# *1993-94 EXPLORATION REPORT*

# *of the*

# *ASHIGAMI LAKE, BUGG LAKE*

# *and*

# *RED ROCK PROPERTIES*

***SCADDING TOWNSHIP***

***SUDBURY MINING DIVISION, ONTARIO***

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***January, 1994***

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# 1. INTRODUCTION

The Ashigami Lake, Bugg Lake and Red Rock (Hazlett) properties are situated east of Lake Wanapitei in east-central Scadding Township (claim map G-3056, Sudbury Mining Division). The area is located approximately 50 kilometers northeast of Sudbury (figure 1).

The Ashigami Lake, Bugg Lake and Red Rock claim blocks cover areas of 240 hectares, 208 hectares and 480 hectares respectively and lie along a roughly east-west line centered at 46 40'N latitude and 80 37'W longitude (figure 2).

A three properties can be accessed via highway 17 east from Sudbury to the Kukagami Lake road. From this point it is an additional 20 kilometer drive along the dirt road to the Bugg Lake grid.

Each of the properties has undergone various work over the years and had been staked for different reasons. The Ashigami Lake claims were initially staked around a mineralized zone of quartz-iron carbonate-greywacke breccia which locally host upto 20% chalcopyrite. The first recorded activity on this property belonged to R.J. Steacy in 1915. The Bugg Lake group was initially staked to encompass zones of strongly albitized metasedimentary rocks which appeared to have the same geological signature as the gold deposits of the area. Limited work was recorded in this area prior to the co-authors 1992-93 OPAP field programme. Initially the Red Rock property was staked to investigate a zone of intense alteration which included carbonatization, quartz-iron carbonate veining and gold mineralization within gabbroic rocks. The original staking of the area was completed

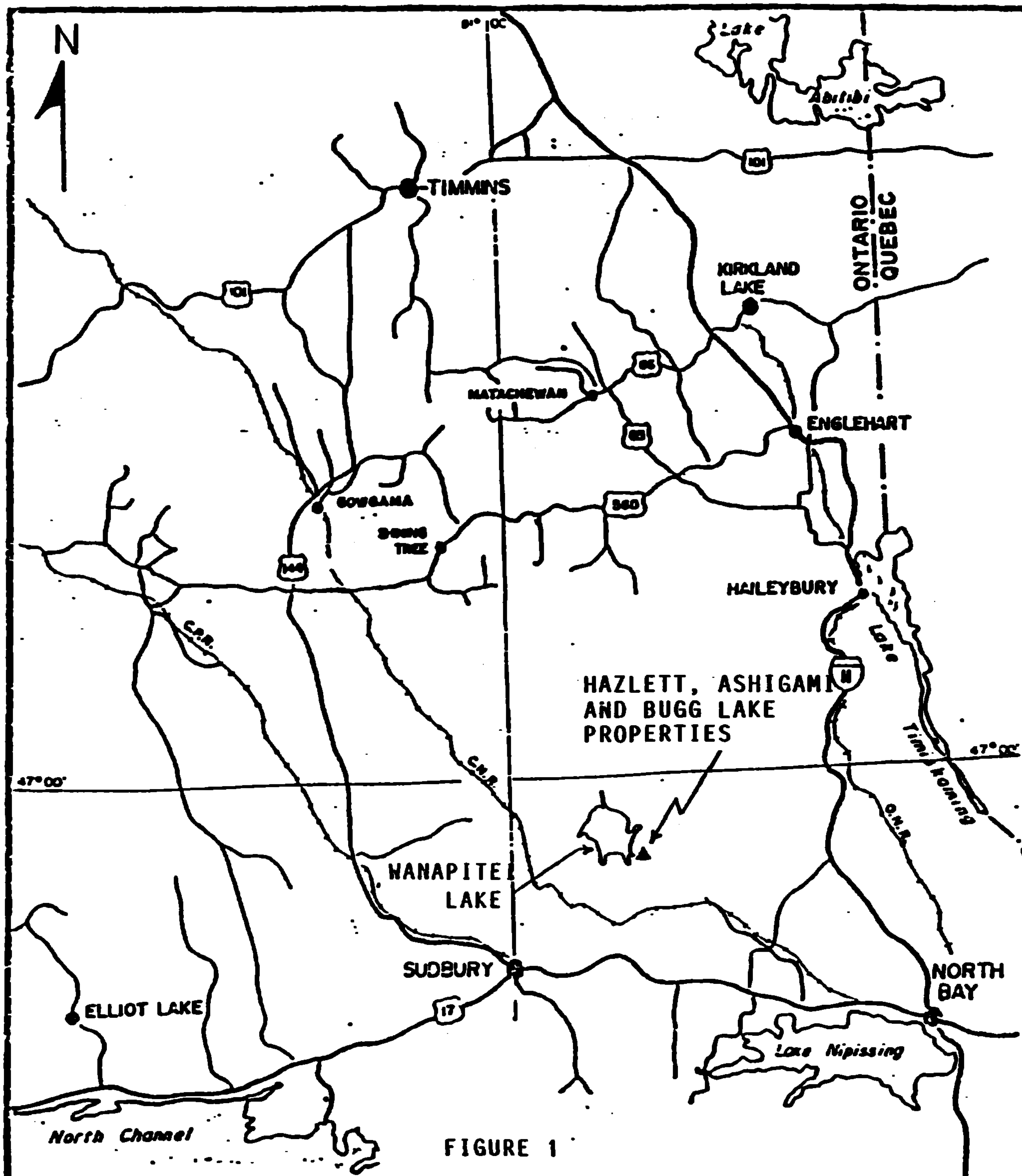


FIGURE 1

LOCATION MAP

HAZLETT, ASHIGAMI, AND BUGG LAKE PROPERTIES

NTS SHEET 41 I / 10

SCALE : 1:1,600,000

| ASHIGAMI LAKE PROPERTY | BUGG LAKE PROPERTY |
|---|---|
| 46° 40' 25" N lat. | 46° 40' 45 " N lat. |
| 80° 36' 00" W long. | 80° 38' 10" W long. |

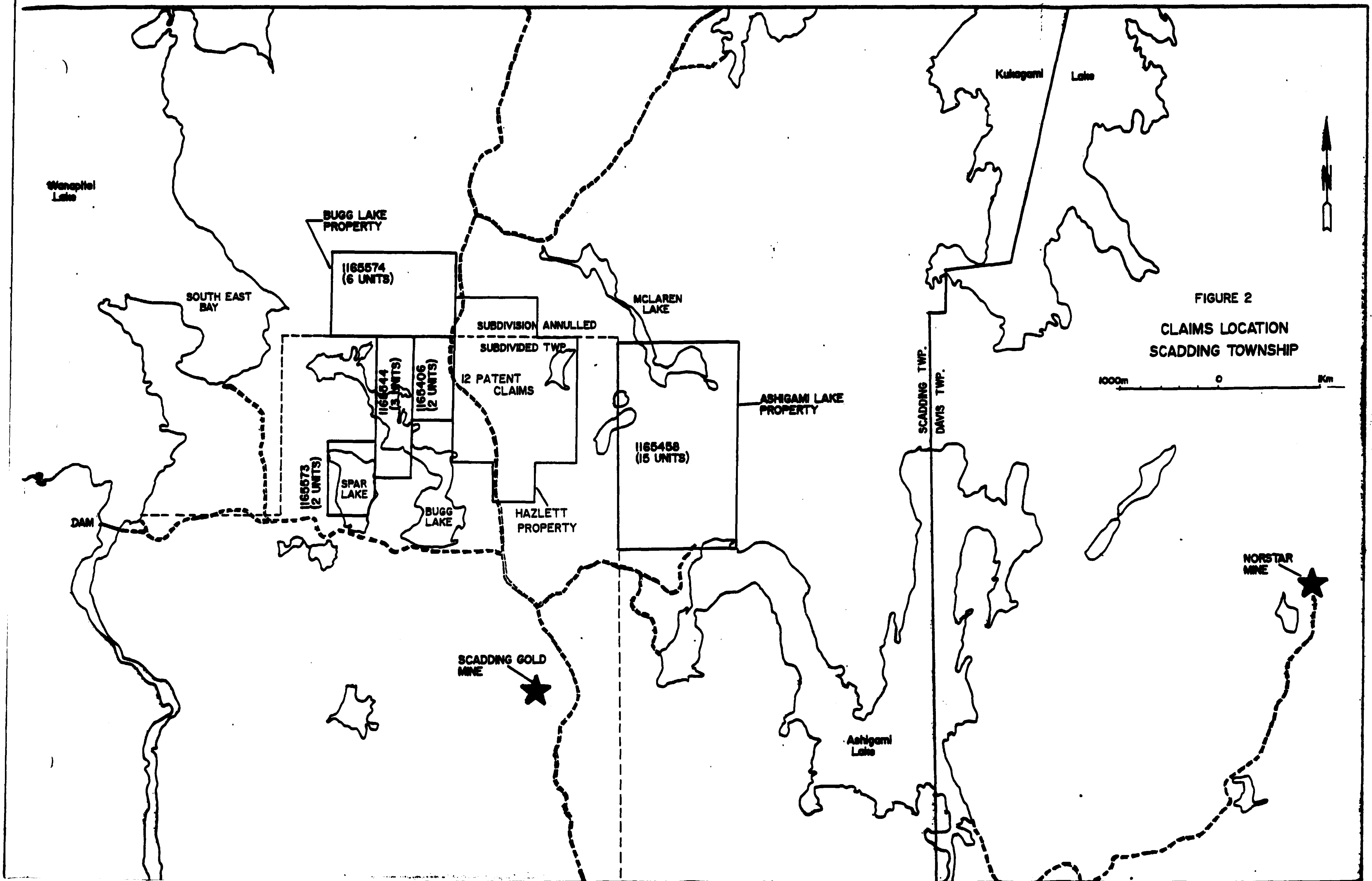


FIGURE 2
CLAIMS LOCATION
SCADDING TOWNSHIP

in 1922 with several test pits and trenches being developed at this time. To date the property consists of 12 contiguous, patent, mining claims owned by Mr. A. Hazlett.

During the 1992 field season a programme of geological mapping and sampling was conducted on the Bugg Lake and Ashigami Lake claim blocks. The results showed the two properties to be underlain by metasedimentary rocks of the Gowganda Formation and gabbroic rocks of the "Lake Wanapitei Nipissing Gabbro Intrusion". Additional metasedimentary rocks of the Serpent Formation were encountered along the south and western sides of the Bugg Lake property. Several area of strong alteration with corresponding mineralization and gold enrichment were highlighted in these units, especially adjacent to the gabbro-metasedimentary contact. Results from this programme were provided in the Final Submission for the 1992-93 OPAP programmes.

A follow up programme was outlined for some of the most anomalous regions on the Bugg Lake and Ashigami Lake claims with additional line cutting, flagging, mapping, sampling, geophysics and trench excavating outline for the property which lies between the two blocks (Red Rock Porperty). This work was completed by the co-authors with the assistance of the Ontario Prospectors Assistance Program (OPAP). The results of this work will be presented in the remainder of this report.

## *2. PROPERTY DESCRIPTION*

### 2.1 Location and Access:

The Ashigami Lake, Bugg Lake and Hazlett properties are situated east of Lake Wanapitei in east-central Scadding Township (claim map G-3056, Sudbury Mining Division), approximately 50 km northeast of Sudbury (figure 1).

Principal access to the properties is via the Kukagami Lake road, an all season gravel road which emanates from highway 17, approximately 11 km east of the village of Wanapitei. The southern units of the Ashigami Lake property can be reach by travelling north from highway 17 for 17 kilometers along the Kukagami Lake road, then 2 km east along the Ashigami Lake road to the public landing along the northwest side of Ashigami Lake. The Bugg Lake claims are located on the west side of the Kukagami Lake road about 20 kilometers north of highway 17.

## 2.2 Claim Description:

The Ashigami Lake and Bugg Lake properties are comprised of 28 units divided into two(2) separate blocks situated about 1.6 km apart (see figure 2). The claims in question are held in good standing by the co-authors (50/50).

Table 1: Claim List

| Property | Claim Number(s) | Number of Units |
|---|---|---|
| Ashigami Lake | 1165458 | 15 |
| | | 15 |
| Bugg Lake | 1165406 | 2 |
| | 1165544 | 3 |
| | 1165574 | 6 |
| | 1165573 | 2 |
| | | 13 |
| | | Total Units: 28 |

The Hazlett property (formerly the Red Rock Gold Mine Property) consists of 12 contiguous patented mining claims: S.5082, S.5102, S.5110, S.16085-16090 inclusive, S.18805 and S.18806. The claims are registered in the name of Joan M. Hazlett, 31 Viamede Crescent, North York, Ontario, M2K 2A7 with whom the co-authors have negotiated a working interest. The Hazlett property occupies the ground between the Bugg Lake and Ashigami Lake properties (figure 2).

## 2.3 Services:

All required services to the claim groups are easily accessible. Electrical power lines are present along both the Kukagami Lake and Ashigami Lake roads which cross or pass close to the outer edges of the claim boundaries. Main power lines are found along highway 17, about 20 kilometers to the south.

The closest major center is Sudbury which occurs 50 kilometers from the Bugg Lake claims. The city can be reached by travelling south 20 kilometers, along the Kukagami Lake road, then an additional 30 kilometers west along highway 17 (figure 1).

The main CNR (North Bay-Sudbury) line passes south of the Bugg Lake claims within a six kilometer distance. The nearest station along this line would be at Crerar. Float plane and helicopter services are available in Sudbury.

## 2.4 Topography and Vegetation:

The properties elevations vary from flat to moderately rugged with elevations varying from 270 meters at the surface of Lake Wanapitei, to 340 meters along the apex of the largest ridges.

Average relief across the properties is 60 meters. Outcroppings tend to be plentiful along these ridges with the Ashigami Lake property containing 10-15%, the Bugg Lake property with considerably <5% and approximately 10-20% exposure on the Red Rock claims. The remainder of the property areas is overlain by glacial drift, swamps and lakes. Lakes and swamps cover 30% of the Bugg Lake claims, 10-15% of the Ashigami Lake claims and <10% of the Red Rock claims.

The high areas tend to be mantled with thin to moderate thickness of jackpine, red pine, pine, poplar and birch. Areas of lower relief and those bordering water courses are characterized by spruce, cedar and alders. Overall drainage in the area is to the south and east.

## *3. PREVIOUS WORK*

**Ashigami Lake and Bugg Lake Properties:**

A search of the Ministry of Northern Development and Mines (MNDM) files, in Sudbury, indicates that the earliest confirmed staking on the **Ashigami Lake Breccia** was by R.J. Steacy of Sudbury in November, 1915 (claim S.3934). The breccia was subsequently restaked by Alex Dole in 1919 and 200 days of work were filed in 1920. The small pit located at the southern extremity of the breccia probably dates back to this period.

Renewed interest in the Ashigami Lake Breccia was stimulated by Northgate Exploration's 1978 production plan announcement for the Scadding Gold Mine.

In 1980, under an option agreement with J. Lee, Anglesea Development Ltd. conducted a power stripping programme on the Ashigami

Lake zone followed by a VLF-EM programme during the winter of 1981. No VLF response was noted over the Ashigami Lake breccia zone.

Ballard Resources Limited conducted geological mapping and bulk sampling of the breccia during the 1981 field season. The property was mapped in a cursory fashion, utilizing claim lines for control. Chip samples across the exposed sections of the breccia returned copper values up to 7% and gold values from trace to 0.27 oz/ton. A bulk sample taken from a 20m X 10m X 3-5m deep rock cut assayed 0.22% copper with negligible gold values.

In May 1983, J. Lee conducted backhoe trenching on the southeastern extension of the Ashigami Lake breccia.

The property was subsequently optioned to Midnapore Resources Ltd, who in the early summer of 1983 initiated an extensive geophysical programme including VLF-EM, magnetometer and self-potential surveys. Although several magnetic and electromagnetic anomalies were detected on the property the surveys failed to delineate the boundaries of the breccia zone. Midnapore initiated a diamond drilling programme in the late summer months of 1983. Four drill holes totalling 511 meters were completed in the vicinity of the Ashigami Lake breccia. Holes # M-3 and M-4 were collared in quartz breccia with hole M-3 extending the breccia to a vertical depth of 110 meters. Values in this hole included 0.017 oz/ton gold over a 3.05 meter length. No copper values are reported. Diamond drill holes #M-1 and M-2 were drilled on geophysical targets along the east edge of the breccia body.

In the summer of 1986, Flag Resources Ltd, drilled an undisclosed number of holes to probe an airborne EM conductor proximate to the

McLaren Lake Fault in what is now the northern units of the Ashigami Lake group. Low nickel and copper values with anomalous PGE values were obtained in brecciated wackes and Nipissing diabase (personal communication with Flag Resources staff). Two drill collars with corresponding core were encountered during the 1992 mapping programme. No accounts of this drilling were found in ministry assessment files.

Although various sections of the Bugg Lake Property have been periodically staked over the past years, a search of the Ministry of Northern Development and Mines assessment files reveal that little detailed exploration activity has occurred in the area.

The Bugg Lake property was covered by a regional airborne radiometric survey conducted by Gulf Minerals Ltd. in 1972. In 1982, Northgate Exploration Ltd, in an attempt to outline further reserves for the Scadding Gold Mine, conducted reconnaissance geological and geochemical (humus) surveys across the property which is now the Bugg Lake claims.

Old rock pits/trenches were encountered on the grid and along the northwest shore of Spar Lake during the 1992 exploration programme. Although not accounted for in the assessment files the pits appear to date well back due to their overgrown state.

A programme of geological mapping, sampling, hand stripping and prospecting were undertaken on the Ashigami Lake and Bugg Lake properties by the co-authors during the 1992 field season. The programme was made possible by assistance obtained from the Ontario Prospectors Assistance Program. Encouraging gold analyses in samples from both properties as well as samples collected along the boundary between the Bugg Lake and Red Rock Gold Mine properties were obtained.

Values as high as 10,000 ppb were obtained during the prospecting phase of the programme. The preliminary nature of the programme and budget limitations did not allow proper follow up work to be conducted in the areas of significant gold mineralization.

**Hazlett (Red Rock) Property:**

Due to the patented nature of the claims, very few records exist on the Hazlett Property, formerly the Red Rock Mine Property. The claim containing most of the work, S.5110, was originally staked in February, 1922 by G. Charsley and subsequently transferred to the Gold Nugget Mining and Development Company Limited in July of that year.

In 1922-23 four (4) test pits and stripping areas were excavated by the company. The largest of the pits measures 27 feet in depth. Between 1923 and 1925 a shaft was sunk to a depth of 160 feet and 1140 feet of workings were excavated at the 100 foot level by McMillan Development Company Limited. The shaft, located in the south-central claim #S.5110, was sunk in diabase just north of the greywacke contact. High grade ore was reported to have been taken from underground.

The property was acquired by J.D. Taylor in the late 1920's. The property was then optioned to Mid-Continental Goldfields Limited whom proceeded to conduct trenching on claims #16085, 16086, 16087, 16089 and 16092. The trenches exposed an extensive quartz-carbonate vein system along the diabase-greywacke contact. A pit was sunk to a depth of 20 feet on a hill in the north end of claim #16092.

It is believed that the work ceased at the mine when a forest fire destroyed the headframe and infrastructures. The property was then returned to J.D. Taylor.

The property remained inactive until 1984 when interest was renewed by the news of the developement of the adjoining Scadding Gold Mine.

From 1984 to 1986 Mr. Andrew Hazlett, on behalf of his wife, conducted a re-evaluation of the Red Rock Mine property. The exploration programme was periodic in nature, with most of the work conducted in the area of the shaft at the southeastern extremity of the property. The programme consisted of linecutting, pit/trench location and rehabilitation and sampling with fresh trenching, mapping and sampling. Limited double dipole geophysics was conducted in the area of these trenches. Mr. Yves Clement was personally involved in the exploration during 1986. Mixed, but encouraging results from the programmes allowed the property to be optioned in 1988 to Jarvis Resources Ltd.

In May of 1988, Jarvis Resources Ltd dewatered the shaft then mapped and sampled the workings. A surface sampling programme was conducted in the vicinity of the shaft. The underground programme found the gold values to be erratic and confined to local vein systems. The property was then returned to Mr. Hazlett in September of 1988.

The Hazlett property lay idle until the spring of 1992 when the co-authors conducted a *prospecting-reconnaissance mapping programme* covering an area of 400 X 600 meters along the common boundary between the Red Rock Gold Mine property and the Bugg Lake property. The programme was initiated due to the presence of numerous overburden trenches and pits along the boundary. Trench rehabilitation, washing and preliminary mapping and sampling returned values of up to 10,000 ppb gold.

## 4. REGIONAL GEOLOGY

The dominant regional geologic feature of the area is the Cobalt Embayment, a Huronian sedimentary basin located north east of the Sudbury Igneous Complex (figure 3). The area is dominated by sediments of the Huronian Supergroup which have been intruded by Nipissing gabbro sills and dykes which form part of the "Lake Wanapitei Nipissing Gabbro Intrusion" (figure 4). Archean basement rocks of the Superior Province occur to the west, while gneisses, schists and intrusive rocks of the Grenville Province occur to the south. Northwest trending olivine diabase dykes belonging to the Sudbury Swarm are also encountered in the claim areas.

A notable structural feature of the area is the McLaren Lake fault which follows a well defined topographic lineament extending southeasterly from Lake Wanapitei through Ashigami Lake, through the Ashigami Lake property up to the Grenville front near Crerar. The claim groups are covered by Geological Report #2, MacLennan and Scadding Townships by Jas. E Thomson (1961, Map No.2009) and Geological Report #213, Geology of the Wanapitei Lake Area by B. O. Dressler (1982, Maps 2450 and 2451).

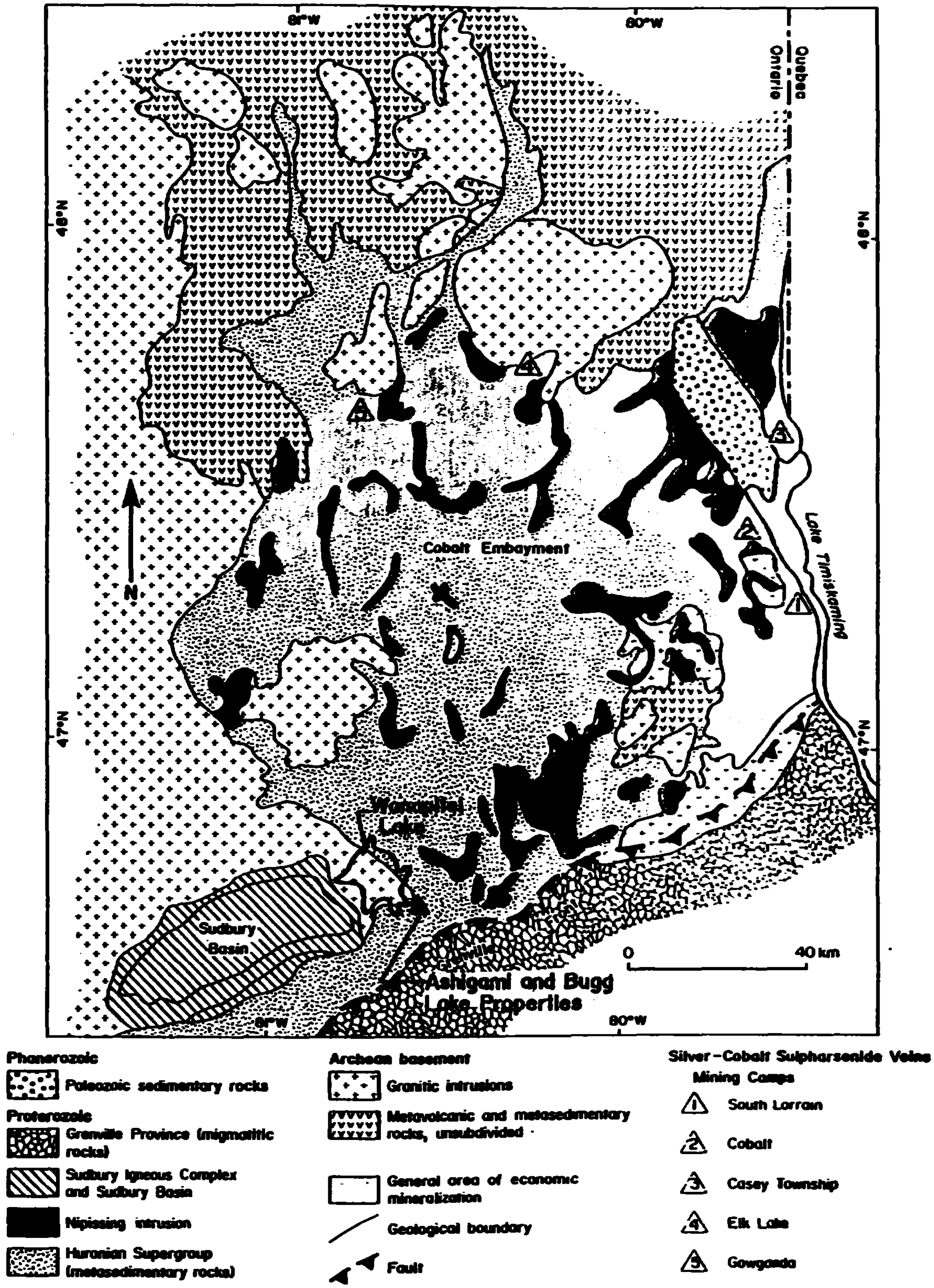


**FIGURE 3**

**REGIONAL GEOLOGY**

**MODIFIED FROM EASTON et. al. (1992)**

## *5. PROPERTY GEOLOGY (as observed from the 1992-93 OPAP programmes)*

Grids were established during this programme on both the Ashigami Lake and Bugg Lake properties. Grid locations with accompanying geology were provided for these properties in the final report of the previous OPAP claim. The properties geology maps are enclosed at the end of this report.

**Bugg Lake:**

The youngest rocks within the map area occur in the north and northeastern corner of the Bugg Lake claim group and consist of fine to medium grained diabase. The exact thickness of this unit is undetermined since two of its contacts occur north of the property boundary. The unit occurs in scattered outcrops and large ridges which form part of the sill-like "Lake Wanapitei Nipissing Gabbro Intrusion".

The diabase is in contact with a unit of interlayered greywacke, pebble wacke, conglomerate, argillite and arkose of the Gowganda Formation. This formation comprises the lowermost subunit of the Cobalt Group which is part of the larger Huronian Supergroup.

The diabase-metasediment contact is traceable between lines 5+00S and 5+00N along a 340-360 degree trend, with the contact occurring between 50 and 200 meters west of the baseline/claim boundary. Along line 6+00N the contact changes direction to approximately 090 degrees where it maintains a subparallel direction to line 7+00N, about 30-40 meters south. The western end of the contact is obscured by areas of heavy glacial drift. The contact is directly observed in a series of outcrops between lines 6+50N and 2+50N from 100 to 350 meters west of the baseline. The position of the contact in these outcrops is not precisely known since the diabase along the contact is finer grained and difficult to distinguish from the greywacke matrix. Large xenoliths of the greywacke are also observed within the diabase along the contact zone.

The trend of the Gowganda metasedimentary band mimics the diabase contact. The unit has an average width of 150 meters between lines 0+00 and 6+00N, with the zone pinching out to the west between diabase and Serpent arkose. To the southeast the Gowganda units thicken as the diabase-metasediment contact again swings easterly off the Bugg Lake property.

The southern and western contact of the Gowganda metasedimentary rocks is exposed in a series of small outcrops between lines 1+00S and 3+00S from 2+00W and 3+50W. The Gowganda units overlay a unit of predominantly pinkish arkose which belong to the Serpent Formation. The Serpent Formation metasediments comprise the uppermost subunit of the

the Quirke Lake Group within the Huronian Supergroup metasedimentary package. The entire western section of the Bugg Lake claims are underlain by arkoses of this sedimentary unit.

The general attitude of all the major lithologic contacts is the same with southeasterly dips in the southern portion of the grid and more northeasterly dips in the northern claims, were the contacts change from roughly northerly to easterly. Contacts between small interlayers of greywacke and arkose of the Gowganda Formation tend to support these findings.

Minor structural features were observed in the rocks of the Bugg Lake property. The most dominant feature is a series of small breccia zones contained within the sediments of both the Gowganda and Serpent Formations. The breccias are typically characterized by subangular to subrounded metasedimentary fragments in a fine grained matrix of iron carbonate +/- quartz. Locally the breccia matrices contain small amounts of chlorite and calcite. A zone of brecciated greywacke/pebble wacke was mapped along line 3+00S between 1+30W and 1+80W. The brecciation occurs in outcrops along a topographic low and is accompanied by moderate to strong alteration and quartz veining.

A broad area of outcrop with associated iron carbonate brecciation was encountered along the eastern side of Spar Lake. Breccias in these areas consist of arkosic fragments within matrices of iron carbonate +/- quartz. The outcrops locally have strong associated albite alteration of the wallrock.

A small overburden/rock trench located at 3+90N/3+40W exposed a narrow 30-50 centimeter wide unit of fine grained iron carbonate-calcite schist. The unit has a thick, rusty orange weathering halo of 3 to 5 centimeters. Minor quartz stringers are present within the schist unit. A single greyish white to black quartz vein is present along the contact between the schist and the hosting Serpent arkose. The vein pinches and swells to 25 centimeters and contains between 5-10% iron-carbonate. Schistosity in the unit trends 045 degrees and has a southeasterly dip of approximately 70 degrees.

Large zones of Sudbury-type breccia were noted during prospecting in an area between line 5+00S and 7+00S. The zones lie 50-100 meters east of the baseline, just east of the Bugg Lake claim boundary and consists of greywacke-arkose fragments in fine grained matrices of similar composition. Formation of these breccias may be related to processes producing the Bugg Lake Fault. These zones are also characterized by strong alteration, quartz veining and local sulphide mineralization. A similar breccia zone occurs in a large outcrop on a small point along the south end of Spar Lake. Minor quartz veining occurs in this zone.

Previous mapping has interpreted a major fault through the northern end of Bugg Lake (Bugg Lake Fault). No structural evidence was observed in the arkosic rocks adjacent to the assumed position of this fault during this programme although most of the rock in this area show some degree of alteration. The fault has an interpreted trend of 310-320 degrees.

Alteration on the Bugg Lake claims vary in type and intensity across the entire property. Weak degrees of alteration are typical of all rock types while zones of more concentrated alteration are often coincident to zones of well developed structure (ie: brecciation).

The weakest and most sporadic alteration occurs in the diabasic rocks. This unit is generally unaltered to very weakly altered with alteration consisting of weak fracture controlled and spotty hematite, calcite and chlorite.

Metasediments of the Gowganda and Serpent Formations tend to show increased degrees of alteration with the strongest alteration occurring in distinct zones. Greywackes and pebble wackes typically exhibit very weak pervasive chlorite +/- sericite alteration. Moderate to strong fracture controlled calcite, chlorite, epidote and hematite occur as isolated patches throughout the units.

Serpent Formation arkosic rocks typically contain small amounts of spotty, pervasive iron carbonate and hematite. The broad distribution of these minerals may suggest the presence of a large, pervasive alteration halo but is more likely a primary feature.

Several areas of moderate to strong alteration were encountered in the metasedimentary rocks of the Bugg Lake claim group during the 1992 mapping programme. All of the areas have related structural features such as zones of brecciation or fault associations.

The first area occurs just north of Bugg Lake, between lines 2+00S and 4+00S. Outcrops in the area are medium grained arkoses which lie just north of the interpreted Bugg Lake Fault. Alteration in the outcrops consists of moderate, spotty iron carbonate with associated quartz-iron carbonate veinlets. The iron carbonate occurs as subhedral to euhedral rhombs comprising up to 10% of the unit. Spotty zones of chloritization and albitization are also enccuntered in the outcrops adjacent to this fault position.

Strong carbonatization with associated quartz and quartz-iron carbonate veining is noted in and around the carbonate schist on line 4+00N at 3+40W. A second pit, 100 meter to the south, has a similar alteration package with the development of strong, foliation controlled sericite (sericite schist) and strong, spotty chloritization. Outcroppings or arkose within a 200 meter radius of these pits exhibit varying degrees of iron carbonatization, calcite alteration and albitization.

A large zone, measuring 350 meters X 350 meters, occurs along the east side of Spar Lake. Larger outcrops within the zone exhibit strong, fracture controlled albitization and moderate, fracture controlled hematization. Iron carbonate alteration varies from moderate to strong and occurs as subhedral rhombs. Quartz stringers are commonly associated with the iron carbonate. The southern edge of this alteration package is characterized by increased brecciation. Breccia matrices consist of iron carbonate with minor quartz stringers.

Moderate to strong albitization and iron carbonate alteration was encountered in most of the outcrops around the periphery of Spar Lake. Quartz-iron carbonate veinlets are frequently encountered within these outcrops.

Strong to moderate alteration is present in the Gowganda metasedimentary rocks between lines 1+00S and 6+50S. The alteration is typically associated with zones of Sudbury-type breccia and consists of moderate to strong, pervasive to semi-pervasive albitization. Zone of strong soda-metasomatism are fine grained, light brown to tan in colour. All primary textures and features of these rocks have been obliterated by the alteration making it difficult to determine the original composition of the units. Associated with the albitization is varying degrees of fracture controlled chlorite, calcite and iron carbonate. Quartz and quartz-carbonate veinlets are common throughout this alteration zone with contacts between veinlets and host rock displaying moderate to strong albitization.

Zones of significant sulphide mineralization are localized on the Bugg Lake property and tend to occur primarily within the metasedimentary rocks.

No mineralization was encountered in the diabase with the exception of a single locality along the Gowganda-diabase contact at 2+85N. Mineralization in this area consisted of 1-2% fracture controlled and spotty pyrite with minor amounts of malachite.

Most areas of sulphide enrichment appear to be associated with zones of increased alteration. Local outcrops of albitized Gowganda metasediment, from lines 1+00S and 6+50S, contain between 3-5% disseminated pyrite with trace amounts of blebby chalcopyrite. Similar percentages were encountered in quartz veining adjacent to the carbonate schist unit along line 4+00N. Spotty pyrite and chalcopyrite were noted in the surrounding outcrops.

The highest sulphide concentrations on the claim group occur in a large albitized outcrop of Serpent arkose along the west side of Spar Lake. The outcrop contains two open cuts which have 5-7% disseminated pyrite, with local accumulations to 20%. Spotty arsenopyrite is also noted within this mineralized zone.

**Ashigami Lake:**

The 1992 mapping programme has shown that a major portion of the Ashigami Lake property is underlain by metasedimentary rocks of the Gowganda Formation. Units within this sequence include greywackes, pebble wackes, argillites, arkoses plus minor "limestone". The Gowganda sediments are in contact with and overlie a unit of conglomerate which comprises a portion of the Bruce Formation. Dressler (1982) interpreted the contact between these units as fault controlled with a general attitude of 015-025 degrees. The contact was not observed in outcrop during field mapping.

To the northeast the Gowganda metasediments are in contact with a unit of medium grained diabase. The diabase occurs in a tongue shaped formation that trends roughly northerly between lines 3+00E and 4+00E. The contact changes direction to westerly between lines 0+00 to 3+00E from 4+50N to 6+00N. The diabase-sediment contact is observed in a single

outcrop that occurs 175 meters west of the property boundary at 5+75N. Scattered diabase outcrops were also noted in the southern half of the Ashigami Lake grid between lines 2+00E and 5+00E. The outcrops occur in a linear trend that is interpreted as a possible dyke off chute from the main diabasic sill.

Two units of significant lithologic interest are the calcareous metasedimentary unit "limestone" and the quartz-carbonate-greywacke breccia. The calcareous, metasediments were mapped in two separate outcrops at grid locations 9+00E/2+50S and 7+95E/5+90S. A well defined contact between this unit and Gowganda arkose is observed in outcrop along line 9+00E. In this region the contact appears strongly deformed due to tight, small scale folding. Further work is required in this area to determine it's true width, economic potential and relationship to the encompassing Gowganda wackes and arkoses.

The second unit of interest is a zone of quartz-carbonate-greywacke breccia with associated copper sulphide mineralization. A description of the unit is provided in the lithology subsection. The rock appears to occur in a roughly elliptical lens centered at 6+00E/6+20S. The unit is marked by silica flooding in strongly fractured greywacke and pebble wacke. A smaller, isolated outcrop of the same unit was located at grid co-ordinates 3+30E/5+40S. Overall dimensional shapes and breccia clast orientations suggest the zone has a roughly east-west attitude. The best exposure of the mineralized portions of the breccia occur in a large, blasted rock cut between lines 5+00E and 6+00E at 625 meters south.

The dominant structural feature on the Ashigami Lake grid is the McLaren Lake Fault which extends in a northwesterly direction across the central portion of the property to the northeast corner of the claim block.

A second fault is projected along the extreme southeast corner of the Ashigami Lake block and is believed to represent the contact between the

Gowganda Formation and Bruce Formation metasedimentary rocks. Both faults are characterized by low relief but are not reflected structurally in surrounding outcrops. Local small scale folding was evident along the contact between the wackes and calcareous metasedimentary rocks in the center of the property. Folds are tight with fold axes striking 110 degrees and plunging steeply to the south.

Zones of brecciation are the most common structural feature observed in outcrop, with most consisting of metasediment or diabase fragments in matrices of quartz and quartz-carbonate. Minor amounts of Sudbury-type breccia were mapped along the southwest corner of the Ashigami Lake grid.

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Weak degrees of fracture controlled to semi-pervasive alteration are typical of all Gowganda Formation rock types. Alteration in these units consists of chlorite, calcite, hematite, albite and iron carbonate with associated fracture controlled quartz and quartz-carbonate veining. Diabasic rocks to the northeast tend to be unaltered to weakly altered with fracture controlled hematite, calcite, chlorite and epidote. Moderate to strong calcite and epidote with occasional quartz stringers are noted in the diabase adjacent to the Gowganda contact.

No alteration was observed in limited outcroppings of the Bruce Formation rocks.

Four zones of significant alteration were highlighted in the Gowganda metasedimentary rocks during geological mapping. The first occurs along the southern and western edge of the quartz-carbonate-greywacke breccia. Rock units in the area vary from wackes to arkose with alteration consisting of local, moderate to strong, pervasive to semi-pervasive albitization. Zones of strong, spotty to fracture controlled hematite with fracture controlled quartz veining common. A single exposure of argillite with 15% quartz stringers was mapped at 3+20E/8+30S. The units in this area texturally and compositionally resemble the quartz-carbonate-greywacke breccia.

A second broad area of scattered, locally altered greywacke outcrops was outlined between lines 7+00E and 10+50E at 1+50S to 8+00S. Outcroppings exhibit moderate to strong, fracture controlled, spotty and semi-pervasive albitization and iron carbonatization. Weaker degrees of fracture controlled to spotty chlorite, calcite and hematite are also noted. Further work is required to determine if the strongly calcareous "limestone" unit within the greywacke is of primary or secondary origin.

A third area occurs between lines 5+00E and 6+00E at 5+00N. The units consist of greywacke with interlayered arkose. Alteration in the units consists of moderate to strongly pervasive albitization, with weak to locally strong chloritization. Local iron carbonate rhombs are encountered in the outcrops. The high degrees of alteration in this zone may be directly linked to the presence of the northwesterly trending McLaren Lake Fault which lies approximately 50 meters to the east.

The last area of significant alteration occurs within diabasic outcrops along the Gowganda-diabase contact. Alteration in this area consists of weak to moderate fracture controlled calcite with strong, patchy epidotization.

Two zones of sulphide mineralization were observed on the Ashigami Lake property. The majority of the property contains barren outcroppings of metasediment and diabase with sparce pyrite, chalcopyrite and malachite.

The strongest mineralization occurs in the quartz-carbonate-greywacke breccia between lines 5+00E and 6+00E. The mineralization consists of vuggy infillings and veinlet controlled chalcopyrite, pyrite and malachite. Earlier documentation reported values of 0.22% copper from a bulk sample taken from an open cut and 0.27 oz/ton gold from chip samples of the mineralized breccia (J.P. Jewell, 1983, assessment report). Observations by the co-authors of the zone noted that the mineralization in this breccia appeared to be concentrated on the northern side of a well defined 110 degree trending fracture. The fracture may represent a fault as strong chloritization and slickensides are found along the surface.

The second zone of mineralization occurs within and adjacent to the calcareous units of line 9+00E and 7+90E. Mineralization in this region consists of blebby chalcopyrite and pyrite with local accumulations to 7% combined sulphides. Lesser degrees of mineralization are encountered in outcrops around this area.

## 5.2 Lithological Descriptions:

### Quartz-Carbonate-Greywacke Breccia:

This unit occurs along a small, 100 square meter area within the southern portion of the Ashigami Lake claim group, between lines 5+00E and 4+00E at approximately 625 meters south. The unit consists of angular greywacke fragments within a matrix of quartz, carbonate and local sulphide pods. The fragments are up to 2.0 meters in diameter and are fine grained, light medium greenish grey in colour. No primary sedimentary features are observed in the fragments. Local zones of weakly brecciated greywacke with little or no quartz-carbonate matrix are also included within the limits of the quartz-carbonate breccia description. Minor subrounded to angular, granitic clasts are infrequently encountered in these portions of the breccia zone. Sections which lack the quartz-carbonate matrix are generally restricted to small areas of less than 4 meters in width.

Alteration of the greywacke fragments consists of weak to moderate chloritization with the strongest chlorite alteration present along fragment boundaries. Moderate to strong albitization is observed in the massive greywackes on the west and southwestern edges of the breccia zone. Albitization is not directly observed in the fragments contained within the breccia. The matrix of the breccia consists of a mixture of milky white quartz with 10-30% carbonate and iron/copper sulphide. The matrix occurs as stockwork like veinlet and vuggy infilling with the carbonate occurring as coarse subhedral iron carbonate blebs and lesser amounts of calcite. Drusy portions of the breccia contain euhedral crystals of both carbonate and quartz. Trends to the quartz veinlets and preferred orientations of the greywacke fragment suggest the zone may have an east-west attitude.

Sulphide mineralization consists of pyrite, chalcopyrite +/- bornite. Areas of malachite staining are present throughout a large pit which measures 20m X 10m X 5m (deep). Chalcopyrite and pyrite mineralization appears to be concentrated along the northern face of this pit with local accumulations reaching 20% chalcopyrite +/- pyrite with possible minor bornite.

Nipissing Diabase:

Gabbroic rocks occur on both the Ashigami Lake and Bugg Lake claim groups and consist of a series of outcrops which comprise a small portion of the open ring shaped "Lake Wanapitei Nipissing Gabbro Intrusion".

The unit varies from fine to medium grained and is subequigranular in character with dark greenish grey weathering and salt + pepper greyish colouring on the fresh surfaces. Fine grained portions of the gabbro are typically encountered adjacent to the contact with the surrounding metasediments of the Huronian Supergroup. The units appear to consist of a mixture of roughly equal amounts of white plagioclase feldspar and subhedral greenish grey pyroxenes. Locally the diabase is porphyritic in character with rosette-like feldspar phenocrysts up to 1.5 cm in diameter present.

Alteration in the gabbro tends to be weak, consisting of minor spotty to fracture controlled epidote, chlorite and carbonate. The unit locally contains trace amounts of pyrite +/- pyrrhotite and is only occasionally very weakly magnetic.

Two additional phases of the gabbro were mapped on the Red Rock property during the 1993-94 OPAP field programme. The first is a pegmatitic phase with mineralogy similiar to the above mentioned gabbros but of much large grain size. Amphiboles in the pegmatites were observed to reach 25 centimeters in length and 4 centimeters in width. Pegmatitic gabbros consist of 30-35% mafic minerals and 60% feldspar. Some quartz grains were note in the pegmatite unit along L9+00N/0+35E on the Red Rock property. In this area quartz contributed about 5% of the rock composition.

The third phase of the gabbro is a leucocratic variety which consists almost entirely of feldspar. The unit is white to pinkish grey in colour with <5%, locally to 10%, mafic minerals. This phase varies from medium grained to pegmatitic with occassional pyrite noted.

Contacts between all three phases was observed in trench L9+00N/0+25E and were found to be sharp giving the unit a layered appearance.

## Metasediments of the Huronian Supergroup

### Bruce Formation:

The rocks of the Bruce Formation form the lower most sequence in the Quirke Lake Group and are only observed in the lower southeast corner of the Ashigami Lake claim block.

The unit consists of conglomerate and pebbly wackes which are characterized by the presence of pebble sized clasts in a greywacke matrix. Pebbles tend to be subrounded to angular in character with granitic compositions predominating. Minor quartzite and metavolcanic fragments are also encountered in the unit. The clasts are supported by a matrix of very fine grained, dark grey to black wacke consisting of quartz, feldspar, chlorite and possible sericite.

### Serpent Formation:

The Quirke Lake Group is further exposed in the map areas by the presence of Serpent Formation arkoses and wackes. These rocks cover the entire west and southwest portions of the Bugg Lake claim group.

The arkosic rocks predominate and consist of fine to medium grained, greyish pink to locally red mixture of quartz and feldspar with possible minor sericite. In outcrop scale the unit locally appears finely laminated and crossbedded with possible thick bedding being present over the entire area of arkose exposure.

The wackes are only exposed between Bugg Lake and Spar Lake. These rocks are a fine grained, grey mixture of quartz, feldspar and chlorite. Minor fragments of rock, quartz and feldspar are present as well as local, subrounded granitic clasts. During earlier mapping programmes interlayering of the wackes and arkosic rocks was observed in the area between the two lakes.

Gowganda Formation:

The greatest portion of the Ashigami Lake map area is underlain by rocks of the Gowganda Formation which is the lowest member of the Cobalt Group within the Huronian Supergroup. Rocks of the Gowganda Formation consist of a mixture of greywacke to conglomerate, argillite, arkose and minor "limestone".

Greywacke and conglomerate matrices are fine grained, greenish grey in colour, consisting of quartz, feldspar, chlorite and rock fragments. Wackes vary from massive to weakly laminated. Variable amounts of subangular to subrounded, granitic clasts are present in the unit as greywackes grade into zones of pebbly wacke. Clasts vary from a few millimeters to 5 centimeters in diameter. Conglomerates are marked by increases in clast size and abundance, with clasts up to 30 centimeters in diameter not uncommon. Layering in the wackes consists of alternating dark, siliceous bands with lighter more feldspar rich bands. Wackes with well developed layering tend to have the fewest pebbles.

Argillites are very fine grained, dark greenish grey rocks that are moderate to strongly layered and/or foliated. Compositionally the argillites consist of chlorite and clay minerals.

Arkosic interlayers are frequently observed within the greywacke-pebble wacke package. Arkoses are medium grained, pinkish white to grey rocks that consist of a mixture of quartz, feldspar, chlorite +/- carbonate. Locally the arkosic interlayers display small scale bedding or crossbedding.

Calcareous Metasediments:

Two (2) small, isolated exposures of calcareous metasediments occur on the Ashigami Lake grid. The unit occurs as an approximately 1.5 meter wide bed/band intercalated within the Gowganda Formation wackes-arkose sequence. The unit appears strongly folded to tortuously contorted in nature.

The rock consists of greyish-white to buff, fine to very fine grained, homogeneous, calcareous sediment with a strong rusty brown weathering. The unit is locally laminated with lamination planes being defined by thin blackish silt and/or manganese layers. The laminations in the unit vary from 2 to 5 millimeters in width.

Erratic quartz-iron carbonate stringers are present throughout the unit. Alteration appears to consist of moderate to strong, pervasive iron carbonate with medium to coarse grained iron carbonate locally comprising the entire unit. Trench mapping during the 1993 OPAP programme suggests that this unit may be a large zone of intense carbonatization as the geometry of the unit is not consistant with the metasedimentary rocks which host it.

## 6. 1993-94 OPAP PROGRAMME

### 6.1 Programme Description:

During the spring of 1993 a follow up OPAP programme was proposed for the Ashigami Lake and Bugg Lake claim groups. The claims are currently held in good standing by the co-authors. The programme was expanded to incorporate a group of patient claims which comprise the area between the Ashigami Lake and Bugg Lake properties. Permission was obtained from Mr. Hazlett to conducted a portion of the OPAP programme over these claims, currently known as the Red Rock Gold Property (Hazlett Property). Proposed work consisted of a double-dipole electromagnetic geophysical surveys on the Bugg Lake and Ashigami Lake properties. The surveys were conducted across zones of strong alteration, mineralization and areas of favourable geology as well as those areas which produced anomalous gold values from the 1992-93 lithogeochemical sampling programmes. In addition prospecting and beep-mat prospecting was completed on the Red Rock claim block with an emphasis along the gabbro-metasedimentary rock contact. The results of this work are incorporated into the property geology of the Red Rock property and are illustrated on the accompanying Geology/Sample Location Map (1:2000).

A power trenching programme of 50 hours was split amongst the Ashigami Lake and Red Rock properties with work being complete along zone of alteration and mineralization. Area within the Ashigami Lake claims which returned very strongly anomalous gold values from previous lithogeochemical sampling were also stripped and/or trenched. Several test pits were also excavated in an attempt to define the eastern extension of the quartz-greywacke breccia zone for which the

Ashigami Lake claims were staked. Trenching on the Red Rock property was set up to investigate the zone of intense quartz-iron carbonate alteration, the gabbro-metasedimentary rock contact and a mineralized, feldspar rich phase of the gabbro intrusive. A total of 15 overburden pits and trenches were excavated on the two(2) properties during this season's programme. Trenching was followed by washing, detailed mapping and sampling were necessary. Result for this phase are discussed in the trenching section of this report. Several trenches and pits which had been previously excavated were rehabilatized for geological investigation and mapping.

In addition the entire Red Rock property was mapped at a scale of 1:2000. Extra man days were spent establishing the Red Rock grid plus flagging and cutting of bush roads into the new trenching sites. A detailed outline of man days is given in the daily report.

### 6.2 Red Rock (Hazlett) Property Geology:

Line mapping was completed over the entire area of the Hazlett claim group at a scale of 1:2000. A total of 27 line kilometers of detailed mapping were completed during the programme. The main purposes of the mapping phase were two-fold. First was to inspect a large zone of intense iron carbonate alteration with associated quartz veining and historical anomalous gold values that had previously been worked by surface trenching, sampling and underground development. The second was to correlate the geology of the Ashigami Lake and Bugg Lake properties through the Hazlett claims. Mapping was conducted along lines of 100 meter line spacing with intervals of 25 meters along each line. A north trending baseline was established through the center of the Hazlett block with flagged crosslines extending east and west to the claim boundaries. Some of the detailed geology through the iron carbonate alteration zone was obtained by rehabilitation and detailed geological mapping of old trenches. The results of the mapping programme are provided on the Red Rock Property geology map in the back of this report and are discussed in the following subsection.

The 1993 programme has shown the Red Rock claim group to be underlain primarily by rocks of the "Lake Wanapitei Nipissing Gabbro Intrusion" and to a lesser extent metasedimentary rocks of the Gowganda Formation.

Two thirds of the property is covered by phases of the gabbro complex which include fine-medium grained gabbros, typical of the Red Rock, Ashigami and Bugg Lake properties, and local zones of porphyritic gabbro, pegmatitic gabbro and leucocratic gabbro. Decriptions of each phase are provided in the lithological descriptions subsection of this report. The remainder of the property is covered by fine to medium grained, pinkish arkose and fine grained, greenish grey wackes. Minor pebble wacke is present in the metasedimentary rock sequence along the southwestern side of the claims.

The gabbros are observed in contact with Gowganda arkose, wackes and pebble wackes along the central, southern and northeastern corners of the grid. The contact is well defined but appears very irregular forming a V-shaped pattern as you proceed from west to east across the property. The irregular nature of the contact is indicative of the shallow, sill like character of the overlying gabbro intrusion.

Several outcrops in the northeastern portion of the map area show the gabbro directly in contact with metasedimentary rocks. Xenoliths of greywacke are observed in the gabbros in this locality adding to the erratic contact pattern. Bedding directions in the underlying metasediments show moderate northerly dips of between 50 and 60 degrees.

Shearing was noted in the gabbros east of the baseline between L16+00N and L17+00N. Shears show attitudes of 050-088 degrees with dips varying from 60N to 60S. Sheared gabbros often have associated foliation controlled quartz stringers and local pyrite enrichment with rare chalcopyrite infrequently observed. Further shearing was encountered in the gabbros along L13+00N between 3+50W and 4+50W. The zone had previously been investigated with overburden and rock pits. Shearing in the area trends 065-090 and dips between 60 and 70 degrees northeast. Quartz-iron carbonate veining, chlorite, calcite, talc and sericite? were noted to be associated with this shear. Trace-5% pyrite, local pyrrhotite and rare chalcopyrite are encountered in these sheared gabbros. Several samples were obtained from this zone and include samples # 228504-228514. Analytical values from these samples returned 9 ppb - 5930 ppb gold, <10 ppb - 98 ppb platinum and 4 ppb - 96 ppb palladium. Smaller shears occur throughout the gabbro and are often associated with carbonatization and very weak sulphide mineralization.

Minor brecciation is noted in the arkose and wackes along the metasedimentary-gabbro contact. These breccias are often associated with alteration and local mineralization. Fragmentation of all rock units is observed in breccias along the southern, nose shaped portion of the contact. Brecciation of the arkosic units in this region is associated with pervasive albitization, chloritization and quartz-iron carbonatization. Brecciation in the gabbros contains pervasive calcite, iron carbonate and quartz-iron carbonate veining. Rare pyrite is noted in these gabbros.

Sudbury breccias are found in the meta-arkoses and wackes toward the southwestern corner of the Red Rock property. The breccias occur along a trend parallel to a large topographic low and are traceable in a north and easterly direction onto the Bugg Lake claims. A second zone of Sudbury breccia is found along the gabbro-metasedimentary contact between L9+00N and L10+00N. In all cases the breccias show strong spatial relationships with zones of moderate to intense pervasive albitization.

Alteration and mineralization on the Red Rock property appears to show a strong association with one or both of the following features:

1- The gabbro-metasedimentary rock contact.

2- Structural features such as shearing and brecciation.

Variable degrees of alteration have been mapped in all rock units along the gabbro contact as well as within zones of shearing and brecciation associated with the contact. Fracture controlled hematite, calcite, chlorite and epidote are common alteration minerals along the contact within the gabbroic suite of rocks. Several locations along this zone also contain stringers and veinlets of quartz. Pyrite is the dominant sulphide phase in the gabbros with local, rare pyrrhotite and chalcopyrite infrequently found. A trench at L9+20N/1+80E was noted to contain upto 5% pyrite, 2% chalcopyrite and rare arsenopyrite.

The strongest alteration within the metasedimentary rocks occurs along the gabbro contact where the units exhibit the development of Sudbury breccia. In these regions the arkoses and wackes exhibit moderate to intense pervasive albitization. The best albitization is observed in the units along the southwestern and eastern margins of the property. Traces of finely disseminated pyrite were also encountered in these breccias. Albitization with quartz stringers and iron carbonate is also observed in the arkose and wackes south of the gabbro contact. The alteration zone extends from the contact to the extreme southern claim boundary. Rare, locally trace, pyrite occurs within the altered metasedimentary rocks and their associated quartz veinlets.

The largest alteration zone on the Red Rock property occurs in the south-central portion of the claim block and is highlighted by a complex system of gold bearing quartz-iron carbonate veins and masses as well as breccias located within schistose and strongly chloritized gabbro. The vein system extends from the south, near the gabbro-wacke contact, north of the shaft along a roughly 030 degree trend for a traceable length of 600 meters. The numerous, locally abundant, quartz-carbonate veins are located within narrow shear zones whose attitude varies from 330-360 degrees with a 50 degree easterly dip. The veins vary in width from 5 centimeters to 1.5 meters. Narrower veinlets tend to be discontinuous in character while veinlets >20 cm in width are traceable over distances of >100 meters. The veins consist of widely varying proportions of quartz and Ca-Mg-Fe carbonate (breunnerite). Rare to locally trace-2%, finely disseminated pyrite, chalcopyrite, arsenopyrite, magnetite and specularite are present within and adjacent to the veins. Historical data suggests that gold mineralization is present as microscopic grains associated with the sulphide mineralization and to a lesser extent as free gold. Previous sampling of old overburden trenches in this zone returned values of 300-10,000 ppb gold.

## 6.3 1993 Power Trenching Programme:

During the fall of 1993 a small programme of power stripping and trenching was initiated on the Ashigami Lake and Red Rock properties. The work was complete by Mainville Lumber of Chelmsford, Ontario, on behalf of the OPAP recipients. The programme involve stripping and trenching in areas of favourable geology and around zones were anomalous gold values had been obtained during the previous years lithogeochemical sampling. Additional trenching was completed on the Red Rock Property along previously untested horizons which had shown some association to gold enrichment. A total of 50 hours was used and a combination of 14 zones were excavated on the two properties. Of the 15 trenches/pits, 9 of these areas occur on the Ashigami Lake claim block with the remaining 6 occurring within the Red Rock claim boundaries. Stripped and trenched areas were then mapped and lithogeochemical samples taken from interesting units. The results including geology and sampling are provided in the remainder of the trenching subsection.

### Ashigami Lake Trenching:

The majority of the trenching hours were spent in areas of interest within the boundaries of the Ashigami Lake claim block. A total of 9 test pits/trenches and stripped areas were excavated. Four shallow test pits were excavated east of the quartz-greywacke breccia zone. The pits occur from L6+00E to 6+85E between 5+70S and 5+25S. Shapes varies from round to rectangular with depths from 1.0 to 4.0 meters. All pits reached bedrock and confirmed the extension of the quartz-greywacke breccias that had been mapped further to the west. Unfortunately unlike this western zone of brecciation no significant sulphide mineralization was found in either of the new test pits. The locations of these four pits is provided in figure 4.

Trench L8+00E/6+00S:

A small, flat lying exposure of intensely carbonatized, deeply weathered material was encountered at this locality during the 1992 OPAP programme. Figure 5 (in back of report) illustrates the geology, sample locations and geometry of the trench. The unit was originally mapped as a calcareous metasedimentary rock unit but may actually represent an extensive zone of carbonatization. The best exposure corresponds to the northwestern extremity of this trench. A double-dipole anomaly was outlined along the trench's northwestern.

The trench consists mostly of strongly-intensely altered/deformed metasedimentary rocks. The upper half of the trench consists of strongly carbonatized and/or albitized pebble wackes, with only a few isolated patches of recognizable wacke material within the alteration zone. A large ridge of lesser altered pebbly wacke is present approximately 5 meters northwest of the trench's northwestern boundary. Along the northwestern edge of the trench rock consists of

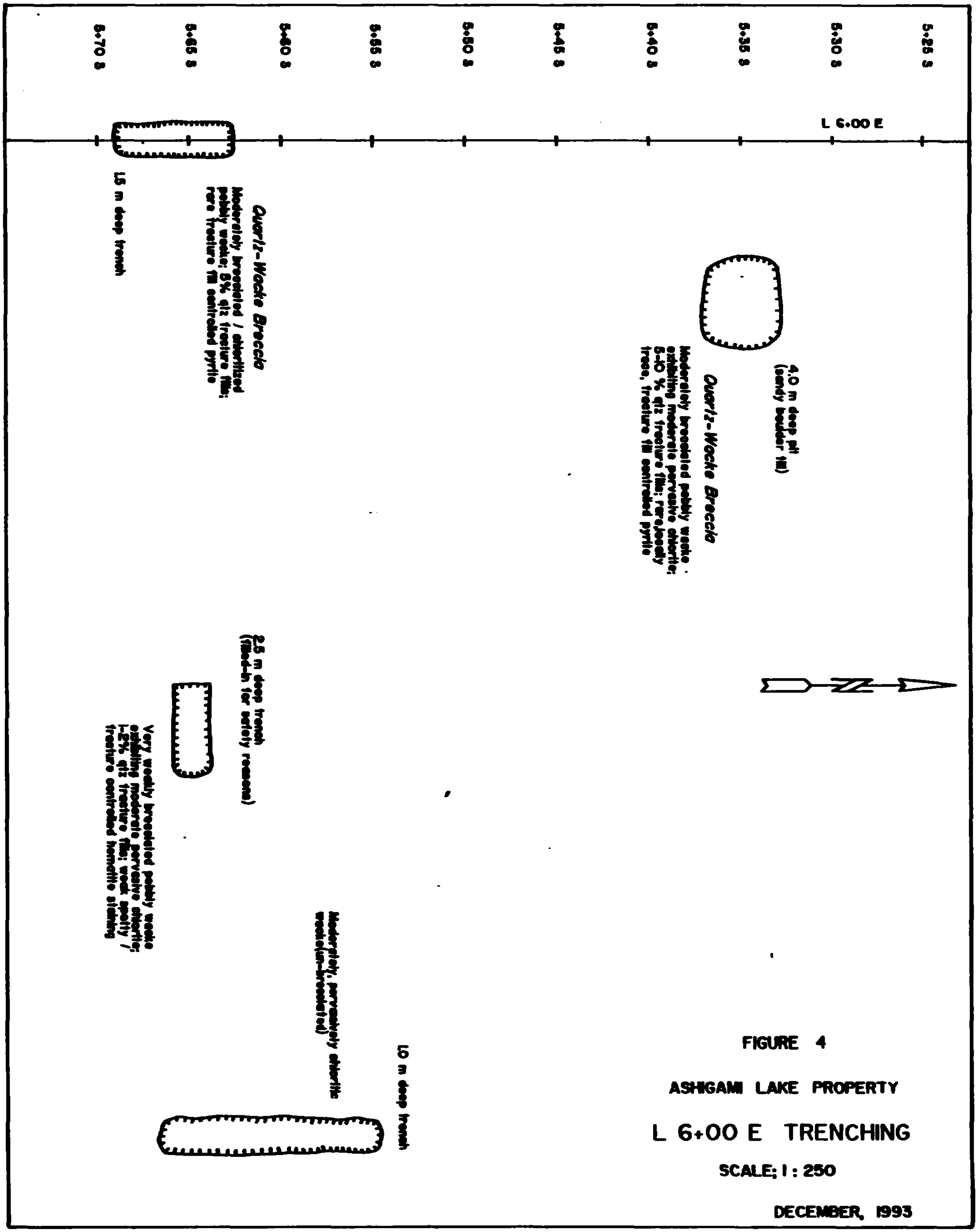



FIGURE 4

ASHIGAMI LAKE PROPERTY

L 6+00 E TRENCHING

SCALE; 1 : 250

DECEMBER, 1993

intense, pervasively carbonatized (iron carbonate and calcite) and albitized rock (wacke?). The unit is deeply weathered exhibiting a 2-10 centimeter wide orangy-brown weathering rind. Rare, locally trace, fine grained, brassy coloured, disseminated pyrite is noted within the iron carbonate rich rock. Composite chip sample # 228526 collected from the zone yielded 174 ppb gold.

The southern half of northeastern portion of this trench consists of sheared/brecciated, strongly albitized/carbonatized wackes. Carbonatization consists of iron carbonate and calcite. The exposure is also characterized by moderate foliation and fracture controlled chlorite and hematite. The central portion of the area is strongly foliated to sheared with schistosity @ 010 degrees and subvertical dips. Shearing includes a 30 centimeter section of crenulated chlorite-pink carbonate schist. An irregular pod (1.0 meter in diameter) of brecciated and chlorite flooded, albitized rock containing 2-5%, locally 10%, brassy pyrite occurs at the northern extremity of the area. Composite chip samples # 228522 and # 228525 returned 672 ppb gold and 622 ppb gold respectively. Chip sample # 228523 collected along the narrow chlorite-pink carbonate schist zone yielded 16 ppb gold.

The northern half of the northeastern portion of the trench consists of strongly albitized and carbonatized rock that also exhibits crude layering/banding. The unit is very fine grained, salmon pink to tan coloured and brittle in character. The banding, trending 355/85E, is defined by alternating tan to salmon pink material. The area is predominantly sulphide barren but for a local zone along the areas northwestern extremity. This area contains

5-15%, medium grained, brass coloured disseminated and band controlled pyrite. Composite chip sample # 228524 collected from this pyrite rich zone returned an analysis of 160 ppb gold.

The central portion of the trench consists of strongly albitized, moderately carbonatized wacke? The altered rock typically contains trace-5% small iron carbonate rhombs. Chlorite and hematite are generally restricted to zones of brecciation and foliation. The southern extremity of the trench consists of strongly albitized arkose? which also exhibits weak-moderate, spotty fracture controlled iron carbonate and chlorite.

Trench L8+15E/5+68S:

This trench is located on the north-east flank of trench L8+00E/6+00S. It is oriented roughly east-west with dimensions of 15 meters X 4 meters. Overburden in the area was shallow with trench depths of 1 to 2 meters. Figure 6 shows the geology and geometry of the trench.

Two main lithologies are present in the trench. The first is a small, discontinuous zone of fractured, milky white quartz which occurs toward the center of the trench. Mapping shows the unit to be a local pod which could not be trace in any direction across the trench. The quartz may also represent a plunging quartz rod but further investigation would be required. Minor fracture controlled iron carbonate is associated with the quartz but no visible sulphide mineralization was found. Grab sample # 227977 taken from the quartz pod returned a value of 4 ppb gold.

The eastern end of the trench is dominated by fine to medium

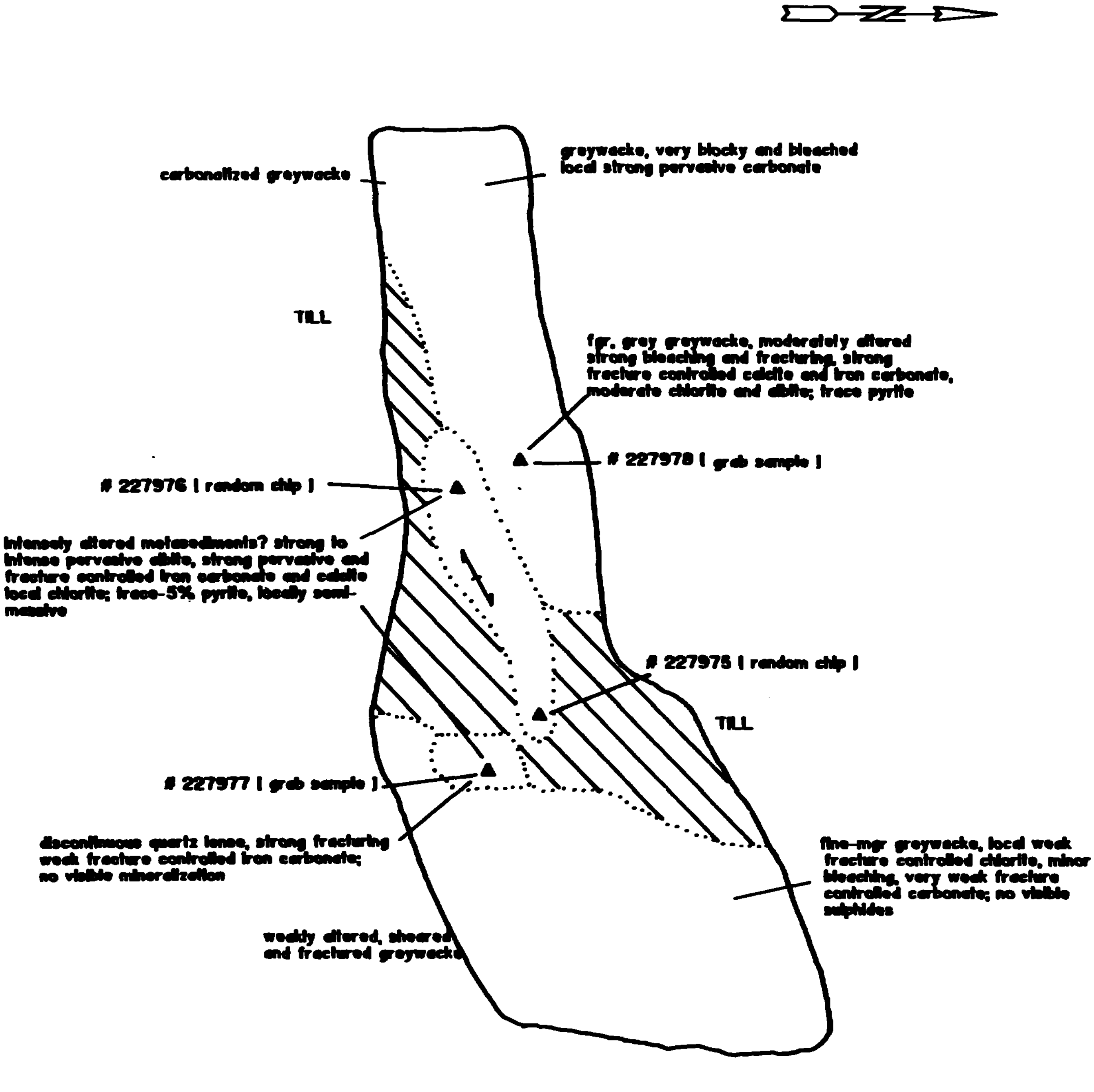



FIGURE 6

ASHIGAMI LAKE PROPERTY

L 8+15 E / 5+68 S TRENCH

Scale: 1 : 100

grained, fractured and jointed greywacke. Locally the wackes are bleached which reflects spotty fracture controlled calcite and iron carbonate. Minor fracture controlled chlorite was also found.

The western end of the trench consists of fine grained, bleached wackes that have undergone local zones of strong fracture controlled calcite, iron carbonate and chlorite alteration. Spotty pods of moderate pervasive albitization are also associated with the wackes in this region. Sample # 227975, taken of the strongest altered portions of the wackes in this area produced a gold value of 548 ppb.

A narrow 5 meter by 1 meter pod through the center of the trench contains strong to intensely altered metasedimentary rocks. Original textures and colours have been destroyed so identification is not possible. The unit exhibits intense pervasive albitization, strong fracture controlled iron carbonatization and calcite alteration with spotty fracture to shear controlled chloritization. The zone contains trace-5%, finely disseminated pyrite which is locally present as semi-massive sulphide mineralization. Sampling of the unit was completed with two chip samples # 227975 and # 227976. Analysis of these samples returned values of 548 ppb and 2160 ppb gold respectively.

<u>Trench L8+00E/0+25N:</u>

This trench occurs toward the center of the Ashigami Lake claim group in an area of strongly altered Gowganda arkose and greywackes. The zone is also marked with anomalous magnetic and double-dipole EM geophysical responses. The trench extends over a length of approximately 70 meters along L8+00E with an average width of 1-2 meters. The geology and geometry of the trench is given in figure 7.

The entire trench is underlain with metasedimentary rocks that range from meta-arkose to mudstones. The prominent rock type is fine grained, pinkish yellow arkose. The unit varies from weakly bleached to weakly albitized. Albitization is spotty to locally pervasive and occurs in patches throughout the arkose unit. The arkose also exhibits weak fracture controlled chlorite and calcite. Iron carbonate and brecciation of the arkose is observed in the southern end of the trench. Sample # 227980 was taken of the brecciated iron carbonate rich arkose. The sample returned a value of 4 ppb gold. Grab sample # 227979 was taken of the mudstone weakly altered mudstone unit and returned a value of 4 ppb gold.

<u>Trench L8+25E/BL0+00:</u>

This is a small zone of stripping across an area of outcropping mapped during the 1992-93 OPAP programme. The rock units consist of strongly altered arkose and wackes. The area lies slightly east of trench L8+00E/0+25N (figure 8) and displays very strong fracturing and blockly character.

The rocks consist of medium grained to aphanitic, altered arkose with minor interlayered wacke. The units vary from grey to yellow with zones of strongest alteration often appearing banded. Alteration consists of moderate to intense pervasive albitization, spotty iron carbonatization and local fracture controlled chlorite and hematite alteration. Brecciated segments of the wacke are associated with the strongest degrees of alteration and may be a indicator of a fault zone to the east. No mineralization was observed during mapping and

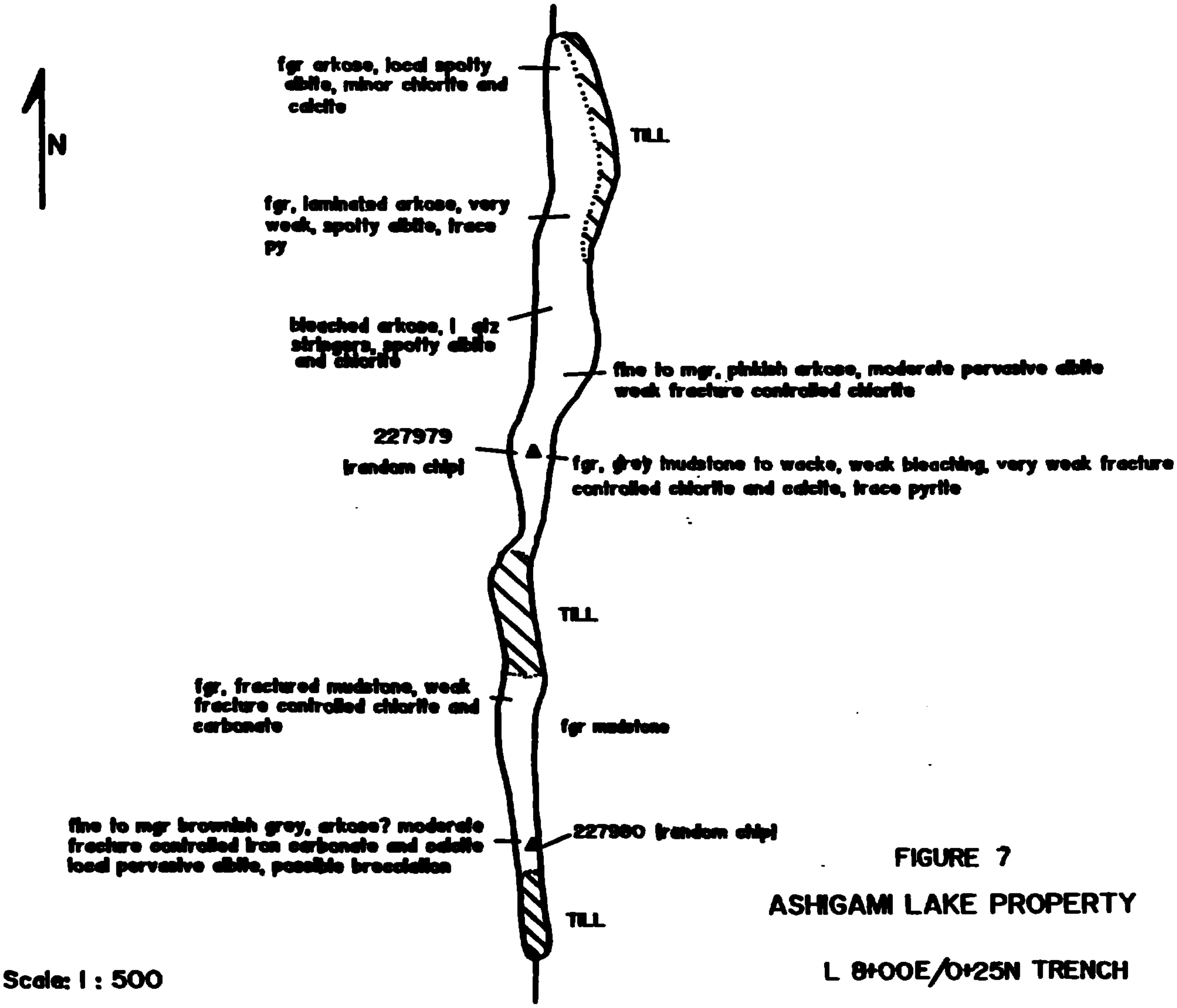



FIGURE 7

ASHIGAMI LAKE PROPERTY

L 8+00E/0+25N TRENCH

Scale: 1 : 500

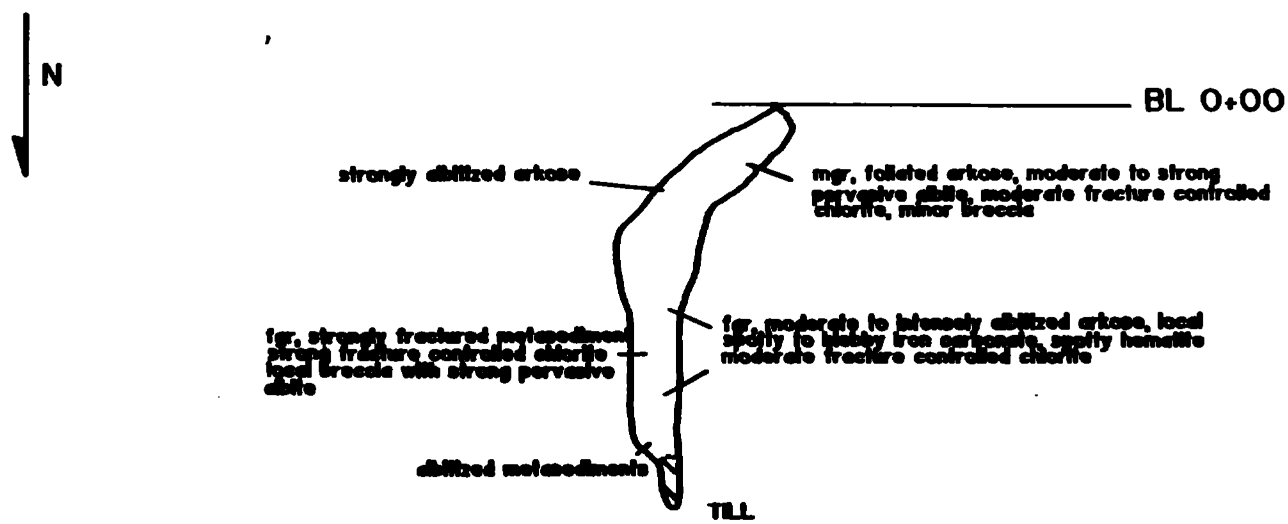



FIGURE 8

ASHIGAMI LAKE PROPERTY

L 8+25E/B.L. 0+00 TRENCH

Scale: 1 : 500

sampling had been completed in the previous years programme.

Trench L9+00E/2+50S:

This locality yielded a strongly anomalous (5180 ppb) gold value during the previous years OPAP programme. The anomaly was obtained from an intensely carbonatized, pyrite bearing unit occurring along the flank of a ledge shaped outcrop. The locality was subjected to extensive trenching/stripping in an attempt to delineate the auriferous zone further. The geology and geometry of the trench is provided in figure 9.

Due to the ledge-like nature of the subcrop and extensive glacial drift cover present along the north edge of the trench area, the carbonatized zone was only partially delineated. The calcareous rock unit consists of strongly folded/contorted, intensely carbonatized (iron carbonate +/- calcite) material with rare-trace brassy coloured pyrite. The pyrite locally reaches 5-10% and occurs as small pods from 2-10 centimeters in diameter. Rare, locally trace, disseminated chalcopyrite is also present. The west-north-westerly trending zone averages approximately 2.0 meters in width. Small scale folds within the iron carbonate rich portion typically exhibit steep, 70 degree, easterly plunges. A representative chip sample # 228527 of the material in question returned a value of 4420 ppb gold. The auriferous iron carbonate zone occurs within brecciated and intensely albitized metasedimentary rocks. The rock is very fine grained, olive-green to tan in colour, crudely banded and very blocky in nature. The northern extremity of the trench is also characterized by moderate, locally strong, semi-pervasive iron carbonate alteration and

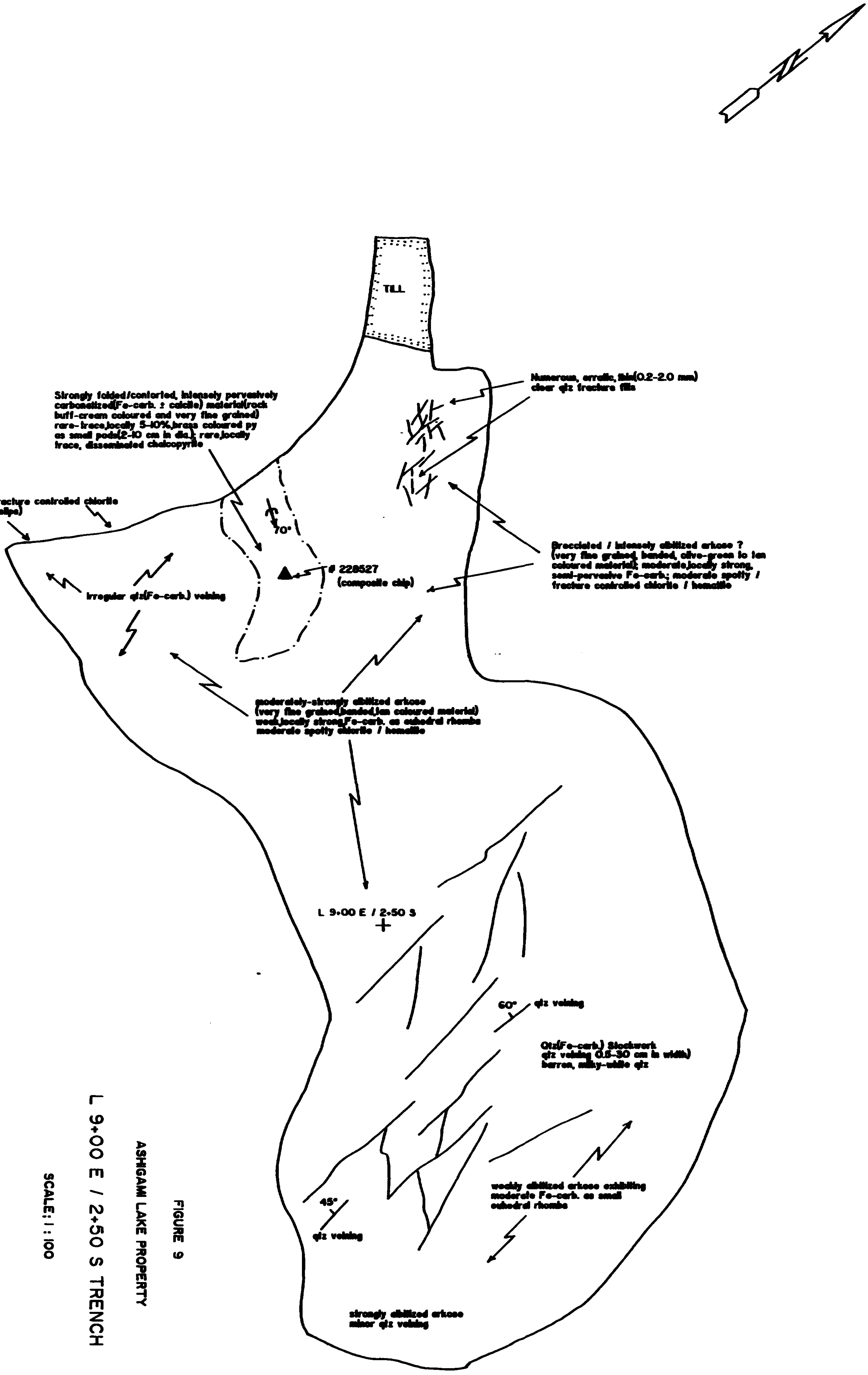



FIGURE 9

ASHIGAMI LAKE PROPERTY

L 9+00 E / 2+50 S TRENCH

SCALE: 1:100

DECEMBER, 1993

moderate spotty, fracture controlled chlorite and hematite alteration.

The southern two-thirds of the trenched area consist of weakly to strongly albitized arkose which contains trace-10% small (1-3mm) euhedral iron carbonate rhombs. The southern half of the trench is characterized by a quartz-(iron carbonate) stock work consisting of north-north-westerly trending, milky white barren quartz (iron carbonate) veins ranging from 0.5 to 30 centimeters width.

Red Rock Property Trenching:

A total of six trenches/pits were excavated on the Red Rock property. Three of these trenches concentrated on a large iron carbonate-quartz veining complex within the center of the property along and just east of the baseline. Several overburden and rock trenches had been previously developed and some of these were cleaned for geological mapping. The remaining three trenches were excavated further north between L9+00N and L10+00N, along and east of the baseline. These trenches were used to test the extent of a previously mapped, mineralized portion of the gabbro sill which appeared pegmatitic and richer in feldspar that the remainder of the gabbro unit on the property.

Trench L9+00N/0+25E:

A large overburden trench was excavated on the Red Rock property along L9+00N. The area had previously been tested by several small rock pits along a zone of mineralized, leucocratic feldspar rich gabbro. The new trench exposed this lithologic unit to the north and east in an attempt to determine it's relationship to the surrounding gabbro complex and to prospect for additional mineralization. The geology and geometry of the trench is provide in figure 10.

The geology of the trench is dominated by three phase of the "Lake Wanapitei Nipissing Gabbro Intrusion" of which the leuco-gabbro is part. This unit is exposed over most of the surface area of the trench and consists of medium-coarse grained feldspar rich gabbro with 5-15% mafics (amphiboles). Locally the unit is pegmatitic in character and often has a strongly fractured appearance. Alteration consists of fracture controlled to spotty calcite and minor hematite. Zones of quartz-iron carbonate veining are present in two old rock pits near the eastern end of the stripped area (figure 10). The veinlets contain trace of pyrite and pyrrhotite with local accumulations to 2%. A grab sample, # 227974, of the strongest mineralized portion of the leuco-gabbro returned a values of 22 ppb gold, <10 ppb platinum and 3 ppb palladium.

A sharp 120 degree contact is observed between the leuco-gabbro and a pegmatitic phase of the more typical gabbro along the north eastern limb of the trench. The pegmatite contains large amphibole blades up to 25 centimeters long and 4 centimeter wide. The majority of these crystals occur at a 140 degree contact between the pegmatitic gabbro and gabbros which typically underlie the Red Rock property. The pegmatite also contains 2-3% vuggy infillings of quartz and iron carbonate with moderate fracture controlled calcite. Minor chloritization is also observed. Grab sample # 227973 of this zone returned values of 36 ppb gold, <10 ppb platinum and 4 ppb palladium.

The remainder of the trench consists of fine to medium grained gabbro that in non to weakly altered with spotty chloritization of the

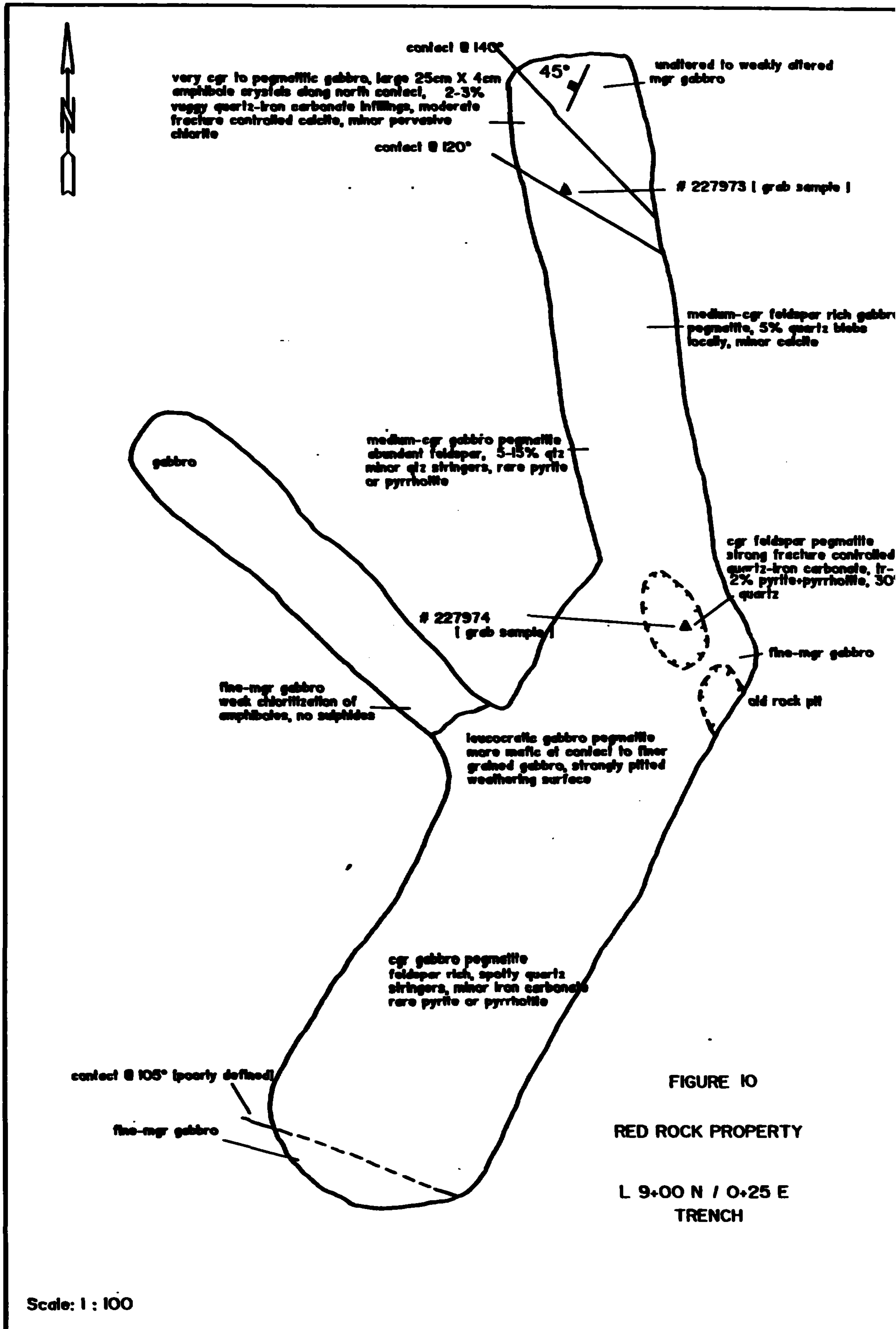



FIGURE 10

RED ROCK PROPERTY

L 9+00 N / 0+25 E
TRENCH

amphiboles. No sulphide mineralization was observed in this unit.

Trench L9+40N/0+35E:

A narrow overburden trench was excavated north of trench L9+00N/0+25E (figure 11). The trench quickly filled with water but appears to consist of fine to medium grained gabbro over it's entire length of approximately 30 meters. The unit is weakly altered with fracture controlled chlorite and iron carbonate.

A 2-4 centimeter wide quartz stringer, trending 350/v was noted during excavation in the northern tip of the trench. No mineralization was encountered. The south end was noted to contain 1% hairline, fracture controlled quartz-iron carbonate veinlets.

Trench L4+00N/1+50E:

This trench, located 90 meters northeast of the main Red Rock Mine shaft, is characterized by an extensive iron carbonate/quartz breccia zone. Limited trenching and stripping was conducted over this zone in 1986. Preliminary sampling of the breccia at that time returned seven (7) ore grade gold values (0.14-0.37 oz/ton: Mackeracher, 1986). According to the mines level plans no underground working were extended to test this auriferous breccia zone. The breccia was subjected to extensive trenching and stripping during this years programme in an attempt to further delineate its geometry and structural characteristics. Unfortunately, due to inclement weather, detailed sampling of the breccia was not completed. Figure 12 (in back of report) provides the geology and geometry of this trench.

Due to funding and time restraints the breccia zone could not be fully exposed but a northeasterly trending zone over a 45 meter length was excavated during 1993. The zone consists of strongly brecciated gabbro with a coarse grained, iron carbonate-quartz matrix. Typically the breccia consists of 50-70% angular to well rounded, oval to lenticular shaped gabbro fragments ranging in size from <1.0 centimeters to 1.5 meters diameter. The gabbro fragments are generally strongly sheared and commonly contain foliation conformable quartz-iron carbonate veining. Fragments are typically moderately-strongly bleached with the bleaching possibly representing a combination of carbonate and albite alterations. The matrix consists essentially of ivory to light purple coloured, very fine-medium grained iron carbonate with minor medium-coarse grained, white to clear quartz. Quartz generally occurs as small pods and lenses within the carbonate matrix. The iron carbonate exhibits a 2-10 centimeter wide orangy-brown weathering rind. Rare-trace, locally 1%, fine grained euhedral, brass coloured pyrite and rare fine grained chalcopyrite are present within the carbonate rich matrix.

The gabbro surrounding the breccia is typically moderately-strongly sheared and fractured, exhibiting moderate to strong foliation controlled chlorite, calcite, iron carbonate and albite alterations. The northeasterly trending (050 degree) breccia may be fold related? Strongly sheared/cleaved gabbro located at the breccias southwestern edge appears to exhibit an arcuate shearing pattern typical of a fold nose. Small scale folding was also observed in the central portion of the trench. At this location folds plunge shallowly to the northeast. The sheared and quartz vein rich character of the breccia fragments suggests that the brecciation of the zone was the last event in the development of the quartz-iron carbonate breccia zone.

Trench L3+80N/1+00E:

A small northerly trending trench occurs just south of L4+00N and west of the intense quartz-iron carbonate alteration zones. The trench extends 10 meters in length and averages 1-2 meters in width. Two rock types are noted. The first is a fine to medium grained gabbro which occupies most of the trench area. The gabbro exhibits spotty epidote and chlorite alteration with rare-trace amounts of pyrite. Occassional fracture controlled quartz-iron carbonate stringers are found in this zone. Stringers have an average strike direction of 125 degrees.

The core of the trench consists of medium grained, pinkish white granitoid (dyke). Contacts with the gabbro are sharp @ 345 degrees. Minor weak fracture controlled chlorite is observed in the unit. No mineralization was encountered. Figure 13 illustrates the shape and geology of this trench.

Trench BL0+00/2+50N:

This trench is located along the southern flank (nose) of the gabbro sill. Geological mapping encountered strongly sheared and albitized metasedimentary rocks in contact with the gabbro at this location (figure 14). Approximately 10-20%, shear concordant (120/60NE), quartz-iron carbonate veins upto 15 centimeters in width are present within this escarpment shaped outcrop. The trench was excavated in an attempt to extend this shear-alteration-vein zone to

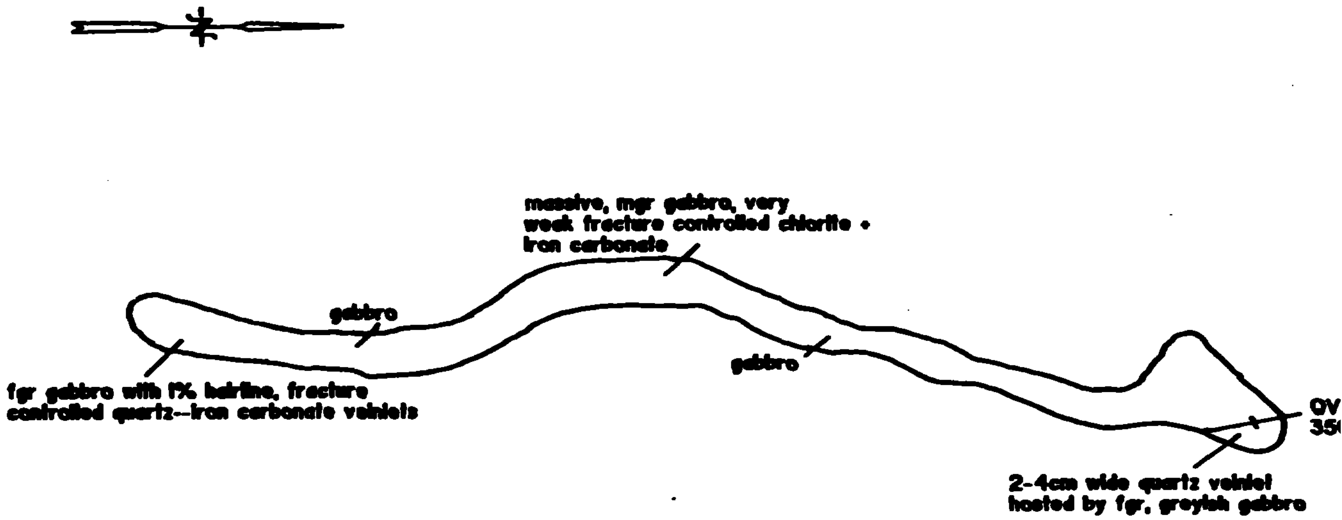



FIGURE 11

RED ROCK PROPERTY
L 9+40 N / 0+35 E TRENCH

Scale: 1 : 200

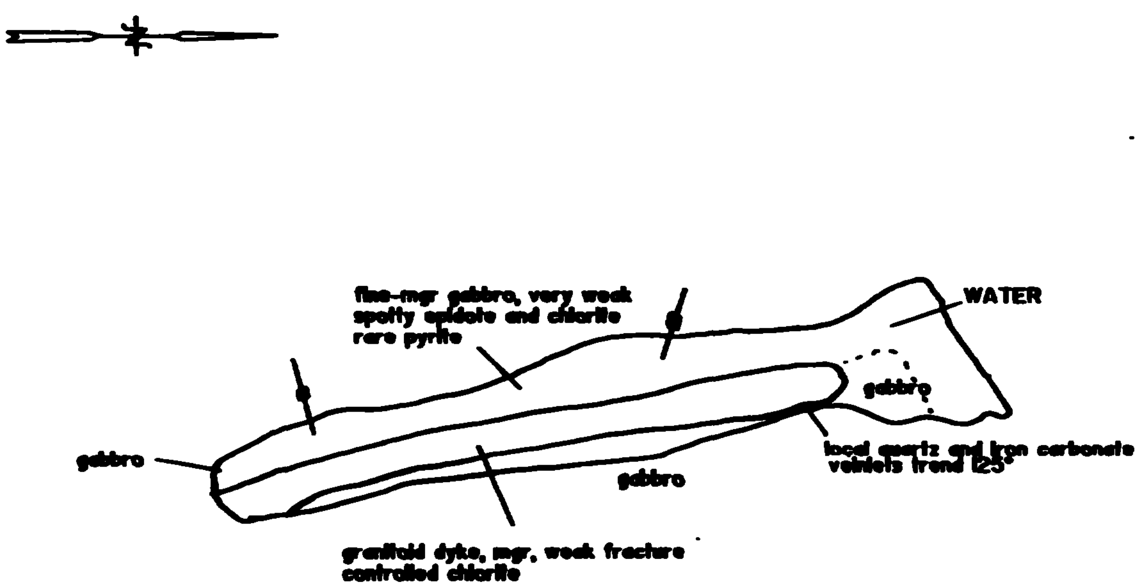



FIGURE 13

RED ROCK PROPERTY

L 3+80 N / 1+00 E TRENCH

Scale: 1 : 100

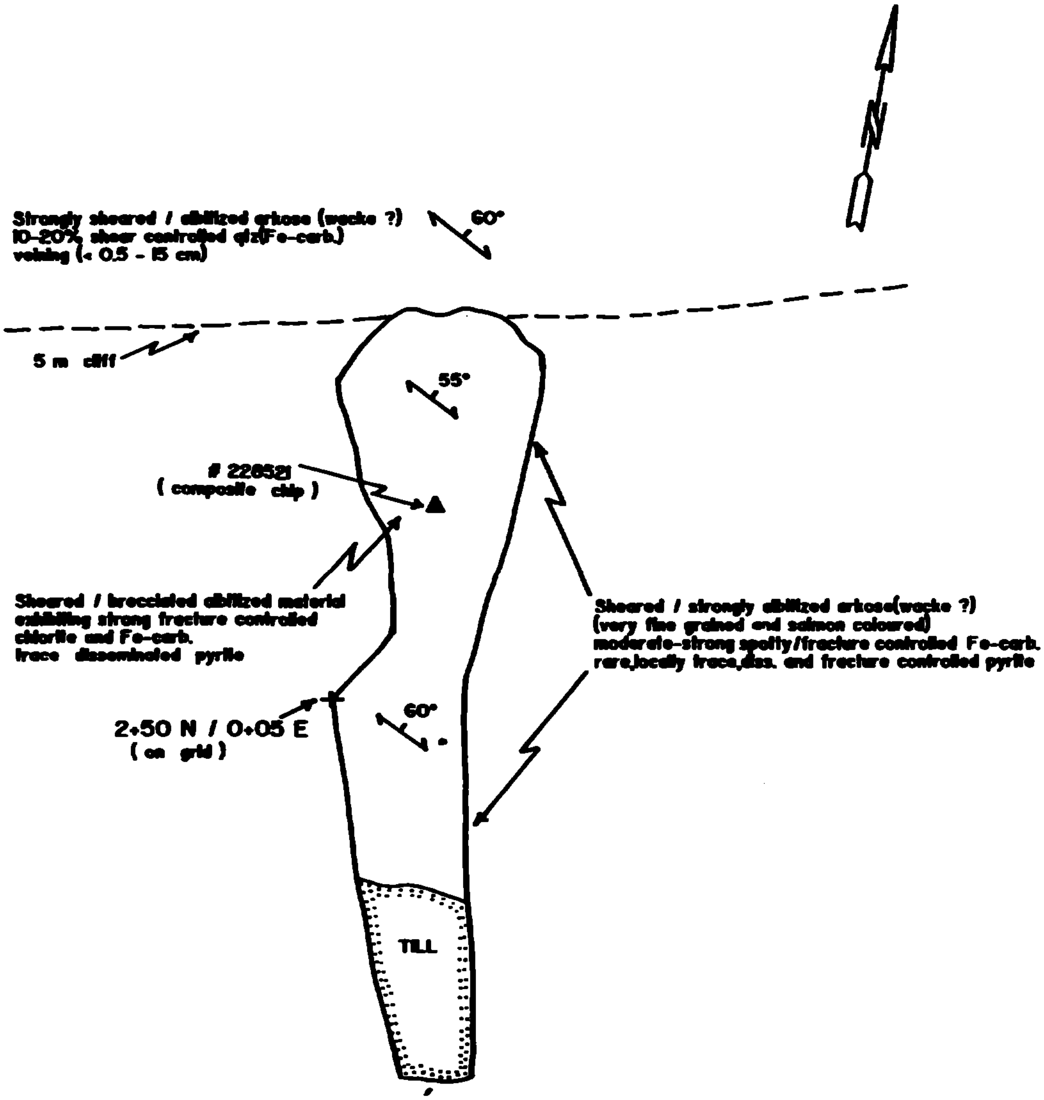



FIGURE 14

RED ROCK PROPERTY

B.L. 0+00 / 2+50 N TRENCH

SCALE ; 1 : 100

DECEMBER, 1993

the south across an area of extensive sand plain.

Trenching at the base of the cliff-like outcrop exposed strongly sheared and albitized (wackes) arkoses. The rock is very fine grained, salmon coloured and very brittle. Moderate to strong spotty, fracture controlled iron carbonate is present throughout the exposure. Mineralization is restricted to rare, locally trace, disseminated and fracture controlled pyrite. The northern most 3 meters of the trench contain 10-15%, narrow, shear concordant (120/55NE) quartz-iron carbonate veins. Albitized material is locally brecciated in character and exhibits strong fracture controlled chlorite and iron carbonate alteration. A composite chip sample # 228521 from the brecciated/chloritized unit returned a value of 5 ppb gold.

### 6.4 Lithogeochemical Sampling Results:

During the 1993 field season a total of 44 lithogeochemical samples were collected from the Ashigami Lake and Red Rock Properties. Samples were collected during the geological line mapping programme on the Red Rock property as well as during trenching and prospecting phases from both properties. A total of 32 samples were collected on the Red Rock grid with the remaining 12 samples occurring on the Ashigami Lake claims. Due to time and funding constraints only 2 of the 32 samples from the Red Rock Property were collected from newly excavated, trenched zones. All 12 samples from the Ashigami Lake Property were taken from area of new trenching and stripping.

Analysis of the samples was done by XRAY Laboratories Ltd. in Don Mills, Ontario using conventional fire assay, direct current plasma methods. All 44 samples were analyzed for gold with a detection limit of 1 ppb. Additional analyses for platinum and palladium were requested on samples of gabbroic composition from the Red Rock Property. Detection limits for these elements were 10 ppb and 1 ppb respectively. A total of nineteen (19) samples were analyzed for all three elements. Analytical result sheets are presented in appendix 2. The results are also presented in tabular form within table 2. Sample descriptions are provided in appendix 1.

Table 2 : 1993-94 OPAP ANALYTICAL RESULTS

| RED ROCK SAMPLES | | | | | | | | ASHIGAMI LAKE SAMPLES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE # | AU ppb | PT ppb | PD ppb | SAMPLE # | AU ppb | PT ppb | PD ppb | SAMPLE # | AU ppb | PT ppb | PD ppb |
| 227964 | 10 | 12 | 9 | 220506 | 15 | 5 | 4 | 227975 | 500 | X | X |
| 227965 | 16 | 12 | 11 | 220507 | 63 | 80 | 90 | 227976 | 2160 | X | X |
| 227966 | 7 | 23 | 22 | 220508 | 44 | 42 | 50 | 227977 | 4 | X | X |
| 227967 | 201 | 40 | 35 | 220509 | 140 | 41 | 47 | 227978 | 96 | X | X |
| 227968 | 40 | 32 | 35 | 220510 | 407 | 90 | 96 | 227979 | 4 | X | X |
| 227969 | 95 | X | X | 220511 | 27 | 76 | 61 | 227980 | 4 | X | X |
| 227970 | 30 | 26 | 30 | 220512 | 5930 | 15 | 15 | 220522 | 672 | X | X |
| 227971 | 40 | X | X | 220513 | 73 | X | X | 220523 | 16 | X | X |
| 227972 | 8 | X | X | 220514 | 891 | X | X | 220524 | 160 | X | X |
| 227973 | 36 | 5 | 4 | 220515 | 8 | X | X | 220525 | 622 | X | X |
| 227974 | 22 | 5 | 3 | 220516 | 227 | X | X | 220526 | 174 | X | X |
| 220501 | 7 | X | X | 220517 | 3 | X | X | 220527 | 4420 | X | X |
| 220502 | 922 | X | X | 220518 | 62 | X | X | | | | |
| 220503 | 10 | X | X | 220519 | 452 | 5 | 4 | | | | |
| 220504 | 9 | 41 | 46 | 220520 | 49 | 5 | 4 | | | | |
| 220505 | 879 | 21 | 24 | 220521 | 5 | X | X | | | | |

X - ANALYSIS NOT REQUESTED
VALUES LISTED AS 5 PPB PT ARE BELOW THE 10 PPB DETECTION LIMIT

***Gold:***

All 12 Ashigami Lake samples were analyzed for gold and returned values of 4 ppb to 4420 ppb. The previous years OPAP programme outlined several zones of strong to intense alteration with local quartz veining and sulphide mineralization. Anomalous to ore grade gold values had been obtained from these areas during last years lithogeochemistry phase. This years sampling concentrated on newly trenched sections within and adjacent to these areas with the greatest portion of the samples taken from two areas of carbonate enrichment. Previous mapping suggested this unit may represent a calcareous metasedimentary unit "limestone" but recent trenching suggests a more secondary control to it's formation (alteration). All samples except # 227979 and # 227980 show strong associations to this carbonate alteration zone. Samples # 227976 and # 228527 occur in mineralized portions of the carbonatization with # 227976 containing semi-massive pyrite, pyrrhotite and possible trace chalcopyrite. Sample # 228527 was noted to contain up to 10% brassy pyrite. The remainder of the samples are taken from lesser to non-mineralized portions of the carbonate rich rock which produced moderately-strongly anomalous values in gold. Analyses from these samples returned values of up to 672 ppb gold with 5 samples occurring between 160 ppb and 672 ppb gold. Two samples of weakly albitized arkose and mudstone from a trench to the north showed very low gold values of only 4 ppb.

Gold analyses were completed on all 32 samples obtained from the Red Rock Property with only 2 samples taken from areas of new trenching. No significant gold values were obtained from the two trench samples taken from the leucocratic and pegmatitic phases of the gabbro in trench 9+00N/0+25E. A strongly anomalous value of 452 ppb gold was obtained from the sampling of a similar leucocratic unit during field mapping. In this area the gabbro showed strong pervasive carbonatization with up to 10% pyrite and trace amounts of arsenopyrite?

The remainder of anomalous samples, collected in the gabbro, show strong associations with shearing, carbonate +/- albite alteration, pyritization and local chalcopyrite enrichment. Values from these samples range from 3 ppb gold to 5930 ppb gold. A total of nine(9) samples of the 32 returned values greater than 100 ppb gold. Sample # 228512 returned the higest value (5930 ppb gold) and occurred about 400 meters west of the baseline at L13+47N. The sample was collected from chloritic gabbros that had been cut by a 5 centimeter wide quartz-iron carbonate vein. The sample was noted to contain up to 5% pyrite along the vein margins as well as rare chalcopyrite. In many cases sample descriptions show a good correlation between anomalous gold values and the presence of chalcopyrite and pyrite mineralization.

Anomalous gold values from the metasedimentary rocks of the Red Rock Property showed similar relationships to structure, alteration and mineralization. Sample # 228502 returned a value of 922 ppb gold from a zone of strongly albitized arkose with 20% vuggy quartz-iron carbonate infillings and trace-2% disseminated pyrite.

***Platinum and Palladium:***

All samples analyzed for platinum and palladium were taken from the gabbroic rock units on the Red Rock Property. Analyses varied from <10 to 98 ppb platinum and 4 to 96 ppb palladium. Unfortunately no data is available for comparison to determine the significance of this data. Analyses presented in OGS Report 213, "Geology of the Lake Wanapitei Area" by B.O. Dressler, report undetected levels of platinum and palladium for background samples of the Lake Wanapitei Nipissing Gabbro Intrusion. Their data is reported however as parts per million. Further background sampling of the gabbro to specifically determine background values in platinum and palladium would be required to full analyze our results.

## 7. *Geophysical Survey and Prospecting*

The survey method to be implemented during this season's programme is a double-dipole EM survey. More common geophysical methods have proven helpful in interpreting regional geology within the area, but have had little success in locating zones of mineralization that are often associated with brecciation, soda metasomatism and quartz-carbonate veining. A trial double-dipole survey was conducted over areas covered by earlier VLF-EM surveys. Where the VLF instrument failed to reveal the zones of brecciation, alteration and veining the double-dipole instrument produced recognizable responces. The following figure depicts the EM responce for this instrument over such features on the Bugg Lake and Red Rock Gold Mine properties. The trial surveys were conducted in the spring of 1986 and fall of 1991. Specifications and characteristics of the Apex double-dipole EM instrument are included in the appendix 3.

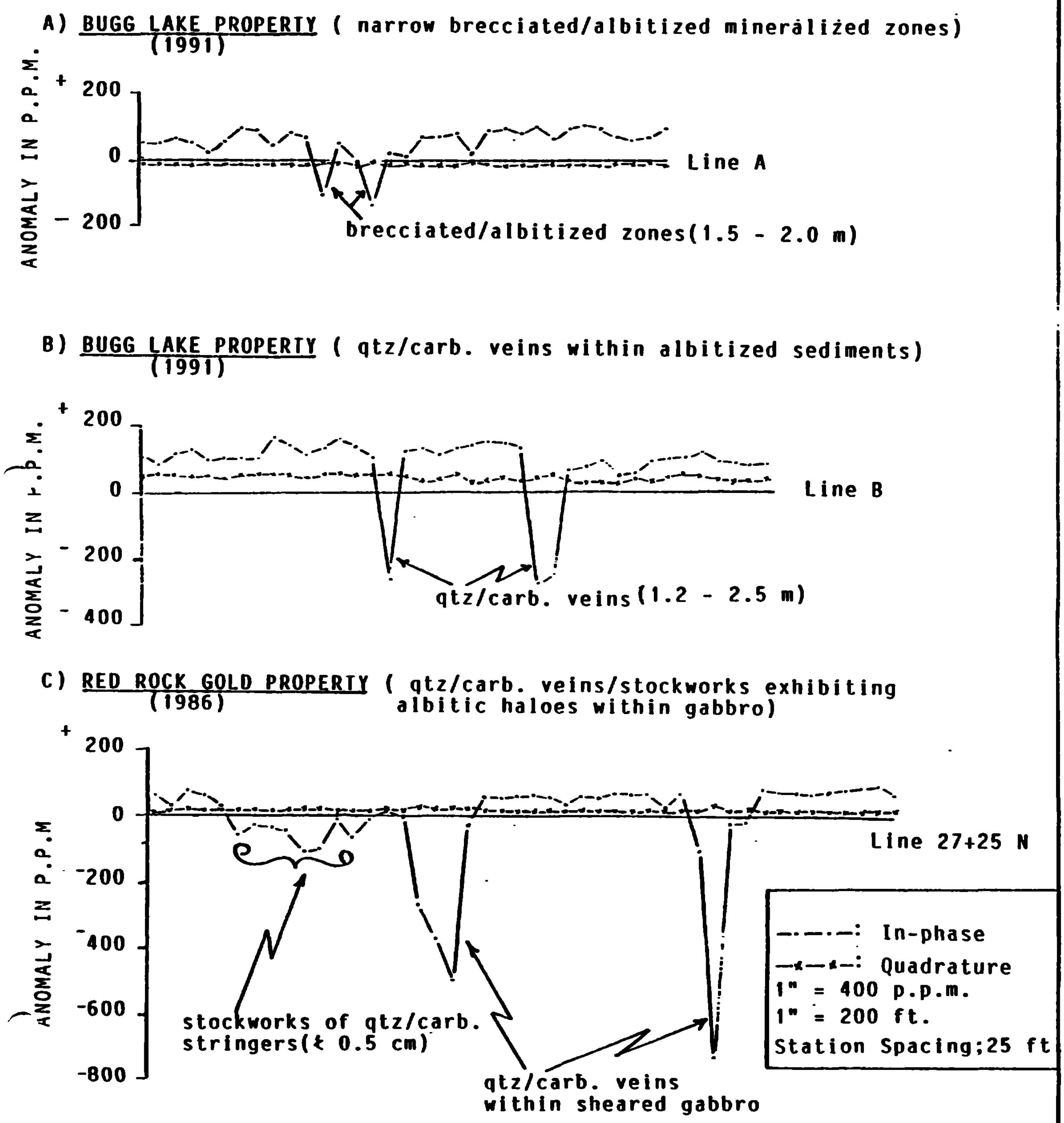
Double-dipole EM surveys were conducted on the Ashigami Lake and Bugg Lake properties during late October, 1993. A total of 26 line kilometers were surveyed with 17 kilometers on the Ashigami Lake claims and the remaining 9 kilometers on the Bugg Lake block. In order to take advantage of the lateral resolving ability of the double-dipole unit, in addition to a tight 12.5 meter station interval, the instrument was kept on while moving. This allowed observations of maximum/minimum readings along the line of travel. In addition to grid line surveying, areas deemed of importance due to mineralization, alteration and/or favourable geologic setting were also subjected to a double-dipole survey. Further surveying time was spent delineating anomalies and known economically interesting zones in preparation for trenching. The results of the Ashigami Lake and Bugg Lake Double-Dipole surveys are depicted on the accompanying maps in the back of the report. Raw field data is provided in appendix 3. A representative survey section across the Ashigami Lake and Bugg Lake properties is provided in the following figure. Although both in-phase and out-of-phase (quadrature) parameters were read and recorded only the in-phase readings were plotted on the sections. Out-of-phase values are more indicative of conductor parameters such as dip, depth etc.

Double-dipole anomalies were subsequently subjected to prospecting and beep-matting. On the Ashigami Lake claim block seven (7) double-dipole anomalies were defined and investigated.

Anomaly #1 (3+00E/6+00N):

Anomaly 1 corresponds to a 40 meter wide zone of strongly deformed (sheared/brecciated) gabbro. The gabbro within the northeasterly trending shear/breccia zone exhibits moderate-strong, foliation controlled calicite and chlorite with calcite and chlorite flooding occurring within the brecciated areas. Discontinuous/boudinaged drusy quartz-iron carbonate stringers and

## TRIAL DOUBLE - DIPOLE(EM) SURVEY



irregular pods are common within the deformation zone. No mineralization was observed within these units. Samples collected from the shear zone during the 1992 mapping programme failed to return any anomalous precious or base metal values. Moderate albitization of the gabbro was indicated by the sodium content of the samples. Beep-mat prospecting within the zone failed to produce any responses.

Anomaly #2 (0+00-2+00E/0+75S-2+50S):

Anomaly 2 consists of several negative peaks which correspond to magnetite bearing beds within the wacke/arkose package. Negative beep-mat reponses over the area confirm moderate magnetite contents in the metasedimentary sequence.

Anomaly #3 (0+00/9+25S):

Similar to anomaly 2, anomaly 3 corresponds to magnetite/specularite bearing wackes within the metasedimentary package. Field observation show the rock to contain up to 5%, medium-fine grained, subhedral black magnetite.

Anomaly #4 (5+00E-8+00E/B.L.0+00-1+50N):

Anomaly 4 spans from L5+00E to L8+00E along the northern flank of the baseline. This anomaly reflects a zone of moderately fractured to brecciated, moderate-strongly albitized/chloritized arkose and fine grained wacke/mudstone. This area was subjected to extensive trenching during with geology presented in figure 7. No beep-mat responses were obtained across anomaly 4.

Anomaly #5 (8+00E/1+25S):

Anomaly 5 corresponds to narrow magnetite bearing beds within a wacke/argillite sequence. Trace-2% fine grained magnetite was observed at this locality. Beep-mat prospecting produced several, discontinuous negative responses indicative of the spotty nature of magnetite concentration in the unit.

Anomaly #6 (8+00E/5+50S-6+25S):

Anomaly 6 was subjected to extensive trenching during this years programme. The detailed geology from this trench is provided in figure 5. In summary the anomaly corresponds to an extensive zone of sheared/brecciated, strongly-intensely albitized and iron carbonatized pebble wacke. Weak to moderate, locally strong, shear and fracture controlled chlorite is also present within the zone. Small pods of brass coloured pyrite were locally encountered throughout the most intensely altered rocks. Pre-trenching prospecting and sampling produced some anomalous lithogeochemical values with sample # 228522 returning 676 ppb gold and # 228523 returning 4 ppb gold. Samples collected during the trench sampling phase yielded weak to moderately anomalous gold values that range from 160-622 ppb. No beep-mat response was obtained across this alteration zone, including areas of strongest sulphide concentration.

Anomaly #7 (8+00E-9+00E/3+00S-5+00S):

This anomaly consists of a series of negative peaks which correspond to magnetite bearing beds within the pebble wacke units. In addition the wackes in the area exhibit moderate fracture controlled to spotty albite and iron carbonate alterations. The unit also contains rare pyrite and chalcopyrite. Beep mat prospecting produced spotty negative responses over zones of strongest magnetite accumulation.

Due to time constraints only a single day was spent beep-matting and prospecting the Double-Dipole anomalies on the Bugg Lake claim block. The prospecting efforts were concentrated on a northerly trending anomaly spanning from 3+00N-3+00S lying along the eastern fringe of the property (see map at back of report). Unfortunately very limited outcrop exposure is present along the anomaly trend. No obvious cause for the anomaly was determined during prospecting but it is assumed to be related to a north-south trending, quartz-iron carbonate shear zone outlined during the previous years mapping programme. Mapping has shown this zone to consist of sheared/ brecciated, intensely albitized wackes and arkoses. Extensive beep matting was conducted along this zone but no responses were obtained.

## 8. *Conclusions and Recommendations*

In summary the 1993 field programme produced and enhanced several areas of interest on both the Ashigami Lake and Red Rock Properties. Follow up work on the Ashigami Lake claim block delineate new zones of alteration with associated mineralization and gold enrichment while local areas of alteration, structure, mineralization and gold enrichment were obtained on the Red Rock Property, distant from the previously worked quartz-iron carbonate breccia zone.

The most interesting area occurs on the Ashigami Lake property were previous mapping and sampling had outlined two areas of carbonate enrichment with anomalous to ore grade gold values. Trenching and further sampling during the 1993 programme has shown the unit to be a large alteration zone rather than a primary unit with anomalous gold values throughout. The zone was opened in two locations with the largest occurring along L8+00E around 5+75S. The carbonate is locally accompanied by quartz stringers and veinlets with scattered sulphide mineralization that is semi-massive in small pods. A small section of the carbonate alteration was trenched around L9+00E/2+50S but topography of the surrounding area made further trenching impossible. The relationship between these two zones is still undetermined. Further exploration of the zone could be accomplished with a small induced polarization survey across the area which hosts both areas of interest. Anomalies obtained from the survey could be indicative of sulphide mineralization which seems to be key for the zone to contain ore grade gold values.

Strongly anomalous to ore grade gold values on the Red Rock property appear to be scattered across the area. This may be due to the fact that the gold, within the gabbros, is confined to small, strongly altered shears with sulphide mineralization. Further time could be spent sampling and mapping these areas at a large scale to determine the extent of the auiferous structure. Trenching and mapping of a large section of previously untested quartz-iron carbonate alteration was completed during the field season. This should be followed up by a more intense lithogeochemical sampling programme. Due to the large surface area of this alteration zone and the erratic nature of sulphide mineralization within the rock a second small induced polarization survey could be intiated to delineate areas most likely to host ore grade gold mineralization.

If exploration of platinum and palladium was going to be on going a background data base for the gabbroic rock suite should be established. With this way further samples could be compared to the background values to determine if the area warrants additional investigation.

## Certificate of Qualifications

I, David Marshall Evans Pilkey do hereby certify:

1. that I am a geologist and reside at 2-1590 Kelly Lake Road, Sudbury, Ontario; P3E-4M1,

2. that I am a graduate from Laurentian University in Sudbury where I completed my Bachelor of Applied Science in Geology in 1984,

3. that I have practiced my profession continuously for the past 11 seasons,

4. that my report on the Ashigami Lake, Bugg Lake and Red Rock Properties is based on my personal knowledge of the area geology through continued visitations over the past few years and from information published or otherwise.

David M.E. Pilkey, Bsc.

January, 1994

# Certificate of Qualifications

I, Yves Pierre Clement do hereby certify:

1. that I am a geological technologist and reside at #209, 227 Notre Dame Avenue, Sudbury, Ontario, P3C-5K4,

2. that I graduated from Cambrian College in 1986 with a Geological Technologist Diploma,

3. that I have partially fulfilled the requirements (missing one credit) for a Bachelor of Applied Sciences in Geology at Lake Superior State University,

4. that I have practiced my profession continuously for the past seven seasons,

5. that my report on the Ashigami Lake, Bugg Lake and Red Rock claim blocks is based on my personal knowledge of the area geology through continued visitations during this season and previous seasons.

Yves Pierre Clement

Yves P. Clement

Geological Technologist

January, 1994

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# APPENDIX 1

## Sample Locations and Descriptions

**1993-94 OPAP Sample Descriptions:**

**Sample Number:** 227964
**Sample Type:** Grab sample from rubble pile
**Property:** Red Rock
**Grid Northing:** L13+55N
**Grid Easting:** 0+55W
**Description:** Rock consists of fine to medium grained gabbro with 3-4% fracture controlled, pinkish white iron carbonate veinlets. Unit contains trace-1% finely disseminated pyrite +/- chalcopyrite.

**Sample Number:** 227965
**Sample Type:** Small chip
**Property:** Red Rock
**Grid Northing:** L12+75N
**Grid Easting:** 0+50W
**Description:** Fine to medium grained, sheared and bleached gabbro. Zone is strongly altered with pervasive chlorite and strong fracture controlled calcite. No sulphides observed.

**Sample Number:** 227966
**Sample Type:** Outcrop grab sample
**Property:** Red Rock
**Grid Northing:** L12+75N
**Grid Easting:** 0+50W
**Description:** Weakly altered fine grained gabbro along shear contact. The unit is light to medium grey in colour and exhibits moderate to strong fracture controlled calcite with trace-1% blebby pyrite +/- pyrrhotite.

**Sample Number:** 227967
**Sample Type:** Outcrop chip sample
**Property:** Red Rock
**Grid Northing:** L13+00N
**Grid Easting:** 1+20W
**Description:** Medium grained, weakly layered gabbro. The unit displays moderate fracture controlled calcite alteration and contains trace-2% pyrite and trace chalcopyrite.

**Sample Number:** 227968
**Sample Type:** Chip sample of mineralization in vein and wallrock
**Property:** Red Rock
**Grid Northing:** L12+40N
**Grid Easting:** 3+25W
**Description:** Unit consists of a five centimeter wide milky, white quartz veinlet. The vein is vuggy in character with drusy infillings of actinolite? Vein wall rock is bleached with biotite and chlorite +/- serpentine. Moderate pervasive hematization persists with trace-2% pyrite and chalcopyrite noted.

**Sample Number:** 227969
**Sample Type:** Selected grab sample from trench shear zone
**Property:** Red Rock
**Grid Northing:** L10+30N
**Grid Easting:** 2+00W
**Description:** Fine to medium grained, sheared gabbro. Shear is vuggy in character and contains abundant, vuggy, foliation controlled quartz stringers. Some quartz in veins to 25 centimeters in width. Matrix to veins is iron carbonate rich with traces of pyrite in veining and wallrock.

**Sample Number:** 227970
**Sample Type:** Sample of gabbroic wallrock to above shear zone
**Property:** Red Rock
**Grid Northing:** L10+30N
**Grid Easting:** 2+00W
**Description:** Rock consists of fine grained gabbro along contact to quartz- iron carbonate shear zone in sample 227969. Gabbro appears as rafted section within the shear display moderate pervasive carbonatization and local albitization. Trace-2% very fine grained pyrite observed.

**Sample Number:** 227971
**Sample Type:** Selected outcrop grab
**Property:** Red Rock
**Grid Northing:** L4+15N
**Grid Easting:** 3+30W
**Description:** Rock consists of medium grained arkose with a narrow zone of intense pervasive albitization and weak to locally strong iron carbonate alteration. No sulphides were observed.

**Sample Number:** 227972
**Sample Type:** Grab sample from quartz vein float material near baseline
**Property:** Red Rock
**Grid Northing:** L4+00N
**Grid Easting:** 0+20W
**Description:** Rock consists of vuggy, milky with quartz with vein contained in gabbroic host rock. The vein contains moderate iron carbonate alteration with locally trace-1% blebby pyrite.

**Sample Number:** 227973 (Trench 9+00N/0+25E)
**Sample Type:** Outcrop grab sample
**Property:** Red Rock
**Grid Northing:** L9+20N
**Grid Easting:** 0+33E
**Description:** Coarse grained to pegmatitic gabbro. Sample contains large amphiboles up to 25cm in length. Unit is grey in colour and occurs at the northern contact of a wider more felsic pegmatite unit. Alteration consists of weak fracture controlled calcite and moderate pervasive chlorite. No sulphides were noted.

**Sample Number:** 227974 (Trench 9+00N/0+25E)
**Sample Type:** Selected grab of mineralized felsic pegmatite
**Property:** Red Rock
**Grid Northing:** L9+12N
**Grid Easting:** 0+31E
**Description:** Unit consists of white to pink, very coarse grained feldspar pegmatite. Sample contains vuggy quartz- iron carbonate alteration and local sulphide enrichment. Sulphides consist of 1-2% fracture controlled pyrite and pyrrhotite. Sulhides tend to occur in pods.

**Sample Number:** 227975 (Trench 8+15E/5+68S)
**Sample Type:** Selected outcrop grab
**Property:** Ashigami Lake Property
**Grid Northing:** 5+68S
**Grid Easting:** L8+25E
**Description:** Unit consists of fine grained, foliated and altered metasediment. Alteration consists of strong albitization, moderate to strong pervasive iron carbonatization and local moderate foliation controlled calcite and chlorite. Sample contains up to 2% disseminated and foliation controlled pyrite.

**Sample Number:** 227976 (Trench 8+15E/5+68S)
**Sample Type:** Selected outcrop grab
**Property:** Ashigami Lake Property
**Grid Northing:** 5+69S
**Grid Easting:** L8+20E
**Description:** Sample of same altered metasediment unit as above with up to 3% blebby to disseminated, sugary and brassy pyrite.

**Sample Number:** 227977 (Trench 8+15E/5+68S)
**Sample Type:** Selected outcrop grab
**Property:** Ashigami Lake Property
**Grid Northing:** 5+68S
**Grid Easting:** L8+26E
**Description:** Unit consists of large milky white, fractured quartz lense within alterated and weakly altered metasediments (wackes?). Vein also contains very minor fracture controlled hematite +/- iron carbonate.

**Sample Number:** 227978 (Trench 8+15E/5+68S)
**Sample Type:** Selected outcrop grab
**Property:** Ashigami Lake Property
**Grid Northing:** 5+69S
**Grid Easting:** L8+20E
**Description:** Unit consists of fine grained, moderately altered and fractured metawacke with 5-10% fracture controlled calcite and iron carbonate veinlets. Unit also displays weak pervasive carbonate alteration and moderate foliation controlled chloritization. No sulphides were observed.

**Sample Number:** 227979 (Trench 8+00E/0+25N)
**Sample Type:** Outcrop grab sample
**Property:** Ashigami Lake (Trench)
**Grid Northing:** 0+56N
**Grid Easting:** L8+01E
**Description:** Rock consists of massive to jointed, fine grained, weakly altered arkose. Unit is medium grey in colour and locally is bleached exhibiting a very weak fracture controlled chloritization and spotty fracture controlled calcite alteration. Sample contains trace pyrite.

**Sample Number:** 227980 (Trench 8+00E/0+25N)
**Sample Type:** Outcrop grab sample
**Property:** Ashigami Lake (Trench)
**Grid Northing:** 0+28N
**Grid Easting:** L8+00E
**Description:** Rock consists of fine to medium grained arkose. Unit weathers orangy brown with grey brown fresh surfaces. Alteration consists of moderate to strong fracture controlled and pervasive calcite and iron carbonate with moderate patchy albitization and spotty fracture controlled chloritization. Sample contains trace pyrite.

**Sample Number:**228501
**Sample Type:**Composite Chip
**Property:**Red Rock
**Grid Northing:**3+35 S
**Grid Easting:**1+85 E
**Description:**Sheared \ brecciated arkose containing 30% shear plane controlled quartz(Fe-Carb.) veining. Weak-moderate fracture controlled chlorite. Rare-trace, medium grained, euhedral, disseminated, pyrite.

**Sample Number:**228502
**Sample Type:**Composite chip sample from several boulders.
**Property:**Red Rock
**Grid Northing:**1+10 S
**Grid Easting:**0+85 E
**Description:**Strongly albitized arkosic material with 20% vuggy quartz(Fe-Carb.) veining. Trace, locally trace-2%, disseminated pyrite.

**Sample Number:**228503
**Sample Type:**Composite Chip
**Property:**Red Rock
**Grid Northing:**2+42 N
**Grid Easting:**6+15 E
**Description:**Brecciated arkose exhibiting strong fracture controlled albite and pink calcite and moderate chlorite. Trace very fine grained disseminated pyrite.

Sample Number:228504
Sample Type:Grab
Property:Red Rock
Grid Northing:13+00 N
Grid Easting:4+35 W
Description:Moderately, pervasively, chloritized gabbro exhibiting strong fracture controlled calcite. Sample contains rare, locally trace, fine grained pyrite associated with thin drusy qtz\Fe-carb. stringers.

Sample Number:228505
Sample Type:Composite Chip (from muck pile)
Property:Red Rock
Grid Northing:12+83 N
Grid Easting:4+55 W
Description:Medium-fine grained, strongly chloritic, gabbro cross-cut by numerous fine qtz(Fe-carb.) fracture fills. Trace, locally 1-2%, medium grained pyrite within and\or proximate to fracture fills. Trace specularite also present.

Sample Number:228506
Sample Type:Grab (muck from old trench)
Property:Red Rock
Grid Northing:12+88 N
Grid Easting:4+25 W
Description:Strongly sheared \ chloritized gabbro containing 10% light greenish-white, greasy, sericite?\talc? lenses. Sample also contains 20% quartz(Fe-Carb.) veining. Rare disseminated pyrite.

Sample Number:228507
Sample Type:Composite Chip (muck from old rock trench)
Property:Red Rock
Grid Northing:12+97 N
Grid Easting:4+03 W
Description:Coarse grained to pegmatitic gabbro exhibiting strong semi-pervasive chlorite and calcite. Sample contains trace-2% disseminated pyrite \ pyrrhotite and trace chalcopyrite.

Sample Number:228508
Sample Type:Grab (from trench wall)
Property:Red Rock
Grid Northing:12+90 N
Grid Easting:4+00 W
Description:Pegmatitic gabbro exhibiting strong orangy staining of feldspars and containing 30% vuggy Fe-Carb.\Qtz\actinolite? material(pods). Rock contains trace-2% chalcopyrite and pyrite.

Sample Number:228509
Sample Type:Composite Chip (trench floor)
Property:Red Rock
Grid Northing:12+90 N
Grid Easting:4+00 W
Description:Medium-fine grained, strongly sheared \ chloritized gabbro containing 30% quartz(Fe-Carb.) stringers. Rock also exhibits moderate shear controlled calcite. Trace-1% combined pyrite \ chalcopyrite within and\or proximate to stringers.

Sample Number:228510
Sample Type:Grab (west wall of trench)
Property:Red Rock
Grid Northing:12+90 N
Grid Easting:4+00 W
Description:Medium-fine grained, strongly carbonated(calcite) gabbro containing 10-15%,thin,pinkish-orange quartzo-feldspathic stringers. Sample contains 1-2% disseminated pyrite and trace chalcopyrite.

Sample Number:228511
Sample Type:Grab (from east muck pile)
Property:Red Rock
Grid Northing:12+90 N
Grid Easting:4+00 W
Description:Dark green, coarse grained to pegmatitic, gabbro exhibiting moderate fracture controlled chlorite and calcite. Strong saussuritization of feldspar grains. Trace-1%, locally 2-3%, lense controlled pyrite and rare, locally trace, chalcopyrite.

Sample Number:228512
Sample Type:Grab (from muck pile)
Property:Red Rock
Grid Northing:13+47 N
Grid Easting:3+95 W
Description:Chloritic gabbro cut by a 5cm vuggy quartz\Fe-Carb. vein. Sample contains 3-5% fine-medium grained pyrite along vein margins. Rare chalcopyrite also present.

Sample Number:228513
Sample Type:Grab (within trench on footwall side of vein)
Property:Red Rock
Grid Northing:13+35 N
Grid Easting:3+95 W
Description:Strongly sheared \ intensely carbonatized(Fe-Carb. + calcite) gabbro on footwall side of a 75 cm qtz\Fe-Carb. vein. Trace fine grained, shear controlled, pyrite.

Sample Number: 228514
Sample Type:Composite Chip (75 cm qtz\Fe-carb. vein)
Property:Red Rock
Grid Northing:13+35 N
Grid Easting:3+95 W
Description:Quartz\Fe-Carb. vein containing trace-rare fine grained disseminated pyrite.

Sample Number: 228515 (5cm vein)
Sample Type:Composite Chip
Property:Red Rock
Grid Northing:13+30 N
Grid Easting:1+65 E
Description:Drusy quartz \ Fe-Carb. \ epidote \ specularite vein. Euhedral qtz and epidote crystals present within vugs.

Sample Number: 228516
Sample Type:Composite Chip
Property:Red Rock
Grid Northing:15+93 N
Grid Easting:1+30 E
Description:Strongly sheared gabbro exhibiting strong chlorite and calcite. Zone also contains 10-15% shear controlled qtz(Fe-Carb.) stringers\lenses. Sample contains trace, locally 1-2%, combined pyrite \ chalcopyrite \ pyrrhotite.

Sample Number: 228517 (3 cm vein)
Sample Type:Composite Chip
Property:Red Rock
Grid Northing:12+45 N
Grid Easting:3+55 E
Description:Drusy Qtz\Fe-Carb. vein exhibiting strong fracture controlled epidote, calcite and hematite.

Sample Number: 228518 (10 cm vein)
Sample Type:Composite Chip
Property:Red Rock
Grid Northing:6+10 N
Grid Easting:1+35 E
Description:Coarse grained Fe-Carb.(Qtz) vein containing trace, locally 2-3%, fine-medium grained disseminated pyrite.

Sample Number: 228519
Sample Type:Composite Sample(from muck pile)
Property:Red Rock
Grid Northing:9+20 N
Grid Easting:1+80 E
Description:Leucocratic pegmatitic phase? of gabbro. Rock consists essentially of very coarse grained, subhedral, greyish-white feldspar. Rock strongly, pervasively carbonated(Fe-Carb.). Sample contains trace-3%, locally 5-10%, medium-fine grained disseminated pyrite. Trace arsenopyrite ? also present.

Sample Number: 228520
Sample Type:Composite Sample (from muck pile)
Property:Red Rock
Grid Northing:9+20 N
Grid Easting:1+80 E
Description:Medium-coarse grained, strongly carbonated(Fe-Carb.+ calcite) gabbro containing 2-3%, locally up to 5%, bleb\pod controlled chalcopyrite. Trace-2% disseminated pyrite \ pyrrhotite also present.

Sample Number: 228521 (Trench B.L.0+00/2+50N)
Sample Type:Composite Chip
Property:Red Rock
Grid Northing:2+55 N
Grid Easting:0+05 E
Description:Strongly sheared \ albitized material(arkose?) exhibiting strong spotty \ fracture controlled chlorite and Fe-Carb.. Rock contains rare-trace, fine grained, disseminated pyrite.

Sample Number: 228522 (Trench 8+00E/6+00S)
Sample Type:Composite Chip
Property:Ashigami Lake
Grid Northing:5+93 S
Grid Easting:8+00 E
Description:Brecciated \ strongly albitized material(wacke ?) exhibiting strong fracture controlled chlorite and Fe-Carb.. Rock contains 2-5%, locally up to 10%, brass coloured, disseminated pyrite.

Sample Number: 228523 (Trench 8+00E/6+00S)
Sample Type:Composite Chip (30cm shear)
Property:Ashigami Lake
Grid Northing:5+98 S
Grid Easting:7+99 E
Description:Strongly sheared albitized material(wacke ?) exhibiting strong-intense foliation controlled chlorite and pink carbonate. Rock consists more or less of a chlorite-carbonate schist.

Sample Number: 228524 (Trench 8+00E/6+00S)
Sample Type:Composite Chip
Property:Ashigami Lake
Grid Northing:5+86 S
Grid Easting:7+98 E
Description:Strongly albitized \ carbonated material(wacke ?) exhibiting crude banding\layering. Sample contains 5-15% medium grained, brass coloured, disseminated and band controlled pyrite.

Sample Number: 228525 (Trench 8+00E/6+00S)
Sample Type:Grab Sample
Property:Ashigami Lake
Grid Northing:5+93 S
Grid Easting:8+00 E
Description:Chlorite flooded brecciated albitized material(wacke ?). Sample contains 2-5%, medium grained, subhedral-anhedral, brass coloured, pyrite.

**Sample Number:** 228526 (Trench 8+00E/6+00S)
**Sample Type:**Composite Chip
**Property:**Ashigami Lake
**Grid Northing:**5+90 S
**Grid Easting:**7+92 E
**Description:**Intensely, pervasively carbonatized(Fe-Carb. +\- calcite) material(wacke ?) containing rare, locally trace, fine grained, brassy coloured, disseminated pyrite. Material strongly weathered exhibiting a 2-10cm weathering rind.

**Sample Number:** 228527 (Trench 9+00E/2+50S)
**Sample Type:**Composite Chip
**Property:**Ashigami Lake
**Grid Northing:**2+45 S
**Grid Easting:**8+90 E
**Description:**Strongly folded\contorted, intensely pervasively carbonatized(Fe-Carb. +\- calcite) material(arkose ?) containing rare-trace, locally 5-10%, brass coloured, pyrite. Pyrite present as fine disseminations and small pods. Rock also contains rare, locally trace, disseminated chalcopyrite.

# APPENDIX 2

## Analytical Results

| SAMPLE | AU-1AT PPB FADCP | PT-1AT PPB FADCP | PD-1AT PPB FADCP |
|---|---|---|---|
| 227964 | 10 | 12 | 9 |
| 227965 | 16 | 12 | 11 |
| 227966 | 7 | 23 | 22 |
| 227967 | 281 | 40 | 35 |
| 227968 | 48 | 32 | 35 |
| 227970 | 38 | 26 | 30 |
| 227973 | 36 | <10 | 4 |
| 227974 | 22 | <10 | 3 |
| 228504 | 9 | 41 | 46 |
| 228505 | 879 | 21 | 24 |
| 228506 | 15 | <10 | 4 |
| 228507 | 63 | 88 | 90 |
| 228508 | 44 | 42 | 50 |
| 228509 | 148 | 41 | 47 |
| 228510 | 407 | 98 | 96 |
| 228511 | 27 | 76 | 61 |
| 228512 | 5930 | 15 | 15 |
| 228519 | 452 | <10 | 4 |
| 228520 | 49 | <10 | 4 |
| 227969 | 95 | -- | -- |
| 227971 | 40 | -- | -- |
| 227972 | 8 | -- | -- |
| 227975 | 548 | -- | -- |
| 227976 | 2160 | -- | -- |
| 227977 | 4 | -- | -- |
| 227978 | 96 | -- | -- |
| 227979 | 4 | -- | -- |
| 227980 | 4 | -- | -- |
| 228501 | 7 | -- | -- |
| 228502 | 922 | -- | -- |
| 228503 | 10 | -- | -- |
| 228513 | 73 | -- | -- |
| 228514 | 891 | -- | -- |
| 228515 | 8 | -- | -- |
| 228516 | 227 | -- | -- |
| 228517 | 3 | -- | -- |
| 228518 | 62 | -- | -- |
| 228521 | 5 | -- | -- |
| 228522 | 672 | -- | -- |
| 228523 | 16 | -- | -- |
| 228524 | 160 | -- | -- |
| 228525 | 622 | -- | -- |
| 228526 | 174 | -- | -- |
| 228527 | 4420 | -- | -- |
| D 227964 | 8 | 14 | 8 |
| D 228508 | 47 | 39 | 52 |
| D 227977 | 6 | -- | -- |
| D 228518 | 63 | -- | -- |

# APPENDIX 3

## Apex Double-Dipole EM Instrument

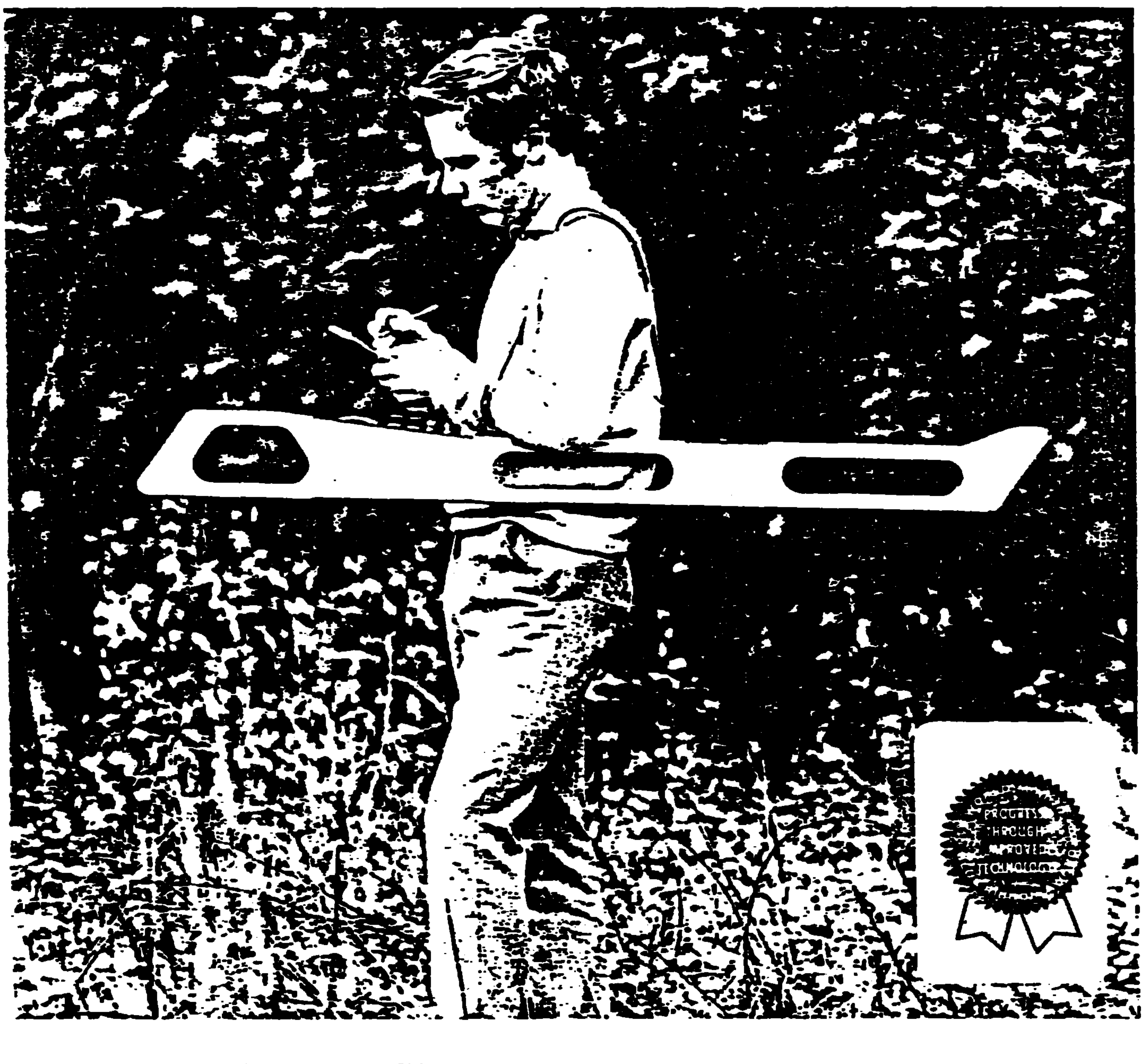
## (Specifications and Characteristics)

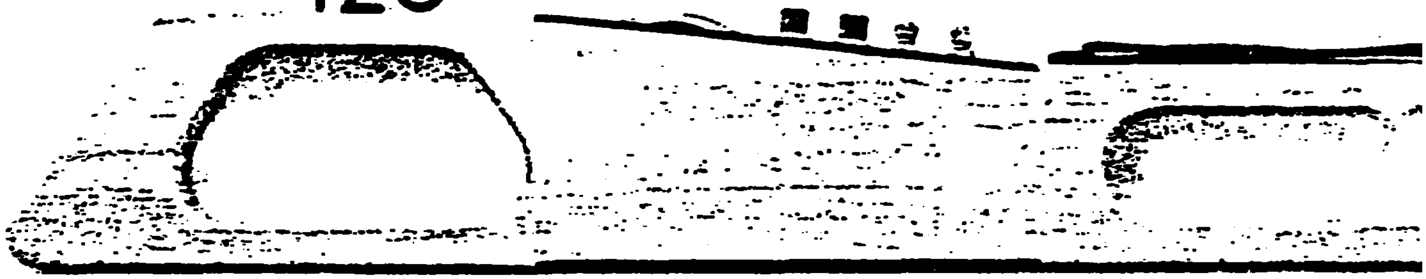
## Raw Geophysical Field Data

# APEX DOUBLE-DIPOLE PORTABLE E.M.

## 127

- Measures In-Phase and Quadrature components at 8 kHz.
- Simultaneous automatic readout of both components.
- Indicates conductors and magnetically permeable bodies.
- Depth of penetration 70 feet (22 metres) maximum.
- Light weight and rugged one-man unit, simple to operate.





## SPECIFICALLY SUITED FOR:

- Surveys by field geologists.
- Preliminary examinations.
- Locating airborne anomalies.
- Aid in drilling decisions.
- Guidance of trenching operations.
- Locating buried metal objects.

## DESCRIPTION:

The Apex Double-Dipole is a rugged one-man electromagnetometer. It is fully self-contained with transmitter, receiver and batteries in a single frame made of highest quality kiln-dried mahogany for maximum thermal stability.

The antenna coils are wound on ferrite cores for compact size. Their axes are set 55° from the horizontal for zero coupling and to minimize overburden response.

The Double-Dipole measures In-phase and Quadrature (Out-phase) components of the secondary fields that are re-radiated by conductive or magnetically permeable bodies.

The In-phase component indicates positive secondary field for conductive targets and negative for magnetically permeable bodies.

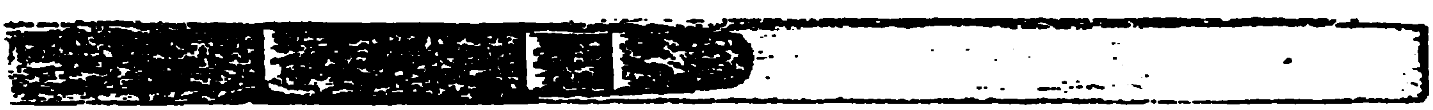
The Quadrature component provides additional information of target conductivity and in areas of magnetic formations allows discrimination between conductivity and magnetic permeability variations, which is an invaluable feature for interpretation. (This is demonstrated by the Cavendish test survey presented on the last page of this paper.)

The Apex Double-Dipole offers extreme portability combined with continuous automatic readout and depth penetration comparable to many larger and much more expensive systems. It provides a very versatile prospecting tool at a minimum cost.


## SPECIFICATIONS:

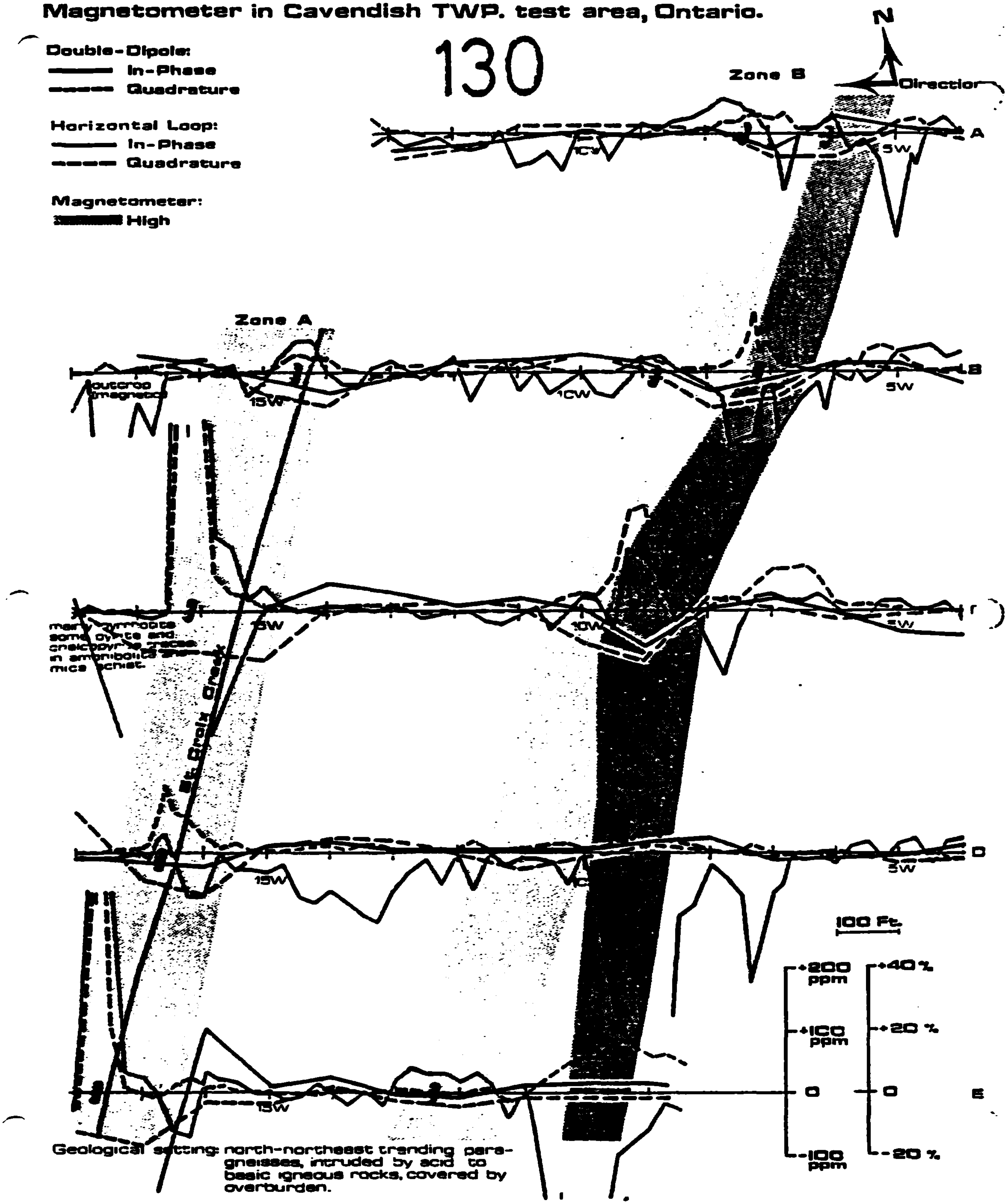
| | |
|---|---|
| **Coil separation:** | • Four feet (1.22 metres). |
| **Coil configuration:** | • Minimum coupled. |
| **Coil orientation:** | • Axes 55° (arc tan $\sqrt{2}$) from horizontal. |
| **Operating frequency:** | • 8000 Hz. |
| **Parameters measured:** | • In-phase and Quadrature (Out-phase) components of secondary field. |
| **Readouts:** | • Two easy to read 2.5 in. meters, one for each component. |
| **Sensitivity ranges:** | • Five: ±100 ppm., ±300 ppm., ±1000 ppm., ±3000 ppm. and ±10 000 ppm. |
| **Resolution:** | • 3 % of full scale of range in use. |
| **Penetration:** | • 70 feet (22 metres) maximum. |
| **Operating temperature:** | • -40 °C to +60 °C (-40 °F to +140 °F) |
| **Power supply:** | • Two standard 9 volt transistor batteries, life: ~50 hours continuous use (alkaline). |
| **Controls:** | • -On-Off & Battery test switch.<br>-Sensitivity range switch.<br>-In-phase and Quadrature compensation adjustments (to be zeroed on neutral ground before start of survey). |
| **Dimensions:** | • 53×5×1.5 inches. (134×13×4 cm³) |
| **Weight:** | • 6 lbs. (2.7 kg.) |
| **Supplied with:** | • Manual, Two batteries (installed), Shoulder strap, Canvas carrying case (leaves both hands free), Foam lined wooden field/shipping case. |
| **Price:** | • $ 880.00 Canadian, f.o.b. Toronto. |
| **Rental (in Canada):** | • $ 100.00 per month, a minimum of three months for new instruments; one month for used equipment when available. |
| **Lease/Purchase:** | • Plans available, phone or write for details. |

Prices and specifications are subject to change without notification.



# Double-Dipole compared with 200 ft. Horizontal-Loop (2400 Hz) and Magnetometer in Cavendish TWP. test area, Ontario.



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## 1. INTRODUCTION

The Apex Double-Dipole is a short coil-separation electromagnetic (EM) survey unit. The basic operating principle is that of any continuous-wave EM unit, based on the alteration of an applied electromagnetic field by a conductive or magnetic object. However, the geometric configuration of the Double-Dipole is different from conventional EM units. The closest comparison would be helicopter EM, but the Double-Dipole generally has a higher target/ground surface distance ratio. This allows for choosing a relatively high operating frequency due to very low value of response function for conductive overburden.

Some advantages of short coil-separation are:
(a) Excellent lateral resolution; e.g. resolving banded conductors.
(b) Can easily be used underground in mines.
(c) Independent of external signal sources.
(d) Versatility, e.g. can be used in any desired direction simply by turning the unit.
(e) One-man operation, no line cutting necessary.

In addition to these, the Double-Dipole offers:
(f) Continuous automatic readouts of both In-Phase and Quadrature components of the secondary field.
(g) No on-line adjustments, extremely fast coverage.
(h) Can be animal mounted for even faster coverage.
(i) Produces peak-type anomalies, easy to recognize without plotting.
(j) Very low initial and operational costs.
(k) Ability to delineate magnetically permeable zones as well as conductive bodies and to distinguish the conductive targets within magnetically permeable zones.

## 2. PRINCIPLES OF MEASUREMENT

Minerals and rocks in nature have greatly differing abilities to conduct electricity. The most conductive minerals are the native metals; silver, copper, and gold. These are followed by semimetallic ore minerals, brine filled sandstones, glacial clays, soils, shales and limestones approximately in this order.

Many minerals and rocks also display ferromagnetic properties. In other words, they can be magnetized by an external magnetic field. The magnetization is due to the alignment of the intrinsic magnetic moments by the external field.

The Double-Dipole measuring principles are based on the detection of electrical conductivity and ferromagnetic properties. An alternating current is generated in the Double-Dipole transmitter and fed through a transmitter coil thereby creating an alternating magnetic field. This field exists in space around the coil and its amplitude is inversely proportional to the third power of the distance from the coil. (in a non-conductive medium and over the range of distances we are interested in). This internally generated field is called the Primary Field.

The Double-Dipole also has a receiver coil (see fig. 1) with its axis perpendicular to the direction of the primary field at the point of the coil location. The receiver coil is said to be minimum coupled to the primary field and when oriented this way it does not sense the primary field. See fig. 2.

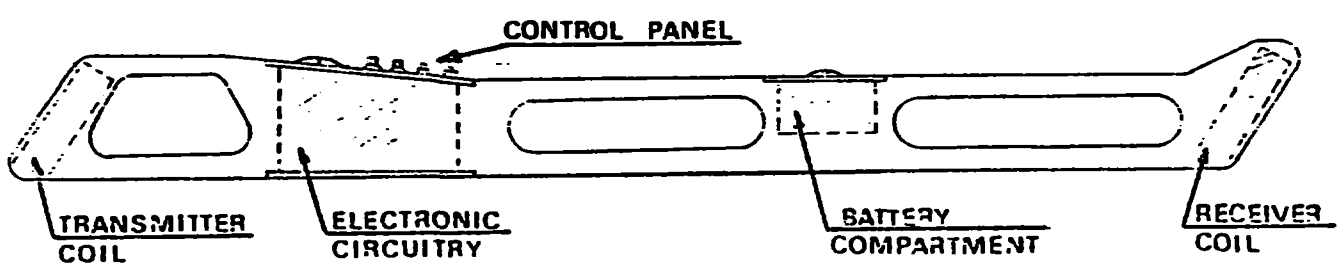



FIG. 1—DDEM LAYOUT

Ai... Lake Property Oct 26/93 Y.C.

| 2 | 8+00 E | (traversing towards North) | | | |
|---|---|---|---|---|---|
| | in | out | | 11:00 AM | |
| 8+75S | -10 | -10 | | 0, 0 => at | |
| 8+62.5 | -12 | -10 | | 2:45 pm. 15 | |
| 8+50S | +20 | -8 | | | |
| | +5 | 0 | | Bad ground compression | |
| 8+25S | +30 | 0 | | | |
| | +50 | +3 | | | |
| 8+00S | +20 | +5 | | | |
| | +35 | +2 | | | |
| 7+75S | +50 | -2 | | | |
| | +25 | +5 | | | |
| 7+50S | +45 | +10 | | | |
| | +50 | +10 | | | |
| 7+25S | +65 | 0 | | | |
| | +50 | +3 | | | |
| 7+00S | +55 | +3 | | | |
| | +60 | 0 | | | |
| 6+75S | +45 | +5 | | | |
| | 50 | 0 | | | |
| 6+50S | 55 | 5 | | | |
| | 60 | 5 | | | |
| 6+25S | 75 | 0 | | | |
| | 2 | 5 | altered... ... | | |
| 6+00S | -120 | 20 | | | |
| | 70 | 3 | | | |
| 5+75S | -100 | +23 | | | |
| | 90 | 2 | | | |
| 5+50S | -40 | 15 | | | |
| | 0 | 10 | 2.5m | south | |
| 5+25S | 50 | 5 | 95 | | |

-40, 10 1m north

- 120 , 20
5+00 S 90 , 0
80 , 0
4+75 S 110 , -2
115 , -2
4+50 S 90 , -2
-185 , 10
4+25 S 65 , 2
-120 , 20 ← -120 to +/- 4+03 S
4+00 S -30 , 10
40 , 15
3+75 S -90 , 30 ← -120 at 3+70 S
-10 , 20
3+50 S -55 , 25 ← -120 at 3+48 S
5 , 20 ← -180 to -200 from 3+36 S
3+25 S -180 , -10 ← to 3+20 S
70 , 5
3+00 S 100 , 0
120 , -5
} possibly due Fe-Carb. high+ in ϕ?
2+75 S 90 , 5
100 , 5
2+50 S 90 , 10
110 , -5
2+25 S 110 , 0

| | | | |
|---|---|---|---|
| | 120, | 0 | |
| 2+00 S | 115, | 10 | |
| | 110 | 10 | good olc |
| 1+75 S | 95 | 20 | |
| | 120 | 30 | |
| 1+50 S | -400 | 100 | |
| | -300 | 60 | @ 1+45 S (-1000; 100) @ 1+42 S (-450, 90) |
| 1+25 S | -190 | 45 | |
| | -60 | 40 | few narrow qtz stringers visible |
| 1+00 S | 80 | 15 | bottom of ridge |
| | 95 | 15 | |
| 0+75 S | 110 | 10 | |
| | 115 | 15 | |
| 0+50 S | 110 | 15 | |
| | 110 | 15 | |
| 0+25 S | 120 | 20 | |
| | 105 | 2 | |
| BL 0+00 | 110 | 5 | 12:35 pm |
| | 100 | 10 | |
| 0+25 N | 90 | 5 | |
| | -165 | 40 | no olc [illegible] |
| 0+50 N | -240 | 45 | up to -800, 50 |
| | -210 | 35 | olc alt, qtz |
| 0+75 N | -70 | 30 | -400, 55 at 0+76 N |
| | -270 | 45 | no olc [illegible] |
| 1+00 N | 120 | 5 | olc. shallow ob. |
| | 25 | 20 | at 1+15 N = -180, 35 |
| 1+25 N | -200 | 35 | shallow ob. |
| | 60 | 15 | |
| 1+50 N | 80 | 15 | |

| | |
|---|---|
| | 90, 10 |
| 1+75N | 100, 0 |
| | 85, 10 |
| 2+00 N | 85,10 |
| | 85, 5 |
| 2+25 N | 85,5 |
| | 80, 10 |
| 2+50N | 80,10 |
| | 90, 25 |
| 2+75N | 85, 10 |
| | 80,10 |
| 3+00N | 80,10 |
| | 75,10 |
| 3+25N | 60,20 |
| | 75,15 |
| 3+50N | 70,10 |
| | 75,10 |
| 3+75N | 50,15 |
| | 85,10 |
| 4+00N | ~~85~~ 75,10 |

(1:15 pm)

L 9+00E (walking south).

| | | | | | |
|---|---|---|---|---|---|
| B.L. 0+00 | 30 | 5 | | | |
| | 70 | -5 | | | |
| 0+25S | 70 | 5 | [illegible] | | |
| | 65 | -5 | | | |
| 0+50S | 75 | 0 | | | |
| | 70 | 0 | | | |
| 0+75S | 70 | -5 | | | |
| (9+00 E). | | | | | |
| 0+25S | 80 | -5 | | | |
| | 90 | -5 | [illegible] | | |
| 1+00S | 75 | -10 | | | |
| | 60 | -10 | | | |
| 1+25S | 60 | -5 | | | |
| | 50 | -5 | [illegible] | | |
| 1+50S | 50 | -10 | | | |
| | 45 | -10 | | | |
| 1+75S | 50 | -10 | | | |
| | 60 | -15 | blc | | |
| 2+00S | 60 | -10 | dc. | | |
| | 65 | -15 | | | |
| 2+25S | 65 | -15 | | | |
| | 60 | -15 | | | |
| 2+50S | 65 | -15 | | | |
| | 85 | -20 | | | |
| 2+75S | 60 | -15 | | | |
| | 50 | -15 | | | |
| 3+00S | 45 | -10 | | | |
| | 15 | -10 | | | |
| 3+25S | 0 | 0 | | | |
| | -70 | 10 ← | cliff | 5 m west | |
| 3+50S | -25 | 0 | -240, 20 at 3+40S (on ridge) → | | dl. bp. gry.

-21[illegible] 30 → -240, 30 moss [illegible] dc

3+75 S -90, 10

-180, 25 ⇒ probably [illegible] b/c [no visible [illegible] structure?]

4+00 S -210, 25

-140, 0 → 7400, 0 (in dc probably [illegible]?)

4+25 S -550, 45 dc.

-90, 0

4+50 S -80, 0

-10, 10

4+75 S -210, 15

-200, 20 → of dc.

5+00 S 30, -10

40, -10

5+25 S 20, -10

20, -10

5+50 S 40, -15

-10, -5

5+75 S 25, -15

20, -15

6+00 S 30, -20

40, -15

6+25 S 35, -15

30, -15

6+50 S 30, -15

| | | | |
|---|---|---|---|
| | 25 | -15 | |
| 6+75S | 20 | -10 | |
| | 20 | -10 | |
| 7+00S | 20 | -10 | |
| | 30 | -5 | [illegible] |
| 7+25S | 60 | 0 | jump |
| | 0 | 0 | |
| 7+50S | 10 | -15 | |
| | 35 | -15 | |
| 7+75S | 25 | -15 | |
| | 20 | -20 | |
| 8+00S | 30 | -15 | |
| | 30 | -25 | |
| 8+25S | 35 | -25 | |
| | 50 | -25 | |
| 8+50S | 30 | -20 | road |
| | 40 | -20 | |
| 8+75S | +45 | -20 | |
| | 30 | -15 | |
| 9+00S | 35 | -20 | marsh by lake (2:45 pm). |
| | L 8E (going North) con't | | |
| | 30 | -15 | middle of road |
| 9+00S | 45 | -10 | steel gate 2 m west |
| 9+25S | 40 | -15 | |
| | 50 | -20 | |
| | 35 | -25 | |
| 9+50S | 40 | -25 | |
| | 50 | -20 | Hydro line } needles very jumpy |
| 9+75S | 40 | -15 | parking lot |
| | 30 | -15 | |
| 10+00S | 40 | -15 | |

L 7+00E (going North)

| | | |
|---|---|---|
| 9+55 S | 35, | -25 |
| | 30, | -25 |
| 9+25 S | 20, | -20 |
| | 30, | -25 |
| 9+00 S | 20, | -20 |
| | 35, | -25 |
| 8+75 S | 50, | -25 |
| | 60, | -25 |
| 8+50 S | 40, | 20 |
| | 35, | -30 |
| 8+25 S | 45, | -25 |
| | 35, | -20 |
| 8+00 S | 45, | -30 |
| | 35, | -25 |
| 7+75 S | 40, | -20 db |
| | 50, | -25 |
| 7+50 S | 60, | -25 |
| | 25, | -10 |
| 7+25 S | 35, | -20 |
| | 25, | -20 |
| 7+00 S | 20, | -25 |
| | 20, | -25 |
| 6+75 S | 30, | -20 |
| | 30, | -25 |
| 6+50 S | 30, | -20 |

along road

same plain no old

C

toward no visible de.

| | | |
|---|---|---|
| | 70 | -15 |
| 4+25 | | -25 |
| | | -25 ← down to 10, -25 |
| 4+0 | 15 | -25 |
| | 20 | -25 |
| 5+ | 5 | -20 |
| | 10 | -20 |
| 5+ | | -20 |
| | | -15 |
| 5+ | 30 | 20 |
| | 10 | -20 |
| 5+ | 35 | -20 |

3:30 pm

L 6+00 E (going on to).

| | | |
|---|---|---|
| 4+50 | 70 | -20 |
| | 70 | -15 |
| 4+75 | 60 | -20 |
| | 50 | -25 |
| 5+00 | 70 | -25 |
| | 80 | -25 |
| 5+25 | 80 | 20 |
| | 90 | -25 |
| 5+50 | 80 | -25 |
| | 80 | -20 |
| 5+75 | 55 | -20 |
| | 50 | -20 |
| 6+00 | 60 | -05 |
| | 65 | -15 |
| 6+25 | 40 | 5 |
| | 70 | -15 |
| 6+50 | 70 | -15 |

55, -20
6+75S 70, -20
65, -15
7+00S 75, -15 (south side of road).
90, -25
7+25S 90, -25
90, -15
7+50S 75, -15

} extensive sand plain

4:15pm

∠ S E ( → S[illegible]    Oct 27/93

| | | |
|---|---|---|
| 5+75 S | 50, 5 | ( [illegible] 11:00 pm ) base of 6x ridge |
| | 45, 5 | |
| 6+00 S | 45, 5 | |
| | 45, 5 | |
| 6+[illegible] | 50, 5 | |
| | 50, 5 | |
| 6+50 S | 55, 5 | |
| | 50, 5 | |
| 6+75 S | 55, 5 | |
| | 55, 5 | |
| 7+00 S | 55, 10 | |
| | 55, 5 | |
| 7+25 S | 60, 5 | |
| | 60, 5 | 18+25 S 60, 10 |
| 7+50 S | 50, 5 | 55, 10 |
| | 55, 10 | 9+00 S 50, 10 |
| 7+75 S | 55, 5 | |
| | 60, 10 | |
| 8+00 S | 55, 10 | |
| | 55, 10 | |
| 8+25 S | 60, 10 | |
| | 60, 10 | |
| 8+50 S | 60, 10 | |
| | 60, 10 | |

| | | |
|---|---|---|
| | 75, 10 | |
| 4+75 S | 70, 10 | |
| | 70, 10 | |
| 4+50 S | 65, 10 | |
| | 75, 10 | |
| 4+25 S | 65, 10 | |
| | 70, 15 | scale |
| 4+00 S | 70, 15 | |
| | 70, 10 | |
| 3+75 S | 65, 10 | |
| | 70, 10 | |
| 3+50 S | 65, 10 | |
| | 210, 30 | |
| 3+25 S | 180, 30 | |
| | 200, 30 | |
| 3+00 S | 210, 30 | (0, 0 → [illegible] @ 12:00 pm) |
| | -5, 10 | |
| 2+75 S | -15, 10 | |
| | -55, 10 | |
| 2+50 S | -55, 10 | |
| | -40, 10 | |
| 2+25 S | -45, 10 | |
| | -45, 15 | |
| 2+[illegible] S | -40, 10 | |
| | -30, 10 | |
| | [illegible] | |

| | |
|---|---|
| | -35, 10 |
| 1+75 s | -40, 15 |
| | -35, 5 |
| 1+25 s | -45, 10 |
| | -50, 5 |
| 1-00 s | -35, 10 |
| | -40, 15 |
| 0+75 s | -10, 10 |
| | 0, 10 |
| 0+50 s | 5, 15 |
| | 5, 15 |
| 0+25 s | 20, 20 |
| | 25, 15 |
| 0+00 [illegible] | 20, 5 |

swamp

| | |
|---|---|
| 8+00 s | 70, 10 |
| | 70, 5 |
| 7+75 s | 70, 10 |
| | 60, 10 |
| 7+50 s | 65, 10 |
| | 60, 5 |
| 7+25 s | 65, 10 |
| | 70, 5 |
| 7+00 s | 60, 5 |
| | 65, 10 |
| 6+75 s | 50, 10 |
| | 70, 10 |
| 6+50 s | 65, 10 |
| | 65, 10 |
| 6+25 s | 70, 10 |
| | 70, 10 |
| 6+00 s | 70, 10 |
| | 65, 10 |
| 5+75 s | 65, 10 |
| | 65, 10 |
| 5+50 s | 65, 10 |
| | 70, 10 |
| 5+25 s | 70, 10 |
| | 75, 10 |
| 5+00 s | 70, 20 |

[illegible]

| | |
|---|---|
| E.L. 0+00 | -15, -5 |
| | 30, -10 |
| 0+25S | 35, -10 |
| | 10, -5 |
| 0+50S | 15, -10 |
| | 10, -10 |
| 0+75S | 0, -5 |
| | 5, -5 |
| 1+00S | 10, -10 |
| | 15, -5 |
| 1+25S | 25, -10 |
| | 10, -10 |
| 1+50S | 0, -10 |
| | 0, -5 |
| 1+75S | 15, -10 |
| | 15, -5 |
| 2+00S | 0, -10 |
| | 5, -5 |
| 2+25S | -30, 5 |
| | -10, 0 |
| 2+50S | 5, -10 |
| | -10, -10 |
| 2+75S | -20, -5 |

-50, 5 @ 2+07S

| | |
|---|---|
| | -5, [illegible] |
| 3+00S | 10, -5 |
| | -20, 5 |
| 2+75S | 0, -5 |
| | 10, 0 |
| 2+50S | 15, -5 |
| | -5, 0 |
| 2+25S | -10, 0 |
| | 0, -5 |
| 2+00S | 15, -5 |
| | 20, 0 |
| 1+75S | 20, 0 |
| | 15, 0 |
| 1+50S | 5, -5 |
| | 10, 0 |
| 1+25S | 20, 0 |
| | 15, 0 |
| 1+00S | 20, 5 |
| | 10, 0 |
| 0+75S | 10, 5 |
| | 15, -5 |
| 0+50S | -20, 5 |
| | -15, 5 |
| 0+25S | -15, 5 |
| | -40, 15 |
| E.L. 0+00 | -20, 15 |

@ 0+45S ⇒ -40, 10

[illegible] → [illegible]

| | |
|---|---|
| | 0, 5 |
| 0+25 N | -110, 20 ← @ 0+30 -180, 20 (narrow zone?) |
| | -5, 5 |
| 0+50N | -210, 40 ← -180, 30 @ 0+40N |
| | 5, 0 |
| 0+75N | 30, 10 |
| | 20, 10 |
| 1+00N | 10, 10 |
| | 15, 15 |
| 1+25N | 5, 15 |
| | 25, 10 |
| 1+50N | 5, 15 |
| | -20, 15 |
| 1+75N | -30, 20 |
| | -40, 25 |
| 2+00N | -35, 20 |
| | 20, 15 |
| 2+25N | -20, 15 |
| | -20, 15 |
| 2+50N | -30, 20 |
| | -15, 15 |
| 2+75N | -20, 20 |
| | -30, 15 |
| 3+00N | -15, 15 |

| | |
|---|---|
| | -30, -5 |
| 3+00S | -10, 0 |
| | -10, 0 |
| 3+25S | -10, 0 |
| | 5, 0 |
| 3+50S | 10, 0 |
| | 15, 5 |
| 3+75S | 5, 10 |
| | 5, 10 } cedar swamp. |
| 4+00S | 5, 5 } cedar swamp. |

L 6E ([illegible])

| | |
|---|---|
| 4+75S | 15, 5 |
| | 15, 5 |
| 4+50S | 10, 0 |
| | 20, 0 |
| 4+25S | 5, 5 |
| | -5, 5 |
| 4+00S | 0, 0 |
| | 0, 0 |
| 3+75S | -5, 5 |
| | 0, 0 |
| 3+50S | -10, 0 |
| | -30, 0 |
| 3+25S | -10, 0 |

| Station | Reading | Notes |
|---|---|---|
| | 0, 20 | |
| 3+25N | -15, 15 | |
| | -20, 20 | |
| 3+50N | -20, 20 | |
| | -20, 20 | |
| 3+75N | -15, 15 | |
| | -30, 20 | |
| 4+00N | -20, 15 | |
| | 5, 15 | |
| 4+25N | 5, 10 | |
| | 5, 10 | |
| 4+50N | 5, 10 | |
| | 10, 10 | |
| 4+75N | 0, 10 | |
| | 5, 15 | -40, 20 4+95N |
| 5+00N | -90, 25 | o/c 25 m west; [illegible] no o/c |
| | -10, 15 | |
| 5+25N | 0, 10 | |
| | 10, 10 | |
| 5+50N | 0, 10 | |
| | 10, 10 | |
| 5+75N | 15, 10 | |
| | -10, 10 | |
| 6+00N | -5, 10 | |

no response lines [illegible] west of line.

| Station | Reading | Notes |
|---|---|---|
| | -5, 20 | |
| 2+25N | -20, 25 | |
| | -20, 20 | |
| 2+00N | -80, 30 | 1+95N to 2+05N; no o/c |
| | -20, 20 | |
| 1+75N | -30, 15 | |
| | -210, 40 | small [illegible] field? |
| 1+50N | -60, 15 | |
| | 0, 10 | |
| 1+25N | -5, 10 | |
| | -25, 10 | |
| 1+00N | -5, 10 | |
| | 10, 15 | |
| 0+75N | -25, 15 | |
| | -100, 30 | [illegible] -150 |
| 0+50N | -65, 15 | [illegible] 150/30 |
| | -90, 20 | -180, 25 @ 0+45N; -450, 65 |
| 0+25N | -210, 40 | [illegible] |
| | -400, 60 | shallow [illegible] |
| B.L. 0+00 | -50, 15 | o/c [illegible] shallow [illegible] |

∠ 75 (→ S[illegible])

-30, 5 ← @ 0+155 -100, 15

0+25 S 30, -15
0, -10
0+50 S 30, -10
30, -10
0+75 S 35, -10
35, -15
1+00 S 25, -15
25, -10
[illegible] 35, -10
15, -10
1+50 S 40, -15
40, -10
1+75 S 30, -10
40, -15
2+00 S 30, -10
45, -10
2+25 S 20, -15
40, -10
2+50 S 30, -10
35, -15
2+75 S 35, -15
40, -10
3+00 S 55, -10

∠ 75 (→ South)

5+25N : -5, 15
-10, 10 ← @ 5+38N -100, 30 [illegible]
5+00N -5, 5
20, 10
4+75N -25, 10
-100, 25
4+50N -35, 15 no ok, old fill [illegible]
-40, 15
4+25N -45, 15 ← @ 4+27 -210, 4 [illegible] 90
-30, 15
4+00 N -40, 15
-35, 10
3+75N -40, 15
-40, 15
3+50N -25, 15
-40, 15
3+25N -25, 15
-30, 20
3+00 N -20, 15
-10, 20
2+75N -20, 20
-25, 20
2+50N -15, 20

45, -10
3+25S 50, -10
30, -10
3+50S 35, -10
30, -5
3+75S 45, -10
25, -5
4+00S 40, -5
50, -5
4+25S 40, -5
40, -10
4+50S 50, -5
40, -5
4+75S 25, -5
25, -10
5+00S -20, 0 ← 5+05 -70, 10
-10, 0 ← -30, 15 5+20
5+25S 15, -10
-100, 15 } avg -70, 5
5+50S -60, 5 }
-65, 10 ← -120, 20 @ 5+57.5
5+75S -30, 10
↳ lined [illegible] to ends.
end [illegible]

-20, 15
6+75S -5, 15
-10, 40 ← 6-57.5
6+50S -7, 35 ← 18, 40
-40, 25 ← 15, 30
6+25S -15, 15
30, 15
6+00S 40, 15
60, 15
5+75S 50, 15
35, 15
5+50S 40, 20
30, 10
5+25S 15, 20
10, 15
5+00S 5, 20
5, 20
4+75S 0, 20
-5, 25
4+50S -15, 25
0, 25
4+25S -5, 25
-20, 25
4+00S -30, 30
0, 20
3+75S -5, 25

bld [illegible]
no [illegible]

| | | |
|---|---|---|
| 3+50 S | -5, 25 | |
| | -5, 25 | |
| | 0, 25 | |
| 3+25 S | -5, 30 | |
| | 10, 25 | |
| 3+00 S | 0, 25 | |
| | -5, 25 | |
| 2+75 S | -30, 25 | no o/c |
| | -25, 30 | |
| 2+50 S | -5, 30 | |
| | 10, 20 | |
| 2+25 S | 5, 25 | Swamp (bog) |
| | 30, 30 | |
| 2+00 S | 10, 30 | |
| | 20, 25 | |
| 1+75 S | 30, 30 | |
| | 30, 30 | -110, 45 @ 1+55 S edge of swamp. |
| 1+50 S | -30, 30 | |
| | 15, 20 | -150, 40 at 1+30 S o/c in area sheared wacke |
| 1+25 S | -140, 45 | |
| | -25, 25 | |
| 1+00 S | 20, 25 | |
| | 0, 25 | |
| 0+75 S | -5, 20 | |
| | 15, 20 | |
| 0+50 S | 20, 20 | |

93
... @ 11:05am Ashigami Lake

## L 3+00 E (→ North)

| | | |
|---|---|---|
| 9+45 S | 0, 0 | ... in tea/spruce swamp |
| | -10, 0 | |
| 9+25 S | -5, -5 | |
| | -15, -5 | |
| 9+00 S | -50, 0 | flank of ... ok |
| | -20, 5 | 8+85 S to 8+70 S -210, 40 -500, 60 |
| 8+75 S | -30, 5 | |
| | -20, 5 | |
| 8+50 S | 0, 5 | |
| | 20, 5 | |
| 8+25 S | 20, 5 | |
| | 10, 5 | |
| 8+00 S | -40, 15 | -110, 30 @ 7+95 S |
| | 0, 10 | |
| 7+75 S | 30, 10 | |
| | 25, 5 | |
| 7+50 S | 25, 10 | |
| | 10, 10 | |
| 7+25 S | -30, 15 | → edge of swamp |
| | -60, 25 | -130, 20 @ 7+15 S |
| 7+00 S | -160, 35 | -120, 35 @ 6+95 S |

| | |
|---|---|
| | 20, 20 |
| 0+25S | 30, 20 |
| | 30, 20 |
| B.L. 0+00 | 30, 25 |

[illegible] (N) → Norm

| | |
|---|---|
| | 40, 20 |
| 0+25N | 20, 15 |
| | 25, 15 |
| 0+50N | 20, 15 |
| | 30, 20 |
| [illegible] | 20, 15 |
| | 30, 20 |
| 1+00N | 30, 20 |
| | 30, 20 |
| 1+25N | 15, 20 |
| | 25, 15 |
| 1+50N | 20, 15 |
| | 40, 15 |
| 1+75N | 30, 20 |
| | 20, 15 |
| 2+00N | 30, 15 |
| | 30, 10 |
| 2+25N | 30, 15 |

| | |
|---|---|
| | -25, -15 |
| 1+25N | -30, -15 |
| | -40, -10 |
| 1+00N | -35, -15 |
| | -60, -15 |
| 0+75N | -40, -15 |
| | -30, -15 |
| 0+50N | -30, -15 |
| | -55, -20 |
| 0+25N | -45, -15 |
| | -40, -20 |
| B.L. 0+00 | -30, -15 |
| | -30, -20 |
| 0+25S | -35, -20 |
| | -35, -20 |
| 0+50S | -45, -15 |
| | -35, -10 |
| 0+75S | -50, -10 |
| | -45, -20 |
| 1+00S | -1500, 85 |
| +24 @ 1+10S | 60, -10 |
| 1+25S | -150, 10 |
| | -50, -10 |
| 1+50S | -50, -10 |
| | -400, 35 |
| 1+75S | -900, 80 |

40 @ 1+03
-180 @ 1+08 S

| | | |
|---|---|---|
| | -650, 65 | o/c to sl. // plateau, o/b contour |
| 2+00S | -40, -10 | |
| | -50, -10 | |
| 2+25S | -150, 10 | |
| | -400, 45 | |
| 2+50S | -600, 65 | |
| | -50, -10 | |
| 2+75S | -55, -10 | |
| | -40, -10 | |
| 3+00S | -40, -10 | |
| | -40, -5 | marsh |
| 3+25S | -30, 0 | |
| | -30, 0 | |
| 3+50S | -35, 5 | |
| | -40, 10 | |
| 3+75S | -45, 10 | |
| | -35, 10 | |
| 4+00S | -45, 05 | |
| | -45, 0 | |
| 4+25S | -55, -5 | |
| | -120, 0 | +/- edge of marsh |
| 4+50S | -400, 40 | |
| | -240, 30 | |
| 4+75S | -950, 80 | |
| | -270, 30 | |
| 5+00S | -70, -10 | |

| | | |
|---|---|---|
| | 35, 15 | |
| 2+50N | 30, 5 | |
| | 35, 15 | |
| 2+75N | 35, 10 | |
| | 40, 15 | swamp. |
| 3+00N | 30, 35 | |

[illegible] re-initiated on large walks o/c [illegible] line.

∠ 2+00 = (⟶ south)

| | | |
|---|---|---|
| 3+00N | -30, -10 | (lake 5m north) |
| | -40, -15 | |
| 2+75N | -55, -10 | |
| | -60, -10 | no ok +/- moraine |
| 2+50N | -20, -10 | |
| | -10, -10 | |
| 2+25N | 0, -10 | |
| | -20, -10 | |
| 2+00N | -40, -15 | |
| | -30, -10 | |
| 1+75N | -25, -15 | |
| | -30, -10 | |
| 1+50N | -35, -15 | |

-50, -10
5+25 S -50, -5
-60, -10
5+50 S -70, -10
-75, -5
5+75 S -120, 0
-65, -5
6+00 S -70, -10
-65, -10
6+25 S -80, -5
-70, -10
6+50 S -60, -15
-70, -10
6+75 S -70, -10
-65, -10
7+00 S -60, -10
-55, -10
7+25 S -50, -5
-65, -5
7+50 S -60, -10
-55, -5
7+75 S -55, -10
-55, -5
8+00 S -70, 0
-120, 5 } +105 ...
8+25 S -65, -5

-20, -15
7+50 S -40, -15
-20, -20
7+25 S -15, -20
-15, -20
7+00 S -25, -20
-25, -20
6+75 S -20, -20
-20, -20
6+50 S -15, -20
-20, -15
6+25 S -20, -15
-20, -20
6+00 S -25, -10
-15, -15
5+75 S -20, -10
-15, -20
5+50 S -20, -15
-25, -15
5+25 S -20, -15
-10, -10
5+00 S -20, -15
-5, -20
4+75 S -45, -10
-10, -15
4+50 S -5, -20

| | |
|---|---|
| | -25, -10 |
| 4+25S | -35, -5 |
| | -30, -10 |
| 4+00S | -25, -10 |
| | -30, -10 |
| 3+75S | -25, -10 |
| | -30, -10 |
| 3+50S | -25, -10 |
| | -40, -10 |
| 3+25S | -30, -15 |
| | -20, -15 |
| 3+00S | -30, -10 |
| | -30, -15 |
| 2+75S | -35, -15 |
| | -15, -10 |
| 2+50S | -25, -10 |
| | -30, -10 |
| 2+25S | -45, -10 |
| | -40, -10 |
| 2+00S | -45, -10 |
| | -30, -15 |
| 1+75S | -10, -10 |
| | -250, 25 |
| 1+50S | -500, 55 → 1500, 85 |
| | -80, 0 |
| 1+25S | -150, 10 → 120, 10 |

| | |
|---|---|
| | -70, 0 |
| 8+50S | -60, 0 |
| | -70, 0 |
| 8+75S | -55, -5 |
| | -60, -5 |
| 9+00S | -70, 0 |
| | -70, 0 |
| 9+25S | -65, -5 |

---

[illegible] (→ North)

| | |
|---|---|
| ~~9+50~~ S | -100, 30 |
| 9+35S | -300, 30 |
| 9+25S | -700, 70 |
| | -120, -5 |
| 9+00S | -20, -20 |
| | -5, -20 |
| 8+75S | -15, -20 |
| | -30, -15 |
| 8+50S | -40, -10 |
| | -55, -10 |
| 8+25S | -55, -15 |
| | -50, -15 |
| 8+00S | -40, -20 |
| | -30, -20 |
| 7+75S | -30, -20 |

| | | |
|---|---|---|
| | -40, -5 | |
| 1+00S | -400, 45 | ok |
| | -250, 30 | |
| 0+75S | -270, 30 | |
| | -35, -5 | |
| 0+50S | -55, 0 | |
| | -45, -5 | |
| 0+25S | -40, -10 | |
| | -50, -5 | |
| B.L. 0+00 | -25, -5 | |
| | -35, -5 | |
| 0+25N | -25, 0 | |
| | -25, 0 | |
| 0+50N | -30, 0 | |
| | -30, -5 | |
| 0+75N | -30, -5 | |
| | -30, -5 | |
| 1+00N | -25, -10 | |
| | -35, -5 | |
| 1+25N | -15, -5 | |
| | -20, 0 | |
| 1+50N | -25, -5 | |
| | -10, 0 | |
| 1+75N | -15, -5 | |
| | -45, 0 | |
| 2+00N | -50, 0 | |

L 5+00 E (North)

| | |
|---|---|
| | -10, 0 |
| 0+25 N | -30, 0 |
| | -30, 30 |
| 0+50 N | -60, 30 |
| | -5, 10 |
| 0+75N | 70, 0 |
| | 80, -15 |
| 1+00 N | 85, -15 |
| | 85, -15 |
| 1+25N | 75, -5 |
| | 60, -5 |
| 1+50 N | 60, 0 |
| | 60, 0 |
| 1+75N | 85, 0 |
| | 85, 0 |
| 2+00N | 80, 0 |
| | 75, -15 |
| 2+25N | 75, -5 |
| | 65, -5 |
| 2+50 N | 65, -5 |
| | 65, 0 |
| 2+[illegible]N | 65, 0 |

[illegible]

3+00 — 60, 0 / 60, 0 / 60 0

3+25 N — 75, 0 / 75, 0

3+50 — 60, -5 / 60, 0

3+75 — 60, 0 / 75, -10

4+00 — 75, -10 / 80, -10

4+25 — 85, 0 / 90, 0

4+50 — 90, -5 / 85, 0

4+[illegible]5 N — 85 0

Swamp marsh

-70, 10
2+25N -80, 10

lake at 2+10 N

L 1+00 E (North)

0+25N -40, -5
-35, -5
0+50N -40, 0
-40, -5
0+75N -40, -5
-35, 0
1+00N -25, 0
-15, 0
1+25N -20, -10
-25, -5
1+50N -30, -5
-40, -5
1+75N -45, -5
-45, 0
2+00N -20, -5
-20, -5
2+25N -20, -5

L 4+00 E South

| | | | |
|---|---|---|---|
| | 25, | -10 | |
| 0+25 N | 30, | -10 | |
| | 0, | -10 | marsh |
| 0+50 N | 30, | -10 | |
| | 30, | -15 | |
| 0+75 N | 35, | -10 | |
| | 35, | -10 | |
| 1+00 N | 25, | -15 | |
| | 25, | -15 | |
| 1+25 N | 35, | -15 | |
| | 15, | -15 | |
| 1+50 N | 40, | -10 | |
| | 40, | -15 | |
| 1+75 N | 30, | -10 | |
| | 40 | -10 | |
| 2+00 N | 30, | -10 | |
| | 30 | 0 | |
| 2+25 N | 20 | 0 | |
| | 40, | -10 | |
| 2+50 N | 35, | -10 | |
| | 40, | -10 | |
| 2+75 N | 40, | -5 | |
| | 55 | -10 | alder swamp |
| 3+00 N | 70 | -10 | |

| | | |
|---|---|---|
| 8+50 N | [illegible] | -5 |
| | [illegible] | 0 |
| 8+75 N | 40. | -5 |
| | 60. | -5 |
| 9+00 N | 60. | 0 |
| | 45. | 0 |
| 9+25 N | 75. | -5 |
| | 70 | -5 |
| 9+50 N | 75, | -5 |
| | 80 | 0 |
| 9+75 N | 75, | 0 |
| | 85, | -5 |
| 10+00 N | 85 | -5 |

L 10+00 E South

| | | |
|---|---|---|
| 10+00 N | 65, | -5 |
| | 60, | -5 |
| 9+75 N | 75, | -5 |
| | 75, | -5 |
| 9+50 N | 60 | -5 |
| | 60, | -5 |
| 9+25 N | 70 | -5 |

L 11+00 E [illegible]

5+50 N 90, -5 swamp
90, -5
5+75 N 40, -5
6?, 0
6+00 N [illegible], 0
[illegible], -5
6+25 N 6?, -5
[illegible], 0
6+50 N 55, -5
55, -5
6+75 N 70, 0
65, 0
7+00 N 65, 0
55, 0
7+25 N 55, 0
7?, -10
7+50 N 7?, 0
70, 0
7+75 N 75, -10
75, -10
8+00 N 60, -5
75, -10
8+25 N 75, -10
75, -10

80, 0
9+00 N 80, -5
80, 0
8+75 N 65, 0
80, -10
8+50 N 85, -5
65, -5
8+25 N 65, 0
60, 0
8+00 N 65, 0
65, 0
7+75 N 75, -5
40, -5
7+50 N 70, 0
70, 0
7+25 N 70, 0
70, -15
7+00 N 80, -10
90, -5
6+75 N 85, 0
85, -5
6+50 N 85, 0, marsh
80, -5
70, 0 [illegible]

L 0+00 (North →)

6+50 N 45, -10
35, -10 Marsh
6+75 N 35, -15
20, -10
7+00 N 35, 0
15, 0
7+25 N 20, 0
20, -5
7+50 N 15, 0
40, 0
7+75 N 35, -5
55, -5
8+00 N 20, -5
4[illegible], -10
8+25 N [illegible], -10
30, -20
8+50 N 30, -15
[illegible], -15
8+75 N 50, ~~20~~
55, 0
9+00 N 45, -5

9+50 N [illegible], -5
[illegible], -5
9+25 N [illegible], 0
45, 0
9+00 N 55, -5
55, -5
8+75 N 45, -5
70, 0
8+50 N 70, 0
65, 0
8+25 N 70, 0
40, 0
8+00 N 4[illegible], 0
[illegible], 0
7+75 N [illegible], -5
55, -10
7+50 N 35, -5
20, -15
7+25 N 15, 5
15, 0
7+00 N 5, 0
30, 5
6+75 N 15, 5
40, 5
6+50 N 40, -10
35, -10

| | |
|---|---|
| | 40, -5 |
| 6+25 N | 40, -5 |
| | 40, 0 |
| 6+00 N | 40, 0 |
| | 15, 5 |
| 5+75 N | 20, 10 |
| | 20, 5 |
| 5+50 N | 25, 10 |
| | 25, 10 |
| 5+25 N | [illegible], 10 |
| | 35, -5 |
| 5+00 N | 25, -5 |
| | 40, 0 |
| 4+25 N | 55, 0 |
| | 55, 0 |
| 4+50 N | 45, 0 |

| | |
|---|---|
| | 60, -5 |
| 9+25 N | 60, -5 |
| | 60, -5 |
| 9+50 N | 60, 0 |
| | 55, 0 |
| 9+75 N | 60, -5 |
| | 60, 0 |
| 10+00 N | 55, -10 |
| | 45, -10 |
| 10+25 N | 40, -5 |
| | 45, -15 |
| 10+50 N | 30, 0 |

Gabbro

L [illegible] (South)

| | |
|---|---|
| 10+50 N | 60, -10 |
| | 30, -10 |
| 10+25 N | -10, 0 |
| | -10, 0 |
| 10+00 N | -30, -10 |
| | 40, -5 |
| 9+75 N | [illegible], -5 |
| | [illegible], -5 |

Flat no o/c.

L 11 N (south)

3+00 60 | 30 a/f... 60 | 10

L 3+00 E (North)

| | | |
|---|---|---|
| 4+50 N | 40, 0 | swamp |
| | 20, 0 | |
| 4+75 N | 10, 0 | |
| | 10, -10 | |
| 5+00 N | 0, -10 | |
| | 15, -15 | |
| 5+25 N | 25, -10 | |
| | 25, -10 | |
| 5+50 N | 60, 0 | Road |
| | 65, -10 | |
| 5+75 N | 75, -10 | |
| | -40, 10 | |
| 6+00 N | -150, 25 | |
| | -210, 25 | |
| 6+25 N | -30, 20 | |
| | 40, 5 | |
| 6+50 N | 40, 5 | |
| | 70, 5 | |
| 6+75 N | 45, 0 | |
| | 80, 0 | |
| 7+00 N | 85, -5 | |
| | 60, -5 | |
| 7+25 N | 60, -5 | |

L 10+00 E (North)

(Road)

| | |
|---|---|
| 9+00 | 80, 15 |
| | 110, 70 |
| 8+75 | 85, 15 |
| | 85, 35 |
| 8+50 | 70, 20 |
| | 75, 20 |
| 8+25 | 75, 20 |
| | 85, 15 |
| 8+00 | 90, 35 |
| | 85, 35 |
| 7+75 | 60, 25 |
| | 60, 20 |
| 7+50 | 60, 5 |
| | 40, 10 |
| 7+25 | 70, 10 |
| | 70, 20 |
| 7+00 | 40, 20 |
| | 25, 20 |
| 6+75 | 25, 20 |
| | 65, 30 |
| 6+50 | 60, 30 |
| | 55, 25 |

6+25 50, 35
40, 10
6+00 70, 0
70, 10
5+75 70, 30
65, 20
5+50 70, 20
70, 10
5+25 70, 10
70, 10
5+00 75, 11
80, 10
4+75 75, -5
70, 5
4+50 70, 15
70, 15
4+25 80, 5
85, 5
4+00 [illegible], 0
100, 5
3+75 [illegible] 5
[illegible], 5
3+50 80, 5
85, 15
3+25 [illegible], 15
[illegible] 120

7+50N 70, 0
45, 0
30, 0
7+75N 30, -5
35, -5
8+00N 30, -5
30, -10
8+25N 30, -5
45, 0
8+50N 45, 0

McLaren lane

10:50 AM Nov 03/93

L 3+00 (=> west) [illegible]

(th under power line)

| | |
|---|---|
| BL 0+00 | 25, 10 |
| | 80, 10 |
| 0+25w | 95, 15 |
| | 110, 10 |
| 0+50w | 120, 10 |
| | 120, 15 |
| 0+75w | -20, 40 -100, 50 @ [illegible] |
| | 120, 20 |
| 1+00w | 120, 20 |
| | 175, 5 |
| 1+25w | 150, 10 |
| | 165, 10 |
| 1+50w | 165, 10 |
| | 180, 15 |
| 1+75w | 165, 15 |
| | 195, 10 |
| 2+00w | 195, 15 |
| | 200, 15 |
| 2+25w | 210, 15 |
| | 195, 10 |
| 2+50w | 195, 10 |
| | 195, 10 |
| 2+75w | 200, 15 |

3+50w

| | | |
|---|---|---|
| | [illegible] | |
| 2+25w | [illegible] | |
| | -20, 5 | |
| 2+00w | -15, 5 | |
| | -25, 15 | older swamp |
| 1+75w | -20, 10 | |
| | -5, 15 | |
| 1+50w | -10, 10 | |
| | -25, 5 | |
| 1+25w | -35, 10 | |
| | -60, 0 | 110, 10 |
| 1+00w | -35, 5 | |
| | -180, 25 | |
| 0+75w | -50, 10 | |
| | -85, 10 | |
| 0+50w | -80, 10 | |
| | -80, 10 | power line + road |
| 0+25w | -75, 30 | |
| | -90, 10 | |
| BL 0+00 | -70, 10 | |

∠ 1+00S (→ west)

| | |
|---|---|
| B.L. 0+00 | -55, 10 |
| | -75, 15 |
| 0+25w | -80, 15 |
| | -30, 20 } road |
| 0+50w | -90, 5 |
| | -105, 10 — -240, 15 |
| 0+75w | -130, 5 |
| | -210, 20 |
| 1+00w | -110, -5 |
| | -135, 5 |
| 1+25w | -100, 0 |
| | -85, 0 (alder swamp) |
| 1+50w | -75, 5 |
| | -75, 5 |
| 1+75w | -65, 25 |
| | -65, 15 |
| 2+00w | -80, 5 |
| | -85, -5 |
| 2+25w | -80, -10 |
| | -90, 5 |
| 2+50w | -90, 5 |
| | -90, 10 |
| 2+75w | -65, 0 |

| | |
|---|---|
| | 210, 10 |
| 3+00w | 225, 5 |
| | 230, 10 |
| 3+25w | 210, 0 |
| | 220, 15 |
| 3+50w | 225, 5 |
| | 230, 5 |
| 3+75w | 230, 5 |
| | 220, 10 |
| 4+00w | 210, 10 |

instrument moved

∠ 2+00S (→ East)

| | |
|---|---|
| 4+00w | -25, 0 |
| | -5, -5 (marsh) |
| 3+75w | 5, -5 |
| | 20, 10 |
| 3+50w | 10, 5 |
| | 0, 15 |
| 3+25w | 0, 5 |
| | 10, 15 |
| 3+00w | -25, 0 |
| | -5, -5 |
| 2+75w | -15, -5 |
| | -10, -10 |
| | -15, -5 |

-60, 5
3+00 W -70, 5
-55, 25
3+25W -65, 20
-50, 15
3+50W -75, 5
-90, 5
(marsh — bracket beside the 3+00W to 3+50W readings)
3+75W -90, 5
-120, 10
4+00W -90, 5
-95, 15
4+25W -70, 20
-95, 15
4+50W -110, 0
-110, 5
4+75W -95, 0
-85, 5
5+00W -130, 10
-110, 10
5+25W -70, 10
-80, 10
5+50W -110, 5
-105, 0
5+75W -110, 5
-90, 5
6+00W -85, 5

L 0+00 ( → East

8+25W : -70, 0
-95, -5
8+00W -110, 5
-100, -5
7+75W -90, -10
-75, -5
7+50W -80, -10
-100, -5
7+25W -105, 0 (re-rmitiwa.)
5, -5
7+00W 10, -10
0, -10
6+75W 5, -10
20, -5
6+50W 20, -15
5, 0
6+25W 5, -5 ← [illegible]
-70, 0
6+00W -50, -5
-25, 5
5+75W -10, -10
-10, -5
5+50W [illegible]25, -5 (open ma[illegible])

| | | |
|---|---|---|
| | 30, 10 | open marsh |
| 5+25w | 30, 15 | |
| | 35, 10 | |
| 5+00w | 35, 15 | |
| | 30, 15 | |
| 4+75w | 30, 10 | |
| | 15, 5 | |
| 4+50w | 0, -10 | |
| | 10, -10 | spruce marsh |
| 4+25w | 0, -10 | |
| | 20, 0 | |
| 4+00w | 5, 15 | |
| | 15, 10 | |
| 3+75w | 25, 20 | |
| | 20, 20 | |
| 3+50w | 15, 10 | |
| | 25, 20 | |
| 3+25w | 20, 15 | |
| | 20, 15 | |
| 3+00w | 15, 10 | |
| | 20, 20 | |
| 2+75w | 15, 20 | |
| | 15, 20 | |
| 2+50w | 15, 20 | |
| | 20, 15 | |
| 2+25w | 15, 15 | |

| | |
|---|---|
| | -90, 0 |
| 6+25w | -75, 0 |
| | -110, 5 |
| 6+50w | -90, 0 |
| | -105, 0 |
| 6+75w | -70, -5 |
| | -65, -5 |
| 7+00w | -95, 5 |
| | -80, 5 |
| 7+25w | -80, 0 |
| | -65, 0 |
| 7+50w | -80, -0 |
| | -80, -5 |
| 7+75w | -70, -5 |
| | -90, -5 |
| 8+00w | -90, 0 |
| | -110, 0 |
| 8+25w | -90, 0 |

## ∠ 1+00N (→ west)

| | | |
|---|---|---|
| B.L. 0+00; | −5, −25 | east shoulder |
| | −35, −10 | west shown |
| 0+25W | −30, 0 | power line. |
| | 5, −15 | |
| 0+50W | −30, −15 | |
| | −15, −20 | |
| 0+75W | 15, −15 | |
| | −40, −15 | |
| 1+00W | −80, −10 | |
| | −50, −15 | ← −130, −10 |
| 1+25W | −90, −10 | |
| | −90, −10 | ← −180, 10 |
| 1+50W | −95, −10 | @ 1+43 −240, 20 |
| | 5, −20 | 270, −70 |
| 1+75W | −30, −20 | |
| | −5, −20 | −120, 0 @ 1+70W |
| 2+00W | −30, −15 | |
| | 5, −15 | |
| 2+25W | −20, −10 | spruce-tam. swamp |
| | 15, 0 | |
| 2+50W | 5, 10 | |
| | 10, −10 | |
| 2+75W | 15, −20 | o/c. |

| | | |
|---|---|---|
| 2+00W | 5, 5 | power line |
| | −?, −5 | 4 ft. [illegible] |
| | −7?, 0 | |
| 1+75W | −10, −10 | |
| | −10, −5 | |
| 1+50W | −80, 5 | ← −110, 5 |
| | −270, 30 | |
| 1+25W | −95, 0 | |
| | −110, 5 | |
| 1+00W | −20, −10 | |
| | −10, −10 | |
| 0+75W | −5, −5 | |
| | −5, 0 | |
| 0+50W | −50, 5 | |
| | −35, 35 | power line |
| 0+25W | −95, 10 | ← −210, 30 road east shoulder |
| | −170, 20 | |
| B.L. 0+00 | −50, −5 | |

-10, 5 swampy
3+00 w 5, 0
20, -20 o/c
3+25 w 5, -20 o/c
-10, -10
3+50 w 10, -10 } spruce/cedar swamp
10, -15
3+75 w 5, -20
-5, -15
4+00 w -10, -10
0, 0
4+25 w 10, -15
-15, -20
4+50 w -10, -20
-5, -15
4+75 w 15, -20
5, -20
5+00 w 30, -20
25, -20
5+25 w 20, 0 } open tea marsh
15, -5
5+50 w 25, 5
30, 5
5+75 w 35, -5
20, -15
6+00 w 20, -10

-15, -20
9+75 w -20, -10
0, -75 boulder field
10+00 w -20, -10
-35, -10
10+25 w -50, 0
-65, -5 no o/c
10+50 w 5, -10 ← -70, -5
-15, -15
10+75 w -50, -10
-5, -10
11+00 w -10, -10
0, -10
11+25 w -10, -10

(2+00 N → east)

11+75 w -10, -10
-40, -10
11+50 w 5, -15
-40, -10
11+25 w -15, -10
0, -10
11+00 w 5, -20

| | |
|---|---|
| | 20, -15 |
| 10+75w | 0, -10 |
| | -10, -15 |
| 10+50w | -15, -10 |
| | 10, -15 |
| 10+25w | -15, -10 |
| | 10, -15 |
| 10+00w | 0, -5 |
| | 20, -20 |
| 9+75w | 5, -15 |
| | -30, -15 |
| 9+50w | 0, -20 |
| | -5, -15 |
| 9+25w | -5, -5 |
| | -10, -15 |
| 9+00w | -90, -5 (side of small ridge; no ole) |
| | -15, -20 |
| 8+75w | -15, -15 |
| | -10, -15 |
| 8+50w | 5, -10 |
| | -5, -10 |
| 8+25w | -20, -15 |
| | -15, -5 (small pond) |
| 8+00w | 5, -10 |
| | -80, 0 |
| 7+75w | -25, -5 |

| | |
|---|---|
| top of sider | -50, -10 (flank of hill, rise, sel. lesser -90, -5) |
| 6+25w | -10, -10 |
| | 30, -15 (wood, lower rise) |
| 6+50w | 5, -10 (alder swamp) |
| | 10, -20 |
| 6+75w | 5, -20 |
| | 10, -10 |
| 7+00w | 30, 5 (open wet marsh) |
| | 25, 5 |
| 7+25w | 10, 0 |
| | 0, -10 |
| 7+50w | 20, 0 |
| | 5, -5 |
| 7+75w | 10, 0 |

no readings. (wet ... )

| | |
|---|---|
| 8+75w: | -20, -10 (small pond) |
| | no reading |
| 9+00w | 5, -15 |
| | -5, -10 |
| 9+25w | -20, -10 |
| | -5, -5 |
| 9+50w | -15, -10 |

- 30, -15 final of [illegible]
7+50 W 25, -10
0, -15 open - wet spruce swamp.
7+25W -5, -15
-30, -10
7+00W -60, -10
-20, -10
6+75W -20, -5
5, -15
6+50 W -50, -10
-25, -10
6+25W 5, -15
10, -15
6+00 W 25, -15
15, -15
5+75W 15, -15
10, -20
5+50W 30, -15
35, -20
5+25W 20, -15
30, -20
5+00W 35, -10
20, 5 edge of
4+75W -5, -17 spruce swamp
25, -15
4+50W 40, -15

-110, 0 ← 450, 50 @ 1+23 W
1+00W -105, 0 ← -210, 20
-80, -5
0+75W -20, 0
-30, -10 ← -130, 10
0+50W -15, -5
-30, -10
0+25W -40, -10 power [illegible] of road
-20, -5 east shoulder of road
B.L. 0+00 -105, 0 ← on [illegible]

D.D. EM Survey Nov. 5, 93
Bugg Lake Pro.

L 3+00N (→ East)

| | |
|---|---|
| BL 0+00 | 40, -10 |
| | 15, -10 |
| 0+25W | 20, -20 |
| | 75, -25 |
| 0+50W | 70, -20 |
| | 80, -20 |
| 0+75W | 95, -25 |
| | 110, -30 |
| 1+00W | 70, -15 |
| | 150, -30 |
| 1+25W | -150, 30 |
| | 165, -30 |
| 1+50W | 180, -30 |
| | 200, -35 |
| 1+75W | 190, -35 |
| | 180, -30 |
| 2+00W | 175, -30 |
| | 180, -30 |
| 2+25W | 150, -25 |
| | 195, -30 |
| 2+50W | 20?, -30 |

| | |
|---|---|
| | 20, -15 |
| 4+25W | 30, -20 |
| | 30, -15 |
| 4+00W | -20, -10 |
| | -5, -15 |
| 3+75W | -30, -10 |
| | 10, -15 |
| 3+50W | 10, -10 |
| | 20, -15 |
| 3+25W | -10, -10 |
| | -25, -10 |
| 3+00W | -10, -10 |
| | 25, -20 |
| 2+75W | 10, -15 |
| | -15, -10 |
| 2+50W | -20, -10 |
| | -50, -5 |
| 2+25W | -50, -5 |
| | 0, -15 |
| 2+00W | -25, -10 |
| | -35, -10 |
| 1+75W | -35, -10 |
| | -50, -5 |
| 1+50W | 0, -15 |
| | -90, -10 |
| 1+25W | -400, 35 |

@2+55W
-88, 70
to North

-120, 10 (no

-110, 10

~~[illegible]~~
2+75W 180, -25
175, -35
190, -35
3+00W 210, -40
195, -30
3+25W 240, -40
250, -40
3+50W 220, -40
230, -35
3+75W 240, -35
95, -15
4+00W 220, -35

[illegible] line

---

4+00W 0, 0 instrument re-initialized
10, -10
4+25W -10, -10
0, -10
4+50W -35, -5
0, -10
4+75W 0, -10
10, -15
5+00W 25, -10
-5, -10
5+25W -20, -5

-30, 5
8+75W -20, 10
-45, 15
9+00W -20, 10
-45, 10
9+25W -35, 10
-50, 10
9+50W -25, 5
-20, 5
9+75W -40, 15
-20, 10
10+00W -40, 10
-35, 10
10+25W -45, 15
-45, 15
10+50W 30, 10
-40, 15
10+75W -25, 15
-25, 20
11+00W -95, 25
-300, 60
11+25W -40, 15
-35, 20
11+50W -75, 20
11+65W (E.O.L.) -60, 20

[illegible] archive

## L 4+00 N (→ East)

10+75W  -45, 10
-40, 10
10+50W  -50, 20
-75, 25  base of ridge?
10+25W  -20, 15
-15, 10
10+00W  -90, 25
-70, 10
9+75W  -30, 10
-50, 15
9+50W  -40, 5
-45, 15
9+25W  -45, 10
-10, 10
9+00W  -25, 10
-5, 10
8+75W  -15, 10
-25, 10
8+50W  -5, 10
-10, 10
8+25W  -10, 10
10, 5
8+00W  0, 5

-20, -5
5+50W  -5, -10
5, -10
5+75W  -5, -10
-5, -5
6+00W  -35, 5
10, -5
6+25W  -5, 0
-5, 0
6+50W  -15, 0
10, -5
6+75W  5, -5
-30, 0
7+00W  -40, 0
-50, 5
7+25W  -55, 5 → -90, 10  till contact? notch
-60, 10
7+50W  -70, 15
-45, 10
7+75W  -50, 10
-30, 10
8+00W  -20, 5
-20, 5
8+25W  -60, 10
-40, 15
8+50W  -35, 15

-60, 15
7+75W -50, 10
-45, 10
7+50W -30, 5
-65, 10
7+25W -50, 15
-85, 15
7+00W -50, 15
-50, 10
6+75W -50, 10
-30, 10
6+50W -25, 5
-35, 5
6+25W -30, 5
-25, 10
6+00W -20, 10
-25, 10 - front of ridge
5+75W -50, 15
-30, 10
5+50W -25, 10
-5, 10
5+25W -15, 10
-35, 15
5+00W -25, 5
-10, 10
4+75W -25, 10

-65, 30
1+25W -90, 25
-110, 32 — 7.50 90 E HOSW (shallow cuts cover o/c).
1+00W -75, 25
-70, 20
0+75W -55, 20
-95, 25
0+50W -75, 20
-75, 25
0+25W -90, 25
-65, 25
B.L. 0+00 -60, 20

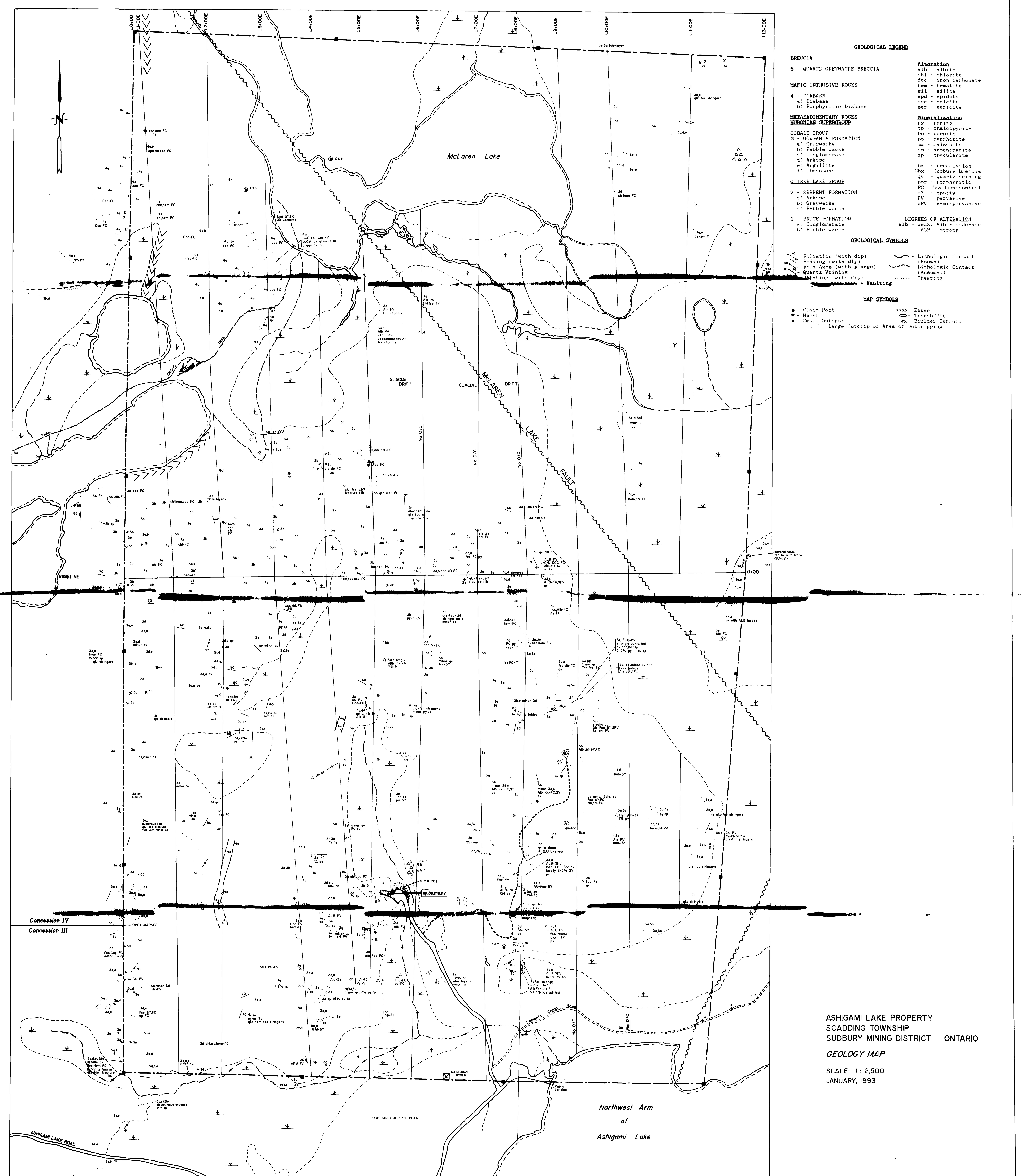
L 5+00 S (→ west)

B.L. 0+00 : -120, 30
-130, 30
0+25W -160, 30
-180, 30
0+50W -140, 30
-120, 35
0+75W -150, 35
-210, 45
1+00W -260, 55
-120, 30
1+25W -95, 25 ← -400, 65 no ok
-95, 25
1+50W -85, 20
-50, 15
1+75W -80, 25
-45, 30
2+00W -80, 30
-65, 25
2+25W -80, 30
-60, 25
2+50W -70, 25
-60, 20
2+75W -60, 15
-50, 15
3+00W -35, 10

(in alder swamp (alone)) — 1+75W to 2+75W

-45, 10
4+50W -45, 15
-45, 20
4+25W -50, 20
-60, 20
4+00W -55, 25
-55 [illegible], 20
3+75W -50, 15
-50, 15
3+50W -60, 20
-90, 25
3+25W -80, 25
-40, 20
3+00W -30, 15
-35, 15
2+75W -40, 15
-50, 15
2+50W -70, 20
-70, 20
2+25W -70, 20
-75, 20
2+00W -80, 25
-90, 25
1+75W -80, 20
-105, 25
1+50W -75, 25

| | | |
|---|---|---|
| | -35, 10 | |
| 3+25W | -35, 10 | |
| | 0, 15 | vast alder swamp. |
| 3+50W | 5, 20 | |
| | 5, 10 | |
| 3+75W | 0, 15 | |
| | -5, 15 | |
| 4+00W | -20, 15 | |
| | -40, 10 | |
| 4+25W | -60, 15 | |
| | -40, [illegible] | |
| 4+50W | -40, [illegible] | |


GEOLOGICAL LEGEND
BRECCIA
5 - QUARTZ-GREYWACKE BRECCIA
MAFIC INTRUSIVE ROCKS
4 - DIABASE
a) Diabase
b) Porphyritic Diabase
METASEDIMENTARY ROCKS
HURONIAN SUPERGROUP
COBALT GROUP
3 - GOWGANDA FORMATION
a) Greywacke
b) Pebble wacke
c) Conglomerate
d) Arkose
e) Argillite
f) Limestone
QUIRKE LAKE GROUP
2 - SERPENT FORMATION
a) Arkose
b) Greywacke
c) Pebble wacke
1 - BRUCE FORMATION
a) Conglomerate
b) Pebble wacke
Alteration
alb albite
chl - chlorite
fcc - iron carbonate
hem - hematite
sil - silica
epd - epidote
ccc - calcite
ser - sericite
Mineralization
py - pyrite
cp - chalcopyrite
bo - bornite
po - pyrrhotite
ma - malachite
as - arsenopyrite
sp - specularite
bx - brecciation
Sbx - Sudbury Breccia
qv - quartz veining
por - porphyritic
FC fracture control
SY - spotty
PV - pervasive
SPV semi-pervasive
DEGREES OF ALTERATION
alb - weak; Alb - moderate
ALB - strong
GEOLOGICAL SYMBOLS
Foliation (with dip)
Bedding (with dip)
Fold Axes (with plunge)
Quartz Veining
Jointing (with dip)
Faulting
Lithologic Contact (Known)
Lithologic Contact (Assumed)
Shearing
MAP SYMBOLS
Claim Post
Marsh
Small Outcrop
Large Outcrop or Area of Outcropping
Esker
Trench Pit
Boulder Terrain
McLaren Lake
McLAREN LAKE FAULT
GLACIAL DRIFT
BASELINE
Concession IV
Concession III
MUCK PILE
SURVEY MARKER
MICROWAVE TOWER
FLAT SANDY JACKPINE PLAIN
ASHIGAMI LAKE ROAD
Northwest Arm of Ashigami Lake
ASHIGAMI LAKE PROPERTY
SCADDING TOWNSHIP
SUDBURY MINING DISTRICT ONTARIO
GEOLOGY MAP
SCALE: 1: 2,500
JANUARY, 1993

200

GLACIAL DRIFT
1165574
GLACIAL DRIFT
GLACIAL DRIFT
T.L. 12+00W
L. 8+00W
BUGG
FAULT
1165544
Bugg Lake
GLACIAL DRIFT
1165573
Spar Lake
Patented Claim
# W.R. 37
Conces
Conces
210


GEOLOGICAL LEGEND

BRECCIA

5

MAFIC INTRUSIVE ROCKS

4

METASEDIMENTARY ROCKS
HURONIAN SUPERGROUP

3

1 Conglomerate

Alteration

Mineralization

DEGREES OF ALTERATION

GEOLOGICAL SYMBOLS

MAP SYMBOLS

BUGG LAKE PROPERTY
SCADDING TOWNSHIP
SUDBURY MINING DISTRICT ONTARIO

*GEOLOGY MAP*

SCALE: 1: 2,000
JANUARY, 1993

Sandy Jackpine Plain
NO O/C
no outcrop
no outcrop
no outcrop
OB trench
OB trench with Sudbury Bx and 2-4% Fcc veinlets, SY Alb
laminated 3d, PV Alb minor 1a
Lot 7/Con IV Marker
Red Rock Mine Road
Snowmobile Trail
Beaver Pond
dried up beaver pond
KUKAGAMI LAKE ROAD
BUGG LAKE
6+00 W
5+00 W
4+00 W
3+00 W
2+00 W
1+00 W
B.L. 0+00
1+00 E
220

CLAIM INDEX MAP
Subdivisions Annulled
Subdivided
CON. IV
16090
16088
18806
16085
16089
18805
16092
16087
5102
5110
16086
Patented, surface and mining rights
LOT 7
LOT 6
LOT 8
SCADDING TOWNSHIP
Scale : 1 : 20000
JOAN LAKE
L 17+00 N
L 16+00 N
L 15+00 N
L 14+00 N
L 13+00 N
L 12+00 N
L 11+00 N
L 10+00 N
L 9+00 N
L 8+00 N
L 7+00 N
L 6+00 N
L 5+00 N
L 4+00 N
L 3+00 N
L 2+00 N
L 1+00 N
L 1+00 S
L 2+00 S
L 3+00 S
L 4+00 S
2+00 E
3+00 E
4+00 E
5+00 E
6+00 E
GEOLOGICAL LEGEND
BRECCIA
MAFIC INTRUSIVE ROCKS
4 DIABASE
b) Porphyritic Diabase
METASEDIMENTARY ROCKS
HURONIAN SUPERGROUP
COBALT GROUP
3 GOWGANDA FORMATION
QUIRKE LAKE GROUP
2 SERPENT FORMATION
a) Arkose
b) Greywacke
c) Pebble wacke
1 BRUCE FORMATION
Alteration
alb albite
chl chlorite
fcc iron carbonate
hem hematite
epd epidote
Mineralization
py pyrite
cp chalcopyrite
bo bornite
ma malachite
DEGREES OF ALTERATION
alb weak; Alb moderate
ALB strong
GEOLOGICAL SYMBOLS
Foliation (with dip)
Bedding (with dip)
Quartz Veining
Lithologic Contact (Known)
Lithologic Contact (Assumed)
Faulting
MAP SYMBOLS
Claim Post
Trench Pit
Boulder Terrain
Sandy Jackpine Plain
Flat Sandy Ground
Till Mound
Survey Peg
Sandy Jackpine Plain NO O/C
(1993-94 Trench Locations)
NOTE : The area encompassing the shafts is dominated by a complex system of northerly trending, auriferous, Qtz-Fe-Carb. veins, masses, and breccias occurring within strongly sheared / chloritized diabase. Historical values range up to .44 oz/ton gold. See report for further details regarding shaft area geology.
RED ROCK PROPERTY
SCADDING TOWNSHIP
SUDBURY MINING DISTRICT-- ONTARIO
GEOLOGY - SAMPLE LOCATION
Scale: 1 : 2000
January, 1994

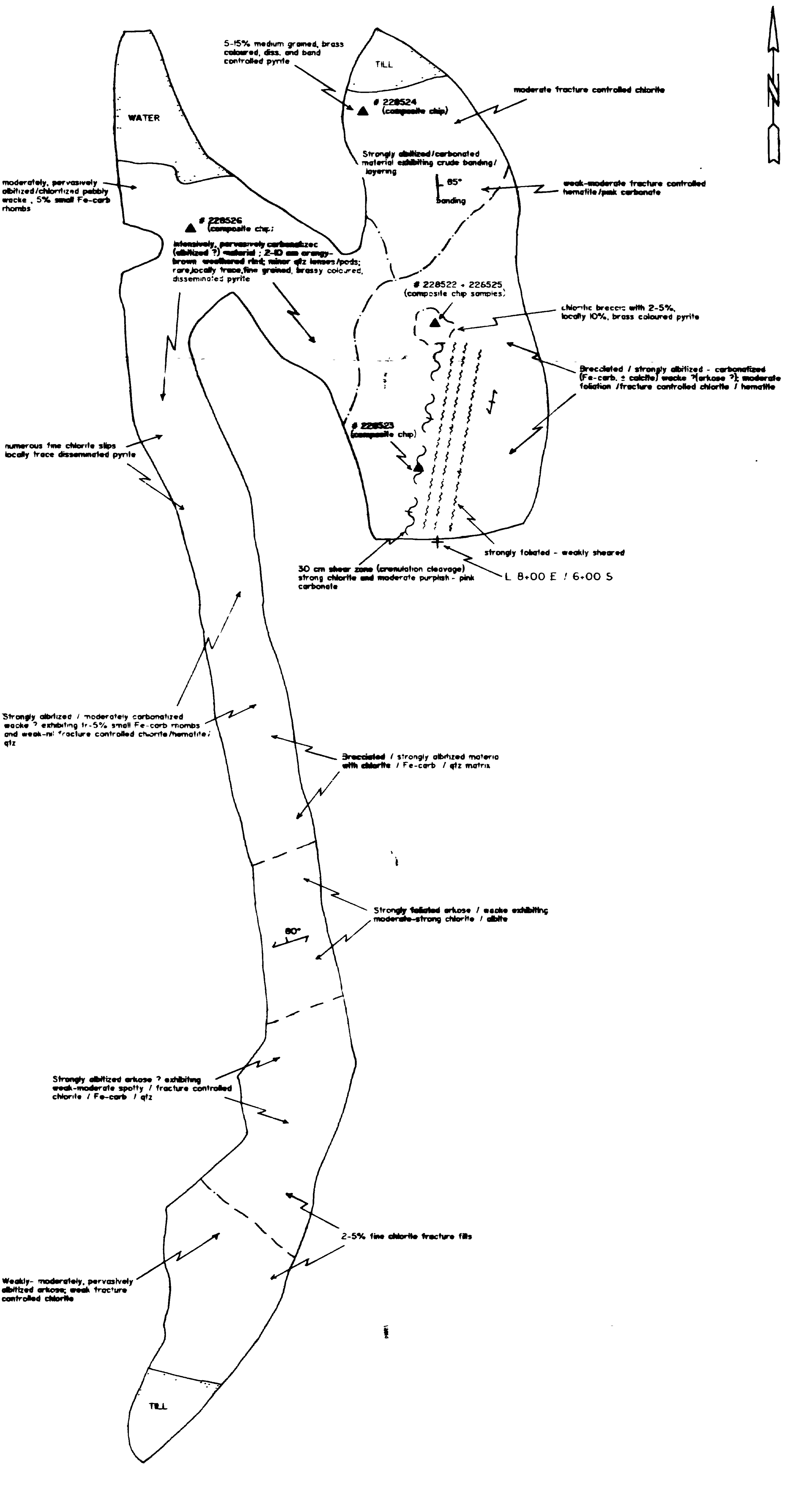



FIGURE 5

ASHIGAMI LAKE PROPERTY

L 8+00 E / 6+00 S TRENCH

SCALE: 1 : 100

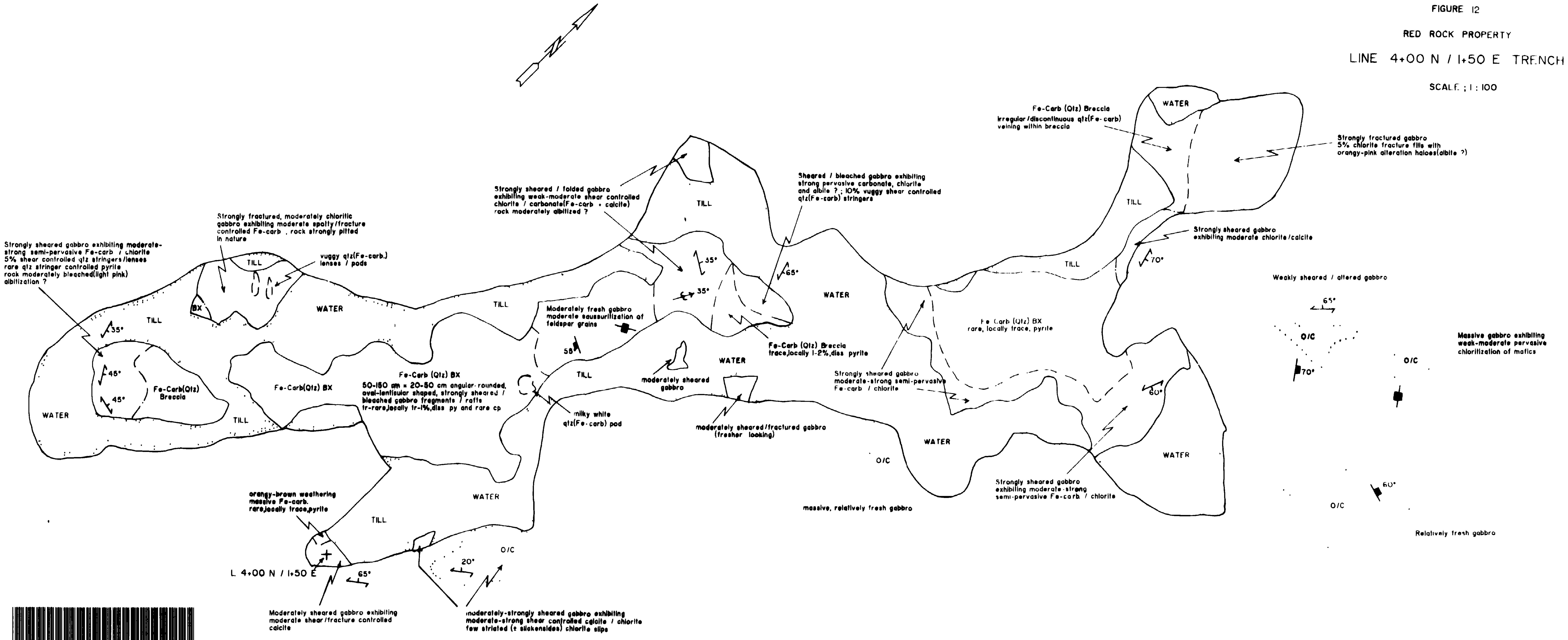
DECEMBER, 1993

FIGURE 12

RED ROCK PROPERTY

LINE 4+00 N / 1+50 E TRENCH

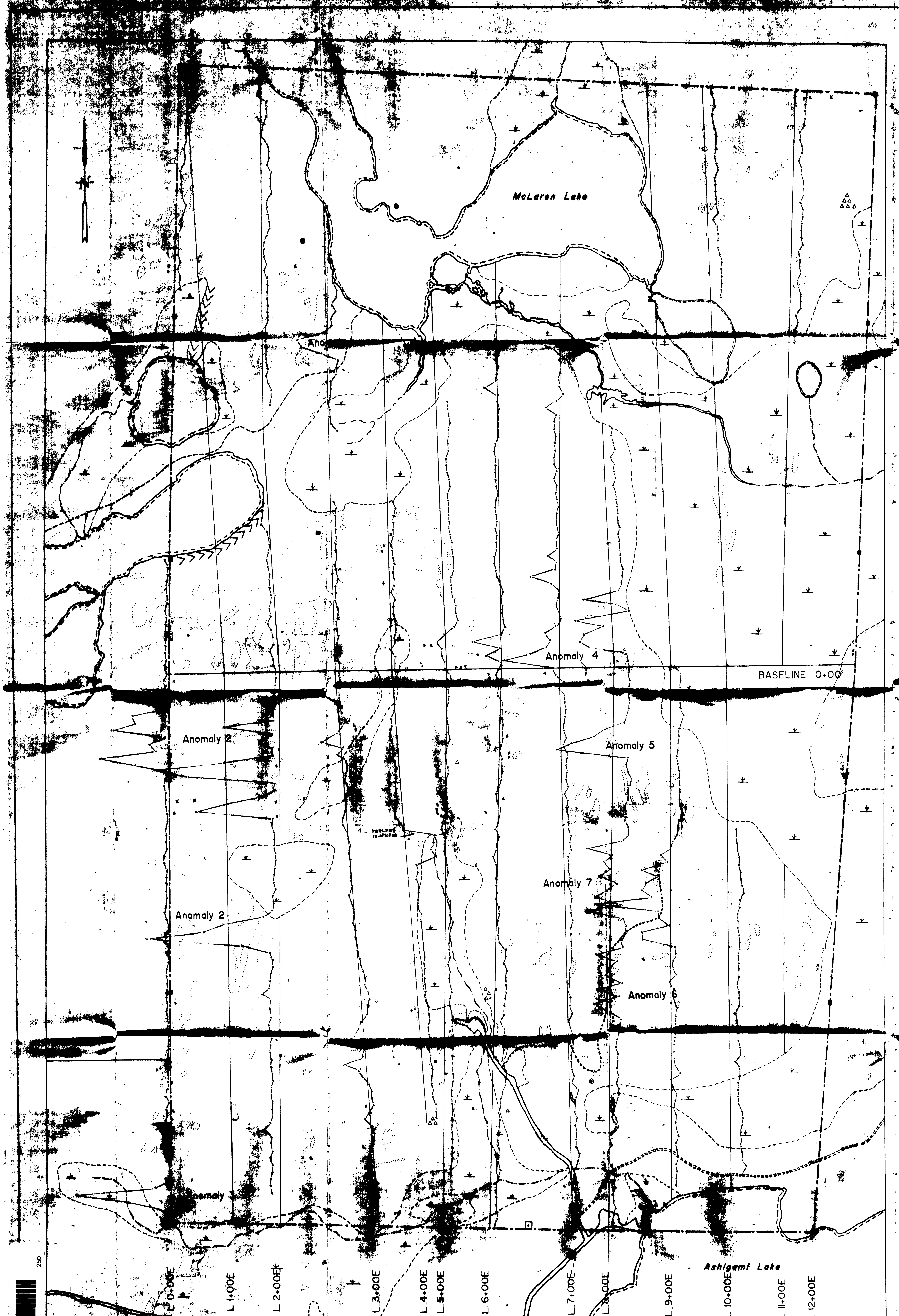
SCALE ; 1 : 100



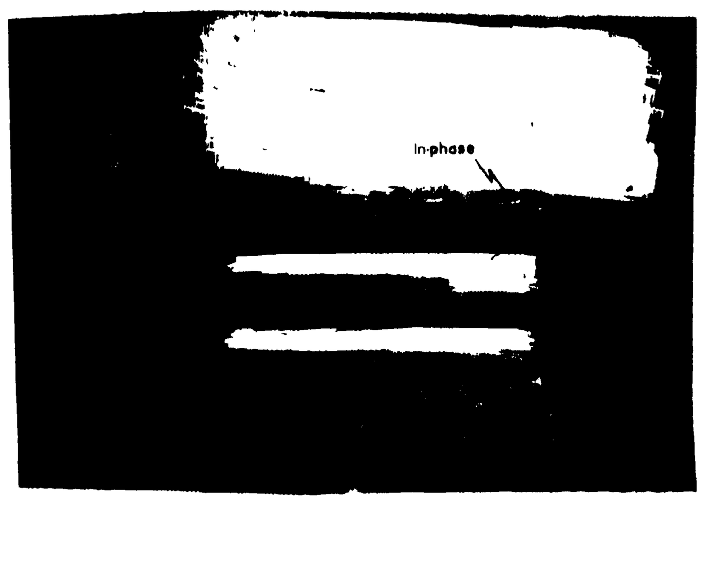

41I10NE0095 OP93-582 SCADDING

240

DECEMBER, 1993




LEGEND




ASHIGAMI LAKE PROPERTY
SCADDING TOWNSHIP
SUDBURY MINING DISTRICT ONTARIO

DOUBLE-DIPOLE SURVEY

SCALE: 1 : 2500

January, 1994


[redacted]

BUGG LAKE PROPERTY
SCADDING TOWNSHIP
SUDBURY MINING DISTRICT

DOUBLE-DIPOLE SURVEY

SCALE: 1 : 2,000
January, 1994