probable that the joints were formed at the very beginning of the stress condition.

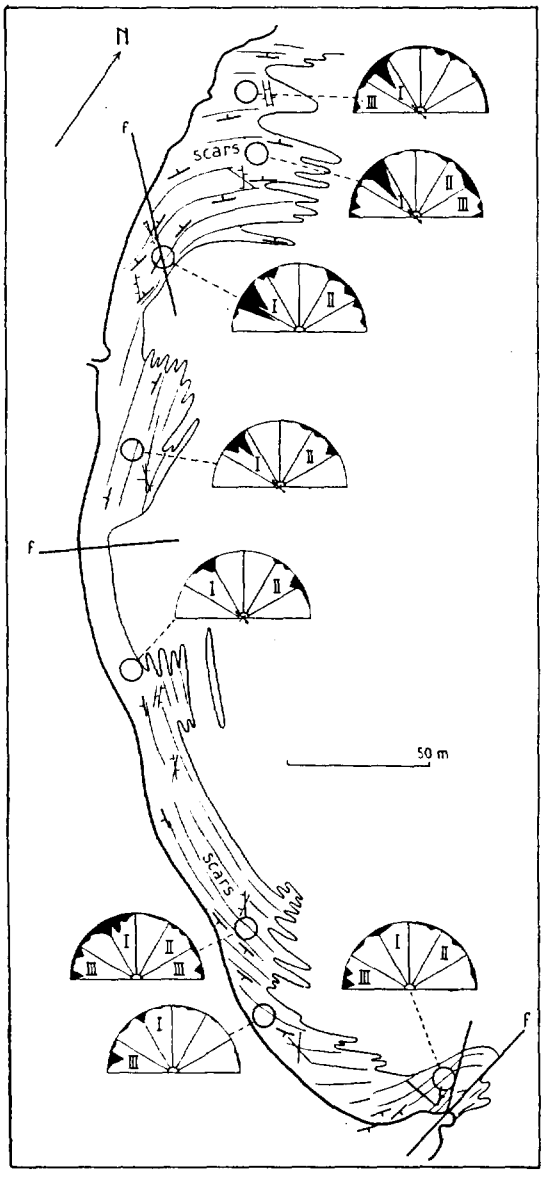


Fig. 85. Joint frequency in Robin Hood's Bay. *(After Zwart, "Breuken en Diaklazen in Robin Hood's Bay", Geol. en Mijnbouw, 1951.)*

The outcome of this survey is in direct contradiction to that of

the South Limburg coalfield, where no joints are related to the normal faults. This is most probably due to the fact that the Carboniferous rocks were already folded, cemented, and generally lithified before the faulting started, whereas the Miocene lignite was still a very soft rock.

A last example I should like to quote is that of the very gently folded anticline of Robin Hood's Bay described by Zwart (1951). Figure 85 gives the joint direction frequency diagrams for different places on the western flank of this gentle structure. We find a well-developed, sometimes double, set of shear-joints (set I) making the very sharp angle of 15°, the median line of which is parallel to the anticlinal axis. Another set (II) are by their appearance clearly tension-joints, being orientated perpendicular to the axis, and were cut off by the shear-joints. There is a third group (III) of EW direction, restricted mainly to the anticlinal plunges. The compound set is contradictory to that we found on the Morsott anticline in East Algeria, but the two anticlines have in common the set of tension-joints

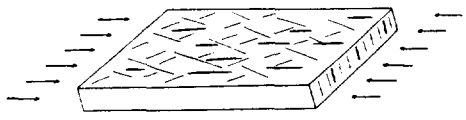


Fig. 86. Shear-joints and tension-joints in an unfolded sheet of rock.

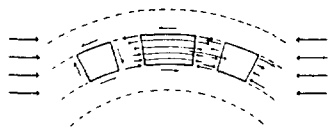


Fig. 87. Shear-joints due to elastic bending of a sheet of rock.

perpendicular to the axis. The tension-joints are due to the tension parallel to the folding-stress, whereas the shear-joints are due to the local tension caused by the arching on the outer arc of the anticline. Set III is characteristic of the plunge, and is therefore due to a local stress condition.

I will try to summarize the results of these joint surveys on very gently folded competent layers which we have reviewed.

In the first place we must distinguish between shear-joints and tension-joints; each type can be recognized in the field by its special characteristics. Further, we have found that there are shear-joints due to a general stress-direction; and others which are due to local stress conditions, as in the anticlinal and synclinal axial regions. The intervening angle between two sets of shear-joints may vary widely; the minimum we found was 15°, the maximum almost 90°. The difference may simply be due to differences in rock properties or to the weight of the overburden; but on the other hand it may merely

indicate that two quite different kinds of shear-joints exist. Tension-joints may develop either parallel to the compressive stress or as an elastic release perpendicular to it. Here also we must distinguish between local and general stress-direction.

THE RELATION BETWEEN JOINT AND FAULT PATTERNS AND STRESS

As we have seen in Chapter 8, Anderson (1951) distinguishes tree main types of faults: normal or tension-faults, thrust-faults, and tear- or wrench-faults, which differ only in their different orientation in relation to the horizontal plane. The same classification can be applied to joints, with the important addition of tension-joints, which would find their equivalent in the fault system as fissures or gash-fractures. All three kinds of faults mentioned by Anderson are shear-faults making an angle varying from 15° to 45° with the largest principal stress; the tension-joints or gash-fractures which we encountered in several examples are parallel to the largest principal stress. Because they have no motion along their faces they are generally not considered as faults, but they are frequent in joint diagrams and play an important role in ore deposits.

Let us consider what kind of joints (and faults) we might expect in a moderately folded limestone.

At first the sheet of rock is in the simple stress condition of Fig. 86. We find *shear-joints* making an acute angle with the deformative stress, and *tension-joints* parallel to this stress.

In the next stage we might expect the *secondary stress condition*, caused by elastic bending of the sheet as described earlier, which will cause a set of shear-joints with their acute angle bisected by the anticlinal axis, and tension-joints parallel to the axis (Fig. 81).

Besides these secondary shear- and tension-joints the elastic state of stress in the bent sheet is apt to create still another system. When we consider a block on the flank of a bent sheet we find opposite stress-directions on the upper and lower surfaces, necessarily compensated by a couple on the other faces to compensate the rotational effect of the first couple, as sketched in Fig. 87. These frictional shear-joints are parallel to the anticlinal (or synclinal) axis.

Finally, we might perhaps expect *release tension-joints* after the stress has vanished, as was suggested by the tension-joints in the Parker survey in New York. They will be either parallel or perpendi-

cular to the axis, depending on whether they release the main or the secondary stress. We have not yet considered the possible shear-joints or faults which make an acute angle with the stratification plane. Since the main stress is always directed parallel to the bedding-plane in an elastically bent sheet, they might cause thrusts or normal shear-joints making an angle of more or less than 45° with the bedding-plane.

If all these possible joints or small faults were formed in one and the same structure, they would appear diagrammatically as shown in Fig. 88 where the normals to the joint planes have been plotted in a stereographic projection instead of in a frequency diagram. If the

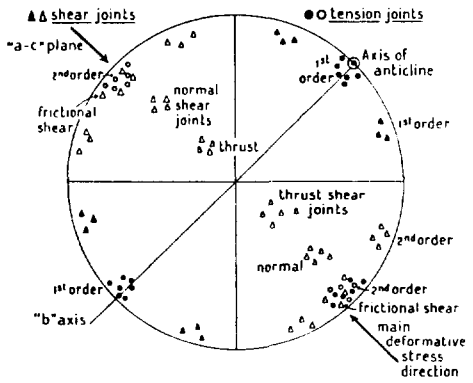


Fig. 88. Stereographic representation of possible joints in an anticlinal structure.

anticlinal axis had a distinct plunge and the survey had been made on the longitudinal curvature of the crest, the picture would have been much more complicated; even in this rather simple case, the distribution of the joint planes becomes so general that a slight deviation of the shear angle from 30° would result in a continuous girdle around the circumference, and another one perpendicular to the first. It would then be obviously impossible to distinguish between the joints by means of their position. In nature we seldom find all kinds of joints in the same outcrop; but as soon as we combine too many outcrops in one diagram, the fact that we are apt to find continuous girdles can be explained by the multitude of possible joints, and need not be due to a varying stress-direction. Difference of joint-patterns from one outcrop to the next may also be due simply to a difference in the lithology of the rocks, one lithology being preferred by one kind of joint, the other by another. As I have mentioned before,

only very simple cases, where elastic bending has not played a preponderant role, give reliable results.

Many investigators, including Deenen (1942), who made a very extensive and detailed survey of jointing in a coal mine, have concluded, from the fact that all joints are orientated to the plane of stratification instead of to the horizontal plane, that the joints were originated before the folding. In other words, they found that their picture of the joint-, or fault-frequency became intelligible only if the strata were rotated to their original horizontal position. In my exposition I have presumed, on the contrary, that many of the joints are due to the folding itself and hence are formed continuously during the folding. This difference arises because Deenen, and those who share his view, assume that the deformative stress is invariable in direction and always in the horizontal plane only; whereas there is ample evidence in favour of the view that during folding there are elastic stresses always necessarily orientated to the upper and lower limit of the deformed sheet or mass of rock, independent of its position in space.

In order to check this assumption we made a joint survey of the well known "Sleek Stone", an asymmetric anticline (one flank dipping at 90°, the other at 25°) exposed in the coastal cliffs of western Pembrokeshire. near Broad Haven. This anticline has the great advantage of showing excellent jointing on the surface of one and the same bed, from one flank into the other.

The net result of the survey was that:

1. the joint system is very much dependent on the lithological character of the rock; a massive sandstone, a grauwacke, and a sandy shale each have their own type of jointing with characteristic frequency and direction. They have some major directions in common but in general the angle of intersection of a conjugate set is different for different kinds of rocks.

2. Some joint directions are early features in the structure; this is proved by the fact that in the sharp anticlinal hinge they show curved faces, obviously bent along with the bed that contains them.

3. Some joint directions which occur near the axis do not occur in the gentle flank.

4. The simple relations between joints and stress which we could discern in some of the examples quoted earlier, cannot be established in this strongly folded structure.

5. Although in limited areas of a few square metres the joint systems are very regular, this regularity disappears as soon as the area under consideration is enlarged to a 100 or 200 square metres.

From these points, which roughly summarize our results, we can conclude that the jointing is certainly partly contemporaneous with the folding. Further, that both the lithological character of the rock and relative position in relation to the fold structure determine the joint orientation; and finally, that in a fold like Sleek Stone, the elastically induced local stress-fields are so variable that they escape our analysis.

ANNEX
D-2

Outlines of
Physical Geology

By

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SECOND EDITION

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and on the circulation of subsurface water (Chap. 6); and we shall consider their importance also in connection with mineral deposits (Chap. 16).

A fracture on which there has been no appreciable displacement parallel with the walls is a *joint*. If there has been relative displacement of the walls parallel with the fracture, so that corresponding points on the two sides are distinctly offset, the fracture is known as a *fault*.

Joints. Field examination shows that joints are common, but that they are much more numerous in some places than in others. Where



I. C. Russell, U. S. Geol. Survey.

FIG. 202. Joints cutting horizontal beds of limestone. There are two sets of joints, nearly vertical and at right angles to each other. Drummond Island, Michigan.

they are abundant, commonly they are arranged in more or less definite *sets;* that is, the divisional planes running through the rock fall into groups according to direction. In many places there are at least two prominent sets of joints, intersecting at a large angle (Fig. 202). Such a combination of two or more intersecting sets constitutes a joint *system*. Combined with natural divisional bedding planes, a well-defined system of joints divides stratified rocks into series of closely fitting blocks. The finer the grain of the rock, as a rule, the more perfect the jointing and the more sharply defined the resulting blocks. In some beds of shale and limestone the jointing is exceptionally perfect.

Some jointing probably results from the tension caused by contraction in beds of sediments when they are elevated from the sea floor to form land masses and are partially dried as a result. A more common probable cause of regular fracturing is the warping and twisting experienced by the rocks during crustal movements. In regions where the strata have been folded, as in many mountain zones, unquestionably the force that flexed the beds also produced many joints.

A common type of jointing in igneous rocks is due to the contraction resulting from their cooling just after they have solidified from the liquid state. It may manifest itself in one of several ways, depending on the rate of cooling, the size and shape of the igneous body, and other factors. Large intrusive masses of granite and similar rocks are characteristically cut by joint planes that divide them into large blocks or prisms. Finer-grained rock in sills, laccoliths, and dikes commonly are divided into small angular fragments by closely spaced joints.

The most striking kind of contraction-jointing in an igneous rock results in development of *columnar structure,* which is characteristic of tabular masses. Many dikes, sills, and lava flows are made up of closely fitting prisms subdivided by inconspicuous cross-joints. The prisms have a variable number of sides, but commonly they tend to be hexagonal, and some of them have remarkable regularity of form. They range from several inches to a number of feet in diameter, and up to 500 feet in length. The Giant's Causeway on the north coast of Ireland is one of the most celebrated examples of this columnar structure; there are many fine examples also in western United States (Fig. 203). The columns form at right angles to the chief cooling surface, and consequently in a level sill or a lava flow they are vertical, whereas in a vertical dike they are horizontal.



U. S. Geol. Survey.

FIG. 203. Columnar structure in a thick lava flow. The Devil's Post-pile, Middle Fork of the San Joaquin River, California.

ANNEX
D-3

Outlines of
Physical Geology

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The cleavage in the shales can, of course, extend itself suddenly or gradually through the whole series, simply by cutting through the intervening sandstone layers. I think we are justified in regarding our Ordovician specimens as a transition phase between ordinary concentric folding and slaty-cleavage – the Rio Lladorre samples being nearer to ordinary folding, and the Barradós sample being further on the way to schistosity deformation.

SLATY OR TRUE CLEAVAGE, FLOW CLEAVAGE, AND FRACTURE-CLEAVAGE

In the foregoing description of Pyrenean Palaeozoic samples we have learned to distinguish the kind of cleavage which is usually called "fracture-cleavage". We concluded that it could develop into a general cleavage. Such a general cleavage is termed "slaty-cleavage" when recrystallization on the cleavage-planes is small. When other minerals, in addition to mica, become involved in the process of recrystallization (with the result that the original bedding disappears or is recognizable only as a faint relic texture) it is termed "flow cleavage".

On the other hand cleavage sometimes assumes a much coarser texture than is seen in our slightly metamorphic samples. In the same axial zone of the Pyrenees, for instance, there are Devonian limestones alternating with shales and sandstones, which are always sharply folded – isoclinally folded in the most strongly compressed zones – with strongly developed cleavage. The cleavage-planes often cut through the whole series, but the distance between the cleavage-planes can be measured in millimetres or even in centimetres instead of in tenths of millimetres. The whole folding mechanism of this series is based on this cleavage system. In other outcrops a fracture-cleavage in the shales is very pronounced, but cuts through the sandstones and limestones only in the anticlinal or synclinal hinges.

The explanation of fracture-cleavage in incompetent beds which one often encounters in textbooks, refers to the drag exercised on the incompetent beds by the slip of the competent beds above and below (cf. Wilson, 1946) as in Fig. 68a. The expression "drag" is not very satisfactory because the cleavage is not restricted to the flanks. It is equally well developed on the hinges, even when they are broad crestal zones where the dragging effect of the competent beds is surely absent.

Nor can this kind of fracture-cleavage be due to oblique-shear, for

in that case we ought to find intersecting fracture-cleavage due to the rotation of the beds in relation to the deformation stress (Fig. 69).

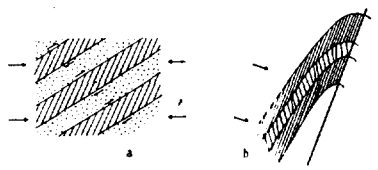


Fig. 68. Fracture-cleavage; *a* seen as originated by drag of competent beds on shale, *b* in competent bed between slates with slaty-cleavage.

Sometimes we do find intersecting shear-planes in shale beds; the so-called "pencil shales", in which the rock breaks up into irregular elongated angular chips, may be an example. This kind of fracturing occurs in thick shale beds which have been rotated, by the bending of under-



Fig. 69. Fracture-cleavage seen as oblique-shear in shale bed between competent beds.

lying or overlying competent beds, during the development of the shear-planes (cf. Fig. 70).

Another kind of fracture-cleavage is sometimes found in the competent beds of a severely compressed sequence; it must be seen as

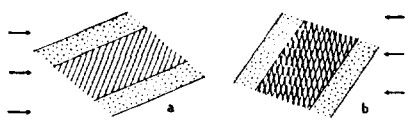


Fig. 70. Intersecting oblique-shear generated in thick shale bed.

shear-planes oblique to the stress and the angle they make with the stress direction is dependent on the lithology of the rock (Fig. 68b).

My general experience, however, is that slaty-cleavage and fracture-cleavage are both roughly parallel to the axial plane, fracture-cleavage converging upwards towards the top of an anticline, true cleavage converging downwards to the anticlinal core as in Fig. 71.

In addition to slaty-cleavage, there are several other kinds of fracture planes, such as joints of various types, and also slickensiding.

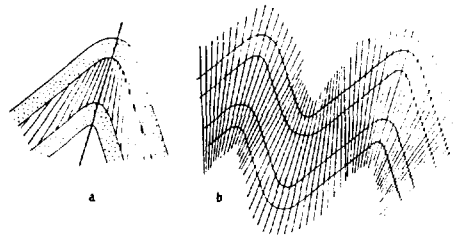


Fig. 71. Fracture-cleavage *a* and slaty-cleavage *b*.

A shale bed between competent beds such as coal-seams is often slickensided parallel to the bedding. This slickensiding is an immediate result of the slipping of the competent beds along the bedding-planes and may be contemporaneous with the development of fracture-cleavage in the shales. Simultaneously, joints will be formed in the competent beds. I shall refer more extensively to joints in Chapter 9, but here it is worth noting that in a folded competent bed we can expect many types of joint. Three types are illustrated in Fig. 72:

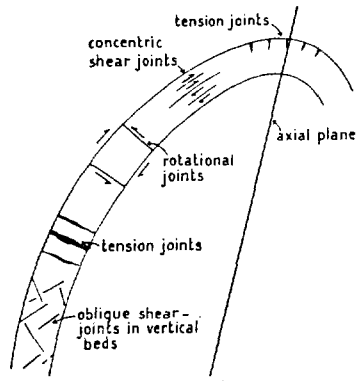


Fig. 72. Joints in concentrically bent competent bed.

tension-joints develop in the regions of greatest curvature as a result of relaxation of the elastic bending; *rotational joints* are due to a couple, perpendicular to the bedding-plane and generated by the slip in opposite directions along the top and bottom of the competently folded bed. Finally, ordinary *shear-joints*, sometimes developed as fracture-cleavage as in Fig. 68b, can develop in the steep flank of a fold when

further lateral shortening by folding becomes impossible. Such shear-planes may even be curved within one bed when the lithology changes, e.g. in a graded sandstone bed. We must remember, however, that an exposure of a fold shows us the final stage of a long history during which the beds have changed from one position to the next in space and in relation to the principal stress, in a continuous process; they carry all the scars inflicted upon them during that process. Moreover, a type of fracture belonging to an early stage may grade into another belonging to a later stage: Fig. 73, part of a close isoclinal fold in the

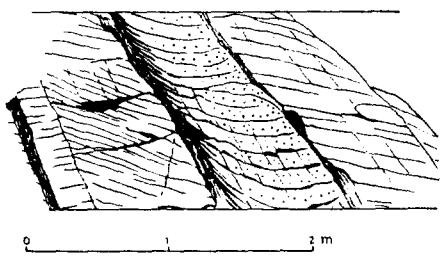


Fig. 73. Curved joints in graded sandstone, Devonian, of axial zone of the Pyrenees.

Central Pyrenees, represents a series of vertical beds of Devonian sandstone of varying composition. The sandstone to the left shows only rotational joints; the next shows oblique-shear joints; and the one to the right, which is a graded sandstone, shows curved joints, curving from a perpendicular rotational joint position to an oblique-shear joint position, then to cleavage, and finally to slickensiding.

Resuming our discussion of the origin of slaty-cleavage, fracture-cleavage, and flow-cleavage, we must conclude from the field evidence that none of these can be due to oblique-shear; they must arise from simple flattening of the rock in a direction parallel to the largest principal stress, accompanied by differential movement along planes perpendicular to this stress. Such shear-planes have never been reproduced in experiments, probably because laboratory experiments never reproduce this kind of elastico-viscous flow.

ANNEX
D-4

WILLIAM C. PUTNAM

GEOLOGY

Second Edition
Revised by ANN BRADLEY BASSETT

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Basalt (whose name is truly one of the most ancient in geology, since it apparently dates back to Egyptian or Ethiopic usage, and one of the first references to it by name is by Pliny) is by far the most abundant of all volcanic rocks. Some regions, such as the plateau bordering the Columbia River in the northwestern United States, the vicinity of Bombay in western India, and the part of South America where Brazil, Paraguay, and Argentina are close neighbors, were inundated by vast outpourings of basalt—some covering as much as 520 million square kilometers (200,000 square miles). In addition, many of the truly oceanic islands, such as Samoa, Hawaii, and Tahiti, are basaltic volcanoes rising many thousands of feet above the sea floor. Deep-sea soundings also give us a clue to the broad expanses of basalt seemingly spread across the oceanic depths in the recent geologic past.

Basalt is a most commonplace-appearing rock for playing such a prominent role in volcanism. Ordinarily, when basalt is fresh or unweathered it is coal black or dark gray and the groundmass is too fine-grained for the minerals to be visible; but under the microscope they can be seen to be mostly pyroxene and plagioclase. If phenocrysts are present, they may be either of these minerals in addition to olivine. Some varieties of basalt crystallized in bodies thicker than thin lava flows and cooled slowly enough that the minerals in their groundmass are large enough to be visible. *Diabase* is such a rock, and its characteristic texture is a felted network of feldspar laths with the spaces between them occupied by later-crystallizing, irregularly shaped pyroxene crystals.

The distinction between andesite and basalt is largely artificial since the two types grade into one another. The separation of one from the other is based on (1) the character of the plagioclase, whether dominantly sodium-bearing (andesite) or calcium-bearing (basalt), and (2) whether or not the principal ferromagnesian mineral is hornblende (andesite) or pyroxene (basalt). These differences are determined by using a microscope and are not likely to be very meaningful in the field. A workable means of distinction in the field is to chip off a small flake of the rock. If when held up to the sun, the flake is opaque, the rock very likely is basalt; if translucent, andesite.

Basalt shows a much more interesting variability physically than it does mineralogically. Some basalt flows are as rough and jagged as so much furnace slag (Fig. 4-15). Other flows are smooth and ropy, with glazed surfaces that look as though they had once been a stream of tar that had been halted instantaneously (Fig. 4-16).

The former is the *aa*, the latter the *pahoehoe*, of the Hawaiian eruptions.



Fig. 4-26 Cellular or scoriaceous basalt. (Photograph by Hal Roth.)



Fig. 4-27 Columnar structure in basalt lava flow. The Devil's Postpile, California. (From the Cedric Wright Collection, courtesy of the Sierra Club.)

Some basalts are dense, uniformly textured rocks with no visible minerals—others are frothy and cellular and are filled with innumerable small holes called *vesicles* that were gas bubbles trapped in the still fluid basaltic lava (Fig. 4-26).

A rock structure typical of basaltic rocks—although by no means confined to them—is the development of geometrically regular columns (Fig. 4-27). Commonly these have five or six sides and are nested so closely together that when the columns are seen on end their pattern resembles that of hexagonal bathroom tiles (Fig. 4-28). This is the result of the contraction of the rock that starts when the lava has first solidified. Should crystallization take place radially outward from approximately equally spaced centers, then the most efficient pattern that can be developed between these individual cells is a hexagonal one, similar in most respects to the cellular hexagonal pattern in

a beehive. Two familiar examples of columnar basalts are The Devil's Postpile in the Sierra Nevada of California and the Giant's Causeway of Northern Ireland.

Other Types of Igneous Rocks

There are several other important kinds of igneous rocks that do not fit into a classification as rigid as the one just discussed.

Obsidian (whose name comes from the Latin word, *obsidianus*, after its describer, Obsius) is also called volcanic glass (Fig. 4-19, 4-25). Actually, it should be thought of as a supercooled liquid, since it is made from magma that passed from the liquid to the solid phase so rapidly that crystals did not have time enough to form. This means that the rock is textureless, and that its appearance and fracture pattern is much like a large mass of insulator or bottle glass that solidified out of control and had to be thrown out on the dump. Actually, a natural glass, such as obsidian, is not too unlike the artificial product, the chief difference being that the careful controls used in making artificial glass eliminate the impurities, while in obsidian they are all present in the magma. The result is that obsidian commonly is black, and it may be a very striking jet black.

Pumice (an ancient name, from a Greek word meaning worm-eaten, mentioned as long ago as 325 B.C. by Theophrastus) is a rather specialized kind of obsidian which has been so dilated by volcanic gas as to become a petrified glassy froth, much as though the foam on top of a beer stein were to be instantly converted to rock. Because it has been so frothed up by gases mixed in it before it solidified, pumice is one of the lightest of rocks and the more porous varieties float on water; if blown out of coastal or oceanic volcanoes it may drift for thousands of miles before becoming waterlogged and sinking to the bottom.

Both obsidian and pumice have chemical compositions that typically are akin to rhyolite—that is, they are rocks that carry relatively high percentages of silicon, potassium, and aluminum in their composition and are correspondingly low in iron, magnesium, and calcium. Although glassy phases do exist for rocks solidified from andesitic and basaltic magmas, they are of minor importance compared to the rhyolitic varieties.

Along with lava flows, volcanoes eject great quantities of solid or semisolid material as part of their explosive activity. This material may range in size from particles as small as dust to blocks as large as houses. The products of such fragmental volcanic debris are called *pyroclastic rocks* (from the Greek; literally translated, the word means fire-broken).

Finer particles the size of dust or sand blown from volcanoes are called volcanic *ash*, and if the particles are the size of small pebbles they are some-

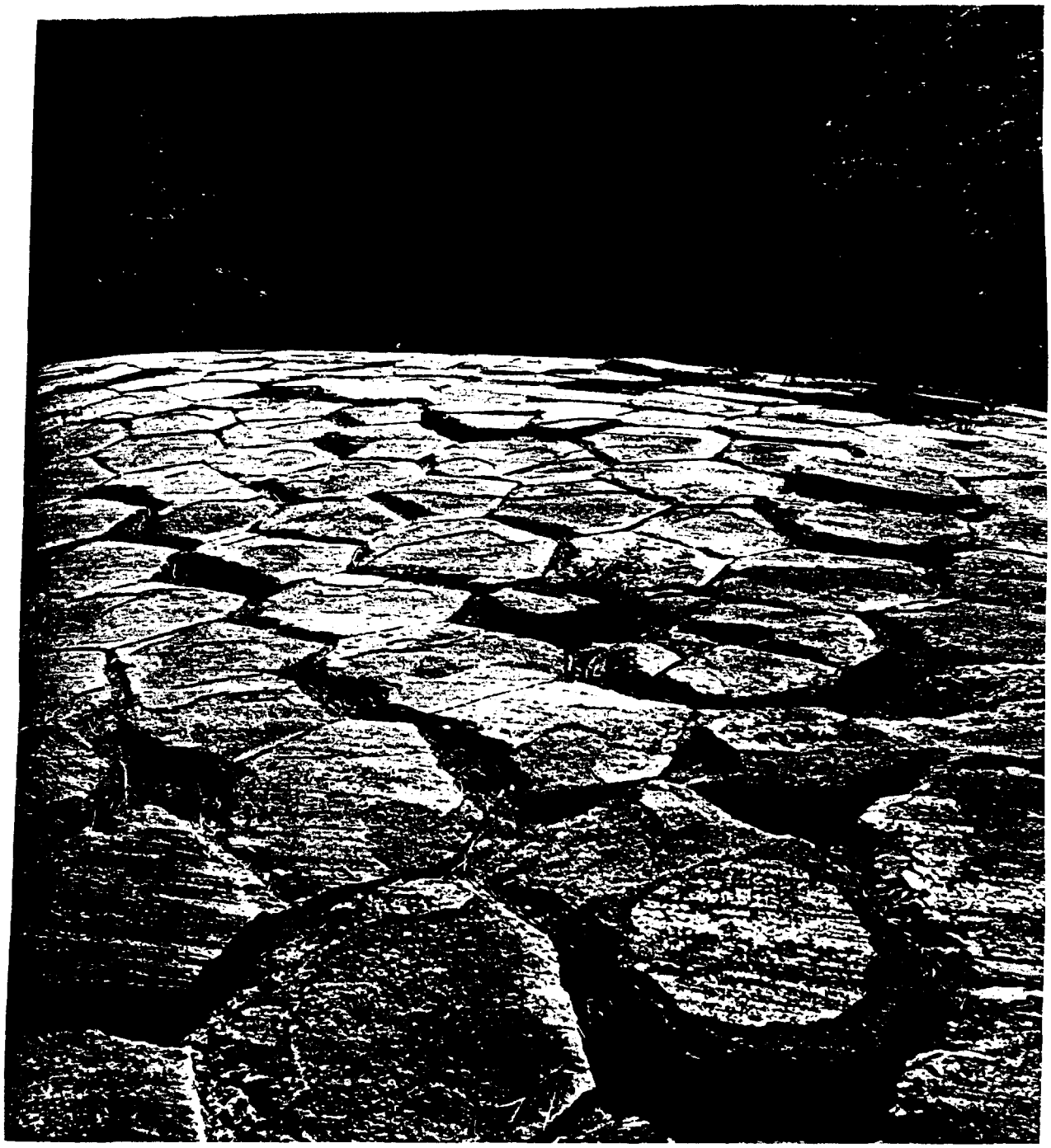


Fig. 4-28 Upper surface of the Devil's Postpile, California, showing the ends or cross sections of the columns seen in Figure 4-27. The grooves extending from left to right are glacial striae. The amount of weathering since the disappearance of the glacier is indicated by the loss of the striated surface. (Photograph by Hal Roth.)

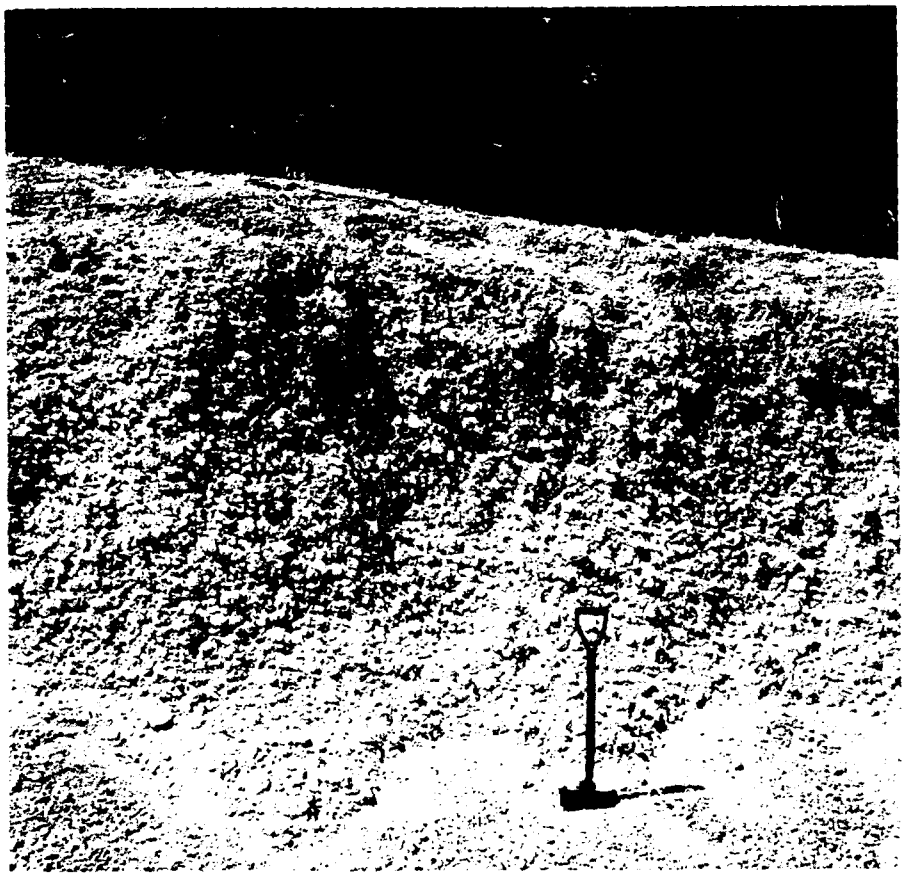


Fig. 4-29 Pumice blocks and lapilli. Mammoth Lakes District, California.

times spoken of as *cinders*. These are poor terms because neither volcanic ash nor cinders have anything to do with fire in the sense that they are not the residue left from the burning of something such as coal or wood. Actually, they are small fragments of volcanic rock with the same chemical composition as the lava that is in the crater or that is flowing down the flanks of the volcano, with the difference that they have been frothed up more by the entrapped gases. Fragments an inch or so in diameter are called *lapilli* (an Italian word for little stones) and fragments that are several inches across are best called volcanic blocks if they were solid at the time of their ejection.

Blobs of lava are often blown out beyond a crater rim from the surface of the caldron within. At night they are a spectacular sight, especially if they are still brightly glowing. Their paths can be followed as they arc through the sky on about the same sort of trajectory as a mortar shell. On color photographs, their trails show as red lines in the air, and also as long streaks on the ground as they bounce and roll down the volcanic slopes. The surfaces of

such lava blobs have a chance to cool in flight, and the whole blob itself may also solidify with a crust that looks much like a loaf of French bread. Such crusted-over lava blobs are called *bombs;* some are spindle shaped if they rotated in flight, while others may be nearly spherical.

Volcanic ash may blanket the countryside for many miles around a volcano like so much newly fallen snow, and, as at Paricutin in Mexico in its eruption of 1943, may accumulate to depths of more than 3 meters (10 feet). A layered rock made of such compacted volcanic ash is *tuff* (Fig. 4-5), and over the centuries it has been a widely used building stone. Much of ancient Rome was built of tuff; it is the rubble masonry one sees today in the Colosseum and in the walls of the Forum since the marble facing was stripped away centuries ago. Tuff was extensively used on the volcanic islands of Greece, where many picturesque villages were excavated in part in it, and also at Naples and Pompeii, and a whole world away at Manila, to cite but a few examples. Tuff is readily excavated, it holds its shape well, and the surface hardens somewhat on exposure to the atmosphere.

Some falls of ash, such as the one that buried Pompeii, retain their heat for relatively long periods of time, and if hot enough the ash particles may fuse together to form a *welded tuff.* Many hundreds of square kilometers of the North Island of New Zealand in the Rotorua geyser district are covered with welded tuff. It is common throughout much of the western United States and in Alaska in the Valley of Ten Thousand Smokes, which is named for the fumaroles and hot springs produced as a result of the hot ash fall in an eruption in 1912. As a welded tuff consolidates and shrinks, it may develop geometrically arranged columns much like those in a basalt flow.

If pyroclastic material consists of blocks and other large angular fragments, these may be cemented together to form a layered rock, much like tuff in its origin but consisting of visible, angular, sharp-edged blocks. Such a rock, composed of angular, indurated blocks, is a volcanic *breccia* (an Italian word meaning the "gravel or rubbish of broken walls"). Very often these breccias are formed on the slopes of volcanic cones, close to the source, or they may be made of fragmental material that accumulated in the volcanic throat and was cemented together by late-crystallizing magma to form a new rock once the volcanic fires were dead. Volcanic breccias are also characteristic of the early-congealing surfaces of lava flows whose interiors may still be fluid. Continued forward motion of this still molten mass may shatter the crust into a jumble of chaotically arranged blocks which, cemented together by lava injected into their interstices, will produce a flow breccia.

Deep-Seated Intrusive Bodies

Plutonic rocks such as granite are an enigma because no one has ever seen such rocks form. Basalt can be seen forming on the slopes and in the craters of

active volcanoes, so that to achieve at least a partial understanding of the genesis of volcanic rocks is not as difficult a problem. Nevertheless, one of the most acrimonious debates in the history of geology sprang up in the late eighteenth century over a curious belief held in Germany that not only basalt, but granite as well, was a chemical precipitate formed on the floor of a universal ocean. Fantastic as this concept might now seem, it had the virtue of forcing its opponents out into the mountains and over the face of the earth to collect data to refute the belief in the aqueous origin of the igneous rocks and to demonstrate that they had indeed crystallized from molten solutions. Much of the evidence that was patiently gathered nearly two centuries ago is valid today, but even now, when we consider the lines of argument advanced then and through the succeeding years, we are still far from an answer concerning the genesis of igneous rocks. This problem continues to spur ingenious research and lively debate among geologists.

Such rocks as granite, diorite, and gabbro are all coarse-grained rocks consisting of interlocking mineral crystals without any preferred orientation. Presumably they owe this coarsely crystalline texture to slow cooling from a magma at great depth. However, no one has ever actually seen this cooling take place, and that we know of these rocks at all is only because the rocky roof which once covered them has been stripped away by erosion. The most widely exposed of these deep-seated rocks is granite and closely related rock types. Such rocks may underlie hundreds or even thousands of square kilometers in mountainous chains, or in broad areas such as Labrador or northeastern Canada.

These tremendous bodies of rocks are called *batholiths* (a word introduced about 1895 and derived from the Greek words for depth + stone). In general usage today this means a body with a surface area of at least 64 square kilometers (40 square miles). A smaller body of coarse-grained igneous rock with a surface extent of less that 64 square kilometers is called a *stock*, and it may very often be a cupola, or protuberance, sticking up above the top of a more deeply buried batholith not as yet unroofed by erosion.

Much has been learned about batholiths and stocks because erosion has cut down to different levels in them at different places and they have been penetrated in deep mining operations. In some instances, batholiths consist of granite which is uncontaminated and homogeneous right up the knife-sharp boundary of the intrusion. In such cases the granite appears to have displaced the so-called country rocks into which it has apparently advanced as a magma.

Other batholiths, or other parts of the same batholith, are surrounded by a wide marginal zone, and the transition between the invading and the invaded rocks is much less abrupt. The contact between the unquestioned granite and its enclosing shell may be blurred, and a zone of *migmatite*, or mixed rocks—partially igneous and partially metamorphic—characterizes such a contact. These are rocks in which tongues of granite may extend far out into the ad-

jacent host rocks, and bands of granitic material may follow selected layers for long distances into the metamorphic *aureole,* or halo of country rock that has been recrystallized in place by the heat and chemical activity associated with the granitic intrusion. This is typical of the so-called *lit-par-lit,* or bed-by-bed, structure; which means that one layer of a rock may be granite, the next a metamorphic rock, the next granite, and so on. Or knots and clusters of orthoclase, or other minerals characteristic of granite, may appear in the metamorphic aureole some distance out from the main body of granitic rocks. In addition, the granite may contain ghost or relict structures, such as layering, which are characteristic of sedimentary and metamorphic rocks. These phenomena suggest that in some way the pregranitic rocks were digested, or replaced by granite—in other words, they were converted *in place* from what they were originally into a brand-new rock, in this case, granite.

Any theory that attempts to explain the origin of granite and batholiths must also explain satisfactorily these two kinds of contacts between the granite and its country rock. In addition, it must explain the so-called "room problem"—where is all the rock that used to be where the granite is now?

One explanation assumes that the granite was formed in place by a process called *granitization.* According to this theory, tremendous thicknesses of sedimentary rocks that accumulated in subsiding off-shore areas were subjected to the great pressures and high temperatures known to exist deep in the crust of the earth. These temperatures and pressures alone have no great effect on "dry" rocks, but many sedimentary rocks contain some sea water trapped during their lithification and, during subsequent metamorphism, additional water is released by the recrystallization of hydrous minerals. These are minerals that contain water as part of their molecular structure, water which they give up when they are converted to anhydrous minerals. It has been suggested that this water forms an interstitial fluid (between the rock grains) in which chemical reactions and chemical transport can take place, thus forming granite from the pre-existing rocks. In the deepest parts of the rock pile the heat may be sufficient to combine with the process of solution to produce actual melting, or at least partial melting, enough to make the whole mass capable of movement. This mobile fluid portion would rise into the shallower parts of the earth's crust where its contacts with the country rock would be sharp and definitely intrusive. At other places in the batholith, where such mobility was not attained, the end products of granitization would remain where they were formed, and here the boundaries with the country rock would be blurred and mixed and could show relict sedimentary structures. A particular bed of highly metamorphosed rock might be unusually susceptible to granitization and might be converted to granite, while "drier" or otherwise more resistant beds above and below it were not so thoroughly changed, creating the lit-par-lit structure.

In this theory then, the type of contact between granite and country rock would depend upon what part of the batholith was being observed. It neatly

solves the room problem by having the rocks converted in place. Unfortunately there are other problems which it does not always solve. In the first place, some batholiths appear not to have had anything to do with the great basins of sedimentary rocks. Secondly, some batholiths are not nearly so thick as this theory would require; they do not have the tremendous "roots" that were once assumed for all batholiths.

To answer these objections, some geologists have proposed that the granitic magma forms much deeper within the earth. These hot liquid masses then rise through the rocks above them, assimilating some of the country rocks and adding their constituents to the melt, and thrusting others of these rocks outward and downward, severely metamorphosing them in the process. They believe that the magma masses may have risen like giant blobs very close to the earth's surface and that they cooled slowly enough to form their large crystals because they were covered and insulated by the volcanic rocks of about the same age with which many batholiths are associated. They further believe that batholiths are quite thin structures, on the order of 10 kilometers (6 miles) in thickness, rather than 40 to 50 kilometers (24 to 30 miles). These large masses of essentially rootless granitic magma would rise toward the surface wherever conditions were favorable, the great basins of sedimentary rocks being only one such place.

Most of the largest batholiths that we can see are of late-Mesozoic age, but large batholiths may well have formed during all of geologic time. If batholiths are originally as thin as these geologists believe, it is quite possible that older batholiths did exist, but have been removed by erosion operating through a greater length of time. The few large Paleozoic and Precambrian batholiths which still remain may have been thicker than 10 kilometers or have been less eroded. We must have more evidence than we have at present before we can determine which of these theories, or which parts of them, are correct.

Intrusions of Intermediate Depth

These are much smaller intrusive bodies than their immense relatives, the mountain-inhabiting batholiths, and although along their length some are measurable in scores of miles, their breadth is more commonly measured in feet. These are called *hypabyssal rocks*, a word that means "of intermediate depth."

Hypabyssal rocks generally have textures intermediate between those of volcanic rocks and those of plutonic rocks. If they are part of bodies of moderate to large size they will have cooled sufficiently slowly that their minerals, although smaller than in batholithic rocks, will be visible to the unaided eye. If they are part of a small intrusion, whose walls were close together, the heat loss is comparatively rapid and crystal sizes are diminished accordingly, to the point where the texture of such rocks may be indistinguishable from their volcanic counterparts. In other words, the texture of hypabyssal rocks approaches those of volcanic rocks on the one hand and at the other extreme

it may be about the same as those of plutonic rocks—depending very largely on the size of the intrusion and the composition of the magma. Incidentally, porphyritic textures are very typical of the group because there may have been a considerable amount of moving of magma from one environment to another in these shallow intrusive channels, with correspondingly different rates of crystallization before final solidification occurs (Fig. 4-21).

Dikes are a common variety of hypabyssal intrusive. They are tabular bodies, which means that of the three dimensions possessed by a solid body, two are very large compared to the third—in the case of dikes they have about the same geometry as that of a thin pad of notepaper. Another attribute of dikes is that they are *discordant*—that is, they cut across the layering, or stratification, or the grain of the rocks they invade (Figs. 4-9, 4-30).

Dikes are seldom more than a few tens of feet thick, but some are hundreds of miles long. An exceptionally long one is the so-called Great Dike of Rhodesia in southeast Africa. It is more than 480 kilometers (300 miles) long but has an average width of only about 8 kilometers (5 miles).

Dikes commonly occur in groups known as dike swarms. Sometimes they may be aligned on roughly parallel courses, or they may radiate from centers, such as the host of basaltic dikes that lace the northern part of Great Britain, with some individual ribbon-like intrusions reaching lengths of 160 kilometers (100 miles) or so (Fig. 4-31). The focal point for such a radial set of dikes very likely will be the throat, or conduit, of a now extinct volcano, and subsequent erosion may reveal its connection with the dikes.

Depending on their resistance to erosion, relative to their host rocks, dikes may be distinctive features of the landscape. If they are more resistant they stand up somewhat as continuous walls, much like the two conspicuous ones radiating outward from Ship Rock, an eroded volcanic conduit in New Mexico. Should they be weaker, they may be etched out, especially if they crop out in a sea cliff exposed to the full fury of the sea.

Columns also characterize dikes, but instead of standing vertically, they may lie horizontally if the dike itself is vertical, and then may look much like an immense stack of cordwood. Such columns grow at right angles away from a cooling surface—in a lava flow this will be upward from the ground and downward from the top of the flow, and commonly these inward-growing columns meet with a rather ragged matching up of the columnar sets along a line close to the center of the flow. In a vertical dike the columns grow inward horizontally from the vertical side walls which here are the cooling surfaces.

Hypabyssal rocks which have been injected into the earth's crust as tabular, sheet-like bodies essentially parallel to the stratification of the enclosing rocks are called *sills* (Fig. 4-9). These are *concordant* intrusions, while dikes, with their cross-cutting relationships, are discordant. This does not mean that each sill follows only a single stratum, because it is not at all uncommon for them to cross up or down from one stratum to another and to follow it for perhaps hundreds or thousands of meters before making another cross-over (Fig. 4-32).



Fig. 4-30 Dike in Precambrian gneiss. Jefferson County, Colorado. (Photograph by J. R. Stacy, U.S. Geological Survey.)

Some sills run for great distances across the country and have lengths comparable to those attained by dikes. An excellent example is the Great Whin Sill in Northumberland in noreastern England. It looms as a dark, north-facing ledge dominating the surrounding country for much of its course, with the result that the Romans, with their experienced eye for the military potentialties of the terrain, seized upon this natural barrier as a foundation for Hadrian's Wall, which was built to keep the Picts from ravaging northern Britain.

Certainly the most familiar of all sills in the United States is the abrupt cliff of the Palisades that follows the Jersey shore of the Hudson and is clearly visible to the millions of inhabitants of Manhattan, let alone the multitudes of commuters who see it every working day. The Palisades sill is a large one, as these things go, and is over 304 meters (1000 feet) thick. It cooled slowly and without much internal disturbance, with the result that the magma within

it had a chance to differentiate. That is, the heavier early-crystallizing minerals, such as olivine and pyroxene, sank to the lower levels of the large pancake-shaped magma chamber while the lighter plagioclase crystals were concentrated near the top.

A more renowned group of hypabyssal rocks, although perhaps not often considered in this light, are the dike and sill that played a decisive role in Pennsylvania during three hot summer days a century ago in July of 1863. One is the thick basaltic sill that underlies Cemetery Ridge and the other is the narrow but persistent dike that supports Seminary Ridge, both of which were the dominant elements of terrain at the Battle of Gettysburg. The Union Army held the former and the Confederate forces the latter. Both sides made the most of the so-called ironstone boulders which had weathered from basalt outcrops along the top of each ridge. Piled into fences these made excellent defensive positions against the round shot and Minié balls of that day. Cemetery Ridge, along which the Union brigades were deployed in full strength on the fateful third morning, makes such a continuous rampart, with a nearly unbroken forward slope up which Pickett's command had to charge, that the assault was virtually foredoomed to failure. This was doubly so when they were called upon to dislodge men sheltered behind a practically shot-proof basaltic barricade and supported, in addition, by one of the greatest concentrations of artillery assembled in the war.

Because contraction occurs in the solidifying magma of sills as well as in dikes and lava flows, columnar joints are characteristic of them, too; since

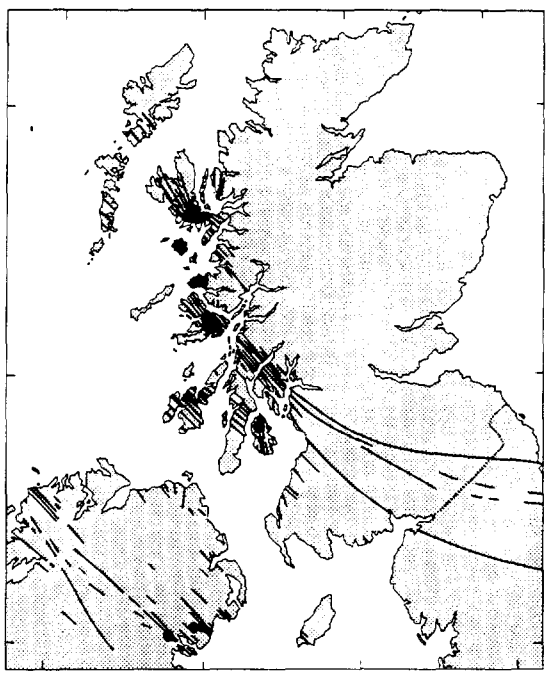


Fig. 4-31 The dike swarms of Scotland and northern Ireland. The black areas are centers of igneous intrusion to which the dikes are related.

most sills tend toward a horizontal position at the time of their origin, the columns in such an intrusion are likely to be vertical, having developed at right angles to the cooling surface.

Discriminating between buried lava flows and sills intruded into sedimentary rocks is not one of the simpler field problems in geology. Igneous rocks in both categories may have about the same texture, and both may have very well developed columnar joints. The most likely place to look for the evidence needed to decide between the two possibilities is at the contact between the sill, or buried lava flow, and the enclosing rocks.

In many sills there very commonly will be a chilled zone in the igneous rock at the margins where crystallization was the most rapid, and here the texture of the rock will be fine-grained, in some cases almost glassy. Additionally, there may be a baked zone in the invaded rocks immediately adjacent to their boundary with the sill. They will have been fired or hardened in much the same way that clay is fired in a kiln to make bricks or pottery. In a sill, fragments of the overlying host rock may be included in the igneous material. However, if the igneous body is an interbedded lava flow, then the baked contact will be lacking on the upper surface of the flow, and the chilled zone can be present only on the bottom. In addition to this, the strata overlying these volcanic rocks will have been deposited after the lava solidified, and more likely than not fragments of rock eroded from the flow will be found incorporated in the covering strata. Sills are more commonly of denser volcanic-type rocks, while lava flows often are vesicular—with many small holes formed by gas bubbles.

A third type of hypabyssal intrusive body is the channel or conduit that once served to connect a volcanic vent on the earth's surface with the magma reservoir at depth. In an erosional sense, volcanoes are vulnerable features; much of their interior consists of loosely consolidated ash and pyroclastic material, their steep slopes lend themselves to gullying, and if they are high enough they may intercept more snow and rain than the surrounding countryside. The result of this augmented runoff working on such an exposed structure is that, geologically speaking, the interiors of many volcanoes are bared to view shortly after they lapse into dormancy.

Their internal skeleton of radial dikes and central conduit often proves to be made of sterner stuff, with the result that dikes stand up as partitions and the solidified magma of the conduit forms a central tower, known as a *volcanic neck*. A well-known example is the Ship Rock in New Mexico.

More often than not, volcanic necks are found in clusters, rather than standing isolated. Prime examples in the United States are the volcanic buttes of the Navajo-Hopi country near the so-called Four Corners area. Here more than a hundred volcanic centers interrupt the surface of the plateau.

Another group of volcanic necks that have achieved a measure of notoriety are the so-called pipes of *kimberlite*, a hypabyssal rock composed dominantly

of ferromagnesian minerals, which are a source of the diamonds of the Republic of South Africa. The ancient volcanic conduits containing the diamonds are deeply weathered near the surface into what is called the "blue ground," a sticky clay from which the diamonds are separated by washing. The pipe-like columns of hypabyssal rock were mined in the Kimberley pit to a depth of 1060 meters (3500 feet) before the workings were abandoned—now they are idle and stand water-filled to within 183 meters (600 feet) of the surface. Since the pressures and temperatures necessary for diamonds to crystallize from solution are not fulfilled short of a depth several miles below the ground level, diamonds are one of the better geologic indicators which demonstrate that (1) volcanic magma can originate at considerable depths within the earth's crust, and (2) because Kimberley diamonds are found at levels far above the depths where pressures necessary for their formation prevail, the magma of which they once were a part streamed upward in a pipe-like conduit to reach the higher levels of the earth's crust, even discounting the removal of some of the overburden by erosion.

ANNEX "D-5"

Swastika Laboratories

A Division of TSL/Assayers Inc.

Assaying - Consulting - Representation

Established 1928

Geochemical Analysis Certificate

8W-2150-RG1

Company: **QUEENSTON MINING INC**

Date: AUG-04-98

Project:

Attn: M.McGill

We hereby certify the following Geochemical Analysis of 6 Rock samples submitted JUL-29-98 by .

Sample Number	Au PPB	Au Check PPB	Cu PPM
53238	Nil	2	-
53239	Nil	-	-
53240	Nil	-	187
53241	Nil	-	-
53242	Nil	-	-
53243	14	12	-
Blank	Nil	-	-
STD TT-15	665	-	-

One assay ton portion used.

Certified by _____

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

Dufresne Property / Eby Township.

① - Sample #53238 - Large basalt sample with a rusty, 1cm carbonate rind. The basalt is very fine grained and mottled in texture from fracturing ± brecciation and alteration. The sample varies from medium green to grey green in colour with yellowish to buff coloured alteration and bleaching. The rock appears to have been fractured with dark chlorite ± silica and later veined and silica flooded. Sample is hard, weakly ankeritic, non magnetic, well fractured, poorly veined with greyish quartz, and sparsely mineralized with traces of pyrite and chalcopyrite. for Au ppb. 2ppb

② Sample #53239 - sample similar to above, basalt but with more fracturing to brecciation which promotes buff to dull yellowish alteration and bleaching (part sericite ?) adjacent to fractures but best developed next to thin quartz veins to 5mm in size. Rock is more reactive to the

presence of ankerite than 53238, is hard, nonmag, has 10-20% veining and is sparsely mineralized with pyrite and lesser chalcopyrite. Rock is similarly hard and silica flooded, nil.

③ Sample # 53240 - Sample that looks like massive black chert with traces of chalcopyrite on weathered surface ... on the fresh surface the black chert contains scattered irregular fragments of quartz ± ankerite (off white to buff coloured) in a black chert matrix. The rock is hard, very weakly to non ankeritic and is nonmagnetic. The chert is cut by fine mm-sized quartz to cherty quartz veins and is mineralized with fine grained clusters of chalcopyrite ± pyrite. In sample submitted there is about 1% to 2% chalco ... it locally appears to be fracture controlled but that is unclear.. for Au & Cu Au - nil Cu = 187 ppm

④ Sample 53241 - Chert breccia - a sample with numerous irregular fragments of buff to milky chert / quartz in a matrix of black chert. Fragments range from angular to

subrounded and are quasi-bimodal with mm sized fragments and coarser to 1cm sized fragments. The rock is finely fractured, nonmagnetic, poorly veined and sparsely mineralized with traces of chalcopyrite & pyrite. The rock has a well developed rusty mind but is essentially nonreactive to the presence of ankerite Au nil.

(5) Sample 53242 - carb rock, carbonated basalt (whole sample submitted) - one edge of this sample looks like the bleached altered basalt seen previously that has become thoroughly blasted with alteration - silica and ankerite. The resultant rock is buff to yellowish and pale grey in colour with weak pinkish tones. The rock is silicified and moderately ankeritic with a well developed carbonate mind. Sample is nonmagnetic, weakly veined with late, fine, quartz stringers and is mineralized with about 3% pyrite that is finely disseminated but more often appears fracture controlled. No Copper noted Au nil

(6) Sample 53243 - Cut sample - carb breccia to strongly brecciated and carbonated syenite (??). ... The sample suggested to be a contact that winds up looking as a simple sericite / chlorite schist face. The rock consists of brick to orange red fragments that have been almost totally obliterated by carb (ankerite). The rock is highly fractured with chlorite, rather poorly veined with quartz and sparsely mineralized with traces of disseminated pyrite. Nonmagnetic. The sample is highly reactive to the presence of ankerite with some calcite detected in and around the 1cm carbonate mind. Portions of the fresh surface look crudely porphyritic --- suggestive of a potentially felsic intrusive but the rock is almost totally obliterated by alteration ... The ankerite varying from offwhite to dull earthy grey, beige, and yellowish with variable reddish tones. Au = 13 ppb

End of samples.

ANNEX
D-6

Globex Mining Enterprises Inc.
Les Entreprises minières Globex inc.

GLOBEX

146-14th Street
Rouyn-Noranda, Quebec
J9X 2J3
CANADA

Tel.: (819) 797-5242
Fax: (819) 797-1470
URL: www.globexmining.com
Email: globex@lino.com

November 9, 1998

Mr. Roger Dufresne
14 Wright Hargreaves
Kirkland Lake, Ontario
P2N 1B2

Dear Mr. Dufresne:

Re: Ebby Township Property Visit

Thank you for allowing our geologist Mr. Ray Zalnieriunas to visit the Ebby Township Claim held by you and Mr. D. Chartre on September 9, 1998.

I understand that the geology is fascinating and that a great deal of OPAP founded work has been accomplished.

Market conditions being what they are, Globex cannot at present make an offer on the property.

I wish you both the best of luck in your property endeavours.

Yours Truly,

Jack Stoch
President

PART 2

ONTARIO PROSPECTORS ASSISTANCE PROGRAM

OP 98 - 131 and OP 98 - 132

FINAL SUBMISSION 1998

prepared by

DENIS CHARTRE AND ROGER DUFRESNE

Prospectors

1998 12 20

Eby Township

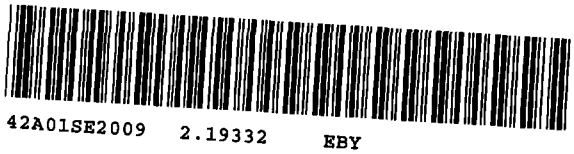
Claim Block #1

Patented claims: L-16679, L-14099 and L-14098
Unpatented claims: 1214384, 1225485, 1186492

Claim Block #2

Patented claim: L-18958

Unpatented claims: 1205843, 1214382, 1214385



020

ANNEX
"H-1"

Summary of micro-fiche data re Walter Little claim

Claim L 14098 (Former L. 11437)

Eby Township

SW 1/4 N 1/2 Lot 3 Con IV

Former claim # L 11437

Staked by Walter Little: March 31, 1924 (Lic # 7742B)

Recorded: April 14, 1924

Patented: April , 1930

Observation: 200 man-days of labour were performed on these claims from July 19, 1924 to March , 1929

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MAR 26 1999
GEOSCIENCE ASSESSMENT OFFICE

2.19589

S 14098 - 710

ne and Address of icen-ee	Walter Little Swastika
nber of License	(7742) 9742
ue of Claim	Elsie S.W¼ N½ Lot 3 Con 4 former L 1437
ndaries	
overy Post	
and Hour of Discovery	
of Staking	31st March 1924 6 p.m.
of Filing	14th April 1924
rate of Record nted	2nd April 1924
rate Performance king Conditions Granted	22nd April 1924.
July 1924	30 days work.
[illegible]	40 days work
Dec 1926	40 days work.
[illegible] 1927	40 days work.
Dec 1928	40 days work
[illegible] 1929	40 days work
April 1930.	Application for patent & fees paid.
Apr. 1930	All papers sent Dept

Summary of micro-fiche data re Walter Little claim

Claim L 14079

Tisdale Township

SE 1/4 N 1/2 Lot 4 Con IV

Former claim # L 11439

39 3/8 acres

Staked by Walter Little: March 31, 1924

Recorded: April 14, 1924

Patented: April , 1930

Observation: 200 man-days of labour were performed on these claims from July 19, 1924 to March , 1929

- L. 14099. TQV

e and Address of censee: Walter Little Surv. Lkg.

nber of Licen se: [illegible] 2.

e of Claim: E½ [illegible] S E - Fr. Sec. 2 - Lon 4

ality: [illegible] Power L 11-59

ndaries: [illegible]

overy Post:

and Hour of Discovery:

of Staking: 2nd - Jan 1924 2 pm

of Filing: 4th June 1924

ate of Record nted: 22nd Mch. 1926

ate Performance king Conditions Granted: 22nd Mch. 1926 [illegible]

9 July 924 50 days work,

Work Approved for [illegible] 40 days work.

0 Dec 1926. 40 days work

Sept 1927. 40 days work.

Nov 1928 40 days work

Nov 1929 40 days work.

ed April 1930. Application to Patent Purchase pro[illegible]

Sept 1930. All papers sent Dept.

Summary of micro-fiche data re Walter Little claim

Claim L 16679 (Former L. 11078)

Eby Township

SW 1/4 N 1/2 Lot 4 Con IV

Former claim # L 11437

Staked by Walter Little: September 13, 1926 (Lic # 7742B)

Recorded: September 24, 1926

Patented: May , 1933

Observation: 200 man-days of labour were performed
on this claim from Dec 30, 1926
to May , 1933

16679

Name and Address of Locator: Hallie Little Juneau

Number of Claims: 17420

Name of Claim:

Location: [illegible]

Boundaries: [illegible]

Discovery Post:

Date and Hour of Discovery:

Date of Staking: 15th September 1926.

Date of Filing: [illegible]

Certificate of Record Granted: 1st Jul. 1927.

Certificate Performance Working Conditions Granted: 1st Jul. 1927.

30 Dec 1926 60 days work

~~3 Sept 1927~~ 40 days work

6 Nov 1928 40 days work

~~30 Sept~~ 1929 40 days work

Jul. 1931. 25 days work

Dismissed 1931. 25 days work.

30 1932. Order of the Mining Court extending time for Patent to 1 May 1933

Jul. 1933. Affidavit of Labor & Improvements filed. 118.

May 1933 All papers sent Department.

May 14, 1935.

ANNEX "H-2"

WALTERS CLAIMS, Eby Township

Sample No. 33984: 30" quartz, carrying iron sulphides, molybdenite. Well mineralized. This vein strikes North, and dips 70° West; width from 6" to 30"; occurs in lenses. Formation basalt. Basalt mineralized in spots. Work done several years ago.

Au. $ 6.00 per ton

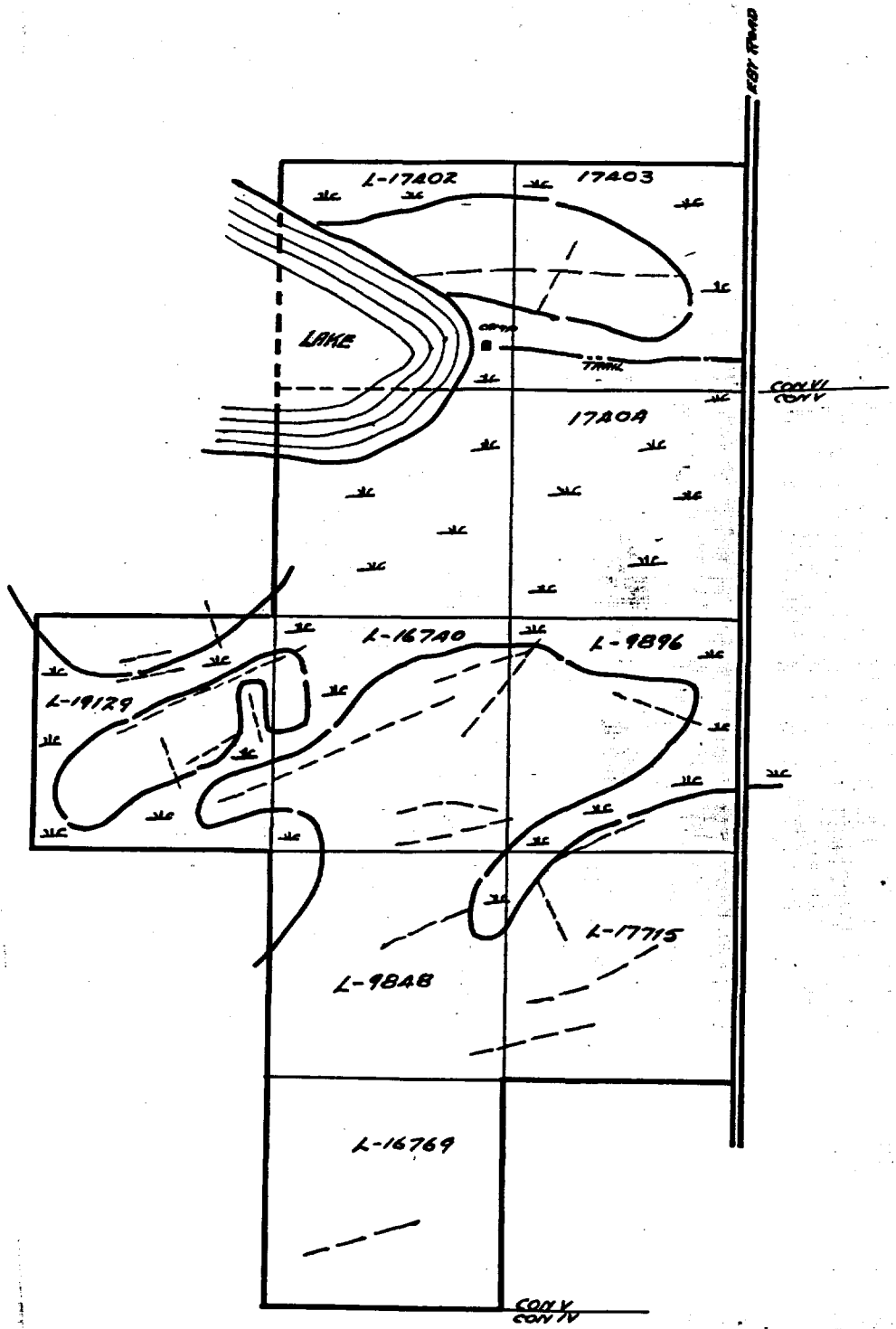
Sample No. 33985: 60" chlorite schist with quartz stringers carrying iron sulphides, light mineral. Strike - Northeast; dip, 80° South. This shearing occurs in basalt. Pit mostly filled in.

Trace

Other claims in group mostly low ground, drift-covered. Old trenches filled in. If samples run, trench should be scraped out, re-sampled for some distance. Samples taken from best section, but looks spotty.

V. Jordan.

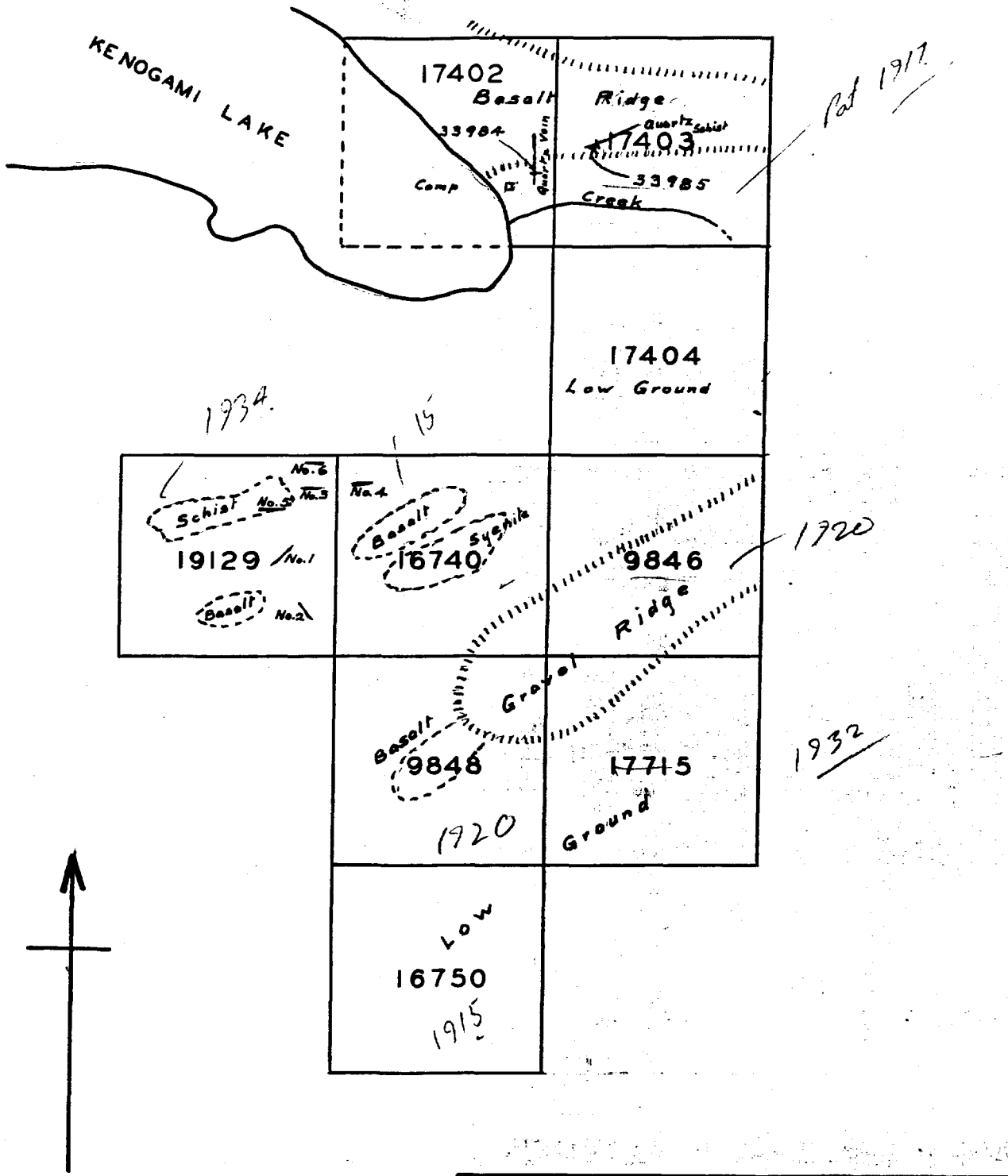
ONT. DEPT. OF MINES
Rec'd from Sylvanite
Expl. Dept.
Date July/61 W.S.
Resident Geologist



---- = VEINS

ERIE CANADIAN MINES

DRAWING	CLAIM MAP
LOCATION	WALTERS CLAIMS EBY. TWP. ONT. KENOGAMI
SCALE	1" - 1000'
DRAWN BY	G.L.H. AFTER O.R.W.
REF. NO.	143
DATE	SEPT. 16 1934



ERIE CANADIAN MINES

DRAWING	CLAIM MAP
LOCATION	WALTER'S CLAIMS EBY TP. KIRKLAND LAKE AREA
SCALE	1" — 1000 FEET
REDUCED BY	G.A.H. FROM SKETCH BY V. JORDAN
REF. NO.	
DATE	MAY 14 — 35

WALTERS PROPERTY

Location

A group of 9 patented claims at the east end of Kenogami Lake immediately south of the Rogick-Elliot-Clark holdings in Eby township. The claim numbers are: L.9846, L.9848, L.16740, L.16750, L.17402, L.17403, L.17404, L.17715, L.19129.

Chief Metal Present

Gold.

History and Development

Charles J. Walters patented, in 1917, the 3 claims (L.17402, L.17403, L.17404) on which most of the subsequent work was done. The rest of the claim group, with the exception of L.17715 and L.19129, were acquired by 1920. Claim L.17715 was acquired and patented in 1932 and claim L.19129 in 1934.

Erie Canadian Mines Ltd., a subsidiary of Sylvanite Gold Mines Ltd., optioned and prospected the property in 1935. Several quartz veins on the 2 north claims, L.17402 and L.17403, were sampled and one gold assay of $6.00 per ton was reported. The property and the adjoining Reed claim L.9832 were developed in 1938 by D. M. Hogarth and associates. Surface work indicated the presence of gold on claim L.17404. Eight drillholes totaling about 3,000 feet were put down to test the carbonate areas.

Geology

Outcrops on the property consist of basic volcanics, green carbonates, and a few syenite and lamprophyre dikes. The carbonate zone on the south boundary of claim L.17402 lines up with other carbonate outcrops along a zone striking S.70°E., which is probably a regional fault. Drilling indicated a zone of talc schist underlying the creek valley immediately north of the carbonate body on claim L.17402.

ıg Results

According to T. L. Wells, engineer in charge of development in 1938, bulk samples from the No. 1 trench, at the east end of the carbonate body on claim L.17404, gave returns of 2.74 ounces and 0.06 ounces of gold per ton from narrow quartz stringers containing finely divided visible gold. A drillhole under this trench failed to reveal interesting values; some of the other holes gave low values.

ıces

O.D.M. Vol. LVII, 1948, pt. 5, pp. 52, 53.
Sampling information from Erie Canadian Mines Ltd. in O.D.M. Resident Geologist's files, Kirkland Lake.

ANNEX "H-2B"

PROVINCE OF ONTARIO

DEPARTMENT OF MINES

HON. PAUL LEDUC, *Minister of Mines* T. F. SUTHERLAND, *Deputy Minister*

FORTY-FOURTH ANNUAL REPORT

OF THE

ONTARIO DEPARTMENT OF MINES

BEING

VOL. XLIV, PART II, 1935

Geology and Ore Deposits of the Matachewan-Kenogami Area, by W. S. Dyer - - - - - - - - - - - - - 1-55

Geology of the Martin-Bird Property in Hearst Township, by W. S. Dyer - - - - - - - - - - - - - - 56-58

Notes on Some Properties in Lebel Township, by W. S. Dyer - 59-61

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO

Printed and Published by T. E. Bowman, Printer to the King's Most Excellent Majesty

1936

mon in the west end of the fractured zone, where it traverses the syenite, than in the east end in the greenstone. The orthoclase was observed only in the west end. The east end would appear to be more favourable for the occurrence of gold than the west end. Unfortunately the fracture zone strikes into low swampy ground toward the east.

A little native gold was noted in the limonite-encrusted cracks in the quartz of the bigger lens at the east end of the main fracture, and some medium assays have been reported, but consistent values have so far been lacking.

Another fracture, upon which some work has been done, comes in from the east, striking N. 75° E., and either intersects or joins up with the first fracture. Narrow, poorly mineralized quartz lenses are found along it.

EBY TOWNSHIP

Lucky-Kirkland Gold Mines, Limited

The property of Lucky-Kirkland Gold Mines, Limited, formerly known as the Baldwin, has been intermittently active since 1911, when gold was first found on the property by a prospector, from whom the old company took its name. It is located on the north half of lot 2, concession VI, Eby township, between the Ferguson highway and the main line of the Temiskaming and Northern Ontario Railway, 2½ miles west of Swastika. Development has included a shaft of 400 feet, 90 feet of crosscutting, and 240 feet of drifting on the 100-foot level; 350 feet of crosscutting and 310 feet of drifting on the 200-foot level; 480 feet of crosscutting and 390 feet of drifting on the 300-foot level, and 200 feet of drifting on the bottom or 400-foot level. At the time of the writer's visit in August, 1934, the shaft at the 1st level had been dewatered, but no other work was being done. A. G. Burrows and P. E. Hopkins[1] in 1923 reported as follows:—

> The rocks are Keewatin basalt schists and Timiskaming sediments intruded by syenite and reddish feldspar porphyry dikes. In these rocks have been located several small gold-bearing veins, striking nearly east and west, with a mineralization somewhat similar to the Swastika and Kirkland Lake deposits. Extremely fine-grained gold was seen in quartz stringers on the surface and on the 100- and 200-foot levels.

S. L. McDonald, who was in charge of the property at the time of the writer's visit, reports that several short shoots have been found in the mine, especially on the 200- and 300-foot levels. Average values of individual ore shoots are reported to range from $1.40 to $36.00.[2] The most interesting one is reported to occur on the 300-foot level and to consist of quartz veins and carbonate schist; it is 7 feet wide but is cut off at both ends by cross-faulting, and the length is only 12 feet; an 11-ton sample is reported to have given an assay of $36.00. Other shoots occur in dikes of red syenite porphyry and light-pink fine-grained syenite. On the 100-foot level one narrow low-grade ore shoot was found and erratic gold values were obtained from other points, and on the 400-foot level, drifting had reached red syenite porphyry, which showed native gold.

Mr. McDonald reported also that the gold was all in the native state; mineralization consists of fine pyrite, molybdenite, and chalcopyrite. Molybdenite is found along the sides of the dike and in fractures in quartz; chal-

[1]Ont. Dept. Mines, Vol. XXXII, pt. 4, 1923, p. 52.

[2]The values reported for this property are all calculated on the old price of gold, $20.67 per ounce.

copyrite appears to be an ore indicator, since wherever it appears gold values appear also.

The shaft and underground workings are in Timiskaming sediments, chiefly greywackés, which strike east-northeast. The contact with the greenstone lies between the shaft and the Ferguson highway, and a zone of carbonate schist parallels the contact a short distance within the sediments. The greywackés in the vicinity of the shaft are intruded by dikes of red syenite porphyry and pink fine-grained syenite. Similar dikes outcrop in the railway cut just north of the shaft. The dikes parallel the strike of sediments and dip vertically. Faults are also found on the railway cut; they are normal faults, post-porphyry in age, and strike parallel to the strike of the sediments and dikes. Movement along them, as judged by striations on slickensided surfaces, appears to have been compound. Similar faults are reported to occur in the drifts.

NOTES FOR PROSPECTORS

The Keewatin greenstones and Timiskaming sediments extend eastward from the Matachewan area through the townships of Holmes, Flavelle, Burt, and Eby, to the Kirkland Lake area. Numerous stocks and dikes of igneous rocks of varied type, including red syenite porphyry, pink syenite, and dark-grey diorite, cut through the greenstones in various places, and coarse-grained granites are found on the flanks of the syncline. Such an assemblage of rocks constitutes in general good prospecting territory, especially when the territory lies between such important gold camps as Kirkland Lake and Matachewan. It should be noted, however, that this section of the area represents a lower horizon with respect to the granite batholiths than either Kirkland Lake or Matachewan, and in this respect is probably not so favourable for gold deposits.

Burt, Holmes and Flavelle Townships

Some parts of the territory appear more favourable than others. For instance, Burt township and the eastern half of Holmes are overlain by the Cobalt series and by the broad sand plain that flanks the Englehart river (south branch of the Blanche river), and prospecting is difficult, if not impossible. There are some stretches of greenstone along the north and south boundaries of Burt township on which some prospecting has been done, but this greenstone is largely granitized and is probably only a shallow covering over granite.

In the greenstone area in Holmes and Flavelle townships with its intrusions of syenite and syenite porphyry and remnants of Timiskaming conglomerate, prospecting would be worth while. A drawback to prospecting in this section has been the large amount of land held as veterans' patents. Access to Holmes township is by a trail leading northwest from mileage 20 on the Elk Lake–Matachewan highway.

Alma Township

Alma township to the north of Cairo and west of Holmes is very largely underlain by greenstones and tuffs. Some prospecting has been done in the township, particularly along the northern contact of the red syenite porphyry stock and the greenstone, where there are in places considerable widths of carbonate schist.

Eby Township

Some desultory prospecting has been done in Eby township, but it deserves more thorough work. Special attention should be paid to the Timiskaming

sediments and to the contact with the greenstones to the south. Some tracts of greenstones of fair size are obscured only by a thin covering of moss, which could be stripped with little labour. The greenstones in the southern half of the township are rather heavily drift-covered.

Barite

Two deposits of barite occur in the Matachewan area. These are the Biederman deposit, in Cairo township, and a deposit on Mistinikon lake in Yarrow. Both deposits were visited by the writer, but the old shafts and trenches are in poor condition and more could be seen of the veins fifteen years ago, when Burrows examined them, than now.

Biederman Deposit

The following description of the Biederman deposit is taken from Burrows' first report[1] on the Matachewan area in 1918:—

This claim (16,042) is situated on the west shore of Browning lake, in the north part of Cairo township. The country rock is a red syenite in which there is a barite vein with strike N. 65° W. and dip 80° N. The deposit can be observed about 100 feet from the shore of the lake where a shallow shaft has been sunk at a point where the vein has been concealed by drift to the east. Here there is a width of 15 feet, and the barite can be traced westerly for 100 feet, decreasing to a width of 7 feet. Beyond this there is drift followed by an exposure of barite about 30 feet in length and three feet wide at the east end, and two feet wide at the west end. The barite is for the most part quite white in colour and of good quality. At the shaft there are minor quantities of zinc blende, galena and specularite and a little fluorite, as impurities. The deposit also contains at this point some large inclusions of syenite. A sample across eight feet, on analysis contains 90.50 per cent. barium sulphate.

Yarrow Deposit

Burrows[2] reported on barite in Yarrow township in 1920, as follows:—

Several veins of barite have been located on a group of claims lying about three miles south of the north boundary of Yarrow township, on the west side of Mistinigon lake. The property, owned by the Ontario Barium, Limited, Toronto, includes four claims, G.G. 4,222, 4,223, 4,328, and 4,329. Most work has been done on a strong barite vein on claim 4,223. This outcrops on the shore of the lake and strikes north 74° west. It is 5 feet wide at the lake, while 60 feet from the lake it is 13 feet in width. By means of trenches it has been traced at least 430 feet up the slope of a drift-covered ridge. At the farthest exposure, which was made through six feet of sand and gravel, a shaft has been begun where the vein is 11 feet wide. There are a few strips of "horses" of greywacké-conglomerate running with the vein, which are quite narrow relatively to the width of the vein.

The barite varies in grain, some being coarsely crystallized with cleavage faces an inch in width. Other portions are fine-grained, resembling greatly in appearance sugary quartz. The difference in grain gives the deposit a somewhat banded structure in parts. In colour the barite varies from a white to a faint pinkish, but all the material grinds white. A selected sample of barite carried 98.25 per cent. barium sulphate, while a channel sample taken by M. B. R. Gordon, from the surface, contained 81.24 per cent. barium sulphate. A sample of fine-grained barite taken by the writer carried 94 per cent. barium sulphate. As far as could be observed the deposit is free from sulphide minerals.

Barite also occurs in a vein a few hundred feet to the north on claim 4,222 along the bed of a creek. Owing to the heavy overburden of gravel only a short part of the vein is exposed. Here the barite is separated into two bands, by a strip of greywacké, 7 feet 6 inches wide, the south barite band being 6 feet 4 inches and the north band 5 feet 10 inches. About 300 feet to the northwest there is a deep trench showing a strong barite vein that is probably part of that exposed in the creek. A sample of barite taken from the north vein by Mr. Gordon contained 77.14 per cent. barium sulphate.

As the claims are not surveyed, and the country is thickly wooded, the deposits have not been accurately located. From the amount of work done it is apparent that there is a large tonnage of high-grade barite. The country rock is greywacké and conglomerate of the Cobalt series. Granite outcrops on the east shore of Mistinigon lake.

[1]A. G. Burrows, Ont. Dept. Mines, Vol. XXVII, pt. 1, 1918, p. 237.
[2]Ont. Dept. Mines, Vol. XXIX, pt. 3, 1920, p. 64.

ANNEX
"H-3"

Haileybury, Ontario,
August 1, 1938.

W. G. Halbrooke,
Erie Can. Mines Ltd.,
Kirkland Lake, Ont.

Johnson
Claims
Eby Twp.

Dear Sir:

Enclosed you will find a sketch of the claims in Eby The values on these claims run from $2 to $6, for the old price of gold.

We have a nice break between red porphyry and greenstone so its very interesting ground.

I intend to go up Wednesday with a few men to clean all the pits and do a little blasting along the breaks

so when I get everything in
good shape it can be sampled
then I either go up there or
phone you from Swastika.

You can motor right into
the ground from Swastika as
it is a good road.

Yours very truly

August Johnson

EBY — Twsp.

Johnson Claims
Eby twp.

18845
(P)
SE ¼ of S ½ Lot 3 - Con 7.

Greenstone form.
Schisted talc.
Greenstone.
Exposed for 500' ± N
Pits No 1 & 2
Red Porphyry Dykes.

24935

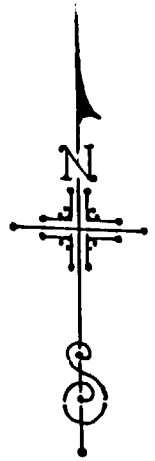
NW ¼ of N ½.
Lot 3 Con 3

18506
(P)
NE ¼ of N. ½
Lot 3 Con 3

24956

SW ¼ of N ½
Lot 3 Con 3

ONT. DEPT. OF MINES
Rec'd from Sylvanite
Expl. Dept
Date July/61 WJH
Resident Geologist



12980

LOW GROUND.

15640

GREENSTONE.

TRACE/GRAB D.D.S.T.
0.40/ " " 56
0.80/ " " 55

SYENITE.

LOW GROUND.

14992

14989

15641

MUNDY GROUP.

ANNEX "H-4"

NOTE -

THE MUNDY CLM. GROUP IS LOCATED 1½ MILES SOUTH OF KENAGAMI LAKE. THE FORMATION EXPOSED IS GREENSTONE & SYENITE WITH QTZ. STRINGERS VARYING FROM ½" TO 8" IN WIDTH, STRIKING N.E. & DIPPING ABOUT 75° S. THE STRINGERS ARE TOO FAR APART TO MAKE ORE. SOME STRIPPING & TRENCHING WAS DONE ABOUT 10 YEARS AGO, ALSO SOME BLASTING. ALL WORK IS NOW FILLED IN & NOT IN SHAPE FOR SAMPLING. POSSIBLE TO TAKE GRAB SAMPLES ONLY.

V.J.

[redacted]

ERIE CANADIAN MINES

DRAWING	ASSAY PLAN.
LOCATION	MUNDY GROUP. EBY TWP. ONT.
SCALE	1" - 500'.
SAMP. BY	V.J.
DRAWN BY	K.O.M.
REF. NO.	591.
DATE	SEPT. 22-38.

SYLVANITE GOLD MINES, LIMITED
(No Personal Liability)
EXPLORATION DEPARTMENT

ANNEX "H-5"

ONT. DEPT. OF MINES
Rec'd from Sylvanite Expl. Dept.
Date July/61 WJJ
Resident Geolog

Rogick-Elliot-Clark Group
Eby Township

Summary

A feldspar-porphyry dyke containing quartz streaks and some showings of visible gold has been exposed by trenching for a length of 40 feet. Unless there is a sharp change in strike the showing is cut off on its projection north, this area only 60 feet away being fairly well covered by outcrops and trenches. To the south, the dyke plunges under overburden.

Conclusion

Although the showing looks interesting as far as it has been traced, the demand of a one thousand dollar down payment forbids any participation.

Location

The Rogick-Elliot-Clark group of three claims, L 18837- 18227
~~8803~~, 8803, is situated in the northeast corner of Eby Township near the east shore of Kenogami Lake. The Eby road which takes off from the Ferguson Highway a short distance east of the Kenogami bridge passes through the property. All of the claims are patented and in good standing.

Geology

The Kirkland Lake belt of Temiskaming sediments pass through the northern part of Eby Township being interrupted only partially by overlying Cobalt conglomerate and greywacke. The southern contact of this belt against Keewatin pillow lavas and tuff passes through 18827 and 8803. In the vicinity of the showing the greenstone is intruded by numerous irregular feldspar porphyry dykes which in some cases are in turn cut by quartz streaks.

During the winter of 1938-39 Pioneer Gold Mines drilled six holes on claim 18827. This work was done in an attempt to pick up a quartz vein which had been indicated by the presence of numerous floats. No results of consequence were obtained from this work.

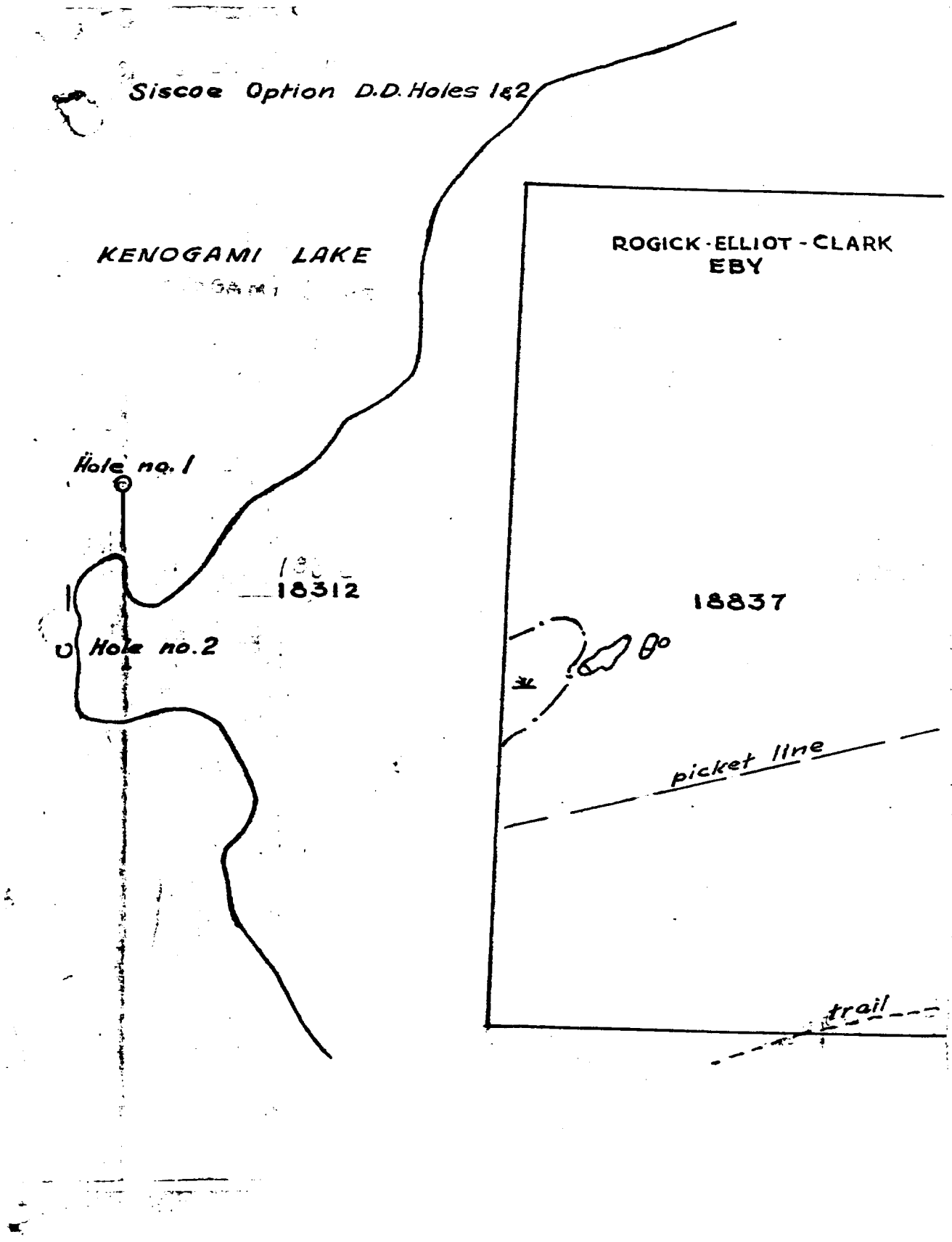
During the spring of 1939 a new showing was discovered in the form of a north-south striking porphyry dyke in contact with carbonated greenstone. The porphyry contains approximately 15% quartz in the form of irregular $\frac{1}{8}$" streaks and carries a medium pyrite mineralization. Over the exposed length of 40 feet visible gold was found at three separate locations. Continuation of the showing on strike, however, is quite indefinite.

To the south no work has been done due to the depth of overburden, while to the north, incomplete trenching has failed to reveal similar conditions. This may be due to changes in strike and will be solved only by additional trenching.

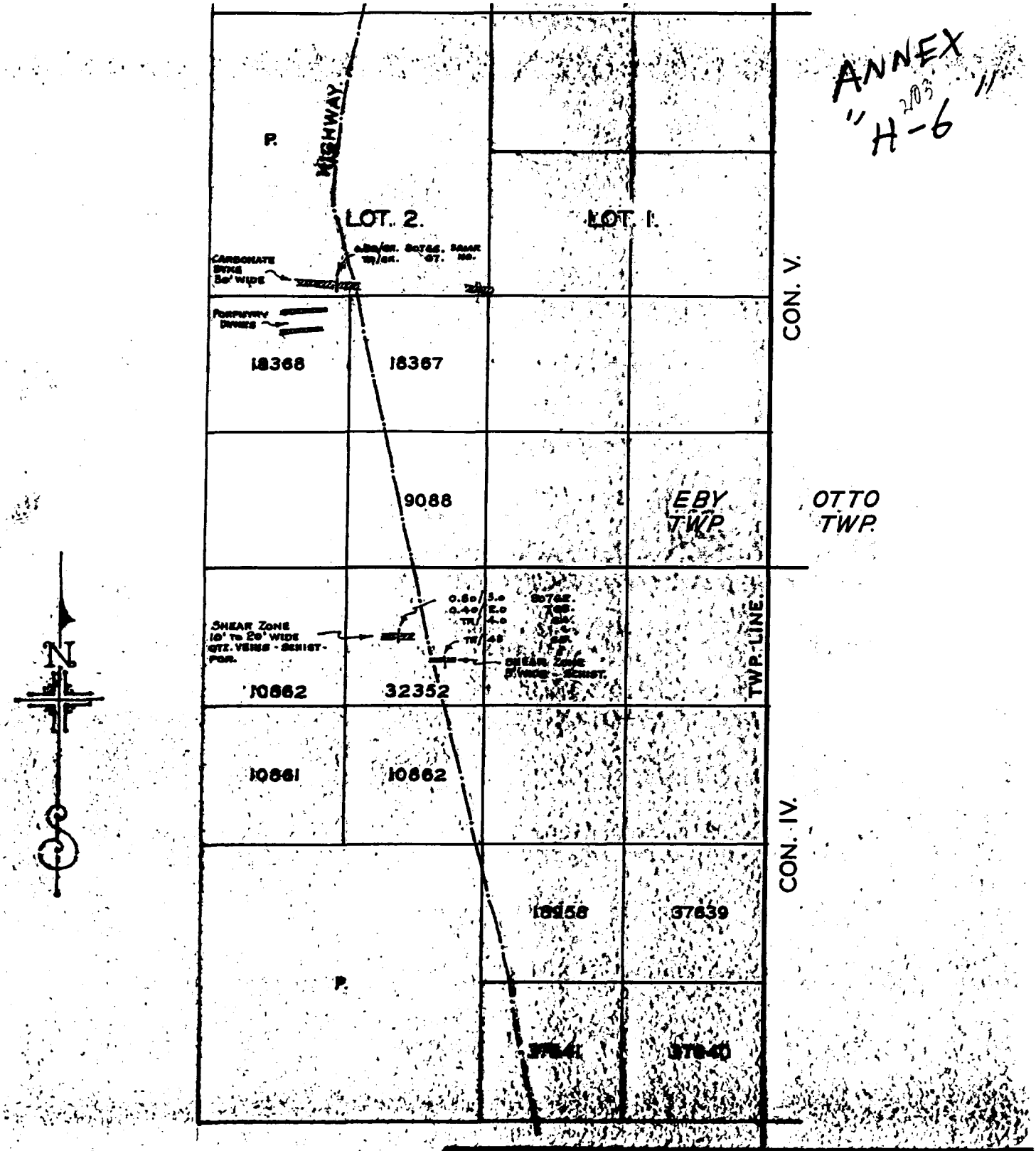
The showing is worth additional trenching in an attempt to discover the strike possibilities but terms exposed by the owners discourage any interest being taken.

D. K. Burke.

Kirkland Lake, Ontario,
August 23, 1939.


Siscoe Option D.D. Holes 1&2
KENOGAMI LAKE
ROGICK-ELLIOT-CLARK
EBY
Hole no. 1
18312
Hole no. 2
18837
60°
picket line
trail

ANNEX "H-6"



N

SYLVANITE GOLD MINES LTD.

EXPLORATION DEPT.

DRAWING	ASSAY PLAN.
LOCATION	LOT 2 CON. IV. & V. EBY TWP. ONT.
SCALE	1" = 1/4 MILE.
SAMP. BY	V.J.
DRAWN BY	K.O.M.
REF. NO.	827.
DATE	JAN. 8 - 41.

BONDS STOCKS GRAINS

ANNEX
"H-7"

Golding & Lumsden

INVESTMENT BROKERS

90 ONTARIO STREET

STRATFORD -- ONTARIO

PHONE 707

Feby.7th1944

Erie Canadian Mines Ltd.,
C/O Sylvanite Gold Mines Ltd.,
Kirkland Lake, Ont.

ONT. DEPT. OF MINES
Rec'd from Sylvanite
Expl. Dept
Date July/61 W.H.
Resident Geologis

Dear Sirs-

I understand that there is a lot of activity,and that your company is interested in the territory around the South end of Kenogami lake. L-17609 — 10.

I am holding 2 Pat.claims part of lot 4 Con.5, Eby Twp.with a prospectors shaft on the south west corner to a depth of 40 ft. in red porphry dyke. at the bottom of the shaft is a pink quart vein which assayed $5.00 over the whole width of the shaft.

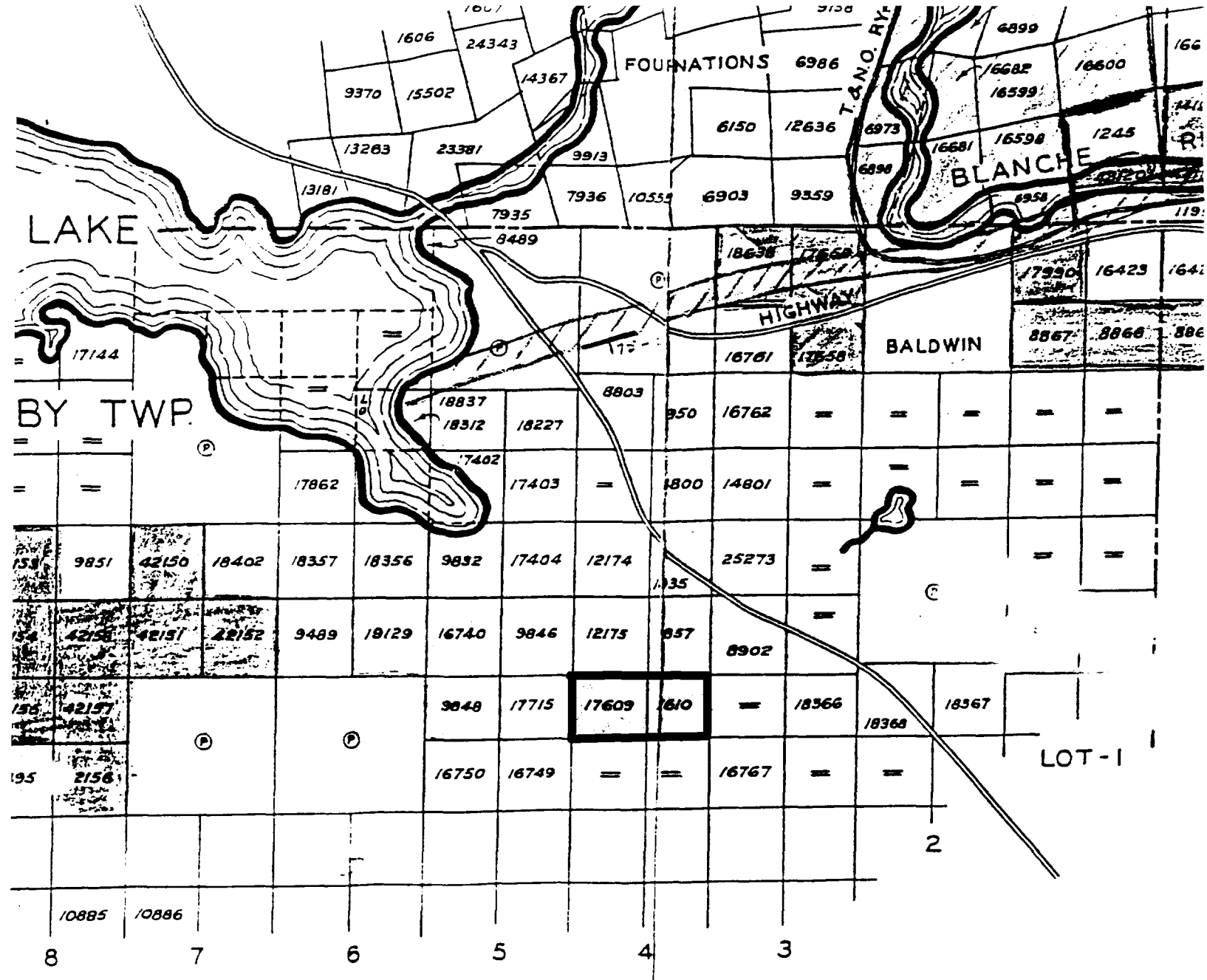
From a previous survey of the property I am sure a few diamond drill holes Soth east of the shaft would be both surprising and profitable.

If you are interested in these claims,you can contact me at thi address.

Yours very truly.

Golding & Lumsden.

Per. A Lumsden



LEGEND

- BALDWIN CLMS.
- PROTECTION FOR BALDWIN CLMS.
- SYLVANITE CLMS
- UNPATENTED CLMS.
- TWP. BDY.

ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

HON. LEO BERNIER, *Minister*
D. P. DOUGLASS, *Deputy Minister* J. E. THOMSON, *Director, Geological Branch*

Geology of the Eby and Otto Area District of Timiskaming

By
H. L. LOVELL

Geological Report 99

TORONTO
1972

Lemu Investments (10)

In Eby Township, concession V, lot 4, S½, NW¼ and NE¼, J.A. Lumsden, who held the claims in 1944, stated that in the southwestern part of his claim, a prospector's shaft was sunk to a depth of 40 feet on a red porphyry dike. According to Lumsden, in 1944, (ODMNA assessment work files, Resident Geologist's office, Kirkland Lake, Ontario) a pink quartz vein at the bottom of the shaft contained $5.00 worth of gold (gold at about $35 U.S. per ounce) over the whole width of the shaft.

Mundy [circa 1938] (11)

In Eby Township, concession IV, lot 11, N½, NE¼, three grab samples from quartz stringers varying in width from ½ inch to 8 inches were taken, in 1938, by Erie Canadian Mines Limited from old filled-in pits on one of the Mundy claims. Results reported were trace, $0.40, and $0.80 cents worth of gold per ton (gold at about $35 U.S. per ounce).

Preston Mines Limited (12)

In Eby Township, concession III, lot 8, N½, work was done in 1949 and 1950 by Preston Mines Limited which was then known as Preston East Dome Mines Limited. The work consisted of geological mapping, followed by three drill holes (total of 588 feet) to test a shear zone containing minor quartz and concentrated pyrite with gold across a width of 2 feet and an exposed length of 25 feet. The drilling intersected syenite, mafic volcanic rocks, quartz stringers, pyrite, and small amounts of gold (0.01 to 0.10 ounces of gold per ton across 0.5 to 1.0 foot). (ODMNA assessment work files, Resident Geologist's office, Kirkland Lake, Ontario).

Martin Rogick, Amelia Clark, and Richard Elliott (13)

In 1939, in Eby Township, concession VI, lot 4, S½, NW¼ and NE¼, and lot 5, S½, NW¼ and NE¼, Martin Rogick, Amelia Clark, and Richard Elliott owned claims. Following the discovery in 1938 of several large angular pieces of gold-bearing float in concession VI, lot 5, S½, NE¼, gold was found in bedrock, and Pioneer Gold Mines Limited diamond drilled 14 holes (most of them along an east-west direction) in the vicinity of the showing and on the adjacent Brookband property, and obtained many intersections of about $2.00 in gold per ton (gold at about $35. U.S. per ounce) across 2 feet. (ODMNA assessment work files, Resident Geologist's office, Kirkland Lake, Ontario).

During 1939, trenching uncovered new showings at the contact of syenite and carbonate rocks cut by numerous quartz stringers containing pyrite and visible gold. Assays of grab samples from the showings on claim L18227 ranged from $2.00 to

ANNEX
"H-8"

TODORA KIRKLAND PROSPECTING SYNDICATE

Eby and Otto Twp.

Property

The property consists of a group of 9 unpatented and 2 patented claims. Claims 52417, 52418, 52419, 52426 occupy the S½ of Lots 1 and 2, con. VI, Eby Twp. Claims 52430, 52427-8-9 and the two patented claims 16010 and 9465 ocoupy the N¾ of Lot 1, Con. V , Eby Twp. One claim in Otto Twp., 39855, is the SW¼ of the N½ of Lot 12, Con. V.

Access

This group of claims lies in the triangle of roads formed by No. 11 Highway one half mile to the north, No. 11 Highway "cut-off" one half mile to the southwest and the Otto township road from Swastika one mile due east. A bush road leads from the Otto township road to the property.

May 11, 1948.

TODORA KIRKLAND PROSPECTING SYNDICATE

A visit was made on May 10, 1948 to the property of the Todora Kirkland Prospecting Syndicate located in Eby and Otto Twps.

The property consists of a group of 9 unpatented and 2 patented claims. Claims 52417, 52418, 52419, 52426 occupy the $S\frac{1}{2}$ of Lots 1 and 2, Con. VI, Eby Township. Claims 52430, 52427, 52429, 52428 and the two patented claims 16010 and 9465 occupy the $N\frac{3}{4}$ of Lot 1, Con. V, Eby Township. One claim in Otto Township, 39855, is the $SW\frac{1}{4}$ of the $N\frac{1}{2}$ of lot 12, Con. V. On this claim a shaft was sunk to a depth of 112' by the former owners, Cheltonia Mines Ltd.

This group of claims lies in the triangle of roads formed by No. 11 Highway one half mile to the north, No. 11 Highway "cut-off" one half mile to the southwest and the Otto township road from Swastika one mile due east. A bush road leads from the Otto township road to the property.

The accompanying report by J. Boyd Taylor, Mining Engineer, contains a summary of previous operations on the property.

Current work consists of establishing property boundaries and cutting survey lines. Specimens containing chalcopyrite can be seen on the dumps of several pits and trenches in claims 52429 and 16010. These trenches and pits are full of water and show no new work to date.

A hill of medium to coarse grained diorite outcrops about the centre of claim 52429. Finer grained diabasic phases can be seen which may be later diabase dikes. To the west of this hill there is a trench about 100' long striking N 60° E in andesitic lava. On the dump, chalcopyrite can be seen in specimens of andesite, brecciated by small strs of quartz and calcite. The N wall of the trench is sheared, the dip of the schistosity being 85° S. Approx. 50' to the SW an old pit can be seen on a porphyry-greenstone contact. The N side of the pit is granite porphyry while the S side is brecciated andesite. The porphyry outcrops for 30' to the N. Another pit 75' to the SW is in andesite.

In the NW $\frac{1}{4}$ of the next claim to the S (16010) another water filled trench striking N 60° E was seen. This trench is in andesite, in part brecciated with quartz-carbonate strs. Specimens well mineralized with chalcopyrite can be seen on the dump. Approx. 250' E of this trench a pit was sunk in granite-porphyry. On an outcrop 20' S of this pit the porphyry-andesite contact is exposed striking N 60° E. This contact shows up again in another pit 150' to the NE along the strike.

In the SW $\frac{1}{4}$ of claim 52428 there is an outcrop of andesitic lava, brecciated by a network of fine quartz strs. Where freshly broken, irregular patches of chalcopyrite can be seen.

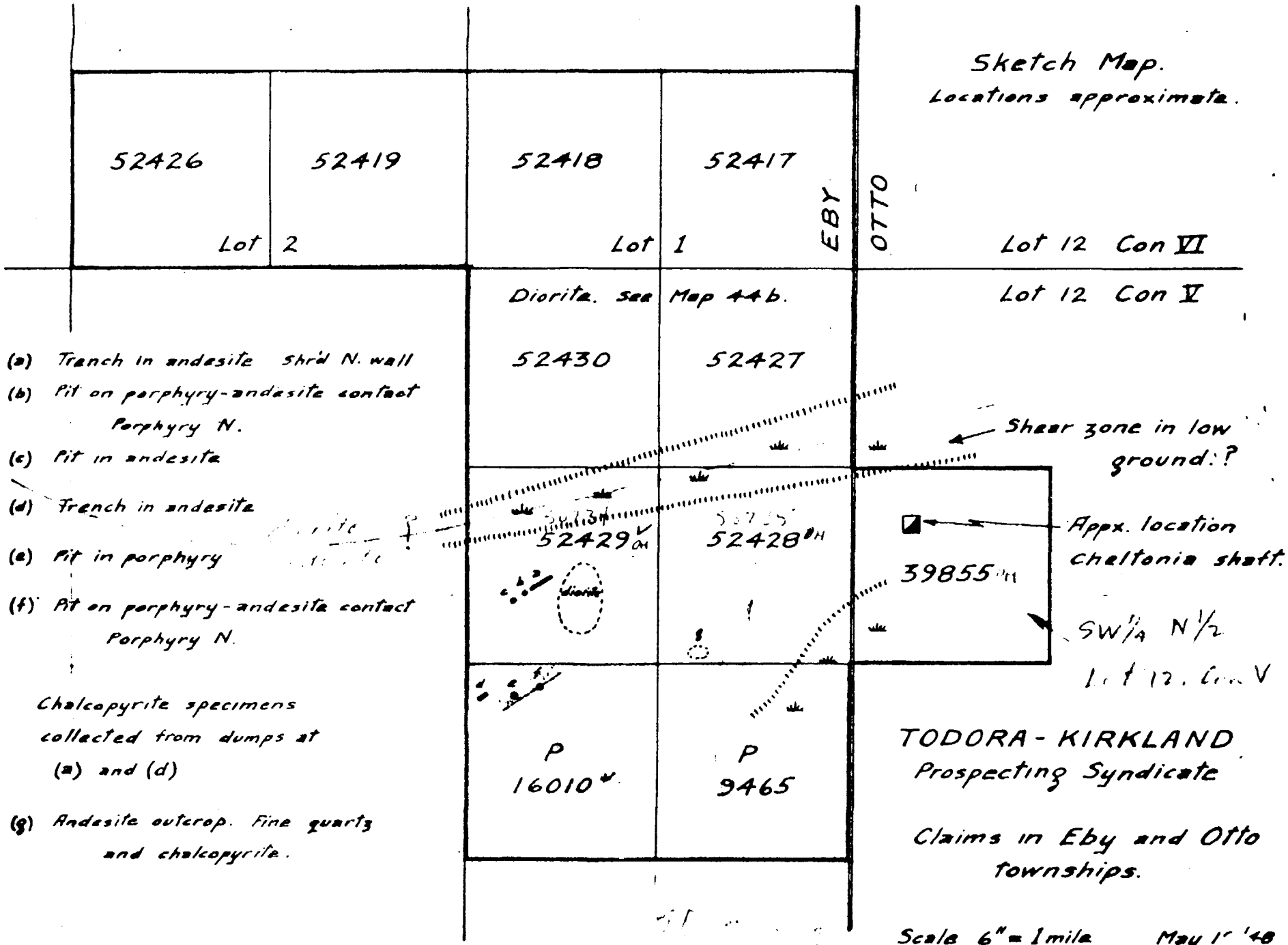
The low ground which extends across the N halves of claims 52429, 52428, and 39855 striking approx. N 75° E may be the locus of a shear zone. Several diamond drill holes put down by former owners are supposed to have cut shearing in this zone. According to Map 44b (Matachewan-Kenogami Area. W. S. Dyer, Vol XLIV, Part 2, 1935) the six claims of this group which lie to the N of this low ground are

underlain by a diorite plug. The remaining five claims which contain the trenches and pits already described and the old Cheltonia shaft are interesting prospecting ground inasmuch as they lie in a narrow band of greenstone between the above mentioned diorite plug and the large syenite mass to the S and E. Small intrusive bodies and porphyry dikes accompanied by mineralizing solutions cut this greenstone.

The old workings should be cleaned out, a detailed geological map made, and the ground thoroughly prospected before any diamond drilling programme is undertaken.

W. S. Savage,
Resident Geologist.

Copy given to Dr. J. E. Thomson, Associate Provincial Geologist,
January 17, 1949.


Sketch Map.
Locations approximate.
52426
52419
52418
52417
Lot 2
Lot 1
EBY
OTTO
Lot 12 Con VI
Lot 12 Con V
Diorite. See Map 44b.
52430
52427
52429
52428
39855
Diorite
Shear zone in low ground.?
Appx. location Cheltonia shaft.
SW¼ N½ Lot 12, Con V
P 16010
P 9465
TODORA - KIRKLAND
Prospecting Syndicate
Claims in Eby and Otto townships.
Scale 6" = 1 mile
May 1st '48
(a) Trench in andesite Shr'd N. wall
(b) Pit on porphyry-andesite contact Porphyry N.
(c) Pit in andesite
(d) Trench in andesite
(e) Pit in porphyry
(f) Pit on porphyry-andesite contact Porphyry N.
Chalcopyrite specimens collected from dumps at (a) and (d)
(g) Andesite outcrop. Fine quartz and chalcopyrite.

1113

ANNEX "H-9"

SYLVANITE GOLD MINES, LIMITED
(No Personal Liability)
EXPLORATION DEPARTMENT

ONT. DEPT. OF MINES
Rec'd from Sylvanite Expl. Dept
Date July/61 W.S.S.
Resident Geologis

REPORT ON

SYLVANITE EBY CLAIMS

Eby twp

CONCLUSION

see also Dom. Gulf.

This property is well worth holding pending developments on the Baldwin property some two miles to the East. Nothing of interest has been found here, but the main Larder Lake break almost certainly underlies the large swamp that covers the Northern part of the claims. Should favorable results be obtained at the Baldwin this swamp will warrant the expense of serious drilling.

LOCATION

The property covers parts of Lots 7 and 8, Concession V, Eby Township, and consists of 9 unpatented claims Nos. L-42150-58, inclusive. It is reached by a 1¼ mile trail from the South shore of Kenogami Lake as shown. It is 1½ miles from the Ferguson Highway to the start of the trail.

The property is well wooded with spruce, jackpine, birch and poplar of sufficient size for mine timbers. The nearest large water supply is Kenogami Lake, but the widespread swamps covering the claims provide ample water for summer diamond drilling. Electric power is available from the Matachewan line three miles to the South.

GEOLOGY

The accompanying plan shows the results of the preliminary mapping of the property in the summer of 1944. It will be noted that the claims are underlain by a series of Keewatin greenstone lava flows cut by occasional sheer zones and on the line between 42151 and 42158 by a 30' wide zone of carbonate alteration striking a little North of East with a steep South dip.

The main value in the property lies under the large swamp covering the northern part of the group. This is the site of the extension of the Larder Lake break in this area which should cross the claims with a N 65° E strike and a steep South dip. An old pit, now filled in, near the NW corner of claim 18402 supports this contention as here pieces of green carbonate cut by quartz veinlets are found on

the dump. Grab samples of this material assayed up to 3.60 dwts.

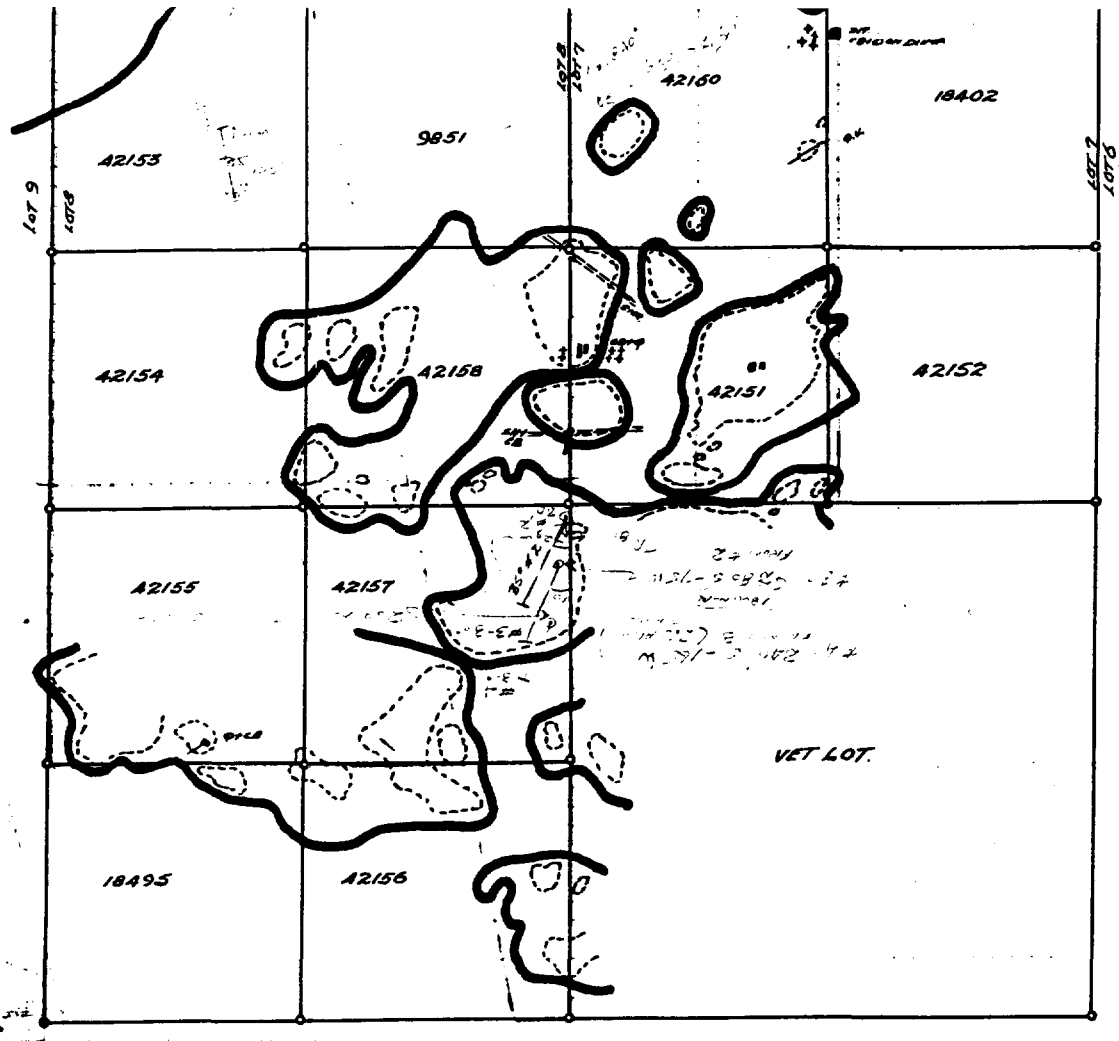
An attempt was made last month to drill under this swamp to investigate the possibilities. The only machine available was not capable of more than 400' and so we were only able to investigate the Southern half of the swamp. As this work was primarily for assessment requirements three other holes were drilled to the South for a total of 1360'. This takes care of all of the assessment requirements of the nine claims until January 28th, 1949, when surveys will be necessary to complete the work and patents will have to be applied for the following year.

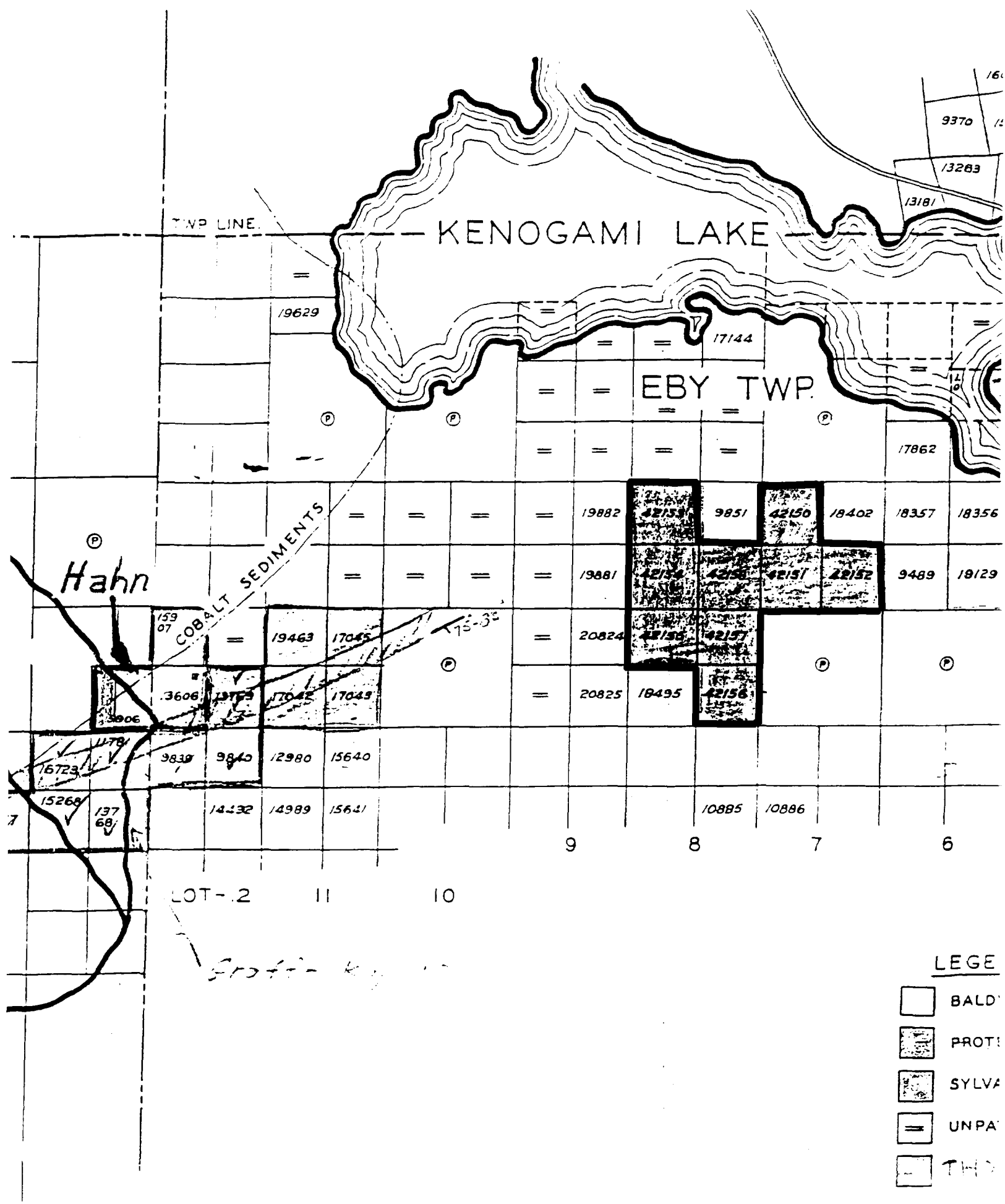
The results of the drilling are shown on the accompanying plan. Two small veins were cut in #1 Hole but showed no values of interest. Holes 2 and 3 showed nothing of interest but Hole #4 intersected the carbonate zone referred to above. The zone here is not well mineralized and returned only trace from samples.

The Southern part of the property is obviously of little use except as dip protection for the Larder Lake break cutting across the Northern part of the group. Should interesting results be obtained from the break anywhere in this area then the swamp across the Northern claims will warrant considerable drilling.

G. L. HOLBROOKE.

Kirkland Lake, Ontario,
August 23rd, 1945.


SHAFT.
9851
42160
18402
42153
42154
42158
42151
42152
42155
42157
VET LOT.
18495
42156
LOT 9
LOT 7
S.GM. EBX
1"=1000'


TWP LINE
KENOGAMI LAKE
EBY TWP.
Hahn
COBALT SEDIMENTS
9370
13283
13181
19629
17144
17862
19882
42153
9851
42150
18402
18357
18356
19881
42154
42155
42151
42152
9489
18129
19463
17045
20824
42158
42157
3606
17042
17043
20825
18495
42156
9839
9840
12980
15640
16723
15268
14432
14989
15641
10885
10886
9
8
7
6
LOT - 2
11
10
LEGE
BALD
PROT
SYLVA
UNPA

1114

ANNEX "H-10"

REPORT ON

ROSA BROWN CLAIM

Conclusion

Although the recent drilling of the property has returned no assays of interest, the possibilities of the property have not been completely explored. I would recommend that the option be completed and the property acquired by Sylvanite. This because the property is the key to the whole situation in this area and controls the development of the Baldwin property to the West.

Location

The property consists of one patented claim No. L-17990 comprising the NW¼, N½, Lot 1, Con. 6, Eby Township. The Ferguson High angles across the South East part of the claim and the T. & N. O. Railway across the North West part. By both it is about 2¼ miles from Swastika.

History

About two years ago negotiations were started to acquire a group of claims in the area centred around the old Baldwin property. The reason for this was that the Larder Lake Break passes through this area and from old reports the Baldwin is one of the few spots along the zone where definite values have been obtained which makes it a very attractive exploration bet.

The Baldwin property consists of only 4 claims and in order to protect the showing and possible extensions it was vital that control of several adjoining claims be acquired. Of these the Rosa Brown claim is the most important, covering as it does the extension of the zone immediately to the East of Baldwin. Accordingly, in April 1944 an option for $20,000.00 was taken on this claim. So far $7,000.00 has been paid under the agreement with $1,000.00 due January 1, 1946, and the $12,000.00 balance due April 1, 1946.

Negotiations for the Baldwin property are proceeding very slowly and there is considerable doubt that they will ever be completed. Therefore, in order to protect the rather large investment which we already have in the area I would suggest that the Rosa Brown claim be retained as it is practically impossible for the Baldwin people to deal with anyone else as long as we can control this claim.

Development

The geology of the claim was mapped and later a series of 8 diamond drill holes, for a total of 1327', was drilled. These are all shallow holes and were drilled in lieu of expensive rock trenching to investigate the main zone crossing the property.

Geology

The surface mapping has shown that the main sediment-greenstone contact of the area crosses the Northern part of this claim with a strike slightly North of East and with a steep South dip.

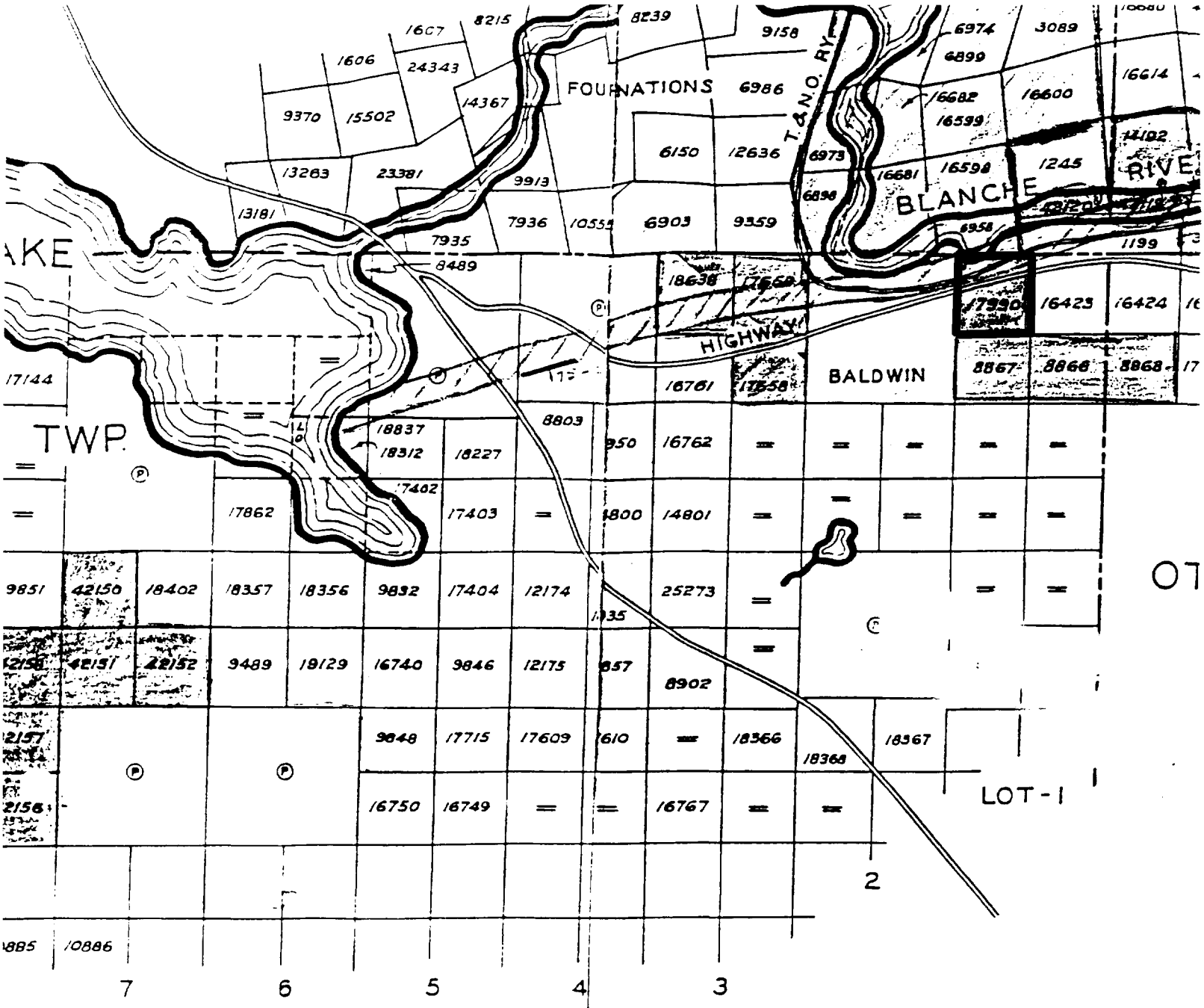
The greenstones to the South of this contact for some 250' are more or less strongly carbonatized and are intruded by syenite porphyry and basic syenite. Frequently the carbonatized areas are cut by numerous quartz veinlets and stringers and more or less strongly mineralized by pyrite, pyrrhotite and occasionally galena.

The general geology of the contact area and the results of the drilling are shown on the accompanying plan. The drilling substantiated the surface mapping fairly well and demonstrated that the porphyry bodies were smaller and more erratic than at first supposed. In addition a wide zone of contorted schisting was found along the sediment-greenstone contact that had not been noted in the mapping. Several quartz veins and numerous quartz stringer zones were also found in the carbonate areas.

Everything in the core that might have a chance of carrying values was thoroughly sampled but all assay returns were negligible. This, of course, does not eliminate the ore finding chances on the claim and considerably more work will be necessary. Holes Nos. 1 and 8 showed the best looking material. Hole 1 is some 300' from the West claim boundary and this length should be drilled. Hole 8 is traversing the area South of that cut in the other holes and the parallel zone indicated here should be further investigated.

G. L. Holbrooke.

Kirkland Lake, Ontario,
November 6, 1945.



LEGEND

- BALDWIN CLMS.
- PROTECTION FOR BALDWIN CLMS.
- SYLVANITE CLMS
- UNPATENTED CLMS.
- TIMBER

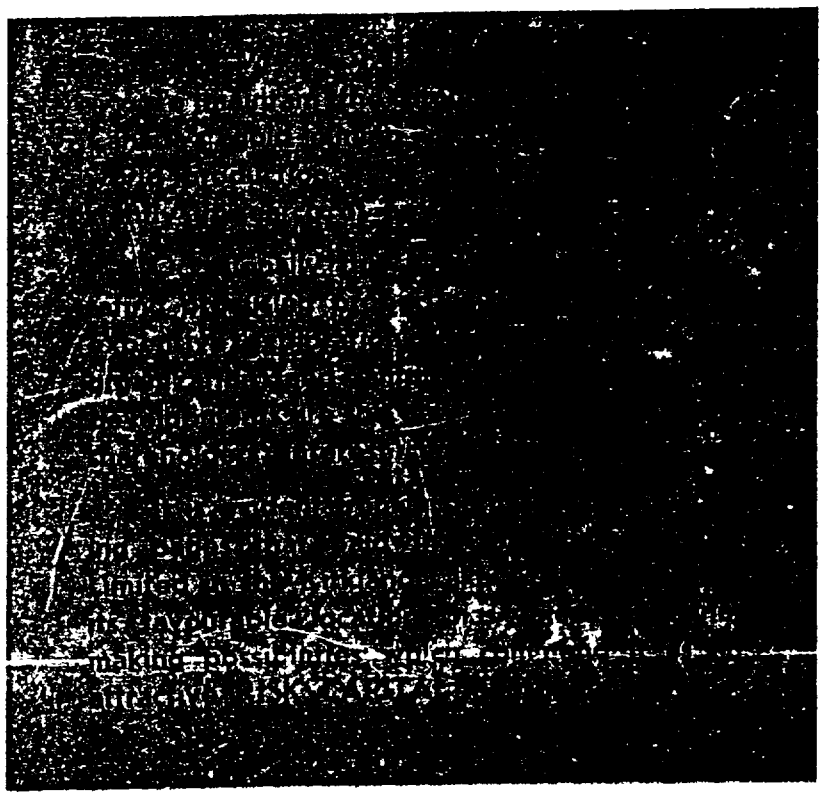
BALDWIN CONSOLIDATED MINES

LIMITED

(No Personal Liability)

ANNEX
"H-11"

ONT. DEPT. OF MINES
Rec'd from Sylvanite
Expl. Dept
Date July/61 WJS
Resident Geologist



Sponsored by

BREWIS & WHITE

TORONTO

SEPTEMBER - - 1946

Foreword

This House has been successful in arranging a consolidation of the interests of Baldwin-Kirkland Gold Mines Limited, Kelmac Mines Limited and Lucky Kirkland Gold Mines Limited, together with other properties. All are located in Eby, Teck and Grenfell townships in the Kirkland Lake Area.

* * * *

A firm underwriting commitment of $74,500.00 has been made by us, as sponsors, to the treasury of the new Company, Baldwin Consolidated Mines Limited.

* * * *

The predecessor Companies have spent approximately $300,000.00 on exploration and the sinking of a two-compartment shaft with the establishment of four levels at one hundred foot intervals.

* * * *

Reproduced verbatim in this folder is a complete report by Mr. G. L. Holbrooke, Consulting Geologist of the Company. It makes special mention of the presence on Baldwin of a 4,000 foot length of the continuation of the Larder Lake Break, together with two other zones, similar and parallel.

* * * *

The property is exceptionally well located with respect to all facilities. The main line of the Ontario Northland Railway traverses its entire length, passing six hundred feet north of the shaft. The Ferguson highway crosses the southwest group of claims three miles west of Swastika and a branch road services all camp installations. An ample water supply and power facilities are immediately available.

* * * *

As principals, we recommend the purchase of the shares of Baldwin Consolidated Mines Limited as an attractive RISK CAPITAL investment.

* * * *

BREWIS & WHITE

Mine Operators and Financiers

TELEPHONE ELGIN 7225*

200 Bay Street, Toronto 1, Ont.

J. M. BREWIS A. W. WHITE Jr.

SOLE PARTNERS

Incorporated in this folder on another page is the Statutory Information required by The Securities Act, 1945.

This information is prescribed by Statute for the protection of the investing public, and should be carefully perused.

BALDWIN CONSOLIDATED MINES LIMITED

(No Personal Liability)

CAPITALIZATION

Authorized (Par Value $1.00)	3,500,000 Shares
Issued for Properties and Cash	1,315,005 Shares
In Treasury (Under firm commitment)	435,000 Shares
Under Option	1,440,000 Shares
Free from Option	409,995 Shares

●

OFFICERS

President and Treasurer
ARTHUR W. WHITE, JR.
Toronto, Ontario

Vice-President and Managing Director
JOHN M. BREWIS
Toronto, Ontario

Secretary and Director
WARREN SELLERS
Toronto, Ontario

●

DIRECTORS

J. W. HENRY - - - - - - Buffalo, N.Y.
BEVERLEY MATTHEWS, K.C., Toronto, Ont.

●

Consulting Geologist
GEORGE L. HOLBROOKE
Toronto, Ontario

●

Registrar and Transfer Agents
THE STERLING TRUSTS CORPORATION
372 Bay Street, Toronto, Ontario

●

Solicitors
McCARTHY & McCARTHY
340 University Avenue, Toronto, Ontario

●

Head Office:
200 BAY STREET, TORONTO, ONTARIO
Dated: September 9th, 1946

PRELIMINARY REPORT
ON
BALDWIN CONSOLIDATED MINES PROPERTY

INTRODUCTION

The following report is based on the personal knowledge of the writer concerning the local and regional geology etc., and on reports of previous operators covering the now flooded underground workings.

LOCATION

The property is located in the Northeast corner of Eby township and adjacent parts of Teck and Grenfell townships. It lies about three miles west of the town of Swastika and six miles west of Kirkland Lake. It consists of the following locations:

(A) In Eby township—
All N½ Lot 2 Con. VI — 160 acres (approx.)
NW¼, N½ Lot 1 Con. VI — 40 acres "
NW¼, N½ Lot 3 Con. VI — 40 acres "

(B) In Teck township—
Mining Claim L-14192 — 40 acres "
" " L-20429 — 40 acres "
" " L-40218 — 40 acres "
" " L-42119 — 40 acres "

(C) In Grenfell township—
Mining Claim 42120 — 40 acres "

Of these locations, claims L-40218, 42119, 42120 are unpatented. The balance are patented except for the water part of the N½ Lot 2 Con. VI which is unpatented Claim L-45614.

FACILITIES AND EQUIPMENT

The property is exceptionally well located with respect to all facilities. The Ferguson highway crosses the southwest claims of the group three miles west of Swastika and a branch road leads to the shaft and camp sites. The main line of the Temiskaming and Northern Ontario railway traverses the length of the property and passes 600' north of the shaft.

The Blanche River flows east along the north side of the railway and provides an adequate water supply for all purposes. The nearest source of electric power is 2 miles distant near Swastika, where an ample supply is available.

With the exception of the office, the old camp buildings are in such a bad state as to be worthless. The office is a 24' square frame building and could be used after minor repairs. The plant buildings, consisting of power house, blacksmith shop, dry and powder magazine, are in poor condition but could be made useable. The enclosed headframe is in good condition.

The plant equipment is all old and practically worn out. It consists of one 60 H.P. locomotive type steam boiler, one 210 cu. ft. C. I. R. compressor and one 6 x 8 Jenckes hoist. The smaller items of equipment such as cars, pumps, drills, etc. are missing from the property.

REGIONAL GEOLOGY

Starting many miles east of the interprovincial boundary, in Quebec, a belt of Temiskaming age sedimentary rocks with interbedded lavas, from one to four miles wide, extends at least 60 miles westward into Ontario, where it passes through the Larder Lake, Kirkland Lake, Swastika, Matachewan and Midlothian areas. This belt probably represents one limb of a major geosyncline enfolded with the unconformably underlying complex of older Keewatin basic lavas and intrusives. It is intruded in many places throughout its length by numerous dykes and irregular masses of medium to acid rocks of Algoman age and is occasionally blanketed by younger, flat lying, Cobalt age sediments.

The economic significance of this geologic feature is easily appreciated when it is realized that a large percentage of the gold production of Canada comes from structures in, or very near, this belt of Temiskaming rocks.

In recent years, detailed geologic mapping of parts of this important area has indicated what is probably the main structural control of gold deposition. It has been shown that a major fault and shear zone closely follows the south contact of the Temiskaming rocks for over forty miles from the Matachewan area to the Quebec boundary, and the same zone has been traced for a further distance eastward of over 100 miles throughout the Cadillac, Malartic and Bourlamaque areas of Quebec. In Ontario this zone is known as the "Larder Lake Break" and is thought to be the main structural control of gold deposition throughout the area. It consists of a wide zone of shearing and alteration that follows a sinuous course across the country with a general East-West trend and steep dips. For much of its length it is marked by a wide zone of carbonate alteration accompanied by silicification and sulphide mineralization. At certain places, where local conditions are favourable, important gold deposits, such as those of the Kerr Addison Mine, have been formed.

Numerous shear and fault zones are found throughout the length of the Temiskaming belt and it is thought many of these are subsidiary structures developed from stresses set up by movement along the Larder Lake Break. Where these secondary "breaks" encounter sufficiently favourable conditions, gold deposits have been formed, such as the "main break" at Kirkland Lake, the Upper Canada veins, etc.

There are thus two main types of ore recurrence throughout the area, one occuring in the Larder Lake Break itself, and the other in subsidiary structures or "breaks". Those in the Larder Lake Break are usually large but relatively low grade and are very sparingly distributed along the zone. Favourable conditions seem to be caused by local flexures in the shear zone and by drag folded areas in the nearby sediments or greenstones. Those in the subsidiary breaks are usually narrow but high grade and are frequently found where the breaks cross relatively brittle rocks such as syenite or porphyry. Orebodies of both types are frequently displaced by later strike and cross faults.

LOCAL GEOLOGY

(A) Rocks

The Baldwin property is located astride the south Temiskaming contact. To the south of the contact the rocks consist predominantly of intermediate to basic pillowed Keewatin lava flows with occasional narrow tuffaceous horizons along flow contacts. To the north of the contact they consist of Temiskaming conglomerates, greywackes and tuffaceous rocks. Both series of rocks have been intruded by lenticular bodies of syenite and syenite porphyry that are localized in and near the main contact area.

(B) Structure

The detailed geologic structure underlying the property has not as yet been worked out. The lavas to the south exhibit definite evidence of broad folding and some faulting. The sediments to the north show close drag folding, roughly parallel to the contact, plus minor cross faulting.

The main contact itself trends east-west across the N½ of Lot 2 Con. VI and NW¼ of Lot 1, Con. VI, a distance of 4,000' and on the latter location shows a broad flexure or warping. In this area the main contact is strongly sheared and altered over widths of from 30' to 200' and almost certainly marks the position of the important Larder Lake Break. As elsewhere along its length it is probable that here too the Larder Lake Break represents a fault zone of major displacement.

The Blanche River flows west-east across the length of the property parallel to, and about 800' north of, the main contact. The rocks on both sides of the river are Timiskaming sediments but while those to the south strike east-west, those to the north strike north-east. This disconformity must mark a fault of major displacement underlying the river bed, a supposition that is substantiated by the 2000' right displacement of two north-south trending diabase dykes as they cross the river near the east property boundary.

(C) Alteration, etc.

The zone of strong alteration that marks the Larder Lake Break follows the sediment greenstone contact. In the mine area it has been developed for an approximate length of 500' on one or other of three levels underground. Here it has an average width of about 50' and consists of an intense carbonization plus a moderate silicification and pyrite mineralization. The silicification is best developed in and near syenite and porphyry bodies lying in the zone. Following the alteration the zone was fractured and the fractures filled by quartz veinlets and stringers running in all directions. This introduction of secondary quartz is frequently accompanied by coarse visible gold and apparently determines the location and shape of the orebodies.

Approximately 1200' South of the Larder Lake Break a parallel zone of shearing and strong carbonate alteration cuts the greenstones across the south part of the property. Some secondary quartz is visible in this zone but no attempt has been made to investigate it and nothing is known concerning the possibilities.

The fault zone underlying the Blanche River has been investigated by one short diamond drill hole put in for assessment purposes. It shows a strong zone of shearing, carbonization, silicification and mineralization. Some secondary quartz veinlets were noted and several low gold values were obtained.

ECONOMIC GEOLOGY

The main feature of possible economic importance on the property is the Larder Lake Break described above. As cited, the break crosses the property for 4,000' with an east-west strike and a steep south dip. It marks the location of a major zone of crustal weakness along which a series of fault movements has taken place over a long period of geologic time. Being a zone of weakness it has formed a locus of acid igneous intrusions and of alteration and mineralization.

Where developed on the property it shows as a 50' wide zone of intense carbonization and silicification cut by later quartz filled fractures. Several relatively small syenite and porphyry masses and dykes are found throughout the zone and these show a rake of about 45° to the east down the plane of the zone.

As described below, a limited amount of diamond drilling and underground development has outlined several small but rich gold ore-bodies lying in the zone and apparently associated with the more easily fractured syenite rocks. As with the intrusive bodies these ore shoots show a 45° east rake and it is probable that both are following some folded structure in the zone. There is a distinct flexure in the zone about 1,000' east of the shaft and it is likely that this has controlled the fracturing which allowed the introduction of secondary quartz and accompanying gold values. The underground work has also indicated the presence of a strike fault with a steep north dip cutting the zone a short distance above the 400' level. The displacement on this fault is such as to cause a fault gap of some 300' from above the 400' horizon to the 600' horizon.

There is thus on this property a set of conditions that has resulted in the formation of important ore-bodies elsewhere in the Larder Lake Break, namely a flexure in the break and the intrusion into it of masses of acid igneous rock. Coupled with this the presence of rich, though small, oreshoots makes the exploration of this area of the break highly desirable and justifies extensive diamond drilling and underground development.

In addition to the Larder Lake Break this zone of shearing and alteration under the Blanche River has shown low gold values and should be further investigated by diamond drilling both from surface and underground. The carbonate zone to the south in the greenstone should also be investigated.

DEVELOPMENT

The property has been developed by a few surface trenches across the main contact zone, by some 12,000' of surface and underground diamond drilling, and by shaft sinking and lateral work.

Most of this work is located on the N½ of Lot 2, Con. VI Eby and is practically confined to the Larder Lake Break. The shaft is located about the centre of the lot and is of two compartments and reaches a depth of 420'. Four levels have been established at 100' intervals and some 4,000' of drifting and cross-cutting has been done mostly on the 200' and 300' levels. On both of these levels crosscuts have been driven 350' north and 300' south of the shaft to give a 650' wide cross section of the area.

The composite lateral work in all levels covers approximately 500' of the zone with the upper levels extended to the west and the lower to the east. Because of the east rake of the ore shoots the actual development of favourable ore structures only covers about a 300' length.

Of the 12,000' of diamond drilling reported, over 7,000' is in 5 holes put down to investigate the contact zone at the 850' horizon, well below the fault gap mentioned above. The balance is in holes drilled from surface and underground to trace the extension of the 300' level ore shoots.

ORE SHOOTS

No assay plans or underground maps are available and the following information has been supplied by the former mine manager, Mr. S. L. Macdonald, both verbally and in a report of January 9, 1939. The statements made in Mr. Macdonald's report have been checked and supplemented by Mr. E. K. Fockler, consulting engineer, in a report of February 25, 1939. Mr. Fockler agreed with Mr. Macdonald's statements.

It is on the 300' level that definite ore lenses are established and it is here that most of the effective development has been carried out. Two ore shoots have been outlined:

i) 311 Ore Shoot

This ore body lies in highly altered and fractured tuffs near the south side of the contact zone. In this ore shoot the distribution of values is very erratic with much visible gold in evidence. For a length of 65' drift assays show values of from $0.70 to $1,000.00 over widths of from 2' to 14'. A representative bulk sample of 11 tons of drift muck sent to the Temiskaming Testing Laboratories returned $62.70. Three holes drilled from surface to investigate this erratic occurrence, some 40' above the level, returned respectively, $199.00 across 9.5', low values across 13', and low values across 6', true widths. One hole drilled up from the 300' level returned two intersections, $43.05 across 20 inches and $15.05 across 24 inches.

A raise was put up on this ore shoot for 45' where it was turned to connect with a heading on the 200' level. On completion of the raise the shoot was stoped, by shrinkage methods, for a height of 45'. The broken ore is still in the stope. Because of the erratic distribution of values, and the abundant presence of visible gold, bulk sampling was used in addition to 20 lb. channel samples in the stope. Following is a list of the results obtained from the bulk samples:

70	Lb. representative overall	$ 62.70
80	" stope sections—average	119.00
80	" " " "	105.00
80	" " " "	3.15
500	" composite	26.25
72	tons to Noranda Mines	11.90
	Overall average	53.35

ii) 310 Ore Shoot

This ore body lies about 25' north and consists of a silicious replacement in fractured syenite. From channel sampling during drifting it shows an average of 24.50 across 3.5' for a length of 35'. A branch vein has been traced a short distance northward and shows much visible gold and gives an average of 22.00 across 1.0'. Additional drifting for 50' to the east showed no definite ore, although some visible gold was found and the present face is very strongly silicified and mineralized.

On the 200' level two small shoots are indicated—

i) 210 Ore Shoot

This ore shoot is only cut in the crosscut and has not been developed. Sampling here shows $51.00 across 18" of quartz replacement in porphyry. It is probably that this is the upward extension of the 310 orebody.

ii) 209 Ore Shoot

This lies about 30' south of 210 and is possibly the upward extension of the 311 occurrence. Channel sampling shows an ore shoot 15' long, 4' wide averaging $21.25. A 5 ton bulk sample of this material returned $21.05.

On the 100' level the faulting, that starts to show on the 200' level, has become so intense that no definite ore shoots can be outlined although several individual high assays have been returned.

As noted above, the 400' level lies in a fault gap that extends from below the 300' level to about the 600' horizon. No values were obtained on this level.

In order to investigate the zone below the fault gap the five deep drill holes mentioned above were drilled on 260' centres to a vertical depth of from 725' to 925'. These holes showed this zone at these horizons and indicated its presence here for over 1,000' of length. No values were obtained but this is not surprising when the erratic nature of the ore, and the east rake of the shoots is considered.

Following is an estimate of indicated and broken ore now on the property. In arriving at this estimate, Mr. Macdonald has cut all high assays, and, where possible, has relied on bulk samples. He has, moreover, cut his final grade figures 40% and also his tonnage figures 40% to allow for sorting. This, I believe, is too drastic and his tonnage figure is too low and probably his grade figure as well. In the tonnage figures he has assumed the extension of ore shoots 50' above and below levels.

Surface dump	660	tons at	$11.20
311 stope—broken	720	" "	27.00
—indicated	2700	" "	27.00
310 lense—indicated	720	" "	13.20
209 lense—indicated	240	" "	13.20

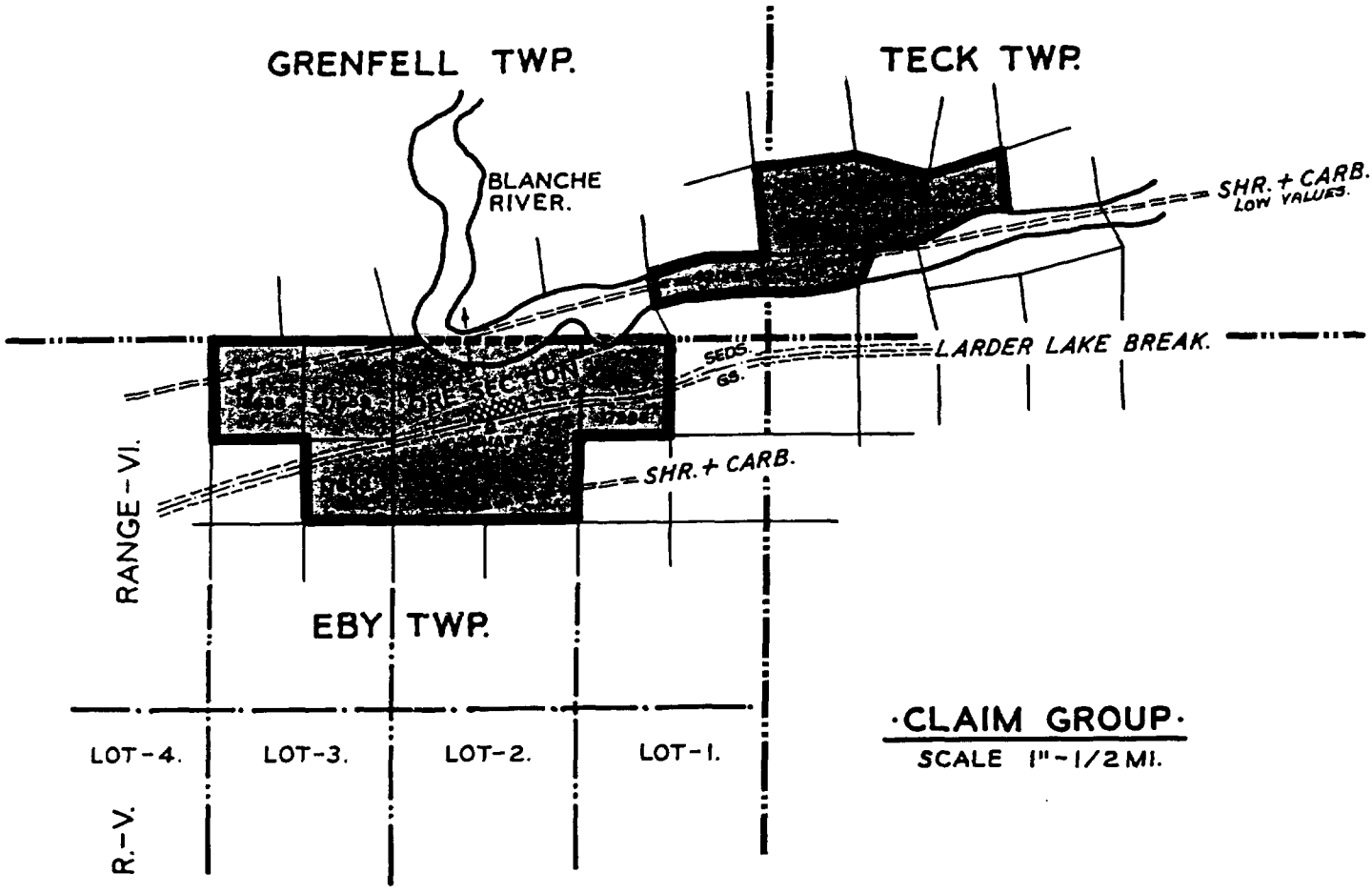
This gives 5,040 tons with a gross value of $112,404.00, or an average value of $22.30 per ton.

CONCLUSION AND RECOMMENDATIONS

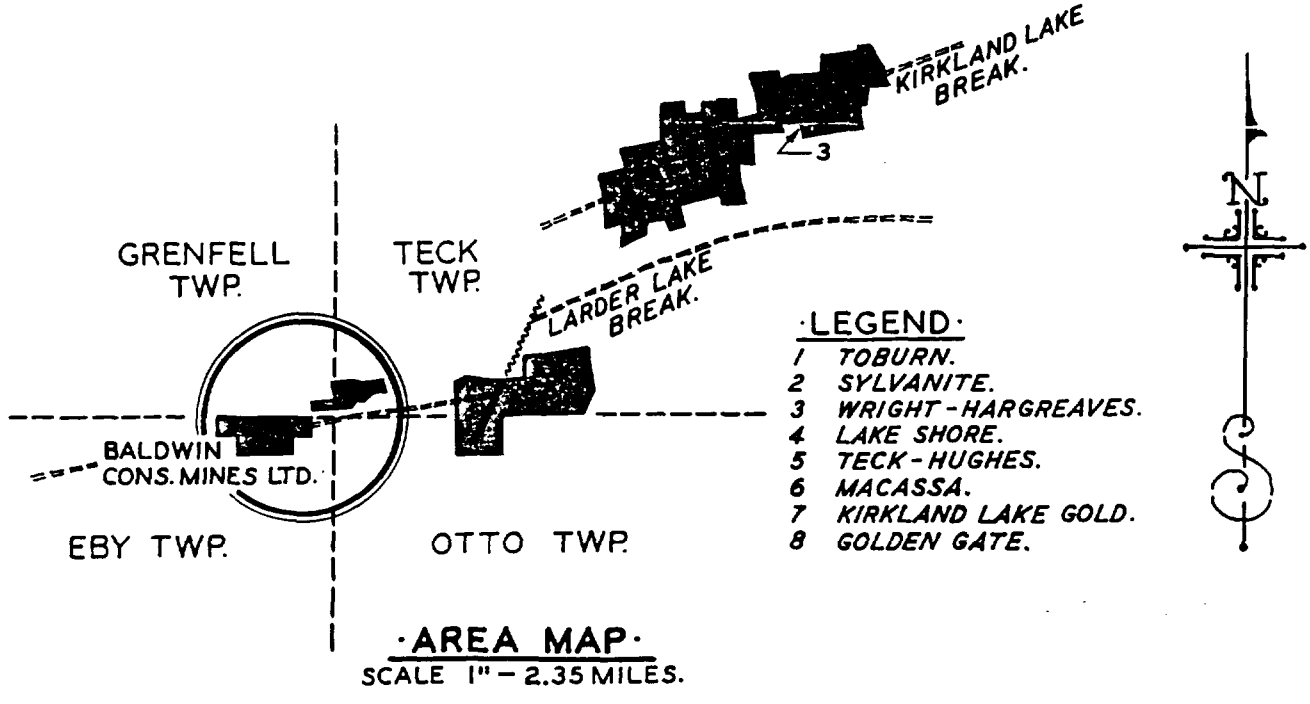
As indicated above the presence on this property of a 4,000' length of the Larder Lake Break together with two other parallel similar zones is a very encouraging feature. When it is further considered that conditions which have formed ore bodies elsewhere along this break are also present and that small, definite, high grade orebodies have been found with a limited amount of development, it becomes obvious that a very considerable expenditure for further exploration is justified.

It is impossible at this time to make detailed recommendations for an exploration programme. I would, however, recommend that the geology of the property be mapped in detail, the old drill core be relogged, and the underground working be de-watered, mapped and sampled. When this has been done, an intelligent programme of development can be laid out.

August 19, 1946. G. L. HOLBROOKE, M.E.



This map shows the properties of BALDWIN CONSOLIDATED MINES LIMITED in the Kirkland Lake area. Especially to be noted is the presence of a 4,000 foot length of the continuation of the Larder Lake Break which indicates excellent mine-making possibilities.



STATUTORY INFORMATION

BALDWIN CONSOLIDATED MINES LIMITED

(No Personal Liability)

(Statement filed pursuant to the provisions of The Securities Act, 1945)

1. Baldwin Consolidated Mines Limited (No Personal Liability) was incorporated by Letters Patent dated the 12th day of July, 1946, under the laws of the Province of Ontario. The Head Office address of the Company is 200 Bay Street, Toronto. The Company's Registrar and Transfer Agent is The Sterling Trusts Corporation, Toronto. Robert B. Moran, 14 Toronto Street, Toronto, Chartered Accountant, is the Company's Auditor.

2. The Officers and Directors of the Company are as follows:

Office	Name in full	Occupation	Address in full	Shares Owned
President and Treasurer (Director)	Arthur Walter White, Jr.	Mining Executive	200 Bay Street, Toronto	92,501
Vice-President and Managing Director (Director)	John Moor Brewis	Mining Executive	200 Bay Street, Toronto	92,501
Secretary (Director)	Warren Sellers	Mining Executive	200 Bay Street, Toronto	1
Director	John William Henry	Executive	190 Delaware Avenue, Buffalo, N.Y.	1
Director	Beverley Matthews, K.C.	Solicitor	340 University Avenue, Toronto	1

3. The capital of the Company is $3,500,000.00, divided into 3,500,000 shares of the par value of $1.00 each. Of the authorized 3,500,000 shares, 1,315,005 shares have been issued as at the date hereof. No securities other than the said shares have been issued (or planned to be issued) which if issued would as to security rank ahead of, or pari passu with the shares which form the subject of this statement.

4. 1,000,000 of the issued shares of the Company are held and are to be held in escrow by The Sterling Trusts Corporation, as escrow agent, to be released, subject to the approval of the Ontario Securities Commission and the Company, (as required by the Commission) as follows:—25% when $74,500.00 has been paid into the Company's treasury, 25% when $150,000.00 has been paid into the Company's treasury, 25% when $200,000.00 has been paid into the Company's treasury, and 25% when $250,000.00 has been paid into the Company's treasury; Provided that in respect of certain of the vendor Companies release to them respectively of the shares to which each is entitled shall be deferred until application for surrender of their respective Charters has been made; Provided also that the said escrow shall be binding on the respective owners of the said shares only as long as the option hereinafter referred to remains in good standing. Shares released as aforesaid shall be released pro rata amongst the vendor Companies or their nominees in proportion to their respective escrowed holdings.

5. As at the date hereof, the following shares in the Company have been sold for cash: 5 shares at $1.00 per share and 125,000 shares at 10c per share. The Company has received $12,505.00 from the said sales of shares. No commissions have been paid on the said sales and no securities other than shares in the Company have been sold.

6. The following are the properties owned by the Company, the names of the Vendor Companies and the consideration paid to each Vendor Company:

Properties	Vendor Companies	Consideration
Parcel No. 2573 in the Register for Nipissing North Division.	Baldwin-Kirkland Gold Mines Limited (No Personal Liability)	$2,500.00 cash and 325,000 shares in the Company.
	Kelmac Mines Limited (No Personal Liability)	$5,000.00 cash and 325,000 shares in the Company.
	Lucky Kirkland Gold Mines Limited (No Personal Liability)	65,000 shares in the Company.
Parcels Nos. 6553 and 4875 Centre Section Temiskaming, Parcel No. 3762 Temiskaming and Parcel 2848 South Section Temiskaming. Unpatented Mining Claims Nos. L-42119 and L-40218 in the Township of Teck, No. L-42120 in the Township of Grenfell and No. L-45614 in the Township of Eby.	Sylvanite Gold Mines Limited (No Personal Liability)	475,000 shares in the Company.

The only additional properties the Company has any present intention of acquiring are Parcels Nos. 3104 and 3105 Temiskaming. John M. Brewis and Arthur W. White Jr. have purchased a registered 4/16 interest and certain other interests in these properties, which are adjacent to said Parcel 2573, and if and when full title to the said parcels is obtained it is intended that the Company will purchase them for $5,000.00 and not more than 10,000 shares in the Company, being less than the aggregate consideration which John M. Brewis and Arthur W. White Jr. obligated themselves to provide on their purchase of their present interest in the said Parcels.

All the above properties are located in the District of Temiskaming in the Province of Ontario.

The Company has no properties other than as set forth above, and has no properties leased or held under option. Except as described in this statement, no shares have been issued or are to be issued and no cash has been paid or is to be paid to any promoter. The Company knows of no persons having more than a 5% interest in the Vendor Companies, except as disclosed by their respective records of Shareholders.

7. John M. Brewis and Arthur W. White Jr. have underwritten 560,000 shares in the Company as follows: 250,000 shares at 10c per share, 250,000 shares at 15c per share, and 60,000 shares at 20c per share. 125,000 shares have been purchased and paid for at 10c per share in cash by the said Underwriters, who are obliged to purchase a further 125,000 shares at 10c per share and 250,000 shares at 15c per share within four months and the remaining 60,000 shares at 20c per share within six months of the "governing date" as hereinafter defined. Subject to the said Underwriters completing payment for the said 560,000 shares as above the Company has granted to the Underwriters an option on all or part of 1,440,000 shares in the Company exercisable as follows:

Number of Shares	Price per Share	Within following time after "governing date"	Number of Shares	Price per Share	Within following time after "governing date"
140,000	20c	8 months	100,000	55c	20 months
200,000	25c	10 months	100,000	60c	22 months
200,000	30c	12 months	100,000	70c	24 months
100,000	35c	14 months	100,000	80c	26 months
100,000	40c	16 months	100,000	90c	28 months
100,000	50c	18 months	100,000	$1.	30 months

The Company has also granted to the Underwriters an option for a period of two years after all the above 2,000,000 shares have been taken up, as aforesaid, to subscribe for 300,000 shares at a price to be agreed upon with the Directors of the Company.

The "governing date" is defined as the date upon which the Ontario Securities Commission accepts from the Company for filing the material set forth in Section 49 of The Securities Act, 1945, (subsequently determined as the 9th day of September, 1946).

8. Except as described in this statement and except for such moneys as are required for preliminary and other expenses for the organization and administration of the Company, it is intended that all moneys received by the Company through the sale of its shares will be used for the purposes of exploration and development of the Company's properties, and, if deemed advisable, bringing these properties into production. It has been estimated by a Mining Engineer formerly connected with the property that more than $300,000.00 has been expended by prior owners in exploration and development on that part of the properties described above as parcel No. 2573. As set forth in the Mining Engineer's Report filed with this Statement, this development included surface trenches, surface and underground diamond drilling and shaft sinking and lateral work. No provision has been made to hold the proceeds of the sales of the Company's shares in trust until a stated minimum is available for the purposes mentioned in this paragraph.

9. It is estimated that the preliminary expenses of the Company will amount to approximately $3,500.00.

10. The Company does not owe nor has it any present intention of assuming any debt, encumbrance or other liability, except for preliminary expenses and in the ordinary course of business.

11. The principal business in which the Directors and Officers of the Company have been engaged for the last three years is as follows: Arthur W. White Jr. and John M. Brewis are Mining Executives and have been carrying on their business as partners in the firm of Brewis & White, Mining Financiers, in Toronto, for more than the last three years. Warren Sellers is a Mining Executive and has been associated with the said firm of Brewis & White as a general executive Secretary for about a year and a half, prior to which he served in the R.C.A.F. Overseas. John W. Henry is a Price Executive and has been employed by the Office of Price Administration in Buffalo, New York, for more than the last three years. Beverley Matthews is a solicitor with the firm of McCarthy & McCarthy, Toronto, having rejoined that firm approximately one year ago, prior to which he served with the Canadian Army Overseas.

12. Except as set forth in this statement, no Director or Officer of the Company has or ever had any interest in any property which the Company has acquired or presently intends to acquire. Arthur W. White Jr. and John M. Brewis entered into agreements with the above named Vendor Companies by which the former or their nominees were entitled to purchase the said properties, and they subsequently nominated the Company to complete the purchase. John W. Henry is an Officer and Director of Baldwin-Kirkland Gold Mines Limited (No Personal Liability) one of the said Vendor Companies. Arthur W. White Jr. and John M. Brewis have each purchased 92,500 of one Vendor Company's escrowed shares in the Company and the said firm of Brewis & White has purchased 190,000 of the same Vendor Company's free shares in the Company. No remuneration has been paid or is now payable by the Company to Directors or Officers of the Company.

13. The Company has paid no dividends since its incorporation on the 12th July, 1946.

14. John M. Brewis and Arthur W. White Jr. by reason of the above described underwriting of and option on shares in the Company can put themselves in a position to elect or cause to be elected a majority of the Directors of the Company.

DATED at Toronto this 9th day of September, 1946.

Underwriters and Optionees:

(Signed) J. M. BREWIS
(John Moor Brewis)

(Signed) A. W. WHITE, JR.
(Arthur Walter White, Jr.)

●

"The following are the names of every person having an interest either directly or indirectly to the extent of not less than ten per centum in the firm of Brewis & White: John M. Brewis, Arthur W. White, Jr."

Directors:

(Signed) A. W. WHITE, JR.
(Arthur Walter White, Jr.)

(Signed) J. M. BREWIS
(John Moor Brewis)

(Signed) WARREN SELLERS
(Warren Sellers)

(Signed) JOHN W. HENRY
(John William Henry)

(Signed) BEVERLEY MATTHEWS
(Beverley Matthews)

ANNEX 3 H-11B 1)
RESIDENT GEOLOGI
ONTARIO DEPT. OF MINES

PROVINCE OF ONTARIO

DEPARTMENT OF MINES

Hon. WELLAND S. GEMMELL, *Minister of Mines* — H. C. RICKABY, *Deputy Minister*

FIFTY-SEVENTH ANNUAL REPORT

OF THE

ONTARIO DEPARTMENT OF MINES

BEING

VOL. LVII, PART I, 1948

Statistical Review of the Mineral Industry of Ontario for 1947 - 1-54

Mining Accidents in Ontario in 1947 - - - - - - - - 55-74

Classes for Prospectors, 1947-48 - - - - - - - - - 75-78

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO
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1949

Baldwin Consolidated Mines, Limited

Baldwin Consolidated Mines, Limited, was incorporated in July, 1946, and acquired property from Baldwin-Kirkland Gold Mines, Limited, Kelmac Mines, Limited, Lucky Kirkland Gold Mines, Limited, and Sylvanite Gold Mines, Limited. The main property is located in the northeast corner of Eby township; four additional claims were held in the southwest corner of Teck township in 1946.

Development by previous owners consisted of surface-trenching, some 12,000 feet of surface and underground drilling, and underground exploration from a shaft located on the north half of lot 2, concession VI, Eby township. The 2-compartment shaft was sunk 420 feet, and four levels were opened at 100-foot intervals. Some 4,000 feet of drifting and crosscutting was done, mostly on the 200-and 300-foot levels. This work covered a 500-foot length of the lava-sediments contact zone. Crosscuts were driven 340 feet north on the 2nd level and 350 feet south on the 3rd level. An ore shoot, 60 feet in length, was located on the 3rd level and stoped to a height of 45 feet. A 20-foot length of ore on the 2nd level is considered to be the upward extension of the ore shoot on the 3rd level.

The earlier developments on the property have been described by Burrows and Hopkins[2] and Dyer.[3]

After acquiring the property in 1946, Baldwin Consolidated Mines dewatered and sampled the old workings; the surface and underground geology were mapped in detail, and a series of short underground holes, totalling 1,300 feet, were drilled. A considerable part of the information given below, including the plan and section facing this page, was obtained from a report by G. L. Holbrooke, consulting geologist of the company, dated July, 1947.

General Geology

The surface geology of the property is indicated on map No. 1946-1. Sediments of the Timiskaming series cover most of the northern part of the claims, and Keewatin volcanics and intrusive diorite lie to the south. The sediments consist mainly of interbedded conglomerate and greywacke; a band of red arkose forms a prominent marker horizon in this series. The Keewatin volcanics are

[1]E. W. Todd, op. cit., pp. 149-150.
[2]A. G. Burrows and P. E. Hopkins, op. cit., p. 52.
[3]W. S. Dyer, Ont. Dept. Mines, Vol. XLIV, 1935, pt. 2, pp. 52-53.

andesitic in composition and locally show poorly developed pillows. Bodies of syenite, basic syenite, and syenite porphyry are found along the lava-sediments contact zone. Underground these bodies show local alteration.

Structure

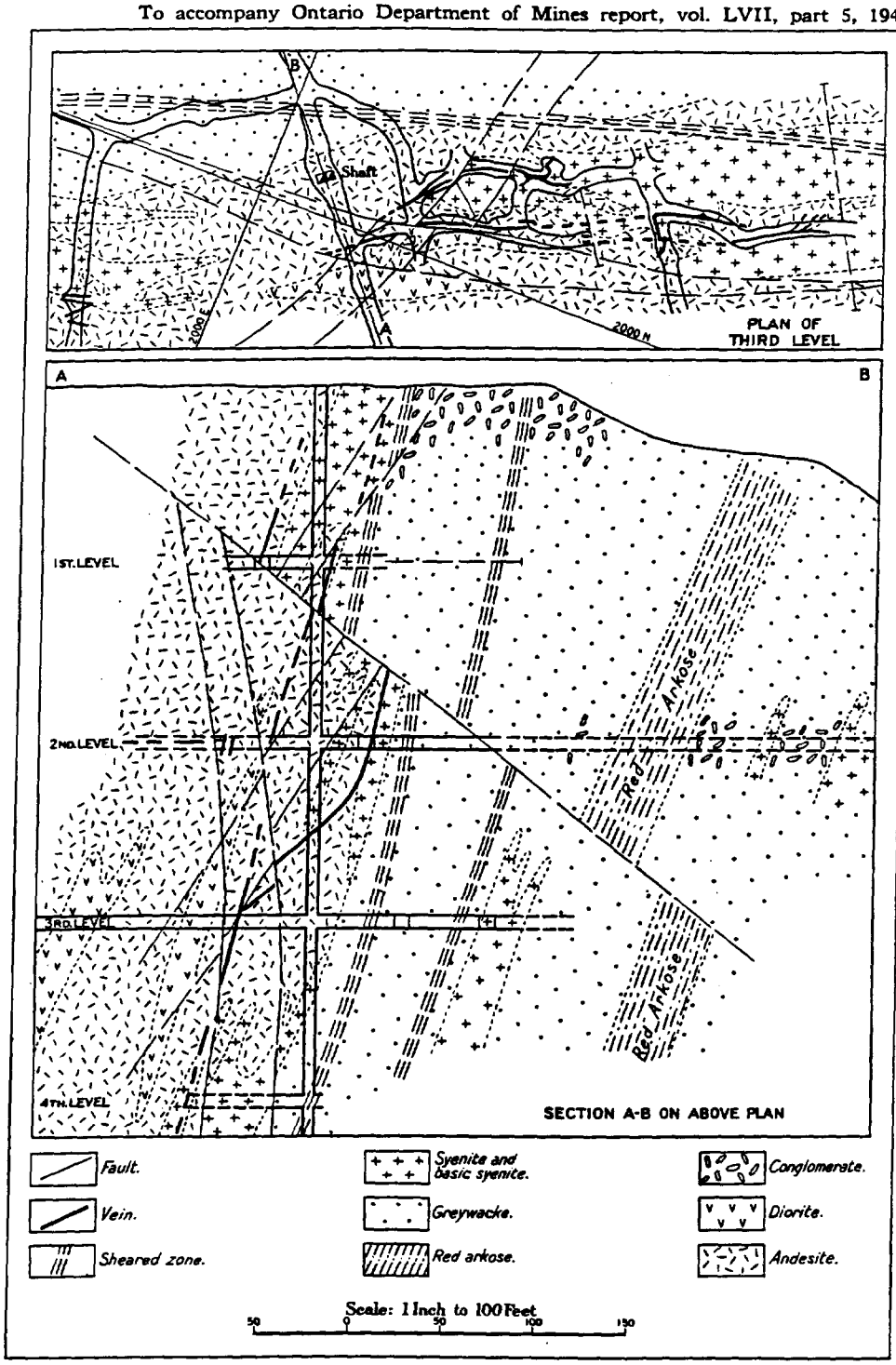
In the vicinity of the mine workings the Keewatin-Timiskaming contact has been folded to an overturned position. The Larder Lake fault may follow this contact (see Fig. 2 facing page 8), but, according to map No. 1946-1, this structure leaves the contact east of the shaft and continues along the railway cut. If this is so, the contact as found in the mine workings and westward would represent an unconformity. On the surface the lava-sediments contact is not well exposed near the shaft or to the west, but it is seen in the mine workings. Here the contact shows a medium amount of carbonatization, but the alteration is erratically distributed. As indicated on the plan and section facing page 36, a sheared zone angles across the contact, but away from this disturbance at the west end of the mine the contact is tight and unfaulted.

The north crosscut on the 2nd level would not quite reach the assumed location of the Larder Lake fault, as shown on map No. 1946-1. A few hundred feet farther north a strong fault zone underlies the Blanche river. This has been investigated by one short drill-hole and shows strong shearing, carbonatization, silicification, and mineralization; several low gold values were reported. The work of the company geologists suggested that the Larder Lake fault may underlie the Blanche river rather than follow the zone of shearing along the railway cut. Additional development work will be necessary before it can be definitely stated which of these is the main fault zone.

Different sets of sheared zones and faults cut across the rock formations on surface and underground. Certain sheared zones strike about N. 65° E. and dip very steeply. In places, these contain zones of barren quartz-carbonate stringers but are probably pre-ore structures. Two sets of late post-vein faults are shown on the mine plans. One set strikes N. 15°–35° E. and dips steeply to the southeast; these faults show displacements of less than 10 feet. This set is cut by faults striking about N. 85° E. with a fairly flat northerly dip; horizontal displacements of 100 feet or more occur along these faults. The only gold values of economic importance found on the property to date occur where the N. 20° E. set of faults cut the vein system.

Veins

According to G. L. Holbrooke,[1] there are two different ages of vein material in the mine workings. The earlier consists of numerous irregular quartz-carbonate veinlets in a sheared zone. The later veins occur as a system of narrow quartz veins trending about N. 65° E. and dipping about 70° S. This vein system has a length of about 250 feet and rakes to the east. These veins contain a small amount of pyrite and range in width from a few inches to more than 2 feet. In detail the veins tend to roll and branch in both plan and section. It is in the principal vein of this system, where the N. 20° E. fracturing and faulting is prominent, that the best gold values are found. Native gold is seen in the stopes on the 2nd and 3rd levels. In addition, there is a set of small, poorly developed cross-veins that show a general north-south trend.



GEOLOGICAL PLAN AND SECTION, BALDWIN CONSOLIDATED MINE.
Modified after mine plans, June, 1947

ANNEX "H-12"

GEOLOGICAL REPORT - EBY TOWNSHIP PROPERTY

(Preston East Dome Mines, Limited)

ASSESSMENT WORK
Received from Deputy Minister of Mines
Date June 29/50 W.H.
Resident Geologi

LOCATION OF CLAIMS

The property consists of a single group of four claims located in Eby Township, District of Temiskaming, Ontario. The four claims occupy the whole of the northern half of Lot 8, Concession III of Eby Township.

ACCESS TO CLAIMS

The claims are accessible by a road four miles long, passable to motor traffic, which leaves Ontario Highway 11 about half a mile south of the junction of Highways 11 and 11A, and goes south. A turn to the west is made about one and a half miles along this road to reach the property.

OWNERSHIP

All claims were staked by T. Hall for Preston East Dome Mines, Limited, South Porcupine, Ontario, and transferred to R. C. Hart as agent for the Company.

CLAIM NUMBERS

The claims are numbered L54861, L54862, L54863, L54864, a total of four claims.

PURPOSE OF WORK

The property lies 12 miles to the southwest of the Kirkland Lake Gold Camp. The Larder Lake fault crosses Kenogami Lake two miles to the north. Narrow, mineralized shears suggest that a branch of the Larder Lake fault may cross the property. One of these shears contains gold values. The purpose of the work is to trace the possible extension of this shear and relate

it to a possible larger shear, the existance of which is suggested by a low swampy area trending northwest. A further purpose is to provide maps on which a drilling program may be based.

SUMMARY OF WORK

Geological work on the claims was done from August 16 to August 24, 1949, inclusive. The mapping was controlled by tape and compass traverses around claim boundaries. Pace and compass traverses to pick up outcrops were tied into the control traverses.

Office work in the preparation of maps occupied the afternoons of the period from August 26 to September 12, 1949, inclusive. The whole of September 17, 1949 was spent in writing the report.

Work performed is summarized as follows:

Field	9 days
Office	6 days
Report	1 day

TABLE SHOWING BY WHOM AND TO WHAT DEGREE THE ABOVE WORK WAS PERFORMED

Name	Address	Time Spent: Geology	Line Cutting	Office	Supervision
R.C. Hart Geologist	c/o Preston East Dome Mines Ltd., South Porcupine.				3 days
R.E. Jones Geologist	" "	9 days		7 days	
T. Hall Prospector	" "	2 days	7 days		
W. Hall Prospector	" "	6 days	3 days		
Total		17 days	10 days	7 days	3 days
Progressive Total		17 days	27 days	34 days	37 days

Apportionment per claim - 9¼ days

MAPS

A geological map on a scale of 200 feet to the inch accompanies this report. All outcrops of mappable size are shown, and where closely spaced small outcrops indicate a large area of bedrock at shallow depth, approximate outlines of the larger area are drawn.

REPORT ON TOPOGRAPHY AND GEOLOGY

TOPOGRAPHY

A draw, the bottom of which is occupied with sparse spruce and in places thick alders, crosses the property from the southeast corner to the centre of the northern boundary. Drainage is to the northwest. Along the western boundary of the claims the ground is generally high. A diabase dyke, the trend of which is slightly west of north, which has resisted erosion better than the surrounding greenstone accounts for the high ground. The northeast corner is on high ground underlain by greenstone.

The road which leads to the property follows most of the northern boundary, but turns away at the northeast and northwest corners to reduce the grade on the high ground there. A ruined barn remains from an attempt to farm the low ground in the centre of the northern two claims. Near the barn is a well suitable for the support for camp of three or four men. This is the only water available on the property in summer.

A wagon road, cleared of stumps, runs close to the western boundary.

Shallow trenching and stripping remains in places, from previous exploration of the property. This is now overgrown and the boundaries are too indefinite to map.

Three small pits on the road near the northwest corner have been the source of a small amount of sand and gravel, probably used for road fill.

ACKNOWLEDGEMENT

The rocks exposed on the property have been identified and named in accordance with the sequence proposed by W. S. Dyer in Vol. XLIV, Part II, Report of the Ontario Department of Mines 1935 -- Geology and Ore Deposits of the Matachewan Kenogami Area.

TABLE OF FORMATIONS

QUATERNARY	Pleistocene	Glacial sand and gravel.
	- - - - - - Great Unconformity - - - - - -	
PRECAMBRIAN	Matachewan	Diabase Dykes
	- - - - - - Intrusive Contact - - - - - -	
	Algoman	Syenite Porphyry Dykes Quartz orthoclase veins
	- - - - - - Intrusive Contact - - - - - -	
	Keewatin	Basic lavas: meta-andesite meta-diorite (Greenstone) pillow lava, breccia, or pyroclastic.

THE KEEWATIN ROCKS

The volcanic rocks on the property are massive, dark greenish grey in colour, weathering a lighter grey.

Finer grained phases of this rock, of which chlorite is the only recognizable constituent, are probably meta-andesites. A dark medium grained rock, in which also only chlorite can be

recognized, is probably a meta-diorite. These rocks will be generally referred to as "greenstones." There is no evidence for an intrusive relationship for the coarser rock: it nowhere transgresses the flows, and rocks intermediate in grain size between the finest and coarsest occur. The coarser rocks are therefore probably the more slowly cooled interiors of the flows.

The massive flows are interbedded with lighter coloured strata three to ten feet thick containing angular fragments which differ slightly in colour from the matrix. These bands are in place in sharp contact on the north side with a moderately coarse phase of the flows, but the contacts are indistinct to the south where the light coloured bands grade into coarser, darker coloured rock. They may be flow breccias or pyroclastics and the grading downward into flows is taken to indicate that the tops of the flows are facing north. The strike of the flows is N85°W with tops facing north and an overturned dip of 85° to the south. A sharp change from fine grain on the south to coarse grain on the north along a line trending approximately east west occurs in two outcrops. This is taken to indicate a fine grained chilled top in contact with a coarser grained bottom of a flow, indicating tops to the north.

Pillow lavas, which occur just outside the north east corner indicate an east west strike with tops facing north.

THE SYENITE PORPHYRY AND QUARTZ ORTHOCLASE VEINS

A porphyry of pink orthoclase crystals up to 1/4" long in a grey matrix of hornblende needles and dark plagioclase of medium grain size occurs in dykes one foot to four feet wide with

an east-west strike. The dykes differ but slightly in strike from the flows and no definite evidence of intrusion was found. It is probable, however, that they are related to a basic phase of the syenite porphyry which Dyer mentions as occurring elsewhere in the larger region which he discusses.

Veins of quartz nine inches to two feet wide striking near S60°E and dipping 50° to 70° S.W. occur in places in the greenstone in the two western claims. Sparsely scattered in these veins are aggregations of coarse pink orthoclase. The veins contain very little sulphides, sparse pyrite and some galena occurring in one locality. They do not carry gold values.

The veins are sharply truncated by the diabase dykes and do not occur in the diabase except possibly as broken fragments of quartz. The date of intrusion of the veins into the Keewatin greenstone cannot be established further than that they are earlier than the diabase. The source of material may have been the pegmatitic phase of the Algoman granite.

THE DIABASE DYKE

Diabase occurs in a dyke of irregular outline trending N10°W and dipping 50° East on the eastern margin and 80° west indicated by joints on the western margin. The dyke crosses the northwest corner of the property and lies close to the western boundary. The maximum width is 200 feet but fingers of diabase 30 or so feet wide branch away from the main dyke and include large blocks of greenstone so that the dyke is apparently wider. The contact between diabase and greenstone is sharp. The diabase is fine grained near the contact but becomes progressively coarser

towards the centre of the dyke.

The texture is diabasic with laths of waxy feldspar surrounded by large grains of black pyroxene.

Numerous joints occur in diabase close to and parallel the contact with greenstone. Dips are 80° west on the western side and 50°-60° east on the eastern side. Jointing is less intense in the centre of the dyke. Some cross jointing occurs.

The diabase is fresher in appearance than the meta-diorite of the Keewatin volcanics. Feldspar and pyroxene may be recognized whereas in meta-diorite only chlorite may be recognized. The weathered surface of the diabase is light brown in contrast with grey of greenstone. Some intrusions of quartz and strongly epidotized schlieren, probably torn from the wall, occur in the diabase dyke.

STRUCTURAL GEOLOGY

The strike of the volcanic flows is a little north of west. Flow tops, graduation of grain size and pillows indicate that tops face north and dip is 85°S with slight overturning.

Numerous shear zones occur in places in the greenstone. These are mineralized with pyrite and a little quartz. A large amount of epidote occurs along these shears both as a dissemination in greenstone fading gradually on each side of the shear, and as veins of coarse radiating acicular green and pink epidote, with quartz, in veins. Strikes of the shears are slightly north of west on the western side of the property, east-west in the centre and slightly north of east on the east side, showing that shearing has taken place in a general east-west direction.

Gash fractures striking approximately S60°E and dipping 50° to 70° S.W. now filled with quartz and some orthoclase are of unknown age.

Marked schistosity and strong shearing occurs in the northeast corner of claim number L54861. Thus there may be a fault running into the low ground on the northeast claim.

INTERPRETATION OF STRUCTURE IN KEEWATIN

If the quartz veins indicate gash fractures contemporaneous with the shearing then movement has been south side up and slightly west with respect to the north side.

STRUCTURE OF DIABASE DYKE

A diabase dyke 200 feet wide cuts across the strike of the greenstone. The strike of the dyke is slightly west of north and the dip 50°E on the east flank and probably near 80° west on the west flank. Movement between the walls of the dyke is probably slight since breccia or pyroclastic horizons and quartz veins occur on each side with slight displacement.

The dyke is irregular in outline with offshoots, some of which rejoin the main body enclosing blocks of greenstone. A shear zone bearing values is contained in such a block about 150 feet wide and 750 feet long in the northwest corner of claim L54864. Estimation of the persistance of this block in depth is impossible from surface indications.

The draw crossing the property in a direction slightly west of north seems to be caused more by the easy erosion of greenstone between more resistant diabase dykes than by erosion along a shear zone. (A diabase dyke parallel to the one described on

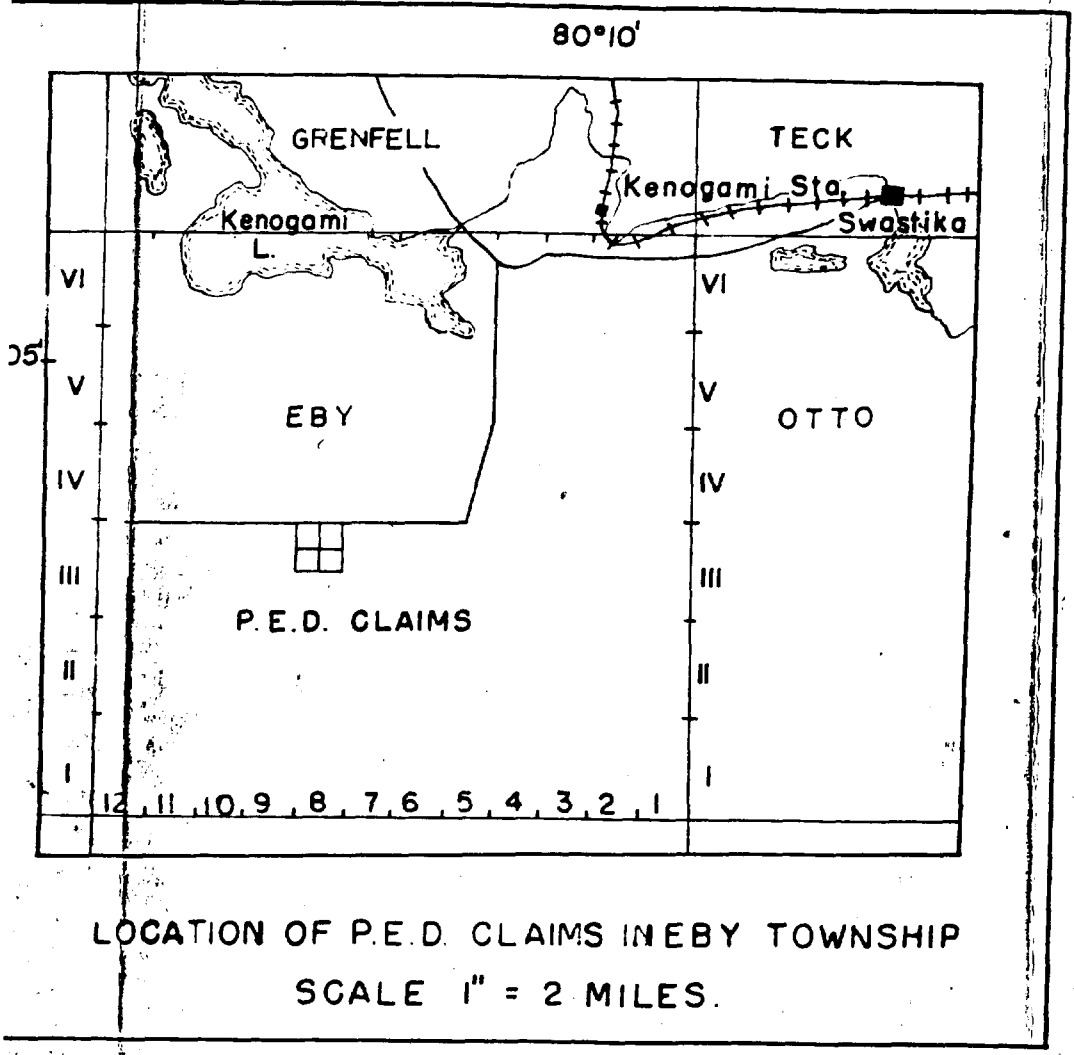
the property is shown on Dyer's map near the eastern boundary of the property. This dyke was not seen during this present mapping.)

ECONOMIC GEOLOGY

The most important shear zone found to date is located in a block of greenstone surrounded by diabase as noted above. Here minor quartz and heavy pyrite carry values over a width of two feet on a knoll about twenty-five feet in length. Drilling will be required to sample and extend this vein, since overburden is quite heavy in strike east and west.

R. E. Jones,
Geologist.

CS



LOCATION OF P.E.D. CLAIMS IN EBY TOWNSHIP

SCALE 1" = 2 MILES.

ANNEX
"H-13"

DOMINION GULF COMPANY

EBY TOWNSHIP CLAIMS

LARDER LAKE MINING DIVISION

GEOLOGICAL REPORT

PROVINCE OF ONTARIO

C. G. MacIntosh
June 21, 1952

C O N T E N T S

1. Location, access, topography
2. Owners, claim numbers, survey data.
3. Table of Formations
4. Description of rock types
5. Structure
6. Mineralization alteration
7. Summary of work to date
8. Geological Map Scale 1" = 400'

Eby Township Claims
Larder Lake Mining Division
Geological Report
Province of Ontario

1. Location, access, topography

The claim group is located in Lots 7,8,9,10 and 11, Concession 5, Eby Twp

The property is accessible from a tote road that follows the fifth concession line westerly from the Eby Township road. It is also accessible from the south shore of Kenogami Lake, a distance of one quarter to one half mile.

Much of the surface of the claim group is flat and swampy. There are a number of low gravel ridges extending southerly from the north boundary. Elevation of the outcrop areas does not exceed 100 feet above the swampy ground.

2. Owners, claim numbers, survey data

The claims are owned by, and the work was performed for, the Dominion Gulf Company, 203 Bay Street, Toronto.

There are thirteen claims in the group numbered L-57598 to L-57610 inclusive.

The survey was made by C. G. MacIntosh, Kirkland Lake, Ontario, assisted by D. Sprague, Larder Lake, Ontario and R. S. Savage, Swastika, Ontario. The work was performed between May 14th. and June 7th., 1952.

Observations are related to picket lines cut in a north direction at 400 foot intervals and marked by pickets at 100 foot intervals. The picket lines are tied to concession and lot lines.

3. Table of Formations

Matachewan
- Diabase Dikes

Algoman
- Basic Syenite

Timiskaming
- Greywacke, argillite
- Conglomerate
- Tuff (trachitic agglomerate)

Keewatin
- Gabbro - (sills?)
- Andesite - pillow lava

4. Description of rock types

Diabase: Matachewan diabase dikes intersect the older formation in a north to north easterly direction. They are fine to medium grained and massive.

Basic Syenite: A few small exposures of basic syenite were observed. It is medium grained, massive and reddish green in colour. It is composed of reddish feldspar (60%), pale green ferromagnesian (augite?) (45%) and biotite (5%). It occur in narrow dikes or lenticular bodies striking northeasterly.

Greywacke, Conglomerate: Timiskaming conglomerate and medium to fine grained greywacke were found in diamond drill core at the site of a drill hole on claim L-57603. The conglomerate contains pebbles of many varieties, including jasper

Greywacke, Conglomerate cont'd.

up to about 3 inches in diameter. The greywacke is greenish grey and contains gra: of jasper and quartz in the medium grained horizons. Grain gradation indicates th the top of the beds face south (toward the collar of the hole).

Tuff: Exposures of trachyte agglomerate or tuff occur on claim L-57601. It consists of angular to rounded reddish fragments in a reddish green matrix. Light coloured feldspar crystals or fragments are prominent. Trachyte fragments ar usually less than 1 inch in diameter.

Andesite, gabbro: The Keewatin formations consist of fine grained, mediu green pillow lavas. The lavas are interbanded with coarser grained, medium to dark green formations which may in some instances be a coarse grained phase of a flow bu contact relationships on some exposures indicate that they are intrusive.

Pillow structures indicate that the flows strike northwesterly and that the tops of the flows face toward the southwest.

The coarser grained formations contain thin stringers of magnetite and hematite. The dip of the flows, though not definitely established, appears to be steep toward the southwest.

5. Structure

The rock exposures are in general massive but there is evidence of faultin or weak shearing on claims L-57599 and 57610. The apparent offset of a diabase dike on claim L-57610 indicates a probable fault striking in a northerly direction.

6. Mineralization, Alteration

The rock formation on claims L-57599 and L-57610 have been carbonatized in the vicinity of weak shears or faults. Occasional narrow quartz stringers are sparsely mineralized with pyrite.

7. Summary of Work:

Work during the present year includes: line cutting; a ground magnetomet survey and a geological survey. The collars of six diamond drill holes, drilled by former owners of the claims, were located. Drill core was available from only one o the holes.

C. G. MacIntosh

/dc
June 21, 1952

DOMINION GULF COMPANY

ASSESSMENT REPORT

ON

GROUND MAGNETOMETER SURVEY

EBY TOWNSHIP CLAIMS

EBY TOWNSHIP

LARDER LAKE MINING DIVISION

PROVINCE OF ONTARIO

J. H. Ratcliffe
July 8, 1952

Dominion Gulf Company

Assessment Report
on
Ground Magnetometer Survey
Eby Township Claims
Eby Township
Larder Lake Mining Division
Province of Ontario

INTRODUCTION

Thirteen claims, in lots 7 to 11 inclusive concession 5, Eby Township, Province of Ontario, were staked by the Dominion Gulf Company in July 1951. Rock outcrops are numerous in the southeastern section of the claim group, but very rare in the north and west. Previous holders of the claims have drilled several holes on the property, mainly in the outcrop area in the southeastern section, although one long hole was drilled near the western boundary of the claims. Interest in the area is related to the location of the Larder Lake "Break" as interpreted by Jas. E. Thomson, a Provincial geologist.

A ground magnetometer survey was proposed, its purpose being to delineate the geological structure in the area, with particular emphasis being placed on the location of the Larder Lake "Break" and any subsidiary faults in the claim group. Since by far the greater part of the claims is covered by overburden, it would be extremely difficult to reconstruct a structure map of the area from geology alone. The presence of individual rock types, having varying amounts of magnetite associated with them, suggested that a ground magnetometer survey might provide some of the information required.

An Askania Schmidt-type magnetic balance having a sensitivity of about 25 gammas per scale division, was used in the survey. Basic coverage consisted of readings taken on picket lines 400 feet apart, using a station interval of 100 feet. Where magnetic gradients were particularly steep, intermediate stations were added. In all, a total of 729 stations were observed on 13.15 miles of picket line.

The magnetic data were observed and reduced by a Dominion Gulf Company magnetometer crew, and then transmitted to the Toronto office of the Dominion Gulf Company for further processing and interpretation. The basic data, together with isomagnetic contours and interpretation are presented on a map at a scale of 1 inch equals 400 feet, accompanying this report.

INTERPRETATION

Geological mapping has indicated the presence of six distinct rock types in the area. Only four of these rock types can be differentiated by the magnetic data; Keewatin andesite, Timiskaming sediments (conglomerate and greywacke), Timiskaming tuffs, and diabase. The Algoman syenite occurs in narrow dykes, and is not reflected in the magnetic data. An additional complication is the high degree of alteration present.

The eastern and southern portions of the claim group are characterized by highly complex magnetics. Contouring the magnetic data in this zone is very difficult since many sharp local anomalies tend to obscure the geological trend directions. Any number of contour patterns may be developed, since the data obtained from the survey was insufficient to develop a unique system of contours.

No matter what contour pattern is developed, however, a sharp discontinuity exists trending northeasterly through the lava series. Southeast of the discontinuity many sharp local anomalies predominate, the overall effect being to lift the general magnetic level some 300 gammas above that to the northwest. Thus it would appear that southeast of the discontinuity much secondary magnetite has been formed while to the northwest little secondary magnetite has been added.

A similar discontinuity exists between the lavas and the sediments, although here the magnetic level drops only about 100 gammas from the lavas to the sediments. The tuff horizon in the northwestern corner is indicated by magnetic values at about the same level as the lavas. When the tuffs are altered however, substantially higher magnetic levels are encountered.

A diabase dyke is represented by a continuous magnetic anomaly in the lava horizon, striking northeasterly. This dyke could not be interpreted if it were not for the information obtained from the Ontario Department of Mines Kenogami Lake Area map sheet, which indicates a diabase dyke on strike with this magnetic indication.

Several faults have been indicated as cutting the claim group. In general, these faults are merely relocations of faults interpreted by provincial geologists. Three main directions of faulting are shown, northeast, northwest and north. The northeasterly trending fault is of considerable importance. It is believed to represent the Larder Lake break in this area. The fault itself is represented by a discontinuity between the magnetic levels northwest and southeast of the break. Immediately west of claim L-57608, the major break appears to be offset about 800 feet to the south by a minor north-south break.

The northwesterly fault is indicated by an interruption of northeasterly trending magnetic "events", one of which represents a diabase dyke. These interruptions are so sharply defined that it is believed that they must be cut off by faulting. In claim L-57606, west of a north-south fault, the northwesterly trending fault is represented by a sharp magnetic anomaly cutting across the sedimentary horizon. The offset indicated along the north-south fault is west side south 600 feet.

The more easterly of the north-south breaks is a continuation of a break indicated on the Kenogami Lake Area geological map. Evidence for this break is not particularly strong from this survey, although it does appear to offset a diabase dyke along the north boundary of the claim group. The movement indicated here would be west side north 200 feet, or about the same as indicated by the government geological map. No magnetic evidence exists that this fault offsets the Larder Lake break by a similar amount, however.

The second north-south break is located along the western edge of claims L-57604, L-57605 and L-57608. The movement along this fault has been described previously in referring to the Larder Lake break and the northwesterly break, as being west side south some 600 to 800 feet. North of the claim group this fault appears to be aligned with a topographic valley indicated on the Kenogami Lake area geological map.

Two other breaks have been interpreted by government geologists in the north eastern portion of the claim group. No evidence of either of these breaks can be

seen from the magnetic data, however. This does not suggest that the breaks do not exist, but rather that the magnetic data is insufficient in this highly complex zone to indicate the faults as such.

The ground magnetometer survey has been quite successful in delineating several faults and contacts between rocks of varying magnetite content. It is believed that this area is somewhat analogous to the Kirkland Lake camp, and that further work, probably diamond drilling is definitely warranted.

J. H. Ratcliffe P. Eng.

/dc

APPENDIX "A"

Areas of particular interest, which have been indicated by this survey are mainly confined to the western group of claims. It is believed that a diamond drilling program should be undertaken to examine several of the areas listed below. These areas of interest, not necessarily in order of importance are:

(a) The sharp local magnetic anomaly on the contact between the sediments and lavas 100 feet south of the Base Line on Line 52W.

(b) The northwesterly trending anomaly attributed to a fault in claim L-57606.

(c) The horse shoe shaped anomaly in the sediments in the northeast corner of claim L-57602.

(d) The anomalous magnetic highs south of the sediment-lava contact in claim L-57602.

(e) Anywhere along the postulated Larder Lake break, in order to prove or disprove its location from this survey.

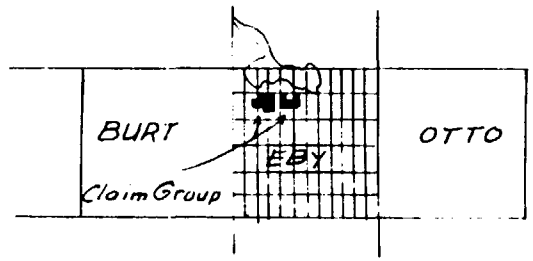
It is also suggested that a re-examination of the outcrop in the southeast quarter of lot 10, concession VI, Eby Township, shown as Timiskaming conglomerate on the Kenogami Lake Area geological map, be made. It is believed that this outcrop will probably fall into the same category as those outcrops in the northwest quarter of lot 10, concession V, recently remapped as tuffs, or agglomerates.

J. H. Ratcliffe

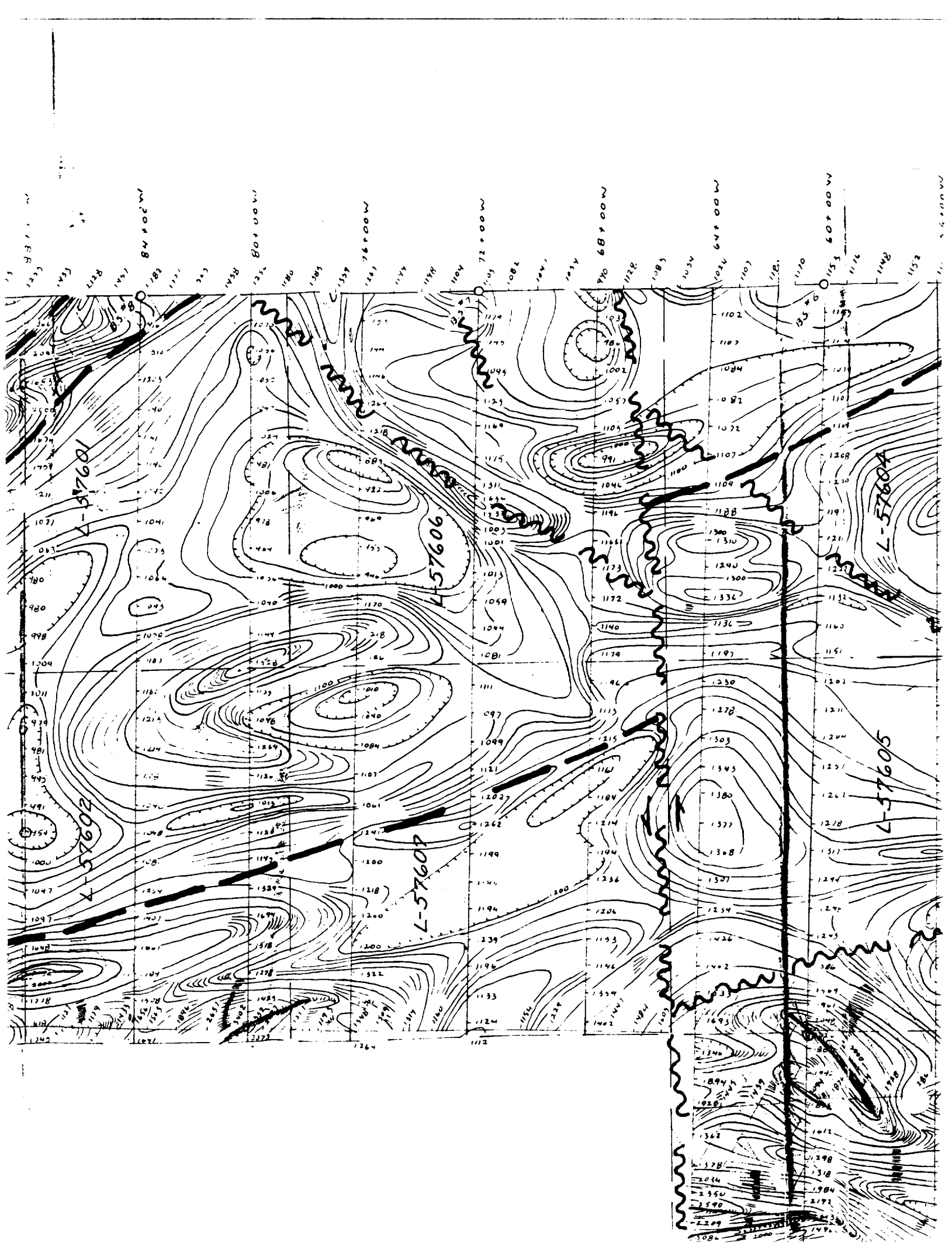
/dc

LEGEND

- Diabase
- Timiskaming Sediments (Conglomerate & Greywacke)
- Tuff
- Keewatin Andesite
- Alteration (Secondary Magnetite
- Contact
- Fault



KEY MAP
Scale 1" = 8 mi.


L-57601
L-57602
L-57606
L-57604
L-57605
L-57604
L-57605
84 + 00 W
80 + 00 W
76 + 00 W
72 + 00 W
68 + 00 W
64 + 00 W
60 + 00 W

L-7598
L-57600
L-57599
L-57610
L-57609
36+00W
32+00W
28+00W
24+00W
20+00W
16+00W
12+00W
8+00W
4+00W

MEMORANDUM

ANNEX "H-13A"

TO Exploration Committee

FROM	DATE
George H. Salton	September 16, 1957
SUBJECT Report on: Ahola Claim Group Eby Township Larder Lake Mining Division, Ontario.	FILE REFERENCE

Summary

On September 14th an examination was carried out of some workings on a claim group in Lot 1, Concession 4, Eby Township, accompanied by Mr. Ahola, one of the parties interested in the property.

Considerable work has been carried out on some occurrences of quartz filled and pyritized tuffs, patches of pyrite-pyrrhotite mineralization in amphibolitized volcanics, and lean iron formation. Nothing of any particular interest was observed in the examination.

Property - Location - Ownership

The property consists of 9 mining claims in Eby Township, Larder Lake Mining Division, Ontario, with numbers L 60613, 60614, 60638, 60639, 61475, 61476, 63304, 63263, 65154. Seven of these claims take up all of lot 1, Concession 4, except for one patented claim held by another party. The other two claims adjoin in lot 1, Concession 5, and lot 2, Concession 4.

Highway 11 traverses the group in a south easterly direction about three miles south from the junction with Highway 66 at Kenogami, which point is some nine miles westerly from Kirkland Lake.

The property is evidently held by some Finnish individuals of Kirkland Lake, headed by a Mr. Ahola.

Geology

The claims border the northern contact of a large syenitic mass some 25 miles in diameter, and are underlain by volcanic rocks which are mainly pyroclastics, at least within the area which received work and was examined. Here a belt of tuffs, with a width of several hundred feet, strikes in a N 60 E direction with steep northerly dips. To the south are some amphibolitized siliceous flows, which probably lie near the contact section of the syenite mass. To the north of the tuffs, along the southern edge of a wet swamp, is a band of lean iron formation of unknown width and continuity which may be of a clastic origin.

Work

During the past two years the owners have carried out considerable work on a small area of the group just east of the highway on claims o0638 and o0614. Two pits have been put down to depths of 22 and 25 feet, on the same rock structure and about two hundred feet apart, and one of

FROM	DATE
George H. Salton	September 16, 1957
SUBJECT Report on: Ahola Claim Group Eby Township Larder Lake Mining Division, Ontario	FILE REFERENCE

these workings is about 18 feet long. Numerous other rock trenchings and lesser blastings have been carried out in the general vicinity. A diamond drill hole was taken to a depth of 175 feet on a 65 degree dip in a section carrying lean iron formation.

Showings - Values

The main showing on the property, on which the two shafts were put down, consists of a band some 15 to 20 feet wide of quartz filled and pyritized tuffs. Quartz stringers and lenses, carrying fair local pyrite, make up to 25% of the rock, and trend with the bedding. The tuffaceous wall rock, which is somewhat sheared to schistose, carries local fair pyrite and is locally graphitic.

The owners say they had four samples of material from the upper part of the wide rock pit assayed for gold, and obtained up to $7.00. Presumably the pit was continued to a depth of 22 feet on no additional justification and no further sampling. The 25 foot deep rock pit some 200 feet to the north east was apparently put down merely on the 'vein' with no substantiation for the work from sampling.

A couple of hundred feet to the south east of the two deep rock pits some rock trenching has been carried out in a few places on patches of heavy pyrrhotite-pyrite mineralization in what appear to be amphibolitized silicified flow rocks. A small amount of copper mineralization seems to be associated with the pyritic sulphides, but tests do not indicate the presence of nickel.

To the north of the two main rock pits some trenching and stripping has been carried out along the northern edge of the ridge which carries all the workings, to the north of which there is an extensive wet swamp, to allow some exposures of a horizon of a lean iron formation. The iron formation is a banded silica-magnetite but except locally the amount of magnetite even in the iron bands is not high. A diamond drill hole was put down to 175 feet, drilling on a 65 degree dip from south to north under the swamp.

The only sample taken during the examination was a representative sample of material from the 22 foot deep rock pit. This was assayed for gold and gave 0.01 ounces.

Conclusions - Recommendations

The only strong and well mineralized structure observed was the quartz filled zone carrying the two deep rock pits. The lack of any consistent

FROM	DATE
George H. Salton	September 16, 1957

SUBJECT	FILE REFERENCE
Report on: Ahola Claim Group Eby Township Larder Lake Mining Division, Ontario.	

gold values precludes this from being of interest. Visual observations eliminate any of the other mineralizations as being of any direct interest, and there is nothing in the geology of the vicinity to indicate any degree of favourability.

George H. Salton

MWH
FB
JCA
WTR
GHS

KELLY KIRKLAND MINES LIMITED

Eby township

ANNEX "H-136"

The western claims of this property in the N E corner of Eby township and the S E corner of Grenfell township, were visited on Oct. 4/63.

PROPERTY

The property consisted of a group of 9 claims straddling the common corner of Grenfell - Teck - Eby and Otto townships and extending along the south bank of the Blanche River. The claim numbers are as follows:

Grenfell township	-	L. 42120 and west ½ of Claim L. 1199
Teck township	-	L. 42119 and east ½ of Claim L. 1199
		L. 14378, L. 16291 - 92
Eby township	-	L. 16423
Otto township	-	L. 16424 - 25

ACCESS

Highway No. 66, trending west from Swastika to Kenogami crosses the claims in Otto and Eby townships.

GEOLOGY

North of Highway No. 66, in the western claims of the group, Timiskaming sediments to the north are in fault contact with Keewatin lavas to the south. This east-west trending fault is known as the Larder Lake "break". It is an outstanding structural feature that extends for many miles across Northwestern Quebec and Northwestern Ontario. O.D.M. Map No. 1946-1, entitled "Kenogami Lake Area" shows an east-west trending ridge of syenite porphyry between Highway No. 66 and the Larder Lake "break" in the northeast corner of Eby township (Claim L. 16423). The syenite porphyry has intruded Keewatin volcanics. On the adjoining claim to the north (the west ½ of Claim L. 1199) in Grenfell township, there is a similar near-parallel intrusion of syenite porphyry cutting Timiskaming sediments.

PROSPECTING & DEVELOPMENT WORK

In the past indications of gold apparently were found in the first mentioned ridge of syenite porphyry north of the road, for a number of north-south trenches (shown on Map No. 1946-1) were blasted across it by former owners.

There was no evidence of recent mining activity in the vicinity of the old showings on Claim L. 16423. The trenches were overgrown and full of debris. Current interest in the property stemmed from an unconfirmed report that a high gold assay was obtained from a grab sample of a quartz vein temporarily exposed in a trench which was opened up to instal the Kirkland Lake branch of the natural gas pipeline. The trench trended east-west along the north flank of the ridge, north of the old workings.

Claim staking was the only evidence of any new work. Witness posts were seen on the south bank for two claims in the Blanche River staked on Sept. 16/60 by Geo. Babcock, a director of Kelly Kirkland. A square survey post that was marked III, L. 42120, was also found on the south bank of the river, in the southeast corner of Grenfell township. One of Babcock's witness posts said that the No. 4 post would be located 100 feet north in the river. The casing of an old d. drill hole with a 50° dip to the north was seen adjacent to the survey post III, L. 42120.

May 15/64.

W. S. Savage
Resident Geologist.

DIAMOND DRILL RECORD

PROPERTY L. 72906 **HOLE NO.** 1

SHEET NUMBER 1 | SECTION FROM 0' TO 52' | STARTED JUNE 27th

LATITUDE Kelly Kirkland | DATUM | COMPLETED JULY 5th

DEPARTURE Mines Ltd. | BEARING N-~~W~~ 50° W. M | ULTIMATE DEPTH 121'

ELEVATION Teck Township | DIP 58° | PROPOSED DEPTH 120'

DEPTH FEET	FORMATION	SAMPLE No.	WIDTH OF SAMPLE	GOLD $	SLUDGE GOLD $
0 — 8'-6"	S. porphyry with qtz stringers				
8'-6" — 9'-6"	" " " Cal. & qtz "				
9'-6" — 16'-6"	Broken ground - porphyry with Calcite & qtz stringers				
16'-6" — 17'-2"	Lost Core				
17'-2" — 17'-8"	S. porphyry with qtz stringers				
17'-8" — 18'-2"	Lost Core.				
18'-2" — 35'-8"	S. porphyry with small qtz stringers				
35'-8" — 37'-6"	Gray Silical Bands (Cherty)				
37'-6" — 37'-10"	Lost Core				
37'-10" — 39'	Gray Silical Bands (Cherty)				
39' — 46'6"	S. porphyry with qtz stringers				
46'6" — 48'	Gray Silical Bands (Cherty)				
48' — 48'-6"	Lost Core.				
48'-6' — 49	Gray Silical Bands Cherty.				
49' — 49'-6"	Lost Core.				
49'-6" — 50'-2"	qtz - felspar - Calcite				
50'-2" — 50'-6"	Lost Core				
50'-6" — 50'-10"	qtz - felspar "				
50'-10" — 51'-3"	Lost Core				
51'-3" — 51'-5"	qtz - felspar				
51'-5" — 52'	Lost Core.				

ASSESSMENT WORK
Rec'd from Mining Recorder
KIRKLAND LAKE
Date July 16/62
Resident Geologist

N.M.P., TORONTO—STOCK FORM No. 501 REV. 12/51

DRILLED BY J. H. PRICE

SIGNED

DIAMOND DRILL RECORD

PROPERTY L-72906 HOLE NO. 1

SHEET NUMBER 2 SECTION FROM 52 TO 102'-6" STARTED June 27nd

LATITUDE ____ DATUM ____ COMPLETED July 5th

DEPARTURE ____ BEARING N-30-W-M ULTIMATE DEPTH 121

ELEVATION ____ DIP 58° PROPOSED DEPTH 120

DEPTH FEET	FORMATION	SAMPLE No.	WIDTH OF SAMPLE	GOLD $	SLUDGE GOLD $		
52' — 56'6"	S. Porphyry with qtz stringers						
56'6" — 56'-9"	felspar mixed with Porphyry						
56'-9" — 57'-2"	Lost Core						
57'-2" - 57'-4"	qtz - felspar						
57'-4" - 68'	S. Porphyry with qtz stringers						
68' — 68'-8"	Lost Core						
68'-8" — 69'-5"	S. Porphyry with silica & Bands						
69'-5" — 70'	Lost Core						
70' — 78'-6"	S. Porphyry with qtz stringers						
78'-6" — 81'-6"	gray silicad Bands (Chloritic)						
81'-6" — 83'-8"	Lost Core						
83'-8" — 84'-4"	Broken ground						
84'-4" — 85'	S Porphyry with qtz stringers						
85' — 90'-6"	" " " " & white stringers						
90'-6" — 90'-9"	Lost - Core						
90'-9" — 93'-3"	S. Porphyry with qtz stringers						
93'-3' — 93'-6"	Lost Core						
93'-6" — 94'-2"	Broken ground Porphyry ~~Lost~~ with rusty seams						
94'-2" — 94'-9"	Lost Core						
94'-9" — 100'-2"	S. porphyry with considerable qtz						
100'-2" 102'-6"	Lost Core.						

N.M.P., TORONTO—STOCK FORM No. 501 REV. 12/51

DRILLED BY J. H. Price SIGNED Arnold Alice

DIAMOND DRILL RECORD

PROPERTY L-72906 **HOLE NO.** 1

SHEET NUMBER 3 SECTION FROM 102'6" TO 121 STARTED JUNE 27th

LATITUDE _____ DATUM _____ COMPLETED JULY - 5th

DEPARTURE _____ BEARING N - 30° W · M ULTIMATE DEPTH 121

ELEVATION _____ DIP 58° PROPOSED DEPTH 120

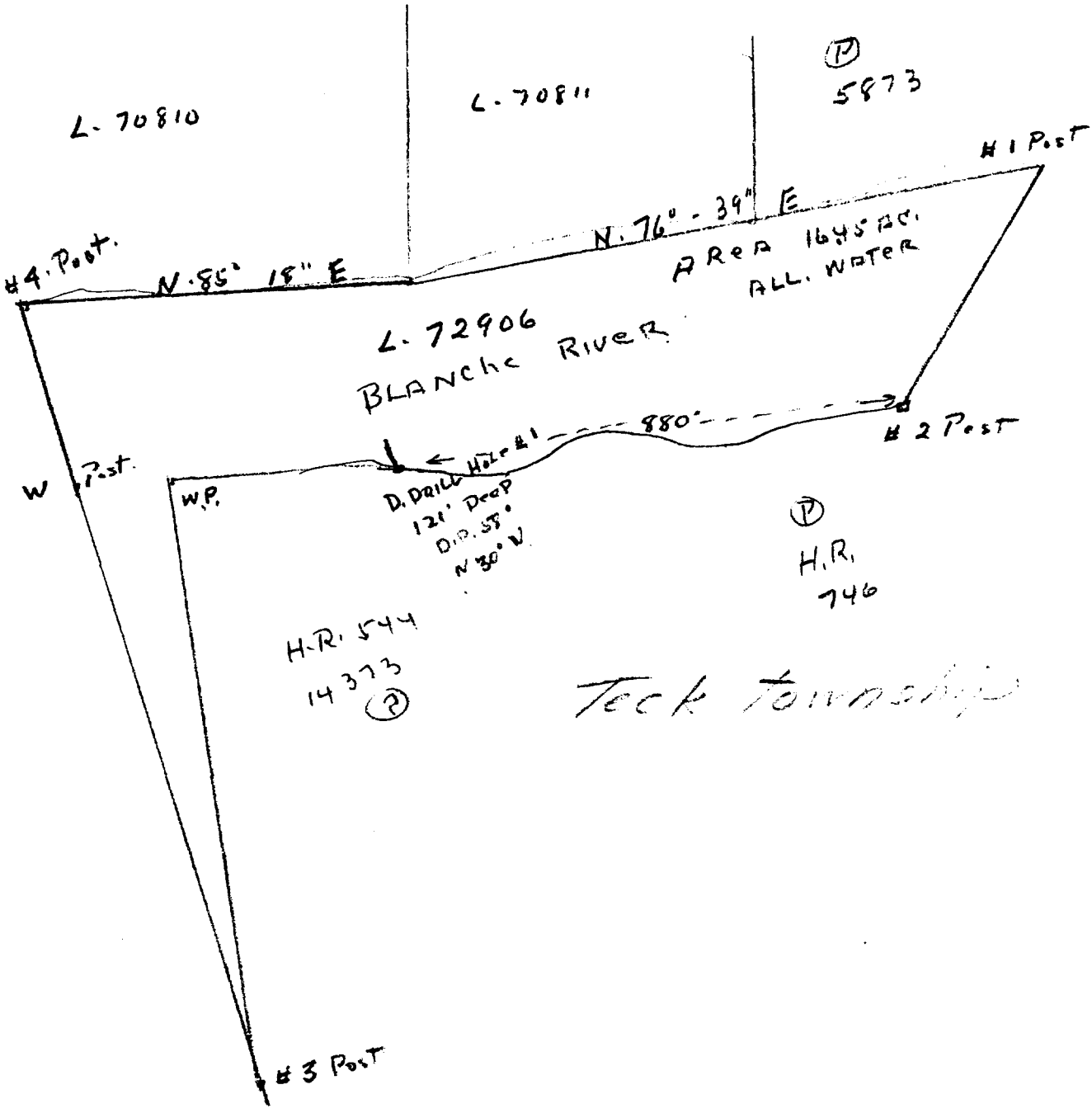
DEPTH FEET	FORMATION	SAMPLE NO.	WIDTH OF SAMPLE	GOLD $	SLUDGE GOLD $		
102'-6" — 103'-2"	Broken ground (porphory with qtz stringers						
103'-2" — 105'	Porphory with qtz stringers						
105' — 105'-10"	Broken ground " " " "						
105'-10" — 106'-4"	Lost Core						
106'-4" — 106'-9"	Broken ground						
106'-9" — 116'-2"	S. porphory with qtz stringers						
116'-2" — 115'-4"	Lost Core						
115'-4" — 116'	S. porphory with qtz stringers						
116' — 116'-4"	Lost Core						
116'-4" — 121'	S. porphory with qtz stringers						

N.M.P., TORONTO—STOCK FORM No. 501 REV. 12/51

DRILLED BY J. H. PRICE

SIGNED [signature]

Cato Summit



Tech Timberlake

ANNEX
"H130"

ONTARIO
DEPARTMENT OF MINES

HON. G. C. WARDROPE, *Minister* D. P. DOUGLASS, *Deputy Minister*
M. E. HURST, *Director, Geological Branch*

Mineral Resources and Mining Properties
in the
Kirkland Lake–Larder Lake Area

By

W. S. SAVAGE

Mineral Resources Circular No. 3

TORONTO
Printed and Published by Frank Fogg, Printer to the Queen's Most Excellent Majesty
1964

MINERAL RESOURCES AND MINING PROPERTIES IN THE KIRKLAND LAKE – LARDER LAKE MINING AREA

BY

W. S. SAVAGE[1]

INTRODUCTION

The Kirkland Lake–Larder Lake mining area is a section of the great gold-producing belt that extends for more than 150 miles from Kirkland Lake, eastward to Larder Lake, and across northwestern Quebec to and beyond the Malartic–Cadillac area. The town of Kirkland Lake, which is the largest community in the area, is situated in Teck township at latitude 48° 09′ north and longitude 80° 03′ west. It is the business centre of the area and is well-connected by highway and railway with other parts of Ontario and Quebec. The township of Teck has a population of about 16,000, most of whom are directly or indirectly dependent upon the gold-mining industry for their living.

On any map outlining the geology of northeastern Ontario, a long and comparatively narrow belt of rocks of Timiskaming age can be seen extending from Kenogami Lake in Grenfell township, eastward through Teck, Lebel, Gauthier, McVittie, and McGarry townships, to the Interprovincial (Ontario–Quebec) boundary. The area under consideration in this report consists of these 6 townships and the contiguous 6 townships south, namely: Eby, Otto, Boston, McElroy, Hearst, and McFadden.

History

The Larder Lake area was the scene of the first gold rush in the northeastern part of Ontario. The discovery of rich silver ores at Cobalt in 1903 stimulated widespread prospecting that extended farther and farther afield until, in August 1906, a gold discovery was made on ground now owned by Kerr-Addison Gold Mines near the northeast arm of Larder Lake. News of the find caused a stampede of prospectors into the area during the late autumn and winter of that year, and a large part of the country was indiscriminately staked. Development work on this ground during the following summer failed to uncover any important gold showings. The resulting disappointment of prospectors and investors gave the camp a serious setback for many years. It was not until 1936, when the Omega mine commenced milling operations and a large tonnage of ore was found at the Kerr-Addison mine, that Larder Lake began to become an important camp.

At the time of the gold rush into Larder Lake in 1906, many claims were staked for gold around Swastika and northeast to the lake which became known as Kirkland Lake, but most of them were allowed to revert to the Crown. Gold was first discovered at Kirkland Lake by W. H. Wright in 1911, on what is now the east claim of the Wright-Hargreaves mine. The following year, gold was found on the Tough-Oakes claims and shipments of high-grade ore from that property (later the Toburn mine) in 1913, started a great prospecting rush, following which the mines of the camp were gradually developed. Production began at Teck-Hughes mine in 1917, at the Lake Shore mine in 1918, at the Kirkland Lake Gold mine in 1919, at the Wright-Hargreaves mine in 1921, at the Sylvanite mine in 1927, and at Macassa mine in 1933.

The records show that most of the mines at Kirkland Lake encountered considerable discouragement in the early stages of development,

[1]Resident Geologist, Ontario Department of Mines, Kirkland Lake.

and it was only through the courage, tenacity, and hard work of the pioneer developers that success was finally achieved.

The 7 gold mines in the Kirkland Lake camp are on contiguous properties extending over a length of about 3½ miles along the main ore zone, which passes through the town of Kirkland Lake. From west to east the mines are Macassa, Kirkland Minerals, Teck-Hughes, Lake Shore, Wright-Hargreaves, Sylvanite, and Toburn. Only 4 of these mines were still in operation at the end of 1961. All of the mines are located on a continuous gold-bearing structure, a strong fault that is commonly referred to as the Kirkland Lake "Main break". The productive portion of this ore zone lies largely in the eastern part of Teck township, but extends a short distance into Lebel township.

Production

Kirkland Lake ranks as the second largest gold-producing camp in the Province of Ontario and in Canada, being second only to the Porcupine camp in the total amount of gold produced. Some of the mines at Kirkland Lake have been in continuous operation for about 50 years. Most of the mines have been opened to great depth and, at present, the camp holds the record for the deepest underground development on the North American continent. To the end of 1962, the 7 mines mentioned above had milled 47,849,594 tons of ore and produced 21,507,928 ounces of gold and 4,009,754 ounces of silver, valued at $680,962,150. From 1915 to 1962, inclusive, the total dividends paid amounted to $241,137,100. (Figures supplied by statistician, Ontario Dept. of Mines.)

The production of such mineral wealth made Kirkland Lake one of the most flourishing communities in Ontario during the decade immediately preceding World War II. Throughout the war years, however, operations were greatly hampered by the shortage of labour. Since the end of the war, mounting costs have overtaken and in most cases wiped out the operating profit. Toburn closed down in 1953, followed by Kirkland Minerals in 1960, and Sylvanite in 1961. Macassa is the only one of the 4 mines still operating that made a profit in 1961. Teck-Hughes, Lake Shore, and Wright-Hargreaves were able to continue operations only because the Canadian Government subsidized them through the Emergency Gold Mining Assistance Act of 1948.

In 1961, in a move to offset declining employment and production in the mines of the area, briefs requesting assistance were submitted by the municipal authorities and the mine managers at Kirkland Lake to the Ontario Department of Mines. Negotiations resulted in arrangements being made for the Kirkland Lake mines, the Canada Department of Mines and Technical Surveys, and the Ontario Department of Mines to participate in a comprehensive program with the ultimate objective of finding new ore bodies within the general area. Preparation of this Inventory of Mineral Resources is one of several projects that are being undertaken in this connection by the Geological Branch of the Ontario Department of Mines.

Sources of Information, and Acknowledgments

A report of this nature must, by definition, consist mostly of information obtained from outside sources. Some descriptions listed are of properties personally examined by the writer, but much the greater part of the information has been compiled from government reports, technical publications, and the records in the files of the Resident Geologist at Kirkland Lake obtained from mining companies, property owners, and individuals.

Descriptions of mineral occurrences in the Kirkland Lake–Larder Lake area have been made by geologists and engineers at intervals dating back to the first prospecting activity north of Lake Timiskaming. A bibliography listing a wide selection of references is at the end of this report.

The writer wishes to acknowledge with appreciation the information obtained from the above-mentioned sources for this Inventory. He is particularly indebted to the geologists of the Ontario Department of Mines who, since 1936, have taken part in a detailed investigation of the entire Kirkland Lake–Larder Lake gold belt. Their reports have provided the information that is summarized under the title of General Geology and Structure, as well as a wealth of detail used in describing the mining properties of the area.

General Geology and Structure

Experience gained from widespread exploration throughout the Kirkland Lake–Larder Lake gold belt has shown that ore bodies have a closer relationship to structures than to rock types. The main ore zone of the Kirkland Lake camp is an outstanding example of the close association between ore and a fault system. In the early days,

the syenite and syenite porphyry were regarded as the favourable host rocks for ore, and the so-called "lamprophyre" was believed to be unfavourable. In recent years, excellent ore has been found in the once-despised "lamprophyre" (augite syenite). In fact, ore is now found in all rock types of the camp with the exception of a few late diabase dikes, and the operators are willing to explore any promising pre-ore structure regardless of the nature of the country rock.

TABLE OF FORMATIONS

QUATERNARY	
PLEISTOCENE	Clay, sand, gravel.
PRECAMBRIAN	
HURONIAN (COBALT SERIES)	Conglomerate; arkose, greywacke, slate.
	Great Unconformity
POST-ALGOMAN	Diabase, lamprophyre.
	Intrusive Contact
ALGOMAN	Syenite porphyry, quartz-feldspar porphyry, alaskite. Quartz porphyry. Basic syenite, augite syenite, and lamprophyre; augite porphyrite. Hornblendite, biotite, diorite. Granite and syenite. Carbonate rock or "dolomite". Diorite and gabbro; quartz diorite and quartz gabbro.
	Intrusive Contact
TIMISKAMING	Trachyte; trachytic breccia. Tuff and agglomerate; tuffaceous conglomerate. Conglomerate, greywacke, basal grit.
	Great Unconformity
KEEWATIN	Tuff, and iron formation. Altered basic volcanics. Intermediate and basic volcanics (greenstone).

ROCK FORMATIONS

The bedrocks of the Kirkland-Larder mining area are Precambrian in age; the formations of economic interest belong to the earlier Precambrian era and consist of volcanics, sediments, and intrusives. In Grenfell township to the west, and in McGarry township to the east, relatively flat-lying sediments of the later Cobalt Series (Huronian) cover the older folded formations with great unconformity. The deposits of sand, gravel, and clay, which form a thin mantle over the bedrock in depressions, were laid down during the continental glaciation of Pleistocene time.

The rock formations with their different members may be classified as in the following Table of Formations, the oldest being placed at the bottom of the list. This table, and the text under the headings *Keewatin-Timiskaming Unconformity, Larder Lake "break", Algoman Intrusives, Structural Control of Ore Deposition and Post-ore*

Faulting, and *Ore Occurrences*, are exerpted from the Guide Book for Field Trip No. 8 of the G.S.A.-G.S.C. in November 1953.

KEEWATIN-TIMISKAMING UNCONFORMITY

The oldest rocks exposed in the Kirkland Lake area are the Keewatin series, a group of volcanic rocks that is widespread and practically devoid of sedimentary members. Long and relatively narrow bands of diorite and gabbro are associated with the lava flows. Some of these are probably intrusive sills; other narrow bands may be only the coarse-grained portions of thick flows. Overlying the Keewatin lavas with great unconformity is the Kirkland Lake belt of predominantly sedimentary rocks. This sedimentary-volcanic group, generally known as the Timiskaming series, occurs in a long and relatively narrow belt. Conglomerate, greywacke, tuff, and trachyte are the most widespread rock types in this series.

Before the deposition of the Timiskaming series, the Keewatin lavas were subjected to pressure in a north-south direction, which resulted in intensive folding. This folding was followed by a long period of erosion. On the erosion surface the sediments, tuffs, and trachytes were laid down. Further pressure downfolded the Timiskaming series into a synclinal structure. Continuing pressure, which could obtain no further relief by folding, caused the rocks to fracture and produced a great overthrust fault dipping steeply to the south, which is known in the area as the Larder Lake "break".

LARDER LAKE "BREAK"

The Larder Lake "break" is the outstanding faulted zone in the area and is now considered to be the westerly extension of the Malartic-Cadillac fault, giving it a known length of more than 100 miles across northwestern Quebec and the Larder Lake and Kirkland Lakes areas. It is a strong wide carbonatized shear zone, characterized by the presence of green mica and quartz stockworks.

This "break" may be regarded as the most important structural feature of the Larder Lake camp, for it or its branches appear to have had some influence on the localization of most of the ore bodies. It has been traced at intervals on surface from a point beyond the Chesterville mine westward across McGarry and McVittie townships and part of Gauthier. In the western half of Gauthier township it is heavily drift covered, and in the south-central part of Lebel township later syenitic intrusives appear to have cut out most of the strucure. The Larder Lake "break" is exposed again in Teck township about a mile to the south of the Kirkland Lake fault on which the producing mines are located. From the southern part of Teck township it has been traced southwestward to where it is overlain by the later Cobalt series in Eby township.

The amount of displacement along the Larder Lake "break" is not known. It cannot even be definitely stated whether the displacement is measurable in hundreds of feet or in miles. Nevertheless, the length of the fault zone, combined with the alteration along it and the deformation of adjoining formations, strongly suggests that the total displacement has been very great. There is evidence to show that the south side moved upward and eastward with respect to the north side.

ALGOMAN INTRUSIVES

The rocks of both the Keewatin and Timiskaming series were then invaded by Algoman intrusives, which occur in the form of stocks, dikes, and irregular-shaped bodies ranging in composition from granite to diorite or lamprophyre. The syenite intrusive, which occupies most of the southern half of Lebel township and cuts out the Larder Lake "break" in that vicinity, has already been mentioned.

In Teck township the most important of the intrusives are the syenite, augite syenite, and syenite porphyry, the longer axes of which roughly parallel the strike of the sediments. The syenite (A2)[1] is in the form of an irregular pipelike body 1,600 by 900 feet at surface, where it is seen at the Teck-Hughes, and plunges westward at 43° through the Kirkland Lake Gold on to the Macassa. The augite syenite (A5)[1] at surface extends westward from the centre of the Lake Shore into the Macassa and the syenite porphyry (A9)[1] extends at surface from the centre of the Lake Shore eastward through the Wright-Hargreaves and Sylvanite on to the Toburn. Both the augite syenite and syenite porphyry stocks are characterized by a steep dip on the north side with a flatter dip at the south contact, so that the widths of these stocks increase with depth. Each has a general westerly plunge.

STRUCTURAL CONTROL OF ORE DEPOSITION AND POST-ORE FAULTING

Following the emplacement of the intrusives, hot circulating solutions produced carbonate replacements along pre-existing faulted zones, of

[1] *See* O.D.M. map No. 1945-1.

which the Larder Lake break is the most important. This carbonatization was followed by the faulting which opened up channelways for the later solutions that produced the gold-bearing veins in the Kirkland Lake camp. The principal vein structure, known as the "Main break" or Kirkland Lake fault, is a thrust fault of some magnitude, striking N.67°E. with a steep southerly dip. The south side has moved up. Further movement took place on the Larder Lake "break" at this time, and it is possible that the Kirkland Lake fault branches away from the Larder Lake "break" in the vicinity of Kenogami Lake.

The "Main break" or Kirkland Lake fault passes through all the 7 producing mines and has been identified to a depth of 7,000 feet. It has cut through the Timiskaming sediments and the various intrusive rocks, and geological sections enable the formations on either side of the fault to be matched, thus giving the amount of movement that has taken place. The south side moved up almost vertically for 1,400 feet relative to the north side.

The fault is represented in some places by a single plane, in others by 2 or 3 planes spaced within a few feet or by fault planes, forming bows in the structure, which may be separated over distances of several hundred feet. Where more than one plane is present the ground between the faults is fractured by cross-over faults, and regions where these are plentiful provide the widest ore bodies.

Two important faults, on which the North and South veins occur, branch off the "Main break" in the centre of the camp. These faults are also thrust faults with the south side moved up relative to the north side. The South vein fault branches off on the hanging-wall side at the Wright-Hargreaves and is traced westward through the Lake Shore, Teck-Hughes, Kirkland Lake Gold, and probably as far as Macassa. The North fault branches off on the footwall side of the "Main break" at the Lake Shore and is traced eastward through the Wright-Hargreaves and Sylvanite to the Toburn, where it is seen to die out. Other minor faults in this series branch off the "Main break" and have been important sources of ore.

Besides the thrust-fault vein structures just described, veins are found on numerous subsidiary structures. Some on the minor faults formed coincidentally with the larger ones and others on tension fractures that were formed during release of the compressive forces. The tension fractures may parallel the major faults or may angle between these structures with dips varying from vertical to flat. Favourable locations for tension fractures are in the wedge-shaped blocks between the main faults.

The veins in which the ore deposits are found are associated with the structures just described. It is due to the fact that this 3-dimensional latticework of thrust faults, cross-over faults, and tension fractures was formed in the east half of Teck township following the emplacement of the intrusives that Kirkland Lake owes its gold mines.

An apparent feature of the structure of the ore zone is the transfer of subsidiary veins from one side of the "Main break" to the other in the east and west halves of the camp. One theory suggests that torsional strains across the camp may be responsible for this transfer of vein fractures from the hanging-wall to the footwall of the main plane of movement, going eastward. On the other hand, if the vein-fracture pattern at the east end of the camp is considered to be related to a branching-fault system rather than to a single fault plane, the entire picture is changed and any transfer of subsidiary veins to a footwall is not noticeable. The vein-fracture pattern of the north vein and its flatter southern subsidiaries in the east end of the camp is generally similar to that of the "Main break" and the southern subsidiaries at the west end of the camp. It is also a fact that ore shoots are more concentrated along the North vein zone than the main line of displacement in the Wright-Hargreaves, Sylvanite, and Toburn mines. There is no appreciable change in the dip of the main shear plane at either end of the Kirkland Lake camp, as would be expected if there had been torsional movements.

If no further rock movements had taken place, outlining and mining the Kirkland Lake ore bodies would have been a very straightforward proposition, but following the introduction of the gold-bearing veins, faulting again took place. The earliest post-ore faulting appears to be the horizontal movements that are evidenced by the offsetting of later diabase dikes on the "Main break" and South vein fault. The later faults are mainly distributed in the eastern half of the ore zone. At the Lake Shore and the mines to the east, post-ore strike faults, both northward- and southward-dipping, and major and minor transverse faults are recognized.

The Lake Shore post-ore fault is the largest transverse fault and has been traced from surface to the deepest workings. This fault dips steeply to the southeast. The east side moved down and north relative to the west side. The horizontal component of the movement is about 650 feet, and the vertical component is more than 300 feet.

The displacements occurring in the ore bodies

as a result of these later movements necessitate very close co-operation between the geological and production departments in all of the Kirkland Lake mines. The mining engineer, who in the past was inclined to scoff at the geologist as a visionary, is having demonstrated to him every day the practical value of geological interpretation.

The foregoing description has outlined in a general way the structural control that influenced the deposition of the Kirkland Lake ore bodies and the displacements brought about by post-ore faulting. The mines elsewhere along the belt owe their existence to structural deformation of the same periods followed by economic mineralization coincidental in time with the vein formation at Kirkland Lake.

The faults at the Bidgood and Upper Canada tend to converge with the Larder Lake "break" and could be subsidiary branches of this structure formed during the later period of deformation that produced the Kirkland Lake fault.

The Amikougami Creek, Sylvanite, Long Lake, and Misema River faults probably belong to the same period of post-ore transverse faulting as the Lake Shore fault.

The main ore bodies in the Larder Lake camp appear to be associated structurally with the periods of deformation that followed the carbonatization of the Larder Lake "break". Only a fraction of the ore bodies lies within the original zone of intense shearing. The remainder lies in adjacent hard competent rocks, which failed under tension during different periods of movement along or near this line of weakness. It is thus important to note that, unless there is some evidence of post-carbonate deformation, the fracturing tends to be weak and the gold content is low. Another important structural control over the localization of ore bodies is the presence of folds or gentle bends in the adjacent strata. In the Kerr-Addison and Chesterville ore zone, which is a single geological unit, the ore bodies on the south side appear to be localized in part within a pitching anticlinal fold, although the structure is badly broken up by faults. In places the ore zone at the Omega mine showed a gentle swing in strike, and the ore bodies lay near the apex of the arching.

No genetic relationship has been established between the gold deposits of the Larder Lake area and any particular type of intrusive. Gold occurs in a variety of rock types at different properties, and even within the limits of one mine's workings. Ore bodies are found in: (1) carbonate rock (dolomite), (2) basaltic lava, (3) dacitic lava, (4) syenite dikes and stocks, (5) tuffs, and (6) talc-chlorite schist with interfingering dikes. It will thus be apparent that structural deformation with accompanying rock alteration is of prime importance in the search for new ore bodies and that the rock types present are of secondary importance.

In the Kirkland-Larder mining area the exceedingly rough topography produced during the various periods of faulting just described has been eroded during the passage of hundreds of millions of years by weathering and glaciation to the relatively level surface that exists today. The south half of the syncline of Timiskaming sediments which was moved up when the Larder Lake "break" occurred, is almost completely gone. The sediments exposed in McElroy, McVittie, and Hearst townships, south of the Larder Lake "break", are shallow remnants of the bottom of the syncline and another small remnant can be seen in the northeast corner of Eby township.

ORE OCCURRENCES

In the Kirkland Lake camp, fissure veins are the commonest type and are responsible for the larger ore bodies on the various faults. Other structures are representative of stockworks, breccia, and gash veins. Quartz is the principal gangue mineral, though its proportion in the ores milled is relatively small. Some calcite is usually associated with the quartz. Other minerals in small amounts are albite, orthoclase, ankerite, barite, tourmaline, actinolite, and apatite. Secondary minerals are represented by sericite, carbonates, chlorite, and pyrite.

Gold, last to be deposited, is found native in the gangue and in fractures in the wall rocks and earlier-formed vein minerals, and is present in calaverite ($AuTe_2$) and petzite, $(Ag,Au)_2Te$. It is also associated with fine pyrite, which mineral constitutes about 2 percent of the ore by weight. Silver is associated with the gold and is also present in the petzite. Other minerals in the ores are chalcopyrite, hematite, galena, sphalerite, molybdenite, graphite, and the tellurides altaite (PbTe), coloradoite (HgTe), and melonite (Ni_2Te_3).

The longest stoping length of ore is at the 3,000-foot horizon, where a length of 6,400 feet of ore was shared by the Teck-Hughes, Lake Shore, and Wright-Hargreaves. Of this, 2,600 feet lies on the "Main break" and the remainder on the North vein fault.

The gold deposits in the Larder Lake camp occur as fissure or composite quartz veins, quartz stockwork deposits in the carbonate zone, quartz-sulphide deposits in lavas and tuffs, sulphide bodies without much quartz, and in talc-chlorite schists and mineralized dikes.

Explanation of Descriptive Notes on Properties

LISTING

Properties are divided into groups according to the chief metal present or sought. Within each group the properties are listed alphabetically under the name by which they are best known in the area. If the claims that constitute the property have not been brought to patent, the mining recorder can provide the name of the present owner. A fee of 25¢ is charged for the search. On the other hand, if the property is patented ground, present registered ownership will have to be ascertained from the local Master of Titles at Haileybury. There is a general index of mining companies, mines, and properties at the back of the report (pp. 103–108).

LOCATION

The claim numbers that constitute the group or property are in most cases listed, and the main showing is located by the number of the claim on which it occurs. For most large properties, the location of important showings or mine shafts can be obtained by consulting the references listed. Many of the properties described in this Inventory are located on the Ontario Mineral Map No. 2024, and on the Timmins-Kirkland Lake Compilation Map No. 2046, both published by the Ontario Department of Mines.

Chart A (*back pocket*), used in conjunction with the Map List beginning on p. 97, will enable the reader to quickly locate any property of interest to him.

HISTORY AND DEVELOPMENT

In the early days of mining in this area, numerous small developments were undertaken of which only scanty records now exist, but every effort has been made to collect and record any available information.

SAMPLING RESULTS, ORE-RESERVES DIMENSIONS, GRADE, PRODUCTION

Wherever possible the authority for a statistical statement is given with the date it was made.

REFERENCES

If a description of the property in question has been given in an O.D.M. annual report, the report is listed as a reference. Such reports usually contain a list of earlier reports on the property. More recent supplementary information may often be found in such publications as the Northern Miner, the Canadian Mines Handbook, the Financial Post's Survey of Mines, and others.

Reports to which the public may refer in the office of the O.D.M. Resident Geologist at Kirkland Lake are filed in alphabetical order under the name of the property. The name of the author and the date when the report was written are included in the reference.

Location

The main property is in the northeast corner of Eby township, and consists of 4 patented claims and the patented N½ of lot 2, concession VI. Claim numbers are L.17658, L.17659, L.17990 and L.18683. Another nearby property held by the company consists of 3 patented claims numbered L.14192, L.40218, and L.24029 in Teck township, and 2 water claims in the Blanche River which are L.O. 42119 in Teck and L.O. 42120 in Grenfell township. The main shaft, known as the Kelmac, is near the centre of the N½ of lot 2, concession VI, Eby township.

Chief Metal Present

Gold.

History and Development

The property, first known as the Baldwin, has been intermittently active since 1911 when gold was first found there by a prospector from whom the old company took its name.

Baldwin Consolidated Mines Ltd. was incorporated in 1946, and acquired property from Baldwin-Kirkland Gold Mines Ltd., Lucky Kirkland Gold Mines Ltd., Kelmac Mines Ltd., and Sylvanite Gold Mines Ltd.

Exploration and development by previous owners consisted of surface-trenching, about 12,000 feet of surface and underground drilling, and underground exploration from the Kelmac shaft. The 2-compartment shaft was sunk 420 feet, and 4 levels were opened at 100-foot intervals. About 4,000 feet of drifting and crosscutting was done, mostly on the 200- and 300-foot levels. This work covered a 500-foot length of the contact zone between Keewatin lavas and Timiskaming sediments. Crosscuts were driven on the second and third levels; an ore shoot 60 feet in length was found on the third level and was stoped to a height of 45 feet. A 20-foot length of ore on the second level is considered to be the upward extension of this ore shoot.

After acquiring the property in 1946, Baldwin Consolidated Mines dewatered and sampled the old workings; the surface and underground geology was mapped in detail, and a series of short underground holes, totalling 1,300 feet, were drilled.

Geology

Sediments of the Timiskaming series cover most of the northern part of the claims, and Keewatin volcanics and intrusive diorite lie to the south. The sediments consist mainly of interbedded conglomerate and greywacke. The volcanics are andesitic in composition and locally show poorly-developed pillows. Bodies of syenite, basic syenite, and syenite porphyry are found along the lava-sediments contact zone. The Larder Lake fault may be the structure that leaves this contact east of the shaft and continues along the railway cut (*see* O.D.M. Map No. 1946-1) or it may be the strong east-west fault that underlies the Blanche River to the north. Additional development work will be necessary before it can be definitely stated which of these structures is the main fault zone.

According to G. L. Holbrooke, there are 2 different ages of vein-material in the mine workings. The earlier occurrences consists of numerous irregular quartz-carbonate veinlets in a sheared zone. The later and more important veins occur as a system of narrow quartz veins trending N.65°E. and dipping south at about 70°. The best values were found in the principal vein of this system where there was considerable fracturing and faulting.

Production

In the years 1929 and 1938, a total of 81 tons of ore yielded gold valued at $1,247. (O.D.M. Vol. LVIII, 1949, pt. 1, Table II)

References

O.D.M. Vol. LVII, 1948, pt. 5, pp. 36, 37.
Report by G. L. Holbrooke, 1946, in O.D.M. resident geologist's files, Kirkland Lake.

Remarks

The property has been dormant since 1947.

GOLDEN GATE MINING CO. LTD.

Location

A group of 23 patented claims in Teck and Otto townships, including the greater part of the village of Swastika.

Teck township claims: L.2692, L.2693, L.2696, L.2697, L.3749, L.4313, L.12088, L.12522, L.12619, L.12680, L.15971, L.16252, L.16418, L.16419, L.16523.

Otto township claims: L.9759, L.9760, L.9591, L.9592, and N½ of lot 8 in concession VI.

Chief Metal Present

Gold.

History and Development

Golden Gate Mining Co. was incorporated in 1934 and acquired the former Lucky Cross property previously held by Kirkland Gateway Gold Mines. The old workings of the Lucky Cross mine consisted of an inclined shaft to 250 feet and 2 levels. Kirkland Gateway Gold Mines deepened the inclined shaft in 1923 to the 350-foot horizon and opened another level. The property was leased in 1933 to the Lucky Cross Leasing Syndicate and was transferred to Golden Gate Mining Co. the following year.

Golden Gate Mining Co. sank a vertical shaft to a depth of 1,000 feet on claim L.2692. This shaft was connected to the old workings and levels were opened at intervals of 125 feet. A 150-ton mill was erected and commenced production in May 1938. It operated at 60–70 tons daily until the mine closed in the summer of 1942.

In June 1940, Golden Gate Mining Co. acquired the neighbouring property of Crescent Kirkland Gold Mines Ltd. where underground workings had previously been opened to a depth of 400 feet in the old Swastika mine on claim L.9592 in Otto township. A small amount of ore was milled from the Crescent Kirkland section in 1941 and 1942. The Crescent mine also closed in 1942. Considerable surface diamond-drilling was done on the Crescent Kirkland property from 1943 to late 1945 when the shaft was dewatered and underground work resumed. The shaft was deepened to 663 feet and lateral work was done on 2 levels which were driven eastward. Development work was carried on until April 1949 when the mine closed.

Geology

The rocks on the property consists of Keewatin volcanics, Timiskaming sediments and tuffs, carbonates, various types of acid intrusives, and later diabase and lamprophyre dikes. In the Golden Gate mine, the veins lie in an area where many irregularly shaped bodies of syenite porphyry intrude the basic volcanics. The veins have a general strike of about N.53°E. and dip steeply north. They have been cut off by a wide zone of faulting known

as the "A" fault which dips at 45°S. The productive veins have not been found on the footwall side of the "A" fault where another approximately parallel fault with a slightly steeper dip occurs. This fault, known as the "valley fault", was mapped at surface in the northern part of the property as a strong sheared zone with siliceous carbonate alteration at or near the Timiskaming-Keewatin contact. The "valley fault" is the continuation of the Larder Lake "break" west of the Amikougami Creek crossfault. Underground drilling intersected green carbonates and quartz stringers with low gold values in the "valley fault".

Geological conditions at the Crescent Kirkland mine are quite similar to those at the Golden Gate mine. The rocks in the mine workings consist of Keewatin lavas intruded by irregularly shaped bodies of diorite, granodiorite, and lamprophyre. Quartz veins intersect all these formations. The vein quartz is locally mineralized with pyrite and small amounts of galena and molybdenite. The entire vein zone has been badly disturbed by a system of post-ore faults; the strongest of these strike northeast and are close to vertical. Because gold values occur along certain of these structures, either some of the movement may have been pre-ore or some gold deposition occurred later than that of the main veins.

Production

In 1910, 1911, and 1913, the Swastika mine (it later became the Crescent Kirkland) produced gold to the value of $11,457 from 2,190 tons of ore milled. In 1941 and 1942 a small amount of ore was mined from the Crescent Kirkland section including some gold from an adit on the shore of Otto Lake south of the Crescent shaft. This gold was obtained from small rich flat-lying veins near the surface. Production from the Crescent Kirkland valued at $42,507 was recovered from 6,288 tons of ore milled in 1947.

Total production from the combined properties of Golden Gate Mining Co. Ltd. by the company and all previous owners from 1910 until milling ceased in 1947 amounted to $1,062,619 from 103,693 tons of ore milled. (O.D.M. Vol. LXIII, 1954, pt. 1, pp. 13, 14)

References

O.D.M. Vol. LVII, 1948, pt. 5, pp. 47–49.
O.D.M. Vol. LXIII, 1954, pt. 1, pp. 13, 14.
Report by D. K. Burke (1940) and level plans in O.D.M. Resident Geologist's files, Kirkland Lake.

Remarks

The name of the company was changed to Kirkland Golden Gate Mines Ltd. in 1946. A second reorganization took place in 1950 when the company became Gateford Mines Ltd.

ROGICK-ELLIOT-CLARK CLAIMS

Location

The property consisted of an east-west-trending strip of 5 patented contiguous claims in concession VI, Eby township; the claim numbers and locations are as follows (going from east to west):
L.8950 in the NE.¼ of S.½ of Lot 4;
L.8803 in the NW.¼ of S.½ of Lot 4;
L.18227 in the NE.¼ of S.½ of Lot 5;
L.18837 in the NW.¼ of S.½ of Lot 5.
L.18312 in the NE.¼ of S.½ of Lot 6 (⅔ water);

Chief Metal Present

Gold.

History and Development

The discovery of angular pieces of gold-bearing quartz float led to the staking of the claims. Subsequent stripping and trenching exposed gold-bearing quartz-carbonate stringers cutting porphyry and greenstone on claim L.18227. During the winter of 1938–39, Pioneer Gold Mines drilled 5

holes from west to east with a dip of 45° in the south half of claim L.18227, and obtained a number of low gold values. In 1944 the property was optioned to Siscoe Gold Mines Ltd. and 4 holes were drilled in a north-south direction. Two of these were put down in Kenogami Lake near the small point of land on claim L.18312. No gold values of economic interest were found.

Geology

Intermediate and basic volcanics of Keewatin age occupy much the greater part of the property. These lavas have been intruded by a number of scattered irregular porphyry dikes. Most of the east half of the east claim (L.8950) of the group consists of intrusive diorite. On the north boundary of the adjoining claim (L.8803), outcrops of conglomerate of Timiskaming age are shown on O.D.M. Map No. 1946-1. The south contact between the Timiskaming sedimentary belt and the Keewatin lavas crosses the north half of claims L.8950 and L.8803 in an east-west direction.

References

O.D.M. Vol. LVII, 1948, pt. 5, p. 51.
Report by D. K. Burke (1939), and diamond-drilling information in O.D.M. Resident Geologist's files, Kirkland Lake.

Remarks

The west claim (L.18312) was acquired by Burtho Gold Mines Ltd. in 1947.

BURTHO GOLD MINES LTD.

Location — Eby township, lots 6 and 7, concession VI. In 1947 the company acquired the land on these 2 lots and the following water claims on them north in Kenogami Lake: L.39107, L.41458, L.41459, L.48761, L.51580, L.52039, L.52040, L.52041, L.52042, L.52043.

Chief Metal Sought — Gold.

History and Development — Burtho Gold Mines Ltd. was incorporated in Manitoba in 1947 as a wholly-owned subsidiary of God's Lake Gold Mines Ltd. It was formed to acquire and develop properties in Ontario. Exploration work in 1947–48 on the Eby township property consisted of geological mapping and the drilling of 8 holes to investigate assumed fault zones that are shown crossing the property on O.D.M. Map No. 1946-1.

Geology — Kenogami Lake occupies the greater part of lots 6 and 7, concession VI, Eby township. South of the lake, the predominant rock types are intermediate and basic volcanics of Keewatin age with minor intrusions of syenite and syenite porphyry dikes. Timiskaming sediments and tuffs lie north of the volcanics on the west boundary of lot 7. All the above-mentioned rock types are cut by narrow diabase dikes. Cobalt sediments form the promontaries that project into the lake along the township line on the north boundary of the property.

O.D.M. Map No. 1945-1 shows 2 roughly parallel zones of shearing striking north of east across the south half of the property. The most northerly of these zones, indicated on the map by 2 closely-spaced converging faults, was cut in 4 holes, spaced at intervals over a length of 4,300 feet. This well-defined structure may be the Larder Lake fault. The second zone of shearing about 600 feet south and the adjoining porphyry and carbonate rock were probed by 2 holes. These fault zones were marked by shearing, brecciation, carbonatization, local mud seams, and some quartz veins and stringers.

Sampling Results — No gold values were obtained in the drilling program.

References — O.D.M. Vol. LVII, 1948, pt. 5, pp. 38, 39.
Diamond-drilling logs and location sketch in O.D.M. Resident Geologist's files, Kirkland Lake.

Remarks — The charter of Burtho Gold Mines Ltd. was cancelled in 1959.

FOUR NATIONS GOLD MINES LTD.

The ground formerly held by this company is shown on O.D.M. Map No. 1946-1 to consist of a group of 11 claims in the southeast quarter of Grenfell township. The claim numbers were:
Patented claims: L.7937, L.8215, L.8238½, L.8239, L.8785, L.8786, L.8787.
Unpatented claims: L.10554, L.12178, L.14821, L.44645.

The shaft is on claim L.14821.

Chief Metal Present

Gold.

History and Development

Four Nations Gold Mines Ltd. was incorporated in 1929. Prior to 1933 a shaft was sunk to 500 feet on claim L.14821, four levels were opened, and considerable lateral work was done. The company was succeeded by Four Nations Consolidated Gold Mines in 1933. Operations were resumed and continued until November 1934. During this time, an additional 1,965 feet of drifting and 1,451 feet of crosscutting were done. Four Nations Consolidated Gold Mines Ltd. was adjudged to be bankrupt in 1935.

Geology

The northern part of the property, including the mine workings, is underlain by interbanded diorite and basic volcanics of the Keewatin series. South of the shaft the relatively flat-lying sediments of the Cobalt series cover the older rock formations. A sheared zone near the Blanche River on claim L.8239 strikes toward the shaft, but seems to be too far north to line up with the sheared zone explored underground on the 500-foot level unless there is some folding or faulting between the 2 points. Most of the underground exploration was done on the 500-foot level and the bulk of it was concentrated along the above-mentioned shear zone lying about 250 feet southeast of the shaft. This shear strikes about N.70°E. and dips steeply to the south. It is from 30 to 40 feet in width and contains some white quartz stringers, but the values found were generally low.

In the vicinity of the shaft the veins strike N.55°E. to N.60E., and dip south at 65°–75°. Here the country rock is basic lava with horizons of porphyritic lava, especially at the east end of the workings. Narrow dikes of felsite and pyroxenite cut the volcanics. On the 250-foot level the No. 1 vein lies about 30 feet north of the shaft. It consists of a 4-foot width of quartz veinlets and pyritized wall rock, the quartz being from 1 to 2 feet in width and very sparsely mineralized.

Sampling Results

An incomplete plan of the No. 1 vein on the 250-foot level showed practically all the assays to be less than 0.11 ounces of gold per ton across drift width. (M. E. Hurst)

References

O.D.M. Vol. XLIV, 1935, pt. 1, pp. 94, 95.
Field notes of M. E. Hurst, Provincial Geologist, who examined the property in 1934.
O.D.M. Vol. LVII, 1948, pt. 5, pp. 39, 40.
Miscellaneous surface and underground maps and assay plans in O.D.M. Resident Geologist's files, Kirkland Lake.

Remarks

In 1944, A. E. Campbell of Stratford, owned 7 claims of the former Four Nations property, including claim L.14821 on which the mine is located.

ANNEX
"H - 14"

KEEVIL CONSULTANTS LIMITED

EBY GROUP - PROJECT 750

REPORT ON THE
GEOLOGICAL MAPPING & ELECTROMAGNETIC SURVEY

REPORT NO. 46P

N.T.S. 42 A/1

January 13, 1966

H.D. McLeod P Eng.

H.D. McLeod.

REGISTERED PROFESSIONAL ENGINEER
Mining
H. D. McLEOD
PROVINCE OF ONTARIO

ASSESSMENT WORK
Rec'd from Mining Lands Br.
Toronto
Date 30 June 1966 Howard Lovell
Resident Geologist

SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Keevil Consultants Limited Eby group was tested by a vertical loop electromagnetic survey and geological mapping in December 1965. A magnetometer survey was done in 1964.

Four strong and four weak conductors were outlined, all lying in overburdened areas. The strong anomalies have excellent magnetic correlation.

A drilling program is recommended, this to consist of one hole to test each of the strong conductors. Of these one hole would be extended to cross-section the magnetite iron formation band known to cross the claims.

ACCOMPANYING MAPS

(1) Drawing 3045 - "Geology Map"

(2) Drawing 3048 - "Vertical Loop E.M. Survey".

INTRODUCTION

Keevil Consultants Limited Eby group consists of the following ten contiguous claims in Eby Township:

L77348	NE¼N½	Lot 3	Concession 3
L77349	SE¼N½	Lot 3	Concession 3
L78187	NE¼S½	Lot 3	Concession 3
L78188	NW¼S½	Lot 3	Concession 3
L78189	SW¼S½	Lot 3	Concession 3
L78190	SE¼S½	Lot 3	Concession 3
L78788	NE¼S½	Lot 4	Concession 3
L78789	NW¼S½	Lot 4	Concession 3
L79120	SW¼N½	Lot 3	Concession 3
L95537	SE¼S½	Lot 4	Concession 3

The claims were staked and recorded on various dates in 1963, 1964 and 1965, the present registered owner being Keevil Consultants Limited, Suite 1000, 11 Adelaide St.W., Toronto, Ontario.

Exploration work consisting of geological mapping and a vertical loop electromagnetic survey was carried out during the period November 3 to December 10, 1965. The work was done by Geophysical Engineering and Surveys Limited personnel under the direct supervision of the writer. The E.M. survey operator was J. Martin, 83 Algonquin Blvd. E., Timmins, Ontario. The geological mapping was done by R. Petersen, Swastika, Ontario.

LOCATION AND ACCESS

The claims are located in the east central part of Eby Township, Larder Lake Mining division, a distance of 9 miles to the south-west of Kirkland Lake, Ontario. Approximate co-ordinates are 49° 03' north, 80° 11' west.

Access is by concession roads south off the Kenogami-Matachewan highway at a point 2 miles to the south of the junction with highway 11.

DESCRIPTION OF SURVEYS

A grid of north-south lines at 300-foot intervals cut in 1964 for a magnetometer survey was used in the present work.

A vertical loop electromagnetic survey was done with a Sharpe S.E. 200 unit fitted with an amplifier and special batteries to increase the range to 600 feet. Readings were taken at 100-foot intervals along all the picket lines using the parallel line method. In this method each reading is taken with the transmitter and receiver set up at the same station on adjacent lines. The transmitter-receiver interval thus is the line spacing, in this case 300 feet. All conductors located were then checked by the detail or fixed transmitter method. In this method the transmitter is set up on a known or suspected cross-over and readings taken at 50-foot intervals on the adjacent line or lines. In this way the conductor is traced from line to line and accurately located within 25 feet on every line.

Approximately 1237 readings were taken.

The geological mapping was done by walking the picket lines and running pace and compass traverses between lines. All outcrops were accurately tied in to the nearest picket line or lines.

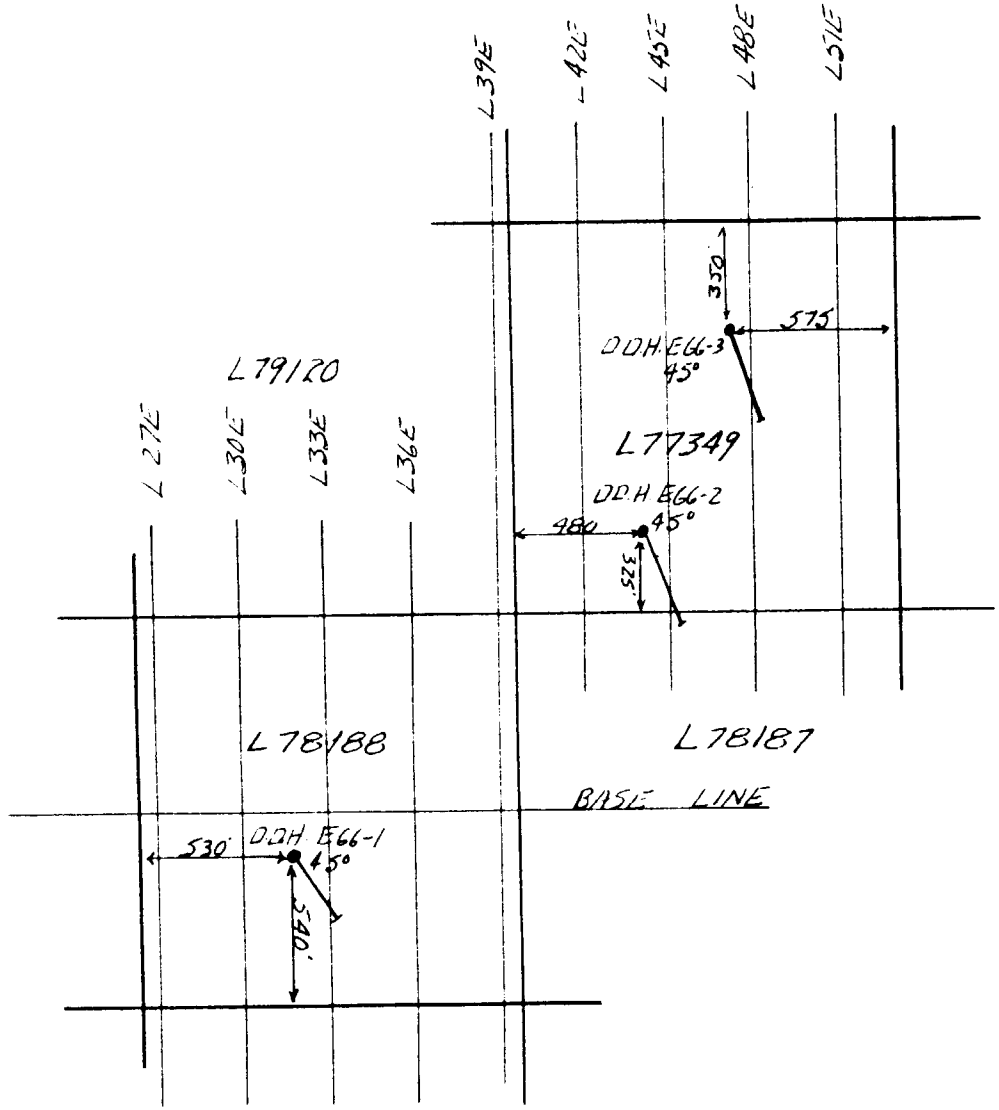
RESULTS OF SURVEYS

The electromagnetic survey located and outlined four strong and four weak conductors as shown on the accompanying map. The strong anomalies all have sections of extremely strong conductivity and partial magnetic correlation. The weak anomalies have poor conductivity although some of the cross-overs are sharp and have little magnetic correlation.

GEOLOGY

The claims are almost completely covered by sand plain with a few outcrops in the north-east corner and the south-west corner of the group. Those along the north boundary are sheared chloritic andesite and a fine-grained pink feldspar porphyry. Rusty siliceous iron formation outcrops in the south-east corner of claim L78789. Outcrops of acid to cherty tuff lie along the west boundary of claim L95537.

Strike of formations as indicated by the electromagnetic and magnetic surveys is east-west to N60^{o}E. Changes in strike of the conductors indicate some folding. Dip is not certain but is considered to be close to vertical.





ASSESSMENT WORK
Rec'd from Mining Recorder
Kirkland Lake
Date 3 Mar. 1966 Howard Lovell
Resident Geologist

KEEVIL CONSULTANTS LTD

EBY TOWNSHIP CLAIMS

LOCATION OF DRILL HOLES

SCALE: 1" = 660' FEB. 1966

Report No. 437T
N.T.S. 42-A-1

GROUND MAGNETIC SURVEY

EBY TOWNSHIP, ONTARIO

ASSESSMENT WORK
Rec'd from Mining Lands
Branch TORONTO
Date. Feb 4/65 W.H.
Resident Geologist

A. R. Clark

ABSTRACT

In the fall of 1964 a ground magnetic survey was completed over part of an airborne magnetic survey in Eby Township, Ontario.

The values were obtained along picket lines spaced 300 feet apart at 50 foot intervals in the anomaly area.

Three profiles were chosen for detailed interpretation along which individual magnetite bands were investigated for widths and percentage magnetite.

The results are described in a three (3) page report with three (3) bound in profiles and an accompanying map on a scale of 1 inch equals 200 feet.

Drawing 2827.

GROUND MAGNETIC SURVEY

EBY TOWNSHIP, ONTARIO

INTRODUCTION

The survey was carried out to detail part of a magnetic anomaly which had been delineated by an aeromagnetic survey in 1962.

LOCATION AND ACCESS

The previously outlined anomaly was located in Eby Township. It's long axis is approximately E-W and extended almost across the township, slightly south of it's centre line.

Most of the anomaly is easily reached by farm or logging roads from Highway 11.

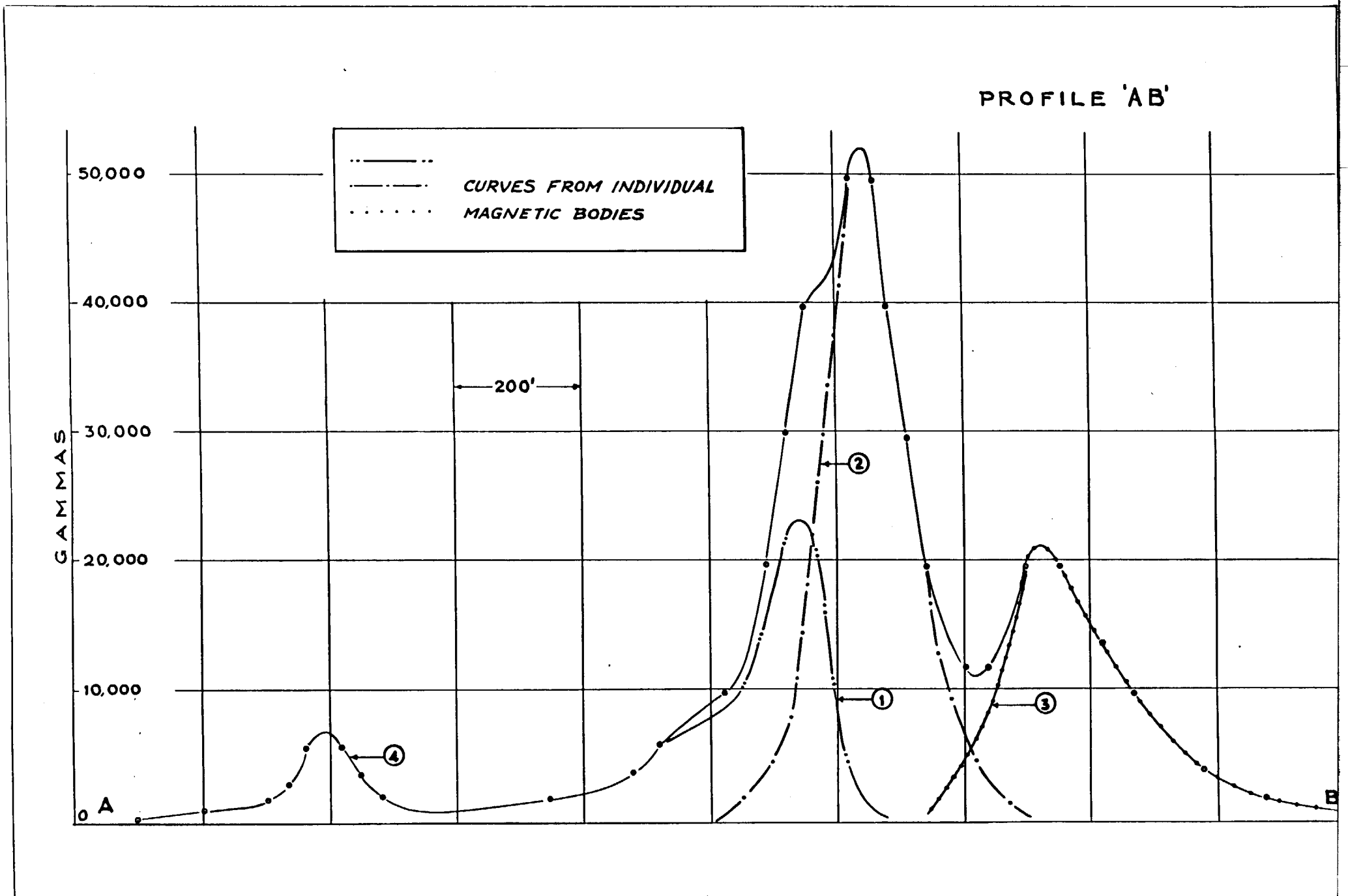
GEOPHYSICAL SURVEY

The survey was completed along N-S lines spaced 300 feet apart, from lines 7 to 17 of the aeromagnetic survey. (G.E. & S.L. report 383T and Dwg. 2414). The determinations were made at 50 foot intervals in the anomaly area and at 100 foot intervals beyond the anomaly.

The results were plotted on a map of scale 1 inch equals 200 feet and contoured. (Dwg. 2807)

INTERPRETATION

Three profiles AB, CD, EF across the most interesting parts of the anomaly were used. Each profile indicated that the magnetic body was made up of several


PROFILE 'AB'
CURVES FROM INDIVIDUAL MAGNETIC BODIES
50,000
40,000
30,000
20,000
10,000
0
GAMMAS
200'
A
B
1
2
3
4

PROFILE A & B

	Anomaly 1	Anomaly 2	Anomaly 3	Anomaly 4
Width	20 ft.	25	40	40
Depth	35 ft.	45	40	40
V	24,000	52,000	21,000	7,000
Vo	65,000	65,000	65,000	65,000
K	0.68	1.54	.36	.12
%	42.0	96	22	8

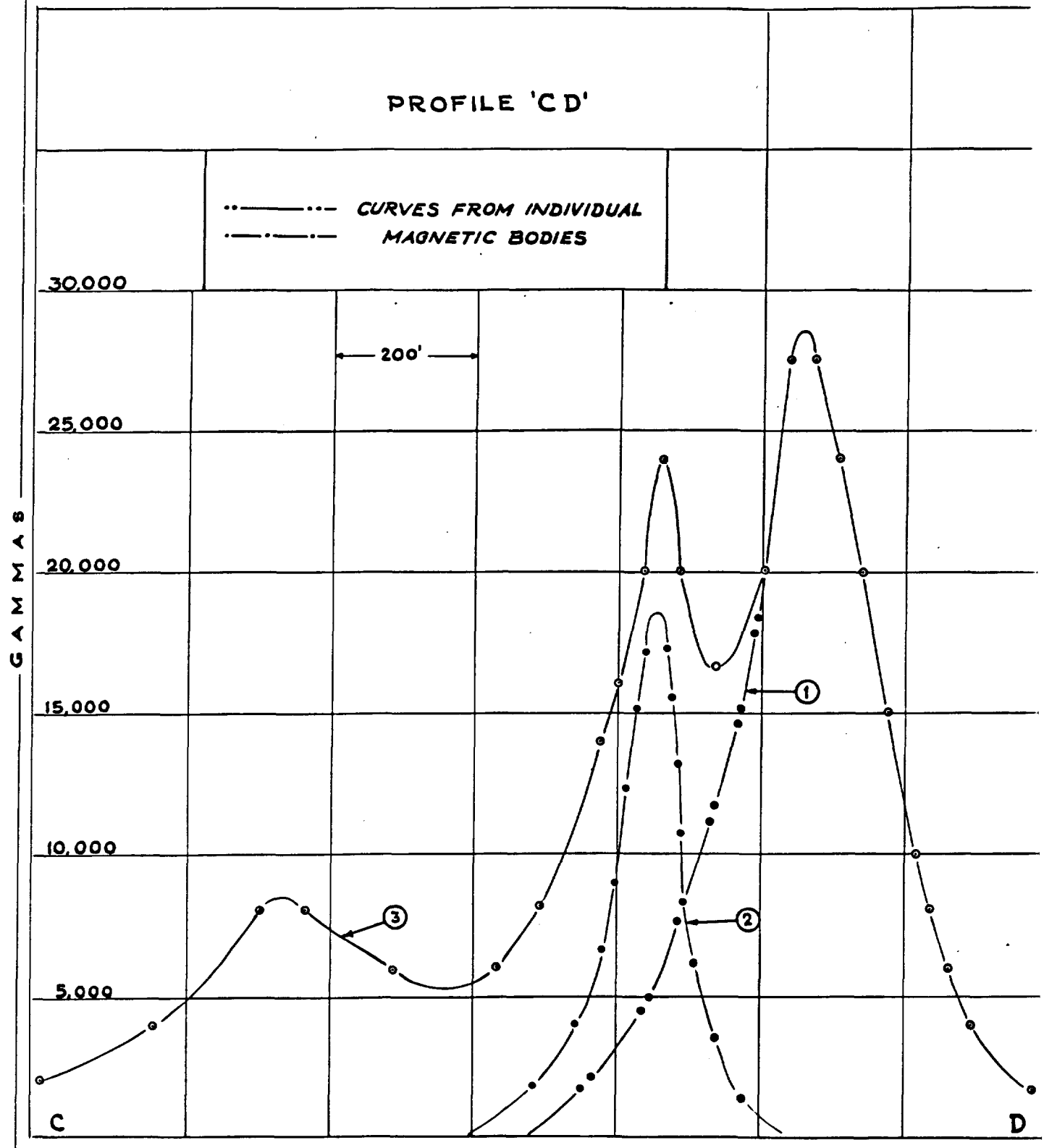
V = Peak anomaly value in gammas

Vo = Earth's magnetic field in gammas

K = Calculated magnetic susceptibility

% = Percent magnetite estimated from susceptibility

The main anomaly is made up of three main components of total width 450 feet. A profile using the values from a previous airborne survey show that at the flight elevation of 500 feet the individual magnetite bands are not resolved. The magnetic body appears to be 375 feet wide with an average of 14 percent magnetite


PROFILE 'C D'
CURVES FROM INDIVIDUAL MAGNETIC BODIES
30,000
25,000
20,000
15,000
10,000
5,000
200'
GAMMAS
C
D
1
2
3

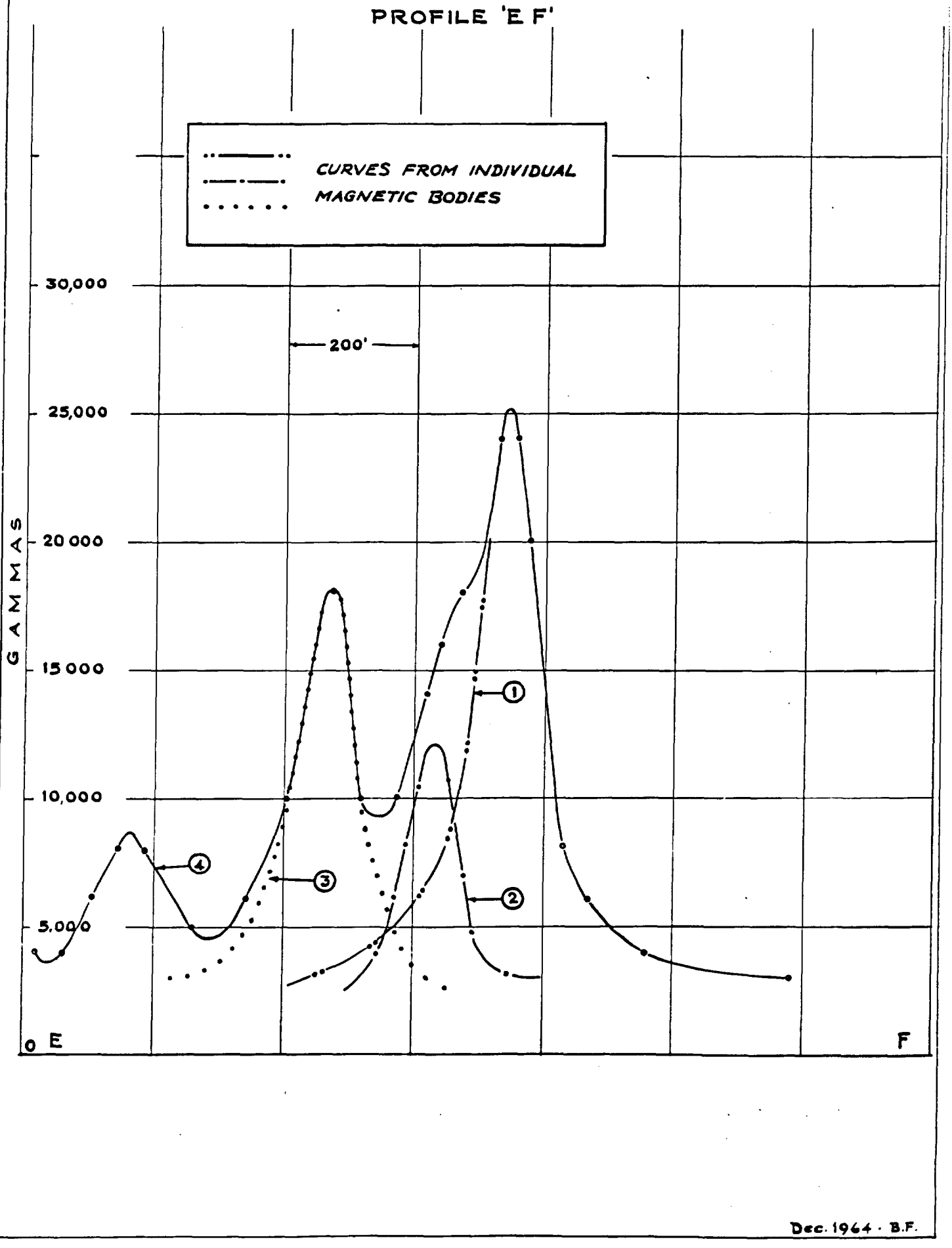
Dec. 1964 · E.J.

PROFILE C - D

	Anomaly 1	Anomaly 2	Anomaly 3
Width	40	10	40
Depth	40	35	80
V	28,500	18,500	8,500
Vo	65,000	65,000	65,000
K	0.47	0.92	0.28
%	29	57	17

The main anomaly is made up of two components which are not resolved in the previous airborne survey. The total width from the ground survey was 260 feet as compared to 300 from airborne results.

The airborne profile indicated an average percentage magnetite of 13.


PROFILE 'E F'
CURVES FROM INDIVIDUAL MAGNETIC BODIES
30,000
25,000
20 000
15 000
10,000
5,000
GAMMAS
200'
0 E
F
1
2
3
4

Dec. 1964 · B.F.

PROFILE E - F

	Anomaly 1	Anomaly 2	Anomaly 3	Anomaly 4
Width	10	30	15	40
Depth	35	30	40	60
V	22,000	9,000	15,000	5,500
Vo	65,000	65,000	65,000	65,000
K	0.85	0.23	0.64	0.14
%	53	14	40	9

The main anomaly is made up of three components. The total width across the three bends is 320 feet as compared to 400 from the airborne data. The average percentage from the airborne results is found to be 12.

CONCLUSIONS AND RECOMMENDATIONS

The airborne results indicate total widths of magnetic material which are slightly less than the width across the combined magnetic bands. The average percentage is much lower as would be expected - however the combined widths times percent of the individual bands is much less than the total width times the average percentage from airborne results.

The detailed survey would indicate considerably less tonnage than the airborne results.

A cross section along Profile AB should be drilled to determine how close to reality the percentage determinations are and to assist in estimating tonnages.

Respectfully submitted,

GEOPHYSICAL ENGINEERING & SURVEYS LIMITED,

A. R. Clark.

A. R. Clark.

Toronto, Ontario,
December 11, 1964.

Use for one type of survey only

Submit in duplicat

Assessment Work Breakdown

1. Type of Survey Magnetometer.

2. Township or Area Eby.

3. Mining claim numbers L-77343, 77349, 78187, 78188, 78189, 78190, 78487, 78738, 78739, 79120.

4. Number of miles of line cut 11.75.

* 5. Type of instrument used E.J. Sharpe, Model MF-1 Fluxgate (Two Used)

* 6. Scale constant or sensitivity ± 10 gammas on 1000 gamma scale.

* 7. Number of stations established Base Stations - 6 ; Regular Stations - 769

8. Summary of days worked (details on reverse side)

Total technical (include consultants, draughting etc.)	27 ½ days X 7	192.5
Total line-cutting	44 days	44.
Total man-days (technical plus line-cutting)		236.5
Assessment days credit per claim		23.6

9. Dated Dec. 11, 1964. Signed J. C. Frantz.

* Complete only if applicable

Complete list of names, addresses and dates on reverse side

Use for one type of survey only

Assessment Work Breakdown

1. Technical

Type of Work	Name & Address	Dates Worked	Hours	D
Operator	A. MacDonnell, Timmins	6-8 Nov. 64.		
"	A. Clemens, Timmins	6-8 Nov. 64.		
Helper	G. Riddler, Timmins	6-8 Nov. 64.		
Surveying	G. Loach, Kirkland Lake.	21-22 Oct. 64.		
"	D. Dekker, Kirkland Lake.	21-22 Oct. 64.		
"	K. Griffin, Kirkland Lake.	21-22,31 Oct. 64.		
		Totals		1.

Consultants

Name & Address	Dates Worked (specify in field or office)	Hours	Dc
J.C. Frantz, Toronto.	4 Dec. 1964 (office)		
A.R. Clark, Toronto.	7-10 Dec. 1964. (office)		
	Totals		5

Draughtsman, Typing, others (specify)

Name & Address	Type of Work	Dates Worked	Hours	Da
R. Woolham, Timmins	Calculating, drafting and Contour work sheet.	9-10 Nov. 1964.		2
		13-20 Nov. 1964.		2
E. Janiec, Toronto	Final Drafting and Contour	9-10 Dec. 1964.		2
E. Pennylegion, Toronto	Typing report.	11 Dec. 1964.		
		Totals		7

2. Line-Cutting

Name	Address	Dates Worked	Hours	Da
J. Merher,	Kirkland Lake, Ontario.	21-22 Oct. 1964.		2
A. David,	Kirkland Lake, Ontario.	21-22 Oct. 1964.		2
J. Whelan,	Kirkland Lake, Ontario.	24 Oct. - Nov. 1. 1964. Incl.		10
W. Arsenault,	Kirkland Lake, Ontario.	24 Oct. - Nov. 1. 1964. Incl.		10
C. Gilmour,	Kirkland Lake, Ontario.	24 Oct. - Nov. 1. 1964. Incl.		10
M. Sullivan,	Kirkland Lake, Ontario.	24 Oct. - Nov. 1. 1964. Incl.		10
		Totals		44

ROAD

F

78789

D

E

C

1

2

3

4

LOT 5

LOT 4

L.3E

L.6E

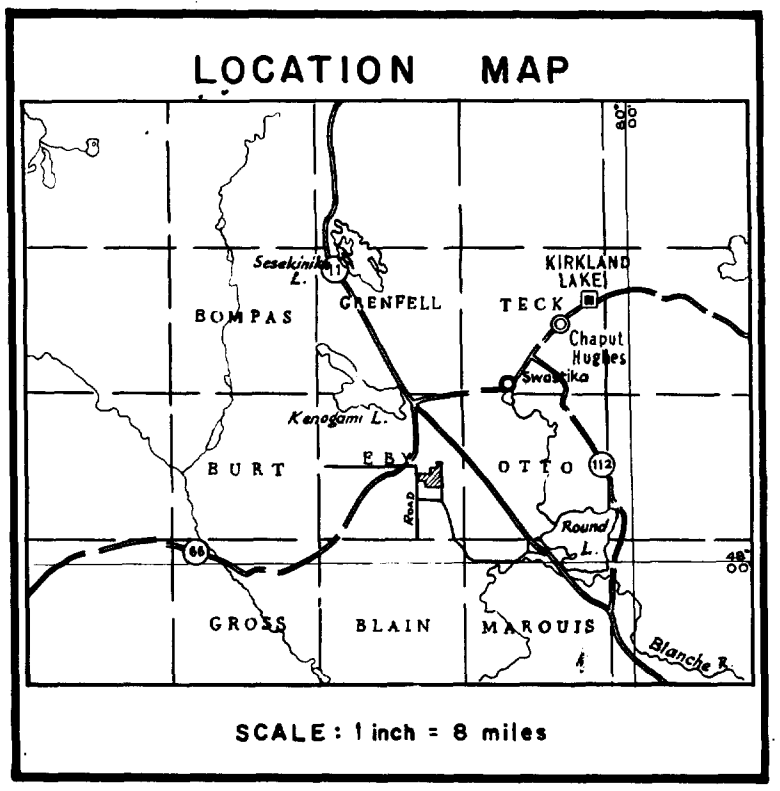
L.9E

L.12E

L.15E

L.18E

LOCATION MAP



SCALE : 1 inch = 8 miles

79120

79188

78187

B

A

1

2

3

4

R O A D

ANNEX
'H-15"

TAYLOR GOLD MINES LTD.

Claims L90284-87, EBY TOWNSHIP, ONTARIO

REPORT ON THE

MAGNETOMETER SURVEY

REPORT No.58P

N. T. S. 42 A/1

March 25, 1966

H. D. McLeod P. Eng.

H. D. McLeod, P. Eng.

REGISTERED PROFESSIONAL ENGINEER
MINING
H. D. McLEOD
PROVINCE OF ONTARIO

ASSESSMENT WORK
Rec'd from Minings and Sr.
Toronto
Date 18 July 1966 Howard Lovell
Resident Geologist

SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Taylor Gold Mines Ltd. Hi-Way claims in Eby Township were tested by a magnetometer survey.

East-west trending high magnetic anomalies were outlined. These are interpreted to be magnetite-rich zones within the basic volcanics.

Geological mapping and a vertical loop electromagnetic survey are recommended.

ACCOMPANYING MAPS

(1.) Drawing 3079 - "Magnetometer Survey".

INTRODUCTION

Taylor Gold Mines Limited Hi-Way claims comprise the following contiguous group in Eby Township:

P90284	NW¼ S½	Lot 3	Concession V
P90285	NE¼ S½	Lot 3	Concession V
P90286	SE¼ N½	Lot 3	Concession V
P90287	NE¼ N½	Lot 3	Concession V

The claims were staked and recorded in March 1965 and presently are registered in the name of Taylor Gold Mines Limited, Suite 1000, 11 Adelaide St. W., Toronto, Ontario.

The magnetometer survey was done by Geophysical Engineering and Surveys Limited personnel under the direct supervision of the writer during the period March 10-14, 1966. The operator was A. MacDonnell, 83 Algonquin Blvd. E., Timmins, Ontario.

LOCATION & ACCESS

The claims are located in the northeast part of Eby Township, Larder Lake Mining division, a distance of 8 miles to the southwest of Kirkland Lake, Ontario. Approximate co-ordinates are 48° 05' north, 80° 10' west.

Access to the claims is by Highway no. 11 which passes through the claims at a point two miles approximately to the southeast of Kenogami, Ontario.

SURVEY METHODS

Line Cutting

Lines were cut in both directions at 300-foot intervals from a base line oriented N 45° E. Tie lines were established along the claim boundaries.

Approximately 7 miles of line was cut.

Magnetometer Survey

The magnetometer survey was done with a Sharpe Fluxgate Model M. F. 1 magnetometer having a constant of 20 gammas per scale division. Readings were taken at 100-foot intervals along all the picket lines with fill-in readings at 50-foot intervals in areas of high magnetic relief. Diurnal readings were taken at 1 to 1½ hour intervals on permanent base stations. The results were corrected, plotted and contoured as shown on the accompanying map.

Approximately 275 readings were taken .

RESULTS OF THE SURVEY

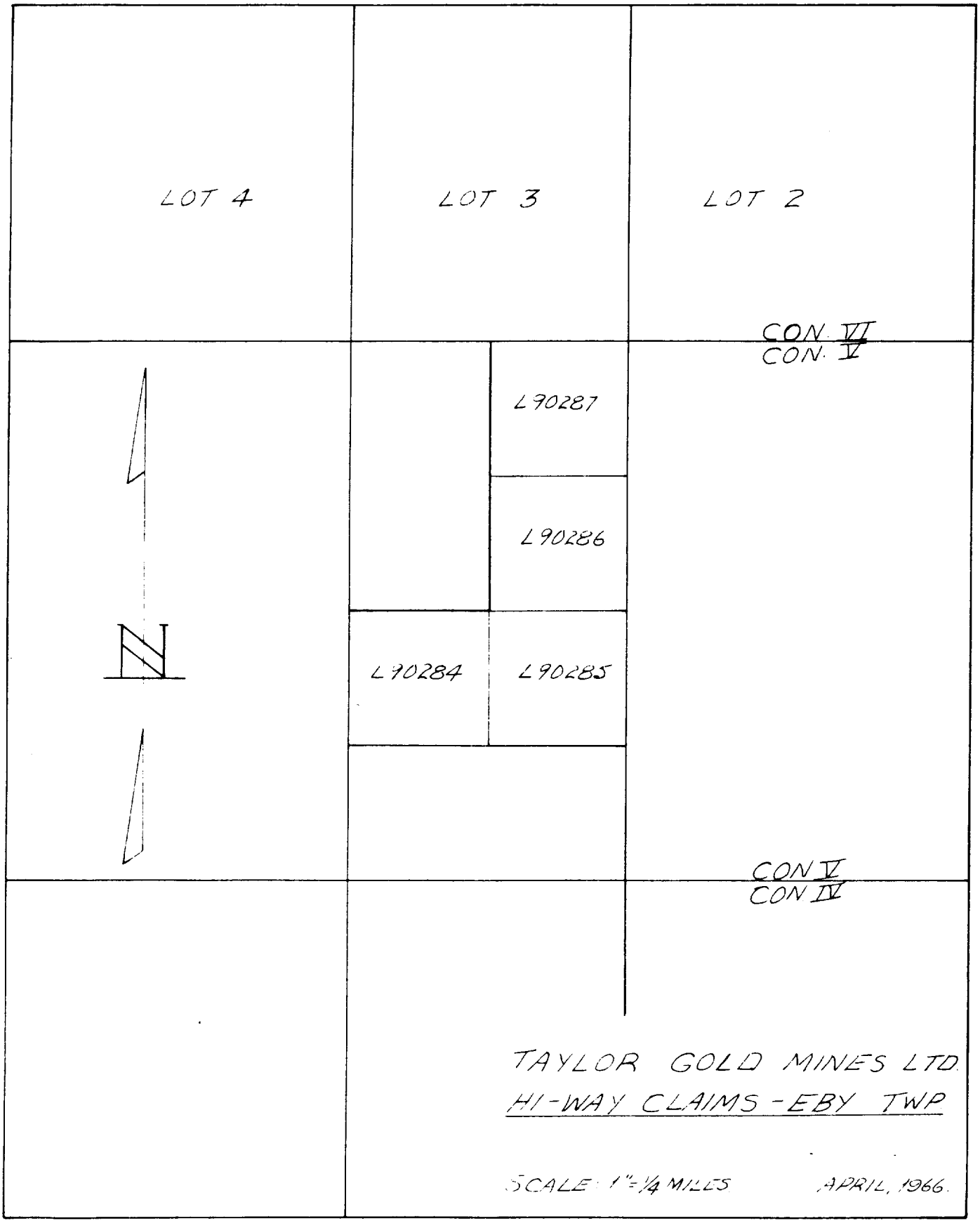
One magnetic trend was outlined. This is a high striking east-west to N 45° E across the southern two claims. Magnetic relief ranges to a maximum of 3800 gammas above background. A second high trend is indicated in the extreme southeast corner of claim L90285, however this lies mostly outside the boundaries of the group. The remainder of the area, particularly the northern two claims, is featured by very low magnetic relief.

GEOLOGY

No geological mapping was done since the survey was done in the winter, however outcrop is present on the claims.

Ontario Department of Mines Map No. 1946-1 titled "Kenogami Lake Area" indicates that the northern two claims are underlain by Algoman diorite and gabbro. The mapping does not cover the southern claims however basic lavas and diorite are indicated to be present. A major fault with carbonate alteration is indicated also.

The high magnetic anomalies are interpreted to be magnetite-rich sections within the basic flows or possibly lean iron formation zones.


LOT 4
LOT 3
LOT 2
CON VI
CON V
L90287
L90286
L90284
L90285
N
CON V
CON IV
TAYLOR GOLD MINES LTD.
HI-WAY CLAIMS - EBY TWP
SCALE 1" = 1/4 MILES
APRIL, 1966.

Use for one type of survey only

Submit in duplicate

Assessment Work Breakdown

1. Type of Survey: Magnetometer
2. Township or Area: Eby Township
3. Mining claim numbers: L90284, L90285, L90286, L90287.

4. Number of miles of line cut: 7

* 5. Type of instrument used: Sharpe Fluxgate Model M. F. 1 magnetometer

* 6. Scale constant or sensitivity: 20 gammas per scale division.

* 7. Number of stations established: 275

8. Summary of days worked (details on reverse side)

Total technical (include consultants, draughting etc.): 77

Total line-cutting: 12

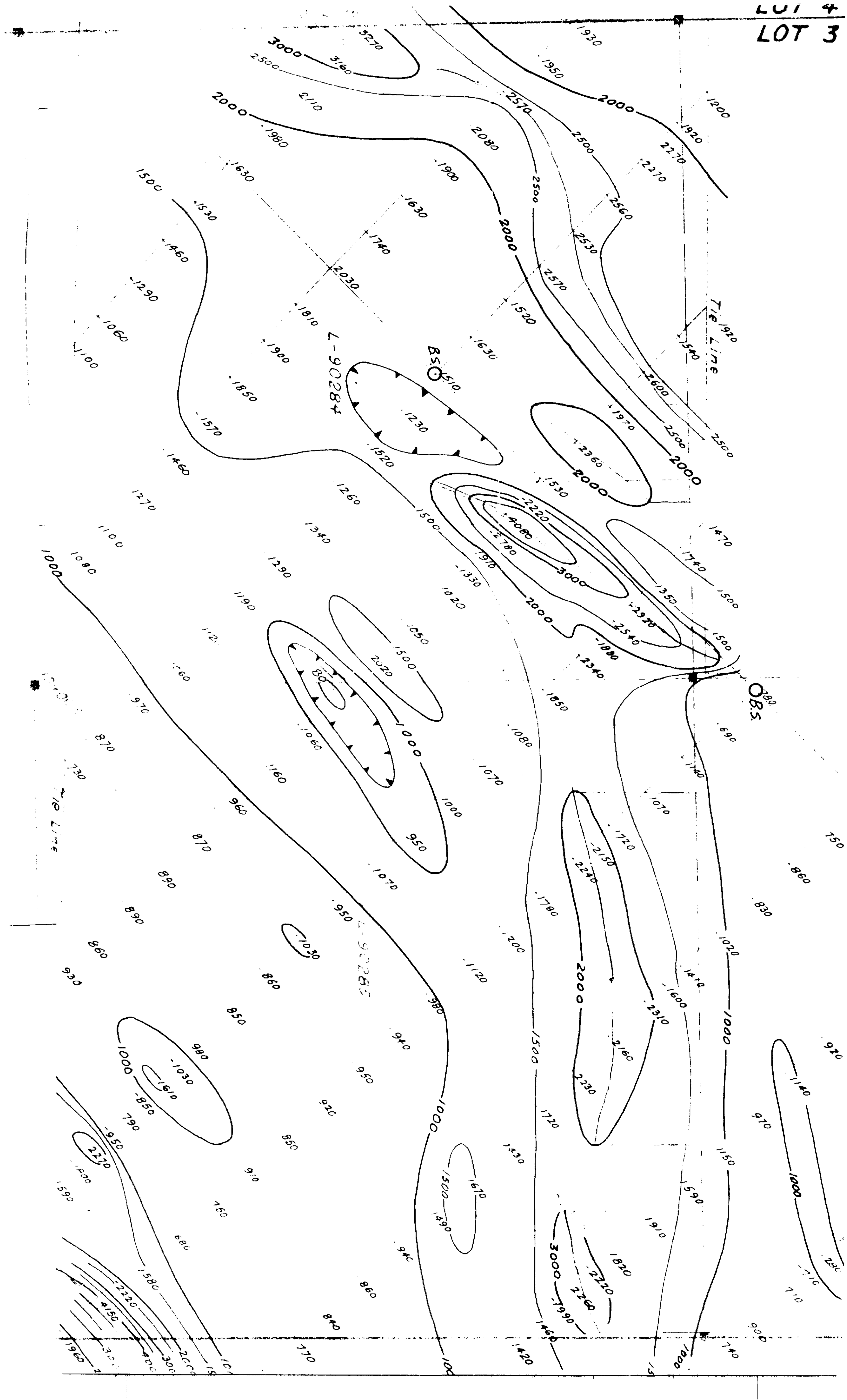
Total man-days (technical plus line-cutting): 89

Assessment days credit per claim: 22

9. Dated March 25,,1966 Signed: W. D. McLeod

* Complete only if applicable

Complete list of names, addresses and dates on reverse side


LOT 4
LOT 3
L-90284
Tie Line
B.S.
O B.S.

ONTARIO

ANNEX "H-16"

THE MINING ACT REPORT OF WORK

A separate form is required for each type of work to be recorded.

To the Recorder of Larder Lake Mining Division

I, Morris Fishkin (name of Recorded Holder) K-16651 (Miner's Licence)

Box 351 Bradford Pennsylvania U.S.A. (Post Office Address)

do hereby report the performance of 138 days of Diamond drilling (type of work)

not before reported to be applied on the following contiguous claims

Claim No.	Days	Claim No.	Days	Claim No.	Days
213461	2	101998	8	102050	13
102051	13	102052	13	101999	13
102108	13	102107	12	102106	12
102149	13	102148	13	102150	13

Eby Twp.

All the work was performed on Mining Claim (s) 213461 SW ¼ of S ½ Lot 2, Con. 5.
(In the case of geological and/or geophysical survey (s) where more than 18 claims are involved attach a schedule)

READ CAREFULLY: THE FOLLOWING INFORMATION IS REQUIRED BY THE MINING RECORDER.

For ual Work, Stripping or Opening up of Mines, Sinking Shafts or Other Actual Mining Operations – Names and addresses of the men who performed the work and the dates and hours of their employment.
For Diamond and other Core Drilling - Footage, No. and angle of holes and diameter of core. Name and address of owner or operator of drill. Dates when drilling was done. Signed core log and sketch in duplicate.
For Compressed Air or Other Power Driven or Mechanical Equipment
Type of drill or equipment. Names and addresses of men engaged in operating equipment and the dates and hours of their employment.
For Power Stripping - Type of equipment. Name and address of owner or operator. Amount expended. Dates on which work was done. Proof of actual cost must be submitted within 30 days of recording.
With each of the above types of work sketches are required to show the location and extent of the work in relation to the nearest claim post. In the case of diamond or other core drilling the sketch must be submitted in duplicate.
For Geological and Geophysical Survey - The names and addresses of men employed as well as dates. Type of instrument used in the case of geophysical survey. Reports and maps in duplicate must be filed with the Minister within 60 days of recording.
For Land Survey - the name and address of Ontario Land surveyor.

The Required Information is as Follows: (Attach a list if this space is insufficient)

Work performed by diamond drill hole No3 on claim 213461, 138ft of "A" core by N. Smith Drilling Ltd, Kirkland Lake August 1969.

Date 18th August 1969

M. Fishkin
Signature of Recorded Holder or Agent

IG A FALSE STATEMENT IN THIS REPORT AND/OR CERTIFICATE IS $500. OR SIX MONTHS IMPRISONMENT OR BOTH

The Mining Act
Certificate Verifying Report of Work

FISHKIN

DIAMOND DRILL LOG

Property Claim L-79864 Eby Township Hole No. 1

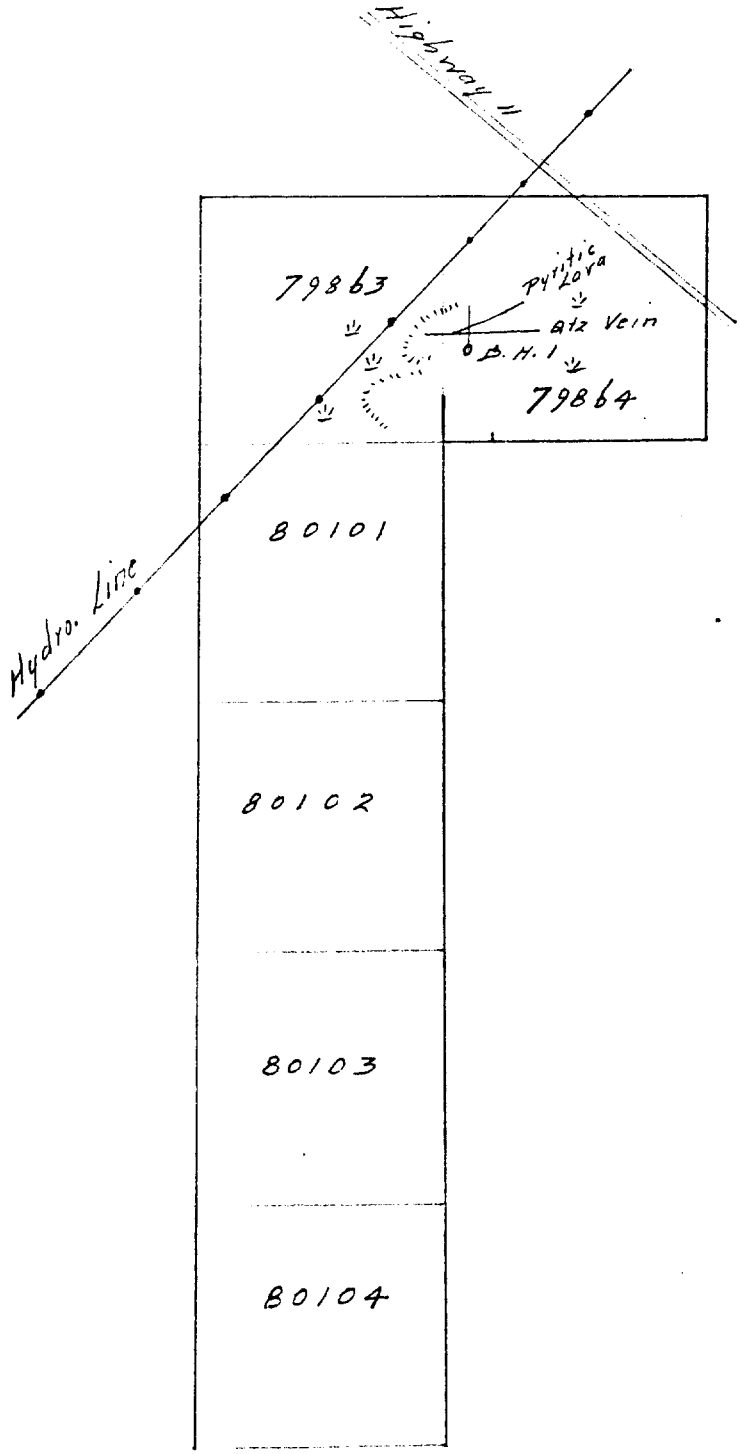
Location of Hole 800 ft south and 100 ft east of the No4 post

Bearing 360° Dip 60° Started 29May65 Completed 1June65 Logged by S.A.Pain

Dip Tests Nil

From	To	Description	Sampled	No.	Length	Assays
0	33	Andesitic lava, with much local granitization. A few quartz seams with slight pyrite. At 31½ a ½" qtz with red stain and slight py. in the lava for ½" each side.				
33	34	Lava slightly brecciated with qtz and slight py.				
34	43½	Andesitic lava as before.				
43½	52	Lava, with much infiltration of qtz, some epidote, slight py. 47-48 streaks of py, with some chalco and a few spots of sphalerite.	48-49	3721	12"	Tr
52	121	Dioritic lava. With occasional finer grained phases, andesitic. 61-63 much infiltration by qtz, with bleaching, and fair dissemination of py. At 109, 2" qtz and brecciated diorite, slight epidote	61-63	3722	24"	Tr
	End					

ASSESSMENT WORK
Rec'd from Mining Recorder
KIRKLAND LAKE
Date June 3/65 WHS
Resident Geologist



1 INCH = 1000 FEET

DIAMOND DRILL LOG

Property Fishkin. Claim 102106 et al. Eby Two. Hole No. F-2

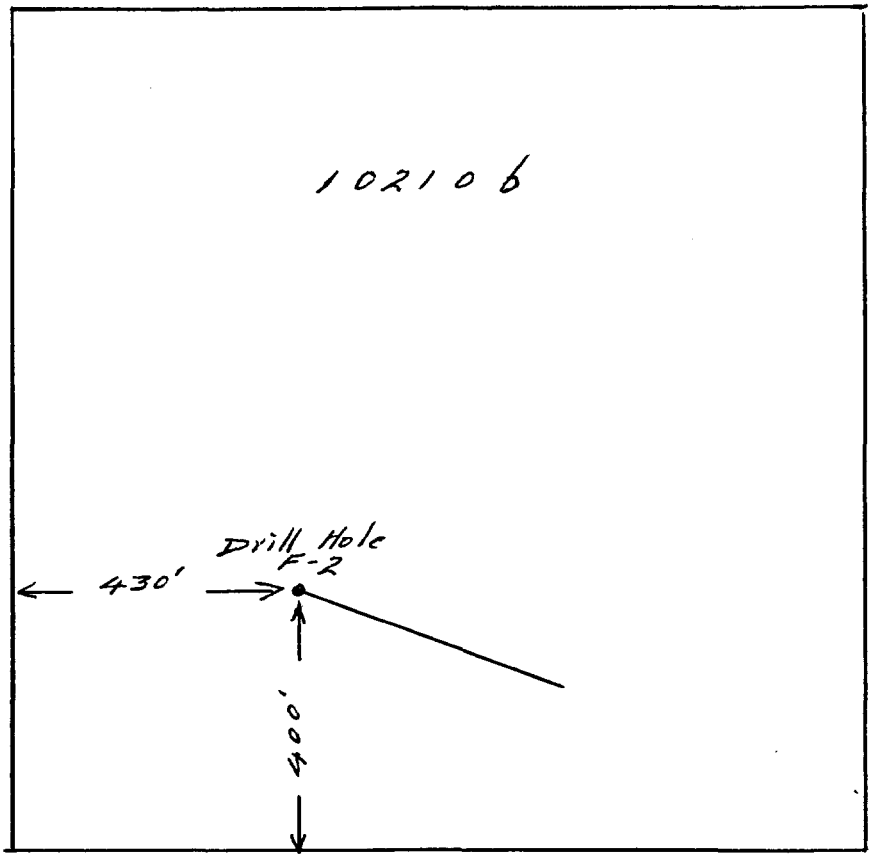
Location of Hole 430 ft East and 400 ft north of No 3 post 102106

Bearing 110° Dip 50° Started 17-Oct-68 Completed 2-Nov-68 Logged by S.A.Pain

Dip Tests At 600 ft 45°

From	To	Description	Sampled	No.	Length	Assays
0	32	Casing. Sand.				
32	42	Rhyolite Tuff, Graphitic, sheared, vert. Thin seams of Py.				
42		Rhyolite Tuff. Banded grey and white. Some sections agglomeratic. Thin seams & grains of Py to 100 ft. At 44' 1½" Qtz. Flat dip E. 53 1" Qtz. Vert. 57 1½" Qtz				
	100	72-73½ Much qtz.				
100		"Iron Formation". Light and dark sections of probably rhyolite tuff with medium to heavy minzn of pyrite, pyrrhotite throughout, and some scattered patches of				
	387	chalcopyrite.				
387		Diabase. Centre portion 405-420 fine grained, grading both ways to aphanitic marginal zones with				
	447	vertical frozen contacts.				
447		"Iron Formation" Baked for 1 ft from contact. Very heavy minzn				
	625	490-615.				
625		Amphibolite Schist. Dark green, minor feldspar, much amph and much magnatite in patches. 792-794 graphitic shearing with qtz, py, po, slight chalco.				
	872	Increasing minzn to 872.				
872		Gabbroic dyke. Fine grained.				
	875	Epidote. No minzn. Vert contacts.				
875		Amphibolite Schist. Many aplitic				
	940 End	and syenitic inclusions.				

ASSESSMENT WORK
Rec'd from Mining Recorder
Date NOV 12 1968



1 INCH = 300 FEET

ASSESSMENT WORK
Rec'd from Mining Recorders
R. Lake Powell
Date NOV 12 1959
Recorder

DIAMOND DRILL LOG

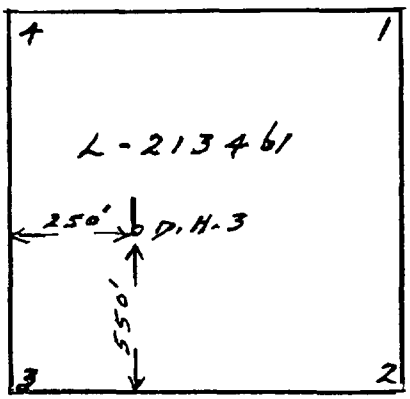
Property Claim L-213461 (former 79864) Eby Township Hole No. 3

Location of Hole 250 ft east and 550 ft north of No 3 post.

Bearing North Dip 60° Started 4-Aug-69 Completed 6-Aug-69 Logged by S.A.Pain

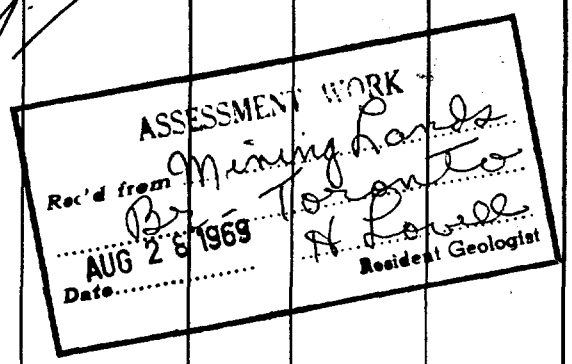
Dip Tests Nil

From	To	Description	Sampled	No.	Length	Assays
0	13	Casing. Sand & gravel				
13		Andesitic Lava Light green, threads and seams of qtz, with disseminated pyrite & pyrrhotite At 33' 2" qtz " 46' 1" pyrite & some calcite 55'-56' mostly qtz. 61'-64' flow structure; much qtz & py. 78'-83' a porphyritic phase				
	103					
103		Diorite Sharp contact. Fine but distinct grain 121'-121½' fair magnetite and slight pyrrhotite Finer grained toward lower contact.				
	127					
127		Andesitic Lava Indistinct contact zone 127-129'. Much broken, with qtz seams and some bleaching.				
	138 End					
		138 ft of "A" core drilled by N. Smith Drilling Ltd, Kirkland Lake.				



Scale (1" : 10ch)

S. A. Pain



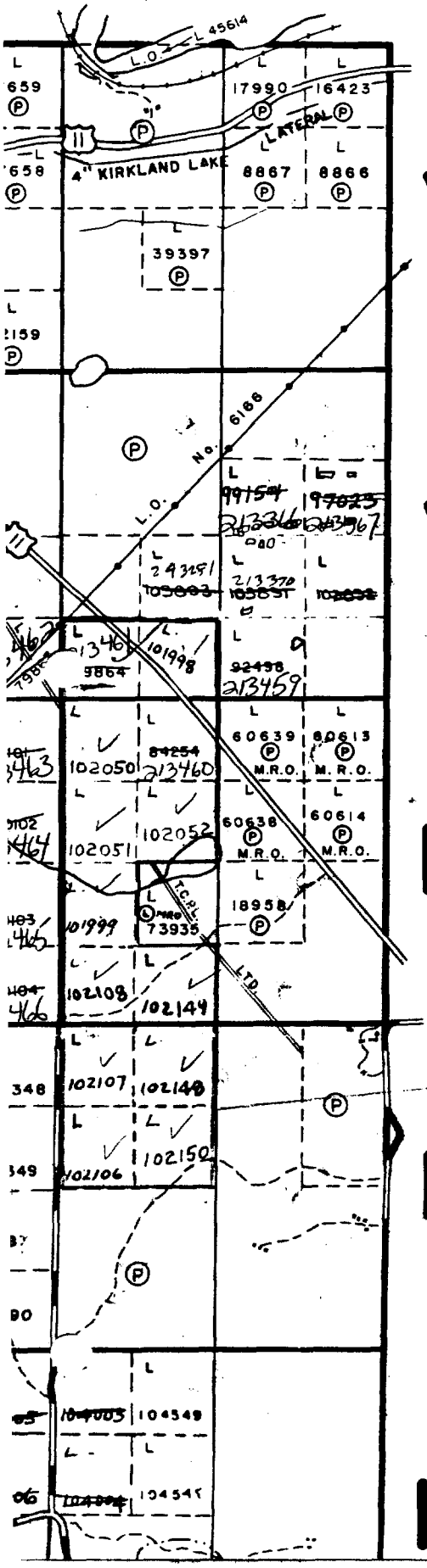
THE TOWNSHIP OF

EBY 1969

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

LARDER LAKE MINING DIV.
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Sept 22
JUN 17 1969
AM PM

Geophysical Surveys

on

Eby 1-79 Group

ANNEX "H-KB"

Eby Township Ontario

Location and Access

This group of 7 unpatented claims covers the N 1/2 of Lot 2 Con. lll and the S 1/2 of Lot 2 Con. lV except for the N.W. 1/4 of the said half of Eby Township, Ontario.

Access is quite easy. From a point two and three quarter miles south of the junction of highways 11 and 66 there is a gravel road which may be followed in a south westwardly direction to the centre of the northern part of the property.

Claims and Numbers

These are:

L. 545891 - N.E. 1/4 of the S 1/2 of Lot 2 Con. lV of Eby Twp.
L. 545885 - S.E. 1/4 of the S 1/2 of Lot 2 Con. lV of Eby Twp.
L. 545886 - S.W. 1/4 of the S 1/2 of Lot 2 Con. lV of Eby Twp.
L. 545887 - N.W. 1/4 of the N 1/2 of Lot 2 Con.lll of Eby Twp.
L. 545888 - N.E. 1/4 of the N 1/2 of Lot 2 Con.lll of Eby Twp.
L. 545889 - S.E. 1/4 of the N 1/2 of Lot 2 Con.lll of Eby Twp.
L. 545890 - S.W. 1/4 of the N 1/2 of Lot 2 Con.lll of Eby Twp.

and comprise some 280 acres.

Linecutting

Picket lines 400' apart with station intervals of 100' were cut and chained.

Some 8.0 miles of this work was done by McClemens Geophysics, Noranda, Quebec in the period November 1 to 6, 1979.

Magnetic Survey

1. Assessment Data

The instrument used was a McPhar M700 Fluxgate magnetometer. Readings were taken at all of the 100' stations and a considerable number of intermediate 50' ones as well.

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KIRKLAND LAKE, ONT.

...../2

The usual diurnal and datum adjustments were made and the corrected results were plotted and then contoured.

Some 610 (base, sub-base and line) stations were read in the period November 8 to 15 by McClemens Geophysics, Contractors, of Noranda, Quebec.

2. Mag Results

There is a narrow sinuous high extending from the south end of L. 16 W. to near the south end of L. 4 E. This is caused by a known diabase dyke.

There is a wedge shaped high which extends from about 1,100 S. on L. 12 W. to about 600 S. on Line 0+0. This is associated with a known sulphide iron formation which may extend further east as indicated by the closures at 100 S. on Line 8 E. and in the north east corner of the property.

E.M. Survey

1. Assessment Data

The instrument used was a Geonics E.M. 17 Horizontal Loop. The coil separation was 200 feet and the coil configuration was horizontal coplanar. The frequency was 1,600 Hz.

Phase and out of phase readings were taken at all of the 100' line stations.

Some 315 stations were read by McClemens Geophysics concurrently with the magnetic work.

E.M. Results

A number of conductors were located.

These are:

AA This short intermittent conductor has only fair conductivity but is close to an old pit in which there was pyrite and pyrrhotite with a low copper content.

BB, CC and DD - These short strong conductors are all in the south west corner of the property. They all exhibit good to excellent conductivity, some width and are close to surface. They extend off the property to the west and have magnetic association.

...../3

Apparently they terminate at or close to the diabase dyke mentioned above.

Conclusion

Conductors BB, CC and DD should be carefully prospected. They are very shallow and possibly can be explained with a limited amount of "moss pulling" or trenching. Failing this "pack sack" diamond drilling should permit an evaluation of their worth.

Toronto, Ontario

October 22, 1980

Respectfully submitted,

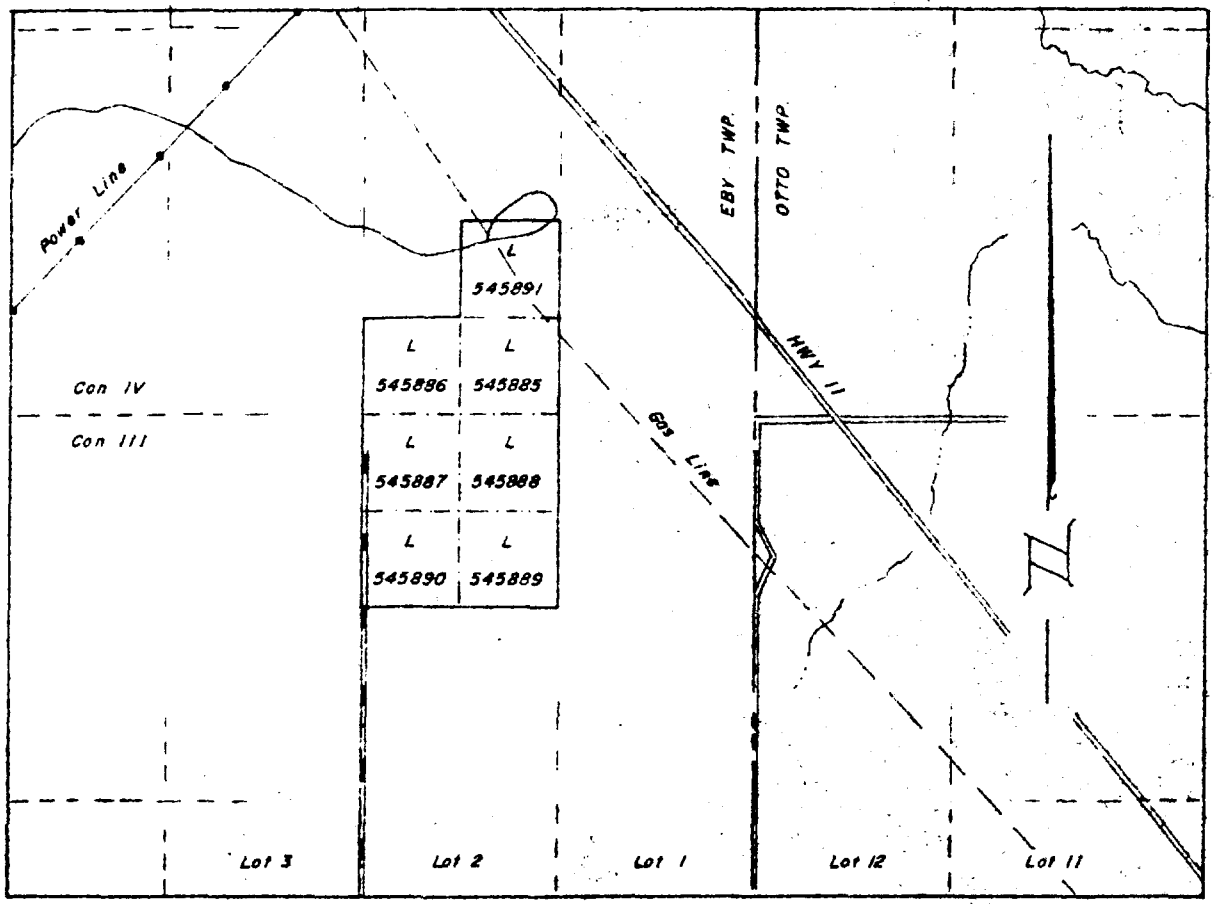
John W. Britton, M.A., P. Eng.

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KIRKLAND LAKE, ONT.

JWB:rd



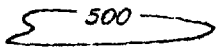
LOCATION PLAN

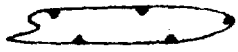
Eby 1-79

Scale 1" = 2640'

LEGEND

INSTRUMENT: McPhar Fluxgate M-700
READINGS: Directly in gammas

Isomagnetic Contours 

Magnetic Depression 

Magnetic Base Station ▲
Contoured at: 200 gammas
No. of readings: 550
Dates of Survey: Nov 1-30, 1979

KL-2044-1

REVISED

Magnetic Survey

Eby 1-79

Eby Twp. Ontario

PROJECT:

PROJ. Nº 934
N.T.S. 42-A-1
DWG. Nº

SURVEYED BY: A. McClemens DATE:
DRAWN BY: L. A. Waddell SCALE: 1" = 400'

NORANDA EXPLORATION CO. LTD.

OFFICE: Timmins, Ont.

TRANSTEX 13 500-8-ST

2 of 2

12E

Lake

0+00 B.L. N 55° E

4W

00

4E

8E

8W

12W

16W

20W

24W

L-545891

L-545885

L-545887

L-545888

L-545889

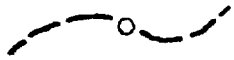
Road

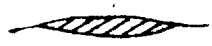
Road

LEGEND

INSTRUMENT: Geonics E.M.-17 (1600 Hz.)
READINGS: In percentage
IN-Phase: Plotted close to the line
Out of Phase: " remote from the line
Profile Scale: 1" = 20%; (plus to left, minus to right)
In-Phase: Solid Line; Out of Phase; Dashed

Defined Conductor Axis 

Inferred Conductor Axis 

Area of Conductivity 

No of Readings: 316 In-Phase; 316 Out of Phase

Dates of Survey: Nov 1-30, 1979

Coil Separation: 200'

KL-2044-2

REVISED	RESIDENT GEOLOGIST ONTARIO GOVERNMENT RECEIVED MAY 11 1981 KIRKLAND LAKE, ONT. **H.E.M. Survey** Eby 1-79 Eby Twp. Ontario
	PROJECT:
PROJ. Nº 934	SURVEYED BY: A. McClemens DATE:
N.T.S. 42-A-1	DRAWN BY: L.A. Waddell SCALE: 1" = 400'
DWG. Nº	**NORANDA EXPLORATION CO. LTD.** OFFICE: Timmins, Ont.

ST-8-005 21 XETRART

2044-2

16E 20E 24E

12E

Lake

0+00 B.L. N 55° E

4W 00 4E 8E

L-545891

A

A

Road

8W

12W

L-545886

L-545885

Gas Line

16W

20W

L-545887

L-545888

Road

B

B

24W

C

D

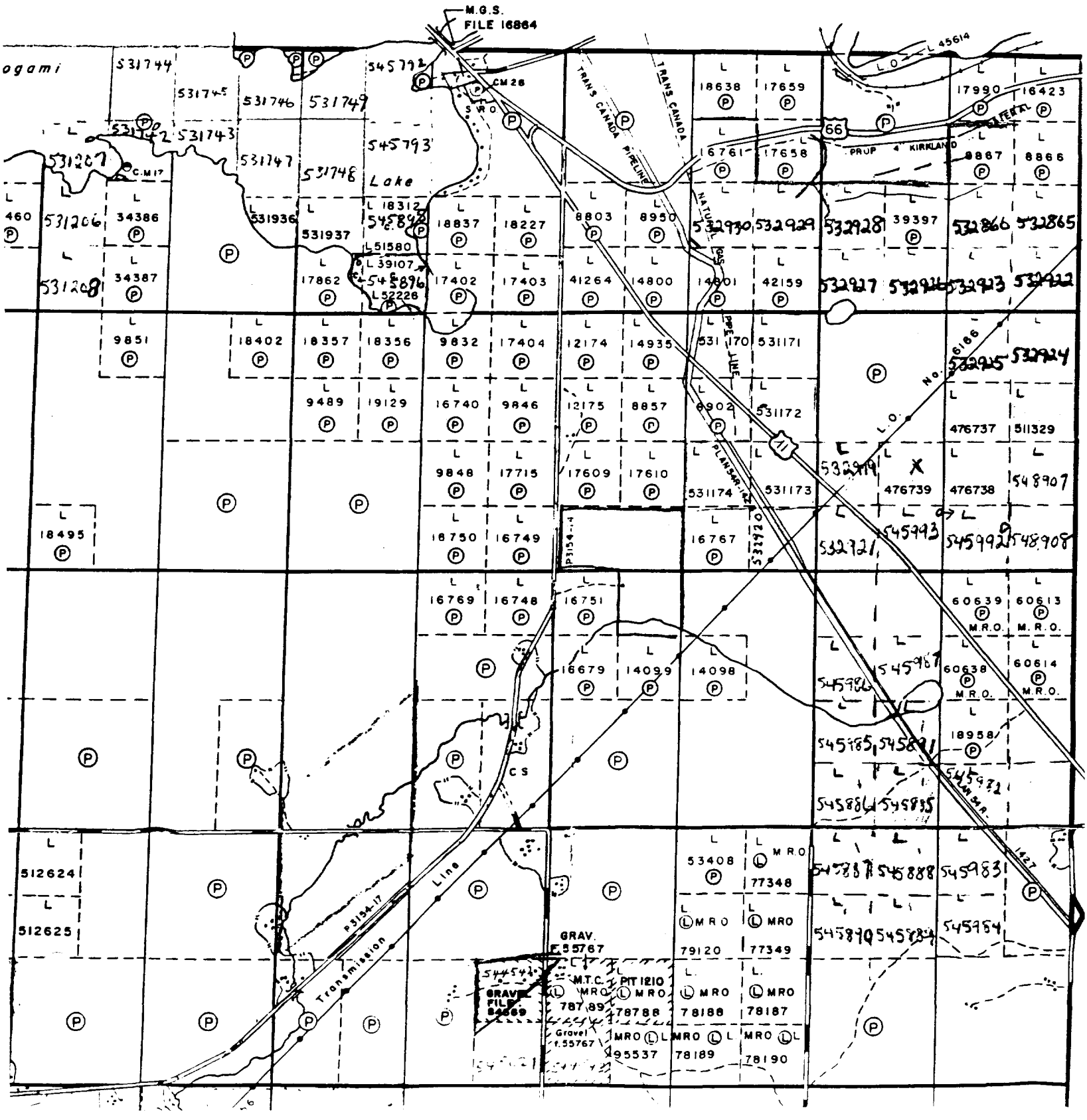
C

D

L-545890

L-545889

Grenfell Twp. M. 351



ANNEX "H-171"

A Report on the Kenogami Lake Gold Property Larder Lake Mining Division, Ontario of Hemlo Reef Resources, Eby Group

OM83-6-C-251

Dundas, Ontario
December 21, 1983.

S. Carmichael B.Sc.

MINISTRY OF NORTHERN DEVELOPMENT AND MINES
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Previous Work Done	3.
Present Work	4.
Introduction	4.
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Mineralization	8.
Geophysics	8.
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Estimated Program Cost	11.
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Appendix I Rock smaple descriptions, locations and assay value	12.
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Summary

The Hemlo Reef Resources gold property, comprising 57 mining claims and 16 optioned patents was worked on by the author during the months of October, November, and December, 1983. The purpose of the work was to delineate a possible zone of sediments which may be conducive to syngenetic gold mineralization. The work consisted of geological mapping at scale of 1:5,000 metric and a proton magnetometer survey.

The property as a whole has never received detailed exploration work, although Sylvanite Gold Mines (1945) and Dominion Gulf Company (1952) carried out minor amounts of drilling at various locations on the property. Most of this drilling was completed for assessment work only and recommendations for further work were never carried out. The Ontario Geological Survey carried out a deep overburden drilling project during 1980-81 on the property and suggested that an auriferous source area may be present on the property.

The rocks on the property consist of magnesium and iron tholeiitic basalts with interflow sediments including chert, iron formation, and chemical sediments. Numerous diabase dikes and lesser amounts of syenite also occur throughout the property. The Larder Lake 'Break' is postulated to occur on the property and provides a good exploration target as many gold mines throughout the area are associated with this structure.

Past exploration on the property has been limited due to lack of rock exposures, however this author feels the property holds a very good potential and is a very attractive exploration target. A systematic program of geological mapping, geophysical surveys, humus sampling, and trenching is recommended, culminating in a drilling program.

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OCT 29 1985

A Report on the Kenogami Lake Gold Property
Larder Lake Mining Division, Ontario
of
Hemlo Reef Resources, Eby Group

Introduction

This report on the Hemlo Reef Resources Eby claim group has been prepared by S.J.Carmichael, B.Sc. geology on behalf of Mr. R.J.Kasner, president of Hemlo Reef Resources. The property lies in the northwest quarter of Eby Township, Larder Lake Mining Division, District of Timiskaming, Ontario.

The purpose of this report is to summarize the work the author did on the property and to provide a frame work for a systematic exploration program. It is suggested that parts of this report remain confidential untill a full scale exploration program on the property is initiated.

Property Location and Access

The property comprises 57 unpatented mining claims and 16 optioned patents covering an area of approximately 13.5km^2

The property is situated in the northwest quarter of Eby Township, Ranges 4 and 5 lots 5-11, District of Timiskaming, Larder Lake Mining Division. The property may be reached by Highway66, 16km southwest of the town of Kirkland Lake. A south concession road traverses the south border of the property and a trail suitable for motorcycle or all terrain vehicles crosses the north part of the property. The central portion of the property may be reached by 4 wheel drive vehicle via a logging road which runs north off of the south concession road at line 24+00W.

The land is generally of low relief with many swamps in the east and north. Up to 70% exposure occurs in the central part of the property were logging operations and subsequent erosion of the topsoil has left outcrops bare. A grub hoe and hand wisk are essential tools when working on the property.

Lake Kenogami lies north of the property and numerous creeks and swamps traverse the property providing abundant water for diamond drilling operations. Electrical power and infrastructure suitable for support of a mining operation are available at the mining centre of Kirkland Lake, there are no facilities on the property itself.

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Previous Work Done

Due to lack of outcrop exposure, relatively little work has been done on the property considering its location and geological setting. Systematic geophysical and geological work has been carried out on only two sections of the property. The first was done by Sylvanite Gold Mines in 1945 on the present claims 616277, 618673-75, 640905-06, and 618676-78. Four holes were diamond drilled, one on claim 616277 and three on claim 618676. The first hole gave very interesting values, up to 0.2 oz/ton Au over 8'. The other three holes were drilled for assessment work and gave poor values. A grab sample from a pit showing 'green carbonate' on claim 18402 assayed 3.60 d wts (.18 oz/ton Au) and it was further reported that an extensive drilling program should be carried out on the north part of the property, drilling which was never carried out.

In 1952, Dominion Gulf Company held two claim groups, present numbers 640898-904, 640966 and 618673-75, 616277, 640905. The work consisted of a magnetometer survey, geological mapping and diamond drilling. Two holes were drilled, one on claim 640904 and one on claim 640899. The purpose of the drilling was to locate the Larder Lake 'Break" which is postulated to run through the north part of the property. No assay values were given from the drill core but the logs show that the drill on claim 640904 intersected 'altered andesite with mariposite (fuchsite)' which may be green carbonate (chemical sediment). This rock type was also intersected in the drill core on claim 640899. In addition, the geological map included in the report shows 'extensive carbonate alteration' on claims 640405 and 618675. It is the opinion of this author that rock types which have previously been termed carbonatized volcanics may in fact be sediments conducive to syngenetic stratiform gold mineralization.

The George Walters property (P 18356-57) was worked on in 1938, the work consisting of pitting and drilling. Although the information is sketchy, a bulk sample (amount of sample unknown) yielded assays of 2.74 oz/ton Au and 0.06 oz/ton Au. A drill hole under the pitted area failed to disclose 'interesting values' (gold at

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$35/oz.) In 1935, Erie Canadian Mines optioned the property and did a limited amount of work. Agrab sample is reported to have given an assay value of $6.00/ton Au (gold at $35/oz.)

In 1980 and 1981, the Ontario Geological Survey carried out a program of deep overburden drilling in the Kirkland Lake Area. Two holes were drilled on the north border of the property and two holes along the south border. The results were very encouraging and indicated that a gold source may lie on the property.

In 1983, an airborn geophysical survey consisting of magnetometer, V.L.F. and horizontal loop E.M. was carried out for Hemlo Reef Resources, the present owner of the property.

Present Work

Introduction

Hemlo Reef Resources employed the author in late October this year to map the geology and complete a magnetometer survey on the property, keeping in mind the notion that the genesis of gold mineralization in the Kirkland Lake area may be sedimentary in origin. Heavy snowfalls in late November prevented the author from completing the geological survey. Despite the early snow, the author was able to delineate a zone of chemical sediments conducive to gold mineralization, roughly 1km in strike length (open at either end) and at least 100 meters in width. Smaller zones of interflow sediments were found throughout the property, however they are not of sufficient size to warrant further work.

At the time of this report, only ⅛ of the property has been mapped at a scale of 1:5,000 metric utilizing grid lines orientated north-south at 200 meter seperation. The 200 meter seperation did not permit detailed outcrop placement or geophysical interpretation, however general trends of both surface geology and geophysics may be assertained.

Geology

During the course of mapping, the author encountered four major different rock types. These include 1. Basalt 2. Diabase dikes

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LAKE

1983
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3. Iron Formation 4. Clastic and chemical sediments of the Larder Lake Group.

1. Basalt : Both iron and magnesium tholeiites of the Larder Lake Group occur on the property, with iron tholeiites dominating to the north. They are generally fine to medium grained, dark green to black in color, occasionally pillowed and flow brecciated. Insufficient exposure of the pillows did not allow a tops determination, however the O.D.M. map #2239 indicates that flow tops face north where encountered on the south portion of the property. To the north, the flow tops face south indicating that a syncline may run through the property, the axis of which is orientated east-west. Small zones of volcanic tuff where found, generally showing a porphyroblastic texture due to shearing and metamorphism on the property.

Small quartz and quartz/carbonate veins are common throughout the property. Where mineralized with sulfides, these veins may carry up to .02oz/ton Au, however they are generally barren of mineralization.

2. Diabase : Numerous diabase dikes were found on the south portion of the property. They are generally 3-5 meters in width, magnetic and strike either east-west or north-south. One large dike was found to have a porphyritic interior, however, generally the dikes are fine to medium grained showing a typical 'diabasic' texture. They are void of mineralization although narrow hydrothermal contact areas may carry up to 10-15% sulfides. A sample from one of these contact areas returned only trace values of gold.

3. Iron Formation : Three zones of iron formation were encountered on the property. The first is a narrow (50 cm wide) zone of hematite/chert iron formation bounded on either side by greywacke-type sediments. The zone strikes roughly north-west dipping steeply south (located on line 26+00 w, south of the baseline) but does not appear to be continuous for any great strike length. The zone is weakly magnetic and may not be traced by the magnetometer.

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The second zone is located north of the base line on line 1+00 w and consists of banded magnetite/hematite and volcanic tuff. This zone strikes north-west and is strongly magnetic. It appears to be faulted off between lines 1+00w and 2+00w with a left hand lateral motion. The offset may be up to 300 meters, the fault striking roughly north-south,

The third zone is located approximately at 7+00w, north of the north tie line (11+50N) and consists of hematite/magnetite and jasper. It is strongly magnetic and appears to be continuous for at least 200 meters (based on the magnetometer survey) and may continue on for another 200 meters (lines 12+00W-16+00W, Howard Lovell, regional geologist, personal communication). This zone is an excellent marker horizon as it appears to lie within the main sedimentary sequence which may host gold mineralization. The strike of the formation is east-west, dipping steeply south.

All of the above iron formations carry only trace values of gold mineralization (0.005 oz/ton maximum).

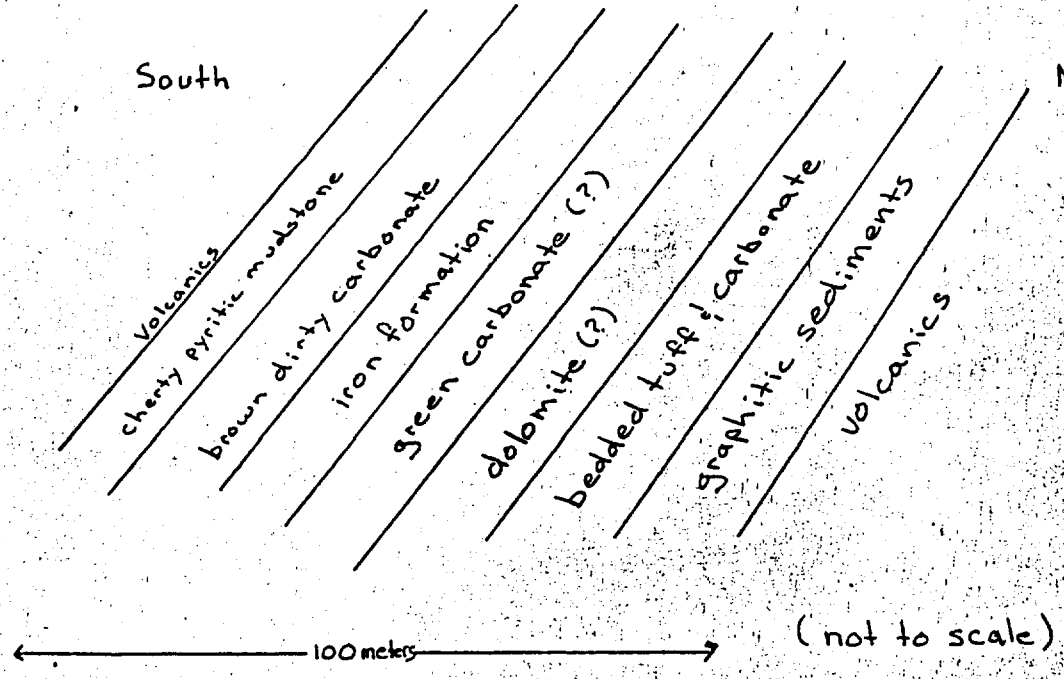
4. Sediments : All sediments encountered during the course of mapping belong to the Larder Lake Group, although Timiskaming sediments occur to the north-west (the grid at this time does not extend that far west)

Small interflow zones of chert are common throughout the property, however they are too narrow and discontinuous to warrant extensive work. Assays from these zones returned only trace values of gold.

An extensive zone of green carbonate, iron formation, dolomite and cherty mudstone appears to extend from the north-east (George Walters property) to Howard Lovell's property (1km distance) and is in all likelyhood open to both the east and west. Previously mapped as discontinuous zones of carbonatized volcanics, this zone may be interpreted as a sedimentary horizon exhibiting rocks of character similar to those found at the Mattachewan Consolidated Gold Mines to the west and the deposits near Larder Lake. Utilizing the theory that these are in fact sediments and not altered volcanics (Guy Hinse, personal communication) the

O.M.E.D.

author has delineated a zone roughly 100 meters wide and 1 kilometer long which may contain gold mineralization. The rock sequence appears to be as follows:



This sequence of sediments strike roughly east-west and dip steeply south. Rock exposure is limited and the sequence is based on a combination of geophysical and geological interpretation. An airborn E.M. survey also tends to comfirm the existance of a conductor over this rock sequence. The hanging wall cherty pyritic mudstone returned an assay value of 0.08 oz/ton Au (grab sample) whereas the rest of the sequence returned lesser gold values, however, this type of mineralization is similar to that of Larder Lake (ie, Omega Property).

Stucture

All rocks encountered have been metamorphosed up to greenschist facies and have been tightly folded. Numerous shears were encountered and faults postulated, howerver, the 200 meter line seperation does not allow a more detailed interpretation. The Larder Lake 'Break' is postulated to run through the north-west section of

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the property, however, the grid at this time does not extend that far to intersect the break. A major north-south left lateral fault appears to be located on the noth-west part of the property. This fault offsets both the carbonate sequence and iron formation a distance of up to 300 meters (based on geophysical data). Rock sequences to the north dip south while those to the south dip north, indicating that syncline, axis east-west may run through the property, however, much more extensive surface work is needed to confirm this.

Mineralization

Numerous pits and trenches were found during the co rse of mapping. Mineralization occurs in quartz and quartz/carbonate veins in basalt, interflow pyritic cherty sediments and in carbonates. The best gold values (0.08 oz/ton Au) occur in cherty banded pyritic mudstones on the hanging wall of the northern sedimentary sequence. The banding of the sulfides would indicate a stratiform origin.

Geophysics

A proton magnetometer survey was completed on grid lines spaced at 200 meters with stations every 12.5 meters. Two readings were taken every 100 meters to test the repeatability of the instrument. Diurnal fluctuations were corrected for by measuring a base station (0+00) every 2-3 hours. Diurnal fluctuation were found to vary no more than 30-40 gammas during the course of the survey. The results were then profiled in order to give a simplistic and factual representation of the property.

The extreme south portion of the property shows very little fluctuation in magnetics. Small localized peaks appear to be caused by diabase dikes which strike either east-west or north-south. North of the baseline the basaltic flows become more iron rich and take on a magnetic character. The two zones of iron formations are represented by sharp peaks and occur on line 1+00W, 8+00W, 10+00W and 12+00W. The western most iron formation

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is bounded on either side by magnetic lows and may represent sediments. The off setting of the magnetometer highs between lines 1+00N and 2+00N may be caused by a north-south striking left lateral fault.

Conclusions

Although only a limited amount of time was spent in the field, a potential gold bearing sedimentary sequence is postulated to occur in the north-east section of the property. This zone strikes roughly east-west for a probable distance of 1km, open at either end andmay be up to 100 meters or more in thickness. Rock types encountered in this area are similar to those which the author has viewed at the Mattachewan Consolidated Gold Mines occurance, the Omega deposit in Larder Lake and the Kerr Addison Virginiatown deposit. This, in conjunction with the government till survey, makes this property a very attractive exploration target.

Recommendations

Lack of rock exposure on the property has limited exploration in the past. This is rather ironic considering the recommendations put forth by the work done by Dominion Gulf and Sylvanite Gold Mines, especially since the Larder Lake 'Break' is thought to pass through the property and has always been a good exploration target from Mattachewan to Virginiatown. This author believes that the property warrants extensive exploration work to include the following:

1.) The cutting of the grid should be completed as soon as possible with lines spaced a 100 meter intervals and 50 meter intervals north of the baseline.
2.) The magnetometer survey should be completed utilizing 12.5 meter interval stations followed up by a more detailed survey if warranted.
3.)A V.L.F. survey may prove useful in finding conductors in the sediments. An I.P. survey may be useful in finding zones of disseminated sulfide mineralization.
4.) Geological mapping of the property should be completed at a scale of 1:2500 metric and 1:1000 metric over the sedimentary

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zone.

5.) A humus geochemical survey would aid in pinpointing anomalous gold bearing zones as indicated by the geophysical survey. Samples should be taken at 100 meter intervals over the sedimentary horizon.

6.) Once potential gold mineralized zones have been found, a program of stripping and blasting followed by drilling should be initiated.

It is further recommended that the above program take place over a time interval of 2 years, with stripping, trenching, and drilling to take place in the second year.

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Estimated Program Costs

Phase I

Line cutting 60 miles	$16,500.00
Humus geochemical survey, 1000 samples	$15,000.00
Geophysical surveys, compilation, interpretation, supervision	$25,000.00
Geological surveys, compilation, interpretation, supervision	
TOTAL PHASE I	$56,500.00

Phase II

Trenching and stripping	$5,000.00
Diamond drilling 300 meters	$22,000.00
Analytical costs	$1,000.00
Supervision	$5,000.00
TOTAL PHASE II	$33,000.00

Total cost plus 10% contingencies $97,900.00

Should initial drilling results prove to be encouraging add $85,000.00 for added drilling.

Signed: S. Stewart Carmichael

S.J. Carmichael B.Sc. geology
December 21, 1983

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[illegible] Report on File

[illegible]

of

[illegible] Boundary Line Ltd.

E B Y T O W N S H I P

[illegible] Timiskaming Division

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MINING LANDS SECTION

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[illegible]

Glenn C. Kerman

Mining Technologist

Table of Contents

	Page
Introduction	1
Survey Results	1
Conclusions	1

Claim Location Map

Enclosed in back flap

Profiled V.L.F. Survey scale 1cm = 25 meters

Contoured Magnetometer Survey scale 1cm = 25 meters

Introduction

The Hemlo Reef Resources Ltd. property on which the ground magnetometer and V.L.F. survey took place comprises one unpatented, unsurveyed mining claim (L-760582), was worked on by the author from October 20 to October 26, 1983. The claim is one of 57 held by Hemlo Reef Resources Ltd. office at 1816 - 44 Victoria Street, Toronto, Ontario, M5C 1Y2. A Phoenix II V.L.F. instrument utilizing the Cutler Maine transmitting station and a geometrics proton magnetometer was used for the surveys. The surveyed claim is one of 57 contiguous claims with the base station located 800 meters to the east of B.L. 0+00. The base station was set to read 59000 gammas with divinal fluctuations corrected for by reading the base station at the start and end of each daily survey. Readings for both the V.L.F. and magnetometer were taken at 25 meter intervals. The area lies in a topographic depression and is covered by swamp and alders.

The claim is located in the north east portion of Eby Township, District of Timiskaming, Concession 4, Lot 6 and may be reached by a dirt road along the south concession line. No previous work has been recorded on the property.

Survey Results

The V.L.F. survey indicates that a weak conductor crosses the claim in an arc fashion and has been folded. The magnetometer survey outlined a relative magnetic high situated on line 8+00W, 2+25S which oriented north east - south west. This magnetometer high flants a magnetic depression which has been folded the same manner as the V.L.F. conductor.

Conclusions

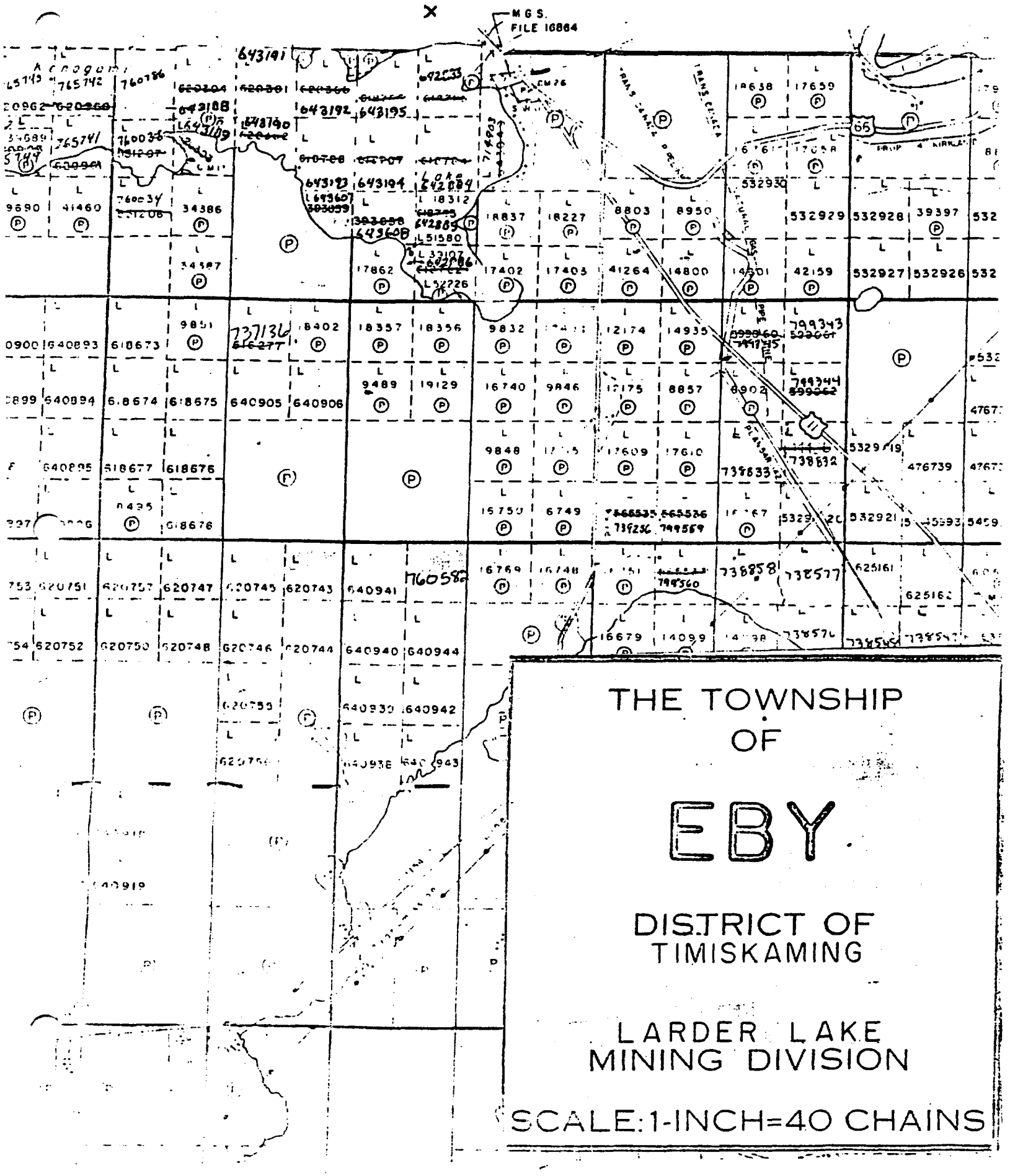
The magnetic depression roughly correlates with the V.L.F. conductor and a closer look at this area should be taken.

Respectfully Submitted

Glenn C. Kasner

Timmins, Ontario
August 30, 1984

Grenfell Twp. M. 351



ANNEX
"H-17B"

SOUTH SHEET

MINES, GEOLOGICAL
AND LAND
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EBY GROUP

DETAILED SURFACE GEOLOGY

2.8661

EBY TOWNSHIP

DISTRICT of TIMISKAMING

LARDER LAKE MINING DIVISION

Scale 1cm. = 12.5 m.



MARY ELLEN RESOURCES

PROJECT No. M-002	DATE: SEPT. 1985	DRAWING No. 3

SYMBOLS



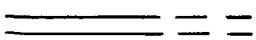
Outcrop boundary



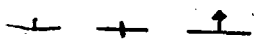
Small outcrop, station



Float



Geological contact, defined, assumed



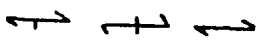
Strike and dip of bedding, inclined, vertical, with tops determination



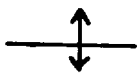
Strike of volcanic flows, with tops determination



Strike of volcanics or bedding, no tops determined



Strike and dip of shearing, inclined, vertical, no dip determined

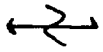


Anticline

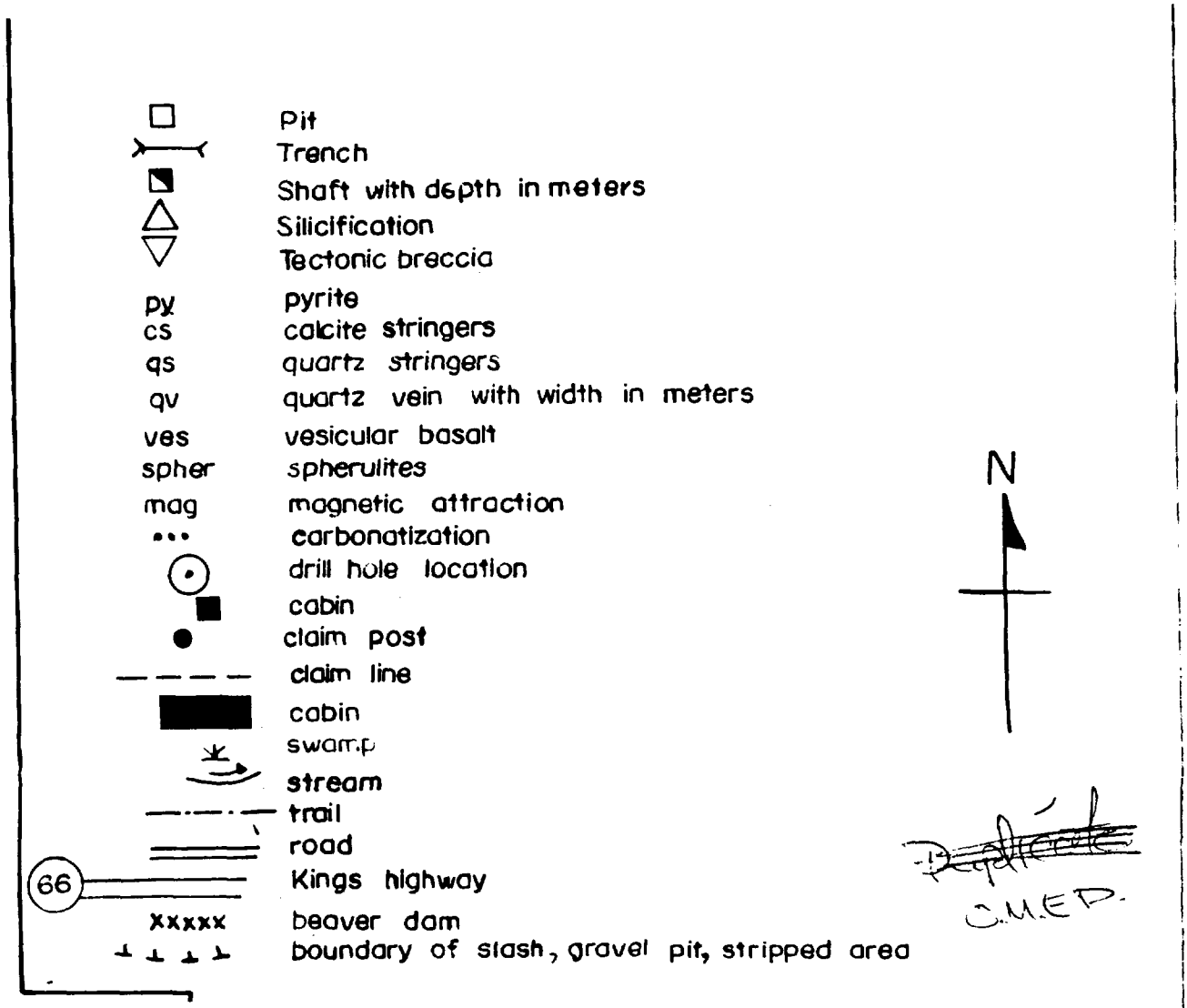


Syncline

Fault



Drag folding


Pit
Trench
Shaft with depth in meters
Silicification
Tectonic breccia
py pyrite
cs calcite stringers
qs quartz stringers
qv quartz vein with width in meters
ves vesicular basalt
spher spherulites
mag magnetic attraction
carbonatization
drill hole location
cabin
claim post
claim line
cabin
swamp
stream
trail
road
66 Kings highway
xxxxx beaver dam
boundary of slash, gravel pit, stripped area
N
C.M.E.D.

Cenozoic Pleistocene and Recent — silt, sand, clay, till

Unconformity

Proterozoic Huronian Cobalt Group Sediments — Hu (arg) argillite

Unconformity

Archean — Intrusive Contact

- I(d) diabase
- I(l) lamprophyre
- I(sm) mafic syenite
- I(sq) quartz syenite
- I(g) gabbro

Timiskaming Series Sediments — Ti(congl.) conglomerate, (tr.) trachyte

Unconformity

Interflow Sedimentary Units

- S(ch) chert, S(if) banded iron formation
- S(carb) green carbonate, dolomite

Volcanics

Kinojevis and Larder Lake Group Fe Tholeiites — V7 (undivided), (a) massive, (b) fractured or sheared, (c) pillowed, (d) tuffaceous, (e) flow brecciated

Kinojevis and Larder Lake Group Mg Tholeiites — V6 (undivided), (a) massive, (b) fractured or sheared, (c) pillowed, (d) tuffaceous, (e) flow brecciated

Larder Lake Group Komatiites — V5 (undivided), (a) with spinafex, (b) with polygonal JOINTING

66

P12175

V7(a)

V7(a) mag.

V7(a)

V7(a) mag.

V7(a)

V7(a) mag.

V7(a) mag.

V7(a)

V7(a)

V7(a)

V7(a) mag.

V7(a)

V7(a)

V7(a) mag.

V7

80 130

V7(b)

V7(a) c.s.

I(1)

p.y.

V7

1100W

0+00

V7(a)

GRAVEL

I(1)

V7(b)

1100E

PIT

V7(b,d) p.y.

V7 ▽ p.s.

V7(b,d)

78 104

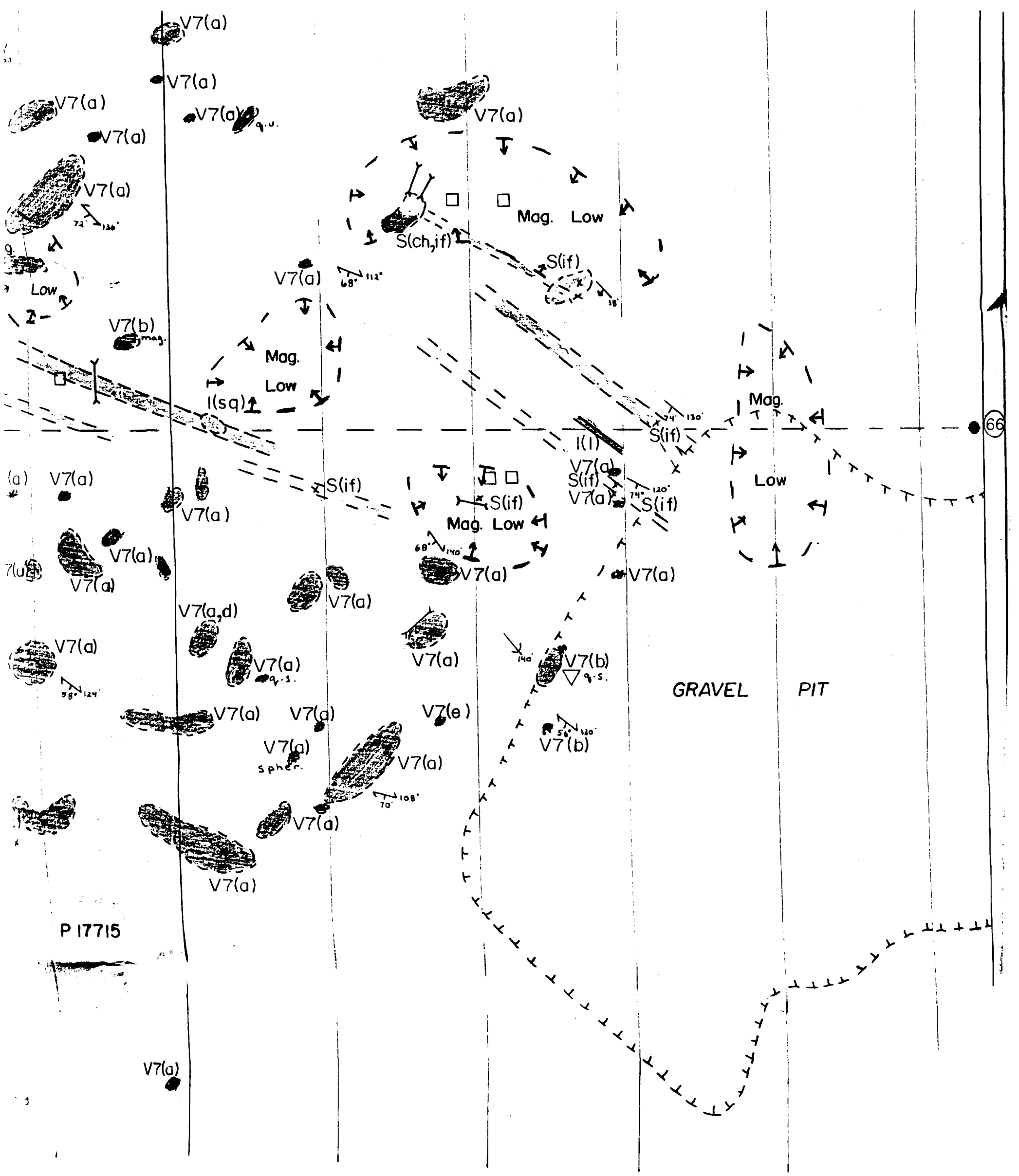
V7(a) mag.

V7(a) p.s.

2100E

△

3100E


V7(a)
V7(a)
V7(a)
V7(a)
q.v.
V7(a)
72°
136°
Low
V7(b)
mag.
Mag.
Low
I(sq)
S(if)
V7(a)
V7(a)
V7(a)
V7(a)
S(ch,if)
Mag. Low
V7(a)
68°
112°
S(if)
38°
Mag.
Low
66
I(l)
V7(a)
S(if)
V7(a)
74°
120°
S(if)
S(if)
Mag. Low
68°
140°
V7(a)
V7(a)
V7(a)
V7(a)
V7(a,d)
V7(a)
V7(a)
q.s.
V7(a)
V7(a)
V7(a)
V7(e)
V7(a)
spher.
V7(a)
70°
108°
V7(a)
V7(a)
140°
V7(b)
q.s.
GRAVEL PIT
56°
120°
V7(b)
P 17715
V7(a)

Ontario Resources

Geochemical and Expenditures)

2.87

(File L739256)

The Mining Act

Note: — Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns
— Do not use shaded areas below.

Type of Survey(s): GEOLOGICAL

Township or Area: EBY

ANNEX 4A-18

Claim Holder(s): MARY GREER

Prospector's Licence No.: K-19410

Address: 49 MCKELVIE AVENUE, KIRKLAND LAKE, ONTARIO P2N 2K6

Survey Company:

Date of Survey (from & to): 20 07 85 | 29 07 85 (Day Mo. Yr. | Day Mo. Yr.)

Total Miles of line Cut: -

Name and Address of Author (of Geo-Technical report): MARY GREER, 49 MCKELVIE AVENUE, KIRKLAND LAKE, ONT. P2N 2K6

Credits Requested per Each Claim in Columns at right

Special Provisions	Geophysical	Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Radiometric	
	- Other	
	Geological	20
	Geochemical	

Man Days	Geophysical	Days per Claim
Complete reverse side and enter total(s) here	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	

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7 8 9 10 11 12 1 2 3 4 5 6

Airborne Credits		Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Radiometric	

Expenditures (excludes power stripping)

Type of Work Performed:

Performed on Claim(s):

Calculation of Expenditure Days Credits

Total Expenditures $ ÷ 15 = Total Days Credits

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

Date: July 29/85

Recorded Holder or Agent (Signature): Mary Greer

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Expend. Days Cr.
L	739256	
	799559	
	799560	

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MINING LANDS SECTION

Total number of mining claims covered by this report of work: 3

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
60	JUL 31 1985	[signature]
	Date Approved as Recorded	Branch Director
	85.10.4	[signature]

Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying: MARY GREER, 49 MCKELVIE AVENUE, KIRKLAND LAKE, ONTARIO P2N 2K6

Date Certified: July 29/85

Certified by (Signature): Mary Greer

GEOLOGICAL SURVEY REPORT
ON THE
PERRON PROPERTY
EBY 66 GROUP

EBY TOWNSHIP
LARDER LAKE MINING DIVISION
DISTRICT OF TIMISKAMING, ONTARIO

FOR

ALEXANDER H. PERRON

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AUGUST 11, 1985

MARY GREER
GEOLOGICAL TECHNICIAN

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ILLUSTRATIONS

CLAIM LOCATION MAP - (Figure 1a). . . . . 2a)

LOCATION MAP - (Figure 1b). . . . . 2b)

ACCOMPANYING PLAN MAP. . . . . IN BACK POCKET

Scale: 1 inch to 200 feet

Date: August, 1985

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Eby 66

Geological Survey

Map No. 85-66-1

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PRESENTATION OF FIELD OBSERVATIONS. 3, 4

CONCLUSIONS AND RECOMMENDATIONS 4

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GEOLOGICAL SURVEY REPORT
ON THE
PERRON PROPERTY
EBY 66 GROUP
EBY TOWNSHIP
LARDER LAKE MINING DIVISION
DISTRICT OF TIMISKAMING, ONTARIO

INTRODUCTION

The Eby 66 Group were recorded by Mary Greer on April 2, 1985.

During the period of July 20 to July 29, 1985, a geological survey was completed describing topography and any visible outcrops.

All field work drafting and interpretation was completed by Mary Greer.

The purpose of this report is to briefly describe the results attained in said survey.

The outcrops detected are shown on the accompanying plan map, at a scale of one inch to 200 feet, that form an integral part of this report.

PROPERTY DESCRIPTION

The Eby 66 Group consists of three (3) contiguous unpatented mining claims located in Eby township, SW 1/4 SE 1/4, Lot 4, Concession V, and NW 1/4 Lot 4, Concession IV, Larder Lake Mining Division, District of Timiskaming,

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Ontario, and are further described as follows:

Claim No.	Township	No. of Claims
L-802618 to L-802621	Eby	4

Ownership of the aforementioned claims have been attested to by Alexander H. Perron of 103 Government Road East, Kirkland Lake, Ontario, and was not independently ascertained by the writer. (See Figure 1a).

LOCATION AND ACCESS

The Eby 66 Group is located in the central part of Eby township, on Highway No. 66. The property is found in Concession V and IV central part of Lot 4.

The property is eleven (11) miles west from the town of Kirkland Lake, Ontario, on Highway No. 66, then two (2) miles west on the Eby Concession III line. (See Figure 1a and 1b).

PREVIOUS WORK

Old trenchings can be found on the claims, no other work is available and no work recorded with the Regional Geologist file.

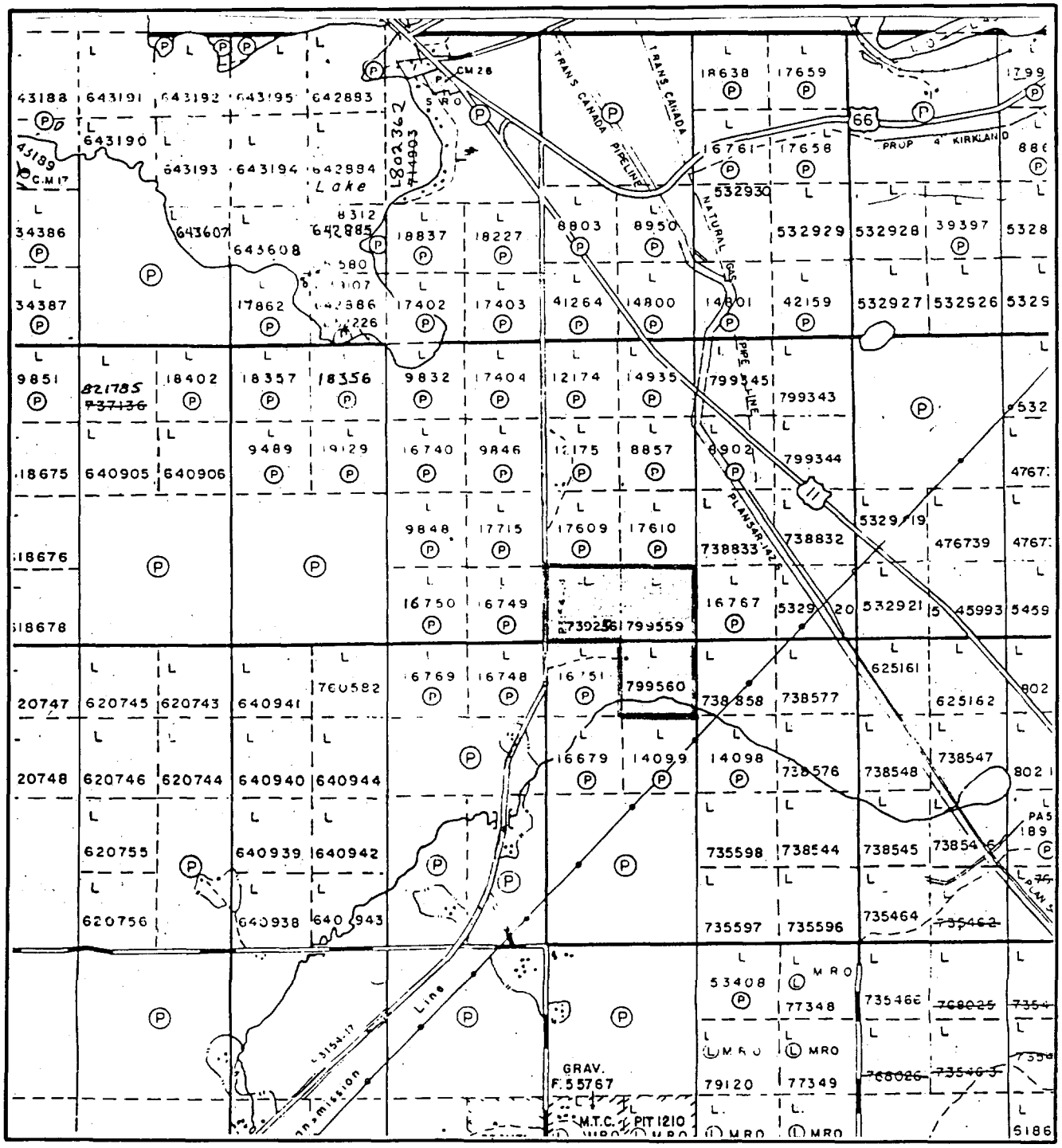
SURVEY PROCEDURE

The geological survey was carried out by using compass and pace traverse lines. Any topographical features or outcrop was then noted along the traverse lines.

TOPOGRAPHY

The claim group is covered by poplar and birch bush to the west, and

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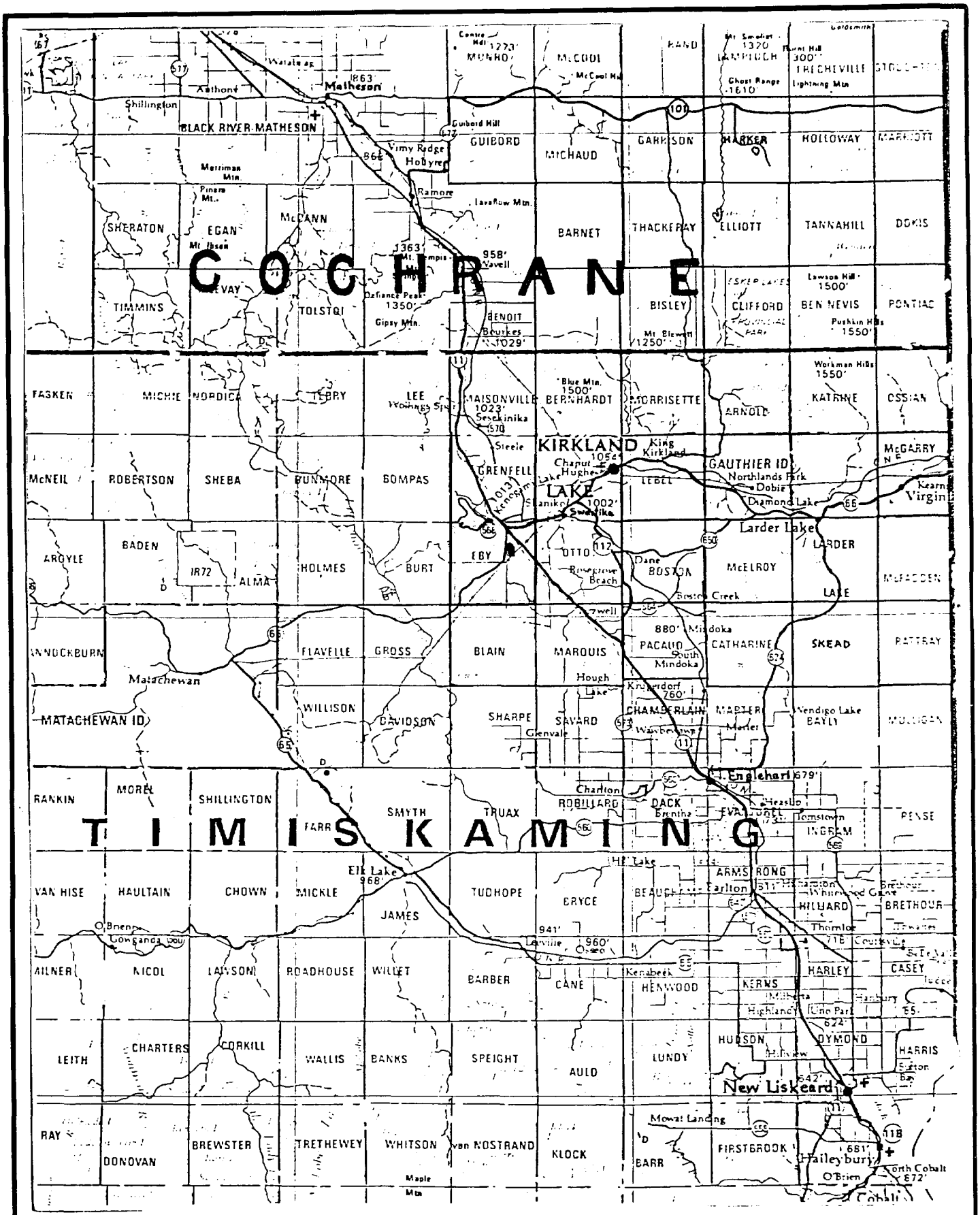
Claim Location Map

Scale: 1 inch to 1/2 mile

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(Taken from a Mar. 1985 claim map)

Figure 1a



Location Map

Figure 1b

areas of spruce, balsam fir and alder to the east. The areas of outcrop found in the centre of the group is dry and rugged, and covered with moss, spruce and popl mixed bush. A creek and swampy area occurs on the southern claim L-799560.

GENERAL GEOLOGY

The O.D.M. Geological Report No. 99, Geology of the Eby and Otto Area, District of Timiskaming, indicates that the underlying bedrock is predominantly mafic metavolcanics. The meta sediments of the Kirkland Lake-Larder Lake break occur to the north of the property, below Kenogami Lake.

ECONOMIC GEOLOGY

Gold is known to occur in carbonate rocks and these rocks are not confined to the area of the Kirkland-Larder Lake break area. These carbonate zones can be found by detailed geological mapping and magnetic surveys for formations under the overburden. The zones will form low areas between the magnetic highs that show up other formations such as iron formations.

PRESENTATION OF FIELD OBSERVATIONS

The field data is presented on a map at a horizontal scale of one inch to 200 feet, Map No. 85-66-1, found in the back pocket of this report.

For the purpose of this presentation, the topography will be described in greater detail.

i) Topography:

Claim L-739256 is primarily poplar with some spruce and alder, claim L-799559 is a low area of alder and scrub spruce and balsam fir.

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ONTARIO
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Kirkland Lake, ONT.

This wet area acts as a drainage into the creek to the south on claim L-799560. This creek flows west through a grassy marsh with spruce along each side. The area of outcrop occurs in spruce and balsam fir. Most of the outcrop is covered by a shallow covering of topsoil and moss.

ii) Geology:

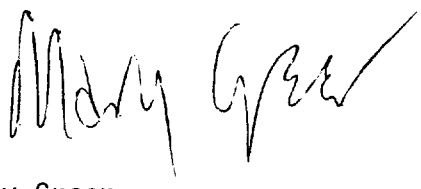
The exposed outcrop found on the Eby 66 Group consists of magnesium tholeiite which can be described as a fine grained greyish green massiv rock. Some minor areas of course grained textures with the same description was also found.

CONCLUSIONS AND RECOMMENDATIONS

The rocks are a magnesium tholeiite which represent large lava flows of the Keewatin age. The course grained textures are the interior part of the lava flows.

It is recommended that a geophysical survey be carried out to further describe the underlying bedrock.

Respectfully submitted,



August 11, 1985

Mary Greer
Geological Technician

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BIBLIOGRAPHY

Ontario Department of Mines and Northern Affairs

Geological Report 99

Geology of the Eby and Otto Area
District of Timiskaming

by H. L. Lovell 1972

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C E R T I F I C A T E

I, Mary Greer, of Kirkland Lake, Ontario, do hereby certify:

1) That I am a Geophysical Technician and reside at: 49 McKelvie Avenue, Kirkland Lake, Ontario, P2N 2K6

2) That I graduated from Sir Sandford Fleming College at Lindsay, Ontario, in 1978, with a diploma as a Geological Technician.

3) That I was employed as a Geophysical Technician by H.E. Neal and Associates Limited for 18 months.

4) That I have been practising my profession for a period of five (5) years and I am not qualified to write this report.

5) That I supervised and participated in this survey.

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August 11/85
Date

Mary Greer
Geophysical Technician

Ontario

Ministry of Natural Resources

File _____

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

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

Type of Survey(s) GEOLOGICAL SURVEY

Township or Area EBY

Claim Holder(s) ALEXANDER H. PERRON, 103 GOVT RD.E.
KIRKLAND LAKE, ONT. P2N IA9

Survey Company PERRONS

Author of Report MARY GREER, 49 MCKELVIE AVENUE

Address of Author KIRKLAND LAKE, ONT. P2N IA9

Covering Dates of Survey JULY 20 TO JULY 29, 1985
(linecutting to office)

Total Miles of Line Cut ------

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	20
Geochemical	

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

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

DATE: August 11/85 SIGNATURE: Mary Greer
Author of Report or Agent

Res. Geol. _____ Qualifications _____

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
L-	739256
L-	799559
L-	799560

RESIDENT GEOLOGIST
ONTARIO GOVERNMENT
RECEIVED
OCT 9 19
KIRKLAND LAKE, ONT.

TOTAL CLAIMS 3

If space insufficient attach list

OFFICE USE ONLY

837 (5/79)

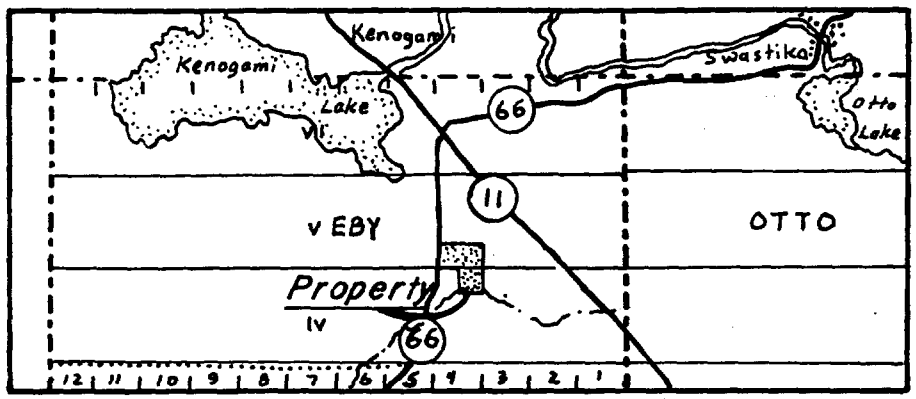
Precambrian

KEEWATIN

1 Tholeiite basalt

KEY MAP

(Scale: 1 inch to 2 miles)



RESIDENT GEOLOGIST
ONTARIO GOVERNMENT
RECEIVED
OCT 9 1985
KIRKLAND LAKE, ONT.

Mary Greer

EBY 66

28458 dup

GEOLOGICAL SURVEY

EBY TOWNSHIP
LARDER LAKE MINING DIVISION
DISTRICT OF TIMISKAMING, ONTARIO

200 0 200 400 600

Scale: 1 inch to 200 feet

PERRONS'

KIRKLAND LAKE CANADA

Drawn by: Mary Greer	Map No.: 85-66-1	Date: August 1985

22281



KL-2228-3

RESIDENT GEOLOGIST
ONTARIO GOVERNMENT
RECEIVED
OCT 9 1985
KIRKLAND LAKE, ONT.

SYMBOLS & LEGEND

- Outcrop
- Trench
- Pillow lava
- Poplar, birch
- Spruce
- Swamp
- Adler
- Claim line
- Claim post
- Highway
- Traverse line

Ontario and Mines

(Geophysical, Geological, Geochemical and Expenditures)

Mining Act

120/87

Note: – Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns.
– Do not use shaded areas below.

Type of Survey(s): GEOPHYSICAL ELECTROMAGNETIC

Township or Area: EBY

Claim Holder(s): MARY GREER

Prospector's Licence No.: K- 19410

Address: 103 GOVERNMENT ROAD EAST, KIRKLAND LAKE, ONTARIO P2N IA9

Survey Company: PERRONS

Date of Survey (from & to): 23 03 87 (Day Mo. Yr.) to 25 03 87 (Day Mo. Yr.)

Total Miles of line Cut: APPROX. 3.5MILES

Name and Address of Author (of Geo-Technical report): MARY GREER, 103 GOVERNMENT ROAD EAST, KIRKLAND LAKE, ONTARIO P2N IA9

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical - Electromagnetic	20
	Geophysical - Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	Geophysical - Radiometric	
	Geophysical - Other	
	Geological	
	Geochemical	

Man Days		Days per Claim
Complete reverse side and enter total(s) here	Geophysical - Electromagnetic	
	Geophysical - Magnetometer	
	Geophysical - Radiometric	
	Geophysical - Other	
	Geological	
	Geochemical	

Airborne Credits		Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Radiometric	

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
L	739256	
	799559	
	799560	

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.

MINISTRY OF NORTHERN DEVELOPMENT & MINES
REGIONAL GEOLOGIST OFFICE
KIRKLAND LAKE
RECEIVED
MAY 13 1987

LARDER LAKE MINING DIVISION
RECEIVED
MAR 27 1987
9:15 am

Total number of mining claims covered by this report of work: 3

Expenditures (excludes power stripping)

Type of Work Performed: RECEIVED

Performed on Claim(s):

Calculation of Expenditure Days Credits

Total Expenditures: $ ÷ 15 = Total Days Credits

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

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
60	MAR 27 1987	M. C. Wenmen
	Date Approved as Recorded: 6 May/87	Branch Director

Date: March 24/87 Recorded Holder or Agent (Signature): Mary Greer

Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying: MARY GREER, 103 GOVERNMENT ROAD EAST, KIRKLAND LAKE, ONT. P2N IA9

Date Certified: March 24/87 Certified by (Signature): Mary Greer

1362 (85/12)

GEOPHYSICAL SURVEY REPORT
ON THE
PERRON PROPERTY
EBY 66 GROUP

EBY TOWNSHIP

LARDER LAKE MINING DIVISION

DISTRICT OF TIMISKAMING, ONTARIO

FOR

ALEXANDER H. PERRON

RECEIVED
APR 13 1987
MINING LANDS SECTION

APRIL 4, 1987

MARY GREER
GEOPHYSICAL TECHNICIAN

MINISTRY OF NORTHERN
DEVELOPMENT AND MINES
RES. GEOLOGIST OFFICE
KIRKLAND LAKE
RECEIVED
MAY 13 1987

ILLUSTRATIONS

CLAIM LOCATION MAP - (Figure 1a). . . . . 2a)

LOCATION MAP - (Figure 1b). . . . . 2b)

ACCOMPANYING PLAN MAP. . . . . IN BACK POCKET

Scale: 1 inch to 200 feet

Date: March, 1987

Eby 66

Ground VLF-EM Survey

Map No. 87-66-2a

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GEOPHYSICAL SURVEY REPORT
ON THE
PERRON PROPERTY
EBY 66 GROUP
EBY TOWNSHIP
LARDER LAKE MINING DIVISION
DISTRICT OF TIMISKAMING, ONTARIO

INTRODUCTION

The Eby 66 was recorded by Mary Greer on April 2, 1985.

A geophysical grid was established by Perrons during February, 1986, and two subsequent geophysical surveys (electromagnetic, magnetic) and a geological survey were completed.

On March 25, 1987, an electromagnetic survey using Annapolis, Maryland was performed over the grid. This work was conducted by Mary Greer with Anita Helin assisting. All drafting and interpretation was completed by Mary Greer.

The purpose of this report is to briefly describe the results attained in the said survey.

The anomalies detected are shown on the accompanying plan map, at a scale of one inch to 200 feet, that form an integral part of this report.

PROPERTY DESCRIPTION

The Eby 66 Group consists of three (3) contiguous unpatented mining claims located in Eby township, SW 1/4 SE 1/4, Lot 4, Concession V, and NE 1/4

Lot 4, Concession IV, Larder Lake Mining Division, District of Timiskaming, Ontario, and are further described as follows:

Claim No.	No. of Claims
L-739256	1
L-799559-799560	2
	3

The recorded holder of the claims is Mary Greer of 49 McKelvie Avenue, Kirkland Lake, Ontario. (See Figure 1a).

LOCATION AND ACCESS

The Eby 66 Group is located in the central part of Eby township, on Highway No. 66. The property is found in Concession V and IV central part of Lot 4.

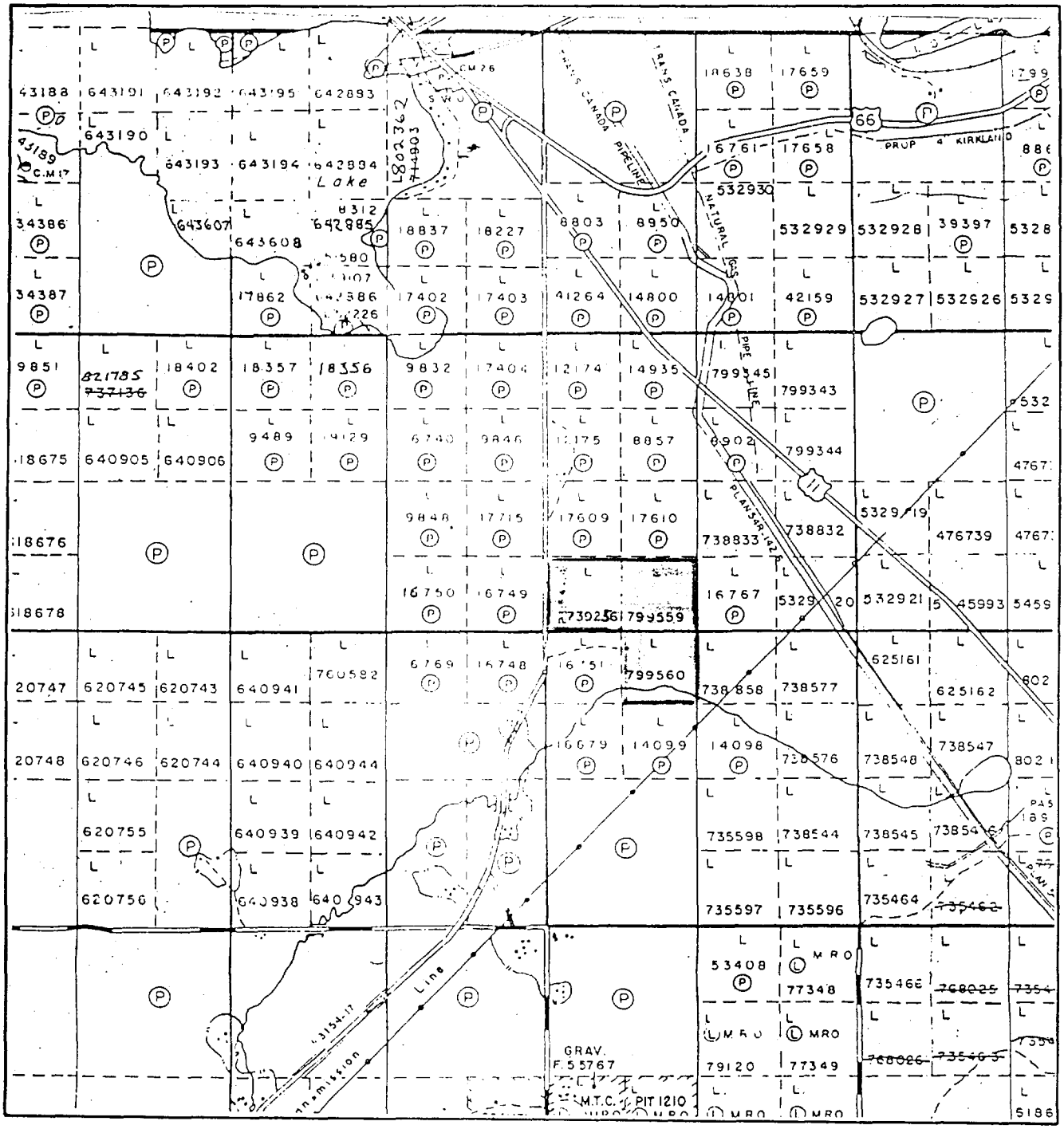
The property is eleven (11) miles west from the town of Kirkland Lake, Ontario, on Highway No. 66, then two (2) miles west to the Eby Concession III Line. (See Figure 1a and 1b).

PREVIOUS WORK

Old trenchings can be found on the claims, see the Regional Geologist Assessment Files for surveys previously performed on Claim Group.

SURVEY PROCEDURE

An east - west baseline was established from the number three post of L-739256 for 2,600 feet.

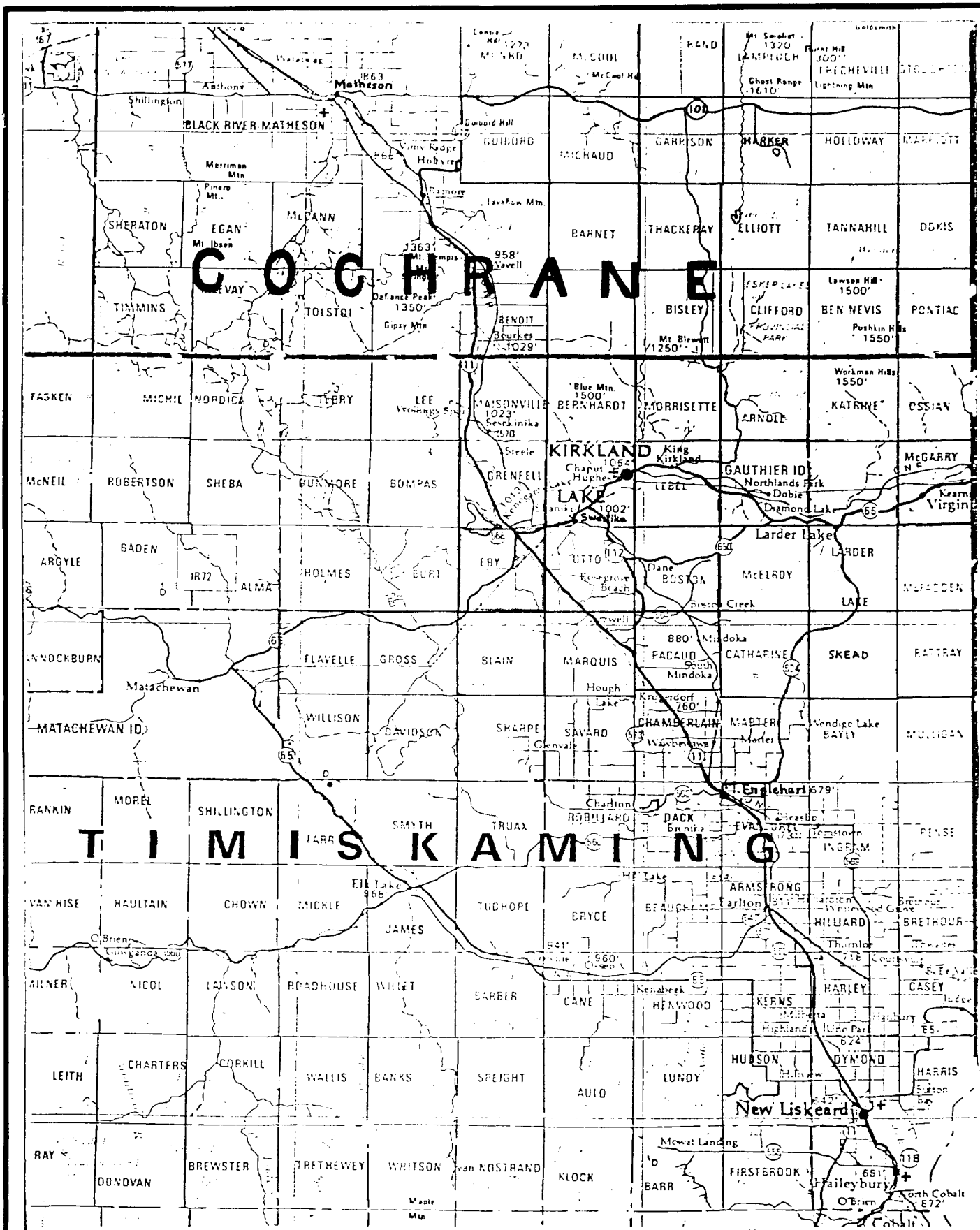


Claim Location Map

Scale: 1 inch to 1/2 mile

(Taken from a Mar. 1985 claim map)

Figure 1a



Location Map

Figure 1b

A grid system of picket lines 400 feet apart with stations every 100 feet, was established at right angles to the baseline.

Readings were taken at each 100 foot station on all picket lines.

TOPOGRAPHY

The claim group is covered by poplar and birch bush to the west, and areas of spruce, balsam fir and alder to the east. The areas of outcrop found in the centre of the group is dry and rugged, and covered with moss, spruce and poplar mixed bush. A creek and swampy area occurs on the southern claim L-799560.

GENERAL GEOLOGY

The O.D.M. Geological Report No. 99, Geology of the Eby and Otto area, District of Timiskaming, indicates that the underlying bedrock is predominantly mafic metavolcanics. The meta sediments of the Kirkland Lake-Larder Lake break occur to the north of the property, below Kenogami Lake.

ECONOMIC GEOLOGY

Gold is known to occur in carbonate rocks and these rocks are not confined to the area of the Kirkland-Larder Lake break area. These carbonate zones can be found by detailed geological mapping and magnetic surveys for formations under the overburden. The zones will form low areas between the magnetic highs that show up other formations such as iron formations.

MAY 1

INSTRUMENTATION

i) Electromagnetic Survey:

The VLF-EM method uses as a source, one of the main submarine communications transmitters in the 15 to 25 kHz band found throughout the world. These submarine communication radio waves travel in a single mode parallel to the surface of the earth along the earth-air interface.

Without vertical conductors and travelling over flat ground, the magnetic field component of this radio or surface wave is horizontal and perpendicular to it's direction of travel.

VLF instruments are capable of picking up these structures that change the direction of the waves by measuring the tilt angle of the major axis of the polarization ellipse. This is illustrated by the tilt angle being zero on flat ground, but when a conductor is present the tilt angle will acquire a finite value. The direction of tilt indicates the direction of the conductor. Calculations of such parameters as depth, depth extent, dip and width of the conductor is very minimal.

The VLF easily illustrates the location of the upper limit of dipping structures which can be seen or plotted as VLF profiles as areas of greatest change in tilt angle per unit of distance.

The instrument used was a Geonics VLF-EM16 Unit. The sensitivity of this unit is $\pm$ 1% for the inphase and $\pm$ 1% for the quadrature. The operation frequency for the EM16 is from 15-25 kHz and the station selection is made by plug-in units.

For the purpose of this survey the station used was Annapolis, Maryland, which has a frequency of 21.4 kHz.

All readings were taken perpendicular to the station and the topography was noted for further use in the interpretation of the EM results.

PRESENTATION AND DISCUSSION OF FIELD OBSERVATIONS

i) Electromagnetic Survey:

The field data is presented on a map at a horizontal scale of one inch to 200 feet, Map No. 87-66-2a, found in the back pocket of this report.

The VLF-EM data is illustrated as profiled data along the survey lines and is plotted at a vertical scale of 1 inch to $\pm$ 40%, with the positive to the left and the negative to the right.

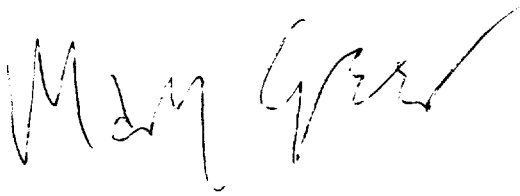
One prominate conductor was found on L 16 + 00 E and L 20 + 00 E at 5 + 00 N. This conductor shows every large inphase and a negative quadrature. This may indicate an anomalous zone at depth which also may be affected by conductive overburden.

CONCLUSIONS AND RECOMMENDATIONS

This conductor verifies the anomalous zones previously detected by the former VLF-EM and magnetic survey. This zone is close to areas accessible by a large back hoe. It is recommended that zone stripping and trenching be performed before any further work such as diamond drilling is considered.

This area would however be the target for future diamond drill consideration.

Respectfully submitted,



April 4, 1987

Mary Greer
Geophysical technician

BIBLIOGRAPHY

Ontario Department of Mines and Northern Affairs

Geological Report 99

Geology of the Eby and Otto Area
District of Timiskaming

by H. L. Lovell 1972

C E R T I F I C A T E

I, Mary Greer, of Kirkland Lake, Ontario, do hereby certify:

1) That I am a Geophysical Technician and reside at:
49 McKelvie Avenue, Kirkland Lake, Ontario, P2N 2K6

2) That I graduated from Sir Sandford Fleming College at Lindsay, Ontario, in 1978, with a diploma as a Geological Technician.

3) That I have been continuously engaged in my profession for the past six (6) years and I am qualified to write this report.

4) That I supervised and participated in this survey.

April 4 (87)
Date

Mary Greer
Mary Greer
Geophysical Technician

Ministry of Northern Development and Mines

Ontario

Geophysical-Geological-Geochemical Technical Data Statement

File _____

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) ELECTROMAGNETIC (NSS) SURVEY

Township or Area EBY

Claim Holder(s) MARY GREER, 103 GOVERNMENT ROAD E.
KIRKLAND LAKE, ONT. P2N 1A9

Survey Company PERRONS

Author of Report MARY GREER

Address of Author 103 GOVERNMENT ROAD EAST, KIRKLAND LAKE, ONT.

Covering Dates of Survey MARCH 25, 1987
(linecutting to office)

Total Miles of Line Cut APPROXIMATELY 3.0 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	20
–Magnetometer	
–Radiometric	
–Other	
Geological	
Geochemical	

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

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

DATE: April 7/87 SIGNATURE: Mary Greer
Author of Report or Agent

Res. Geol. _____ Qualifications _____

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
L-	739256
L-	799559
L-	799560

If space insufficient, attach list

TOTAL CLAIMS 3

OFFICE USE ONLY

837 (85/12)

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEY ... for each type of survey

Number of Stations 139 Number of Readings 121

Station interval 100 FEET Line spacing 400 FEET

Profile scale 1 INCH = ± 40%

Contour interval

MAGNETIC

Instrument

Accuracy – Scale constant

Diurnal correction method

Base Station check-in interval (hours)

Base Station location and value

ELECTROMAGNETIC

Instrument GEONICS EM16

Coil configuration HORIZONTAL AND VERTICAL

Coil separation INFINITY

Accuracy ± 1

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

Frequency ANNAPOLIS MARYLAND 21.4 KHz
(specify V.L.F. station)

Parameters measured INPHASE AND QUADRATURE

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

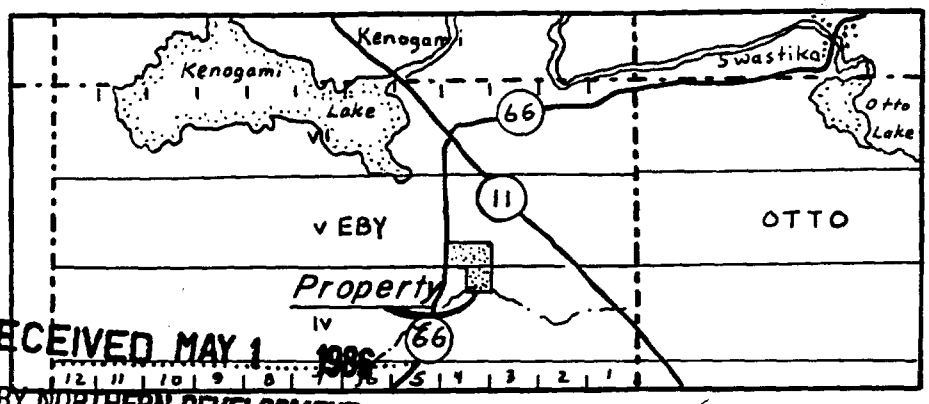
Electrode array

Electrode spacing

Type of electrode

KEY MAP

(Scale: 1 inch to 2 miles)



RECEIVED MAY 1 1986
MINISTRY NORTHERN DEVELOPMENT AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
REC'D

Mary Greer

EBY 66

2.9042 dep

GROUND VLF-EM SURVEY

EBY TOWNSHIP
LARDER LAKE MINING DIVISION
DISTRICT OF TIMISKAMING, ONTARIO

200 0 200 400 600

Scale: 1 inch to 200 feet

PERRONS'

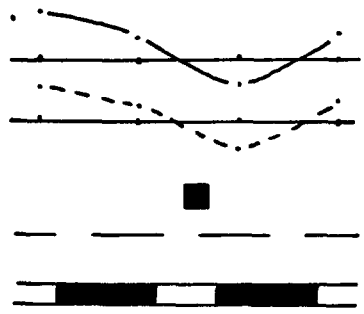
KIRKLAND LAKE CANADA

Drawn by: Mary Greer	Map No.: 86-66-2	Date: March 1986

2.28-2

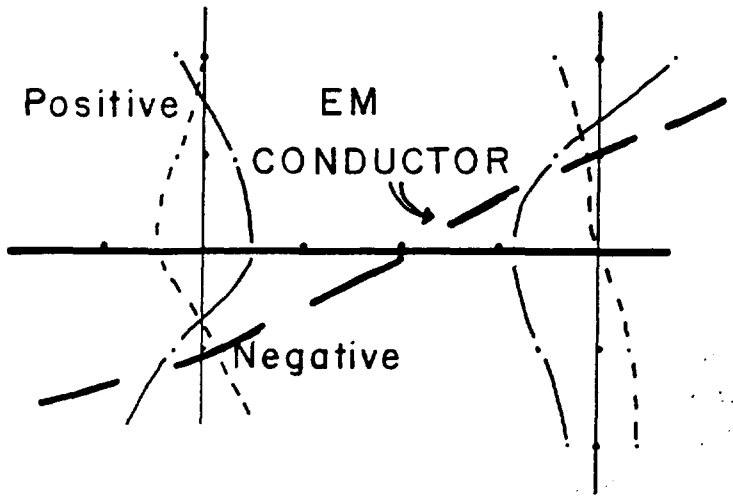


SYMBOLS



INSTRUMENTATION

GEONICS VLF-EM16
Cutler, Maine 24.0 kHz
Vertical scale: 1 inch = ±40%



Ontario Ministry of Northern Development and Mines

(Geophysical, Geological, Geochemical and Expenditures)

Mining Act

2.9042

Note: – Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns.
– Do not use shaded areas below.

Type of Survey(s): GEOPHYSICAL SURVEY - ELECTROMAGNETIC - MAGNETIC

Township or Area: EBY

Claim Holder(s): MARY GREER

Prospector's Licence No.: K-19410

Address: 49 MCKELVIE AVENUE, KIRKLAND LAKE, ONTARIO P2N 2K6

Survey Company: PERRONS INC.

Date of Survey (from & to): 18 03 86 (Day / Mo. / Yr.) — 20 03 86 (Day / Mo. / Yr.)

Total Miles of line Cut: 2.9 MILES

Name and Address of Author (of Geo-Technical report): MARY GREER, 49 MCKELVIE AVENUE, KIRKLAND LAKE, ONT, P2N 2K6

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical - Electromagnetic	20
	Geophysical - Magnetometer	40
For each additional survey: using the same grid: Enter 20 days (for each)	Geophysical - Radiometric	
	Geophysical - Other	
	Geological	
	Geochemical	

Man Days		Days per Claim
Complete reverse side and enter total(s) here	Geophysical - Electromagnetic	
	Geophysical - Magnetometer	
	Geophysical - Radiometric	
	Geophysical - Other	
	Geological	
	Geochemical	

Airborne Credits		Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Radiometric	

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.	Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
L	739256				
	799559				
	799560				

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MINISTRY NORTHERN DEVELOPMENT AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
RECD

LARDER LAKE MINING DIVISION
RECEIVED
APR 1 - 1986

Total number of mining claims covered by this report of work: 3

Expenditures (excludes power stripping)

Type of Work Performed:

Performed on Claim(s):

Calculation of Expenditure Days Credits

Total Expenditures: $ ÷ 15 = Total Days Credits

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

For Office Use Only

Total Days Cr. Recorded: 180

Date Recorded: APR 1 - 1986

Date Approved as Recorded: 86.4.23

Mining Recorder: [signature]

Date: APRIL 1,1986

Recorded Holder or Agent (Signature): [signature]

Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying: MARY GREER, 49 MCKELVIE AVENUE, KIRKLAND LAKE, ONT. P2N 2K6

Date Certified: [illegible]

Certified By (Signature): [signature]

GEOPHYSICAL SURVEY REPORT
ON THE

PERRON PROPERTY
EBY 66 GROUP

EBY TOWNSHIP

LARDER LAKE MINING DIVISION
DISTRICT OF TIMISKAMING, ONTARIO

FOR

ALEXANDER H. PERRON

RECEIVED
APR 21 1986
MINING LANDS SECTION

APRIL 17, 1986

MARY GREER
GEOPHYSICAL TECHNICIAN

RECEIVED MAY 1 1986
MINISTRY NORTHERN DEVELOPMENT
AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
REC'D

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ECONOMIC GEOLOGY. 3

INSTRUMENTATION 4, 5

PRESENTATION AND DISCUSSION OF FIELD OBSERVATIONS 6

CONCLUSIONS AND RECOMMENDATIONS 6, 7

BIBLIOGRAPHY. 8

CERTIFICATE 9

MINISTRY OF NORTHERN DEVELOPMENT
AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
REC'D

ILLUSTRATIONS

CLAIM LOCATION MAP - (Figure 1a). . . . . 2a)

ACCOMPANYING PLAN MAPS. . . . . IN BACK POCKET

Scale: 1 inch to 200 feet

Date: March, 1986

Eby 66

Ground VLF-EM Survey

Map No. 86-66-2

Eby 66

Ground Magnetometer Survey

Map No. 86-66-3

MINISTRY OF NORTHERN DEVELOPMENT
AND MINES
RESIDENT
KIRKLAND LAKE
RECD

GEOPHYSICAL SURVEY REPORT

ON THE

PERRON PROPERTY

EBY 66 GROUP

EBY TOWNSHIP

LARDER LAKE MINING DIVISION

DISTRICT OF TIMISKAMING, ONTARIO

INTRODUCTION

The Eby 66 Group were recorded by Mary Greer on April 2, 1985.

A geophysical grid was established by Perrons during February, 1986, and two subsequent geophysical surveys (electromagnetic, magnetic) were completed over the entire three claims. The instruments used for these surveys were an EDA OMNIMAG PPM350 and a Geonics EM16 Unit.

This work was conducted by Mary Greer with Alexander Perron assisting. All drafting and interpretation was completed by Mary Greer.

The purpose of this report is to briefly describe the results attained in said survey.

The anomalies detected are shown on the accompanying plan map, at a scale of one inch to 200 feet, that form an integral part of this report.

PROPERTY DESCRIPTION

The Eby 66 Group consists of three (3) contiguous unpatented mining claims located in Eby township, SW 1/4 SE 1/4, Lot 4, Concession V, and NE 1/4

MINISTRY OF NORTHERN DEVELOPMENT
AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
RECEIVED

Lot 4, Concession IV, Larder Lake Mining Division, District of Timiskaming, Ontario, and are further described as follows:

Claim No.	No. of Claims
L-739256	1
L-799559-799560	2
	3

Ownership of the aforementioned claims have been attested to by Mary Greer, 49 McKelvie Avenue, Kirkland Lake, Ontario, P2N 2K6. (See Figure 1a).

LOCATION AND ACCESS

The Eby 66 Group is located in the central part of Eby township, on Highway No. 66. The property is found in Concession V and IV central part of Lot 4.

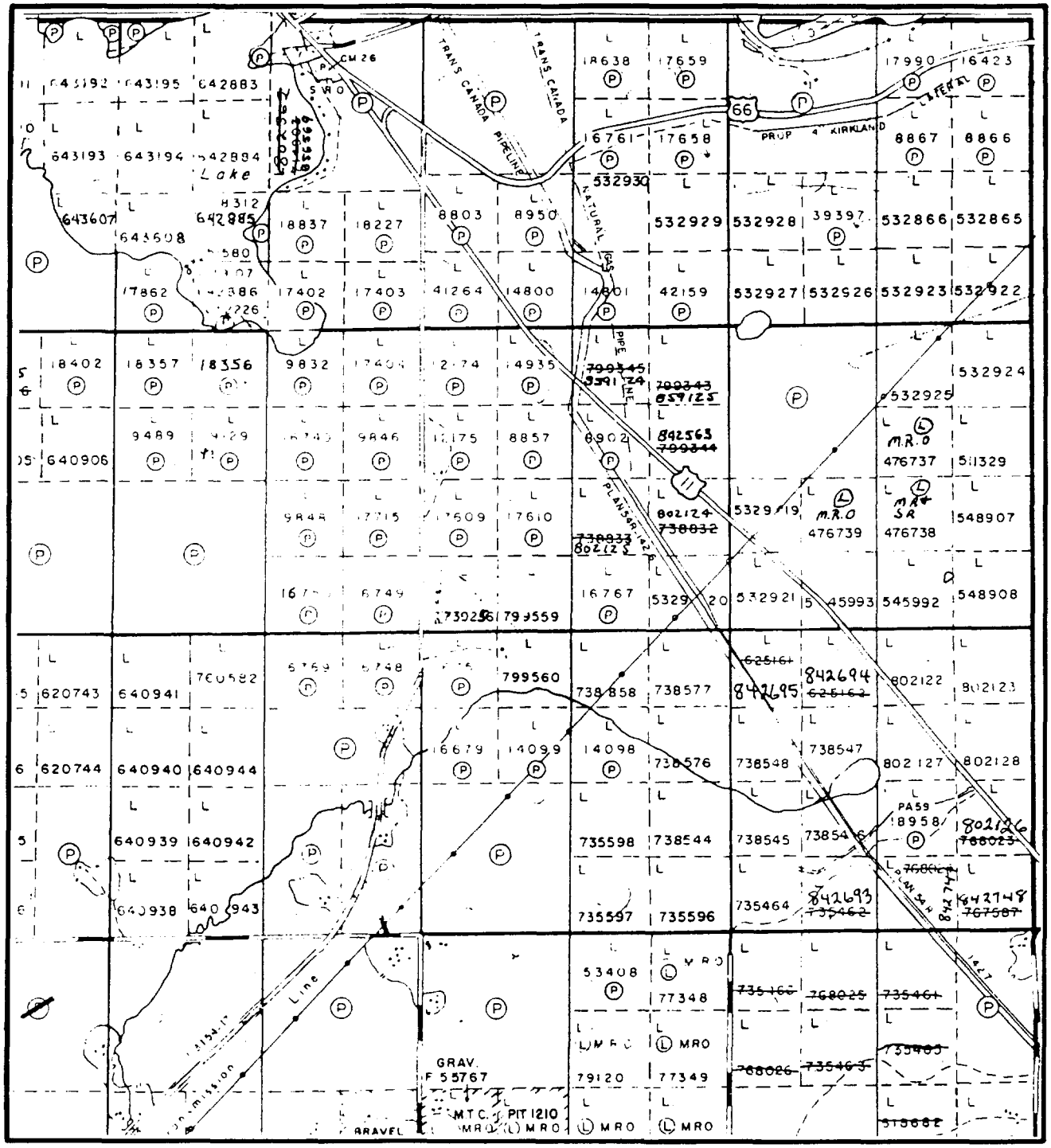
The property is eleven (11) miles west from the town of Kirkland Lake, Ontario, on Highway No. 66, then two (2) miles west on the Eby Concession III line. (See Figure 1a)

PREVIOUS WORK

Old trenchings can be found on the claims, during July 1985, a geological survey was completed by Perrons.

SURVEY PROCEDURE

An east - west baseline was established from the number three post of L-739256 for 2,600 feet.



Claim Location Map

Scale: 1 inch to 1/2 mile

MINISTRY NORTHERN DEVELOPMENT
AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
REC'D

Taken from a March 1986

Figure 1a

A grid system of picket lines 400 feet apart with stations every 100 feet, was established at right angles to the baseline.

Readings were taken at each 100 foot stations on all picket lines. The primary magnetic base station was set up at BL 4 + 00 E with secondary check stations established at 400 foot intervals along the baseline. The time interval between each check station was within thirty (30) minutes.

TOPOGRAPHY

The claim group is covered by poplar and birch bush to the west, and areas of spruce, balsam fir and alder to the east. The areas of outcrop fround in the centre of the group is dry and rugged, and covered with moss, spruce and poplar mixed bush. A creek and swampy area occurs on the southern claim L-799560.

GENERAL GEOLOGY

The O.D.M. Geological Report No. 99, Geology of the Eby and Otto Area, District of Timiskaming, indicates that the underlying bedrock is predominantly mafic metavolcanics. The meta sediments of the Kirkland Lake-Larder Lake break occur to the north of the property, below Kenogami Lake.

ECONOMIC GEOLOGY

Gold is known to occur in carbonate rocks and these rocks are not confined to the area of the Kirkland-Larder Lake break area. These carbonate zones can be found by detailed geological mapping and magnetic surveys for formations under the overburden. The zones will form low areas between the magnetic highs that show up other formations such as iron formations.

[illegible] NORTHERN DEVELOPMENT
[illegible]
[illegible] OFFICE
[illegible] LAKE

INSTRUMENTATION

i) Electromagnetic Survey:

The VLF-EM method uses as a source, one of the main submarine communications transmitters in the 15 to 25 kHz band found throughout the world. These submarine communication radio waves travel in a single mode parallel to the surface of the earth along the earth-air interface.

Without vertical conductors and travelling over flat ground, the magnetic field component of this radio or surface wave is horizontal and perpendicular to it's direction of travel.

VLF instruments are capable of picking up these structures that change the direction of the waves by measuring the tilt angle of the major axis of the polarization ellipse. This is illustrated by the tilt angle being zero on flat ground, but when a conductor is present the tilt angle will acquire a finite value. The direction of tilt indicates the direction of the conductor. Calculations of such parameters as depth, depth extent, dip and width of the conductor is very minimal.

The VLF easily illustrates the location of the upper limit of dipping structures which can be seen or plotted as VLF profiles as areas of greatest change in tilt angle per unit of distance.

The instrument used was a Geonics VLF-EM16 Unit. The sensitivity of this unit is $\pm$ 1% for the inphase and $\pm$ 1% for the quadrature. The operation frequency for the EM16 is from 15-25 kHz and the station selection is made by plug-in units.

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AND MINES
RESIDENT GEOLOGIST OFFICE
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REC'D

For the purpose of this survey the station used was Annapolis, Maryland, which has a frequency of 21.4 kHz.

All readings were taken perpendicular to the station and the topography was noted for further use in the interpretation of the EM results.

ii) Magnetic Survey:

This system uses a backward motion of spinning protons of a hydrogen atom within a fluid of hydrogen and carbon. These spinning magnetic protons are caused to have two opposite poles by applying a magnetic field using a current within a coil of wire. When the current is stopped, the protons precess about the earth's magnetic field and in turn generate a small current in the wire. This frequency of precession is proportional to the earth's total magnetic field.

This instrument is read directly in gammas which is the absolute value of the earth's total field for that station.

The instrument used for this survey was a Geometrics G-816 Proton Magnetometer, this instrument has a one gamma sensitivity.

The diurnal variation was monitored by closing each loop at any secondary check station, at a gridline-baseline intersection.

Diurnal corrections were applied by linear distribution of any observed variation over the time between base stations. The corrections were calculated by using a time vs drift graph.

DEVELOPMENT

PRESENTATION AND DISCUSSION OF FIELD OBSERVATIONS

i) Electromagnetic Survey:

The field data is presented on a map at a horizontal scale of one inch to 200 feet, Map No. 86-66-1, found in the back pocket of this report.

The VLF-EM data is illustrated as profiled data along the survey lines and is plotted at a vertical scale of 1 inch to $\pm$ 40%, with the positive to the left and the negative to the right.

Two conductors were found on the property, one south of the baseline and one to the north.

The southern conductor outlines the creek and the northern one occurs over a dry area with little outcrop.

ii) Magnetic Survey:

The field data is presented on a map at a horizontal scale of one inch to 200 feet, Map No. 86-66-3.

The magnetic data is illustrated at isomagnetic values recorded at each station.

The magnetic survey shows an east west trend with a magnetic association with the north conductor.

CONCLUSIONS AND RECOMMENDATIONS

The north east west conductor may be associated with a magnetic

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AND
RESIDE... POINT OFFICE
KIRKLA...
RECD

anomaly crossing the property in approximately the same area. Some trènches are found in this area and should be re-examined at a later date.

Respectfully submitted,

Mary Greer

April 17, 1986

Mary Greer
Geophysical Technician

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KIRKLAND LAKE
REC'D

BIBLIOGRAPHY

Ontario Department of Mines and Northern Affairs

Geological Report 99

Geology of the Eby and Otto Area
District of Timiskaming

by H.L. Lovell 1972

MINISTRY NORTHERN DEVELOPMENT
AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
REC'D

C E R T I F I C A T E

I, Mary Greer, of Kirkland Lake, Ontario, do hereby certify:

1) That I am a Geophysical Technician and reside at:
49 McKelvie Avenue, Kirkland Lake, Ontario, P2N 2K6

2) That I graduated from Sir Sandford Fleming College at Lindsay, Ontario, in 1978, with a diploma as a Geological Technician.

3) That I have been continuously engaged in my profession for the past six (6) years and I am qualified to write this report.

4) That I supervised and participated in this survey.

April 17/96
Date

Mary Greer
Mary Greer
Geophysical Technician

Ontario

Ministry of Natural Resources

File _____

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

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

Type of Survey(s) GEOPHYSICAL SURVEYS - MAGNETIC - ELECTROMAGNETIC

Township or Area EBY

Claim Holder(s) MARY GREER
49 MCKELVIE AVE.,KIRKLAND LAKE,ONT.

Survey Company PERRONS P2N 2K6

Author of Report MARY GREER

Address of Author 49 MCKELVIE AVE., KIRKLAND LAKE,ONT. P2N 2K6

Covering Dates of Survey MAR.18/86 - MAR.20/86
(linecutting to office)

Total Miles of Line Cut APPROXIMATELY 2.9 MILES

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes ... utting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	20
–Magnetometer	40
–Radiometric	
–Other	
Geological	
Geochemical	

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

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

DATE: April 17/86 SIGNATURE: Mary Greer
Author of Report or Agent

Res. Geol. _____ Qualifications _____

Previous Surveys

File No.	Type	Date	Claim Holder

...DEVELOPMENT
...ONTARIO
KIRK...
REC...

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
L-	739256
L-	799559
L-	799560

TOTAL CLAIMS 3

If space insufficient, attach list

37 (5/79)

GEOPHYSICAL TECHNICAL DATA

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

Number of Stations 139 Number of Readings MAG 139, VLF 121

Station interval 100 FEET Line spacing 400 FEET

Profile scale 1 INCH = ± 40%

Contour interval 100 GAMMAS

MAGNETIC

Instrument EDA OMNIMAG PPM 350

Accuracy – Scale constant ± .01 GAMMAS

Diurnal correction method CLOSED LOOPS

Base Station check-in interval (hours) 30 MINUTES

Base Station location and value BL 4 + 00 E 59907 GAMMAS

ELECTROMAGNETIC

Instrument GEONICS EM16

Coil configuration HORIZONTAL & VERTICAL

Coil separation INFINITY

Accuracy ± 1

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

Frequency CUTLER, MAINE 24.0 kHz (specify V.L.F. station)

Parameters measured INPHASE AND QUADRATURE

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

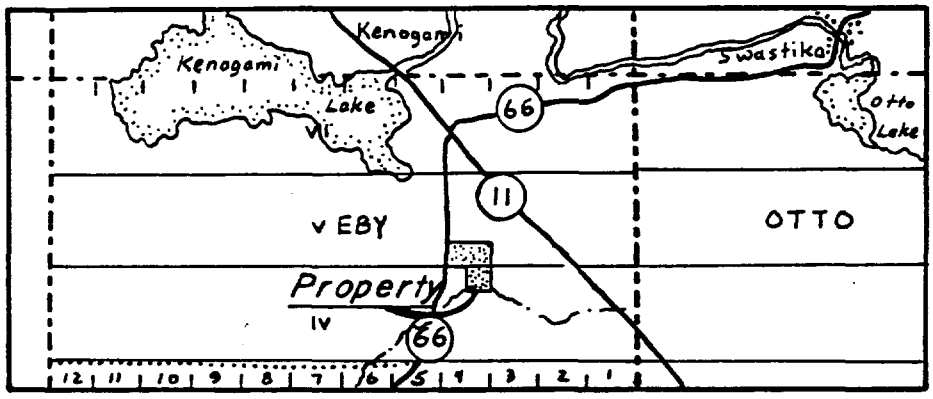
Type of electrode

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RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
RECD

KL-2228-4

KEY MAP

(Scale: 1 inch to 2 miles)



Midway Lake

EBY 66

2.9042

GROUND MAGNETOMETER SURVEY

EBY TOWNSHIP

LARDER LAKE MINING DIVISION

DISTRICT OF TIMISKAMING, ONTARIO

200 0 200 400 600

Scale: 1 inch to 200 feet

PERRONS'

KIRKLAND LAKE CANADA

Drawn by: Mary Greer	Map No.: 86-66-3	Date: March 1986

2228-4

Mag. N10°W



SYMBOLS

Isomagnetic contours 

Base station 

Claim post 

Claim line

Highway 

INSTRUMENTATION

EDA OMNI 350 PPM

Contour interval - 100 ɣ

Contour by: Mary Greer

ANNEX "H-19"

EXPLORATION REPORT

EAST EBY PROPERTY

EBY TOWNSHIP, ONTARIO

1988

NTS: 42 A/1

PREPARED FOR

BUTTE CANYON RESOURCES INC.

DERRY, MICHENER, BOOTH & WAHL

2.11819

James R. Lawton, B.Sc.

Ian D. Trinder, B.Sc.

Toronto, Ontario
August 31, 1988

Ref.: 88-82

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Ian D. Trinder, B.Sc.	14

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LIST OF DRAWINGS
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88-82-01:	West Sheet, Property Geology and Sample Location Main Claim Group
88-82-02:	East Sheet, Property Geology and Sample Location Main Claim Group
88-82-03:	Property Geology and Sample Locations, North Claim Group

SUMMARY

During the period June 21, 1988 to July 13 1988, Derry, Michener, Booth & Wahl (DMBW), on behalf of Butte Canyon Resources Inc., carried out a geological mapping and lithogeochemical sampling program on the East Eby property, Eby Township, Ontario. The property is located approximately 20 km southwest of Kirkland Lake and 5 km southeast of the town of Kenogami Lake.

Despite the fact that the property has been the site of historic exploratory drilling, trenching and blasting since the 1930's and several samples containing anomalous to highly anomalous gold values up to 0.2 oz. Au/ton have been reported, it was DMBW's belief that the property had not been adequately explored. A property-wide mapping and geochemical sampling program was therefore proposed.

The property is predominantly underlain by a northeast-striking, subvertically-dipping sequence of felsic to mafic volcanics and volcanogenic sediments intruded by various types of plutonic rocks.

The southern portion of the property is underlain by a major unit of dominantly felsic flows and pyroclastics and iron formation horizons. Minimal diamond and stripped exposures of the unit indicate that both oxide and sulphide facies iron formation are present.

The entire property was mapped at a scale of 1:2,500, with a small section of detailed mapping at a scale of 1:1,000. In addition, a lithogeochemical sampling program was carried out over the property.

Results of the current sampling program have not been encouraging with respect to gold mineralization. The highest gold value returned was 81 ppb Au which, while slightly anomalous, is not significant.

Platinum-palladium analytical results are quite interesting and indicate a couple of anomalous zones that require some follow-up work.

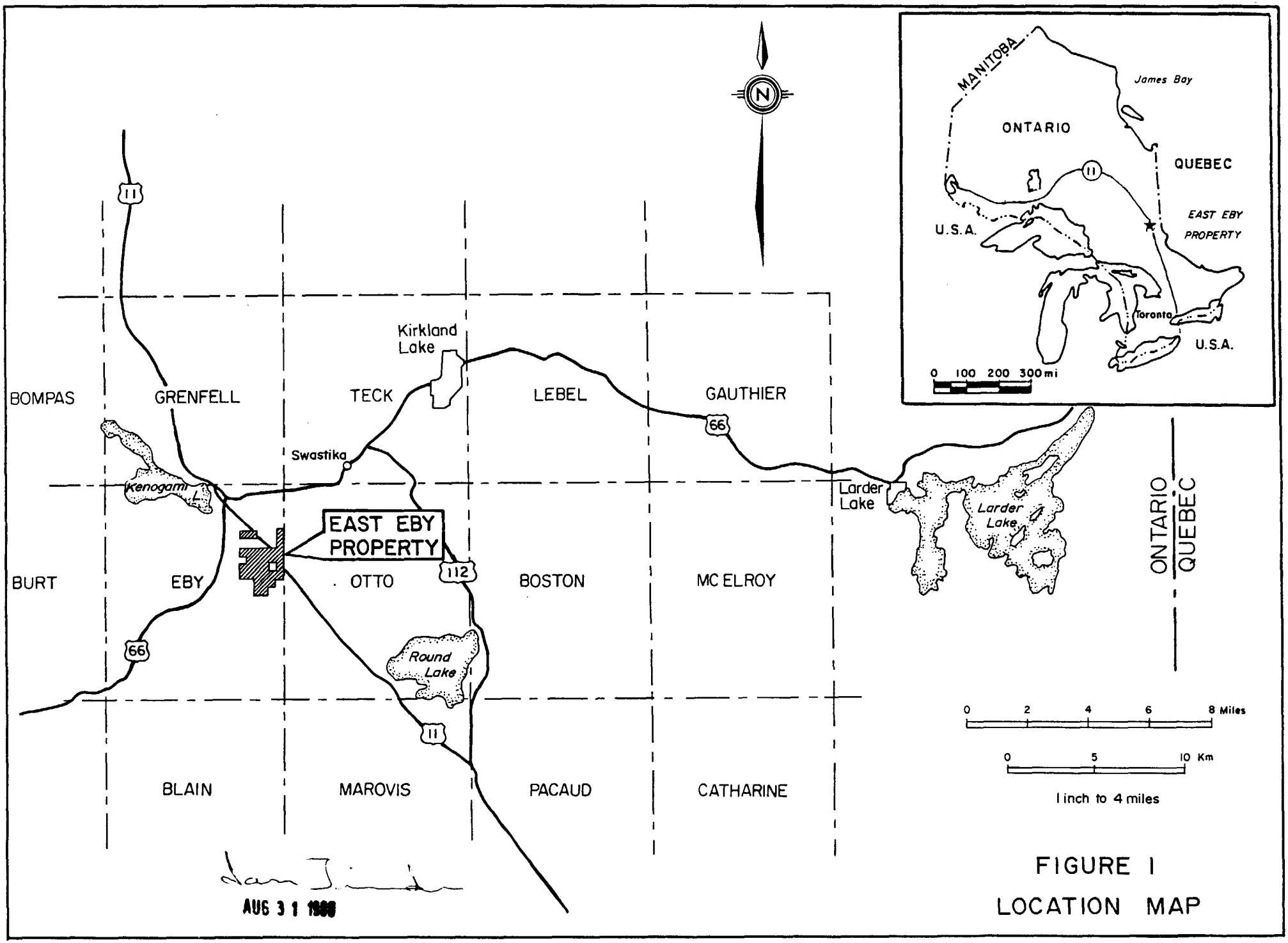
DMBW, therefore, recommends that a limited lithogeochemical and soil geochemical sampling program be carried out to delineate the platinum anomaly.

INTRODUCTION

The following report was prepared by Derry, Michener, Booth & Wahl (DMBW) at the request of Butte Canyon Resources Inc. The report describes the geological mapping and geochemical sampling program carried out by J. R. Lawton, DMBW contract geologist, during the period June 21, 1988 to July 13, 1988.

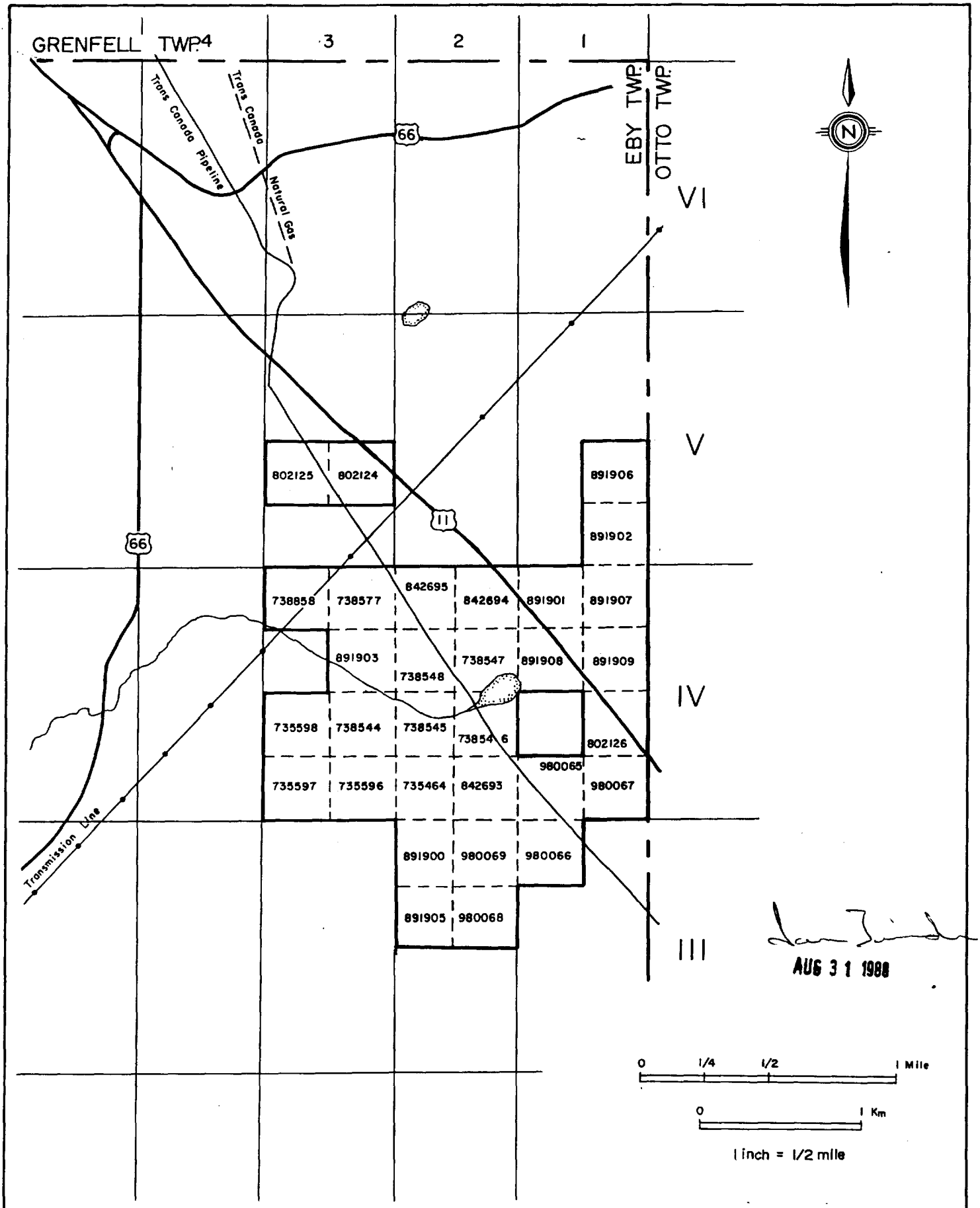
PROPERTY, LOCATION, DESCRIPTION AND ACCESS

The East Eby property is located in Eby Township approximately 20 km southwest of Kirkland Lake and 5 km southeast of the town of Kenogami Lake (Figure 1). The property consists of the following 31 unpatented mining claims covering approximately 496 hectares (Figure 2).



AUG 3 1 1988

FIGURE 1
LOCATION MAP



NOTE:
All claim numbers prefixed by letter "L".

FIGURE 2
CLAIM MAP

Claim Numbers	Date of Record	Total Days Credit Approved and Applied For	Anniversary Date*
L735464	March 7, 1984	211	March 7, 1990
L735596	March 7, 1984	211	March 7, 1990
L735597 - 98	March 7, 1984	197	March 7, 1989
L738544	March 7, 1984	197	March 7, 1989
L738545	March 7, 1984	211	March 7, 1990
L738546 - 47	March 7, 1984	202	March 7, 1990
L738548	March 7, 1984	211	March 7, 1990
L738577	March 7, 1984	201	March 7, 1990
L738858	March 9, 1984	162	March 9, 1989
L802124	March 27, 1985	169	March 27, 1990
L802125	March 27, 1985	170	March 27, 1990
L802126	March 28, 1985	171	March 28, 1990
L842693	April 29, 1985	171	April 29, 1990
L842694 - 95	December 12, 1985	131	December 12, 1989
L891900	May 27, 1986	131	May 27, 1990
L891901	July 28, 1986	111	July 28, 1990
L891902	July 30, 1986	117	July 30, 1990
L891903	November 21, 1986	87	November 21, 1989
L891905	May 27, 1986	131	May 27, 1990
L891906	July 30, 1986	97	July 30, 1989
L891907	July 28, 1986	124	July 28, 1990
L891908	July 28, 1986	74	July 28, 1989
L891909	July 28, 1986	111	July 28, 1990
L980065 - 66	April 7, 1987	111	April 7, 1991
L980067	April 7, 1987	97	April 7, 1990
L980068 - 69	April 7, 1987	111	April 7, 1991

* The anniversary date given is based, in part, on the recent Report of Work forms filed with The Ministry of Northern Development and Mines (reproduced in Appendix C).

Note that all claims with the exception of two, claims L802124 and L802125, are contiguous with the group. For abstracts of previous assessment work refer to Hartwick and Woolham (1987).

Access to the property is excellent. Highway 11 crosscuts the northeast corner of the property and there are bush roads and trails which lead to the other sections. In addition, a wide clearing for the Trans Canada Pipeline crosscuts the centre of the property, providing excellent accessibility.

DMBW has not examined title to the claims nor substantiated their physical boundaries and, accordingly, expresses no opinion as to validity of title and property description.

REGIONAL GEOLOGY

The regional geology of the Kirkland Lake area is shown in Figure 3 after Ontario Geological Survey (OGS) Map 2205. Although this regional map is very similar to the Geological Survey of Canada (GSC) map published in Goodwin (1979), many stratigraphic correlations and theories pertaining to the genesis of the gold ore deposits are fundamentally different. The authors favour the GSC interpretation and, consequently, the following summary is taken from Ridler (1972) and from Goodwin (1979).

Essentially all of the consolidated rocks in the Kirkland Lake area are of Precambrian age. Proterozoic formations consist of Gowganda Formation sediments of the Cobalt Group, and two generations of diabase dykes. The more areally extensive Archean stratigraphy can be essentially divided into four major stratigraphic categories:

(1) Pre-Timiskaming mafic to felsic flows and pyroclastics, chemical sediments and local ultramafic flows and intrusives.

(2) Timiskaming group fine- to coarse-grained clastic metasediments, chemical metasediments, alkaline flows, tuffs and breccias, felsic volcanics and komatiitic (ultramafic) flows.

(3) Post-Timiskaming Highway 11 basalts and local komatiites.

(4) Various gabbroic, syenitic and granitic intrusives.

The pre-Timiskaming rocks consist of a thick (up to 27,500 m), conformable sequence of Skead Group volcanics and sediments and overlying McVittie Basalts.

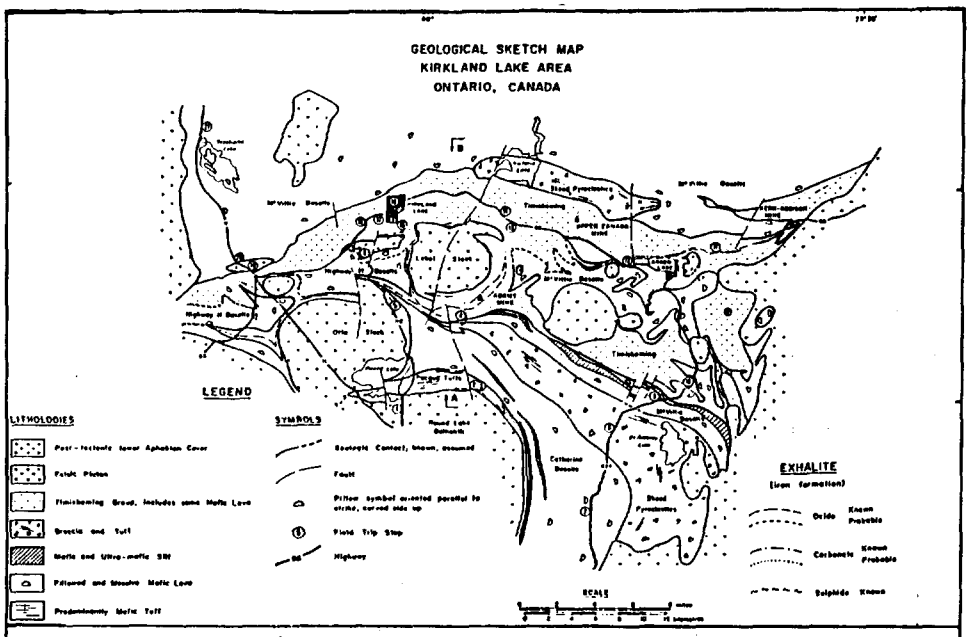
As shown in Figure 4, the lower part of the Skead Group consists of the Catherine Formation: a thick succession of tholeiitic pillow lavas and local komatiite flows with associated synvolcanic intrusives and interbedded tuffs. At the base of the sequence lies the Pacaud Tuffs which are in direct contact with the Round Lake Batholith. Overlying the Catherine Basalts at the top of the Skead Group are the Skead Pyroclastics: a thick, variable sequence of andesitic, dacitic and rhyodacitic breccias, tuffs and their hypabyssal equivalents.

Overlying the Skead Group is a thick (up to 1,000 m) sequence of compositionally heterogeneous mafic pillow lavas, flow breccias and associated gabbroic phases called the McVittie Basalts. Thin interflow bands of alkaline tuff, chert and carbonaceous exhalite are common at the base of the sequence (Figure 4(c)).

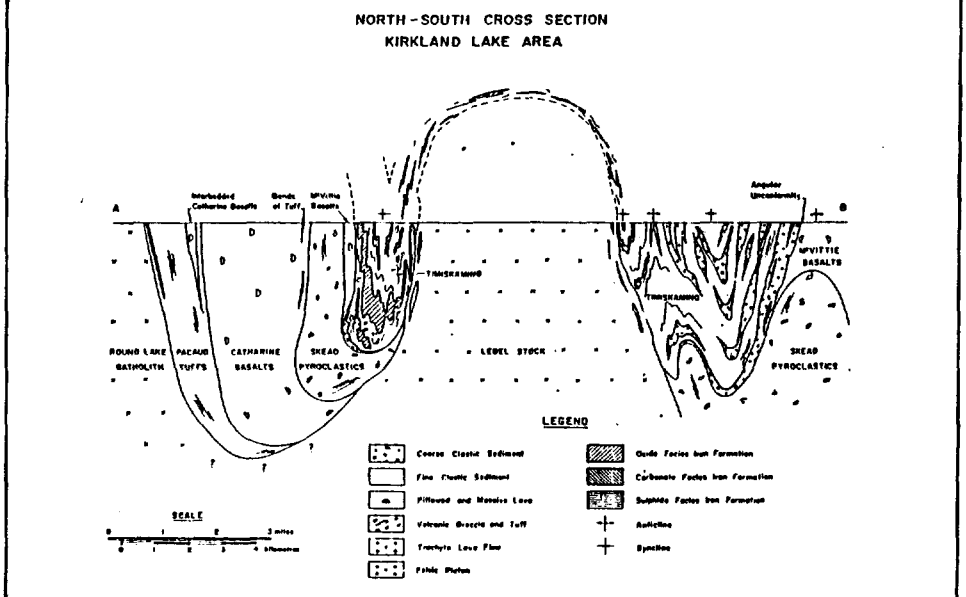
Ridler (1970) suggests that the Skead Group represents a thick platform of basalts locally surmounted by large pyroclastic domes. South of Kirkland Lake the entire sequence subsided prior to McVittie volcanism without significant folding such that the Skead-McVittie contact is everywhere conformable. The McVittie Basalts which occur north of Kirkland Lake have been named the Kinojevis Group by Jensen (1979).

Overlying the predominantly volcanic Skead-McVittie succession lies the 300 m to 1,100 m thick Timiskaming Group, a complex of greywacke, polymictic conglomerate, exhalite (Boston Iron Formation) and ultramafic (komatiitic) to felsic igneous rocks. In the vicinity of Kirkland Lake lies a unique suite of variably alkalic pyroclastics and flows. Ridler (1972) states that the Boston Iron Formation can be used locally to define the upper limit of the group.

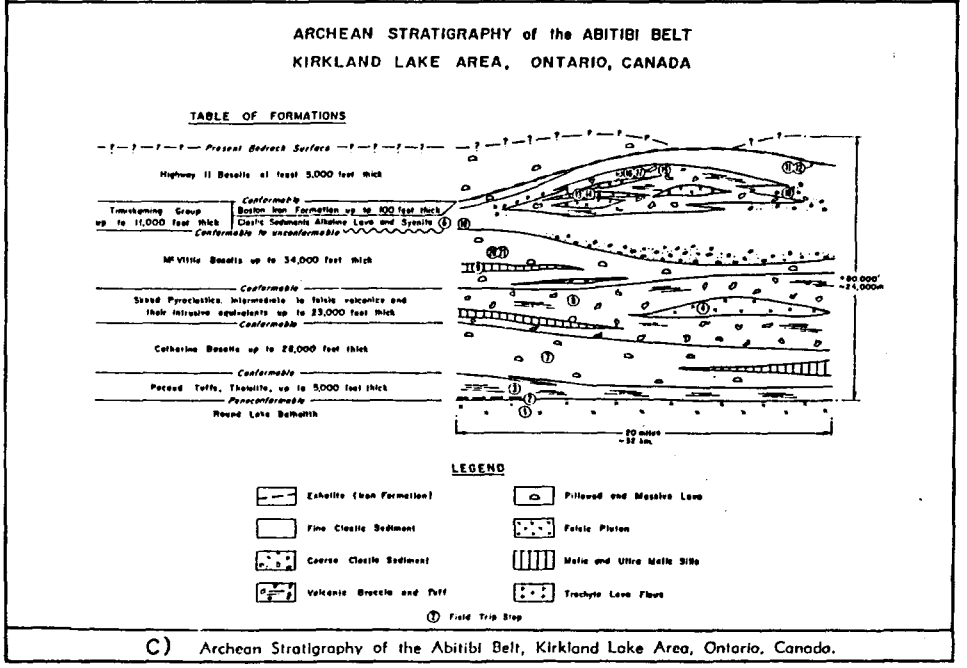
North and west of the East Eby property, a basal sequence of mafic lavas called the Highway 11 Basalts (Ridler, 1972) conformably overlies the Timiskaming Group. This sequence has been included with the Kinojevis Group by Jensen (1978).



A) Geological Sketch Map of the Kirkland Lake Area.



B) North-South Cross Section of the Kirkland Lake Area.



C) Archean Stratigraphy of the Abitibi Belt, Kirkland Lake Area, Ontario, Canada.

(After Ridler, 1972)

AUG 3 1 1988

FIGURE 4: REGIONAL FORMATION MAP AND SECTIONS

There are four main types of plutonic rocks in the Kirkland Lake area: ultramafic to felsic sills; intermediate to felsic diapiric stocks; felsic batholiths; and small discordant felsic and/or alkaline intrusions.

Regional metamorphic grade is generally lower to middle greenschist facies with amphibolite grade rocks occurring in the contact aureoles of intrusive stocks.

EXPLORATION HISTORY

The East Eby property area has been the site of much exploration over the years, with the first documented exploration work starting in 1930 when a 7 hole, 915 m (3,002 ft.) drilling program was carried out by Todara Kirkland Prospecting Syndicate. For further information on the exploration history of the property and surrounding area see Hartwick and Woolham (1987).

Since acquiring portions of the current East Eby property in 1984, the property vendors, Mr. F. Rivard and his partners, have carried out extensive surface stripping and trenching and have drilled two diamond drill holes totalling 276 m (904 ft.). For the drill logs refer to Hartwick and Woolham (1987).

PRESENT PROGRAM

The 1988 summer exploration program was carried out by DMBW contract geologist J.R. Lawton and one technican from June 21 to July 13, 1988 and included the following:

(a) Geological mapping of the entire property at a scale of 1:2,500. Control was maintained through use of a cut-line grid with 100 m spaced lines picketed every 25 m. The baseline was oriented at 045°.

(b) Geological mapping of the southwest corner of the property at a scale of 1:1,000. Control was maintained by a compass and tape grid put in by the author. The 25 m spaced lines were picketed every 25 m.

(c) A lithogeochemical sampling program was carried out over the entire property, a total of 171 composite grabs were taken.

Lithogeochemical Sampling

The objective of the property-wide sampling program was to test for anomalous concentrations of a variety of elements and chemical groups relative to background concentrations in the various rock types. Correlation of these results could provide a detailed picture of the geochemical nature of the property and give an indication of where further exploration should be directed.

Sampling Methods

Representative chip samples collected over several m^2 were taken every 100 m, or whenever a new rock type occurred along the cut lines. Samples were also taken along the strike of an oxide facies iron formation to help delineate it and check for chemical changes.

The samples were all analyzed for a multi-element suite including Au and Ag (See Table 1 for the list of elements and oxides). In addition, 12 samples were also analyzed for platinum and palladium (See Appendix B for analytical results).

Table 1

ELEMENTS ANALYZED FOR IN MULTI-ELEMENT ANALYSIS

Au (in ppb)	Nb (in ppm)	Zn (in ppm)	Pt (in ppb)
Ag (in ppm)	Ni (in ppm)	Zr (in ppm)	Pd (in ppb)
As (in ppm)	Pb (in ppm)		
B (in ppm)	S% (in ppm)	Al_2O_3 (in %)	
Ba (in ppm)	Sb (in ppm)	Fe_2O_3 (in %)	
Be (in ppm)	Se (in ppm)	CaO (in %)	
Bi (in ppm)	Sn (in ppm)	MgO (in %)	
Cd (in ppm)	Sr (in ppm)	Na_2O (in %)	
Ce (in ppm)	Te (in ppm)	K_2O (in %)	
Co (in ppm)	Th (in ppm)	TiO_2 (in %)	
Cr (in ppm)	U (in ppm)	MnO (in %)	
Cu (in ppm)	V (in ppm)	P_2O_5 (in %)	
La (in ppm)	W (in ppm)		
Mo (in ppm)	Y (in ppm)		

PROPERTY GEOLOGY

The East Eby property is underlain by a northeast-striking, subvertically-dipping sequence of felsic to mafic volcanics and volcanogenic sediments intruded by plutonic rocks of various compositions.

The major unit of interest on the property consists predominantly of southwest striking felsic flows and pyroclastics and iron formation horizons (Figure 5). Two diamond drill holes collared in this sequence by F. Rivard (Figure 5, Map 88-82-01) also intersected impure, medium to coarse-grained sandstones, arkose horizons and a cherty, aphanitic, iron-poor equivalent to an iron formation. The bottom half of drill hole R86-01 consists mainly of a komatiite flow structurally overlying a thick komatiitic sediment. See Hartwick and Woolham (1987) for the drill logs.

Lying to the south of the property is the late Archean alkalic Otto stock. It consists of a very coarse grained syenite with varying amounts of included mafic material. An almost pure amphibolite is present in the contact aureole. While minor sulphides are present this unit is not of economic value.

The other intrusives on the property are a series of mafic-ultramafic dykes, sills and plugs (Maps 88-82-01 and 88-82-02). They appear to be gabbro/norites and contain up to 1% disseminated pyrite and minor pyrrhotite and have a weak magnetic character. Several of these were analyzed for platinum and palladium (see Discussion of Results).

There are a number of faults crosscutting the property area with a general northwest trend. These faults could not be located on the ground or the outcrop scale; however, they are evident with geophysical methods (Figures 6 and 7). Aeromagnetic patterns are discussed by Hartwick and Woolham (1987). The locally strong sulphide concentrations in the oxide facies iron formation appear to be epigenetic mineralization localized by the above faults rather than syngenetic sulphides precipitated at the time of deposition.

The only other major structure on the property is an antiform with an axis trending northeast-southwest just south of the baseline.

ECONOMIC GEOLOGY

The purpose of the exploration program was to delineate a unit or zone which would return consistently anomalous gold values.

The main target was an oxide facies iron formation which outcropped at various locations across the length of the property (Maps 88-82-01 and 88-82-02). The unit varies from an almost pure layered chert to a classic oxide facies iron formation with well banded layers up to 10 cm wide containing chert and weak to moderate magnetite and hematite mineralization (Plates 1 and 2). In some places it has been altered to almost massive pyrite and pyrrhotite (Plate 5).

A series of samples was taken along the length of the unit to establish gold values and overall compositional changes. Unfortunately, no results over 81 ppb Au were obtained. In fact, the locally abundant pyrite and pyrrhotite mineralization, while visually impressive, returned no significant Au or base metal values.

An area just north of the baseline consisting of mafic metavolcanics showed a slight correspondence between relatively high Au values, above 40 ppb, and high Cr (above 500 ppm) and Ni (above 200 ppm) values. Sample 4750 returned 2,040 ppm Cr, 616 ppm Ni and 26 ppb Au. Northeast of this, sample 4823 returned 1,247 ppm Cr, 445 ppm Ni and 79 ppb Au (See Table 2 for anomalous values). These values are anomalous and appear to be within the same lithological unit.

Table 2

CORRESPONDING Au AND HIGH Cr AND Ni VALUES

Sample No.	Au (ppb)	Cr (ppm)	Ni (ppm)
4710	67	810	220
4722	71	1,020	430
4725	23	1,660	1,650
4739	38	550	260
4750	26	2,040	616
4768	24	731	195
4796	75	513	339
4823	79	1,247	445
4849	51	2,130	697
4935	63	1,500	534

The remaining economic target is the extensive mafic-ultramafic intrusive rock represented by gabbro/norites. Twelve samples from this unit were analyzed for platinum and palladium. Five samples returned distinctly anomalous values, with the highest being 390 ppb Pt and the lowest 145 ppb (Table 3).

These samples occur in distinct zones (Maps 88-82-01 and 88-82-02) and, consequently, represent a significant target.

Table 3

ANOMALOUS PLATINUM VALUES >50 PPB

Sample No.		Pt	Pd	Lithology
Zone 1	4780	250	<15	gabbro/norite
	4787	145	<15	gabbro/norite
Zone 2	4922	235	<15	gabbro
Zone 3	4928	387	<15	mafic intrusive (gabbro?)
	4929	390	<15	mafic intrusive (gabbro?)

DISCUSSION OF RESULTS

The objective of the program was to accurately map and sample the entire property in an effort to delineate significant gold anomalies.

Table 2 lists the samples which returned anomalous gold, Cr and Ni values (cut-offs of 500 ppm Cr and 200 ppm Ni) and Table 3 lists anomalous platinum values.

Unfortunately, as mentioned in the Economic Geology section of this report, the highest gold value returned was 81 ppb Au. As the background for the property is 50 ppb and the anomaly threshold is 70 ppb, the above value is anomalous; however, it is not considered significant. There are, however, some high Cr and Ni values present which correspond to a slight degree to the higher gold values (See Table 2). This could represent an area requiring backup sampling and exploration.

Twelve samples were analyzed for platinum and palladium and returned some very anomalous values, the highest being 390 ppb (see Table 3). The values seem to be within specific zones or units of gabbro/norites. This, combined with the commonly associated high Cr background, suggests that a soil geochemical and lithogeochemical sampling program could possibly delineate the extent of these anomalies.

CONCLUSIONS AND RECOMMENDATIONS

Unfortunately, the lithogeochemical sampling program failed to outline a significant gold anomaly.

However, the results of the platinum analysis indicate that there is a distinct possibility that a significant platinum anomaly can be delineated on the property. Therefore, DMBW recommends that a limited follow-up field program consisting of lithogeochemical and soil geochemical sampling be conducted to investigate this possibility.

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CERTIFICATE OF QUALIFICATION

I, James R. Lawton, of Apt. 1811, 270 Scarlett Road, Toronto, Ontario, M6N 4X7, do hereby certify that:-

1. I am an exploration geologist employed with Derry, Michener, Booth & Wahl, Consulting Geologists and Engineers, of Toronto.

2. I am a graduate of Queen's University at Kingston in Honours Geology with the degree of B.Sc. in 1985.

3. I have been practising my profession since graduation.

4. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the properties or securities of Butte Canyon Resources Inc.

5. The statements contained in this report and the conclusions and recommendations made are based upon my review of all data available. I have visited the property.

6. I hereby consent to the use of this report in a Statement of Material Facts of the Company for the preparation of a prospectus for submission to the Ontario Securities Commission and other regulatory authorities.

James R. Lawton, B.Sc.

Toronto, Ontario
August 31, 1988

CERTIFICATE OF QUALIFICATION

I, Ian D. Trinder, of Apt. 2025, 30 Denton Avenue, Scarborough, Ontario do hereby certify that:-

1. I am an exploration geologist employed with Derry, Michener, Booth & Wahl, Consulting Geologists and Engineers of Toronto.

2. I graduated from the University of Manitoba in 1983 with a degree of Bachelor of Science, Honours Geology.

3. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the properties or securities of Butte Canyon Resources Inc.

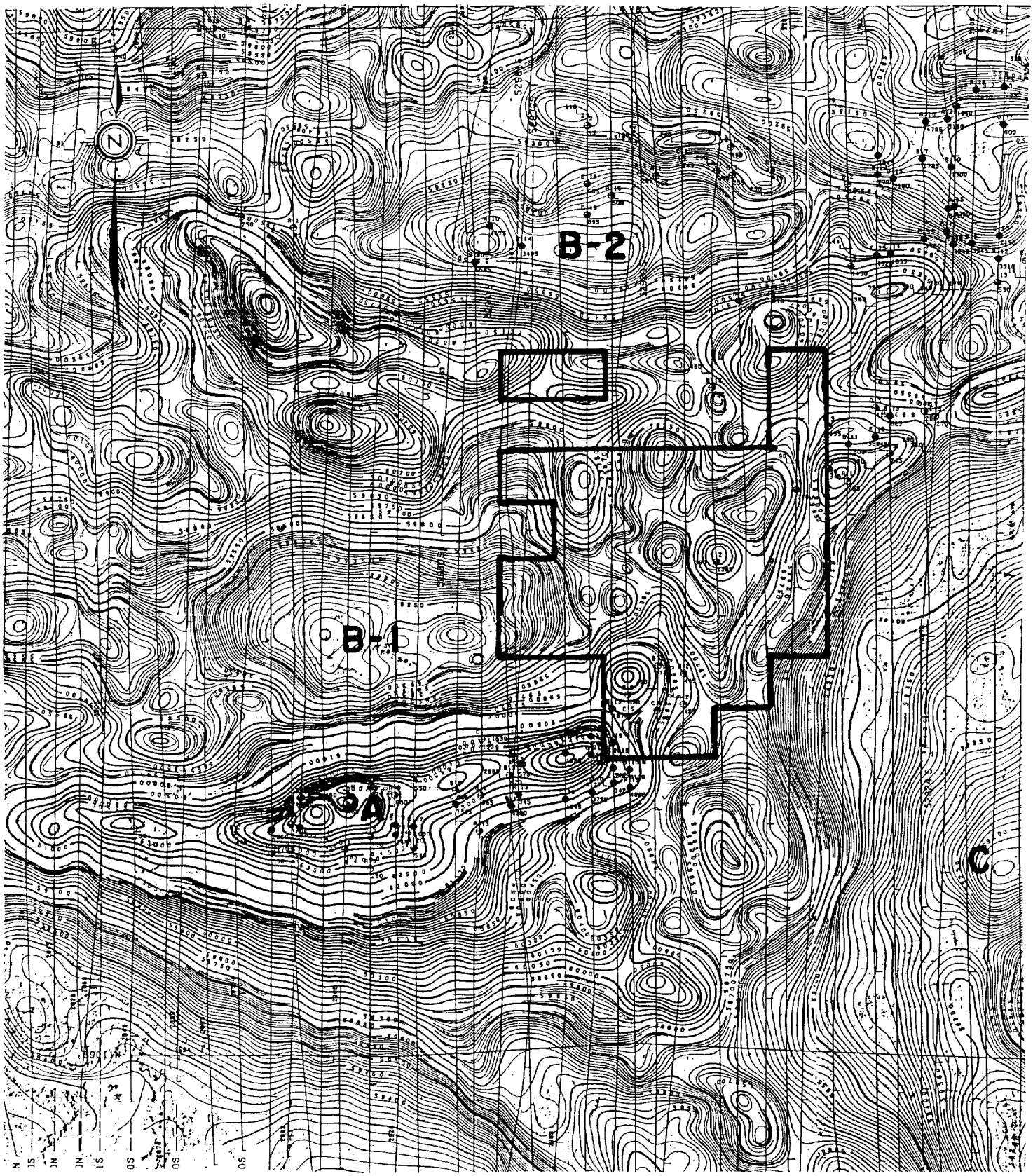
4. The statements contained in this report and the conclusion and recommendations made are based upon my review of all data available. I have not visited the property.

5. I hereby consent to the use of this report in a Statement of Material Facts of the Company for the preparation of a prospectus for submission to the Ontario Securities Commission and other regulatory authorities.



Ian D. Trinder, B.Sc.

Toronto, Ontario
August 31, 1988



0 800 1600 metres

FIGURE 6
AEROMAGNETIC MAP
EBY AND OTTO
TOWNSHIPS
1:40,000

AUG 31 1988

After OGS Maps P2268-69

EXPLORATION HISTORY

No.	Date	Property/Prospector Name	Type of Exploration	Significant Results
(1)	1930-48	Todora Kirkland/ Macassa	geol., 11 ddhs, 121 ft. shaft	Cpy, Mo, Au in qtz., up to 13.39% Cu
(2)	1938	A. Johnson	3 pits	up to 0.1 to 0.3 oz. Au/ton
(3)	1945	Sylvanite	trenches	trace to 0.023 oz. Au/ton
(4)	1955-57	Mr. Ahola	2 shafts, trenches, 1 ddh	up to 0.2 oz. Au/ton in tuff and qtz. veins
(5)	1965-69	M. Fishkin	3 ddhs	cpy + abund. py, cpy in south hole
(6)	1965-66	Keevil	geol., mag, EM, 3 ddhs	8 conductors, iron fm with 15%-80% sulphides 0.005 oz. Au/ton in sludge
(7)	1978-80	P. Harrington	5 ddhs	-
(8)	1980	KLIP	1 OVB hole	3,200 ppb Au in basal till
(9)	1980	Noranda	mag and EM, 1 ddh	3 short, strong conductors, up to 0.016 oz. Au/ton over 1 m
(10)	1980-84	J. Reed	geol., mag, EM, 3 ddhs	0.005 oz. Au/ton in grab, up to 0.01 oz. Au/ton over 1.5 m in core
(11)	1984-86	F. Rivard	trenching, 2 ddhs	up to 0.04 oz. Au/ton in grabs

LEGEND

PROTEROZOIC

ALKALIC INTRUSIVE ROCKS

7 — 7a Coarse-grained syenite, syenite porphyry, pegmatite.
7b Malic syenite, syenite contaminated by country rocks.
7c Medium-grained syenite, aplite dikes.

INTRUSIVE CONTACT

ARCHEAN

MAFIC INTRUSIVE ROCKS (MATACHEWAN OR NIPISSING)

6 — 6 Diabase.

INTRUSIVE CONTACT

FELSIC INTRUSIVE ROCKS (ALGOMAN)

5 — 5a Granite, porphyritic granite, granodiorite.
5b Granodioritic gneiss.
5c Syenite and trachyte.
5d Malic syenite and malic trachyte.

INTRUSIVE CONTACT

EARLY MAFIC AND ULTRAMAFIC ROCKS (HAILEYBURIAN, EARLY ALGOMAN, AND KEEWATIN)

4 — 4a Serpentinite, peridotite.
4b Gabbro, diorite.

INTRUSIVE CONTACT

METASEDIMENTS (TIMISKAMING AND KEEWATIN)

3 — 3a Conglomerate.
3b Quartzite, greywacke.
3c Tuff, agglomerate, minor amounts of trachyte agglomerate, breccia.

UNCONFORMITY AND INTERBEDDING

FELSIC METAVOLCANICS (KEEWATIN)

2 — 2a Rhyolite, dacite.
2b Iron formation, silicic tuff, agglomerate.
2c Dacite porphyry, amygdaloidal and spherulitic dacite.

MAFIC METAVOLCANICS AND METASEDIMENTS

1 — 1 Unsubdivided mafic volcanics.
1a Basalt, andesite.
1b Chloritic mafic tuff, agglomerate.
1c Altered (bleached, carbonatized) volcanic and sedimentary rocks.
1d Amphibolite, garnet-epidote amphibolite, amphibolite gneiss.
1e Andesite porphyry, amygdaloidal and spherulitic dacite.
1g Biotite-garnet-pyroxene amphibolite.

SYMBOLS

- Glacial striae.
- Area of bedrock outcrop.
- Bedding, top unknown; (inclined, vertical).
- Lava flow; top (arrow) from pillows shape and packing.
- Schistosity; (horizontal, inclined, vertical).
- Gneissosity, (horizontal, inclined, vertical).
- Geological boundary, observed.
- Geological boundary, position interpreted.
- Fault; (observed, assumed). Spot indicates down throw side, arrows indicate horizontal movement.
- Lineament.
- Drag folds with plunge.
- Anticline, syncline, with plunge.
- Drill hole; (vertical, inclined).
- Vein, vein network. Width in inches.
- Shaft; depth in feet.
- Motor road. Provincial highway number encircled where applicable.
- Other road.
- Trail, portage or winter road.
- Building.

AUG 31 1988

0 1/4 1/2 Mile

0 500 Metres

1 inch = 1/4 mile

FIGURE 5

PROPERTY GEOLOGY AND EXPLORATION

(After OGS Map 2239)

ZONE B-2

ZONE B-1

ZONE A

ZONE C

EBY TWP.

OTTO TWP.

N

LEGEND

- High Amplitude Magnetic Trends
- Low Amplitude Magnetic Areas
- Fold/Fault Structure
- ZONE A — Refer to Figure 6 and Text
- Property Boundary
- Area of Detail Survey by Noranda

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0 1/4 1/2 Mile

0 500 Metres

1 inch = 1/4 mile

FIGURE 7

INTERPRETIVE GEOPHYSICAL COMPILATION

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REPORT ON THE VLF AND HORIZONTAL LOOP ELECTROMAGNETIC SURVEYS EAST EBY PROPERTY, EBY TOWNSHIP NTS 42A/1

PREPARED FOR

BUTTE CANYON RESOURCES INCORPORATED

210313 Dwg.

DERRY, MICHENER, BOOTH & WAHL

R. W. Woolham, P.Eng.

REGISTERED PROFESSIONAL ENGINEER
R. W. WOOLHAM
PROVINCE OF ONTARIO

Toronto, Ontario
February 1, 1988

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MINING LAND SECTION

Ref: 88-08

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APPENDIX 1: Technical Data Statement
APPENDIX 2: Instrument Specifications

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LIST OF MAPS

88-08-01: VLF Electromagnetic Survey, Scale 1:5,000
88-08-02: Horizontal Loop Electromagnetic Survey, Scale 1:5,000

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MINING LANDS SECTION

INTRODUCTION

Geophysical surveys, utilizing VLF and horizontal loop electromagnetic methods were completed on the East Eby property of Butte Canyon Resources Incorporated. The surveys were performed by the staff of Derry, Michener, Booth & Wahl (DMBW) under the direct supervision of the author. The surveys were conducted during the period October 15, 1987 to November 30, 1987 at two separate times. This work was part of an exploration program recommended by DMBW in a report dated April 15, 1987. This report is for assessment credits and a technical data statement is contained in Appendix 1. A magnetic survey, completed at the same time, was reported on previously and submitted for assessment credits (ref. #87-114).

PROPERTY LOCATION, DESCRIPTION AND ACCESS

The East Eby property is located in Eby Township, about 12 km southwest of the town of Kirkland Lake and about 5 km southeast of Kenogami Lake as shown in Figure 1. The property consists of the following 31 unpatented mining claims in two contiguous blocks covering about 496 hectares (Figure 2). Survey coverage was completed on portions of the Main Block claims only.

Main Block Claim Numbers	Date of Record
L 735464	07/03/84
L 735596 to 735598 incl.	07/03/84
L 738544 to 735548 incl.	07/03/84
L 738577	07/03/84
L 738858	09/03/84
L 802126	28/03/85
L 842693	29/04/85
L 842694 to 842695	12/12/85
L 891900	27/05/86
L 891901	28/07/86
L 891902	30/07/86
L 891903	21/11/86
L 891905	27/05/86
L 891906	30/07/86
L 891907 to 891909 incl.	28/07/86
L 980065 to 980069 incl.	07/04/87

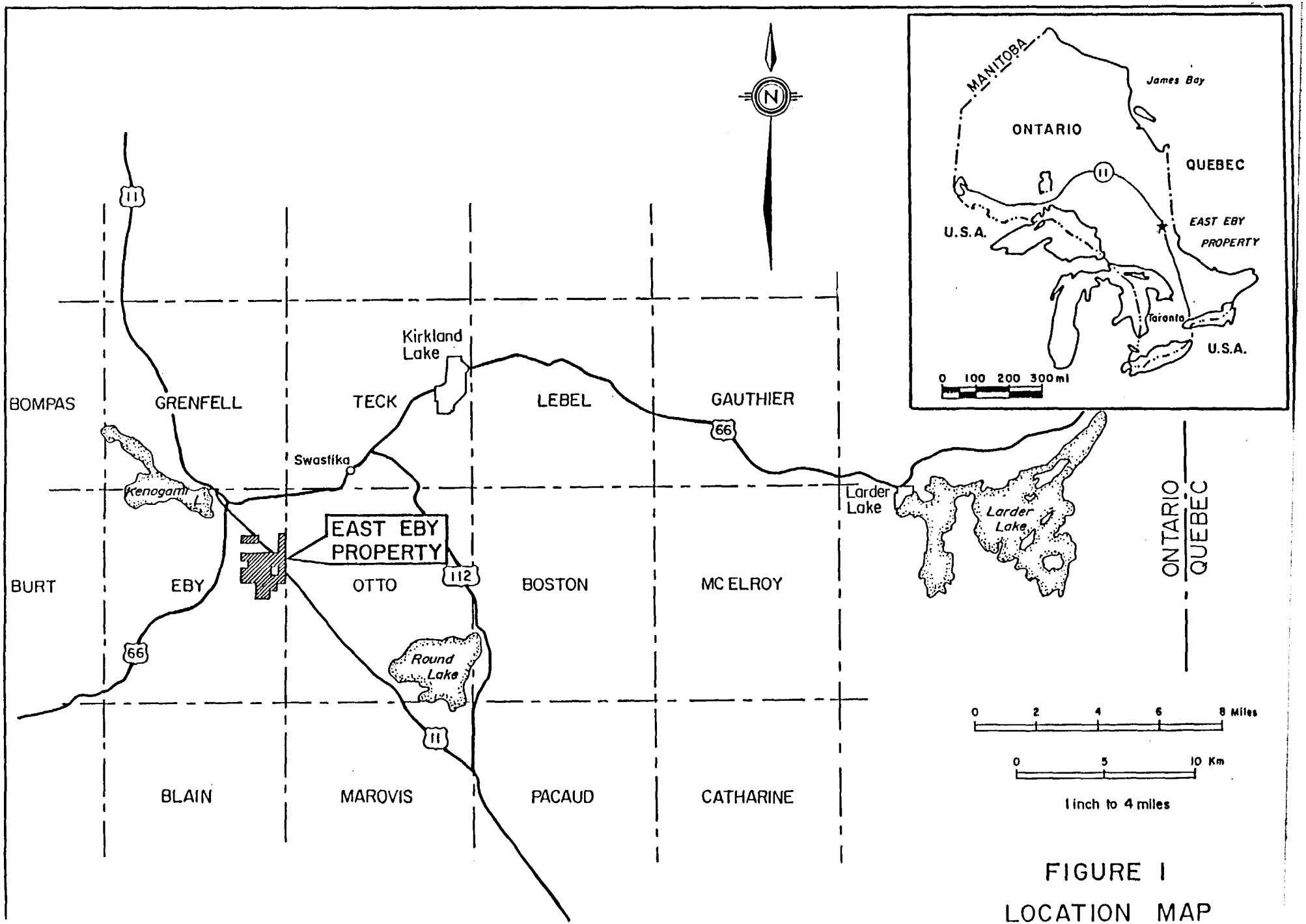
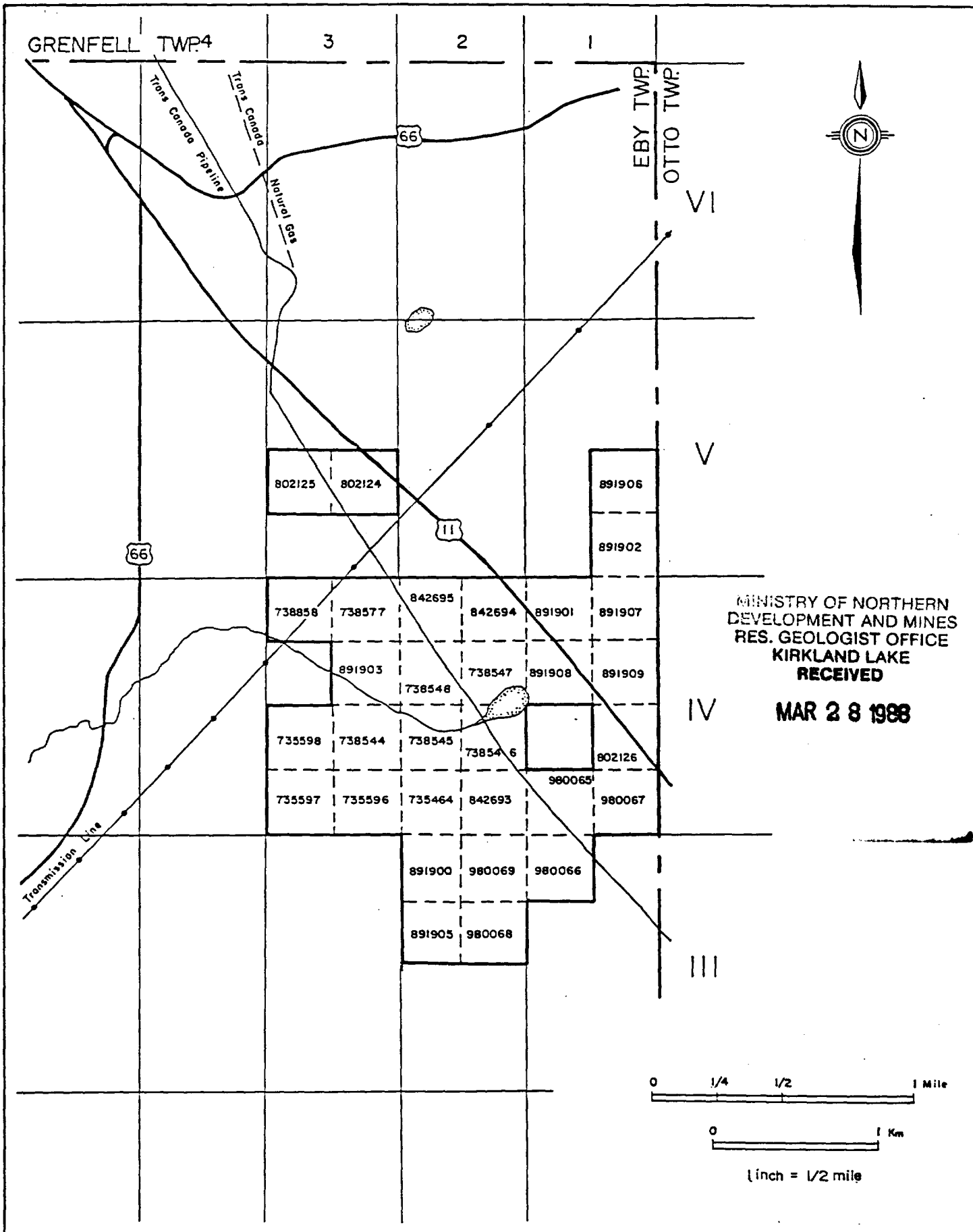


FIGURE I

LOCATION MAP



NOTE:
All claim numbers prefixed by letter "L".

FIGURE 2
CLAIM MAP

North Block

L 802124	27/03/85
L 802125	27/03/85

DMBW has not examined title to the claims nor substantiated their physical boundaries and, accordingly, expresses no opinion as to validity of title and property description.

Access to the property is excellent. Highway 11 crosscuts the northeast corner of the property and there are bushroads and trails which lead to the other sections. In addition, a wide clearing for the Trans-Canada Pipeline crosscuts the centre of the property, providing excellent mobility.

GEOLOGY

Essentially, all of the consolidated rocks in the Kirkland Lake area are of Precambrian age. Proterozoic formations consist of Gowganda Formation sediments of the Cobalt Group, and two generations of diabase dykes. The more areally extensive Archean stratigraphy in the area can essentially be divided into four major stratigraphic categories:

(1) Pre-Timiskaming, Skead Group, mafic to felsic flows and pyroclastics, chemical sediments and local ultramafic flows and intrusives.

(2) Timiskaming Group fine- to coarse-grained clastic metasediments, chemical metasediments, alkaline flows, tuffs and breccias, felsic volcanics and komatiic (ultramafic) flows.

(3) Post-Timiskaming Highway 11 basalts and local komatiites (Kenojevis Group).

(4) Various gabbroic, syenitic and granitic intrusives.

The East Eby property is underlain by a northeast-striking, subvertically dipping sequence of felsic to mafic volcanics and volcanogenic sediments intruded by various types of plutonic units.

Based on government mapping, a major unit consisting dominantly of felsic flows and pyroclastics and iron formation horizons transgresses the property from the northeast to the southwest. Two diamond drill holes collared in the unit indicate that the package also contains impure medium to coarse-grained sandstones, arkose horizons and a cherty, aphanitic, iron-poor equivalent to an iron formation. The bottom half of one drill hole dominantly consists of a komatiite flow structurally overlying a thick komatiitic sediment. These units probably represent the basal succession of the Highway 11 Basalts. Both oxide and sulphide facies iron formations, having association with gold mineralization, exist on the property.

Based on regional mapping, there are three types of intrusive rocks on the property: early mafic to ultramafic stocks, dykes and sills; late Archean felsic intrusives, presumably part of the Round Lake Batholith; and the late Archean alkalic Otto stock. Proterozoic diabase dykes undoubtedly crosscut portions of the property.

SURVEY PARAMETERS AND PRESENTATION

VLF Electromagnetic Survey

This survey utilized the Scintrex IGS-2 system used for the magnetic survey, previously reported on, with a VLF-4 electromagnetic sensor. Instrument specifications are contained in Appendix 2. The VLF readings were recorded at the same time as the magnetic readings. The measurements consisted of the horizontal amplitude, vertical component of the in-phase and quadrature secondary fields produced by the primary field from the VLF transmitter station at Cutler, Main with a frequency of 24.0 KHz. Readings were taken every 25 m along lines spaced 100 m apart. A portion of the grid was not surveyed because the VLF transmitter station was inactive at the time of the combined magnetic-VLF survey. A total of 32 line km of data or about 1,280 readings were recorded.

Each day's results were dumped to a floppy disc storage device for later office editing and plotting by DMBW. The machine plotted profiles of the in-phase and quadrature values at a scale of 1:5,000 are shown on Map 88-08-01 in a pocket at the back of this report.

Horizontal Loop Electromagnetic Survey

The electromagnetic instrument was an Apex Parametrics Ltd. Max-Min II unit. Instrument specifications are contained in Appendix 2. A coil spacing of 100 m was used for the survey with a station reading interval of 25 m. Survey lines were 100 m apart. Only the south part of the grid was surveyed. Accurate levelling of the coils was monitored at each station and correct coil distance was maintained using the picket line chainages. The in-phase and quadrature readings at a frequency of 1,777 Hz were measured at each station. A total of 16 line km of data or about 1,280 readings were collected on the property.

Office compilation consisted of entry of the data values in the field notebooks into a computer system for machine plotting. A survey map was generated at a scale of 1:5,000 with appropriate title and legend. The in-phase and quadrature values are shown as solid and dashed profile lines respectively (see Maps 88-08-02 in pocket.

RESULTS

Horizontal Loop Electromagnetic Survey

There are two conductive areas on the portion of the grid that was surveyed. In the southwest corner of the grid there are several parallel conductive trends having very high conductivity characteristics. Conductive trend displacements suggest that cross-faulting is present in at least one and probably two locations. All of the conductors in this area are coincident with medium to high amplitude magnetic responses (refer to report #87-114 of December 29, 1987).

The other conductive response area is located in the northeast at about 500 south. It is a linear northeast trending feature with a coincident, very low amplitude, magnetic response. There is a poorer conductivity, low amplitude, parallel conductor to the south of this main trend which has poor line-to-line continuity and no magnetic association.

Note that a portion of line 800 and 700 west was not surveyed. This was the result of erratic off-scale readings produced by a gas pipeline running subparallel to the survey lines in this area.

VLF Electromagnetic Survey

The high conductivity responses in the southwest corner of the grid detected by the horizontal loop survey were only partially detected by the VLF survey. Conductive overburden is probably masking responses from the bedrock conductors in this area. The much higher frequency generated VLF response is prone to such masking effects. The other horizontal loop conductor on the east side of the grid was only partially detected by the VLF survey because of inadequate line coverage in this area.

Except for a few local one-line VLF responses and the erratic responses in the central grid area related to a gas pipeline, the only other conductor of note occurs on or in the vicinity of the east and west portions of the baseline. A single conductive trend is suggested at the west end of the baseline while at the east end of the baseline a more complex multiple zoned conductive area is indicated.

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CONCLUSIONS

The horizontal loop electromagnetic survey has identified several conductive trends having coincident magnetic signatures. The source of these conductors is most probably oxide and sulphide iron formation as indicated by previous drilling and prospecting on and along strike from the conductors. However, not all of the conductive indications have been explained.

In addition to the conductors delineated by the horizontal loop survey, the VLF electromagnetic survey detected one intermittent conductive horizon which is coincident with a contact between felsic and mafic to intermediate metavolcanics. Other than the erratic readings obtained over the gas pipeline, other isolated VLF responses have no obvious explanation but are possibly related to conductive overburden effects but may have bedrock sources.

RECOMMENDATIONS

The iron formations in the area are known to have an association with gold mineralization. Areas of alteration associated with sulphide iron formation and magnetite/hematite iron formation may occur in structurally complex areas of faulting and folding. Such areas may be recognized from their magnetic/conductive characteristics and, if outcrop exposure exists, from their alteration products and detailed mapping. The conductive trends associated with coincident magnetic responses in the southwest part of the property appear to be faulted and/or folded. These conductive areas are prime exploration targets. Other conductive responses need evaluation on a second priority basis. A detailed program of mapping and prospecting is planned for the next field season. This work will aid in identifying specific targets worth drill investigation.

-600

-900

-1200

-1500

-2000

-1600

-1200

-800

-400

N

ANNEX "H-20"

MARY ELLEN RESOURCES LIMITED

ASSESSMENT REPORT ON CLAIMS L980369, L980368

EBY TOWNSHIP

LARDER LAKE MINING DIVISION

BY

S.J. CARMICHAEL, B.Sc.

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Project # M-0[illegible]

NTS 42A/SE

June 15, 1988

Kirkland Lake, Ontario

2.11385

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INTRODUCTION

Work was carried out during the months of May and June, 1988 on claims numbered L980368, L980369 and L842568. Mary Ellen Resources Ltd. hold 100% interest in the property.

A V.L.F. survey, trench work and sampling was completed on the property.

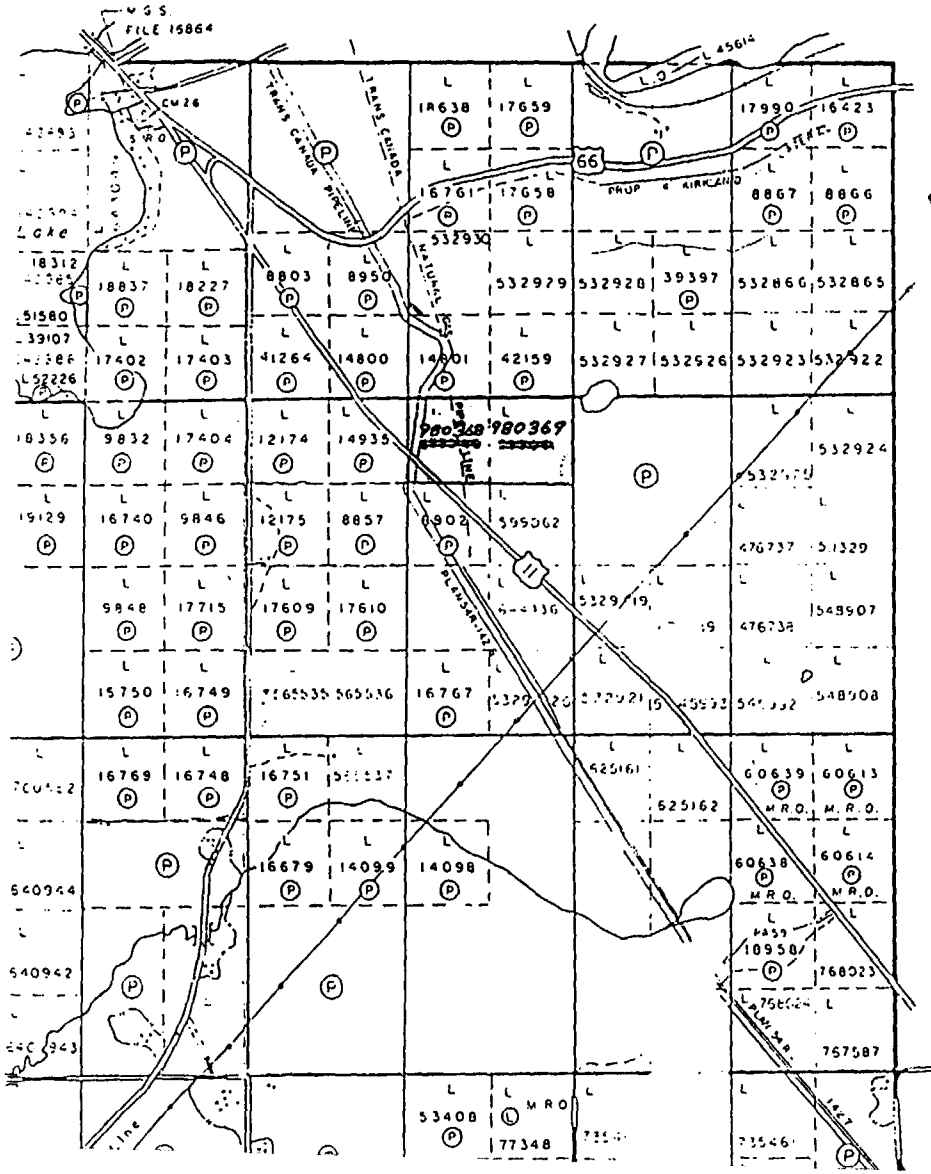
The results of the program are presented and recommendations for further work are outlined in the report.

LOCATION AND ACCESS

Claims numbered L980368 and L980369 are located in the Eby Township, District of Timiskaming, Concession 5, Lot 3, north 1/2, northwest 1/4 and northeast 1/4 in the province of Ontario. Highway 11 passes through the southwestern portion of claim L980369 which is found approximately two miles (3.2 kilometers) south of the Village of Kenogami.

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Twp. M. 351



Twp. M. 379

THE TOWNSHIP OF EBY

DISTRICT OF TIMISKAMING

LARDER LAKE MINING DIVISION

SCALE: 1-INCH=40 CHAIN

LEGEND

- PATENTED LAND
- CROWN LAND SALE
- LEASES
- LOCATED LAND
- LICENSE OF OCCUPATION
- MINING RIGHTS ONLY
- SURFACE RIGHTS ONLY
- ROADS
- IMPROVED ROADS
- KING'S HIGHWAYS
- RAILWAYS
- POWER LINES
- MARSH OR MUSKEG
- MINES
- CANCELLED

TOPOGRAPHY AND VEGETATION

The claims are overlain by clay and glacial till. Outcrop exposure is estimated at 20 - 30%. The topography is undulating with high relief on the east portion of Claim L980369. The western portion of Claim L980369 and the central and eastern portions of Claim L980368 are characterized by flat relief with minor marshy depressions. Outcrop are elongate and generally ovoid trending 020 degrees.

Both claims have been logged in the past with resulting alders and low bush covering 40% of the area. The remainder of the property is covered by mature forest consisting of spruce, birch and poplar. A small beaver dam lake sits on the north east portion of Claim L980369.

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GEOPHYSICAL DISCUSSION

VLF survey was completed over claim numbers L980368, L980369. The survey was carried out through uncut forest. Lines were spaced 100 meters apart with station intervals every 50 meters.

Geonics EM-16 VLF instrument was used to complete the survey using Annapolis Maryland (21.4 KH2) as a base station.

Results show a flat response over claim number L980369 with the exception of a weak anomaly D-D, (Map 1). It is proposed that this anomaly represents the clay-silt bottom of a northeast trending pond/marsh area.

Responses on claim number L980368 were considerably stronger than those found on L980369. It is inferred that anomaly A-A is a response to a graphitic sediment. The graphitic sediment can be seen in outcrop proximal to the first station on line 1.

It is proposed that anomaly B-B is the easterly strike extension of anomaly A-A. East of anomaly B-B the VLF responses are flat. This change may be explained by an abrupt change in lithology or a

2 4 1988

north-south offset fault.

TRENCHING

Trenching was completed on claim L980369. The area on claim L980369 was trenched to uncover information pertaining to the geophysical anomally D-D.

Trenching indicates that cause of anomaly D-D is a north-east trending fault intruded by a possible mafic dike. This dike carries up to 5% pyrite over a width of 2 feet. Assays from this dike returned negligable gold values. Further work on the property should include geological mapping with close attention made to carbonate boulders which may indicate stronger mineralized structures on the property.

Respectfully submitted,

Stewart J. Carmichael

Stewart J. Carmichael, B.Sc.

APR 4 1988

ANNEX "H-21"

RESIDENT GEOLOGIST
4 GOVERNMENT ROAD EAST
KIRKLAND LAKE, ONTARIO
P2N 1A2

1990 Eby Township OPAP Report

December 11, 1990

Results and Recommendations
in
The Eby Township Property, District of Timiskaming
for
Fernand Rivard (OPAP# OP-90-121)

SUMMARY

This report documenting the work completed on the Eby Township claim group held by Fernand Rivard has been prepared by S.J. Carmichael, B.Sc., FGAC at the request of Mr. Rivard. It covers the exploration work completed during the 1990 season and provides recommendations for additional work. This work was completed with the aid of an OPAP grant number OP-90-121, part of which was applied to a claim group located in Otto Township, District of Timiskaming. The author of this report is familiar with the Eby property, having visited a number of the claims and has logged the drill holes completed during the 1990 program. Previous work on the claims indicates that the property is underlain by a complex sequence of intermediate/felsic to mafic/ultramafic volcanics with intercalated clastic and chemical sediments. A number of documented gold and base metal showings are present on the property and a program of selected stripping, sampling and geological mapping of the showings is recommended prior to any additional diamond drilling.

WORK SUMMARY

The 1990 exploration program consisted of the drilling of two holes for a total of 1016.5 feet. The first hole, located on claim L-891900 tested a wide syenitic body intruded into ultramafic (komatiite) volcanics. The second hole, located on claim L-738546, tested a thick sedimentary package which included cherts and graphitic mudstone. All drilling was done between May and August of 1990.

DRILLING RESULTS

Drill hole E-90-1 was collared 2 feet east and 12 feet south of the #4 post on claim L-891900 with a dip of -55 degrees and an azimuth of 005 degrees. A dark red mafic syenite with feldspar porphyry phases was cored from 56.0 to 456.0 feet. A summary log follows:

0.00 - 17.00 feet	Casing
17.00 - 56.00 feet	Ultramafic Volcanics (komatiite)
56.00 - 456.00 feet	Syenite
456.00 - 504.00 feet	Ultramafic Volcanics (komatiite)

504.00 feet End of Hole

The intrusive was generally massive throughout with minor sections that were fractured with quartz veins. All assays were low from both the sludge and the split core. Anomalous values were cored from 62.8' to 65.0' (129 ppb Au) and from 94.0' to 97.0' (314 ppb Au). Both of these sections are associated with bleaching of the syenite, perhaps related to shearing. The first 30' of core within the komatiites gave a sludge assay of 1,100 ppm Cu.

Drill hole E-90-2 was collared 118 meters north and 213 meters west of the #2 post on claim L-738546 with a dip of -50 degrees and an azimuth of 322 degrees. Intercalated wackes, siltstones, cherts and graphitic mudstone were intersected throughout the entire hole. A summary log follows:

0.00 - 6.0 ft.	Casing
6.00 - 66.0 ft.	Intermediate Tuff or Wacke
66.0 - 112.0 ft.	Sandstone/Wacke
112.0 - 125.2 ft.	Siltstone
125.2 - 142.0 ft.	Sandstone/Wacke
142.0 - 170.5 ft.	Chert
170.5 - 287.0 ft.	Graphitic Sediment
287.0 - 339.5 ft.	Siltstone
339.5 - 351.0 ft.	Iron Formation
351.0 - 389.0 ft.	Siltstone
389.0 - 512.5 ft.	Carbonaceous Mudstone
512.5 feet	End of Hole

Mineralization was weak throughout this hole with pyrite mineralization confined to cherty and graphitic sections. No anomalous gold, silver, copper, lead or zinc assays were cored in either the split core or the sludges.

RECOMMENDATIONS

Future work on the Eby claims should include geological mapping and sampling of existing stripped areas and additional stripping on the south section of claim L-891905 where a drill hole by M. Fishkin (c. 1969) intersected chalcopyrite and pyrite mineralization. An area of equal interest is on claim L-891909 where shallow shafts and trenches were made by M. Ahola (c.1956). Gold values up to 0.2 oz/ton were reported from this area. Mr. Rivard has indicated that he probably will not undertake additional exploration work on these claims, however a provisional budget of $2,000.00 is estimated to complete the above stripping and sampling program.

Respectfully submitted

Stewart J. Carmichael

Stewart J. Carmichael B.Sc., FGAC

GEOLOGICAL ASSOCIATION OF CANADA
S. J. Carmichael
Dec. 11/90
FELLOW

DIAMOND DRILL RECORD

Company:	Fern Rivard			Hole No.	E-90-2
Location:	Eby Township	Date Started:	June 30, 1990	Page No.	1
Level:	Surface	Date Finished:	August 2, 1990	Core Size:	EX 7/8"
Bearing:	322 degrees	Logged:	S. Carmichael	Test-Acid:	Tropari:
Inclination:	-50 degrees	Core Saved?	Yes	Discarded:	Strike Dip
		Casing: Left			
Total Depth:	512.5 feet	Elevation:	N/A	At:	
		Claim No.:	L-738546	At:	
Coords Collar - Lat:	118m North of #2 Post	Dep:	213m W #2 Post	At:	
Drilled by:	F. Rivard	Date Logged:	October 6, 1990		

FOOTAGE From - To	GEOLOGICAL & PHYSICAL DESCRIPTION	SAMPLE NUMBER	FROM - TO	AU PPB	AU GRAMS/TON	AU OZ/TON	LENGTH
0.0-6.0 feet	Casing						
6.0-66.0 feet	Tuff						
	Buff grey-green intermediate tuffaceous volcanics. Locally interbedded with carbonaceous chert. Minor sulfide mineralization in chert sections.						
	12.0-18.5' - carbonaceous chert						
	23.1-27.0' - grey chert, 2% pyrite in bands. Banding at 54 deg. to C.A.	1241	23.1-27.0 feet	21.0			3.9 ft.
	46.4-52.6' - black carbonaceous chert	1242	49.0-53.0 feet	7.0			4.0 ft.
66.0-112.0 feet	Sandstone/Wacke						
	Buff green well foliated sandstone. Clasts of quartz and feldspar up to 1mm in size. Foliation at 96.0' at 44 deg. to C.A.						
112.0-125.2 feet	Siltstone						
	Very fine grained dark grey to black laminated siltstone. Locally carbonaceous.						
125.2-142.0 feet	Sandstone/Wacke						
	Continuation of unit from 66.0-112.0'.						
142.0-170.5 feet	Chert						
	Buff green to grey cherty sediment. Moderately laminated with trace to 2% pyrite in local concentrations.						
	142.0-147.0' - 4% pyrite.	1243	142.0-147.0 feet	Nil			5.0 ft.
	147.0-152.0' - 25% core recovery						
	152.0-165.0' - intercalated wacke and						

	chert.						
170.5-287.0 feet	Graphitic Sediment						
	Intercalated dark grey/black graphitic sediment and dull green cherty siltstone. 2-4% pyrite throughout with local concentrations up to 10%. Section averages 75% core recovery.						
	180.0-185.0' - buff carbonate clasts in graphitic siltstone to 181.0'.	1244	180.0-185.0 feet	3.0			5.0 ft.
	185.0-190.0' - 4% pyrite	1245	185.0-190.0 feet	5.0			5.0 ft.
	190.0-195.0' - 5-8% pyrite	1246	190.0-195.0 feet	17.0			5.0 ft.
	195.0-200.0' - graphitic with 10% py. from 195.0-196.0'. 50% core recovery.	1247	195.0-200.0 feet	Nil			5.0 ft.
	246.0-251.0' - buff chert with 10% py.	1248	246.0-251.0 feet	Nil			5.0 ft.
	251.0-256.0' - brecciated chert/sandstone. 5% pyrite with 70% recovery.	1249	251.0-256.0 feet	Nil			5.0 ft.
	273.5-280.0' - grey chert, 4% pyrite.	1250	273.5-280.0 feet	Nil			6.5 ft.
287.0-339.5 feet	Siltstone						
	Light green-colored fine grained laminated siltstone. Locally intercalated with dark carbonaceous sections						
239.5-351.0 feet	Iron Formation						
	Dark grey fine grained magnetic siltstone. Moderately to highly magnetic with magnetite ← pyrrhotite. Unit is not banded.						
351.0-389.0 feet	Siltstone						
	Continuation of unit above iron formation.						
389.0-512.5 feet	Carbonaceous Mudstone						
	Intercalated grey chert and black mudstone. Minor quartz stringers throughout.						
	397.0-402.0' - graphitic mudstone, 2% pyrite.	121599	397.0-402.0 feet	10.0			5.0 ft.
	453.0' - foliation at 48 deg. to C.A.						
	464.0-469.0' - 10% disseminated py.	121600	464.0-469.0 feet	Nil			5.0 ft.
512.5 feet	End of Hole						

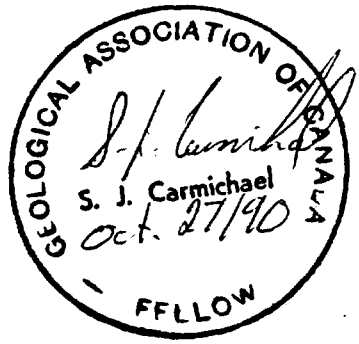
Sludge Assays (Au PPB)

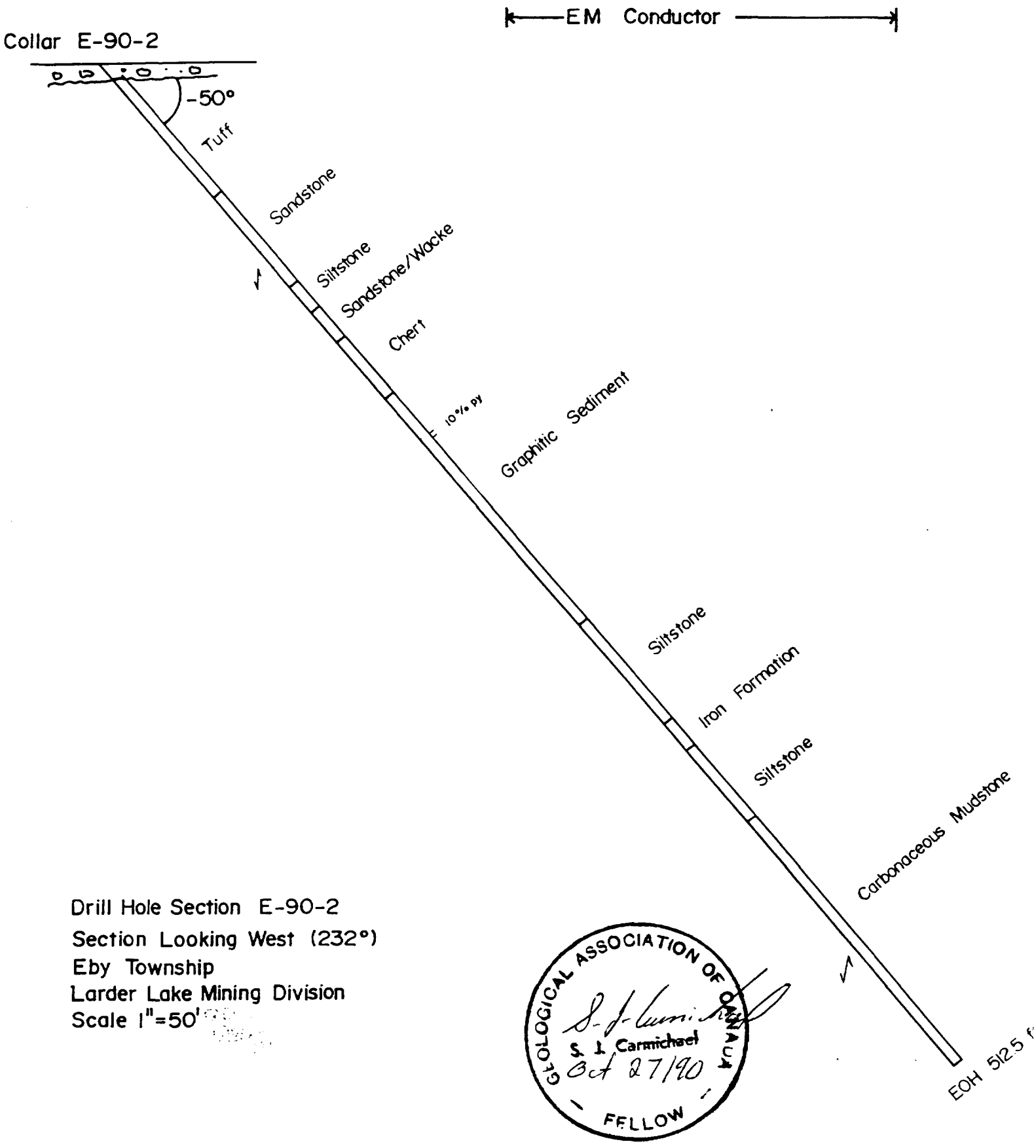
10.0-20.0 ft.	10	370.0-380.0 ft.	Nil
20.0-30.0 ft.	5	380.0-390.0 ft.	16
30.0-40.0 ft.	<5	390.0-400.0 ft.	7
40.0-50.0 ft.	7	400.0-410.0 ft.	Nil

50.0-60.0 ft.	12		410.0-420.0 ft.	10	
60.0-70.0 ft.	11		420.0-430.0 ft.	7	
70.0-80.0 ft.	9		430.0-440.0 ft.	Nil	
80.0-90.0 ft.	9		440.0-450.0 ft.	3	
90.0-100.0 ft.	9		450.0-460.0 ft.	Nil	
100.0-110.0 ft.	9		460.0-470.0 ft.	Nil	
110.0-120.0 ft.	9		470.0-480.0 ft.	12	
120.0-130.0 ft.	17		480.0-490.0 ft.	14	
130.0-140.0 ft.	7		490.0-500.0 ft.	28	
140.0-150.0 ft.	14		500.0-512.5 ft.	9	
150.0-160.0 ft.	Nil				
160.0-170.0 ft.	27				
170.0-180.0 ft.	Nil				
180.0-190.0 ft.	Nil				
190.0-200.0 ft.	31	0.2 ppm Ag	184 ppm Cu	225 ppm Zn	<5 ppm Pb
200.0-210.0 ft.	Nil				
240.0-250.0 ft.	Nil				
250.0-260.0 ft.	Nil				
270.0-280.0 ft.	7		295 ppm Cu	438 ppm Zn	
280.0-290.0 ft.	Nil				
290.0-300.0 ft.	12		298 ppm Cu	354 ppm Zn	
300.0-310.0 ft.	5				
310.0-320.0 ft.	Nil				
320.0-330.0 ft.	Nil				
330.0-340.0 ft.	3		172 ppm Cu	187 ppm Zn	
340.0-350.0 ft.	3		171 ppm Cu	180 ppm Zn	
350.0-360.0 ft.	7		288 ppm Cu	293 ppm Zn	
360.0-370.0 ft.	12	0.2 ppm Ag	274 ppm Cu	306 ppm Zn	

Additional Core Assays

185.0-190.0 ft.	342ppm Zn
190.0-195.0 ft.	107ppm Zn
246.0-251.0 ft.	355ppm Zn





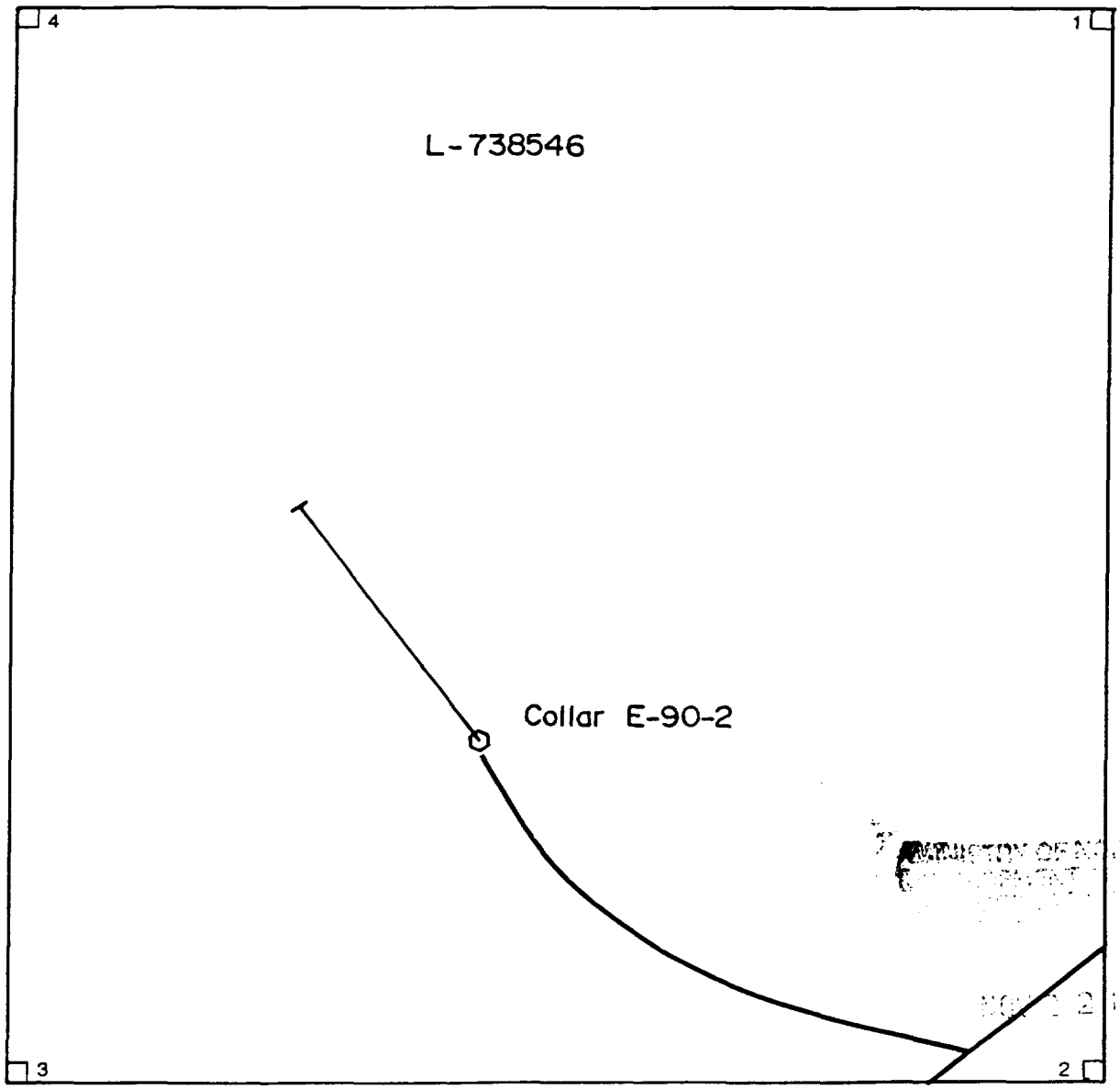
Drill Hole Section E-90-2
Section Looking West (232°)
Eby Township
Larder Lake Mining Division
Scale 1"=50'

GEOLOGICAL ASSOCIATION OF CANADA
S. J. Carmichael
Oct 27/90
FELLOW

Oct. 1990

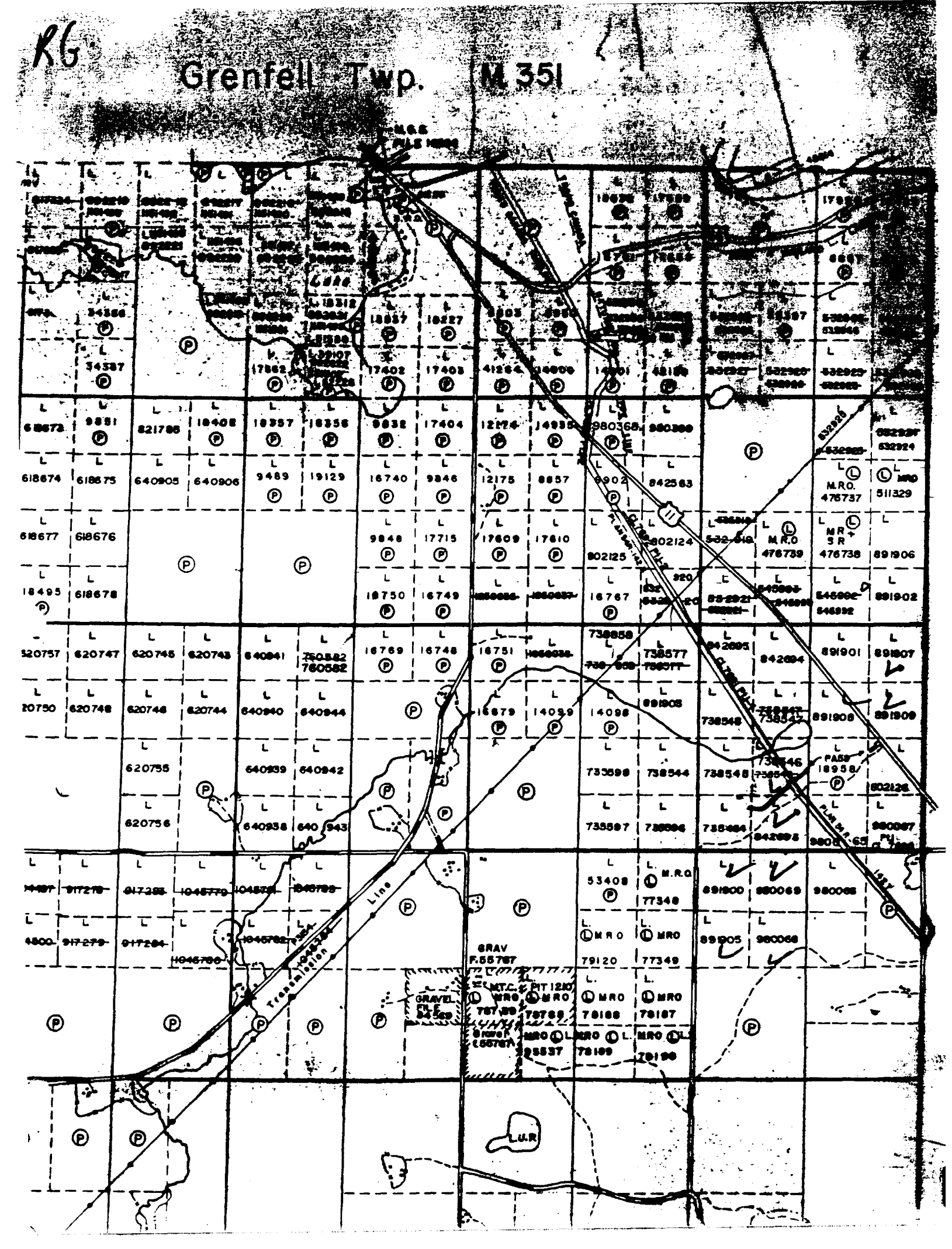
DRILL HOLE LOCATION PLAN
EBY TOWNSHIP
DISTRICT of TIMISKAMING
Concession IV
Lot 2, S 1/2, NE 1/4

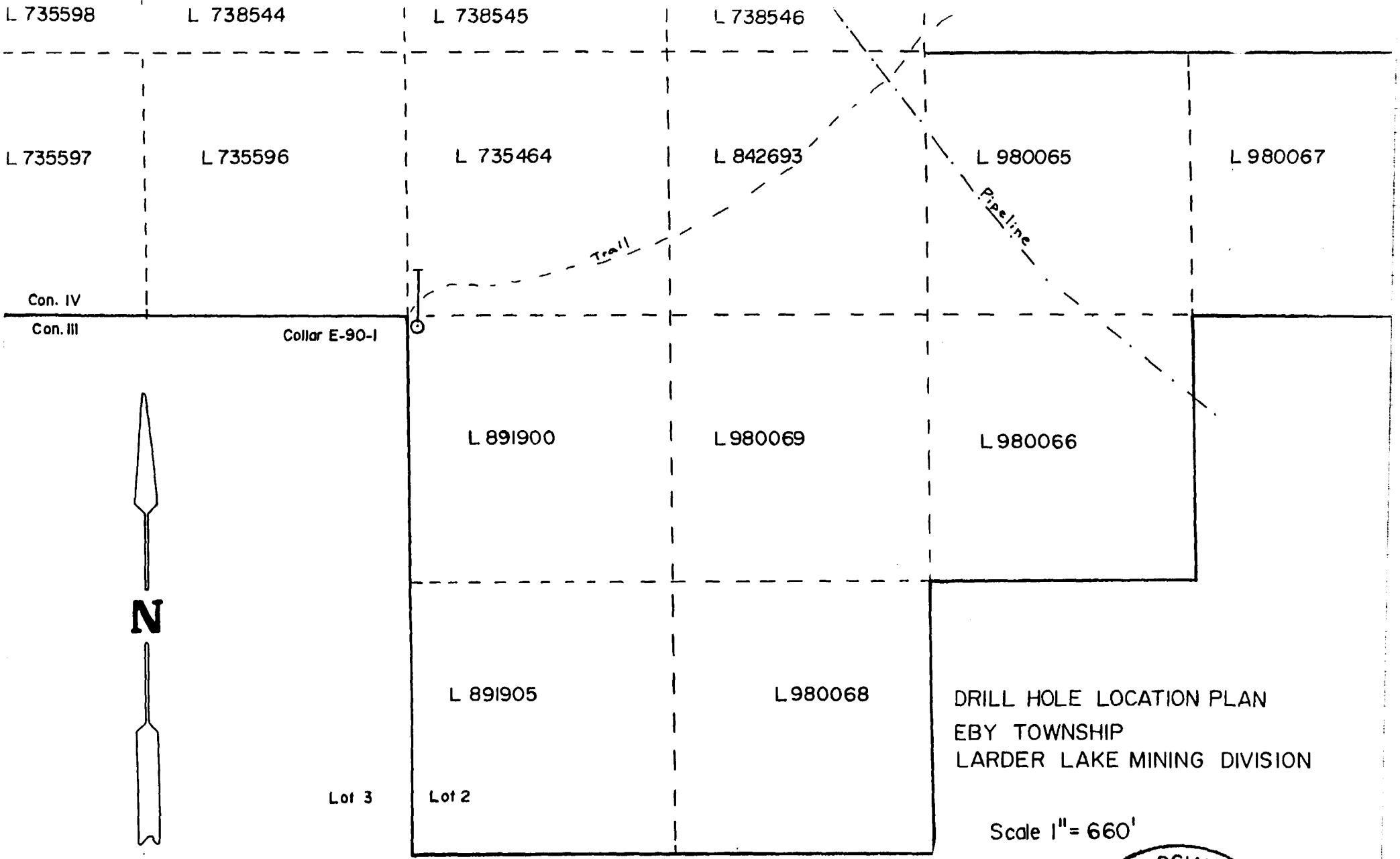
GEOLOGICAL ASSOCIATION OF CANADA
S. J. Carmichael
Oct. 27/90
FELLOW



Scale 1"= 200'

Oct. 1990

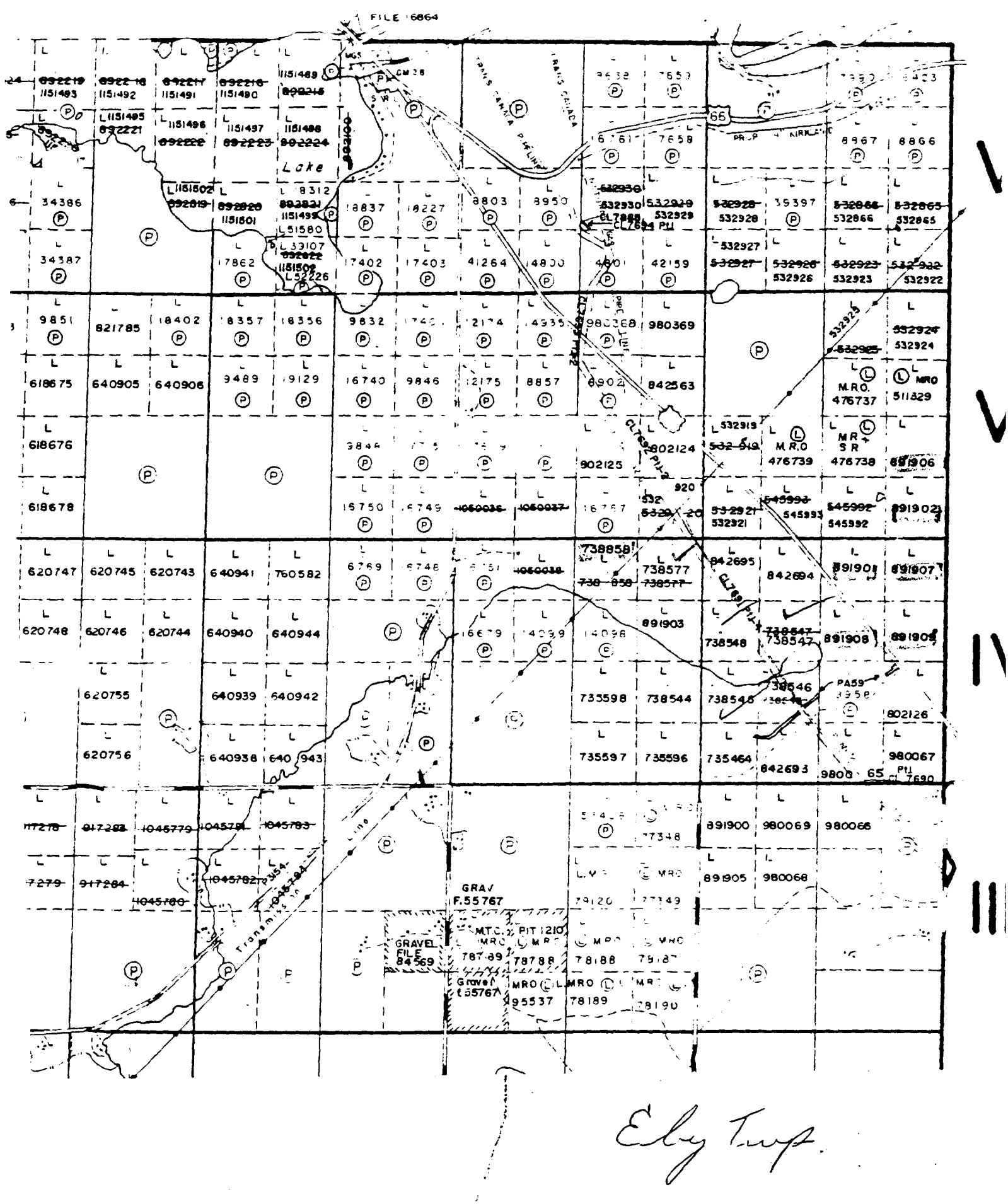

RG
Grenfell Twp.
M 351
Transmission Line
GRAV
GRAVEL PIT E
PIT 1210
M.R.O.
M R O
MRO
L.U.R



DRILL HOLE LOCATION PLAN
EBY TOWNSHIP
LARDER LAKE MINING DIVISION

Scale 1" = 660'

GEOLOGICAL ASSOCIATION OF CANADA
S. J. Carmichael
July 4/90
FELLOW


FILE 16864
Lake
TRANS CANADA PIPELINE
PRC LINE
CL7694 PLI
CL7695 PLI
CL7696 PLI
CL7697 PLI
CL7698 PLI
M.R.O.
476737
M.R.O
476739
M R
S R
476738
GRAV
F.55767
GRAVEL
FILE
84569
Gravel
F.55767
Transmission Line
Ely Twp.

DIAMOND DRILL RECORD

Company:	Fern Rivard			Hole No.	E-90-1
Location:	Eby Township	Date Started:	May 24, 1990	Page No.	1
Level:	Surface	Date Finished:	June 15, 1990	Core Size:	EX
Bearing:	005 Deg.	Logged:	S. Carmichael	Test-Acid:	Tropari:
Inclination:	-55 Deg.	Core Saved?	Yes	Discarded:	Strike Dip
		Casing: Left			--- ---
Total Depth:	504.0 feet	Elevation:	Surface	At:	0.0 ft. 005 deg. -55 deg.
		Claim No.:	L-891900	At:	
Coords Collar - Lat:	2 feet east of No. 4 Post	Dep:	12 feet South of No. 4 post	At:	
Drilled by:	F. Rivard	Date Logged:		June 14, 1990	

FOOTAGE From - To	GEOLOGICAL & PHYSICAL DESCRIPTION	SAMPLE NUMBER	FROM - TO	AU PPB	AU GRAMS/TON	AU OZ/TON	LENGTH
0.00-17.00 feet	Casing						
17.00-56.00 feet	ULTRAMAFIC VOLCANICS (KOMATIITE)						
	Very fine grained komatiitic basalt. Weakly fractured with carbonate stringers. Minor clots of pyrite throughout. Komatiite is locally syenitized due to lower syenite plug. Core is blocky and broken throughout with estimated 70% recovery. Lower contact with syenite is marked by narrow shearing and quart-carbonate flooding. 49.0-56.0' - foliated komatiite, foliation at 45 deg. to C.A.						
56.00-456.00 feet	SYENITE						
	Fine grained dark brick-red syenite with local phases of albite-feldspar porphyry. Core recovery at upper contact with volcanic is 25%. Syenite is weakly magnetic. Minor small (<1cm) inclusions of chloritised volcanics throughout. The syenite is also moderately chloritised throughout.						
	56.0-59.0' - fine grained feldspar porphyry. Phenocrysts up to 2mm in size. 1-2% disseminated pyrite.	192351	56.0-59.0 feet	44.0			3.0 ft.
	59.0-62.8' - as above	192352	59.0-62.8 feet	18.0			3.8 ft.
	62.8-65.0' - bleached altered syenite porphyry. Alteration includes albite	192353	62.8-65.0 feet	129.0	0.129	0.004	2.8 ft.

	and carbonate. Shearing at 64' at 44 deg to C.A. Brecciated from 63.2-64.2'. 4% fine pyrite throughout with narrow (1") sections of up to 10% py.						
	65.0-68.0' - weakly altered syenite, weakly fractured with hairline calcite stringers. 1-2% pyrite.	192354	65.0-68.0 feet	29.0			3.0 ft.
	68.0-73.0' - as above, possible shear at 70.5' marked by 2" of brecciation and quartz stringers.	192355	68.0-73.0 feet	6.0			5.0 ft.
	73.0-76.0' - as above	192356	73.0-76.0 feet	7.0			3.0 ft.
	89.2-89.5' - brecciated syenite, fragments up to 2cm in size. Brecciation at 12 deg. to C.A. Minor carbonate flooding.	192357	89.0-92.0 feet	69.0			3.0 ft.
	94.0-97.0' - moderately fractured with local stringers containing up to 1% py.	192358	94.0-97.0 feet	314.0	0.314	0.009	3.0 ft.
	122.0-127.0' - slightly bleached with 1% disseminated pyrite throughout.	192359	122.0-127.0 feet	21.0			5.0 ft.
	144.0-148.2' - bleached syenite, 1% py throughout. 8-10% py from 145.8-146.5'.	192360	144.0-148.2 feet	46.0			4.2 ft.
	189.0-191.0' - moderately fractured with quartz stringers. 1% pyrite.	192361	189.0-191.0 feet	61.0			2.0 ft.
	248.0-250.5' - sheared syenite, strong foliation at 30 deg. to C.A. Pyrite mineralization in bleached syenite from 250.5' (fault breccia) to 254'. Moderately carbonatized in shear.	192362 192363	247.0-250.5 feet 250.5-254.0 feet	26.0 71.0			3.5 ft. 3.5 ft.
	273.0' - shear zone, foliation at 44 deg to C.A. Syenite becoming lighter (buff green) after shear.						
	275.0-277.0' - possible lamprophyry dike or phase of syenite						
	319.0-331.0' - moderately fractured syenite with hairline qtz/calcite stringers.						
	331.0-335.0' - lamprophyric phase						
	382.0' - becoming darker orange-red in color.						
	404.5-404.8' - calcite flooded section						
	403.0-408.0' - moderately fractured section with 4% calcite stringers, 1% pyrite, locally up to 4%.	192364	403.0-408.0 feet	<5.0			
456.0-504.0 feet	ULTRAMAFIC VOLCANICS (KOMATIITE) Dark green fine grained komatiitic basalt, becoming increasingly talcose down section. Contact with syenite is irregular at 65 deg. to C.A. Possible flow breccia to 473.0'.						

	475.3-478.3' - hematized, moderately fractured (calcite) section. 2-4% py. 478.3-480.0' - komatiite, weakly mineralized.	192365	475.3-478.3 feet	17.0			3.0 ft.
		192366	478.3-480.0 feet	<5.0			1.7 ft.
504.0 feet	End of Hole						
	Casing Pulled						

Additional Core Assays

171192	92.0-94.0 feet	25.0			2.0 ft
171193	97.0-102.0 feet	16.0			5.0 ft
171194	102.0-106.0 feet	11.0			4.0 ft
171195	157.0-161.0 feet	27.0			4.0 ft
171196	161.0-166.0 feet	85.0			5.0 ft
171197	166.0-171.0 feet	101.0	0.101	0.003	5.0 ft
171198	171.0-176.0 feet	44.0			5.0 ft
171199	176.0-181.0 feet	28.0			5.0 ft
171200	181.0-186.0 feet	16.0			5.0 ft
192367	186.0-189.0 feet	216.0	0.216	0.006	3.0 ft

Sludge Assays

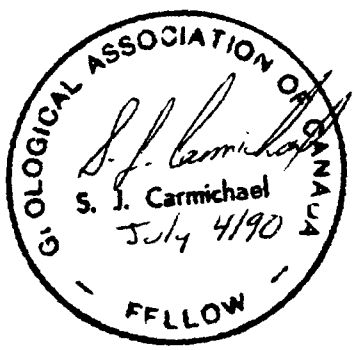
0.0-30.0 ft. 177142 1100 ppm Cu
30.0-40.0 ft. 177143 170 ppm Cu
40.0-50.0 ft. 177144 200 ppm Cu
230.0-240.0 ft. 171164 120 ppm Cu, 120 ppm Zn

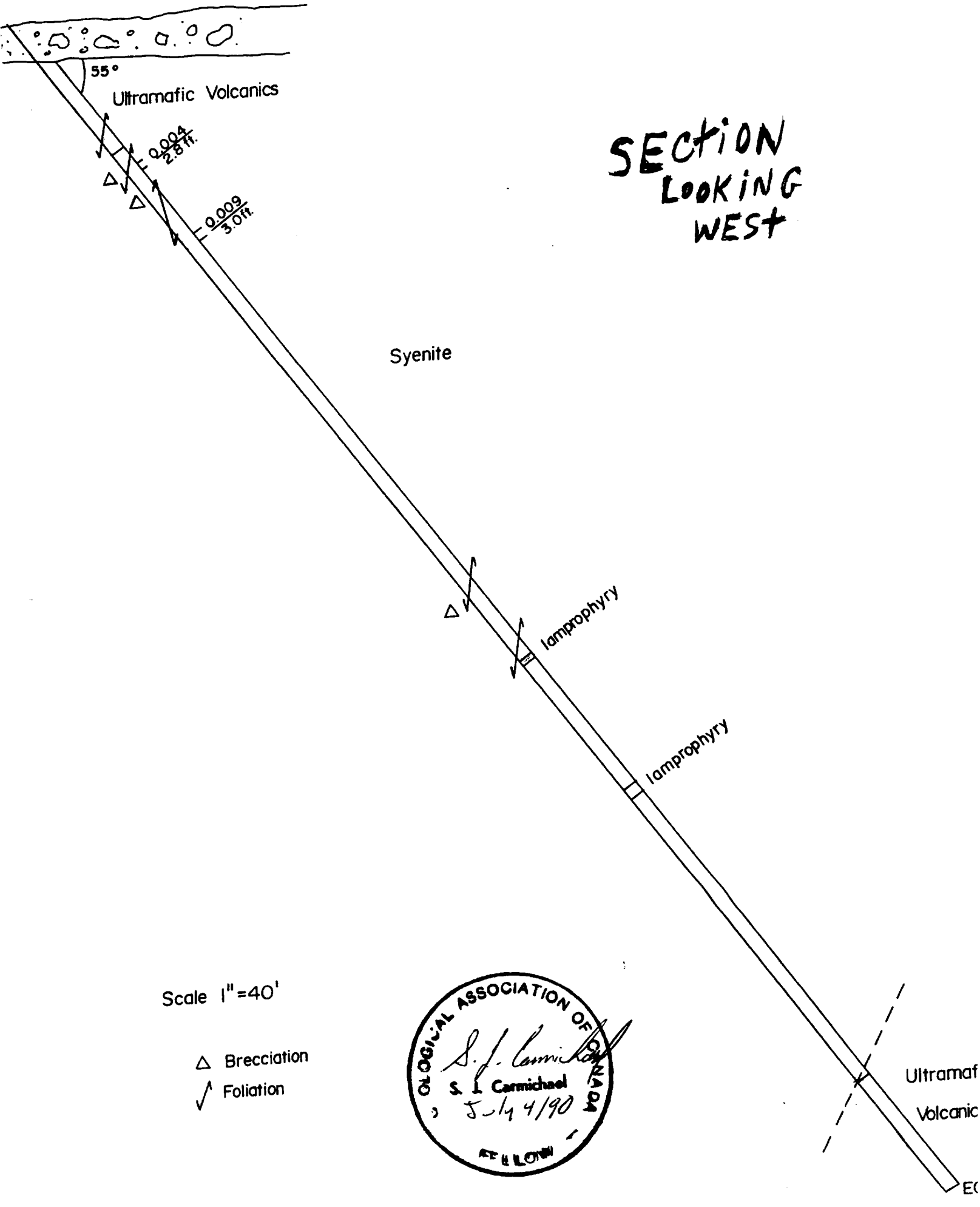
0.0-60.0	171145	35 ppb Au	2 ppm Ag	180.0-190.0	171158	227 ppb Au	
60.0-70.0	171146	138 " "	1 ppm Ag	190.0-200.0	171159	95 " "	
70.0-80.0	171147	13 " "	2 ppm Ag	200.0-210.0	171161	48 " "	
80.0-90.0	171148	31 " "		210.0-220.0	171162	36 " "	
90.0-100.0	171149	216 " "		220.0-230.0	171163	23 " "	
100.0-110.0	171150	92 " "		230.0-240.0	171164	28 " "	
110.0-120.0	171151	93 " "		240.0-250.0	171165	65 " "	
120.0-130.0	171152	20 " "		250.0-260.0	171166	116 " "	
130.0-140.0	171153	31 " "	2 ppm Ag	260.0-270.0	171167	15 " "	
140.0-150.0	171154	96 " "		270.0-280.0	171168	24 " "	
150.0-160.0	171155	77 " "		280.0-290.0	171169	20 " "	
160.0-170.0	171156	257 " "		290.0-300.0	171170	38 " "	
170.0-180.0	171157	225 " "	2 ppm Ag				

(240.0-250.0 171165 2 ppm Ag)

300.0-310.0	171171	9 ppb Au		400.0-410.0	171182	12 ppb Au	
310.0-320.0	171172	11 " "		410.0-420.0	171183	13 " "	
320.0-330.0	171173	14 " "		420.0-430.0	171184	17 " "	
330.0-340.0	171174	12 " "		430.0-440.0	171185	17 " "	
340.0-350.0	171175	13 " "		440.0-450.0	171186	13 " "	
350.0-360.0	171176	14 " "		450.0-460.0	171187	28 " "	

360.0-370.0	171178	13	"	"	460.0-470.0	171188	26	"	"
370.0-380.0	171179	19	"	"	470.0-480.0	171189	23	"	"
380.0-390.0	171180	15	"	"	480.0-490.0	171190	42	"	"
390.0-400.0	171181	13	"	"	490.0-504.0	171191	22	"	"




55°
Ultramafic Volcanics
0.004
2.8ft.
0.009
3.0ft.
SECTION
LOOKING
WEST
Syenite
lamprophyry
lamprophyry
Ultramaf
Volcanic
Scale 1"=40'
Brecciation
Foliation
S. J. Carmichael
7-14/90

Ontario Northern Development and Mines

of Work Daily Log #10106

Mining Act CF54

– For Geo-technical work use form no. of Work (Geological, Geophysical, Geo Expenditures)".

Name and Postal Address of Recorded Holder: FERNAND RIVARD

Prospector's Licence No.: K 1?102

BOX 1091 KIRKLAND LAKE ONT. P2N-2C9

Summary of Work Performance and Distribution of Credits

Total Work Days Cr. claimed: 504

for Performance of the following work. (Check one only)

- ☐ Manual Work
- ☐ Shaft Sinking Drifting or other Lateral Work.
- ☐ Compressed Air, other Power driven or mechanical equip.
- ☐ Power Stripping
- ☒ Diamond or other Core drilling
- ☐ Land Survey

Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number
	L 735464	40		L 802126	40		
	L 841693	40		L 738548	40		
	L 735596	40		L 738547	40		
	L 735597	40		L 738858	40		
	L 735598	40		L 738577	24		
	L 738544	40					
	L 738545	40					
	L 738546	40			504		

MINISTRY OF NORTH DEVELOPMENT AND MI RES ST OFFI ND LAKE

DEC 8 1986

All the work was performed on Mining Claim(s): 735464

Required Information eg: type of equipment, Names, Addresses, etc. (See Table Below)

DIAMOND DRILL = SPRAG & HENWOOD E RODS STANDARD DRILL
E CORE

OWERS

F RIVARD BOX 1091 KIRKLAND LAKE ONT P2N 2C9

P RIVARD 59 SECOND ST KIRKLAND LAKE ONT

RAITANEN 63A SECOND ST KIRKLAND LAKE ONT P2N 1R

WORK PERFORMED JUNE 28/86 - SEPT 14/86

RECORDED
NOV 14 1986

NOV 14 1986
11:35 am.

Date of Report: Nov. 14/86

Recorded Holder or Agent (S

Certification Verifying Report of Work Receipt # _____

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

Name and Postal Address of Person Certifying

FERNAND RIVARD BOX 1091

KIRKLAND LAKE ONT. P2N. 2C9

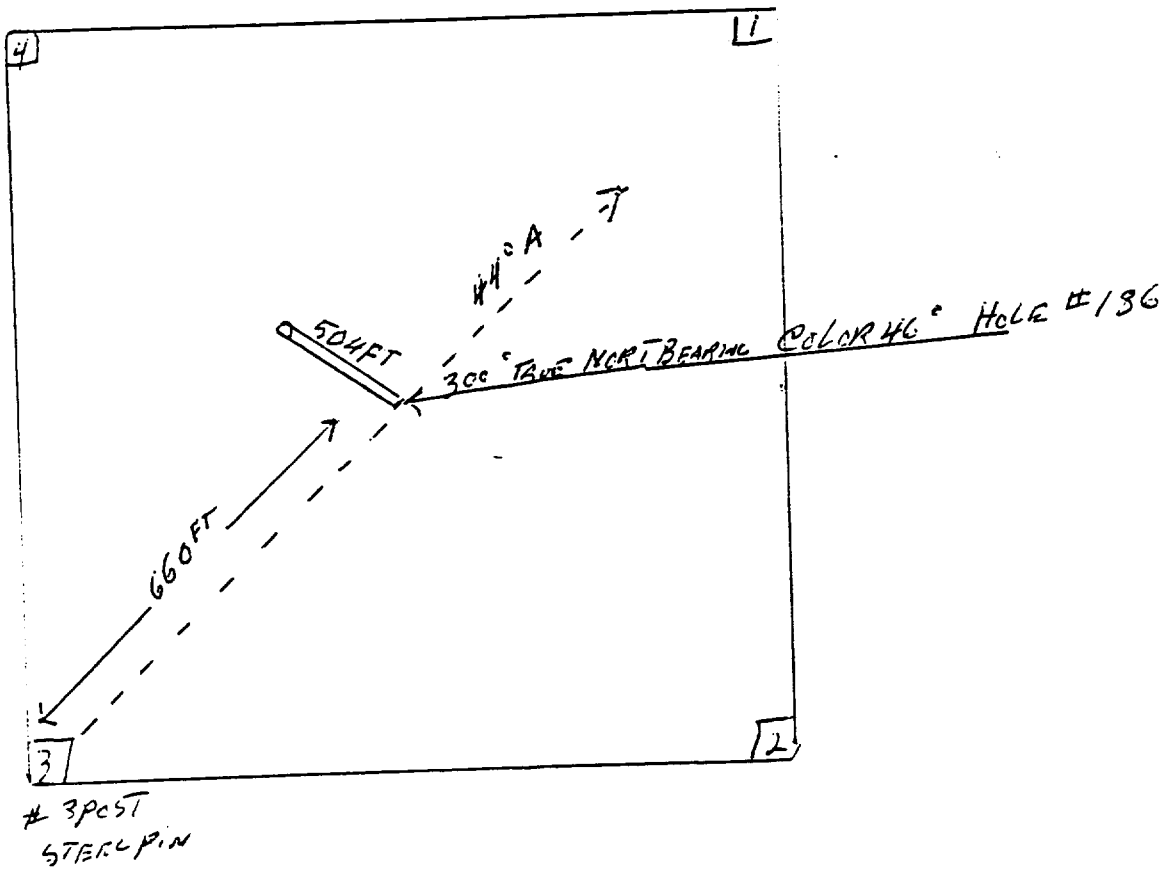
Date Certified: Nov 14/86

Certified by (Signature)

Table of Information/Attachments Required by the Mining Recorder

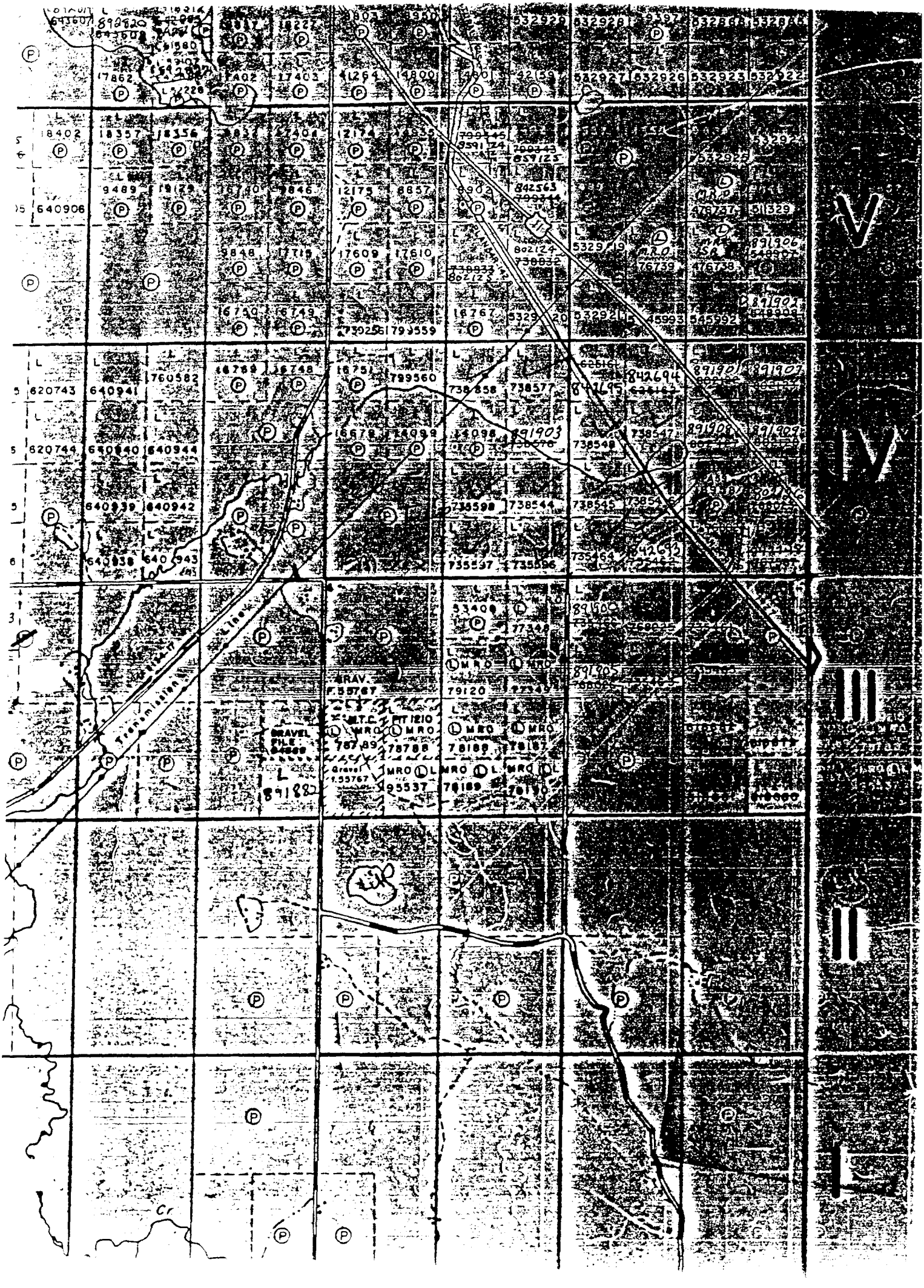
Type of Work	Specific information per type	Other information (Common to 2 or more types)	Attach
Manual Work	Nil	Names and addresses of men who performed manual work/operated equipment, together with dates and hours of employment.	Work Sket are require the locatio extent of relation to nearest cl
Shaft Sinking, Drifting or other Lateral Work			
Compressed air, other power driven or mechanical equip.	Type of equipment		
Power Stripping	Type of equipment and amount expended. Note: Proof of actual cost must be submitted within 30 days of recording.	Names and addresses of owner or operator together with dates when drilling/stripping done.	
	Signed core log showing: footage, diameter of		Work Ske above) in

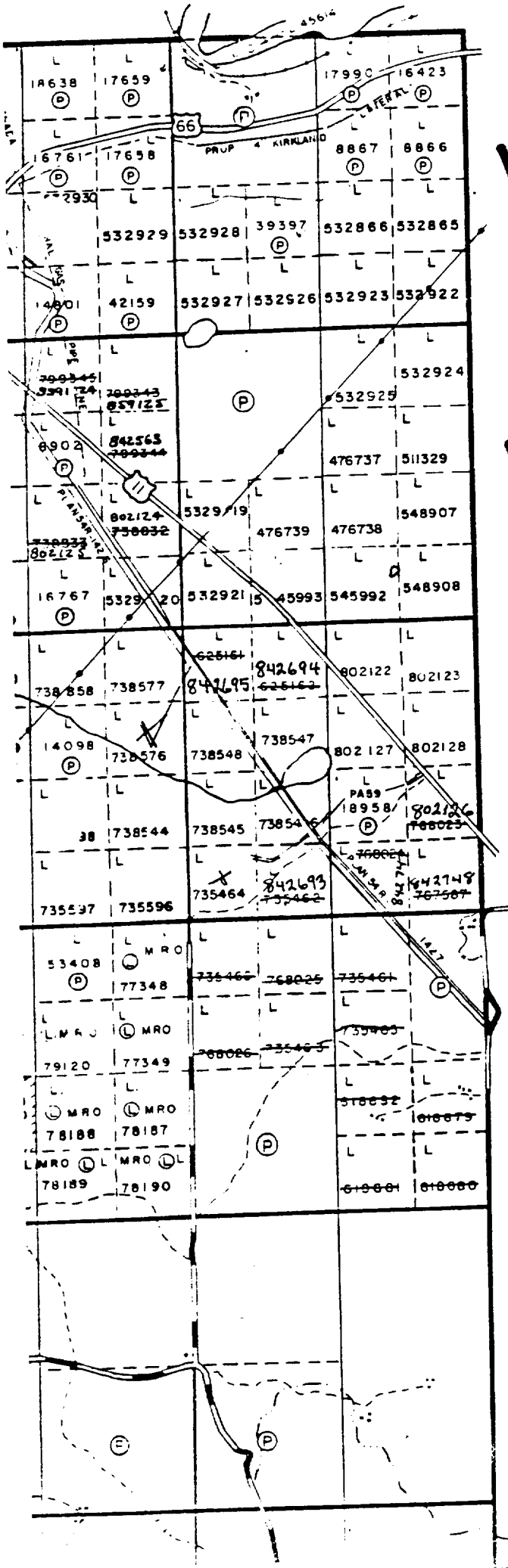
EBY TWP CLAIM # 735464
LOT 2 CONS 4 SW ¼ - S ½



FRIVARD

Nov-14/86


Transmission
GRAVEL PIT
Gravel
MRO
Cr



EBY

411345

DISTRICT
TIMISKAMI

LARDER L
MINING DIVI

SCALE: 1-INCH=4(

LEGEND

PATENTED LAND
CROWN LAND SALE
LEASES
LOCATED LAND
LICENSE OF OCCUPATION
MINING RIGHTS ONLY
SURFACE RIGHTS ONLY
ROADS
IMPROVED ROADS
KING'S HIGHWAYS
RAILWAYS
POWER LINES
MARSH OR MUSKEG
MINES
CANCELLED

NOTES

400' surface rights reservation of all lakes and rivers.

AREAS WITHDRAWN FR
under Sec. 43 of The Mining Act (
Order No. File Date

Ne Lot 7, Con. 3 - Cert. of Forfeiture -

Ontario Natural Resources

# of Work

51015

Mining Act

type of work to be recorded (see table belo
– For Geo-technical work use form no. 1362 "Rep
of Work (Geological, Geophysical, Geochemical a
Expenditures)".

Name and Postal Address of Recorded Holder	Prospector's Licence No.
FERNAND RIVARD.	K19102
BOX 1091 - KIRKLAND LAKE. ONT. P2N-2C9	

Summary of Work Performance and Distribution of Credits

Total Work Days Cr. claimed	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days Cr.
220		L 802122	20						
for Performance of the following work. (Check one only)		L 802123	20						
☐ Manual Work		L 802127	20						
☐ Shaft Sinking Drifting or other Lateral Work.		L 802128.	20						
☐ Compressed Air, other Power driven or mechanical equip.		L 738546	40						
☒ Power Stripping		L 735464	40						
☐ Diamond or other Core drilling		L 842693	20						
☐ Land Survey		L 735596	40						

All the work was performed on Mining Claim(s): 735464 – (130 DAYS) – 738546 (90 DAYS)

Required Information eg: type of equipment, Names, Addresses, etc. (See Table Below)

POWER STRIPPING PER ATTACHED MAP AND DATES WORKED.

69 HRS. @ $32.00 PER HR. = $2,208.00 = 220.8 DAYS

2010 JOHN DEER CRAWLER.

OWNER. FERNAND RIVARD.

BOX 1091 - KIRKLAND LAKE. ONT.

RESIDENT GEOLOGIST
ONTARIO GOVERNMENT
RECEIVED
DEC 13 1985
KIRKLAND LAKE, ONT.

RECORDED DEC 12 1985
REC No.

Date of Report	Recorded Holder or Agent (Signature)
DEC. 12/85	

Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying	Date Certified	Certified by (Signature)
FERNAND RIVARD BOX 1091 KIRKLAND LAKE ONT P2N 2C9	Dec 12/85	

Table of Information/Attachments Required by the Mining Recorder

Type of Work	Specific information per type	Other information (Common to 2 or more types)	Attachments
Manual Work	Nil	Names and addresses of men who performed manual work/operated equipment, together with dates and hours of employment.	Work Sketch: these are required to show the location and extent of work in relation to the nearest claim post.
Shaft Sinking, Drifting or other Lateral Work			
Compressed air, other power driven or mechanical equip.	Type of equipment		
Power Stripping	*Type of equipment and amount expended.* **Note:** Proof of actual cost must be submitted within 30 days of recording.	Names and addresses of owner or operator together with dates when drilling/stripping done.	
Diamond or other core drilling	Signed core log showing; footage, diameter of core, number and angles of holes.		Work Sketch (as above) in duplicate

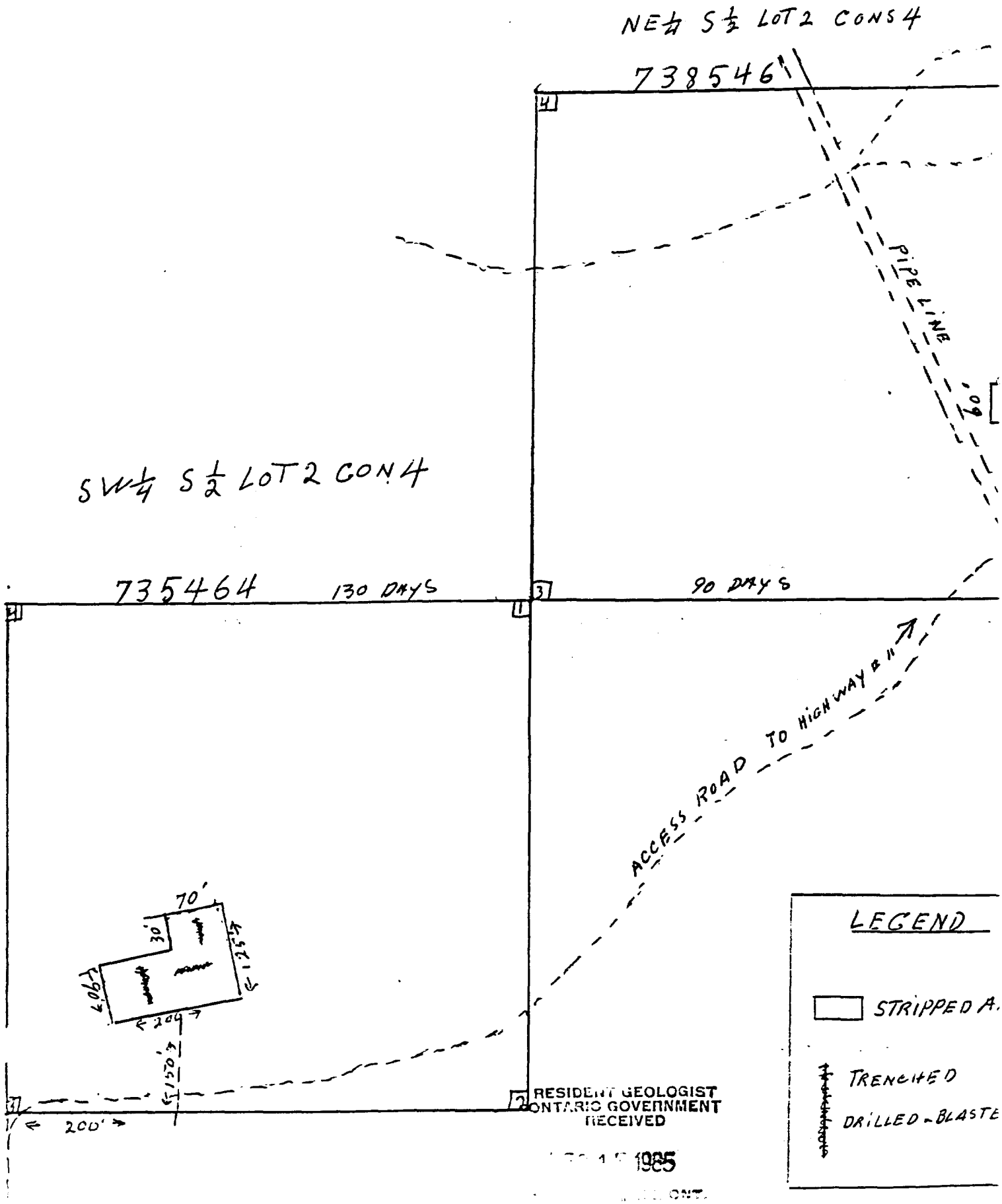
	Initials Initiales
Prepared by Préparé par	
Approved by Approuvé par	

FERNAND RIVARD
BOX 1091 - KIRKLAND LAKE : ONT.
P3N-2C9

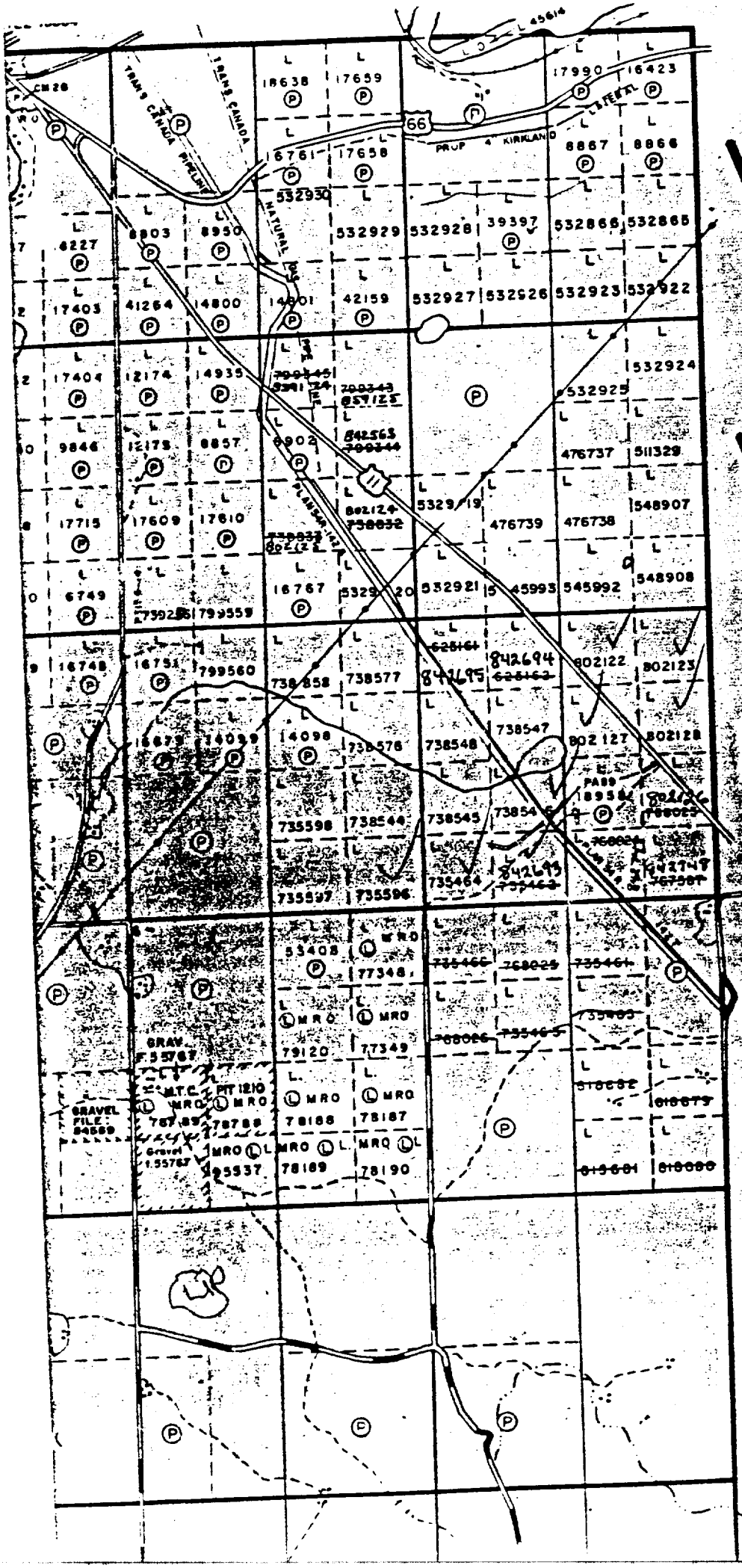
			1	2	3	4	5
	DATE 1985		TRACTOR STRIPPING.				
1	JUNE	1	4 - HRS.				
2	"	2	4 - HRS.				
3	"	8	5 - HRS.				
4	"	9	6 - HRS.				
5	AUG	3	7 - HRS.				
6		4	7 - HRS.				
7		12	7 - HRS.				
8	SEPT.	1	7 - HRS.				
9	"	7	7 - HRS				
10	"	8	7 - HRS.				
11	"	15	8 - HRS.				
12							
13	TOTAL		69 HRS. @ $32.00 PER HR. = $2,208.00				
14			STRIPPING ON CLAIMS 735464 & 738546				
15							
16			E Rivard				
17							
18							
19							
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21							
22							
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24							
25							

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ONTARIO GOVERNMENT
RECEIVED
SEP 11 1985
KIRKLAND LAKE, ONT.

EBY TOWNSHIP



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RECEIVED
1985


Eby twp
M345
VI
V
IV
III
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M.379
Twp.
TRANS CANADA PIPELINES
NATURAL GAS
PROP 4 KIRKLAND
66
11
CM28
GRAVEL
FILE: 84689
GRAV. F.55787
PIT 1210
MRO
MTC
Gravel F.55787
PATENTED
CROWN
LEASES
LOCATED
LICENSE
MINING
SURFACE
ROADS
IMPROVED
KING'S
RAILWAYS
POWER
MARSH
MINES
CANCELL
400' su
of all
under Sec
Order
RESIDENT GEOLOGIST
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RECEIVED
DEC 11 1985

Ontario Natural Resources

# of Work

5 11/85

The Mining Act

– For Geo-technical work use form no. 1502 of Work (Geological, Geophysical, Geochem Expenditures)".

Name and Postal Address of Recorded Holder

FERNAND RIVARD

Prospector's Licence No.

K19102

BOX 1091 KIRKLAND LAKE ONT P2N-2C9

mary of Work Performance and Distribution of Credits

Total Work Days Cr. claimed	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number
53 DAYS		L 738577	40					
for Performance of the following work. (Check one only)	[redacted]	L 738576	13	[redacted]			[redacted]	
☐ Manual Work								
☐ Shaft Sinking Drifting or other Lateral Work								
☒ Compressed Air, other Power driven or mechanical equip. GAS PLUGGER.								
☐ Power Stripping								
☐ Diamond or other Core drilling								
☐ Land Survey								

RESID... ONTAR... GEOLOGIST ...ERNMENT ...ED ...65 KIRKL... ONT.

All the work was performed on Mining Claim(s): 735424 – (330 FTS) 738546 – (20 DAYS)

Required Information eg: type of equipment, Names, Addresses, etc. (See Table Below)

MAY 12/85	TRENCHING	2 MEN	6 HRS.	EACH =	12 HRS.
MAY 20/85	TRENCHING.	2 MEN.	6 HRS	EACH =	12 HRS
MAY 25/85	TRENCHING.	2 MEN.	4 HRS	EACH. =	8 HRS
MAY 26/85	TRENCHING.	2 MEN.	4 HRS	EACH. =	8 HRS.
JULY 7/85.	TRENCHING	2 MEN	8 HRS	EACH =	16 HRS.
JULY 13/85	TRENCHING	2 MEN	8 HRS	EACH =	16 HRS.
JULY 14/85	TRENCHING	2 MEN.	8 HRS	EACH. =	16 HRS.
JULY 20/85	TRENCHING	2 MEN.	8 HRS	EACH =	16 HRS.
JULY 21/85	TRENCHING	2 MEN	8 HRS.	EACH =	16 HRS.
JULY 27/85	TRENCHING	2 MEN.	7 HRS	EACH =	14 HRS.
JULY 28/85	TRENCHING.	2 MEN.	7 HRS	EACH. =	14 HRS.
AUG 3/85	TRENCHING	2 MEN	6 HRS	EACH. =	12 HRS
TOTAL HRS. FOR GAS PLUGGER WORK.					160 HRS.

WORK PERFORME... PHIL RIVARD 59 SECOND ST KIRKLAND LAK... PHONE 567-376...

L. RAITANE 63A SECOND ... KIRKLAND ... PHONE 567-...

RECORDED DEC 12

Date of Report	Recorded Holder or Agent (Signa...
DEC 12/85	

Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying

FERNAND RIVARD BOX 1091

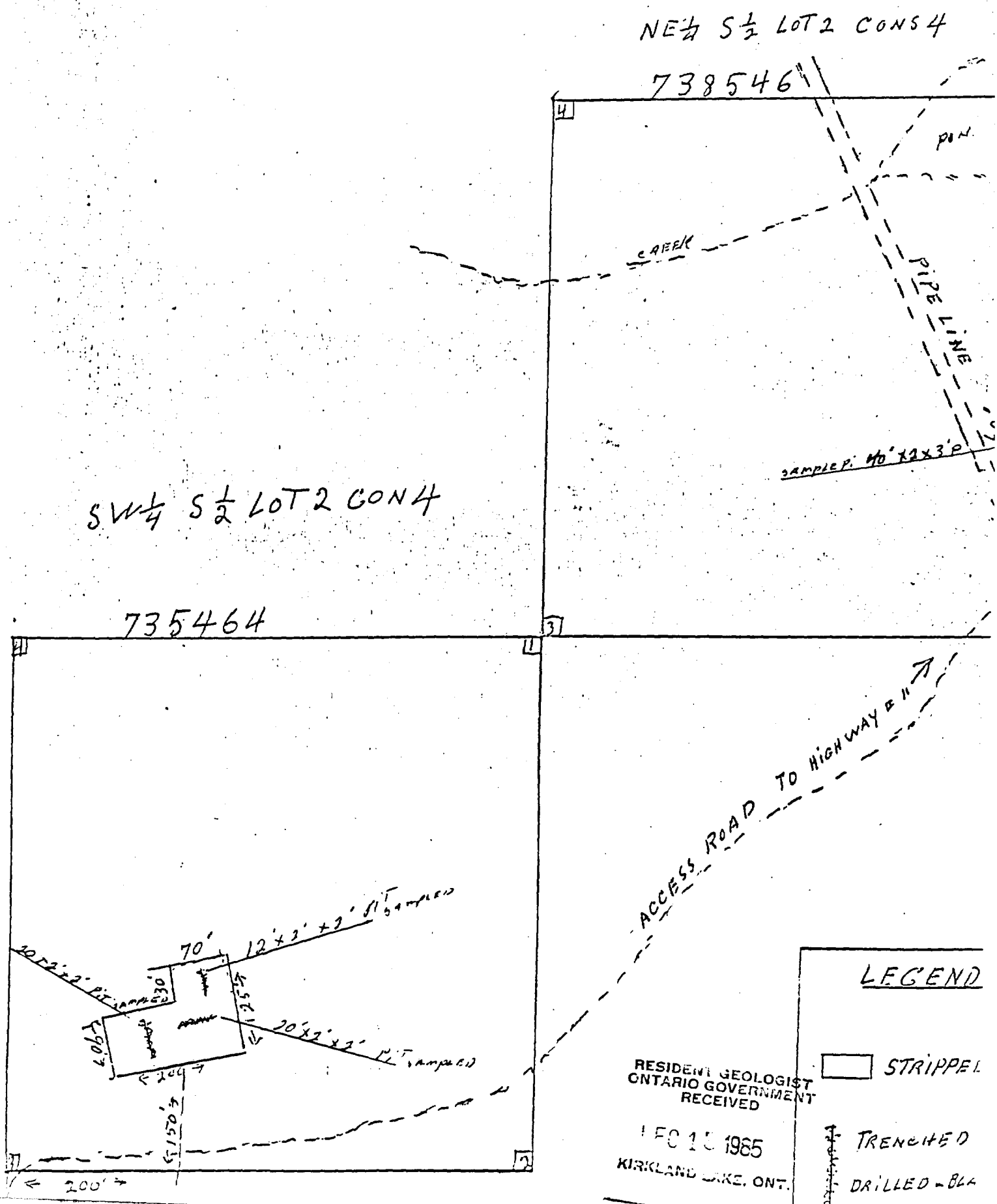
KIRKLAND LAKE ONT P2N 2C9

Date Certified	Certified by (Signature)
Dec 12/85	

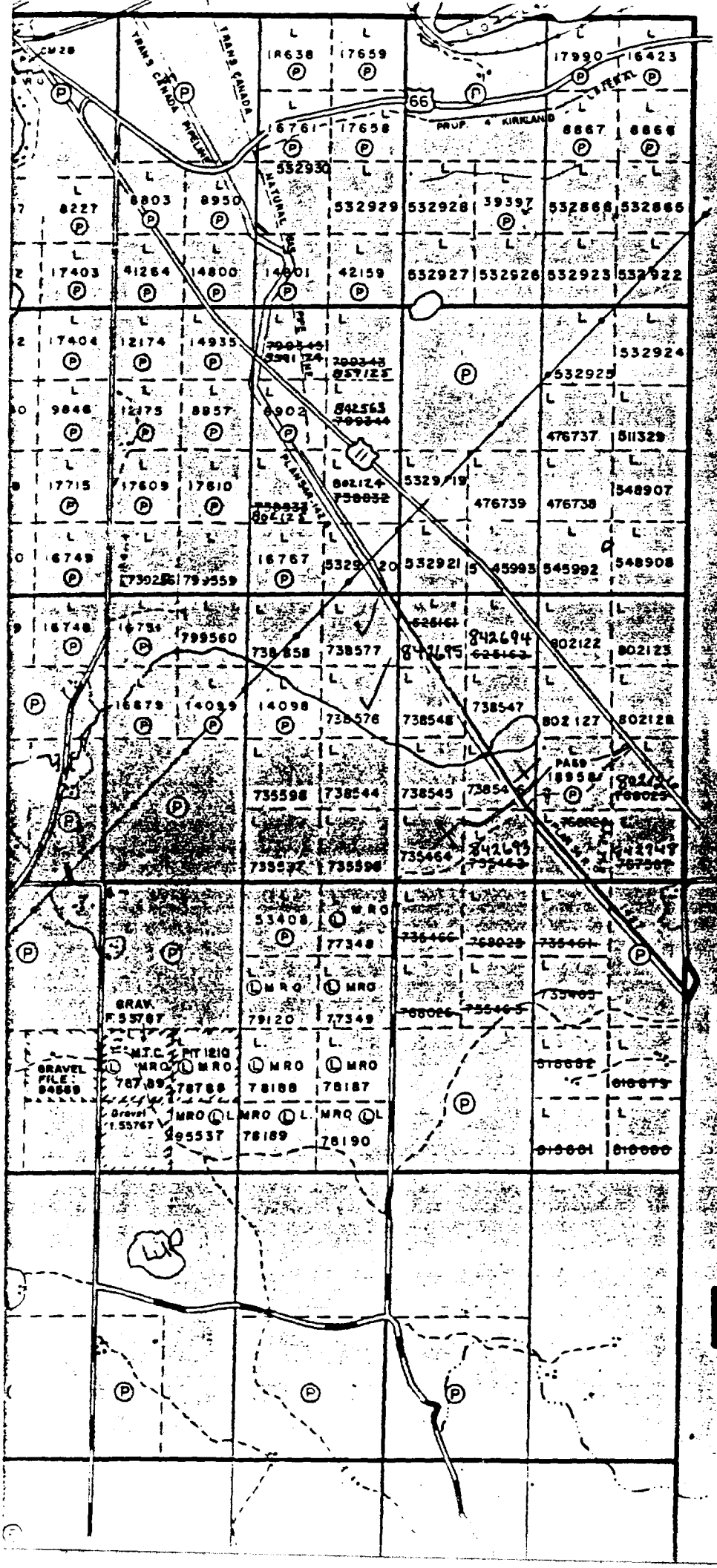
Table of Information/Attachments Required by the Mining Recorder

Type of Work	Specific information per type	Other information (Common to 2 or more types)	Attachmen...
Manual Work	Nil	Names and addresses of men who performed manual work/operated equipment, together with dates and hours of employment.	Work Sketch: are required to the location a... extent of work... relation to the... nearest claim
...haft Sinking, Drifting or ...er Lateral Work			
Compressed air, other power driven or mechanical equip.	Type of equipment		
Power Stripping	Type of equipment and amount expended. Note: Proof of actual cost must be submitted within 30 days of recording.	Names and addresses of owner or operator together with dates when drilling/stripping done.	
Diamond or other core	Signed core log showing: footage, diameter of ...per, number and angles of holes.		Work Sketch ... above) in dup...

EBY TOWNSHIP



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KIRKLAND LAKE, ONT.



SCALE

PATENTED
CROWN L.
LEASES
LOCATED
LICENSE
MINING RI
SURFACE
ROADS
IMPROVED
KING'S H
RAILWAYS
POWER L
MARSH OF
MINES
CANCELLED

400' surfa
of all lak

AR
under Sec. 43
Order No

RESIDENT GEOLOGIST
ONTARIO GOVERNMENT
RECEIVED
DEC 13 19[illegible]
KIRKLAND LAKE

Ontario Ministry of Natural Resources

Report of Work

Mining Act

- For Geo-technical work use form no. 1362 "R of Work (Geological, Geophysical, Geochemica Expenditures)".

Name and Postal Address of Recorded Holder	Prospector's Licence No.
FERNAND RIVARD BOX 1091 KIRKLAND LAKE ONT P2N 2C9	K, 9102

Summary of Work Performance and Distribution of Credits

Total Work Days Cr. claimed	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days
10		L 738858	10						

for Performance of the following work. (Check one only)

- [ ] Manual Work
- [ ] Shaft Sinking Drifting or other Lateral Work.
- [x] Compressed Air, other Power driven or mechanical equip.
- [ ] Power Stripping
- [ ] Diamond or other Core drilling
- [ ] Land Survey

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KIRKLAND LAKE, ONT.

All the work was performed on Mining Claim(s): 735596 - 735464

Required Information eg: type of equipment, Names, Addresses, etc. (See Table Below)

JULY 21/84 TRENCHING 2 MEN 4 HRS EACH = 8 HRS
JULY 22/84 TRENCHING 2 MEN 4 HRS EACH = 8 HRS
AUG 25/84 TRENCHING 2 MEN 4 HRS EACH = 8 HRS
AUG 26/84 TRENCHING 2 MEN 4 HRS EACH = 8 HRS

TOTAL HRS FOR GAS PLUS SLUSHER WORK 32 HRS

10 WORK DAYS CLAIMED

WORK PERFORMED BY

F RIVARD PH 7-73
9 GOV RD WEST
KIRKLAND LAKE ONT

L RAITANEN PH 7-37
634 SECOND ST
KIRKLAND LAKE

RECORDED JAN 25 1985
REC. No.

PER ATTACHED SKETCH

RESIDENT GEOLOGIST
ONTARIO
JAN 25 1985
Kirkland Lake, Ont.

LARDER LAKE MINING DIV.
RECEIVED
JAN 25 1985
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

LARDER LAKE MINING DIV.
RECEIVED
JAN 11 1985
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

Date of Report	Recorded Holder or Agent (Signatur
JAN 10/85	

Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying	Date Certified	Certified by (Signature)
FERNAND RIVARD BOX 1091 KIRKLAND LAKE ONT P2N 2C9	Jan 11/85	

Table of Information/Attachments Required by the Mining Recorder

Type of Work	Specific information per type	Other information (Common to 2 or more types)	Attachments
Manual Work	Nil	Names and addresses of men who performed manual work/operated equipment, together with dates and hours of employment.	Work Sketch: thes are required to sho the location and extent of work in relation to the nearest claim post.
Shaft Sinking, Drifting or other Lateral Work			
Compressed air, other power driven or mechanical equip.	Type of equipment		
Power Stripping	Type of equipment and amount expended. Note: Proof of actual cost must be submitted within 30 days of recording.	Names and addresses of owner or operator together with dates when drilling/stripping done.	
Diamond or other core drilling	Signed core log showing; footage, diameter of core, number and angles of holes.		Work Sketch (as above) in duplicat

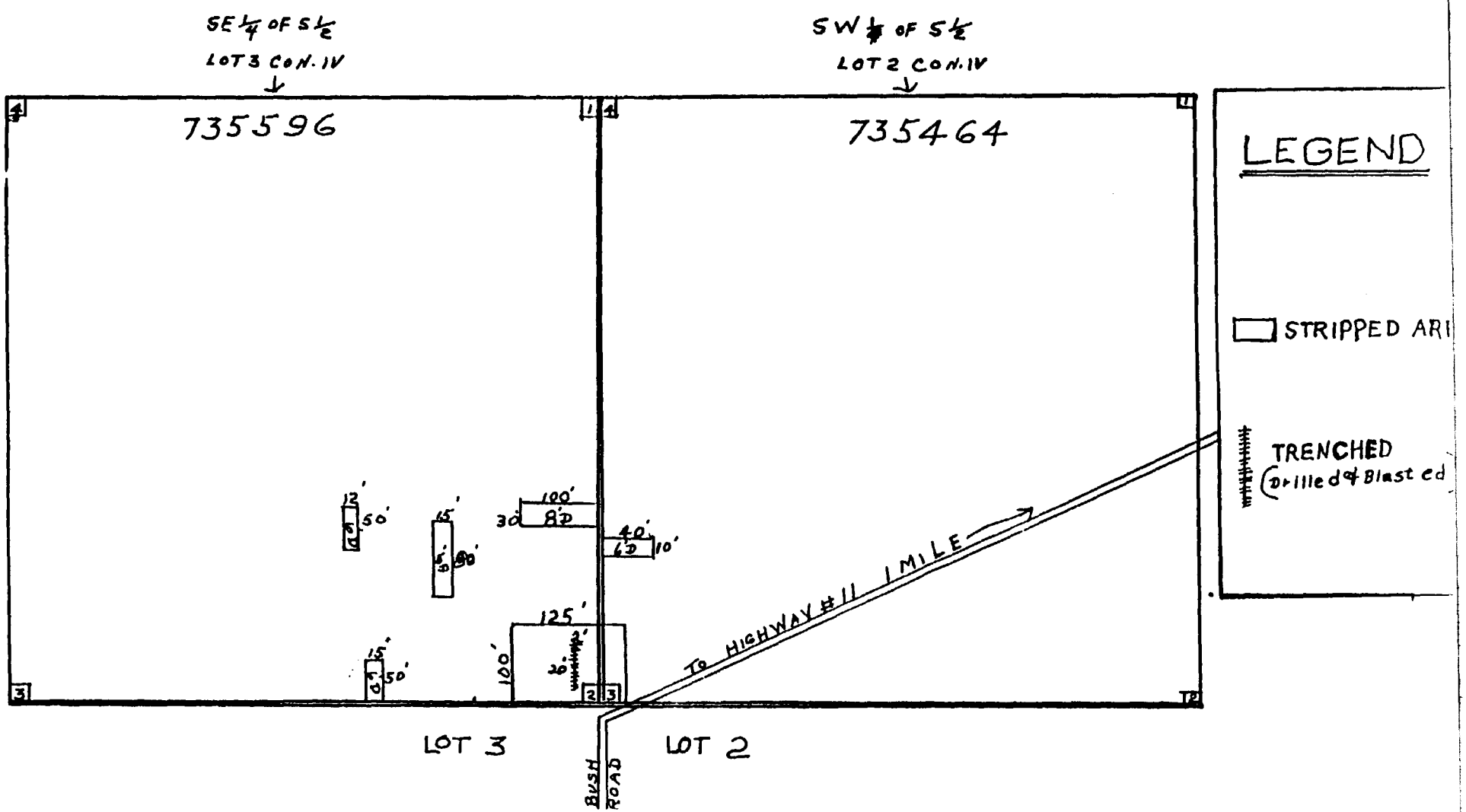
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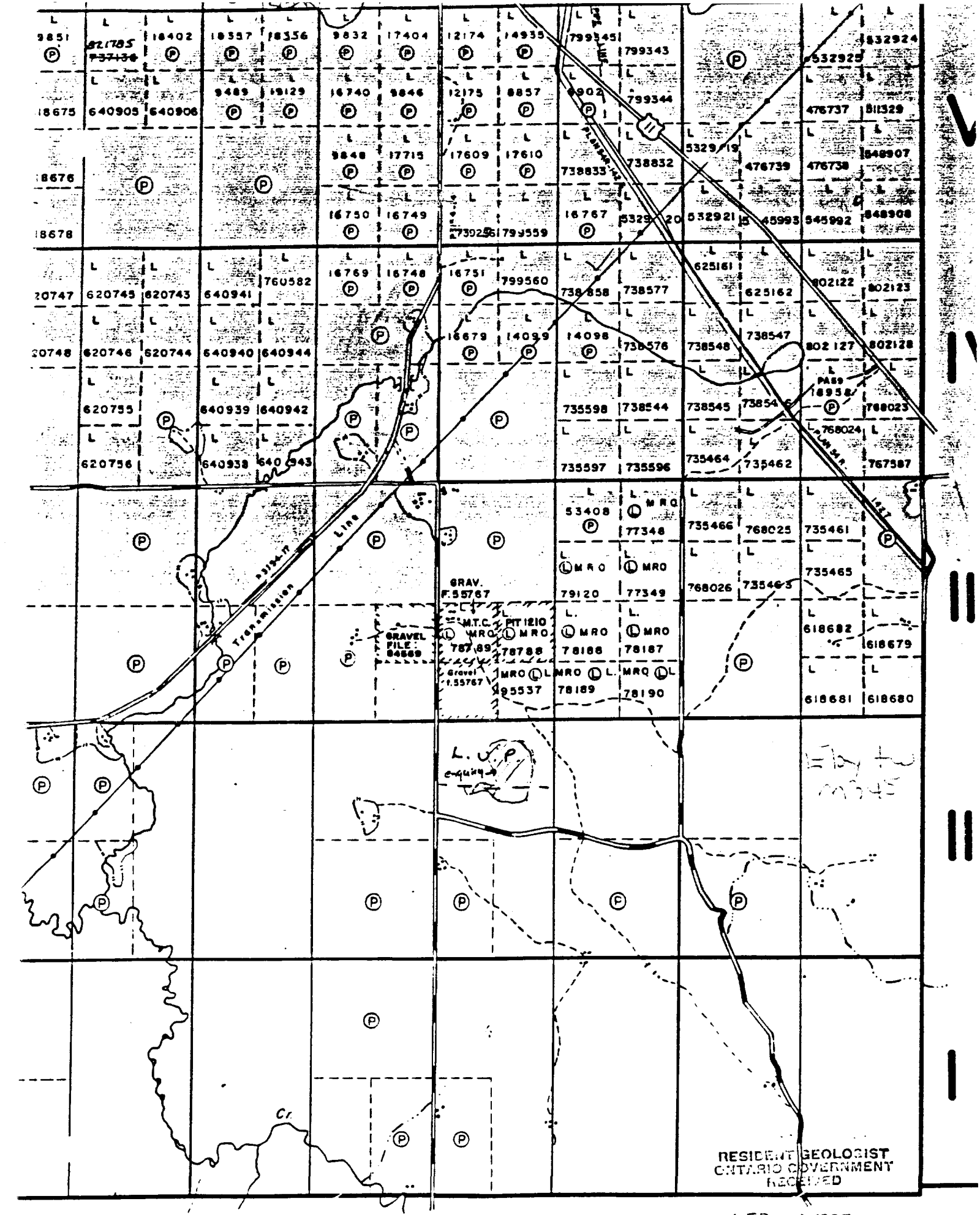
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LOTS 2+3

CONCESSION IV

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KIRKLAND LAKE, ONT.




GRAVEL FILE 84569
GRAV. F.55767
M.T.C. PIT 1210
Gravel f.55767
L. of P.
Transmission Line
Cr.
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ONTARIO GOVERNMENT
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FEB 4 1985
KIRKLAND LAKE, ONT.
7
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Ontario Ministry of Natural Resources

# of Work

Mining Act

– For Geo-technical work use form no. 1362 "Re: of Work (Geological, Geophysical, Geochemical Expenditures)".

Name and Postal Address of Recorded Holder	Prospector's Licence No.
FERNAND RIVARD	K19102

BOX 1091 KIRKLAND LAKE ONT P2N·2C9

Summary of Work Performance and Distribution of Credits

Total Work Days Cr. claimed: 252

for Performance of the following work. (Check one only)

- ☐ Manual Work
- ☐ Shaft Sinking Drifting or other Lateral Work.
- ☐ Compressed Air, other Power driven or mechanical equip.
- ☒ Power Stripping
- ☐ Diamond or other Core drilling
- ☐ Land Survey

Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days Cr.	Mining Claim Prefix	Mining Claim Number	Work Days
	L735466	20		L738576	20			
	L735464	20		L738548	20			
	L735596	20		L738547	20			
	L735597	20		L738577	20			
	L735598	20		L738858	12			
	L738544	20						
	L738545	20						
	L738546	20						

All the work was performed on Mining Claim(s): ~~738576~~ - ~~735464~~ - 738547

Required Information eg: type of equipment, Names, Addresses, etc. (See Table Below)

POWER STRIPPING PER ATTACHED MAPS AND DATES WORKED
90 DAYS AT 28 HP = 2,520 HP = 252 DAYS

2010 JOHN DEER CRAWLER.
OWNER FERNAND RIVARD
BOX 1091 KIRKLAND LAKE
ONT

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ONTARIO GOVERNMENT
RECEIVED
FEB 4 1985
KIRKLAND LAKE, ONT.

LARDER LAKE MINING DIV.
RECEIVED
JAN 25 1985
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

RECORDED JAN 25 1985
REC. No.

LARDER LAKE MINING DIV.
RECEIVED
JAN 11 1985
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

Date of Report	Recorded Holder or Agent (Signatur
JAN 10/85	

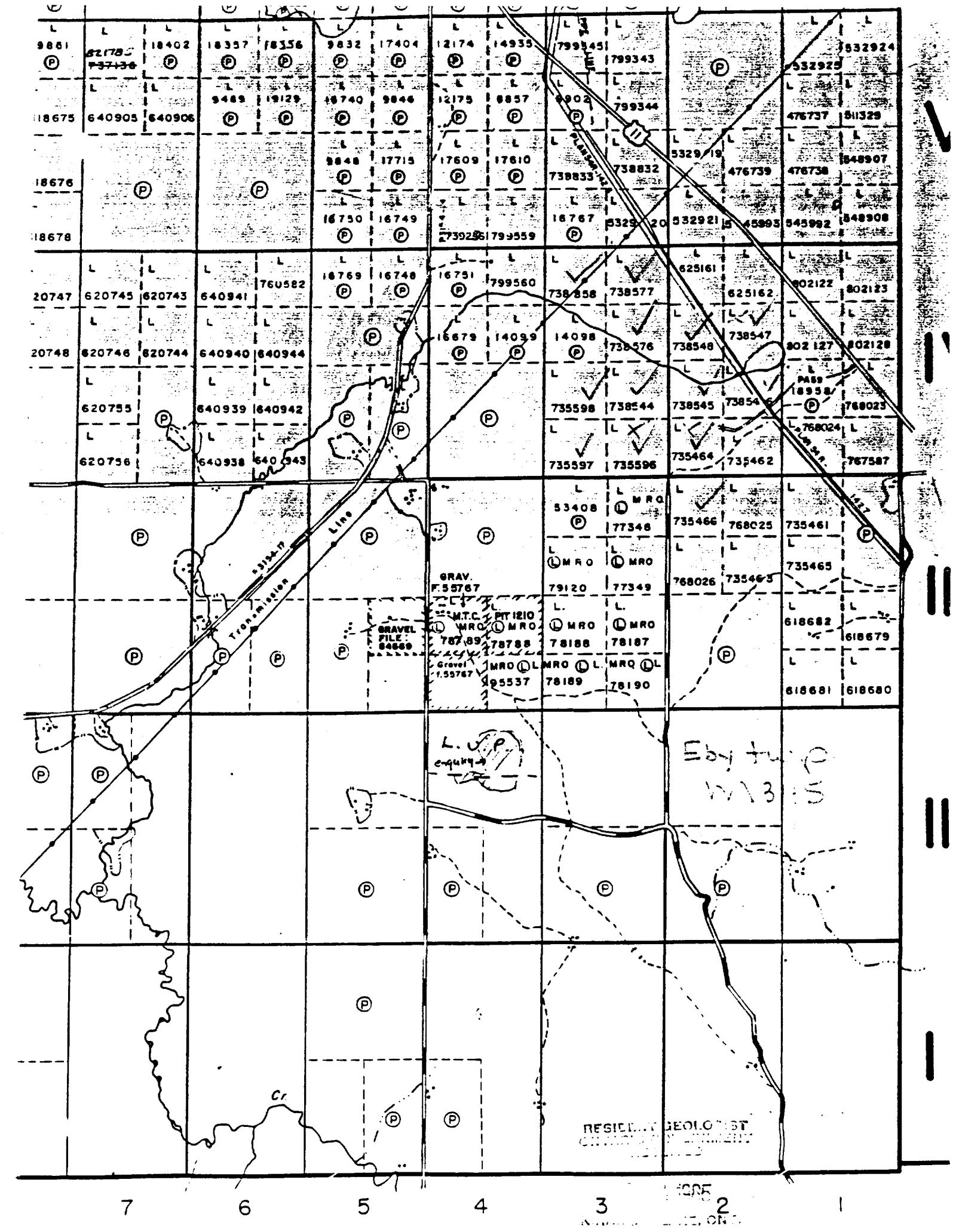
Certification Verifying Report of Work

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

Name and Postal Address of Person Certifying	Date Certified	Certified by (Signature)
FERNAND RIVARD BOX 1091 KIRKLAND LAKE ONT P2N 2C9	JAN 11/85	

Table of Information/Attachments Required by the Mining Recorder

Type of Work	Specific information per type	Other information (Common to 2 or more types)	Attachments
Manual Work	Nil	Names and addresses of men who performed manual work/operated equipment, together with dates and hours of employment.	Work Sketch: thes are required to sh the location and extent of work in relation to the nearest claim post
Shaft Sinking, Drifting or other Lateral Work			
Compressed air, other power driven or mechanical equip.	Type of equipment		
Power Stripping	Type of equipment and amount expended. Note: Proof of actual cost must be submitted within 30 days of recording.	Names and addresses of owner or operator together with dates when drilling/stripping done.	
Diamond or other core drilling	Signed core log showing; footage, diameter of core, number and angles of holes.		Work Sketch (as above) in duplicat


GRAV. F.55767
GRAVEL FILE 84669
M.T.C. PIT 1210
Gravel F.55767
Transmission Line
L. of P.
RESIDENT GEOLOGIST
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3
2
1

STATEMENT

DATE JAN 10 1985

FERNAND RIVARD

BOX 1091 KIRKLAND LAKE ONT

P2N 2C9

DATE	DETAILS	DEBIT	CREDIT	BALANCE
JULY	29/84 6 HRS			
AUG	6/84 7 HRS			
Aug.	11/84 5 HRS			
AUG	13/84 6 HRS			
AUG	19/84 5 HRS			
SEPT	3/84 5 HRS			
SEPT	9/84 4 HRS			
SEPT	23/84 4 HR			
	TOTAL 42 HRS @ 28.00 PER HR =			1,176 00
TOTAL Hours Shipping on Claims			2735396	
			2735464	

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FEB 4 1985

KIRKLAND LAKE, ONT.

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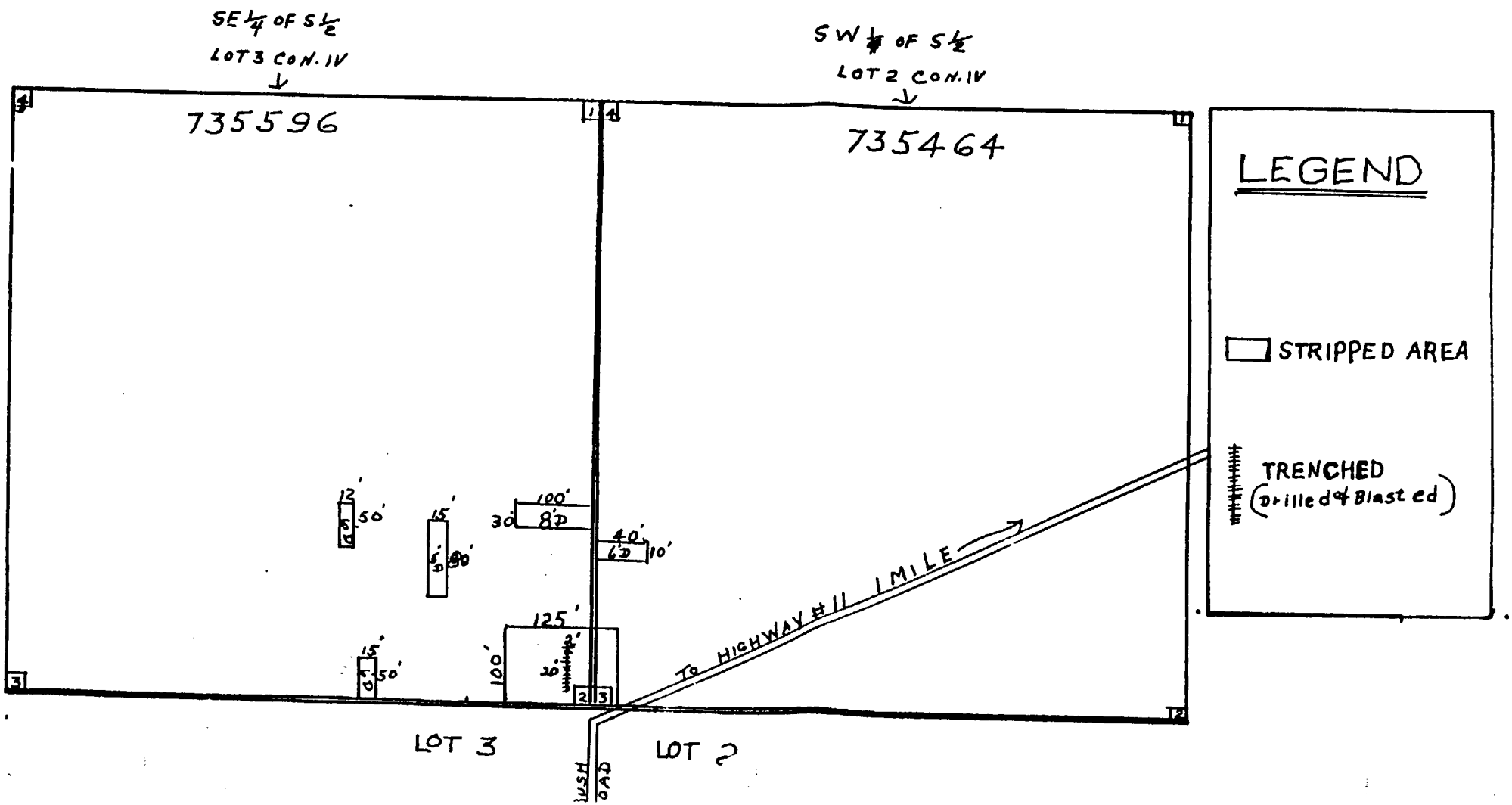
TOWNSHIP OF EBY

LOTS 2 + 3 CONCESSION IV

RESIDENT GEOLOGIST
CLAIM DEVELOPMENT
1985
KIRKLAND LAKE, ONT.

RESIDENT GEOLOGIST
1985
KIRKLAND LAKE, ONT.

N



63.6025
LOGS # 29 OTTO TWP
ANNEX
"21-B"

Battle Mountain (Canada) Inc.

KIRKLAND LAKE PROJECT
REPORT ON GEOLOGICAL MAPPING
OVERBURDEN STRIPPING, CHANNEL
SAMPLING AND DIAMOND DRILLING
VIGRASS LAKE PROPERTY

TECK, OTTO, EBY AND GRENFELL TOWNSHIPS
LARDER LAKE MINING DIVISION
ONTARIO, CANADA

MINISTRY OF NORTHERN
DEVELOPMENT AND MINES
REG. GEOLOGIST OFFICE
KIRKLAND LAKE
RECEIVED
JAN 1 4 1992

W. Benham
K. Barron

Kirkland Lake, Ontario
September, 1990

OMIP 90-122

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2.1 Property, Location and Access 2
2.2 Topography 3

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6.1.1 Timiskaming Group 8
6.1.2 Larder Lake Group 10
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7.2 Mineralization 13

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FIGURES

1 Kirkland Lake Project, Location Map

APPENDIX

I Diamond Drill Logs

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1.0 SUMMARY

Geological mapping, overburden stripping, channel sampling and the drilling of two holes for a total of 302.4 metres was carried out on the Vigrass Lake property located in Teck, Otto, Eby and Grenfell Townships, northeastern Ontario by Battle Mountain (Canada) Inc. (BMCI). This program was part of BMCI's Kirkland Lake project covering six properties in the area. All of the properties are presently held by BMCI under an option agreement with Queenston Mining Inc. dated June 15, 1989.

The property is underlain by Timiskaming Group trachytic volcanics and sediments and Larder Lake Group mafic to ultramafic volcanics with interbedded graphitic sediments.

The Larder Lake and Blanche River Fault Zones cross the property. Sub-parallel and splay faults, altered pyritic syenites, volcanics and sediments associated with these structures are present on the property.

Although no high priority targets were located by the 1989-90 exploration program, some weakly to moderately anomalous gold mineralization was found along the Larder Lake Fault and south of Vigrass Lake which warrant additional work.

Diamond drilling is recommended to test shear zones and some unexplained geophysical anomalies located along the south shore of Vigrass Lake.

2.0 INTRODUCTION

This report describes the results of geological mapping, overburden stripping, channel sampling and diamond drilling carried out by Battle Mountain (Canada) Inc. (BMCI) on the Vigrass Lake property during the periods of July to November, 1989 and May to August, 1990. The claims south of Vigrass Lake were mapped by H. Dillon-Leitch and V. Sheen under the supervision of D. Boucher during 1989. The majority of the northern part of the property was mapped by K. Barron during the 1990 summer field season. Some mapping between the highway and the Blanche River was carried out by S. Dawson in 1989 and M. Masson in 1990. Descriptions of the Timiskaming rock units underlying the North Vigrass claims are taken from an internal memo by K. Barron dated August 27, 1990.

A metric grid with lines at 100 metre intervals and pickets every 25 metres, was cut over the entire property. The lines were turned off a surveyed baseline along the east-west common boundary between Teck and Otto Townships.

The overburden stripping south of Vigrass Lake was to follow-up mineralized carbonate zones exposed by HSK Minerals during their 1987 power stripping program.

Ground total field and vertical gradient magnetic surveys were completed over the entire property. The magnetic data was used to interpret geological contacts in overburden covered areas and to define shear and fault zones.

A horizontal-loop electromagnetic survey was carried out along lines 96E to 112E south of the baseline. Results of these geophysical surveys are described in a separate report by Stratagex, Ltd. (Roth, 1990).

Two holes were drilled during July, 1990 to test two H.E.M. conductors on the Allsop-Zabudsky claims.

2.1 Property, Location and Access

The Vigrass Lake property consists of 33 mining claims optioned by Queenston Mining Inc. (formerly HSK Minerals Ltd.) from seven vendors: C. Forbes, M. Leahy and J. Forbes (3 claims); R. Condie (3 claims); D. Strome (Trust) (7 patents); Premier Exploration Inc., R. Chrichton, M. Leahy and J. Forbes (6 claims); F. Kiernicki, T. Obradovich, J. Forbes, and Premier Exploration (6 claims); J. Kidston (4 claims); and A. Allsop and D. Zabudsky (5 claims). The property is currently held by Battle Mountain (Canada) Inc. as part of an option agreement with Queenston Mining Inc. Dated June 15, 1989.

A mining rights lease (#105470) was issued for three Forbes/Leahy/Forbes claims on January 1, 1990 and an application to lease was submitted for the four Kidston claims on June 9, 1989. The remaining unpatented claims are in good standing with 200 days credit each.

The property is located close to the common corners of Teck, Otto, Grenfell and Eby Townships in the Larder Lake Mining Division about 8 km west southwest of the Town of Kirkland

Lake and 0.5 km west of the village of Swastika (NTS 42 A/1; UTM 564750E / 5327450N; See Figure 1 and Drawing PL-001).

Access to the central part of the property is provided by Highway 66 which crosses the claim group. The southern claims are accessible by tractor roads leading from the Otto Lake road which passes through the southeastern corner of the property. Access to the claims north of the Blanche River is provided by a trail from Athena Blvd. in Swastika. Right of ways for hydro, natural gas and railway lines cross the central part of the property.

2.2 Topography

The property consists of low rounded knolls and steep-sided outcrop ridges up to 30 metres high. The Blanche River passes through the northern part of the property.

The property is covered by balsam, spruce and poplar bush. Jack-pine forest covers the central part of the property along highway 66. Cedar and tag alder swamps are found south and west of Vigrass Lake and between outcrop ridges on the property.

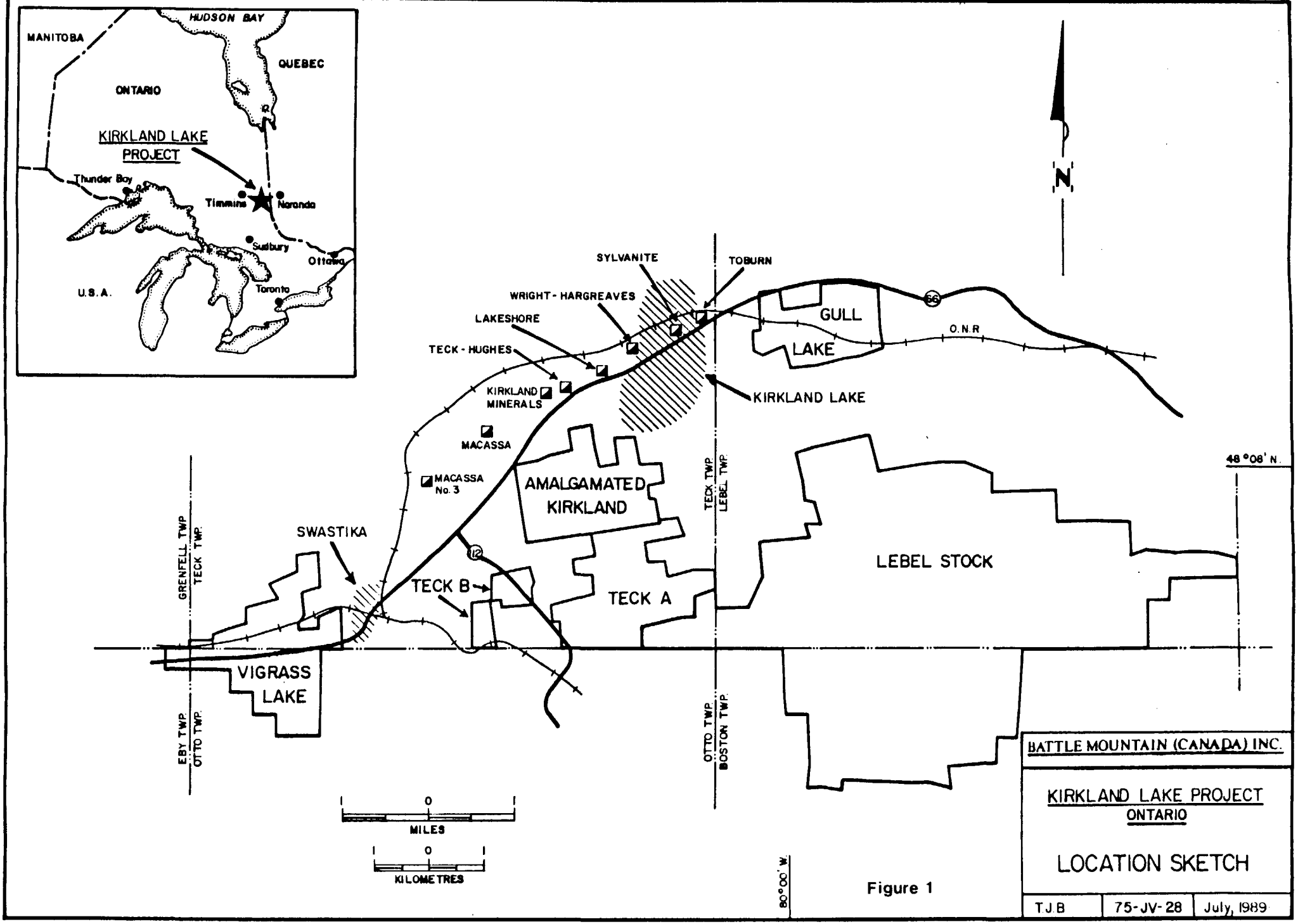

HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
N
SYLVANITE
TOBURN
WRIGHT - HARGREAVES
LAKESHORE
TECK - HUGHES
KIRKLAND MINERALS
MACASSA
MACASSA No. 3
GULL LAKE
O.N.R
KIRKLAND LAKE
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
VIGRASS LAKE
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48°08' N.
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BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
ONTARIO
LOCATION SKETCH
TJB
75-JV-28
July, 1989

Figure 1

3.0 PREVIOUS WORK

The Vigrass - Otto Lakes area was one of the first areas which was prospected in the Kirkland Lake district around about 1906. The Golden Crescent and Golden Gate Mines (the present Gateford-Crescent property) were developed between 1911 and 1928 along the north shore of Otto Lake to the east of the Vigrass Lake property. Numerous historic pits, adits and trenches were found on the property. Details of exploration work carried out on the property prior to 1980 are poorly recorded. The area north of Vigrass Lake in Teck Township was mapped by Thomson (1950).

During the 1980's, various exploration programs, which consisted of prospecting, mapping, geophysical surveys, hand and power stripping and diamond drilling have been carried out by the vendors of the individual claim groups which make up the present Vigrass Lake property.

The following is a list of work carried out on the Vigrass Lake property.

1. A 60 metre ling adit on claim 891860 was driven on the Larder Lake Fault Zone by Homestead Mining Company in 1912.

2. A 50 foot deep shaft was sunk on claim 16425 by Matabanick Kirkland Gold Mines in 1929.

3. Three short holes were drilled to test the syenite in the Homestead adit and some other small syenite bodies along and south of the Larder Lake Break (results and date unknown).

4. Kerr Addison drilled a hole to test a massive pyrite showing in a highway 66 road-cut on claim 9880, in 1966.

5. Hand stripping, prospecting, magnetic and VLF-EM surveys on the Kidston claims by Jomi Minerals in 1984.

6. A 162 metre drill hole from the island in Vigrass Lake by Rio Algom Exploration Inc., 1985.

7. Stripping and sampling of the "Highway Zone" south of highway 66 and north of Vigrass Lake on claim 843400 by H.S.K. Minerals Ltd., 1986

8. Magnetic, HEM, VLF-EM and IP surveys over the area south of Vigrass Lake by H.S.K. Minerals Ltd., 1987.

9. Diamond drilling of 11 holes (1223 metres) to test the "Highway Zone" and geophysical anomalies and alteration zones located south of Vigrass Lake by H.S.K. Minerals Ltd. in 1987/88.

10. Power stripping by H.S.K. Minerals Ltd. south of Vigrass Lake in 1987.

11. Geological mapping south of Vigrass Lake and core re-logging by A. Workmen for H.S.K. Minerals Ltd. in 1988.

Drilling of the "Highway Zone" intersected up to 348 ppb Au over six metres (V1-87-2). Surface channel samples from this zone assayed up to 12.3 g/t Au over 1.5 metres. Hole VI-88-8, which tested a carbonate zone south of Vigrass Lake, intersected 125 ppb Au over a core length of 56 metres. Grab samples from the surface showing near the collar of this hole returned 5185 ppb Au.

4.0 OVERBURDEN STRIPPING

During October, 1989, overburden stripping was carried out in two areas south of Vigrass Lake. One area was around H.S.K. drill hole VI-88-8 in an attempt to expose the surface expression of the anomalous gold intersections in this hole which is located to the west of H.S.K.'s 1987 stripping. The other area was along Line 107E from 9100N to 8760N across the northern bedrock ridge on the Allsop-Zabudsky claims where previous stripping by H.S.K. had exposed quartz veining, carbonate alteration, lamprophyre and feldspar porphyritic dykes.

The locations of the stripped areas are shown on Drawing GL-016.

5.0 REGIONAL GEOLOGY

The Kirkland Lake district is situated in the central part of the Archean, Abitibi greenstone belt on the south limb of a major east-west trending, east plunging synclinorium. The northern and southern limbs of this synclinorium are cut by the Destor-Porcupine Fault Zone and the Larder Lake-Cadillac Fault Zone which form two of the most historically significant gold-controlling structures in the Abitibi belt. The southern limb of the synclinorium in the Kirkland Lake area consists of mafic to ultramafic volcanics with interbedded sediments of the Larder Lake Group and tholeiitic volcanics of the Kinojevis Group, as well as trachytic volcanic rocks and sediments of the Timiskaming Group which unconformably overlies the Kinojevis and Larder Lake Groups. The boundary between the Larder Lake and Timiskaming Groups is marked by the Larder Lake Fault Zone.

The majority of gold production in the district has been from a structure in Timiskaming rocks known as the "Kirkland Lake Main Break" which together with its major splays has produced about 25 million ounces of gold from mines such as the Wright-Hargreaves, Lakeshore, Teck Hughes and Macassa. Only the Macassa is still in production from a 7,000 foot deep shaft at the western, down plunge extent of this structure. Typical grades have been greater than 0.5 opt Au, from narrow quartz veins and quartz breccia orebodies. Another important deposit in the Timiskaming rocks is the Upper Canada Mine located 18 km further to the east, which produced about 4.7 million tons at a grade of 0.32 opt Au.

The Kerr-Addison mine, which is located 36 km to the east in the Larder Lake district, produced in excess of ten million ounces. This ore deposit is hosted by altered mafic to ultramafic volcanics with interflow sediments of the Larder Lake Group in mineralized structures associated with the Larder Lake Fault Zone.

6.0 PROPERTY GEOLOGY

Geological mapping of the Vigrass Lake property was carried out by traversing the 100 metre spaced metric grid lines. The results of the mapping are presented on Drawings GL-012 to GL-016 at a scale of 1:2500 and Drawings GL-017 and GL-018 at a scale of 1:5000. The geology of the stripping areas is shown on Drawings TG-032 to TG-034 at a scale of 1:500. The location of the grids relative to the individual mining claims is shown on Drawings GL-017 and GL-018.

6.1 Lithology

The Vigrass Lake property can be divided into two parts: the southern, underlain by mafic to ultramafic volcanics with interbedded sediments of the Larder Lake Group; and the northern underlain by Timiskaming Group rocks consisting of trachytic flows and tuffs, conglomerates, graywacke and basal grits. The two parts are separated by the Larder Lake Fault Zone.

The northern part can be further subdivided into two parts by the Blanche River Fault. Small irregular syenite bodies and lamprophyre dykes have been intruded along the Blanch River and Larder Lake Fault Zones as well as related sub-parallel structures.

6.1.1 Timiskaming Group

The Timiskaming Group rocks underlying the northern part of the property were mapped, and are described below, by K. Barron.

The very base of the Timiskaming, adjacent to the Larder Lake Break, consists of graphitic laminated argillites which can be seen in the road cuts on the north side of Highway 66, just north of the power line. These give way north to a poorly sorted matrix-supported conglomerate/graywacke. This unit has been seen on the north edge of the Timiskaming series in contact with Kinojevis volcanics (see Thomson, 1950, p. 7) where it is termed the "basal grit". This basal unit has not been previously recognized along the southern edge of the Timiskaming except on the highway near Lake Kenogamis some two kilometres west of the property boundary (Thomson, 1950, p. 14) where it is also north dipping and facing. The rock is grey in colour and locally bedded although generally massive and unstratified. Clasts are fine grained sediment, basaltic volcanics and rarely, komatiitic, spinifex-textured clasts. Clasts are sub-rounded to angular and generally less than one centimetre in size. Trachytic, syenitic and jasper clasts are conspicuously absent.

Commonly the grit contains 2-3% disseminated pyrite, in otherwise unaltered rock. The pyrite is rounded, and is of the "shot" variety as seen in the Elliot Lake and Witwatersrand conglomerates.

The grit unit fines to the north into a lithic arenite unit and ultimately to laminated mud and siltstones. It appears to be much thicker here, at approximately 300 metres, than where recognized elsewhere in the Timiskaming. In one place, L105E, 101+50N, an overturned Bouma sequence was seen.

The basal grit is capped by Timiskaming-type polymictic conglomerate, which is repeated in section northwards across the property. This unit is comprised of cobble and pebble-sized, and rarely boulder clasts, which are generally rounded to sub-rounded in shape. The rock is typically clast supported with clasts from a wide spectrum of rock types. It is most easily recognized by the presence of granitic textured and porphyritic pink syenite, trachyte, quartz feldspar porphyry, vein quartz and conspicuous red jasper clasts. The jasper clasts make up only about 2% of the rock but these are a convenient diagnostic feature for the unit. The conglomerates are crudely bedded, and locally graded. Cross beds were seen in one or two places.

South of the Blanche River, the unit grades both northwards and eastwards into jasper-bearing graywacke and to mudstones and siltstones near the contacts. North of the river, a very coarse boulder conglomerate was found. The conglomerate unit here is bisected by an extensive graywacke and argillite unit. Arenites within this unit are locally cross bedded. The conglomerate north of the river is not as extensive as that recorded by Thomson (1950), and has been confused with coarse, trachyte tuff-breccia. In places it is intimately interbedded with slightly reworked tuffs. These "epiclastic" tuffs are composed of sub-rounded but essentially monolithic trachyte clasts. The proportion of trachyte clasts in polymictic conglomerate increases northwards towards trachyte flows. The conglomerate also becomes poorly sorted and matrix supported.

Alkaline volcanics are represented by trachyte tuffs and flows. the volcanics south of the Blanche River are large predominantly water-lain ash and lapilli tuffs. North of the Blanche River, the tuffs are much coarser and are generally blocky tuff-breccia and lapilli-tuff. Almost all outcrops are essentially unaltered and massive.

The tuffs are generally well-bedded to laminated. Both trough and normal cross bedding are common. Ripple marks are occasionally seen on bedding planes. Frequent, thin laminae of magnetite grains probably represent winnowed material. The tuffs are generally quite mafic and dark green in colour with pink tinged feldspars. Clasts are often trachytoid textured internally.

This rock has been examined in thin section from a sample taken at L112E, 103+75N and is consists of non-vesicular juvenile fragments and crystal shards. Concentrically zoned hornblende and augite is common with occasional euhedral albite and orthoclase grains. The grains sit in a groundmass of very finely trachytic-aligned, alkali-feldspar microlites.

All trachytes are moderately magnetic. Notably, a few grains of angular quartz were seen as well as one or two fragments of mafic basement rock. A proportion of exotic fragments of basement rock are always expected in tuff units, but the quartz probably represents a sedimentary component. These rocks were probably laid down in a basin where active sedimentation was ongoing as indicated by the interbedded polymictic sequences Thomson, 1950, p.10).

A few outcrops of tuff with one or two quartz, quartz-feldspar porphyry and even jasper clasts were seen in the mapping. Understandably, this can lead to confusion during mapping. Rock names could only be assigned after the overall fragment composition was considered.

On the north extremity of the property, on the north side of the Blanche River, as well as at the east end of the property immediately south of the River are some unusual augite porphyritic units. Thomson (1950, p.16) was reluctant to call these augite syenite and instead termed them "augite porphyrite". He comments that they resemble trachyte flows near Larder Lake, but that they have intrusive contacts. Cooke (1966) refers in his thesis to "mafic trachyte" west of Amikougami Creek. These trachytes are presumably part of the extensive "porphyrite" body mapped by Thomson.

It appears that these augite porphyritic units have caused considerable consternation among geologists in the camp. They have been considered too coarsely porphyritic to be flow rocks and so have been mapped as "syenites". The augite syenite along the Kirkland Lake Break is a different rock type altogether and is granitoid in appearance. Alkaline rocks in general have low viscosities due to their high fluorine and chlorine contents and so can flow with a higher percentage of phenocrysts than the 50-55% "locking point" of calc-alkaline lavas. Therefore, trachytes can carry larger or more numerous phenocrysts in flows than sub-alkaline flow types.

Recent mapping north of the Blanche River has located some excellent examples of scoriaceous flow top breccias and agglomerates. These are highly vesicular rocks with abundant augite (± feldspar) phenocrysts up to 5 mm in size. Bombs up to a metre or so in size were seen. The breccias lie immediately south of massive flows which rapidly become non-vesicular northwards. To the south, polymictic conglomerates become flooded with trachyte clasts, so that within several tens of metres south of the contact the conglomerates are essentially monolithic. Here the difference between conglomerate and slightly reworked tuff breccia becomes somewhat of a moot point. The rock types suggest several rapidly denuded coalesced trachyte domes. Facing directions are therefore indicated to be to the south, compared to the north facing sequence south of the River.

South of the river similar augite porphyritic but non-vesicular rocks were seen. These flows are again conformable to bedding, and a possible flow top breccia was seen at L114E, 105+75N. An intrusive contact of a similar unit was seen at L100E, 102+60N. In thin section these rocks, which are massive in hand sample, appear to be moderately chloritized, carbonatized and sericitized, probably as a result of autometasomatism, and not gold-related alteration. Tuff breccia units in contact with these flows contain abundant augite porphyritic clasts (eg. L105E, 111+75N). This would seem to indicate that these porphyritic bodies have both intrusive and extrusive character and may be sub-volcanics feeding short flows. They are mapped as porphyritic trachyte flows.

6.1.2 Larder Lake Group

The volcanic rocks of the Larder Lake Group, south of the Larder Lake Fault Zone, consist of komatiitic to basaltic flows with interbedded graphitic, pyritic sediments. The flows are massive, pillowed, variolitic, polysutured and spinifex textured. North west of Vigrass Lake is a type area for komatiites as described by L. Jensen (1985), and frequently used as a stop during field trips.

Massive, fine grained basalts form east-west trending outcrop ridges separated by a broad low-lying swamps at 87N and at Vigrass Lake (96N). These swamps are probably underlain by komatiitic units.

The graphitic interflow sediments are best observed in drill core and the stripped area between lines 105E and 107E at 9250N. They consist of finely bedded argillites locally grading to fine grained graywacke. Semi massive pyrite lenses and 1 to 2 cm pyrite nodules were found in the sediments.

6.1.3 Intrusives

Feldspar porphyritic syenite, augite syenite and mafic syenite intrusives are found throughout the property but are preferentially sited along structural zones. Most common are brick red feldspar porphyritic leuco-syenite dykes and pods in and adjacent to both the Larder Lake Break and Blanche River Fault. A parallel east-west shear has localized three possible bodies in the centre of the map

area. This constitutes an important rock type, since historically gold was mined from veins in red syenite at both the Baldwin Consolidated property to the west and the Gateford Crescent Mine to the east.

Almost all syenite is highly ankeritic and sericitized with green mica phenocrysts. The only exception is north of the Blanche River, where it is unaltered. Veinlets of specular hematite are common. Chalcopyrite and pyrite are sporadic but often seen. These intrusives are fractured but rarely sheared. The enclosing volcanic and sedimentary rock is strongly hematized and also brick red, making discrimination of contacts difficult. This is particularly so on the south bank of the Blanche River.

Hosting the old Homestead Mine adit (114+50E, 101+30N) is a composite meso- and leuco-syenite body (syenodiorite), which is quite mafic in places. Generally it is grey rather than pink and non-porphyritic. In the vicinity of the adit it is almost completely carbonatized and buff coloured, with 3-5% pyrite.

Several small syenite dykes, from meso- to augite syenite, were seen south of the Larder Lake Fault Zone. They are weakly to moderately magnetic, granitic in texture and clearly of a different nature to those north of the fault. Medium-grained to coarse euhedral pyrite is frequent up to several percent. These intrusives are weakly to moderately ankeritic.

Lamprophyre dykes intruded the Larder Lake Fault Zone and the altered, carbonated komatiites and basalts south of the Lake. Lamprophyre "boulder dykes" at 107E and 10850E, 8930N are 1 to 5 metres wide and contain rounded xenoliths of ultramafic to granitoid composition in a medium grained, biotite-amphibole matrix.

6.2 Structure

The major structure on the property is the Larder Lake Fault Zone which separates the Timiskaming Group to the north from the Larder Lake Group to the south. It consists of a poorly exposed, east-west belt of talc + chlorite + carbonate schist.

Warps along the Larder Lake Fault Zone probably provided dilational sites for syenite intrusions. The Homestead adit syenite is situated in such a warp. The adit follows a sub-vertical fault splay at 45° to the Larder Lake Fault.

A fault splay at 250° in basalts south of the Larder Lake Fault is interpreted from the ground magnetic data to pass through the Matabanick historic shaft area at 8900E, 9900N.

The Blanche River Fault can be traced as a linear magnetic low along the Blanche River. To the east this fault is interpreted to be the Amalgamated Kirkland Fault. Strong brittle deformation within syenites and ductile deformation in volcanics and sediments which are related to the Blanche River Fault are found in cuts along the railway. This fault marks the boundary between the south facing sequence north of the River from the north facing sequence to the south. As such, it may represent the trace of the major synclinal axis within the Timiskaming "basin".

Late north, northwest and northeast striking faults are interpreted from the magnetics and from abruptly truncated units within the Timiskaming and Larder Lake rocks.

The Timiskaming Group rocks strike 075° to 90° except in the northeastern corner of the map area where they strike 110° to 130°. South of the Blanche River, dips are 65° - 85° to the north, although locally the beds have been overturned and tilted to the south. Bedding north of the river is steep, but dips are predominantly to the south.

East-west trending shear zones, sub-parallel to the Larder Lake Fault Zone, cross the property in a number of locations, for example: at 102N within the Timiskaming rocks; along the south shore of Vigrass Lake at 95N; and along the southern edge of the northern outcrop ridge at 88N within the Larder Lake rocks along a contact between basalts and komatiites.

North of the Blanche River at 105E, 109N, a three metre wide shear zone at N50°E follows a conglomerate/mudstone contact. The magnetic data indicates that this shear continues across the entire property. A structure striking 070°, centred at 110E, 115N within trachyte flows, is inferred from a magnetic linear low. This structure follows a topographical lineament.

The Larder Lake Group rocks strike 065° to 110° and dip steeply to the south at 75° to 90°. Top determinations from pillowed basalts indicate a southerly facing sequence.

Strongly altered, carbonated and silicified shear zones, with finely disseminated sulphides and irregular quartz veins, are located within the Larder lake Group volcanic rocks, up to 1000 metres south of and sub-parallel to the Larder Lake Fault Zone. These shear zones usually mark the contacts between komatiitic and basaltic flows, e.g. along the north and south shores of Vigrass Lake and at 107E, 8675N.

A complex zone of shearing and faulting, with associated carbonatization and silicification, is located along the south shore of Vigrass Lake. This complex structural zone is part of a regional feature which is sub-parallel to the Larder Lake Fault Zone. It is the western extension of the Teck "A" fault zone which is located 5 km to the east on the Teck "A" property.

A triangular-shaped, fault-bounded block of altered, pyritic volcanic rocks with geochemically anomalous gold mineralization, is centred along line 106E from 92N to the south shore of Vigrass Lake, i.e. the Vigrass Lake Fault Zone.

Linear, low magnetic susceptibility anomalies indicate the possibility of some additional shear zones located south of the chain of islands in Vigrass Lake and to the east of the above mentioned altered triangular fault block.

7.0 ALTERATION AND MINERALIZATION

7.1 Alteration

The Timiskaming rocks on the Vigrass Lake property are relatively fresh with strong carbonate alteration found only in proximity to the Larder Lake and Blanche River Faults and related sub-parallel shear zones. Shearing is marked by strong foliation and local zones of sericitization and carbonatization up to 25 metres, but usually less than two metres, wide. Hematite-carbonate altered syenite intrusives are located along the railway tracks in close proximity to the Blanche River Fault. Syenites along the Larder Lake Fault are strongly carbonate altered.

Strongly altered, carbonated and silicified shear zones with finely disseminated sulphides are found in the Larder Lake volcanics up to 1000 metres south of and parallel to the Larder Lake Fault Zone. A complex area of shearing, carbonatization, silicification and altered lamprophyre dykes and faulting is located along the southern shore of Vigrass Lake.

7.2 Mineralization

Channel and/or grab samples were taken of altered, sheared rocks, quartz-carbonate veining and/or sulphide mineralization exposed in the stripped areas and located during the mapping survey. The assay results for the grab samples are presented in Drawings GA-012 to 016 while channel samples from the stripped areas are shown on Drawings TA-032, 033 and 035.

Channel sampling along two lines 7.5 metres apart at 0.3 metre intervals in the area of a previous 1.52 metre anomalous sample on the Highway Zone returned single anomalous samples of 4.37 g/t Au over 0.3 metres and 1.90 g/t Au over 0.3 metres on each line.

Along the highway, at 8900E, 9915N, semi-massive pyrite in strongly altered, quartz veined mafic volcanics returned assays of 290 to 1440 ppb Au.

Grab samples of pyritic quartz veins in altered mafic volcanics along the southern edge of an outcrop ridge at 109E, 8800N, assayed 100 to 320 ppb Au.

Overburden stripping around H.S.K. drill hole (VI-88-8), which intersected 125 ppb Au over a core length of 56 metres, exposed highly altered, carbonated, silicified and pyritic mafic volcanics, lamprophyre and feldspar porphyritic dykes and graphitic sediments with semi-massive pyrite. Channel sampling returned anomalous gold assays of 100 to 680 ppb Au over widths of one to seven metres. Grab samples of the semi-massive sulphides returned assays up to 223 ppb Au, 1.4 ppb Ag, 528 ppm Cu and 518 ppm Zn.

Narrow, northerly flat-dipping carbonatized zones in the stripped area along line 107E at 90N returned grab sample assays of 180 to 670 ppb Au in 1989. Channel samples cut during the 1990 field season assayed up to 179 ppb Au over widths of 1 to 2 metres.

Altered syenites, with minor pyrite and chalcopyrite, located along the Blanche River and Larder Lake Faults, assayed trace to 130 ppb Au.

Shear zones in the Timiskaming rocks, associated with pyritic quartz + carbonate veins, assayed nil to trace Au.

8.0 DRILLING

Two holes were drilled during July, 1990, to test two H.E.M. conductors on the Allsop-Zabudsky claims, and to fulfil the March, 1990 vendor agreement work commitment. A total of 302.4 metres were drilled and 176 samples were assayed. No economic mineralization was intersected.

Hole VA90-01 tested a strong H.E.M. anomaly, striking 305°, and crossing the Allsop-Zabudsky/Kidston common boundary at 10530E, 9200N. The hole intersected highly altered, carbonated, silicified basalts, graphitic sediments, lamprophyre dykes and komatiites. There is finely disseminated pyrite, locally up to 15%, throughout the hole. Locally intense fuchsite, sericite and siliceous alteration were encountered, as well as multiple phases of quartz veining. Up to 2% sphalerite was intersected in the graphitic sediments, quartz veining, and silicified basalts.

The source of the EM conductor is the graphitic sediments. A fault zone was intersected at 20 to 23 metres down the hole. This fault, with an apparent dip of 30° NE, has offset the conductive sediments an estimated 35 metres to the northeast.

The entire hole VA90-01 was cut and sent for assay. Only four (4) samples returned gold assays greater than 100 ppb Au. Selected samples assayed up to 7080 ppm Zn, 418 ppm Cu and 1.6 ppm Ag.

Hole VA90-02 tested a weak H.E. M. anomaly along the sheared southern edge of a bedrock ridge at 8770N 10900E. It intersected sheared, altered komatiites and basalts intruded by lamprophyre dykes. The basalts are weakly silicified and carbonated from 89 to 110 metres down the hole. This section was cut and sent for assay; no anomalous gold assays were returned. The weak conductor is probably due to the sheared contact between the komatiites and the basalts and/or the overburden/bedrock interface.

Drill logs for the two holes are located in Appendix I. The holes are shown in cross section on Drawings DC-001 and DC-002.

9.0 DISCUSSION OF RESULTS

The Vigrass Lake property is underlain by trachytic volcanics and sediments of Timiskaming Group in the north part and mafic to ultramafic volcanics with interbedded sediments of the Larder Lake Group in the south part. The historically productive Larder Lake Fault Zone and sub-parallel structures cross the property. Altered, pyritic syenites have been intruded along these structures. However, previous drilling of these intrusives has failed to intersect any economic mineralization.

The highly altered, silicified, carbonated, pyritic mafic to ultramafic volcanics intersected in hole VA90-01 possibly could be indicative of deeper seated mineralized zones. The geological setting, host rocks, alteration and structure is comparable to the near surface geology associated with the Kerr Addison deposit in the Larder Lake district.

It is possible that the structures inferred from the magnetic data, located at 115N within Timiskaming trachyte flows is similar to the gold-bearing structures presently being explored on the Amalgamated Kirkland property or the Kirkland Lake Main Break. Assuming an easterly camp plunge, gold exploration targets are probably at considerable depths.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Mapping and prospecting of the Timiskaming rocks underlying the North Vigrass claims did not locate any high priority targets for follow-up at this time. Hematitic syenites along the Blanche River Fault may warrant some future consideration.

Anomalous gold mineralization was found in altered basalts 100 metres south of the Larder Lake Fault along line 89E. A splay fault off the Larder Lake is interpreted to cut through a magnetic high anomaly in this area. Further work is required to determine if any drilling is warranted.

The extensive area of geochemically anomalous gold mineralization, carbonatization, silicification and shearing located along the south shore of Vigrass Lake warrants further drilling. A 700 metre drill hole is proposed to test this alteration zone at a vertical depth of 300 metres.

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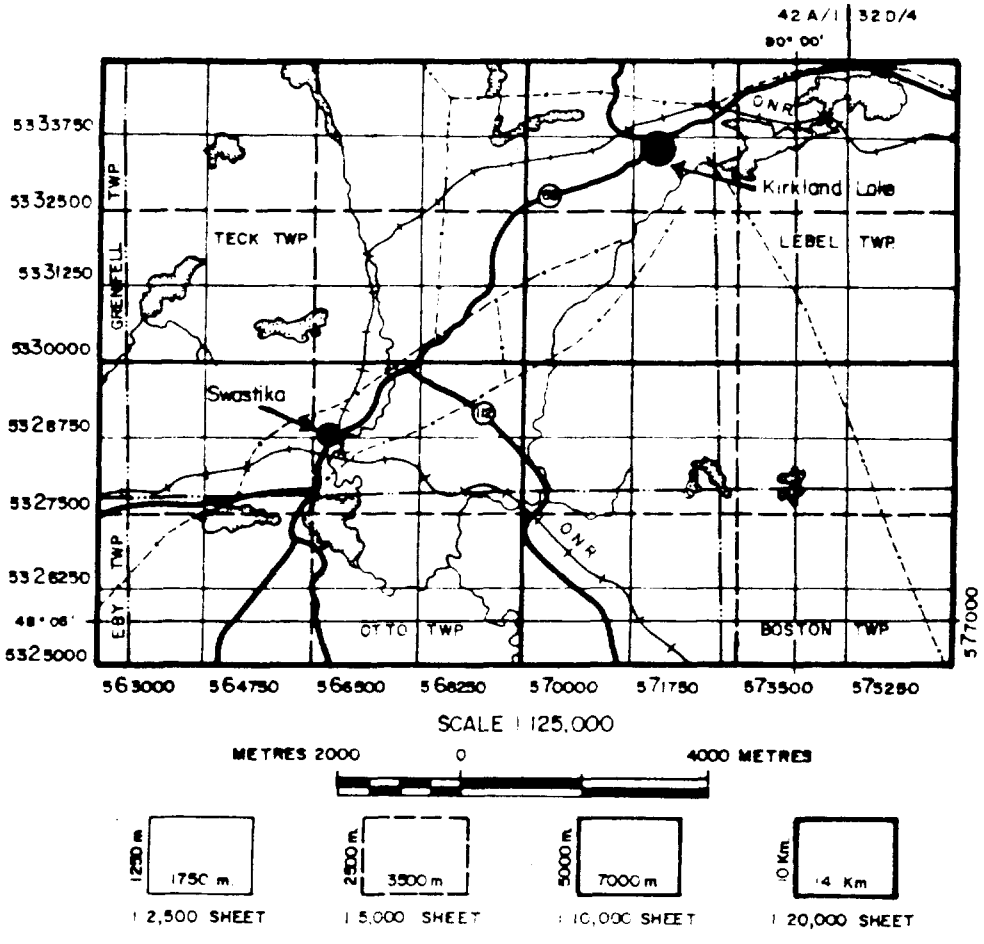
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MINISTRY OF NORTHERN DEVELOPMENT AND MINES GEOSCIENCE ASSESSMENT OFFICE KIRKLAND LAKE RECEIVED

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sources, therefore accuracy cannot be guaranteed.



LE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

MINISTRY OF NORTHERN DEVELOPMENT AND MINES
RES GEOLOGIST OFFICE
KIRKLAND LAKE

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

JAN 14 1992

CLAIM MAP

PROJECT No. 75 - JV - 28	DATA BY:
NTS 42A/1 & 32D/4	DRAWN BY: B.H Madill, Tech.
DRAWING No. PL-001	DATE: 07/11/90

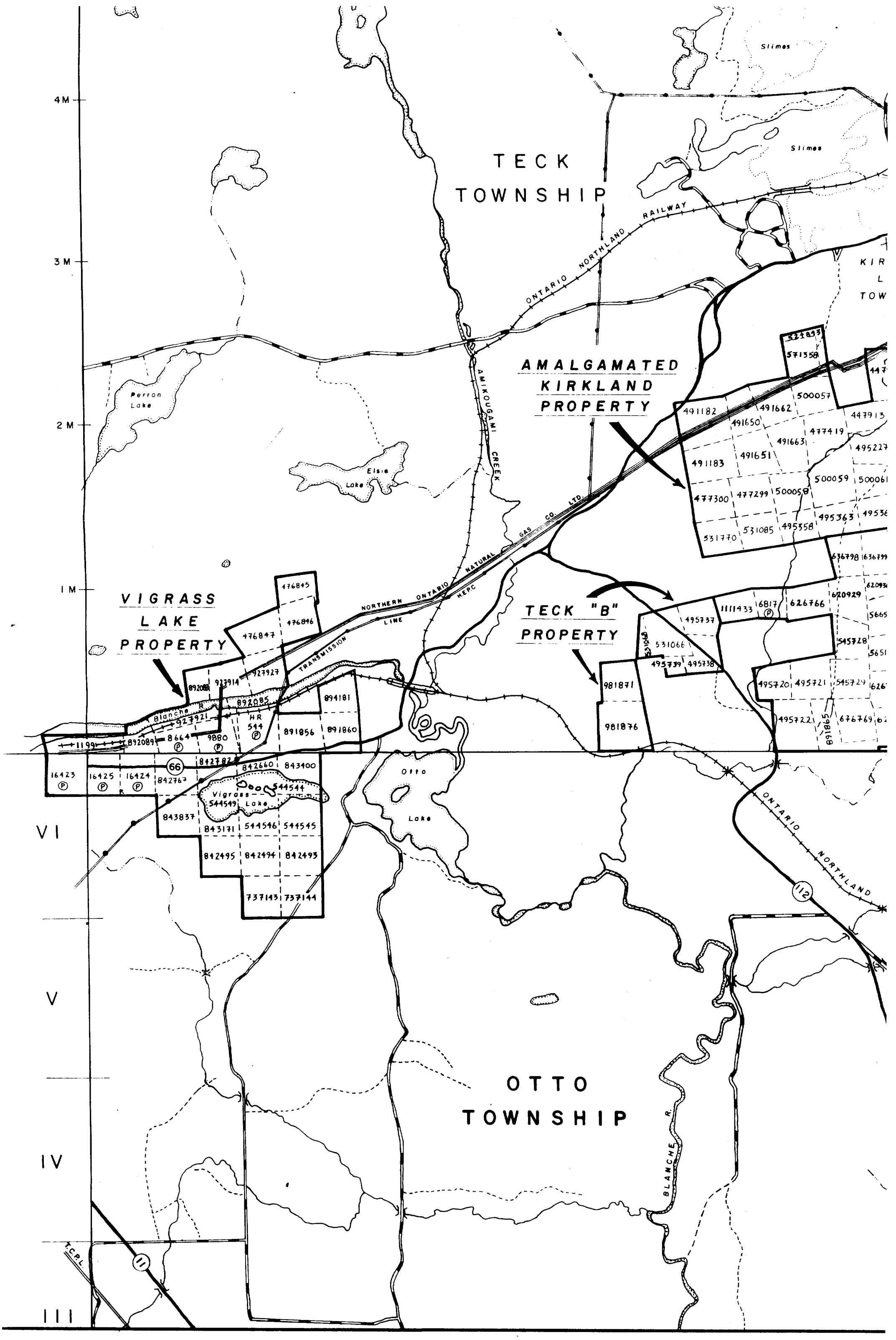
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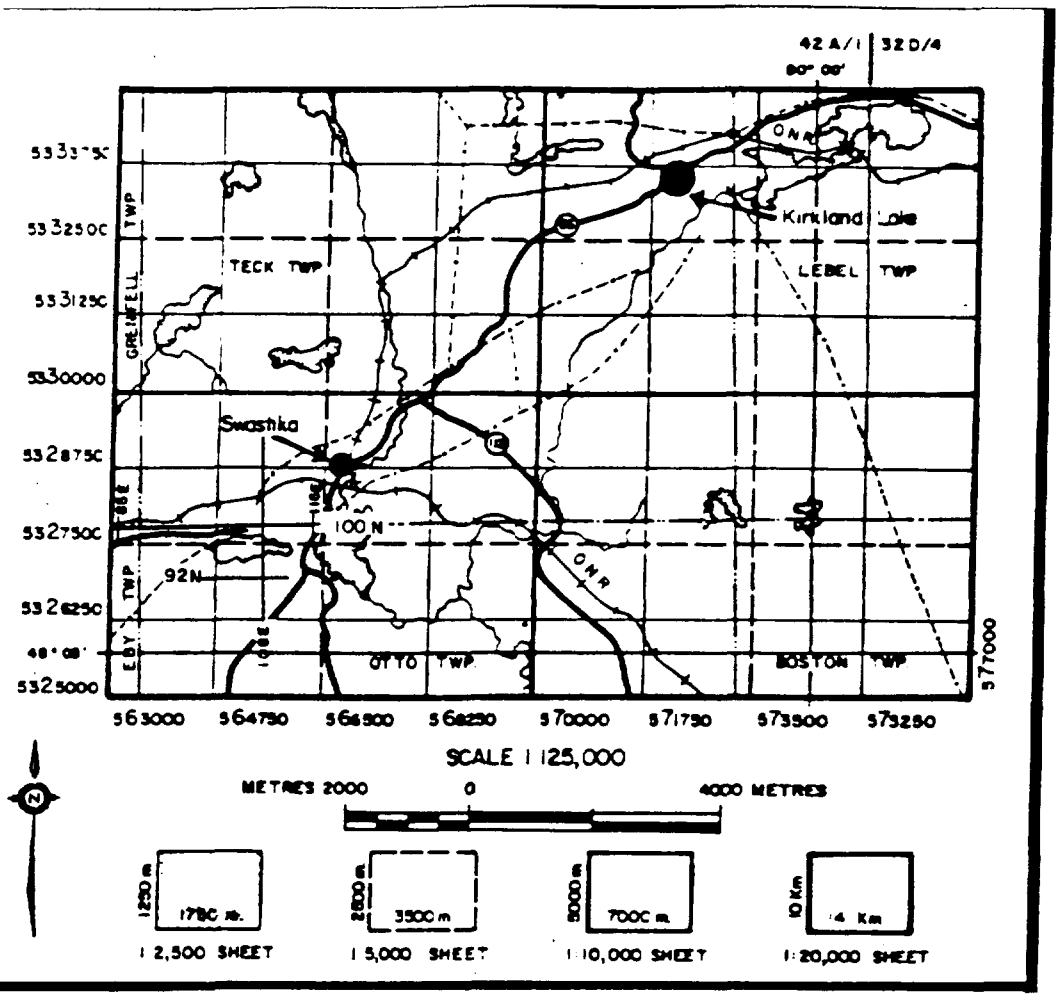
FEET 0 1000 2000 4000 6000 8000

METRES 0 200 1000 2000

KL-3130-1

KL-3130-4


TECK
TOWNSHIP
AMALGAMATED
KIRKLAND
PROPERTY
VIGRASS
LAKE
PROPERTY
TECK "B"
PROPERTY
OTTO
TOWNSHIP
ONTARIO NORTHLAND RAILWAY
NORTHERN ONTARIO NATURAL GAS CO. LTD.
HEPC TRANSMISSION LINE
AMIKOUGAMI CREEK
Blanche R.
Perron Lake
Elsie Lake
Vigrass Lake
Otto Lake
Slimes
Slimes
ONTARIO NORTHLAND
BLANCHE R.
T.C.P.L.
4M
3M
2M
1M
VI
V
IV
III
66
112
11
571358
491182
491662
500057
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843171
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842495
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842493
737143
737144



BATTLE MOUNTAIN (CANADA) INC.

MINISTRY OF NORTHERN DEVELOPMENT AND MINES
RESIDENT GEOLOGIST OFFICE
KIRKLAND LAKE
RECEIVED
JAN 14 1992

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

VIGRASS LAKE PROPERTY

(GEOLOGY PLAN)

showing

GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 563000E / 5327800N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., K.B.
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GA-014	DATE: October 1990

SCALE 1:2,500

50 0 50 100

METRES

KL-3130-16

+ SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ±Carbonate ±Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ±Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ±Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

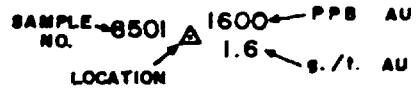
- a -fine grained
- b -medium grained
- c -coarse grained
- p -pebble
- d -cobble
- e -boulder
- g -grit

VOLCANIC ROCKS

- a -ash tuff
- b -lapilli tuff
- c -block tuff
- f -flow
- fbx -flow breccia

IGNEOUS ROCKS

- a -fine grained
- b -medium grained
- c -coarse grained
- p -pegmatitic



ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx - spinifex
ca. - calcite	m. - massive	sh. - sheared

SHEET ALIGNMENT POINT

BLANCHE

GRENFELL TWP

EBY TWP

OTTO TWP

ONR

ICG NATURAL GAS PIPELINE R.O.W.

HWY 66

BASE LINE 100 N

8500 E

8600 E

8700 E

8800 E

8900 E

9000 E

9100 E

9200 E

9300

310

80

5327900 E.

563000 E.

35

40

+ SHEET ALIGNMENT POINT

464

46

13ch., cb.

13

653

654
5-10% py

493
14 ppb

494
127 ppb

65

61

13cb

13 sil, q.v.

13f

PIT

13, ch, cb.

13ch.

13, 654, py.

998 1331 ppb
999 1113 ppb
1000 415 ppb

Waste Dump
13, qx., ank., py.

72700
290 ppb
13, q.v., cb., py.

320

13f, var.

13sh.

13sh., ank., 2% py.

13m, f

13m

21

22

18

21p

18a, 26

701
22g, 1% py.
10 ppb

22, py.

23sh, 623

704
Nil

23,622

614

495
7 ppb

703
14 ppb
22g, py

707
Nil

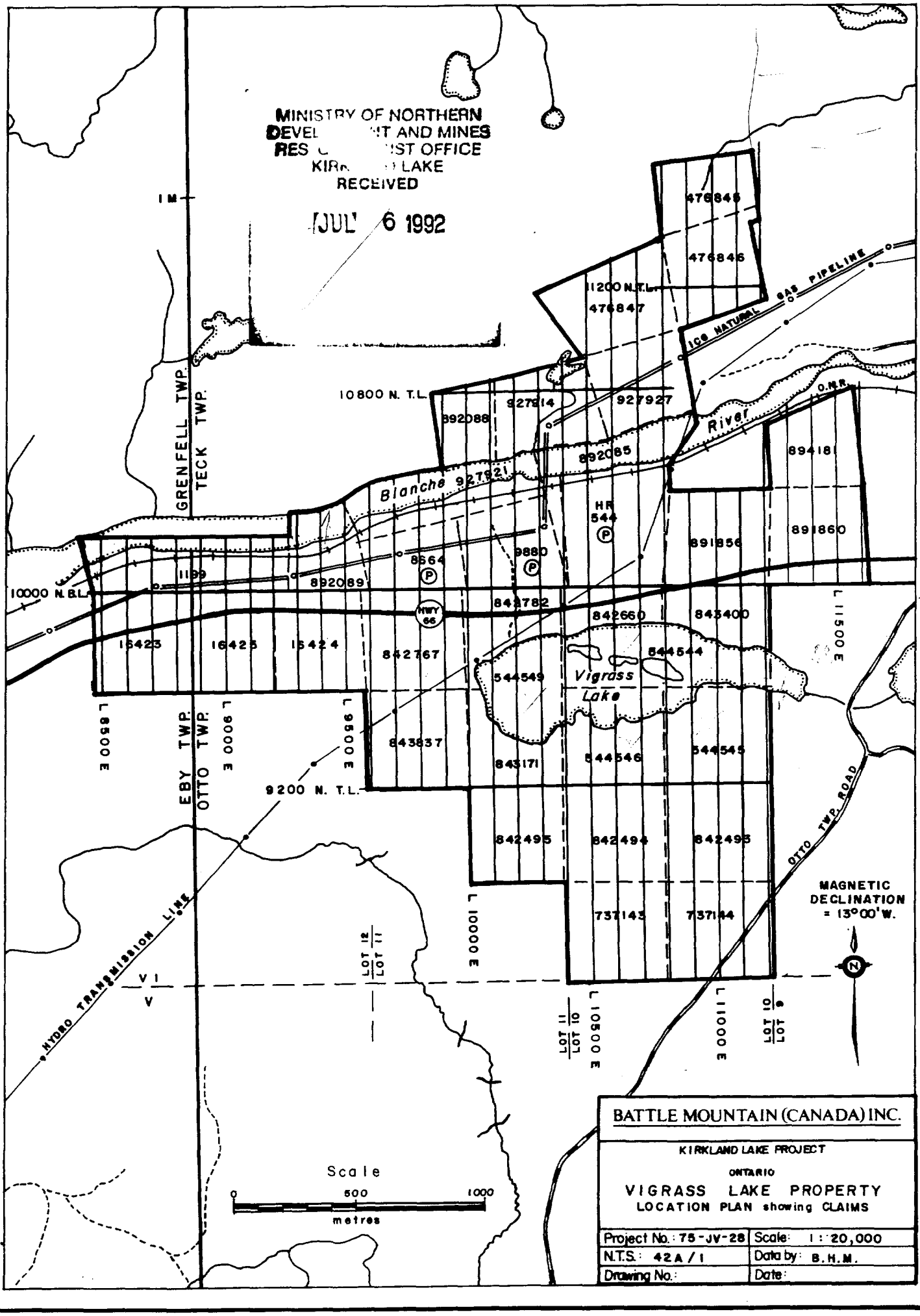
26sh

461

461, 1% py.

702
Nil

13f


MINISTRY OF NORTHERN
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KIR LAKE
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JUL 6 1992
1M
GRENFELL TWP.
TECK TWP.
EBY TWP.
OTTO TWP.
10800 N. T.L.
11200 N.T.L.
9200 N. T.L.
10000 N.B.L.
GAS PIPELINE
ICG NATURAL
O.N.R.
River
Blanche
Vigrass Lake
HR 544
HWY 66
HYDRO TRANSMISSION LINE
OTTO TWP. ROAD
476845
476846
476847
927914
927927
892088
892085
927921
894181
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892089
842782
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843400
842767
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737144
16423
16424
15424
MAGNETIC DECLINATION = 13°00'W.
N
Scale
0
500
1000
metres
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
ONTARIO
VIGRASS LAKE PROPERTY
LOCATION PLAN showing CLAIMS
Project No.: 75-JV-28
Scale: 1:20,000
N.T.S.: 42A/1
Data by: B.H.M.
Drawing No.:
Date:

STRATAGEX

63.6025

REPORT

on

MAGNETIC AND HLEM SURVEYS

VIGRASS LAKE PROPERTY

KIRKLAND LAKE

ONTARIO

for

BATTLE MOUNTAIN (CANADA) INC

Toronto, Ont.

MINISTRY OF NORTHERN DEVELOPMENT AND MINES
MINE GEOLOGY OFFICE
KIRKLAND LAKE, ONT.

J. Roth
STRATAGEX LTD

JAN 14 1992

September, 1990 Toronto, Ont

ONIA 90-122

REPORT
on
MAGNETIC & HLEM SURVEYS
VIGRASS LAKE PROPERTY
KIRKLAND LAKE, ONTARIO

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JAN 14 1992

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Map V-6	MaxMin Profiles: 3555Hz (Corrected) + Interpretation	"

STRATAGEX

REPORT ON
MAGNETIC AND HLEM SURVEYS
VIGRASS LAKE PROPERTY

SUMMARY

Magnetometer and horizontal loop EM surveys were executed by Val d'or Geophysique during the period March-April, 1990, over claims comprising the Vigrass Lake property located southwest of Kirkland Lake, Ontario. These surveys form part of an integrated exploration program for gold deposits being conducted by Battle Mountain (Canada) Inc. within portions of this prolific gold district.

The Vigrass Lake property is known from past geological mapping and substantial prior exploration to be underlain by Timiskaming Group sediments and volcanics to the north and Larder Lake Group volcanics and subordinate sediments to the south, along with syenitic intrusives, all of which exhibit a general east-west to east-northeast fabric. Several persistent ENE strike faults (Larder Lake and Blanche River) extend across the property. A number of geochemically interesting gold occurrences occur associated with ENE to E-W shear zones, although none have achieved producer status.

The magnetic survey, totalling 55.1 km, was carried out in very detailed fashion reading both total field and vertical gradient. The results are interpreted to define eight lithomagnetic domains which likely define subunits of the Timiskaming and Larder Lake Groups. A series of dominantly east-west strike faults are inferred; while several correspond to known faults, a number are new and hence of interest as favourable loci for gold mineralization. Comparison and correlation of the detailed ground survey data with district-wide aeromagnetic surveys has enabled identification of the more persistent structural and lithologic features, while the ground data enables

recognition of subtle structural elements and lithologic units beyond the resolving power of the airborne survey.

The MaxMin horizontal loop EM survey, comprising 22 km in the south-central sector of the property, was conducted with a 50m coil separation at three frequencies. The results, after correction for local topographic effects, define 16 conductive zones of possible, probable or definite bedrock origin. Most of the conductors are judged to be graphitic beds within a sedimentary subunit of the Larder Lake Group, consistent with the results of past and recent drilling; however, undrilled conductors, particularly associated with interpreted faults, retain interest for further investigation.

Based on the geophysical results, taken in the context of pertinent geological information, it is recommended that:

1) Additional mapping, sampling and trenching be directed at interpreted strike faults, particularly where geological and/or geochemical encouragement is discerned.

2) Undrilled EM conductors be similarly checked as to geological environment;

3) The present interpretation be reviewed and revised as new information is obtained and/or new gold occurrences identified;

4) Detailed IP/resistivity surveys be considered if encouraging gold mineralization associated with disseminated sulphides is encountered.

1.0 INTRODUCTION

This report treats the results of a combined magnetometer and MaxMin horizontal loop EM survey completed over most of the Vigrass Lake property currently being explored by Battle Mountain (Canada) Inc. under an agreement with HSK Minerals Ltd. (now Queenston Mining Inc.)

The property, located in the southwest sector of the Kirkland Lake gold camp, is centered on Vigrass Lake immediately south and west of the town of Swastika, straddling the east-west boundary between Otto and Teck Townships.

This property is one of several under intensive exploration by Battle Mountain for new gold deposits similar to those already discovered in this prolific district. The present geophysical surveys comprise one component of an integrated exploration effort which has included regional geophysical surveys and geological studies as well as detailed mapping, trenching and sampling programs and limited drilling on specific properties.

2.0 GEOLOGY & PRIOR EXPLORATION

The Vigrass Lake property is underlain by portions of the Timiskaming and Larder Lake Groups, two assemblage of Precambrian lithologies typical of the Kirkland Lake sector of the Archean Abitibi greenstone belt.

The distinctive lithologies of the Timiskaming Group comprise clastic sediments and subordinate volcanics (including trachytes), which have been intruded by syenites and syenodiorites, all with a dominant orientation of east-northeast. Major deformation zones oriented subparallel to stratigraphy host most of the known significant gold deposits.

On the present property units of the Timiskaming Group are found north of Vigrass Lake. The Larder Lake Break and the Blanche River Fault pass through this sector of the property.

Rocks of the Larder Lake Group are found in the southern part of the Vigrass lake property, south of Vigrass Lake. These are principally mafic and ultramafic volcanics with interbedded sediments.

Exploration for and exploitation of gold deposits commenced in the vicinity of Swastika in the early 1900s preceding the discoveries in Kirkland Lake camp by ten years.

In the post-war period, when gold prices were low, exploration throughout the Kirkland Lake camp was quite limited. Renewed exploration commenced with the advent of increased gold prices, with many exploration companies known to have been active in the Kirkland Lake district since 1974.

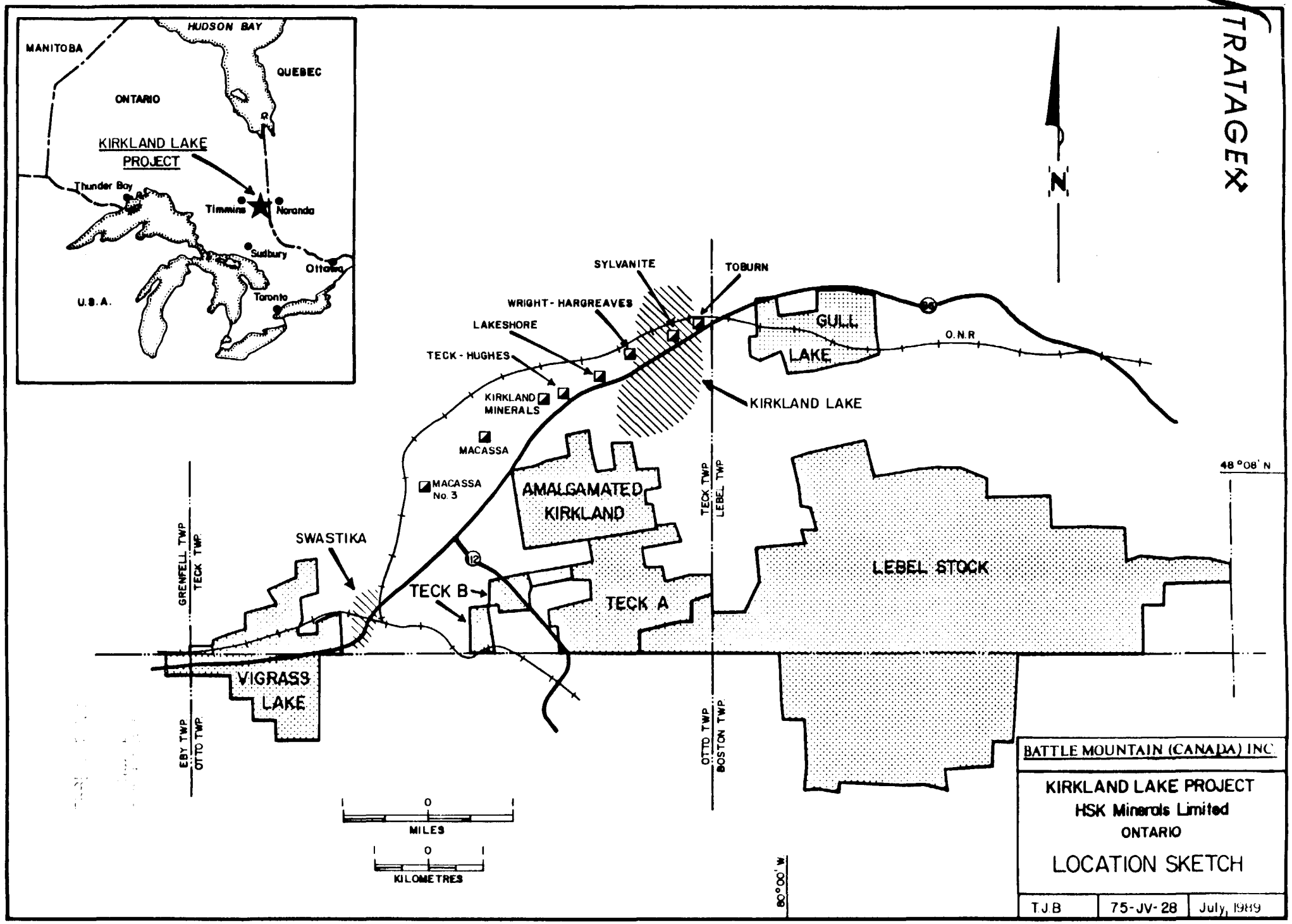

HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
STRATAGEX
N
SYLVANITE
TOBURN
WRIGHT-HARGREAVES
LAKESHORE
TECK-HUGHES
KIRKLAND MINERALS
KIRKLAND LAKE
GULL LAKE
O.N.R
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
GRENFELL TWP
TECK TWP
LEBEL TWP
EBY TWP
OTTO TWP
BOSTON TWP
VIGRASS LAKE
48°08' N
80°00' W
0
MILES
0
KILOMETRES
BATTLE MOUNTAIN (CANADA) INC
KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO
LOCATION SKETCH
T.J.B
75-JV-28
July, 1989

FIGURE 1

Among the recent exploration activities on and near the Vigrass lake property, Rio Algom drilled at least one hole at the northern edge of Vigrass Lake on a weak, graphitic shear zone in 1985, while HSK Minerals conducted drilling in 1988, including one hole (88-8) which encountered geochemically anomalous gold values in sheared and altered Larder Lake lithologies immediately south of Vigrass Lake.

No significant gold deposits are known on the Vigrass property, although a number of showings with anomalous gold values (e.g., Highway and 88-8) have been discovered by past and present exploration. Adjacent to the property, gold production was achieved in the past from several modest gold deposits, including the Golden Crescent/Gateford deposits immediately to the east.

Full details of the lithologic units, alteration and gold occurrences as well as the past exploration on and around the present claims may be found in various reports by Battle Mountain (Canada) and HSK Minerals.

3.0 SURVEY DESCRIPTION

Prior to commencing the geophysical surveys a cut line grid was established over the property during September and October, 1989 by F. Kiernicki of Kirkland Lake, using base and tie lines established by Northland Positioning. The grid has north-south cross lines spaced at 100m intervals and tie lines at 800m intervals, for a total of 55.1 km of survey lines. The survey grid has only a few minor departures and distortions from the intended ideal grid; these are shown on the appended geophysical maps.

Both the magnetic and HLEM surveys were conducted by Val d'or Geophysique during the period March 26-April 13, 1990.

3.1 Magnetic Survey

The magnetic survey employed an EDA OMNI 4 proton magnetometer reading both total field and vertical magnetic gradient, with a sensitivity of 1.0nT and 0.1 nT/m, respectively. A digital EDA base station magnetometer was used to record diurnal variations for subsequent removal.

Because magnetic sources were anticipated to be complex and shallow, the survey was conducted in a very detailed fashion, with readings taken on cross lines and tie lines at 12.5m intervals, for a total of 55.1 km of survey. Fill-in readings to 6.25m were taken in areas of significant magnetic relief.

The total field magnetic data was processed to remove the diurnal variations, posted along the grid lines, and gridded and contoured at 25 nT intervals where appropriate. The resulting maps for the total field data (Maps V-1 and V-1N) display good coherency and good ties at tie line intersections.

The vertical gradient magnetic data, on the other hand, display a degree of incoherency and only fair ties, due to the multiple, shallow magnetic sources. Consequently the data are most advantageously viewed in profile form (together with the profiled total field data), as seen in Maps V-2 and V-2N. The vertical gradient data are useful for analyzing individual anomalies in the total field data.

The magnetic data for the Vigrass property were originally compiled by Val d'or Geophysique on six separate 1:2500 map sheets designated A thru F, corresponding to geologic map sheets. However, for the present report, the data has been composited to form one principal map sheet, with Sheet A to the north retained as a separate map.

The magnetic features indicated by the survey have been interpreted in terms of simplified sources, distinguished in terms of generalized susceptibility (low, moderate, high and very high) as seen in the attached maps. Regions with similar magnetic characteristics have been designated as magnetic domains I through VIII.

Faults and shear zones identifiable from the magnetic data have also been indicated on the attached maps. These zones are of particular importance in view of the structurally controlled nature of most gold mineralization in the Kirkland Lake camp.

3.2 MaxMin HLEM Survey

The horizontal loop EM survey employed an Apex MaxMin II instrument. A coil separation of 50m was utilized in view of the generally shallow overburden, with readings at 25m intervals at 444, 1777 and 3555 Hz. The MaxMin survey was restricted to the central portion of the grid between 8900N and 10,000N, where a series of weak to moderate INPUT responses were detected in the OGS KLIP airborne survey. A total of 22.7 km of survey was completed.

The measured in-phase and quadrature values have been plotted in standard profile format at a scale of 1 cm = 10% for 444 and 1777 Hz, and 1 cm = 20% for 3555 Hz, as seen in Maps V-3 through V-5, respectively. In addition, corrections for topography to the 3555Hz in-phase values have been computed by subtracting the 444 Hz value from the 3555 Hz reading; the resulting corrected profiles comprise Map V-6.

Apart from the significant variations caused by topography, the recorded data generally display low noise (less than 2%), so that weak, poorly conductive features are readily recognizable.

Those HLEM anomalies judged to be geologically valid have been interpreted as definite, probable or possible bedrock or as probable overburden sources, as shown in Map V-6. Continuity of individual anomalies is indicated as possible, probable or definite. As seen in Map V-6 and in the other MaxMin maps, relatively few responses of possible to definite bedrock origin are present in the area surveyed, primarily within a restricted band in the south-central portion of the grid.

4.0 SURVEY RESULTS

The magnetic survey results will be discussed first, followed by the MaxMin results. The combined interpretation is portrayed superimposed on the contoured total field magnetic data (Maps V-1 and V-1N), while the MaxMin interpretation is portrayed independently on Map V-6.

4.1 Magnetic Results

The magnetic survey on the Vigrass property revealed alternating bands of low and moderate-to-high susceptibilities, with an general alignment of east-west to east-northeast.

Virtually all the magnetic sources lie within ten metres of the surface, with the exception of several magnetic features beneath Vigrass Lake, where source depths are on the order of 25 metres. Most of the sources are inferred to be quasi-vertical in orientation; however, several of the highly magnetic features that likely reflect syenitic intrusives, such as beneath Vigrass Lake, appear to have moderately dipping contacts.

The regions of differing magnetic characteristics have been designated as magnetic domains I through VIII, described in greater detail below.

Magnetic domain I, which is only partially disclosed in the northernmost portion of the survey, is composed of strongly magnetic lithologies trending generally east-northeast. This unit, revealed by aeromagnetic data to be several kilometers in strike length, reportedly corresponds to a mafic trachyte flow.

Domain I is inferred to be bounded to the south by a fault or deformation zone of sub-regional extent (part of the Larder Lake fault zone) which here trends northeast. A splay off that fault system is interpreted to extend into domain I near 10,800N, occasioning an offset in the magnetic lithologies, although these features are only partially defined due to limited survey coverage in this sector.

An additional fault internal to domain I is suggested by an interval of lower susceptibility trending east-northeast near 11500N, as seen in Map V-1N.

Domain II, located immediately to the south of domain I, is a narrow, largely non-magnetic region containing a few weak, isolated magnetic sources of variable orientation. This character is consistent with non-magnetic (Timiskaming) sediments or volcanics. At least one major fault system, trending east-northeast, is interpreted to extend through domain II near its southern contact with domain III.

Domain III, in the north-central sector of the survey, consists of narrow, moderate to strong magnetic sources occupying a belt which extends east-northeast across most of the survey area and which widens considerably to the east. Lithologies are interpreted to be mixed volcanics with syenitic intrusives belonging to the Timiskaming Group. This belt is inferred to contain a number of east-northeast to east-west strike faults, as well as to be bounded by similar faults.

A compact area to the southwest of the main portion of domain III containing moderately magnetic sources may be a continuation of this domain and accordingly is designated as subdomain III_A.

Domain IV extends east-northeast across the central portion of the area surveyed near baseline 10000N. This domain is characterized by a general absence of magnetic sources, consistent with a dominantly sedimentary composition. Major faults are interpreted to bound this domain, separating it from adjacent domains III and V to the north and south, respectively.

Domain V, located immediately south of domain IV, is a similarly narrow band aligned east-west, but differentiated from domain IV by the comparatively abundant weak to moderately strong magnetic sources embedded within it.

Domain VI, located to the south of domain V, is a 300m wide irregular band which extends east-west across the grid in the vicinity of Vigrass Lake. This domain is characterized by a rather variegated magnetic terrain containing numerous discrete, strong magnetic sources as well as a large, ovoid, strong magnetic source. A mixed assemblage of volcanics and intrusives is inferred for this domain which lies along the transition from Timiskaming to Larder Lake Groups.

The prominent ovoid anomaly, which lies beneath Vigrass Lake, is designated subdomain VI_A, and may reflect a syenodioritic or gabbroic intrusive. A series of moderate magnetic sources aligned along the southern boundary of domain VI is designated subdomain VI_B; volcanic flows are a plausible geologic source for these anomalies.

Domain VI is inferred to be bounded to the north and south by faults which separate it from domain V to the north and VII to the south. Transverse faults, offsetting local magnetic anomalies, are also interpreted in this domain. An obliquely trending west-northwest fault may separate subdomain VI_A from the main portion of domain VI to the south. Several of the persistent faults interpreted from the magnetic data are seen to have correlating MaxMin responses; in particular, MaxMin zones 1 and 2 within Vigrass Lake correlate with fault zones identified from the magnetic data, thereby increasing confidence in the validity of this interpretation. These conductors are discussed further in the following section on the MaxMin results.

Imparting additional interest to domain VI are the sheared and altered rocks encountered in DH 88-8 on the south shore of Vigrass Lake.

An essentially non-magnetic region indicated in the extreme western portion of the survey, centered on baseline 10000N may be a western extension of domain VI, or possibly a re-appearance of Timiskaming lithologies similar to those in non-magnetic domain IV to the east-northeast, or, less likely, a western continuation of domain V. Accordingly, this partially defined sector has been designated separately as **domain IV/VI** to indicate its uncertain correlation.

Domain VII designates an irregular, very weakly magnetic band trending generally east-west across the survey area and centered on tieline 9200N. The domain contains a few, scattered, minor magnetic sources, suggesting dominantly sedimentary lithologies belonging to the Larder Lake Group. Persistent strike faults are inferred to bound domain VII, separating it from domains VI to the north and VIII to the south.

Domain VII has been divided into a northern subdomain VII_A and a southern subdomain VII_B on the basis of the concentration of EM conductors in the northern subdomain. This distribution of EM conductors supports a predominantly sedimentary environment, particularly for subdomain VII_A. An additional persistent strike fault is inferred to separate these two subdomains.

Domain VIII, located in the southernmost portion of the area surveyed, contains numerous moderate to strong magnetic sources. These sources display no strongly defined trend, but have an average northwest alignment. A mixed assemblage of volcanics and mafic intrusives is suggested for this domain. An small inclusion of sediments is indicated to the east by a restricted non-magnetic region which also contains parallel EM conductors (zone 16).

Comparison of the ground magnetic features with those displayed by public and proprietary aeromagnetic surveys provokes a number of useful insights. In particular, it is noted that:

1) Domain I is part of a major magnetic feature which can be traced across most of the Kirkland Lake camp;

2) On a district basis east-northeast trending faults are more persistent and important, although within this sector SW of Swastika east-west faults predominate;

3) The interpreted fault bounding domain I to the south parallels the major Larder Lake Fault to the north;

4) The important SW-trending Amicougami Fault passes just to the east of the property;

5) Ground magnetic surveys are required for full resolution of the complex, multiple, shallow sources and structural regime.

4.1 MaxMin Results

The results of the MaxMin HLEM survey over portions of the Vigrass Lake property revealed a cluster of conductive responses concentrated in the southern sector between 9200N and 10000N, largely within the Larder Lake Group. This distributions corresponds reasonably well with the INPUT anomalies recorded by the OGS survey.

Most of the MaxMin conductors detected are classified as possible, probable or definite bedrock sources. Weak, predominantly quadrature responses are also present though less numerous, and display no particular concentration.

All EM conductive sources are shallow (in view of the 50m coil spacing employed), with depths less than 15m, and are sub-vertical to steeply dipping.

The significant conductive features have been designated zones 1 through 15, and are discussed briefly below.

Zone 1, located along the northern shore of Vigrass Lake, consists primarily of weak, dominantly quadrature anomalies interpreted to reflect conductive overburden. A persistent fault or shear zone is inferred from the magnetic data; consequently zone 1 may indirectly define the locus of this fault, which may represent a favourable environment for structurally controlled gold deposition. Rio reportedly drilled one hole on or near this feature.

Zone 2, located south of zone 1, extends east-southeast through Vigrass Lake from 10400E to 11000E. Judged a possible bedrock source, it is defined by dominantly quadrature anomalies at the higher frequencies. The conductor corresponds closely to a prominent fault or shear zone identified from the magnetic data. No prior drilling is reported for this interesting target.

Zone 3 consists of a weak but possible bedrock feature detected on line 10400E near 9500N, with a possible extension to the west. The conductor lies just to the north of a weak magnetic source within domain VI_B, implying a pyritic or graphitic source.

Zone 4, located to the southeast of zone 3, also consists of a weak, suspect response, in this case on line 10600E near 9450N. Its location on the north flank of a strong magnetic anomaly within subdomain VI_B suggests a geologic source similar to zone 3 to the west.

Zone 5 consists of a moderate EM response of probable bedrock origin detected on line 10900E near 9400N. It is located beyond the northern edge of a constituent magnetic anomaly within domain VI_B.

Zone 6 consists of isolated, weak but possible bedrock sources detected on lines 10600E and 10800E near 9350N,

located approximately 70m south of zone 5. Discrete pyritic lenses are a possible geologic source. The proximity of an interpreted strike fault imparts additional interest in these weak features.

Zone 7 is defined by anomalies of probable to definite bedrock origin detected on line 9800E to 10000E near 9350N in the southwestern sector of the area surveyed. A moderately steep dip to the south is indicated on several lines. Zone 7 lies within subdomain VII_A and has no local magnetic association, pointing to graphite as the likely source.

Zones 8 and 9, located immediately south of zone 7, are discrete conductors indicated by weak responses of possible bedrock origin detected on lines 9900E and 10000E. Neither zone has any magnetic association, suggesting graphite as the probable geologic source.

Zone 10, located several hundred metres to the west of zones 7,8 and 9, is a definite bedrock conductor detected on lines 9600E and 9700E, with a likely extension further to the west beyond the sector presently surveyed with MaxMin. The conductor is narrow and shows evidence for a dip to the south. Located with subdomain VII_A, it has no appreciable magnetic association, again suggesting a graphitic source.

Zone 11 consists of strong responses of probable to definite bedrock origin. Detected on lines 10100E through 10400E near 9400N, the non-magnetic zone 11 is located in the northern portion of subdomain VII_A and hence is probably a graphitic horizon.

Zone 12, located to the southeast of zone 11, is a strong conductor of probable to definite bedrock origin detected on lines 10300E through 10600E near 9250N.

In detail, the continuity of the zone 12 is subject to some uncertainty. The conductor apparently strikes east-west on lines 10300E and 10400E, changing to southeast further to the east, reflecting either folding or displacement by transverse faulting. An initial drill hole (VA90-1) drilled in March intersected altered, carbonated and silicified basalts and graphitic sediments, containing disseminated pyrite and (locally) fuchsite, sericite and quartz veining, with low gold values and minor sphalerite.

Zone 13 consists of weak anomalies of possible bedrock origin on lines 10600E and 10700E, immediately to the east-northeast of zone 12. Although a possible weak extension of zone 12, zone 13 is judged a separate source, probably graphitic if valid.

Zone 14 is a definite, narrow bedrock source detected solely on line 10700E near 9240N. Its non-magnetic character (within subdomain VII_A) suggests a probable graphitic origin.

Zone 15 is a definite bedrock source detected solely on line 11000E near 9250N. It appears to be spatially coincident with a distinct negative magnetic anomaly located within subdomain VII_A, and hence may be a restricted lens of pyrrhotite with reverse magnetization.

Zone 16 consists of two parallel conductors detected in the extreme southeastern portion of the area surveyed with MaxMin on lines 11100E and 11200E near 8500N. Both conductors are judged to be of probable bedrock origin, and occur within a limited non-magnetic subarea within domain VIII. Hence a band of sediments containing several graphitic horizons is inferred as the likely source. This band and its enclosed conductors are indicated by airborne data to extend considerably further to the east beyond the present ground survey limits.

An additional very weak, suspect conductor occurs near 8770N, 10900E. A drill hole (VA90-2), sited only partially on geophysical considerations, intersected sheared and weakly altered komatiites and basalts, indicating that the conductor is caused by overburden.

The above conductors, particularly those not previously drilled or with anomalous gold values indicated by prior drilling, hold obvious interest as targets for gold mineralization associated with graphitic sediments (e.g., Hoyle Pond, Golden Pond) or with sulphides (e.g., Detour River, Golden Knight), whether of syngenetic origin or introduced post-lthification due to subsequent shearing or deformation.

5.0 CONCLUSIONS

Based on the preceding results and interpretation, it is concluded that the magnetic and HLEM surveys on the Vigrass Lake property have provided significant information pertinent to the exploration of this property for gold deposits in that:

1) Eight specific lithomagnetic units have been identified, providing a means of extrapolating from scattered outcrop; in particular, six subunits within the Timiskaming Group are defined;

2) The structural regime is dominated by a network of faults and/or shear zones trending east-west to east-northeast, comparable to those recognized as important in controlling known gold mineralization;

3) Potentially interesting faults additional to those previously known are inferred within the Timiskaming Group in the northern portion of the property;

3) Undrilled conductive horizons fully resolved by the detailed MaxMin survey offer potential for graphite- or sulphide-hosted gold mineralization within the Larder Lake Group in the southern part of the claims;

4) Detailed lithologic and structural features have been resolved by the ground surveys beyond that achievable by detailed airborne surveys alone; conversely, trends and features of district-wide significance are discernible in the broader perspective provided by airborne data.

6.0 RECOMMENDATIONS

Based on the above discussion and conclusions, it is recommended that additional exploration be undertaken on the Vigrass Lake property and environs to establish the geological validity of the presently interpreted features. and their potential significance in terms of gold mineralization and its attendant alteration.

In particular, it is recommended that:

1) The inferred faults within the Timiskaming be carefully evaluated in terms of past geological information, and, in the absence of negative data, mapping and trenching undertaken as appropriate;

2) Undrilled conductors be scrutinized as to favourability, and pursued with trenching or drilling as appropriate;

3) IP/resistivity surveys be considered if disseminated sulphide zones with encouraging gold values are encountered;

4) The present interpretation be reviewed and updated in the light of new information or prospects.

Respectfully submitted,

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Senior Geophysical Consultant

MINISTRY OF NORTHERN DEVELOPMENT AND MINES

JAN 1 1 1992

STRATAGEX

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RES. GEOLOGIST
KIRKLAND LAKE

JAN 1 4 1992

ANNEX "H-22"

ASSESSMENT REPORT, EBY NW & SE GROUPS, (DOUGLAS ROBINSON)

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A. INTRODUCTION

Line cutting, detailed geological mapping, whole rock and Au analysis of selected character samples, magnetic total field-gradient surveying and MaxMin surveying were conducted on two claim groups in Eby Township: the NW Group and the SE Group (D. Robinson properties). This work was partially funded by OPAP grant OP94-389.

B. PROPERTY

NW Group (D. Robinson Property)

This property consists of the following two claims in Eby Township (Plan # M-345).

1186974 - SE 1/4 of S 1/2 of Lot 2, Conc VI, Eby Tp (1 unit)
1186975 - W 1/2 of S 1/2 of Lot 2, Conc VI, Eby Tp (2 units)

The NW Group is centred at Latitude 48°05'30" and Longitude 80°10'00" (UTM Zone: 5326500N, 562500E). The bulk of the proposed work is concentrated on claim 1186975, 700 m south of Highway 66, 10 km west of Kirkland Lake (Figure 2).

SE Group (D. Robinson Property)

This property consists of the following three claims in Eby Township (Plan # M-345).

1186976 - NW 1/4 of S 1/2 Lot 2 Conc V, Eby Tp
NE 1/4 of S 1/2 Lot 3 Conc V, Eby Tp (2 units)
1200893 - S 1/2 of S 1/2 Lot 2 Conc V, Eby Tp (2 units)
1200894 - N 1/2 of N 1/2 Lot 2 Conc IV, Eby Tp (2 units)

The South Claim group is centred at Latitude 48°05'00" and Longitude 80°09'40" (UTM Zone: 5325000N, 562000E) on Highway 11 at a point 2.5 km south of the intersection of Highways 11 and 66 (Figure 2).

C. LOCATION

The property locations are outlined in Figure 1. General Location of Claim Groups (NTS Map Sheet 42 A/1) and Figure 2. Claim Map: Eby Tp.

NW Group (D. Robinson Property)
The NW Group is centred at Latitude 48°05'30" and Longitude 80°10'00" (UTM Zone: 5326500N, 562500E) at a point 700 m South of Highway 66, 10 km west of Kirkland Lake (Figure 2a).

SE Group (D. Robinson Property)
The SE Group is centred at Latitude 48°05'00" and Longitude 80°09'40" (UTM Zone: 5325000N, 562000E) on Highway 11 at a point 2.5 km south of the intersection of Highways 11 and 66 (Figure 2a).

D. ACCESS

NW Group (D. Robinson Property)
The North Claim Group is best accessed from Highway 66 at a point 2.3 km east of the intersection of Highways 11 and 66. At this point park at the access road leading north from Highway 66 and walk 400 m at Azimuth 180° to the #1 Post of claim 1186975.

SE Group (D. Robinson Property)
The South group is best accessed from Highway 11 at a point 2.5 km south of the intersection of Highways 11 and 66. At this point, park at the Ontario Hydro transformer station. The entire claim group is easily accessed from this point at the south edge of Claim 1186976. Highway 11 cuts all three claims of the south group.

E. SURVEY DATES AND SUPERVISION

The EM and Magnetometer surveys and line cutting were supervised by the author. All geological mapping was performed by the author. Work dates are recorded on the enclosed invoices and work logs.

F. DEPOSIT TYPE AND GEOLOGY

Gold is the primary exploration target; however potential exists for platinum or nickel-copper-platinum deposits hosted in coarse grained differentiated gabbro-diorite intrusives.

NW Group

The NW group is located on the north cental part of an east-west trending 3 X 1.5 km body of mafic rock previously mapped as intrusive gabbro and diorite (Map P.448). 1994 mapping of these groups by the author confirmed this unit and defined sub-units consisting of dark green diorite, pale coloured feldspathic rocks mapped as anorthosite and coarse grained hornblendite. These formations appear to have crosscutting relationships and are locally intercalated as alternating bands which is consistent with intrusive rocks.

Fine grained Mg-tholeiitic flows are prominent in the west north west portion of the NW group.

A chloritic unit of uncertain origin was mapped between the gabbro-diorite intrusive and the Mg-tholeiitic flows. This unit is characterized by quartz grains in a dark green chloritic matrix. The quartz grains, comprising 1-5% of the rock, range from barely visible to several mm. Locally this quartz appears to be angular interstitial grains that survived chloritization of the gabbro-diorite. Locally, rocks within the chlorite unit have tuff-sediment textures. It is the opinion of the author that the chloritic unit is altered rock of intrusive, volcanic

and tuffaceous origin where alteration has destroyed most primary textures. This chloritic unit appears to host the strong EM conductors located in this exploration area.

In the NW Group approximately 30 scattered outcrops of moderate to intense Fe-carbonate alteration were located and hand stripped. 13 samples were analyzed for Au, giving anomalous values to 103 ppb Au.

In 1995, after the completion of mapping, a strongly altered syenite outcrop was identified at the 0+00N base line near line 26+00E.

SE Group (D. Robinson property)

The majority of the SE group is a sequence of steeply dipping Fe-tholeiitic volcanics and associated sediments. These volcanics consist of massive to banded dark rocks with hornfels developed to the south towards the Otto stock. Banding, locally prominent in the southern portion of the grid, appears to be in part epidote alteration that has been sheared.

The northern portion of the grid consists of Mg tholeiitic volcanics.

The southern two units were staked on a bull's eye anomaly, indicating potential for kimberlite. Sufficient outcrop was examined to indicate this anomaly is not kimberlite related. A narrow lamprophyre dike was noted along Highway 11 at 020S. This is similar to narrow lamprophyre dikes observed at 3160E-300S on the NW grid.

In the SE group approximately 14 scattered outcrops of moderate to intense Fe-carbonate alteration were located and hand stripped.

Alteration Zones NW and SE Groups

Two strong trends of Fe-carbonate alteration zones were identified on the NW group. A 075-085 trend in part associated with strong breaks and locally having strong to weak conductors is parallel to the Kirkland Lake Main Break and Larder Lake Breaks that host gold deposits within the Kirkland Lake-Larder Lake mining camp. A second strong trend 100°-140° is associated with a series of linear depressions crossing the property and the area to the east. The cross trend is observed in outcrops only at the edges of narrow ravines.

Two strong alteration zones were identified in the north half of the SE Group. Strong Fe-carbonate alteration was identified west of and along the north and south edges of the swamp south of the transformer station. West of Highway 11 this zone has prominent pyrite mineralization. Also a broad zone of intense Fe-carbonate alteration and stockwork quartz veining was identified north of the power lines. These two zones appear to have an east northeast trend.

G. SUMMARY OF PREVIOUS WORK

NW Group (D. Robinson Property)

No prospecting work other than work done by James Reed is recorded in MNDM assessment files. The only evidence of older work is two trenches located at 2538E-048N and 2642E-025S and a pit at 2460E-301N. The two trenches exposed fault zones within intense Fe-carbonate zones having anomalous Au vales. The pit tested an area of quartz veining in talus.

Mr. Reed mapped, power stripped overburden, conducted magnetic and VLF surveys of these claims. This work was conducted on north-south grid lines spaced at 400 foot centres and both magnetic and VLF readings were taken at 100 foot intervals.

SE Group (D. Robinson Property)

The bulk of work performed on the South Group was conducted during the 1980's by James Reed (Reference: Kirkland Lake Assessment file KL-2349) and Butte Canyon Resources Inc (Reference: Kirkland Lake Assessment file KL-0309). The split control of the ground at the time of the surveys resulted in this 6 claim unit group being divided into three separate surveys:

1. the north-west grid of Butte Canyon Resources (1 unit), north south lines on a 100 metre line spacing.
2. the central grid of James Reed (3 units), north-south lines on a 400 foot spacing.
3. the south grid of Butte Canyon Resources (2 units), azimuth 315° lines on a 100 metre spacing.

Butte Canyon Resources conducted geological mapping, litho-geochemical sampling, magnetometer, VLF and Horizontal Loop EM surveys. A 25 metres reading spacing was used for these geophysical surveys. James Reed also conducted geological mapping, magnetometer and VLF surveys using a 100 foot reading spacing. These three surveys established the general trends of

the ground geophysics, however these surveys are not sufficiently detailed to define the subtle responses related to narrow carbonate zones hosting gold deposits. Also the southern survey by Butte Canyon Resources was conducted parallel to the target anomaly inferred to be an intrusive formation, possibly a kimberlite.

James Reed drilled three diamond drill holes:

1. 80-2 (102 feet) drilled east from the east boundary of claim 1100894.
2. 84-8 (115 feet) drilled on claim 1100893 at the east edge of a swamp east of Highway 11.
3. 84-9 (103 feet) drilled on claim 1100893 west of Highway 11 and north of the magnetic low anomaly

These three holes were directed at EM conductors and intersected graphite. EM conductors in themselves are not the primary targets of the exploration project area.

Fernand Rivard conducted surface exploration including trenching and diamond drilling two to three claim lengths to the south of this group (Kirkland Lake Resident Geologist's assessment file KL-2391).

A map in the assessment files at the Kirkland Lake Resident Geologist's office indicates Sylvanite Gold Mines Ltd. exposed two shear zones on claim 1100894. These were 10-20 feet wide and 5 feet wide with the wider zone having gold values of 0.64 oz Au/ton over 5 feet (0.80 oz Au/ton over 3.0 feet). This zone may be located in a pit located at 3130E-285S.

H. SUMMARY 1994 WORK

NW Group (D. Robinson Property)

1994 exploration work, included line cutting, geological mapping, a MaxMin EM survey and a magnetic total field-magnetic gradient survey. Detailed mapping and hand stripping with emphasis on alteration and structural lineaments were conducted by the author. A total field-vertical gradient magnetic survey and a MaxMin EM survey were supervised by the author. Character samples of alteration zones and mineralization were collected.

SE Group (D. Robinson Property)

1994 exploration included line cutting, geological mapping and a magnetic total field-magnetic gradient survey. Character samples of alteration zones and mineralization were collected.

I. LINE CUTTING

Separate grids were cut on the NW and SE Groups. The departure of the SE grid (easting) was established to correspond with the NE grid. All grid latitudes and departures were established relative to true north.

A total of 18.538 km (8.983 km SE Group) (9.555 km NW group) were cut by Douglas Robinson (applicant), Graham Robinson, David Robinson and Shaney Hill. Both grids were cut with a line spacing of 50 m and a 25 m station interval. All grid lines were cut north and south of the base line on the NW grid. The majority of grid lines of the SE grid were also cut north south with the exception of the south-east corner where east-west lines were established at 100 meter centres. This rotation of the grid was established to trace a known magnetic anomaly that crosscuts the regional stratigraphic trend.

J. MaxMin HORIZONTAL LOOP EM SURVEY

A total of 9.555 km of Maxmin EM surveying on the NW grid (D. Robinson Property) was directed to locating the surface trace and character of conductive formations (See tables below).

Three frequencies were measured using a 100 m coil separation with readings at a 25 m interval. Three frequencies on each line to establish the signature of the conductors. A fourth frequency (110 hz) was used on five lines but was abandoned as it did not add significantly to the data. Lines 26+00 and 27+00 were also surveyed using a 200 m coil separation. Terrain corrections were performed by recording a running average slope of the four station intervals between the coils. The average slope was used to maintain the coils coplanar.

Data was plotted on standard profile plots recording IP and OP curves for each frequency and terrain profile on separate graphs on a common sheet. Data for each line was plotted on a separate sheet. This presentation was used to accommodate multi-frequency data from variable coil separations and to accommodate reproduction on standard xerox machines.

TABLE OF TRAVERSE LINES: NW GRID (D. ROBINSON PROPERTY)

LINE	COIL SEPARATION (m)	TRAVERSE LENGTH (m)	TOPOGRAPHY MEASURED (m)	FREQUENCY MEASURED
24+00	100	900	900	(440,880,7040 Hz)
24+50	100	775	0	(110,440,1760,7040 Hz)
25+00	100	750	750	(440,1760 7040 Hz)
25+50	100	750	750	(110,440,1760,7040 Hz)
26+00	200	800	800	(440,880,3520 Hz)
26+00	100	625	625	(110,440,1760,14080,Hz)
26+50	100	850	850	(110,440,1760,7040 Hz)
27+00	200	900	900	(440,880,3520 Hz)
27-50	100	875	875	(110,440,1760,3520 Hz)
28+00	100	375	375	(440,880,3520 Hz)
TOTAL		7600	6825	

K. ANOMALIES

Ground EM consisting of MaxMin EM surveys were directed to locating the surface trace and character of conductive formations within the grid area. The following anomalies were identified:

LIST OF ANOMALIES: NW GROUP (D. ROBINSON PROPERTY)

Anomaly K	
K24	035N
K24.5	043N
K26	075N
K26.5	087N
K27	108N
K27.5	123N
K28	100N
Anomaly L	
K24	085S
K24.5	080S
K24	065S
K26	087S
Anomaly M	
K24	235N
K25.5	250N
K25	246N

Conductors K26, K26.5, K27, K 27.5 K27.5 K28 and L24 appear to result from bedrock sources containing sulphides and/or graphite. Conductors K24, L24.5, L25, L26, M24, M24.5 and M25 appear to result from bedrock shearing and/or mineralization that marks the lateral extensions of strong conductors.

Anomaly K26.5-K28 occurs at the south edge of a broad mag low having low magnetic relief. This MaxMin anomaly and the associated mag low appear to be truncated by a mineralized fault observed at 2538E-049N. Anomaly K26 appears to have detected the conductive zone at considerable depth. Anomaly K24 and K24.5 appear to have detected the west projection of the fault

observed at 2538E-049n and the associated Fe-carbonate alteration. The fault and Maxmin anomaly may diverge at line 2600E with the anomaly being north of the fault. The fault, Fe-carbonate alteration and the bedrock source of the EM response reflect a broad gold target over a 400 m strike length.

Anomaly L24.5 and L25 have weak quadrature responses that appear to reflect the westward projection of the strong fault and associated Fe-carbonate alteration at 2643E-025S. These responses are also on line with the strong bedrock response L24. Response L24 could reflect a concentration of mineralization along this fault. Alternatively, a strong bedrock conductor could be faulted off between lines 2400E and 2450E. A parallel mag low 20 metre north of these EM responses could reflect a zone of intense Fe-carbonate alteration. The fault, Fe-carbonate alteration, EM responses and associated mag low are a 300 meter long gold target.

Anomaly M is directly east of an airborne EM response to the west on ground held by J. Reed. This anomaly is also in a broad area having low magnetic relief. This low magnetic relief could reflect gold related alteration.

L. MAGNETIC SURVEY

A rented Scintrex ENVI-MAG was used for blanket coverage of all lines of the NW and SE grids. This instrument was selected because of its ability to give a high density of readings suitable for profiling. This procedure was selected to detect short wavelength and low amplitude negative magnetic anomalies associated with magnetite destruction related to carbonate alteration of magnetite and ferro-magnesium minerals. This style of destructive alteration was observed by the author on ground held by Arnold Allsopp. Here; half a kilometre to the southeast pervasive Fe-carbonate alteration crosscuts magnetite iron formation and hosting volcanics. The magnetite is totally replaced by Fe-carbonate.

Both total magnetic field and magnetic gradient were measured. The magnetic gradient is a useful tool to define a precise surface trace of total field anomalies. It also defines the relative depth of the source anomalies as magnetic gradient responds strongly to near surface features.

Geosoft programming has been rented to plot profiles of the data, however hardware problems with my computer prevented use of this programming. The data was alteratively plotted using Lotus 123.

The magnetic surveys established the Maxmin responses occurred in areas having low magnetic total fields with many responses being at the edge between magnetic lows and magnetic highs. The lack of positive magnetic signatures indicate the EM responses lack significant magnetite and pyrrhotite. This indicates the strong bedrock EM responses are the result of pyrite and/or graphite mineralization. The magnetic lows associated with EM responses could be related to destructive alteration that represents gold targets. The trends of magnetic lows appear to be at low angle to the EM responses indicating priority areas within EM responses can be identified using the magnetic survey. It is possible only portions of the EM sources have been subjected to alteration that could host gold.

Magnetic lows due to alteration that lack EM responses are prime gold targets as well.

The use of magnetic signatures is a valuable tool in projecting known alteration zones and prioritizing advanced exploration targets, but the absence of an identifiable response should not exclude a target from exploration. Incomplete alteration, narrow target zones, zones having post ore diking and magnetic till can mask identifiable responses.

M. RECOMMENDATIONS

The 50 metre spaced grids should be extended to cover the remainder of the property. The MaxMin and magnetic surveys and mapping should be extended over this expanded grid. Humus geochemical program should be conducted to locate areas that host gold mineralization. Samples should be collected at 100 m intervals along all lines with sample densities increased to 25 m in alteration areas, near conductors and on the projection of known faults. Also character samples of each altered outcrop area should be sampled for gold.

Follow up power stripping by backhoe excavator should be utilized to extend alteration zones along strike and expose the full width of alteration zones which are commonly centred in depressions with alteration exposed only at the base of slopes on either side. OP EM conductors lacking IP responses should also be power stripped to determine their source.

Diamond drilling should be employed to test the best geological and geochemical targets with emphasis on those zones having best Au values. The intersection of alteration and mineralized zones with EM conductors are also a preferred drill target. All drill casings should be left in the holes as the close proximity of numerous zones make it viable to extend holes to test additional zones. The conductors represent only a portion of the targets as gold bearing alteration zones and quartz veins are poor conductors.

The following table lists potential drill holes.

Collar Coordinates	Length	Azimuth	Dip	Target
2700E-160N	125m	180°	45°	Conductor K, extension of major fault and alteration, and area of flat mag, possible extension.
2700E-065S	50m	180°	45°	Area of talus (intense alteration) south of lineament, possible extension.
2700E-065S	200m	0°	45°	projection of major fault and associated alteration, possible extension.
2550E-095N	100m	180°	45°	major fault and associated alteration and gold values, possible extension.
2500E-105S	100m	0°	45°	Conductor L, extension of major fault and alteration zone and extension of alteration zone from south-east, possible extension.
2475E-065N	60m	180°	45°	Projection of fault and alteration, possible extension.
2650E-358N	75m	180°	45°	Quartz vein, alteration and possible magnetic anomaly, possible extension.
2500E-285N	120m	180°	45°	Conductor M and projection of quartz vein, possible extension.

N. LIST OF HOLDER and CO-HOLDERS

SE and NW Groups (D. Robinson)
Douglas R. Robinson
Box 218
Swastika, Ontario
P0K 1T0

O. LIST OF REFERENCES

EBY TOWNSHIP

Cooke, H. C.
1922: MEMOIR 131 - Canada Department of Mines; Kenogami, Round, and Larder Lake Areas, Timiskaming District, Ontario.

Lovell, H. L.
1972: Geological Report 99 - Ontario Department of Mines Preliminary Geology of the Eby and Otto Area, District of Temiskaming

Thomson, J. E.
1948: Geology of Teck Township and the Kenogami Lake Area, Kirkland Lake Gold Belt, Ontario Department of Mines Annual Report for 1948, Volume 57, Part 5, 196p.

Map 1946-1 - Kenogami Lake Area; parts of Grenfell and Eby Townships

Map P. 448 - Ontario Department of Mines Preliminary Geological Map No. P. 448; Eby Township.
Scale 1 inch = 1/2 mile

Map P. 903 - Preliminary Map P.903; Kirkland Lake Data Series; Eby Township.
Scale 1 : 15 840

Map P. 2268 - Ontario Geological Survey Preliminary Map P.2268 Kirkland Lake Area; Eby Township; Airborne Electromagnetic Survey.

Map P. 2268 - Ontario Geological Survey Preliminary Map P.2268; Kirkland Lake Area; Eby Township; Airborne Electromagnetic Survey; Total Field Magnetic Survey.
Scale 1 : 20 000

CERTIFICATE

I, Douglas Robinson, of 24 Victoria Avenue Swastika, Ontario, hereby certify that:

1. I am a registered professional Engineer of Ontario engaged in my profession for approximately 19 years.

2. I am a graduate of Queen's University in Kingston Ontario with an Honours Bachelor of Science degree in Geological Engineering and
Northern College, School of Mines in Haileybury, Ontario with a Mining Technician Certificate.

3. I personally supervised the EM and magnetometer surveys claimed in this report.

4. I personally conducted all mapping and sampling claimed in this report.

5. I authored this report.

6. My knowledge exploration procedures was acquired through 20 years employment in the mining industry.

7. My knowledge of the properties was acquired by personally mapping the property and reviewing MNDM assessment reports.

Douglas Robinson, P. Eng
January 2, 1996.

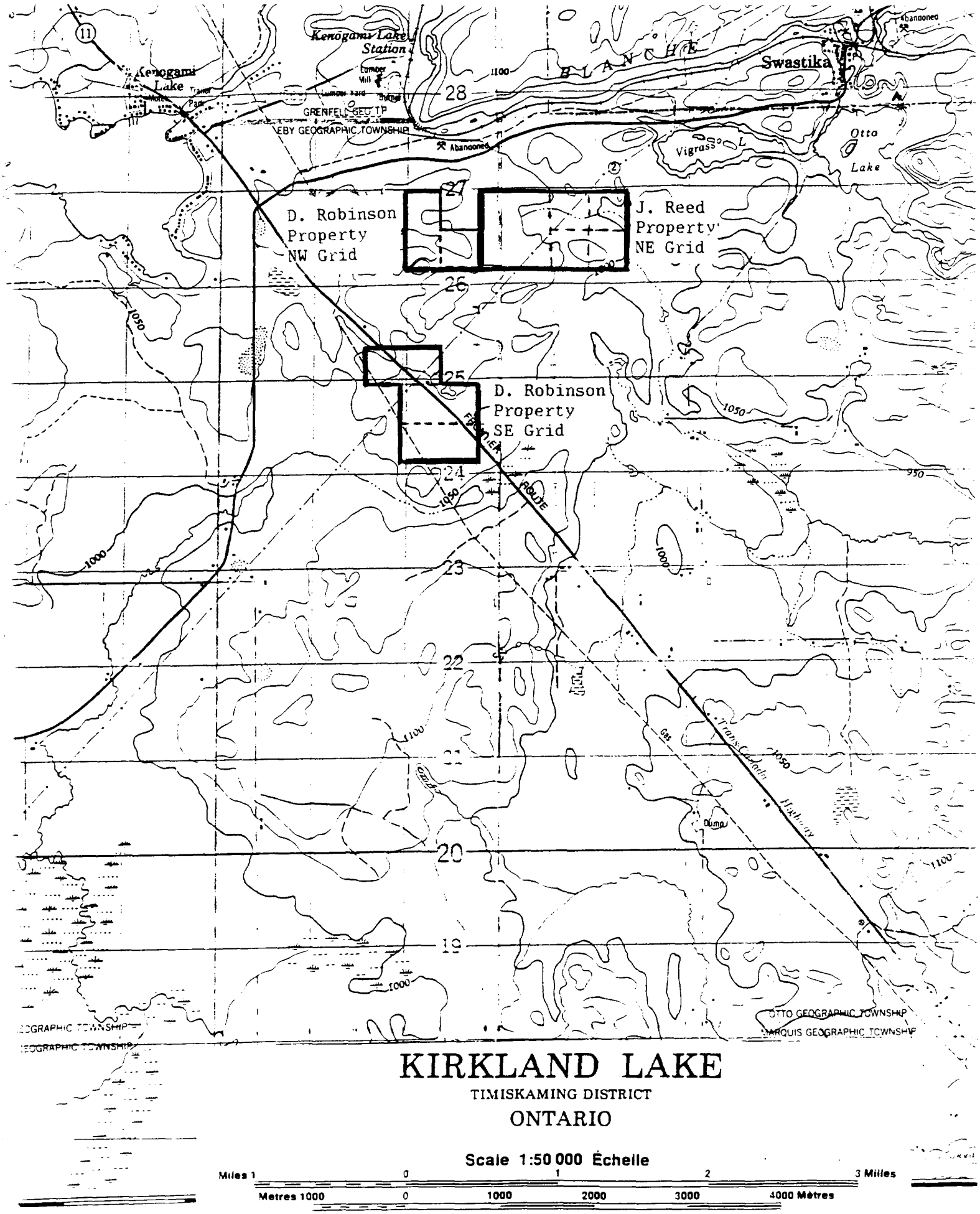


Figure 1. General Location of Claim Groups

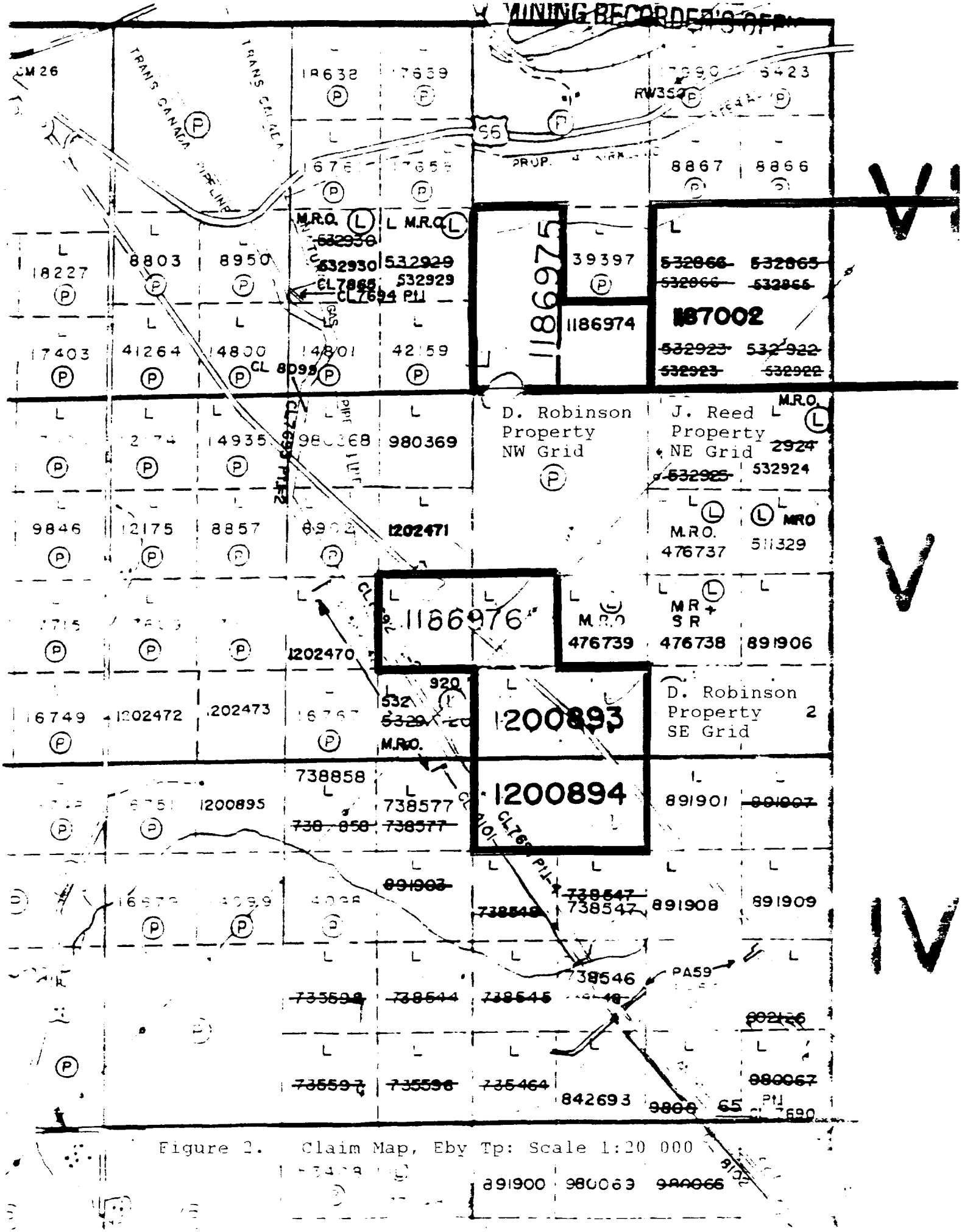


Figure 2. Claim Map, Eby Tp: Scale 1:20 000

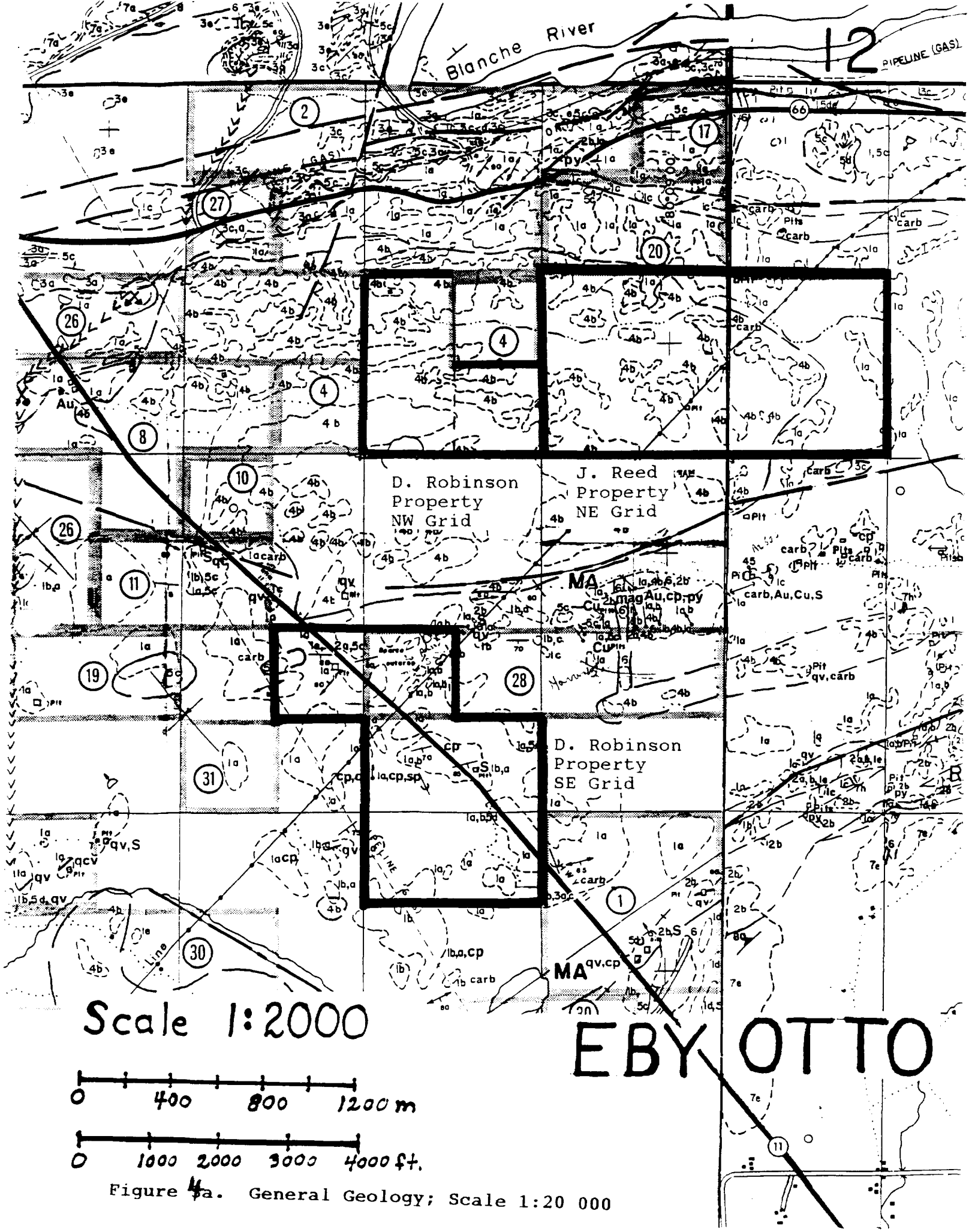


Figure 4a. General Geology; Scale 1:20 000

Map P. 448 - Ontario Department of Mines Preliminary Geological Map No. P. 448; Eby Township.
Scale 1 inch = 1/2 mile

LEGEND

PRECAMBRIAN

PROTEROZOIC

8 MAFIC INTRUSIVE ROCKS

HURONIAN

COBALT GROUP

7 GOWGANDA FORMATION

ARCHEAN

MAFIC INTRUSIVE ROCKS

6 Diabase

FELSIC INTRUSIVE ROCKS (ALGOMAN)

5c Syenite and Syenite Porphyry

5d Mafic syenite, lamprophyre, and hybrid syenite and country rocks

MAFIC AND ULTRAMAFIC INTRUSIVE ROCKS (HAILEYBURIAN, EARLY ALGOMAN, AND SOME KEEWATIN)

4b Gabbro and Diorite

METASEDIMENTS (TIMISKAMING OR KEEWATIN)

3

FELSIC VOLCANIC ROCKS (KEEWATIN)

2a Rhyolite and dacite

MAFIC VOLCANIC ROCKS (KEEWATIN)

1a Basalt and andesite (pillowed and massive)

1b Mafic agglomerate and tuff

Figure 4b. General Geology; Legend

Reference Map
Including GEOLOGY
EBY SOUTH-EAST GROUP (D. Robinson)
Scale 1 : 5000

0 100 200 300 400m

..... x A – Fe Carbonate Alteration
Q – Quartz Vein

7 Chlorite Alteration
6 Diorite
5 Hornblendite
4 Anorthosite
3 Fe Tholeiite
2 Mg Tholeiite
1 Komatiite

N

Lot 3
Lot 2

1202471

1202470

1186976

HIGHWAY 11

POWER LINES

PIPELINE

PIPELINES

532920
(J. Reed)

545992
(J. Reed)

25+00 E
26+00 E
27+00 E
29+00 E
30+00 E

7+00 N
4+00N
3+00 N
2+00N
1+00 N
0+00 BL
1+00 S
2+00 N
0+00 N
1+00 S
2+00 S
3+00 S

1200893

1200894

Conc V
Conc IV

S.Line

Jan.1, 1995
Supervision, Douglas Robinson

Figure 15

ANNEX "H-23"

1995 OPAP APPLICATION: DOUGLAS ROBINSON

A. PROJECT LOCATION 1

B. ACCESS 1

C. CLAIM LIST AND CLAIM MAP 2

D. SUMMARY OF PREVIOUS WORK 3

E. DEPOSIT TYPE AND GEOLOGY 4

F. TYPE and AMOUNT OF PROSPECTING-EXPLORATION WORK 5

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APPENDICES

Figure 1. General Location of Claim Group
Showing Major Breaks; 1:50 000

Figure 2. Claim Map; Scale 1:31680

Figure 3a. Geology from P.448; Scale 1:15840

Figure 3b. General Geology; Legend

Figure 4. Reference Map Eby West Grid

A. PROJECT LOCATION

This exploration property west of Kirkland Lake includes 15 claims consisting of 26 claim units. All claims are in the north west quarter of Sby Township (Plan # M-245) of the Larder Lake Mining Division. This area claim group is centred at Latitude 48°04'00" and Longitude 80°14'00" (UTM Zone: 531824N, 5740575E). The reader is referenced to the south-central portion of NTS Map Sheet 42 A/1 for the general location of these two groups (Figure 1). "Figure 2a. Claim Map", and "Figure 3. General Geology" provide additional information regarding location.

B. ACCESS

To access the property travel south 4.0 km along Highway 66 from the intersection with Highway 11. Turn left onto the West Road and proceed west. The best point of access is located 3.0 km west of highway 66. At this point an overgrown access road to the north is an excellent walking trail to the east end of the exploration area. A second overgrown and wet access road 4.5 west of Highway 66 gives access to the west end of the claim group.

C. CLAIM LIST AND CLAIM MAP

The property includes the following 20 claims comprising 34 claim units.

1205781 - NW 1/4 of N 1/2 of Lot 6, Conc IV, Eby Tp (1 unit)
1205782 - NE 1/4 of N 1/2 of Lot 7, Conc IV, Eby Tp (1 unit)
1205783 - NW 1/4 of N 1/2 of Lot 7, Conc IV, Eby Tp &
- NE 1/4 of N 1/2 of Lot 8, Conc IV, Eby Tp (2 unit)
1205784 - NE 1/4 of S 1/2 of Lot 8, Conc V, Eby Tp (1 unit)
1205787 - NW 1/4 of N 1/2 of Lot 8, Conc IV, Eby Tp (1 unit)
1205788 - NW 1/2 of N 1/2 of Lot 9, Conc IV, Eby Tp (2 unit)
1205789 - S 1/2 of S 1/2 of Lot 9, Conc V, Eby Tp (2 unit)
1205790 - N 1/2 of N 1/2 of Lot10, Conc IV, Eby Tp (2 unit)
1205791 - N 1/2 of N 1/2 of Lot11, Conc IV, Eby Tp (2 unit)
1205792 - S 1/2 of N 1/2 of Lot11, Conc IV, Eby Tp (2 unit)
1205793 S 1/2 of N 1/2 of Lot10, Conc IV, Eby Tp (2 unit)
1205794 - S 1/2 of N 1/2 of Lot 9, Conc IV, Eby Tp (2 unit)
1205795 - S 1/2 of N 1/2 of Lot 8, Conc IV, Eby Tp (2 unit)
1205796 - S 1/2 of N 1/2 of Lot 7, Conc IV, Eby Tp (2 unit)
1205797 - S 1/2 of Lot 6, Conc IV, Eby Tp (4 unit)
1205798 - S 1/4 of N 1/2 of Lot 6, Conc IV, Eby Tp (2 unit)
1205799 - NW 1/4 of S 1/2 of Lot 10, Conc IV, Eby Tp (1 unit)
1205800 - SW 1/4 of S 1/2 of Lot 10, Conc IV, Eby Tp (1 unit)
1202474 - NW 1/4 of S 1/2 of Lot 7, Conc IV, Eby Tp (1 unit)
1205798 - SW 1/4 of S 1/2 of Lot 7, Conc IV, Eby Tp (1 unit)

The work was performed on claims 1205783, 1205784, 1205787, 1205788, 1205789, 1205794, 1205795, 1205796, 1202474 and 1202479 (Figure 2a).

D. SUMMARY OF PREVIOUS WORK

Prior to 1985 very little assessment work was recorded on this property. A few test pits are present on the east end of the property. The only systematic work done on the property was done in 1985 by Mary Ellen Resources. Mary Ellen Resources cut a metric grid having a 100 m line spacing with pickets established at 25 m. VLF and magnetometer surveys at 25 m station intervals and geological mapping were performed. The bulk of the detailed work was performed on ground to the north along the known deformation zone cutting the south east bay of Kenogami Lake.

This property lay dormant from 1985 to 1995 at which time the author staked the ground when it came open for lack of assessment credits.

In 1979 MNDM conducted Airborne EM and magnetometer survey of Eby Township.

E. DEPOSIT TYPE AND GEOLOGY

Tholeiitic volcanics and interflow tuffs and metasediments are the dominant rock type within the claim group (MNDM map "Map 2239"). It was not possible to differentiate any significant mappable units within the volcanic flows, however numerous very fine to coarse tuff beds and locally pillows and flow tops indicate a consistent northwest strike. The volcanics range from very fine to 2 mm crystalline massive flows, with local flow texturing including a few pillowed flows. 0.5 cm quartz Boudins are common in some of the tuff beds indicating considerable shearing.

1994 mapping by the Author within Lots 1 and 2 of Concession IV of Eby Township indicate previously unknown major deformation zones exist 1.2 km and 2.9 km south of the Blanche River. These deformation zones are hosted in Fe carbonate-albite-sericite alteration zones parallel to the Larder Lake Break. The author staked 34 claim units in the Eby West Group to cover the west projection of the southern alteration zone which projects to the linear swamp along the north Concession IV line along the north edge of the grid. No outcrop was observed within the area of the expected alteration zone, however an EM survey indicates structures at low angles to the expected break. Several north northwest trending lineaments are marked by major swamps. Several possible northeast to east northeast lineaments are inferred from geological mapping and geophysics. These lineaments are considered to be possible exploration targets for alteration zones similar to those the author mapped south of the Blanche River.

F. TYPE and AMOUNT OF PROSPECTING-EXPLORATION WORK

A metric grid totalling 23.964 line km with line spacing of 100 m was cut to control detailed geological mapping hand stripping, a magnetometer survey and a MaxMin EM survey. Lines were cut by Douglas Robinson, David Robinson and Graham Robinson. All mapping was performed by the author. A 23.900 km Envimag magnetometer survey was performed by Douglas Robinson, David Robinson and Graham Robinson December 18-22, 1995. David Robinson and Graham Robinson performed 16.250 km of MaxMin survey July 28-Aug 3, 1995.

Line Cutting

14+00W		1189S	425N	1614
15+00W		400S	450N	850
16+00W		425S	825N	1250
17+00W		425S	825N	1500
18+00W		425S	825N	1250
19+00W		425S	825N	1250
20+00W		425S	825N	1250
21+00W		425S	450N	875
22+00W		425S	450N	875
23+00W		425S	450N	875
24+00W		450S	850N	1300
25+00W		450S	875N	1325
26+00W		450S	875N	1325
27+00W		475S	800N	1275
28+00W		475S	750N	1225
29+00W		000N	800N	800
4+00S	TL	1400W	2975W	1575
0+00N	BL	1400W	2900W	1500
4+00N	TL	1400W	2950W	1550
7+50N	BL	2400W	2900W	500
			Total	23964

Total field Scintrex Envimag magnetometer readings were automatically taken at one second intervals as the instrument man walked an even pace along the line. The instrument distributed readings evenly (by time) between picket intervals. A two man crew was used with the lead man tramping a trail to allow the instrument man to proceed unobstructed along the line at a constant pace. Magnetometer readings were plotted using Lotus 123.

Total Field Magnetic Survey

14+00W		1175S	375N	1550
15+00W		400S	450N	850
16+00W		450S	850N	1300
17+00W		450S	825N	1275
18+00W		450S	825N	1275
19+00W		450S	850N	1300
20+00W		450S	850N	1300
21+00W		450S	450N	900
22+00W		450S	500N	950
23+00W		450S	475N	925
24+00W		475S	875N	1350
25+00W		475S	875N	1350
26+00W		475S	875N	1350
27+00W		450S	800N	1250
28+00W		500S	825N	1325
29+00W		000N	825N	825
4+00S	TL	1400W	2975W	1575
0+00N	BL	1400W	2900W	1500
4+00N	TL	1400W	2950W	1550
7+50N	BL	2700	2900W	200
			Total	23900

The MaxMin survey was conducted using 444, 888, and 2355 hz and a 100 m coil separation. The field crew was trained by the Author. Approximately two work days were lost due to problems relating to an intermittent short and an intermittent break in the reference cable.

MaxMin EM

Line	From	To	Length (m)
14+00W	1175S	475N	1650
15+00W	475S	500N	975
16+00W	450S	875N	1325
17+00W	450S	875N	1325
18+00W	450S	875N	1325
19+00W	450S	875N	1325
20+00W	450S	875N	1325
21+00W	450S	500N	950
22+00W	475S	500N	975
23+00W	450S	475N	925
24+00W	475S	875N	1350
25+00W	500S	925N	1425
26+00W	450S	925N	1375
		Total	16250

G. ANOMALIES

1400W 345N OP, mag low
1500W 385N OP, smooth mag
1600W 175-100N OP, smooth mag low
1600W 417N OP, smooth mag
1600W 687N OP?
1700W 040S OP?
1700W 407N OP, smooth mag (deep overburden?)
1700W 725N OP (very weak), sharp mag high
1800W 420N OP
1900W 425N OP, flat mag low
2000W 300N OP, mod deep overburden indicated by mag
2000W 465N OP, mod deep overburden indicated by mag
2100W 125S-25N OP (very weak) mag indicates deep overburden
2100W 250N-325N OP, north flank of mag high
2200W 214S OP? south flank of mag high
2200W 025S OP? south flank of mag high
2200W 416N OP? mag high
2300W 215S OP? south flank of mag high
2400W 050S OP, centre of broad mag high
2400W 160N OP, sharp mag low
2400W 655N OP, flat mag
2400W 774N OP, mag low
2500W 050N OP? minor mag low
2500W 502N OP? south flank of mag high
2500W 616N OP, flat mag low
2500W 700N OP, flat mag low
2500W 786N OP, flat mag low
2600W 150S OP, flat mag on south flank of mag high
2600W 000S OP, mag low
2600W 410N OP, mag low
2600W 475N OP, mag low
2600W 560N OP? mag high

The area north of a line defined by 2900W-300N to 2400W-400N has flat low mag values that could reflect a major alteration zone. The occurrence of Out of Phase EM anomalies indicates the possible presence of strong structures within alteration zones.

H. ESTIMATE OF WORKING DAYS BY APPLICANT

See OPAP Final Submission Form 9b

I. ESTIMATE OF PROJECT BUDGET

See OPAP Final Submission Form

J. LIST OF CO-HOLDERS APPLYING FOR ASSISTANCE

This application for OPAP grant relates solely to ground held by the applicant only.

IV. DAILY REPORTS (Summarize work activity in section 1)

1995-6 WORK LOG FOR DOUGLAS ROBINSON

EBY WEST GRID

Date		Hours	Area	Work Performed
May	4	8	EWG	cut (Includes Turning Lines)
	5	8.5	EWG	cut
	6	9	EWG	cut
	8	9.5	EWG	cut
	9	7.75	EWG	cut
	12	8	EWG	cut
	13	11	EWG	cut
	15	4	EWG	cut
	19	11	EWG	cut
	20	12	EWG	cut
	22	6	EWG	map (Includes hand stripping & drafting)
Jun	09	10	EWG	map
	29	10	EWG	map
	30	10	EWG	map
Jul	10	10	Ebyw	map
	11	11	Ebyw	map
	12	11.5	Ebyw	map
	14	10	Ebyw	map
	15	8.5	Ebyw	map
	17	11	Ebyw	map
	18	10.5	Ebyw	map
	19	10.5	Ebyw	map
	21	11	Ebyw	map
	22	11	Ebyw	map
	24	10	Ebyw	map
	25	10	Ebyw	map
	26	11	Ebyw	map (+MaxMin Logistics)
	27	10	Ebyw	map
	28	12	Ebyw	EM
	29	12	Ebyw	EM
	30	12	Ebyw	map
	31	12	Ebyw	map
Aug	01	12	Ebyw	map
	02	12	Ebyw	map
	03	6	Ebyw	MaxMin logistics & EM draft 5
	04	6	Ebyw	map
Sept	30	11	Ebyw	EM drafting
Oct	02	10	Ebyw	Map
	03	9	Ebyw	Map
	04	11	Ebyw	Map
	05	10	Ebyw	Map
	06	9	Ebyw	Map
	09	11	Ebyw	Map
	14	09	Ebyw	map
	21	10	Ebyw	map
	22	7	Ebyw	Draft EM
	23	8	Ebyw	Draft EM
	28	6	Ebyw	Draft EM
Dec	18	12	Ebyw	Mag survey & data processing
	19	12	Ebyw	"
	20	12	Ebyw	"
	21	12	Ebyw	"
	22	10	Ebyw	"
	24	6	Ebyw	"
	26	12	Ebyw	report
Jan	04	10	Ebyw	report
	05	8	Ebyw	report
		559.75	hours/8	70 days

K. LIST OF REFERENCES: EBY TOWNSHIP

MEMOIR 131 - Canada Department of Mines
Kenogami, Round, and Larder Lake Areas, Timiskaming District, Ontario, By H. C. Cooke, 1922.

Geological Report 99 - Ontario Department of Mines Preliminary Geology of the Eby and Otto Area, District of Temiskaming By H. L. Lovell, 1972.

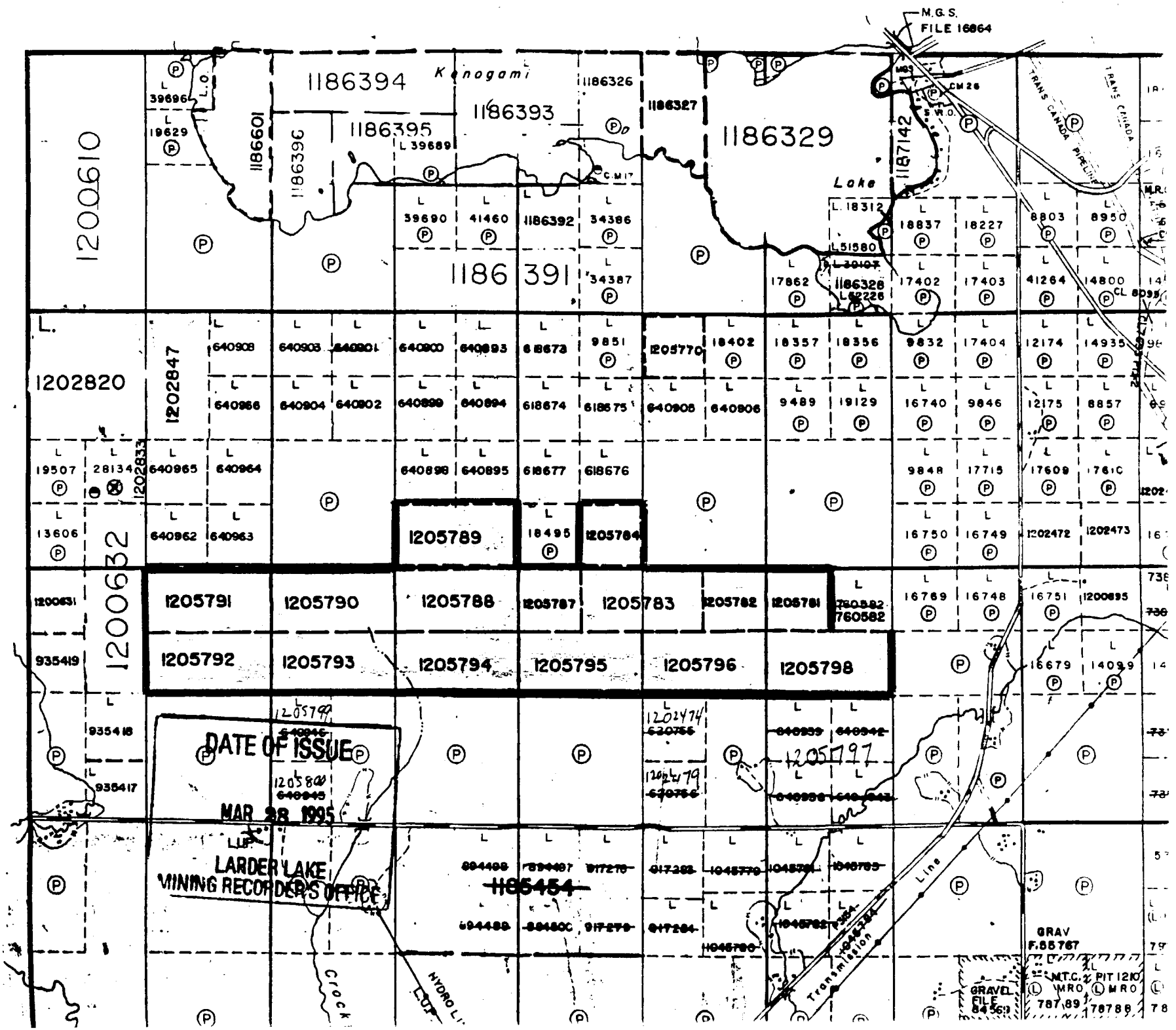
Mineral Resources Circular No. 39 - Mineral Resources and Mining Properties in the Kirkland Lake-Larder Lake area. By W. S. Savage, 1964.

Map P. 448 - Ontario Department of Mines Preliminary Geological Map No. P. 448; Eby Township.
Scale 1 inch = 1/2 mile

Map P. 903 - Preliminary Map P.903; Kirkland Lake Data Series; Eby Township.
Scale 1 : 15 840

Map P. 2268 - Ontario Geological Survey Preliminary Map P.2268 Kirkland Lake Area; Eby Township; Airborne Electromagnetic Survey.

Map P. 2268 - Ontario Geological Survey Preliminary Map P.2268; Kirkland Lake Area; Eby Township; Airborne Electromagnetic Survey; Total Field Magnetic Survey.
Scale 1 : 20 000


Burt Twp. M.334
Figure 2. Claim Map, Scale 1:31680
1200610
1200632
1202820
1202847
1202833
1186394
1186393
1186326
1186327
1186329
1186396
1186601
1186395
1186391
1187142
Kenogami
Lake
M.G.S.
FILE 16864
TRANS CANADA PIPELINE
1205791
1205790
1205788
1205787
1205783
1205782
1205781
1205792
1205793
1205794
1205795
1205796
1205798
1205789
1205784
1205797
1205799
1205800
1202474
1202479
1186454
DATE OF ISSUE
MAR 28 1995
LARDER LAKE
MINING RECORDER'S OFFICE
Transmission Line
GRAV
F.85767
GRAVEL PIT
FILE
8456
M.T.C. PIT 12K
MRO
MRO
787
789
788

Map P. 448 - Ontario Department of Mines Preliminary Geological Map No. P. 448; Eby Township.
Scale 1 inch = 1/2 mile

LEGEND

PRECAMBRIAN

PROTEROZOIC

8 MAFIC INTRUSIVE ROCKS

HURONIAN

COBALT GROUP

7 GOWGANDA FORMATION

ARCHEAN

MAFIC INTRUSIVE ROCKS

6 Diabase

FELSIC INTRUSIVE ROCKS (ALGOMAN)

5c Syenite and Syenite Porphyry

5d Mafic syenite, lamprophyre, and hybrid syenite and country rocks

MAFIC AND ULTRAMAFIC INTRUSIVE ROCKS (HAILEYBURIAN, EARLY ALGOMAN, AND SOME KEEWATIN)

4b Gabbro and Diorite

METASEDIMENTS (TIMISKAMING OR KEEWATIN)

3

FELSIC VOLCANIC ROCKS (KEEWATIN)

2a Rhyolite and dacite

MAFIC VOLCANIC ROCKS (KEEWATIN)

1a Basalt and andesite (pillowed and massive)

1b Mafic agglomerate and tuff

Figure 3b. General Geology; Legend

Figure 8a. Geology from P-448: Scale 1:15840

Reference Map
including GEOLOGY
EBY WEST GROUP (D. Robinson)

Scale 1:5000

0 100 200 300m

EM Conductor
IP - In Phase
OP - Out Of Phase

Lineament Inferred

8+00 N
6+00 N
4+00 N
2+00 N
0+00 BL
2+00 S
4+00 S

29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14

Figure 4.

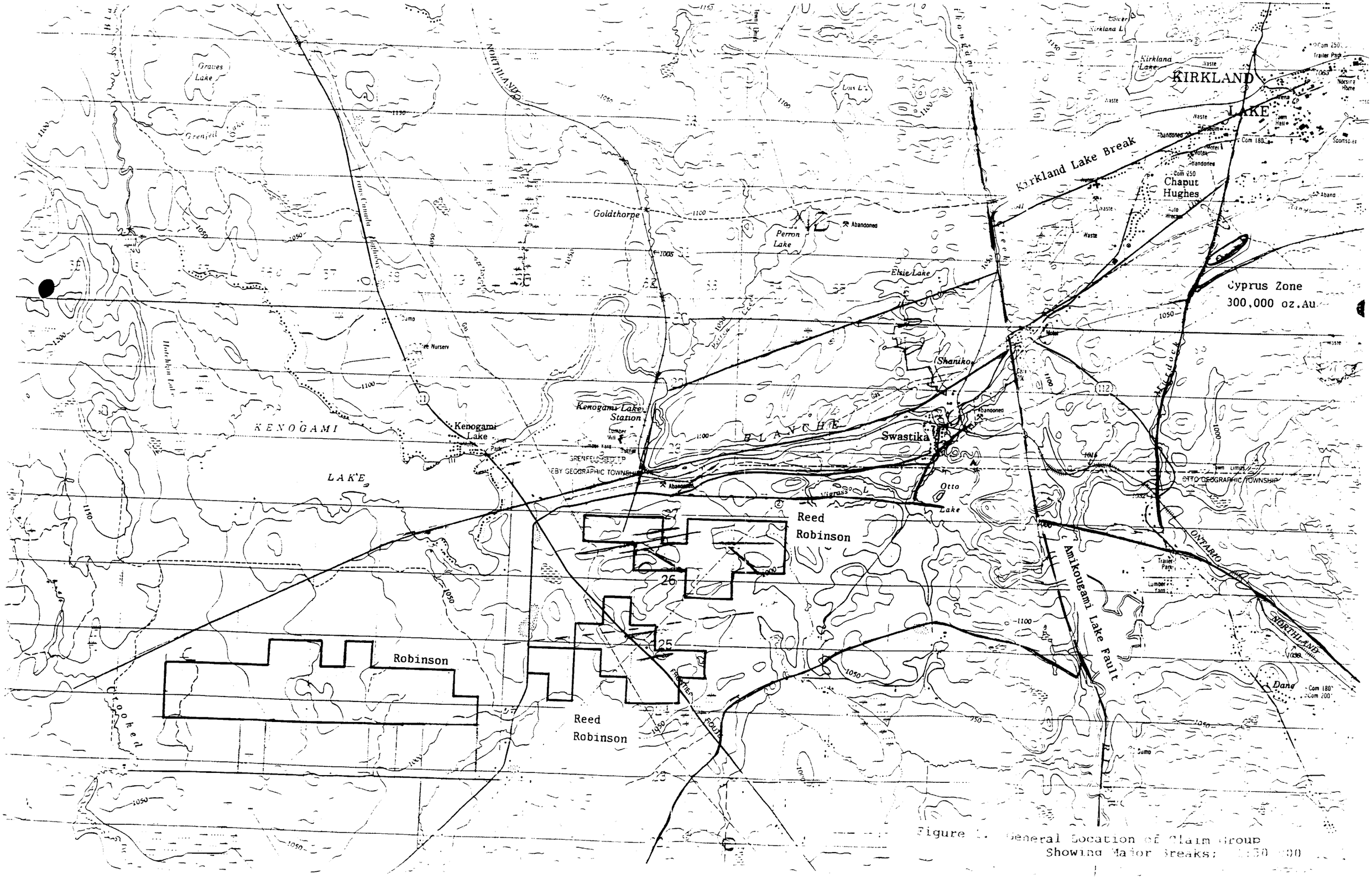


Figure 1. General Location of Claim Group
Showing Major Breaks: [illegible]

ANNEX
"H-24"

The Global Search for Gold

Queenston looks where others did not in Kirkland Lake

Queenston looks where others did not in Kirkland Lake



Photo by The Northern Miner

Geologists Dale Alexander (left) and Frank Ploeger (right) of Queenston Mining display results of recent mapping on the Kirkland Lake Break to analyst Brian Christie of HSBC James Capel.

BY JAMES WHYTE

KIRKLAND LAKE, ONT. — Many Canadian exploration companies have gone to the ends of the earth for gold, bringing back tales that gave the market a taste for the exotic.

Investors were less excited about companies like **Queenston Mining** (QMI-T), which has concentrated on Canadian projects clustered along the Kirkland Lake-Cadillac break in Ontario and Quebec, and farther north in the Harker-Holloway camp in Ontario.

Queenston already had a presence in the Kirkland Lake camp when the present management, under president Charles Page, took over the company at the end of 1989. It had held a royalty interest in the Macassa mine and was also **Inco**'s (N-T) partner at the McBean open pit, which operated in the mid-1980s. By 1989 the company had substantial land holdings along a 17-mile (27-km) strike length of the Break in Teck, Lebel and Gauthier twps.

Aware that a junior with a large land position in a single camp wields more power than one with widely dispersed properties, management began the slow process of consolidating the Kirkland Lake holdings by acquiring land in the gaps between its properties and buying out joint-venture partners. "It was difficult to put together a land package," says Page, but the effort was worth it. "The majors wouldn't waste their time putting a land package together, but we knew the importance of it."

The final step came when **Franco-Nevada Mining** (FN-T) became a joint-venture partner in late 1995, bringing a cash infusion for Queenston in the form of a $1-million share and warrant purchase. This allowed Queenston to buy out Inco's position in the McBean and the surrounding properties and begin serious exploration along the full length of its land holding.

Franco-Nevada kicked in its own Kirkland Lake land holdings, and the two companies have operated a 50-50 joint venture since the middle of 1996. One advantage to the large property holding is that assessment work on the property package can be credited to contiguous claims. As a result, the company can concentrate on its best targets without worrying about outlying ground coming open for staking.

The backing from Franco-Nevada has also given Queenston a chance to pursue the real exploration that the stock market seems to find so tedious: detailed drill programs aimed at the extensions of known gold structures. "That's the luxury we have — we've got the land, we've got $11 million, and we've got a partner with cash that likes this kind of exploration and has had success with it."

"This kind" of exploration focuses on careful interpretation of geological structure. Kirkland Lake has historically been a camp of deep mines: Macassa, for example, still has North America's deepest operating shaft, at 7,200 ft., and Lake Shore went to 8,000 ft.

The nearly vertical plunges of the gold orebodies are matched by limited surface expression; William Wright and William Hargreaves sank a shaft on a gold showing 6 inches wide at surface, with a little rusty weathering and virtually no wallrock alteration. But the Wright-Hargreaves mine produced close to 5 million oz. gold, and is generally considered to have mined a single 17-million-oz. deposit it shared with the Lake Shore and the Teck-Hughes.

Queenston has concentrated much of its effort along the down-

See QUEENSTON, Page C4

From Page C1

plunge extension of the McBean, where a "green-carbonate" mineralization type has been discovered. The green carbonate rock, usually interpreted as a highly altered ultramafic flow, made up a large proportion of the ore at the Kerr-Addison mine, about 12 miles (19 km) to the east. It is interfingered with talc schists which are clearly the metamorphic equivalents of komatiites, and intruded by any number of felsic dykes.

The green carbonate was loaded with quartz veins and often carried visible gold, but only about 20% to 25% of the drill intersections showed mine grades. The coarse, nuggetty gold in the unit would frequently be missed in sampling. The problem even extended to underground workings. "You'd be in a stope and the face would be barren," recalls consulting geologist Dale Hendrick, who worked at the Kerr. "But you'd take another round and it would be reeking with gold."

The unpredictable gold grades and the erratic distribution of the rock unit itself infuriated one mine manager after another at the Kerr, but there was no denying its value. "A lot of people forget there was a lot of carbonate at the Kerr," says Queenston geologist Frank Ploeger. "Once they found the flow ore [gold ore in silicified basaltic flows], they began to neglect the green carbonate." But the neglected ore type contributed about 14 million tons of the 37 million the Kerr hoisted.

Ploeger and other Queenston geologists have found that a myriad of intersecting structures cross the green carbonate they are seeing in the McBean area. Frequently, too, sets of intersecting veins expand into a material more like a vein breccia. The veining always shows up in the same place as the felsic dykes, and it was a rare stope in the Kerr green carbonate that did not take out some dyke material as well.

Offshoot

The McBean, during its short lifespan, operated on mineralization in a felsic dyke. Queenston's drill holes below the pit have begun to suggest that the mineralization in the dyke is an offshoot of a much wider altered and deformed zone, with typical green carbonate in its footwall and more gold mineralization hosted in volcanics and dyke rocks in the hangingwall. The gold has frequently reached underground-mine grades (the highest was 2.75 oz. per ton over 21.4 ft.), but that tells only part of the story, given the history of green carbonate as a sampler's nightmare. The type has a typical "hit ratio" of one in five holes, but Queenston's drill program on the McBean extension hit in about 60% of its holes. "We couldn't have been *that* lucky," says Page.

"There seems to be some joy when you get green carbonate and felsite developed together."

Like the Kerr, the McBean shows the same association between the felsic dykes and the mineralization. Geologist Murray McGill notes that "there seems to be some joy when you get green carbonate and felsite developed together."

Queenston has a preliminary resource of 1.1 million tons grading 0.22 oz. per ton (1 million tonnes at 7.5 grams per tonne) in the green carbonate below the McBean, in addition to 1.7 million tons grading 0.15 oz. in the dyke material. To the west, the Anoki deposit sits in the hangingwall of the deformation zone, and holds 1.2 million tons grading 0.12 oz.

The drilling on which the Anoki resource is based stopped at the deformation zone, making the zone itself an untested target both on the property and along strike to the McBean. Two scout holes, MB97-15 and MB96-06, have intersected the structure, and some mineralization between Anoki and McBean and the new "Deep zone" at Anoki is much farther back in the hangingwall than the known resource.

Princeton

Drilling has started on the Princeton property, immediately east of McBean. Its target is the extension of the McBean green carbonate in a 1,000-ft.-wide package of ultramafics and green carbonate rock, intruded by more felsic dykes. Two shafts were put down on the property in the early days of the Kirkland Lake rush, but there is little evidence of old work on the green carbonate. The mines of the western part of the camp may have given the oldtimers the impression that the felsic dykes were the best host rock for gold, suggests Ploeger. "I think they were looking more for the Kirkland Lake style [gold in felsic dykes] than the Kerr style."

The first drill hole intersected the ultramafic-green carbonate package over a 900-ft. core length representing at least 500 ft. of horizontal width.

Queenston geologists are also using backhoes and water pumps to good effect. Outcrop stripping has revealed the same ultramafic package at surface, complexly intruded by the felsic dykes. "You're shoving felsite through a chemical jungle here," says geologist Dale Alexander, pointing out complex veining and alteration patterns.

"You'll never die for new projects or ideas around here," says Hendrick. The technical success and new gold resources that have come out of Queenston's ideas must please its partner. And doubtless Franco-Nevada is also happy to see some of its royalty revenue going back into the ground, rather than to the Receiver General of Canada. Says Page, "That's what the money was raised for: to do deep drilling on good geological targets."

ANNEX-F1

ALEX MACINTYRE & ASSOCIATES LIMITED

MINING CONTRACTORS

FAX 705-567-4925 P.O. BOX 517 PHONE 705-567-3266

KIRKLAND LAKE, ONTARIO

P2N 3J5

INVOICE

Roger Dufresne
14 Wright Hargreaves
KIRKLAND LAKE, Ontario

Invoice No. : 98 - 06 - 28
Date : June 30, 1998
Your P.O. No.: Verbal

Excavator Work Stripping Your Claims, Matachewan Road :

Rental :

Date	Float	790 Excavator
June 25	1.5	0.0
June 26	0.0	10.0
June 29	0.0	10.0
June 30	0.0	10.0
July 01	0.0	7.0
July 02	3.0	4.0
	4.5	41.0

Float	4.5 hrs.	@	$ 75.00/hr.	$ 337.50
790 Excavator	41.0 hrs.	@	$ 85.00/hr.	3,485.00
				3,822.50

7 % G.S.T. (R 100 128 164) $ **267.58**

PAID
ALEX MacINTYRE & ASSOC. LTD
P.O. BOX 517
KIRKLAND LAKE, ONT. P2N 3J5

TOTAL INVOICE $ **4,090.08**

Paid By Cheques
July 13/98

ANNEX I-2

Swastika Laboratories
P.O. Box 10
1 Cameron Avenue
Swastika, Ontario
P0K 1T0

Tel: (705) 642-3244

INVOICE

NO.: 00044509
DATE: 09/15/98
PAGE: 1

SOLD TO:

R. DUFRESNE
14 WRIGHT-HARGREAVES AVE

KIRKLAND LAKE, ON P2N 1B2

SHIP TO: D521

Same

GST Number: R132862640

Proj #/P.O. # OPAP-98

ITEM NO.	QUANTITY	UNIT	DESCRIPTION	G	P	UNIT PRICE	AMOUNT
	46		Au			7.00	322.00
	46		Sample Prep			3.50	161.00
			Cert #8W-2666-RG1				
			GST @ 7%				33.81

SWASTIKA LABORATORIES
PAID
NOV 6/98
WITH THANKS
PER

COMMENTS:

Net 30 Days

TOTAL 516.81

Swastika Laboratories
P.O. Box 10
1 Cameron Avenue
Swastika, Ontario
P0K 1T0

Tel: (705) 642-3244

INVOICE

NO: 00044720

DATE: 10/13/98

PAGE: 1

SOLD TO:
R. DUFRESNE
14 WRIGHT-HARGREAVES AVE

KIRKLAND LAKE, ON P2N 1B2

SHIP TO: D521
Same

GST Number: R132862640

Proj #/P.O. # OPAP-98

ITEM NO.	QUANTITY	UNIT	DESCRIPTION	G	P	UNIT PRICE	AMOUNT
	2		Ag			3.00	6.00
	2		Co			1.50	3.00
	2		Cu			1.50	3.00
	2		Ni			1.50	3.00
	2		Zn			1.50	3.00
			Cert #8W-2666-RG1				
			GST @ 7%				1.26

COMMENTS:
Net 30 Days

TOTAL 19.26

Swastika Laboratories
P.O. Box 10
1 Cameron Avenue
Swastika, Ontario
P0K 1T0

Tel: (705) 642-3244

INVOICE

NO: 00044723

DATE: 10/14/98

PAGE: 1

SOLD TO:
R. DUFRESNE
14 WRIGHT-HARGREAVES AVE

KIRKLAND LAKE, ON P2N 1B2

SHIP TO: D521

Same

GST Number: R132862640

Proj #/P.O. # OPAP-98

ITEM NO.	QUANTITY	UNIT	DESCRIPTION	G	P	UNIT PRICE	AMOUNT
	1		WRA Package			20.00	20.00
	1		Sample Prep			3.50	3.50
			Cert #8W-2920-RG1				
			GST @ 7%				1.65

COMMENTS:
Net 30 Days

TOTAL 25.15

Swastika Laboratories
P.O. Box 10
1 Cameron Avenue
Swastika, Ontario
P0K 1T0

Tel: (705) 642-3244

INVOICE

NO.: 00044838

DATE: 10/27/98

PAGE: 1

SOLD TO:

R. DUFRESNE
14 WRIGHT-HARGREAVES AVE

KIRKLAND LAKE, ON P2N 1B2

SHIP TO: D521

Same

GST Number: R132862640

Proj #/P.O. # OPAP 98

ITEM NO.	QUANTITY	UNIT	DESCRIPTION	G	P	UNIT PRICE	AMOUNT
	9		Au			8.00	72.00
	1		Rare Earth Package			20.00	20.00
	1		Chondrite Plot			2.00	2.00
	6		Additional Elements			1.00	6.00
	9		Sample Prep			3.50	31.50
			Cert #8W-2768-RG1				
			GST @ 7%				9.21

SWASTIKA LABORATORIES
DEC 21 PAID 98
WITH THANKS

COMMENTS:
Net 30 Days

TOTAL ▶ 140.71

ANNEX "I-3"

TÉLÉPHONE: (819) 797-0853
1-800-567-6053

FAX: (819) 797-1848
1-800-661-1848

SERVICES EXPLORATION SERVICES Enrg. Reg'd.

765, BOUL. QUÉBEC
C.P. 428
ROUYN-NORANDA, P.Q.
J9X 5C4

Levés géophysiques	Geophysical Surveys
Levés géologiques	Geological Surveys
Jalonnement de claims	Claim staking
Dessin et reproduction	Drafting and Reproduction
Coupage de lignes	Line Cutting
Programmes d'exploration	Exploration Programmes
Ventes d'articles d'exploration minière	Sales of mining exploration articles

En compte avec:
In account with:

D. Chartré - R. Dufresne

14 Wright-Hargeaves

Kirkland Lake, Ont.

P2N 1B2

FACTURE / INVOICE 9034

DATE	NUMÉRO DU CLIENT / CUSTOMER NO.
Dec. 30, 1998	
N° COMMANDE / PURCHASE ORDER NO.	

Projet:
Project: EBY TWP. CLAIM BLOCKS "A" & "B"

OPAP PROJECT

DESCRIPTION	PRIX UNITAIRE / UNIT PRICE	TOTAL
Mapping,Report & Maps		1 600.00 $
GST		112.00 $
	TOTAL	$ 1712.00

T.P.S./G.S.T.: R105801906
T.V.P./P.S.T.: Q-10-0169-9225 TV 0001

THANK YOU

LF-2132

Code: 10-B-98

TERME: NET 30 JOURS
TERMS: NET 30 DAYS

COPIE DU CLIENT

ANNEX I-4

INVOICE

DUFRESNE EQUIPMENT RENTALS

OUR NUMBER 533606
DATE OCT 1/98
CUSTOMER'S ORDER

SOLD TO D. CHARTRE
ADDRESS BOX 53 SWASTIKA DUF
SWASTIKA, ONT
P0K 1T0

SHIP TO
ADDRESS

TAX REG. NO. | SALESMAN | F.O.B | TERMS | VIA

QUANTITY	DESCRIPTION	PRICE	AMOUNT
	RENTAL OF WAJAX MARK III H/P WATER PUMP 1500' OF 1½" HOSE AND OPERATOR (PAUL DUFRESNE OR ASSISTANT)		
	15 DAYS IN EBY TWP	90 00	1350 00
	PAID		

BLUELINE DC31

INVOICE

DUFRESNE EQUIPMENT RENTALS

OUR NUMBER 533605
DATE OCT 1/98
CUSTOMER'S ORDER

SOLD TO R. DUFRESNE
ADDRESS 14 WRIGHT HARGREAVES
KIRKLAND LAKE, ONT
P2N 1B2

SHIP TO
ADDRESS

TAX REG. NO. | SALESMAN | F.O.B | TERMS | VIA

QUANTITY	DESCRIPTION	PRICE	AMOUNT
	RENTAL OF WAJAX MARK III H/P WATER PUMP 1500' OF 1½" HOSE AND OPERATOR (PAUL DUFRESNE OR ASSISTANT)		
	14 DAYS IN EBY TWP	90 00	1260 00
	PAID		

BLUELINE DC31

Ontario Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use)
W9980.00228
Assessment Files Research Imaging

42A01SE2009 2.19332 EBY 900

section 65(2) and 66(3) of the Mining Act. Under section 8 of the Mining Act, sment work and correspond with the mining land holder. Questions about this ern Development and Mines, 3rd Floor, 933 Ramsey Lake Road, Sudbury,

nstructions: - For work performed on Crown Lands before **recording** a claim, use form 0240.
- Please type or print in ink.

CHARTRE - DUFRESNE
1998 - EBY TWP PROPERTY

1. Recorded holder(s) (Attach a list if necessary)

Name
Address
Mr. Roger Dufresne
14 Wright-Hargreaves Ave.
Kirkland Lake, Ontario
P2N 1B2

Client Number 127749
Telephone Number (705) 567-3725
Fax Number

Name
Address
Client Number
Telephone Number
Fax Number

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration:

Geotechnical: prospecting, surveys, assays and work under section 18 (regs) | Physical: drilling stripping, trenching and associated assays | Rehabilitation

Work Type: PROSPECTING PROGRAM ASSAYS ✓

Dates Work Performed: From Day 02 Month 05 Year 1998 To Day 17 Month 01 Year 1999

Global Positioning System Data (if available)

Township/Area: EBY TWP

M or G-Plan Number: M-0345

Office Use
Commodity
Total $ Value of Work Claimed 26,419
NTS Reference
Mining Division Larder Lake
Resident Geologist District KLK

RECEIVED
LARDER LAKE
MINING DIVISION
MAR 25/99
10:38

Please remember to:
- obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name: SERVICE EXPLORATION
Address: 765 BOUL. QUÉBEC
Name: C.P. 428
Address: ROUYN - NORANDA P.Q.
Name: J9X 5C4
Address:

Telephone Number (819) 797-0853
Fax Number 1-800-661-1848
Telephone Number
Fax Number
Telephone Number
Fax Number

4. Certification by Recorded Holder or Agent

I, ROGER DUFRESNE (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: Roger Dufresne
Date: MARCH 25, 199

Agent's Address: 14 Wright-Hargreaves Ave.
Kirkland Lake, Ontario
P2N 1B2

Telephone Number (705) 567-3725
Fax Number

41 (03/97)

RECEIVED
3:15 p.m.
MAR 26 1999
GEOSCIENCE ASSESSMENT OFFICE

June 24/99

W9980.00228

5. **Work to be recorded and distributed.** Work can only be assigned to claims that are contiguous (adjoining) to the mi
land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this fo

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land.	Value of work applied to this claim.	Value of work assigned to other mining claims.	Bank. Value of work to be distributed at a future date
eg	TB 7827	16 ha	$26,825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8,892	$ 4,000	0	$4,892
1	BLOCK I					
2	80%					
3	1214384	16	0	2400	0	0
4	1225485	16	8454.	2400	0	7224.
5	118 6492	16	9511.	2400	0	7111.
PATENTED	L-16679	16	0	0		
PATENTED	L-14099	16	3170.	0	3170.	
PATENTED	L-14098	16	0	0		
9	BLOCK II					
10	20%					
11		~~16~~				
12	1205843	16	0	1761.	0	0
13	1214382	16	0	1761.	0	0
14	1214385	16	0	1762.	0	0
PATENTED	L-18958	16	5284.00	0	5284.	0
	Column Totals		26419.	12,484.	8454.	13935

I, Roger Dufresne, do hereby certify that the above work credits are eligible unde
subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing	Date
Roger Dufresne	MARCH 25, 1999

6. Instruction for cutting back credits that are not approved.

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☐ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☒ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date	Date Notification Sent
RECEIVED LARDER LAKE MINING DIVISION MAR 25/99 10:35 AM	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature)	

0241 (03/97)

2.19382

RECEIVED
MAR 26 1999
GEOSCIENCE ASSESSMENT OFFICE

Ontario Northern Development and Mines

Statement of Costs for Assessment Credit

W9980.00228

nal information collected on this form is obtained under the authority of subsection 6 (1) of the Assessment Work Regulation 6/96. Under section 6 of the g Act, this information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. ions about this collection should be directed to a Provincial Mining Recorder, Ministry of Northern Development and Mines, 3rd Floor, 933 Ramsey Lake Sudbury, Ontario, P3E 6B5.

Work Type	Units of work Depending on the type of work, list the number of hours/day worked, metres of drilling, kilometres of grid line, number of samples, etc.	Cost Per Unit of work	Total Cost
MANUAL LABOUR (DENIS)		56 X 100	5600.00
MANUAL LABOUR (ROGER)		57 X 100	5700.00
ASSAYS		(ANNEX I-2)	701.93
SERVICE EXPLORATION (GEOLOGICAL REPORT)		(ANNEX I-3)	1712.00
EXCAVATOR AND OPERATOR		(ANNEX (I-1)	4090.08
PUMP RENTAL AND OPERATOR		(ANNEX I-4)	2610.00
Associated Costs (e.g. supplies, mobilization and demobilization).			
PROPANE AND FUELS	$729.11	+ 721.21	1450.32
SUPPLIES	$474.84	+ $1241.61	1716.45
Transportation Costs			
DENIS	P.19		254.40
ROGER	P.27		324.00
Food and Lodging Costs			
DENIS	P.19		1120.00
ROGER	P27	~~444~~	1140.00
		Total Value of Assessment Work	$26,419.18

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LARDER LAKE
MINING DIVISION
MAR 25 1999
10:35 AM

ulations of Filing Discounts:

'ork filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work. work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total alue of Assessment Work. If this situation applies to your claims, use the calculation below:

)TAL VALUE OF ASSESSMENT WORK x 0.50 = Total $ value of worked claimed.

:
'ork older than 5 years is not eligible for credit.
recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for cation and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all rt of the assessment work submitted.

fication verifying costs:

Roger Dufresne (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably termined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying ration of Work form as RECORDED HOLDER (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature	Date
Roger Dufresne	MARCH 25, 1999

1997)

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MAR 26
GEOSCIENCE ASSESSMENT OFFICE

Ministry of Northern Development and Mines

Ministère du Développement du Nord et des Mines

Ontario

Geoscience Assessment Office
933 Ramsey Lake Road
6th Floor
Sudbury, Ontario
P3E 6B5

Telephone: (888) 415-9846
Fax: (877) 670-1555

Visit our website at:
www.gov.on.ca/MNDM/MINES/LANDS/mlsmnpge.htm

June 17, 1999

ROGER J. DUFRESNE
14 WRIGHT HARGREAVES AVENUE
Kirkland Lake, Ontario
P2N-1B2

Dear Sir or Madam:

Submission Number: 2.19332

		Status
Subject: Transaction Number(s):	W9980.00228	Approval

We have reviewed your Assessment Work submission with the above noted Transaction Number(s). The attached summary page(s) indicate the results of the review. WE RECOMMEND YOU READ THIS SUMMARY FOR THE DETAILS PERTAINING TO YOUR ASSESSMENT WORK.

If the status for a transaction is a 45 Day Notice, the summary will outline the reasons for the notice, and any steps you can take to remedy deficiencies. The 90-day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, will no longer be in effect for assessment work which has received a 45 Day Notice. Allowable changes to your credit distribution can be made by contacting the Geoscience Assessment Office within this 45 Day period, otherwise assessment credit will be cut back and distributed as outlined in Section #6 of the Declaration of Assessment work form.

Please note any revisions must be submitted in DUPLICATE to the Geoscience Assessment Office, by the response date on the summary.

If you have any questions regarding this correspondence, please contact Lucille Jerome by e-mail at lucille.jerome@ndm.gov.on.ca or by telephone at (705) 670-5858.

Yours sincerely,

ORIGINAL SIGNED BY
Blair Kite
Supervisor, Geoscience Assessment Office
Mining Lands Section

Correspondence ID: 13913

Copy for: Assessment Library

Work Report Assessment Results

Submission Number: 2.19332

Date Correspondence Sent: June 17, 1999 **Assessor:** Lucille Jerome

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9980.00228	1214384	EBY	Approval	June 16, 1999

Section:
10 Physical PSTRIP
10 Physical PTRNCH

The report and maps provided by Services Exploration as well as a daily field log similar to the summary provided on your OPAP forms would have been adequate for filing the physical work. The one item that needed to be expanded on was the use of heavey equipment. The type of equipment used and the hours the equipment operated and the rates of pay for the equipment and operator should be more detailed in future submissions.

Correspondence to:
Resident Geologist
Kirkland Lake, ON

Assessment Files Library
Sudbury, ON

Recorded Holder(s) and/or Agent(s):
ROGER J. DUFRESNE
Kirkland Lake, Ontario

Grenfell Twp. M.351

Burt Twp. M.334

Otto Twp. M.379

Blain Twp. M.418

VI

V

IV

III

II

I

12 11 10 9 8 7 6 5 4 3 2 1

THE TOWNSHIP OF EBY

DISTRICT OF TIMISKAMING

LARDER LAKE MINING DIVISION

SCALE: 1-INCH=40 CHAINS

LEGEND

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

NOTES

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

AREAS WITHDRAWN FROM STAKING

Surface Rights Withdrawn under Sec. 35, The Mining Act R.S.O. 1980, ORDER NO. W-01/81/ONT (Trans Canada Pipeline Right of Way and Buffer Zone particularly 40.26 meters or 132 ft on either side of centre line of right of way)

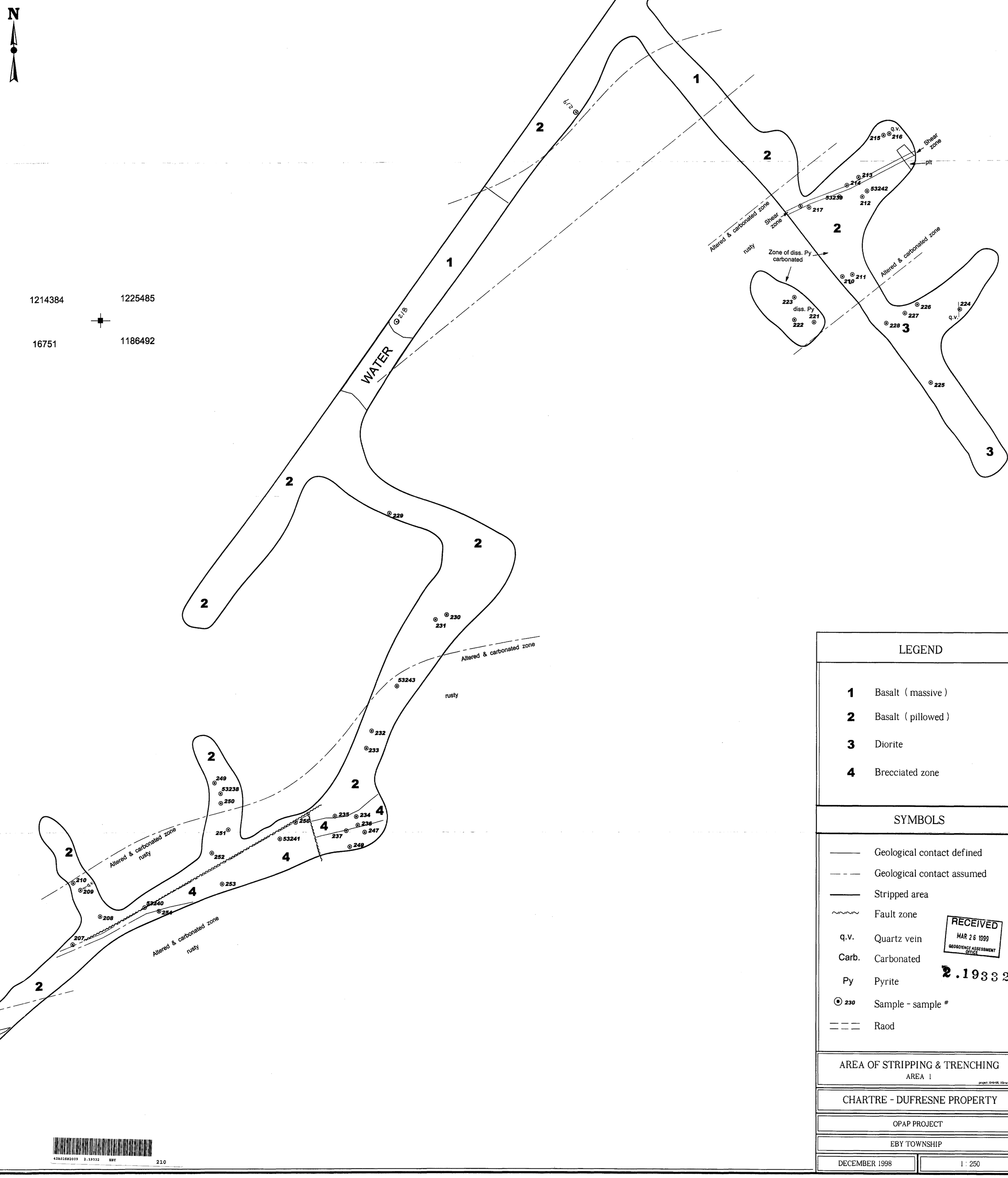
THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

PLAN NO.- M-345

MINISTRY OF NORTHERN DEVELOPMENT AND MINES

COPY OF THIS MYLAR ARCHIVED APR.27/92
ARCHIVED JANUARY 26, 1995
ARCHIVED ON JUNE 01/95
ARCHIVED JULY 19, 1996

42A01SE2009 2.19332 EBY 200
K. Kalamov



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2.19332

AREA OF STRIPPING & TRENCHING
AREA 1

project 10-11-98, 100-area1.dwg

CHARTRE - DUFRESNE PROPERTY

OPAP PROJECT

EBY TOWNSHIP

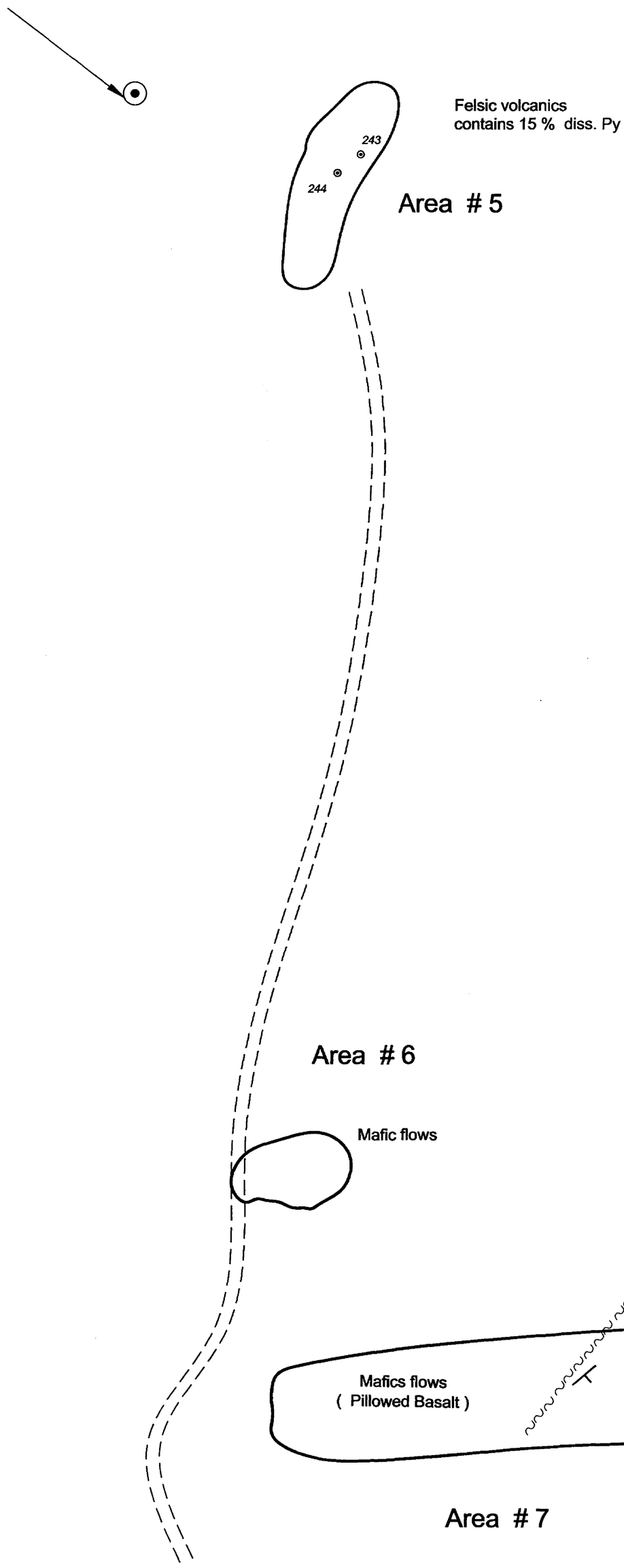
DECEMBER 1998 | 1 : 250

42A01SE2009 2.19332 EBY 210

SERVICES EXPLORATION SNRL

N

This point is 86 m south
of # 4 post of
claim # 18958 PA59



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LEGEND

∿∿∿∿	Fault zone
⊙ 246	Samples
= = =	Road
Py	Pyrite
——	Stripped area

AREA OF STRIPPING & TRENCHING
AREA 5, 6, 7

CHARTRE - DUFRESNE PROPERTY

OPAP PROJECT

EBY TOWNSHIP

DECEMBER 1998	1 : 250

42A01SE2009 2.19332 EBY 220

CON V

CON IV

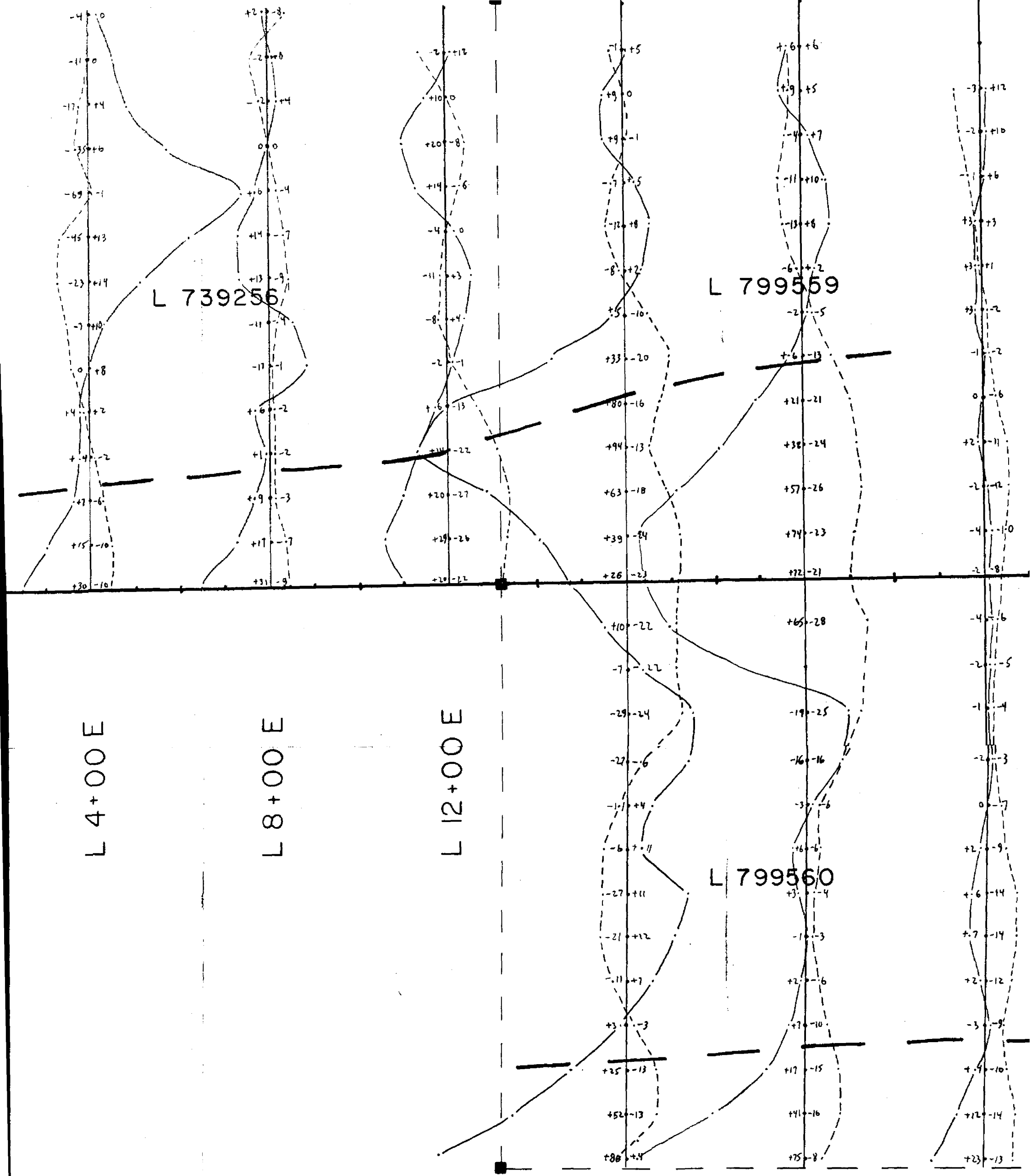
L 799559

L 799560

L 739256

Highway No. 66

42A01SW2009 2.19332 EBY 230


L 739256
L 799559
L 799560
L 4+00 E
L 8+00 E
L 12+00 E
L 16+00 E
L 20+00 E
L 24+00 E
Lot 4

CON. V

CON. IV

L 24+00 E

L 20+00 E

L 16+00 E

L 12+00 E

L 8+00 E

L 4+00 E

L 799559

L 799560

L 739256

Lot 4

42A016E2009 2.19332 EBY

250

LEGEND

MAFIC VOLCANICS (basalt, tuff)

SEDIMENTS (carbonates, mudstone, wacke)

IRON FORMATION

STRIKE and DIP of BEDDING

FAULT

DIABASE INTRUSSIVES

ONTARIO GEOLOGICAL SURVEY BASIL TILL HOLES

KENOGAMI LAKE

Direction of glaciation

1945 Drilling by Sylvanite gave 0.5 oz/ton Au over 10

best value 310 ppb Au (.009 oz/ton)

North Concession Road

81-02

LAKE AREA

best value 90 ppb Au (.003 oz/ton)

81-01

PROJECTED LARDER

1938 Bulk Sample 2.77 oz/ton; 0.06 oz/ton Au

1983 Grab Sample 0.08 oz/ton Au

AREA NOT MAPPED

AREA NOT MAPPED

AREA NOT MAPPED

80-25

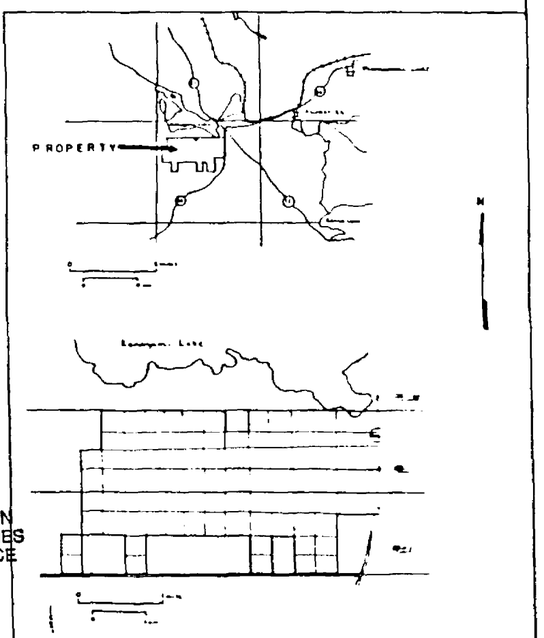
South Concession Road

best value 2100 ppb Au (.06 oz/ton)

80-24

best value 2000 ppb Au (.058 oz/ton)

Direction of glaciation



MINISTRY OF NORTHERN DEVELOPMENT AND MINES
RES. GEOLOGIST OFFICE
KIRKLAND LAKE
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OCT 29 1986
O.M.E.P.

EBY GROUP

SURFACE GEOLOGY

EBY TOWNSHIP

LARDER LAKE MINING DIVISION

DISTRICT of TIMISKAMING, ONTARIO

Scale 1cm = 100 meters

HEMLO REEF RESOURCES

GEOLOGY BY S. [illegible] | DRAWING NO. 1 | DATE Nov. 13/81

KL-1123-4

42A01SE2009 2.19332 EBY

260