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Geology of
Glasgow, Meath, and Rennie Townships

Districts of Algoma and Sudbury

By

R. A. RILEY

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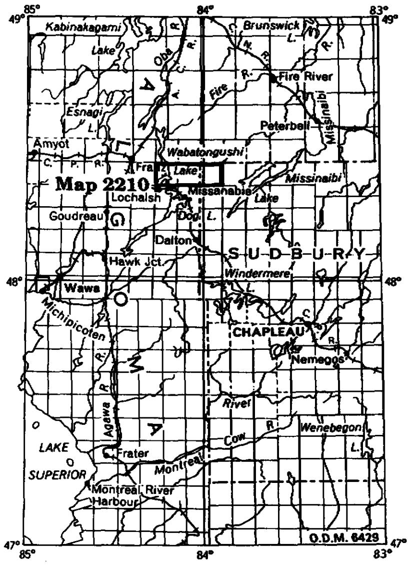
ABSTRACT

Described in this report are the geology and mineral deposits of Glasgow, Meath, and Rennie Townships. These townships comprise an area of about 108 square miles situated on the northeast end of the Michipicoten metavolcanic-metasedimentary belt and centred about 135 miles north of Sault Ste. Marie, Ontario.



Scale 1 inch to 50 miles

Figure 1—Key map showing location of Glasgow, Meath, and Rennie Townships.

The metavolcanic-metasedimentary sequence consists of the following: a lower mafic metavolcanic unit of predominantly metabasalt flows; an overlying lower unit of intermediate to felsic metavolcanics, principally metamorphosed dacite and quartz latite pyroclastics and subordinate flows; an overlying and in part intercalated upper mafic metavolcanic unit of metabasalt flows; and an upper intermediate to felsic metavolcanic unit consisting mainly of metamorphosed dacite and quartz latite pyroclastics with subordinate and locally derived metasediments.

Complex granitic batholiths consisting predominantly of foliated to gneissic granodiorite and trondhjemite cut by massive to slightly foliated varieties of the same rock types border and intrude the metavolcanics on the north and west. Two large granodiorite stocks, one hornblende syenite stock, and several smaller granitic stocks and sills intrude the metavolcanics. A swarm of north- to northwest-trending diabase dikes, a few northeast-trending diabase dikes, a prominent northeast-trending quartz diorite dike, and several small ultramafic stocks and sills cut both the metavolcanic-metasedimentary sequence and the granitic batholiths.

Unconsolidated Pleistocene sediments consisting of ground and terminal moraine and glaciofluvial and glaciolacustrine deposits are extensive.

Regional fold trends are in a general east-west direction, but have been disrupted by the intrusion of granitic rocks. Two main directions of faulting are present: northwest and northeast. The north-northwest-trending Meath Lake Fault is of regional proportions and aeromagnetics (O.D.M.-G.S.C. 1963a; 1963b) suggest an apparent horizontal offset, west side south, of as much as three miles.

Gold, zinc, silver, lead, copper, and iron mineralization are present in the Glasgow-Meath-Rennie area.

Geology

of

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by

R. A. Riley[1]

INTRODUCTION

Re-examination of silver-zinc mineralization south of Conboy Lake in Rennie Township in 1963 and 1964 and the resulting heavy staking across the central parts of Rennie and Meath Townships and in the northeastern part of Glasgow Township prompted the remapping of these townships by the Ontario Department of Mines. This report and the accompanying Geological Map 2210 (back pocket) describe the results of the detailed mapping program undertaken in this area during the 1966 field season and concluded early in the spring of 1967.

LOCATION AND ACCESS

Glasgow and Meath Townships in the District of Algoma and Rennie Township in the District of Sudbury are located on the northeast end of the Michipicoten metavolcanic-metasedimentary belt. The three townships comprise an area of 108 square miles and are centred 135 air miles north of Sault Ste. Marie, Ontario and 44 air miles northeast of the mining community of Wawa. A townsite maintained by Renabie Gold Mines Limited straddles the eastern boundary of Rennie Township, approximately ¾ mile from its southeastern corner. Lochalsh, a maintenance point on the Canadian Pacific Railway's main line, lies at the south end of Wabatongushi Lake and only ¾ mile south of the southwestern corner of Glasgow Township.

The area is most readily accessible by means of float-equipped aircraft from White River, Wawa, Hawk Junction, or Chapleau. A 12-mile, gravel-surfaced, all-weather road leads northeast from the railway town of Missanabie to Renabie and provides access to the southern part of Rennie Township. During the field season Missanabie and Lochalsh were serviced twice daily by the Canadian Pacific Railway's Dayliner with terminals at Chapleau and White River.

Much of the area is accessible by boat or canoe from Wabatongushi Lake and the Renabie Road, and the portages connecting the various lakes are shown on the accompanying Map 2210 (back pocket). An early section of the Renabie Road, now bypassed to the south, leads to Colborne Lake and from its west end an old winter road can be followed north to Conboy and Butler Lakes.

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[1]Geologist, Ontario Department of Mines, Toronto, 1966-1967. Now Resident Geologist, Ontario Department of Mines, Red Lake. Manuscript received by the Director, Geological Branch, 9 April, 1969.

TOPOGRAPHY

Narrow linear valleys and numerous lakes are present in the map-area. Relief is low, being generally about 75 to 100 feet, but along some of the linear valleys such as those northwest of Stephenson Lake or southeast of Ren Lake or along the south shores of several lakes including Battley Lake and Loch Lomond relief of 150 to 250 feet is common. In addition, a ridge north of Easey Lake and another southeast of Moorhouse Lake are estimated to be 250 to 300 feet above the general level of the terrain. Although quite inconspicuous, the divide between the Arctic and Atlantic watersheds passes through the northeastern part of Rennie Township where it essentially parallels the southwestern shore of South Greenhill Lake. The difference in mean elevation between the eastern and western parts of the map-area is estimated to be between 150 and 200 feet.

An irregular, often swampy lowland, underlain predominantly by Pleistocene sand and clay, stretches across the centre of the map-area from Garvey and Rennie Lakes in the east to Meath Lake in the west. In this lowland of Easey Lake and between Easey and Meath Lakes, bedrock is absent except for a few isolated knobs. A similar swampy lowland area is located in the northwestern quarter of Glasgow Township.

During normal years the surface of Wabatongushi Lake is maintained at an elevation of 1,142 feet by means of a control dam at the exit of the lake. In the southeastern part of Rennie Township, the top of the diabase ridge at the site of the Department of Lands and Forests fire tower has an elevation of 1,530 feet. Elevations along the Canadian Pacific Railway immediately south of the map-area at Lochalsh are 1,175 feet above mean sea level and at Gutelius, at the mouth of the Lochalsh River, 1,115 feet above mean sea level. The highest elevation in the map-area is unknown, but is probably either a ridge about 4,500 feet north of Easey Lake or a ridge on the northern boundary of Rennie Township about 4,000 feet west of South Greenhill Lake.

Drainage patterns are controlled by the bedrock, but have been modified by glacial deposits. In areas where bedrock is exposed, the drainage pattern varies from a trellis pattern in the northern part of Rennie Township to a dendritic pattern in northern Meath Township. In Rennie Township, the southwest-flowing streams occupy narrow valleys, in part caused by faults. These valleys were probably increased in both width and depth by the southwest-flowing ice masses. Drainage in the northern section of Meath Township is to the south and southeast and control by ground moraine is very pronounced. Rennie, Easey, and Spring Lakes lie in small, well-jointed granodiorite stocks and were developed to their present state mostly as a result of the removal of the granodiorite joint-blocks by the continental ice sheets. The presence of several small lakes north of Rennie Lake, east of Meath Lake, and east of Loch Katrine reflects poor drainage in areas primarily underlain by terminal moraine and glaciofluvial deposits.

The area around South Greenhill Lake northeast of the watershed drains north and east via the South Greenhill, Greenhill, Missinaibi, and Moose Rivers to James Bay. The remainder of the area drains southwest through Dog Lake and the Michipicoten River into Lake Superior. The major tributary in the map-area is the Dog River and most of the runoff of Rennie and Meath Townships is channelled into this river. Most of Glasgow Township drains into Dog Lake via Wabatongushi and Glasgow Lakes, Loch Lomond, and the Lochalsh River.

Streams are usually slow and sluggish and those confined to narrow bedrock valleys generally occupy only part of the valley floor. Except for the southern part of the Dog River, the streams are not navigable because of their small size.

NATURAL RESOURCES

Logging operations in the 1920's and early 1930's for both sawn timber and railway ties removed most of the valuable timber from the Glasgow-Meath-Rennie area. To facilitate movement of this timber, dams were constructed on the Dog River south of Harcourt Lake and on the western tributary draining into Easey Lake; remnants of some of these dams are still in evidence today. A tote road once extended from the railway just east of Loch Katrine to the end of the west arm of Easey Lake, but has now grown over and can be recognized only by the old bridge abutments on the Dog River south of the Meath Township boundary. In addition to dams and bridges, evidence of this early logging activity is seen in a few old logging camps, some piles of rotting railway ties, and local areas of decomposed stumpage. Forest fires burned over much of the area at one time or another, but no large fires have occurred since 1935. An area of about 45 acres, estimated to have burned about 1960, is located about 1,000 feet south of the east end of Battley Lake.

Black spruce, poplar, birch, Banksian (jack) pine, and balsam fir are the dominant varieties of trees in the map-area. Bedrock ridges are usually forested with a mixture of these varieties: Banksian pine is the main type where bedrock is covered by a thin mantle of sand and black spruce occurs predominantly where the ridges are till-covered. Forest cover on sand and gravel ridges is generally thin and consists of poplar, birch, and scattered small spruce. Near stream beds, black spruce stands have gradually thinned out and have been replaced by thick growths of alders along the creeks. Cedar is found in a few swamps and some red and white pine are occasionally seen in areas some distance away from major watercourses. Black ash, mountain ash, pin cherry, mountain maple, and tamarack are found in local concentrations. With the exception of sand ridges, forest cover is generally thick second growth which renders traversing difficult.

No commercial fishing is carried out in the map-area. Sport fishing, however, is popular and tourist camps specifically designed to accommodate fishermen are located on Wabatongushi Lake, Easey Lake, and Dog Lake south of Glasgow and Meath Townships. From these camps and from the Renabie Road, most of the major lakes in the area are fished. Walleye pike (pickerel) and northern pike (jack-fish) are the main sportfish taken. Ling and whitefish are locally abundant, whereas speckled (brook) trout are reported to be plentiful in South Greenhill Lake.

As the map-area lies within the Chapleau Game Preserve, hunting is prohibited and consequently game is plentiful. Moose and bear are common; deer and wolves are occasionally seen. Fur bearers common to the area are beaver, muskrat, mink, otter, weasel, and fisher. Grouse are plentiful in the bush as are several varieties of ducks on the lakes and ponds.

Water power potential in the map-area is limited because of the low gradients and the small size of streams. Wabatongushi Lake, however, has been dammed by the Hydro Electric Power Commission of Ontario in order to provide a reserve supply of water for power installations on the Michipicoten River.

There were no permanent inhabitants in the map-area in 1966.

PREVIOUS GEOLOGICAL WORK

Glasgow, Meath, and Rennie Townships were first mapped in 1934 by E. M. Burwash (1937) during a reconnaissance survey of 14 townships at the east end of the Michipicoten metavolcanic-metasedimentary belt. Rennie Township was mapped by E. L. Bruce (1944) in 1941 during his investigation of the Renabie gold area and H. C. Horwood (1944) mapped the southwestern part of the township in 1943 while examining a gold property in Stover Township.

The southwestern corner of Glasgow Township has been shown on several maps covering the Goudreau area southwest of Lochalsh: T. L. Gledhill (1927), E. S. Moore (1932), and Bruce (1942, 1947); Bruce (1947) also incorporated a ½-mile wide strip of Glasgow Township on his map of Township 47 immediately to the south. Glasgow and Meath Townships were geologically mapped by T. W. Page (1960) for the Canadian Pacific Railway and were also included in a geological compilation map of Manitowik Lake-Lochalsh released by the Algoma Central and Hudson Bay Railway in the fall of 1966 (Joubin 1964).

PRESENT GEOLOGICAL SURVEY

The present survey was carried out by a five man party during the 1966 field season and the writer also spent three days in the area with a helicopter in the early spring of 1967 checking some of the more important areas.

Except along roads and shorelines, traverses were accomplished by pace-and-compass methods and were generally tied to topographic features easily recognized on air photographs at a scale of 1 inch to ¼ mile; along the eastern boundary of Rennie Township traverses were tied to surveyed claim lines. In areas underlain by metavolcanic-metasedimentary rocks, traverse spacings ranged from 500 feet to ¼ mile depending upon the complexity of the area and the amount of outcrop. In areas underlain by granitic rocks, traverse intervals averaged ½ mile. Shoreline mapping was carried out by canoe where accessibility permitted and, where not, by foot. Geology was plotted in the field on acetate sheets attached to vertical air photographs and was later transferred to cronaflex base maps prepared by the Cartography Section of the Ontario Department of Mines from maps supplied by the Forest Resources Inventory of the Ontario Department of Lands and Forests.

Rock exposure is generally scarce and few outcrops can be located directly on air photographs because of heavy forest cover. Good exposures are found only in the west-central part of Glasgow Township, the northeastern part of Rennie Township, and south and east of Harcourt Lake (these are in areas underlain by granitic rocks). Elsewhere, ridges are covered by a carpet of glacial debris, humus, and moss. Interpretation of complicated geology in the low-lying areas devoid of outcrop is conjectural and for this reason some of these areas have been left uncoloured on the geological map accompanying this report.

Three preliminary uncoloured geological maps P.402, P.403, P.404 at a scale of 1 inch to ¼ mile were issued by the Ontario Department of Mines in the spring of 1967 (Riley 1967a, b, c). The final Map 2210 (back pocket) has been extensively revised as a result of further field and laboratory work and supersedes the previously published preliminary maps.

ACKNOWLEDGMENTS

Able assistance in the field was provided by D. G. Cargill, R. E. Wood, L. B. Samis, and W. J. Zalken; Mr. Cargill carried out independent mapping in several areas. S. A. Ferguson provided valuable guidance in the field during the early part of the project. Discussions on the geology of the area with S. A. Ferguson and L. D. Ayres, who also reviewed parts of the manuscript, proved most rewarding.

John Bonnell of McIntyre Porcupine Mines Limited, J. V. Huddart of The Algoma Steel Corporation Limited, and W. C. Martin of Westfield Minerals Limited provided information regarding exploration work in the map-area. George Kellar assisted the writer during the examination of the Westfield Minerals prospect south of Conboy Lake. A. G. Liddle and L. Burton, operators of Camp Lochalsh on Wabatongushi Lake, rendered many courtesies to the field party during its stay on the lake.

GENERAL GEOLOGY

Metavolcanic rocks with subordinate amounts of metasedimentary and metagabbroic rocks underlie about 50 percent of the Glasgow-Meath-Rennie area. Mafic metavolcanics, primarily metabasalts, predominate in the central parts of Rennie and Meath Townships and the southern part of Glasgow Township. Intermediate to felsic metavolcanic flows and pyroclastic rocks are common in the southeastern and southwestern parts of Rennie Township and the southern part of Meath Township, and in minor amounts in the mafic metavolcanic sequence in the southern part of Glasgow Township. Metasedimentary rocks occur only locally and seem to be of local derivation; they are most abundant along the southwestern boundary of Rennie Township. Metagabbro occurs in minor amounts and is most abundant in the southern part of Glasgow Township.

Massive to gneissic granitic batholiths border the metavolcanic rocks on the north and west in the map-area and are also present immediately east of Rennie Township. Stocks, dikes, and sills of massive granitic rocks have intruded the metavolcanic sequence.

Mafic intrusive rocks include several ages of diabase dikes with predominantly north-northwest trends, two northeast-trending quartz diorite dikes, and several narrow massive basaltic dikes. Several small plugs and sills of ultramafic rocks have been mapped. One dike of granophyre is present on the Dog River south of Martin Lake.

Unconsolidated ground moraine, terminal moraine, and glaciofluvial and glaciolacustrine deposits of Pleistocene age cover most of the map-area.

Table 1 | TABLE OF LITHOLOGIC UNITS

CENOZOIC

RECENT
Lake, stream, swamp deposits

PLEISTOCENE
Sand, gravel, clay, till

Unconformity

PRECAMBRIAN

PROTEROZOIC

LATE FELSIC INTRUSIVE ROCKS
Granophyre

Intrusive Contact (?)

ULTRAMAFIC TO MAFIC INTRUSIVE ROCKS
Serpentinized pyroxenite and peridotite, serpentinite
Basaltic dikes

Intrusive Contact (?)

LATE MAFIC INTRUSIVE ROCKS
Quartz diorite

Intrusive Contact (?)

LATE FELSIC INTRUSIVE ROCKS
Granitic dikes

Intrusive Contact

LATE MAFIC INTRUSIVE ROCKS
Diabase, quartz diabase, olivine diabase, porphyritic diabase

Intrusive Contact

ARCHEAN

FELSIC INTRUSIVE ROCKS
Pegmatite

Intrusive Contact

Granitic dikes

Intrusive Contact

MASSIVE TO FOLIATED FELSIC INTRUSIVE ROCKS
Granodiorite, trondhjemite, quartz monzonite, hornblende syenite

Intrusive Contact

GNEISSIC TO FOLIATED FELSIC INTRUSIVE ROCKS
Granodiorite, albite granodiorite, trondhjemite, albite trondhjemite, albite quartz monzonite

Intrusive Contact

EARLY MAFIC INTRUSIVE ROCKS
Metagabbro

Intrusive Contact (?)

EARLY FELSIC INTRUSIVE ROCKS
Porphyritic dikes

Intrusive Contact

METAVOLCANIC AND METASEDIMENTARY ROCKS
Iron Formation
Magnetite-chert, magnetite-greywacke
Argillite, feldspathic greywacke
Dacite to quartz latite flows, tuff, lapilli tuff, tuff-breccia, breccia
Basalt and minor andesite flows and minor tuff and tuff-breccia, amphibolite, layered amphibolite

ARCHEAN

Metavolcanics and Metasediments

MAFIC METAVOLCANICS

Mafic metavolcanics, at least 95 percent of which were extrusive flows, are found in the map-area. They were probably predominantly basaltic in composition but some andesites may have been extruded. Regional and thermal metamorphism has produced mineral assemblages characteristic of the greenschist, almandine-amphibolite, and hornblende-hornfels facies.

Greenschist facies rocks are characterized by essential albite, amphibole, and epidote and they may contain one or more of chlorite, biotite, quartz, or carbonate. The almandine-amphibolite and hornblende-hornfels facies rocks are mineralogically identical and are characterized by plagioclase and amphibole and one or more of epidote, biotite, quartz, and carbonate; plagioclase is more calcic than An_{10}, may show albite and pericline-twinning, and may be zoned. The amount of quartz in all facies is estimated to be less than 10 percent with an average content of about 4 percent. Accessory minerals present are iron-titanium oxides, pyrrhotite, leucoxene, sphene, apatite, and rarely potassium feldspar and garnet.

Only one example of relict texture, from a pillowed unit immediately south of Rennie Township, was observed in thin section. In this sample, randomly oriented laths of sodic plagioclase, pseudomorphic after original calcic plagioclase, occur in a recrystallized aggregate of chlorite and amphibole. The plagioclase has been mildly saussuritized and carbonatized.

Mafic metavolcanics of the greenschist facies are fine grained and grey-green to dark green on weathered surfaces, whereas fresh surfaces are medium green. Foliation is present in most outcrops, although in some it is poorly defined and, therefore, in the field, these outcrops were described as massive. Amphibolites of the almandine-amphibolite facies are fine to medium grained, massive to foliated, and dark green to black. In contrast to mafic metavolcanics elsewhere in the area, the amphibolites of the hornblende-hornfels facies adjacent to the granitic batholiths are generally coarser grained, darker in colour, have better developed amphibole, and are gneissic. Foliation is imparted to the amphibolites by oriented amphibole grains and locally by thin lenticles of recrystallized plagioclase. With increasing proximity to granitic rocks, the plagioclase lenticles increase in size and coalesce to form elongate streaks and, finally, thin layers several feet long.

Weathered surfaces of amphibolites are generally more irregular than those of rocks of the greenschist facies mainly as a result of the larger grain size of the amphibolites. In some of these coarser grained varieties, knots of amphibole up to ¼ inch in diameter weather slightly in relief forming a very rough surface.

Pillowed flows were only locally seen, but shearing, recrystallization, and poor exposure make recognition difficult. Pillows are exposed best along the Renabie Road east of the south end of Colborne Lake. Rocks here are of greenschist grade, poorly foliated, and grey-green in colour. Individual pillowed flows as thin as 35 feet were recognized in the intermediate to felsic ash-flow unit.

Pillows are restricted to the upper parts of some flows, whereas other flows have pillows throughout their entire thickness. Pillows range from 4 inches to more than 36 inches in length and length-width ratios range from 1.5 to 1, to 6 to 1. An average pillow would be about 28 inches long with a length to width ratio of 2.5 to 1. Very small and very large pillows are least distorted. Distortion of intermediate size pillows varies even in individual outcrops. Pillow packing is usually very good and only rarely were selvages thicker than one inch observed.

Only one outcrop of pillows was observed in rocks of the almandine-amphibolite facies and this was found on the north side of Butler Creek at its exit from Trem Lake. These pillows average about 26 inches long with a length-width ratio of 3 to 1. Selvages are commonly less than 0.75 inches thick.

Flow contacts were observed in several places along the southern boundary of Rennie Township where mafic flows, ranging from 35 to 150 feet thick, are interbedded with intermediate to felsic ash-flow units. In general, the centres of flows are coarser grained and this is particularly well illustrated by the lower part of the flow which lies along part of Rennie Creek. On the north side of Butler Creek, between Garvey and Tucker Lakes, feldspar-filled amygdules and a fine-grained marginal phase mark the contact between a metabasalt flow and an intermediate metavolcanic unit. Narrow iron formation, metatuff, and locally derived metasediments mark flow contacts in the southwestern part of Rennie Township.

Very few outcrops of massive coarse-grained metabasalt flows are in the map-area. They are mainly composed of amphibole and plagioclase and are dark green in colour. It was found difficult to distinguish between the coarse-grained flows and pretectonic gabbro in the field, especially south of Loch Lomond. Where doubt existed as to origin, the rocks in question were mapped as gabbro.

Only two outcrops of coarse mafic metavolcanic pyroclastic rocks were mapped. One, on the north side of Trem Lake just above its outlet, consists of scattered small mafic fragments up to 3 inches long in a fine-grained matrix. The extent of this unit is unknown because of scarcity of outcrop and the difficulty in recognizing fragments. The second occurrence is about 20 feet thick and is exposed for a strike length of about 100 feet on the southern boundary of Glasgow Township about ½ mile west of the Lochalsh River. Here mafic fragments containing 30 to 40 percent medium-grained amphibole and other fragments of fine-grained, light to medium grey felsic metavolcanics are found in a matrix of medium-grained amphibolite. Fragments comprise less than 15 percent of the unit, are up to 6 inches long, and have length-width ratios of about 4 to 1.

No mappable units of mafic metatuff were observed, but minor amounts of mafic metatuff are associated with mafic flows along the Renabie Road and with flows, locally derived metasediments, and iron formation in a unit stretching from the southwestern part of Rennie Township north and west to the west end of Easey Lake.

Layered amphibolites (Photo 1) consisting of alternating plagioclase-rich and hornblende-rich layers are found in all three townships, and are developed best near contacts between mafic metavolcanics and granitic batholiths. Individual layers range from 1/16 inch to 1 inch in thickness and are both continuous and discontinuous along strike. The layering results from the segregation during metamorphism of mafic minerals, which are predominantly hornblende, from felsic minerals, which are predominantly plagioclase. Garnets are present locally. The layering is developed best near Wabatongushi Lake, south and west of the granitic contact in Meath Township, and on the north shore of Easey Lake.

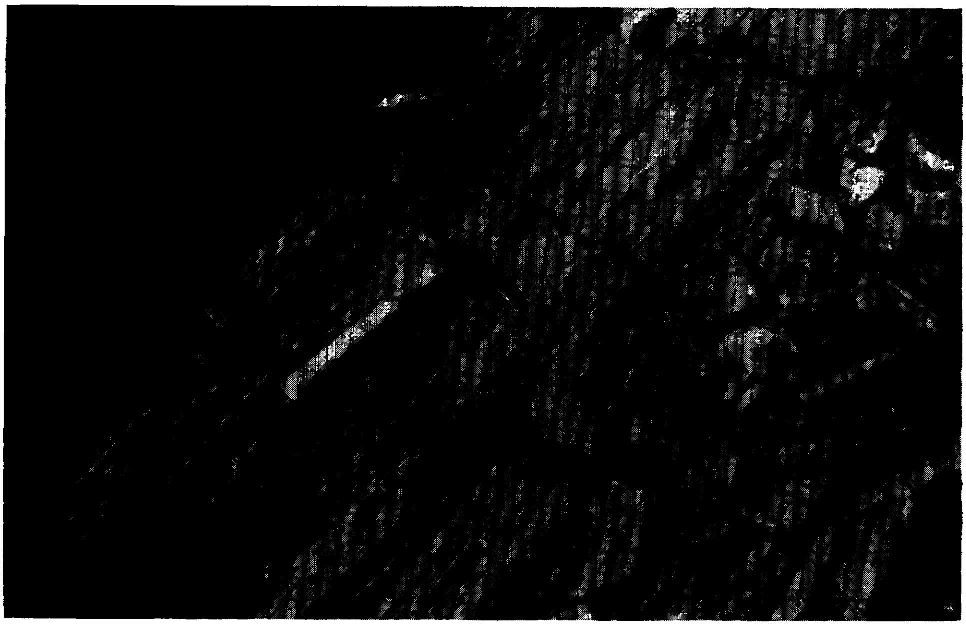

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Photo 1—Layered amphibolite—North shore of Easey Lake.

Because of the similarities between these layered amphibolites and mafic metasedimentary rocks in outcrop, the writer, following Bruce (1942), originally considered the amphibolites as the eastern extension of the Doré metasediments. However discussion with several geologists experienced in mapping layered amphibolites, a thin-section study of several rock speciments from the area, and a re-examination of several outcrops in the spring of 1967, convinced the writer that the layered amphibolites are volcanic in origin. Examination of Bruce's (1942) "Doré metasediments" along the Canadian Pacific Railway between ½ mile and 1 mile west of Lochalsh showed them to be poorly layered amphibolites similar to the mafic metavolcanic rocks in Glasgow Township. A re-examination of Bruce's Doré series in Townships 48 and 49 would thus seem to be in order. The "Doré conglomerate" reported by M. H. Frohberg in (Bruce 1942, p. 20) is located at the north end of the largest of three islands in Wabatongushi Lake about 1½ miles northeast of the southwestern corner of Glasgow Township. Upon closer examination of the conglomerate, the writer (Riley) considers it to be an intrusion breccia composed of lensoidal fragments of dark green to black amphibolite (Photo 2) in a matrix of grey to pink granitic rocks. Two linear but irregular zones of this breccia, about 6 feet apart, strike east-northeast across the northern part of the island. The "slaty greywacke" reported from the south side of the island by Frohberg is in reality a highly sheared, layered amphibolite.

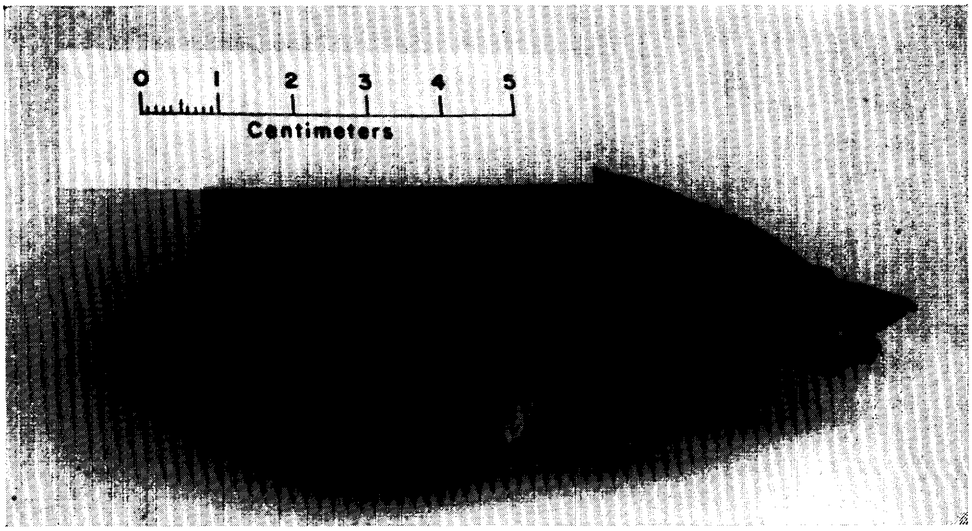

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Photo 2—Intrusion breccia, consisting of angular fragments of amphibolite in granitic matrix, from large island in southwest corner of Wabatongushi Lake.

Intermediate to Felsic Metavolcanics

Intermediate to felsic metavolcanics are predominantly confined to Rennie and Meath Townships and seem to occupy two main stratigraphic levels. In Rennie Township, felsic pyroclastic rocks underlie approximately 75 percent of the eastern section of the township south of the contact with the granitic batholith. Here the felsic metapyroclastic rocks overlie and are overlain by mafic metavolcanics and interbedded thin units of massive and pillowed mafic metavolcanics which provide marker horizons for stratigraphic and structural interpretation. In Meath Township, intermediate flows and pyroclastic rocks formed the basement upon which the overlying mafic volcanics and intermediate to felsic pyroclastic rocks were deposited.

The mineralogical composition of the intermediate to felsic metavolcanics indicates greenschist and, locally, almandine-amphibolite metamorphic equivalents of dacite, quartz latite, and, rarely, rhyodacite. Greenschist facies varieties are composed of albite, quartz, muscovite, biotite, and minor amounts of one or more of epidote, chlorite, carbonate, blue-green hornblende, potassium feldspar, and garnet. Rocks of the almandine-amphibolite facies contain sodic oligoclase, quartz, biotite, and smaller amounts of epidote and sericite. Magnetite-ilmenite, leucoxene, hematite, pyrite, apatite, rutile, sphene, and tourmaline are the accessory minerals. Texturally, the intermediate to felsic metavolcanic rocks commonly contain quartz and(or) plagioclase phenocrysts. In all pyroclastic varieties, a well-developed foliation is defined by the alignment of the micas and chlorite which are commonly bent around the phenocrysts. Where phenocrysts have been slightly crushed, the fragments form small lenses aligned approximately parallel to this foliation.

Quartz and plagioclase phenocrysts are the most common relict textures observed. Although many of the plagioclase phenocrysts have been altered to albite, a few sodic oligoclase phenocrysts, some zoned, are also present. Quartz phenocrysts frequently have irregular embayments on their outer edges probably as a result of resorption of part of the phenocryst previous to consolidation. In a few flows, lath-shaped grains of albite preserve the texture of the original groundmass. Lithic fragments and broken phenocrysts testify to the pyroclastic nature of the tuffaceous varieties.

Alteration of plagioclase phenocrysts is common. Incipient alteration manifests itself in the form of dusty feldspar grains whereas sericite or saussurite were developed as alteration became further advanced. Recrystallized albite in the groundmass is commonly devoid of alteration products, but it can be recognized by its zoning and twinning, where present.

Massive to foliated porphyritic ash-flow tuff may comprise as much as 75 percent of the felsic metavolcanic rocks underlying the eastern part of Rennie Township. On the weathered surface, ash-flow tuff varies from cream to tan through various shades of grey to medium grey-green. Foliation is not well developed and massive outcrops are common. The rock is characteristically porphyritic with either quartz and(or) feldspar phenocrysts present. Quartz *eyes* are often opalescent and average slightly less than 0.25 inches in diameter with larger ones up to 0.5 inches in diameter. Feldspar phenocrysts average about 0.15 inches in diameter and may be more or less numerous than quartz phenocrysts. Layering was not recognized in the ash-flow tuff. However units of metamorphosed breccia, tuff breccia, lapilli tuff, and locally derived metasediments are interbedded with the ash-flows.

Breccia, tuff-breccia, and lapilli tuff are common members of the intermediate to felsic metavolcanic sequence and their differentiation from ash-flow tuff of similar composition is difficult because of poor exposure. Breccia is most commonly associated with felsic ash-flow tuff, but it is associated with intermediate metavolcanic flows between the Dog River and Pinny Lake and south of the fault east of the main body of Easey Lake. Typical breccia consists of from 50 to 100 percent of lapilli, bombs, and blocks of quartz-feldspar porphyry set in a matrix of similar porphyry. Recognition of the breccia is facilitated by the fact that the fragments weather slightly in relief and may be coarser grained and lighter in colour than the matrix. Fragments are generally rounded to subrounded, although angular varieties are present. Sorting is usually absent, but a crude gradation from coarse to fine fragments was noted in several outcrops. Fragments have an average length of about 4 inches and a length-width ratio of about 3 to 1, but lengths up to 27 inches and length-width ratios as high as 9 to 1 were observed. The fragments tend to be flattened parallel to the foliation.

On the north end of Stephenson Lake, a breccia composed wholly of fragments of fine-grained, light grey, possibly pumiceous, sericitic metadacite porphyry occurs (Photo 3). Feldspar phenocrysts in this rock are scattered and small. Similar small fragments are quite prominent in the tuff-breccia unit that outcrops along the Renabie Road and are present elsewhere in some of the pyroclastic units in Rennie Township.

Felsic tuff-breccia is associated with breccia units east of Rennie Lake; intermediate tuff-breccia occurs north of the Dog River and, with lapilli tuff, in the metapyroclastic unit south of Easey and Rennie Lakes.

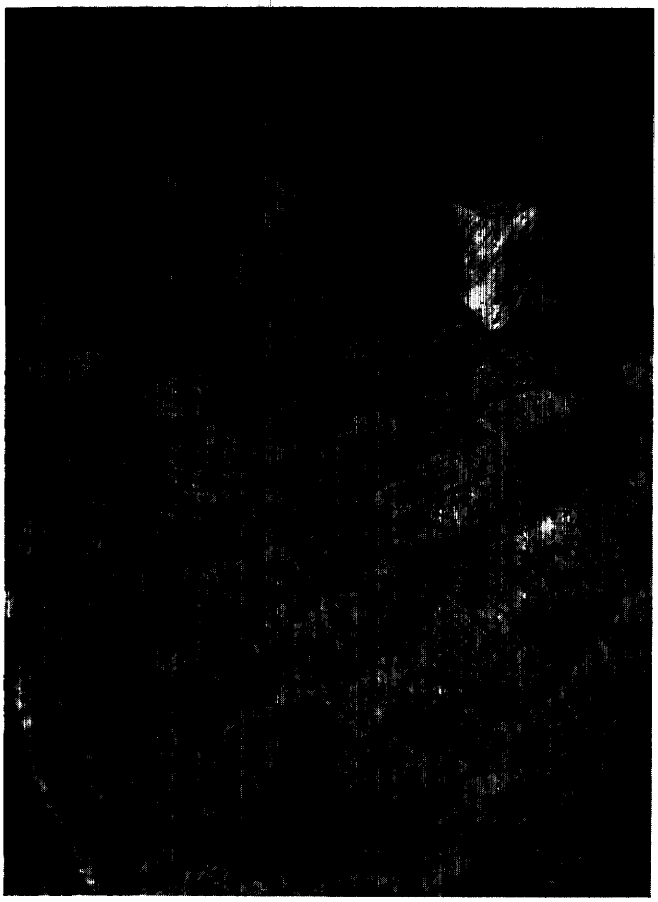

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Photo 3—Coarse dacite breccia from west shore of Stephenson Lake showing variation in size and shape of fragments. Scale, camera case about 6.5 inches long.

Except for colour, felsic tuff-breccia being buff to tan and the intermediate variety being pale green to grey-green to buff, the two varieties of tuff-breccia are similar in outcrop. The matrix is fine grained, porphyritic, and well foliated. Fragments are predominantly light grey to buff quartz-feldspar porphyry; however, locally, especially east and south of Rennie Lake, fine-grained, grey to white sericitic fragments may form up to 70 percent of the coarse pyroclastic debris. The content of fragments in the tuff-breccia units may be as high as 60 percent, but outcrops composed of 25 percent fragments are more common. The average length of these fragments is about 2 inches with a maximum observed length of 24 inches. Locally, length-width ratios as high as 8 to 1 occur, but the average ratio is about 2 to 1. The fragments in the breccia may be rounded to subangular.

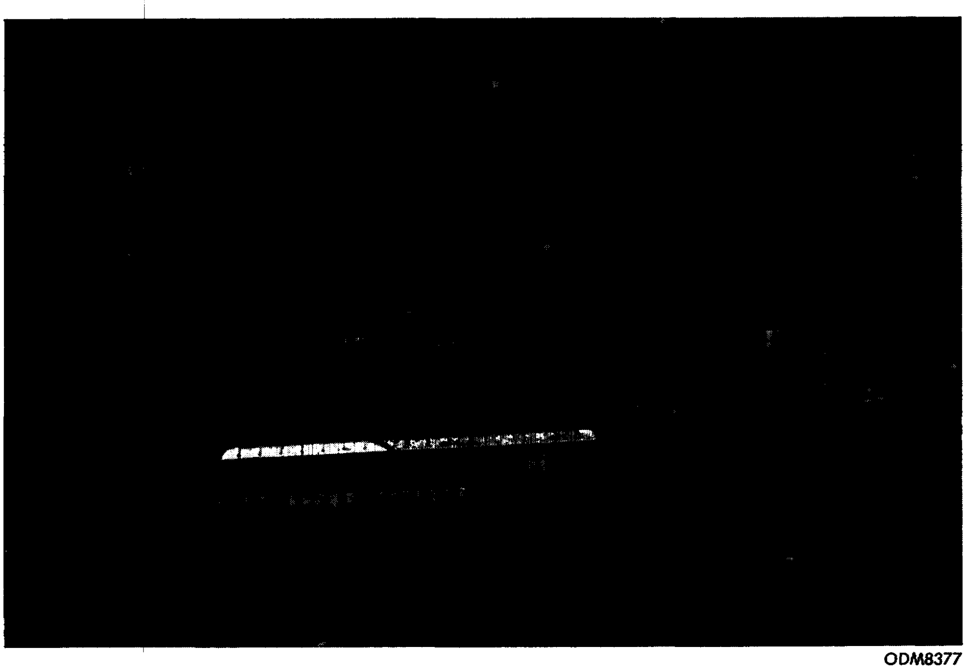

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Photo 4—Typical tuff-breccia southwest of Rennie Lake.

Intermediate lapilli-tuff occurs with tuff-breccia south of Easey and Rennie Lakes and with tuff south of Meath Lake. It resembles the tuff-breccia previously described except that the size of the fragments is considerably smaller, averaging less than 1 inch in diameter.

A rock type described as sericitic metatuff in the field lies along the north side of the intermediate to felsic metavolcanic unit south of Conboy Lake. It can be traced eastward by scattered outcrops from a few hundred feet west of the south end of Conboy Lake to a point 4,000 feet east of Butler Creek. The rock is fine grained, weathers buff to tan, is buff to pale grey-green on a fresh surface, contains scattered, frequently opalescent, quartz *eyes* and some feldspar phenocrysts, and regularly displays a well-developed foliation. The rock is exposed best where stripped and trenched on the Westfield Minerals Limited property (12) south of Conboy Lake. Layering, on the scale of several feet, is apparent in the material as a result of slight lithological differences. Contacts between layers may be either sharp or gradational. Individual layers, however, cannot be traced for any distance along strike. Stripping across the contact between the sericitic metatuff and mafic metavolcanics about 100 feet east of the cabin on Conboy Lake exposes about 16 inches of gritty metagreywacke separating the two rock types.

Similar sericitic metatuff associated with minor tuff-breccia (Photo 4) and lapilli-tuff are found in the intermediate to felsic metapyroclastic unit which trends westward from the south end of Loch Katrine to the area south of Loch Lomond. These schists are generally more highly sheared than those in the Conboy Lake area and commonly contain disseminated pyrite. Elsewhere in the map-area, local concentrations of sericite schist are found in association with intermediate to felsic metapyroclastic rocks. Intermediate tuff was mapped south of Meath Lake where it is fine grained, sometimes porphyritic, and usually grey-green, weathering dull green to greenish brown. These rocks contain few recognizable lapilli.

Intermediate to felsic, massive to foliated and pillowed flows, differentiated from mafic metavolcanic flows by lighter colour and superior hardness, are found in the southern part of Meath Township and extend to the east into the southwestern part of Rennie Township. Massive to foliated flows predominate. They are generally light to medium grey-green to dark grey; however, a few outcrops of a dark green to black variety were mapped. The latter are on the south end of Easey Lake in proximity to the granite contact and along the Dog River east and south of Martin Lake. These dark coloured rocks are fine grained, hard, and break with a conchoidal fracture. Phenocrysts of both quartz and feldspar, rarely visible to the naked eye, are common in this unit.

Pillowed intermediate flows are associated with breccia near the small lake in the southeastern part of Meath Township and north of the entrance of the west arm of Easey Lake and overlie the mafic metavolcanic iron formation unit in Meath and Rennie Townships. These rocks are moderately hard, light grey-green to dark grey, and porphyritic. Pillows are both bun-shaped and ellipsoidal with tops rarely indicated. Pillow selvages consist of a hard, fine-grained, light coloured material rarely more than 0.75 inches thick. Some of the pillows on the west side of the small lake in the southeastern part of Meath Township have mottled light and dark green centres as a result of the splotchy distribution of epidote.

METASEDIMENTS

Metasediments occur only in minor amounts and, except for iron formation, have been locally derived from the associated metavolcanic rocks. About 1 mile east of the southwestern corner of Rennie Township, two narrow units of metasediments are associated with pillowed intermediate metavolcanics, both of which pinch out to the northwest. The best outcrops, however, are found immediately south of the township boundary where fine-grained, thin-bedded, blue-grey argillite is interbedded with medium-grained, feldspathic metagreywacke (Photo 5). Individual beds in the argillite range from fractions of an inch to about 3 inches and form units up to 10 feet thick. Beds of feldspathic metagreywacke range from less than 1 inch to over 10 feet in thickness. Grain gradations in metagreywacke beds are both to the northeast and to the southwest and thus are not amenable to top determinations.

Elsewhere, argillite is present on the eastern edge of the outcrop by the Rennie Lake dock and also about 500 feet southeast of this outcrop. Minor amounts of locally derived dark grey, fine-grained metagreywacke are associated with mafic metavolcanic flows, minor tuff, and lean iron formation in a narrow zone underlying the main intermediate to felsic metapyroclastic unit in Rennie and Meath Townships. Minor siliceous metagreywacke is associated with mafic metavolcanics and iron formation immediately south of Trem Lake and with layered amphibolites on the west side of the southwest-trending promontory on Easey Lake. In areas underlain by mafic metavolcanics, narrow discontinuous interflow bands of fine-grained metagreywacke are occasionally present.

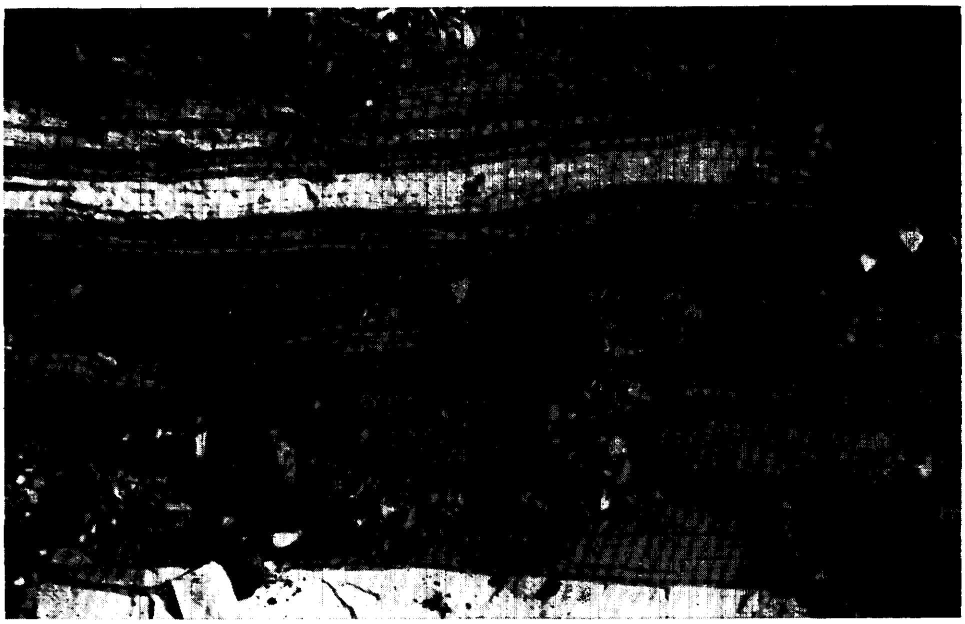

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Photo 5—Interbedded argillite and metagreywacke from metasedimentary unit south of Rennie Township boundary southwest of Rennie Lake.

A one-foot band of unsorted conglomerate consisting predominantly of subangular quartz with subordinate porphyritic felsic metavolcanic cobbles was mapped on a point on the east side of Stephenson Lake approximately 3,500 feet north of the outlet. The conglomerate is a buff, medium- to coarse-grained rock, apparently a reworked lapilli-tuff. Contacts of this metasedimentary unit cannot be precisely defined, but a thickness of at least 4 feet of locally derived metasediment is present.

Some reworking of the intermediate to felsic metapyroclastic rocks has undoubtedly occurred elsewhere in the map-area, but only rarely has it been thorough enough to develop characteristic sedimentary structures. In one area, on and along the Renabie Road near the turnoff to Rennie Lake, a few slightly stretched but rounded boulders of trondhjemite are found with a few stretched and rounded cobbles of fine-grained porphyritic quartz latite in a fine-grained, greenish brown tuffaceous matrix. The presence of the trondhjemite boulders and the rounded nature of both the trondhjemite and quartz latite cobbles suggests local reworking of this unit, probably under shallow water conditions.

IRON FORMATION

Iron formation occurs as interflow sediment in a mafic metavolcanic unit which trends north and west into Meath Township from the southwestern part of Rennie Township. Several occurrences of iron formation were mapped in this unit. However local magnetic anomalies in areas of overburden suggest the presence of several others. The thickest unit observed was in excess of 10 feet and is located approximately 2,200 feet northeast of the southwestern corner of Rennie Township. It is composed of bands of fine-grained magnetite up to 0.5 inches thick separated by bands of fine-grained, granular chert generally less than 0.25 inches thick. Minor amounts of chamosite and a fine-grained amphibole are also present. Other outcrops of iron formation in this unit contain magnetite bands up to 2 inches thick and bands of dark grey chert in thicknesses up to 1 inch.

On the south side of Trem Lake about 2,200 feet east of the outlet, bands of magnetite up to 1 inch thick are found in a narrow interflow unit of metagreywacke. A narrow recrystallized chert unit 250 feet east of the Rennie Lake dock carries enough scattered grains and streaks of magnetite to deflect the compass. Some 2-inch bands of magnetite and light pyrite and pyrrhotite were reported by C. M. Bartley (1947, Private report) along the contact between "acid (felsic) breccia and quartz-feldspar porphyry" about 500 feet northwest of the southwest end of Stephenson Lake; this occurrence was not located by the field party. Narrow widths of iron formation have also been recorded from holes drilled on the southeastern end of the mineralized zone south of Conboy Lake.

Local occurrences of argillite or fine-grained greywacke, carrying apparently syngenetic pyrite, or rarely pyrrhotite, have been mapped in the metapyroclastic units south of Easey Lake, Loch Katrine, and Loch Lomond.

Early Felsic Intrusive Rocks

PORPHYRITIC DIKES

Feldspar and quartz-feldspar porphyry dikes and sills occur frequently in the metavolcanics. They average about 4 feet thick, but their persistence along strike could not be determined because of the scarcity of outcrop. Mineralogically and texturally, they resemble the porphyritic ash-flow metatuffs east of Rennie Lake and cannot be differentiated from these rocks unless crosscutting relationships are exposed. Crosscutting relationships exposed on the northeast shore of Easey Lake suggests that these dikes and sills are older than some of the diabase dikes.

On the southeast side of the main northeast-trending promontory in Stephenson Lake an irregular contact, marked by slight colour change and chilling, between intrusive quartz-feldspar porphyry and typical ash-flow metatuff is exposed. The size and form of this intrusive body could not be ascertained as it was not possible to distinguish the two rock types away from the contact. On the northeast end of the same promontory an atypical feldspar porphyry dike occurs. This east-southeast-trending dike (Photo 6) exposed on both sides of the lake as well as the promontory, is highly irregular and bifurcating with a maximum exposed thickness of about 8 feet. It is brownish grey, weathered buff, is well foliated, and contains subhedral feldspar phenocrysts up to 12 mm long which weather slightly in relief. The matrix is composed of feldspar with minor amounts of amphibole, epidote, and sericite.

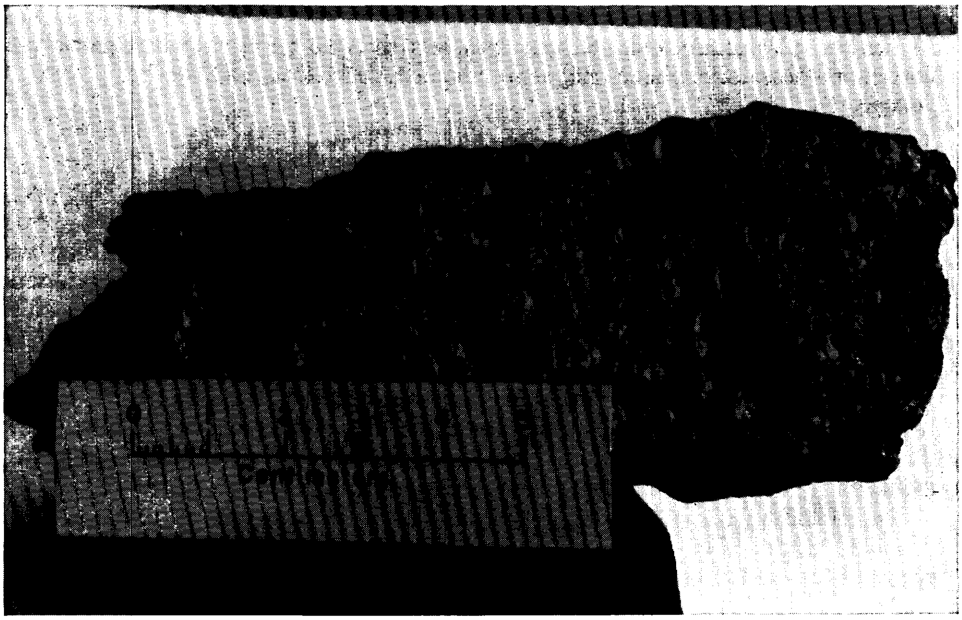

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Photo 6—Coarse-grained feldspar porphyry dike from west shore of Stephenson Lake.

Early Mafic Intrusive Rocks

METAGABBRO

Metamorphosed gabbro dikes and occasional sills occur in the metavolcanics. South of Loch Lomond a large irregular metagabbro has been mapped, but its intrusive origins are uncertain. Some contacts display well-defined crosscutting relationships with mafic metavolcanics; however in other areas contacts appear to be gradational over several feet. Thus, part of this gabbro unit may be in reality coarse-grained metabasalt. Elsewhere, metagabbro dikes are up to 150 feet thick but average less than 50 feet; scattered outcrops suggest that they are up to 1,500 feet in length, but most could not be traced more than about 500 feet. Along the shore of Stephenson Lake very narrow dikes and sills pinch out over distances of less than 100 feet.

The metagabbro dikes are dark green to almost black, massive to poorly foliated, and medium to coarse grained. In some of the coarse-grained varieties, resistant grains and clusters of hornblende up to 1 cm in diameter produce a very rough irregular surface. Some of the narrow dikes exposed on the shore of Stephenson Lake are finer grained and present a speckled appearance due to the prominence of feldspar on the weathered surface.

These rocks are composed mainly of hornblende with small amounts of highly saussuritized plagioclase, epidote, generally less than 10 percent quartz, carbonate, chlorite, and accessory sphene, magnetite-ilmenite, leucoxene, and apatite.

Felsic Intrusive Rocks

Rocks of granitic composition underlie slightly more than 1/3 of the map-area and about 80 percent of these form complex batholiths bordering the metavolcanic sequence on the east, north, and west. The batholiths are composed mostly of older gneissic and strongly foliated rocks intruded by younger massive to slightly foliated varieties. Since the granitic rocks received only cursory examination by the author, the complex relationships existing among the various types are imperfectly known. Areas designated massive to foliated granitic rocks on Geological Map 2210, (back pocket) contain minor amounts of gneissic rock; likewise those areas designated gneissic to foliated contain varying amounts of massive rock.

The remaining 20 percent of the granitic rock in the map-area occurs as massive to foliated stocks, sills, and dikes. These rocks are considered to be the same relative age as the massive granitic rocks of the batholiths.

GNEISSIC TO FOLIATED GRANITIC ROCKS

Gneissic to foliated granitic rocks are confined to the batholiths and seem to be the oldest granitic rocks in the map-area. They are medium to coarse grained and predominantly grey to white although, locally, minor amounts are fine grained and white to pink. Where foliation is well developed, colour boundaries are often diffuse, imparting a patchy appearance to the rock. Biotite is the main mafic mineral and is responsible for the well-developed foliation. In some outcrops, well-developed biotite foliae envelop knots and lenses of quartz and feldspar imparting an augen structure to the rock. Inclusions of amphibolite, hornblende gneiss, and granitic gneiss are not uncommon and *schlieren* are often present.

Bruce (1944, p. 11-12) gives analyses of several samples of gneiss collected in the vicinity of the Renabie Mine on the western edge of the batholith immediately east of Rennie Township. Examination of his recast analyses indicate that these gneisses range in composition from albite quartz monzonite to albite granodiorite to albite and oligoclase trondhjemite. The writer believes these rock types to be typical of most of the gneisses in the Glasgow-Meath-Rennie area with the sodic varieties considerably more abundant than the potassic.

Hybrid granitic rocks have been mapped in several areas and are most abundant between the Meath Lake Fault and the central section of Wabatongushi Lake, north and west of Conboy Lake, and south of Cormick Lake. They range from amphibolites through hornblende-feldspar gneisses to granitic gneisses and are a result of progressive metamorphism. Amphibolites in this unit are fine grained and grey-green to dark green in colour. An increase in grain size, the presence of calcic oligoclase, and the segregation of narrow hornblende and feldspar-rich layers mark the transition of the amphibolites to hornblende-feldspar gneisses (Photo 7). Knots of feldspar or hornblende may be present imparting an augen structure to the rock. The

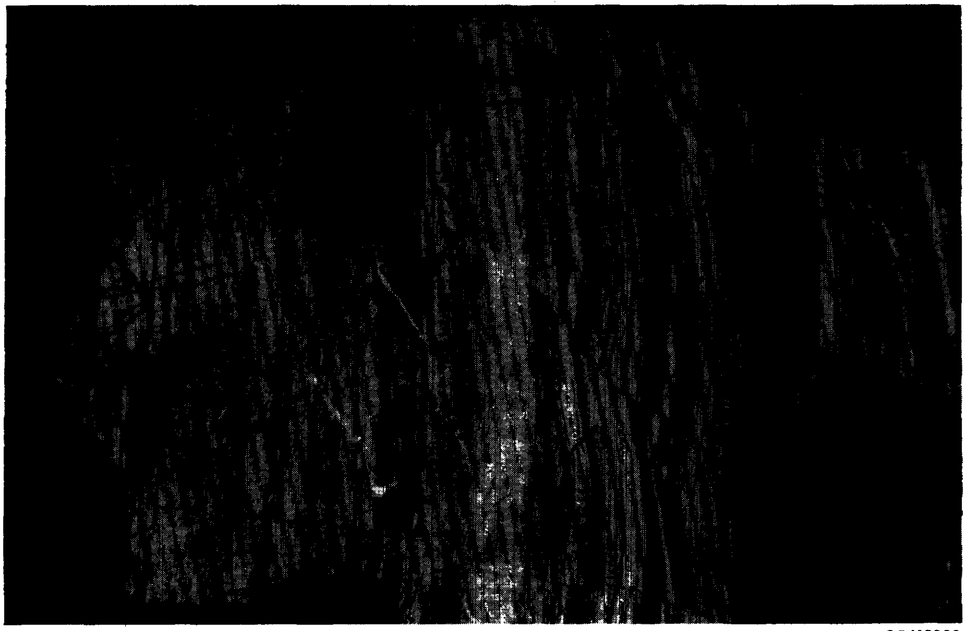

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Photo 7—Hornblende-feldspar gneiss from east-central Glasgow Township.

banding in the associated granitic gneisses varies. Some gneisses are well banded whereas others are poorly banded. The granitic gneisses are grey, medium to coarse grained. Hornblende is the principal mafic mineral. Sills of grey to pink granodiorite or trondhjemite ranging from a few inches to several tens of feet thick impart a *lit-par-lit* structure to the rock in some outcrops.

MASSIVE TO FOLIATED GRANITIC ROCKS

Massive to foliated granitic rocks are thought to be younger than the gneissic varieties and intrusive contacts verifying this relationship were mapped in several areas. The relative ages of the various massive units are, however, unknown.

These rocks vary from pink to light grey on the weathered surface, are medium to coarse grained, and may contain feldspar phenocrysts up to 5 mm in diameter. The mafic mineral content of the rocks is generally low, averaging less than 5 percent, but some varieties containing up to 20 percent mafic constituents were mapped. Biotite is the most abundant mafic mineral; chlorite is common and hornblende is locally present. Inclusions of amphibolite or gneiss are rare.

A low mafic pink granodiorite from an outcrop immediately west of June Lake is composed mainly of oligoclase, with an estimated 17 percent microline, 10 percent quartz, and 5 percent combined epidote, biotite, and chlorite. Slight alteration of the plagioclase to sericite has occurred.

Three large stocks are found in the metavolcanics. One partly underlies the basin of Rennie Lake, the second partly underlies Easey Lake, and the third is found in southern Meath Township and in the northern part of Township 46. The Rennie Lake and Easey Lake stocks consist of massive to slightly foliated, medium-grained, pink to grey, porphyritic granodiorite. Oligoclase forms from 50 to 60 percent of the rock, potassium feldspar from 15 to 20 percent, and quartz about 15 percent. Biotite and chlorite are the main mafic minerals; epidote is present in minor amounts; sphene and apatite are the main accessory minerals. Sericite, resulting from the breakdown of plagioclase, tends to cloud the centres of these grains. Phenocrysts average 3 mm in diameter and form less than 1 percent of the rock.

The stock on the southern boundary of Meath Township outcrops in a series of hummocky ridges. The rock is massive to slightly foliated, varies from pink to grey, and contains hornblende as the predominant mafic constituent; biotite, however, occurs toward the centre of the outcrop. Burwash (1937, p. 34) noted the presence of what he described as hornblende syenite on the ridge immediately south of Harcourt Lake; Page (1960, p. 6) described the stock as predominantly of syenitic composition, composed essentially of orthoclase with some plagioclase, quartz, and hornblende. A thin section from a massive pink to grey porphyritic rock, which was collected by the writer just south of the contact 4,000 feet east of the south end of Harcourt Lake, consists of oligoclase, about 10 percent acicular actinolite, about 15 percent potassium feldspar, from 5 to 10 percent quartz, and minor amounts of biotite, sphene, apatite, and other accessory minerals. This specimen, a syenodiorite according to the ODM classification, Appendix I, is probably not representative of the stock as a whole due to its location near the contact and its possible contamination by wall-rock material.

Most of the smaller stocks in the map-area, the sill-like granitic bodies in Glasgow Township, and the granitic dike east of Rennie Lake resemble the Rennie Lake and Easey Lake stocks in outcrop. They are massive to slightly foliated, medium to coarse grained, pink to grey, and carry small amounts of mafic minerals, biotite and chlorite in particular. Hornblende, however, is the major mafic constituent of the granitic dike east of Rennie Lake and of a smaller dike just north of Butler Creek on the trail to Conboy Lake. In association with minor biotite and chlorite, hornblende is also the major mafic constituent of a small trondhjemite stock north of Easey Lake. This rock is massive to foliated, medium grained, and porphyritic with highly sericitized feldspar phenocrysts up to 4 mm in diameter. The rock in the small stock northwest of Spring Lake is slightly foliated, grey to pink, and has a mafic mineral content of about 3 percent. Thin-section examination indicates this rock to be quartz monzonite.

Granitic sills and subordinate dikes are common in the mafic metavolcanic unit from Cormick Creek west to the Meath Lake Fault and in Glasgow Township. These sills are most abundant near the contacts of the batholiths, away from which they diminish in both frequency and size. The sills are commonly 5 to 10 feet thick, locally up to 30 feet, and although they follow the foliation in the amphibolites they cannot be traced for any distance along strike because of abundant overburden.

Cutting both the gneissic and massive granitic rocks are irregular stringers and dikes up to at least 10 feet thick of massive, fine- to medium-grained, pink- to grey-weathering, generally porphyritic granitic rocks. From hand specimens, the mafic content of these rocks is estimated to be generally less than 2 percent and the quartz content between 5 and 15 percent. These dikes may represent more than one age of granitic rocks.

Pegmatite cuts both gneissic and massive granitic rocks, is confined to the batholiths, and is particularly common in the gneissic rocks west of Wabatongushi Lake. It occurs as irregular patches and stringers, rarely over 10 feet thick, of pinkish feldspar and quartz with small amounts of muscovite, epidote, and magnetite. Contacts betwen the pegmatite and enclosing rocks may be either sharp or gradational.

PROTEROZOIC

Late Mafic Intrusive Rocks

DIABASE

Diabase dikes, some of which have been traced by geophysical methods for over 13,000 feet, are common throughout Glasgow-Meath-Rennie Townships. The predominant trend averages about N15°W and ranges from N15°E to N55°W; three dikes trend approximately N45°E, and one on the promontory of the southwest side of Loch Katrine trends at about N70°E. The emplacement of the north-northwest-, northwest-, and northeast-trending dikes seems to be controlled by jointing as the most well-defined joint directions parallel the trends of these diabase dikes. Diabase dikes have been intruded along several faults in the map-area including the Meath Lake Fault on the northwest side of Meath Lake and the faults at the south end of Rennie Lake; south of Spring Lake a diabase dike has been offset slightly by a fault. Dikes in the eastern part of Rennie Township have been well outlined by ground magnetometer surveys. Their sinuous outlines, bifurcations, and abrupt nature of pinching out are well defined and similar patterns for the dikes are probably much more common elsewhere than indicated on the map. Nonetheless, many dikes do have the linear trends as shown.

The diabase dikes average slightly less than 100 feet in thickness. However thicknesses up to 350 feet are indicated for dikes in the vicinity of the fire tower in Rennie Township and east of the bay on the northeast side of Wabatongushi Lake. In the southwestern corner of Rennie Township, scattered outcrops suggest a thickness of 500 feet for one dike. Two relatively large areas of diabase are shown on the map, one south of Moorhouse Lake and the other between Easey and Harcourt Lakes. Although continuous outcrop across these masses was not observed, small scattered outcrops suggest that this interpretation has considerable merit. An alternative explanation may be the presence of two or more dikes.

Diabase may be either altered or fresh. Altered diabase is fine to medium grained and may or may not be porphyritic. Weathered surfaces are grey to grey-green and commonly show randomly oriented blades and grains of amphibole set in a matrix of feldspar. Fresh surfaces are dark grey to grey-green, frequently with a reddish tinge resulting from the oxidation of iron released by the breakdown of mafic minerals. Phenocrysts in these diabases are greenish plagioclase averaging between 1 to 2 cm in diameter and rarely reaching a diameter of 15 cm. A dike, however, may not necessarily be porphyritic throughout its entire length.

An altered porphyritic dike from the south shore of the unnamed lake 4,000 feet west of Carter Lake is composed primarily of secondary amphibole set in a matrix of highly saussuritized plagioclase laths. A few feldspar grains essentially free of alteration range in composition from albite to sodic oligoclase. Epidote, chlorite, and a little quartz are present as minor constituents. A common accessory is leucoxene-magnetite pseudomorphic after ilmenite containing exsolved magnetite. An altered diabase, located near the outlet on the northwest side of the small lake 6,000 feet east and slightly south of the exit of Easey Lake, is cut by an unaltered diabase and a very narrow basaltic dike. This dike is composed of grains of secondary amphibole set in a matrix of partly saussuritized plagioclase and accompanied by epidote, quartz (an estimated 10 percent), and chlorite. Carbonate, ilmenite, leucoxene, magnetite, apatite, and pyrite are the accessory minerals.

Unaltered diabase dikes are fine to medium grained, grey to dark grey, weathering grey to rusty brown, and may or may not be porphyritic. A specimen from the northwest-trending diabase immediately south of Hall Lake consists of subhedral grains of clinopyroxene, bordered by narrow rims of uralite, set in a matrix of lath-shaped andesine-labradorite. Minor alteration of plagioclase to sericite and saussurite is common, especially along cleavage planes. Present, also, are minor amounts of quartz, biotite, chlorite, and magnetite. Bruce (1944, p. 13) described a similar specimen from the island in Rennie Lake.

W. H. Collins and T. T. Quirke (1926, p. 36-39) and E. Thomson (1926, p. 151-152) divided the diabase dikes of the Michipicoten greenstone belt into two main groups: early quartz diabases and later "olivine" diabases in which olivine is not necessarily present. The quartz diabases, according to Collins *et al.*, are considerably decomposed, slightly sheared, and tend to be sinuous as opposed to the later "olivine" diabases which are unaltered, unsheared, and straight. However it would seem that neither the mineralogy nor the metamorphic state of the rock can be used as age criteria.

Wanless *et al.* (1966) gives age dates for two diabases in the Glasgow-Meath-Rennie Townships and two others south and east of the map-area. Impure biotite from the dike on the east side of the small lake 500 feet east of the southwestern corner of Rennie Township (GSC Sample 64-121, coarse-grained ophitic gabbro, p. 74) was dated at 1,495± 125 million years. A dike with a sinuous trend (GSC Sample 64-123, medium-grained ophitic gabbro, p. 75) which cuts the southern boundary of Rennie Township approximately 1,100 feet west of the southeastern corner of the township was sampled 2,500 feet south of the map-area. K-Ar dates from mafic minerals in the dike gave an age of 1,730± 150 million years. According to Wanless *et al.* (1966) both dikes petrographically resemble fresh diabase as previously described. An age of 2,155± 165 million years was obtained from a quartz diabase (GSC Sample 64-109, medium-grained ophitic gabbro, p. 69-70), striking N20°W near the west side of Dog Lake and another highly altered diabase (GSC Sample 64-110, ophitic gabbro, p. 70) trending N45°E across Jenner Bay of Missinaibi Lake has an age of 2,120± 55 million years.

The data presented by Wanless *et al.* (1966) suggests that there are at least three separate ages of diabase dikes trending in a north-northwest to northwest direction and that at least some of the northeast-trending dikes were emplaced at the same time as the early north-northwest-trending varieties. It, also, indicates that the relative ages of diabase dikes in the map-area cannot be determined by their mineralogy, state of alteration, or their trace in plan view as suggested by Collins *et al.* (1926).

QUARTZ DIORITE

Trending northeast across the map-area from the southern boundary of Meath Township to a location west of Conboy Lake is a massive, coarse-grained, quartz diorite dike. The dike is about 400 feet thick and, although it is offset by numerous faults, it appears to maintain this thickness for its entire length. The margins of the dike have been chilled against the enclosing rocks and cannot be distinguished from fine-grained diabase. For this reason and because the dike is usually covered by dense bush and a thin but constant blanket of overburden, age relationships between this large dike and the smaller north-northwest-trending diabase dikes were not established.

The coarse-grained centre of the dike consists of from 50 percent to 60 percent zoned and partly saussuritized plagioclase (An_{40}-An_{55}), from 15 percent to 20 percent usually anhedral, in part uralitic, amphibole and from 15 percent to 20 percent interstitial quartz. Minor amounts of epidote, chlorite (in part after biotite), sphene and leucoxene after ilmenite, magnetite, and apatite are present. A second smaller dike with similar trend, texture, and mineralogy is located approximately 1,500 feet north of the west end of Harcourt Lake.

Page (1960) shows a second large dike just south of Easey Lake and subparallel to the dike mentioned above. A few outcrops of coarse-grained altered diabase were located along the approximate position of Page's second dike but these represent the coarser phase of the north-northwest-trending diabase intrusive and related dikes.

Late Felsic Intrusive Rocks

GRANITIC DIKES

Page (1960, p. 7) reports the presence of "pink to reddish syenite dikes and stringers" cutting diabase dikes in Meath and Glasgow Townships. During the present survey, small irregular stringers of pink feldspathic material up to 1 inch thick were found which cut the diabase on the west side of Meath Lake. A small dike, composed primarily of pink feldspar and possibly similar to those described by Page, occurs on the north side of Easey Lake near the fault.

In addition, two granitic dikes were found which cut diabase in Meath Township. One, located at the rapids on the Dog River below Harcourt Lake, consists of a very highly sheared granitic rock with a mylonitic appearance. The second, found just west of the south end of Martin Lake, is fine grained, massive, pale pink to grey, and contains small scattered feldspar phenocrysts.

GRANOPHYRE

A granophyre dike occurs on the Dog River 300 feet downstream from the outlet of Martin Lake. The dike, about 100 feet wide, grades from a fine-grained, reddish granophyre on the north to a dark reddish green rock carrying rounded segregations of coarse-grained amphibole, some of which are up to 4 inches in diameter. The "red rock" consists of about 65 percent sodic plagioclase, about 25 percent hornblende, and minor amounts of chlorite, apatite, and carbonate. The plagioclase is poorly twinned and contains considerable reddish dusty patches of inclusions. Chlorite occurs as large masses surrounded by anhedral hornblende.

The matrix of the amphibole-bearing part of the dike is similar to the red granophyre except that epidote and carbonate are much more abundant at the expense of plagioclase. The predominant amphibole mineral is hornblende altered to uralite along grain boundaries. Large magnetite-leucoxene (after ilmenite) intergrowths are very common in some segregations whereas in others apatite, chlorite, or carbonate may be prominent. Extensions of the dike away from the river were not found.

Ultramafic to Mafic Intrusive Rocks

SERPENTINIZED PYROXENITE AND PERIDOTITE, SERPENTINITE

Nine bodies of ultramafic intrusive rocks are known to occur in the map-area and on the basis of geophysics, the presence of two others is suggested. These ultramafic rocks are dark grey-green to black, weather grey-green, and are usually massive. They range in composition from serpentinized pyroxenite to partly altered peridotite and, locally, areas of light green waxy serpentinite may be present. Small stringers of cross-fibre asbestos are found in some of the intrusives as well as small seams and patches of magnetite. The small ultramafic plug located on the west shore of Glasgow Lake has been intruded into massive granitic rocks. Although definite contact relationships are lacking, the ultramafic body associated with the large body of diabase south of Easey Lake is thought to be younger than the diabase. These ultramafic rocks may be genetically related to the large body of olivine gabbro described by Bruce (1947, p. 11-17) and located approximately 1½ miles south-southwest of Glasgow Lake.

BASALTIC DIKES

Several small, irregular, hard, black, aphanitic dikes ranging from 2 to at least 24 inches thick cut the metavolcanics. One dike, about 3 inches thick, cuts an outcrop of diabase on the northwest shore of a small lake 6,000 feet southeast of the exit of Easey Lake. A sample of a similar dike from the first outcrop on the Dog River upstream from Martin Lake consists of subhedral plagioclase phenocrysts (An_{50}-An_{60}) up to 2 mm long set in a fine-grained aggregate of randomly oriented plagioclase laths (An_{45}), irregular biotite grains, white mica, and a granular to feathery black oxide. Small crosscutting veinlets contain chalcedony, carbonate, and chlorite. White mica is present as an alteration product of some plagioclase phenocrysts and the considerable amounts of white mica in the groundmass may result from alteration of very fine grained plagioclase.

CENOZOIC

Pleistocene

Pleistocene deposits cover most of the map-area (Figure 2) and consist of ground moraine, terminal moraine and glaciofluvial and glaciolacustrine deposits. Thirteen glacial striae were found in or adjacent to the map-area. The attitude of these striae indicate that during its last advance the continental glacier moved from the northeast along a mean direction of S37°W.

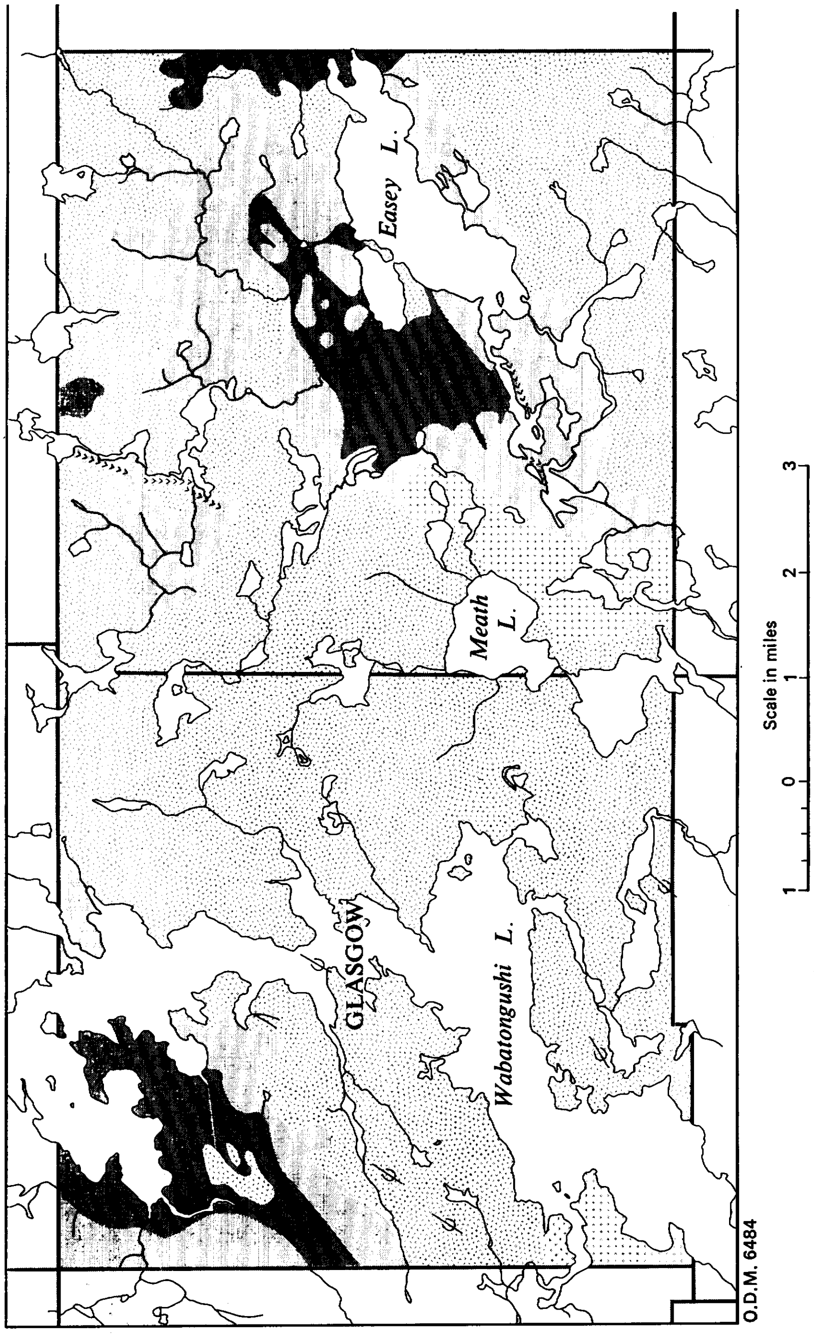
Ground moraine consisting of silty to sandy till, usually reddish in colour, and containing varying proportions and sizes of clasts, mantles about 65 percent of the Glasgow-Meath-Rennie area. Pebbles and boulders, most of which were derived locally from the Precambrian bedrock, are common constituents and, locally, sand and gravel may compose much of the till. Generally ground moraine is not more than a few feet thick. However thicker accumulations may be present in valleys between resistant ridges of bedrock.

Boissonneau (1965) shows two small areas of terminal moraine in the Glasgow-Meath-Rennie area; one in the southwestern part of Glasgow Township; the second, which terminates at its northeast end in an outwash plain, south of Meath Lake. These deposits consist of stratified sand and gravel in which scattered boulders are occasionally present. The moraines occur as broad, hummocky northeast-trending areas within which narrow irregular northeast-trending ridges are present. Some of the ridges may be as high as 100 feet and are frequently steep sided. A few small kettles are present in the moraine in the southwestern part of Glasgow Township. These moraines probably represent a series of minor retreats of a local ice lobe as indicated by their considerable widths and by their composite nature, being composed of several separate northeast-trending ridges.

The configuration of the eskers on Figure 2 indicates that the intraglacial and subglacial rivers flowed south-southwest in the northern part of the area and southwest in the southern part. Composed primarily of sand and gravel with varying proportions of boulders, the eskers average about 75 feet high and may be from 75 to 300 feet wide. They are found in areas of ground moraine, outwash, and glaciolacustrine deposits.

Outwash deposits in the Glasgow-Meath-Rennie area are shown on Figure 2. They consist of sand, gravel, and, locally, boulders, range from well to poorly bedded, and are light grey to red in colour. The clasts comprising these deposits are primarily fragments of granitic rocks, minor amounts of metavolcanic or metasedimentary material, and, rarely, well-rounded pebbles of Paleozoic limestone. One fragment of Paleozoic limestone contains a poorly preserved brachiopod; a second fragment contains a poorly preserved coral. The outwash deposits vary from flat to hilly and are usually heavily forested. Both east and west of Easey Lake and west of Wabatongushi Lake, the outwash deposits have undergone erosion by the action of glacial-lake waters.

The eroded nature of the outwash deposits and the presence of flat topography locally bordered by wave-washed outcrops suggests the presence of glaciolacustrine deposits east of Wabatongushi Lake and east and west of Easey Lake. Material deposited at the mouths of streams meandering across these flat low-lying areas in-


Easey L.
Meath L.
GLASGOW
Wabatongushi L.
Scale in miles
1 0 1 2 3
O.D.M. 6484

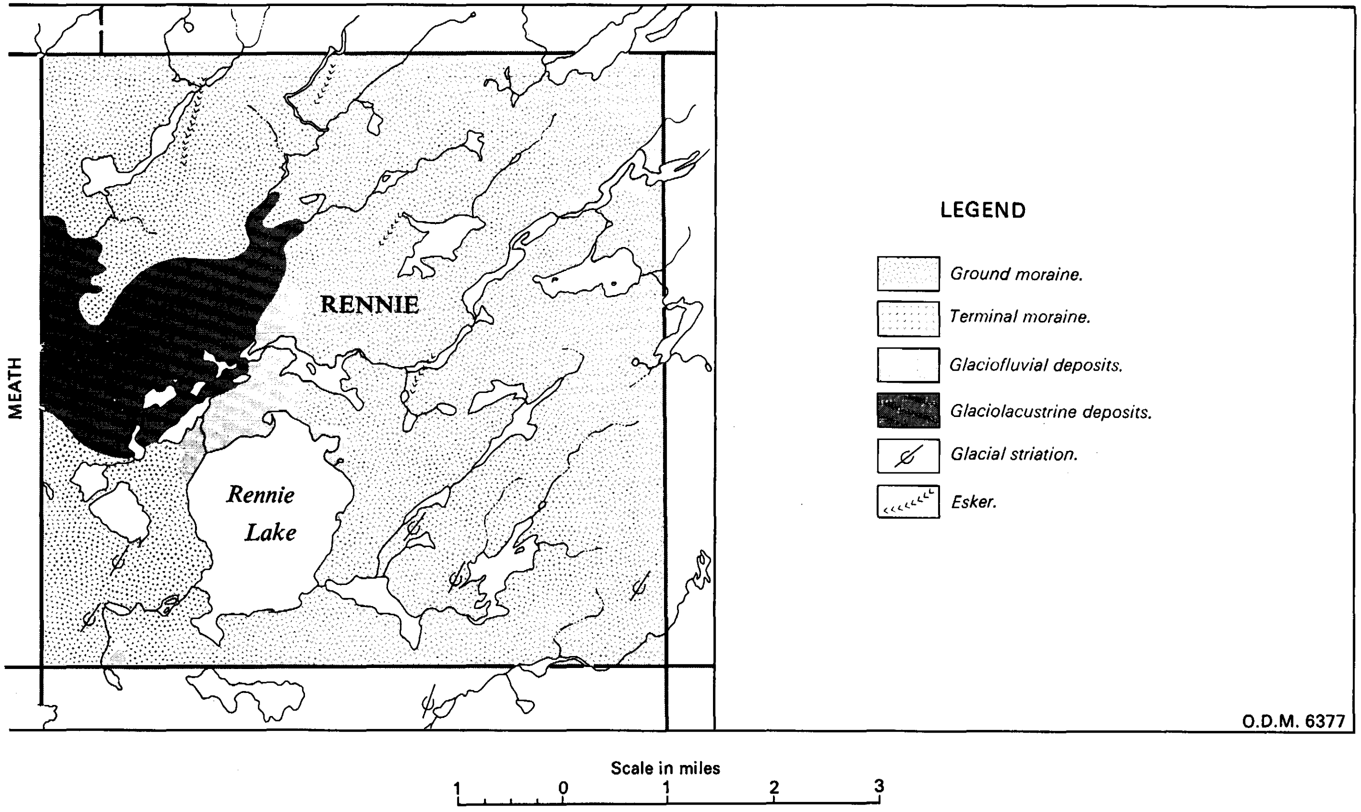


Figure 2—Photo interpretation of surficial geology in Glasgow-Meath-Rennie Townships.

dicates that these areas are underlain by clay, silt, and fine sand. These latter sediments seem to have been originally deposited in shallow extensions of Wabatongushi and Easey Lakes. The extended lakes were probably caused by melt water from the retreating glacier. The lack of well-developed beaches on the outwash deposits and on the esker east of Easey Lake strongly suggests that these extended lakes were of short duration.

Recent

Recent deposits are of two main types: lacustrine and fluvial deposits of clay, sand, gravel; and swamp and bog deposits chiefly of clay and silt mixed with considerable organic material.

Deltaic deposits of clay, sand, and gravel are found at the mouths of several creeks including Cormick Creek, Butler Creek, and Meath Creek, the creek emptying into the northwest bay of Easey Lake, and the creek emptying into the bay of Wabatongushi Lake in the northwestern part of Glasgow Township. Fluvial deposits of fine-grained well-bedded sand are common along the Dog River where sand and gravel from the outwash and moraine has been reworked and deposited in oxbows and along bends in the river. Recent lacustrine deposits consist of sand and gravel of glacial origin which has been reworked by wave action. Several beaches along the shores of the northern half of Rennie Lake, of the east side of Easey Lake, and at the northeast end of Meath Lake are of this type.

Swamp and bog deposits are primarily in the low-lying areas along the creeks and the edges of some small lakes. Recent deposition in these areas consist of organic material and minor silt and clay. Some of the swamp deposits around the small low-lying lakes and sluggish rivers will probably gradually drain as isostatic adjustment continues in the Glasgow-Meath-Rennie area.

GENERAL STRATIGRAPHIC RELATIONSHIPS

Because of a paucity of good outcrop exposure, which hampers both correlation and structural interpretation, the stratigraphic relationships in the Glasgow-Meath-Rennie area are imperfectly known. The eastern and southern parts of Rennie Township and the southern half of Meath Township are more amenable to general stratigraphic interpretation because structural relationships here are better understood.

There seems to be four main stratigraphic units in the map-area: (1) a lower sequence of mafic metavolcanic flows at least 6,000 feet thick; (2) a lower sequence of intermediate to felsic metavolcanic flows and pyroclastics, the thickness of which is uncertain but which may reach a maximum of 12,000 feet; (3) an upper mafic metavolcanic sequence made up mostly of metabasalt flows and at least 6,000 feet thick; (4) an upper intermediate to felsic metapyroclastic unit with a maximum thickness of about 1,500 feet.

The oldest rocks in the Glasgow-Meath-Rennie area are the mafic metavolcanics along the eastern boundary of Rennie Township and in the vicinity of Battley and Conboy Lakes. Scattered pillows in this unit indicate subaqueous extrusion at least in part. Extrusion of mafic flows was superseded by deposition of felsic to intermediate volcanic rocks and the interbedded nature of the felsic and mafic metavolcanics in the eastern part of Rennie Township indicates that this change was a gradual process and was not interrupted by lengthy intervening periods of erosion.

The rocks of the lower intermediate to felsic metavolcanic sequence including the felsic pyroclastics of the Stephenson Lake area, those south of Conboy Lake, and the intermediate metavolcanics at the southwest end of Easey Lake and underlying the southern part of Meath Township, are considered to have all originated during the same general period of felsic to intermediate volcanism. Volcanic activity during this period, however, varied considerably. In the eastern region, the deposition of a thick sequence of coarse felsic pyroclastic rocks and associated ash flows was periodically interrupted by extrusion of mafic flows, and pillows in many of these flows indicate subaqueous deposition. The large amounts of coarse pyroclastic debris near Stephenson Lake suggests that the source of much of the felsic pyroclastic material was nearby. During this period of predominantly explosive felsic volcanism in Rennie Township, a thinner sequence of intermediate to felsic volcanic flows and pyroclastics was being deposited to the west. Pillows in these units also indicate subaqueous deposition. Except for one small area immediately east of Easey Lake, pyroclastic debris in this unit is relatively fine grained and the location of the vent from which the volcanic material was extruded is not known, although it may possibly have been in the Stephenson Lake area. It is more likely, however, that the material comprising this felsic to intermediate volcanic unit was extruded from several vents.

This period of felsic and intermediate volcanism was followed by a second episode of mafic volcanism, but the change was not everywhere abrupt. In the eastern part of the map-area, mafic volcanic flows were extruded throughout the felsic episode, and gradually increased in volume and quantity until they became the dominant flow type. On the west and south side of the Baltimore Lake syncline, the upper mafic unit is present as a thin layer of mafic metavolcanics, iron formation, and metagreywacke, overlain by a thin unit of intermediate metavolcanic flows; on the eastern and northeastern side the unit consists primarily of massive to pillowed flows. The large area of mafic metavolcanic rocks north of Rennie and Easey Lakes and northwest of Moorhouse Lake seems to be part of this same sequence. Except for a few pillows found near the contact with the lower felsic metavolcanic sequence north of Garvey Lake, there is no evidence of subaqueous deposition for this part of the upper mafic metavolcanic unit. A few pillowed outcrops are present in the faulted extension of the upper mafic metavolcanic sequence in the southern part of Glasgow Township, and these, coupled with a minor amount of interflow sediment, suggest a subaqueous environment for this sequence in the western part of the map-area.

The youngest metavolcanic-metasedimentary rocks in the Glasgow-Meath-Rennie area are in the Baltimore Lake syncline. These rocks, mainly intermediate to felsic pyroclastics with subordinate amounts of sedimentary material, overlie the upper mafic metavolcanic unit. The thickening of these pyroclastics and the increasing amounts of sedimentary material towards the southeast probably indicate a deepening of the basin in this direction. An increase in the size of the pyroclastic fragments towards the southeast may indicate that the source of the volcanic detritus was in this direction as well. Lack of the upper pyroclastic unit in the northern part of this belt suggests that either sedimentation did not extend this far north or that it has been removed by erosion.

The general stratigraphic sequence as described for the Glasgow-Meath-Rennie area is similar in many respects to the general sequence described by Goodwin (1962) for the main part of the Michipicoten metavolcanic-metasedimentary belt to the west. Goodwin divided the metavolcanic assemblage in the Michipicoten area into three main sequences separated by chemical and clastic sediments. His lower volcanic rocks include a lower intermediate to mafic flow section and an upper felsic pyroclastic section which correspond to the lower mafic volcanic sequence and lower intermediate to felsic pyroclastic sequence of the Glasgow-Meath-Rennie area.

Iron formation overlies both the felsic section of Goodwin's lower volcanic rocks and the lower intermediate to felsic volcanic sequence of the Glasgow-Meath-Rennie area. However the iron unit in the map-area of this report is very narrow (probably less than 20 feet) and consists mainly of iron minerals of the oxide facies. In the western section of the belt, iron minerals of the carbonate and sulphide facies predominate and the unit is commonly marked by a layered silica member between 100 to 200 feet thick.

Overlying the iron formation unit in the western section of the belt are the andesite flows and pyroclastics of Goodwin's middle volcanic member; in the Glasgow-Meath-Rennie area the upper mafic volcanic unit overlies the iron formation unit. Across most of the belt, Goodwin's middle volcanic unit grades upward through interbedded volcanic and sedimentary rocks to the overlying Doré sediments. This latter unit is not represented in the Glasgow-Meath-Rennie area where the contact between the upper mafic volcanics and upper felsic to intermediate volcanics is sharp.

The upper volcanic rocks of the main part of the belt are predominantly mafic to intermediate flows with minor pyroclastic rocks. In contrast, however, the youngest rocks in the stratigraphic sequence in the Glasgow-Meath-Rennie area consist of intermediate to felsic pyroclastics grading upward into fine-grained sediments. It is possible that this upper intermediate to felsic metavolcanic sequence is equivalent in time to the upper part of Goodwin's middle volcanic unit.

STRUCTURAL GEOLOGY

FOLIATION

Bedding is well displayed in the metasedimentary rocks, particularly along the southern boundary of Rennie Township, due to marked lithologic contrasts. In metapyroclastic rocks, bedding ranges from good in the fine-grained tuff and lapilli-tuff units to absent in the coarse-grained breccias and ash-flow tuff units. Local areas of reworked pyroclastic material display poor to moderate bedding and, south of Conboy Lake, bedding can be seen in some of the fine-grained sericitic metatuff.

Schistosity (also referred to as foliation) is present in many outcrops and is due to the parallel alignment of mineral constituents during metamorphism, often accentuated by later slippage along these foliation planes. The schistosity varies, being well developed in fine-grained metapyroclastics, poorly developed in mafic metavolcanics and felsic ash-flow metatuffs, and nonexistent to well developed in intermediate metavolcanic flows. Where the metavolcanic-metasedimentary sequence is cut by intrusive rocks, schistosity commonly parallels the contact of the intrusive body;

away from the contacts, schistosity is usually parallel to bedding or flow contacts. In granitic rocks, schistosity, at least in part resulting from preconsolidation movement, is vague to moderately well developed and is due to the parallel alignment of biotite and hornblende. Schistosity is present in local areas only near contacts with the granodiorite stocks.

In the vicinity of some faults, shearing has caused a poorly to well developed foliation parallel to the fault. Narrow zones of poorly to moderately developed foliation parallel to some of the major linears in the map-area suggest that these linears are faults or shear zones.

GNEISSOSITY

Gneissosity is developed best in the hornblende-hornfels facies of mafic metavolcanic rocks where metamorphic mineral segregation has produced a very distinct layering. These layers are up to 0.5 inches thick and alternate between dark coloured layers of hornblende and epidote with minor plagioclase and light coloured bands of plagioclase with minor epidote. Well developed locally, this layering is easily mistaken for preserved bedding, but individual layers cannot be traced more than a few feet along strike before pinching out.

Poorly to well-developed gneissosity is present in some parts of the batholiths. Near the contacts of the batholiths with the metavolcanics and in areas of hybrid rocks, the gneissosity seems to reflect metamorphic layering originally developed in the amphibolites.

A poorly developed gneissosity, characterized by lenticles of feldspar set in a matrix of aligned amphibole, is present in some parts of the metagabbro body south of Loch Lomond.

LINEATION

Several types of lineation, including mineral lineation, minor fold axes, crenulations, stretched fragments, and S-plane intersections, are present in the map-area. Mineral lineations most frequently observed were aligned amphibole grains, amphibole and biotite aggregations, and, occasionally, aggregates of feldspar. Such lineations were observed on bedding, schistosity, and joint planes.

Both S- and Z-type minor folds are present and usually the axes of these folds plunge at an angle greater than 60°. These folds are developed best in tuffaceous metavolcanic rocks, but several were noted in the hornblende-hornfels facies of mafic metavolcanics. Crenulations are present on foliation planes and not infrequently on joint surfaces. They are generally small except in areas near fault zones. Large crenulations were found in an outcrop of sericitic tuff southwest of Rennie Lake.

In addition to the above, elongated fragments, slickensides, S-plane intersections, and boundinage were occasionally observed.

JOINTS

Attitude determinations on joints in the Glasgow-Meath-Rennie area numbered 229 of which 153 of these were recorded in Rennie Township. Joints are developed best in the more massive rocks including diabase, massive granodiorite, some massive amphibolite, and, locally, ash-flow metatuffs. Because of well-developed jointing in the massive granodiorite, the continental ice sheets were able to remove the tops of the stocks, permitting the development of Rennie, Easey, and Spring Lakes.

The most prominent joint direction determined by the author is N5°W, vertical; with the other main directions being N46°E, 86°NW; N45°W, vertical; N67°E, 85°NW; in that order. Many diabase dikes seem to have been emplaced along the N5°W-trending joint set. The trend of the quartz diorite dikes and two east-northeast-trending faults may be related to the set of joints trending at N67°E. The northeast- and northwest-trending faults are also probably related to jointing as they are parallel or subparallel to the predominant jointing trends.

FOLDS

Where structural and stratigraphic data permit, interpretation of the traces of the axial planes of the major folds in the Glasgow-Meath-Rennie area has been undertaken (Map 2210, back pocket). Insufficient data in northern Meath and Glasgow Townships precluded the interpretation of fold patterns in this area. Fold trends in the map-area have been in part controlled by and certainly complicated by the intrusion of granitic rocks.

The isoclinally folded Baltimore Lake Syncline is the most prominent and continuous fold in the map-area. Several top determinations from pillowed metavolcanic rocks on both sides of the structure attest to its synclinal nature.

An anticline, the core of which has been intruded by Harcourt Lake Stock, is suspected to be along the southern boundary of Meath Township. The intermediate metavolcanic unit in this area is shown by Horwood (1944) to pinch out to the southeast in Stover Township. Bordering this metavolcanic unit on the south and west is a sequence of interbedded mafic flows and iron formation. A similar unit bordering the intermediate metavolcanic unit on the north was traced northwest through Rennie into Meath Township during the present mapping program. These stratigraphic relationships in conjunction with a few top determinations suggest that the mafic metavolcanic-iron formation sequence overlies the intermediate to felsic metavolcanic unit and that the latter has been eroded from the core of an anticline.

The presence of a west-trending syncline between Battley and Spring Lakes is substantiated by stratigraphy and subordinate structural data. Top determinations from pillow shapes, one west of Trem Lake and a second northeast of Garvey Lake, suggest younger rocks to the south. No top determinations were available in the Spring Lake area, but the prevalent dip of the foliations in this area is to the north.

In the area east of the north end of Stephenson Lake, the trend of the volcanic rocks coupled with foliation attitudes suggests the presence of a steeply westward-plunging anticline. The intrusion of the granitic batholith east of Rennie Township has imparted a steep westerly dip to the volcanic formations near the contact and is responsible for the steep westerly plunge of the anticline. The Rennie Lake Stock interrupts the trace of the axial plane of the anticline west of Stephenson Lake and is at least partly responsible for the other structural complexities in the western part of the felsic pyroclastic sequence.

FAULTS

There are two predominant fault trends in the map-area, N15° to 40°W and N35° to 60°E. With the exception of the Meath Lake Fault, faults in the northwest-trending set generally have little topographic expression and are defined on the basis of offset rock units, rarely exposed narrow shear-mylonite zones, and occasionally, poorly developed topographic lineaments. Fault traces appear to be relatively straight indicating vertical to near vertical fault planes. Apparent movement of these faults, according to stratigraphic relationships, seems to have been both sinistral and dextral. The apparent horizontal component of movement is as much as 1,100 feet; the amount of vertical movement unknown. The trend of many of the diabase dikes is approximately parallel to the northwest set of faults and it is probable that some of the dikes are located along such faults. Movement along some of these faults has been post-diabase as indicated by the apparent offset of the magnetics over the dike south of Quary Lake. The fact that most of the northwest-trending faults shown on the map are located south of Easey and Rennie Lakes results from more accurate stratigraphic control in this area. It does not necessarily imply a dearth of such faults elsewhere in the Glasgow-Meath-Rennie area.

The Meath Lake Fault, trending north-northwest through Meath and Glasgow Townships, is the most prominent fault in the map-area. It is of regional proportions and its extensions beyond the map-area are shown on the Lochalsh Aeromagnetic Map (O.D.M.-G.S.C. 1963a). The trace of the fault in the map-area is relatively straight. Its topographic expression may be either positive as observed northwest of Carter Lake or negative as observed south of Meath Lake. The topographic highs northwest of Carter Lake coincide with a mylonite zone which is up to 300 feet thick west of Shehan Lake. The mylonite is pale green, hard, and massive in outcrop. Locally, a few poorly defined fragments may be recognized. Epidote is ubiquitous both as a component of the rock and in stringers. Sparse finely disseminated pyrite is also present.

Immediately bordering the mylonite zone, the granitic rocks have a pronounced foliation and schistosity is very well developed in amphibolites; both are essentially parallel to the fault trace. Near the diabase dike at the northwest end of Meath Lake, the rocks are highly contorted and altered and their identity difficult to establish. South of Meath Lake, rocks on either side of the topographic low display evidence of shearing and alteration.

The fault is of regional proportions and, although the amount of movement along the fault zone is unknown, aeromagnetics suggest that there may be a strike separation, west side south, of as much as three miles. The vertical component of movement is probably also considerable.

The northeast-trending faults are defined by marked depressions, disconnected scarps, and local shearing and brecciation. Their topographic expression has been in part developed by the southwest movement of the continental glaciers which removed considerable amounts of incompetent rock from the fault traces. Along the edges of scarps, these faults are marked by narrow shear or breccia zones, which at some outcrops have considerable amounts of quartz and pyrite. Apparent movement has been both sinistral and dextral, but where reasonably well defined does not appear to have been more than a few hundred feet. Southwest of Ren Lake, diabase dikes cross the northeast-trending fault with no apparent offset, whereas elsewhere they appear to terminate at the northeast-trending faults. These relationships and the fact that the younger ultramafic body along the northeast-trending fault near Martin Lake has been highly sheared suggest that movement along this fault set has been intermittent.

ECONOMIC GEOLOGY

The first intensive exploration program in the Glasgow-Meath-Rennie area was undertaken in the period from 1939 to 1941 as a result of the discovery of the Renabie orebodies in Leeson Township near the southeastern corner of Rennie Township. This exploration, carried out mainly by Renabie interests, was concentrated in the southeastern part of Rennie Township in the vicinity of the mine, but no mineral deposits of an economic nature were uncovered. South of Conboy Lake, however, a zinc-silver showing was discovered and limited trenching undertaken.

In the period immediately following World War II, interest in the area was revived and several mining companies undertook exploration programs. Lysander Gold Mines Limited (8) and Wesson Mines Limited (11) carried out a co-operative program of prospecting, geological mapping, magnetometer surveys, and drilling on their adjoining properties between Tucker Lake and the southern boundary of Rennie Township. Camabie Mines Limited (5) carried out limited exploration on five claims, the eastern extension of a larger block in Leeson Township, along the eastern boundary of Rennie Township immediately north of the Renabie ground.

A third period of active exploration occurred during the period from 1950 to 1954. During 1949 and 1950, McIntyre Porcupine Mines Limited carried out a program of drilling on several gold showings on either side of the Dog River near the southern boundary of Meath Township, under option from Maisondor Gold Mines Limited (3). Coulee Lead and Zinc Mines Limited carried out trenching and drilling on the zinc-silver showing south of Conboy Lake in 1951 and 1952. Cobalt Products Limited carried out a magnetometer survey and limited drilling on an asbestos showing on Butler Lake in 1952. In 1953, Northabie Mines Limited (9) undertook geological mapping, a resistivity survey, and drilling on a group of 15 claims along the eastern boundary of Rennie Township between Battley Lake and the Camabie Mines Limited (5) property.

Except for a geophysical survey and limited drilling south of Loch Lomond by Algoma Ore Properties Limited [1958] (1) in 1958, the period between 1954 and 1961 saw little exploration in the area. In 1962, a reconnaissance mapping program covering Glasgow and Meath Townships was undertaken by T. W. Page (1960) for the Canadian Pacific Railway. In 1962, Algoma Central Railway carried out general reconnaissance prospecting in Glasgow and Meath Townships. During 1964 and 1965, Winchester Exploration Limited carried out surface prospecting on the former gold showings of Maisondor Gold Mines Limited (3) near the Dog River. From 1963 to 1967 Westfield Minerals Limited (12) re-examined the zinc-silver showing south of Conboy Lake, carrying out airborne magnetic and electromagnetic surveys, induced polarization surveys, geological mapping, trenching, and diamond drilling.

GOLD

Gold was the magnet which attracted prospectors to this general region; first, after the discovery of gold near Goudreau in 1918, and again after the discovery of the Renabie orebodies in 1939. Only very limited success has so far been attained in the search for gold in the Glasgow-Meath-Rennie area.

Quartz veins seem to be the most significant host for gold mineralization. These veins range from a few inches to over 48 inches thick and may contain minor amounts of pyrite and traces of galena, sphalerite, and chalcopyrite. Some veins are apparently continuous over distances up to 300 feet, whereas others take the form of *en echelon* lenses or discontinuous pods traceable over distances up to 100 feet. Most veins, however, cannot be traced for such distances due to heavy overburden.

The southwestern part of Meath Township contains the highest proportion of auriferous quartz veins. These veins are commonly less than one foot thick and usually have sulphide minerals associated with them. Immediately south of Spring Lake in Rennie Township, a similar vein is reported to carry low values in gold. A considerably larger vein is found straddling the Rennie-Leeson Township boundary about 1,800 feet north of the township corner. This vein is up to 4 feet thick and has been traced intermittently for about 300 feet.

A noteworthy point is the fact that all the auriferous quartz veins found in the area to date are located near or in granitic rocks. This point should be born in mind by the prospector when selecting an area in which to prospect for gold.

Horwood (1944) reports low gold values from quartz and disseminated pyrite in shear zones in felsic metavolcanic breccia in Stover Township. Similar shear zones in both metabreccia and metatuff are common in the Glasgow-Meath-Rennie area, particularly in Rennie Township and the southern part of Glasgow Township. Samples from these sulphide-rich zones assayed by the Laboratory and Research Branch of the Ontario Department of Mines returned only trace amounts of gold. Very low gold values are associated with the zinc-silver mineralization south of Conboy Lake.

SULPHIDE MINERALIZATION

Except for the zinc-silver occurrence south of Conboy Lake, sulphide mineralization is not found in amounts significant enough to encourage intensive prospecting. Pyrite and less commonly pyrrhotite are found in shear zones, particularly in the intermediate to felsic metapyroclastic units, but these zones are usually barren of other sulphide mineralization.

On the east side of the Lochalsh River just below the outlet of Loch Lomond, blocks of sericite schist carrying up to 20 percent pyrite are found across a width of 150 feet. About 500 feet southeast of this area, Page (1960) reported the presence of a shallow pit exposing, over a 6-foot width, nodules and bands of pyrite up to 2 inches wide separated by bands of sericitic material.

On the south side of Loch Katrine, minor disseminated pyrite occurs in narrow zones in quartz-sericite schist. Further west, south of Loch Lomond, massive to disseminated pyrite and pyrrhotite in narrow widths and in amounts up to 25 percent have been reported by Algoma Ore Properties (1) in graphitic quartz-sericite schist. These two zones are undoubtedly in the same unit as the pyrite occurrences along the Lochalsh River. Lack of continuity of these deposits along strike indicates that they probably occur as discontinuous lenses.

Minor amounts of pyrite, usually associated with quartz, are found in outcrops along the northeast-trending fault northwest of Easey Lake, along the fault on the west side of the lake in the northeastern part of Glasgow Township, and along a narrow fault southwest of Moorhouse Lake. Sparsely disseminated pyrite is found in the mylonite zone along the Meath Lake Fault.

A narrow shear zone in intermediate metatuff south of Meath Lake contains minor chalcopyrite and pyrrhotite in addition to about 2 percent pyrite and gave 0.13 percent copper upon assay by the Laboratory and Research Branch of the Ontario Department of Mines. Trace amounts of chalcopyrite associated with from 10 to 80 percent sulphides, mainly pyrite with minor pyrrhotite, were reported by Lysander Gold Mines Limited (8) from drilling in sheared metapyroclastics in the southeastern part of Rennie Township.

Traces of chalcopyrite, sphalerite, and galena in association with pyrite are frequently found in and along quartz veinlets. Minor chalcopyrite and malachite associated with pyrite and tremolite occur in irregular calcite veinlets less than 5 inches thick over a strike distance of 15 feet on a point on the north shore of Easey Lake. Chalcopyrite associated with pyrrhotite, pyrite, and some magnetite has been reported from old trenches on the northwest end of Spring Lake. The host rock here consists of garnetiferous metavolcanic breccia, intruded by several narrow porphyritic granodiorite sills and containing silicified zones and quartz veins. The quartz veins and silicified zones carry heavy pyrrhotite and pyrite mineralization, but chalcopyrite was not observed in the trenches by the writer nor was any reported in drill logs submitted for assessment work by Wesson Mines Limited (11).

Molybdenite has been reported (MacIntosh 1962a) from a small pegmatite on the northwest shore of Wabatongushi Lake about 4,000 feet north of the east end of the large island in the southwestern part of Glasgow Township. A diligent search by members of the field party failed to locate this reported occurrence.

The most significant sulphide showing lies about 1,000 feet south of Conboy Lake. It consists of pyrite, sphalerite, and minor galena and chalcopyrite and contains significant silver values. The occurrence is found in a sheared sericitic metatuff.

ASBESTOS

Four occurrences of asbestos have been located in the Glasgow-Meath-Rennie area. The largest is on the northwest shore of Butler Lake about 800 feet northeast of the portage to Conboy Lake (Photo 8). Minor cross-fibre asbestos stringers up to 0.4 inches thick, but averaging about 0.06 inches, are present in narrow, yellow-green serpentinite zones in grey-green serpentinized pyroxenite. A second occurrence, on the northeast shore of a small lake 6,000 feet north of the east end of Easey Lake, contains cross-fibre asbestos in a medium grey-green serpentinized pyroxenite.

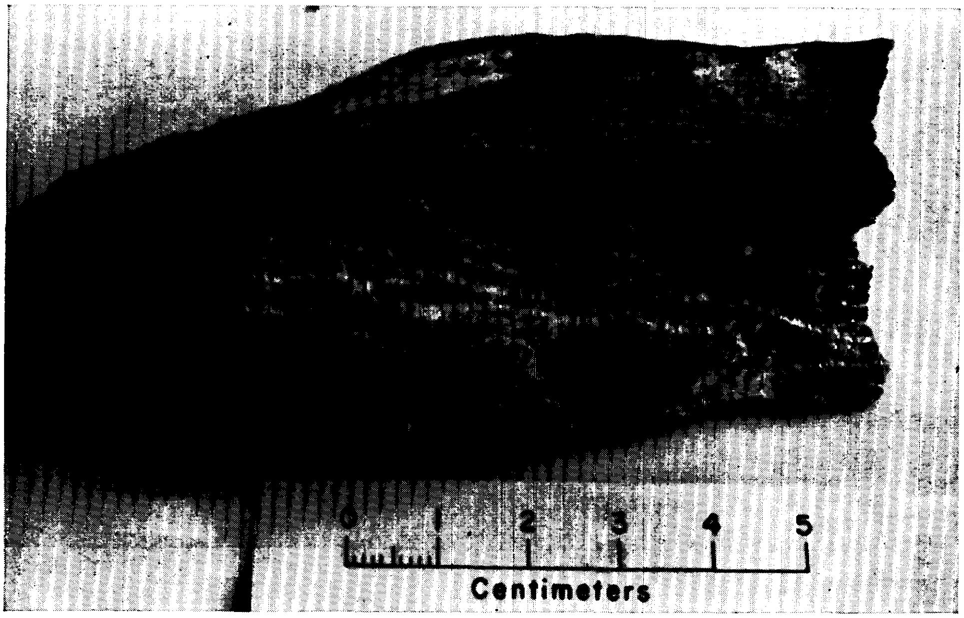


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Photo 8—Chrysotile asbestos stringers in serpentinite from Butler Lake asbestos deposit.

These fibres average about 0.06 inches thick with a few up to 0.5 inches and occur with minor magnetite in irregular fractures spaced at intervals of between 4 and 36 inches. Sparse fibres of asbestos, averaging about 0.06 inches thick, occur in the southwestern end of a narrow sill of dark green to black serpentinized pyroxenite about 3,200 feet southeast of Easey Lake. A small serpentinite plug on the southwest shore of Conboy Lake contains a few narrow seams of cross-fibre asbestos, occasional slip-fibre asbestos, and light magnetite mineralization.

IRON

The iron formation units in the Glasgow-Meath-Rennie area are narrow and discontinuous and consequently their exploitation as a source of iron ore is not economically feasible.

SAND AND GRAVEL

Extensive deposits of sand and gravel cover a considerable area in Glasgow-Meath-Rennie Townships and are indicated on Figure 2. Gravel has been used as road metal on the Renabie Road in Rennie Township but, except for one very small pit along the road, most of the gravel was obtained from outside the map-area.

Table 2 SUMMARY OF EXPLORATION WORK IN GLASGOW-MEATH-RENNIE TOWNSHIPS

	No. of Claims	Type of Work	No. of Drill Holes	Drilling Total Footage	Property No.	File Nos. SSM	Glasgow	Meath	Rennie	Year Work Done	Remarks
Algoma Ore Properties Limited [1958]	18	GP DD	1	763	1	SSM 643	*			1958	Part of block of claims extending into Township 47
Butler Lake Asbestos Deposit	10	MAG DD TP TR	1	464	4	SSM 962			*	1951 1953	MAG by Cobalt Products Ltd. DD by Coulee Lead and Zinc Mines Ltd.
Camabie Mines Limited	5				5	SSM 958			*		Pt. of block extending into Leeson Tp. worked on. Inactive since 1948. No record of any work on Rennie Group.
Carmichel, D. H.	2				6				*		No record of exploration work.
Cascaden, E. S.	2	TR			2			*			Staked in 1919. Patented 1926.
Ginn, Peter	9	MAG GL DD	4		7				*	1947	MAG, GL DD by Wesson Mines Ltd.
Lysander Gold Mines Limited [1947]	14	MAG GL DD TR, ST	4	856	8	SSM 528			*	1947	One claim in Stover Township.
Maisondor Deposit	23	TR DD SA ST GL	9	965	3			*		1949-1950 1962 1964	McIntyre Porcupine Mines Ltd. option of property. TR, GL and DD, additional DD but no record. SA by McIntyre Porcupine Mines Ltd. H.G. Exploration Ltd. TR. Winchester Expl. surfaced, prospected.
Northabie Mines Limited [1952]	15	GL DD, RS	Unknown	25,000	9	SSM 568			*	1953	

Renabie Mines Limited	11	GL TR, SA DD, RS	Unknown	Unknown	10	SSM 1377						Patented in 1946.
Wesson Mines Limited [1947]	46	MAG GL DD	10	1149	11	SSM 492				*	1947	Inc. 1947. Charter cancelled 1957.
Westfield Minerals Limited	41	ST, TR AMAG AEM DD GL SA MAG EM IP	9 13 6	3213 246	12					*	1939 1946 1947 1953 1962 1963 1964 1965 1966 1967	ST, TR ST, TR ST, TR SA, DD by Coulee Lead and Zinc MAG, EM, SA by Gunnex DD DD, AMAG, AEM DD, GL, EM TR, ST IP

Symbols:

A — Airborne
DD — Diamond Drilling
EM — Electromagnetic
GL — Geological
GP — Geophysical
IP — Induced polarization
MAG — Magnetic, magnetometer
RS — Resistivity Survey
SA — Sampling, assaying beneficiation studies
ST — Stripping, manual, plugger, compressor, mechanical equipment, bulldozing
TR — Trenching
TP — Test Pitting

DESCRIPTION OF PROPERTIES

Algoma Ore Properties Limited [1958] (1)[1]

In 1958, Algoma Ore Properties[2] held a block of claims south of Loch Lomond in Glasgow Township and Township 47. This prospect is underlain by metabasalt flows, metagabbro, quartz-sericite schist, and minor granitic rocks. Exploration consisted of a ground geophysical survey followed by 763 feet of drilling in one hole. Several sections of mineralized quartz-sericite schist ranging from a few inches to 32 feet in length and containing an average of about 5 percent pyrite and pyrrhotite, and infrequent trace amounts of chalcopyrite, were encountered in the hole. Several graphitic sections of quartz-sericite schist were also logged with one section of 25 feet containing 40 to 50 percent graphitic laminae.

Butler Lake Asbestos Deposit (4)

This deposit, discovered by prospector Jack Tremblay in 1940, is on the northwest shore of Butler Lake about 800 feet northeast of the portage to Conboy Lake in Rennie Township. A small pit has been blasted into a poorly exposed outcrop of serpentinized pyroxenite uncovering yellow-green to dark green waxy serpentinite carrying stringers of cross-fibre asbestos. The average length of fibres is about 0.06 inches, but a few are up to 0.25 inches long. About 30 feet north of the pit, minor cross-fibre asbestos is also present in a host rock which is not as highly serpentinized as that in the pit. Irregular magnetite stringers up to 0.5 inches thick are present about 15 feet east of the pit.

The occurrence was first explored in 1951 by a magnetometer survey under the direction of Cobalt Products Limited. This survey delineated the ultramafic body and two small peripheral stocks and indicated the main body to be of limited dimensions. In 1953, Coulee Lead and Zinc Mines Limited drilled one hole of 464 feet on the showing. According to the log of the hole, 110.5 feet of asbestos-bearing material with a weighted grade of 0.708 percent asbestos were intersected. The best section graded 1.48 percent asbestos over 25 feet.

Camabie Mines Limited (5)

Camabie Mines Limited holds 5 patented claims numbered S34422 to S34425 inclusive and S34542 in Rennie Township bordering the Renabie property on the north. The claims are part of a group staked in 1939 by prospector Robert Campbell. Most of the claims lie in adjoining Leeson Township. The claims in Leeson Township were trenched and drilled during the period from 1946 to 1948 and, although

[1]Number refers to property number on Map 2210, back pocket.
[2]Amalgamated with The Algoma Steel Corp. Ltd.

there is no record of work being done on the claims in Rennie Township, it is probable that they received at least a brief examination at that time.

The claims are underlain by interbedded metabasalt flows and dacite and quartz latite metapyroclastics intruded by several north-northwest-trending diabase dikes. No significant sulphide mineralization or gold-bearing quartz veins are known to occur on the property.

D. H. Carmichel (6)

Two claims, S88737 and S89329 along the southern boundary of Rennie Township, are held under lease by Mr. D. H. Carmichel of Toronto. The claims are underlain primarily by intermediate metapyroclastics. A narrow unit of metasedimentary rocks occurs in the southwestern corner of S88737; the northeast corner of claim S89329 is underlain by metabasalt. No record of exploration on the claims is available and no concentrations of sulphide mineralization or auriferous quartz veins are known to occur on the property.

E. S. Cascaden (2)

Two patented claims SSM2341 and SSM2342 located between Pinny Lake and Loch Katrine are held by Mr. E. S. Cascaden of Lapeau, Indiana. These claims were staked in 1919 by Mr. John Aitken of Goudreau, transferred to Mr. Cascaden in 1922, and brought to patent in 1926.

The property is underlain by metadacite and metadacite breccia. About 600 feet north of the southeast end of Loch Katrine, a milky quartz vein is exposed for about 100 feet along a strike of N60°W. The vein, averaging about 4 inches thick but locally up to 30 inches, occurs in porphyritic metadacite on the east end of a low ridge.

A shallow trench 20 feet long has been excavated on the southeast end of the vein, whereas a pit, 8 feet wide, 8 feet long, and 15 feet deep, has been sunk on the northwest end of the vein to explore one of the larger swells. The wall-rocks along the vein are slightly silicified and carry minor disseminated pyrite. Narrow seams of white carbonate along joints and fractures carry minor disseminated pyrrhotite and traces of pyrite, galena, sphalerite, and chalcopyrite.

No assay results are available from this showing.

In 1965, a group of 13 claims surrounding Mr. Cascaden's property were staked by Mr. Robert Duval of South Porcupine, Ontario. No work is known to have been carried out on these claims during the field season of 1966.

Peter Ginn (7)

Nine unpatented claims held by Mr. Peter Ginn of Matheson, Ontario lie between Alister and Quary Lakes in Rennie Township. These claims are underlain by massive to foliated intermediate metapyroclastics, predominantly of ash-flow derivation, and, to the west, by granitic rocks.

The eastern part of this property was investigated for gold in 1947 by magnetic and geological surveys followed by drilling under the direction of Wesson Mines Limited (1947) (11). Four shallow holes were drilled on a semicircular magnetic anomaly about 200 feet south-southwest of Quary Lake. These holes encountered several irregular quartz veins apparently filling fractures in a brecciated buff quartz-feldspar porphyry. No assay results are available.

Lysander Gold Mines Limited [1947] (8)

Lysander Gold Mines Limited formerly held a block of 14 claims southeast of Stephenson Lake. One of the claims is in Stover Township. The remaining 13 are in Rennie Township and these are bordered on the east by the Renabie claims and on the south by the southern boundary of Rennie Township. In 1947, a magnetometer survey and geological mapping program were carried out followed by a limited program of drilling. Four holes totalling 856 feet were filed for assessment work.

The area is underlain primarily by intermediate metapyroclastic rocks including breccia, tuff breccia, and ash-flow tuff. One narrow northwest-trending dike occurs in the eastern part of the former claim group.

Prospecting uncovered only a few rusty zones containing disseminated pyrite in sheared metapyroclastics. The subsequent drilling program disclosed only a few scattered bands of disseminated to massive pyrite and pyrrhotite mineralization and a few narrow quartz veins. One mineralized zone was about 8 feet thick whereas the remaining sections averaged about 2.5 feet thick.

Maisondor Deposit (3)

The showings of the Maisondor Deposit are located along the southwestern boundary of Meath Township. Showings 1 and 2 lie about 600 feet north of the township line and about 300 feet west of the Dog River and can be reached by a trail from the Winchester Exploration Limited cabin on Dog River just south of the Meath Township line. Showing 4 is located about 1,400 feet east of the Dog River along the southern township boundary and Showing 3 is about 600 feet northwest of Showing 4. Showing 5 lies about 1,800 feet east of Showing 4. Showings 4 and 5 can be reached by following a blazed line trending N80°E from the old campsite at the point where the Dog River turns north.

The history of the showings is rather vague. Page (1960, p. 11) stated that the westernmost showing has been known since at least 1934. In 1949 and 1950, McIntyre Porcupine Mines Limited, holding the property under option from Maisondor Gold Mines Limited, trenched all the showings, but confined a program of 1,040 feet of drilling in 9 holes to Showings 1, 2, and 4. Page also reported drilling to have been carried out on Showings 1 and 2 between 1958 and 1960, but no record of this drilling is available. MacIntosh (1962b) reported that H. G. Exploration Limited probably trenched Showings 1, 2, and 5 in 1962. In 1964, Winchester Exploration Limited acquired 18 claims covering Showings 1 and 2 and carried out limited surface prospecting.

Showings 1 and 2 consist of two parallel zones about 45 feet apart containing narrow irregular bifurcating and *en echelon* quartz stringers up to 4 inches thick. These showings are located on a ridge of dacite cut by a thick diabase dike on its east side. A small granitic dike is located at the west end of Showing 2. The area immediately surrounding the veins is slightly silicified. In addition around Showing 1, the rocks are brecciated, and like the veins contain minor amounts of pyrite, pyrrhotite, and chalcopyrite. Showing 1 varies from 2 to 15 feet in width, is about 100 feet long, and at the east end is cut off by the diabase. Showing 2 varies in width, being at most 4 feet wide, and has been traced intermittently for about 100 feet. Considerable blasting has been carried out on a 15-foot scarp at the east end of Showing 2. Here, the vein, including some silicified wall-rock, is about 3 feet thick and contains very fine visible gold as well as pyrite, pyrrhotite, and minor chalcopyrite.

Assays of 11 samples from Showing 1 reported by McIntyre Porcupine Mines Limited indicated the best values were 0.82 oz. of gold over 1.5 feet and 0.24 oz. of gold over 2.5 feet. The remaining assays were less than 0.08 oz. Except for one value of 0.06 oz., assays from the trenches on Showing 2 were trace and nil. Values from the face of the pit on the edge of the outcrop, however, ranged from 0.05 oz. of gold over 3.0 feet to 2.98 oz. of gold over 3.1 feet. Assays from the five drill holes were mainly nil and trace with none above 0.02 oz.

Showings 3 and 4 are located 600 feet apart. Showing 3 consists of an 80-foot trench in which slightly sheared dacite is cut by two narrow felsite dikes, the more northerly one of which carries minor disseminated pyrite. In the south end of the trench, two quartz stringers, 1 to 2 inches thick and separated by 11 inches of dacite, carry minor pyrite and very sparse fine visible gold. Of four samples taken across these veins only one assayed over 0.03 oz. This one sample showed 2.64 oz. of gold over 1.0 feet.

Showing 4 consists of a quartz vein which pinches and swells but averages about 8 inches thick and which was traced intermittently along a N60°W strike for 200 feet by trenching. The vein occurs in medium grey-green silicified metavolcanic rocks which in some outcrops have the appearance of volcanic breccia. At the west end of the trench, the chilled border phase of a diabase is exposed on the north side, whereas a light grey, medium-grained granite rock outcrops on the south side. The quartz vein and silicified wall-rocks are mineralized with minor amounts of disseminated pyrite; the vein also carries sparse, very fine visible gold. Assays up to 8.92 oz. of gold over 0.6 feet with several assays over 1.0 oz. of gold were obtained by McIntyre Porcupine Mines Limited from the trench. Drilling, however, failed to establish continuity of these values at depth.

Showing 5 is located about 1,900 feet east of Showing 4. It consists of two trenches, one 40 feet by 15 feet and a second about 10 feet by 5 feet, in which intermediate metavolcanics, trending about N40°W, are cut by narrow quartz stringers. In the larger trench, a two-foot quartz vein bordered by a three-foot medium-grained pink granitic dike is present in the northeast end and several narrow criss-crossing quartz stringers are found in a five-foot section of metavolcanics in the southwest end of the trench. Both the quartz stringers and the vein contain minor pyrite and, in addition, the vein carries minor tourmaline and patches of chlorite. Narrow quartz stringers striking from north to northwest occur in the smaller trench and minor pyrite is present in both quartz stringers and metavolcanics. A grab sample collected by an assistant of the writer from the large quartz vein returned no gold values and only a trace of silver (assay by Cochenour Willans Gold Mines Limited).

Northabie Mines Limited [1952] (9)

The ground formerly held by Northabie Mines Limited consisted of 15 claims located north of the property of Camabie Mines Limited (5) along the east boundary of Rennie Township. In 1953, the company carried out resistivity and geological surveys. According to Mr. M. H. Lipton, President of Northabie Mines Limited, the company then proceeded with a 25,000-foot drilling program; however no significant mineralization was encountered. The logs were not available to the writer and only 1,000 feet of the core from one hole was found during the mapping program.

The property is underlain by interbedded felsic to intermediate metapyroclastics and metabasalts. The latter have been intruded by granitic rocks in the northern part of the former claim group. No sulphide mineralization of any significance nor auriferous quartz veins are known to occur on the property.

Renabie Mines Limited (10)

Renabie Mines Limited owns a group of 11 patented claims, numbered S34310, S34311, and S34319 to S34327 inclusive, in the southeastern part of Rennie Township. The claims were patented in 1946 and have undergone a modest exploration program including geological mapping, trenching, and some drilling. The results of the drilling were not available. The property is underlain by interbedded intermediate to felsic pyroclastics and mafic flows, cut by north-northwest-trending diabase dikes.

Two quartz veins, possibly extensions of the same vein, are present in the southeastern part of the property, one on the eastern edge of S34324, and the other on the boundary between S34326 and S34323. The southeastern vein (in S34324) is up to 48 inches thick, occupies the nose of a small fold plunging about 50 degrees west, and occurs between massive quartz-feldspar porphyry and intermediate, contorted, garnetiferous tuff. In Leeson Township, the southeastern extension of this vein has been exposed by stripping. The second vein, reported by Ferguson (1968) and not found by the field party, also lies in felsic to intermediate metavolcanic rocks.

No assay results are available from either vein.

Wesson Mines Limited [1947] (11)

The former property of Wesson Mines Limited in Rennie Township consisted of 46 claims in the area between Tucker, Alister, and Stephenson Lakes on the west and the former properties of Northabie Mines Limited [1952] (9) and Lysander Gold Mines Limited [1947] (8) and the properties of Renabie Mines Limited (10) and Camabie Mines Limited (5) on the east and south. The property is underlain by intermediate to felsic metapyroclastic rocks, metabasalt flows, granitic stocks, and several diabase dikes.

Exploration carried out in 1947, consisting of general prospecting, a magnetometer survey, geological mapping, and a follow-up drilling program of 10 holes totalling 1,195 feet, resulted in the location of three zones of disseminated to massive pyrite and pyrrhotite mineralization. One zone occurs about 1,000 feet north of the end of the southeast bay of Stephenson Lake. Drilling in this area indicated only a few relatively barren quartz veins in quartz-feldspar porphyry and minor pyrite and pyrrhotite in the underlying mafic metavolcanics. A second zone occurs on the north shore of Spring Lake in a narrow unit of intermediate metapyroclastic rocks lying between mafic metavolcanics on the north and a granitic stock on the south. Here, pyrrohotite and pyrite mineralization is associated with dark quartz veins which may be brecciated and are in garnetiferous metadacite breccia which has been intruded by several narrow granitic sills. The third area investigated lies about 200 feet southwest of the southwest end of Quary Lake and is further described in the section dealing with the Ginn property (7).

Westfield Minerals Limited (12)

LOCATION AND ACCESS

The Westfield Minerals property consists of 41 claims which are south and west of Conboy Lake in Rennie Township. Access is by means of float-equipped aircraft from Wawa or by a six-mile winter road leading north from the old road south of Colborne Lake. A zinc-silver showing is located about 700 feet south of Conboy Lake and can be reached by a trail from the campsite on the southwest bay of the lake.

HISTORY

The zinc-silver mineralization was discovered by Jack Tremblay in 1939 while prospecting for gold. As low gold values are associated with the sulphide mineralization, limited stripping and trenching were carried out at this time and again during 1946 and 1947.

In 1953, Coulee Lead and Zinc Mines Limited investigated the base metal potential of the property with a series of nine drill holes totalling 3,213 feet.

In 1962, Gunnex Limited examined the property, relogged and sampled the Coulee core, and carried out magnetic and electromagnetic surveys. The results of the electromagnetic survey were negative; however the magnetometer survey outlined a strong magnetic high, about 1,100 feet long, south of the mineralized zone.

In 1963, Westfield Minerals Limited acquired the property and during 1963 and 1964 carried out a drilling program of 13 short holes on the mineralized zone. In 1964, airborne magnetic and electromagnetic surveys were undertaken and resulted in the staking of a large block of claims across central Rennie and Meath Townships. Ground follow-up in 1965 consisted of electromagnetic and reconnaissance geological surveys and six short drill holes totalling 246 feet. During the summer of 1966, further stripping and trenching were carried out in the vicinity of the Conboy Lake showing with no significant results. During early 1967, an induced polarization sur-

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Photo 9—Highly sheared and mineralized sericitic metatuff from trench on Westfield Minerals Limited (12) property. Several layers of massive pyrite are present, one at end of hammerhead.

vey was completed over part of the 41 claim group in Rennie Township. Several anomalous areas were indicated, but to the writer's knowledge no further work has been undertaken.

GENERAL GEOLOGY

The zinc-silver showing occurs in fine-grained tuffaceous metapyroclastics ranging in composition from dacite to quartz latite (see Figure 3). Metabasalt flows, locally metamorphosed to amphibolite, and some metagabbro sills border the metapyroclastics on both the north and south. One small diabase dike trends northwest across the showing and several concordant feldspar porphyry dikes and one narrow granitic dike are exposed in the trenches.

South of the mineralized zone, the metapyroclastics are generally light grey to buff, fine to medium grained, porphyritic, and massive to slightly foliated. Their massive nature, texture, and composition are indicative of ash-flow derivation. In the vicinity of the mineralization and north to the metabasalts, the pyroclastics, termed sericitic metatuff (Photo 9) in the field, are pale grey to buff, highly sericitic, weakly to strongly schistose, and contain scattered quartz *eyes*. Interbedded within the sericitic metatuff are narrow, discontinuous units of pale greenish yellow waxy porphyritic tuff, narrow discontinuous units of fine-grained grey biotite schist, and a few narrow units of massive quartz-feldspar porphyry. Drilling indicates that two narrow units of iron formation occur on the eastern end of the mineralized zone. Tiny

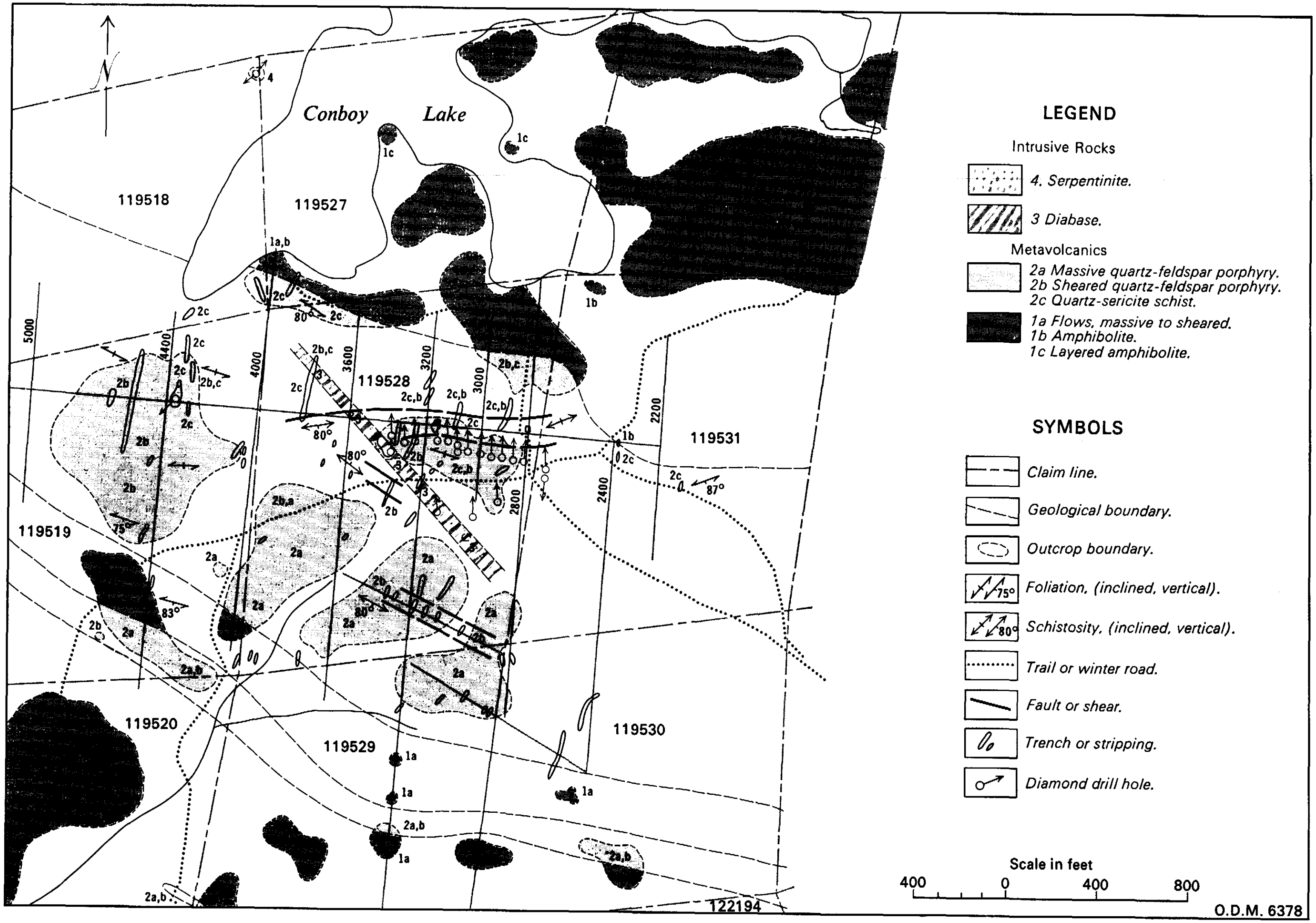

Figure 3—Geological sketch map, Westfield Minerals Ltd. (12) property, Rennie Township.

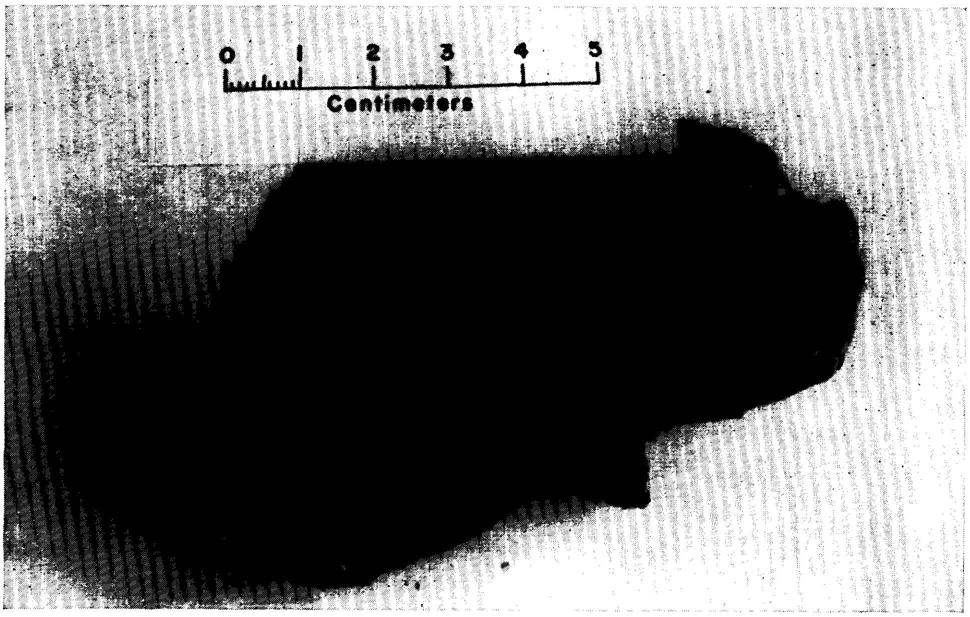

Photo 10—Fine-grained massive sphalerite containing fragments of quartz, sericite schist, and pyrite nodules from trench on Westfield Minerals Limited property.

garnets, widely disseminated pyrite, and very minor amounts of biotite are not uncommon in the fine-grained pyroclastics. Because of local concentrations of pyrite, rusty zones are common.

MINERALIZATION

The mineralization is found in a shear zone in sericitic metatuff and is known to extend for a strike length of at least 900 feet. The main section of mineralization, however, is about 550 feet long. On surface, mineralization occurs over widths of up to 14 feet, but the economic sections of the zone have a maximum thickness of about 3 feet. The drilling by Westfield Minerals Limited established a west-raking zone about 350 feet long with an average thickness of about 4.3 feet.

The mineralization consists of stringers, rarely up to 4 inches thick, of massive dark brown to resinous sphalerite, (Photo 10), stringers of coarsely crystalline pyrite, and minor galena and chalcopyrite disseminated in small patches and in stringers. Assays indicate that significant amounts of silver are present, but the nature of the silver mineralization is unknown. In the south end of the trench at 3,800 (Figure 3), several fragments of fine-grained pyrite nodules up to 1 inch in diameter displaying very well-developed concentric and radial structures were found. The fragments have been recemented by quartz and coarsely crystalline pyrite. About 50 feet from the south end of the trench at 3,100, small round pyrite nodules, up to 0.2 inches in diameter and lacking any apparent structure, occur in massive sphalerite in association with numerous rounded fragments of quartz and some quartz-sericite schist, most of which are of similar dimensions. Also present in the same trench is a zone of coarsely crystalline massive pyrite and minor quartz containing stringers and lenticles of a very fine grained, hard, black mylonite. The mylonite, the fragments of quartz and quartz-sericite schist, and the highly schistose nature of the host rocks indicate that the mineralization lies along a small fault zone.

Two selected grab samples of massive mineralization, collected by the writer, were analysed by the Laboratory and Research Branch of the Ontario Department of Mines. The first sample gave 0.80 percent lead, 14.1 percent zinc, 0.10 percent copper, 20.28 oz. silver, and 0.06 oz. gold; the second sample gave trace lead, 7.60 percent zinc, 2.15 percent copper, 18.12 oz. silver, and 0.06 oz. gold. The grade of the 350-foot section of the zone drilled by Westfield Minerals Limited is reported by the company to be 14.8 percent zinc and 10.6 oz. silver over an average thickness of 4.3 feet.

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1963b: Renabie Sheet, Sudbury and Algoma Districts, Ontario; Ontario Dept. Mines—Geol. Surv. Canada, Aeromagnetic Series, Map 2220G, scale 1 inch to 1 mile. Survey flown 1962 to 1963.

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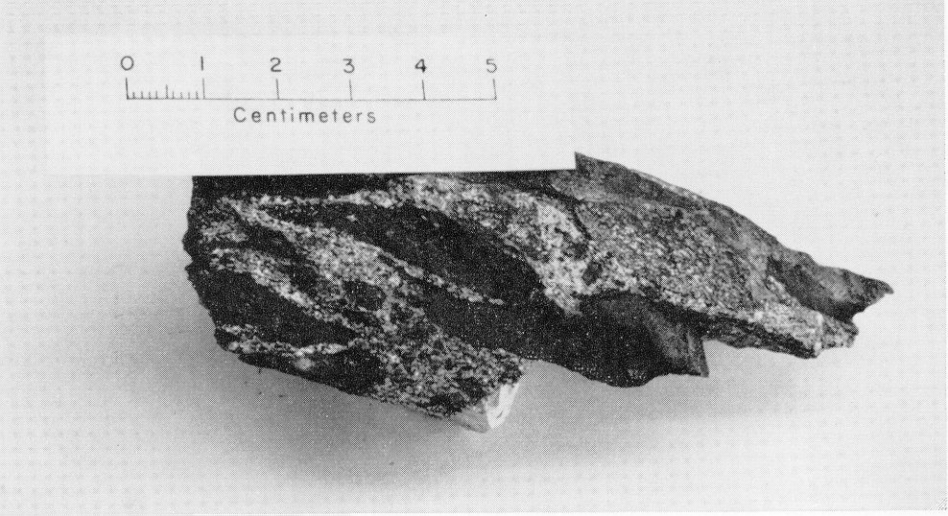
APPENDIX I

	Potassic feldspar / Total feldspar	Composition of Plagioclase: An_{0-10}	An_{10-30}	An_{30-50}	An_{50-100}
Quartz > 10%	$> \frac{2}{3}$	GRANITE RHYOLITE			?
	$\frac{1}{3}-\frac{2}{3}$	ALBITE QTZ. MONZONITE QTZ. LATITE	(OLIGOCLASE) QTZ. MONZONITE QTZ. LATITE	ANDESINE QTZ. MONZONITE QTZ. LATITE	?
	$\frac{1}{8}-\frac{1}{3}$	ALBITE GRANODIORITE RHYODACITE	(OLIGOCLASE) GRANODIORITE RHYODACITE	QUARTZ DIORITE	QUARTZ GABBRO
	$< \frac{1}{8}$	ALBITE TRONDHJEMITE DACITE	(OLIGOCLASE) TRONDHJEMITE DACITE	DACITE	QUARTZ BASALT
Quartz < 10%	$> \frac{2}{3}$	SYENITE TRACHYTE			?
	$\frac{1}{3}-\frac{2}{3}$	ALBITE MONZONITE LATITE	(OLIGOCLASE) MONZONITE LATITE	ANDESINE MONZONITE LATITE	CALCIC MONZONITE
	$\frac{1}{8}-\frac{1}{3}$	ALBITE SYENODIORITE	(OLIGOCLASE) SYENODIORITE	DIORITE	GABBRO
	$< \frac{1}{8}$	SODIC LATITE	SODIC LATITE	ANDESITE	BASALT

IGNEOUS ROCK NOMENCLATURE
RECOMMENDED BY THE ONTARIO DEPARTMENT OF MINES

INDEX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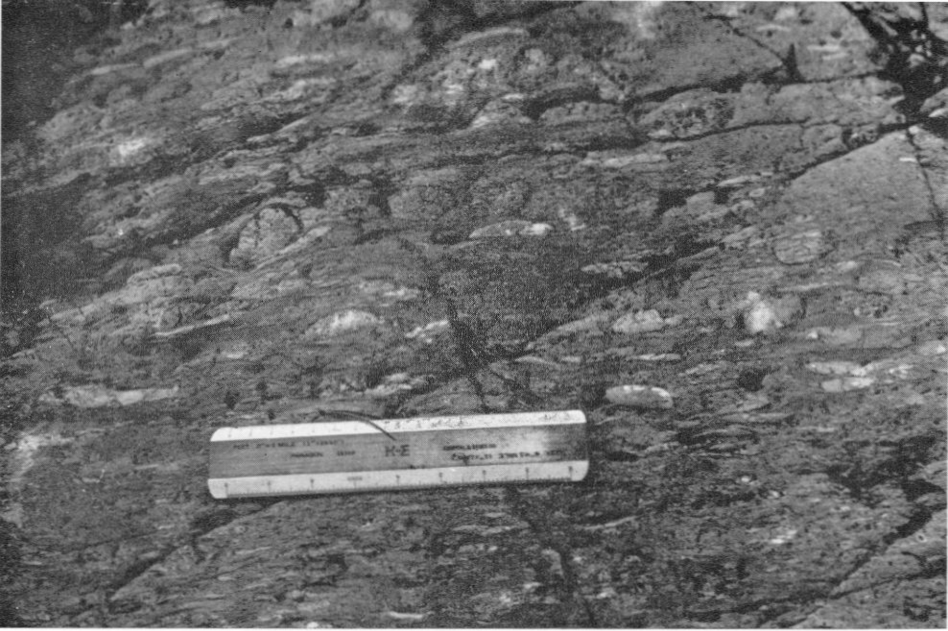

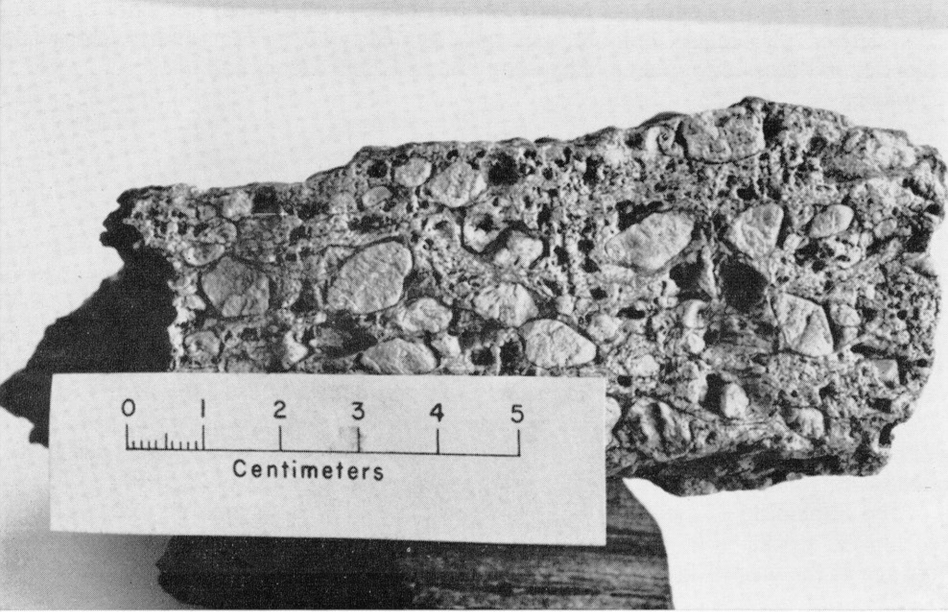
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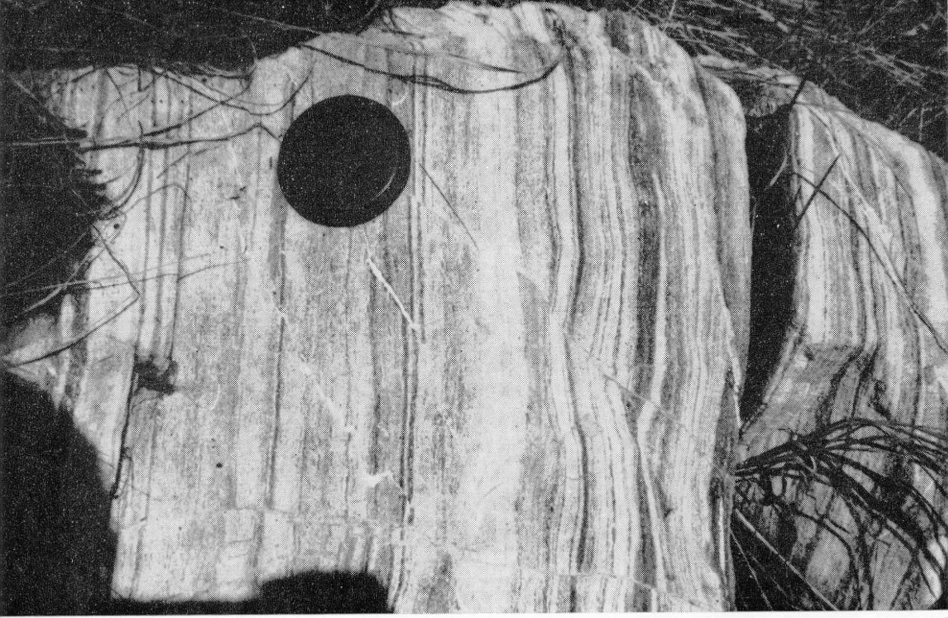

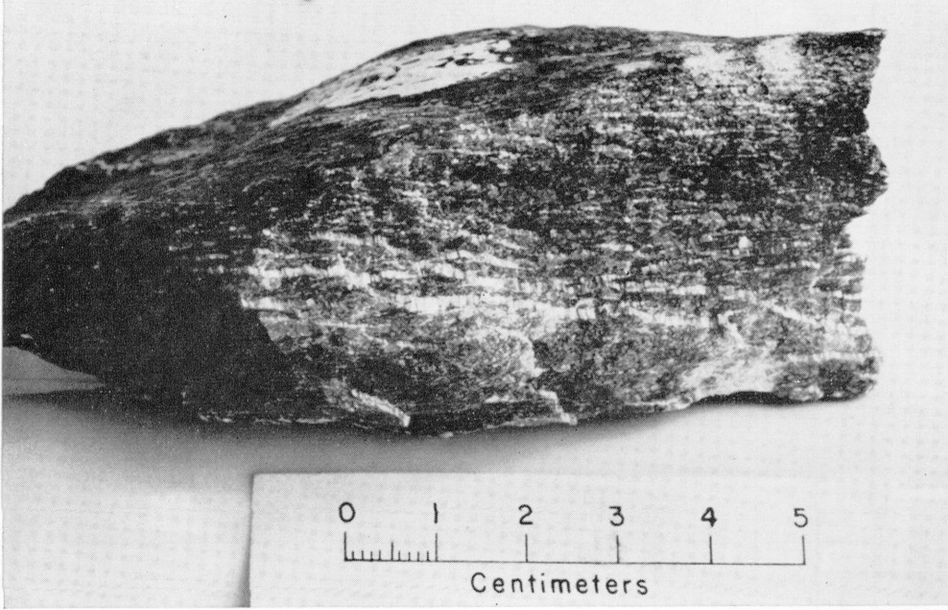
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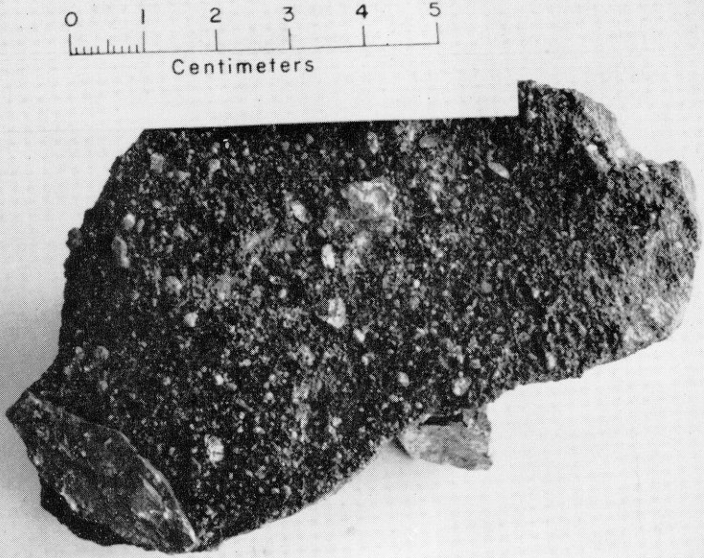
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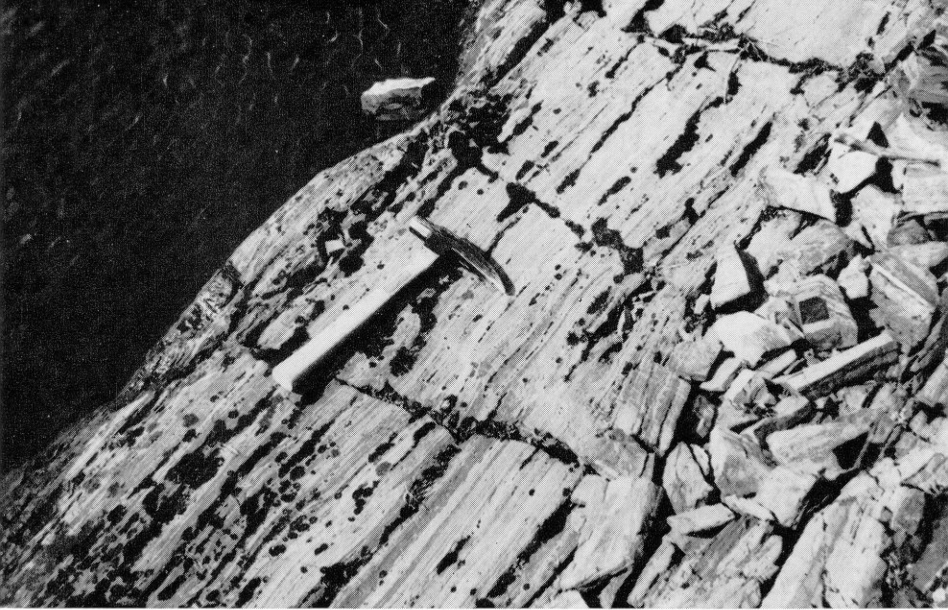

ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

HONOURABLE ALLAN F. LAWRENCE, *Minister*
D. P. Douglass, *Deputy Minister* J. E. Thomson, *Director, Geological Branch*

Map 2210
Glasgow, Meath,
and Rennie Townships

Scale 1 inch to 50 miles

N.T.S. reference 42B/5, 42C/8

SYMBOLS

- Glacial striae.
- Esker.
- Small bedrock outcrop.
- Area of bedrock outcrop.
- Bedding, top unknown; (inclined, vertical).
- Lava flow; top (arrow) from pillows shape and packing.
- Gneissosity, (horizontal, inclined, vertical).
- Foliation; (horizontal, inclined, vertical).
- Geological boundary, observed.
- Geological boundary, position interpreted.
- Geological boundary, deduced from geophysics
- Fault; (observed, assumed). Spot indicates down throw side, arrows indicate horizontal movement.
- Drag folds with plunge.
- Anticline, syncline, with plunge.
- Drill hole; (vertical, inclined).
- Vein, vein network. Width in inches.
- MA Magnetic attraction.
- 1,530′ Altitude, in feet, above sea level.
- Muskeg or swamp.
- Motor road.
- Trail, portage, winter road.
- Building.
- Electric Power Transmission Line.
- District boundary.
- Township boundary, base line, with mile post, approximate position only.
- Township boundary, unsurveyed, approximate position only.
- Property boundary, approximate position only.
- Surveyed line, approximate position only.
- 5 Location of mining property, surveyed. (See List of Properties).
- ⑦ Location of mining property, unsurveyed. (See List of Properties).

Published 1971

SOURCES OF INFORMATION

Geology by R. A. Riley and assistants, 1966, 1967. Geology of Renabie property modified from mine plans. Geology is only locally tied to surveyed lines.

Map 44c, Lochalsh-Missinaibi Area, 1935; map 51g, Rennie-Leeson Area, 1942; Ontario Department of Mines.

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Preliminary maps:—
P. 402, Glasgow Township, scale 1 inch to ¼ mile, issued 1967.
P. 403, Meath Township, scale 1 inch to ¼ mile, issued 1967.
P. 404, Rennie Township, scale 1 inch to ¼ mile, issued 1967.
P. 492, Renabie Mines Limited, Nudulama Mines Limited and Adjoining Properties, scale 1″ to 500 feet, issued 1968.

Cartography by D. J. Hughes and assistants, Ontario Department of Mines, 1970.

Base maps derived from maps of the Forest Resources Inventory, Ontario Department of Lands and Forests.

Air photographs from the Forest Resources Inventory, Ontario Department of Lands and Forests.

Magnetic declination in the area was approximately 6°00′W., 1966.

LIST OF PROPERTIES

GLASGOW TOWNSHIP

1. *Algoma Ore Properties Limited.* [1958]

MEATH TOWNSHIP

2. *Cascaden, E. S.*
3. *Maisondor Deposit.*

RENNIE TOWNSHIP

4. *Butler Lake Asbestos Deposit.*
5. *Camabie Mines Limited.*
6. *Carmichel, D. H.*
7. *Ginn, Peter.*
8. *Lysander Gold Mines Limited* [1947]
9. *Northabie Mines Limited* [1952]
10. *Renabie Mines Limited.*
11. *Wesson Mines Limited.* [1947]
12. *Westfield Minerals Limited.*

Ownership of properties as of December 31, 1966. Date in square brackets [1952] indicates year of last major work on property. For further information, see report.

Map 2210

GLASGOW, MEATH, and RENNIE TOWNSHIPS

ALGOMA and SUDBURY DISTRICTS

Scale 1:31,680 or 1 Inch to ½ Mile

Chains 80 60 40 20 0 1 2 Miles
Metres 1000 0 1 2 3 Kilometres
Feet 1000 0 5,000 10,000 Feet

LEGEND

CENOZOIC[a]

RECENT

Lacustrine and fluvial sand, silt, and clay; organic mud.

PLEISTOCENE

Clay, sand, gravel, till.

UNCONFORMITY

PRECAMBRIAN[b]

PROTEROZOIC

INTRUSIVE ROCKS[c]

ULTRAMAFIC INTRUSIVE ROCKS

7 *Serpentinized pyroxenite and peridotite, serpentinite.*

INTRUSIVE CONTACT(?)

LATE MAFIC INTRUSIVE ROCKS

6 *Undifferentiated.*
6a *Diabase, quartz diabase, olivine diabase, porphyritic diabase.*
6b *Quartz diorite.*

INTRUSIVE CONTACT

ARCHEAN

GRANITIC ROCKS

5 *Undifferentiated.*
5a *Gneissic to foliated granodiorite, albite granodiorite, trondhjemite, albite trondhjemite, albite quartz monzonite.*
5b *Massive to foliated granodiorite, trondhjemite, quartz monzonite.*
5c *Massive granodiorite.*
5d *Massive to foliated hornblende syenite.*
5e *Hybrid rocks. Granitized amphibolite, hornblende-feldspar gneiss, granitic gneiss, lit-par-lit gneiss.*

INTRUSIVE CONTACT

EARLY MAFIC INTRUSIVE ROCKS

4 *Metagabbro.*

INTRUSIVE CONTACT

METASEDIMENTS AND METAVOLCANICS[c]

METASEDIMENTS

3a *Greywacke, feldspathic greywacke.*
3b *Argillite.*

INTERMEDIATE TO FELSIC METAVOLCANICS

2 *Undifferentiated.*
2a *Flows, massive to sheared.*
2b *Flows, pillowed.*
2c *Breccia.*
2d *Tuff-breccia, lapilli-tuff.*
2e *Ash-flow tuff.*
2f *Sericitic tuff.*

IF *Iron Formation. Magnetite-chert, magnetite-greywacke.*

MAFIC METAVOLCANICS

1 *Undifferentiated.*
1a *Flows, massive to sheared*
1b *Flows, pillowed.*
1c *Breccia.*
1d *Tuff.*
1e *Amphibolite, layered amphibolite.*

IF *Iron Formation. Magnetite-chert, magnetite-greywacke.*

Ag	*Silver*
asb	*Asbestos*
Au	*Gold*
Cu	*Copper*
mo	*Molybdenite*
Pb	*Lead*
q	*Quartz*
S	*Sulphide mineralization*
Zn	*Zinc*

a *Unconsolidated deposits. In general, Cenozoic deposits are represented by the lighter coloured and uncoloured parts of the map.*

b *Bedrock geology. Outcrop areas and inferred extensions of each rock map unit are shown respectively in deep and light tones of the same colour. Where in places a formation is too narrow to show colour and must be represented in black, a short black bar appears in the appropriate block.*

c *Rocks in these groups subdivided lithologically and the order does not imply age relationships within the groups.*