



Geological Report  
on the  
Marshall-Evoy Option  
Boston Township  
Province of Ontario

INTRODUCTION

The Marshall-Evoy option consists of a group of ten contiguous claims, numbers L-54236, L-55726 and L-55819 to L-55826 inclusive, lying in the north-east part of Boston Township, Larder Lake Mining Division, District of Temiskaming, Northern Ontario. The group is situated approximately seven miles south-east of Kirkland Lake, Ontario, and lies astride the old Dane-Larder road a distance of approximately five miles east of Dane Station on the Ontario Northland Railway.

The claims were optioned in June 1952 and a program of development, consisting of line-cutting, a magnetometer survey, an electromagnetic survey, detailed geological mapping, stripping, and trenching, was instituted immediately.

The mapping was done by the author, assisted at various times by Don Colquhoun, Ralph Waites and Stan Leverre, on a scale of 1" = 200' by pacing between the picket lines which were cut at 200-foot intervals. Fill-in lines were cut in areas of extreme magnetometer readings. All outcrops were accurately located with respect to the nearest picket line. In the northern section of the map-area, strikes of bedding etc. were estimated since the presence of highly magnetic iron formation precluded the use of a compass.

TOPOGRAPHY

The claims area is largely covered by low rugged hills containing numerous outcrops but a considerable area of low open swamp lies along the creek in the southeast part of the group. Claim L-55823 is almost totally covered by swamp. Marshall Lake, a small spring lake, lies along the north boundary of Claim L-57426. Drainage is to the south into the main creek which flows north-east across the group. Two intermittent streams flow south through the west half of the area - one draining out of Marshall Lake, the other out of a small pond lying to the north of claim L-55824.

SUMMARY AND CONCLUSIONS

The older formations within the map area are split into two distinctive units - a southern band composed of greywacke intruded by irregular masses of gabbro and a northern band consisting of a series of volcanics and sediments. The latter series consists of an agglomerate - conglomerate - tuff horizon, a thick andesite flow, and a wide zone of iron formation in order of age from oldest to youngest. All these older formations have been intruded by syenite, granite, feldspar porphyry, lamprophyre, and diabase dikes. One area of serpentinized peridotite outcrops in the swamp but cannot be related in age to the other formations.

The two structural units, the highly-folded, volcanic-sediment zone, and the unfolded greywacke-gabbro zone, apparently lie in faulted contact with each other, a major fault known to the east passing through the claims in a section lacking in outcrop which lies between them.

The greywacke-quartzite formation is most likely a water-lain siliceous tuff.

The odd mixture of agglomerate, conglomerate and tuff can only be explained as a series of water-lain, pyroclastic rocks with numerous changes in the character of the material being ejected from nearby volcanoes.

#### GEOLOGIC TIME TABLE

Matachewan

Diabase dikes

Algoman

Lamprophyre dikes

Syenite, granite, feldspar-porphry dikes

Haileyburian

Serpentinized peridotite

Gabbro

Keewatin

Iron formation

Andesite

Agglomerate, tuff, conglomerate

Greywacke, quartzite

#### DESCRIPTION OF FORMATIONS

##### Greywacke, Quartzite

A mixture of siliceous greywacke with some quartzite horizons forms a wide, irregular formation along the south boundary of the claims group, the irregularity of the zone being caused by the presence of extensive gabbro intrusives. Quartzite occurs alone as border phases of the iron formation zone on claims L-55824 and L-55826.

The greywacke-quartzite mixture is composed of a medium-grey-to-white, siliceous rock that is too fine-grained to enable recognition of any of the constituents. Some beds are composed of sugary, white-to-rusty quartz, and a few of fine-grained, dark grey-to-black slate. The formation is thinly-bedded, dips vertical and locally exhibits cross-bedding and grain gradation. The relation of this formation to the other volcanic types in the area could not be established but indications of top facings found here and in the andesites to the north, show that it is the oldest formation in the area. It strongly resembles a siliceous greywacke but may actually be a siliceous water-lain tuff.

The quartzite associated with the iron formation is a fine-grained, massive rock composed of cherty quartz either white or grey in color. The grey-to-black color is caused by a fine dissemination of magnetite. The formation is generally well-banded and grades into iron formation with increasing content of magnetite.

### Agglomerate-Tuff-Conglomerate

The various phases of the pyroclastic rocks have been mapped as a single structural unit striking east-west across the central part of the claims area. This unit consists of thick series of agglomerates, tuff, and conglomerates which will be described individually.

#### Basic Agglomerate

The basic agglomerate is the most abundant phase of the unit and itself occurs in two textural phases.

The first is composed of round boulders or fragments of a coarse-grained, dark-green material, now completely chlorite and carbonate, set in a fine groundmass of the same material. The boulders vary from 1/2 inch to a maximum of 14 inches in diameter. In texture this rock is a conglomerate but the composition of the pebbles and groundmass is all the same.

The second phase is composed of angular fragments of the same material as described above with some fragments of fine-grained, dark-green andesite. Some siliceous fragments and pebbles were found locally.

#### Siliceous Agglomerate

The siliceous agglomerate occurs as one wide horizon in the west part of the group and as a number of narrow beds within the basic material to the east. In the west the formation is composed of angular fragments of black-to-dark-grey chert set in fine material composed partly of chert and partly of black slate. The fragments are generally angular and vary to a maximum of 3 inches in diameter. Locally rounded pebbles of chert and granite were found.

In the east the formation consists of angular fragments of chert, quartzite and siliceous tuff with scattered rounded chert and granite pebbles. The fragments and pebbles range in size to a maximum of 10 inches and are generally light-colored in contrast to the dark-colored formation to the west.

In places the basic and siliceous phases are thinly interbedded. The contact between the two is gradational over a distance varying from a few inches to five feet, the fragments of one phase gradually disappearing in the other.

#### Carbonated Agglomerate

Carbonated agglomerate was found as lenses and short thin horizons throughout the basic phases of the formation. It is actually a basic agglomerate of the angular fragment type with the inter-fragment material replaced by crystalline white calcite. Small calcite veinlets can be seen cutting many of the fragments and, locally, the calcite replaces part of some of them.

#### Tuff

A few narrow lenses of basic tuff were found with the basic phases of the agglomerate and one short zone of acid tuff with the siliceous agglomerate in the north-west corner of claim L-55825. The basic tuff is a poorly-banded, fine-to-medium-grained soft rock composed of carbonate and chlorite.

One narrow zone of basic agglomerate was found within the iron formation and quartzite horizons on claim L-55826. This zone is composed of angular fragments of andesite composition.

### Andesite

Andesite occurs as one thick flow striking generally east-west across claims L-55824, L-55826 and L-55820 in the north-west section of the area, and a few scattered thin lenses in the agglomerates of the west part of the claims area. The major flow, which varies from 100 feet to 600 feet in thickness, lies between the iron formation and the agglomerate-tuff-conglomerate series, and in general reflects the folding in the former series.

The flow shows a typical textural gradation from south to north indicating that the top faces north. The basal section of the flow, which averages from 100' to 150' in thickness, is composed of a coarse-grained, uniform, massive gabbro which, in places, varies in composition almost to a peridotite. This grades into fine-grained, dark-green andesite in the center of the flow which, in turn, grades into fragmental material at the top.

The smaller occurrences of andesite are all the typical fine-to-medium-grained, dark-green rock composed of chlorite and white feldspar.

### Iron Formation

The iron formation forms a wide intricately-folded band trending in an arc across claims L-55824 and L-55826. The zone strikes south-west into the east part of claim L-55826, is crumpled into a number of folds with north-south axes along the boundary of claims L-55826 and L-55824, then strikes N 75° W across claim L-55824 and out of the map area.

The rock is composed of finely-interbanded magnetite and quartz. The magnetite is black in color, strongly magnetic, and occurs in stringers varying from a hair line in thickness to a maximum of 3 inches. The quartz stringers are wider on the average and vary in color from white through various shades of grey to black, the dark color being due to a finely disseminated magnetite. Red jasper quartz is found in certain horizons throughout the zone but is not abundant.

The banding within the zone is extremely contorted and drag folded, so much so that it is useless in determining the trend of the formation. This crumpling may be in part related to the folding in the immediate area but is probably largely due to slumping and local movements within the formation before consolidation.

### Gabbro

Gabbro occurs as a number of irregular intrusives cutting the greywackes along the south boundary of the map area. These occurrences may be separate intrusives or tongues of a larger mass lying to the south of the group. The rock is definitely younger than the greywackes as it cuts sharply across bedding in many sections and contains inclusions of the earlier rock.

The texture of the rock varies from a fine-grained diorite to a coarse basic gabbro but, in general, is that of a coarse-grained gabbro composed of 60% dark ferromagnesian minerals and 40% white feldspar. Locally, scattered grains of blue quartz can be seen throughout the rock. These may be small undigested fragments of the older greywacke-quartzite horizon or may be a constituent of the rock. If the latter case is true, the intrusive should be designated as a quartz diorite. Many sections of the intrusives have good diabase texture. Most of the fine-grained phases occur as narrow tongues out into the older rocks and as border phases of the main intrusives. The contact with the greywacke is gradational and is accompanied by alteration and baking of the older rocks.

#### Serpentinized Peridotite

Serpentinized peridotite occurs as four small outcrops in a group in the north central part of claim L-55822. This outcrop area is totally surrounded by swamp.

The rock is coarse-grained, dark-green in color, and composed of light-green serpentine and dark-green ferromagnesian minerals. Some picrolite was seen along fractures.

There is no evidence to establish the age of this formation in relation to the other rock types in the area.

#### Syenite, Granite, Feldspar Porphyry Dikes

Acid dikes of Algonian age are common throughout the area and, with the exception of one phase of the syenite, are all similar in composition.

The syenite dikes are fine-to-medium-grained in texture, pink in color, and composed of white and pink feldspar with minor amounts of black ferromagnesian minerals.

The granite dikes are similar except that they contain a small percentage of quartz in their composition.

Feldspar porphyry is not a common rock in the area and occurs only as border phases of some of the larger syenite and granite dikes. Two types were seen. The first is composed of scattered phenocrysts of white and pink feldspar in a medium-grained groundmass consisting of feldspars, quartz and ferromagnesian minerals. The second consists of rounded and angular white phenocrysts in a fine-grained black groundmass.

The remaining phase of the syenite is a rather peculiar rock composed of approximately 65% biotite mica and a black ferromagnesian mineral and 35% pink-to-red feldspar grains. This may actually be a phase of the lamprophyre dikes which most likely originated from the same magma as the acid dikes.

#### Lamprophyre Dikes

A few narrow lamprophyre dikes were found in the area. They are composed of black biotite mica in a medium-grained grey groundmass with no recognizable minerals.

## Diabase Dikes

Two diabase dikes of Matachewan age cross the claims area - one striking approximately north-south across claims L-55825 and L-55824, and the second N 70° E approximately across the east central portion of the group. Both dikes are branches of one larger dike which splits up a short distance to the south of claim L-55825. The north-south dike is the wider averaging approximately 100 feet in width, whereas the other averages only 60 feet.

Both are composed of the typical coarse-grained quartz diabase - that is white feldspar, a black ferromagnesian mineral and some quartz. Diabase texture is marked in many sections and the weathered surface is the typical mottled brown.

## STRUCTURE

The structure of the area is rather obscure. The greywacke horizon along the south boundary of the group strikes uniformly east-west along its entire length, whereas the volcanics and sediments to the north are intricately folded or crumpled. The iron formation and andesite flow are folded along a series of north-south axes in claims L-55824 and L-55826, but this folding cannot be traced through the agglomerate-conglomerate horizon into the greywackes. Also the folding in the agglomerates is not conspicuous but this may be due to a lack of marker horizons.

Throughout the whole area there is a section lacking in outcrops lying between the gabbro-greywacke horizon and the agglomerate-andesite-iron formation series. Although there is little corroborative evidence, it is believed that a major fault, known to the east, lies under this section and that the two distinctive series are in fault contact. A large fault with a horizontal displacement of approximately 4500 feet is known some distance to the east and should enter the claims in the swamp area covering the north part of claim L-55822. A few scattered outcrops of carbonate schist were found adjacent to the swamp along the north edge of the greywacke-gabbro hill on claims L-55822 and L-55821. The fact that the volcanics and iron formation are intensely folded while the greywacke series is not, can be taken as evidence for a fault lying between the two. Other vague evidence is a slight divergence in strikes of the various formations in the east half of the area. The greywacke strikes east-west whereas the agglomerate-conglomerate horizon trends in a general N 60° E direction.

However if this fault does exist, all movement must have occurred previous to the intrusion of the diabase dikes. Also both dikes have crossed the possible fault zone without any offset or migration along it, which is not a common occurrence in such cases.

Minor north-south faulting was found throughout the area. These faults have a general east side to the north movement with a maximum displacement of 60 feet.

"H. D. McLeod"



32D04SW0370 63.328 BOSTON

020

## INTRODUCTION

Ten claims located in Boston Township, Larder Lake Mining Division, Province of Ontario, and owned jointly by Charles Marshall and Norman Evoy were optioned by the Dominion Gulf company in June, 1952. The claim group adjoins other Dominion Gulf Company interests on two sides. Based on observations made on neighbouring properties, it was believed that the Marshall-Evoy property warranted a thorough geological and geophysical examination. A preliminary geological investigation indicated that the northwestern portion of the claim group was largely underlain by iron formation of marginal economic grade. In the central portion of the claim group, the owners had located two separate copper, zinc showings in the agglomerate bands.

A ground magnetometer survey was proposed, its purpose being twofold. The magnetic survey would indicate directly zones of high magnetite content in the iron formation, and thereby permit a detailed evaluation of the iron possibilities. Secondly, it was believed that the magnetometer survey might indicate magnetic anomalies which could be correlated with the structural features associated with the mineralization in the agglomerate bands, thus indicating the location of other favorable areas.

An Askania Schmidt-type magnetic balance having a sensitivity of about 26 gammas per scale division, was used in the survey. Readings were taken at intervals of 100 feet on picket lines 200 feet apart over the entire claim group. Intermediate stations and intermediate picket lines were surveyed in zones of high magnetic intensity. In all, a total of 1663 stations were observed on 22.87 miles of picket line.

The magnetic data were observed and reduced by a Dominion Gulf Company magnetometer crew, and then transmitted to the Toronto office of the Dominion Gulf Company for further processing and interpretation. The basic data, together with isomagnetic contours and interpretation are presented on a map at a scale of 1 inch equals 200 feet, accompanying this report.

## INTERPRETATION

In general, the claim group may be divided into four distinct geological and geophysical units. The northwestern portion of the claim group contains the iron formation, with associated quartzite and andesitic lavas. The central zone, in which the copper, zinc mineralization is found, is composed of an agglomerate, tuff series, with interbedded lava flows. In the east central zone, a peridotite intrusive predominates,

while the southern zone appears to be composed of greywacke, andesite, and a gabbroic intrusive. It was believe preferable to study each of these zones individually.

The iron formation zone in the northwestern portion of the claim group is easily distinguishable on the contoured geomagnetic map. Anomalies of over 100,000 gammas are quite common within the iron formation horizon. It is interesting to note, however, that the known iron formation appears to be represented by magnetic anomalies in excess of 30,000 gammas. Thus a crude approximation of the outline of the iron formation horizon may be obtained by tracing the 30,000 gamma contour line throughout the area. Adjacent to the iron formation is a band of quartzite. This material perhaps should be more properly named a ferruginous quartzite, or a very low grade iron formation. Next to the quartzite is an andesite flow horizon, which averages about 300 feet in width. No direct correlation exists between the magnetic intensity or character, and either the quartzite or the andesite horizon, since both of these horizons occur on the flank of the main iron formation anomaly and their individual magnetic effects are masked by the main anomaly. This zone has suffered intense deformation, probably from slumping during deposition. The strikes of the individual horizons, while conformable, are highly unpredictable.

The second zone, occupying the central portion of the claim group from east to west, is composed primarily of agglomerates, and tuffs, with a narrow andesitic flow interbanded with them. It is possible to trace silicified zones across a good part of the claim group. In places these horizons may be used as marker beds. The strike of this formation changes from east-west in the western portion of the claims group, to N 45° E in the eastern portion of the group.

The magnetic representation of this zone is somewhat inconclusive. Apparently the magnetite content in the agglomerate, tuff, andesite, greywacke, gabbro, and diabase is about the same. It is therefore quite difficult to separate one rock type from the other by means of magnetic intensity measurements. However, the geomagnetic contours do indicate changes in trend directions, which have been found to correspond with the geologic strikes. Since the strike direction of the agglomerate diverges sharply from that of the greywacke in the eastern part of the claim group, it is therefore possible to map the contact between the two formations in this area at least. However, where the agglomerate and greywacke have the same strike, it is impossible to separate them magnetically.

The third zone, in the east central portion of the claim group is represented by a rather strong magnetic anomaly. While this anomaly cannot be compared to the anomaly obtained over the iron formation, it stands out in bold relief when compared to the magnetic relief exhibited by the agglomerate, tuff series. Four small outcrops of peridotite were found to coincide with the western end of the magnetic anomaly. The remainder of the magnetic anomaly, under overburden cover, was therefore



ascribed to peridotite. It would appear from the data available that the peridotite mass was cut off in the vicinity of line 28W and the south claim line, however insufficient data is available to outline the mass completely.

Two smaller zones of peridotite have been interpreted from the magnetic relief. A sharp local magnetic anomaly occurs within the agglomerates on line 60 W about half a claim from the south boundary of the group. No outcrop was obtained in this vicinity, but the intensity of the anomaly and its special orientation suggested that it might be caused by peridotite. A linear anomaly near the northeastern corner of the claim group was found to be associated with a peridotite dyke.

The fourth zone, occupying a strip along the southern boundary of the claim group, is magnetically indistinguishable from the agglomerate, tuff series. The geologic strike, and the major magnetic trend directions appear to coincide, the direction being east-west throughout the zone. Thus in the western portion of the claim group, where the strike of the agglomerate, tuff band is similar to that of this greywacke, gabbro series, it is impossible to determine where the contact between the series lies. In the eastern portion of the claim block, however, the greywacke series strikes east-west, which the agglomerate series strikes N 45° E. These strike directions are reproduced accurately by the magnetic trends, and it is therefore possible to determine the location of the contact as the line of intersection of the two trend directions.

Two diabase dykes enter the claim group near the southwest corner. One dyke strikes northerly, and cannot be distinguished magnetically as it cuts through the greywackes, agglomerates, and andesites. On entering the iron formation, however, the diabase may be found to follow a magnetic low zone. The second dyke, which strikes northeasterly, cannot be traced by the magnetic data since it occupies the greywacke and agglomerate horizons throughout its course. The large number of outcrops however indicate that the strike of the diabase is similar to the formational strike of the agglomerates, and consequently the magnetic trend direction. The dyke has therefore been extended beyond the outcrop area.

The structural features of the area include folding and faulting. Part of the folding may more properly be called crumpling. The iron formation crumpled badly while in its colloidal state, through slumpage. Later intrusive action from the west setup compressional forces which caused major folding. Most of this force however was dissipated in the agglomerate bands, with the result that no evidence of the major folding is found in the greywacke series.

Several faults have been indicated on the map. The northerly trending faults appear to be late faults, with small movements, which merely offset the geologic horizons somewhat. These faults are relatively

unimportant. There are, however, two older faults which may be of importance. Both of these faults have been extended from a government geological map of McElroy Township. The first fault, trending slightly south of west, appears to be the western extension of a northwesterly trending fault of major proportions in McElroy Township. A movement of about 4500 feet has been postulated for the fault. The fault in the vicinity of the claim group must exhibit a remarkably arcuate form.

The evidence for the existence of the second important fault is not very conclusive. It has been shown to cut off a sedimentary basin in McElroy Township, and within the claim group, coincides with an electromagnetic anomaly. This anomaly disappears when the fault enters the peridotite zone. The degree of coincidence is quite high, and for this reason a fault trending northeasterly, and cutting across the north-eastern corner of the claim group, to intersect the major fault, has been postulated.

The property appears to be interesting on two counts. The magnetite content in the iron formation appears to be sufficiently high to be classified as marginal ore grade. Secondly, two mineralized zones, containing copper and zinc have been found by geological mapping. While these zones do not contain economic deposits of ore minerals, they do indicate that mineralizing solutions have been active. It is interesting to note that these mineral occurrences appear to be associated with relatively uniform magnetic horizons, indicating little deformations in the host rocks.

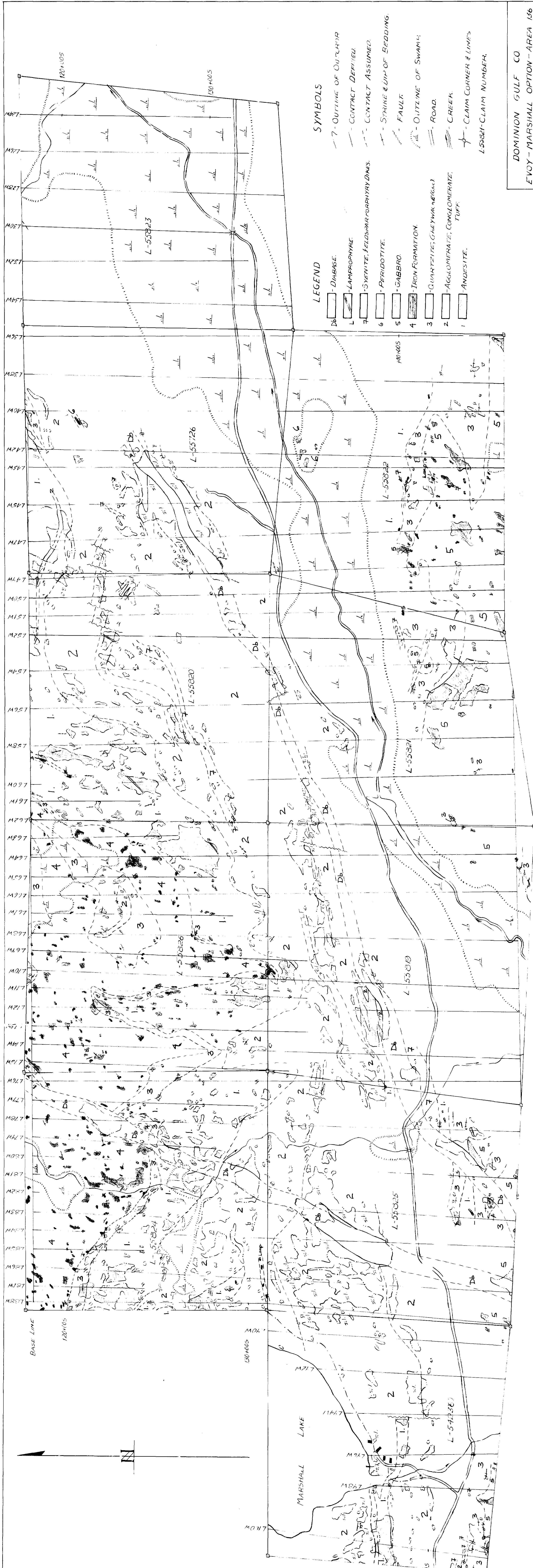
The major zone of interest for base metal deposition to lie in the east central portion of the claim group where the peridotite intrusive occupies a zone between two interpreted faults. It is believed that this zone warrants some diamond drilling. Geological conditions would appear to be favorable, and the presence of an electromagnetic conductor adds to the possibilities of the zone.

It is therefore recommended that further work be done on the property as a whole. The work, probably diamond drilling, should be concentrated on the iron formation in the northwestern part of the claim group and on the margins of the peridotite intrusive in the east central region.

"J. A. Ratcliffe"

JAR:jm

Encl.



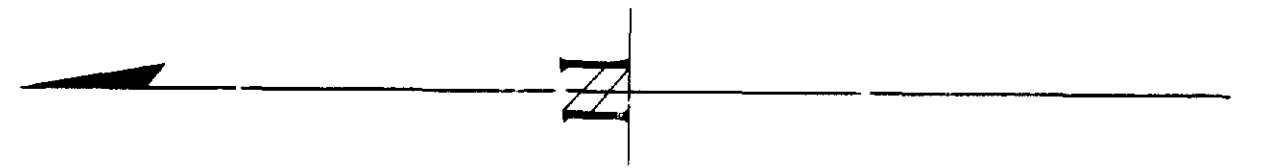
**SYMBOLS**

- 7 - OUTLINE OF OUTCROP
- CONTACT DEFINED
- CONTACT ASSUMED
- STRIKE & DIP OF BEDDING
- FAULT
- OUTLINE OF SWAMP
- ROAD
- CREEK
- CLAIM CORNER & LINES
- L-55821-CLAIM NUMBER.

**LEGEND**

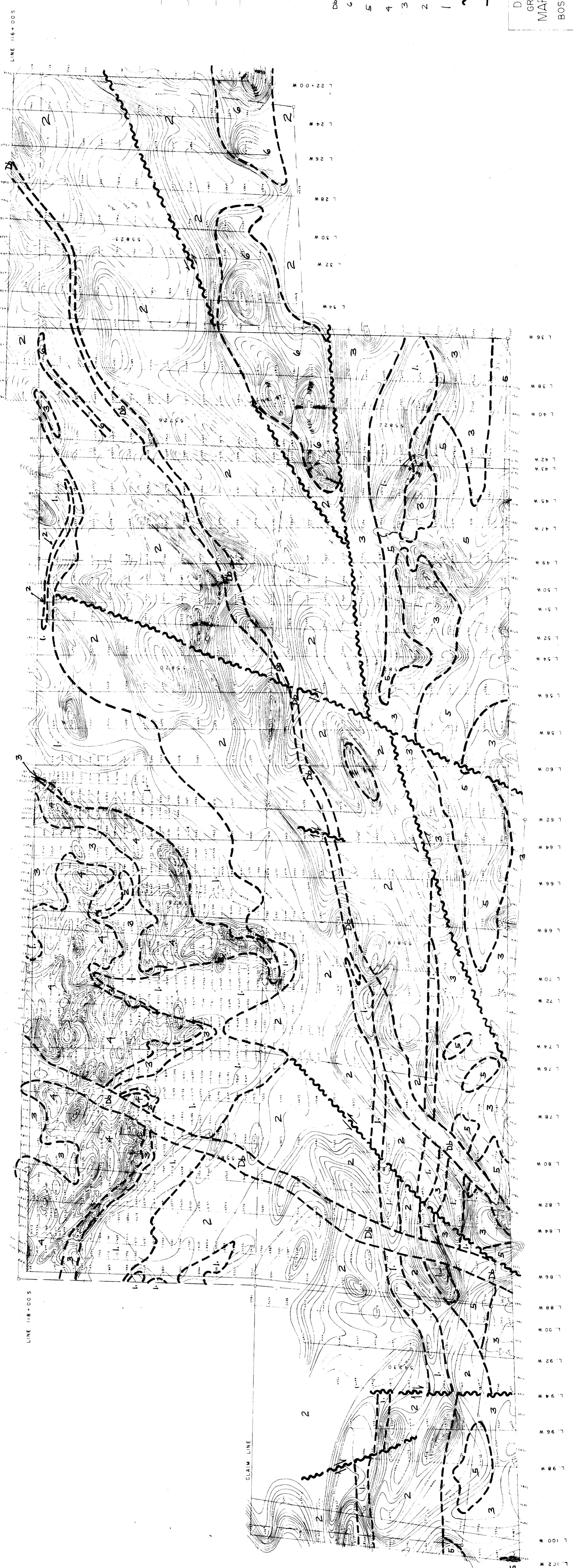
- Db - DIABASE.
- L - LAMPROPHYRE.
- 7 - SYENITE, FELDSPHAROPHYRITES.
- 6 - PERIDOTTITE.
- 5 - GABBRO.
- 4 - IRON FORMATION.
- 3 - QUARTZITES, GAYWAKA (G664).
- 2 - AGGLOMERATE, CONGLOMERATE TUFF.
- 1 - ANDESITE.

DOMINION GULF CO  
 EVOY - MARSHALL OPTION - AREA 136  
 DETAILED GEOLOGY  
 SCALE: 1"=200'  
 OCT 30, 1954  
 J. H. W. [Signature]  
 FILE 65.13.13



TAKE NOTE

CONTOUR INTERVAL  
 100 Gammas - 5000  
 1000 " - 10,000  
 10,000 " above 10,000



- LEGEND**
- Db DIABASE
  - 6 PERIDOTITE
  - 5 GABBRO
  - 4 IRON FORMATION
  - 3 QUARTZITE, GREYWACKE
  - 2 AGGLOMERATE, TUFF
  - 1 ANDESITE
  - FAULT
  - CONTACT

DOMINION GULF COMPANY  
 GROUND MAGNETOMETER SURVEY  
 MARSHALL-EVOY OPTION  
 BOSTON TWP PROVINCE OF ONT  
 SCALE 1" = 200' OCT 1952