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Department of Lands, Forests and Mines:
Ontario

Bulletin No. 29

OF THE

ONTARIO BUREAU OF MINES

BOSTON CREEK GOLD AREA
AND
GOODFISH LAKE GOLD AREA

By A. G. BURROWS and P. E. HOPKINS

Accompanied by a geologically coloured Map of each area

PRINTED BY ORDER OF
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TO THE HONOURABLE G. H. FERGUSON,

Minister of Lands, Forests and Mines.

SIR,—I have pleasure in submitting to you herewith Bulletin No. 29 of the Bureau of Mines, containing brief preliminary reports on the Boston Creek and Goodfish Lake gold areas in Northern Ontario, by Messrs. A. G. Burrows and P. E. Hopkins, Assistant Provincial Geologists. Accompanying the report are geologically coloured maps upon which the significant rock formations are indicated.

The gold-bearing veins discovered in the Boston Creek and Goodfish Lake areas have attracted considerable attention. Some of them are undoubtedly of value, and are now undergoing development. It is hoped the rock descriptions and maps presented herewith may prove of assistance in the early days of these camps, when accurate information regarding the geological and mineral conditions is of special value alike to prospectors and investors.

I have the honour to be, Sir,

Your obedient servant,

THOS. W. GIBSON,

Deputy Minister of Mines.

Bureau of Mines,

Department of Lands, Forests and Mines,

Toronto, 1st June, 1916.

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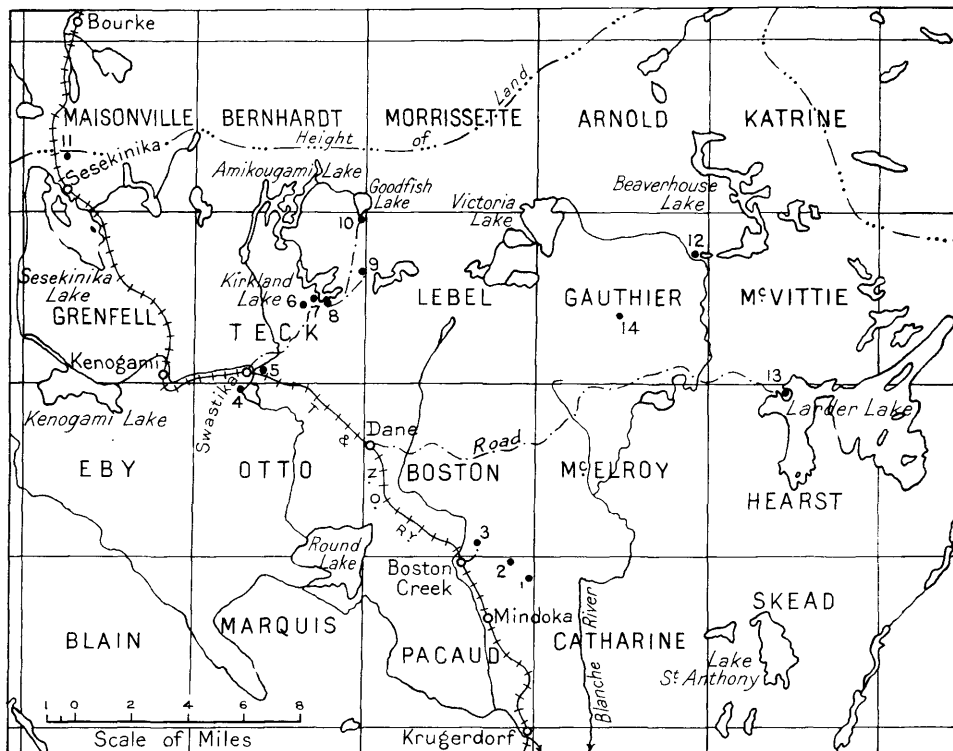
BOSTON CREEK GOLD AREA

By

A. G. BURROWS and P. E. HOPKINS

Introduction

That part of Boston, Pacaud, McElroy and Catharine townships in the vicinity of Boston Creek is spoken of herein as the Boston Creek gold area. The region is situated in the district of Timiskaming, about 45 miles northwesterly from Cobalt, and is traversed by the Timiskaming and Northern Ontario railway. Boston Creek station, mileage 153.5, is approximately in latitude 48° north and longitude 80° west. By rail, Boston Creek station is 382 miles north of Toronto.



Sketch map showing the locations of some of the gold properties mentioned in the reports on Boston Creek and Goodfish Lake areas:

- | | | |
|------------------------|------------------------|--------------------------------|
| 1. Miller-Independence | 6. Kirkland Lake Mines | 11. Smith-La Bine |
| 2. McRae | 7. Teck-Hughes | 12. La Mine D'Or Huronia |
| 3. R. A. P. Mining Co. | 8. Lake Shore | 13. Goldfields, Limited |
| 4. Swastika | 9. Tough-Oakes | 14. Elstone-Dunkin Mines, Ltd. |
| 5. Lucky Cross | 10. La Belle Kirkland | |

Claims were staked for gold in this area in 1906 and 1907 during the days of the Larder Lake gold rush. Again in 1913, during the activity at Kirkland lake twelve miles to the northwest, many claims were re-staked and some work

was done on them. Since May, 1915, John Papassimakos has had a number of men at work on what is known as the Kenzie vein, on claims L 3665 and L 5163, in the south central part of Boston township. The promising development work on the Kenzie vein attracted many prospectors to the area, and several other gold discoveries were made in the four townships. Considerable prospecting, particularly on the surface, was done during 1915, but as yet no bullion has been shipped.

A railway station has been erected near the crossing of Boston creek, around which has grown a small settlement.

Part of the Boston Creek area was included in the map¹ of the Kirkland Lake and Swastika gold areas. During September and October, 1915, the writers examined about 70 square miles, including Pacaud and parts of Boston, McElroy and Catharine townships. Owing to the lateness of the season and the extremely wet weather, a part of the area was examined only in a general way. A coloured geological map² of this area, showing the main rock outcrops on a scale of three-quarters of a mile to the inch, accompanies the report.



Boston Creek station, T. & N. O. railway, showing hotel on the right, and the stream valley and railway bridge on the left. *May, 1916.*

Early Exploration of the Area

The first exploration was by Walter McOuat³ who in 1872 made a reconnaissance survey of the Blanche river from lake Timiskaming to Round lake.

W. G. Miller,⁴ Provincial Geologist, in 1900 described a portion of the area. In his report the geology along the Blanche in McElroy and Catharine townships

¹ Map No. 23 a, accompanying Part II, Vol. XXIV, Rep. Ont. Bur. Mines, 1914.

² Map No. 25 d, Ont. Bur. Mines.

³ Report on an Examination of the Country between Lakes Timiskaming and Abitibi, Report of Progress, Geol. Sur. Can., pp. 112-135, 1872-73.

⁴ Lake Timiskaming to the Height of Land, 11th Report, Ont. Bur. Mines, 1902, pp. 214-230.

is described. He also mentions prospecting for gold on a 4 or 5-foot quartz vein in the hill west of the lower end of a portage which is now shown in lot 9, concession III, Catharine township.

In 1904, after the discovery of Cobalt, W. A. Parks⁵ of the University of Toronto made a geological survey of this portion of the country. Parks remarks that the high hills along the Blanche, in the township of Catharine, are well worth prospecting for gold.

In 1908 and 1909, M. E. Wilson examined the Larder Lake gold area, which is located to the east of Boston creek. The geological map accompanying his report⁶ joins the east side of the Boston Creek sheet.

Topography

The area in general has an elevation varying from 700 to 1,050 feet above sea level. Boston Creek station has an elevation of 920 feet. While the difference in elevation is seldom more than 200 feet, the country is somewhat rugged and broken, particularly in the vicinity of Boston Creek station and along the north branch of the Blanche river in McElroy and Catharine townships.

The country is situated south of the continental divide, and is drained by two branches of the Blanche river and their tributaries, which flow southward into lake Timiskaming.

The magnetic declination is about 8 to 9 degrees west of north.

General Geology

The rocks are all pre-Cambrian in age, the nearest younger formation being an exposure of Niagara limestone about ten miles to the south in lot 10, concession IV, Evanturel township. The rocks of the area may be classified as follows:

PLEISTOCENE

Glacial and recent:— Boulder clay, sand and gravel.

PRE-CAMBRIAN

Keweenaw:— Quartz diabase dikes.

(INTRUSIVE CONTACT)

Algoman:— Feldspar porphyry and quartz porphyry, hornblende and biotite granite, and syenite.

(INTRUSIVE CONTACT)

Timiskamian (?):— Conglomerate, greywacké and slate.

(UNCONFORMITY?)

Keewatin:—

{ Grey schist (volcanic fragmental rocks and iron formation).
Ellipsoidal, amygdaloidal and spherulitic lavas, agglomerate, tuff, iron formation, serpentine, diabase and felsite. (These rocks are in part altered to hornblende and chlorite schists.)

⁵ The Geology of a District from Lake Timiskaming Northward. Summary Report of the Geol. Sur. Can., pp. 198-225, 1904.

⁶ Geology and Economic Resources of Larder Lake District, Mem. No. 17-E. Geol. Sur. Can., 1912.

Keewatin

The Keewatin rocks have the widest distribution, and are important since they contain gold-bearing veins. They consist chiefly of greenstones with some volcanic fragmental rocks and iron formation. A band of clastic sediments is mapped as grey schist. The original constituents are so entirely altered that many exposures may be spoken of as serpentine, hornblende and chlorite rocks. Cutting the greenstones is a felsitic rock which may be post-Keewatin in age.

Greenstones: The greenstones are fine-grained, and consist of altered basic volcanics which are sometimes schistose, but more often massive. They commonly show the amygdaloidal and ellipsoidal structure, and more rarely the spherulitic, indicating their volcanic origin. The spherulitic structure, which is rare in basic rocks, has not been noted before in this section of Ontario. What may be the spherulitic structure in greenstone was reported on the north shore of Doig lake in the northwest corner of Lebel township.⁷ A similar structure was also seen under the microscope in an acid rock, a rhyolite, from lot 6, concession III, Beatty township.⁸ In this area, spherulitic greenstones are beautifully developed on a bare hill on claim L 1878, Boston township. The varioles, which are rounded and white-weathering, vary in size from minute pea-like form to those about two inches in diameter, and constitute a large part of the rock. Under the microscope the varioles consist of coarse radiating flakes of chlorite, feldspar, epidote and probably quartz in a fine groundmass of the same material, and actinolite. Throughout the whole rock are pyrrhotite grains and numerous black ferruginous specks. The rock is probably an altered basalt.

The pillow lava flows constitute the main portion of the greenstone. They are interbedded with much non-pillow greenstones, which have a diabasic texture at times, and some tuff, agglomerate and slate which point to a subaqueous origin. The nearly complete alteration of the greenstones, with the retention of their original ellipsoidal structure, is, according to Leith and Van Hise, due to a metasomatic rather than a dynamic change. Under the microscope the original minerals in the greenstones are hornblende, quartz, magnetite and plagioclase, the altered plagioclase laths suggesting a basaltic or diabasic texture. The secondary minerals are calcite, hornblende, chlorite, sericite and quartz. The altered greenstone in places may be spoken of as hornblende or chlorite schist.

Volcanic fragmental rocks: Tuff and agglomerate are prominent, particularly in the northwest corner of Catharine township. They are, in places, interbedded with the basic volcanics. They are somewhat similar to the grey schists described below, but are too much intermingled with the greenstones to map separately.

Iron formation: Iron formation, consisting of interbanded silica, black slate and magnetite, occurs in the greenstone in the north part of Boston township. The iron range has been described in detail by W. G. Miller⁹ and by the writers.¹⁰

⁷ Kirkland Lake and Swastika Gold Area, by A. G. Burrows and P. E. Hopkins. Report, Ont. Bur. Mines, Vol. 23, Pt. 2, 1914, p. 4.

⁸ Beatty-Munro Gold Area, by P. E. Hopkins. Report, Ont. Bur. Mines, Vol. 24, Pt. 1, 1915, p. 176.

⁹ Boston Township Iron Ranges, 14th Rep., Ont. Bur. Mines.

¹⁰ Kirkland Lake and Swastika Gold Areas, 23rd Rep., Pt. II, Ont. Bur. Mines.



Keewatin volcanic fragmental, intruded by narrow reddish feldspar porphyry dikes, southeast of Boston Creek station.



Volcanic fragmental rock, one-quarter of a mile east of Boston Creek station.

Serpentine: The trail on claim L 4902, Boston township, passes over an exposure of serpentine. A thin section of the rock was examined microscopically and found to consist of about 60 per cent. of serpentine and 40 per cent. of calcite. Numerous magnetite grains and a little pyrite are scattered through the rock.

Grey schist: A belt of banded, greyish-green schist resembling an altered sediment has been differentiated on the map. The series, which occurs on the periphery of a granite and syenite mass, is about one mile in width and ten miles in length, passing in a semi-circular shape from lot 12, concession II, Catharine, through Boston Creek station to Round lake. The rocks may be best seen in the vicinity of Boston Creek station, where deep railway cuts have been made. The schist approaches a vertical attitude with a strike parallel to the periphery of the granite. A great portion of the series consists of narrow alternating bands of rusty carbonate (including some magnetite and pyrite bands) and slate. Ash rocks, with bomb-like inclusions, are common. Some thin sections represent greywacké and quartzite, while one is clearly an altered porphyry. The whole series is greatly metamorphosed by the large granite mass, and is cut by narrow porphyry, lamprophyre and other dikes. In the vicinity of Round lake much altered diabase and green chloritic dikes are intruded into the banded schist. At mileage 153 on the Timiskaming and Northern Ontario railway two or three narrow bands of pyrite occur in the grey schist. The series was probably laid down conformably with the Keewatin pillow lavas.

Felsite: In the southwest part of McElroy township, and running north-westward across Boston township, are small areas of a white-weathering, felsitic-looking rock which may be post-Keewatin in age. Owing to the complex manner in which the felsite or rhyolite and greenstones have been intermingled, it would be difficult to map the outcrops on a small scale map. The word "felsite" is written on the map across the main areas. The rock is fine-grained, grey, green or pink in colour, and resembles chert. Under the microscope one-half the thin section is seen to consist of phenocrysts, which are rather small, and uniform in size. The phenocrysts consist of albite, partly altered to sericite, an occasional quartz grain, and some hornblende and chlorite masses. The fine-grained groundmass is dominantly quartz, with feldspar, chlorite, sericite, epidote and numerous grains of magnetite and pyrite. Narrow quartz veins are sometimes present in the rock.

Timiskamian

A few small, isolated patches of conglomerate schist, slate and greywacké, standing in a vertical attitude, occur along the Larder Lake road in Boston and McElroy townships. The rocks are similar to the sediments classed as Timiskamian on the map of the Kirkland Lake and Swastika gold areas. The pebbles of the conglomerate, which are elliptical in outline, consist largely of greenstone and felsite and some Iron formation. A grey magnesian limestone occurs both as pebbles and matrix in the conglomerate in McElroy township about a mile east of the three-mile post on the west boundary.

Algoman

These rocks include batholith and stocks of granite and syenite, and dikes of feldspar porphyry, quartz porphyry and lamprophyre. They are massive, fresh-looking, and are probably Algoman in age, since similar granite in Boston and Lebel townships to the north was found cutting the Timiskamian series.

Granite and Syenite: A batholith of red, biotite granite occupies nearly all of Pacaud township, and extends to the south and west beyond the township boundaries. In the southwest part of the township garnets are present, while in other parts the granite may be said to change into a quartz syenite. The rock is massive, except near the contact with the Keewatin, where it occasionally takes on a gneissoid structure. Near the contact with the greenstone, just south of mileage 153, the granite is intruded by numerous parallel felsitic dikes which give the rock a banded structure. It is cut by quartz veins, and by pegmatite and other dikes representing various differentiation facies of the magma. The rock in the south part of lot 9, concession VI, Pacaud, is a light grey, medium



Granite, with fragments of Keewatin greenstone, and narrow dikes (apophyses of the granite) cutting the granite and fragments of greenstone on Authier claim, Boston township.

grained, biotite granite. Under the microscope microcline is seen showing the gridiron structure, albite partly altered to sericite, biotite altered partly to hornblende and chlorite, quartz and calcite.

A reddish syenite outcrops in the west part of Boston township, being part of the large syenite boss-like mass occupying most of Otto township.

A small stock of reddish biotite and hornblende granite intrudes the greenstones in McElroy township. Gold and a telluride have been found in this granite in a pegmatitic quartz vein which is probably a part of the granite magma.

Other small, irregular, granitic dikes cut the greenstones and felsitic rocks. Gold was seen in quartz veins in these small granite dikes on claim L 5165 and L 5133, Boston township.

Feldspar Porphyry: Numerous intrusions of massive red and grey feldspar porphyry occur over the whole area. They appear as narrow dikes up to thirty feet or more in width, and probably represent apophyses from the granite masses. The phenocrysts usually consist of albite, often showing a zonal structure, an occasional rounded quartz grain, and blades of biotite in a microcrystalline ground-mass of quartz, feldspar, chlorite and calcite. Fine grains of magnetite and pyrite, and crystals of apatite are often present. A feldspar porphyry on claim L 2000, Boston township, and in other parts of that vicinity, contains white feldspar phenocrysts up to one inch across, which show beautiful zonal structure in the hand specimen. Some porphyry dikes in the southwest part of Boston township contain many prominent quartz phenocrysts, and thus resemble the quartz porphyry at Porcupine. In other parts the rock may be called a felsite. The acid dikes are usually cut by minute veinlets of quartz, some of which carry gold. Small, irregular fragments of red feldspar porphyry are also, at times, present in auriferous quartz veins.

Lamprophyre: A few narrow lamprophyre dikes cut the greenstones and grey schist, but these are too small to map. They may be seen on the south part of lot 3, concession VI, Pacaud township, and at about mileage 154.3 along the railway. In the Kirkland Lake area the lamprophyre cuts the Timiskaming sediments, but is older than the feldspar porphyry. A lamprophyre dike that intrudes the Algonian granite can be observed in a rock-cut about half a mile north of Mindoka.

Keweenawan

Quartz diabase dikes are rare in this area; however, they were noted cutting the greenstones and Timiskamian (?) sediments. To the northwest, in Teck township, the diabase was seen to cut the red feldspar porphyry. These dikes are classed as Keweenawan, since they are fresh-looking and resemble the diabase at Cobalt. A thin section of a sample taken immediately south of M.R. 15, Boston township, shows labradorite laths, partly altered to saussurite and sericite, augite partly altered to hornblende and chlorite with a little quartz, biotite, magnetite and intergrowths of quartz and feldspar.

Glacial and Recent

The region has been heavily glaciated, the ice having moved in a general S. 20° E. direction, astronomic.

The area lies at the northern edge of a tract of farming land, which extends from Haileybury to Round lake, and is covered in places with stratified clays, sand and gravels. At Boston Creek station one can see the vertical section of a morainic deposit which has been cut into by Boston creek. The central part of McElroy township to the east of the Blanche river is one vast area of sand, representing probably large terminal moraines and outwash plains.

Economic Products

Gold

Gold, the chief mineral sought for in the area at the present time, 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 a varying strike and dip, are well mineralized with varying quantities of pyrite and molybdenite, and sometimes with chalcopyrite, galena, specular hematite, bismuthinite, gold and a telluride. 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.

There are various types of gold deposits, viz.:

(a) Fissure quartz veins in the greenstone and porphyry, with well-defined walls. Examples, Miller-Independence, McRae and Authier.

(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. Example, the Kenzie vein on the R. A. P. property.

(c) A stockwork in granite and porphyry. Examples, Charest claim (McElroy township), Authier (L 4737) and Papassimakes (L 5133).

The chief deposits will be described later in the report when dealing with the gold claims.

Pyrite

Pyrite occurs in two narrow bands, and disseminated through the grey schist at mileage 153 on the railway in Pacaud township. About 100 feet east of the 153-mile post, two shallow pits were sunk several years ago, and at present one can see a little pyrite on the dumps, but the deposit "in place" is covered with débris. In the deep railway-cut there are two bands of pyrite 10 and 20 inches wide respectively which will carry about 35 per cent. of sulphur; samples from each band were found to contain no gold values. The deposits did not appear to be large enough to work, although wider ore bodies might be revealed by further trenching. Iron pyrites is used in the manufacture of sulphuric acid.

Copper

Several calcite veins with some quartz, and carrying copper pyrites, occur in the vicinity of the Blanche river in the south part of McElroy township. The Jean Petit copper property, W.R. 97, in this vicinity, has been referred to by W. G. Miller and W. A. Parks. Considerable work has been done on the calcite veins, but as far as known no copper has been shipped. It is reported that gold and silver values occur with the copper.

The Dane Mining Company has done considerable prospecting and shipped some copper ore from Teck and Lebel, adjacent townships to the north and northwest.

Iron

The isolated exposures of iron formation along the Larder Lake road in Boston township represent the southern portion of the Boston township iron range. The formation consists of interbanded silica and magnetite, with some black slate. Numerous shallow test pits were sunk in 1902, but the iron proved to be too low grade to be workable at that time. The iron formation is, in places, intruded by quartz veins, some of which carry gold.

Building Stone

The red and grey granite and syenite along portions of the railway in Pacaud township is serviceable for building purposes. The fine station at Matheson is constructed of stone taken from along the railway immediately to the north and south of Mindoka.

Timber and Agriculture

In general the trees are small, and consist of spruce, jack pine, poplar, birch and cedar. A few white pine, three and one-half feet in diameter, to the south-east of Smith lake, have escaped an old fire which swept most of the area. Large charred stubs of pine in various parts of the area are relics of the same fire. Other parts have been recently burned.

Many farms have been located on the scattered clay areas of Pacaud township, while the greater part of the remaining area is unsuitable for agriculture by reason of rock, sand or swamp.

Water Powers

No hydro-electric power is used as yet in the area, mining being in the early prospecting stage.

The transmission line of the Long Lake Power Company runs from Charlton along the west side of the area and furnishes energy to the Tough-Oakes mine at Kirkland lake.

K. Farah, of Englehart, has applied for a waterpower on the northwest branch of the Blanche river in lot 12, concession IV, Pacaud township. On August 12th, 1914, the discharge of the river at this point was 350 cubic feet per second. The 61-foot falls is expected to develop 405 horsepower. Immediately to the north in concession V, is a 36-foot falls which could be utilized to develop an additional 240 horse power.

Messrs. Hotchkin and Grover of Haileybury expect to develop a minimum of 2,000 horse power at High falls on the north branch of the Blanche river in lot 11, concession IV, Marter township, where a total operating head of 138 feet is available. The discharge of the river on May 6th 1915 was 552 cubic feet per second. The transmission line would follow approximately the railway to Boston creek and Kirkland lake.

It is the intention of the Northern Ontario Light and Power Company to extend their lines during 1916 from Cobalt to serve both Boston creek and Kirkland lake.

Origin of the Gold Deposits

As pointed out by W. G. Miller and C. W. Knight in a paper called "Metallogenetic Epochs in the Pre-Cambrian of Ontario,"¹¹ most of the gold deposits of Ontario belong to the Algonian epoch. The gold deposits of Boston creek supply another example of gold being derived from acid intrusives of Algonian age. The granite, syenite and feldspar porphyry exposed in this area by erosion are probably different facies of a plutonic rock which underlies the whole area. The gold generally occurs near these acid rocks. The presence of a number of gold-

¹¹ Rep., Ont. Bur. Mines. Vol. XXIV, Part I, 1915, pp. 243-248.

bearing veins along the contact of the intrusive porphyry and older rocks at Boston creek, as in many other parts of central Canada, and the frequent occurrence of auriferous quartz veinlets in the porphyry and granite, suggest the relationship between the intrusives and the veins. The relationship is more clearly shown in this area by the occurrence of gold in a pegmatitic vein in the granite on the Charest claim, McElroy township.

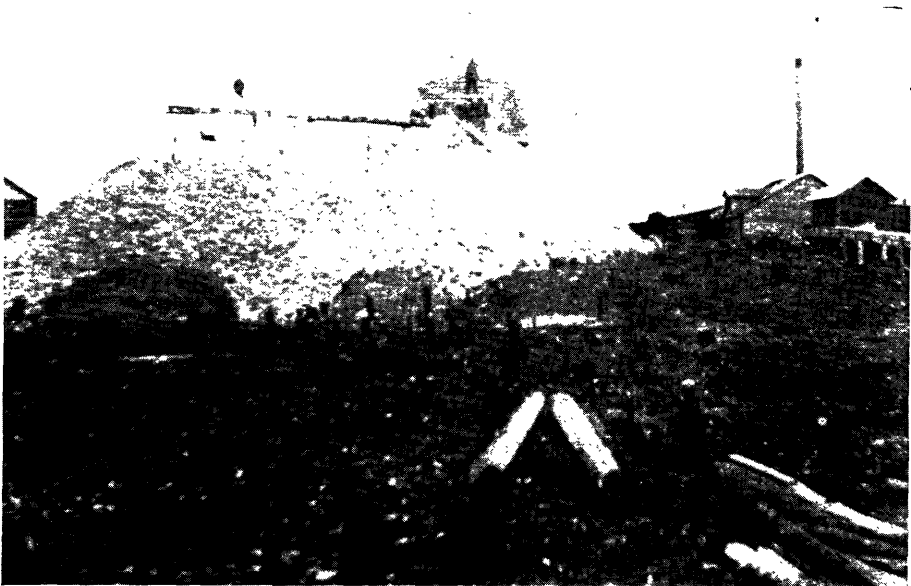
The deposits are in part due to the replacement of the country rock by mineral solution.

Some minerals which characterize deposits that are formed at high temperatures are found in the veins at Boston creek. Actinolite was noted in a thin section of material from the Kenzie vein, and specularite has been frequently observed in other veins. Other minerals formed at high temperature, such as pyroxene, apatite and tourmaline, have not been noted. It is probable that the deposits were formed at great depth, but not at extremely high temperature.

Description of the Gold Prospects

R. A. P. Mining Company

The R. A. P. Prospecting, Developing and Mining Syndicate owns a number of mining claims in the area, the principal ones being L 3665 and L 5163 in the south central part of Boston township. Some work was done on these claims



Shaft and power plant, R. A. P. Mining Co.

May, 1916.

in 1914 by the La Rose Mining Company. Since May, 1915, Mr. John Papasmakes has had a number of men engaged in opening what is known as the "Kenzie" vein, which occurs in a massive pillow lava. The vein, which has been stripped

for about 400 feet, strikes 30 degrees north of east, astronomic, and dips from 60 to 70 degrees to the south. It varies from several inches up to five feet in width, with good breaking walls on either side. Spectacular gold showings were obtained from a 28-foot shaft on the western end of the vein and finely disseminated gold can be seen in many samples on the dump.

When the property was visited in May 1916, the easterly inclined shaft had reached a depth of 135 feet, and 230 feet of drifting on the vein had been done on the 100-foot level. Development has shown the ore to occur in shoots in the vein. 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 quantity.

Thin sections of the ore show the gold to be closely associated with the sulphides in chlorite and calcite seams near the foot wall 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.

The property is equipped with a small plant, including a 60 h.p. boiler, 2-drill compressor and hoist.

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.

About one mile to the northeast, on claim L 5165, there is a red medium grained mica granite intruding the Keewatin. Cutting the granite are several narrow white quartz veins, some of which carry molybdenite and a few specks of native gold.

Currie

The Currie unsurveyed claim, L 5037, is situated about one-half mile northeast of the R. A. P. property in Boston township. In the west and northwest parts 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. Some trenching has been done.

Miller-Independence

This property is situated on the south half of lot 1 in the sixth concession of Pacaud. Gold was discovered on the lot by a prospector, Mr. Joseph McDonough, in July 1915. The 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 foot wall side of the vein. Telluride, copper pyrites, pyrite, specular iron ore and galena are observed in the quartz. Native gold occurs frequently with the telluride and other minerals in a net-like arrangement in the quartz along the foot wall. There are probably several tellurides, but so far only one, a bismuth telluride, containing some selenium, has been recognized. This telluride of a brilliant grey colour appears to occur abundantly with the gold.

The country rock is mainly fine-grained pillow lava, associated with which is a coarsely grained basic rock of a hornblendic type. Along the vein there is a dike of grey feldspar porphyry which at two places is two feet wide on the hanging



Power plant and mill at Miller-Independence property.

May, 1916.

wall side of the vein. The porphyry was also observed on the foot wall side. It contains much calcite and other carbonates, as well as disseminated iron pyrites, and is cut by veinlets of quartz.

The vein has been prospected by means of a number of trenches and pits, from which some high-grade ore has been bagged. A shaft was being sunk to the north of the vein. The property is equipped with a small plant, including boiler, compressor, hoist, and a Nissen stamp mill; and a small oil flotation plant was being constructed.

McRae

The McRae claim is the northeast quarter of the north half of lot 2, concession VI, Pacaud township. The vein has a general magnetic north and south strike, with a dip of about 45° to the east. Fine gold can be seen in a number of places, particularly on the hanging wall part of the milky white quartz vein, which is about one foot in width.



Small steam plant on McRae property.

May, 1916.



Gold bearing quartz vein, dipping 20° N. The man is standing on the hanging wall side of vein, while the foot wall is shown in the foreground, Connell-McDonough claim, Catharine township.

The country rock is pillow lava and massive greenstone showing a diabasic texture, while the wall rock is considerably altered in places next the vein. A shaft is being sunk on the vein to the 100-foot level. Exposed in the shaft, the vein has a somewhat banded structure, showing streaks of dark quartz, with considerable iron pyrite, some films of molybdenite, and dark grey calcite.

The property was being prospected by the Crown Reserve Mining Company in May 1916.

Connell-McDonough

This property is the south half of lot 12, concession VI, Catharine township. The vein on the Miller-Independence which is being prospected can be traced easterly to the Connell-McDonough claim, where there has been considerable trenching along the strike of the vein. Native gold can be observed at several places along the foot wall of the vein.

Cullen-Renaud

This group of claims is situated in the northeast corner of Pacaud township. Native gold has been reported to occur in several veins which outcrop on the surface. The veins which outcrop on the McRae and Miller-Independence properties, if continued to depth on their indicated dips, would pass into this property at some depth.

Authier-Charlebois



Prospector at his discovery of native gold in veinlets in the granite. Authier claim, southeast part of Boston township.

Mining claims L 4737 and L 5025 are situated in the southeast part of Boston township, just to the north of the McRae property. The quartz veins in the greenstone are similar to the McRae vein, being narrow and dipping about

45° N. Native gold has been discovered in some of them, along with pyrite and a grey mineral bismuthinite.

Toward the north part of the property is a small area of fine-grained mica granite which intrudes the greenstone. At one place near the contact there is a quartz vein one foot wide in the granite, on which a shallow pit has been sunk. Molybdenite, pyrite and bismuthinite are disseminated in parts of the quartz vein, and visible gold was reported to have been seen. A sample across eleven inches, taken a few feet from the pit, gave \$4.80 in gold. Northwest of this discovery, beyond a ravine, the granite is intersected by numerous quartz veinlets, some of which are several inches wide. In some of the narrow joint-like cracks native gold was observed, along with a grey mineral which gave reactions for tellurium and bismuth and is probably tetradyomite. There is also considerable iron pyrites in the granite along some of the veinlets.

Charest

The Charest unsurveyed claim, L 5305, is situated in the southwest quarter of McElroy township. As shown on the map, the claim is on a small stock of massive, coarse-grained, flesh-coloured hornblende and biotite granite. A quartz vein averaging about one inch in width, and 300 feet long, strikes 30 degrees north of west across the granite. Considerable fine gold, pyrite, chalcopyrite, and a grey mineral which proved to be a telluride, were noticed in different parts of the vein. A few pieces of quartz from the vein gave, on assay, \$8.80 in gold to the ton. Other veins on the property contain molybdenite and specular hematite. Some of the veins contain coarse feldspar and are pegmatitic in character, while many of the narrow veins represent the filling of joint cracks. The occurrence of gold in the pegmatitic vein is important, since it strongly points to the formation of the gold-bearing quartz veins following the pegmatitic veins and representing part of the granite intrusion.

Conclusion and Acknowledgments

The geology and mineralogy of the Boston Creek area is, in a general way, similar to that of the adjoining Swastika, Kirkland Lake and Larder Lake areas. Gold is known to be widely distributed over all the areas. No bullion has, as yet, been shipped from Boston creek. The Tough-Oakes, Swastika, Lucky Cross, La Mine D'Or Huronia and Goldfields Limited properties, which are from 12 to 15 miles from Boston Creek station, have from 1912 to the end of 1915, yielded gold valued at \$779,715. Most of this production was from the Tough-Oakes mine. In Boston creek the prospecting, as yet, has been largely confined to the surface, the deepest shaft being 135 feet (May, 1916). Prospecting is aided by the excellent transportation facilities. In prospecting the area it seems a good rule to trench in the old rocks near the porphyry dikes and small granite areas.

In conclusion, the writers wish to express their indebtedness to several of the men in charge of mining and prospecting operations, particularly to J. Papassimakos of the R. A. P. property. The assays were made and some minerals identified by W. K. McNeill and T. E. Rothwell, of the Provincial Assay Office. The accompanying map was drawn by P. A. Jackson.

GOODFISH LAKE GOLD AREA

By

A. G. Burrows and P. E. Hopkins

Introduction

Goodfish lake, 1,025 feet above sea level, is situated two miles northeast of Kirkland lake in the Larder Lake Mining Division, near the intersections of the four townships, Teck, Bernhardt, Morrisette and Lebel. The area is three miles south of the height of land which separates the Hudson Bay and St. Lawrence River waters. Hills seldom rise more than 100 feet above the adjacent valleys. A wagon road nine miles in length connects Goodfish lake with Swastika, a station on the Timiskaming and Northern Ontario railway, 390 miles north of Toronto.

Gold was first found on the Costello claim, L 2194, in the summer of 1912, shortly after the discovery of gold on the Tough-Oakes mine, two and one-half miles to the south. Reference is made to gold on the Costello claim in the report on the Kirkland Lake and Swastika gold areas,¹ and part of the geology is included on the coloured map accompanying that report.

During 1915 considerable prospecting was done around the lake on the Costello, Martin, Brennan, Gibson, Potvin, Papassimakes and other claims. All have ceased work at present (April, 1916,) except the La Belle Kirkland mines, who are continuing with underground mining on the Gibson-Potvin claims in the northeast corner of Teck township.

Geology

Keewatin

The Keewatin is the oldest and most dominant of the rocks, which are all pre-Cambrian in age. The Keewatin rocks consist of pillow and amygdaloidal lavas (meta basalts) and altered diabases in about equal volume. Some of the rocks are quite massive, while others are very schistose and rusty, striking easterly and dipping vertically. The original constituents are largely altered, mainly to calcite, chlorite and sericite, and often the rock is so greatly metamorphosed that there is no clue to its original nature. The fine-grained greenstone on the southwest corner of the Costello claim, L 2194, Morrisette township, shows under the microscope rounded and angular quartz grains, some with corroded edges, in a groundmass of calcite, chlorite, sericite, altered feldspar, leucoxene and apatite. This rock is identical to the rock which shows large "eyes" of quartz and occurs with the pillow lava flows in Porcupine, and is probably a more acid rock than basalt.

Quartz-Feldspar Porphyry

Cutting these older rocks are dikes, stocks and flow-like masses of granite porphyry (quartz-feldspar porphyry or rhyolite porphyry). The porphyry has a grey colour, and a whitish weathering surface in which white quartz phenocrysts

¹ Ont. Bur. Mines, Vol. XXIII, Pt. 2, 1914, p. 31.

a quarter of an inch across are quite conspicuous. Under the microscope the rock is holocrystalline. The phenocrysts consist of about 5 to 10 per cent. of quartz and 50 per cent. of albite-oligoclase partly altered to sericite. The ground-mass is felsitic, consisting of sericite, plagioclase, quartz, chlorite, pyrite and iron oxide. The porphyry is somewhat schistose, and is similar to certain porphyries described in Porcupine and many other parts of northern Ontario.

In the Kirkland Lake and Swastika report² the quartz-feldspar porphyry was classed as Keewatin on account of the fact that a conglomerate, on the north shore of Gami lake, classed as "Timiskaming," was found to contain fragments of quartz-feldspar porphyry quite similar to the porphyry which occurs near at hand "in place." There is a possibility that this small isolated area of conglomerate is of later age than "Timiskaming," in which case the quartz-feldspar porphyry might be of Algonian age, similar to the feldspar porphyry around the Tough-Oakes mine.

The age of the quartz porphyries in northern Ontario is usually difficult to determine, that is, whether of Keewatin or later age. They may be in part connected with the acid flows interbedded with the Keewatin pillow lavas, or they may be of Laurentian age. In any case some porphyries seem to have yielded most of the acid pebbles for the Timiskaming conglomerates.

Timiskamian Series

The conglomerate and slate in the southeast corner of the accompanying map is the northern extremity of a large volume of Timiskamian sediments which have been described fully in the report on the Kirkland Lake and Swastika gold areas.³ The sediments were laid down unconformably on the eroded Keewatin surface. An unconformity can be seen on claim L 2796, where the overlying conglomerate contains fragments of the amygdaloidal basalt and diabase similar to the underlying Keewatin.

Economic Geology

The rocks of the area are mostly massive and schistose greenstones, cut by small irregular masses of schistose quartz-feldspar porphyry. Gold, the chief mineral sought for, occurs in narrow quartz veins and replacement deposits along the contact of porphyry with other rocks. The veins or stringers are generally an inch or less in thickness, but there may be a series of them forming a lode deposit. Often two or three parallel slip planes coated with quartz and a thin film of molybdenite may form the ore body. The large amounts of molybdenite and pyrite give the deposits a dark and rusty appearance. Visible gold, in a state of fine division, occurs in many parts of the area. A telluride has been reported to occur in Morrisette township, but no such mineral has been identified in the laboratory of the Bureau of Mines. Calcite and other carbonates occur with the quartz.

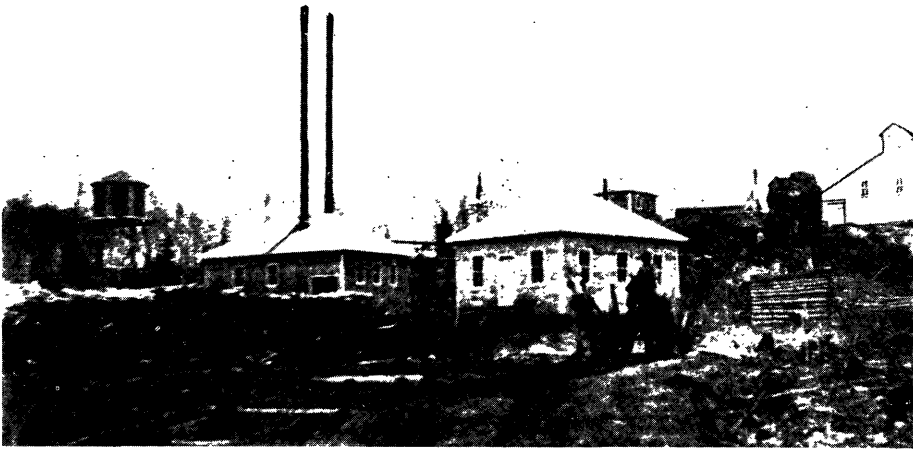
The quartz-feldspar porphyry appears in some way to have influenced the gold deposition as similar porphyries have done in Porcupine; and it seems also to have been the source of the gold-bearing solutions. If the porphyry is the source of the ores and is pre-Timiskamian in age, then the gold deposition of

² Ont. Bur. Mines, Vol. XXIII, Pt. 2, 1914, p. 10. ³ Ibid, pp. 9 and 10.

Goodfish lake is of an older type (Keewatin or Laurentian) than the Kirkland Lake gold-telluride deposits, which are clearly connected with the Algonian intrusions of feldspar porphyry.

The cessation of work by many properties would suggest that many of the deposits are low grade. La Belle Kirkland Mines, the only property being worked (May 1916) has blocked out considerable ore.

La Belle Kirkland: La Belle Kirkland Mines Limited is operating a group of claims to the south of Goodfish lake. Of these claims the most important is L 1751, on which the company had sunk a shaft to the 300-foot level (May, 1916). The ore deposit occurs along the contact of quartz porphyry and basalt. The porphyry lies to the north, and forms the hanging wall of the deposit, which occurs in the altered basalt. The shaft, which inclines 60° N. for 80 feet, and



La Belle Kirkland Mines, showing a large erratic of basalt on the right.

May, 1916.

70° N. below this level, is on the dip of the ore body, which is also approximately the angle of contact of the porphyry and basalt. The basalt near the contact is greatly altered to a greyish rock high in silica, calcite and other carbonates. The altered rock has the following composition: silica, 46.94 per cent.; ferric oxide, 5.60; ferrous oxide, 5.16; alumina, 13.94; lime, 9.31; magnesia, 1.19; soda, 2.12; potash, 2.48; water, 2.15; carbon dioxide, 11.43. In this altered basalt area there are streaks or bands of blackish material which form the higher grade portion of the deposit. These streaks contain films of molybdenite, to which the dark colour is due, and abundant iron pyrite, quartz and calcite, while visible gold is occasionally seen. A dark band near the foot wall was persistent in the shaft, while other bands toward the hanging wall are more lenticular, but have similar characteristics to the foot-wall streak. The silicified material between the streaks or bands carries low values in gold, but the values obtained in the high-grade streaks, which vary from a part of an inch to a foot in width, have indicated that the deposit is workable over a considerable width. The management is at present continuing the sinking of the shaft and drifting and cross-cutting at several levels to determine the size of the ore body.

The narrow high-grade streaks or bands are reported to carry from \$20 to \$150 per ton in gold, while a probable value of from \$15 to \$18 per ton is given for a width of 7 feet to 10 feet, for some of the ore.

The deposit is evidently a replacement of the basalt near the contact with the porphyry. There is no evidence of the filling of open fissures with milky white quartz. Slickensides surfaces in the material of the streaks indicate some faulting along the dip of the deposit.

The equipment consists of two 60 h.p. Robb-Mumford boilers, a 4-drill compressor, and hoist. Timber from the company's properties is at present used for fuel. Frank Loring is manager, and Ernest Loring superintendent of the mine.

Costello: Gold was found on the Costello claim, L 2194 and L 2202, Morrisette township, in 1912. The dominant rock is a Keewatin greenstone, which has been intruded by small irregular masses of a quartz-feldspar porphyry. The basalt has been greatly altered to rusty-weathering carbonate. The gold occurs in rusty quartz and calcite veinlets, which are more or less irregularly distributed in a mineralized zone as shown on the map. Considerable trenching has been done transverse to the strike, which shows the gold-bearing zone to extend for 400 yards or more. A shaft was sunk in 1915 on the west part of the zone, and while some gold was found near the surface, the work was discontinued. The property is owned by the Goodfish Lake Mines, Limited.

Martin (L 2233): This claim is situated north of the Costello (L 2194). A gold-bearing zone occurs along the contact of the quartz-feldspar porphyry and the basalt. It dips about 65° N. and strikes N. 30° E., and has been traced by trenching to the Brennan claim, which lies to the east. On the line between the claims the vein four inches in width is exposed, while along the contact the porphyry and schist are greatly stained by iron oxide, an alteration product of iron pyrites. An inclined shaft was sunk on the Martin claim to a depth of 20 feet, but at the time of the visit was filled with water. It is reported, however, that the south wall of the shaft showed a mineralization over widths of four to six feet, several narrow irregular quartz veins being exposed with promising assays in gold, while the north wall of the shaft showed neither so much quartz nor such good values.

Brennan (L. 2603): An inclined shaft 18 feet in depth was sunk on this claim. The shaft is probably on the extension of the vein which occurs on the Martin. The vein material between the porphyry and basalt has a width in one place of 15 inches, and consists of quartz, calcite, molybdenite and pyrite.

Brennan-Bowes Group: During the fall of 1915 the Dominion Reduction Company had a working option on a group of claims immediately to the east of the Costello group. A large amount of trenching was done across contacts of porphyry and basalt, while two shafts were sunk to a moderate depth at supposedly favourable locations. A shaft on claim L 2614 is on the contact of the porphyry and basalt, with the basalt forming the north or hanging wall. This condition is the opposite to that at the La Belle Kirkland mine, where the porphyry forms the north or hanging wall. Low gold values were obtained in the vein material from this shaft, but these were not sufficient to indicate a workable deposit.



