FIFTY-FIRST ANNUAL REPORT

OF THE

ONTARIO DEPARTMENT OF MINES

1942

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HON. LESLIE M. FROST, *Minister of Mines* H. C. RICKABY, *Deputy Minister*

FIFTY-FIRST ANNUAL REPORT

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The Northeastern Portion of the Timagami Lake Area

By

W. W. MOORHOUSE

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The Northeastern Portion of the Timagami Lake Area

By W. W. Moorhouse

INTRODUCTION

The Northeastern portion of the Timagami Lake area comprises the townships of Strathy, Strathcona, Chambers, and Briggs and parts of the townships of Yates, Phyllis, Joan, and Cynthia. It centres about the Northeast arm of Lake Timagami, which extends from Bear island on the west to the town of Timagami and the Temiskaming and Northern Ontario railway on the east, and from Shiningwood bay of Lake Timagami and Herridge lake on the south to Chambers lake and the north boundary of Strathy township on the north.

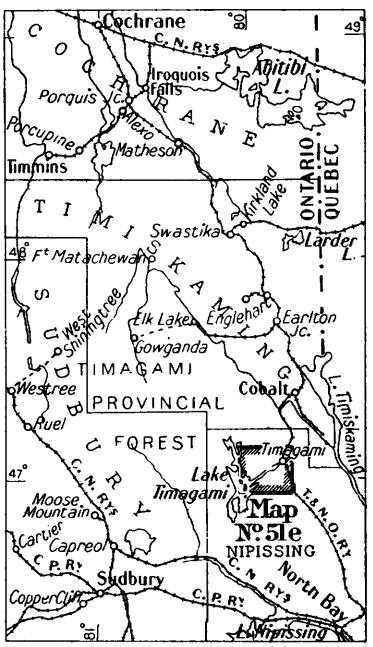

Fig. 1—Key map showing the location of the northeastern portion of the Timagami Lake area. Scale, 1 inch to 60 miles.

All parts of the area are readily accessible by canoe from Lake Timagami and tributary lakes and rivers, or from provincial highway No. 11. There are many trails and bush roads and a maze of lumber roads. Travel along them is difficult owing to the many trees blown down by the heavy gales of November, 1940. In many places, especially on exposed hills and on the north and west shores of lakes, strips of forest, chiefly spruce and jackpine, have been levelled. In these areas, scarcely a tree is left standing, and the ground is covered with an almost impassible network of windfalls.

The mapping on which this report is based was carried out during the field season of 1941. Pace-and-compass traverses spaced at intervals of a quarter of a mile were used in the preparation of the accompanying geological map (No. 51e). Topographical control was provided by existing topographical surveys of Lake Timagami and adjoining lakes and by township and claim surveys.

In some cases micrometer and pace-and-compass surveys were necessary to supplement this information.

In the accompanying map it has not been possible to indicate the individual outcrops on the scale used. The outcrops as outlined consist of ridges and areas where bed rock exposures are abundant or only lightly covered, as contrasted with areas where rock is scarce or obscured by heavy overburden.

Acknowledgments

The writer wishes to express his appreciation for the willing co-operation and efficient work of his assistants, H. S. Armstrong, S. A. Ferguson, and I. C. Brown. Mr. Armstrong was responsible for part of the mapping, in particular the southeast part of Strathcona township. The writer is also under obligation to Dewey Derosier, Paul D. Hermiston, H. T. Lloyd, C. J. Niemetz, N. Oslund, and R. A. Percy for their assistance and hospitality. Information was generously supplied to the writer by L. V. Bell and L. W. Outred, of the Consolidated Mining and Smelting Company of Canada; Sydney Beanland, of Haileybury; W. G. Chipp, of Timagami Gold Mines, Limited; and D. M. Briden, formerly manager of the Goodfish (Beanland) property. The writer and his party are under special obligation to Phil Hoffman and other members of the staff of the Ontario Forestry Branch at Timagami for their generous co-operation on many occasions during the summer.

Previous Work

The first geological mapping in the area was carried out by A. E. Barlow and his associates of the Geological Survey of Canada. His final report on the Nipissing-Timiskaming area, including the Timagami region, was published in 1907.[1] Prior to this, in 1898, iron ore was discovered near the town of Timagami. By this time, also, auriferous arsenopyrite and nickel-copper mineralization had been discovered north of Timagami. These finds were visited and described by A. P. Coleman[2] in 1899. In 1899, W. G. Miller[3] examined and reported on the Timagami, Iron Lake, and Ko-ko-ko Lake iron formations. Prospecting was also stimulated by the development of the rich Cobalt silver camp. In 1919, C. W. Knight[4] reported on the arsenic and copper-nickel deposits in the vicinity of Kanichee (Cedar) and Net lakes and described the general geology of the vicinity. E. W. Todd[5] mapped areas adjoining the Timagami on the east and north, including parts of Strathy and Chambers townships. Following the increase in the price of gold, Strathy township was actively prospected. A number of encouraging discoveries were made in 1934–35, and further work was carried out on properties already located. Although underground development was performed on four properties, only one, the Cuniptau, a copper-nickel prospect, entered production. A pilot plant was operated there during 1936 and subsequently closed down. W. S. Savage[6] described these developments up to

[1]A. E. Barlow, "Second Edition of a Report on the Geology and Natural Resources of the Area Included by the Nipissing and Timiskaming Map-Sheets, Comprising Portions of the District of Nipissing, Ontario, and of the County of Pontiac, Quebec," Geol. Surv. Can., Pub. No. 962, 1907, together with maps Nos. 599, 606, and preliminary edition No. 944.

[2]A. P. Coleman, "Copper and Iron Regions of Ontario," Ont. Bur. Mines, Vol. IX, 1900, pp. 172-174.

[3]W. G. Miller, "Iron Ores of Nipissing District," Ont. Bur. Mines, Vol. X, 1901, pp. 160-174.

[4]C. W. Knight, Windy Lake and Other Nickel Areas," Ont. Dept. Mines, Vol. XXIX, 1920, pt. 1, pp. 207-219.

[5]E. W. Todd, "The Matabitchuan Area," Ont. Dept. Mines, Vol. XXXIV, 1925, pt. 3; "Anima-Nipissing Lake Area," Ont. Dept. Mines, Vol. XXXV, 1926, pt. 3, pp. 79-104.

[6]W. S. Savage, "Part of Strathy Township," Ont. Dept. Mines, Vol. XLIV, 1935, pt. 7, pp. 48-56.

the fall of 1934 in a report on the geology of part of Strathy township. During the last four or five years interest has also been aroused by the discovery of gold values on Denedus point, Lake Timagami.

Many men have contributed to the discovery and development of the prospects in the vicinity of Timagami. Probably the most active pioneer was the late Dan O'Connor, who was engaged for many years in investigating the mining possibilities of the area.

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Natural Resources

The tourist trade is the principal support of the town of Timagami. Lake Timagami is famous for its beauty and for the fish caught in its waters. A number of lodges, camps, and hotels are located on the lake, and cottages have been built on many of its numerous islands. Regular transportation and freight deliveries serve the camps during the tourist season. Some of the lodges are also used by hunting parties in the fall.

Lumbering is being carried on in several parts of the area by John Milne and Son, who have a mill on Link lake, and by the Timagami Lumber Company at Goward. The area was once covered by splendid stands of white and red pine. Remnants of these still clothe the shores of the principal lakes. Trees 3 or 4 feet in diameter are not uncommon. One of these was found to be nearly 200 years old. Jackpine, spruce, cedar, and balsam are abundant in many parts of the area. East of Ko-ko-ko lake and south of Iron lake open bush characterized by unusually large maple and birch trees was encountered. Poplar, various types of birch, swamp ash, and other deciduous trees are common.

Agriculture is negligible. Bed rock is generally near the surface, and the soil, even where thick, appears to be sandy and poor.

Fish and Game

Lake trout, black bass, pickerel, and pike are caught in Lake Timagami and adjoining waters. Black bear were exceedingly plentiful during the summer of 1941. Deer, moose, and timber wolves are also found. Small game is abundant, and traces of beaver are not uncommon.

Residents

The population, both Indian and white, is chiefly dependent on the tourist trade for its livelihood. Some Indians live in the town of Timagami; others on Bear island, where a Hudson's Bay post is located.

Topography

The area is rugged and rocky and is dotted with numerous lakes. Outcrops of diabase or sediments of the Cobalt series, especially, stand in bold relief. The Forestry tower at Timagami is located on a typical hill of Cobalt sediments. Many cliff-like elevations characterize these formations in the vicinity of Lowell and Herridge lakes. The coarse porphyritic granite exposed between Ko-ko-ko bay and Iron lake forms equally high, precipitous ridges. In other parts of the area, both granites and greenstones commonly outcrop in persistent, rolling hills. Swamps are restricted for the most part to narrow valleys between ridges and outcrops, and typical muskeg was rarely encountered except around the shores of the smaller lakes. The only sizable area of sand plain forms the north shore of Link lake. Drift is widespread as a thin cover for the bed rock and as valley-fill. To this extent it renders prospecting and a proper understanding of the geology difficult. Owing to the fact that much of the forest is virgin timber, most of the outcrops are moss-covered, and continuous exposures are relatively few.

As in other areas in which the drift cover is not heavy, the topographical features reflect to a marked degree the structure of the underlying bed rock. The northeast arm of Lake Timagami, Shiningwood bay, Link lake, Tetapaga lake, Vermilion lake, Iron lake, and many smaller lakes follow more or less closely the strike of regional shearing and bedding. A second element of the structural pattern is represented by the northwesterly course of the South Tetapaga river, Iceland lake, and Herridge lake. They probably follow the strike of a diabase dike, which is exposed on the first portage south from Lake Timagami. The same strike shows up in other lakes just outside the limits of the present map and is to be ascribed to the same cause.

Many bays of Lake Timagami and Wasaksina, Kanichee, and Chambers lakes, and several smaller lakes such as Sutton, Business, and Alfreda, have a well-defined trend north-south or slightly east of north. It is believed that these bodies of water occupy zones of faulting and fracturing along which movements occurred from Algoman to post-Keweenawan time.

GENERAL GEOLOGY

The consolidated rocks of the area are all pre-Cambrian in age and include a wide range of types.

Table of Formations

QUATERNARY	
RECENT:	Peat, sand, and gravel.
PLEISTOCENE:	Boulder clay, sand, and gravel.
Unconformity	

PRE-CAMBRIAN	
KEWEENAWAN:	Olivine diabase dikes. *Intrusive contact(?)* Nipissing diabase sill and associated dikes.
	Intrusive contact
HURONIAN:	Cobalt conglomerate, slate, and quartzite.
	Unconformity
ALGOMAN:	Lamprophyre; amphibolite, carbonate, diorite, and greenstone dikes. *Intrusive contact* Quartz porphyry, feldspar porphyry, felsite dikes and intrusives. Granite, granodiorite, including porphyritic types, albite granite, granite and aplite dikes. *Intrusive contact* Diorite, quartz diorite; sheared and altered phases.
PRE-ALGOMAN(?):	Diorite, quartz diorite, and sheared equivalents, peridotite, and metadiabase intrusives.
	Intrusive contact
KEEWATIN:	Basic and intermediate lava flows, pillow lavas, amygdular lavas, pyroclastics, tuffs, dioritic and recrystallized rocks, chlorite, carbonate, and hornblende schist. Rhyolite, quartz and feldspar porphyry, acid tuffs, agglomerates, carbonate and sericite schist. Banded iron formation.

Keewatin

The Keewatin rocks occur in three belts, which unite to form a continuous area in Strathy township and the northeastern part of Strathcona. The northern belt, which is the widest, extends from Strathy township almost due west through Chambers into the eastern part of Cynthia. On the west side of Ko-ko-ko lake in Cynthia township, it is buried under Cobalt sediments. To the south it is separated from the narrow central belt, which is exposed on the Northeast arm of Lake Timagami, by a batholith of porphyritic granite. The southern belt, locally hidden under Cobalt sediments and irregularly intruded by granites, extends south to the boundary of the area. Granite and diabase divide it from the central belt.

The Keewatin volcanics and sediments in the area are exceedingly diverse. The distinction of basic, intermediate, and acid volcanics on the map is difficult owing to the intimate association of all three types. No attempt has been made to separate basic and intermediate lavas and pyroclastics. The belts of the more siliceous types are represented only in the most general way. Intermediate volcanics are present in the areas mapped as acid volcanics, and narrow rhyolite and quartz porphyry flows frequently occur interbedded with lavas of basic and intermediate composition.

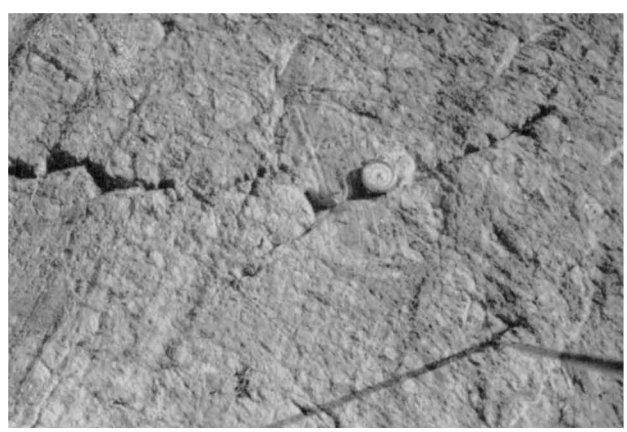
Acid Volcanics

Siliceous rhyolites and pyroclastics are well exposed along the south shore of the Northeast arm of Lake Timagami. The most typical rhyolites are very fine grained and pale greasy yellow in colour. They are cut by intersecting fractures, which at times give them a fragmental appearance. A typical occurrence is exposed at the south end of the east portage from Turtle lake to the Northeast arm of Lake Timagami. In local areas spherulitic cavities are abundant (see photograph on page 6). Some rhyolites, especially near the granite

contact in the vicinity of the mouth of the South Tetapaga river, appear to have been somewhat metamorphosed so that they are very tough and felsitic in appearance.

Spherulitic cavities in rhyolite near the east portage from Turtle lake to the Northeast arm of Lake Timagami.

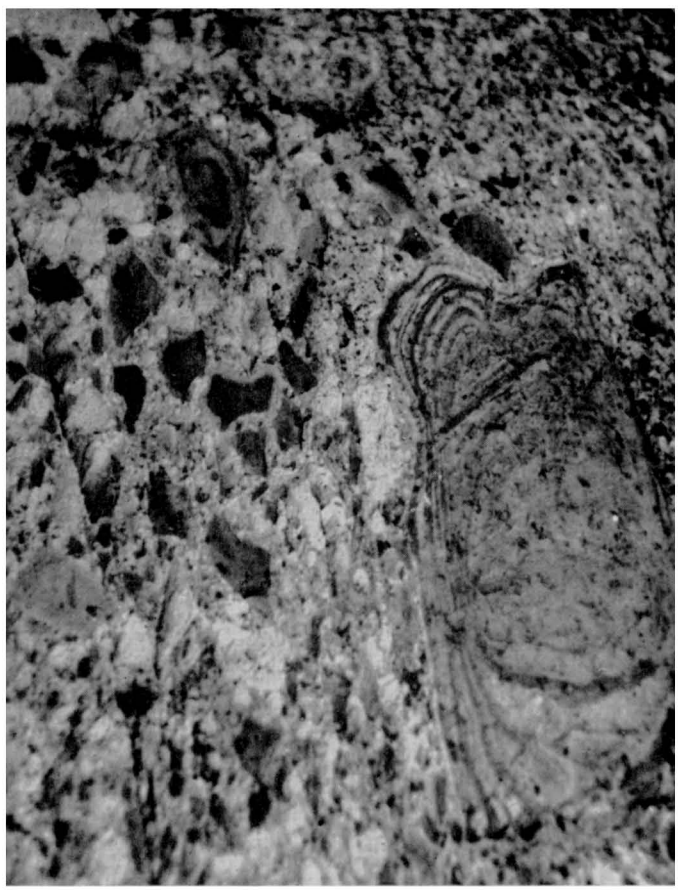
Quartz porphyries are abundant in the Keewatin of the area. They are almost indistinguishable from intrusive Algoman porphyries in the field. In



Rhyolite agglomerate containing fragments of lava and bedded tuff (beside watch), southwest corner of Iron lake.

some cases, however, they were found to be associated with agglomerates containing quartz porphyry fragments or to contain vesicular phases or spherulitic cavities. An example is the sheared quartz porphyry extending southwest

from Kanichee and Net lakes. This body is shown on maps No. 29c[1] and 35c[2] as an intrusive but was found to contain spherulites and indications of an agglomeratic character in some exposures. It does not, of course, necessarily follow that all the quartz porphyry mapped as such is volcanic in origin. The difficulty of finding contacts makes correct interpretations difficult, and it is possible that intrusive porphyries have been mapped as volcanic, especially in the western half of Chambers township and south of Jessie lake in Strathcona.



Agglomerate composed of black traplike fragments and bomb of alternating light and dark layers in a rhyolite matrix, head of Amphibolite bay.

It is tentatively suggested from the study of a few thin sections of quartz rhyolites and porphyries that the two may be petrographically distinguished in this area by the predominance of sericite in the former and albite in the latter.

Good exposures of rhyolite agglomerate occur east of Ko-ko-ko lake in Chambers and Cynthia townships, at the southwest corner of Iron lake, and at various points along the south shore of the Northeast arm. As illustrated in the photograph on page 6, some of these fragments are composed of bedded tuff. In some outcrops the fragments are rounded, presumably by stream or wave

[1]C. W. Knight, op. cit.
[2]E. W. Todd, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 3.

action, and should therefore be classed as volcanic conglomerates. An unusual breccia outcrop at the head of Amphibolite bay is composed of fragments of black traplike material in a matrix of rhyolite (see photograph on page 7). A small shoal just to the east of this outcrop contains volcanic bombs characterized by alternating bands of rhyolite and trap. Acid tuffs are abundant along the Northeast arm. They are largely sheared and altered. In many places, the tuffs contain rhyolite fragments, and in a few places feldspar crystals and fragments make up much of the rock.

Bedded acid tuff, southeast of Axe narrows, Northeast arm.

Intermediate and Basic Volcanics

The intermediate and basic volcanics are even more diverse. Exposures of massive, structureless, medium- to fine-grained, altered andesite and basalt are abundant in Strathy and Chambers townships. Pillow lavas are abundant in the central part of Strathy township, the western part of Chambers, Cynthia, and the northwestern part of Yates. The pillows only occasionally give indications of the attitude of the flows. Vesicular, amygdaloidal, and spherulitic basic lavas are best developed in Strathy township. Some spherulitic lavas, probably of andesitic composition, were observed southwest of Tasse lake in Chambers township. Porphyritic andesite containing phenocrysts of altered plagioclase are characteristic of the andesite band in Yates township. An unusual quartz feldspar porphyry (porphyritic dacite) is quite conspicuous on and west of Nellem lake in Chambers township. In a number of places in Strathy and Strathcona townships, fine- to medium-grained, purplish andesites were observed, dotted with chloritic clots and, in the coarser varieties, with small yellow grains of leucoxene.

The dominant rock types along the north shore of the Northeast arm and as far north as Link lake are intermediate tuffs, slaty tuffs, and agglomerates.

Some tuffs are strikingly banded. Others are characterized by abundant light-coloured fragments of volcanic rocks or feldspar fragments. Much of the tuff is very schistose and slaty in appearance. A well-defined band of slaty tuff a quarter of a mile in width is exposed south of Link lake. It is light-weathering but rather dark on the fresh surface. The beds are narrow and highly contorted. Agglomerates are abundant and are found in all parts of the area. They range from massive and undeformed to highly sheared rocks in which the fragments are drawn out into lenticular shapes.

The volcanics are affected by granite intrusions to varying degrees. In some cases little or no effect is recognizable. This is especially true of the acid volcanics, which have been sheared and baked but are otherwise unaffected. The fine-grained and agglomeratic phases of the intermediate lavas similarly appear to have escaped visible alteration, even in close proximity to the granite. In an agglomerate west of Iron lake the matrix is apparently unchanged, whereas the fragments are recrystallized and coarse. In the vicinity of the granite in the northeastern part of Chambers township, the intermediate volcanics are flintier and white-weathering. These rocks are indicated on the map as feldspathized volcanics.

Basic lavas have undergone extensive recrystallization. Epidote and hornblende are conspicuous in andesites and basic lavas near the granites, as, for instance, north and east of Ko-ko-ko bay. In the southeastern part of Strathcona township, to an even more pronounced degree hornblende schists and gneisses are the dominant Keewatin rocks. Pillow lavas are hornblendic and frequently sheared and, in the area just mentioned, are replaced by epidote, although the selvages are still recognizable.

Dioritic and amphibolitic rocks are found in abundance along the contact of the north granite in Chambers and Strathy townships. Large and numerous outcrops of dioritic greenstones also occur in the vicinity of the north end of the central batholith of porphyritic granite. Dioritic rocks are especially persistent along the south edge of the Ko-ko-ko iron range near the granite. The relationships of these diorites are not clear. Good exposures of the contacts of these rocks are visible on the south shore of Chambers lake. In some cases, the dioritic greenstones appear to have chilled edges against acid volcanics. In others, the associations are so intimate as to suggest that the diorite is simply greenstone recrystallized in place. It is possible, however, that some of the occurrences mapped as dioritic greenstones are intrusive. Thin sections of these rocks reveal that the principal constituents are saussuritized feldspar, uralite, and quartz with a prevailing diabasic texture.

Iron Formation

A persistent member of the Keewatin is the iron formation. For the most part it is associated with tuffs, agglomerates, and slaty rocks. It is strikingly banded and consists of alternating layers of almost massive magnetite, sugary white quartzite, jasper, grey (cherty) quartz, and chloritic and tremolitic tuff. The proportions of these bands vary considerably. The Ko-ko-ko iron range is notable for the high percentage of banded jasper and magnetite. The Vermilion Lake and Iron Lake bands contains jasper in considerable but smaller percentages. The Timagami band is less spectacular, containing much more quartzite, grey chert, and tuff.

The iron formation ranges in width from a few feet, as in the narrow bands in the central part of Strathy township, to more than 500 feet. The normal width of the Timagami band is about 4 chains. The Iron Lake band is perhaps

the widest. Exposures on the south shore of the lake are as much as 8 chains in width. If the islands composed of contorted magnetite, tuff, and quartzite are included, the width is much greater. To the east the band is narrower, being 5 chains wide where it is exposed on Vermilion lake and 3 chains wide about 20 chains farther east. The band appears to terminate a short distance east of the lake. The Vermilion Lake band, which lies about 5 chains north of the Iron Lake band, is about a chain in width and is composed of pyritic schist, pyritic banded silica, and some sections of banded jasper and magnetite. It is exposed at intervals along the south shore of Vermilion lake and on the east side of O'Connor lake. The Ko-ko-ko iron range has been traced for 2 miles east of

Thin-bedded iron formation of magnetite and tuffaceous material, Timagami iron range.

Ko-ko-ko lake. About 40 chains still farther east, an outcrop is indicated on Barlow's map on the east shore of Business lake. It is separated from the main iron formation by granite.

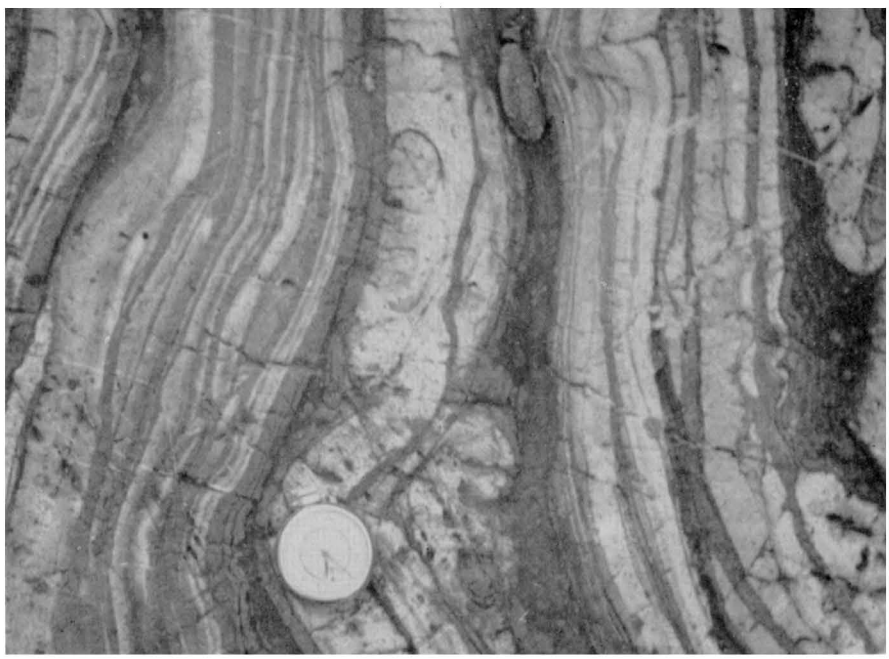
A band of iron formation about a chain in width was mapped from 1½ to 2½ miles east of Matagami point on the north shore of the Northeast arm. It also occurs on a small island 3 miles east of the point. An outcrop of magnetite on Timagami island has been described by Miller.[1]

The individual bands in the iron formation range from microscopic widths to several inches. Bands of massive magnetite a foot or more in width can be seen in the road cut north of the town of Timagami. Interbedded tuffaceous bands may be as wide as 3 or 4 feet. The individual layers are quite persistent, but close inspection of many outcrops will reveal branching and lenticular bands. In many exposures, especially where there is considerable crenulation and folding, the magnetite has a strong tendency to flow. It cuts across the more

[1]W. G. Miller, op. cit., p. 169.

brittle siliceous material and is noticeably thickened in the crests of drag folds. Chloritic tuffaceous bands have a similar tendency.

The iron formation shows considerable evidence of deformation. Many outcrops are strongly brecciated (see photograph on page 12) and are cemented by siliceous material. It is possible that some of these are breccias formed at the time of deposition. Drag-folding and intricate crenulation are prominent in many exposures. Minor cross-faults with maximum displacements of a few inches are universal. Cross-faults with displacements of the order of 100 feet or more were noted in two places east and west of Turtle lake. Considerable fracturing and faulting has taken place just east of Ko-ko-ko lake. Folding on



Thin-bedded iron formation of magnetite and cherty quartz, Timagami iron range. Note branching and lenticular bands.

a major scale has deformed the Ko-ko-ko range a mile east of Ko-ko-ko lake. Strong warping has affected the Timagami iron formation at Turtle lake so that it dips north at the unusually flat angle of 30 degrees. A large drag fold has doubled the thickness of the same range in the road cut north of Timagami. In many places the iron formation is cut by narrow quartz stringers in irregular swarms.

The stratigraphy of the iron formation varies in different ranges. The Timagami range is characterized generally by the presence of rusty or black ferruginous slaty tuff on the north side of the band and, especially east of Turtle lake, by tuff containing irregular lenses and bands of white, cherty-looking quartz.

The Iron Lake and Vermilion Lake bands are very similar. In general the north and south edges of the iron formation are banded silica and tuff, sometimes jaspery, while the centre band, which is one or more chains in width, consists of banded jasper and quartz with more abundant magnetite. South of the formation very rusty weathering tuffs and andesites(?) are persistently exposed.

The magnetite in the main iron ranges differs in texture and appearance. The Timagami range is characterized by rather fine grained magnetite. In thin section, it is clearly recrystallized and the grains in the principal magnetite layers average 0.04 millimetres in diameter. The layer sometimes contain irregular cross-fractures, which appear to be due to contraction of the iron ore during deposition. They are filled with quartz or a tremolitic amphibole. The leaner ferruginous layers are made up of finer grains of magnetite intimately intergrown with recrystallized quartz. Tuffaceous bands appear to be principally mixtures of chlorite and carbonate.

South of Vermilion lake and O'Connor lake the magnetite is similar to that in the Timagami range. The Iron Lake iron formation is, however, considerably

Brecciated iron formation cut by quartz stringers, Timagami iron range.

coarser. The average grain size in the bands of coarser magnetite is about 0.09 millimetres. In the Ko-ko-ko range the magnetite grains are even coarser (average about 0.18 millimetres) and have a more metallic or steely lustre. These differences are thought to be due to the nearer proximity of the granite to Iron Lake and Ko-ko-ko Lake iron formations, resulting in more extensive recrystallization. It should be pointed out, however, that there is no evidence that the magnetite is coarser near the granite at the east end of the Ko-ko-ko Lake range than at Ko-ko-ko lake itself, 2 miles from the nearest granite.

Pre-Algoman(?)

Diorite, Peridotite, Metadiabase

The rocks discussed under the heading of "Pre-Algoman" are not known to be contemporaneous and are grouped together for the sake of convenience. The diorites are classed as pre-Algoman because of their highly deformed and altered

character. They were not observed in contact with granite or related dikes. The peridotites and metadiabases of Strathy township are considered to be pre-Algoman by Knight.[1] He based his conclusions on the presence of inclusions of "diabase and gabbro" in granites on the east shore of Net lake, just east of Goward. It is possible that these amphibolitic rocks are merely hybrids, in which case the assumed age may not be correct. Indeed, the peridotite is similar in thin section to coarse amphibolite dikes cutting the granites and other rocks south of the Northeast arm of Lake Timagami. The quartz diorite on the

Incompetent small-scale folds in iron formation, Timagami iron range.

Hermiston-McCauley property in Strathy township may well be Algoman although it is strongly sheared and altered. It closely resembles in the field and in thin section certain phases of the quartz diorite that forms a border facies of the granite south of the Northeast arm.

Diorite occurs as sills cutting the volcanics at two places along the Northeast arm. One of these sills outcrops on peninsulas and islands from the northwest corner of Denedus point east for a distance of 2 miles and has a maximum width of approximately 20 chains. Its south contact is marked by chlorite schist, which is speckled with yellowish flecks of leucoxene. North of this is a belt of

[1]C. W. Knight, op. cit., p. 209.

massive white diorite and quartz diorite, which is especially well exposed on the islands at the mouth of Dewy bay. North of this zone, in the vicinity of the navigation light just to the west, a very siliceous phase, with local aplitic dikes (differentiates), is found along the shore. This suggests that the sill is differentiated and faces north. In this respect it agrees in attitude with the volcanics as far as can be determined.

The second sill occurs on the O'Connor property on the south shore of the Northeast arm in the north central part of Strathcona township. It is similar

Drag-folding in iron formation, Timagami iron range.

to the one described above. At the south contact with pyritic rhyolite it is a sheared and fractured chloritic rock, which is mineralized with disseminated to massive pyrite. Massive feldspathic phases are especially noticeable at the east extremity of the belt, where they are abundantly sprinkled with visible grains of titanite. The feldspars are completely altered and are embedded in a fine-grained matrix of chlorite, carbonate, and quartz. Along the shores of the bay very siliceous rocks, which are probably acid differentiates of this sill, were observed.

The quartz diorite on the Hermiston-McCauley property, just south of the southwest arm of Net lake is more siliceous and almost as much altered as the rock described above. It is in the form of an irregular sill. It strikes northeast-southwest and appears to have a southeasterly dip. The southeastern part is a massive, altered quartz diorite with a wide, fine-grained border. The centre and northwestern parts and the tapering southwesterly extension are sheared and highly sericitized, carbonated, and silicified.

The peridotite outcrops southwest of Kanichee lake on the Cuniptau property of the Ontario Nickel Corporation. According to descriptions by Knight,[1] it is made up of fibrous hornblende and serpentine. It is mineralized with nickeliferous sulphides (see description on page 24). The intrusive is about three-quarters of a mile long in a north-south direction and has a maximum width of half a mile. Mapping by engineers for properties in the immediate area would suggest a slightly greater extent to the south and east than is indicated by earlier maps of the area. To the southeast, on claim T.R.T. 4,427 of Timagami Gold Mines, a knob of metadiabase is exposed; this may be an extension or satellite of the Cuniptau intrusive. It is an altered, amphibolitic

Small-scale faults in iron formation, Timagami iron range.

quartz diabase, which has been differentiated to form a zone of sericitized siliceous micropegmatite. Auriferous pyrite mineralization is associated with the latter phase.

Other outcrops of diorite have been recognized in Strathy township during the present survey and are shown on the plans of Timagami Gold Mines, Limited (see Figs. 9 and 10 on pages 39 and 40). The information available is not sufficient to permit their delineation on the general map. As already noted, some dioritic and recrystallized phases of the greenstone might properly be grouped here. Savage[2] has included a massive dioritic rock on claim W.S. 13 in this group of intrusives. Several outcrops of the same rock were noted to the east. On the map it was not differentiated from recrystallized greenstone.

Algoman

Quartz Diorite

South of the Northeast arm of Lake Timagami an area of quartz diorite and diorite is exposed which is possibly equivalent to some of the rocks described

[1]C. W. Knight, op. cit., p. 210.
[2]W. S. Savage, op. cit., p. 51.

above, but owing to its intimate association with the southern area of granite it has been classed as an Algoman intrusive. It is darker-coloured than the normal granite of the area and in thin section is shown to be made up of well-formed, altered plagioclase (often albitic) with interstitial quartz, hornblende, and biotite or chlorite. At its contact with the volcanics, the rock appears darker and is generally without visible quartz. To the south, it becomes more siliceous and lighter-coloured. In some cases it seems to grade into granite without any visible contact. In other sections of the area, as for instance southwest of Ferguson island in Strathcona township, it is definitely intruded by granite and has been recrystallized and altered to an epidotic rock. Small dikelets of granitic material have been observed cutting it without showing very sharp contact.

Certain sections of the quartz diorite have been sheared and altered, especially north of Broom lake in Briggs township. The rock that results is greenish, sericitized, and more siliceous. Locally, it may be so changed as to resemble a quartz porphyry. It is cut by quartz veins and mineralized with scattered pyrite.

Granite

There are three major masses of granite in the area. The northern one is found in the northern parts of Chambers and Strathy townships. The central one, a very characteristic body of coarse porphyritic granite, is found in Joan and Briggs townships and the south central part of Chambers. The southern mass outcrops in Yates and Strathcona townships and is unusual because of the association of a number of small satellitic bodies.

The northern mass of granite is variable in its characteristics. The normal type is rather coarse, massive, and pink in colour with a small proportion of ferromagnesian minerals. It may be seen to advantage on Chambers lake and in the road cuts south of Goward on highway No. 11. Areas of grey, frequently sheared, and finer-grained granite occur on the south shore of Chambers lake. Irregular dikes of feldspar porphyry occur with these zones. Locally, they appear to grade into the granite but generally cut it. Near the contact with the greenstone the granite is more siliceous, and towards the west end of Chambers lake considerable amounts of pyrite are found in the granite, in the greenstone near the granite, and in accompanying hybrid rocks. A few grains of chalcopyrite were noted, and on the north shore traces of molybdenite were observed in rather dark granite containing inclusions of agglomerate. Sulphides are also widely distributed in greenstones near the granite contact in the northeastern part of Strathy township.

The granite has caused the formation of many zones of hybrid rocks. Small exposures of these may be seen at various places on Chambers lake and on the small lake to the east. They are numerous at the west side of the small lake a mile south of Hansen lake. These rocks are dioritic in composition and contain coarse, prominent hornblende grains. They are abundant along the north-south granite-greenstone contact that roughly parallels the northern part of the boundary between Strathy and Chambers townships, as described by Todd.[1] Considerable recrystallization is also in evidence along the granite-greenstone contact in the eastern part of Strathy township.

Thin sections of the typical pink granite show that it is composed of well-formed plagioclase crystals, with anhedral microcline, perthite, and quartz. The principal ferro-magnesian mineral is biotite.

The porphyritic granite in Briggs and Chambers townships is a remarkably uniform massive rock. It is unusual because of the magnitude of the phenocrysts

[1]E. W. Todd, op. cit., p. 91.

of plagioclase (oligoclase), which may attain a length of 1½ inches. The matrix is composed of the same minerals as comprise the rock mentioned in the preceding paragraph. The only significant variations in the granite are seen near the contacts. Where inclusions of greenstone are present, the rock is usually more uniform in grain. At the contact, the granite is chilled to form a fine-grained, friable aplite. The granite appears to be entirely free from shearing or alteration of any kind. The only variation is the occasional presence of greenstone, amphibolite, and diabase dikes.

Inclusions of recrystallized granitized greenstone in granite, Chambers lake.

The southern granite mass is even more variable than the northern one. The main mass extending through Yates township to Herridge lake in Strathcona is a white or greenish to pink granite. The former seems to be more siliceous than the latter. In thin section, this granite is seen to be siliceous albite granite. It shows a considerable variety of contact phases. In the southeastern part of Strathcona township, the granites are especially variable. Just south of Lowell lake the intrusive is red to yellowish-green in colour and even-grained; it is characterized by chloritized ferromagnesian minerals. Near the south boundary of Strathcona township, the granite ranges from coarse-grained and massive to gneissic. It is contaminated to varying degrees by assimilation of the volcanics

and contains numerous inclusions, generally of small size, in varying stages of digestion. The irregular nature of the greenstone masses in this corner of the area is noteworthy. This, together with the extent of recrystallization already mentioned and the abundance of granite dikes, indicates that the greenstones must be underlain by granite at no great depth. The granites themselves are abundantly seamed by pegmatite and aplite dikes.

The north contact of the Yates-Strathcona granite batholith is unusual because of the variety of satellitic intrusives in its vicinity. On Denedus point and in the area to the east, a series of narrow, irregular bodies of fine- to medium-grained, rather aplitic albite granites are exposed. They are locally sheared and altered and are frequently pyritic. Owing to their light colour and fine grain, they are very difficult to distinguish from the acid volcanics. It is probable that many outcrops that have been classed as volcanic are really intrusive and vice versa. In the same section, a large number of quartz-albite porphyry dikes with a maximum width of more than a chain strikes a few degrees east of north. Though of different texture, they closely resemble in mineral composition the albitic intrusives just mentioned. A large area of quartz and feldspar porphyry was mapped just north of the east end of Shiningwood bay. The southwestern part of this intrusive is filled with inclusions of andesite. The exact location of the contact with the intruded andesites is difficult to define.

At the northeast corner of the batholith, southwest of Jessie lake, a second area of quartz porphyry is recognizable. The porphyry and a number of satellitic dikes intrude acid and intermediate volcanics, and again the determination of contacts and the recognition of dikes is not always easy. The dikes seem to strike in the same direction as those north of Shiningwood bay.

Determination of the north edge of the Strathcona granite mass south of Ferguson island is complicated by the presence of fine-grained and porphyritic contact phases containing inclusions of andesite. A few small sills of similar quartz porphyry and aplite granite intrude the volcanics along the south shore of Lake Timagami in this vicinity.

No evidence was found to indicate a difference in age between the three granites. All of them appear to be overlain unconformably by the Cobalt sediments, and thus they are probably of Algoman age.

Porphyries

Porphyry dikes, both quartz and feldspar, are abundant in certain sections of the area. The largest and most characteristic are the quartz porphyry dikes north of Shiningwood bay near the granite. Similar dikes are also to be found between Jessie lake and the Northeast arm in Strathcona township. Tourmaline was observed in one of the dikes and in andesites intruded by it. Numerous quartz porphyry bodies intrude the volcanics south of Kanichee and Net lakes. Some of those indicated on the map may be quartz rhyolite flows, but many have been identified as dikes. Sulphide mineralization is developed in and along the contacts of some of the dikes. Examples of this are found on the Niemetz property and on Denedus point in Phyllis township, on the Lloyd-Sproat claims in the northeastern part of Briggs township, and in the section north of Link lake. In addition to the dikes already described, at least two sizable bodies of quartz porphyry are associated with the Yates-Strathcona granite.

Feldspar porphyries are found at several places along the Northeast arm. A type which seems to be associated with the porphyritic granite carries large and unusually well crystallized feldspar phenocrysts. These dikes outcrop both north and south of the granite. A few feldspar porphyry dikes of a less spectacular character were also observed on Denedus point and elsewhere.

The relationship of the porphyries to the granites is not clear. They are cut by late basic dikes but except in the vicinity of the south shore of Chambers lake[1] were nowhere seen cutting the granite. In some cases, the quartz porphyry appears to be simply a border phase of the Yates-Strathcona granite. The difficulty of distinguishing porphyritic acid flows from the dikes and bodies just described and their proper identification on the map should again be emphasized.

Basic Dikes

A considerable variety of basic dikes occur throughout the area. All cut the granite and porphyry, but it seems likely that they are related to the same period of igneous activity. They are pre-Cobalt in age. The largest and most persistent of these dikes are the amphibolites, which abound in the Yates-Strathcona granite area and adjoining volcanics. They have a maximum width of 2 chains and strike in two principal directions, north of west and roughly north-south. In thin section they are seen to range from a hornblendic altered diabase to serpentinous amphibolite. One dike running across O'Connor island seems to change along the strike from amphibolite to a carbonate-rich greenstone.

Dioritic dikes outcrop on some islands in the eastern half of Chambers lake and at various places on the mainland south of Ferguson island, Northeast arm of Lake Timagami. These dikes are as much as a chain or so in width and strike in the same directions as the amphibolites. They are altered diabases.

Greenstone and carbonate dikes are very abundant along the south shore of the Northeast arm and in the granite to the south. A thin section of one of these shows it to be composed chiefly of alteration products, including quartz, chlorite, carbonate, alkali feldspar, and leucoxene. Owing to their carbonate content, these rocks are usually brown-weathering. A dike exposed on the shore at Finlayson Park near the north end of the Northeast arm contains unusually coarse grains of carbonate. The strikes vary. In some cases the dikes follow the schistosity of the enclosing rock. Usually they strike north of west and north-south, as in the case of those described above. Dikes exposed on the west side of O'Connor island are crossed obliquely by shear zones, and it appears that the shearing persisted, at least locally, after the intrusion of some of them.

A few mica lamprophyres were noted. An unusual lamprophyre was found cutting the quartz diorite intrusive on the Hermiston-McCauley property in Strathy township. It is composed of corroded olivines, which have been entirely replaced by serpentine embedded in a matted network of augite, biotite, hornblende, and alkali feldspar.

Huronian

Cobalt Sediments

In mapping the area, attention was chiefly confined to the greenstone belt, and no detailed work was done in the rocks of Cobalt age. The most typical Cobalt phase is a sediment containing scattered boulders of granite, greenstone, and other rocks, in a fine-grained, dark-green matrix. It was described by early writers as "slate conglomerate" and by Barlow[2] as "breccia conglomerate." The characteristics mentioned suggest that this rock is a tillite. No evidence, however, was discovered of a smoothed and striated glaciated surface beneath the "tillite." This rock is beautifully exposed in the road cuts on the old highway

[1]See page 16.
[2]A. E. Barlow, op. cit., p. 62.

at the west end of Lowell lake in Strathcona township. In the vicinity of Timagami, the pebbles generally form a much larger proportion of the conglomerate. Beds of finer-grained sediments are also exposed.

On the shores of Timagami island and along the north shore of Shiningwood bay, intermittent exposures of conglomerate are interbedded with quartzite, slate, and greywacke. On the south side of Shiningwood bay, massive quartzites appear to be the dominant rock type. Similar sediments are exposed on the west shore of Ko-ko-ko lake. Erosion remnants of conglomerate, along with some quartzite and slate, are preserved on the east shore of Ko-ko-ko lake and the bay of the same name. For the most part they are thin crusts on the westward-facing slopes of the granite and greenstone cliffs along the shore.

The Cobalt sediments are not strongly deformed. Considerable variations in dip and strike were observed in Shiningwood bay, but this is undoubtedly due largely to irregularities in the surface on which they were deposited. In the road cut just south of Timagami, near the road leading to Finlayson Park, the conglomerates appear to have been considerably contorted. Carbonate and pyrite are abundant in this exposure, but this is probably due to the highly carbonated rocks from which they were derived. On island No. 38 in the bay at Timagami, a Cobalt outcrop has been sheared. This may be due to slight movement along the major shear zone which has deformed the Keewatin rocks in the Northeast arm. Slates on Ko-ko-ko bay have also been heavily sheared in a north-south direction.

Keweenawan

Nipissing Diabase

The largest exposed area of Nipissing quartz diabase is in the southeast corner of Strathcona township. There are also outcrops of considerable extent immediately to the west of the area. The diabase is a normal brown-weathering type, forming high, rocky outcrops and prominent cliffs. It shows some variation in texture, as is usual with this rock. Locally, the diabase is altered to a hornblende-epidote rock. This is best seen on the west shore and adjacent islands of the south end of Ko-ko-ko bay. Similar dioritic altered diabase is located a short distance south of Upper Twin lake on the boundary between Strathcona and Riddell townships.

Dikes of quartz diabase have also been observed. A striking example outcrops near the mouth of the South Tetapaga river and on the first portage going up the river. It contains crystals of plagioclase more than a foot in length. Various bodies of diabase in the eastern part of Strathcona township are clearly related to the nearby sill and are therefore classed as quartz diabase. An unusual association of feldspar porphyry and diabase was observed at the southwest corner of Denedus point, on island No. 132 at the north end of the Northeast arm, and on the mainland to the south of the island. The contact between the two appears to be gradational.

Olivine Diabase

Several very persistent diabase dikes striking N. 50° W. to N. 80° W. were mapped. Most of these are olivine diabase. They characteristically weather brown to greyish-white, and the wider ones are quite coarse grained. They range in width from a few feet to 2 chains. They cut the Cobalt and, although not observed in contact with the Nipissing quartz diabase, are believed to be younger from analogy with other areas.

STRUCTURAL GEOLOGY

Folding

The Keewatin rocks are believed to have been folded into a syncline, whose axis is located in the vicinity of Link and Tetapaga lakes. The reasons for this are as follows:—

1. Grain gradation in tuffaceous beds in the Timagami iron range indicate that the tops of the beds face north.
2. This is corroborated by determinations from minor drag folds and the general northerly dip of the iron formation.
3. A fragment of jasper was observed in agglomerate just south of Link lake, indicating that the agglomerate is younger than the iron formation.
4. A few determinations of tops from pillow lavas north of Link lake in Strathy township indicates that they face south. The same interpretation was arrived at by Savage.[1]
5. Drag folds and fracture cleavage in the iron formation at Iron lake are in harmony with this interpretation. As the major drag fold east of Ko-ko-ko lake pitches west, it also affords corroboration.

If this interpretation is correct, then it is probable that the Vermilion Lake, Iron Lake, and Ko-ko-ko Lake iron ranges on the north limb of the structure represent the same horizon as the Timagami range on the south limb. The pillow lavas outcropping near Shiningwood bay in Yates township also correspond to those north of Link lake in Strathy township.

Drag-folding of the iron formation on a major and minor scale has already been mentioned. Crenulation of the slaty tuffs is of common occurrence. Otherwise folding is not much in evidence. The variation of the strike and schistosity of the Keewatin appears to be connected with the intrusion of the granite bodies.

Shearing

As mentioned above, there is considerable variation in the regional schistosity. Along the Northeast arm in Phyllis, Yates, Briggs, and Strathcona townships, the predominant strike is northeast. In the vicinity of Hay lake in Briggs township, the strike changes to almost north-south owing to the influence of the large batholith of porphyritic granite. Near Timagami, the strike is almost east-west. In Chambers township, however, the dominant strike of shearing and bedding is south of east except immediately southeast of Chambers lake. North of O'Connor lake, the regional strike changes to northeast-southwest. In the area south and west of Kanichee lake, the strike is about N. 20°–30° E. In the southeastern part of Strathcona township, the strike is again northwest-southeast.

There are at least two major shear zones in the area. One follows the Northeast arm of Lake Timagami. Most of the islands exposed in the arm are highly sheared, platy volcanics. The highly carbonated schists on Ferguson, O'Connor, and Bell islands in Finlayson Park, and on the many islands near Timagami are characteristic. Another zone of highly sheared volcanics is located just north of Link lake and outcrops on the provincial highway. Both strike north of east.

Complementary to the shearing along the Northeast arm are tension fractures striking about N. 60°–70° W., which are quite frequent on the south shore. In many cases, they are mineralized.

[1]W. S. Savage, op. cit., p. 50.

Fracturing

The diabase, amphibolite, and diorite dikes occupy fractures, which have in general a rather complex pattern. As already indicated, they may be divided into two main groups, one striking about N. 60° W., the other roughly north-south.

Faulting

A few minor faults were observed in the field. They are of special importance at the Hermiston-McCauley and Beanland properties in Strathy township, where they have offset the veins, usually for a distance of several feet.

A number of major faults have been inferred from apparent offsetting of diabase dikes and iron formation. Owing to the difficulty of accurate location on the iron formation, it is possible that other offsets have been overlooked. The same is true of the diabase dikes. It is probable that the prominent bays of Net and Kanichee lakes, the southwest extension of Vermilion lake, Ko-ko-ko bay, and other north or north-northeast trending bodies of water are located on these lines of faulting and fracturing. Whether or not there has been significant movement along all of them is not clear. A heavy shear zone in the Cobalt sediments on the west shore of the north end of Ko-ko-ko bay may be one of these zones.

Apparently movement has taken place in this direction at various times. Thus, at the Beanland property mineralization was noted in lenses in the fault zone. As there is no evidence that it is a dragged block of ore, it would appear that movement preceded as well as followed mineralization. Subsequent to the deposition of the Cobalt series and the intrusion of the diabase, further movement took place.

ECONOMIC GEOLOGY

The area is remarkable for the variety of mineral deposits that have been discovered in it. At various times in the past forty-five years, prospecting has been carried on for iron, nickel and copper, molybdenite, pyrite, arsenic, gold, and silver. Outside of a little production of arsenic, copper-nickel matte, and pyrite, this has not so far resulted in the development of a mining camp. Underground operations have been undertaken on several properties, but so far none has been brought to the point of production.

Iron

The iron deposits of the area have been known since 1899 and have been described by several geologists[1] and engineers. Most of the work done on the iron formation has been carried out on the Caldwell-Mulock claims east of Turtle lake. In 1904 and 1905, some trenching and diamond-drilling were done, and the writer was informed that diamond-drilling had been done about fifteen years ago on these claims. This work was planned with the object of locating

[1]W. G. Miller, Ont. Bur. Mines, Vol. X, 1901, pp. 160, 167.
E. Lindeman and L. L. Bolton, Mines Br., Can. Dept. Mines, pub. No. 217, Vol. II, pp. 106-109, 1917.
A. E. Barlow, Geol. Surv. Can., Vol. XV, 1902-1903, pp. 120-133 AA.
Ont. Bur. Mines, Vol. XIV, 1905, pp. 31, 78; Vol. XV, 1906, pt. 1, p. 26.
Geol. Surv. Can., map. No. 944, 1907.
G. C. Mackenzie, Ont. Bur. Mines, Vol. XVII, 1908, pp. 272-273.
E. Lindeman, Mines Br., Can. Dept. Mines, Sum. Rept. 1909, pp. 67-68.
A. E. Barlow, Geol. Surv. Can., Sum. Rept. 1909, Vol. XV, pp. 126-133 AA.
Report of the Ontario Iron Ore Committee, with Appendix, 1923, Ont. Dept. Mines, pp. 213-214.

secondary concentrations of high-grade ore in the rather lean banded magnetite and silica formations. The examination made by the writer and his assistants has failed to indicate any justification for the expectation of such enriched bodies. The vicinity of faults, unconformities, drag folds, diabase dikes, and granite intrusives were studied for evidences of concentration, but none was found. A careful watch was kept for float. High-grade hematite float was observed on the north end of island No. 725 just west of Timagami island. It is not known whether this came from the lake bottom or from Ko-ko-ko lake, where the iron formation has been much faulted.

The content of iron in the various ranges is difficult to estimate. Samples taken from unspecified localities on the Timagami range are reported by Lindeman and Bolton[1] to have given from 18.6 to 27.2 per cent. metallic iron over widths of from 18 to 100 feet. A sample taken by S. A. Ferguson[2] from the excellent exposure on the highway north of Timagami and assayed by W. F. Green, of the Provincial Assay Office, averaged 28.8 per cent. metallic iron over a width of 26.3 feet. The content of phosphorus and sulphur is low (0.063 to 0.081 and 0.064 to 0.148 per cent., respectively), and silica is, of course, high (48.34 to 59.99 per cent.). A test was made for manganese, but none was found. Across a width of 3½ to 4 chains, this exposure of iron formation averages perhaps 25 per cent. or more metallic iron. In most other exposures, however, it is probable that the sections averaging more than 20 per cent. metallic iron would not exceed 2 chains in width.

There is probably a width of about 2 chains in the Vermilion Lake band that would yield 20 per cent. iron, and the grade might be somewhat higher in the section south of O'Connor lake. About the same widths and values are to be expected from the Iron Lake and Ko-ko-ko Lake ranges.

Except for a short section covered by Turtle lake, the Timagami iron formation has been traced for an uninterrupted length of almost 5 miles. Of this, the east and west extremities are much narrower than the average. The Vermilion Lake–Iron Lake range is 2⅕ miles long, the eastern end being very narrow. The Ko-ko-ko Lake range is of fairly uniform width and composition for a length of more than 1½ miles.

The economic possibilities of the iron formation would seem to lie in the possibility of magnetic concentration of the low-grade banded magnetites. Tests were conducted at the University of Toronto by S. A. Ferguson[3] on typical material from the Timagami, Iron Lake, and Ko-ko-ko Lake bands. It was found that grinding to 150 mesh yielded a concentrate with from 50.18 to 55.39 per cent. metallic iron. The coarser grain of the Ko-ko-ko Lake material resulted in a more complete concentration. For some reason, as yet undetermined, a much smaller concentrate was obtained from the Ko-ko-ko Lake material than from Timagami and Vermilion Lake materials, although the grade from the outcrop was about the same in each case. As no attempt was made in the experiments to duplicate actual mill conditions, it is not known whether these results are applicable to commercial operation.

Nickel and Copper

Nickel-copper deposits are known on two properties in the area. One occurs in an altered peridotite, the other in a roof pendant, consisting of recrystallized and injected rocks, in granite.

[1]E. Lindeman and L. L. Bolton, op. cit., p. 107.

[2]S. A. Ferguson, "Banded Iron Formation of the Timagami Area, Ontario," Unpublished Master's thesis, University of Toronto, 1942.

[3]S. A. Ferguson, op. cit.

L. B. Norrie

The Norrie property is located on the east shore of Net lake, northeast of Goward. It comprises 9 surveyed claims, T.R.T. 4,069 to 4,071, 5,313, 5,314, 5,626 to 5,628, and 5,660, and 2 unsurveyed claims, Nos. 5,848 and 5,860. The property was staked by R. A. Percy and turned over to L. B. Norrie, of New York. In the summer of 1941, 225 feet of diamond-drilling was done on the claims. The deposit was known many years ago and is described in full by Knight.[1] The country rock is a variable, fine- to coarse-grained hornblendic rock, which is designated by Knight as diabase or gabbro. It is injected by granite and quartz veins and is much silicified. Sulphides, which occur as irregular impregnations, consist predominantly of pyrrhotite with veinlets and seams of chalcopyrite. Mr. Percy[2] states that picked samples from the old dumps yielded from 0.05 to 0.15 per cent. nickel and as much as 3.5 per cent. copper.

Ontario Nickel Corporation, Limited

The Cuniptau property of the Ontario Nickel Corporation, Limited, comprises a group of claims in the central part of Strathy township. The property is equipped with camp buildings, a mining plant, and a small smelter. The plant is located on claim T.R. 3,187. The geology is fully described by Savage.[3] The mineralization is located in a body of serpentinized and uralitized peridotite, which has been intruded into Keewatin volcanics and is itself intruded by a north-south, east-dipping dike or sill of olivine diabase. The following description is taken from Savage's report:[4]—

> This zone has a thin coating of rust, is shattered, and in places contains disseminated pyrite and chalcopyrite. Cutting the rusty zone are very small lenses or veins of calcite carrying these minerals together with pyrrhotite and pentlandite. They are narrow and irregular and range from a fraction of an inch to 12 inches in width. . . .
>
> A drift on the 100-foot level has followed a vein zone in a general north-south direction for some 200 feet. This vein zone contains lenses of massive sulphides, chiefly pyrrhotite and chalcopyrite, with some pentlandite, and these range from a few inches to 4 feet in width. The dip varies from 30 to 40 degrees east. On this level two crosscuts to the east passed through about 20 feet of fine-grained serpentine followed by a zone of disseminated sulphides, which ranges from 40 to 70 feet in width. The north drift also passed through 36 feet of similar mineralization.

The following data have been taken from the Canadian Mines Handbook:[5] The shaft is 245 feet deep; lateral work totals 2,200 feet. The pilot smelter was operated in 1936 and produced 212,118 pounds of nickel-copper matte. This yielded 77.6 per cent. copper and nickel, 37 ounces gold, 52.7 ounces platinum, 196.3 ounces palladium, and 910 ounces silver.

The property has been inactive since 1936. A good road leads directly to the property from Goward.

Other Occurrences

A deposit in greenstone and altered diabase similar to that on the Norrie property is reported by Knight[6] on claim W.D. 264 just west of the railroad on Net lake.

Nickel and copper are reported by Miller[7] to occur in a sulphide zone, which is probably to be identified with the O'Connor pyrite property in the northern part of Strathcona township. He states that the sulphide on assay yielded:

[1]C. W. Knight, Ont. Dept. Mines, Vol. XXIX, 1920, pt. 1, p. 213.
[2]Personal communication.
[3]W. S. Savage, Ont. Dept. Mines, Vol. XLIV, 1935, pt. 7, p. 54.
[4]Ibid.
[5]Canadian Mines Handbook, 1938, Northern Miner Press, Limited, Toronto, p. 210.
[6]C. W. Knight, op. cit., pp. 213-214.
[7]W. G. Miller, Ont. Bur. Mines, Vol. X, 1901, p. 169.

"gold, $1.40; copper, 0.48 per cent.; nickel, 0.27 per cent.; sulphur, 26.20 per cent."

Copper mineralization was also observed on the east and west sides of Timagami island, just north of island No. 210 and a few chains south of island No. 808, respectively, on the south shores of the two long bays that nearly split the island. Mineralization on the east side is a rusty zone mineralized with sparse chalcopyrite, pyrite, pyrrhotite, and sphalerite. Some massive pyrite is also present. In the exposure on the west side of the island, disseminated pyrite and chalcopyrite occur with streaks of magnetite. The zone is about 20 feet wide. This mineralization may be connected with the diorite sill outcropping to the northeast.

Molybdenite

Molybdenite occurs on the west shore of Net lake about 4 miles north of Timagami station and a quarter of a mile east of the Temiskaming and Northern Ontario railway. It is described by Parsons[1] as follows:—

> The main ore body, upon which a shaft has been sunk, is about 50 feet wide, and consists of a series of gash veins of quartz carrying chalcopyrite and molybdenite in greenstone. The molybdenite is present in radiating nodules. . . .

A shaft about 50 feet deep is located on the main showing. Two other occurrences of high grade, narrow veins were opened up. The writer did not see this prospect.

Pyrite

Pyrite is of widespread occurrence in the area. It is especially abundant along the granite contact in Chambers and Strathy townships. A small production is reported[2] from the Rand syndicate claim, three-quarters of a mile south of Kanichee (Cedar) lake, Strathy township. The prospect was not seen by the writer. Just outside the area, at James lake, 9 miles north of Lake Timagami, near the railroad, a sulphide deposit has been described by several geologists.[3] This deposit consists of a 40-foot width of pyrite, chalcopyrite, and pyrrhotite at the contact of granite and greenstone. The pyrrhotite is said to carry gold, copper, and nickel in small amounts.

D. O'Connor

A rather extensive deposit of pyrite has been opened up on the O'Connor property on the south side of Sulphur bay in the north central part of Strathcona township. Six open pits were sunk to a maximum depth of 15 or 20 feet, a number of smaller openings were made in the mineralized zone, and some diamond-drilling was done. The writer understands that this work was done in the 1920's. The mineralization appears to consist chiefly of pyrite, which occurs as disseminations, scattered pockets, and massive pods as much as 4 feet in width. The country rock is a massive, fractured, and slickensided chloritic rock, which is believed to be the chilled base of a differentiated diorite sill. Rhyolite outcrops a few feet south of the mineralization zone.

While a considerable quantity of pyrite and derived rust is visible in many of the pits, none of the bodies so far exposed is as massive as the deposits in

[1]A. L. Parsons, Ont. Bur. Mines, Vol. XXVI, 1917, p. 308.
[2]Ont. Bur. Mines, Vol. XXV, 1916, pt. 1, p. 104.
[3]E. W. Todd, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 3, p. 104.
W. E. H. Carter, Ont. Bur. Mines, Vol. XIV, 1905, pt. 1, p. 73.
E. L. Fraleck, "Iron Pyrites in Ontario," Ont. Bur. Mines, Vol. XVI, 1907, pt. 1, p. 165.
E. T. Corkill, Ont. Bur. Mines, Vol. XVII, 1908, pt. 1, p. 82.

southeastern Ontario or the Michipicoten area. While values in gold, copper, and nickel are reported by Miller,[1] character samples of massive pyrite and of disseminated sulphide, assayed by the Provincial Assay Office, yielded no gold and only traces of silver. The geological environment of the deposit is sufficiently well defined to make prospecting for further zones of mineralization relatively simple wherever outcrops are available.

Arsenic

Arsenical ores are abundant in Strathy township. Most of the veins occur in narrow, irregular fractures and are too small to be of economic value. There are two deposits, however, of some size: the Big Dan and the Manitoba and Eastern (including the Little Dan). The Manitoba and Eastern is described in the section on gold and silver.[2]

Big Dan

The Big Dan is located south of Net lake in the eastern part of Strathy township. It was known in 1899, and about 1906 a mining and milling plant was installed. No data on production are available, but apparently it was not large. Descriptions have been given by several geologists, of which the following are the most comprehensive:—

M. E. HURST, "Arsenic-Bearing Deposits in Canada," Geol. Surv. Can., Econ. Geol. Series No. 4, 1927, p. 118.
E. W. TODD, "The Matabitchuan Area," Ont. Dept. Mines, Vol. XXXIV, 1925, pt. 3.
C. W. KNIGHT, "Windy Lake and Other Nickel Areas, Ont. Dept. Mines, Vol. XXIX, 1920, pt. 1, pp. 214-218.
A. P. COLEMAN, "Copper and Iron Regions of Ontario," Ont. Bur. Mines, Vol. IX, 1900, p. 173.

Other references will be found in these publications.

The deposit, which has been opened by an adit, 2 shafts, an open cut, and a number of trenches, is located in an irregular shear zone striking N. 20° E. (magnetic) for about 1,000 feet in basic volcanics. A quartz porphyry dike about 100 feet wide extends parallel to the shear zone. Mineralization consists of sulphides, disseminated and in lenses and stringers. Arsenopyrite and pyrrhotite are the most abundant sulphides, but pyrite and chalcopyrite are also present. Gangue minerals are not prominent. The ores are said to carry values in gold and silver. Most of the ore obtained was taken from a solid lens 1 foot wide and 50 feet long.

An interesting feature of the deposit is the fact that it is located roughly on the strike of the Link Lake shear zone. Arsenopyrite occurs as disseminated grains in this shear zone and in massive form in a related fracture trending N. 30° E., on the Milne claim, J.S. 107.

Gold and Silver

The principal types of gold deposits in the area may be classified as follows:—

1. Arsenical gold ores, in places with high silver values.
2. Pyritic ores.
3. Ores containing lead and zinc sulphides as well as pyrite.

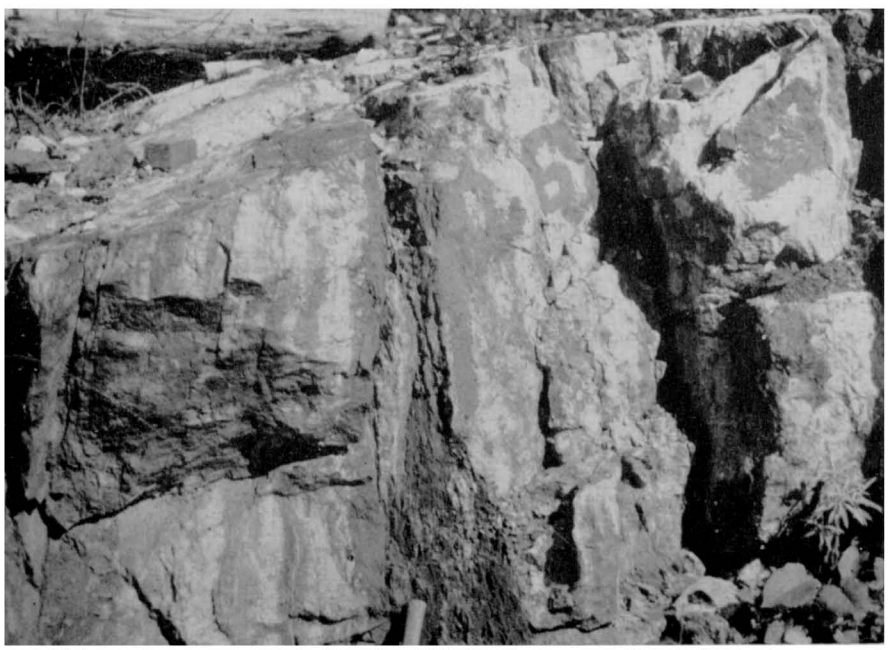
In the first group are included the Big Dan, the Manitoba and Eastern, the Milne claim (J.S. 107), some showings on the property of Timagami Gold Mines, the Long Lac Adair property, and a showing on the Beanland property. The first three strike east of north or west of north, and the last three are arsenical

[1]See pages 24 and 25 of this report.
[2]See page 35 of this report.

replacements of iron formation. The relationships of the arsenical ores and the others are not clear.

The second group includes the Billfeld and Niemetz deposits, the south vein on the Hermiston-McCauley property, the main northwest showing on the property of Timagami Gold Mines, and several others. The third group is frequently associated with the second, even in the same vein, so that the distinction is not a fundamental one. The Beanland vein, the Shaver vein on the Hermiston-McCauley property, and the Derosier deposit are examples of the third type.

Structurally, the gold-bearing veins may be divided into three groups: (1) those striking from N. 30° W. to N. 30° E. (arsenical veins); (2) those



Vein on the property of the Beanland Mining Company. The dark streaks are sulphides. A horse of schist is located under the hammer handle.

striking northeast (Hermiston-McCauley, Beanland, and others); and (3) those striking N. 60°–80° W. (Billfeld, Derosier, Niemetz, Timagami Gold Mines).

DESCRIPTION OF PROPERTIES

Beanland Mining Company, Limited

The property of the Beanland Mining Company, Limited, comprises four surveyed claims, J.S. 62, W.D. 340, T.R.T. 4,250, and T.R.T. 4,257, in the central part of Strathy township. The claims were staked by Sydney Beanland, June 20, 1929. The main showing was discovered in 1934 by Paul D. Hermiston and Robert McCauley while doing assessment work. The property was optioned to the Consolidated Mining and Smelting Company of Canada. After doing a considerable amount of surface work and diamond-drilling, the company relinquished its option. In the early stages of development, funds were supplied by the Goodfish Mining Company, Limited, in return for an interest in the property.

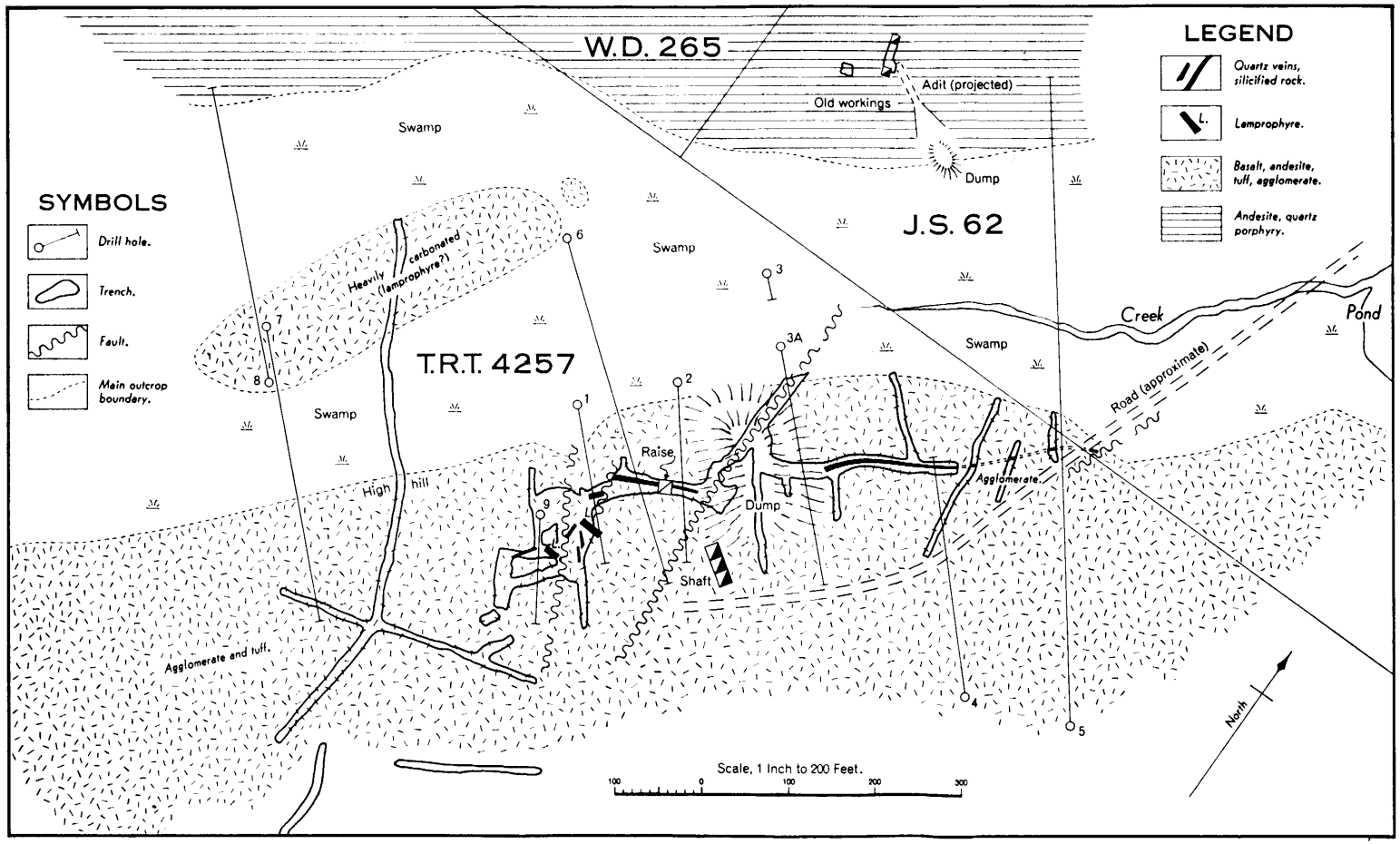


Fig. 2—Geological sketch map of part of the property of the Beanland Mining Company, Limited. (Based on plans by the staff; geology by W. W. Moorhouse.)

The southeastern part of the property is underlain by basic and intermediate volcanics, including pillow lavas, vesicular lavas, tuffs, and agglomerates. In the northwestern part rhyolite outcrops with some andesitic rocks and iron formation. The two sections are separated by a northeastward-trending swamp. A strongly carbonated, brown-weathering ridge, which may be lamprophyric in

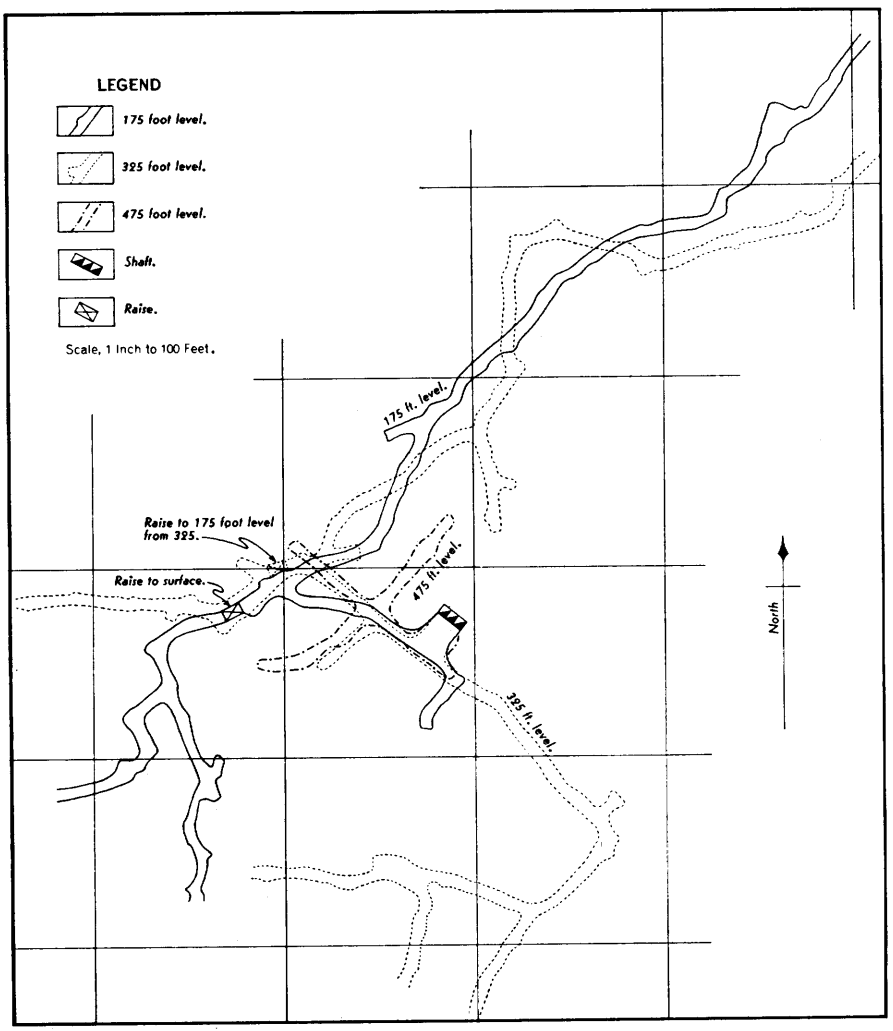


Fig. 3—Plan of the underground workings of the Beanland mine. (From plans by D. M. Briden.)

character, is located in the southern part of the low ground. A narrow lamprophyre dike cuts the vein zone near its west end.

Most of the work on the property has been done on a quartz vein located on the northward-facing slope of the main ridge of basic volcanics overlooking the swamp. The vein strikes N. 50°–70° E. and has a nearly vertical dip. It has a length of about 560 feet and a maximum width of 5 feet. It is not a single continuous vein but branches to form two or more narrow veins separated by altered country rock. Cross-faults striking north-south and west of north have offset

the mineralized zone about 50 feet just east of the shaft and 40 feet a distance of 170 feet west of the shaft. The east end of the vein also terminates against a fault. Movement in each case has been left-handed, i.e., the west side has shifted south with respect to the east. As mineralized quartz veinlets are present in the shear zone, the movement on the west fault appears, in part at least, to have been pre-mineralization.

The mineralization includes pyrite, sphalerite, and galena. In some exposures just west of the shaft, the last two are dominant, but for the most part pyrite, frequently accompanied by a little galena, is the most persistent sulphide. The principal gangue is quartz, which is cut by stringers of carbonate. The wall rock for a few inches on each side of the vein is silicified, carbonated, and sprinkled with pyrite.

Interesting values were obtained on the surface showings. Sampling by the Consolidated Mining and Smelting Company indicated an ore shoot west of the east fault 160 feet long and 4.6 feet wide, averaging 0.31 ounces gold and 1.8 ounces silver. Individual values were rather consistent, ranging from a trace to a maximum of 0.82 ounces. Values from other sections of the vein were not so encouraging. Sampling on the 175-foot level would seem to indicate a tendency for the ore shoot to pitch northeast. Elsewhere on this level, values are rather spotty though high assays were obtained from sections of the north-south shear zone at the southwest end of the vein zone. Surface work was also done on a band of iron formation carrying arsenopyrite.

The property has a complete mining plant, and underground development has been carried out on three levels, the 175-, 325-, and 475-foot. Lateral work, including drifting and crosscutting, totals roughly 2,200 feet. Of this, about 800 feet is on the first, 1,150 feet on the second, and 200 feet on the third level. Operations were under the direction of D. M. Bryden.

Billfeld

The Billfeld property is located near the northwest corner of Denedus point It comprises 3 patented claims, T.R. 4,031 to 4,033; 6 surveyed claims, T.R.T 5,693 to 5,695 and 5,897 to 5,899; and 5 unsurveyed claims, T.R.T. 5,652 to 5,654, 5,687, and 5,688.

The original discovery is said to have been made by an Indian from Bear Island named Moore. The present claims were staked in 1934.

The mineralization occurs principally in a zone of shearing and fracturing in rhyolitic agglomerate. This zone strikes N. 75°–87° W. and dips vertically or steeply south. It has been trenched for about 385 feet, except for a swampy section of about 70 feet. The most important mineralization is in the west trench. In the east trenches, narrow fractures and shear zones contain as much as 6 inches of rust. Carbonate is fairly abundant, and a lamprophyre dike appears at the east end. The west trench has exposed a zone of mineralization from a few inches to 4 feet in width. The average width over a length of about 125 feet is a little more than 2 feet.

The only visible sulphide is pyrite, which is present in two forms: a fine-grained, massive variety, which occurs in pods, lenses, and streaks from an inch to several feet in length; and a coarsely crystalline variety, usually embedded in quartz. The quartz tends to be rather vuggy, owing to leaching of carbonate, which is prominent in the wall rock as well as in the vein. William Feld states that sampling for Arntfield Gold Mines, Limited, by V. A. James indicated a shoot 115 feet long and 2 feet 3 inches wide, averaging $11.37 in gold (calculated at $35.00 an ounce). Two character samples were taken by the writer and submitted to the Provincial Assay Office. Fine-grained pyrite from the east

end of this showing gave 0.09 ounces of gold per ton and a trace of silver; and coarse-grained pyrite with quartz from the widest part of the vein yielded 0.18 ounces of gold per ton.

Four diamond-drill holes, each about 200 feet long, which were put down on this zone by the Mining Corporation of Canada, are said to have yielded inconclusive results. Six short holes were drilled on the west showing by Arntfield Gold Mines. Three of these are said to have intersected narrow widths (up to 1.4 feet) of mineralized material, which yielded values ranging from 0.14 to 0.18 ounces gold per ton.

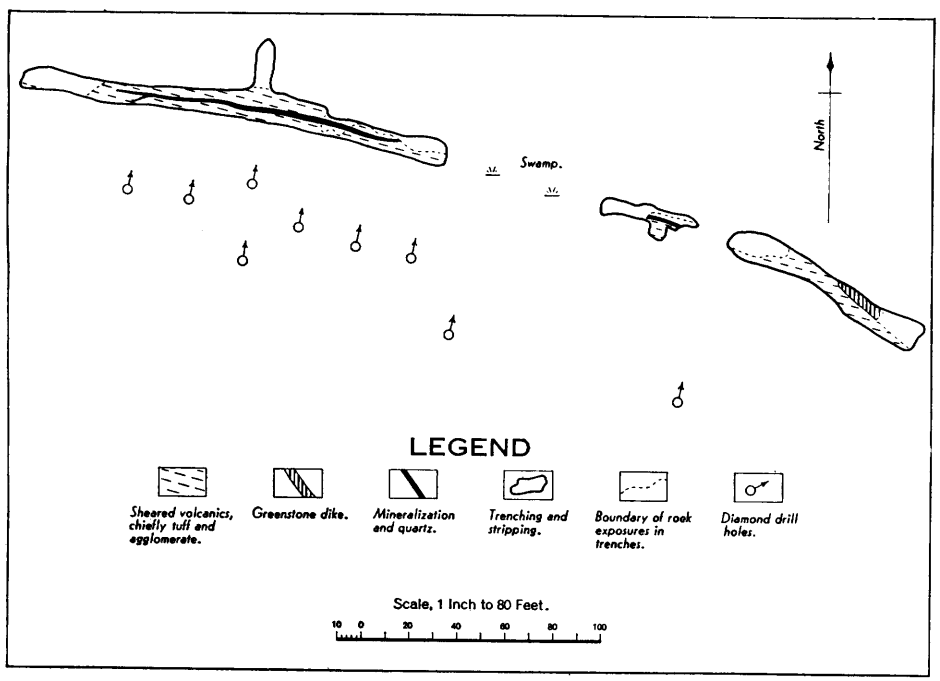


Fig. 4—Plan of the surface workings and drilling at the main showing on the Billfeld property.

A number of other mineralized zones have been discovered on the property. On the east boundary of claim T.R. 4,031, three brown-weathering carbonate veins in rhyolitic volcanics have been exposed by stripping. These veins are irregular in strike and width (up to 1½ feet). They are mineralized locally with disseminated pyrite. Gold values are said to be present.

A third mineralized zone, striking N. 80°–85° W., is located some 3 chains south of the main showing. It consists of a series of carbonate veins and lenses and lamprophyre dikes. At the east end of the zone, which is about 200 feet long, an area of irregularly mineralized carbonate nearly 40 feet in diameter is cut by an 18-foot vein of barren quartz.

D. Derosier

A large number of claims have been taken up north and east of the Billfeld property on Denedus point by Dewey Derosier, J. R. Sproat, and associates. The principal showing on the property is located on claim T.R.T. 5,879. It was discovered about 1928 by Harry Smith.

The country rock in the vicinity of the deposit consists of rhyolitic volcanics. These are considerably silicified and have been cut by a number of northwest-southeast mineralized joints. The diorite sill mentioned earlier in the report is probably located in the lake to the north. The mineralization occurs in the form of an irregular impregnation of fractured and brecciated rhyolite and agglomerate striking roughly N. 65° W. East and north of this exposure, there are numerous rusty joints striking roughly in the same direction. The main zone has a maximum width of 20 feet and has been exposed for a length of about 100 feet. The country rock is heavily carbonated and cut by ankerite veinlets. Quartz is not prominent. Fine-grained pyrite, sphalerite, chalcopyrite, and

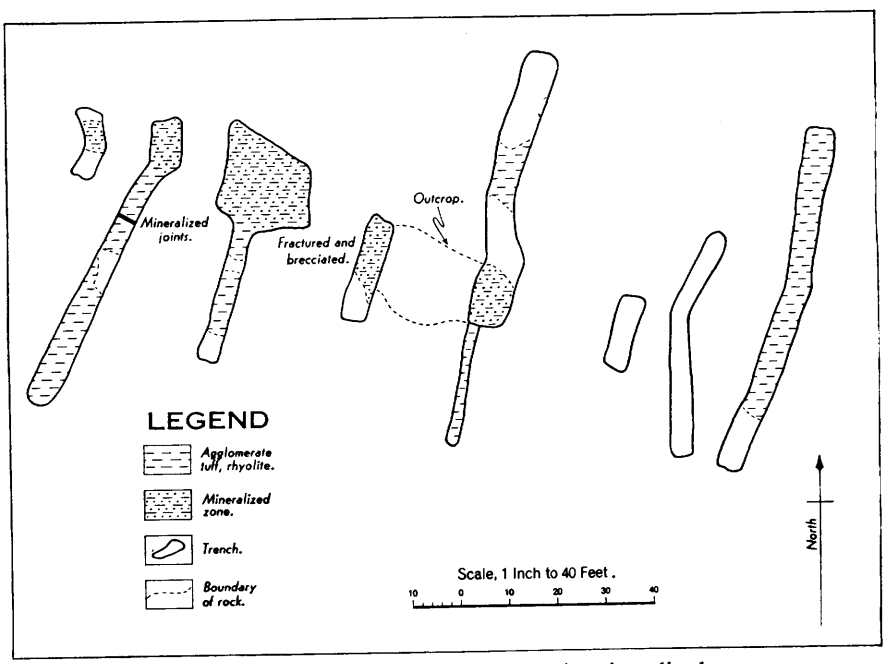


Fig. 5—Plan showing trenching on the main mineralized zone on the Derosier property.

malachite were noted. The sphalerite appears to be generally associated with the ankerite veinlets. Character samples of pyritic and sphalerite-rich material were submitted to the Provincial Assay Office for assay. The first yielded 0.01 ounces of gold per ton and a trace of silver, the second only a trace of gold.

Friday

Some work has been done on pyritized shear zones in rhyolitic volcanics on the Friday claims just east of Amphibolite bay in the southern part of Briggs township. These zones strike N. 85° E. A narrow andesite dike has been intruded parallel to the schistosity.

P. D. Hermiston

A group of 6 claims was staked late in the summer of 1941 by Paul D. Hermiston in the central part of Strathy township. They are located between claim J.S. 107 on Link lake and the property of Manitoba and Eastern Mines at Arsenic lake. The claims have been transferred to the Consolidated Mining and Smelting Company of Canada.

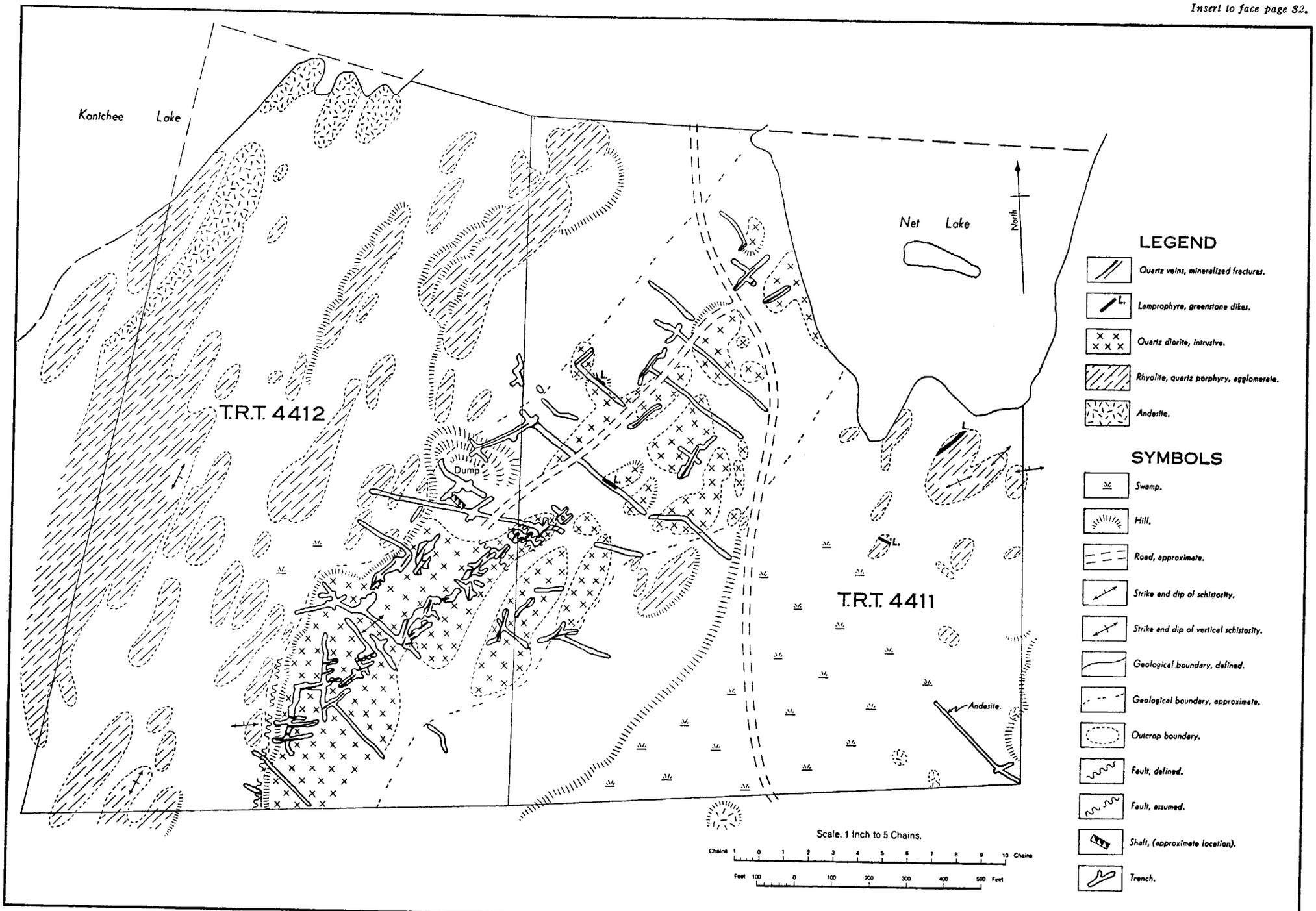


FIG. 6—GEOLOGICAL SKETCH MAP OF THE HERMISTON-MCCAULEY PROPERTY.

Hermiston-McCauley

The Hermiston-McCauley property, owned by the Consolidated Mining and Smelting Company of Canada, comprises claims T.R.T. 4,411 and 4,412, situated between the long southwest bay of Net lake and the southeast arm of Kanichee lake in the central part of Strathy township. The property was staked by Paul D. Hermiston and R. McCauley in the fall of 1934.

The general geology is illustrated on the accompanying sketch map (Fig. 6). Sheared rhyolites, which locally show spherulitic and agglomeratic structures, underlie much of the property. In the southeast and northwest corners, andesitic rocks are associated with the rhyolites. The volcanics have been intruded by a sill of altered quartz diorite, which has a maximum horizontal width of 600 feet or more. The sill strikes roughly N. 50° E. and probably dips south. To the north it disappears under Net lake. To the south it extends through claim W.D. 265 into the southeast corner of T.R.T. 4,413. It is much narrower in this southwesterly part. The irregular north contact of the sill is a fine-grained, chilled phase, which passes into a medium-grained, massive, altered quartz diorite. This is well exposed near the mine office and on the road that leads to the shaft. The mineralization is located in the central and northwestern part of the sill. The diorite in this vicinity has been heavily sheared, carbonated, silicified, sericitized, and pyritized. The alteration seems to be more intense where the mineralized zones and fractures are most abundant. The intrusive has been cut by greenstone and lamprophyre dikes; one of the latter has been previously described.[1] Porphyries are shown cutting the quartz diorite in plans showing underground geology.

There are two important veins on the property. In addition to surface work, underground exploration totalling about 4,000 feet was done on the 150- and 300-foot levels. The main or south vein, which strikes N. 40° E., has been exposed for a continuous length of 250 feet and has a maximum width of 5 feet, although in some sections parallel veins increase the total width of quartz to 6 feet. The vein has been cut by a number of minor cross-faults, which strike northwest-southeast and show a maximum displacement of about 20 feet. The direction of displacement is in every case right-handed, i.e. the east side of the fault has moved southeast with respect to the west side. At its west end, the vein is sinuous and lenticular. Southwest of this vein, narrow curving veins and short thick lenses of quartz occur in some abundance in highly altered quartz diorite. The mineralization in this zone as far as can be seen on surface is principally pyrite, which occurs as patches, streaks, and bands in the quartz and disseminated in the country rock for a few inches on each side of the vein. Traces of copper were also noted in the outcrop. Carbonate is not abundant in the vein, although it is common in the wall rock. According to the management, sampling on surface indicated a shoot roughly 70 feet long with gold values ranging from a trace to 1.15 ounces over 8.8 feet. On the first level, the same ore shoot was encountered, and one section assayed 0.388 ounces over 3.32 feet for a length of 34 feet. Other sections gave rather lower values. The total length is roughly 100 feet.

In the area 240 feet to the southwest of this shoot, two small shoots, totalling 95 feet in length, carry somewhat lower values. On the second level, the east zone failed to carry commercial ore and in the west zone the various mineralized sections were narrower, values being obtained across widths of 1.3 to 2.6 feet.

The second important vein, known as the Shaver, is located 270 feet north of the main vein. On surface it strikes N. 60° E. and has a maximum exposed

[1]See page 19 of this report.

width of 1½ feet. Mineralization is largely pyrite, though galena was observed in one exposure. Specimens from the underground workings are well mineralized with pyrite and galena. The quartz is grey to white and well fractured. The country rock is less altered than that of the south zone. Surface sampling is reported to have yielded 0.66 ounces of gold per ton over an average width of 4.62 feet for a length of 68 feet. On the first level, the vein carried 0.71 ounces over a width of 1.26 feet and a length of 101 feet. On the second level, the corresponding portion of the vein was slightly lower in grade, but several short sections, aggregating nearly 200 feet, are said to have yielded commercial values in gold with some silver.

The quartz diorite intrusive is cut by a number of mineralized and rusty shear zones and fractures. Most of these are less than 1½ feet in width, but one or two are 3 feet wide. Some values are obtained from them. The principal sulphide is disseminated pyrite, but splashes of chalcopyrite were noted in one vein. These veinlets and seams are featured by a rather variable strike. Even individual shear zones and fractures may vary in strike and dip.

During the first part of the summer of 1941, Paul Hermiston discovered a narrow zone of mineralization in andesite near the southeast corner of the property. Sheared porphyry or rhyolite in the andesite has been silicified and mineralized with a fibrous mineral (jamesonite?), pyrite, sphalerite, and chalcopyrite. At one place the mineralization is 2 feet wide and is said to carry up to 0.228 ounces gold per ton. It has been traced for 30 or 40 feet to the west, but values are not as good. About 15 feet to the east, a bluish-grey flaky mineral with pyrite in a 3-inch shear zone carries silver but no gold.

Iris Gold Mines, Limited

Iris Gold Mines, Limited, controls 4 claims, T.R.T. 4,414, 4,415, 4,436, and 4,437, adjoining the Hermiston-McCauley property on the north and east in the central part of Strathy township. The property is covered for the most part by overburden. Some diamond-drilling and trenching were done, but the drill-holes were not completed owing to boulders in the drift. Mr. Beanland[1] reports that erratic gold and copper values were obtained along the contact of the rhyolite (shown as porphyry on earlier maps).

Lloyd-Sproat

The Consolidated Mining and Smelting Company of Canada holds an option on the Lloyd-Sproat claims on the Northeast arm of Lake Timagami in the northeastern part of Briggs township. A considerable amount of surface work has been done, but no ore shoots have been discovered. One of the trenches noted during traversing exposes an acid dike 4 feet wide, which strikes N. 37° E. and dips 80° S. in andesite. The dike is cut by quartz stringers and spotted with rust.

Long Lac Adair

The Long Lac Adair property is located south of Cooke lake in the central part of Strathy township. It has been described by Savage,[2] and as far as the writer knows no developments have taken place since his report was published. The following description is abstracted from Savage's report. The main showing is a 5-foot band of banded iron formation comprising cherty quartz, massive magnetite, and sulphides (pyrite and some arsenopyrite). The iron formation

[1]Personal communication.
[2]W. S. Savage, op. cit., p. 55.

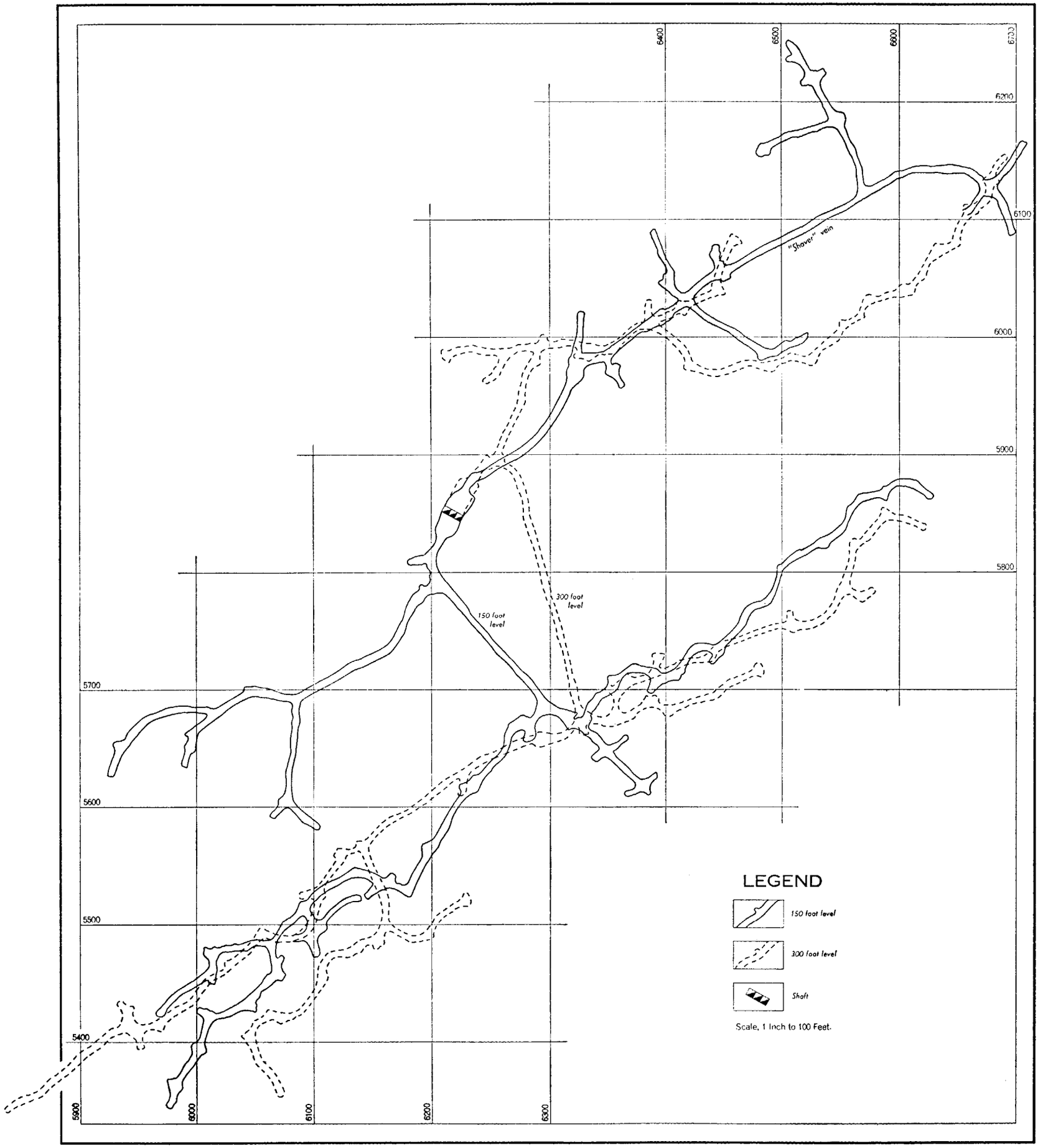


FIG. 7—PLAN OF THE UNDERGROUND WORKINGS AT THE HERMISTON-MCCAULEY PROPERTY.

has been traced for 1,000 feet about 5 chains south of Cooke lake and is intersected about in the middle by a quartz vein striking N. 20° E. and dipping 60° E. The vein is "heavily mineralized with pyrite, arsenopyrite, and some chalcopyrite." Just north of this is a second band of iron formation 80 feet wide and similarly mineralized.

Manitoba and Eastern Mines, Limited

Manitoba and Eastern Mines, Limited, controls 12 claims and license of occupation No. 2,177 around Arsenic lake in the central part of Strathy township. It has been fully described by Savage.[1] The claims are underlain by Keewatin greenstones, which have been cut by quartz porphyry, "older diabase," and olivine diabase dikes. A dioritic mass just east of the main zone is considered by Savage to be pre-Algoman diabase.

Most of the underground work has been done on the No. 1 zone located just east of Arsenic lake. This well-mineralized, silicified, altered zone in greenstone strikes N. 14° W. and dips 50° to 60° W. It has been traced for a distance of 400 feet. Instead of being a single persistent vein, it consists of several veins, which appear to partially overlap. The vein zone is said to be cut by a lamprophyre dike. The mineralization consists of pyrite, arsenopyrite, pyrrhotite, and chalcopyrite. The mineralization is in many places rather massive, and an examination of the material on the dump suggests considerable variability, so that in a given specimen any one of the sulphides mentioned may dominate.

The No. 2 zone (Little Dan) is located south of the lake. On surface it is a narrow band of almost solid arsenopyrite in platy schist, which strikes from north-south to east of north. Stringers of arsenopyrite also extend into the schist. A shaft approximately 56 feet deep was sunk on the showing, and about 90 feet of lateral work was performed.

The No. 3 showing has been explored by trenching and an inclined shaft, which is located on highway No. 11, a short distance south of the road to the main shaft. The mineralization is exposed by trenching for about 400 feet. Savage[2] states that "Gold values (at $20.67) were shown to range from 40 cents to $12.00, and vein widths from 1 to 5 feet were indicated."

Underground work on the property was financed by Bobjo Mines, Limited. Operations were suspended in March, 1937, and the mining plant was subsequently dismantled.

The writer was informed that while excellent values were obtained, the ore tended to be rather lensy and erratic in its distribution.

Grab samples from the dump of the No. 1 and No. 2 deposits were assayed by the Provincial Assay Office for gold, silver, cobalt, and nickel. These yielded assays from 0.30 to 0.87 ounces in gold per ton but no cobalt or nickel and only a trace of silver.

John Milne and Son

A narrow vein, ranging in width from a crack to 1 foot and striking N. 30° E., was prospected many years ago on claim J.S. 107, which is now the property of John Milne and Son, in the south central part of Strathy township. This vein, which is nearly 200 feet long, is mineralized with disseminated to massive arsenopyrite and pyrite. It is terminated at the north end by sheared rhyolite, which strikes N. 80° E. The vein was sampled by P. D. Hermiston in the summer of 1941 and is said to have yielded from 0.04 to 1.30 ounces gold per ton and from a trace to 20.04 ounces silver per ton over widths up to 1 foot. A character sample

[1]W. S. Savage, op. cit., pp. 52-54.
[2]Ibid, p. 53.

of heavy arsenopyrite was assayed for the writer by the Provincial Assay Office and yielded 0.58 ounces gold per ton, 10.7 ounces silver per ton, and no cobalt or nickel.

Where the road to the Milne lumber yards crosses the small creek that traverses claim J.S. 107, an outcrop of rhyolite and carbonate schist, striking north of east, is mineralized with disseminated arsenopyrite, which is said to carry a little gold.

C. J. Niemetz

A considerable amount of work has been performed by C. J. Niemetz on a group of 5 claims on the southwest corner of Denedus point in Phyllis township. The principal workings are on claim T.R.T. 5,193. The claim is underlain by pillow lavas and Cobalt conglomerate. The former have been cut by a number of quartz porphyry, feldspar porphyry, and lamprophyre dikes.

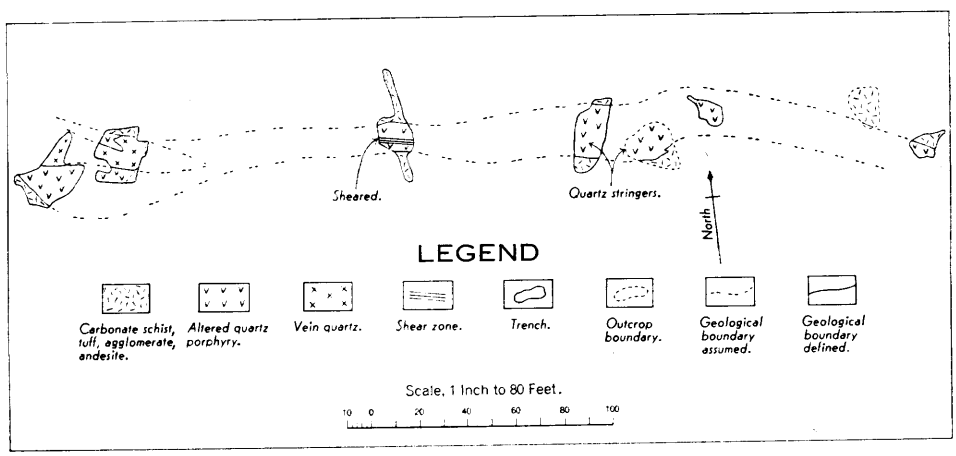


Fig. 8—Plan showing trenching on a mineralized quartz porphyry dike on the Niemetz property.

Near the north boundary of the claim, a number of trenches have been opened on a quartz porphyry dike cutting sheared and carbonated tuff and andesite. The dike strikes roughly east-west for at least 380 feet and has a maximum width of 23 feet. It is much silicified and mineralized with disseminated grains, pockets, and lenses of fine-grained and coarse cubic pyrite (as on the Billfeld main showing). In some trenches the dike is heavily sheared for widths of 5 feet and is well mineralized in these shear zones. The size and persistence of this body makes it interesting, but values are reported to be low. Grab samples of both types of pyrite submitted to the Provincial Assay Office by the writer gave 0.02 ounces gold per ton and no silver.

South of this showing, a number of fractures and shear zones in greenstone striking between east-west and N. 45° W. have been prospected. A series of these narrow fractures in massive pillow lava contain pyrrhotite, pyrite, sphalerite, and chalcopyrite. Two fairly strong northward-dipping shear zones have each been trenched for some 500 feet in from the lake shore. The north zone, which has a maximum width of 5 feet, is rather sparsely mineralized with pyrite and chalcopyrite over most of its length; at the east end a considerable amount of quartz is in evidence. The south shear zone is more strongly mineralized

and ranges in width from more than 5 feet at the lake to a little over 2 feet at the east end. Mineralization consists of pyrite, both fine-grained and coarse crystalline types, vuggy and sugary quartz veinlets, and carbonate. A grab sample from the lake end of this zone was assayed at the Provincial Assay Office and yielded 0.02 ounces gold per ton. The writer was informed by Mr. Niemetz that gold may be panned from rust in the seams.

North of this claim an interesting occurrence of chalcopyrite was noted in a greenstone dike, which is about 30 feet wide and strikes N. 75° W. It is crossed by a lens of quartz, which is about 20 feet long and 4 or 5 feet thick and dips

Agglomerate (left) cut by porphyry (right), Niemetz property.

east. The quartz contains masses of solid chalcopyrite as much as 6 inches in diameter. The writer was informed that no gold values were obtained from the chalcopyrite.

Oslund-Hurst

The Oslund-Hurst property, located on claim P. 6, at the east end of Vermilion lake, Strathy township, was staked by N. Oslund and F. Hurst. The claim is underlain by Keewatin volcanics and along the south shore of the lake by iron formation. Part of the iron formation, which is about a chain in width, consists of banded jasper, quartz, and magnetite, and part is replaced by pyrite. On an exposure near the northeast end of the lake, the iron formation has been drag-folded and intruded by a greenstone dike, which is from 10 to 15 feet in width and terminates about 20 feet from the shore. West of the dike, the magnetite has been replaced by coarse pyrite; east of the dike, the magnetite is unaffected. Other exposures of the iron formation, in some places pyritic and in others unreplaced, occur at intervals along the shore.

The property was trenched and drilled by Coniagas Mines, Limited. Some

interesting values are reported from the drilling, although most were low. A sample of pyritized iron formation assayed by the Provincial Assay Office gave 0.02 ounces gold per ton and a trace of silver.

R. A. Percy

In June, 1941, R. A. Percy drilled a few short diamond-drill holes on a carbonate vein on claims T.R.T. 5,593 and 5,594 on Ferguson point, Northeast arm, Strathcona township. The vein is intermittently exposed almost to the east end of the arm. Where the work was done, the vein is about 20 feet wide and is cut by milky-white quartz stringers. Sulphides are erratically distributed in the vein but are generally sparse. Assays are said to have been discouraging.

Sey-Bert Temagami Mines, Limited

Sey-Bert Temagami Mines, Limited, controls a group of 9 claims in the east central part of Strathy township, adjoining the Manitoba and Eastern property on the north. Two occurrences of mineralization were seen by the writer. One is located in altered granite on the west side of highway No. 11 near the greenstone contact. It is a narrow quartz vein with splashes of lamprophyric material and contains some pyrite, galena, and sphalerite. The other occurrence is near the old provincial highway. It is a silicified shear zone with a maximum width of 18 inches in greenstone and a 20-foot granite dike. It has been traced for 70 feet. Sulphides, associated with narrow, vuggy quartz lenses, are coarse pyrite, sphalerite, and galena. Values in gold are said to have been obtained from both these veins.

Strathy Basin Mines, Limited

Strathy Basin Mines, Limited, controls a large group of claims in the north central part of Strathy township. The property has been reported on by Savage,[1] who states that a number of rusty fractured zones were prospected in Keewatin volcanics. Some work was done on these claims subsequent to the publication of his report, but nothing of importance was discovered. R. A. Percy informed the writer that native gold was obtained from a narrow vein that outcrops just north of the road to the Cuniptau property, west of the Kanichee Lake bridge. The vein strikes N. 63° E., dips 25° N., and cuts andesite and a fine-grained rhyolitic dike. It has been traced for about 175 feet and is from 4 to 6 inches in width.

F. W. Thompson

In August, 1941, F. W. Thompson restaked ground on the south shore of Chambers lake, Chambers township, which had been prospected in 1934 by the Consolidated Mining and Smelting Company of Canada.

Rocks exposed on the property are predominantly intermediate tuffs, agglomerates, and andesites, with some coarse dioritic rocks and granite. The principal workings are located at the southwest corner of a small lake. The mineralized zone strikes roughly N. 35° E., and fairly heavy mineralization is exposed for a length of about 300 feet. A vein of quartz from 7 to 14 feet wide is mineralized on one wall (usually the south) with pyrite, sphalerite, galena, and chalcopyrite. In the eastern exposure of the vein, pyrite is the only sulphide. An irregular body of quartz porphyry, which closely resembles the porphyry on the Niemetz claim, outcrops south of the vein and occurs as sericitized inclusions

[1]W. S. Savage, op. cit., pp. 55-60.

in it. The quartz porphyry is cut by numerous quartz stringers. Greenstone dikes were noted in the vein zone at one place. Andesite forms the south wall. Two smaller veins, generally not more than a foot wide, have been stripped at points about 30 and 100 feet north of the main vein. They are locally mineralized with

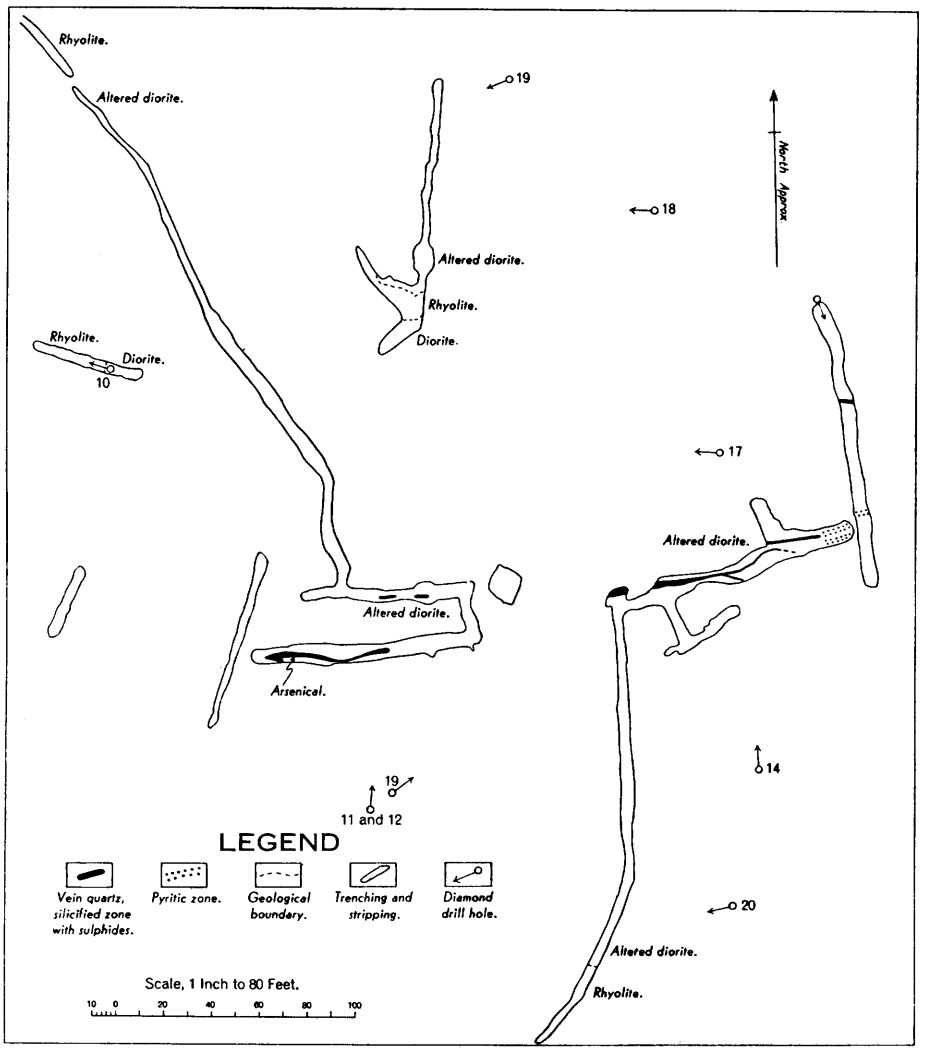


Fig. 9—Plan showing trenching and drilling on claim T.R.T. 4,413 of Timagami Gold Mines, Limited. (After plan by W. A. Kelly.)

massive sphalerite, galena, and pyrite. A grab sample of heavy sulphide assayed by the Provincial Assay Office was found to carry 0.13 ounces gold per ton and a trace of silver.

Timagami Gold Mines, Limited

Timagami Gold Mines, Limited, holds some 15 claims in the west central part of Strathy township. The claims have been carefully prospected, and a number of mineralized zones have been discovered.

The claims on which the most work has been done are T.R.T. 4,413, 4,426, and 4,427. The geology is rather complex. The oldest rocks exposed are Keewatin

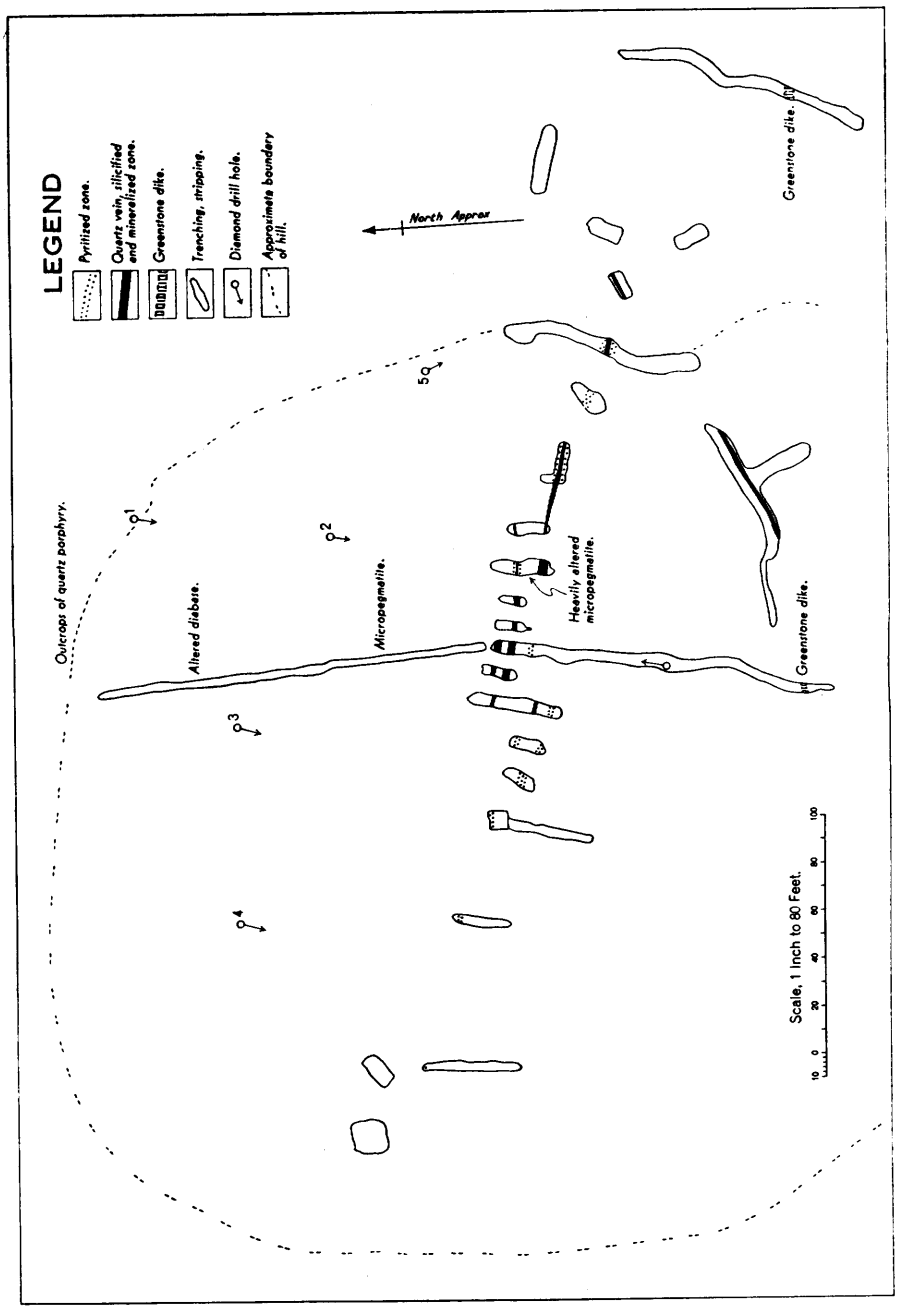


Fig. 10—Plan showing trenching and drilling on claim T.R.T. 4,427 of Timagami Gold Mines, Limited. (Modified from plans by W. A. Kelly.)

rhyolites and andesites. These have been cut by several bodies of dioritic and diabasic rock. In the southeastern claim, T.R.T. 4,413, the diorite is probably the southwestern extension of the Hermiston-McCauley intrusive. On the

claim adjoining to the west, T.R.T. 4,427, near the north boundary, a stocklike mass of metadiabase is exposed. Porphyry dikes are reported cutting the volcanics and dioritic rocks.

On claim T.R.T. 4,413, several veins have been trenched and drilled in the diorite. The easternmost workings are on a series of narrow silicified zones in diorite, which strike N. 80°–87° E. and have a maximum width of 2½ feet. Pyrite is the most abundant mineral, but sphalerite was observed in one narrow vein 8 inches wide. A little native gold is said to have been discovered in one section of the trench. The mineralization has been traced for nearly 100 feet. Rather scattered values, ranging up to 0.342 ounces gold per ton over 4 feet, are said to have been obtained. Another vein, possibly an extension of the first, 80 feet to the west has a length of about 70 feet. South of this is a sinuous parallel vein, which strikes about N. 85° W. for about 60 feet. It varies in width from a crack to 3 feet and is heavily mineralized with pyrite, arsenopyrite, pyrrhotite, chalcopyrite, and grey copper. A character sample assayed by the Provincial Assay Office yielded 1.72 ounces gold per ton, 14.80 ounces silver per ton, and no cobalt or nickel.

A few chains to the west of these showings, a shear zone in rhyolite 20 feet wide is cut by numerous stringers of quartz and carbonate containing disseminated pyrite. The strike of the shear zone is N. 35° E., and the dip is south. Other shear zones in rhyolite to the west are mineralized with stringers of pyrite and arsenopyrite and a little chalcopyrite.

About 100 feet north of the east end of Cooke lake and again 550 feet to the west and north, trenching has opened up two carbonated zones. The writer was informed that as much as 0.085 ounces in gold per ton was obtained from the westernmost of these trenches, which is 10 feet wide.

Considerable work was done on an altered, silicified, pyritized zone, located on a hill of altered diabase ("diorite"). In the vicinity of the zone, which strikes about N. 60° W., the "diabase" appears to have differentiated to a siliceous, sericitized micropegmatite. The mineralization is associated with parallel quartz veins and stockworks, which appear to be rather lenticular and have a maximum width of more than 3½ feet. As many as three separate silicified sections may be visible in a single trench. Pyrite occurs in quartz and wall rock in abundant tiny cubes and may be profusely distributed over widths of as much as 5 feet.

Recommendations to Prospectors

The variety of mineral deposits so far discovered in the area makes it an interesting field for prospecting. Strathy township has been rather extensively prospected for forty years, but there is still room for further work. The area south of the Northeast arm of Lake Timagami is still almost virgin territory, except along the lake shore itself. Chambers township also contains many geological features of interest and warrants further prospecting.

The following areas would seem to merit special attention in the light of developments to date.

1. The vicinity of the granite-greenstone contact in Chambers and Strathy townships warrants careful prospecting throughout its length. Gold, pyrite, traces of copper and nickel, and molybdenite have been found near it.

2. The main northeastward-striking shear zones in the Northeast arm and just north of Link lake are interesting, not so much for the mineralization that may occur along them as for deposits in branching or subsidiary fractures that

strike around N. 70° W. south of the Timagami shear zone and N. 30° E. along the Link Lake shear zone. It is possible that other shear and fracture zones parallel to these two have been overlooked in the course of the survey.

3. The south contact of the diorite sills in the Northeast arm of Lake Timagami should be carefully prospected. The pyrite deposits of the O'Connor property and possibly the sphalerite, chalcopyrite, and pyrite of Timagami island occur along this contact.

4. The altered granodiorite and quartz diorite between Broom lake and the Northeast arm in Briggs township is thought to warrant at least a preliminary investigation.

5. Altered diorite and serpentine bodies, such as those on the Hermiston-McCauley, Timagami Gold Mines, and Cuniptau properties should be looked for and prospected. They merit special attention where they are silicified, bleached, and fractured or sheared.

6. Attention should be paid to fractured and veined zones in the iron formation. No visible mineralization was noted in such areas in the main iron bands, although interesting results have been obtained from the narrow bands in Strathy township. Ore shoots in this type of rock are very important in Northwestern Ontario, however, and hence this possibility should not be neglected.

7. During the present survey little attention was paid to the Cobalt sediments and Nipissing diabase. Miller[1] reports the occurrence of silver-bearing galena with chalcopyrite on an island in Cross lake, just south of the area.

8. The areas north of Shiningwood bay and south of Ferguson and O'Connor islands are interesting because of the presence of gold values in small satellitic bodies of albite granite. A specimen of rather pyritic albite granite from the west shore of Denedus point was submitted to the Provincial Assay Office and yielded 0.01 ounces gold per ton.

[1]W. G. Miller, Ont. Bur. Mines, Vol. XIII, 1904, pt. 1, p. 101.

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