SIXTY-SIXTH ANNUAL REPORT

OF THE

ONTARIO DEPARTMENT OF MINES

1957

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DEPARTMENT OF MINES

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Geology of Boston Township and Part of Pacaud Township

By

K. D. LAWTON

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TABLE OF CONTENTS

Volume LXVI, Part 5

PHOTOGRAPHS

MAPS AND PLAN

COLOURED GEOLOGICAL MAP

Geology of Boston Township and Part of Pacaud Township

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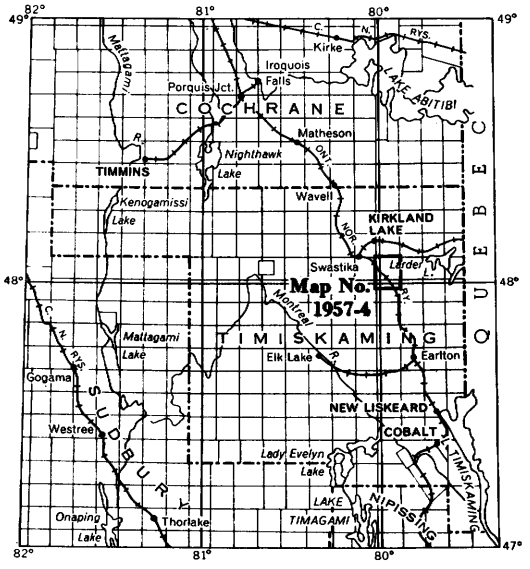
K. D. Lawton

INTRODUCTION

This report deals with the geology of Boston township and concessions V and VI of Pacaud township. It is one of a series of reports, with accompanying maps, issued by the Geological Branch of the Ontario Department of Mines dealing with the Kirkland Lake–Larder Lake gold mining area. The detailed mapping of individual townships within, and adjacent to, this important mining belt was begun in 1936, and to date, seven other reports and nine geological maps have been



Key map showing the location of Boston and Pacaud townships. Scale, 1 inch to 50 miles.

issued on the following townships: Teck, Lebel, Gauthier, McVittie, McGarry, Hearst, McFadden, McElroy, and Skead.

The first recorded mineral discovery in the map area was made around the turn of the century when a deposit of low-grade iron ore was found. Since then the townships of Boston and Pacaud have been extensively prospected, particularly for gold and copper. The low-grade iron deposits discovered about 50 years ago were recently acquired by Jalore Mining Company, Limited, for possible development as a source of low-grade, "concentrating" iron ore.

Boston and the northern part of Pacaud townships are a natural unit for geological study. The south boundary of Boston township is, in places, less than ½ mile north of the Round Lake granite batholith. Accordingly, when mapping Boston, it was decided to extend the map area southward for an additional 2 miles in order to enclose most of the batholith–country rock contact in Pacaud township. The geology of Boston township and of concessions V and VI, of Pacaud township is shown on the map accompanying this report. (Map No. 1957-4, in map case.)

Acknowledgments

The author wishes to express his appreciation for the willing co-operation and efficient work of his assistants. In 1952 he was assisted by D. J. Emery, J. G. A. Manson, R. M. Quigley, and R. B. Hughson; in 1953 by D. J. Emery, K. L. Currie, and Robert McBain; and in 1954 by J. G. A. Manson, R. M. Quigley, D. G. Korba, David Pim, and R. G. Jury. Mr. Manson joined the party in 1953 but was forced, through illness, to terminate his appointment on June 10. Mr. Emery in 1952 and 1953, Mr. Manson in 1952 and 1954, and Mr. Quigley in 1954, did independent field mapping. William Timmins in 1952 and 1953, and Dennis Jennings in 1953, were hired locally as part-time assistants.

The author is indebted to W. S. Savage, resident geologist of the Ontario Department of Mines at Swastika for much valuable assistance and advice given during the course of the field work. Dr. Savage also gave access to his property files and kindly compiled property maps of Boston and Pacaud townships for the author's use.

D. J. Emery, a graduate student at Harvard University, provided a short report and surface maps that he had prepared of the Amity, Patterson, and Trethewey-Ossian copper properties in Pacaud township.

Access was had to geological and geophysical assessment reports submitted to the Ontario Department of Mines by Dominion Gulf Company, Limited. These were prepared in connection with the exploration of the eastern part of the Boston iron range in 1951 and 1952. Nine geological reports and nine geophysical assessment reports, covering claim groups in the iron range, were prepared by this company. They were written by staff personnel. Of the geological reports, H. D. McLeod wrote seven, T. Parks, one; and R. N. Parkinson, one: of the geophysical reports, J. H. Ratcliffe wrote eight; and D. Torrens, one.

The party was fortunate to obtain the services of a Kirkland Lake prospector, D. Lowe. In 1953, under contract, he cut nearly 20 miles of picket line very efficiently.

J. B. Tarzwell, a prospector and long-time resident of the area, was particularly helpful during the course of the survey. A. G. MacDonald, prospector, of Kirkland Lake, drew to the author's attention a number of exposures of iron formation when the party was mapping the Boston Township iron range in 1953.

The party was based at Round Lake (Tarzwell post-office) during the field seasons of 1952, 1953, and 1954 in cabins rented from George Timmins. It is a pleasure to acknowledge the assistance given and courtesies extended by Mr. and Mrs. Timmins during this period.

Mapping Methods

A base map on a scale of 1 inch to 800 feet of Boston township and concessions V and VI of Pacaud township was drawn by the cartography section of the Ontario Department of Mines. Data were taken from survey notes of township boundaries, mining claims, highway and railroad right-of-ways, and power

transmission lines. Additional topographic detail, including roads, lakes, streams, buildings, and clearings, were plotted by the author from air photographs and plane-table surveys.

In 1947 the east boundary of Boston township was resurveyed under the supervision of the Surveys and Engineering Division of the Ontario Department of Lands and Forests. The north, west, and south boundaries were resurveyed in May, 1952, by J. A. Lonergan (O.L.S.).

Pacaud township was subdivided by J. L. Laird (O.L.S.) in the summer of 1889. No resurveys of Pacaud township were carried out in connection with the present geological survey. Evidences of the original survey are scarce.

The geology of Boston and Pacaud townships was plotted on a scale of 1 inch to 800 feet. However, owing to varying geological conditions, some parts of the map area received more detailed examination than others. Most of the area was mapped by means of pace-and-compass traverses spaced at 400-foot intervals. An individual traverse was generally not over more than ½ mile long and was tied-in at both ends to stations established along claim lines, roads, power lines, railroad right-of-ways, or picket lines.

Remote from their contacts, the Round Lake batholith and the Lebel syenite stock are so uniform in composition and structure that examination by traverses on the same scale was not warranted. Accordingly, traverses over these masses were spaced at ¼-mile intervals. Therefore the outlines of bedrock outcroppings prepared from these traverses and from air photographs are more generalized.

In mapping the Boston Township iron range, the presence of magnetite (magnetic iron oxide) in the iron formation ruled out the use of pace-and-compass traverses over much of this area. Excellent control for mapping, however, was provided by a network of picket lines cut by Dominion Gulf Company, Limited, in 1951 and 1952 in connection with the exploration of the eastern part of the range. This network of picket lines, spaced generally at 200-foot intervals, covered an area that coincides with a block of patented claims in the north-eastern part of Boston township. In addition, picket-line coverage extended westward for 1 mile from claims L.56810 and L.56811, to include a block of eight claims west of the patented block. Mapping control for the remainder of the range (the western part) was provided by seven picket lines extending eastward from the power line that passes the west end of Helent Lake. They were spaced at intervals of generally less than 1,000 feet. These lines were cut by the Ontario Department of Mines.

Most of the traverses were made by a senior and a junior geologist working together; the junior ran a compass line while the senior examined and mapped the adjacent outcrops. Individual traverse lines were run at right angles to the structural trend of the rocks.

Means of Access

All parts of Boston and Pacaud townships are quite easy to reach. General access to the area is provided by highway No. 112, and by the Ontario Northland Railway.

The old Ferguson Highway, now in disrepair, crosses the western part of the map area not far east of highway No. 112. Highway No. 112 is a branch of highway No. 11 extending northward to Swastika and Kirkland Lake.

The old Dane–Larder Lake road provides access to the northern part of Boston township. It extends eastward for over 6 miles, leaving the township at a point 900 feet south of milepost IV on the Boston-McElroy boundary. It is a

motor road only for about ¼ mile east of Dane station. The remainder is suitable for travel by wagon, or perhaps by jeep. In 1953 the bridge over Boston Creek was in disrepair and liable to collapse under heavy loads.

About 3,000 feet east of Dane station along the Dane–Larder Lake road a wagon road extends northward. It parallels the power transmission line, entering Lebel township just east of Bostebel Lake. It was built many years ago to provide access to the Dane Mining Company property, a copper prospect in southwestern Lebel township.

About 1,500 feet east of the bridge over Boston Creek a wagon road extends southeastward from the Dane–Larder Lake road.

The central part of Boston township may be reached by a wagon road that extends northward from the village of Boston Creek to an abandoned lumber camp about 1,200 feet south of Hildas Lake. The southeastern part of Boston is covered by a network of wagon roads.

The northern part of Pacaud township is crossed by a gravel road extending eastward from highway No. 112, through Boston Creek village, to the Cathroy Larder mine in McElroy township. A branch road just east of Boston Creek reaches into southeastern Boston township. Another branch farther east in Pacaud township extends southward to Englehart.

History

The earliest recorded mineral discovery in Boston and Pacaud townships was made just after the beginning of the century. In 1902 the Boston township iron range was discovered, only to have preliminary exploration disclose the grade of iron ore to be too low to be worked at that time.

At the end of 1903 the work of exploration and preliminary surveying of the right-of-way of the Temiskaming and Northern Ontario Railway (now the Ontario Northland Railway) north from New Liskeard, had been carried well over the height-of-land. The route adopted crossed the present map area, and by 1905, a wooden trestle bridge was built over Boston Creek and track laid through Boston and Pacaud townships.

The discovery of silver at Cobalt in 1903 brought hundreds of prospectors into northeastern Ontario; from 1905 to 1918 important gold discoveries were made annually in this part of the province. In 1906 gold was discovered at Larder Lake. The Ontario government, as part of its colonization roads program for 1907, spent $28,000 to build the Larder Lake road (Dane–Larder Lake road) to provide access to this promising area. The road, now largely abandoned, extends from Dane station in Boston township eastward to the northwest arm of Larder Lake, a distance of 18 miles. Also in 1907 land was secured and surveys made for a townsite at Dane station (known then as Boston). The only buildings now (1954) standing at the townsite are a couple of houses and a railway station house, all in a state of disrepair.

The first recorded discovery of gold in the map area was made in 1914 on the "Kenzie" vein. It crosses claims L.3665 and L.5163 in the south-central part of Boston township, west of O'Donald Lake. Promising development work on this vein attracted many propectors to the area, and considerable surface prospecting was done during 1915 in Boston and nearby townships. By 1918 a permanent frame railway station was built at mileage 153 on the railway, in the northern part of Pacaud township. The present small settlement of Boston Creek grew up around this station. Other veins were discovered in southeastern Boston town-

ship and adjacent parts of Pacaud township, some of which received considerable exploration and development work. Two of these properties (Barry-Hollinger, and Miller Independence) produced gold bullion.

Up to the middle 1920's prospecting activity in Boston and Pacaud townships was confined mainly to searching for gold deposits. However, in 1926, copper was discovered in the northeastern part of Pacaud township, in country rock adjacent to the Round Lake batholith. The copper-bearing zone was explored on three adjoining properties (Amity, Patterson, and Trethewey-Ossian). Several cars of ore were shipped from the Amity property to the custom smelter at Noranda, Que. The three properties closed down early in the 1930's. Consolidated Golden Arrow Mines, Limited, took options on these properties in 1952, only to drop them after limited exploration, particularly of the Trethewey-Ossian mine. In 1955 some narrow high-grade copper veins were selectively mined from the upper levels of the Amity and Patterson mines. A small tonnage of copper ore was also produced from the Trethewey-Ossian mine in the fall of 1955, when it was known as the Cam Copper property.

In 1951 interest centred once again on the initial mineral discovery in the map area. Dominion Gulf Company, Limited, staked and took under option a large block of claims covering the eastern part of the Boston Township iron range. After several years of exploration, the block was optioned to Jalore Mining Company, Limited, a subsidiary of Jones and Laughlin Steel Corporation, Pittsburgh, Pa. This organization explored the block further and reported that drilling indicated a large tonnage of low-grade iron ore suitable for beneficiation. In 1956, Jalore exercised its option and acquired the property from Dominion Gulf Company.

Previous Geological Work

References to the geology of the area may be found in the following reports:

WALTER MCOUAT, "Report on an Examination of the Country Between Lakes Temiscamang and Abbitibbe," *Report of Progress*, Geol. Surv. Can., 1872-73, pp. 112–35.

WILLET G. MILLER, *Boston Township Iron Range*, Ont. Bur. Mines, Vol. XIV, 1905, pt. 1, pp. 261–68.

A. G. BURROWS AND PERCY E. HOPKINS, *The Kirkland and Swastika Gold Areas and Maisonville, Grenfell and Eby Townships*, Ont. Bur. Mines, Vol. XXIII, 1914, pt. 2, pp. 1–35.

A. G. BURROWS AND P. E. HOPKINS, *Boston Creek Gold Area*, Ont. Bur. Mines, Vol. XXV, 1916, pp. 244–59.

E. LINDEMAN AND L. L. BOLTON, "Description of Iron Ore Occurrences," *Iron Ore Occurrences in Canada*, Vol. II, Can. Dept. Mines, No. 217, 1917, pp. 1–201.

A. G. BURROWS AND P. E. HOPKINS, *Boston-Skead Gold Area* (Second Report), Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, pp. 1–26.

A. G. BURROWS AND P. E. HOPKINS, *Blanche River Area*, Ont. Dept. Mines, Vol. XXXI, 1922, pt. 3, pp. 1–20.

Report of the Ontario Iron Ore Committee with Appendix, 1923, Ont. Dept. Mines, pp. 1–290.

T. L. GLEDHILL, *Ben Nevis, Munro, Kamiskotia, and Other Base Metal Areas, Districts of Cochrane and Timiskaming*, Ont. Dept. Mines, Vol. XXXVII, 1928, pt. 3, pp. 1–52.

L. V. BELL, *Boston–Skead Gold-Copper Area, District of Timiskaming*, Ont. Dept. Mines, Vol. XXXVIII, 1929, pt. 6, pp. 86–113.

E. M. ABRAHAM, *Geology of McElroy and Part of Boston Townships*, Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, pp. 1–66.

Aeromagnetic Map No. 47G—*Larder Lake, Ontario.* (Geol. Surv. Can., Geophysics Paper 47, 1951).

Topography and Natural Resources

Pronounced topographic relief is not a feature of Boston and Pacaud townships. The physical features of the area are typically Precambrian, with drift-covered and swampy areas separated by low hills and rounded rock exposures.

The centre of Boston township, adjacent to Boston Creek and its tributaries, is generally low, and the drift-sheet is thicker than elsewhere. The largest swampy areas occur east of Hildas Lake, northeast of Lianne Lake, adjacent to the Dane–Larder Lake road near the McElroy township boundary, and in the northern part of lot 4, concession V, Pacaud township.

Differences in elevation generally do not exceed 200 feet. Some of the boldest topography of the map area is visible southwestward from Boston Creek railway station across the valley of Boston Creek. Here, the Round Lake batholith is exposed as a number of large, practically bare ridges.

Boston Creek station has an elevation of 920 feet above sea-level.

Boston and Pacaud townships are located south of the continental divide and are drained by Boston Creek and its tributaries. These flow southward into the Blanche River, which empties into Lake Timiskaming.

Lumbering operations for pulpwood, railway ties, mine timbers, and lumber have been carried on in Boston township for many years. Poplar, balsam, spruce, jackpine, and birch are abundant, but most of the choice stands of timber have been cut.

There are no recently burnt-over areas in the township.

GENERAL GEOLOGY

The consolidated rocks of the area are Precambrian in age, consisting mainly of Archean volcanics, sediments, and intrusives. Late diabase dikes intrude the Archean rocks and are the sole representatives of the Proterozoic era in the map area.

Members of the Keewatin series of early Precambrian rocks are the dominant formations outcropping in Boston township. They consist of lava flows, volcanic fragmental rocks, and sedimentary rocks. A small area of Timiskaming clastic sedimentary rocks outcrops in the northeast corner of Boston township. Here, the Keewatin and Timiskaming series are in faulted contact. Field relationships in nearby townships, however, indicate that the rocks of Timiskaming age stratigraphically overlie the Keewatin series. In the Kirkland Lake area Thomson[1] has shown that a great structural unconformity separates the Timiskaming series from the underlying Keewatin rocks.

There are two groups of basic intrusives of post-Keewatin age. The older of the two is composed of diorite and metadiorite, whereas the younger includes serpentinite, hornblendite, diorite, and minor diorite porphyry.

The Keewatin, Timiskaming, and "post-Keewatin" rocks are folded and faulted, and intruded by a variety of igneous rocks classified as Algoman in age. The Algoman series includes rocks of the following composition: granite, syenite, porphyries, diorite, and lamprophyre.

Much of the bedrock is covered by a mantle of unconsolidated clay, sand, and gravel, laid down during the period of Pleistocene glaciation that affected this area.

The rock classification used in this report conforms generally, but with some revision, to that adopted by Abraham[2] for McElroy township and the eastern part of Boston township. In the following table of formations, the members

[1] J. E. Thomson, "The Keewatin-Timiskaming Unconformity in the Kirkland District," *Transactions*, Royal Soc. Can., Sect. IV, Third Series, Vol. XL, 1946, pp. 113–122.

[2] E. M. Abraham, *Geology of McElroy and Part of Boston Townships*, Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, p. 8

range from oldest at the bottom of the list to youngest at the top, though the rocks within a given group are not necessarily arranged in chronological order:

TABLE OF FORMATIONS

CENOZOIC	
RECENT AND PLEISTOCENE:	Clay, sand, gravel, and boulders.
	Great Unconformity
PRECAMBRIAN	
KEWEENAWAN OR MATACHEWAN:	Diabase.
	Intrusive Contact
ALGOMAN:	Basic syenite; syenite and porphyritic syenite; syenite porphyry; quartz porphyry; granite (dikes and small stocks); lamprophyre; diorite and metadiorite; quartz-feldspar porphyry; felsite. Batholithic granite (Round Lake batholith).
	Intrusive Contact
HAILEYBURIAN (?):	Diorite; gabbro; hornblendite; serpentinite; diorite porphyry.
	Intrusive Contact
TIMISKAMING:	Fine-grained sedimentary rocks; greywacke; arkose; quartzite; slate. Conglomerate; conglomerate with some interbedded arkose, slate, and greywacke.
	Great Unconformity
POST-KEEWATIN (?):	Diorite and metadiorite.
	Intrusive Contact
KEEWATIN:	Basic and Intermediate Volcanics: Greenstone; brecciated and carbonate-veined greenstone; andesite, basalt, and pillow lava; dioritic, diabasic, and gabbroic lava;[1] amphibolite; sheared basic lava; fragmental lava; basic lava containing horizons of tuff; injection gneisses, and metamorphosed basic lava and tuff adjacent to the Lebel and Otto syenite stocks; variolitic lava. Intermediate and Acid Volcanics: Fragmental volcanics, generally porphyritic; porphyritic andesite, dacite, and rhyolite, containing horizons of acid and cherty tuff; dacite; andesite, occasionally fragmental. Iron formation, including banded silica rock ("lean iron formation"). Acid volcanics, Tuff, Quartzite, etc.: Rhyolite; acid tuff and cherty tuff; agglomerate, conglomerate; tuffs, and sediments interbedded with volcanic rocks; tuff and iron formation; tuff, tuffaceous sediments, and their altered equivalents; cherty quartzite.

Keewatin Series

Rocks of Keewatin age occupy most of Boston township and all of Pacaud township lying north of the Round Lake granite batholith. The Keewatin series, as it is exposed in these two townships, embraces a variety of rock types of diverse origin, composition, and texture. It includes lava flows, volcanic fragmental rocks, and sedimentary rocks. Iron formation is an important member of the series.

[1]The northeast-striking band of dioritic rock, which enters Boston township at milepost II on the east boundary, may be a sill-like intrusive.

Primary structural features useful for top determinations, such as pillows and breccia flow tops in lavas, and grain gradation and cross-bedding in tuffs and other sedimentary rocks, are scarce. The series has been folded and faulted and intruded by a variety of igneous rocks. As a result, it is not possible to establish a reliable stratigraphic succession within the Keewatin in this map area.

The series is divided into four groups for representation on the geological map:[1] (1) acid volcanics, tuff, quartzite, etc.; (1f) iron formation; (2) intermediate and acid volcanics; and (3) basic and intermediate volcanics. This division is purely a lithological one, and the order in which these rocks appear in the legend is not meant to represent the stratigraphic succession in the series.

Acid Volcanics, Tuff, Quartzite, etc.

These rocks are treated as group (1) on the geological map. Included in this group are: rhyolite (1a); acid tuff and cherty tuff (1b); agglomerate and conglomerate (1c); tuffs and sediments interbedded with volcanic rocks (1d); tuff and iron formation (1e); tuff, tuffaceous sediments, and their altered equivalent (1g); and cherty quartzite (1k). Some, or all, of the members of this group find their most extensive development in two parts of the map area, as part of the Boston Township iron range and along the border of the Round Lake batholith in Pacaud township and adjoining parts of Boston townships.

The rhyolite flow rocks (1a) are massive, fine-grained, pale-grey to grey-green rocks. Commonly they weather to pale-grey or white. The rhyolites may be porphyritic with small phenocrysts of quartz and feldspar set in an aphanitic groundmass. Associated with these rhyolite flows are acid and cherty tuffs and acid fragmental rocks. Rhyolite flow rocks also occur in group (2). They are distinguished from those in group (1) on the basis of their occurrence. Those in group (1) occur as thin horizons, generally only a few feet wide, interbedded with the basic rocks of group (3). The rhyolites of group (2) are much more extensive. They are part of a related series of porphyritic flow rocks, which range in composition from andesite to rhyolite.

Acid tuff and cherty tuff (1b) occur mainly as narrow bands interbedded with basic flows and associated with agglomerate horizons in the iron range. They often occur with rhyolite flows (1a). On fresh fracture these rocks are grey or grey-green. They weather pale-grey or white and are generally thinly bedded.

Agglomerate (1c) occurs in a number of places within, or close to, the Boston Township iron range.

A small outcrop of conglomerate (1c) is exposed along the old Dane–Larder Lake road at the top of a hill immediately east of Boston Creek. This is part of a band that extends eastward from here for about 3,000 feet. The band is 300–800 feet wide. It is offset at one place by a north-striking fault. A good exposure of this rock may be seen on the east side of an old bush road about 300 feet south of the Dane–Larder Lake road. The bush road joins the Larder Lake road at a point near the top of a hill, about 300 feet east of the bridge, where the latter crosses Boston Creek. The matrix of the rock ranges from dark-green to pink in colour. Fragments range from a fraction of an inch to 18 inches long and form over 50 percent of the rock. Greenstone, iron formation, pink felsite, medium-grained syenite, feldspar porphyry, and acid tuff fragments were noted. The pebbles are angular to rounded in outline and are poorly sorted as to size. Narrow horizons of fine-grained, sheared tuff occur interbedded with the agglomerate. Under a microscope the matrix of the agglomerate is seen to consist of a recrystallized aggregate of microcline, plagioclase, quartz, epidote, hornblende,

[1]No. 1957–4, in map case.

biotite, and augite. Burrows and Hopkins[1] classified this band of fragmental rock as conglomerate of possible Timiskaming age, owing to its similarity to conglomerates of this age occurring in the Kirkland Lake area. However, it appears to be of more local origin and from its lithology and field relations does not warrant correlation with the Timiskaming conglomerates at Kirkland Lake.

Agglomerate is exposed in the vicinity of Marshall Lake. It extends west of the lake for about one claim. East of the lake various horizons are exposed through claims L.54230, L.55825, L.55819, L.55820, L.55821, and L.55726. A variety of fragments occur in the rock, including greenstone, chert, and dark-grey flinty pebbles. In places the rock is highly fractured. Tuff and conglomerate are interbedded with the agglomerate. Some prospecting has been done on showings of galena and sphalerite occurring in the agglomerate on claims L.55819, L.55820, and L.55826.

Tuff, tuffaceous sediments, and their altered equivalents, (1g) are thinly bedded, fine-grained, dark-grey rocks readily distinguished in the field from the lighter-coloured, lighter-weathering, acid and cherty tuff (1b). Owing to their dark colour they have been variously termed "basic" tuff or "andesitic" tuff to distinguish them from the other varieties. This rock type is most extensively developed in the Boston Township iron range, and as a belt along the periphery of the Round Lake batholith.

The tuff associated with the iron formation is largely confined to two areas, located at either end of the iron range. At the northeast end, in that part of the range extending northward from claim L.57196 to the Boston-Lebel boundary, the tuff occurs as long, narrow horizons interbedded with iron formation.

The main areas of tuff and iron formation are distinguished on the geological map in as much detail as the scale of mapping permits. However, interbedding of the two rock types occurs on a scale much smaller than is possible to represent, and thus areas designated as iron formation on the map often contain narrow horizons of tuff, or vice versa.

The tuff is a fine-grained, dark-grey or greenish-grey rock. It is thinly bedded, with the bedding readily apparent, especially on weathered surfaces. The bedding is quite regular and displays none of the extreme contortions seen in the adjacent iron formation. Narrow horizons of agglomerate occur in the tuff.

The tuffs in the Boston Township iron range are interbedded with banded iron formation and basic lava flows. Judging by the extent of these rocks, much volcanic activity accompanied the deposition of the iron formation. The well-stratified nature of the tuff and its intimate association with the iron formation, indicates that most of it was water-laid and sorted. The pyroclastic material fell, or was carried, by running water into the basins where the iron formation was being deposited.

A belt of thinly-bedded, fine-grained sedimentary rocks, now altered to hornblende-chlorite-epidote schist, occurs along the periphery of the Round Lake batholith in Pacaud township and adjacent parts of Boston township. The entire belt is over 10 miles long and has a maximum width of about 1 mile. It extends from the southern part of lot 6, concession VI, of Marquis township eastward to the village of Boston Creek, where it swings southeasterly and crosses the Pacaud-Catherine townships boundary in concession IV. On the north and northeast these rocks grade into basic lava flows or are in faulted contact with them.

These rocks are dark-grey in colour and weather to lighter shades of grey or greenish-grey. They are well stratified, with individual beds ranging from ⅛ to

[1]A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, p. 6.

1 inch wide. Bedding strikes parallel to the batholith contact and everywhere stands vertically or nearly so.

The series has been sheared and metamorphosed by the intrusion of the Round Lake batholith. A well-defined schistosity strikes and dips parallel to the bedding.

Microscopic study shows that these rocks are completely recrystallized to mixtures of hornblende, chlorite, and epidote; variable amounts of quartz, carbonate, sericite, feldspar, and pyrite are present. Injection gneisses and granitization effects occur along some parts of the contact with the Round Lake batholith, where granitic magma injected and replaced the country rock.

Metamorphism of these rocks has largely obscured their original nature. Judging from their present mineralogical composition, lithology, and association, they were originally water-laid basic tuff, or tuffaceous greywacke composed of

Banded Keewatin iron formation, Boston Township iron range.

reworked and redeposited tuffaceous material mixed with ordinary sedimentary detritus. The series probably accumulated in a large lake.

A northwest-striking mass of cherty quartzite (1k) occurs immediately south of the Dane–Larder Lake road about ¾ mile east of Boston Creek. Stratigraphically, it is part of the Boston Township iron range and merges with iron formation along strike. It weathers to a pale-grey. On fresh fracture, the colour is variegated light- to dark-grey, and the texture is cherty to finely sugary. Bedding is visible on weathered surfaces but is not distinct. Thin sections show the rock to be composed of very fine-grained quartz and variable amounts of white mica, epidote, and biotite. Lithologically, this rock is distinguished from the iron formation, even the so-called "lean iron formation," which is composed largely of silica. The cherty quartzite lacks the well-banded structure of the iron formation and has a finer texture. Its magnetite content is very low.

Iron Formation

Iron formation (1f) is fully described in this report under Economic Geology. The reader is referred to this section for a description of the lithology and petrography of this rock type.

Intermediate and Acid Volcanics

In addition to extensive outpourings of basic lavas, Keewatin volcanism in this part of northeastern Ontario produced a series of rocks of more acid composition. This series is composed of lava flows (andesite, dacite, and rhyolite) and volcanic fragmental rocks of intermediate and acid composition. Some of its members may be intrusive.

A distinctive feature of the series and one that helps to distinguish it in the field is the porphyritic character of most of its members. Burrows and Hopkins[1] report that this belt of porphyritic rocks extends northwestward from Bayly township, through the townships of Skead, Catharine, McElroy, into Boston.

The series is classified as group 2 on the geological map. It is a continuation of a belt shown as group 2 on map No. 1950-3 of McElroy township.[2]

Pillow lava exposed on nearly vertical face of outcrop, Pacaud township.

Abraham[3] reports that fragmental rocks make up the largest part of this division in McElroy township. In Boston township, fragmental rocks are less abundant, and the series consists mainly of porphyritic lava flows. Feldspar phenocrysts of varying size and abundance occur in practically all the rocks of this group.

The belt strikes northwest in Boston township. It extends diagonally across the centre of the map area between milepost I on the Boston-McElroy townships boundary and the power line in the western part of Boston township. As it crosses the Boston-McElroy townships boundary at milepost I, the belt has a width of about 6,300 feet. Between Hildas Lake and the power line, the series gradually narrows. It is dislocated by faulting and splits into a number of separate horizons interbanded with basic lavas. Only one horizon, about 500 feet wide, persists as far west as the power line.

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[1] A. G. Burrows and P. E. Hopkins, *op. cit.*, p. 5.

[2] Map No. 1950-3—*Township of McElroy and Portion of Township of Boston*, District of Timiskaming, Ontario. Scale, 1 inch to 1,000 feet. (Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, by E. M. Abraham.)

[3] E. M. Abraham, *op. cit.*, p. 13.

The andesitic and dacitic members of the series are grey, green, or greyish-green on fresh surfaces and weather to a medium-grey colour. The rhyolites are lighter in colour, generally pale- to medium-grey. They weather to light pinkish or whitish grey. Texturally, these rocks are porphyritic with a very fine-grained matrix. The phenocrysts are mainly of feldspar, with quartz "eyes" occurring in the dacites.

Commonly these rocks are fractured, and weathered surfaces have a rough variegated appearance. West of Hildas Lake schistosity is quite pronounced, and the series is traversed by a number of sheared zones. The strike of the shearing is about N.60°W.

Horizons of acid and cherty tuff occur throughout the belt. West of Hildas Lake, part of this series may be intrusive. The rocks show no obvious volcanic structures such as pillows and vesicles, and lithologically some members resemble intrusive porphyries, especially certain of the coarser-textured porphyritic rhyolites. A few porphyry dikes, believed to be members of this series, intrude basic lavas. Contacts between members of group 2 and the basic lavas of group 3 were observed but gave no clue to their nature, as to whether they were intrusive or flow contacts.

Basic and Intermediate Volcanics

Included in this group are rocks of andesitic and basaltic composition. They are classified as group 3 on the geological map. Rocks of this group exhibit a variety of metamorphic, structural, and textural features, some of primary and some of secondary origin. The most important of these are distinguished on the map.

The series is composed mainly of lava flows. The rocks are generally massive except in the vicinity of the larger intrusive masses. They are generally dark-green, and texturally may be fine-, medium-, or coarse-grained. Primary structures such as pillows, vesicles, amygdules, and spherules are quite common. Pillows, where well-exposed, were used for determinations of the direction in which the tops of lava flows faced.

The coarse-grained, massive rocks mapped as dioritic, diabasic, and gabbroic lavas (3c) represent the centres of thick flows. As is commonly the case in mapping Keewatin rocks of this type, difficulty was encountered in distinguishing these rocks from intrusive diorite and gabbro occurring in the area, especially where the field relationships could not be seen.

A particularly fine sequence of basic lava flows is exposed in the southeastern part of the map area, in the vicinity of O'Donald Lake and east of there. It is possible to distinguish individual flows, each composed of flow-top breccia and pillow lavas, which grade downward into massive dioritic or gabbroic phases.

The term greenstone (3) refers to a dark-green or almost black, fine-grained, altered basic lava, usually more or less schistose. In the northern part of the map area, small exposures occur of a rock termed "brecciated and carbonate-veined" greenstone (3a). It is exposed most extensively on claims L.57182, L.57186, L.57188, L.57189, L.57207, L.57212–14. The rock, a greenstone, has been brecciated, and the fragments cemented by grey-brown-weathering carbonate. Greenstone fragments may be partly or wholly altered to masses of epidote. The rock possesses an extremely rough-weathered surface due to deeper weathering of the carbonate matrix surrounding the greenstone fragments.

Basic lavas, especially those in the Boston township iron range, often contain horizons of interbedded tuff. The scale of mapping may not permit separation of these horizons from the lavas, and where this happens, the two are grouped together under the symbol (3h).

Injection gneisses and metamorphosed basic lavas and tuffs bordering the Lebel and Otto syenite stocks are represented as 3k on the geological map. These rocks possess a distinct schistosity, which strikes parallel to the intrusive contact.

A variolitic horizon (3v) can be traced for 3,400 feet in a northwesterly direction across claims L.5025, L.4906, and L.5119 in the southeast corner of Boston township. Other variolitic lava is exposed on claim L.5108, and just south of claim L.1879. The variolites range from 1/16 to 1 inch in diameter. They are round, white-weathering structures. Abraham[1] reports that they "consist of a radiating aggregate of chlorite, feldspar, epidote, and occasionally a little quartz."

Amygdaloidal pillow lava, northeast corner of Pacaud township.

Post-Keewatin (?) Intrusives

A mottled- to dark-green dioritic rock is exposed in the southern part of the map area. It occurs as sill-like bodies and irregular-shaped masses in Keewatin tuffaceous sediments and basic volcanics adjacent to the Round Lake batholith. These rocks are represented as group 4 on the geological map. They are medium-grained and generally possess a strongly foliated texture, which strikes parallel to the bedding of the enclosing sediments. The most persistent of the sill-like members of this group occurs in the northeastern part of Pacaud township, paralleling the adjacent contact of the Round Lake batholith; it extends in a direction N.45°W. from a point in the south half of lot 2, concession V, to the south half of lot 4, concession VI, a distance of 1½ miles. It has a maximum width of 300 feet. Another large body of this rock, of less regular shape, is exposed in the southwest corner of Boston township on claim L.23518, and east and north of there.

Microscopic study reveals that these rocks are metadiorites or metagabbros. They are highly altered and are now composed largely of secondary hornblende, epidote, clinozoisite, white mica, chlorite, and minor quartz.

[1]E. M. Abraham, *Geology of McElroy and Part of Boston Townships*, Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, p. 16.

It is difficult to decide whether these rocks are extrusive (Keewatin flows intercalated in the sediments) or intrusive (post-Keewatin basic intrusives). They are generally conformable with the structure of the enclosing sediments, and few crosscutting relationships were observed. In addition, alteration of the coarse-grained, massive phases of Keewatin basic lava flows would yield rocks lithologically similar to these. However, there is a general lack of primary volcanic structures (pillows, etc.), and some of these bodies contain inclusions of country rock. The evidence favours an intrusive origin.

These rocks are intruded by dikes of Algoman granite, porphyry, and lamprophyre. Their foliate structure indicates that they were stressed by the same forces that sheared the enclosing sediments, making them pre-batholith in age. Based on this evidence, the group is classed as "post-Keewatin" in age.

Bomb-like vesicular fragment embedded near the top of the basic lava flow, southeast corner of Boston township.

Timiskaming Series

Clastic sedimentary rocks of the Timiskaming series occupy a small area in the northeast corner of Boston township. These rocks are part of a northwest-trending belt of sediments that outcrops in Hearst and McElroy townships and extends for about a mile into Boston township. Here the belt terminates against the northeast-striking Boston fault.

E. M. Abraham mapped these rocks as part of a strip in Boston township, which he examined in 1948 following completion of a mapping program in the adjoining township of McElroy. The strip of geology so mapped is included with that of McElroy.[1]

This area is also incorporated into the geological map that accompanies the present report.

The Timiskaming series is divided into two groups: conglomerate and conglomerate with some interbedded arkose, slate, and greywacke, in group 5;

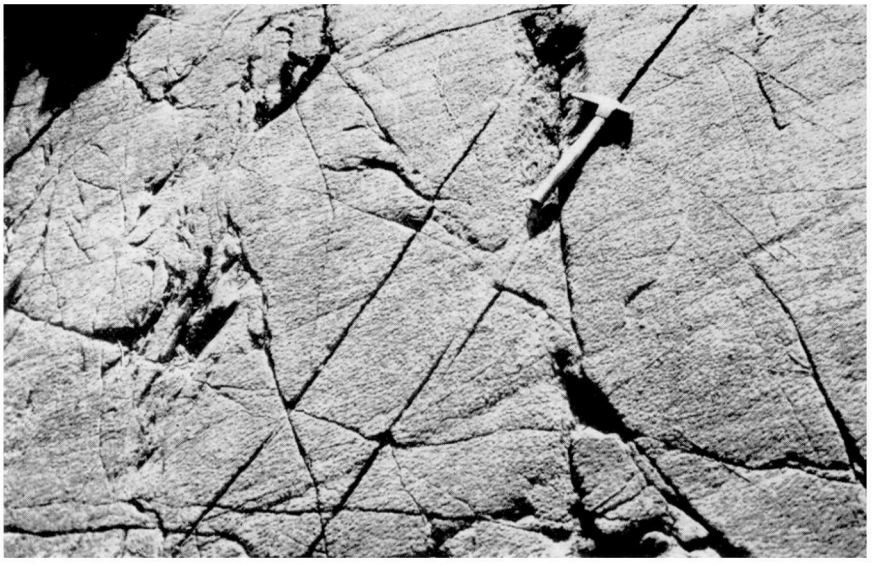
[1] Map No. 1950-3, Ont. Dept. Mines.

and fine-grained sedimentary rocks, including greywacke, arkose, quartzite, and slate, in group 6.

A description of the lithology, origin, and metamorphism of these rocks may be found in Abraham's report.[1]

Haileyburian (?) Intrusives

A persistent sill-like mass of basic rock, group 7, intrudes Keewatin volcanics in the southeastern part of the map area. It emerges from under overburden in the southwestern part of lot 1, concession VI, Pacaud township, and extends for nearly 3 miles northwestward past the east side of O'Donald Lake in Boston township up to a point about 150 feet south of the No. 3 post of claim L.26690. It strikes about N.45°W., parallel to Keewatin lava flows, in this part of the map



Massive dioritic lava, northeastern part of Pacaud township.

area and is 50–600 feet wide. Before disappearing beneath overburden south of the No. 3 post of claim L.26690, the sill has narrowed to a width of 50 feet; it probably dies out not far north of here. Along strike, the sill is offset by a number of cross-faults of small horizontal displacement.

The sill is composed of three members, which appear to have been injected at different times. They are hornblendite (7c), serpentinite (7d), and diorite (7a). Hornblendite is the most abundant of the three and is exposed along the entire length of the sill. Serpentinite and diorite are less extensive, being confined to certain parts of the mass. A minor amount of diorite porphyry (7e) also occurs.

The hornblendite is a massive, coarse-grained rock, dark-green to black in colour. It is composed largely of elongated hornblende crystals. Under the microscope, the hornblende is seen to be accompanied by plagioclase and minor microcline, magnetite, and sphene. Carbonate, chlorite, and epidote replace the hornblende to some extent.

[1]E. M. Abraham, *op. cit.*, pp. 16–19.

The serpentinite here has the typical appearance of this rock type. On fresh surfaces it is fine-grained, and dark greenish-grey in colour. Weathered exposures are lighter grey and possess soft, greasy surfaces. The rock may contain narrow veinlets of asbestos. This mineralization, however, is not abundant. A 5-foot wide shear may separate the serpentinite and hornblendite where they are in contact.

The diorite is a medium-grained, massive rock of fresh appearance. It is composed largely of altered plagioclase and hornblende.

A large sill of serpentinite[1] extends diagonally across McElroy township. It crosses the Boston-McElroy boundary about 2,000 feet north of milepost III and extends into Boston township as far west as the Dane–Larder Lake road, a distance of nearly 4,500 feet.

A few other small masses of serpentinite outcrop in the map area.

Algoman Intrusives

The Algoman series includes a granite batholith and two syenite stocks, parts of which outcrop in Boston and Pacaud townships. They are accompanied by a suite of smaller intrusives, including syenite, porphyries, granite, diorite, and lamprophyre.

Round Lake Batholith

The Round Lake batholith (9s) is one of the largest intrusions in northeastern Ontario. It is about 50 miles long and has a maximum width of nearly 25 miles. The batholith is a composite body composed of two general rock types; an older "quartz diorite–oligoclase granite" facies of very uniform composition and a younger hornblende granite. The latter is notably massive and may grade into hornblende syenite.

A small part of the Round Lake batholith outcrops in concessions V and VI, Pacaud township. Here, the older "quartz diorite–oligoclase granite" facies intrudes Keewatin tuffs. The intrusive is a quartz-rich oligoclase granite composed mostly of feldspar and quartz. It is pale-grey to pink, with a medium- to coarse-grained, faintly foliate texture.

The periphery of the batholith has been effected by extensive shearing and granulation. These effects are shown in a belt of strongly foliated, protoclastic gneiss developed in the batholith up to ½ mile from its contact with the country rock. The gneissic structure is vertical in attitude and strikes parallel to the contact. The intensity of shearing and granulation increases as the contact is approached, and augen-gneiss characterizes the last 500 feet.

In the south half of lot 6, concession VI, Pacaud township, the presence of pale-pink-weathering bands in the green augen-gneiss imparts a striped appearance to the rock. Large "augen" of feldspar remnantal from the gneiss and gneissic structure itself are still faintly visible in the pink-weathering bands. These are not aplite dikes but appear to have been developed by intimate penetration or "soaking" of the augen-gneiss by feldspathic solutions. In thin section these bands are composed of very finely divided sodic plagioclase with some microcline and a little myrmekite and quartz. All are very fresh.

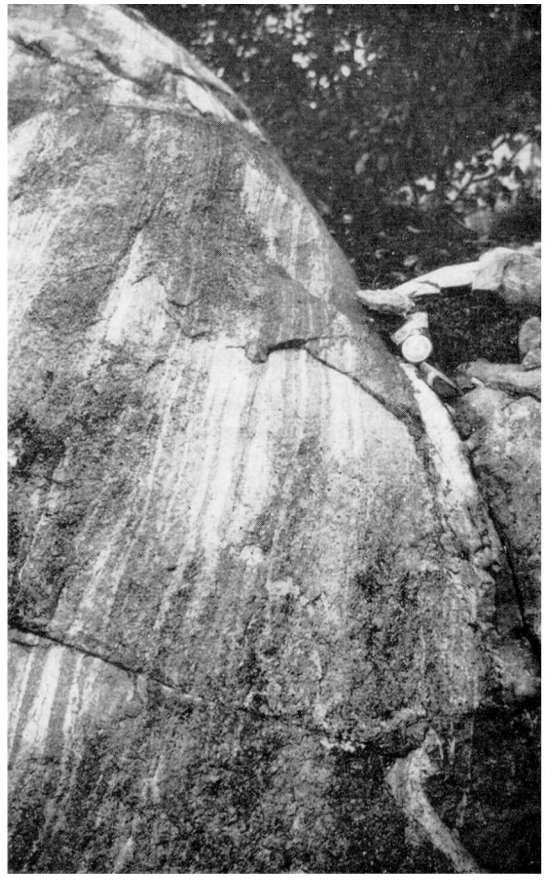
Otto Syenite Stock

The Otto syenite stock (9a) extends eastward into Boston township for a short distance, about as far as the old Ferguson highway. The syenite is pale pink and very fresh in appearance. Euhedral, tabular grains of perthitic feldspar

[1]E. M. Abraham, *op. cit.*, p. 20.

make up over 90 percent of the rock. The remaining 10 percent is composed of small, dark-green pyroxenes scattered through the rock in the interstices between the feldspar grains. The syenite is medium- to coarse-grained.

As the periphery of the stock is approached, the feldspar crystals become larger, up to a maximum of 2 inches long. This very coarse syenite is essentially an aggregate of euhedral feldspar crystals set in a sparse groundmass of mafic minerals and smaller feldspar grains.



Augen-gneiss phase of the Round Lake batholith injected by late-stage feldspathic material (light-coloured bands).

The contact of the Otto stock with Keewatin basic volcanics is gradational. Marginal phases of the intrusive may be darker than the interior of the mass owing to assimilation of country rock.

Lebel Syenite Stock

The Lebel syenite stock (9a) occupies most of the south half of Lebel township and extends for over 1 mile into Boston township to the south. It closely resembles the Otto syenite stock, and a close genetic relation between the two is indicated. It is probable that they are upward protuberances of a large body of syenite or granite that extends continuously from the southern part of Otto township northeastward to Jordan Lake in Lebel township, a distance of about 12 miles.

Lithologically, the Lebel syenite closely resembles the Otto syenite. It is composed of an aggregate of coarse feldspar crystals set in a sparse groundmass of dark-green mafic minerals and finer feldspar grains. The feldspar grains amount to over 75 percent of the rock and are mostly microperthite. Combined mafic minerals (augite, biotite, and hornblende) make up about 15 percent. Unlike the Otto syenite, dark-brown biotite is present in the Lebel syenite. Accessory sphene, similar to that found in the Otto syenite, occurs as dark-brown grains.

Marginal phases of the stock may be more basic than the interior of the mass owing to assimilation of country rock.

Basic Syenite

Basic syenite is represented as 9 on the map. These rocks are products of the assimilation of country rock (Keewatin basic volcanics) by syenitic magma. They are largely confined to the margins of the Lebel and Otto syenite stocks, either as dark phases within the intrusives or as small bodies intruding the adjoining country rock. They show considerable variation in texture and in content of dark minerals (hornblende, pyroxene, and biotite), as is commonly the case in contaminated rocks of this type.

Diorite and Metadiorite

Algoman diorites and metadiorites (9g) occur principally in the north half of Boston township. They are generally massive, dark-green rocks of intermediate-to-coarse texture. The outlines of some of these bodies suggest that they may be sills. These rocks intrude Keewatin basic volcanics and closely resemble the coarse-grained, massive phases of the lava flows in this series. From the available field evidence, it is often difficult to decide whether certain diorites are intrusive or extrusive.

Southeast of Fox Lake, diorite grades into basic syenite. It is probable that much of the dioritic magma from which these rocks crystallized was developed in conjunction with the extensive syenitic intrusion in this area.

Acid Intrusives (Dikes and Small Stocks)

Dikes of granite, syenite, syenite porphyry, quartz porphyry, and quartz-feldspar porphyry are scattered throughout the map area. Some are shown on the geological map, but many are too narrow to be so represented. Syenite porphyry dikes are the most numerous of this group. A number of small stocks of medium-grained, pink granite are exposed in the southeastern part of the map area. A large dike of this composition intrudes porphyritic syenite of the Lebel stock at the north end of Fox Lake. South of Smith Lake, in lots 8 and 9, concession VI, Pacaud township, Keewatin tuffs are injected by a swarm of granite and felsite dikes. In the northwest corner of lot 10, concession VI, Pacaud township, about 800 feet south of the Boston-Pacaud township boundary, two large dikes of quartz-feldspar porphyry intrude Keewatin tuffs.

A distinctive pink or brick-red syenite, having a fine-grained to felsitic texture, occurs in the western part of the map area. It is exposed at a number of places as narrow dikes and networks of dikelets intruding country rocks adjacent to a cross-fault. This rock type is limited in extent but is of interest because of the low radioactivity it possesses. Under the microscope it is seen to be composed mostly of alkali feldspar. The syenite, and the country rock it intrudes, may be fractured and cut by veinlets of specular hematite up to ½ inch wide. An interest-

ing feature of this rock type is its peculiar distribution; it is apparently confined to country rocks adjacent to a cross-fault. The fault in question crosses the western part of the map area in a direction S.15°W., from a point 700 feet west of milepost II on the Boston-Lebel townships boundary, to the Blanche River in lot 12, concession V, Pacaud township, a distance of nearly 8 miles. The following are locations of exposures of this rock type known to the author: (1) east of Boston Creek, about 800 feet from the No. 4 post of claim L.37322 in a direction N.20°W.; (2) west of Boston Creek, 1,500 feet from the No. 4 post of claim L.37322 at N.50°W.; (3) in the northwest corner of lot 11, concession VI, Pacaud township, about 700 feet north along highway No. 112 from the intersection of the highway and the Boston Creek road; (4) in lot 12, concession V, Pacaud township, on the north bank of the Blanche River, immediately north of a small stream mouth. The syenite at locations (1) and (2) was tested for radioactivity, and it is reported that readings of 4 or 5 times the background count were obtained by using a geiger counter. The radioactivity is probably due, in part, to the presence of a radioactive isotope of potash in the alkali feldspar of the syenite.

Lamprophyre

Lamprophyre (9f), as narrow dikes and small, irregular-shaped bodies, is most abundant in, or adjacent to, the larger Algoman intrusives. It has the typical appearance of this rock type—dark grey in colour with a fine-grained, rather sugary texture. On fresh fracture, biotite is visible as tiny glistening flakes and as phenocrysts.

A mass of lamprophyre over 50 feet wide intrudes the Round Lake batholith about 200 feet south of its contact with country rock in the southeast quarter of lot 5, concession VI, Pacaud township. It is a mica lamprophyre containing large fragments of the granite as inclusions. Narrow dikes of mica lamprophyre and hornblende lamprophyre are quite numerous, intruding the country rock adjacent to the batholith in Pacaud township. Lamprophyre dikes also cut the Otto and Lebel syenite stocks and adjacent country rocks. Under the microscope these latter dikes are seen to be quite fresh. Intergrown albite and microcline, and biotite, are most abundant. Amphiboles and augite are present in variable proportions, and accessory apatite, magnetite, sphene, or pyrite do not exceed 2 percent. Carbonate is present in some sections.

The lamprophyre dikes appear to have been intruded late in the general Algoman sequence and may represent the last igneous activity in this period.

Keweenawan

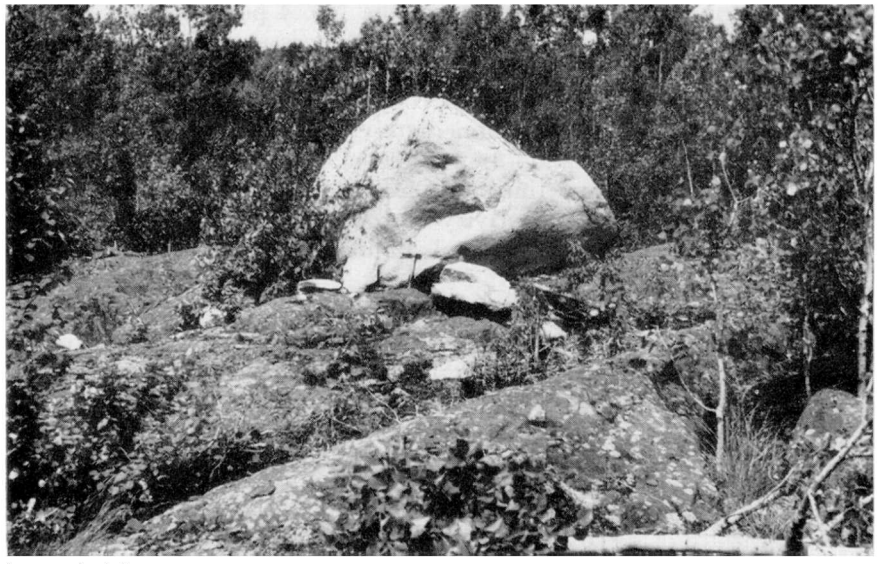
A number of diabase dikes intrude the Keewatin and Algoman rocks in Boston and Pacaud townships. They are of typical appearance, dark greenish-grey, massive rocks, which weather to a rich, brown colour. They show diabasic texture, with chilled edges and coarse-grained central portions. These dikes have a maximum width of 120 feet, and the most persistent is over 3 miles long. Primary quartz occurs in some thin sections of the rock.

Pleistocene and Recent

The drift- and swamp-covered areas in Boston and Pacaud townships are shown on the geological map. The drift consists of till, clay, sand, and gravel, all of Pleistocene glacial derivation. Varved clays are exposed along Boston Creek at

a few places, and large ice-transported boulders (glacial erratics) are numerous throughout the map area. Bedrock outcroppings may be rounded and grooved by glacial action, and exposures of iron formation often present smooth, polished surfaces.

Glacial striae indicate that the direction of movement of the Pleistocene ice-sheet in this area was slightly east of south.



Large glacial erratic of hornblende syenite resting on Keewatin pillow lavas, northeastern part of Pacaud township.

STRUCTURAL GEOLOGY

Archean bedrock underlies the entire map area with the exception of a few diabase dikes assigned to a late Precambrian age. These rocks have been affected by at least one or two periods of mountain building, which have left them tilted at steep angles, folded, faulted, and cut-up by magmatic intrusion. Interpretation is made more difficult by the incompleteness of rock exposure. This sequence therefore presents a complex structural picture. The general interpretation of the regional and local structures is shown on the geological map. The lighter tints show the assumed extension and boundaries of formations under overburden.

Close folding of the formations is common. All dip steeply and may have been overturned, with the result that the direction of dip is useless in locating fold axes. The interpretation of folding and stratigraphy is based primarily on determinations of the tops of flows and beds, using primary structural features such as pillow facings in lava flows and grain gradation across individual beds in sedimentary rocks.

The presence of most of the faults is inferred from structural discordance of formations, topographic expression, and shearing.

Folding

The most intricate folding in the map area occurs in the northeastern part of the Boston Township iron range. Immediately south of milepost V on the Boston-Lebel townships boundary the range is folded into a series of synclines and

anticlines. The axes of these folds strike N.0°–45°E., and pitch 45°–90°SW. The major structure here is a syncline whose axis strikes about N.35°E. through claims L.57191, L.57190, L.57183, and L.57184.

Timiskaming sediments exposed southwest of milepost V on the Boston-McElroy townships boundary are folded about a north-south synclinal axis. This axis is arcuate and pitches south, probably at a steep angle. East of here, in the adjoining township of McElroy, Timiskaming rocks in the same belt are closely folded about axes striking northwest to west.

Keewatin volcanics strike northwest and dip steeply in the east half of Boston township south of the old Dane–Larder Lake road. The Keewatin series here occupies the north limb of a major anticline whose axis lies somewhere south of the map area. The direction of the tops of lava flows, as determined by pillow facings, is consistently northeast and indicates that the series is not repeated by close folding.

In the central part of Boston township, about ¾ mile west of Hildas Lake, there is exposed an unusually wide sequence of intermediate and acid volcanics group (2). The apparent thickening of the series here may be due to the presence of a large drag fold.

Faulting

The known and assumed faults are shown on the geological map. The most important of these are described below.

The Boston fault, striking southwesterly into Boston township from the adjoining township of McElroy, is the major structural break in the map area.

Cross-faults are numerous. Many occur in groups offsetting certain geological horizons.

Boston Fault

In the northeastern part of Boston township, north of the old Dane–Larder Lake road, Timiskaming rocks lie in faulted contact with northeast-striking Keewatin basic volcanics and iron formation. The Timiskaming sedimentary rocks are part of a belt striking northwest through the adjoining township of McElroy. Judging from the apparent structural discordance between the two series and the extent of shearing and brecciation adjacent to the fault, an important structural break is indicated.

The Boston fault, so named by Abraham,[1] has an average strike of S.45°W. Shearing adjacent to the fault dips vertically or at steep angles.

Abraham reports that north of the Dane–Larder Lake road this zone is marked by a zone of intense shearing and brecciation several hundred feet wide. On map No. 1950-3[2] he shows the fault extending from a point about 1,000 feet north of milepost V on the Boston-McElroy townships boundary southwestward to the vicinity of the Dane–Larder Lake road. From here the author has extended the Boston fault southwestward through a swampy valley to the north end of Hildas Lake. Bedrock exposures adjacent to the valley are sheared and, in places, brecciated and veined with carbonate. Southwest of Hildas Lake the fault is assumed to split into two branches, but evidence of faulting, in the form of shearing and topographic expression, is less marked.

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[1]E. M. Abraham, *Geology of McElroy and Part of Boston Townships*, Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, p. 35.

[2]Map No. 1950-3—*Township of McElroy and Portion of Township of Boston*, District of Timiskaming, Ontario. Scale, 1 inch to 1,000 feet. (Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, by E. M. Abraham.)

Pacaud Fault

In the southeastern part of the map area a faulted contact separates the belt of sheared and altered tuff and tuffaceous sediments adjacent to the Round Lake batholith and the thick series of Keewatin flows lying northeast of them. On the geological map the Pacaud fault is shown extending from claim L.10708 in Boston township southeastward to the southeast corner of lot 1, concession V, Pacaud township.

The presence of this fault is indicated by discordant structural trends in the two rock series and by marked differences in lithology on each side of the fault. Some shearing and silicification is apparent on outcrops adjacent to the break. Topographically, the fault line is marked by valleys and low ground.

Lincoln-Nipissing Fault

An assumed extension of the Lincoln-Nipissing strike fault[1] crosses the east boundary about 900 feet north of milepost III and extends for about 1 mile into Boston township. The fault has been mapped in the adjoining township of McElroy and in Skead township[2] where it is regarded as a major structural break. There it strikes N.55°–70°W., and its locus is marked by intense shearing and much carbonatization.

There is no direct evidence of this major structure in Boston township, and its assumed presence is based on a projection of the fault along strike from the adjoining township of McElroy.

Northwest Boston Fault

The Northwest Boston fault crosses the west boundary of Boston township about 2,100 feet north of milepost IV. It strikes S.45°E. up to the vicinity of Boston Creek where it dies out or is offset by the Long Lake cross-fault. The fault extends into the adjoining township of Otto for an unknown distance. It strikes nearly parallel to the trend of the adjacent formations.

Throughout much of its length the fault occupies a narrow swamp-filled valley.

Long Lake Fault

A cross-fault strikes S.15°W. through the western part of Boston township. It is an apparent extension of the Long Lake fault in the township of Lebel.[3] Similar faults are described by Thomson[4] in Teck township.

The fault follows the valley of Boston Creek from the Lebel township boundary southward and apparently splits into two branches. The west branch again splits into two branches near Rosegrave Beach at Round Lake.

At a number of places, small masses of pale-pink to brick-red, fine-grained syenite intrude country rocks adjacent to the fault. Small veinlets of specular hematite often accompany the syenite. Apparently the syenite was intruded along the fault plane and is peculiar to this particular fault.

Peripheral Faulting of the Round Lake Batholith

In Pacaud township peripheral faulting of the Round Lake batholith has occurred. The presence of these faults is indicated principally by the offset of the

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[1] E. M. Abraham, *op. cit.*, p. 33.

[2] D. F. Hewitt, *Geology of Skead Township*, Larder Lake Area, Ont. Dept. Mines, Vol. LVIII, pt. 6, p. 27.

[3] Map No. 53a—*Township of Lebel*, District of Timiskaming, Ontario, Scale, 1 inch to 1,000 feet. (Ont. Dept. Mines, Bull. 150, 1956, by A. MacLean.)

[4] Jas. E. Thomson, *Geology of Teck Township and the Kenogami Lake Area*, Ont. Dept. Mines, Vol. LVII, 1948, pt. 5, p. 31.

contact between the intrusive and country rock. They are expressed topographically as narrow linear valleys.

The contact of the Round Lake batholith in Pacaud township has the shape of a large, almost semicircular, arc. As a group, these cross-faults are developed in a general radial pattern in such a way as to maintain an essentially transverse attitude to the strike of the contact of the batholith.

A number of small, northeast-striking cross-faults cut the batholith and adjacent country rock along the contact, between lot 1, concession V, and lot 5, concession VI, Pacaud township. These appear to be part of the same group of faults, but they are too small to be represented on the map.

Faulting of the Haileyburian (?) Compound Sill

In the southeastern part of the map area, a compound sill of Haileyburian (?) age forms a good marker horizon. It strikes about N.45°W. Over a strike length of nearly 3 miles the sill is displaced by 14 faults. In each case, apparent horizontal displacement is small, the maximum being about 350 feet. Most of the faults are cross-faults, that is, they strike northeasterly transverse to the trend of the sill. A few east-striking members cross the sill at more acute angles.

These faults tend to follow narrow linear valleys or low ground, with some shearing of adjacent formations. Cross-faulting is extensive east of Boston Creek in the vicinity of the old Dane–Larder Lake road. These faults have a general north-south strike. The most important member of the group extends from the old Dane–Larder Lake road to the centre of the township. Maximum apparent horizontal displacement on this structure is 900 feet.

Besides these faults described above, other small faults occur in the map area.

Shearing and Fracturing

Many of the formations in the area are quite massive. However a regional schistosity, which strikes northwest, about parallel to the rock formations, is recognized. Everywhere it dips at steep angles.

More locally, schistosity is developed in Keewatin country rocks adjacent to each of three large Algoman intrusive masses bordering the map area. In each case, the schistosity is nearly vertical in attitude and strikes parallel to the contact of the intrusive. Of the three, the intrusion of the Round Lake batholith was attended by the most extensive shearing and resulted in the strongest foliated structure found in the map area. As well as shearing the adjacent country rock, the batholith itself is sheared and granulated for distances up to ½ mile from its contact, with augen-gneiss characterizing the 500 feet farthest from the contact.

Rocks of group 2 (intermediate and acid volcanics) may be quite schistose, especially in the area west of Hildas Lake and are traversed by a number of narrow sheared zones. The strike of schistosity here is about N.60°W. Extensive fracturing also characterizes these rocks in this area.

Schistosity is locally developed in all rock types where they are traversed by, or lie adjacent to, faults and sheared zones. The directions of schistosity determinations are shown on the geological map.

Intrusion of the Round Lake Batholith

Strong shearing of the periphery of the Round Lake batholith and adjacent country rocks is believed to be related to the mode of intrusion and solidification of the batholith. It was during this period that the shearing stresses were ap-

parently active. A zone of protoclastic gneiss nearly ½ mile wide, which marks the periphery of the batholith and the adjacent country rock, has been converted into hornblende-chlorite-epidote schist. Boudinage and certain drag folds found in the country rock are structures believed to have been developed by the same shearing stresses.

The stresses are believed to be of primary origin. They developed at a stage when the granite batholith reached a fairly complete state of crystallization along its periphery while the interior of the mass was still in a more highly fluid state and was still in motion. The peripheral parts become sufficiently solidified so that further "drag" exerted by continued upward motion of the still-fluid but highly viscous interior could not be accommodated by flowage, and shearing and granulation took place.

Most of the drag folds observed in the altered tuffs adjacent to the batholith pitch northwesterly at shallow angles.

Horizons of boudinage are quite common in the belt of sheared and altered tuffs adjacent to the Round Lake batholith. Exposures of this structure may be seen about ¼ mile from the village of Boston Creek on outcrops adjacent to the road leading eastward from the village to the Cathroy Larder mine. The boudinage here consists of distinct horizons in which lens-shaped fragments are arranged end to end, usually in single lines. The fragments range from 1 inch up to about 2 feet long. On fresh fracture they are grey, and are generally fine-grained, brittle, and massive. Bedding in the tuffs tends to wrap around individual fragments in the boudinage. Originally the fragments are believed to have been part of continuous layers in the tuffs.

When stressed, boudinage structure may develop in a rock series whose members are of unequal competency. In the present case, certain brittle, more massive layers interbedded with the tuffs acted as competent members. These were flanked by relatively incompetent, thinly-bedded tuff. Under the shearing stresses that developed during the intrusion of the Round Lake batholith the brittle layers failed by fracturing and were broken into fragments, whereas the enclosing tuffs yielded by plastic flowage.

ECONOMIC GEOLOGY

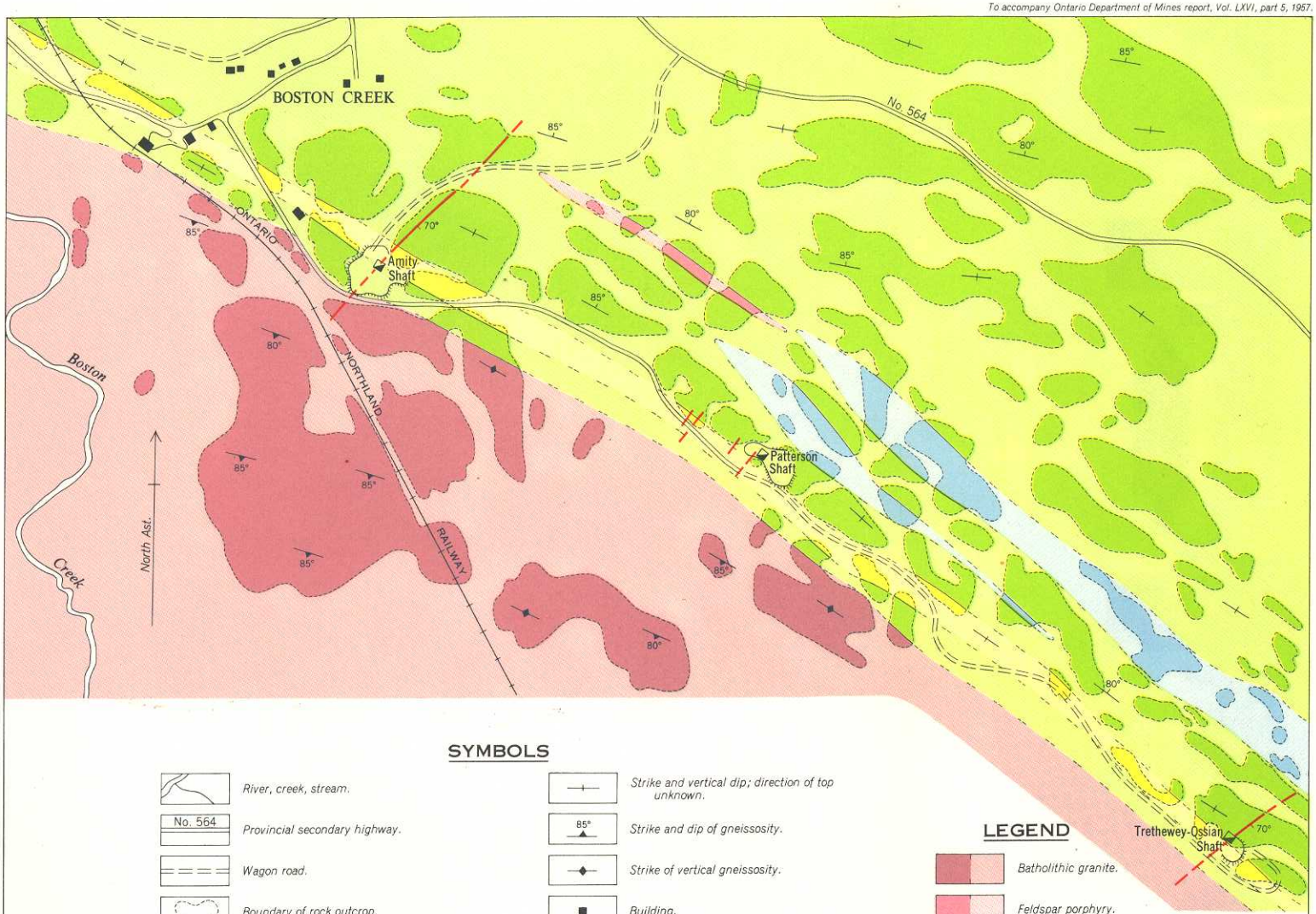
Copper

In 1926 copper was discovered in country rocks adjacent to the Round Lake batholith, along a zone extending for nearly 2½ miles from the vicinity of Boston Creek station to the south half of lot 2, concession V, Pacaud township. Between 1927 and 1930, copper prospects on three adjoining properties (Amity, Patterson, and Trethewey-Ossian) in this area were explored by underground development.

The country rock is predominantly Keewatin tuff or tuffaceous sediments that have been intruded by a large batholith of Algoman granite. The tuffs are thinly bedded, water-laid sediments now altered to hornblende-chlorite-epidote schists. A number of sill-like bodies of altered diorite occur in the tuffs; and feldspar porphyry and lamprophyre, as dikes and sill-like masses, intrude both the granite and tuffs.

A narrow horizon of acid and cherty tuff is intercalated with the main band of Keewatin tuffs. It is more siliceous in composition and is distinguished from the latter by a lighter-coloured, lighter-weathering appearance. This horizon is shown

To accompany Ontario Department of Mines report, Vol. LXVI, part 5, 1957.



SYMBOLS

- River, creek, stream.
- No. 564 — Provincial secondary highway.
- Wagon road.
- Boundary of rock outcrop.
- Geological boundary, defined.
- Geological boundary, assumed.
- 80° — Strike and dip; direction of top unknown.
- Strike and vertical dip; direction of top unknown.
- 85° — Strike and dip of gneissosity.
- Strike of vertical gneissosity.
- Building.
- Shaft, vertical.
- Mine dump.
- Quartz veins.

LEGEND

- Batholithic granite.
- Feldspar porphyry.
- Diorite (intrusive).
- Dark grey tuff.
- Acid tuff.

Scale of Feet

1000 0 1000 2000

The heavier colours indicate rock outcrops. The lighter colours indicate the inferred extension of formations beneath the drift.

Geology by D. J. Emery and K. D. Lawton

General Geology of the Boston Creek Copper Area.

on the accompanying sketch map, striking northwesterly, parallel to the contact of the granite batholith, at a distance of 100–200 feet northeast of it.

Narrow layers of banded siliceous iron formation, ranging from 4 to 10 feet wide, occur on both sides of the acid tuff horizon along its contact with the more basic tuffs. The iron formation may be mineralized with sulphides, and surface exposures of this rock are often marked by rusty-weathering outcrops. The importance of the iron formation lies in the fact that it appears to have been the horizon most favourable to replacement by copper sulphides.

The copper ore so far discovered is confined to the narrow bands of iron formation lying along the contacts of the acid tuff shown on the sketch map. Here, the ore occurs as sulphide replacement bodies on each side of small cross-faults, which cut the iron formation. These faults, which are often filled with quartz, may have served as channelways for the copper-bearing solutions since all the ore shoots occur adjacent to these structures.

Although of fairly good grade, the ore shoots are quite small, about 50 feet long and 5 feet wide at the maximum. The limited extent of the orebodies appears to be due to the narrowness of the favourable iron formation horizons and to the wide spacing of the cross-faults. This resulted in a comparatively small amount of ground being amenable to replacement.

The horizon of favourable iron formation extends westward from the village of Boston Creek to a cross-fault that strikes south through lot 6, concession VI, Pacaud township. In the south half of lot 6, concession VI, a band of rusty-weathering outcrops is believed to be the faulted extension of this horizon.

The tendency of iron formation to occur along contacts of acid tuff bands makes the country rock along the contact of the Round Lake batholith between Boston Creek and Round Lake favourable for copper prospecting. Considerable acid tuff is exposed in this area and the contacts of these bands could be prospected for possible associated iron formation favourable to copper-sulphide replacement. In undertaking any prospecting, it should be borne in mind that the sought-after horizons of iron formation may be quite narrow (10 feet or less in width), and that they may be marked by rusty-weathering gossans.

Immediately east of O'Donald Lake in Boston township is another type of copper occurrence. Here, chalcopyrite occurs as disseminations in vein quartz.

Gold

The first recorded discovery of gold in the map area was made in 1914 in the "Kenzie" vein. Other veins were discovered later, some of which underwent considerable exploration and development work. Two or these properties, the Barry-Hollinger (formerly the Patricia) and the Miller-Independence, produced gold bullion.

A. G. Burrows and P. E. Hopkins,[1] who mapped the area during the height of gold prospecting activity, classified the gold deposits in southeastern Boston and the adjacent parts of Pacaud townships as follows:

> Gold . . . occurs, usually native, but occasionally combined with tellurium, in quartz veins and veinlets in the Keewatin greenstone and later intrusions of granite and porphyry. The veins, which have various strikes and dips, are well mineralized with varying quantities of pyrite and molybdenite, and sometimes with chalcopyrite, galena, specular hematite, cosalite, native bismuth, gold and tellurides. The gangue consists largely of quartz of several generations, with considerable calcite and chlorite. The gold is found along the dark streaks of chlorite and calcite.

[1]A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, pp. 9, 10.

There are many types of gold deposits, viz:

(a) Fissure quartz veins in the greeenstone, granite and porphyry, with well-defined walls. Examples: No. 1 vein at Miller-Independence, Boston-McCrae, Authier, Patricia and Wisconsin-Skead.

(b) Replacement veins. The country rock, including altered greenstone and porphyry, has been brecciated and partly replaced by vein-forming solutions of quartz of several generations, and by calcite and other carbonates. Examples: the calaverite vein on the Miller-Independence and the Kenzie vein on the R.A.P. property.

(c) A stockwork in granite and porphyry. Examples: Charest (L.5305), Authier (L.4737), and Papassimakes (L.5133).

Iron (Magnetite)

Recent advances in mining practice and in methods of concentration are permitting the use of low-grade, "concentrating" deposits as economic sources of iron ore. Plants designed to treat this type of ore are producing concentrates that contain more than 60 percent iron. As furnace feed, the concentrates are reported to be easier to reduce and richer in iron than the average iron ore fed to blast furnaces in the past few years. These developments have led to an extended search for low-grade iron deposits of a size and type suited to beneficiation.

THE BOSTON TOWNSHIP IRON RANGE

The iron deposits in Boston township are of the low-grade, "concentrating" type. They are confined to a single range, which extends for nearly 6 miles across the northern part of the township. Iron, in the form of magnetite, occurs as a constituent of banded siliceous iron formation of Keewatin age. There is much tuff, agglomerate, and basic lava associated with the iron formation in this range.

Location

The Boston township iron range is located about 7 miles southeast of the town of Kirkland Lake. It extends for nearly 6 miles across the northern part of the township in the form of a great arc. The range is not of economic interest throughout its entire length; the area of principal interest lies between milepost V on the Boston-Lebel boundary, and Marshall Lake lying about 3 miles to the southwest. This area coincides with a 15,000-gamma anomaly appearing on the Larder Lake aeromagnetic sheet.[1]

The east end of the range lies in the adjoining township of Lebel, apparently dying out about ¼ mile northeast of milepost V on the Boston-Lebel boundary. The west limit is indefinite, but for practical purposes the range dies out in the vicinity of Helent Lake.

The range is 2,500–4,000 feet wide, but a large volume of lava, tuff, and quartzite is intercalated with the iron formation. These figures thus represent over-all dimensions for the range and are not meant to imply unbroken widths of banded siliceous iron formation.

Lithology of the Iron Formation

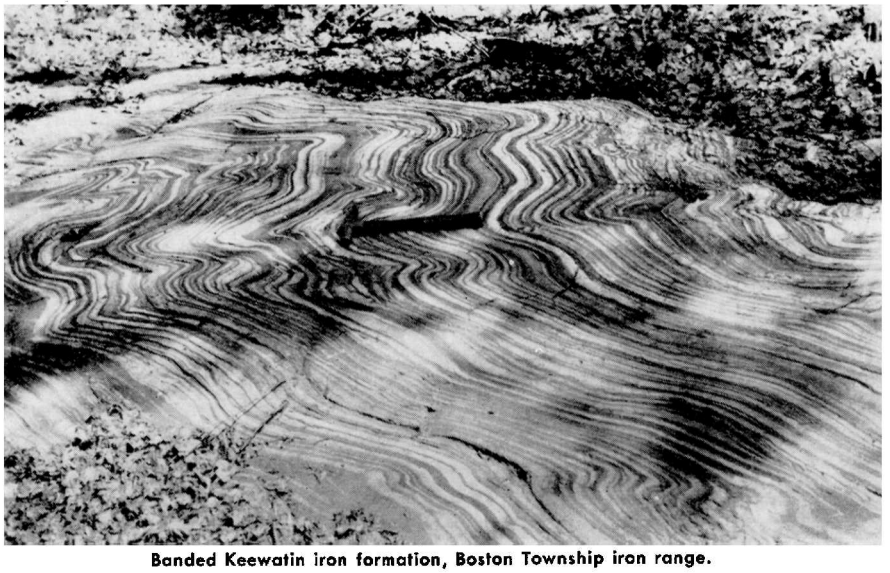
The iron formation is typical of that found in the Keewatin series of Precambrian rocks. It is composed of alternating layers of siliceous magnetite, massive magnetite, sugary quartzite, and cherty quartzite. Tuff, agglomerate, basic lavas, and some jasper are associated with it. Alternation of differently

[1]Aeromagnetic Map No. 47G—*Larder Lake, Ontario*, Geol. Surv. Can., Geophysics Paper 47, 1951.

coloured layers of these materials imparts a strikingly banded appearance to the iron formation. Individual layers range in colour from white to black. The individual bands range from microscopic widths to 3–6 inches wide. The average width is about ½ inch. The iron formation commonly presents a highly-folded and contorted appearance.

In hand specimen, the texture of the iron formation ranges from sugary to cherty.

On some outcrops, the iron formation is cut by swarms of irregular quartz stringers and veins. These range from tiny veinlets up to veins a foot or more wide. The volume of this added material is often sufficient to significantly lower the over-all iron content of the outcrop. In this section, this secondary quartz is coarser-grained than the banded silica and, unlike it, contains no disseminated magnetite.



Banded Keewatin iron formation, Boston Township iron range.

Microscopic Features of the Iron Formation

Under the microscope the iron formation is seen to be composed largely of quartz and magnetite. Hornblende, tremolite, grunerite, and garnet are present in some thin sections.

The banded character of the rock is readily apparent. The silica bands vary in grain size although they maintain a general uniformity of size within each band. In the thin sections examined, the grain size of quartz ranges from 0.02 to 0.8 millimetres in diameter. The magnetite occurs in two general ways, disseminated through silica-rich bands, or in bands or layers composed largely of this mineral. In the siliceous bands it is quite uniformly distributed and ranges in size from tiny specks up to grains exceeding 0.1 millimetres in diameter. In the magnetite-rich bands, individual mineral grains may exceed 1 millimetre in diameter. Some bands rich in magnetite are aggregates of tiny grains 0.02 millimetres, or less, in diameter.

Amphibole minerals occur in most sections, generally in the magnetite-rich bands. The iron-rich amphibole, grunerite, was identified in one section, and hornblende and tremolite were noted in others. Pale reddish-brown garnet and clinopyroxene are quite abundant in a narrow horizon of iron formation out-

cropping at the west end of the range immediately northwest of Helent Lake. The clinopyroxene is believed to be a member of the diopside-hedenbergite series. Some of it occurs in veinlets cutting the iron formation.

Pyrite, often in large cubes, is sparsely distributed throughout the iron formation.

Origin of the Iron Formation

An extensive literature exists on the type of iron formation outcropping in the Boston Township iron range, particularly concerning its origin. Moore and Armstrong[1] give a brief description of the origin of this rock type, and the reader is referred to this report for more detail.

The iron formation in Boston township is a sedimentary deposit. Prevailing theories postulate that weathering and leaching of volcanic flows and tuffs yielded the silica and iron that are the main constituents of the iron formation. These were transported, probably in the colloidal state, to basins of accumulation where they were deposited. Consolidation and metamorphism followed, and the iron formation was crystallized to its present state. The iron in this range was thus deposited with the silica, as part of the original chemical deposit.

During the accumulation of the iron formation there was much volcanic activity, as witnessed by the volume of lavas and pyroclastics found associated with it.

Structure and Extent of the Iron Formation

The range is divided into three sections for descriptive purposes: (1) between milepost V on the Boston-Lebel townships boundary and Marshall Lake, (2) between Marshall Lake and Boston Creek, and (3) west of Boston Creek.

1) The iron range enters Boston township in the vicinity of milepost V on the Boston-Lebel boundary. Immediately south of here, the iron formation and volcanics are folded into a series of synclines and anticlines. The axes of these folds strike N.0°–45°E. and pitch 45°–90°SW. In this area, it is possible to reconstruct a large S-shaped drag fold using outcrops of iron formation located west of the creek and near the centre of claim L.57193, together with the syncline whose axis strikes about N.35°E. The existence of this fold is a matter of conjecture since it was not indicated by a magnetometer survey of the area. However, this may be due to part of the fold being cut out by syenitic intrusion.

The main band of iron formation strikes southwest from claim L.57187, through claims L.57195, L.57196, L.57286, L.57316, L.57315, L.57310, and L.57309 to an assumed cross-fault that strikes southwest across claims L.57308, L.57309, L.56822, and L.56825. A number of narrow but persistent horizons of iron formation split off the east side of the main band and extend parallel to it through claims L.57186, L.57189, L.57195, L.57196, L.57285, L.57286, L.57311, L.57310, and L.56824.

A number of pod-shaped masses of iron formation are exposed in the southeastern part of claim L.57189 and the northwestern part of L.57215. The most persistent of these extends southwestward through claims L.57215 and L.57199. It splits into two parts on claim L.57199.

East of the main band, an isolated mass of iron formation extends southwesterly through claims L.57285, L.57284, and L.20823.

Immediately southwest of a cross-fault striking through claims L.57308, L.56822, and L.56825, iron formation is exposed in three bands, which are separated by flows of basic lava. A number of small, isolated masses also occur.

[1]E. S. Moore and H. S. Armstrong, *Iron Deposits in the District of Algoma*, Ont. Dept. Mines, Vol. LV, 1946, pt. 4, p. 3.

The most northerly band strikes southwest across claims L.57308, L.56820, and L.56819. It splits on claim L.56819. One segment extends southwesterly through L.56819 and dies out at the northwest end of a small lake near the No. 1 post of claim L.56809. The other segment extends into the northeastern part of claim L.56818 where it is terminated by a cross-fault. The middle band strikes westerly through claim L.56822 and then swings southwest. It dies out in the centre of claim L.56821.

Two parallel bands of iron formation may be traced southwesterly from claim L.56826, through a cross-fault on claim L.56825, to the centre of L.56823 where they unite to form a single wider band. This band continues southwestward to a cross-fault on claim L.55826. West of here the iron formation extends through claims L.55824, L.56818, and L.56809 and dies out on the southwest side of a small lake.

North of Marshall Lake, on claim L.56812, a few exposures of iron formation occur along the sides of a valley. The valley trends northward through the centre of the claim.

2) Between Marshall Lake and Boston Creek, the iron range strikes nearly parallel to the old Dane–Larder Lake road, and practically all the iron formation lies within 2,000 feet of the road. The amount of iron formation is somewhat less than that found to the northeast, between Marshall Lake and the Boston-Lebel townships boundary. It consists chiefly of isolated bodies having narrow, elongated outlines. This description is especially true of the occurrences north of the road.

The iron formation in this part of the range attains its greatest widths in two parallel bands crossing claims L.37321 and L.37322 and extending eastward for about one claim. The old Dane–Larder Lake road crosses these claims about ¼ mile east of Boston Creek. Considerable tuff is interbedded with the iron formation, especially in the more southerly band. The two bands are offset by a number of north-striking cross-faults.

3) The Long Lake cross-fault cuts the west end of the iron range. Boston Creek marks the locus of this fault, which strikes about S.15°W. through the western part of Boston township. West of this fault, the amount of iron formation is small. It occurs as narrow, isolated, pod-shaped masses in greenstone and tuff. None of the bodies mapped were large enough to be of economic interest.

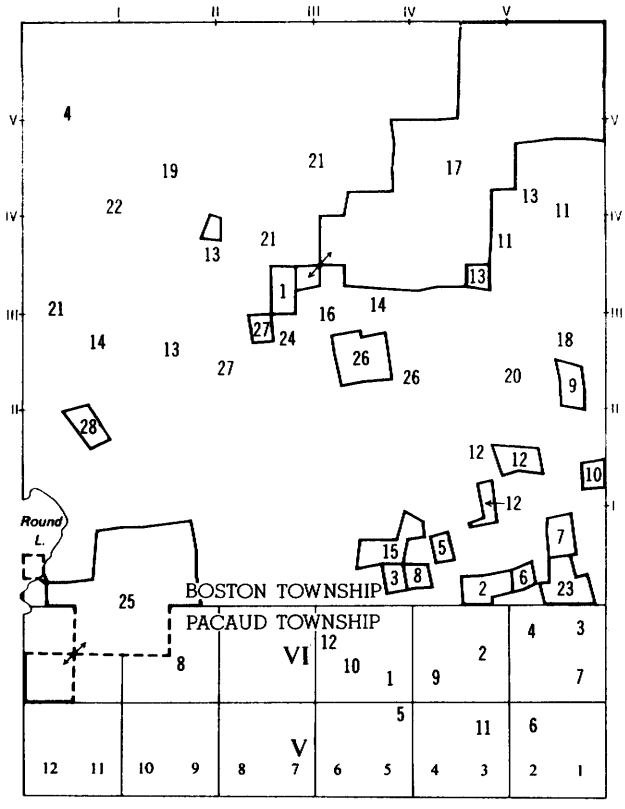
Iron Deposits

The banded siliceous iron formation that consitutes the ore in this range is composed largely of quartz and magnetite. The magnetite content, however, varies.

Included within the iron formation there is a considerable volume of so-called "lean iron formation," that is, banded silica rock containing only minor amounts of magnetite.

It is probable that the economies afforded by open-pit operations make this the only mining method feasible here, and the development of mineable deposits is thus dependent on outlining blocks of iron formation of sufficient size and grade to be mined in this way. Experience shows that a minimum grade of about 25 percent iron is required. The iron deposits, being too low in grade to qualify as "direct-shipping" ore, will require concentration to render them suitable for blast-furnace feed.

The Jalore Mining Company, Limited, reports that drilling on its 69-claim group at the east end of the range has indicated a large tonnage of low-grade iron ore suited to concentration.



Plan of Properties in Boston and Pacaud Townships

Boston Township

1. Anderson Property
2. Alfio Bargnesi
3. Boston Creek Mining Co., Ltd.
4. Mildred Campbell
5. Claim L.5037 (Currie Property)
6. Claim L.5079 (Ivanhoe-Boston Claim)
7. Claims L.5092 and L.5093
8. Claims L.5163 and L.5216 (R.A.P. Synd.)
9. Claims L.5881 and L.6927
10. Claim L.39837 (Gold Leaf Property)
11. Pat Collins
12. Dominion Gulf Co. Ltd.
13. Norman Evoy
14. George Gill
15. Gogita Mining Synd., Ltd.
16. Fred Healy
17. Jalore Mining Co., Ltd.
18. R. Kuzik
19. Mike Lunge
20. W. Mandrow
21. Charles Marshall
22. E. R. Ostrom
23. Planet Gold Mines, Ltd.
24. J. Radley
25. Sheroomac Mining Corp., Ltd.
26. Shunsby Gold Mines Ltd.
27. W. T. Stewart
28. W. Watkins

Pacaud Township

1. Amity Copper and Gold Mines, Ltd.
2. Barry-Hollinger Gold Mines, Ltd.
3. Bennet-Pacaud Mines, Ltd.
4. Boston-McCrea Gold Mines, Ltd.
5. M. Johnston
6. George McMillan
7. Miller Independence Mines, Ltd.
8. NW. ¼, S. ½, lot 9, con. VI
9. Patterson Copper Mines, Ltd.
Sheroomac Mining Corp., Ltd. (See Boston tp.)
10. Peter Tagliamonti
11. Trethewey-Ossian Mines, Ltd.
12. J. D. Weatherhead

DESCRIPTION OF PROPERTIES[1]

Boston Township

1. Anderson Property

The Anderson property consists of two adjoining patented claims (L.7069, L.2577) located near the centre of Boston township. The claims are easily accessible, being located a short distance south of the old Dane–Larder Lake road at a point about 3 miles east of Dane station.

The claims are underlain by Keewatin volcanics and minor iron formation intruded by a sill-like mass of altered diorite. The volcanics consist of porphyritic flow rocks, tuffs, and some agglomerate of intermediate-to-acid composition; and altered lava of more basic composition. The strike of bedding and schistosity is N.60°–80°W.

A gossan zone of indefinite extent, but which may be as much as 100 feet wide, is located in the northeast quarter of claim L.7069. Many years ago, five test pits were sunk on this zone. A trail about 500 feet long connects these pits with the old Dane–Larder Lake road to the north. Mineralization consists mostly of pyrite replacing what appears to be an acid pyroclastic rock. About 150 feet south of these pits, there are several old trenches on another patch of gossan. Mineralization here consists of pyrrhotite, magnetite, pyrite, and minor chalcopyrite.

Rusty-weathering shear zones, up to 15 feet wide, mark both contacts of the sill-like mass of altered diorite that strikes westerly across the centre of the Anderson property. Mineralization consists mostly of pyrite, which may be massive over 1-foot widths. Some test-pitting and trenching have been done along both contacts.

2. Alfio Bargnesi

The Bargnesi property is a copper prospect consisting of two patented claims (L.5054, L.5303) located along the south boundary of Boston township. Claim L.5054 occupies part of O'Donald Lake. The property is readily accessible from the village of Boston Creek.

The property is located immediately north of the Barry-Hollinger gold property, and gold-bearing quartz veins are reported to have been found on the claims. In 1937, Elsie Boston Lake Mines, Limited, was formed to develop the property. Later the claims were worked by Alfio Bargnesi of Boston Creek.

The group is underlain by Keewatin basic lavas intruded by a compound sill of hornblendite and serpentinite. The flows and sill strike northwest.

In 1956, Alfio Bargnesi prospected two showings. The main showing is located on the east shore of O'Donald Lake near the centre of claim L.5054. Here, a quartz-carbonate vein stockwork occurs in massive, dark-green, dioritic lava. Mineralization consists of chalcopyrite, disseminated rather sparingly through the quartz as blebs and small masses. The country rock may be weakly pyritized. A pit, 5 by 5 feet, has been sunk 12 feet along the vein. About 65 feet northeast of the pit, Mr. Bargnesi commenced sinking a 10- by 7-foot shaft on the same vein structure. In September, 1956, the shaft was 10 feet deep, and a small headframe was being erected. In the shaft, the stockwork is composed of a vein of massive,

[1]Properties are numbered to correspond with the property plan opposite and the geological map.

milky quartz flanked on either side by a network of quartz-carbonate-filled fractures. The stockwork strikes N.30°–35°E. and dips 80°–85°NW. It has an exposed width of 7 feet on the north wall of the shaft.

A second showing occurs in the hornblendite phase of the compound sill, which outcrops on the claims. It is located in the northeastern part of claim L.5054 about 240 feet northeast of the shaft on the main showing, and just south of a small arm of O'Donald Lake. The showing so far exposed is about 5 by 5 feet. A quartz-carbonate vein stockwork occurs in dark-grey, massive hornblendite, which is somewhat carbonatized. Chalcopyrite and minor bornite occur as disseminations in the vein matter, and some finely disseminated chalcopyrite is distributed through the adjacent country rock. The apparent strike of the vein here is N.50°–80°E.

3. Boston Creek Mining Company, Limited

Patented claim L.3665 is located in the southeastern part of Boston township about ½ mile west of O'Donald Lake. The claim, a gold prospect, was explored many years ago by Boston Creek Mining Company, Limited.

The claim may be reached by a wagon road leading northward from the village of Boston Creek.

The claim is underlain by Keewatin dioritic and pillowed lavas, except in the southwest corner where thinly bedded tuffs are exposed. The tuffs, now somewhat schisted and altered, are believed to lie in faulted contact with the lavas. The Pacaud fault, which separates the two series, is assumed to strike southeast through the claim.

The "Kenzie" vein, on which early exploration was concentrated, is located in the northeastern part of the claim.

The property is described by Burrows and Hopkins[1] as follows:

> The Boston Creek Mining Company, Limited, did considerable development work on claim L.3665 in Boston township during the year 1916. Work was carried on through the R.A.P. shaft, which was rented with hoisting equipment from the R.A.P. Syndicate.
>
> The drifts on the 100 and 200-foot levels of the R.A.P. were extended into the Boston Creek ground and a raise carried to the surface from the 200-foot level. A winze has been sunk 200 feet from the 200-foot level, and stations cut at the 300 and 400-foot levels. Development is as follows: 100-foot level, 325 feet of drifting and cross-cutting; 200-foot level, 300 feet of drifting and cross-cutting; 300-foot level, 50 feet of drifting and cross-cutting; 400-foot level, 300 feet of drifting and cross-cutting.
>
> The vein is a continuation of the "Kenzie" vein from the R.A.P., and similar in appearance. Spectacular gold showings were obtained in the upper 30 feet of the shaft and a few very small shoots were obtained in the deeper levels.

4. Mildred Campbell

In 1954, Miss Mildred Campbell owned a block of 16 claims located in the northwest corner of Boston township. Access to the claims is provided by a wagon road, which extends northward from the old Dane–Larder Lake road at a point about ½ mile east of Dane station.

The claim group is underlain by Keewatin basic lavas and tuffs and minor iron formation. These rocks lie in contact, to the east, with Algoman porphyritic syenite of the Lebel stock. The contact strikes across the property in a direction about S.20°E. The Keewatin rocks adjacent to the contact are noticeably schisted and metamorphosed. The trend of bedding and schistosity in the country rock is northwest-to-north and everywhere dips steeply. A small mass of diorite is exposed in the south-central part of the claims. It intrudes the Keewatin rocks but is cut by the syenite.

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[1]A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, p. 13.

Test-pitting and trenching of gossans have been carried out on the property, particularly on claims about a mile northeast of Dane station. This prospecting has revealed some pyrite, pyrrhotite, and chalcopyrite mineralization. Some X-ray diamond-drilling has been done. A pit has also been sunk to a reported depth of 19 feet on a calcite-quartz vein containing blebs and irregular stringers of sphalerite and galena. The exposed width of the vein is 1–2 feet.

5. Claim L.5037 (Currie Property)

Patented claim L.5037 is located in the southeastern part of Boston township about 1,200 feet northwest of O'Donald Lake. The claim, a gold prospect, was originally known as the Currie property.

The claim is accessible by a wagon road leading northward from the village of Boston Creek.

The property is underlain by Keewatin dioritic and pillowed lavas, which have been intruded by a compound sill of Haileyburian(?) age. The lavas are part of a thick series of flows, which strike northwest and face northeast. The Haileyburian sill is composed of hornblendite, serpentinite, and diorite members. The sill is offset by a diagonal fault, which strikes a little north of west through the centre of the claim.

The property is described by Burrows and Hopkins[1] as follows:

> In the northwest part of the claim are rusty schist bands heavily mineralized with iron pyrites and cut by quartz stringers. No visible gold could be seen in place, but gold colours can be panned from the sulphides. A grab sample showing cubes of pyrite gave $2.40 in gold to the ton, while samples across two feet and three feet seven inches gave $1.60 and 60 cents respectively in gold to the ton.

6. Claim L.5079 (Ivanhoe-Boston Claim)

Patented claim L.5079 is a gold prospect located in the southeastern part of Boston township about ½ mile east of O'Donald Lake.

The claim is underlain by Keewatin dioritic and pillowed lavas. Trenching and test-pitting have been done on veins on the south half of the claim.

Burrows and Hopkins[2] have described the claim as follows:

> On claim No. L.5079 is a quartz vein, of a few inches to 4 or 5 feet in width which strikes northeast-southwest and dips approximately 65° to the southeast with numerous quartz veinlets running nearly at right angles on either side. Some cosalite carrying high values in gold and silver occurs in one portion of the vein. The wall rocks are massive Keewatin diabase and pillow lava which are extremely altered for a few inches next to the veins.

7. Claims L.5092 and L.5093

Patented claims L.5092 and L.5093 are located in the southeastern part of Boston township.

E. M. Abraham[3] describes the group as follows:

> Patented claims L.5092 and 5093 in the southeastern part of the township are underlain by pillow lavas, facing towards the northeast, and porphyritic lavas and crystal tuffs. A test pit has been sunk on a sheared zone in the northeast corner of claim L.5093. Two quartz veins 6 inches and 12 inches in width occur along the boundary between claims L.5093 and L.5092. The veins strike in an easterly direction, and some test-pitting has been done to the east of the exposed veins.

8. Claims L.5163 and L.5216 (R.A.P. Syndicate)

Patented claims L.5163 and L.5216 are located in the southeastern part of Boston township about 1,500 feet west of O'Donald Lake. The claims, a gold prospect, were explored many years ago by the R.A.P. syndicate.

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[1] A. G. Burrows and P. E. Hopkins, *op. cit.*, p. 14.
[2] A. G. Burrows and P. E. Hopkins, *op. cit.*, p. 13.
[3] E. M. Abraham, *Geology of McElroy and Part of Boston Townships*, Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, p. 57.

Access to the group is provided by a wagon road leading northward from the village of Boston Creek.

The group is underlain by Keewatin dioritic and pillowed lavas. The lavas are part of a thick series of flows, which strike northwesterly and face northeast. A diagonal fault is asssumed to strike west through the north half of the block.

The "Kenzie" vein, on which an inclined shaft was sunk, is located in the northwestern part of claim L.5163.

The property has been described by Burrows and Hopkins[1] as follows:

The first discovery of gold in Boston Creek was made in 1914 in the "Kenzie" vein, which extends from claim No. L.3665 to claim No. 5163 in the south central part of Boston township. During that year some work was done on the vein by La Rose Mines, Limited. During 1916, the R.A.P. Syndicate, controlled by E. M. Richardson, W. B. Albright and J. K. Papassimakes, continued development on the Kenzie vein on L. 5163. The inclined shaft was sunk to the 200-foot level and drifting done as follows: on the 100-foot level, east drift, 250 feet; west drift, 175 feet; 200-foot level, east drift, 90 feet; west drift, 190 feet. Development has shown the ore to occur in small shoots in the vein. The vein strikes 30° north of east and dips 65°S. in massive pillow lava. The vein varies from several inches up to 5 feet in width with good breaking walls on either side. The vein material consists of quartz of several generations, silicified rock, reddish calcite, and brecciated and partly replaced masses of reddish feldspar porphyry. The occurrence of feldspar-porphyry in various parts of the workings suggests that originally the greenstone was intruded by a narrow feldspar-porphyry dike that, at a later period, was greatly brecciated and impregnated with vein-forming solutions which carried the gold and other minerals. The gold occurs with a very fine-grained greenish quartz, which has the character of a replacement deposit, while the green colour is due to minute inclusions of chlorite. Iron pyrites is finely disseminated in the vein, and copper pyrites, molybdenite and galena occur in minor quanitity.

Thin sections of the ore show the gold to be closely associated with the sulphides in chlorite and calcite seams near the footwall part of the vein, where there is a narrow band of fine-grained greenish quartz. Certain sections of the vein run as high as $25 or $30 in gold to the ton, across five feet.

On the east side of claim L.2631, which lies immediately northeast of that on which the main shaft is sunk, there is an irregular band of mineralized schist with quartz, about one foot wide, which contains visible gold. The showing occurs where the greenstone is intruded by a dike of feldspar-porphyry, and near the contact.

9. Claims L.5881 and L.6927

Patented claims L.5881 and L.6927 are located in the eastern part of Boston township, a claim-length west of milepost II on the east township boundary.

Abraham[2] describes the claim as follows:

On the south boundary of claim L.5881 and about 1,700 feet west of No. 2 mile-post of the township boundary, an 8-inch quartz vein striking in a northeasterly direction cuts fragmental volcanic rocks. A test pit has been sunk on the south end of the vein. In the southeast corner of claim L.6927, some surface work has exposed a small quartz vein, which lies on strike with the one described above.

10. Claim L.39837 (Gold Leaf Property)

Patented claim L.39837 (formerly L.5757) is the old Gold Leaf property. It is located in the southeastern part of Boston township along the east boundary about 1,000 feet north of milepost I.

Abraham[3] has described the geology of the claim. He reports that it is

underlain by fragmental volcanics and granite. Within the granite a 2- to 3-foot quartz vein has been cut by a fault trending north-northwest. The east block has moved 25 feet to the north relative to the west block. The fault could be traced for more than 125 feet along its strike. A considerable amount of exploration work has been done on a network of quartz veins and stringers cutting the hornblende granite. In addition to the surface work a small shaft was sunk just west of the fault. The quartz veins and stringers, whose main trends are N.44°E. and S.16°E., range in width from 4 feet to less than an inch. The larger veins have a tendency to favour the N.44°E. direction. Sulphide mineralization is sparse and consists of pyrite, chalcopyrite, and molybdenite.

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[1]A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, p. 11.

[2]E. M. Abraham, *op. cit.*, p. 58.

[3]E. M. Abraham, *op. cit.*, p. 63.

11. Pat Collins

In 1954, Pat Collins held an irregular-shaped block consisting of 10 unsurveyed claims. The group is located in the northeast quarter of Boston township about ¼ mile west of the township's east boundary. The old Dane–Larder Lake road crosses the southern part of the group.

The claims are underlain principally by Timiskaming conglomerate, greywacke, and arkose. A small area of serpentinite is exposed near the south boundary, and Keewatin basic lavas occur on the west side of the Boston fault, which strikes southwest across the property. Much swampy ground covers the south half of the group, and rock outcropping is rare.

12. Dominion Gulf Company, Limited

In 1954, Dominion Gulf Company, Limited, held an irregular-shaped block of five claims in the southeast quarter of Boston township. The group is centred around Lianne Lake. Three of the claims are former surveyed claims L.10031, L.10032, and L.5104.

The block is underlain by two conformable series of Keewatin volcanics. One series, composed of porphyritic lavas of intermediate-to-acid composition, strikes northwest through the eastern part of the group. The western part of the block is underlain by dioritic and pillowed lavas.

In 1950, Dominion Gulf Company, Limited, drilled 2 holes, in the north and south of claim L.5104. Both holes were drilled nearly due north for some 300 feet; they failed to show any interesting mineralization, and assays for gold showed only a trace, or nothing.

13. Norman Evoy

In 1954, Norman Evoy owned four separate holdings in Boston township.

The largest group is an irregular-shaped block of nine claims located in the northwest quarter of the township. They lie north and east of patented claims L.37322 and L.37321, and adjoin patented claim L.7069 to the east. Easy access is provided by the old Dane–Larder Lake road, which crosses the claims at a point about 2 miles east of Dane station.

The northern part of the group, north of claim L.37322, is underlain by Keewatin andesitic tuff and greenstone and a number of narrow horizons of iron formation. In the central part, east of claim L.37322, the amount of banded siliceous iron formation increases. The southern part of the group, consisting of three claims lying east of claim L.37321, is underlain by a sill-like mass of diorite intruding Keewatin country rock.

Some trenching and test-pitting of iron formation have been done, and a 3-inch calcite vein mineralized with galena and sphalerite is exposed in a pit located in the southwest corner of claim L.56863.

A second block of claims is located in the northeast quarter of Boston township. The group consists of four claims, arranged in a strip from north to south, immediately east of patented claims L.57285 and L.57284, which are about a mile west of milepost IV on the east boundary of the township.

The claims are underlain by Keewatin basic lavas and Timiskaming conglomerate, which lie in faulted contact. This structure, known as the Boston fault, strikes southwest across the centre of the block and is marked by a zone of intense shearing and brecciation. A late diabase dike intrudes the Timiskaming conglomerate a short distance south of the fault.

A third holding (patented claim L.7788) is underlain by Keewatin basic lavas accompanied by acid tuff. It is located in the northeast quarter of Boston town-

ship immediately south of patented claim L.55823. The old Dane–Larder Lake road crosses the south part of claim L.55823.

A fourth holding of two claims is located about 1½ miles west of the centre of Boston township; it lies immediately south of claims L.1504 and L.4171. The claims are underlain by Keewatin basic lavas and minor Algoman syenite. On this property a trench has been put down on an 8-foot-wide shear zone striking a little east of north. A small quartz vein is exposed in a trench near the northeast corner of the claim.

14. George Gill

In 1954, George Gill held two separate claim groups in Boston township.

The larger group consisted of six unpatented claims immediately north of Hildas Lake. The Boston fault is assumed to strike southwest through a swampy area in the centre of the group. East of here, the claims are underlain by dioritic lava. West of the fault, the most abundant rock type is a sill-like mass of diorite. It is bordered by porphyrytic rhyolite along its south side and by basic lavas on the north. There are a few old pits on the property.

The second block consists of three unpatented claims in the west-central part of the township, southwest of claim H.S.55. The claims are underlain by basic lavas, some of which are considerably schisted and altered. An old prospect shaft is located on the property.

15. Gogita Mining Syndicate, Limited

The Gogita Mining Syndicate owns a gold prospect in the south-central part of Boston township about 3,500 feet northwest of O'Donald Lake. The group consists of three patented claims (L.2000, L.2582, and L.4902). The claims are easily accessible by a bush road leading northward from the village of Boston Creek.

The block is underlain by northwest-striking Keewatin pillowed and dioritic lavas. Hornblendite intrudes the Keewatin on claim L.2582. It is part of a northwest-striking compound sill of Haileyburian(?) age.

In the western part of the block, the southeast-striking Pacaud fault is assumed to follow a valley through the centre of claim L.4902.

Over a strike-length of nearly 3 miles, a number of transverse and diagonal faults offset the Haileyburian compound sill, which crosses claim L.2582. Three of these faults are assumed to cross claims L.2582 and L.2000 of the Gogita group. Considerable east- to northeast-striking shearing in the group is probably related to these faults.

The main gold showing is located in the northeast quarter of claim L.2000. Here, an eastward-trending sheared zone in basic lavas has been traced by test-pitting and trenching for about 275 feet. The zone has an indicated width of 5–10 feet and dips about 70°S. Mineralization consists of quartz and sulphides. Sampling of the pits and trenches for gold is reported to have returned some ore-grade assays.

In 1947, Sylvanite Gold Mines, Limited, optioned the ground and drilled four short holes under the main showing. These failed to give encouraging results, and the option was dropped.

At the west end of the main showing a quartz vein about 8 feet wide is exposed in a large trench. The vein strikes in a general north-south direction and is mineralized with patches of sulphide.

A narrow quartz vein about 18 inches wide is located south of the main showing on claim L.2000. It strikes northeast. The quartz is mineralized with pyrite, and sampling of the vein is reported to have shown some ore-grade assays in gold.

16. Fred Healy

In 1954, Fred Healy held two separate unpatented claims, one north of patented claim L.6234, and the other east of it. A sill-like mass of diorite occupies the north half of this north claim. It lies in sheared contact with porphyritic rhyolite alongs its south side. In places, the shear is mineralized with pyrite and pyrrhotite.

The east claim, 500 feet southeast of the north claim, is underlain by porphyritic rhyolite. The Boston fault is assumed to strike southwest under swampy ground in the eastern part of this claim.

17. Jalore Mining Company, Limited (Formerly Dominion Gulf Co., Property)

The Jalore Mining Company, Limited, owns property consisting of 69 patented claims on the Boston Township iron range. The company is a Canadian subsidiary of Jones and Laughlin Steel Corporation, Pittsburgh, Pa.

The claims are located in the northeast quarter of Boston township and include the eastern part of the iron range extending from Marshall Lake northeastward to the Boston-Lebel townships boundary.

The old Dane–Larder Lake road, which crosses the south part of the claim group, provides access to this section of the property. It is possible to reach the north end of the group by a road leading southward from highway No. 66. The road leaves the highway at the same point as a road leading northward to Crystal Lake. The road southward to the Jalore claims is suitable for motor traffic as far as an old lumber camp; from there on it is a wagon road only.

Iron, in the form of magnetite, occurs as a constituent of banded siliceous iron formation of Keewatin age. Associated with the iron formation, there is much "lean iron formation," that is, banded silica rock containing little magnetite, together with considerable tuff, agglomerate, and basic lava.

The area covered by the Jalore claims includes a 15,000-gamma aeromagnetic anomaly.[1] In 1950 and 1951, Dominion Gulf Company, Limited, acquired a total of 69 claims in the area of highest magnetic intensity. This company conducted a program of detailed geological mapping and geophysical (magnetometer) surveys. Fourteen holes, totalling some 6,000 feet in length, were drilled, and surface channel-sampling of the iron formation was carried out. Some beneficiation tests were conducted to determine the characteristics of the iron formation and its amenability to concentration.

In April, 1954, Dominion Gulf Company leased the claims to Jones and Laughlin Steel Corporation for further exploration. Jalore Mining Company, its subsidiary, undertook more diamond-drilling and laboratory testing. The company reported that drilling indicated a large tonnage of low-grade iron ore suited to concentration.

In 1956, Jalore Mining Company exercised its option and acquired the property from Dominion Gulf Company.[2]

Claims L.55726 and L.55819—Areas of sphalerite and galena mineralization are exposed on claims L.55726 and L.55819. The No. 1 post of claim L.55819 is situated one claim-length west of claim L.55726. The old Dane–Larder Lake road crosses both claims.

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[1]Aeromagnetic Map No. 47G—Larder Lake, Ontario. Geol. Surv. Can., Geophysics Paper 47, 1951.

[2]The deposit, according to Jones and Laughlin officials, may contain 150,000,000 tons of crude magnetite ore. (*Northern Miner*, Apr. 29, 1954.)—Ed.

Originally, the claims were part of a group held by Charles Marshall and are now included in the large block owned by Jalore Mining Company, Limited.

The geology of both claims is similar. In the western part of claim L.55726 a southwest-trending ridge is exposed for about 900 feet. The ridge is composed largely of fractured Keewatin agglomerate, which has been intruded by a dike of later diabase. The dike is 75 feet wide and strikes about S.65°W. W. S. Savage[1] reports on the mineralization as follows:

> For 150 feet to the north of the diabase dike recent work in several shallow pits, scattered over a length of about 200 feet and put down on rusty patches in the agglomerate, has exposed irregular narrow stringers of calcite and sulphide mineralization. The sparsely distributed sulphides observed were pyrite, sphalerite, galena, pyrrhotite, and rare traces of chalcopyrite, in irregular blebs and fine stringers. The sphalerite often occurs as thin platings on the joint planes. The galena favours the calcite stringers in which it occurs in cubic crystals.

A short adit located on the southeast side of the ridge was driven on a vein reported to consist of a network of calcite stringers mineralized with galena and sphalerite.

Reporting on the mineralization on claim L.55819, Dr. Savage continues:

> Approximately ½ mile to the southwest, about the centre of the west half of claim L.55819, another pit exposes similar mineralization in the same fractured host rock. The north wall of this pit is said to be feldspar porphyry, but water in the pit prevented verification. An outcrop of diabase about 70 feet wide occurs 200 feet south of the pit and immediately north of the old Dane–Larder Lake road.

The two areas of mineralization, which are about 3,000 feet apart, may be located on a common zone of fracturing.

In 1951, the property was optioned by McIntyre Porcupine Mines, Limited, and the two showings were tested by 12 short X-ray diamond-drill holes. The four holes drilled in the vicinity of the showing on claim L.55819 are reported to have disclosed only low values in zinc and lead. The showing on claim L.55726 was tested with 8 holes, but with apparently discouraging results since the option was subsequently dropped.

18. R. Kuzik

In 1954, R. Kuzik held a block of eight unsurveyed claims. The block is located along the east boundary of Boston township. From milepost III the group extends southward for two claims and westward for four claims.

The block is underlain by Keewatin volcanics of basic and intermediate composition, which have been intruded by small masses of syenite porphyry.

At 1,350 feet west and 900 feet south of milepost III on the east boundary of Boston township, a mineralized stockwork of quartz veinlets was trenched by former owners.

A shear zone strikes northwesterly through part of the property.

At the southwest end of the group, a prospect shaft has been sunk on a small quartz vein cutting Keewatin diorite.

19. Mike Lunge

In 1954, Mike Lunge held a block of nine claims. The claims are located in the northwestern part of Boston township, about a mile northeast of Dane station. The group adjoins the Ostrom claims lying to the southwest.

The claims include part of the south contact of the Lebel syenite stock and Keewatin basic volcanics. Much coarse-grained porphyritic syenite is exposed, particularly in the northern part of the group. This is accompanied by a considerable amount of basic syenite developed through assimilation of country rock

[1]W. S. Savage, Resident Geologist, Ont. Dept. Mines, Swastika, private report, 1950.

by the syenite. Intrusion of the Lebel stock was accompanied by extensive metamorphism and injection of the country rock, and Keewatin basic lavas and tuffs lying along the contact are altered to coarse-grained hornblende and hornblende-biotite gneisses. The strike of gneissosity being a little north of west.

The claims are bisected by the Long Lake cross-fault, which follows the valley of Boston Creek. It strikes across the claims S.10°W.

The Lunge claims were optioned by Dominion Gulf Company, Limited, in 1951. The company conducted geological and ground magnetometer surveys of the ground but subsequently dropped its option.

A few small pods of iron formation occur in the south-central and southeastern parts of the group, but these are too small to be of economic interest.

20. W. Mandrow

In 1954, W. Mandrow held a block of three unsurveyed claims in the east-central part of Boston township.

The block is underlain by Keewatin volcanics of basic and intermediate composition. A transverse fault is assumed to strike southwest through one of the claims.

Some trenching and test-pitting has been done on a 1-foot-wide quartz vein located on the property.

21. Charles Marshall

In 1954, Charles Marshall owned three separate holdings in Boston township. The northernmost group consists of 14 unsurveyed claims adjoining patented claims L.57313, L.57312, and L.57308, of the Jalore Mining Company claim group, on the east. The block extends westward from here for 1¾ miles to Fox Lake. The claims are mostly east of Fox Lake.

In 1951, Dominion Gulf Company optioned six claims of this group. The company conducted geological and ground magnetometer surveys of the ground before dropping the option in 1952.

A few small sulphide showings occur in the eastern part of the group. Samples from these are reported to have shown no gold or nickel on assay. A few small bands of iron formation outcrop in the southeast corner of the group.

The bedrock consists of Keewatin basic lavas and tuffs intruded by porphyritic syenite of the Lebel stock. The south contact of the stock strikes east to northeast through the north half of the block. Country rock adjacent to the contact is considerably altered and injected. Throughout the claims, the lavas and tuffs are cut up by much diorite and basic syenite. These intrusives are probably hybrid phases of the main porphyry mass.

A second group consisting of eight unsurveyed claims is about a mile south of Fox Lake. This block is immediately east of patented claims L.56810 and L.56811 of Jalore Mining Company, Limited, and extends westward for 1 mile. The old Dane–Larder Lake road crosses the claims about 2¼ miles east of Dane station.

Dominion Gulf Company, Limited, optioned the ground and conducted geological and ground magnetometer surveys. The option was dropped in 1952.

A number of small lenses of iron formation outcrop in the group, but none are large enough to be commercial. Some years ago two pits were sunk on a narrow, rusty-weathering shear in cherty quartzite. Sulphide mineralization consists of coarse pyrite and fine pyrrhotite. Assay returns on recent grab samples from the old dumps are reported to have shown no gold or nickel.

A third block of claims adjoins the west boundary of Boston township, south of patented claim L.15537. The group consists of five unsurveyed claims.

The claims straddle a section of the east contact between coarsely-crystallized porphyritic syenite of the Otto stock and Keewatin basic volcanics. The Keewatin volcanics are metamorphosed to hornblende-rich rocks possessing a strong foliate structure. The strike of the foliation is parallel to the intrusive contact.

22. E. R. Ostrom

In 1954, the late E. R. Ostrom owned a block of 15 claims. The claim group is located in the western part of Boston township between Boston Creek and the old Dane townsite plot at Dane station. Helent Lake is in the centre of the group.

The claims are easily accessible. The old Dane–Larder Lake road from Dane station crosses the southern part of the block; and a wagon road runs northward through the claims from a point about ½ mile east of Dane station. An electric transmission line of the Hydro-Electric Power Commission of Ontario crosses the group.

The claims are underlain by basic lavas, tuffs, and iron formation of Keewatin age. In the northeastern part of the group, these rocks are intruded by porphyritic syenite of the Lebel stock. A narrow horizon of more acid volcanics is intercalated in the Keewatin rocks at the south end of the group. The Long Lake cross-fault strikes about S.15°W. across the easternmost claim in the block.

The Ostrom claims lie at the west end of the Boston township iron range. Some prospecting and trenching of iron formation have been carried out, particularly on the west side of Helent Lake, together with a ground magnetometer survey of the entire claim group. At least eighteen lenses of iron formation are known to outcrop, but all are apparently too small to be of economic interest.

23. Planet Gold Mines, Limited

Planet Gold Mines, Limited, owns a gold prospect consisting of three patented claims in the southeast corner of Boston township. The claims, L.4737, L.4906, and L.5025 were originally known as the Authier group. A motor road extending eastward from the village of Boston Creek crosses the claims.

E. M. Abraham[1] describes the property as follows:

> The property is underlain by Keewatin dioritic and pillow lavas and an irregular mass of granite and its associated dikes. Flow contacts and spherulitic zones make excellent horizon markers. The flows face northeast. Exposed bedrock is found nearly everywhere on the property.
>
> Much work has been done on the numerous quartz veins exposed. At least 19 veins and 25 pits and trenches were located during the course of mapping. In 1946 some diamond-drilling and surface-trenching was done by Lebon Mines, Limited. Several gold-bearing intersections were reported.
>
> In the vicinity of the shaft, in the northeast corner of claim L.4737, two sets of quartz veinlets striking N.60°E. and S.16°E. occur within the granite mass. Aplite dikes, which cut the granite, strike S.38°E.
>
> In addition to quartz veins, several sulphide zones composed largely of pyrite occur in the Keewatin lavas. In the neighbourhood of these zones the lavas are usually sheared, carbonatized, and silicified.

Burrows and Hopkins[2] give the following account of the showings on claims L.4737 and L.5025:

> Visible gold has been found on a number of veins on the Authier claims, Nos. L.4734 [4737] and L.5025, which are situated in the southeast part of Boston township. The veins are from a few inches to three feet in width and occur in greenstone, iron-formation, granite and porphyry. The deposits strike a little north of east and dip from 20°–45° to the north, although some veins dip to the south. There are often cross veins forming a stockwork. The veins contain much disseminated iron pyrites and small quantities of chalcopyrite, specular hematite, molybdenite, bismuthinite, magnetite, and tetradymite, but on the whole sampling has shown the gold content to be low.

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[1] E. M. Abraham, *Geology of McElroy and Part of Boston Townships*, Ont. Dept. Mines, Vol. LIX, 1950, pt. 6, p. 60.

[2] A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, p. 14.

24. J. Radley

In 1954, J. Radley held a group of two unsurveyed claims, near the centre of Boston township. The block lies south of surveyed claim L.6235. The claims are underlain by Keewatin volcanics of intermediate-to-acid composition. A south-striking cross-fault is assumed to extend into the property.

25. Sheroomac Mining Corporation, Limited

This company was incorporated in 1953 and acquired approximately 33 mining claims together with other properties held by Taroomac Prospecting Syndicate. The claims are in the townships of Boston, Pacaud, Marquis, and Otto, and all are located in the vicinity of a common corner shared by these four townships.

Access to the claims is by highway No. 112, which crosses the group about a mile north of its junction with highway No. 11. A gravel road leading eastward to the village of Boston Creek, a section of the old Ferguson highway, and bush roads provide further means of access.

In 1954 the company held the following claims in Boston township: 2 patented claims (L.23518, L.36254), 11 unpatented claims (L.S.209, L.5193, L.10750, L.15917, L.52323, L.55594, L.55850–52, L.56663, L.58324) and 2 claims (L.12796, L.15918) for which it held mineral rights only. With the exception of claim L.58324, these claims form a contiguous group, which is located in the southwest corner of Boston township between Round and Smith lakes.

The claims are underlain by Keewatin tuffs and tuffaceous sediments, basic lavas, and tuffs interbedded with basic lavas. The tuffs are thinly bedded, water-laid sediments now altered to hornblende-chlorite-epidote schists. The basic lavas, which may be pillowed, are dark-green flow rocks with fine- to coarse-grained textures. A number of sill-like masses of altered diorite, classified as post-Keewatin (?) in age, intrude the Keewatin members, together with dikes and small masses of syenite porphyry, granite, and quartz-feldspar porphyry of Algoman age.

The general strike of bedding and schistosity throughout the claims is N.65°–85°E.

Two branches of the Long Lake cross-fault strike through the group in a southerly direction. One branch crosses claim L.36254 just west of highway No. 112. The other branch strikes about S.20°E. through claim L.23518.

Prospecting of this claim group, accompanied by stripping, trenching, test-pitting, and some X-ray drilling, has disclosed the presence of a number of sheared zones and quartz veins. Mineralization consists mostly of pyrite, in places accompanied by chalcopyrite. A few of the showings are described below.

In the west-central part of claim L.36254, W. J. Matthews[1] reports that a pit believed to be 25 feet deep has been sunk on a rusty-weathering carbonatized shear zone about 10 feet wide, which cuts basic lavas. Quartz stringers cut the sheared zone, and mineralization consists of pyrite with some chalcopyrite.

A rusty shear zone in Keewatin tuffs occurs near the centre of claim L.55852 about 50 feet west of Smith Lake. W. J. Matthews reports that the zone strikes about S.80°E., and that it has been traced for 150 feet along the west side of the lake. A dike of syenite and quartz veins intrudes the shear along part of its length. Mineralization consists of coarsely crystallized pyrite.

On claim L.5193 a small mass of granite is exposed along the northwest side of an outcropping of Keewatin basic lava. Mr. Matthews reports that the outcrop is located about 1,200 feet north of the northwest end of Smith Lake.

[1]Chief Geologist, Lake Shore Mines, Ltd., private report.

The author's mapping, however, places it a little north of here, in adjoining claim L.10750. The granite is somewhat sheared and cut-up by a network of quartz veins. Small quantities of pyrite and molybdenite are reported in some of the quartz. Some trenching and stripping have been done. Mr. Matthews refers to this showing as the Smith Lake vein.

In 1954, Sheroomac Mining Corporation held eight unpatented claims in Pacaud township, in the south half of lot 12, concession VI, and the north half of lot 10, concession VI. The company held mineral rights only for the north half of lot 11, concession VI.

The north halves of lots 10 and 11, concession VI, are underlain by thinly bedded Keewatin tuffs and tuffaceous sediments, which have been schisted and altered by the intrusion of an Algoman granite batholith nearby. Narrow horizons of lava and lighter-weathering acid tuff are intercalated in the main band of tuffs. The Keewatin is intruded by sill-like masses of altered diorite, and by dikes and small masses of quartz-feldspar porphyry and syenite porphyry.

A branch of the Long Lake cross-fault is assumed to extend through lot 10, concession VI, with a strike of about S.30°E. Another cross-fault, having about the same strike, extends southeastward through lot 11.

Prospecting of the north halves of lots 10 and 11, has uncovered a number of small sheared zones, mineralized mostly with pyrite.

The claims in the south half of lot 12, concession VI, Pacaud township, were formerly held by Round Lake Copper Mines, Limited. They were later abandoned and reverted to the Crown before being re-staked by Taroomac Prospecting Syndicate.

The claims straddle the contact of Keewatin tuffs with the Round Lake granitic batholith, otherwise the geology of the group is similar to that described above for lots 10 and 11, concession VI. The Long Lake cross-fault strikes about S.10°W. across the block.

According to W. J. Matthews there are a number of copper showings on this group of claims. The following information is from Mr. Matthews' report.

1) In the northeast corner of one of the claims (NE. ¼, S. ½, lot 12, con. VI, Pacaud tp.) a shear zone in tuff, striking about N.55°E., is flanked along its north side by 10 feet of silicified tuff. The zone is sparsely mineralized with pyrite and sphalerite.

2) In the northwest corner of this claim, west of highway No. 112, an area, about 30 by 70 feet, exposed by stripping, shows tuff injected by syenite porphyry and irregular quartz veins. The porphyry, quartz, and adjacent tuff are mineralized with pyrite and accompanied by some chalcopyrite. A pit, 8 feet deep, has been sunk.

3) In the southwest corner of the same claim some patches of massive chalcopyrite and pyrite are exposed in a shear zone in tuff and in a quartz vein adjacent to it. The strike of shearing is N.65°E.

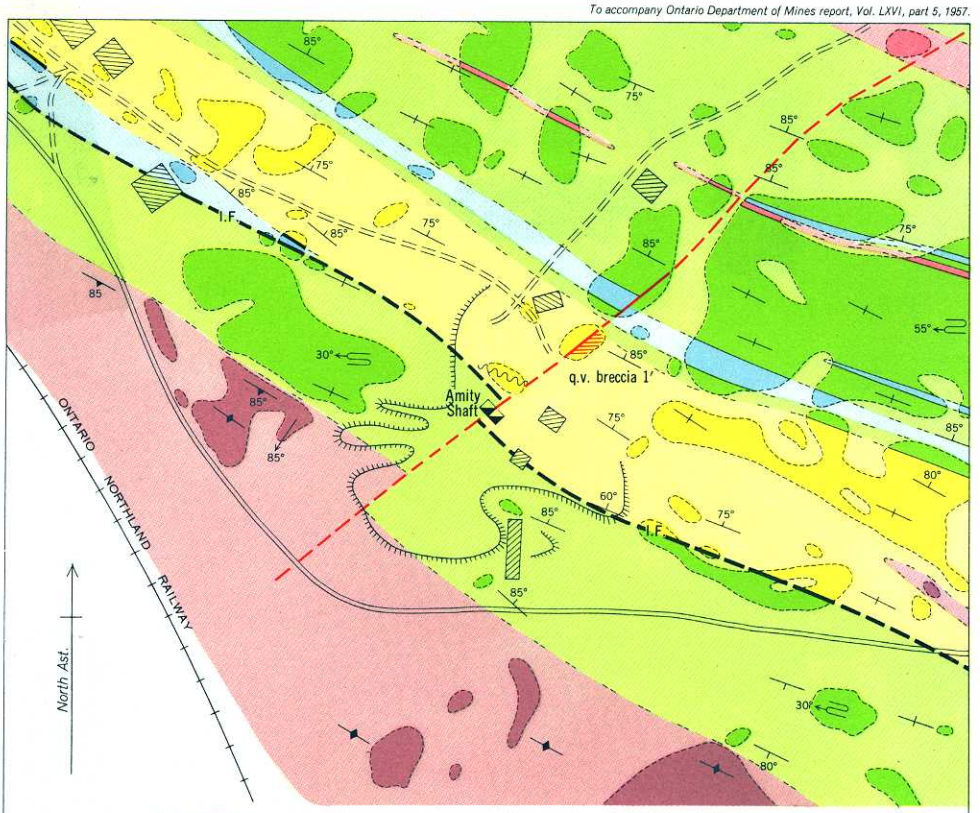
4) In the northeast corner of a claim to the southwest (SW. ¼, S. ½, lot 12, con. VI, Pacaud tp.), east of highway No. 112, sheared tuff is intruded by granite dikes and narrow quartz stringers. The strike of schistosity is about N.55°E. Mineralization consists of pyrite and chalcopyrite.

26. Shunsby Gold Mines, Limited[1]

In 1954, Shunsby Gold Mines, Limited, held a block of 15 claims in the central part of Boston township.

[1]Later Shunsby Mines, Limited.

To accompany Ontario Department of Mines report, Vol. LXVI, part 5, 1957.



LEGEND

- Lamprophyre.
- Batholithic granite.
- Feldspar porphyry, syenite.
- Diorite.
- Dark grey tuff.
- Acid tuff.
- I.F. — Iron formation.
- Geological boundary, assumed.
- 75° — Strike and dip; direction of top unknown.
- Strike and vertical dip; direction of top unknown.
- 85° — Strike and dip of gneissosity.
- Strike of vertical gneissosity.
- 85° — Lineation, plunge known.
- 30° — Drag-folds. (Arrow indicates direction of plunge).
- Fault, defined.

SYMBOLS

- Motor road.
- Wagon road.
- Boundary of rock outcrop.
- Geological boundary, defined.
- Building.
- Shaft, vertical.
- Mine dump.
- Quartz veins.

The heavier colours indicate rock outcrops. The lighter colours indicate the inferred extension of formations beneath the drift.

Geology by D. J. Emery and K. D. Lawton

Scale of Feet

100 0 200 400 600

Geology in the vicinity of the Amity shaft, Lot 5, Concession VI, Pacaud Township.

The claims are easily accessible. The old Dane–Larder Lake road passes 2,000 feet north of the group at a point about 4 miles east of Dane railway station, and a bush road extending northward from the village of Boston Creek reaches the southwest part of the block.

The claims are underlain by two conformable series of Keewatin volcanics. One series, composed of porphyritic lavas of intermediate-to-acid composition, strikes northwest through the centre of the group as a band over 2,000 feet wide. This is flanked on either side by basic lavas assigned to a second series. A few dikes and small masses of syenite and syenite porphyry intrude the Keewatin, and a diabase dike over 50 feet wide strikes north through the two westernmost claims of the group.

Two branches of the Boston fault are assumed to strike southwest through claims L.1959 and L.1560. Another fault is assumed to strike S.65°W. across the centre of the group. All of these faults have offset the contact between the basic series and the intermediate-to-acid series of Keewatin volcanics.

Trenching and test-pitting have been carried out in various parts of the group, but most of the prospecting appears to have been concentrated along the boundary between surveyed claims L.1877 and L.1878. Here, trenching, test-pitting, and some diamond-drilling of quartz-sulphide mineralization in lavas have disclosed the presence of minor amounts of gold.

27. W. T. Stewart

In 1954, W. T. Stewart held two separate blocks of ground in the centre of Boston township. The larger block consists of six unsurveyed claims lying immediately north of patented claim L.1505. The group is underlain by Keewatin lavas of basic and intermediate composition, which are intruded by small masses of syenite. A cross-fault is assumed to strike southerly through the centre of the ground. A small shaft has been sunk in the northwest corner of the block, and some trenching and test-pitting have been done elsewhere on the claims.

The second block of ground consists of a single claim lying about 500 feet east of the northeast corner of the larger claim group. It is surveyed claim, L.6236. A cabin located on the claim is accessible by a wagon road leading southeastward from the old Dane–Larder Lake road at a point about 1,700 feet east of Boston Creek.

The claim is underlain by Keewatin porphyritic lavas of intermediate and acid composition. A cross-fault strikes south through the western part of the claim.

28. W. Watkins

In 1954, W. Watkins held two claims (L.13737, L.13738) in the southwest quarter of Boston township. The right-of-ways of the Ontario Northland Railway and the old Ferguson highway cross the group.

The claims are underlain by Keewatin basic volcanics, now somewhat altered and schisted by the intrusion of a nearby syenite stock. Two diabase dikes intrude the volcanics on claim L.13737. Two branches of the Long Lake cross-fault are assumed to strike south through claim L.13738.

Some years ago, in addition to test-pitting and trenching, two prospect shafts were sunk on claim L.13737.

PACAUD TOWNSHIP

1. Amity Copper and Gold Mines, Limited

Amity Copper and Gold Mines, Limited, was formed in 1927 to operate the Johnston property in the south half of lot 5, concession VI, Pacaud township. The company sank a two-compartment shaft to a depth of 1,020 feet and carried out lateral work on the 50-, 125-, 250-, 475-, 600-, and 1,000-foot horizons. In

addition, stations were cut at the 735- and 866-foot levels. On the 250-foot level, 76 feet of raising was done, and a 100-foot winze sunk to a sublevel at the 350-foot horizon.

The accompanying sketch map illustrates the surface geology in the vicinity of the shaft on the Amity property. The shaft was sunk on a 2-foot quartz vein that strikes normal to the granite contact and intersects iron formation lying along the southwest contact of the acid tuff member. On each side of the quartz vein short lenses of chalcopyrite occur as replacements in iron formation.

The Amity ore consists of chalcopyrite with varying amounts of magnetite, pyrite, sphalerite, and galena. Typically, the ore consists of a seam of massive chalcopyrite 4–12 inches wide flanked on either side by 2–3 feet of cherty laminated ore. This banded ore consists of alternating thin layers of grey cherty quartz and sulphides.

Small headframe erected in 1955 over the original Amity shaft by Mirla Exploration, Limited.

S. A. Pain[1] has summarized the ore developed in 1927–30, as follows:

125-foot level—approximately a 60-foot shoot of ore averaging 4 percent copper over a width of 5 feet.
250-foot level—a 100-foot shoot of ore, which grades better than 6 percent copper over a width of 5 feet.
475-foot level—drifting at this level had not proceeded far enough to reach the copper zone.
600-foot level—there is a shoot of ore about 60 feet long here, assaying about 6 percent over a width of 5 feet.
1,000-foot level—the principal shoot of ore was found here to be about 50 feet long, of well over 5 percent copper, and similar in character to the ore in upper levels.

The mine was closed in May, 1930. During the period 1927–30, 13 cars of ore of 4–13 percent copper content are reported to have been shipped to the smelter at Noranda, Que. This was development ore since no stoping was done.

The mine was re-opened for a few months in 1933, and 177 tons of ore was reported as shipped from the property. In 1951, Consolidated Golden Arrow Mines, Limited, optioned the property. The shaft was de-watered below the 250-foot level, and the level was resampled. The option was later dropped.

[1]S. A. Pain, consulting engineer, private report.

Prompted by the prevailing high price of copper, the property was re-opened in 1955 by Mirla Exploration, Limited, under lease. A small headframe was erected, and some ore was gouged from the old workings for shipment to a customs smelter.

2. Barry-Hollinger Gold Mines, Limited

The property is an inactive gold producer comprising a block of nine patented claims in Pacaud township. Eight of the claims are in lot 3, concession VI, and one occupies the southeast quarter of the north half of lot 4, concession VI.

Originally known as the Patricia property, it was acquired by Barry-Hollinger Gold Mines, Limited, in 1918. The mine operated intermittently until 1936. During this period some 267,741 tons of ore was milled for a recovery of $1,618,319

Barry-Hollinger property, Pacaud township.

in gold, and $3,799 in silver. In 1946, the property was acquired by Lebon Gold Mines, Limited.

The claims are easily accessible by a motor road leading eastward from the village of Boston Creek.

The property is underlain by two series of Keewatin volcanics, which lie in faulted contact. The fault, known as the Pacaud fault, is assumed to strike southeast through the centre of the property and separates a series of sheared and altered tuffs and tuffaceous sediments on the southwest from a thick series of Keewatin basic lava flows lying northeast of the fault.

A compound sill of Haileyburian(?) age, composed of hornblendite and serpentinite, crosses the northeast corner of the property. The sill is offset by a number of transverse and diagonal faults, some of which strike southwest-to-west, into the property.

A few dikes and small masses of syenite porphyry intrude the Keewatin.

Burrows and Hopkins[1] report that twelve veins were found on the property, but underground operations were chiefly confined to the so-called No. 7 vein.

[1]A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, p. 14.

The mine shaft and buildings are located in the northwest corner of the property (NW. ¼, S. ½, lot 3, con. VI, Pacaud tp.). The mine is developed to the 2,250-foot level. A two-compartment shaft extends from surface to the 1,000-foot level, and a three-compartment winze from the south cross-cut on the 1,000-foot level to the 2,250-foot level.

L. V. Bell[1] visited the property during the summer of 1928 and described it as follows:

The entire output of the mine has been derived from one vein, known as No. 7, which strikes N.57°E. and dips 70°SE. On all levels, the hanging wall of this vein is a well-defined fault plane. Ore shoots in the vein have been more or less continuously stoped from the surface to the 1,000-foot level, where the ore shoot had an approximate length of 150 feet. In September, 1928, stoping values were indicated in the west drift on the vein on the 1,250-foot level. With depth the ore has a definite pitch to the east. The vein varies considerably in width from hanging to foot wall; at one point on the 1,250-foot level it is 14 feet wide. The vein has been stoped over an average width of 6 feet, although two parallel stopes about 10 feet apart were opened up for a short distance on the 875-foot level, which would give a total width of about 30 feet to the vein zone at this point. The presence of gold is largely dependent on the quartz, which occurs as irregular lenses in the vein, with the result that values are not very consistent, causing a considerable dilution of ore in stoping operations.

At one of the best faces in the west drift on the 1,250-foot level, the vein near the hanging wall was made up of 8 feet of green schist with a ribboned structure of parallel veinlets of quartz, carrying pyrite with a little chalcopyrite, but on the whole low in gold. The ribboned schist merged into more highly silicified vein matter with lenses and kidneys of quartz forming a 5-foot zone along the footwall. Visible gold was common in the quartz, and chalcopyrite much more abundant; a little calcite was noted and gold values were very much higher than in the schist. It is believed that, on the whole, gold is associated with chalcopyrite rather than with pyrite.

Calcite is very common, particularly in the upper levels of the mine, but does not carry appreciable amounts of gold. Several veins, consisting chiefly of calcite, some of which are later than No. 7 vein, have been intersected in the drifts. Just above the 200-foot level of the mine a calcite vein comes in along the foot wall; the vein has been completely stoped out to the east of the calcite vein, but no appreciable values were found west of it. This seems to indicate that the calcite came in first, and acted as a dam to the gold-bearing solutions of No. 7 vein.

There is considerable evidence of faulting, all of which has preceded ore deposition. The major fault, which is marked by No. 5 vein, strikes in an easterly direction. Near the shaft the fault intersects and displaces a diorite porphyry dike. On the south side of the fault the dike has been displaced 200 feet to the east. The fault is earlier than No. 7 vein, since no displacement of the vein can be seen at their intersection. The dip of the fault could not be ascertained from the surface or underground. Some 300 feet south of this fault is a second fault occupied by No. 8 vein, which has further displaced the diorite porphyry dike for a distance of approximately 100 feet in the same direction. No. 7 vein may also represent a fault, since the hanging wall shows indications that a movement has taken place along it. There is no information available as to the amount of displacement which may have resulted.

The mine workings are chiefly in Keewatin basic lavas, but the shaft is in Keewatin diabase. Pillow lava was encountered in the crosscut 105 feet south of the shaft on the 875-foot level; a drift was carried from here for a short distance along the sheared contact. The diorite porphyry dike was cut in the crosscuts on the 1,000- and 875-foot horizons. A few narrow syenite and feldspar porphyry dikes occur in the mine; two of these may be seen in the west drift on the 875-foot level. One of them has a steep dip to the south, and at one point above this level it intersects the vein and forms the roof of a stope, the ore being apparently limited by the dike. Several narrow porphyry dikes with large phenocrysts of feldspar intrude the greenstones near the mine; they are locally termed "bird's eye porphyry."

3. Bennett-Pacaud Mines, Limited

The old Bennett-Pacaud property is a gold prospect consisting of four patented claims (N. ½, lot 1, con. VI, Pacaud tp.).

The group is underlain by Keewatin basic lavas, which strike northwest and face northeast. The lavas are intruded by small masses of granite and by dikes of syenite porphyry and later diabase.

The property has been idle for many years. It has been described by Burrows and Hopkins[2] as follows:

Much trenching was done on the south-central part of the property, where the basalt carries irregular stringers of quartz in a general NW.-SE. direction. One trench shows mineralization

[1]L. V. Bell, *Boston-Skead Gold-Copper Area, District of Timiskaming*, Ont. Dept. Mines, Vol. XXXVIII, 1929, pt. 6, p. 98.

[2]A. G. Burrows and P. E. Hopkins, *op. cit.*, p. 15.

over a width of sixty feet across narrow bands of quartz in the basalt, the rock being altered along the quartz veinlets to a grey color and containing grains of iron pyrites. A little copper pyrites and calcite occur in the veins. Some low gold assays were obtained in the fractured zone, but no commercial ore was found. Work was also done on the southeast part of the property where the basalt and other Keewatin rocks are intruded by a small irregular body and narrow dikelets of granite. A number of narrow quartz veins, from an inch to a few inches in width, were discovered in the granite or basalt near the contact, and some visible gold with a black telluride [was] found in some veins. Needle-like crystals of bismuthinite were observed in one quartz veinlet. Gold was also found in irregular veinlets of quartz in a red porphyry dike eight feet in width. A shaft was sunk 100 feet on a fracture along an E.-W. basic dike, cutting the Keewatin.

Also, L. V. Bell[1] reports:

On the southwest corner of the property there occurs a 60-foot mineralized zone, made up of narrow bands of quartz with pyrites and chalcopyrite, in basalt.

4. Boston-McCrea Gold Mines, Limited

Thd old Boston-McCrea property is a gold prospect consisting of four patented claims (N. ½, lot 2, con. VI, Pacaud tp.).

The group is underlain by Keewatin basic lavas, which strike northwesterly and face northeast. The lavas are intruded by a compound sill of hornblendite and serpentinite, and by a few dikes and small masses of syenite porphyry. The sill is offset by a number of northeast-striking cross-faults of small horizontal displacement.

The property has been idle for many years. Burrows and Hopkins[2] have described it as follows:

A number of mineralized zones have been found, generally containing irregular veinlets and masses of quartz. A well-defined quartz vein, with N. and S. strike and dip 45°E., occurs in the northeastern part of the property. An inclined shaft was sunk in 1916 by former operators. The vein averaged about twelve inches in width and visible gold was observed in the hanging-wall at a number of points. This vein is cut by a diabase dike to the south of the shaft. Further work was done near the north line to the west and a shaft started on a series of lenticular quartz veins dipping gently to the east. The shaft was down fifteen feet, showing a series of quartz veinlets on the east wall for eight feet from the surface. Native gold and tellurides with iron pyrites have been recognized in the ore. Some faulting was observed in the shaft. The surface where the quartz stringers occur is highly oxidized, this condition being traced to the Authier claim on the north. The rock below the surface shows the characteristic grey colour of basalt altered by carbonate with quartz and sulphide.

On the south-central part of the property a shaft has been sunk on a wide schist zone carrying quartz stringers, iron pyrites, copper pyrites, and some value in gold.

L. V. Bell[3] makes a brief reference to the property.

5. M. Johnston

In 1954, M. Johnston held one claim located in the northeast quarter of Pacaud township (NE. ¼, N. ½, lot 5, con. IV). The right-of-way of the Ontario Northland Railway and a hydro-electric transmission line cross the ground.

The claim is underlain by granite gneiss of the Round Lake batholith.

6. George McMillan

In 1954, George McMillan held two claim groups in the northeastern part of Pacaud township. One block consists of eight claims (N. ½, lot 2, con. V, and S. ½, lot 2, con. VI).

Overburden covers much of the centre of this group, and rock outcropping is confined largely to the northeastern and southwestern sections.

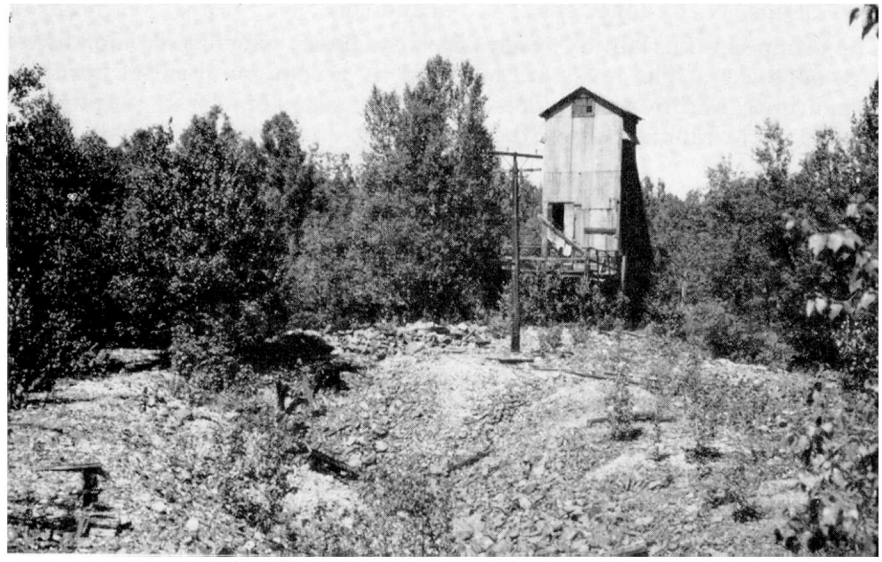
A southeast-striking fault is projected beneath overburden in the centre of this group. Northeast of this structure, Keewatin basic lavas, which strike northwesterly and face northeast, are exposed. These are intruded by a sill-like

[1] L. V. Bell, *op. cit.*, p. 100.
[2] A. G. Burrows and P. E. Hopkins, *op. cit.*, p. 15.
[3] L. V. Bell, *op. cit.*, p. 100.

mass of hornblendite and serpentinite. Southwest of the fault, the bedrock consists of thinly bedded tuffs and tuffaceous sediments, which have been schisted and altered by the intrusion of a nearby granite mass.

The south half of the claim group adjoins the old Trethewey-Ossian copper property in the north half of lot 3, concession V, Pacaud township. A zone on the Trethewey-Ossian ground favourable to copper sulphide mineralization extends southeasterly and crosses the extreme southwest corner of the McMillan claims.

The second block of ground held by Mr. McMillan also encloses a projected extension of the copper zone that crosses the Trethewey-Ossian property. This block consists of four claims covering the south half of lot 1, concession V. The geology of this group largely duplicates that of the claims described above. Keewatin basic lava flows in the northeastern part of the group and schisted Keewatin



C shaft, Miller Independence property, Pacaud township.

tuffs in the southwestern are assumed to lie in contact along a fault that strikes southeasterly through the centre of the claims.

Little copper mineralization is known to occur on the claims.

7. Miller Independence Mines, Limited

The Miller Independence property occupies the south half of lot 1, concession VI, Pacaud township. It is a gold prospect in the Boston Creek area that has been idle for many years. A motor road extending eastward from the village of Boston Creek provides easy access to the property.

The property is underlain largely by Keewatin basic lavas. They are developed here as a fairly uniform succession of flows, which strike northwesterly and face northeast. The tops of the flows are finer-grained and are marked by the development of pillowed structure. The interiors of the flows are massive, medium to coarse-grained phases of dioritic or gabbroic composition in which pillowed structure is lacking. Small outcroppings of Haileyburian (?) hornblendite and serpentinite occur in the western part of the property, and a few dikes of Algoman feldspar porphyry are intruded into the Keewatin.

The property has been described by Burrows and Hopkins[1] as follows:

Gold was first discovered on the lot in No. 1 vein by Joseph McDonough in July, 1915. Three years later W. Adams, then mine captain, discovered the "Independence Vein," which contains a small shoot of ore carrying a precious telluride, calaverite.

. . . . . .

The original No. 1 vein has been traced on the property for about 600 feet in an east and west direction and for several hundred feet easterly into Catharine township. It is narrow, averaging about a foot in width, and has a low dip to the north, usually about 20° or less, at one place being almost horizontal. The vein material is milky white quartz, and the mineralization is more or less concentrated toward the footwall side of the vein. Tellurides, copper pyrites, pyrite, specular iron ore, and galena are observed in the quartz. Native gold occurs frequently with the telluride in a net-like arrangement in the quartz along the footwall. A bismuth telluride, brilliant grey in colour, and containing some selenium, occurs abundantly with the gold. A darker-coloured telluride (petzite?) is also present in smaller amounts. The vein has been prospected by means of a number of trenches, pits and shafts, from which some high-grade ore was bagged, and a small production recorded. Along parts of both walls of the vein there is a narrow dike of grey feldspar-porphyry. The porphyry contains much calcite and other carbonates, as well as disseminated iron pyrites and is cut by veinlets of quartz.

The Independence vein, containing the small shoot of exceptionally high-grade ore, strikes N. 20° E., and dips 55° southeasterly. The rich ore was found between the depths 30 feet and 160 feet in the inclined shaft, but could not be traced for any great distance on the 100-foot level. The hanging wall of the shaft is a strong fault plane. Below this is a second fault plane nearly parallel to the upper one, the planes varying from a foot to three feet apart. Below the lower fault plane is a series of irregular quartz veinlets, from a fraction of an inch to one inch in width and roughly parallel to the fault plane. A few veins are terminated sharply at the fault plane, indicating that some of the faulting is later than the mineralization. About ten feet above the 100-foot level the veinlets occur over a width of four feet. These veinlets can be followed down to 160 feet in the shaft below which the rock is less altered. Where the veinlets occur, the dark basalt has been altered for a few inches to a light grey rock carrying abundant iron pyrites. The quartz carries in places iron pyrites and copper pyrites together with a gold telluride, calaverite. The telluride occurs chiefly in minute veinlets and small masses in and with the copper pyrites and is sometimes accompanied by native gold. Faulted sections of flat-lying quartz veins were observed between the main fault planes about fifty feet below the 100-foot level.

Shaft No. A has been sunk vertically to a depth of 500 feet and extensive exploration carried on at this level. The strong faults on which the inclined shaft "D" was sunk to the 200-foot level were encountered in the cross-cut on the 500-foot level, 190 feet north of "A" shaft; drifting along these faults did not reveal any ore of similar character to the rich telluride ore which was found in "D" shaft. Seven diamond-drill holes were made from the 500-foot level.

8. Northwest Quarter of the South Half of Lot 9, Concession VI, Pacaud Township

A 20-inch-wide band of sulphide mineralization is developed along a contact between acid tuff and andesitic tuff. It is exposed in a trench about 50 feet long. The mineralization consists of massive pyrrhotite accompanied by a small amount of chalcopyrite.

9. Patterson Copper Mines, Limited

Patterson Copper Mines, Limited, was formed in 1927 to operate a 160-acre copper prospect in the south half of lot 4, concession VI, Pacaud township. The Patterson group adjoins the old Amity claims along its west boundary and is located on the same zone of copper mineralization.

The company sank a three-compartment shaft to a depth of 520 feet and carried out the following lateral work:

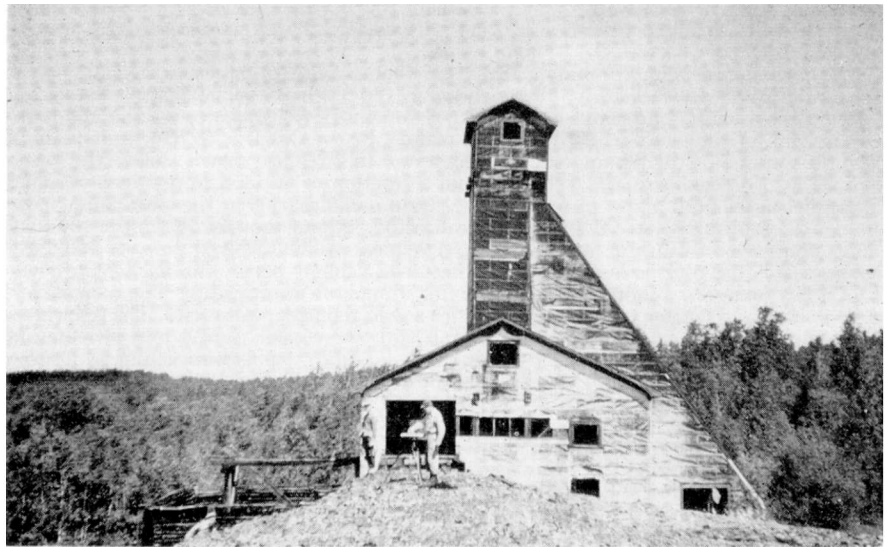
Level	Cross-cutting	Drifting
	feet	feet
125-foot	71	569
250-foot	304	661
375-foot	9	.....
500-foot	362	570

[1]A. G. Burrows and P. E. Hopkins, *Boston-Skead Gold Area*, Ont. Dept. Mines, Vol. XXX, 1921, pt. 6, p. 16.

The general geology and ore occurrence on the Patterson property are typical of the Boston Creek copper area. These are described under Copper in the section of the report dealing with economic geology. (See also sketch map facing p. 24.)

The shaft is sunk a little north of a narrow horizon of mineralized iron formation. The iron formation occurs along the northeast contact of a band of acid tuff, which strikes southeasterly across the property from the adjoining Amity claim. As on the Amity property, the copper ore occurs as replacement bodies in narrow bands of iron formation on each side of small quartz-filled cross-faults.

The Patterson ore consists of chalcopyrite with varying amounts of magne-



Headframe, Patterson copper property, Pacaud township.

tite, pyrite, pyrrhotite, and other sulphides. S. A. Pain[1] has summarized the ore developed in 1928–30, as follows:

125-foot level—five separate shoots of ore of lengths 32, 12, 25, 13, and 32 feet. All shoots very narrow except the last mentioned, which is the farthest north, and this would stope a good 5 percent copper over 4 feet.
250-foot level—five separate shoots of ore of lengths 7, 6, 13, 10, and 11 feet, all very narrow and not worth stoping.
500-foot level—one shoot of ore assaying probably 2 percent copper over 3 feet.

Between 1928 and 1930, the company reportedly shipped 9 cars of sorted ore averaging about 8 percent copper to the smelter at Noranda, Que.

The mine was closed in March, 1930.

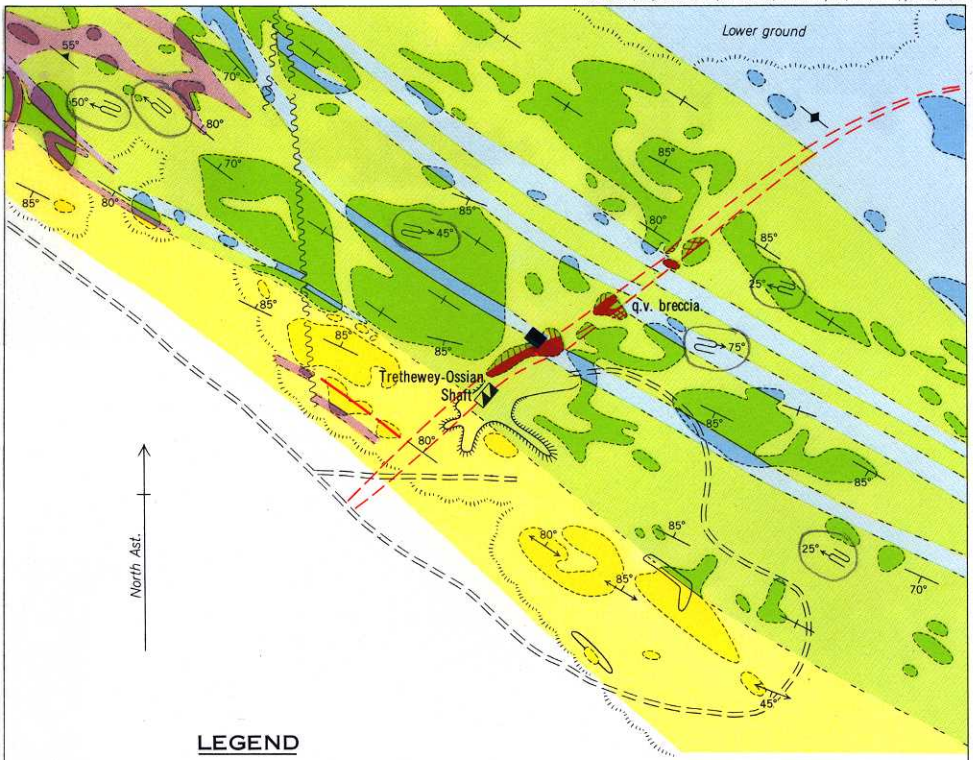
The Patterson property, which was controlled by Barry-Hollinger Gold Mines, Limited, was purchased outright by the latter at a sheriff's auction on June 16, 1933.

Sheroomac Mining Corporation, Limited

An account of the company's holdings in Pacaud township accompanies a description of its Boston township property under Description of Properties, Boston Township.

[1]S. A. Pain, consulting engineer, private report.

To accompany Ontario Department of Mines report, Vol. LXVI, part 5, 1957.



LEGEND

- Lamprophyre.
- Batholithic granite.
- Diorite.
- Dark grey tuff.
- Acid tuff.

- Strike and vertical dip; direction of top unknown.
- 80° Strike and dip of schistosity.
- 55° Strike and dip of gneissosity.
- Strike of vertical gneissosity.
- →45° Drag-folds. (Arrow indicates direction of plunge).
- Fault defined.
- Fault assumed.
- Building.
- Shaft, vertical.
- Trench.
- Mine dump.
- Quartz veins.

SYMBOLS

- Wagon road.
- Boundary of rock outcrop.
- Geological boundary, defined.
- Geological boundary, assumed.
- 70° Strike and dip; direction of top unknown.

The heavier colours indicate rock outcrops. The lighter colours indicate the inferred extension of formations beneath the drift.

Geology by D. J. Emery and K. D. Lawton

Scale of Feet

100 0 200 400 600

Geology in the vicinity of the Trethewey-Ossian shaft, Lot 3, Concession V, Pacaud Township.

10. Peter Tagliamonti

In 1954, Peter Tagliamonti held one claim covering the northeast quarter of the south half of lot 6, concession VI, Pacaud township. The claim straddles the contact of the Round Lake granitic batholith with thinly bedded Keewatin tuffs. Both the tuffs and granite are considerably schisted and altered. The strike of the contact and of the schistosity is about N.75°W.

In the west-central part of the claim, about 110 feet north of the granite contact, two narrow bands of rusty-weathering iron formation are exposed. These are developed along the south contact of a band of acid tuff. The two bands, ranging from 1 to 2 feet wide, are separated by 10 feet of dioritic rock. The iron formation is mineralized with pyrite, but little or no chalcopyrite was observed.

The bands of pyritized iron formation appear to represent the faulted extension of a band of mineralized iron formation, which strikes southeast through the nearby Amity, Patterson, and Trethewey-Ossian copper properties, southeast of the village of Boston Creek.

Some prospecting for copper has been done on the claim in the form of test-pitting and trenching of the mineralized iron formation.

11. Trethewey-Ossian Mines, Limited

The Trethewey-Ossian property, known also as the Cameron claims or the Cam Copper property, consists of 4 claims (N. ½, lot 3, con. V, Pacaud township). The property is located in the Boston Creek copper area, along the zone of copper mineralization passing through the neighbouring Amity and Patterson properties.

The general geology and ore occurrence in the Trethewey-Ossian property are typical of the Boston Creek area. These are described under Copper in the section of the report dealing with economic geology. The surface geology in the vicinity of the Trethewey-Ossian shaft is shown in the accompanying sketch map.

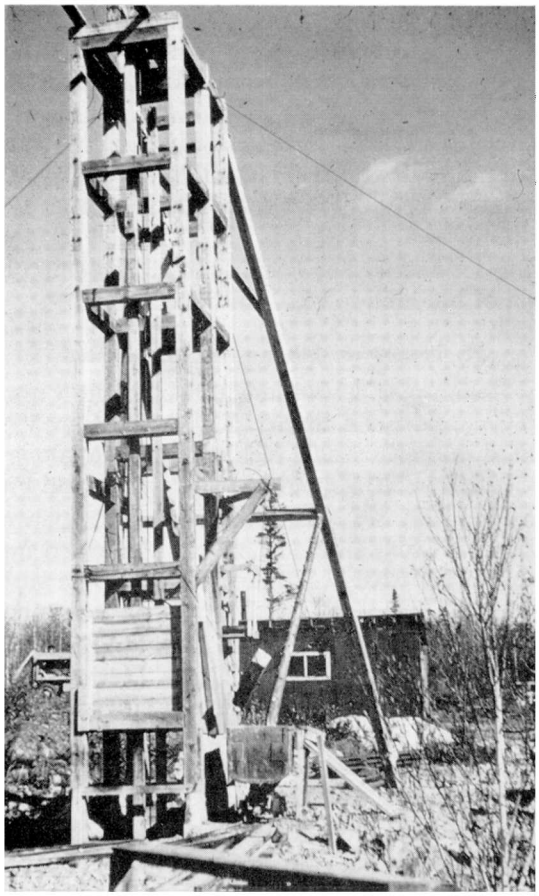
A band of acid tuffs striking across the neighbouring Amity and Patterson properties continues southeasterly through the Trethewey-Ossian claims just south of the shaft. Narrow horizons of banded siliceous iron formation occur along both contacts of this band. Copper mineralization, as replacement bodies, is localized in the iron formation adjacent to small cross-faults, which cut across it. These faults may be filled by quartz.

Exploration was first directed to copper mineralization occurring in the iron formation along the northeast contact of the acidic tuff member. In 1929, a shaft was sunk to a depth of 120 feet on a large quartz vein, which crosscuts the iron formation. Some 50 feet of drifting was done at the 115-foot horizon, and a crosscut was started southwestward to intersect mineralization occurring in iron formation along the southwest contact of the acidic tuff band. However, company funds were depleted before the heading reached its destination.

The property was closed in 1930, and later abandoned. The claims reverted to the Crown and were restaked by C. Cameron of Kirkland Lake, early in 1947. Consolidated Golden Arrow Mines, Limited, optioned the claims and during the winter of 1951–52 drilled 11 angle-holes from surface, in the vicinity of the shaft shown on the sketch map. The holes were drilled from northeast to southwest to intersect zones of sulphide mineralization in the two horizons of iron formation occuring on the property. The old shaft was deepened to a depth of 220 feet, and a crosscut 140 feet long was driven southwestward at the 200-foot horizon to intersect the southernmost band of mineralized iron formation. Some drifting was done on this band.

The ore consists of chalcopyrite, together with appreciable bornite and some chalcocite. Pyrite and negligible quantities of galena and sphalerite also occur. Typically, the ore exposed underground consists of a seam of massive chalcopyrite and bornite, 4–14 inches wide, flanked on either side by 1–2 feet of lean, banded ore. This laminated ore consists of alternating thin layers of grey cherty quartz and sulphides.

S. A. Pain[1] reports that much copper mineralization was exposed in the shaft



Prospect shaft, Trethewey-Ossian property, Pacaud township.

when sunk to its original depth of 120 feet, in 1929. A drift at the 115-foot horizon exposed a shoot of copper ore about 50 feet long, which he estimated would average 6 percent copper over a width of 5 feet.

12. J. D. Weatherhead

In 1954, J. D. Weatherhead held a claim in the northern part of Pacaud township (SW. ¼, N. ½, lot 6, con. VI).

The claim is underlain by thinly bedded Keewatin tuffs now somewhat schisted and altered. These are intruded by narrow sill-like bodies of diorite and dikes of syenite porphyry.

[1]S. A. Pain, consulting engineer, private report.

INDEX, PART 5