REPORT ON THE GEOLOGICAL AND GROUND GEOPHYSICAL SURVEY BIGSTONE BAY, KENORA DISTRICT, ONTARIO

FOR

MINAKI GOLD MINES LIMITED

BY

BARRINGER RESEARCH LIMITED
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METROPOLITAN TORONTO
REXDALE, ONTARIO

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LIST OF DRAWINGS

1. INTRODUCTION

1.1 GENERAL

In August 1972 Barringer Research submitted a geological report to Minaki Gold Mines Ltd., concerning Minaki's Sultana Island property in the Bigstone Bay Area, Lake of the Woods in the Kenora District, Ontario.Recommendations of this report were that induced polarization and magnetometer surveys were to be conducted over the property with an accompanying geological survey.

During the period from October 3 to October 19, 1972 inclusive, a combined induced polarization/resistivity and magnetometer survey was carried out by Barringer Research Limited for Minaki Gold Mines Limited on the claims group. In addition, a geological investigation and mapping of the claims was completed between October 12 and October 20, 1972, inclusive by a Barringer Research staff geologist.

The following report describes both the geology, and the findings of the geophysical survey. Bound with the report are geophysical maps nos. 5-331-3 to 6 and geological map no. 5-331-2.

1.2 PROPERTY

The property consists of five claims on the northwest portion of Sultana Island, Bigstone Bay, Lake of the Woods Ontario. The claims are in Kenora Mining Division being numbered K 314875 to 314878 inclusive and K 314948. The latter is a water claim.

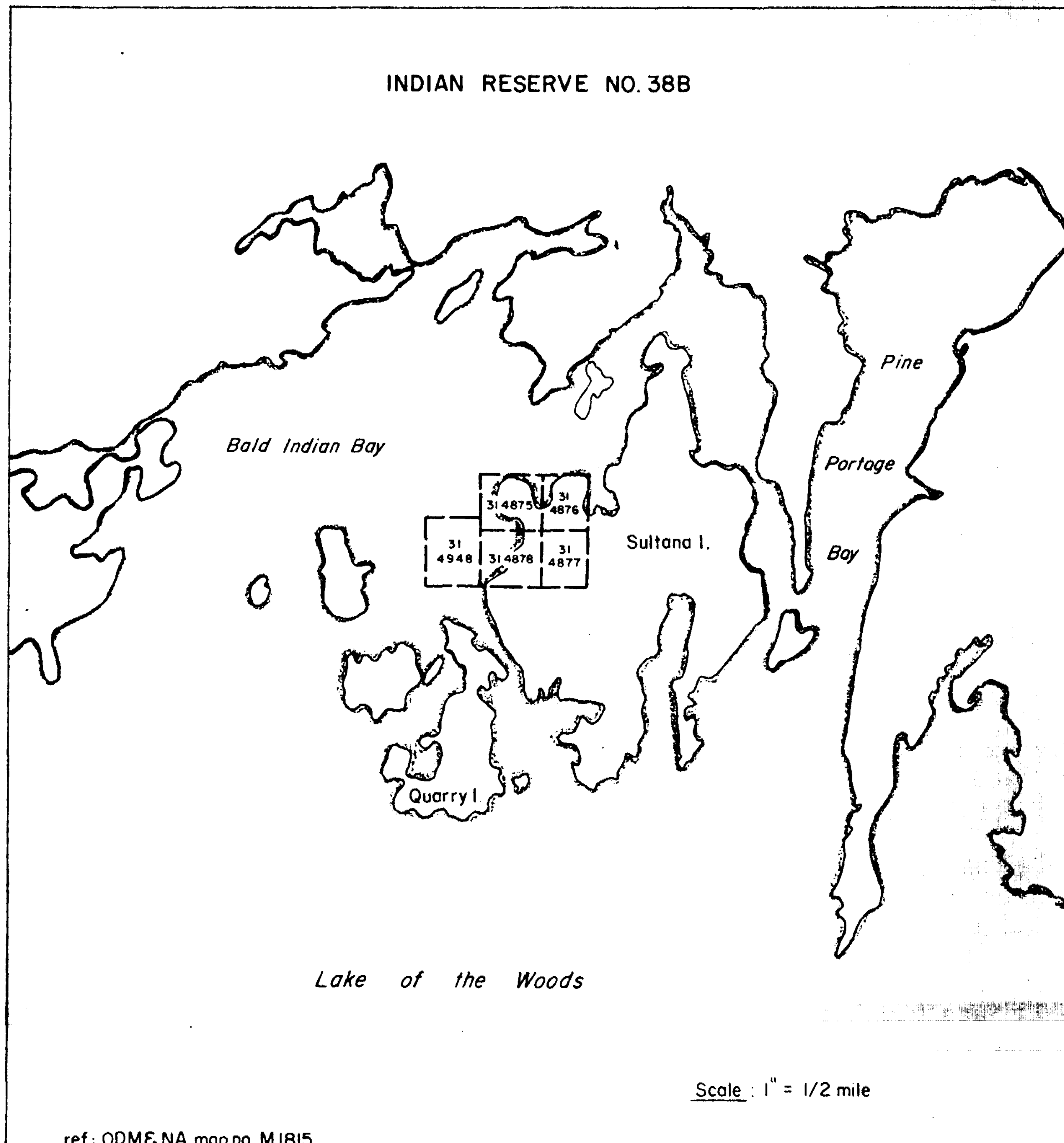
1.3 LOCATION AND ACCESS

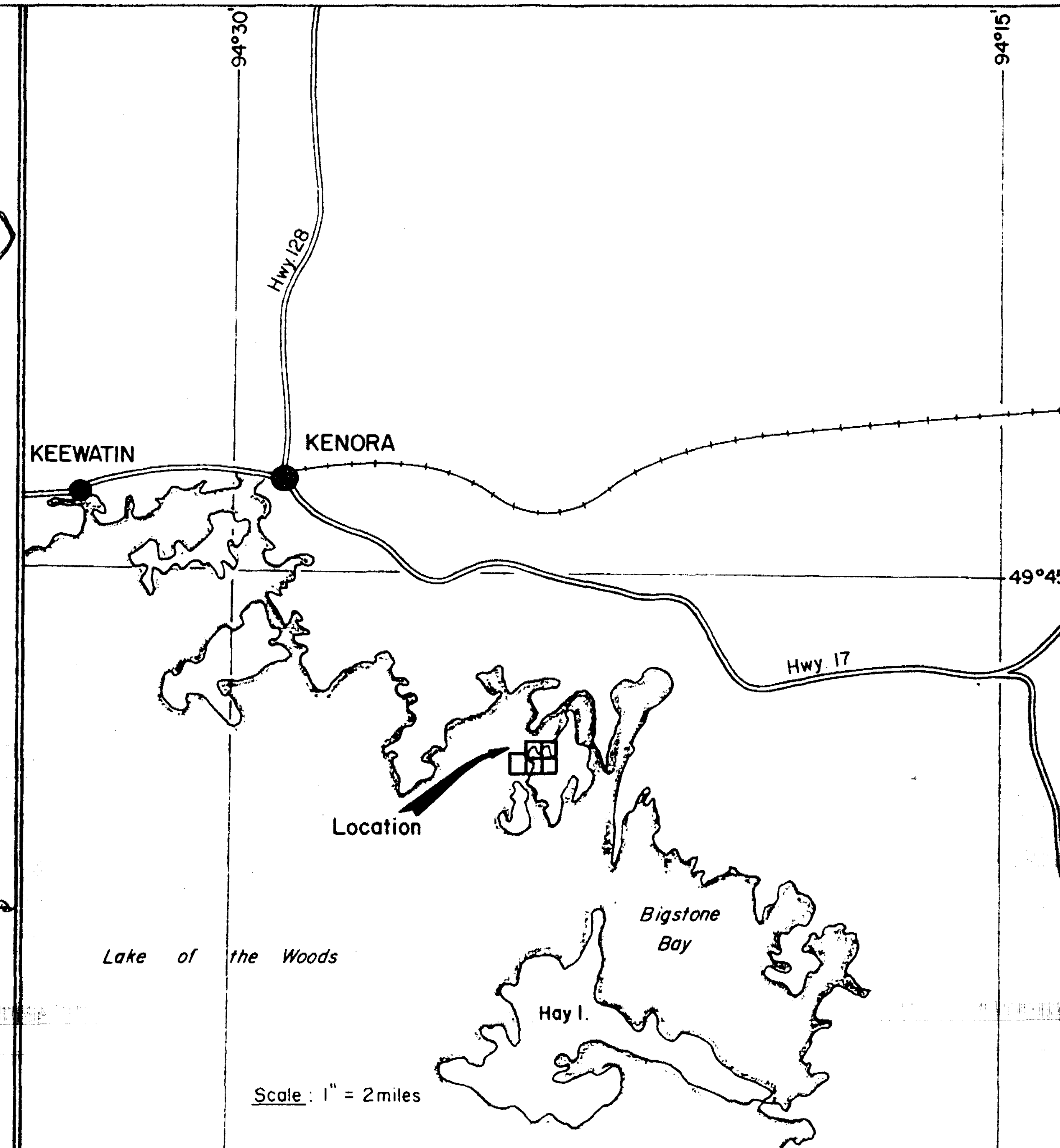
The property is on Sultana Island in the Bigstone Bay area of northeast Lake of the Woods. It is about 10 miles by boat from Kenora. The property can also be reached by boat from one of several roads east of Kenora which join Highway 17 to the lakeshore, e.g., Bigstone Bay Road about 6 miles east of Kenora and Ormiston Road about 7 miles east. A road within the Indian Reservation on the mainland north of Sultana Island comes down to the shore approximately east-northeast of the property. At one time when the lake level was lower, Sultana Island formed part of this same mainland and part of the Indian Reserve.

A power line follows Highway 17 and most cottages along the lake shore are electrically serviced. The Town of Kenora has a population of about 12,000 and can supply personnel and services. The main line of the Canadian Pacific Railway lies 1½ to 2 miles north of the highway. Transair has daily DC-3 airservice between Kenora and Dryden connecting with the Transair jet to Toronto from Dryden.

1.4 PREVIOUS WORK

Part of the Minaki property was the former gold producer Sultana Gold Mine Limited, active in the 1890's and early 1900's. A historical resume is presented in Barringer Research report to Minaki dated August, 1972. Litigation and depletion of ore reserves closed the mine. Workings included an inclined shaft and lateral workings on eight levels. An exploration programme was undertaken in 1934 by Canadian Gold Fields. They reportedly did about 3500 feet of diamond drilling in the form of short (150 feet) holes drilled from the de-watered workings. Two holes were drilled below the old workings, presumably in deference to the opinion of Bruce (1929) who considered that the main vein had not been faulted off as previously suggested, but had merely narrowed drastically and could well continue at depth.





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Work undertaken by
BARRINGER RESEARCH LTD, Toronto, Canada.

MINAKI GOLD MINES LIMITED		
BIGSTONE BAY AREA, LAKE OF THE WOODS, ONTARIO		
LOCALITY PLAN		
AUG. 1972		DWG.5-331-1

Claims of the Sultana Gold Mine were held under patent, not requiring the submission of work for assessment requirements. Consequently very little information is on file in the Kenora Assessment Work Library. It is known that Strathcona Mines carried out limited surface work and limited drilling but the Company is defunct and records have been destroyed. Level plans and mine longitudinal section are on file. These also show results of channel (?) sampling along drifts and drill hole projections of the 1934 exploration work.

Regional geological map P 281 (O.D.M.) covers the area at a scale of 1" = 2 miles. Numerous short interim reports on the mine appear in Annual Reports of the Ontario Department of Mines between 1899 and 1925. Geological studies were subsequently done by Suffel (1930) and Goodwin (1965 and Open File 5042). These references are listed in section 7.

1.5 GEOPHYSICAL SURVEY

The purpose of the induced polarization and magnetic surveys was to determine the extent of some observed mineralization and to attempt to locate previously unknown mineralized veins. The minerals of main interest are gold, silver, copper, and possibly also molybdenite.

The reconnaissance IP survey covered 3.09 line miles, and the detail 0.87 line miles for a total of 426 readings. The magnetic survey covered 6.86 line miles for a total of 870 readings plus the establishment of 6 control or base stations along the base line and subsequent readings to obtain diurnal variation relative to the base stations.

1.6 SURVEY CONTROL

The grid was cut by Mr. Ben Nelson of the Sturgeon River Camp near Jellicoe, Ontario. The lines were cut 100 feet apart and chained and picketed for 100 foot station interval. For grid control a base line and two sub-base lines were cut.

1.7 PERSONNEL

The geological mapping was carried out by Mrs. M.L. Halladay, P. Eng., Barringer Research geologist, and the geophysical work by R.R. Marvin and G. Young, senior geophysical operators under the direction and supervision of R. Cavén, P. Eng., Barringer Research geophysicist.

2. SURVEY PROCEDURES AND INSTRUMENTATION

2.1 SURVEY PROCEDURES

The magnetic survey was carried out on lines spaced 100 feet apart, and with a station interval of 50 feet, closing to 25 feet in areas of large gradient. The data was corrected for diurnal variation with respect to base stations established at 00, 4S, 8S, 12S 16S, and 20S along the base line by looping

The induced polarization survey utilized every second line with readings at 100 foot station intervals, except for some detail work in which readings were obtained every 50 feet. The IP survey was carried out with a pole-dipole array, for which the dipole or 'a' - spacing was 100 feet. The reconnaissance survey was made with n = 1 and 2 for a potential dipole - current pole distance of 100 and 200 feet respectively. Over anomalous areas readings were also taken with n = 3 and 4 to obtain a better definition of the depth extent of the chargeable bodies and thus improve the interpretation. The potential dipole and the current pole move in unison along the survey line, while the second, or infinity, current pole is fixed at a distance which is sufficiently large so as not to affect significantly the current distribution of the moving current pole. Commonly this distance is at least 10 times the "na" - spacing from the nearest survey point on the grid.

2.2 MAGNETOMETER

For the magnetic survey a Barringer Research GM 102 proton precession magnetometer was used. This instrument measures the total intensity of the earth's magnetic field to an accuracy of $\pm$ 10 gammas.

2.3 INDUCED POLARIZATION SYSTEM

The induced polarization system used is a 7.5 Kw time-domain system manufactured by Huntec Limited of Toronto. The pulse or time domain approach of the induced polarization method comprises of passing direct current through the ground which builds up charges on the interfaces between metallic minerals and electrolytes. The current is switched off and the redistribution of these charges is measured as a voltage decay (referred to as "overvoltage" or I.P. effect) at the ground surface. Comparison of this secondary voltage (V_s) with the primary voltage (V_p) measurement when the current is on provide a measure of chargeability of the subsurface.

The system consists of a generator set, a transmitter and a receiver. The generator set, consisting of an engine driven alternator and voltage regulator, provides the primary three phase power at 120V AC - 400 cps to the transmitter. The transmitter contains the circuitry and front panel controls to step up and convert the primary AC voltage to a rectangular low frequency waveform, the amplitude of which can be selected by the operator for application to the ground. The transmitter also contains switching circuitry for the current. The current is applied to the ground for 1.5 second and it is switched off for 0.5 seconds. The polarity of current is reversed after each cycle. The receiver contains its own power supply and is used to measure the primary (V_p) and secondary (V_s) potentials across two electrodes on the survey lines.

The applied current is measured on the transmitter and the apparent resistivity for the given electrode array calculated from the current (Ig) and primary voltage (V_p) and factor applicable for electrode array employed.

In most environments the measurement of the chargeability can be repeated to an accuracy of 5 - 10% or better, depending on the power rating.

3. DATA REDUCTION AND PRESENTATION OF THE RESULTS

The base line was read and looped with the magnetometer to establish six base or control stations to enable corrections to be made for diurnal variation. At frequent intervals during the magnetic survey the base stations were read and subsequently corrections made to the data. The proton precession magnetometer reads the absolute magnitude of the earth's total-field regardless of its direction. The instrument is therefore drift-free.

The corrected magnetic data is presented as a contour plan at a scale of 1 inch = 100 feet, with readings shown at each station. Stations marked O.S. represent gradients which are too high to give repeatable readings, and are sometimes due to pieces of steel, or due to near surface rocks of high magnetic susceptibility.

The induced polarization data is presented as pseudo sections separately for chargeability and apparent resistivity, at a horizontal scale of 1 inch = 200 feet. The linespacing is not shown to scale. In addition the n = 2 data is shown in contour plans for chargeability and apparent resistivity, at a scale of 1 inch = 100 feet.

The n = 2 data has been chosen for contour presentation rather than the data at n = 1 because it is not affected as much by near surface noise.

4. GEOLOGY

4.1 REGIONAL GEOLOGY

The Lake of the Woods area is underlain by Keewatin volcanics of two superimposed basic to acid sequences. These have been folded into anticlines and synclines with axes striking east-west and northeast-southwest. The upper sequence is preserved in the synclines while anticlines display the underlying earlier sequence. After the folding there was intrusion by very large, lobed, batholithic masses of granite. There are eight of these masses 40-50 miles in diameter in the region, partly mantled or draped with the Keewatin volcanics and sediments. In the area near Sultana one of these domes, the Dryberry Dome, comes within about half-a-mile of the east coast of Bigstone Bay near Sultana Island. The smaller acidic intrusive of Sultana Island is not connected, at least at surface, with the Dryberry Dome. The airborne magnetic pattern indicates the Sultana intrusive extends to the southwest under the lake. If a relationship exists at depth between it and the Dryberry Dome, it is not indicated by the published airborne magnetics. One of Goodwin's synclinal axes (Goodwin 1965) cuts through the northwest corner of the property and an anticlinal axis lies in Bigstone Bay to the southeast. The pyroclastics and sediments on the claim group are therefore probably of the upper sequence of extrusives while the lavas further to the southeast would probably be of the lower sequence. Basic flows of the eastern part of the property might be of either age. Goodwin attributes mineralization in the Lake of the Woods area to the upper acid and pyroclastic members of the first cycle of volcanism. However, it must also be remarked from regional maps that a large part of the mineral occurrences of the Lake of the Woods area lies in volcanics near the borders of granitic bodies: either batholiths or smaller intrusive bodies within the volcanic belts which may be later members of the volcanic pile.

4.2 LOCAL GEOLOGY

The Minaki property on Sultana Island is geologically and structurally complex. An early sequence of intermediate and acid flows with intercalated sediments underlies the claim group. It strikes northeast dipping steeply northwest to vertical. These horizons top to the northwest. The southwestern part of the property is intruded by a zoned granitic body. The sequence of formations is displayed in Table I, and the geology is shown on map No. 5-331-2

4.2.1 Intermediate to Basic Lavas

These occur in the southeast portion of the property and extend north to the base of the western peninsula and almost to the top of the eastern peninsula. In the southern portion the flows are massive, without pillows and having very rare rusty (mainly limonitic) patches. Microstringers of carbonate-quartz are occasionally present. Bruce describes these flows in thin section as being composed mostly of small crystals of light green amphibole. They are andesitic in hand specimen. In the central portion of the property there is a suggestion that similar looking rocks may be intrusive into the same flows but the form or forms of these intrusive bodies were not easily isolated from the flows. The intrusives may be similar to those referred to by Thompson (1936 p.7) who did not attempt to separate them. Near the top of this unit pillows are discernible. In particular,an outcrop just east of the base line about 1+50N, which contains some 10% sulphides in inter-pillow form. The sulphides are pyrite and pyrrhotite and are essentially barren except for 0.10 oz/T. silver. With one exception, all sulphide assayed within this sequence of flows and interflow sediments carry values in silver which are 50 to 100 times those reported by Goodwin in analyses of similar flows (presumably barren specimens) some ten miles further west. Minaki values range 0.10 - 0.38 oz/T with an arithmetic mean of 0.25 oz/T. This is equivalent to 8.57 ppm silver. Goodwin's weighted average chemical composition (Ag:- in presumed barren rocks) is 0.10 ppm. One of his specimens described as tuff or lava which was mentioned as having dissiminated pyrite ran 0.31 ppm. It is not known how the amounts of sulphides present compare, but certainly the Minaki rocks are very anomalously enriched in silver.

TABLE 1 - TABLE OF FORMATIONS

Era	Lithology	
Archean		
	Granitic Intrusive	Quartz diorite, coarse grained quartz feldspar (granite) porphyry and granite
	Intrusive Contacts	
	Lamprophyre dyke Feldspar porphyry (sill?)	
	Intrusive Contacts	
	Sediments Rhyolite porphyry (lavas?)	
	Faulted Contact	
	Dacitic lavas Sediments	
	Faulted Contact (?)	
	Intermediate to basic lavas	

At the margin of the granite about Line 1S at 1E, sulphides have been localized into a massive zone, as if smelted out by the advancing granite. Three trenches in this location cut a zone 3 - 6 feet wide of heavy to massive mineralization. In this location 0.53% Cu accompanied the low (0.32 oz/T) silver.

To the northeast, probably on the same horizon as the interpillow sulphides, are other limonitic areas, occasional disseminated pyrite, microstringers of quartz - (feldspar?). A strong IP response is found in this immediate area.

4.2.2 Sediments

Overlying (?) these intermediate flows is a well banded sequence of cherty sediments. They strike northeast and are believed to dip vertically. The sequence has a thickness of about 300 feet. They are grey to greenish grey and fine grained. Compositionally they range from a siliceous greywacke to chert and in general they are highly siliceous. Some carry sulphide (pyrite only?) of extremely fine disseminated habit, which yields low silver values. It is believed that some of these may be tuffaceous in nature, but no thin section work has been done on them. They are overlain by a dacitic flow.

A second horizon of sediments overlies the dacite.

4.2.3 Dacite and Rhyolite

A dacite flow or flows some 400 feet thick lie stratigraphically above the first sedimentary horizon. At the base they are similar to the andesites, but near the top occasional quartz phenocrysts occur. The dacite appears to be gradational to the rhyolite porphyry stratigraphically overlying it on the west end. Although the two are in fault contact at the shoreline, a gradational change is apparent. The greenstone appears to grade from a rock similar to the andesites through dacite, and dacite with quartz phenocrysts, to the very siliceous rhyolite porphyry. Sulphides were not seen in the dacite except where it is involved in a fault at the open cut at 5+50N, 0+50E. Bruce describes the petrography of these rocks as a felt of tiny plagioclase laths with sheaf-like bundles of amphibole, and a few areas of secondary quartz. The rock is altered and less basic than the andesite.

The rhyolite porphyry weathers dark gray but on the fresh surface it is black with abundant quartz eyes and occasional quartz phenocrysts. This rock lies on the west side of the northern most part of the land area of the claims. To the east, along strike, are siliceous sediments or tuffs. The relationship between the rhyolite and the sediments is not known. The pattern shown on the geological map suggests that the rhyolite is a 'dome' or a toe of a flow. Similar rocks are found on an island north of Sultana Island. Bruce describes a thin section as decidedly porphyritic rock with rounded phenocrysts and blocky, well formed crystals of orthoclase. Most of the crystals are oval, but a few show embayed outlines. The ground mass is fine grained and has a well-marked flow structure which curves around the quartz and feldspar phenocrysts. He does not mention composition of ground mass, nor origin of the black colour. To the east, off the end of the dome or toe lie intermediate to siliceous sediments.

4.2.4 Feldspar Porphyry

Feldspar porphyry probably in sill configuration, lies within the andesite. It closely resembles the flows, but is an intrusive, and is slightly porphyritic. It is believed to be a part of the volcanic series.

4.2.5 Lamprophyre

A lamprophyre dyke cuts the rhyolite porphyry along the west coast, and is seen in limited exposure.

4.2.6 Granitic Intrusive

The granitic intrusive has three distinct phases on the Minaki property. No conclusive evidence of their inter-relationship was seen, however certain aspects were noted. The grey, very coarse, granite porphyry forms the central part of the intrusive in the west central and southwest part of the claims. It is rimmed peripherally by a coarse grained black and white quartz diorite some 300-400 feet thick. One small tongue of fine grained black and white granite of less mafic composition is seen near the trenches on Line 00 at the base line. This last type is quite different in appearance to the other phases, and may be intruded at a differnt time - possibly later because it is less dark in colour. Because of the complex structure with its prolific fault zones, the contact between quartz diorite and granite porphyry often appears very sharp, and in some places it could be sharp, although a cutting relationship is not seen on surface, but near Line 14S at the base line the porphyry does seem to grade into quartz diorite.

The quartz diorite is a dark grey to coarsely black and white in appearance. It has an even, granitic texture (often 5-7 mm. grains), variable in composition but usually half mafic minerals (biotite, hornblende), and half feldspars (usually more plagioclase than orthoclase), and minor quartz. Bruce describes a thin section as quartz, orthoclase and plagioclase with sericite as an alteration product, and basic segregations of almost colourless, non-pleochroic hornblende with some alteration to chlorite.

The porphyry is very variable in size and proportion of phenocrysts. It is a medium grey in colour with grey phenocrysts (orthoclase only?) usually about 1 cm. on a side and quartz grains some 2 mm. on a side in a very fine grained matrix of slightly darker colour. Bruce describes "white to bluish or lavender coloured feldspars". Along certain zones crushing has folded the dark-coloured constituents around the phenocrysts, producing an 'augen' texture. The phenocrysts are found to be micro-perthitic in character and considerably sericitized. The abundant quartz shows strain shadows. The dark mineral in this rock is biotite which is altering to chlorite. Calcite is also abundant.

The groundmass contains considerable plagioclase. It is also noted that where the porphyry is faulted, there is much rotation of phenocrysts, which are then set into an almost continuous net of chloritic looking material.

4.3 STRUCTURAL GEOLOGY

An older flow series with intercalated sediments or tuffs was deposited in the Minaki area, then folded to an almost vertical position and cut by a zoned grantic intrusion. Air photo coverage shows up a very large number of faults disecting the property in several directions:-

N86E
N62E
N55E
N14-20E (probably including the main vein system)
N18W
N34W

many of these faults are not particularly obvious on the ground, although a few are easily recognized.

There are also curved faults : one following the intrusive-greenstone contact and other fanning out from it to the east.

Fault breccias are seen in a number of places on the property, particularly along the shores of a small bay just north of Line 0 near 1E. Fault breccia has the same appearance in many places on the property : fragments of rocks compressed and flattened to lensoid shapes, mostly encased in chloritic minerals.

A further matrix of quartz-carbonate usually is present, encasing the chlorite wrapped fragments.

4.4 ECONOMIC GEOLOGY

Possibilities for economic mineralization arise from two main areas of potentiality: (1) mineralization associated with the gold bearing structures a) known and/or mined at the time of the mining operation. b) new possibilities. (2) Other potential aside from gold, unearthed by the recent geological and geophysical surveys.

Recommendations of Barringer Research report of August 1972 were aimed at unearthing mineralized zones within and marginal to the granitic intrusive. It was hoped that hitherto unknown veins would be discovered, or that zones of disseminated copper and gold (or molybdenite) would be encountered. Base metal possibilities were known to exist in a shear zone along the granite-greenstone contact.

4.4.1 Gold Bearing Structures

Known and/or previously mined gold structure are not evaluated because of lack of data.

During the recent geological survey it was evident that careful prospecting and surface investigation of all quartz vein occurrences had been done at one time. No important outcropping occurrence is likely to have been missed. A geophysical (IP) response is recorded along the porphyry - quartz diorite contact (Lines 8S - 12S incl., 3-5W) which has been interpreted as a possible re-cemented fault zone. High resistivity accompanying the IP anomaly could be the result of a simple rock change, a fault zone, or a vein. This feature may be interpreted as one of two possibilities. Firstly, it is noted that the workings which represent the old Crown Reef (cross fault) zone extend south eastward in the general direction of this anomaly suggesting the possibility that this anomaly, if it is a mineralized vein or zone could be the continuation of the Crown Reef. It must be remembered that very intense faulting has taken place on this property, which not only provided the space for the vein deposits but which could also have displaced them subsequently to formation. Thus it is also possible that this same IP trend could represent a continuation of the of the main vein zone which has been offset to the east by the Crown Reef structure. At present these hypotheses are mainly conjecture, because accurate locations of underground workings are not available.

Another possibility for projection of the mined out main vein towards the south, is seen on air photos where a well defined linear feature seems to follow the underground workings (the latter being located and oriented to the best of our present knowledge), and continue southwest beyond the limit of the workings. It was not possible to extend geophysical coverage over this linear because of its proximity to the shore. The air photo indicates the linear continuing on some 800 - 900 feet beyond the extent of the workings and possibly under the lake. A 3 - 4 inch quartz vein was seen crossing the open cut in a position which would accommodate the interpretation.

These two possibilites (the anomaly and the linear) both have merit and to evaluate these "new" possibilities it becomes important to determine whether they have been tested by previous exploration.

4.4.2 Other Potential

In addition to the weak IP anomaly mentioned above with respect to gold possibilities, results of geophysical surveys have pointed out three "excellent" IP responses (Anomalies 1, 2 and 3) and an additional anomaly which might be described as "good" (Anomaly 4). Part of Anomaly 1 is cut by trenches near Line 00 at the base line. There are massive sulphides seen on surface in the trenches, of which a grab sample ran 0.005 oz/T Au., 0.32 oz/T Ag., 0.53% Cu., 0.31% Zn and trace Pb. The IP response is stronger at 300 ft. - 400 ft. depth. A second excellent IP anomaly (Anomaly 2), the strongest encountered, was found on Line 4N near 7E. There is no outcrop at the anomaly, but nearby greenstones were noted to have possible pillows and minor rust and limonite. The third excellent anomaly (Anomaly 3) is also partly investigated by trenching although the main part of the anomaly lies at a depth of 200 feet. Heavy sulphide mineralization in the trench ran 0.05% Cu., trace of Au and Ag. It was not assayed for other minerals.

In one of the trenches on Anomaly 1 mentioned above, it is observable that the sulphides are of inter-pillow configuration similar to the inter-pillow sulphides seen in an outcrop about 200 feet to the north, on the shore of the small bay. It is possible that the sulphides originally were deposited as inter-pillow occurrences which were subsequently remobilized by the intrusive and localized in a shear along its margin. The horizon in which these inter-pillow sulphides lie is believed to extend to the east northeast in the direction of the strongest IP anomaly (Anomaly 2). This latter is also suspected to be of exhalative character, but does not outcrop. This polarizable material lies at a depth of 100 feet and constitutes a very strong anomaly which is believed to lie near the top of the andesites, close to the andesite - sediment (tuff?) contact. Some sediments exposed at the shoreline, a couple of hundred feet to the east northeast of the anomaly (in the lower member of the sedimentary-tuff? - sequence), were observed to carry extremely fine disseminated sulphides which assay NIL gold, 0.38 oz Ag/T and 0.01% Cu. They were not tested for other minerals.

All of the assays from this property except one carry low but persistent silver values between 0.10 and 0.38 oz Ag/T. These values are not significant from a mining point of view but in the present situation of the existence of probable exhalative inter-pillow sulphide, their presence could be an indication of proximity to a volcanic vent. They are 30 to 100 times as high as average silver (ppm) content of rocks from studies further west in the Lake of the Woods area. These rock content analyses form part of a study by A.M. Goodwin (open file Report ODM 5042). His average silver contents for different rock types for Lake of the Woods range between 0.10 - 0.13 ppm. Minaki samples are between 3.4 ppm and 12.9 ppm (calculated).

It must also be noted that members of the volcanic sequence which appear to overlie this mineralized andesite grade from the andesite to intermediate and acid tuffs(?),to dacites, to black rhyolite porphyry. The latter may be the toe of an acid flow or even the eastern portion of a rhyolite dome.

In light of these considerations the underwater portion of the claim group should be covered by a geophysical survey in order to check for exhalative massive sulphides,particularly west of the of the central portion of the property where a low intensity airborne magnetometer anomaly lies close to the projected andesite - sediment (tuff?) contact.

The IP anomaly classified as "good" is also of merit and should be considered for priority with any anomalies resulting from the proposed geophysical survey.

5. GEOPHYSICAL WORK

5.1 GENERAL

Sultana Island has a history of previous mining. The economic mineral was gold.

The presence of an occurrence of sulphides on the property and no available record of geophysical exploration provided the impetus for the present survey. In addition to the sulphides it was thought that veins carrying gold may also be present, and as yet undiscovered. Gold bearing veins on the surface had been mined previously in addition to the underground workings.

Since some of the mineralization was expected to be in disseminated form the induced polarization method was used. At the same time a magnetic survey was carried out for correlation with the IP survey and to aid in the geological mapping.

5.2 INTERPRETATION - MAGNETIC SURVEY

The magnetic survey presents a picture of a complex geology. There are numerous faults cutting across the property in many directions. Some of these faults have been shown on the interpretation map. The different rock-types and the pyrrhotite mineralization also find expression in the magnetics. Thus the volcanic flows and pillow-lavas in the north end show up as a generally north-east trending magnetic feature. The intrusive acid rocks in the southwest of the property are marked by low magnetic activity, and the same holds for the rhyolite in the extreme north-west.

The magnetic contour plan was used to outline some of the more prominent faults which were not as readily recognized from the aerial photographs. While the set of faults shown is not complete it nevertheless provides an understanding of the geological trends.

The correlation of the magnetics with the induced polarization anomalies has been described together with the latter.

5.3 INTERPRETATION - INDUCED POLARIZATION SURVEY

Both chargeability and apparent resistivity values showed a large range between maximum and minimum readings. The chargeability readings were high in the north end of the property accompanied by low resistivities, while in the southern two thirds of the surveyed area the resistivities are high but the chargeabilities mostly are near background.

The low apparent resistivities, below 2000 ohm-metres, are associated with the volcanics, with very low values at the chargeability anomalies. The high resistivities to the south are due to the acid intrusives as well as faulting and shearing along narrow zones which would cause high rather than low apparent resistivities.

The overall chargeability background is about 7 milliseconds, which in itself is much higher than normally would be expected, indicating a widespread occurrence of polarizable minerals, in this case probably low concentrations of iron sulphides. Superimposed upon this background are several anomalies, some of which are very strong, others weak.

The survey revealed some very localized extreme resistivity highs. Two major causes for these resistivity anomalies have been observed, fractures and relatively narrow shears, and contact problems. Fracturing coupled with thin conductive overburden would lead to irregular current distribution with attendant resistivity pattern. The resistivity anomalies generally occur on one line only, because the relative positions of the potential electrodes and the shear or fault would be different for each line. Contact problems are usually corrected in the field before the readings are obtained.

The first three anomalies occur in a band of high chargeability, which have been interpreted from the magnetics to strike northeast, and which has been mapped as volcanics.

5.3.1 Anomaly 1 at L00/1W-1E

This feature occurs near surface at 1W but also at depth towards 1E. The chargeability is variable with values from 20 to 40 milliseconds. The anomaly has an apparent easterly dip.

Although this very strong anomaly is part of the volcanic band, local deformation due to the intrusive activity has changed the strike close to a north-south direction. The anomaly also extends across Lines 2S and 4S but appears to be terminated north of Line 6S. On both Lines 2S and 4S the chargeability increases with depth in a progression suggesting a steep southward plunge. A southward plunge is substantiated to an extent also by the magnetics. The intense low at 1E on Line 0 may be due to near furface pyrrhotite at that station or immediately to the west. Immediately to the south is a magnetic high indicating a somewhat deeper source, assuming pyrrhotite as the causative ferromagnetic mineral. In progressing southward the intensity decreases further. The correspondence between magnetic and induced polarization anomalies is very good.

The apparent dip of the chargeability anomaly at Line 0 does not show on the lines further south, and may be caused by irregular distribution of pods of mineralization.

5.3.2 Anomaly 2 at L4N/5E - 10E

While this anomaly appears to extend along the entire line across the easterly point, the strongest response is at Station 7E where the chargeability reaches a peak of 49 milliseconds, near surface and somewhat lower at depth at 8E. The very low resistivities prevented the obtaining of readings at depth at Stations 6E and 7E, but the indications are that they would also be highly anomalous.

The widespread high would likely be caused by the survey line here being nearly parallel to strike. The low resistivity readings would also be a result of this, as well as directly due to mineralization. If the mineralization is assumed to be between lava pillows and/or flows then the survey line may well have traversed such occurrences near 5E and 7E respectively.

The chargeability anomaly peaks do not coincide with the magnetic highs along Line 4N, although the magnetic activity is high throughout.

On Line 2N the IP values, while still highly anomalous, are subdued. The magnetic anomalies are not as high as would have been expected if the chargeability readings were caused by pyrrhotite alone. And in comparison with Anomaly 1 it can be seen that although the IP anomaly is stronger on Anomaly 2, the magnetic anomaly is lower, as well as non-coincident.

The induced polarization anomalies at the east end of Line 0 coincide well with a mineralized porphyritic dyke approximately paralleling the strike of the volcanics.

5.3.3 Anomaly 3 at L4N/1W

This excellent anomaly appears mainly at depth but a surface manifestation of it would be expected between 2W and 3W. A moderate magnetic anomaly is located at 1W coincident with the best IP response, while at 2W a magnetic low flanking a high at 2+50W indicates some near surface pyrrhotite. It is likely that some of the main IP response is also caused by pyrrhotite as judged by the presence of the magnetic anomaly. The restriction imposed by the lake prevented further data to be collected over the anomaly to the east. The anomaly does not appear on Lines 6N and 2N.

5.3.4 Anomaly 4 at L8S/1E

In comparison with above strong anomalies this one is much weaker, but with an amplitude of more than twice the background values it is still very significant. The anomaly is essentially confined to Line 8S although it may have appeared also on Line 9S had the latter been surveyed with IP. The magnetic anomaly which parallel it to the west is more prominent on Lines 9S and 10S.

The magnetic anomaly occurs along an interpreted fault which is also partly visible on aerial photographs.

The induced polarization response indicates a disc or lens-shaped body extending to depth with a steep or near vertical dip. Some near surface effects are also seen, and outcropping or near outcropping is possible. The magnetic survey showed some high gradients in the neighbourhood of the IP anomaly. The magnetic gradient was too large for the magnetometer to give a repeatable reading.

5.3.5 Anomaly 5 at 3-4W on Lines 8S-12S

This anomaly is very weak, barely extending above background. The anomaly lacks a significant magnetic signature, but there is a coincident relative resistivity low. In an area where gold occurs in quartz veins an anomaly of this nature takes on a special interest. The anomaly amplitude is expected to be small and since quartz is a poor conductor the resistivities would not be lowered much.

A shear zone with chloritic and/or sericitic alteration may also give this type of response.

5.3.6 Anomaly 6 at L16S/1W

As was the case with Anomaly 5 this one is also very weak and in all respect similar to the latter, i.e., a corresponding relative resistivity low and no magnetic signature.

Upon examination of the pseudo sections indications can be seen for a connection between Anomalies 5 and 6 on Line 14S at 1W-2W, where a relative chargeability increase is present, The resistivities also indicate a contact zone here. No significant mineralization is expected on Line 14S, the interest here is primarily in the possible geological interpretation.

6. CONCLUSIONS

6.1 GEOLOGICAL CONCLUSIONS

The Minaki property on Sultana Island displays merit on two counts:

6.1.1 Gold

Two structures meriting investigation have been outlined by the recent geological and geophysical surveys.

(i) A linear displayed on air photos suggests the main vein structure may continue in a straight line to the southwest beyond the open cut of the cross-cutting Crown Reef vein structure i.e., south of of the old workings.

(ii) A low IP expression (Anomaly 5) which appears to lie more or less parallel to the main vein structure, lies slightly to the east of the eastern-most working of the Crown Reef vein. By its position, this IP anomaly might represent a displaced segment of either the Crown Reef or main vein structures.

In order to confirm the positions of underground workings with respect to current findings, and in order to ascertain whether the above possibilities have been tested previously by exploration diamond drilling it becomes most desirable to obtain all available information concerning previous exploration and development work.

6.1.2 Other Potentialities

Outside the area of the intrusive and along its margin are found a number of geophysical anomalies within the extrusive sequence which are strong in character and merit investigation by drilling. It is not known whether any of these has been tested by previous exploration and/or development. Within the property these extrusives exhibit transition from andesite to acid sediments (tuffs?) and black rhyolite flows. Inter pillow sulphides are seen in a couple of places, and although evidence is not conclusive, it is believed the mineralization is exhalative in nature. Also the sediments (and tuffs?) overlying the pillowed andesites display in several places very fine uniformly disseminated sulphide. Sulphides in the extrusive sequence generally carry persistent values in silver ranging from 0.10 to 0.38 oz/T. which are 30 to 100 times the average silver content for different rock types in the Lake of the Woods area. In view of these evidences of possible exhalative mineralization, it is advisable to check the remainder of the property (water covered portion) with geophysics.

6.2 GEOPHYSICAL CONCLUSIONS

The present geophysical survey covered the claims within the limits set by the shorelines and claim boundaries.

Two major strike directions were found to exist, one following strong faulting and shearing trenching approximately N22W, the other the sequence of volcanic flows and sediments striking north east. The survey grid was based upon the first direction, which had previously been observed on the ground.

From the magnetic survey several faults and shears were outlined and then confirmed on the aerial photographs, where some of them were only visible in part. In addition to structural information the underlying lithology is also outlined. Furthermore, information on magnetic correlation, or lack of it, was provided for the induced polarization anomalies.

The induced polarization survey, including both chargeability and apparent resistivity, outlined three very strong anomalies, one intermediate, and two weak ones.

The strong anomalies are indicated as being at least in part caused by pyrrhotite, although this mineral does not appear to be sole causative agent. The intermediate strength anomaly produced some very high gradients due to near surface effects. Sampling uncovered some magnetic basic rocks. It cannot be determined if the magnetic surface effects are related to the coincident

Induced polarization anomaly. Another and discrete magnetic anomaly occurs immediately to the west. The latter anomaly is along an interpreted fault.

The two weak anomalies appear to be related, and may represent a slightly mineralized vein, although present information is not sufficient for a more detailed analysis. Some trenching across the anomalies may provide the necessary information on which to base further recommendations.

6.3 RECOMMENDATIONS

It is therefore recommended that:-

1. Additional available information concerning previous mining, development and exploration works (which was not filed for assessment credit) be examined with a view to purchase.

2. A geophysical survey be conducted over the remainder (water covered portion) of the Minaki property. The type and specifications of the survey should be determined after assimilation of the data mentioned above which hopefully will be of a scope and quality such as to be of assistance.

3. A drilling programme be outlined in the light of a) present surveys, b) the future geophysical survey and c) past development and exploration.

Respectfully submitted,

BARRINGER RESEARCH LIMITED.

REGISTERED PROFESSIONAL ENGINEER
M.L. HALLADAY
PROVINCE OF ONTARIO

M. L. Halladay

M.L. Halladay, P. Eng.,
Senior Geologist.

Roger Cavén

Roger Cavén, P. Eng.,
Senior Geophysicist.

REGISTERED PROFESSIONAL ENGINEER
Roger J. Cavén
PROVINCE OF ONTARIO

REPORT ON
GROUND GEOPHYSICAL SURVEY

SULTANA ISLAND, LAKE OF THE WOODS
DISTRICT OF KENORA, ONTARIO

FEBRUARY 26TH - MARCH 7TH, 1973

FOR MINAKI GOLD MINES LIMITED

BY

BARRINGER RESEARCH LIMITED
304 CARLINGVIEW DRIVE
METROPOLITAN TORONTO
REXDALE, ONTARIO

APRIL 1973

52E09NW8922 2.1229 BIGSTONE BAY (LAKE O

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LIST OF DRAWINGS

1. INTRODUCTION

1.1 GENERAL

During the period of February 26 to March 7, 1973, both dates inclusive, a geophysical survey was carried out by Barringer Research Limited on a claims group on Sultana Island, Bigstone Bay, in the Lake of the Woods, District of Kenora.

This survey was carried out as a follow-up to a geophysical and geological investigation of the land portions of the claims group in October, 1972, and covered mainly the water covered part.

The following report describes the additional work and also includes an overall re-appraisal of all the data in the light of the new information.

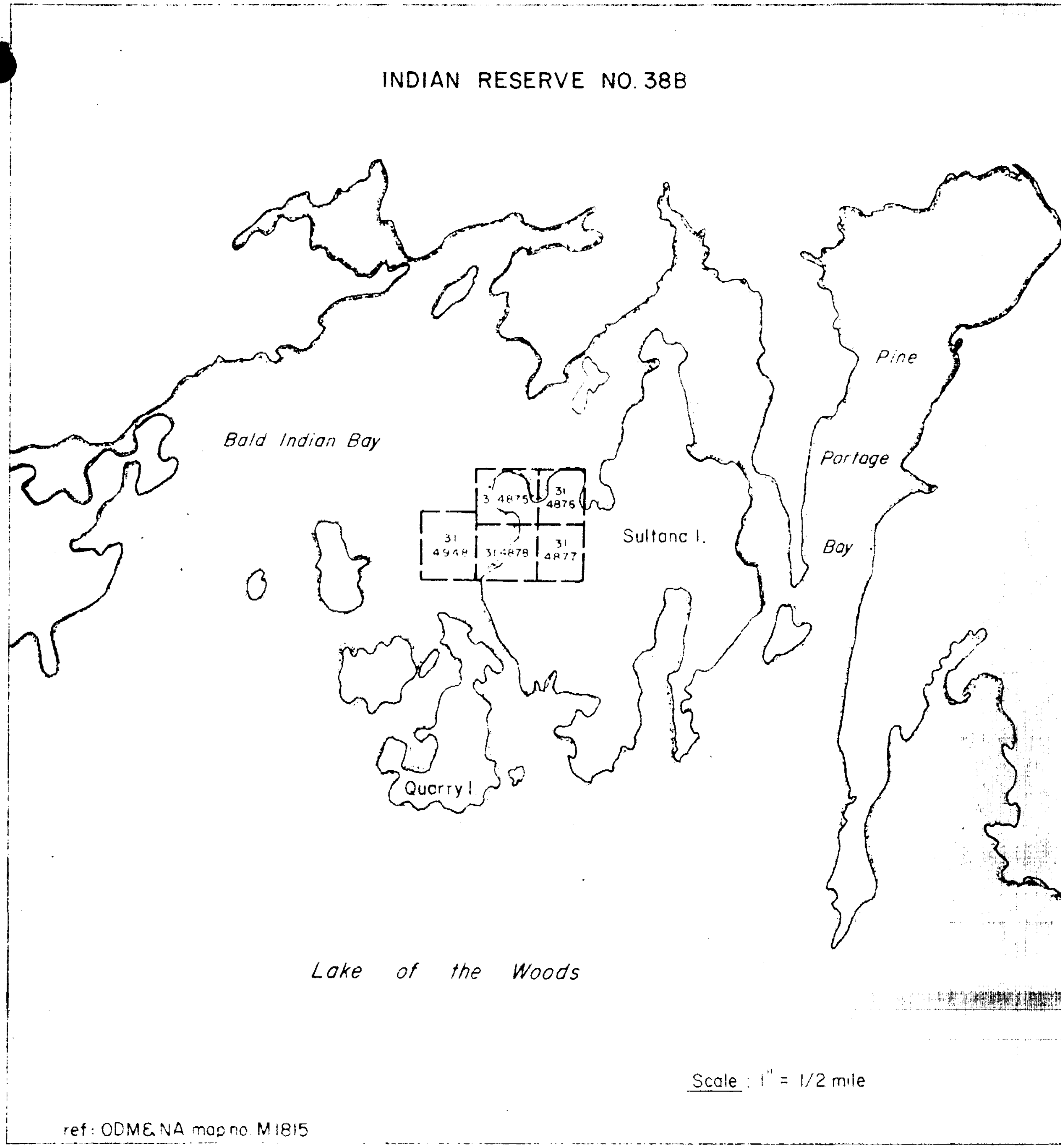
1.2 PROPERTY

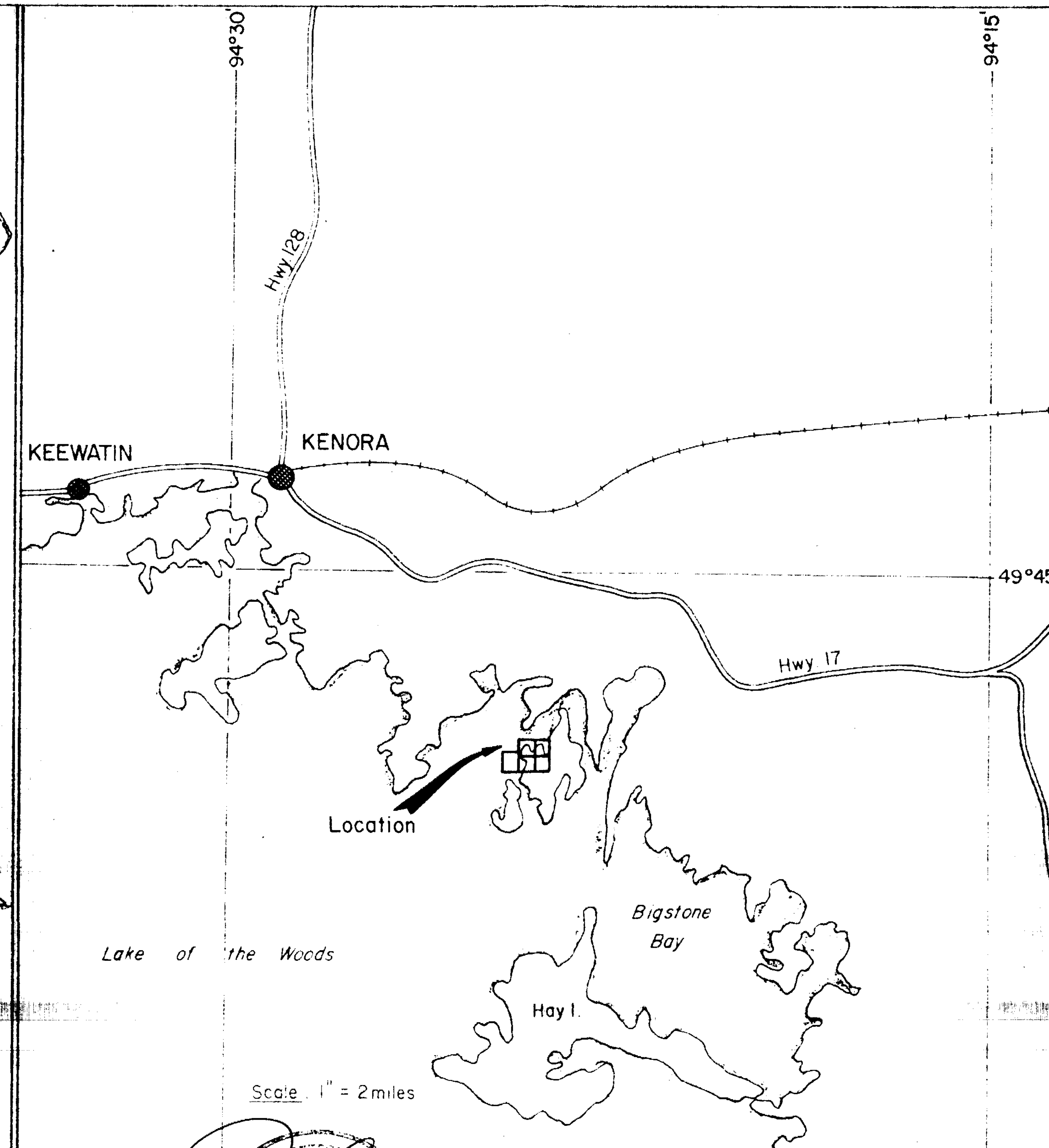
The property consists of five claims on the northwest portion of Sultana Island, Bigstone Bay, Lake of the Woods, Ontario. The claims are in Kenora Mining Division and are numbered K 314875 to K 314878 inclusive and K 314948. The latter is a water claim.

1.3 LOCATION AND ACCESS

The property is on Sultana Island in the Bigstone Bay area of northeast Lake of the Woods. The property is about 10 miles from Kenora and access is by boat or over the ice in winter time. The property can also be reached by boat from one of several roads east of Kenora which join Highway 17 to the Lakeshore, e.g. Bigstone Bay Road and Ormiston Road about 6 and 7 miles respectively east of Kenora.

A road within the Indian Reservation on the mainland north of Sultana Island comes down to the shore approximately east-northeast of the property. At one time when the lake level was lower, Sultana Island formed part of this same mainland and part of the Indian Reserve.





PROVINCE OF ONTARIO

Work undertaken by
BARRINGER RESEARCH LTD, Toronto, Canada.

MINAKI GOLD MINES LIMITED

BIGSTONE BAY AREA, LAKE OF THE WOODS, ONTARIO

LOCALITY PLAN

AUG. 1972	DWG 5-342-1

Reference: Topographic Map: NTS 52 E/9.

1.4 PREVIOUS WORK

Part of the Minaki property was the former gold producer Sultana Gold Mines Limited which was active in the 1890's and early 1900's. A historical resume is presented in Barringer Research report to Minaki Gold Mines Limited dated August, 1972.

From October 3 to 20, 1972 inclusive, a geological and geophysical survey was carried out by Barringer Research Limited (Report, December, 1972).

The geophysical survey, induced polarization and ground magnetics served to outline the extent of mineralization and aid the geological mapping and interpretation. The geological mapping was carried out concurrently with the geophysical survey.

Upon completion of the geophysical programme it became evident that the emphasis had been shifted towards sulphide mineralization from a search for gold-carrying quartz veins. The geophysical anomalies from the former category were very strong. In addition, the strike direction was found to differ from the original concepts and the anomalies continued into the water covered portions of the property, thus limiting the effective coverage by the induced polarization survey, due to the physical size of the necessary electrode array.

1.5 GEOPHYSICAL SURVEY

The results of the earlier geophysical work as well as the new emphasis on sulphide exploration made it possible to use electromagnetic methods, rather than induced polarization over the water covered parts of the claims group. For an optimum survey the direction of the survey lines was also changed, and a new base line was established along strike of the sequence of volcanic flows and sediments.

A broadside vertical loop electromagnetic survey was used for reconnaissance work and detail was obtained with a horizontal loop configuration utilizing 300 and 100 foot coil separation between transmitter and receiver.

The ground magnetic survey was continued on the new grid.

The ground magnetic survey covered 6.50 line miles including 4400 feet of base line. Vertical loop electromagnetic survey was done over 4.56 line miles in reconnaissance and an additional 0.39 miles in detail.

Horizontal loop survey with 300 foot cable covered 2.92 line miles while the survey with 100 foot cable covered 1.55 line miles.

1.6 SURVEY CONTROL

The grid was laid out on the ice, with lines 400 feet apart plus some intermediate lines, chained and marked with a 100 foot station interval, by the geophysical crew.

1.7 PERSONNEL

The geophysical work was carried out by George Young, Senior Geophysical Operator, under the direction and supervision of Roger Caven, P. Eng., Barringer Research geophysicist.

The geophysical interpretation has been written by J.B. Boniwell, Exploration Geophysical Consultant for Barringer Research in consultation with Mrs. M.L. Halladay, Senior Geologist, and Roger Caven, P. Eng., Senior Geophysicist.

2. SURVEY PROCEDURES AND INSTRUMENTATION

2.1 SURVEY PROCEDURES

The basic grid consisted of lines 400 feet apart on a base line bearing N 35°E. In addition six intermediate lines were also surveyed. The magnetometer survey was carried out on all lines, and with a station interval of 50 feet. The data was corrected for diurnal variations with respect to BL/0+00 on the old grid, and base stations established along the new base line by looping.

A vertical loop broadside electromagnetic survey, with some fixed transmitter detail work, was carried out over all lines of the basic grid. Station interval was 100 feet, except for detail work which used 50 foot intervals.

In anomalous areas as well as on the intermediate lines a horizontal loop electromagnetic survey was also carried out in order to obtain additional information not so readily available from the vertical loop data. The horizontal loop electromagnetic survey used two frequencies 600 Hz and 2400Hz. The primary coil separation was 300 feet, with a 100 foot separation over some anomalies. Station interval was 100 feet with the 300 foot coil separation and 50 feet with the 100 foot long cable.

2.2 MAGNETOMETER

For this ground magnetic survey a Barringer Research GM 122 proton precession magnetometer was used. This instrument measures the total intensity of the earth's magnetic field to an accuracy of ± 1 gamma.

2.3 ELECTROMAGNETOMETER

A McPhar VHEM unit was used both in the vertical loop and horizontal loop configuration. In the vertical loop mode the receiver measures the dip angle of the resultant electromagnetic field, at two frequencies, 600 Hz and 2400 Hz.

When used in the horizontal loop mode this instrument measures the in-phase and quadrature components of the secondary magnetic field in the presence of a primary excitation at the two frequencies 600 Hz and 2400 Hz. Three coil separations are possible with 100, 200 and 300 foot cables.

3. DATA REDUCTION AND PRESENTATION OF THE RESULTS

The base line was read and looped with the magnetometer at the intersection of the survey lines to establish base or control stations to enable corrections to be made for diurnal variations. The control stations were tied to Station 00 on Line 0+00 on the previous grid. The base stations were read frequently during the survey and corrections made to the data. The proton precession magnetometer reads the absolute magnitude of the earth's total magnetic field regardless of its direction. The instrument is therefore drift free.

The corrected magnetic data is presented on Dwg. Nos. 5-342-5A & 5B as a contour plan at a scale of 1:1200, i.e. 1 inch equals 100 feet, with readings shown at each station.

The electromagnetic survey data is shown as profiles with a horizontal scale of 1:1200 and a vertical scale of 1 inch equals 20 degrees for the dip angles (Dwg. Nos. 5-342-2A & 2B) and 1 inch equals 40 per cent for the in-phase and quadrature components of the horizontal loop data (Dwg. Nos. 5-342-3A, 3B, 4A & 4B).

Interpretation of the results of the surveys are shown on the ~~600~~ 2400 Hz Horizontal Loop EM drawings.

4. GEOLOGY

The geology has been described in detail in the report on the previous work by M.L. Halladay, F.G.A.C., P. Eng., Senior Geologist (Reference 1).

An early sequence of intermediate and acid flows with interrelated sediments underlies the claims group. Strike is northeast, with a steep northwest to vertical dip. The top of the horizons is to the northwest. The southwestern part of the property is intruded by a zoned granitic body.

5. INTERPRETATION

5.1 THE EXPLORATION EMPHASIS

The old mining activities on Sultana Island were concentrated on payable gold occurrence in quartz veins in a relatively small and local granite porphyry stock. The immediate environs were also prospected for similar ore material, and indeed one vein, the so-called Klondike vein cutting intermediate volcanics 300' away from the intrusive contact, was sunk on and worked.

Beyond the outcrops on the island however, there are limits to what can be done to project new vein structures by geologic inference or by geophysical method short of a lot of drilling. For instance, the I.P. work that has been done across the mine setting (landward portions only) can be expected to reflect mostly the distribution of sulphides therein, perhaps some magnetite, but little else. It will not have been sensistive to gold-rich quartz veins as such unless they were intimately associated with sulphides in sizeable amount, say 10%. This may or may not be the case in actual fact.

By contrast the amount of strong I.P. response that has been obtained in the wall rocks outside the intrusive almost inevitably diverts attention from possibilities in quartz vein mineralization to those in more massive sulphides contained within the surrounding volcanic sequence. Such a shift in emphasis is accompanied by the hope that these heavier sulphide occurrences, themselves so much easier to find and outline, will in the prevailing circumstances carry significant precious metals as well as supplying attendant chances in base metals (copper, zinc) in the classical context of volcanogenetic deposition. Empirically and on the evidence collected by the Barringer investigation here, there is every good reason to suppose that this hope is real, viz. the differentiation of the volcanics and the presence of rhyolite flow, the anomalous level of contained silver in the sulphides so far sampled in the volcanics, likewise the smells of copper (up to 0.53% Cu) in those massive sulphides that have already been encountered, and of course the known presence of gold in the general setting.

5.2 DISCUSSION OF THE RESULTS

If as perceived the main thrust of exploration has been somewhat diverted from the direct search for gold-bearing quartz veins, then the geophysical results (in paricular) need be viewed on a priority basis for their inherent massive sulphide possibilities.

From this standpoint, what immediately becomes important is the observed conduction in the lake. Pre-eminent is a clear, at times strong conductor zone recorded in good quality over some 2000 feet of strike length (Lines 10W to 28W). Throughout it is in fair correlation with magnetic activity ranging up to 3200 gammas in local relief, the strength of the correlation by and large consonant with the strength of the conductor. An underlying heavy pyrrhotite mineralization is thus presumed. (Incidentally a small islet at 16W/4+50N in the zone is known to contain sulphides in outcrop.)

In detail, the zone is composed of at least two separate axes generally less than 100 feet apart but diverging to 150 feet apart on Line 26W. The more south-easterly of the two is more magnetic, thereby suggesting some zoning to the mineral content between source horizons. Dips appear steeply to the northwest. Overburden (that is, water plus lake bottom sediments) amounts to no more than 30 feet - 75 feet in thickness.

The host formation to this conductor system is almost certainly volcanic, and probably dacitic. However thin interbeds of sediments are quite possible and graphite perforce remains a possibility as part-cause (only) to the individual axes. There is also the suggestion that shearing attendant upon a fault linear striking into the system from the northeast is an added control to conductor cause and disposition here. Just beyond the property boundary a cross-structural break between Lines 28W and 30W further affects the system before it dies out by Line 34W.

While these extra factors tend to distort the picture, and of course at the west end actually introduce a substantial disruption, nevertheless over the strike distance of the main zone the changes in sulphide conduction are sufficiently good and interesting to warrant their drill-testing. This is not just a matter of sulphide concentration, but of mineral diversity within a setting that most likely includes (on magnetic evidence) the close proximity of the (mine) granite intrusive contact. In this sense, the increasing strength, quality and complexity of the conduction on Line 26W makes that section a natural target for a first drilling. It lies however right at the present property boundary, and some consideration necessarily will have to be made regarding further ground protection in this direction.

Should it prove that this major conduction in the lake is mineralogically promising, then the two additional and apparently related conductors across Lines 2W to 4W (circa 2+50N) and Lines 6E to 10E (near the BL) would immediately deserve priority attention. Both would appear to lie within the dacite unit. The first of these on land, is the weaker, but clearly runs into and almost certainly becomes part of that strong I.P. anomaly centre obtained at or close to the Klondike vein. It is not consistently a magnetic conductor in this instance, and indeed it could be slightly higher in the stratigraphy, but if anything these differences only serve to enhance its character. Thus despite its weakness this little conductor commends itself as a target for drilling independently of the outcome in the lake to the southwest. The second cited conductor (at 6E/BL etc.), while it looks very similar to the original lake zone to which it is being related, at least to the extent it has been delineated strength, quality and magnetic expression are quite comparable, particularly on Line 10E, the last line on the grid - it is sufficiently far removed in a sector of high silver values to again warrant an independent testing. Moreover, it should be noted that it remains open to the east.

Beyond these events, there occurs one other that merits passing consideration. This is a conductor that has been part-described (in vertical loop only) on Lines 6E and 10E, parallel to the above (BL) axis but 300 feet south of it. As such it falls on land among outcroppings of andesite but with no exposure to explain its cause. It obviously ties in with the strong I.P. anomaly previously observed in the sector, albeit this again only partially defined; also it seems probable that the third strong anomaly (of the I.P. survey) which lies 800 feet southwest on regional strike will also be part of the same zone (see interpretation on Dwg. No. 5-342-4A). At the latter point trenching has been undertaken in the past to reveal heavy pyrrhotite/pyrite in andesite at the (transgressing) intrusive contact. While the andesite host rock here is not overly encouraging, the presence of a porphyry sill, the main intrusive contact itself and above-background traces of copper in the sampled sulphides all indicate that some weight has to be given this suggested mineralized horizon occurring lower down in the volcanic sequence.

The final feature of note is a conductor obtained well out in the lake near the property's north boundary (over Lines 10W to 18W). Not covered by horizontal loop surveying, it is a rather weak, poor quality vertical loop axis and is essentially non-magnetic. Its strike behaviour however generally conforms to regional trends, and thus it could be real to bedrock. Its virtue is that it represents a separate stratigraphic event manifestly high enough in the sequence to be within the postulated rhyolite unit (mapped on the extreme north shore peninsula on Sultana Island). Its chief drawback, aside from its dubious quality, is that it occurs on strike with a small reef from which an old DDH had been reportedly put down only to intersect considerable interbedded graphite. While the correlation is far from clear, such a hinted relationship for such an und stinguished conductor is too damaging to promote an immediately foreseeable testing.

6. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the most recent geophysical investigations have defined a set of sulphide-rich horizons in the volcanic sequence immediately surrounding the granite porphyry stock central to previous gold prospecting and mining in the area. In a shift away from quartz vein exploration, these horizons present themselves as mineralized zones in which there now reside such fair chances in both base and precious metals that they take precedence over all other possibilities so far conceived.

It is recommended therefore that a programme of diamond drilling be undertaken to test at least two if not three of these prescribed (conductor) zones for their contained mineral potential. A total of 2000 feet or $20,000.00 is envisaged in a winter drill programme as laid out below:

Recommended Diamond Drill Holes

DDH #1	Collar : 8 + 50N/23 + 50W Drilled due south @ -45° for 500 feet
DDH #2	Collar : 7 + 00N/18 + 00W Drilled grid south @ -45° for 400 feet
DDH #3	Collar : 4 + 50N/4 + 00W Drilled grid south @ -45° for 350 feet
DDH #4	Collar : 1 + 00N/8 + 00E Drilled grid south @ -45° for 350 feet
DDH #5	Collar : 2 + 00S/8 + 00E Drilled grid south @ -45° for 450 feet

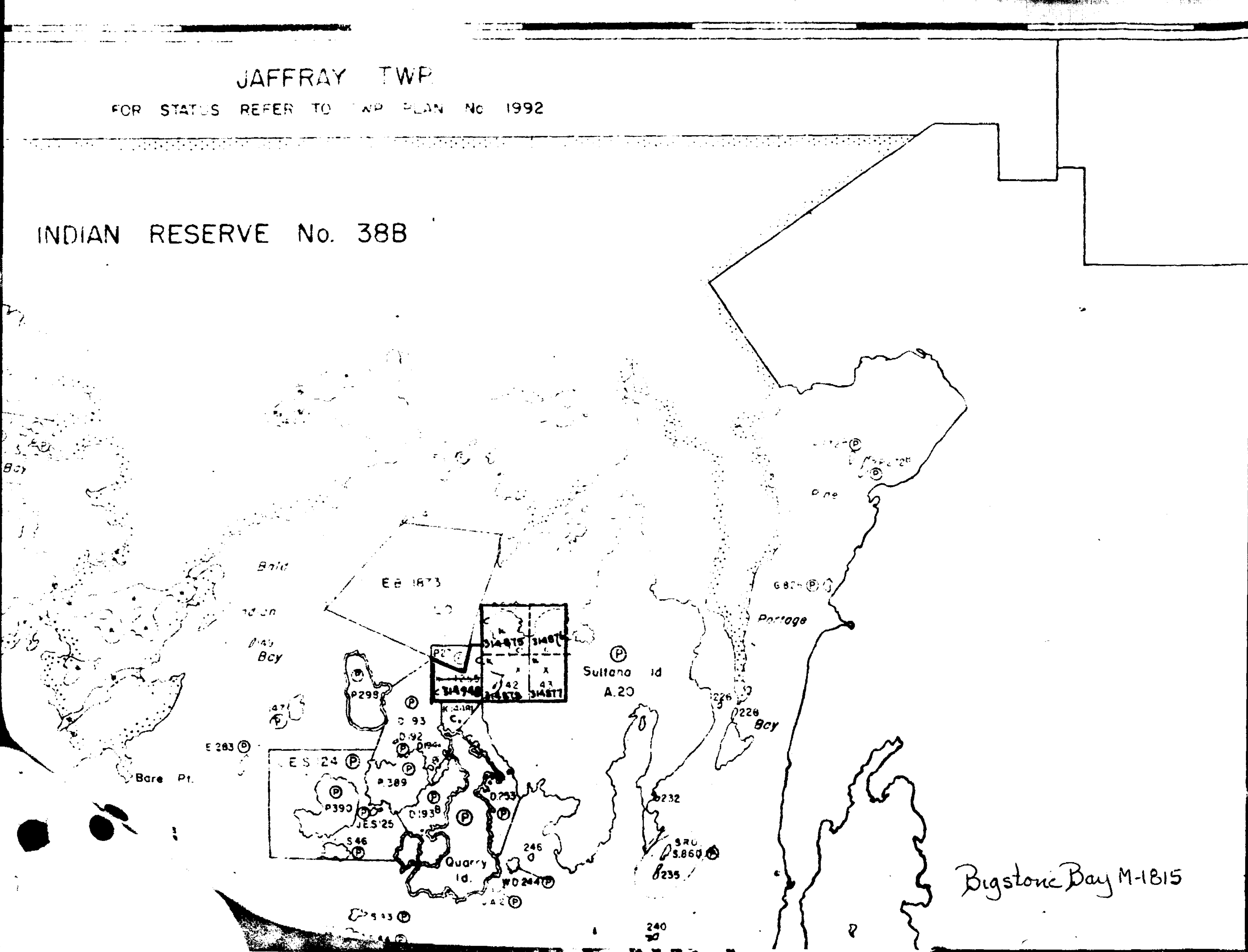
These holes as numbered are intended to represent some order of priority.

BARRINGER RESEARCH LIMITED

J.B. Boniwell,
Exploration Geophysical Consultant

Roger Caven, P. Eng.,
Senior Geophysicist

REGISTERED PROFESSIONAL ENGINEER
Roger J. Cavén
PROVINCE OF ONTARIO


JAFFRAY TWP.
FOR STATUS REFER TO TWP PLAN No 1992
INDIAN RESERVE No. 38B
Sultana Id
A.20
Portage
Bay
Quarry Id.
Bare Pt.
E.B. 1873
P299
P390
J.E.S.124
J.E.S.125
P.389
D.93
D.192
D.193
D.253
S.46
E.283
W.D.244
S.860
232
235
246
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228
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43
Bigstone Bay M-1815

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1. Bruce, Dr. E.L. (1925), Ontario Department of Mines, Vol. XXXIV, Part VI.

2. Caldwell, J.F., Ontario Department of Mines Assessment files; Description of Sultana Mine Property.

3. Cross, J.G., (1950), The Sultana Mine, dated at Port Arthur, Ontario, May 8, 1950.

4. The Colonist, Vol. 10, No. 12, May 1896.

5. Goodwin, A.M., (1965), Preliminary Report on Volcanism and Mineralization in the Lake of the Woods-Manitou Lake - Wabigon Region of Northwest Ontario; Ontario Department of Mines, P.R. 1965-2 (with map).

6. Goodwin, A.M., Ontario Department of Mines Open File Report 5042, Lake of the Woods Area.

7. Ontario Bureau of Mines:
   a) Vol. 8, 1899
   b) 9th Annual Report (1900)
   c) 1902
   d) Vol. 13 pt. 1 (1904)
   e) 20th Report 1911

8. Suffel, G.G., (1930), Geology of the Bigstone Bay Area, Lake of the Woods, District of Kenora, Ontario Department of Mines Annual Report Vol. XXXIV, part 3 (1930).

7. REFERENCES

1. Report on the Geological and Geophysical Survey, Bigstone Bay, Kenora District, Ontario, for Minaki Gold Mines Limited, by Barringer Research Limited, December, 1972.

GEOPHYSICAL – GE
TECHNICAL

52E09NW8922 2.1229 BIGSTONE BAY (LAKE 0

900

MAY 1 8 1973

PROJECTS SECTION

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

Type of Survey Induced Polarization - Magnetic - Geology

Township or Area Bigstone Bay Kenora

Claim holder(s) Minaki Gold Mines Ltd., Ste 203, 350 Bay Street, Toronto

Author of Report M. Halladay - R. Caven

Address 304 Carlingview Drive, Rexdale

Covering Dates of Survey Sept. 20 - (linecutting to office)

Total Miles of Line cut 7.5

SPECIAL PROVISIONS CREDITS REQUESTED

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

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	
–Magnetometer	40
–Radiometric	
–Other IP	20
Geological	20
Geochemical	

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

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

DATE: MAY 15-73 SIGNATURE: M. Halladay / Roger Caven
Author of Report

MINING CLAIMS TRAVERSED
List numerically

-IP

(prefix)	(number)	
K	314875	2/3 not covered
K	314876	1/2
K	314877	
K	314878	1/2

See other sheet for Mag credits – land & water areas traversed at different times (Assessed as one complete survey)

If space insufficient, attach list

-IP

Area of claims not covered = 1 1/3

4×20 = 80 ÷ (4+1 1/3)
= 14.1 days per claim.

TOTAL CLAIMS 4

OFFICE USE ONLY

PROJECTS SECTION

Res. Geol. ______ Qualifications M.L. Halladay: on this file; R. Caven: 2.1049

Previous Surveys 63.2986 not for assessment credit L. D.

Checked by ______ date ______

GEOLOGICAL BRANCH ______

Approved by ______ date ______

GEOLOGICAL BRANCH ______

Approved by ______ date ______

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS

Number of Stations 815 Number of Readings MAG 931 - IP 427

Station interval 100 ft.

Line spacing 100 ft. MAG 200 IP

Profile scale or Contour intervals Magnetic 20γ - Chargeability Millisec - resistivity 250 ohm metres
(specify for each type of survey)

MAGNETIC

Instrument Barringer GM 102

Accuracy - Scale constant ± 10γ

Diurnal correction method Assume Linear Change Between Base Readings

Base station location BL 0 (1) BL 4S (2) BL 8S (3) BL 12S (4) BL 16S (5) Bl 20S (6)

ELECTROMAGNETIC

Instrument

Coil configuration

Coil separation

Accuracy

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

Frequency
(specify V.L.F. station)

Parameters measured

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION – RESISTIVITY

Instrument Huntec 7.5 W Trans MK1 REC.

Time domain Yes Frequency domain

Frequency Range

Power 7.5 KW

Electrode array P Dipole

Electrode spacing 100 '

Type of electrode Steel & Porous Pots

File 2.1229

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

RECEIVED
MAY 18 1973
PROJECTS SECTION

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

Type of Survey: Magnetic, Vertical loop EM, Horizontal loop EM

Township or Area: Bigstone Bay, Kenora

Claim holder(s): Minaki Gold Mines
Suite 520,25 Adelaide St.E.,Toronto

Author of Report: R. Caven

Address: 304 Carlingview Drive, Rexdale, Ont.

Covering Dates of Survey: Feb. 26/73 to Mar. 7/73
(linecutting to office)

Total Miles of Line cut: 3,95

SPECIAL PROVISIONS CREDITS REQUESTED

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

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
—Electromagnetic	40
—Magnetometer	~~20~~ 40
—Radiometric	
—Other	
Geological	
Geochemical	

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

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

DATE: May 16, 1973 SIGNATURE: Roger Caven
Author of Report

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
K	314875
K	314876
K	314877
K	314878
K	314948

See other sheet for explanation.

If space insufficient, attach list

TOTAL CLAIMS 5

OFFICE USE ONLY

PROJECTS SECTION

Res. Geol. ____ Qualifications ____

Previous Surveys ____

Checked by ____ date ____

GEOLOGICAL BRANCH ____

Approved by ____ date ____

GEOLOGICAL BRANCH ____

Approved by ____ date ____

GEOPHYSICAL TECHNICAL DATA

Mag 354
Horizontal loop 202 St.
Vertical loop 144

GROUND SURVEYS

Number of Stations 354 Number of Readings

Station interval Mag 50', Horizontal loop EM 100', Vertical loop 100'

Line spacing Mag 400'+200', EM 400'+200'

Profile scale or Contour intervals Mag 25 gamma, Horizontal loop 1"=40%, Vertical loop 1"=20°
(specify for each type of survey)

MAGNETIC

Instrument Barringer GM-122

Accuracy - Scale constant ± 1 gamma

Diurnal correction method tied to base stations, diurnal distributed linearly with time

Base station location 8E, 6E, 4E, 2E, 00, 2W, 4W, 6W, 10W, 14W, 18W, 22W, 26W, 30W

ELECTROMAGNETIC

Instrument McPhar VHEM

Coil configuration Vertical loop, Horizontal

Coil separation Vertical loop 400', Horizontal loop 300' + 100'

Accuracy Horizontal ± 2%, Vertical ± 1°

Method: [X] Fixed transmitter [ ] Shoot back [X] In line [X] Parallel line

Frequency 2400 Hz, 600 Hz
(specify V.L.F. station)

Parameters measured Horizontal loop - inphase and quadrature phase of secondary EM field, Vertical loop - dip of total EM current.

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION – RESISTIVITY

Instrument

Time domain Frequency domain

Frequency Range

Power

Electrode array

Electrode spacing

Type of electrode

BARRINGER RESEARCH

BARRINGER RESEARCH LIMITED
304 CARLINGVIEW DRIVE
METROPOLITAN TORONTO
REXDALE, ONTARIO, CANADA

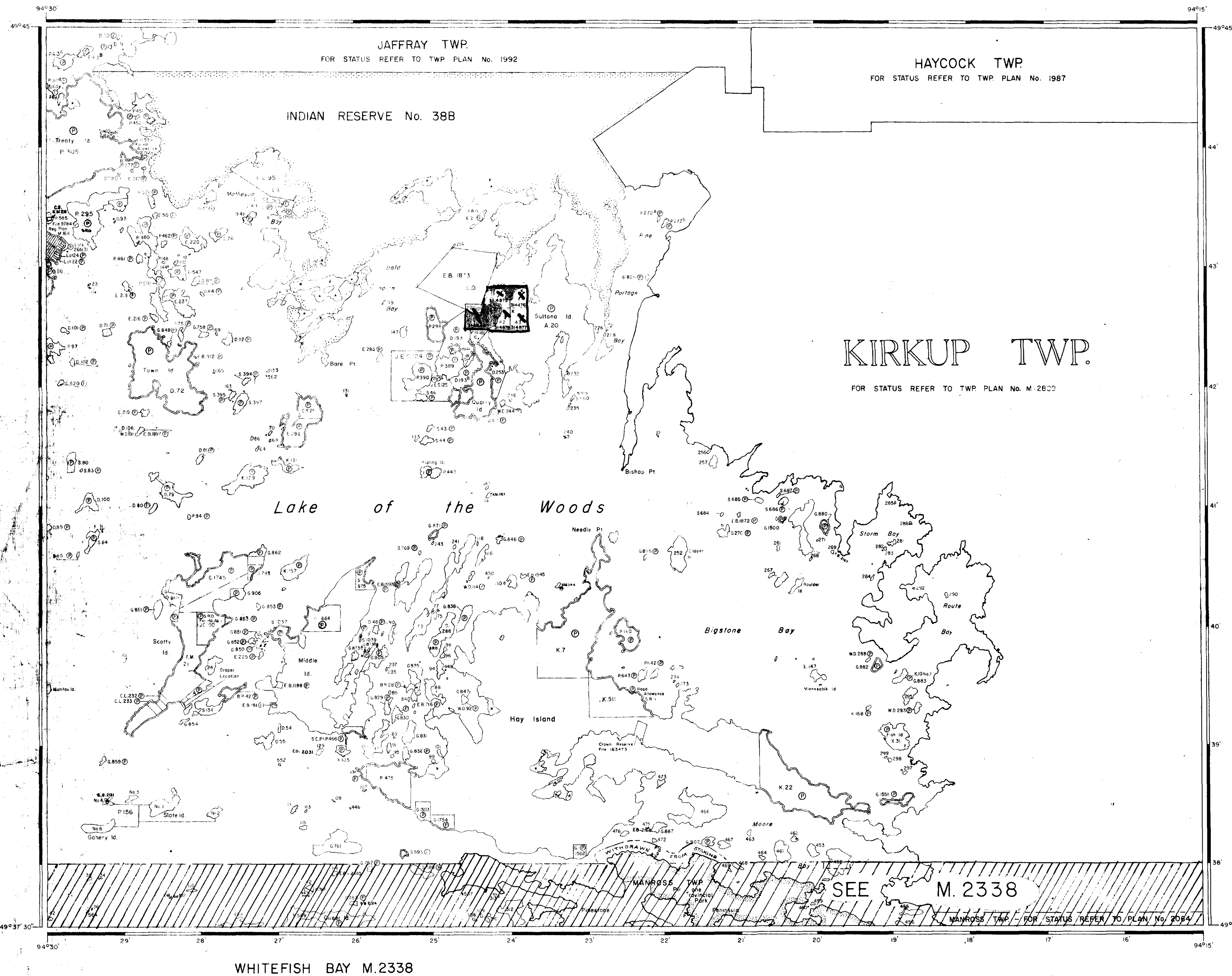
Ministry of Natural Resources
Whitney Block
Queens Park
Toronto, Ont.

Attn: Mr. F. Matthews
Supervisor - Projects Section

ADVANCED TECHNIQUES AND INSTRUMENTATION FOR THE EARTH SCIENCES

ADVANCED TECHNIQUES
AND INSTRUMENTATION
FOR THE EARTH SCIENCES

REXDALE 17 V '73 ONT.
METER COMPTEUR 542652
CANADA POSTES POSTAGE 2.90



AREA OF

BIGSTONE BAY

LAKE OF THE WOODS

DISTRICT OF KENORA

KENORA MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

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

NOTES

400' Surface rights reservation around all lakes & rivers.

Reserve flooding rights to 1064' on all lands bordering on Lake of the Woods. File 4922 Vol. 1.

Pipestone Provincial Park withdrawn from staking.

MINING LANDS
DATE OF ISSUE
MAY 25 1973
MINISTRY OF NATURAL RESOURCES

1 = Geological
1 = Geophysical

NATIONAL TOPOGRAPHIC SERIES 52 E 9

PLAN NO. M.1815

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

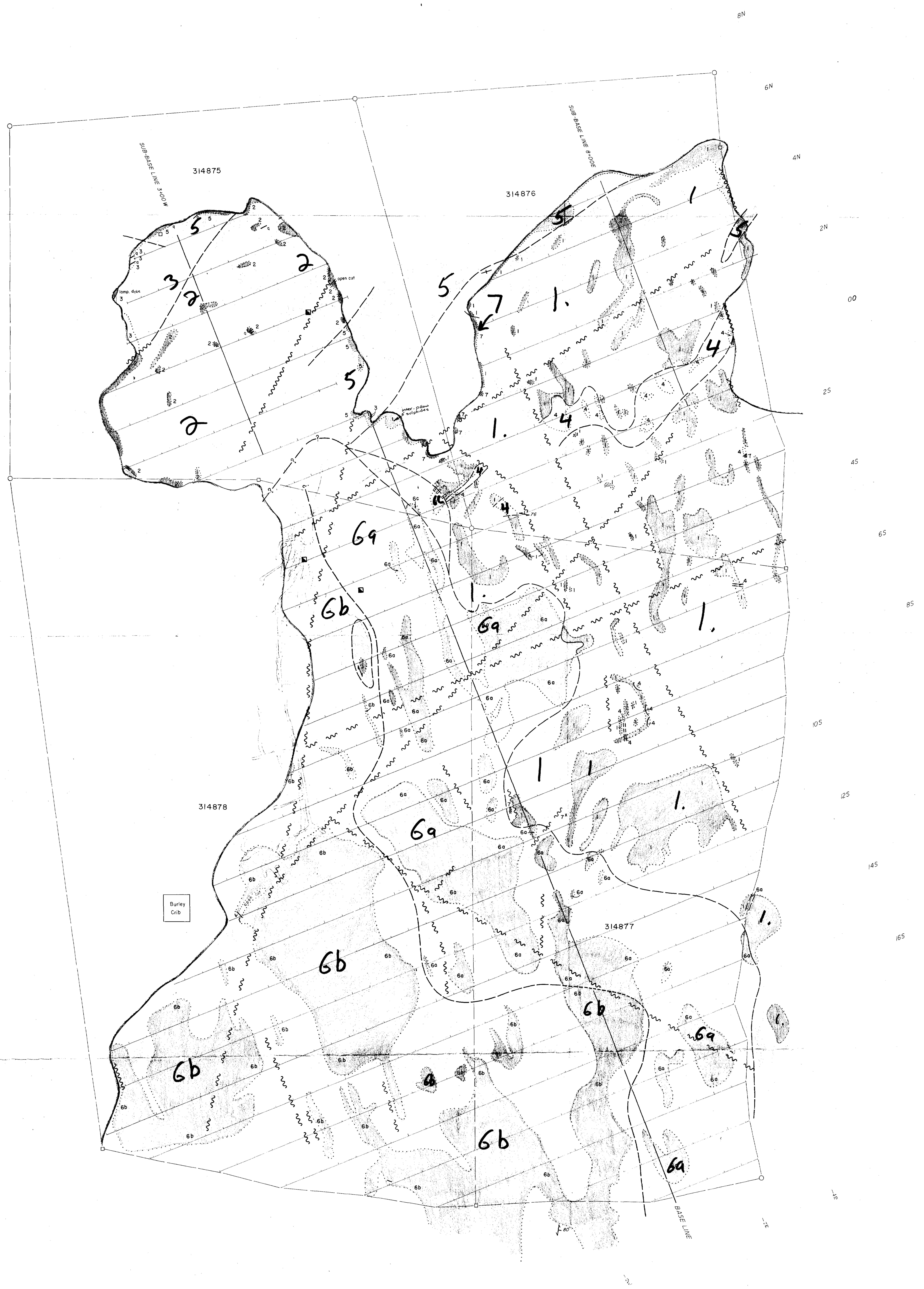
496942

2.1229

200

M.1815

52E09NW8922 2.1229 BIGSTONE BAY (LAKE O



L E G E N D

7	Fault breccia
ACID INTRUSIVES	
6c	Granite
6b	Porphyry
6a	Quartz diorite
ARCHEAN	
5	Sediments
4	Feldspar porphyry (intrusive, probable part of flow sequence)
ARCHEAN (cont'd)	
3	Rhyolite porphyry
2	Dacite porphyry
1	Andesite

- Areas of predominant outcrop
- Contacts · observed, assumed, gradational
- Fault · observed, assumed
- Bedding
- Schistosity
- TR Trench
- Shaft
- Claim post · located, unlocated

M. Halladay

REGISTERED PROFESSIONAL ENGINEER · M.L. HALLADAY · PROVINCE OF ONTARIO

Geology by M. Halladay, P.Eng.
from Oct. 12 to Oct. 20 1972

2.1229

Work undertaken by·
BARRINGER RESEARCH LTD, Toronto, Canada

MINAKI GOLD MINES LIMITED		
BIGSTONE BAY, KENORA DISTRICT - ONTARIO		
GEOLOGY		
NOVEMBER 1972	SCALE 1" = 100'	DWG. 5-331-2

210

LEGEND

Contour interval — 20 gammas
500 gamma contour
100 gamma contour
20 gamma contour
Depression
Claim post, located, unlocated
Claim line
Interpreted fault

Work undertaken by:

Registered Professional Engineer — Roger J. Cavén — Province of Ontario

MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT - ONTARIO

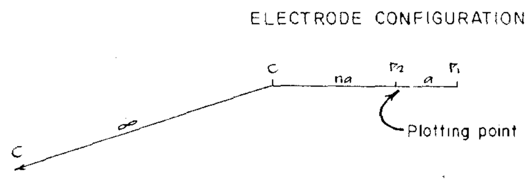
TOTAL INTENSITY MAGNETICS

NOVEMBER 1972	SCALE 1" = 100'	DWG. 5-331-3

52E09NW9922 2.1229 BIGSTONE BAY (LAKE D

220

ELECTRODE CONFIGURATION



LEGEND

Contour interval .... 1 Millisec
25 Millisecs
5 Millisecs
1 Millisec
Depression
Claim post, located, unlocated
Claim line

Work undertaken by:

MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT - ONTARIO

CHARGEABILITY CONTOURS

a = 100' , n = 2

NOVEMBER 1972	SCALE 1" = 100'	DWG. 5-331-4

ELECTRODE CONFIGURATION

Plotting point

LEGEND

Contour interval	250 Ohm-metres
25000 Ohm-metre contour	
5000 Ohm-metre contour	
1000 Ohm-metre contour	
250 Ohm-metre contour	
Depression	
Claim post, located, unlocated	
Claim line	

Work undertaken by:

Roger J. Caven

PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT - ONTARIO

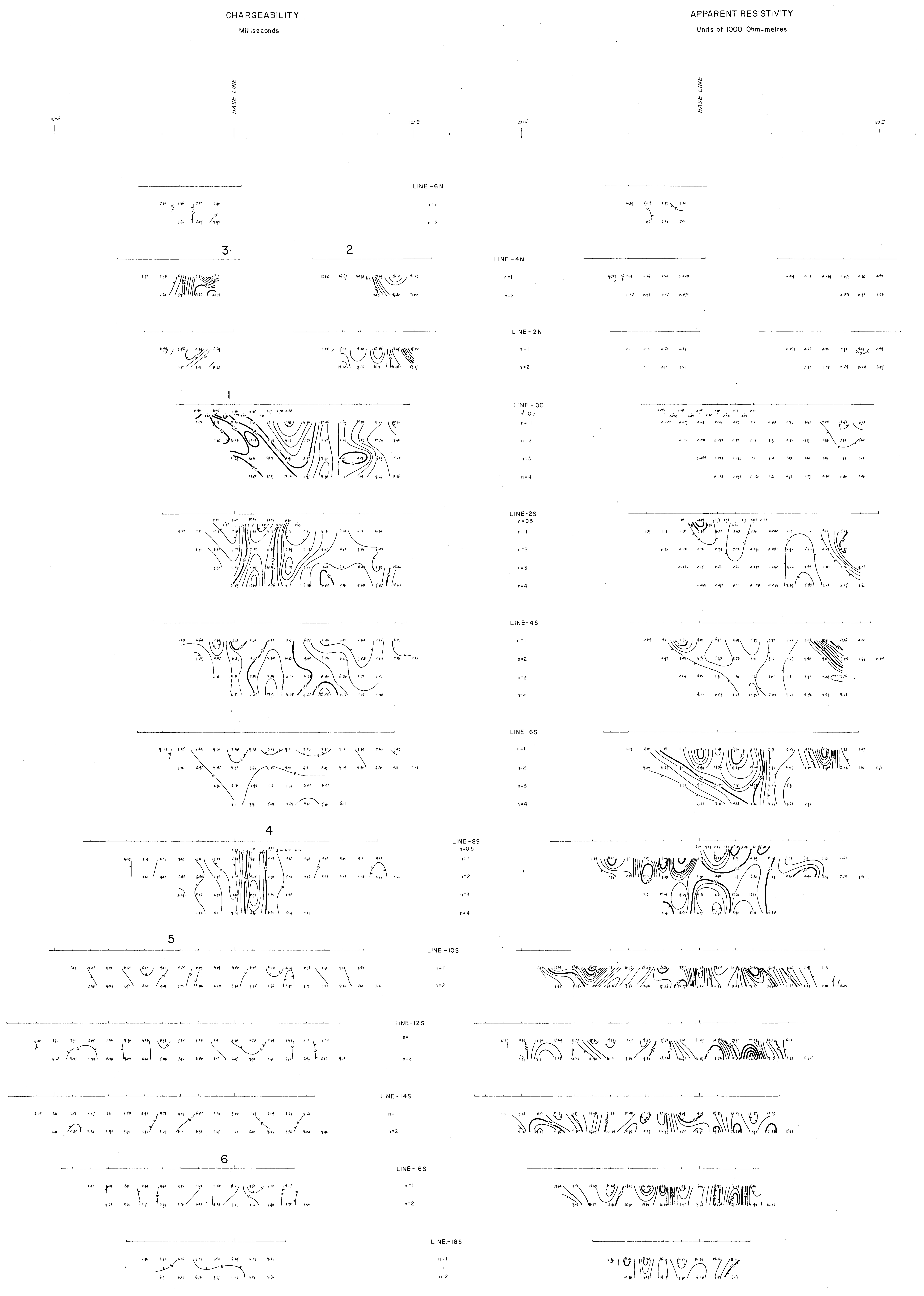
APPARENT RESISTIVITY CONTOURS

a = 100' n = 2

NOVEMBER 1972 | SCALE 1" = 100' | DWG 5-331-5

52E09NW8922 2.1229 BIGSTONE BAY (LAKE O

240



ELECTRODE CONFIGURATION

Plotting point

a=100'

Roger J. Cavén
Registered Professional Engineer
Province of Ontario

Work undertaken by:
BARRINGER RESEARCH LTD., Toronto, Canada

MINAKI GOLD MINES LIMITED		
BIGSTONE BAY, KENORA DISTRICT - ONTARIO		
INDUCED POLARIZATION & RESISTIVITY SECTIONS POLE-DIPOLE ARRAY		
NOVEMBER 1972	SCALE 1" = 200'	DWG. 5-331-6

LAKE OF THE WOODS
BASE LINE (bearing 35°T)
10E
8E
6E
4E
2E
00
2W
4W
6W
10W
20N
15N
10N
5N
5S
Sultana Island
WP (No1 of 314948)
CB 314876
CB 314877
CB 314948
CB 314875
CB 314878
LEGEND
PARALLEL LINE
2400Hz profile
600Hz profile
Transmitter
Plotting configuration
Profile scale : 1" = 20°
Claim posts (located, unlocated)
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A
B
Work undertaken by
BARRINGER RESEARCH LTD, Toronto, Canada.
NTS ref 52 E/9
MINAKI GOLD MINES LIMITED
BIGSTONE BAY, KENORA DISTRICT - ONTARIO
VERTICAL LOOP
EM SURVEY
MARCH 1973
Scale : 1" = 100'
DWG. 5-342-2A
260

LEGEND

DETAIL — PARALLEL LINE — 2400Hz profile

600Hz profile

Profile scale: 1" = 20°

△ Transmitter

Plotting configuration (North dip / South dip)

□ ○ Claim posts (located, unlocated)

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MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT — ONTARIO

VERTICAL LOOP EM SURVEY

MARCH 1973 | Scale: 1" = 100' | DWG. 5-342-28

270

LEGEND

IN-PHASE	QUADRATURE	
——	- - - -	300' Coil separation
—·—·—	·-·-·-·	100' Coil separation
		Plotting configuration (plotted at midpoint of coil separation)

Profile Scale: 1" = 40%

□ ○ Claim post (located, unlocated)

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280

NTS ref 52 E/9

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BARRINGER RESEARCH LTD, Toronto, Canada.

Roger J. Cavén

REGISTERED PROFESSIONAL ENGINEER, PROVINCE OF ONTARIO

MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT-ONTARIO

HORIZONTAL LOOP
EM SURVEY
FREQUENCY 600Hz, COIL SEPARATION 300' 100'

MARCH 1973	Scale 1" = 100'	DWG. 5-342-3 A

EM LEGEND

IN-PHASE QUADRATURE

300' Coil separation

100' Coil separation

Profile scale : 1" = 40%

Plotting configuration (plotting point at midpoint of coil separation)

□○ Claim posts (located, unlocated)

INTERPRETATION LEGEND

Conductor axes with probable extension

Interpreted fault

DDH No. I — Proposed DDH and number

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NTS ref 52E/9

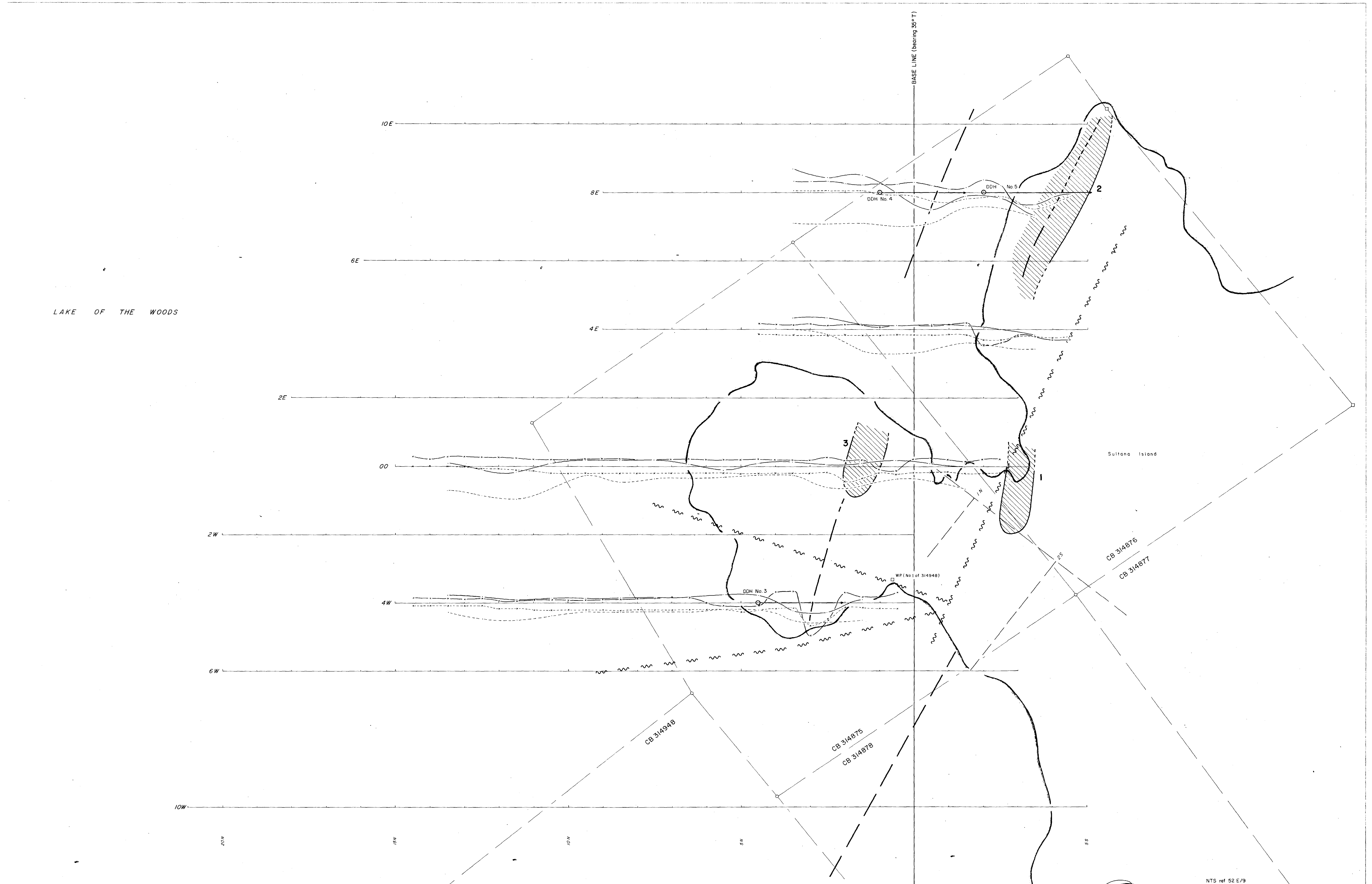
MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT – ONTARIO

HORIZONTAL LOOP
EM SURVEY
FREQUENCY 2400Hz, COIL SEPARATION 300' & 100'

MARCH 1973	Scale : 1" = 100'	DWG. 5-342-4B

290



EM LEGEND

IN-PHASE — QUADRATURE — 300' Coil separation

IN-PHASE — QUADRATURE — 100' Coil separation

Plotting configuration (Plotting point at midpoint of coil separation)

Profile Scale : 1" = 40%

□ ○ Claim posts (located, unlocated)

INTERPRETATION LEGEND

Conductor axes with probable extention

I.P. zone and number (from December 1972 report)

Interpreted fault

Proposed DDH and number (DDH No. 3)

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Roger J. Caven, Registered Professional Engineer, Province of Ontario

MINAKI GOLD MINES LIMITED

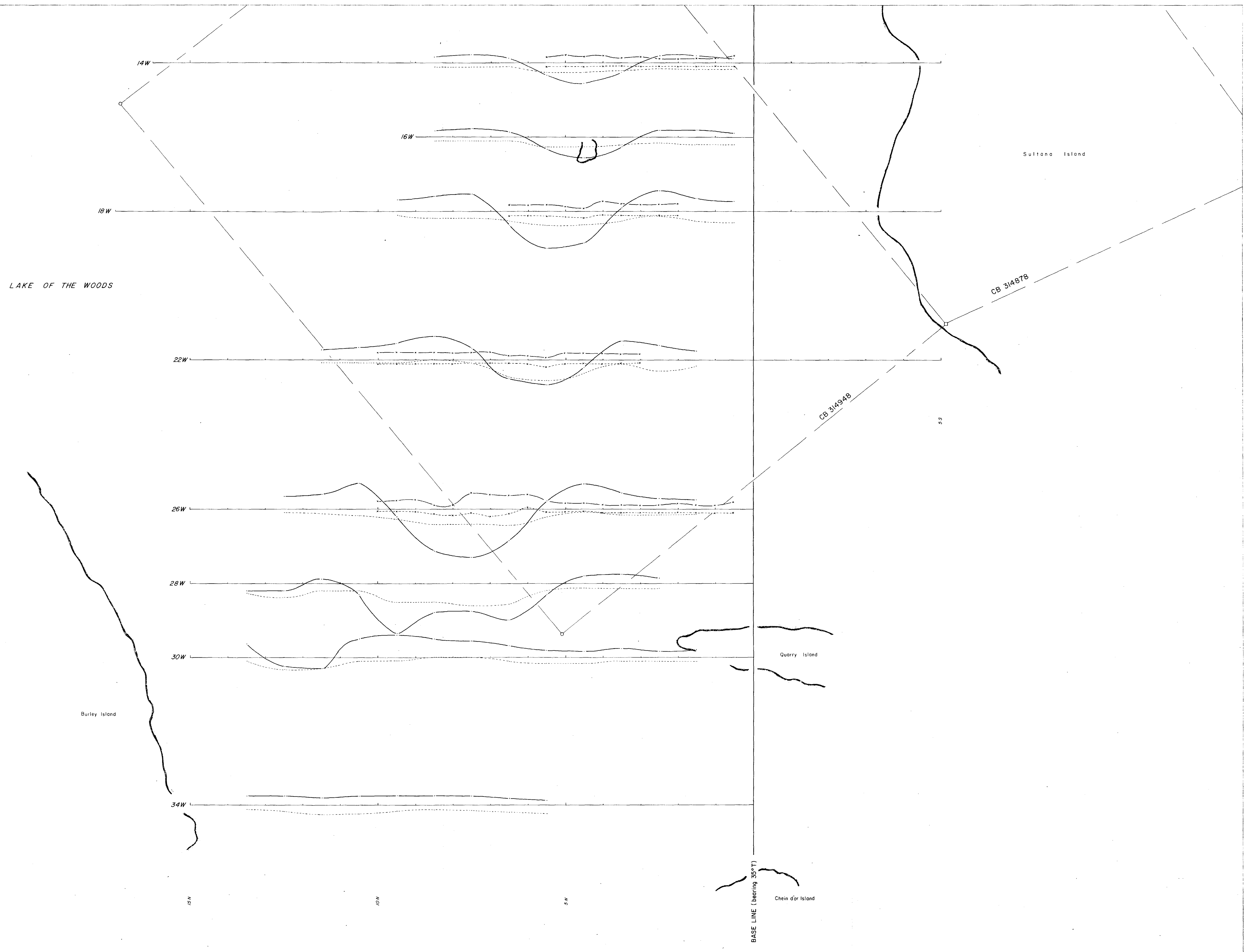
BIGSTONE BAY, KENORA DISTRICT - ONTARIO

HORIZONTAL LOOP EM SURVEY

FREQUENCY 2400Hz, COIL SEPARATION 300' & 100'

MARCH 1973	Scale : 1" = 100'	DWG. 5-342-4A

300



LEGEND

IN-PHASE — QUADRATURE — 300' Coil separation

IN-PHASE — QUADRATURE — 100' Coil separation

Plotting configuration (plotted at midpoint of coil separation)

Profile scale : 1" = 40%

□○ Claim posts (located, unlocated)

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MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT — ONTARIO

HORIZONTAL LOOP
EM SURVEY

FREQUENCY 600 Hz, COIL SEPARATION 300' & 100'

MARCH 1973 | Scale 1" = 100' | DWG. 5-342-38

310


LAKE OF THE WOODS
BASE LINE (bearing 35° T)
Sultana Island
CB 314876
CB 314877
CB 314948
CB 314875
CB 314878
10E
8E
6E
4E
2E
00
2W
4W
6W
10W
20N
15N
10N
5N
LEGEND
Contour interval 50 gammas
1000 gamma contour
200 gamma contour
50 gamma contour
25 gamma contour
Magnetic low
Base station
Claim post — located, unlocated
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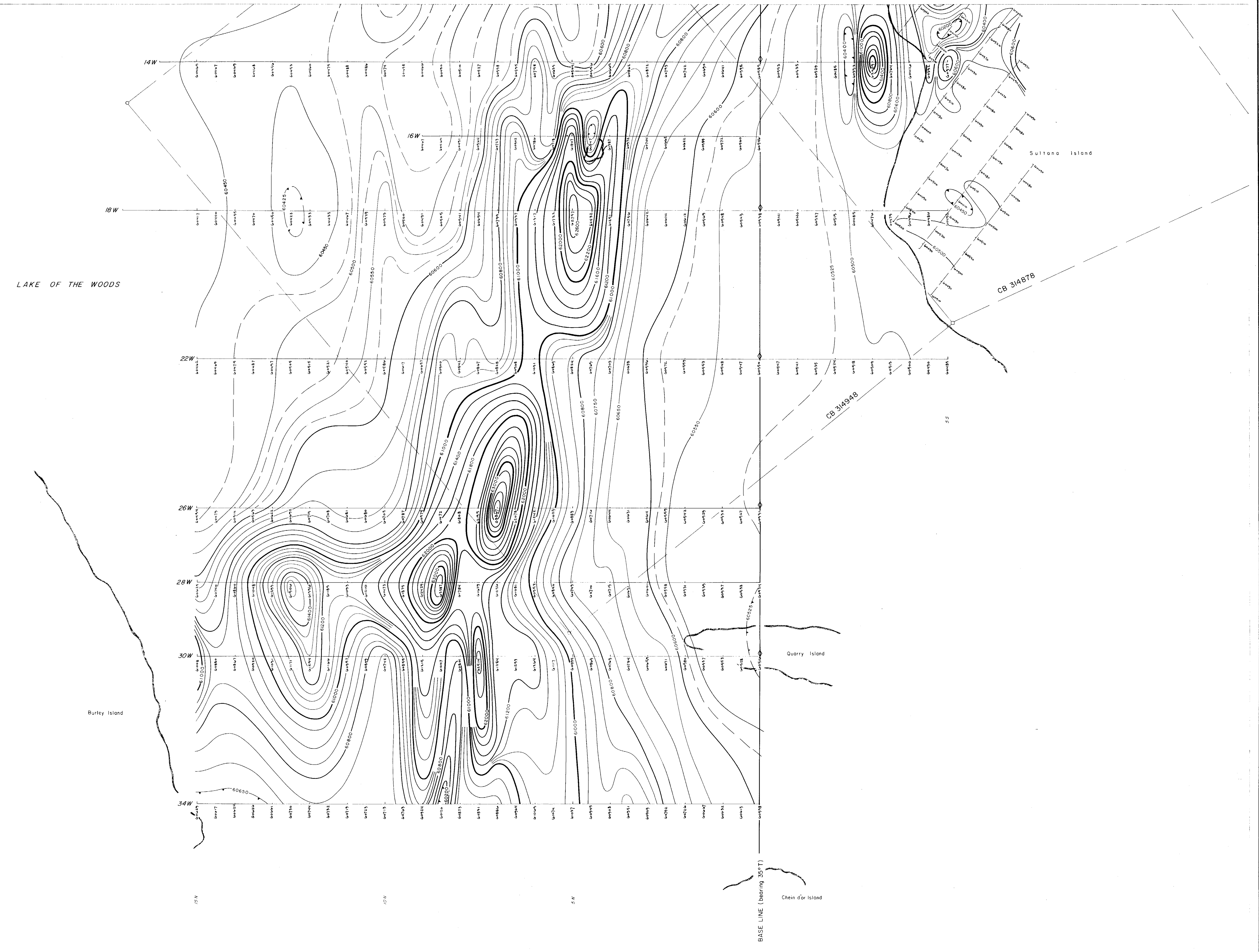
Roger J. Cavén
NTS ref 52E/9
MINAKI GOLD MINES LIMITED
BIGSTONE BAY, KENORA DISTRICT - ONTARIO
TOTAL INTENSITY
MAGNETICS
MARCH 1973
Scale 1" = 100'
DWG. 5-342-5A
320



LEGEND

- Contour interval 50 gammas
- 1000 gamma contour
- 200 gamma contour
- 50 gamma contour
- 25 gamma contour
- Magnetic low
- Base station
- Claim post — located, unlocated

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B

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MINAKI GOLD MINES LIMITED

BIGSTONE BAY, KENORA DISTRICT — ONTARIO

TOTAL INTENSITY
MAGNETICS

MARCH 1973 | Scale 1" = 100' | DWG. 5-342-5B

330

52E09NW8922 2.1229 BIGSTONE BAY (LAKE O