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PRELIMINARY REPORT 47-6

on the

GEOLOGY OF THE

BARRINGTON LAKE AREA

GRANVILLE LAKE DIVISION
Manitoba

by

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(Preliminary Map 47-6 in pocket)

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GEOLOGY OF THE

BARRINGTON LAKE AREA

INTRODUCTION

LOCATION AND ACCESS

The Barrington Lake map-area, bounded by latitudes 56° 45' and 57° 00' and longitudes 100° 00' and 100° 15', is 120 miles north-northeast of Sherridon, Manitoba. Aircraft based at this rail terminal afford easy access to the area. Barrington Lake may be reached from the Churchill River by easy canoe travel up Barrington River, a fairly swift flowing stream which requires, at most, twelve short portages.

Granville Lake district, including the Barrington Lake area, was mapped geologically on a scale of four miles to one inch by G. W. H. Norman and J. F. Henderson of the Geological Survey of Canada in 1932 and 1933. This work is described in Summary Report 1933, Part C, Geological Survey, Canada, by G. W. H. Norman.

The work reported herein was done during 1947. It was shared by J. D. George, O. B. Rutherford, T. C. Meadows and the writer, who is indebted to these men for their co-operation. The geological mapping of 63 claims, the property of Nickel Lake Mines Limited, on the south shore of Barrington Lake, in the western part of the map-area, is largely the detailed work of Dr. G. M. Brownell. Similarly, the geology shown for the property held by Lynbar Mines Limited, an area of 46 claims at Tow Lake, is that recorded by R. J. Merrill. Both of these areas were traversed by the writer's party, but, as general agreement was found with the work of these geologists and because their mapping furnished more detail, their data have been adopted in general. The writer is indebted to these men and the companies concerned for permission to use this material. Valued assistance was received from M. C. Minton in mapping the property of Barrington Lake Copper Mines Limited on the east side of Barrington Lake.

The Barrington Lake area is typical of Precambrian terrain, having a general cover of glacial deposits, muskegs, swamps and lakes. Clay and boulder ridges are numerous, and bed rock is exposed at many places on ridges and through the surface of muskegs. Ridges of rock and glacial material generally have relief less than 100 feet above the muskegs. Eskers observed trend in a direction between north and west. The map shows two that are extensive. One of them, seven miles long, is nearly parallel to Barrington River, and partially controls the course of this stream.

Spruce, jackpine and tamarack are common trees in the area. Birch is fairly plentiful, and occasional clumps of poplar were seen. Where terrain is ideal for growth and protected against fires, a few trees have attained diameters of about sixteen inches, but generally trees are rather small and slender. Tangled deadfall in small second growth is common in the eastern part of the area.

GEOLOGY

GENERAL ACCOUNT

All rocks of the Barrington Lake map-area are presumably of Precambrian age, and are units of the assemblage that trends easterly from the Lynn Lake area across Cockeram Lake, Hughes Lake, and Farley Lake map-areas. None of the Sickle series of sedimentary rocks was identified in the Barrington Lake area, so that the succession as mapped comprises volcanic rocks that are probably parts of the Wasekwan series, Pre-Sickle in age, and igneous bodies, probably Post-Sickle, that intrude the volcanic rocks.

No horizon markers or bedding tops were found in the area so that stratigraphic sequence within the Pre-Sickle series could not be established. Difference in lithology is necessarily used as the basis for division into units. Zones (1)[1] of sedimentary rocks with minor volcanic flows are known to occur in the chiefly volcanic assemblage that comprises division (A). No essential age difference from the volcanics or from units (2) and (3) that may be correlatives of them, is implied by assigning these sedimentary rocks to the base of the series as division (1). However, at least one zone is continuous with sedimentary rocks of the Farley Lake map-area where such rocks are more clearly grouped on the south side of the volcanic rocks, and form an apparently regular succession dipping north[2]. That the sedimentary rocks are older than the bulk of the volcanic rocks, excepting those with which they are interbedded, is suggested by at least one exposure where the top of the sediments was determined to be facing north on the basis of questionable crossbedding.

The following table presents the divisions made in mapping rocks found in the Barrington Lake area.

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1 Numbers and letters in parenthesis refer to map units.

2 Stanton, M. S.; Farley Lake Area, Granville Lake Division, Manitoba; Manitoba Mines Branch, Preliminary Map and Report 47-5, 1948.

TABLE OF FORMATIONS

Precambrian	Post-Sickle Intrusive Rocks	Diorite porphyry dykes and later andesite porphyry dykes: Quartz-feldspar porphyry, quartz porphyry, and rhyolite; may be older than the granites; felsite, in part may be extrusive and related to Pre-Sickle volcanic rocks: Biotite granite and granite gneiss; quartz-rich granite; porphyritic granite; hornblende granite and quartz diorite; binary granite: Diorite, quartz diorite; some granodiorite and hornblende granite: Diorite, some gabbro; undifferentiated basic intrusions; may include some altered volcanic rocks: Gabbro, gabbro gneiss, norite, hornblendite; includes minor narrow anorthositic bands at Tow Lake.
	Pre-Sickle (Wasekwan) Series	Complex of hornblende schists and gneisses, diorite and gabbro, and gneissic biotite granite; injection gneiss. Interbedded basic flow breccia, porphyritic basic flow breccia, agglomerate and pyroclastic breccia, tuffs, and basic flows: Chiefly andesite and basalt lavas, massive to schistose; amygdaloidal lavas; porphyritic andesite and basalt; hornblende-feldspar gneisses and schists and dioritic rocks derived from basic flows; coarse-grained lavas; granitized volcanic rocks: Chiefly sedimentary rocks: tuffs and quartz-feldspar-biotite-hornblende schists, interbedded with some basic lavas.

PRE-SICKLE SERIES

Mixed Rock or Complex (A)

The mixed rock (A) that extends across the southern part of the Barrington Lake map-area is predominantly hornblende schists and gneisses (Ab) derived from volcanic rocks, and is to be correlated with less altered volcanic rocks of the same belt west of the map-area. Alteration to schists and gneisses, and ubiquitous small intrusions of quartz diorite and diorite (Ac) and later gneissic granite (Aa), impart lithologic complexity not resolvable without a more detailed mapping program. Both diorite and granite intruded preferentially along bedding directions. Large masses of units of the complex have been mapped separately.

Volcanic rocks (Ab) of the complex may be typical dark grey or green-black, fine-grained, massive lavas, but they are largely recrystallized hornblende schists of fine grain and dark grey colour. Small hornblende crystals are aligned imparting fissility, and this may be accentuated by biotite accompanying the hornblende. Weathered surfaces usually have a pepper-and-salt appearance. Locally in the greenstone narrow zones of volcanic breccia occur, showing stretched fragments of light-weathering, acidic material in dark lava matrix. Hornblende-biotite-feldspar gneisses, that show felted hornblende aggregates and irregular feldspar patches, are attributed to alteration of volcanic rocks, but it is sometimes difficult to be sure such rock is not intrusive diorite.

Diorite and quartz diorite (Ac) intruding the schists and gneisses are medium to dark grey, even-grained rocks that have sharp contacts with the greenstone. Feldspar comprises about sixty per cent of the rock, and black hornblende with some biotite nearly forty per cent. Quartz may be present in small amounts. Gneissic texture is not uncommon.

The granite (Aa) intruding schists, gneisses and diorite in the mixed rock is a medium-grained rock, usually gneissic, with abundant quartz and a moderate to scant amount of biotite. Irregular lenticular stringers and narrow dykes of this granite are present in most exposures of the complex, and some fairly large masses occur, particularly in the eastern part of the belt.

The two belts mapped as mixed rock or complex differ in some respects. The band in the northeast part of the area is largely typical injection gneiss in which bands of gneissic granite alternate with hornblende-biotite-feldspar gneisses and schists derived from volcanic rocks by granitization and recrystallization. Intimate mixing has contaminated some granite with a large amount of ferromagnesian minerals. On the other hand, the belt of mixed rock crossing the south part of the area is largely greenstone and hornblende schist, and intrusive diorite is as prominent as granite in this unit.

Interbedded Sedimentary and Volcanic Rocks (1)

The sedimentary rocks (1) mapped in the Barrington Lake area are interbedded with volcanic rocks of the mixed rock (A). Some are thin-bedded, quartz-feldspar-biotite-amphibole schists that resemble laminated sandy greywacke or tuff, but commonly there are schists with these constituents that show no banding. Where much amphibole is present, it is difficult to stipulate whether such recrystallized rock was originally sedimentary or volcanic.

Basic Volcanic Flows (2)

Massive andesite and basalt flows (2), typically "greenstone" in appearance, occur on the south shore of Barrington Lake at the west side of the area and form, with fragmental rocks (3), a thick succession that comprises much of the greenstone folded between granite bodies in the area. Pillow structure was seen at only one outcrop. Amygdaloidal zones (2a) observed are narrow and not useful as horizon markers in general mapping. Minor occurrences of acidic lavas and volcanic fragmental rocks are included with the massive basic lavas. The flows, chiefly andesites and basalts, are dark grey to green-black in colour and fine-grained. Small matted amphibole needles obscure the feldspar except on weathered surfaces.

Feldspar is prominent as phenocrysts in the lavas over large areas. These porphyritic andesites and basalts (2b) were not found to be regular in extent. Feldspar phenocrysts may attain a dimension of one-quarter inch, but generally they are quite small and more readily observed on weathered, rather than fresh surfaces.

Locally, alteration of basic lavas has produced dark amphibole-feldspar schists and gneisses (2c) and some amphibolite. Coarse-grained lavas (2d) that simulate diorite occur about 3,000 feet southeast of July Lake. Their granitoid appearance is due to aggregates of small amphibole and feldspar crystals. On the same outcrop, however, this texture is gradational to that of normal amphibole schist. Granitized volcanic rocks (2e) are found two and a half miles east of Sere Lake. The principal difference between these and normal lavas is their colour, which is pale grey at some places. Numerous granite dykes and stringers transect the volcanic rocks.

Fragmental Volcanic Rocks (3)

A thick succession of interbedded volcanic breccias, tuffs, and flows (3) is associated with the massive basic lavas (2). These rocks are prominent in the band of volcanic rocks on the south and east shorelines of Barrington Lake, and in the disposition of this greenstone belt east of Barrington Lake. The proportion of

massive flows in this division is variable, but subordinate to fragmental zones. Flow breccias, which are not greatly different from massive flows (2) in overall composition, predominate in the assemblage, and, just as for the massive flows, there are non-porphyritic and porphyritic types. The flow breccias are mapped with pyroclastic rocks, however, because of close association with them.

Basic flow breccia (3a) is common in the greenstones east of Barrington Lake. Andesite fragments, sometimes angular, but usually sub-angular, ellipsoidal, or elongated, are generally small, weathering pale grey to distinguish them from the andesite in which they occur. Fresh surfaces disclose no obvious contrast between fragments and matrix. Scattered bombs of light-coloured, cherty material also occur in the rock. Detection of the fragmental character of flow breccias is difficult on poorly-weathered exposures.

Another type of flow breccia is prominent in the fragmental rocks; a basic porphyritic andesite or basalt containing angular, sub-angular or elongated fragments of similar porphyritic material, like the lava containing them and having a maximum size of two feet. Both fragments and lava matrix are of green-black colour, weathering black, with contrasting small white phenocrysts of feldspar. These rocks are well exposed on the east side of the north end of Barrington River, westward along the south shore of Barrington Lake, northwest of Webb Lake, and west and southwest of Spider Lake. Westward from Barrington River, along and near the south shore of Barrington Lake, such flow breccias (3b), with agglomerate, pyroclastic breccia and tuffs interfinger with massive lavas (2) and are gradually displaced by them.

Agglomerate and pyroclastic breccia (3c) occur as narrow bands interbedded with flow breccias, tuffs, and massive lavas, throughout the extent of division (3). They consist of light-weathering acidic fragments, sub-angular to ellipsoidal in shape, in greenish andesitic flow material. Occasionally a band having an acidic matrix as well as acidic fragments is present. Assemblages of these types occur near the south and east shores of Barrington Lake. Fragments are elongated to such an extent at some places that the rock has an apparent banding and gneissic texture. Dark bands of green amphibole, in which bladed or needle-like crystals lie roughly in the plane of the banding, alternate with green-grey felsitic layers. Tuffs may also show such amphibole needles scattered on bedding planes, alternating with light grey, fine-grained laminae. Rocks of this description are common in the bands of fragmental rocks south of Barrington Lake.

Tuffs (3d), interbedded with volcanic breccias, are not common in the area, but are prominent south of Barrington Lake west of Barrington River. They are generally narrow bands of pale grey, fine-grained rock having thin laminae of dark and light materials. Locally they could be used as horizon markers, but they have not been useful in tracing general structure.

POST-SICKLE INTRUSIVE ROCKS

Gabbro, Norite, Hornblendite (4)

Rocks of the gabbro family with variety in composition, texture and general appearance are found in the area, usually intruding volcanic rocks, and usually elongated in the general direction of formational trend. The view that much of the hornblende gabbro common in the Lynn Lake district is altered norite is suggested by observations near Lynn Lake of residual orthorhombic pyroxene in occasional specimens, especially those free from fractures and remote from later intrusive rocks. Gabbro bodies in the Barrington Lake map-area are generally hornblendic, and resemble in part the gabbros found in the Lynn Lake area, but the largest basic intrusive body in the area, a plug six miles long and one mile wide, is unique in that it contains not only the usual hornblende gabbro, as a marginal zone, but also a core of norite. Traversing both of these are narrow bands of anorthosite.

Textures of the gabbro in the area are commonly medium to coarse, but a very coarse texture is prominent in the gabbro body two miles northeast of Spider Lake, in another body between Spider Lake and July Lake, and in part of the gabbro zone of the large plug, mentioned previously, that extends east and west of Tow Lake. In this plug a slightly gneissic texture is common, but elsewhere the gabbro is generally granitoid. The gabbros consist almost entirely of light to dark grey basic plagioclase and green-black hornblende. Hornblende may be so predominant locally that the term hornblendite may be applied. Content of the hornblende exceeds fifty per cent in much of the gabbro examined. Weathered surfaces characteristically show the resistant hornblende, with greenish colour accentuated, standing up from softer, pale, chalky plagioclase.

The large basic plug that extends west-southwest for six miles from Barrington River through Tow Lake into Farley Lake map-area has a core of norite (4a) roughly three miles long and three-quarters of a mile wide, changing outward by irregular transition to gabbro gneiss and hornblende gabbro (4). Anorthosite bands, generally less than ten feet thick, are found in both norite and gabbro, trending north of east parallel to the long dimension of the plug. Contacts between norite and anorthosite may be sharp or indistinct, and the norite itself may have a high content of plagioclase.

The norite (4a) is a medium- to coarse-grained rock, slightly gneissic, of even dark grey colour, with approximate composition being labradorite ($Ab_{40}An_{60}$) eighty per cent; hypersthene fifteen per cent; and green amphibole, largely uralite, five per cent. Magnetite is common as disseminated grains, and locally concentrated in narrow lenticular seams along contacts of greenstone inclusions. Labradorite and hypersthene are tabular grains of similar dark grey colour, so that it is difficult to distinguish one from the other in specimens. In thin sections studied, the hypersthene

is optically negative and exhibits a "schiller" texture with tiny brown flakes oriented within the grains, but lacks the distinct pleochroism common in hypersthene. Secondary amphibole, chiefly uralite, replaces the hypersthene grains marginally in varying degree.

Surrounding the central area of norite is a marginal zone of hornblende gabbro (4), generally medium- to coarse-grained, locally very coarse, and gneissic at many outcrops. No precise contact is present between norite and gabbro, but Merrill[1] has located an approximate boundary between the two as shown on the map. The hornblende gabbro is not a uniform dark grey rock like the norite. At places it resembles gabbros elsewhere in the area, where it is granitoid, and consists of light grey plagioclase (labradorite-bytownite) and green-black hornblende. Hornblende may be more abundant than the plagioclase. Much of it differs from other gabbros, however, in that the colour of the basic plagioclase, determined in one specimen to be bytownite ($Ab_{27}An_{73}$) is brown, and, like the norite, contains a large amount of disseminated magnetite, especially in the rock containing the brown feldspar. No hypersthene was observed in specimens of gabbro examined by the writer, but Merrill states that the transition from norite to gabbro is partly due to progressive alteration of pyroxene to hornblende. This change is evident even in the norite where partial uralitization may be observed.

The anorthositic rock found in the plug occurs as bands, as thin as one inch and generally less than ten feet thick, that trend through either norite or hornblende gabbro parallel to the long exposed dimension of the intrusive. These bands may have sharp contacts, but in some places they are indistinct and the anorthosite appears to be transitional to a norite with a large plagioclase content. Weathering accentuates slight compositional differences, and a fresh surface of uniform grey colour like the norite may have a corresponding weathered surface that shows lighter grey bands representing more feldspathic zones. The anorthosite may consist almost entirely of labradorite ($Ab_{45}An_{55}$) but, as stated, the content of hypersthene and amphibole is different from place to place.

Differentiation may be inferred from the composition of the intrusive plug, as the outer zone, hornblende gabbro, contains a more basic plagioclase than the inner zone, norite. Zoned crystals of plagioclase, more basic internally, are present in the norite. The norite is more feldspathic than the hornblende gabbro, and the anorthosite bands, that seem to intrude the norite and gabbro in some places, are more feldspathic still. This true zoning between gabbro and norite is evident in the colour change of the constituent plagioclases, but the zoning effect is enhanced by a secondary change, the alteration of dark grey hypersthene to green-black hornblende.

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1 Merrill, R. J.; Report and map, Lynbar Mines Limited property; Towagmac Exploration Company, Toronto, Ontario, 1947.

The gabbro bodies well north of Tow Lake, near the south shore of Barrington Lake, are described by Brownell[1] as consisting almost entirely of bytownite ($Ab_{30}An_{70}$ to $Ab_{20}An_{80}$) and green hornblende. The hornblende content ranges from ten per cent to ninety per cent, and in many places is more than fifty per cent. Some secondary epidote and quartz were noted.

Diorite (5)

The term diorite (5) is not used strictly to define a rock type, but rather includes those rocks of dioritic appearance that have not otherwise been classified. It may include some altered volcanic rocks, some gabbro, and some quartz diorite or diorite (6). Additional study is expected to assist distinction.

Diorite, Quartz Diorite (6)

Intrusive bodies of diorite and quartz diorite form a mappable unit (6) that is older than the granite (7) and probably younger than the gabbro (4). The rock contains light grey to medium grey or violet-grey andesine plagioclase (about $Ab_{55}An_{45}$), green-black hornblende, usually some biotite replacing hornblende, and a variable amount of quartz. The quartz content ranges from nil to ten per cent and hornblende between fifteen and forty per cent. These variables, together with a range in the colour of the feldspar, account for differences in the appearance of the rock. With andesine of rather dark grey colour, a small content of quartz and abundance of hornblende, the rock resembles some of the gabbro. On the other hand, where the andesine is light grey, quartz abundant and hornblende content moderate, it may be mistaken for a hornblende granite. Despite this wide range in appearance and mineral constitution, the plagioclase varies but little from a composition $Ab_{55}An_{45}$. Zoned plagioclase crystals are common in this rock.

Near the western edge of the map-area, outcrops along the south shore of Barrington Lake and on some islands in the lake are mapped as hornblende granite because of their appearance. Recent microscopic work by M. S. Stanton and the writer suggests that the rock has affinities with quartz diorite (6), and if this proves to be significant, final interpretation will refer such rock to that unit. Similarly, diorite occurring south of Wellmet Lake in the northern part of the area seems transitional through quartz diorite to rock that is mapped as hornblende granite (7c). This distinction, again imposed by lithological appearance, is subject to question and additional study may show that the rock having the

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1 Brownell, G. M.; Report to Nickel Lake Mines Limited, with maps; 1947.

general appearance of a hornblende granite is rather a quartz-rich diorite, to be correlated with the unit (6). The large body of quartz diorite about two miles south of Barrington Lake in the western part of the area is intruded by numerous dykes of pink to grey biotite granite. Much of the diorite and quartz diorite in the complex (A) is similar to the rocks of unit (6). The hornblende gabbro south of Tow Lake is cut at one place by a narrow dyke of diorite that is similar in appearance to the diorite of unit (6) and contains plagioclase of the same composition, $Ab_{55}An_{45}$.

Granites (7)

Much of the Barrington Lake map-area is underlain by granitic rocks. There is considerable variation in their appearance due to differences in original composition and texture, textural changes related to shearing and crushing, and the degree of contamination in areas of mixed rock.

Biotite granite (7), granitoid to gneissic, pink to cream-grey, medium- to coarse-grained, is widespread in the central and northern parts of the map-area, underlying most of Barrington Lake and the area east of the lake. Local variations are the development of large feldspar crystals forming a porphritic texture, and development of muscovite to accompany the biotite. A sheared or crushed texture is locally prominent, and at some places the content of quartz is abnormally large. Reddish areas in feldspar and quartz grains, probably due to finely disseminated iron oxide, are common. The granite weathers light grey to tan-brown. Crushing or shearing exhibited locally in the granite varies in degree. It affects quartz in the initial stages, but at some places feldspar crystals are also crushed. Biotite is foliated around granulated areas, imparting a gneissic texture to the rock.

A crushed texture, local in the biotite granite (7), is general in quartz-rich granite (7a). This distinctive rock is found in large areas east of Barrington Lake. It is coarse-grained, light grey, containing light grey feldspar, biotite, occasionally hornblende, and a notable amount of quartz, as much as forty per cent. On weathered surfaces lenticular streaks of quartz stand up as ridges suggesting flow structure. The quartz is granulated, and feldspar also shows fracturing and crushing. Streaky biotite patches enhance the gneissic appearance. Over large areas this granite contains angular to elongated fragments of amphibole schist and dioritic rock. The quartz granite appears to be gradational to normal biotite granite (7) by decrease in quartz content and slight change in colour. These changes may be noticed on a single outcrop, in a distance of 200 feet, or gradually, from one outcrop to another, in a much greater distance.

Porphyritic biotite-microcline granite (7b) underlying the southern part of the Barrington Lake map-area is the northern fringe of a batholith that extends south to Granville Lake.

It is a coarse-grained rock, generally gneissic and pink to cream in colour, that contains large flesh-coloured microcline crystals, and abundant quartz, as much as 25 per cent. The amount of biotite contained is considerably greater at some places due to contamination by digested material. The granite contains numerous schlieren, small biotitic patches elongated in the direction of gneissosity, generally east-west. There are included bands of greenstone at some places, as shown on the map. Microscopically, the porphyritic granite exhibits granulated quartz, some crushed feldspar, and a flow-like arrangement of biotite around feldspar and quartz.

Hornblende granite (7c) is not a distinct rock type of the map-area. Hornblende may accompany biotite in any of the other granite types, or may occur in them without biotite. It is characteristic, however, of a rock mapped as hornblende granite that occurs south of Wellmet Lake and on the south shore of Barrington Lake. As mentioned previously, this rock may be identified by further study as a correlative of diorite and quartz diorite (6).

Binary granite or granite almost lacking ferromagnesian minerals (7d) is not common in the area, but is found locally north and west of Tow Lake in an area of pink biotite granite. The rock is flesh-coloured and contains principally microcline and quartz.

Granite gneiss (7e) is designated on the map merely to indicate gneissic texture which is developed particularly in areas where granite invades greenstone. Contamination of granite by digested foreign material, usually greenstone, produces impure granite gneiss (7f) that contains more ferromagnesian minerals than normal granite.

Quartz-Feldspar Porphyry, Quartz Porphyry, Rhyolite and Felsite (8)

Light grey quartz-feldspar porphyry, quartz porphyry and rhyolite (8a) occur in the volcanic rocks (2, 3) as bands that follow formational trends, and as irregular small bodies. Two persistent bands of rhyolite and quartz porphyry occur in lavas south of Barrington Lake, and two bodies, one of which is fairly large, are found near the southeast extremity of Barrington Lake, just west of Webb Lake. Other smaller masses are present along the east shore of Barrington Lake. The age of the porphyries and rhyolite is not known. They are assumed to be intruding the basic volcanic rocks, but no direct evidence was found to show such relationship. They may be members of the succession of extrusive rocks. None of them are in contact with granite. A few narrow rhyolite dykes cut through late basic dykes (9), but their relation to the large bodies of rhyolite and porphyry that are generally intruded by the basic dykes is not known.

The rhyolite and rhyolite matrix of the porphyries seem to be transitional to a grey felsite (8b) of fine, granular texture. Crushed quartz "eyes" may be present in this rock to which a foliation is imparted by aligned flakes of biotite. The felsite is an associate of the porphyries and rhyolite near the southeast extremity of Barrington Lake.

Diorite Porphyry and Andesite Porphyry Dykes (9)

Narrow dykes of basic rocks, here termed diorite porphyry and andesite porphyry (9) are found cutting other rocks, including granite. The diorite porphyry contains fairly crowded phenocrysts of feldspar as large as one-fifth inch in a fine-grained matrix of felted amphibole needles and feldspar. A gneissic texture is not uncommon. Feldspar phenocrysts also occur in the andesite porphyry dykes, but they are generally smaller, one-sixteenth inch or less. The groundmass of the andesite porphyry is more dense than that of the diorite porphyry, and amphibole needles are not visible. Distinction between the two rocks is not easily made, but where they occur together, as on the property of Barrington Lake Copper Mines Limited, near the southeast extremity of Barrington Lake, the andesite porphyry dykes are seen to cut the coarser diorite porphyry dykes. East of Barrington Lake numerous basic dykes cutting the granite are similar to the andesite porphyry dykes, though some contain no feldspar phenocrysts. The dykes seem to follow definite fracture directions in the rocks, and themselves contain fractures that are sealed with quartz and scattered biotite flakes. A few grains of chalcopyrite were observed on such a seam in an andesite porphyry dyke.

STRUCTURAL GEOLOGY

Volcanic rocks of Pre-Sickle age, continuous with those of the Lynn Lake succession to the west, pass through the Barrington Lake map-area. In the southern part of the area, two main bands, separated by large masses of granite and quartz diorite, enter the area from the Farley Lake map-area, trend easterly with near convergence at Barrington River, and pass easterly out of the area with increasing separation. The relative attitudes of the two belts of strata are not defined, and it is not known whether they are correlative limbs of a major fold or separated parts of one succession. If the volcanic rocks of the southerly belt, the complex (A), are not equivalent to those of the northerly belt (2, 3), they may be counterparts of the most northerly band of volcanic rocks in the area north of Wellmet Lake, that are also mapped as complex (A). In this case the structure would be a major fold of two greenstone belts, the inner one showing some closure within the map-area by accounting for most of the greenstone bands folded around granite areas in the central part of the area, and the outer one, much intruded by granitic rocks, closing at some place east of the Barrington Lake area.

Because no tops of beds or horizon markers were found in the Pre-Sickle rocks, the structure of the area can be shown only in a general way. The squeezing and stretching to which the volcanic rocks have been subjected probably involved much dragging and strike-faulting, but these were observed only locally and were not found useful in resolving structure. A number of straight lineaments can be seen on aerial photographs of the area, but investigation of these yielded no information to demonstrate displacement. Many of them coincide with depressions in the general drift covering. Local shears were observed at some places in the volcanic rocks, but no persistent breaks have been located in them. Fracturing, rather than shearing, is the commonest strain effect in the rocks of the area, and these were recorded where found. There seems to be no systematic pattern, perhaps because there are often more than one set of complementary fractures observed at one place. Commonly, however, fractures of one direction are dominant and close-spaced. This condition obtains in the basic plug near Tow Lake, and at places along the east shore of Barrington Lake, in the lavas. Two sets of intersecting closely spaced fractures may form a broken zone on the lava outcrop that trends in a direction bisecting the angle between the strike directions of the fractures.

ECONOMIC GEOLOGY

GENERAL REMARKS

Prospecting in the Barrington Lake map-area has been directed principally towards the location of nickel and copper occurrences. The rock types considered auspicious for such mineralization are present in the area, but few occurrences have been found to date. Nickel in the form of nickeliferous pyrrhotite has been detected in the large basic intrusion (norite and gabbro) near Tow Lake, together with pyrite and some chalcopyrite. Chalcopyrite has been observed in small amounts in the gabbros and in the basic lavas. Chalcopyrite with molybdenite, pyrrhotite and pyrite occurs in small aplite dykes intruding the lavas. Float, bearing appreciable amounts of chalcopyrite, is reported to occur on the property of Lynbar Mines Limited, and float carrying gold is found about 700 feet east of the east end of Nickel Lake, near the west edge of the map-area. There are probably two ages of sulphide mineralization, since chalcopyrite occurs in fractures in late basic dykes (9) as well as in the gabbros (4) as syngenetic mineralization.

DESCRIPTION OF PROPERTIES

Lynbar Mines Limited

The property held by this company comprises a block of 46 claims (Hope, Rio, Ken and Vic groups) that cover the extent of a large norite-gabbro plug from its eastern extremity near

Barrington River westward for four miles. The geology of this plug has been described in foregoing pages.

There are at least two sheared and fractured zones in the basic plug, striking between east and northeast and dipping northerly at steep angles. One of these has been traced for several miles. Concentration of fractures defines this zone for some of its extent, but locally the rock is sheared and altered to chlorite and amphibole schists, and amphibolite. At such places concentrations of magnetite may occur, and pyrite, chalcopyrite and nickeliferous pyrrhotite may be disseminated in the rock. At one place south of Tow Lake trenching has disclosed two small veins of massive sulphide. Pyrite predominates over the pyrrhotite and chalcopyrite. At the surface of the outcrop weathering has removed the sulphides. Cross-fracturing in a direction between north and northeast accompanies movement along the zone, and small displacements are evident.

Much of the immediate vicinity of the shear zones is covered by a shallow mantle of clay, and so far only geophysical work has tested the possibility that other shears and mineralization occur under this cover. Magnetic, self-potential and electromagnetic surveys of the property have been made by K. G. Honeyman, in addition to a detailed geological survey by R. J. Merrill.

Nickel Lake Mines Limited (GLMC East group)

The eastern block of the property held by Nickel Lake Mines Limited, a subsidiary of God's Lake Gold Mines Limited, comprises 63 claims on the south side of Barrington Lake, covering the interval between the west margin of the map-area and a large bay about two and a half miles east. Geological surveying of this property during the summer of 1947 was directed by Dr. G. M. Brownell.

Volcanic rocks that underlie the claims have been intruded by bodies of hornblende gabbro, usually having a longer axis or surface trending east-west in the direction of formational trends. The lavas are generally squeezed. Along the contacts between gabbro and volcanic rocks small rusty zones occur, containing a little disseminated pyrite and occasionally small amounts of chalcopyrite. Chalcopyrite is also found as sparse grains disseminated within the gabbro bodies, and occasionally in quartz stringers in the volcanic rocks. Recent drilling to test geophysical data at the location, shown approximately on the map, is reported to have encountered some chalcopyrite mineralization.

Near the east end of Nickel Lake, about two hundred feet east of the west margin of the map-area, a small body of light grey granite has been sheared and silicified near its southern contact with amphibole schists. This shear zone strikes south of east, dipping southerly, and has an extent of more than 200 feet as defined by trenching and stripping. Fine disseminated pyrite occurs in the

sheared granite and in the neighboring lavas. Angular pieces of float, reported to carry appreciable amounts of gold, are found nearby. Some of the float resembles the sheared granite, and the angularity of the fragments suggests that it has not been moved far from its source.

Barrington Lake Copper Mines Limited

Barrington Lake Property

The south group of the Barrington Lake property consists of 28 claims (Tor 7-13, 33-45 and 120-127) located on the southeast shores of Barrington Lake. Interbedded massive, basic flows, flow breccia, porphyritic flow breccia, agglomerate and pyroclastic breccia, with some bodies of quartz-feldspar porphyry, quartz porphyry, rhyolite and associated felsite underlie most of the property. Granite cuts off the lavas in the northeastern part of the property, but a body of diorite lying between the greenstone and granite occupies the southeastern part, at Webb Lake. The volcanic rocks are cut by numerous dykes of diorite porphyry and andesite porphyry, and some small aplite dykes.

A shear zone striking E 25° S occurs at the south shore of a large bay in Barrington Lake, about one mile north of the Barrington River outlet. This is the mineralized zone of the old Caribou mining claim, described by Norman[1]. Small amounts of pyrite pyrrhotite, chalcopyrite and sphalerite occur as stringers of sulphide in the sheared volcanic rock. The shear zone has not been traced inland beyond an outcrop about 100 feet from the water. Another shear zone, about thirty feet wide, occurs about 300 feet to the southwest, and may be followed for about 900 feet southeast, from outcrop to outcrop, in basic lavas. It contains a fine dissemination of pyrite and pyrrhotite, with occasional grains of chalcopyrite. Oxidation has stained the outcrops brown. On the peninsula west of these shears, massive basic lavas show close-spaced fractures that are sealed with thin quartz films carrying an occasional grain of pyrite. At several other places on the property, near the large mass of quartz porphyry and rhyolite, intersecting fractures have produced broken zones in basic lavas. These zones trend in directions that bisect the angle between the strike directions of the fractures. No mineralization was noted.

Work done on the property during 1946 and 1947 consisted largely of investigating the mineralization in several aplite dykes

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1 Norman, G. W. H.; Granville Lake District, Northern Manitoba; Geological Survey of Canada, Summary Report, Part C, 1933, p. 39c.

that cut volcanic rocks. These dykes are cream-white, dense, siliceous rocks consisting of quartz and feldspar. Some are well mineralized by chalcopyrite, molybdenite, pyrrhotite and pyrite that occur in patches disseminated in the rock. One such dyke twelve to eighteen inches wide has been traced for a distance of 375 feet. Other, shorter dykes occur, and one drill hole has been put down to test a dyke traced for fifty feet into covered ground.

The northern group (Tor 82-119) of 38 claims held by Barrington Lake Copper Mines Limited is located on the east shore of Barrington Lake. Volcanic rocks and granite underlie these claims. No mineralization of consequence has been observed, but chalcopyrite and molybdenite were found in a few quartz stringers cutting the volcanic rocks.