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BELL RIVER HEADWATERS AREA: DETAILING THE PASCALIS-LOUVICOURT GOLD DEPOSITS

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PROVINCE OF QUEBEC, CANADA

BUREAU OF MINES

Honourable J. E. PERRAULT, Minister of Mines

J. L. BOULANGER, Deputy-Minister

A. O. DUFRESNE, Director

ANNUAL REPORT
OF THE
QUEBEC BUREAU OF MINES
FOR THE CALENDAR YEAR
1931

JOHN A. DRESSER, Directing Geologist

PART B

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BELL RIVER HEADWATERS AREA

DETAILING THE PASCALIS-LOUVICOURT GOLD DEPOSITS ABITIBI COUNTY

by L. V. Bell and A. M. Bell

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BELL RIVER HEADWATERS AREA
DETAILING THE
PASCALIS-LOUVICOURT GOLD DEPOSITS
ABITIBI COUNTY

by L. V. Bell and A. M. Bell

INTRODUCTION

GENERAL STATEMENT

Gold is known to occur at intervals throughout a zone extending eastward from the Quebec-Ontario boundary to more than twenty miles east of the Bell river. This zone, or belt, has certain well defined characteristics, the most significant of which is the fact that it is rather closely restricted to the major east-west contact of a belt of Témiscamian sediments with Keewatin volcanics that lie to the north of them.

Although these deposits are related to the main contact, there are a number of important structural features within the zone which have been instrumental in localizing them still further. Thus, for example, the deposits of the O'Brien, Thompson-Cadillac, and Pandora properties, in Cadillac township, are related to a unitary structure; whereas those of the Siscoe and Sullivan, in Dubuisson, and the deposits in Pascalis and Louvicourt townships, are associated with another distinctive structural feature within the same major zone.

Having early recognized the importance of the zone from a primary economic standpoint, officers of the Geological Survey of Canada have systematically mapped the area extending eastward from the Quebec-Ontario boundary nearly to the Bell river, or to line of longitude $77^{\circ} 30'$, which passes through the western part of Louvicourt and Pascalis townships. In the fall of 1930, important gold discoveries were made in these two townships, near the eastern limit of this geologically mapped area, and these discoveries served to emphasise the

need of extending the mapping of the zone still farther along its easterly strike. The fact has also been made evident, partly through subsequent discoveries, that such mapping should be continued as far eastward as favourable geological conditions are found to persist, or, in other words, to the eastern end of the sedimentary belt.

With this object in view, systematic geological mapping of the zone was commenced by the Quebec Bureau of Mines in the spring of 1931. Two parties were sent into the field, with instructions to co-operate in their work in-so-far as possible. The work of a party in charge of L. V. Bell was confined to the area lying west of the Bell river, and included an examination of the recent gold discoveries in Louvicourt and Pascalis townships, the results of which are incorporated in the present report, and in the accompanying geological map No. 168 (in pocket). A. M. Bell was in charge of a second party, which geologically surveyed an adjoining area to the east of the Bell river, and examined, among others, the recent mineral discoveries in the vicinity of Garden Island lake, in Pershing township. His report on these occurrences, and on the economic possibilities of that part of the map-area, is included in the present report. The accompanying map No. 167, and the general description of the area as a whole, is the work of the joint authors.

ACKNOWLEDGMENTS

The writers wish to express their deep appreciation to the people connected with prospecting and mining development in the area, who supplied much useful information and assisted the work in many ways. Courtesies were received at the hands of so many that it is impossible to single out any one for individual mention. The hospitality extended by the provincial government forest rangers is also gratefully acknowledged.

Through the valued co-operation of the Topographical Survey of Canada, an advance copy of a detailed and accurate geographical base-map was made available to the writers early in 1932, and was a great aid in the making of the geologically coloured map accompanying this report. The map of the Topographical Survey was prepared from photographs of the district taken by the Royal Air Force.

The writers were capably assisted in the field work by the following student assistants: F. Morisset, F. T. Denis, R. Dallaire, M. Scott, G. Sarault, and D. Daoust.

For a considerable part of the season, Mr. Morisset acted as chief of a small sub-party engaged in surveying trails and in establishing tie points. O. P. Harty and J. N. Paquette efficiently performed their duties as cooks.

LOCATION, EXTENT, ACCESS

The area mapped is in the southern part of Abitibi county, between longitudes $77^{\circ} 30'$ and $77^{\circ} 00'$, and latitudes $48^{\circ} 00'$ and $48^{\circ} 15'$. It is bounded on the north by an east-west central line through Pascalis, Tiblemont, and Tavernier townships; on the west by the western boundaries of Pascalis and Louvicourt townships; and on the east by parallel of longitude $77^{\circ} 00'$ passing through eastern Tavernier, Pershing, and Denain townships. To the south it includes the northern part of Villebon and Denain townships.

The map-area thus comprises Louvicourt and Vauquelin; the greater part of Pershing; half of Pascalis, Tiblemont, and Villebon; and parts of Tavernier and Denain townships; a total area of approximately 475 square miles. A very limited amount of reconnaissance work was also done in the township of Marrias.

The Quebec-Cochrane branch of the Canadian National railways passes within a short distance to the north of the northern boundary of the map-area. Access to the greater (central) part of the district is most convenient from the town of Senneterre, situated at the point where the railway crosses the Bell river. Good automobile roads have been constructed on either side of the river from Senneterre to the northern end of Tiblemont lake and these are used almost exclusively for transportation, in preference to the river, owing to the numerous rapids between these two points. The road on the west side of the river has recently been extended as a winter road to the large bay in the west shore of Tiblemont lake, and from thence in a southwesterly direction across southeastern Pascalis township, and into northern Louvicourt. This winter road is largely in high ground and was extensively used during the winter of 1931-32, in particular by the

Treadwell-Yukon Company, in the transportation of supplies to their mining property in the Pascalis-Louvicourt mining district.

Another winter road connecting the Pascalis-Louvicourt district with the town of Barraute was cut during the winter of 1930-31. This road follows the western boundary of Louvicourt township for some distance.

The mining properties in Pascalis and Louvicourt townships may also be reached during the winter by a road that extends across Bourlamaque township and connects the camps to the west, including the Siscoe and Greene-Stabell mines.

The western part of the area, including the Pascalis-Louvicourt mining district, may also be entered from Senneterre by canoe, from Tiblemont lake through lake Pascalis (Wabanoni) and up the connecting creek to 'Little Pascalis' lake. A trail has been cut from the head of this small lake to the mining camps. An alternative water route, and the one principally used for summer transportation to the mining camps, is from Amos by way of the Harricana and Colombière rivers and their connecting lakes. Jumper trails have been constructed from the 'landing' on the Colombière river, in Bourlamaque township, to connect with the mining camps to the east.

General Airways, Limited, with a flying base in Amos, is providing aerial transportation during both winter and summer. This means of transport is extensively employed by persons entering and leaving the new mining district. During the summer, a small lake ('Landing lake'), in southwestern Pascalis township, is utilized as a landing base. A trail connects it with the mining camps. Other small lakes in the district, including Bonnefond lake, also form suitable landing places.

Southeastern and southwestern Louvicourt township may be reached from Senneterre by canoe through Tiblemont lake and the Bell river to the rapids on the Cachée river, from which point there is a good 'jumper' trail to the mining property in southwestern Louvicourt township formerly known as Obaska Mines, Ltd.

A good route to the eastern part of the area is by motor road from Senneterre to Tiblemont lake and thence by canoe through Tiblemont, Simon, Guéguen, and Matchi-Manitou lakes, and their

connecting rivers. At the head of Tiblemont lake is a 15-chain portage; between Simon and Guéguen lakes there are two portages, eight chains and half a mile; and between Guéguen and Garden Island lakes is a 30-chain portage. In addition, several small rapids occur along this route, up which canoes may readily be pulled.

The eastern part of the area may also be entered from the Mégiscane river. Two routes are available. From the Mégiscane river, a winding creek may be followed to Tavernier lake, from which a creek may be ascended as far as a trail or portage, two and a quarter miles long, that leads to Garden Island lake. The alternative route is by way of the Mégiscane to its junction with the Assup river, and up to the head of the Assup, whence there is a good four-mile portage leading to lake Matchi-Manitou.

The numerous lakes in the eastern portion of the area greatly facilitate aerial transportation, since they afford convenient landing places.

DRAINAGE AND WATER-POWER

The area is, in general, of low relief, and since it lies so near (immediately to the north of) the height-of-land between the St. Lawrence River and the Hudson Bay waters, it is rather poorly drained, and much of it is swamp-covered. In the eastern part are a number of large lakes, all draining into the Bell river. With the exception of lake Matchi-Manitou, they are shallow. The Louvicourt river, the tributary from Simon lake, and the Garden Island river run through a broad belt of low, drift-covered ground. There are rapids between Simon and Guéguen lakes, and a series of rapids and a chute between lakes Christopherson and Simon. Altitudes of the lakes as given in *Altitudes in Canada*^①, are as follows: Tiblemont lake, 1,033 feet; Christopherson (Villebon) lake, 1,099 feet; and Simon lake, 1,055 feet, above sea level.

A relatively small supply of electric energy is shortly to be developed along the rapids between lakes Villebon and Simon by Treadwell-Yukon interests, and a transmission line is to be constructed to their mining property in western Louvicourt township. There are potential, but rather limited, supplies of power in several of the other rivers, as, for example, the Garden Island river, but more particularly in the Mégiscane river, a short distance to the east of the map area.

^① Commission of Conservation, Canada, 1915.

TOPOGRAPHY

Areas of bare rock appear at intervals, projecting through the cover of glacial drift and confined largely to the higher areas, or uplands. The rocky hills and ridges are composed of the more resistant formations and commonly have an easterly trend, determined by the strike of these formations. The highest upland area is in the south of Pershing township. It is underlain chiefly by hornblendic rocks. Devil's mountain, west of lake Matchi-Manitou, rises to a height of 690 feet above the lake, as measured by barometer readings. Nearby hills are almost as high. Assuming the elevation of lake Matchi-Manitou to be similar to that of lake Christopherson (Villebon), the elevation of Devil's mountain would be about 1,790 feet above sea level. G. W. Bain^① has estimated the height of a hill to the east of the lake as 1,600 feet, and he regards its flat top as a remnant of an ancient peneplain. The tops of these hills may well represent the remnants of the ancient peneplain postulated to exist, at an elevation of from 1,600 to 1,700 feet, in the western part of Abitibi^②.

TIMBER

With the exception of the west-central part of Louvicourt, part of southwestern Pascalis, and certain small local sections that have been burned-over, the western portion of the area is covered by green bush or swamp. In the eastern part, also, green bush is prevalent, except in Tavernier township and the eastern part of Tiblemont.

In the low ground throughout the area are good stands of black spruce and balsam, and also some swamp-cedar and alder swamps. On the higher ground, the timber is more mixed, white spruce, birch, poplar, scrub maple, and occasional white pine being the predominant types. The sand plains are covered with jack-pine. The only lumbering operations within the area to date have been in the vicinity of lake Tiblemont.

POPULATION

Apart from the residents of the new mining camps in Louvicourt and Pascalis townships, the only permanent inhabitants are a number

^① "The Geology and Mineral Deposits of the Harricanaw and Bell River Basins"; Bull. Can. Inst. Min. & Met., No. 178, Feb., 1927, p. 203.

^② Geol. Surv. Can., Mem. 166, 1931, p. 19.

of Indian families established at Simon lake. A church has been built on the west side of the lake and a very small amount of ground is under cultivation. The provincial fire rangers have stations at the head of Tiblemont lake and at the south end of lake Matchi-Manitou.

PREVIOUS WORK AND BIBLIOGRAPHY

The earliest exploration of the district was that by Robert Bell and his assistants, A. C. Cochrane and R. W. Brock, during the years 1895-97. Their exploratory surveys included the two principal navigable waterways, the Bell and Mégiscane rivers.

W. J. Wilson, in 1906 and 1907, made a geological reconnaissance extending for ten miles on either side of the Transcontinental (Canadian National) railway, in western Quebec, which included the region lying immediately to the north of the present map-area.

The first extensive geological examination of the region was undertaken by M. E. Wilson in 1907 and subsequent years, his final report, on Témiscamingue county, appearing in 1918. His geological maps (C.S.C. maps Nos. 100A and 145A) include the present map-area.

Further reconnaissance work including the area under discussion was carried out by G. W. Bain during the summer of 1924.

The conclusions reached from the systematic mapping and study of the region extending westward from the present map-area to the Quebec-Ontario boundary, by H. C. Cooke, W. F. James, J. B. Mawdsley, and others, and carried out during the years 1922-1930, are set forth in Summary Reports of the Geological Survey of Canada for those years, and are summarized in their recent memoir entitled *Geology and Ore Deposits of Rouyn-Harricana Region, Quebec*. Many of their conclusions have a direct application to the area herein described. The Dubuisson map-sheet of James and Mawdsley (accompanying the Summary Report for 1926, Part C) includes the western portion of Pascalis and Louvicourt townships.

The work of J. E. Hawley for the Quebec Bureau of Mines, in 1930, included an examination of the western part of Pascalis and Louvicourt, and also a report on one of the first of the recent gold discoveries in Pascalis township.

BIBLIOGRAPHY

- Bain, G. W., *Barraute Area, Abitibi County, Quebec* (map only); Geol. Surv. Can., Summ. Rept., 1924, Part C, p. 126.
The Geology and Mineral Deposits of the Harricanaw and Bell River Basins; Bull. Can. Inst. Min. & Met., Feb., 1927, pp. 102-247.
- Bell, R., Geol. Surv. Can., Ann. Rept., Vol. VIII, 1895, p. 74A; Vol. IX, 1896, p. 64A; Vol. XIII, 1900, Part K (*Geology of the Basin of Nottaway River*).
- Cooke, H. C., James, W.F., and Mawdsley, J. B., *Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec*; Geol. Surv. Can., Mem. 166, 1931.
- Hawley, J. E., *Gold and Copper Deposits of Dubuisson and Boulamaque Townships, Abitibi County*; Que. Bur. Mines, Ann. Rept., 1930, Part C, pp. 1-95.
- James, W. F. and Mawdsley, J. B., *Fiedmont and Dubuisson Map-Areas, Abitibi County, Quebec*; Geol. Surv. Can., Summ., Rept., 1926, Part C, pp. 56-72.
- Wilson, M. E., *Timiskaming County, Quebec*; Geol. Surv. Can., Mem. 103, 1918.
A Geological Reconnaissance from Lake Kipawa via Grand Lake Victoria to the Headwaters of the Nottaway; Geol. Surv. Can., Summ., Rept., 1912, pp. 315-336.
- Wilson, W. J., *Geological Reconnaissance Along the Line of the National Transcontinental Railway in Northwestern Quebec*; Geol. Surv. Can., Mem. 4, 1910.

NATURE AND SCOPE OF REPORT

The western part of the area, which includes the district in which the Pascalis-Louvicourt gold deposits occur and also the eastern end of a batholith known as the 'Boulamaque granodiorite', was examined and mapped in greater detail than was the country farther east. In the area to the east of the Bell river, localities in which rock outcrops are most prevalent were first outlined, and the work then concentrated on those sections that were regarded as the most favourable for prospecting.

The accurate and detailed base-map provided by the Topographical Survey of Canada covers the map-area with the exception of the three half-townships on the south, which have not yet been photographed by the Royal Air Force. These three half-townships were examined in much less detail than the main part of the area, the work being limited mainly to the determination of the extent of the belt of volcanic rocks in Villebon township, and to a study of the nature and structure of the sedimentary formations. In the principal part of the area, the aerial photographs were a great aid in

locating and delimiting rock outcrops and also swamp areas, making it possible to neglect the latter.

GENERAL GEOLOGY

The several major rock types within the map-area represent the continuation, along their easterly strike, of the similar rocks which occur along the western portion of the belt. Since these major rock types have already been fully described, especially in the publications of the Geological Survey of Canada, they are not dealt with in detail in the present report, except insofar as they exhibit local peculiarities or features of special interest.

Apart from Recent and Pleistocene deposits, the area is underlain entirely by pre-Cambrian formations.

TABLE OF FORMATIONS

Recent and Pleistocene.....	Clay, alluvium, beach gravel, sand, ground moraine, eskers
<i>(Great unconformity)</i>	
Pre-Cobalt (?) intrusives.....	Later quartz gabbro
<i>(Intrusive contact)</i>	
Pre-Cobalt intrusives.....	Pegmatite Quartz monzonite, granite, hornblendite Quartz-feldspar porphyry Granodiorite Diorite porphyry Diorite, quartz diorite
<i>(Intrusive contact)</i>	
Témiscamian.....	Greywacke, conglomerate, and altered equivalents
<i>(Probable unconformity)</i>	
Kewatin.....	Iron formation Diorite, amphibolite, serpentine Volcanics: basalt, andesite, trachyte, rhyolite, volcanic breccia, agglomer- ate, tuff, tufaceous sediments; altered equivalents of all these

KEEWATIN

All the volcanic rocks of the district have been mapped as Keewatin. While it is possible they may not all be of the same age, evidence to the contrary is lacking. The lavas range in composition from acid to basic, with intermediate and basic varieties predominating. Pillow lavas show their greatest development in Tavernier and Villebon townships, in the eastern section of the area. There is a large exposure of volcanic breccia in southwestern Pascalis township. Rhyolites are comparatively rare, although they do occur, as, for example, to the northwest of Vincent lake and in the west-central part of Louvicourt township, where they are considered to be of volcanic origin. Whether the same is true of other fine-grained acid (rhyolitic) rocks occurring in southern Tiblemont township, or whether these are related to the granitic intrusives, could not be definitely determined. They have been grouped tentatively with the Keewatin volcanics.

Agglomerates are commonly associated with the lava flows. A considerable thickness of tuff occurs to the south of Simon lake, and also in the northwestern part of the map-sheet, in western Pascalis township. In the latter locality, some of the tuffaceous beds resemble normal clastic sediments. Highly altered tuff is found in a number of places near the contact between volcanic rocks and the typical sediments.

Iron formation occurs in Pershing township to the east of Vauquelin lake, and also in the vicinity of lake Matchi-Manitou. A strong, continuous zone of magnetic attraction extends through southeastern Vauquelin township. The zone is swamp-covered, but the indications are that a band of highly magnetic iron formation lies buried beneath the swamp. In the exposures that were seen, the iron formation consists of banded chert and magnetite. Though discontinuous in lateral extent, the bands locally attain apparent thicknesses of more than a quarter of a mile. The iron formation was seen in contact with other rocks only to the west of lake Matchi-Manitou. Here, the contact is with massive andesite, which is on the north. The bands that were observed occupy structural positions near the top of the Keewatin series.

In the southeastern part of Vauquelin township, and extending eastward into Pershing, is an area of amphibolites. These rocks

have been largely recrystallized and their original nature is rather obscure. They now consist chiefly of hornblende with varying amounts of quartz, fresh plagioclase, orthoclase, and ilmenite. In texture, they grade from a fine-grained rock to one with hornblende crystals three-quarters of an inch in length. They appear to have been formed through the metamorphism of a basic intrusive or volcanic rock, or, in the case of some of them, of basic tuffs, a supposition that is supported by their association with more acid, well preserved tuffs, and by the fact that tuffaceous fragments may be distinguished in thin sections of some of the less highly metamorphosed rocks of the amphibolite belt. The amphibolites are tentatively included in the Keewatin, although some of them are possibly equivalent in age to the Témiscamian sediments.

Hornblende rocks also occur along the northern margin of the granitic mass in Vauquelin township, where they appear to represent a contact phase of the intrusive.

Altered diorite, intrusive into the lavas to the east of the Bell river, has been included in the Keewatin. All dioritic rocks cannot, however, be assumed to be intrusive, since thick lava flows commonly develop a coarse texture.

Serpentine, veined with asbestos, outcrops in northwestern Louvicourt township, where it forms a small bay in the Bourlamaque granodiorite mass, on its eastern margin, where it is in contact with Keewatin rocks. The serpentine may represent an intrusion of basic rock, but the alteration to serpentine is almost certainly an effect of the intrusion of the granodiorite.

TÉMISCAMIAN

The sedimentary series that has been traced eastward from the vicinity of the Quebec-Ontario boundary by other workers, and classed by them as Témiscamian, continues eastward through southern Louvicourt and Marrias townships, to the belt of volcanic rocks in Villebon township. East of this volcanic belt, sediments again appear that are lithologically similar to those farther westward, and they have undergone similar deformation. They are therefore regarded as approximately equivalent in age. In this locality, bands of sediments are infolded with the Keewatin. The sediments consist chiefly of

recrystallized greywacke, with some chert and conglomerate. It should be stated, however, that although it has been generally assumed that the sediments in all these occurrences are of the same age, this is by no means certain.

SEDIMENTS IN SOUTHERN PART OF MAP-AREA

The main band of sediments that has been traced eastward through Louvicourt township, and the sediments occurring still farther to the east, which are believed to form the continuation of this band, are chiefly greywackes with minor amounts of conglomerate. Although the actual contact of the sedimentary band with Keewatin rocks was seen at only one point, the structural relationships indicated are similar to those found by other writers in the areas to the west. The sediments overlie, and are younger than, the Keewatin volcanics. Structurally, they form a geosyncline, whose northern limb is adjacent to the Keewatin volcanics, which lie to the north of them. For some distance south of the contact, drag folds, and the relation of the cleavage to the bedding, indicate that the strata are overturned to the south, so that the axis of the folds dips steeply to the north. In Denain township, minor folds in the sediments all pitch eastward, thus indicating a general pitch of the sediments to the east. The intense shearing of the volcanic rock at its contact with the sediments, where observed near the south end of Trivio lake, in Louvicourt township, indicates strong faulting along the contact.

In Vauquelin township, at some distance to the south of the main sedimentary-volcanic contact, are a number of bands of fine-grained igneous rock interbedded with the sediments. These seem to indicate that volcanic activity continued into Témiscamian time. Near the north-south centre line of southern Louvicourt township, also, is a narrow sill-like body of hornblende rock, or amphibolite, lying within the fine-grained sediments.

In the vicinity of lake Villebon, to the south of the sedimentary-volcanic contact, is an extensive band of basic and intermediate volcanic rocks. The relationships of this band are difficult to determine, but it seems probable it is an infolded band of Keewatin rather than an interbedded Témiscamian lava flow.

All of the sedimentary rocks in the district have been highly altered by folding, and, in part, by contact metamorphism. In the

southeastern part of the area, in particular, the contact action of the southern granite mass has resulted in the formation of much garnet in the sediments, and, nearer the granite, complete recrystallization has produced a rock closely resembling granite in appearance. A band of metamorphosed staurolite schist is exposed near the west side of lake Matchi-Manitou. The sediments are intruded by the granite, porphyry, pegmatite, and 'younger' gabbro.

GARDEN ISLAND LAKE SEDIMENTS

Sediments outcropping east and south of Garden Island lake consist of altered greywacke, conglomerate, and also staurolite and garnet schists. A conglomerate band occurs within the fine greywacke beds several hundred feet south of the assumed position of the contact between the sediments and the Keewatin volcanics which lie to the north of them. It is difficult here to locate the exact contact, because, towards the sediments, the volcanics are tuffaceous and thus closely resemble the greywacke. The occurrence of staurolite, a mineral common in metamorphosed clay-bearing rocks, but not characteristic of Témiscamian sediments elsewhere, indicates that the terrain from which these sediments were derived must have undergone fairly complete weathering in order to supply the clay they apparently once contained.

The beds in this belt dip steeply to the north and have an average strike of 30° north of west. To the west along this general strike, iron formation occurs near Vauquelin lake, and greywacke is found at the north of Guéguen lake. As the band is traced eastward from Garden Island lake, it strikes in a more southerly direction, suggesting that it connects with the main body of sediments on the south of lake Matchi-Manitou. The probable connection between these two sedimentary bands is, however, obscured by an intrusion of granite and by drift-cover. The structure suggested is that of a narrow, overturned syncline of sediments, pitching east at a low angle. The occurrence of staurolite in the easterly mapped portions of both belts suggests a relationship between them.

PRE-COBALT INTRUSIVES

BATHOLITHIC AND ASSOCIATED INTRUSIVES

GRANODIORITE:

The Bourlamaque granodiorite batholith, an important feature in the region to the west, extends but a short distance into the present map-area. As it has been described in some detail in a number of published reports^①, a further account of it here has been deemed unnecessary. The batholith extends in an easterly direction for 1½ miles into Louvicourt township, and for a considerably lesser distance into Pascalis. Its eastern border is exposed for a total of five miles in a north-south direction, 3½ miles in Louvicourt and 1½ miles in Pascalis. The granodiorite intrudes Keewatin rocks, and the contact between the two has a fairly uniform north-south trend, but with minor irregularities, chiefly due to dykes of granodiorite extending out from the main mass. These granodiorite tongues are less altered, and not as much foliated, as is the greater part of the eastern margin of the batholith. For the most part, they are within a half-mile of the main contact.

A second stock, lithologically identical with the Bourlamaque granodiorite, of very much smaller but as yet undetermined size, outcrops in the northeastern quarter of Louvicourt township, 4½ miles to the east of the main mass. Although intervening outcrops of Keewatin rock are rather sparse, they are in sufficient number and size to indicate that this smaller granodiorite mass represents a separate stock or cupola, probably connected only at depth with the Bourlamaque batholith.

The granodiorite of both occurrences is characterized by a fairly uniform granitic texture, pinkish to grey colour, and the presence of opalescent 'eyes' of quartz. It is rich in soda plagioclase, and carries hornblende. Secondary minerals are abundant, and alteration is pronounced, more particularly inasmuch as the border phases of both intrusive masses are here chiefly represented.

At several points along the eastern margin of the Bourlamaque batholith are occurrences of hybrid rock that seem to have resulted

^① Que. Bur. Mines, Ann. Rept., 1930, Part C, pp. 23-25.
Geol. Surv. Can., Memoir 166, 1931, p. 133.

from the incomplete assimilation of the Keewatin rocks by the intrusive granodiorite. A large outcrop of such rock occurs near the southeastern end of the mass, in a group of claims controlled by the F. M. Connell interests. Several occurrences of diorite, described on a later page, may be closely related to the hybrid border phases of the granodiorite.

PASCALIS-TIBLEMONT INTRUSIVE:

Although the composition of this mass varies considerably, it is, correctly speaking, a quartz-monzonite, *i.e.*, a rock intermediate in composition between granite and granodiorite. Specimens of the typical rock consist of albite, microcline, orthoclase, and quartz, with biotite and hornblende, and secondary chlorite and epidote. More than half of the feldspar is plagioclase, and the quartz content is high. The feldspars are comparatively fresh. Where the rock has been altered, the quartz is commonly opalescent. Locally, differentiates of this batholith are exceptionally high in quartz, whereas elsewhere granodiorite and quartz-diorite appear to represent more basic differentiates of the main body. Fine-grained quartz-diorite in narrow dykes cuts the monzonite, of which it is assumed to be a differentiate. Such dykes are well exposed on the west shore of Tiblemont lake (see Plate No. I-A).

VAUQUELIN-PERSHING INTRUSIVE:

A second intrusive mass occurs immediately to the southeast of that described above, and extends across east-central Vauquelin and west-central Pershing township. This batholith, also, may be classed as a quartz-monzonite. To the north of the batholith, in Vauquelin township, highly acid fine-grained rocks are found, and are assumed to represent the fine-grained equivalent of the granitic mass. Small dykes of this rock may be seen cutting the banded iron formation.

DIORITE, QUARTZ-DIORITE:

A short distance to the southeast of the central point of Louvencourt township are several outcrops forming part of a small stock of what is assumed to have been originally a quartz-diorite. The rock is dark and chloritic, is rich in plagioclase, and carries quartz in the form of opalescent 'eyes'. In one of the outcrops there is a little mineralization.

To the south of the Bourlamaque granodiorite in Louvicourt township are two occurrences of feldspathic rock, which is presumably an altered diorite. The ferromagnesian minerals are altered to chlorite, and the small amount of quartz present seems to be secondary. The rock is foliated and is intrusive into the Keewatin lavas. Although apparently earlier, the dioritic intrusives seem to be related to the granodiorite.

J. E. Hawley^① has suggested that occurrences of diorite in the Dubuisson-Bourlamaque area, which are somewhat similar to that described above, are equivalent in age to the rock formerly termed 'older gabbro' in the Rouyn district.

DIORITE PORPHYRY:

In the vicinity of the southwestern bay in Guéguen lake, the rock consists largely of a fine-grained, dark-coloured intrusive diorite porphyry containing irregularly distributed phenocrysts of feldspar. This rock intrudes the volcanics in a very irregular manner. Dykes of quartz-feldspar porphyry in turn cut the diorite porphyry. Since gradations may be traced from the main granitic intrusion both to the quartz-feldspar porphyry and to the diorite porphyry, it would seem that both porphyries are differentiates of the same intrusive mass, and that the diorite porphyry is only slightly earlier than the quartz-feldspar porphyry. The diorite porphyry is the more highly altered, and contains much sericite, epidote, and chlorite.

QUARTZ-FELDSPAR PORPHYRY:

Two types of quartz-feldspar porphyry occur in Vauquelin and Pershing, and both are probably derivatives of the main granitic intrusive in these townships.

One type consists of phenocrysts of plagioclase, orthoclase, and quartz, with some biotite, in a fine groundmass of quartz and feldspar. As stated above, gradations may be traced between this type of porphyry and the quartz-monzonite in the vicinity of the southwest arm of Guéguen lake.

The other type occurs to the east of Garden Island lake, and in northwestern Vauquelin township. It is composed of phenocrysts of

^① *Op. cit.*, p. 20.



A.—Quartz-diorite dyke intrusive into acid phase of monzonite on west shore of Tiblemont lake.



B.—Flow structures in Kewatin lavas, southern Pascalis township.

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albite, orthoclase, and quartz, in a subordinate groundmass of quartz and feldspar. The rock has a very white appearance due to the absence of ferromagnesian minerals. Owing to the fact that dykes of this type were observed only near the eastern and western ends of the Vauquelin-Pershing intrusive, they are assumed to be closely related to it, and also to the mineralization in the vicinity of Garden Island lake, which is described on a later page. In composition, this porphyry somewhat resembles the aplite dykes occurring in the principal zone of mineralization of the Bousquet-Cadillac area^①.

It also resembles the soda-aplite, described immediately below, which occurs as dykes in the vicinity of the Bourlamaque granodiorite. It is coarser, however, and much more porphyritic in texture.

SODA-APLITE (ALBITITE):

Dykes of fine-grained, light-weathering 'soda aplite' are intrusive into the Bourlamaque granodiorite and the adjacent Keewatin rocks in Pascalis and Louvicourt townships. They are rather closely confined to the contact zone. Most of the occurrences are in the form of narrow dykes that cannot be traced for any appreciable distance. The rock consists primarily of soda plagioclase and quartz, the two commonly in micrographic intergrowth. The soda aplite is undoubtedly genetically related to the granodiorite. Hawley^② has shown that dykes of similar type at the Siscoe mine, termed albitite by him, are very closely related to the mineralized veins.

ANDESITE DYKES:

Along the eastern margin of the Bourlamaque granodiorite there are narrow, greenish dykes consisting essentially of secondary quartz, carbonate, and plagioclase. The fractures occupied by such dykes usually contain also vein matter, indicating that the dykes and the mineralization have a very close genetic relationship, since both followed the same channels. Their resemblance to certain greenstone inclusions in the granodiorite is very marked, both in colour, and, commonly, in the foliated character of the rock. The term 'andesite dykes' is used here, following Hawley^③, who has described seemingly identical occurrences at the Siscoe mine.

^① Que. Bur. Mines, Ann. Rept., 1929, Part C, p. 31.

^② *Op. cit.*, p. 28.

^③ Que. Bur. Mines, Ann. Rept., 1930, Part C, p. 37, p. 43.

SOUTHERN GRANITES AND PEGMATITES:

In the southeastern part of the area, granite and pegmatite, connected with a large granitic mass, intrude the sediments, which they have highly altered. A boss of granite was also observed to the west, in Marrias township, intruding the sediments. The pegmatites are commonly light coloured dykes of varying, though not very coarse, grain, composed of quartz, feldspar, and muscovite.

At the southern end of lake Villebon (Christopherson), gneissoid acid rocks were observed which seem to be intrusive into the lavas.

GENERAL RELATIONSHIPS OF THE PRE-COBALT INTRUSIVES:

The age relationships of the individual intrusions are for the most part not known. Although there is evidence that the great majority of them were intruded subsequent to the major period of folding, they have been subjected to later regional stresses, evidence of which may be seen in the fracturing of the granitic masses near their edges, and occasionally in the development of shearing in the porphyry dykes.

LATER GABBRO

Dykes similar in all respects to those termed 'later gabbro' by other workers in the western part of the belt, occur in the present map-area. Only the quartz-gabbro type was observed here. These dykes are composed chiefly of fresh labradorite feldspar and augite, the latter in part altered to green hornblende. Most of them strike approximately N.50°E., which is the characteristic strike of the 'later gabbro' dykes observed elsewhere.

PLEISTOCENE AND RECENT

The area is in the clay belt, near its eastern edge. The Pleistocene deposits, particularly in the eastern part of the area, are characterized by an abundance of sand, boulders, and boulder clay, rather than by lake clays. Extensive sand deposits occur in west-central Louvicourt, southern Vauquelin, Denain, Villebon, and Tavernier townships. Much of this sand seems to have been deposited by wind action.

The eastern shore-line of the post-glacial lake Barlow-Ojibway is assumed to have run parallel to the Bell river, but a few miles to the east of it^①. Such a boundary is no doubt approximately correct, although several deep indentations of the shore line appear to have extended to the east. The high, upland region in the southeastern part of the map-area is in large part covered by glacial drift. High hills along the boundary between Denain and Villebon townships are completely drift-covered.

STRUCTURAL RELATIONSHIPS

STRUCTURE IN VICINITY OF EASTERN MARGIN OF BOURLAMAQUE GRANODIORITE

Although the Bourlamaque granodiorite is for the most part quite massive, the rock is commonly foliated along most of the eastern margin of the batholith. The direction of foliation is constant, varying only between N.70°E. and N.80°E., and the dip is vertical or steep to the north or south. This constancy in the strike and dip is the more remarkable in view of the fact that the foliation of the adjacent Keewatin rocks varies considerably in its strike. In the more massive phases of the granodiorite, there are at least two sets of joints. The better defined has a general strike of true north, although it may deviate as much as 25° either to the east or west of north. The second set strikes, as an average, slightly south of east.

Fracturing and foliation of the granodiorite are of particular interest on account of their relationship to the mineralized veins. The vein-fractures are connected with the foliation, and in general they have a similar strike, although in places they have a somewhat more northerly or more southerly trend. Proximity to the margin of the batholith, and the trend of the latter, clearly have an important influence on the foliation and fracturing. In general, both become more pronounced as the margin is approached and, in most cases, they strike approximately at right angles to it. Most of the vein-fractures have a southerly dip.

The fact that the effects of dynamic action are much more evident along the margin of the granodiorite mass than in its interior, may be

^① Geol. Surv. Can., Memoir 166, p. 153.

ascribed to the contact between a competent plutonic rock mass, and less competent volcanic beds, giving rise to a zone of weakness along which stresses might be expected to have a maximum effect. The foliation, jointing, and fracturing of the granodiorite are connected with external dynamic forces, rather than with the cooling and contraction of the igneous mass.

Although the foliation or schistosity of the Keewatin rocks adjacent to the granodiorite varies considerably in its strike, in a broad way it follows three general directions. At the south and southeast

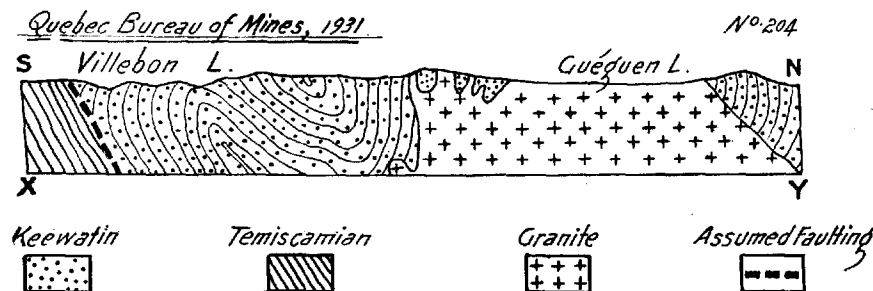


FIGURE 1.—Hypothetical section from the north narrows of Guéguen lake to the west side of Villebon (Christopherson) lake.

of the batholith, it parallels the border of the latter, namely N.75°E. Foliation in this vicinity is so intense that in many places the rock is altered to sericite and chlorite schist. In the Keewatin to the east of the granodiorite, foliation is for the most part roughly east-west, and thus corresponds closely in direction to the regional schistosity of the area. North and northeast of the granodiorite, there are two directions of foliation, that striking N.75°E. being superimposed over the more typical one, which strikes northwest-southeast. The dip of the foliation or schistosity is invariably at steep angles, in most places closely approaching the vertical.

STRUCTURE TO EAST OF BOURLAMAQUE GRANODIORITE

In the region to the east of the Bourlamaque granodiorite, the general strike of the formations and the regional cleavage of the rocks varies from E.-W. to N.65°W., the average being N.77°W. The dip

is generally steep to the north. Two sets of joints observed in the Tiblemont and Vauquelin granites display a regularity of direction such as would result from the same regional stresses as were responsible for the folding in the adjacent volcanics and sediments.

In the eastern section of the area, the general structure indicated is that of close interfolding of the sediments with the lavas, the folds being overturned to the south with their axes dipping at about 80° to the north. The folds have a general pitch to the east.

The relationship between the sediments and volcanic rocks in Villebon township is difficult to determine. The lavas represent either volcanic flows of Témiscamian age interbedded with the sediments, or an exposed anticline of Keewatin lavas. The general structure, as interpreted, supports the latter view. Intense shearing in the lavas along their western contact with the sediments, together with the change in strike of the adjacent sediments, indicates the probability of a faulted contact.

ECONOMIC GEOLOGY

WESTERN PART OF AREA

(Pascalis and Louvicourt Townships)

GENERAL CONSIDERATIONS

All of the more important gold deposits discovered up to the time of writing are in the western part of the map-area. For the most part they are near the eastern margin of the Bourlamaque granodiorite, or are associated with the stock of similar granodiorite in the north-eastern quarter of Louvicourt township. In the adjoining Dubuisson-Bourlamaque area to the west, the deposits of the Siscoe and Sullivan mines are connected with the westerly extension of the Bourlamaque mass. There is thus evidence of a very close relationship between the gold deposits and the granodiorite.

A striking fact is that all of the more important gold-bearing veins so far discovered in the two townships occur *within* the intrusive granodiorite, and generally within a half mile of its contact with the invaded (Keewatin) rocks. In this respect, the deposits are unusual. The fact that they are so closely confined to the margin of the in-

trusive, presumably as a result of the intensity of the fracturing there, is an important consideration in this connection. It has been pointed out by W. H. Emmons^① that in the shield areas of the world, including the pre-Cambrian shield of Canada, lode-gold deposits of importance do not in general occur within the intrusive rock at a distance greater than one mile from its contact with invaded rocks. Among the lode-gold deposits occurring within intrusive rock less than one mile from the contact, to which class the newly-discovered Pascalis-Louvicourt deposits belong, Emmons cites the principal ones as being the Owl, Acorn, and Battlefield mines in Southern Rhodesia.

The eastern margin of the Bourlamaque granodiorite forms a zone in the townships of Pascalis and Louvicourt almost five miles long and with a width averaging about three-quarters of a mile, throughout which the principal deposits occur. Since the fracturing and the veins are roughly at right angles to the line of contact, and are more or less parallel to one another, there are possibilities of a large number of occurrences throughout this distance. The fact that the vicinity of the actual contact is in considerable part drift-covered, adds to the possibility of further important discoveries being made.

The satellitic granodiorite mass in the northeastern quarter of Louvicourt township, with which gold mineralization is connected, adds further to the possibilities of the district, and it is reasonable to suppose that other related stocks of granodiorite may exist in the rather extensive drift-covered areas to the east of the Bourlamaque mass.

Although deposits of importance have not as yet been discovered within Keewatin rocks adjacent to the granodiorite, the possibility of such occurrences seems reasonably good. Favourable conditions necessary would appear to be the occurrence, near the contact, of Keewatin rocks sufficiently competent to maintain fractures. A number of the observed exposures of Keewatin rocks in the vicinity of the granodiorite mass, and thus within the zone of more intense fracturing and shearing, have yielded to the dynamic stresses to such an extent that they have been metamorphosed to highly foliated schists. These intensely schistose rocks are not considered favourable for gold deposition. The occurrence of important deposits in the Keewatin rocks more remote from the granodiorite would seem to be dependent on the presence of favourable intrusives in these rocks.

^① Am. Inst. Min. & Met. Eng., Technical Publication No. 452, 1932.

Veins similar to those occurring within the granodiorite, in that they consist of quartz carrying abundant tourmaline, are found in the Keewatin rocks on the Cockshutt-McLeod claims (Noranda option) in Louvicourt township, more than a mile west of the assumed contact with the main granodiorite. The only veins that were revealed at the time the claims were visited are small and irregular, and are not, in general, well mineralized, although some of them do carry gold. It is understood that a much more important gold discovery has since been made in the Keewatin rocks of these claims.

A feature of the rather limited number of exposures of Keewatin rocks both in Louvicourt and in southern Pascalis township, is the widespread mineralization, or indications of mineralization, in them, a feature which should encourage intensive prospecting here. Sulphide zones occur in west-central Louvicourt township, and carbonated sulphide bodies in the southeastern quarter of the township, near the Louvicourt river.

Although indications of mineralization in the rather poorly exposed Témiscamian sediments of Louvicourt township are not abundant, some quartz veins were noted in them, more particularly in the vicinity of small, porphyritic intrusives. Such places afford favourable prospecting ground.

Hydrothermal alteration of the rocks, including silicification, carbonatization, and the development of such secondary minerals as chlorite and epidote, is a feature connected with the mineralization in the district as a whole and is a favourable indication of its occurrence. Such rock-alteration should serve to some extent as a guide to prospecting in the district. It is particularly evident in the granitic masses near their margins, in many occurrences of Keewatin rocks, and occasionally in the Témiscamian sediments.

NATURE OF THE DEPOSITS

With the exception of one of the two original discoveries, that on the property of Pascalis Gold Mines, Ltd., all of the more important deposits of the district consist of quartz-tourmaline veins and lenses carrying pyrite and gold. The veins are composed dominantly of quartz, which is white and vitreous and seems to be of more than one generation. Carbonate usually forms a minor part of the vein filling

and is later than the first generation of quartz. Black tourmaline is commonly very abundant, and locally it may constitute 20 per cent or more of the vein matter. The tourmaline is occasionally banded with the quartz, parallel to the vein walls. Albite was observed in the veins of the Treadwell-Yukon vein system and suggests a genetic relationship between the veins and the soda-aplite dykes already described. Sericite is commonly seen with the quartz.

Metallic mineralization consists essentially of pyrite, which is often characterized by a greenish tinge. It commonly occurs in massive, somewhat friable, aggregates. In the surface exposures of the veins, the pyrite has often been removed by weathering, leaving vugs in what would thus appear to be non-mineralized quartz. Pyrite may occur, as in parts of the LeRoy vein, as a finely disseminated mineralization which occasionally becomes massive, and which is closely associated with the gold. Chalcopyrite is generally present, but is not abundant, and sometimes is indicated only by films of secondary bornite. Gold is quite common in visible form, and it may be coarse or fine. It occupies fractures both in the quartz and in the pyrite. The higher gold values seem to be associated with the heavily pyritized portions of the veins. A soft, black, metallic mineral may occasionally be seen, and is very closely associated with the gold. This mineral has been identified by Dr. Ellis Thomson, of the University of Toronto, as the bismuth telluride, tetradymite.

Milling tests conducted by the Mines Branch of the Federal Department of Mines on bulk samples from the more heavily mineralized portions of the LeRoy and Matthews veins (described on a later page) indicate that the gold is essentially in the free state, and that its recovery presents no great metallurgical difficulties. In their report on the LeRoy ore, it is pointed out that much of the gold is probably loosely held in, or with, the pyrite crystals. The method of treatment recommended in each case is amalgamation, followed by regrinding and cyanidation of the amalgam tailing.

Many of the more promising veins are characterized by re-opening or secondary fracturing, evidence of which is provided in the occurrence of quartz with a coating of tourmaline which shows grooving or gouging as a result of movement along the grooved surface. The direction of movement thus indicated is commonly parallel to the direction of dip of the veins. Since this feature is common to the

more promising veins, and since gold is in general one of the last phases of the mineralization, the inference is that the introduction of the gold was largely dependent on secondary fracturing of the veins. The gold may have been introduced with a later generation of quartz.

The deposit of Pascalis Gold Mines, Ltd., differs from the quartz-tourmaline veins in that it is an irregular replacement body consisting of quartz, carbonate, and albite, and carrying disseminated pyrite, usually in the form of small cubes. Gold also is present.

The location of the deposits with respect to the granodiorite leaves no doubt as to their genetic relationship to the latter. Cutting the granodiorite and adjacent rocks, and limited to the vicinity of the former, are the soda-aplite (albitite) dykes, which are almost certainly a differentiate of the granodiorite. The fact that these dykes are seemingly much more prevalent in the vicinity of the deposits than elsewhere suggests a relationship between the two. This is further indicated by the occurrence of albite, the characteristic mineral of these dykes, in some of the mineralized quartz veins. The genetic relationship between mineral deposits and intrusive rocks rich in soda-plagioclase would thus seem to be characteristic of the Pascalis-Louvicourt deposits, as it is of those in other Quebec gold districts.

EASTERN PART OF AREA

GENERAL CONSIDERATIONS

As in the region farther to the west, the most favourable places to prospect for gold in the eastern portion of the map-area are considered to be in, or adjacent to, small masses of granite and granodiorite and their related porphyries, or just within the margins of the larger intrusions and in projections from them. It seems probable that the function of the intrusive rocks has been to afford a controlling structure along which the mineral-bearing solutions might ascend. According to this view, deposits will occur where the fracturing is most suitable, and this may be either in the adjacent country rock or in the intrusive. No suitable fracturing can be expected in the granites except close to the margins of the masses. The granitic intrusives occurring in the area are high in soda, and locally are similar in composition to the Bourlamaque granodiorite. It is not known, however, whether they are actually connected with the latter, nor whether they have similar

deposits associated with them. The impure, or 'hybrid,' phase of the granodiorite, typical of the marginal zone of the Bourlamaque mass in Pascalis and Louvicourt townships, was not observed in the granitic intrusives here. However, gold has been found in the fractured granite of northern Tiblemont, and gold deposits might reasonably be expected to occur associated with the granitic rocks elsewhere if suitable fracturing can be found. Gold is also associated with porphyritic intrusions in this eastern part of the area.

PROSPECTING CONDITIONS

Brief descriptions of geological conditions in various parts of the area to the east of the Bell river follow:

SEDIMENTS AT SOUTH OF AREA:

The field work of the past season did not reveal the presence of favourable intrusives in these sediments. The possibility of commercial mineralization in the greywackes themselves does not appear encouraging.

LAKE VILLEBON GREENSTONE BELT:

Outcrops are scarce, except in the vicinity of the northwestern part of the lake, where zones of intense shearing occur. Gneissic granitic intrusives are found to the south of the lake, but porphyries appear to be lacking. Along the contact between the sediments and the greenstone to the south of the lake there is a rusty sulphide zone.

VAUQUELIN TOWNSHIP:

Suitable prospecting ground is limited owing to the relative scarcity of outcrops. A rocky area occurs to the south of the west arm of Guéguen lake. Here greenstones are intruded by tongues of granite and its porphyritic phase, and there are some shear zones in the greenstones. To the south of Simon lake there are exposures of Keewatin tuffs traversed by flat-dipping quartz veins mineralized with sulphides, but apparently containing no gold; there are also a few small porphyry dykes here. West of Simon lake, the volcanics are cut by similar quartz veins that carry pyrite, chalcopyrite, and a

little sphalerite; small quartz stringers are reported to carry free gold. Farther north, pyrite and chalcopyrite mineralization is found in the volcanics.

In the northwestern quarter of the township, outcrops are very scarce, but exposures of andesite intruded by quartz-feldspar porphyry were observed at a point one mile west of the Louvicourt river.

In northeastern Vauquelin, the chief area of suitable outcrop is eastward from the narrows at the north of Guéguen lake. Here, the relatively basic marginal phase of the granitic intrusive is fractured and traversed by quartz veins. To the north of this are sediments and sheared greenstone. A very fine-grained phase of the granite outcrops in places towards the east of the lake. The contact of the Vauquelin granitic mass with the surrounding rocks is for the most part covered by drift.

In the southeastern part of the township, there are scattered outcrops, principally of massive hornblendite cut in places by porphyry dykes. Sediments occurring along the Pershing-Vauquelin township line have been intruded by quartz-feldspar porphyry dykes. Reference has already been made (page No. 72) to the probability that a band of strongly magnetic iron formation, buried beneath a swamp, extends through southeastern Vauquelin township.

PERSHING TOWNSHIP:

In the southern part of this township, basic igneous rocks and hornblendites occupy an upland area which extends east to lake Matchi-Manitou. Along the northern margin of this upland, these rocks are intruded by porphyry dykes. To the southeast of it, andesites and iron formation are exposed. The sheared iron formation is mineralized with pyrite, chalcopyrite, and sphalerite, but outcrops in this region are scanty. The sediments along the southern boundary of the township are cut by numerous pegmatite dykes, but, so far as observed, these contain no minerals of commercial significance. The iron formation on the east side of Lake Matchi-Manitou is highly contorted and metamorphosed. A sample taken across a few feet of one of the richer magnetite bands exposed on the lake showed a content of 41.6 per cent iron, but on the whole, the iron formation is lean. No indication was seen of any secondary concentration of

iron. If such has occurred, it might be expected along the contact between the iron formation and the Témiscamian sediments, which contact is not exposed.

A mineralized zone occurs in the sheared greenstones to the north of the Garden Island Lake sediments. This zone is up to thirty chains in width and extends from Garden Island lake for several miles in a direction about 20° south of east. Within this belt are bodies of siliceous carbonate schist, probably arranged *en échelon*, as well as numerous whitish dykes of quartz-feldspar porphyry. Pyrite mineralization and quartz veins are found in shear zones in and adjacent to these dykes. Gold values are associated with the pyrite and with some of the quartz stringers. While outcrops are low and scattered, there would appear to be favourable prospecting ground here, both in the sheared greenstone and in the conglomerate beds to the south, both being cut by porphyry dykes. This mineralized zone has been traced for several miles eastward from Garden Island lake and a considerable amount of staking has been done along it. To the west, its probable extension is covered with heavy drift for several miles.

Keewatin lavas are well exposed in the northern part of the township, but few intrusives are found cutting them.

SOUTHERN TAVERNIER TOWNSHIP:

The southwestern part of Tavernier is largely covered by sand plains, through which project scattered areas of outcrop. The rock is mostly andesite, with pillow structure.

SOUTHERN TIBLEMONT TOWNSHIP:

Pillow lavas occur in the eastern part of the township. Rhyolites, probably of volcanic origin, are seen to the northwest of Vincent lake. At the south of this lake, some iron sulphide mineralization occurs. Whether the fine grained quartz-porphyry mass at the west end of the portage to Vincent lake is of volcanic origin, or is a fine-grained phase of the granite to the west of it, could not be determined. The eastern and southern contacts of the granite are largely drift-covered. It is noteworthy that in places on the east side of Tiblemont lake the granite has been mineralized throughout with pyrite, and is also traversed by quartz veins that carry pyrite and chalcopyrite. Since, near the northeast bay in Tiblemont lake, gold occurs in the

fractured granite, near the margin of the intrusive, favourable prospecting ground might be found also along the margin of the granite to the north of the present map-area.

DESCRIPTION OF MINING PROPERTIES

PASCALIS AND LOUVICOURT TOWNSHIPS

LEROY GOLD MINES, LTD.

(Louvicourt township)

The property of LeRoy Gold Mines, Ltd., comprises a block of 20 claims adjoining the eastern boundary of northeastern Louvicourt township. The claims are numbered A-33699 to A-33718, inclusive. The principal showing, commonly termed the LeRoy vein, is located in claim A-33714 and is approximately 3 1-3 miles south of the north boundary, and slightly less than half a mile west of the east boundary, of Louvicourt township.

The vein was discovered by Georges Bussière, who was prospecting in the interests of Oscar Roy, of Barraute. The ground was subsequently staked, late in September of 1930. This was the first gold discovery of importance in Louvicourt township, and one of the earliest in the area. The claims are now the property of LeRoy Gold Mines, Ltd., who have already done a considerable amount of development work on the property. The Company is capitalized at 3,000,000 shares of no par value.

During the spring of 1931, mining equipment was hauled to the property over the winter road from Barraute, an approximate distance of 27 miles. The equipment consists of two 48 h.p. locomotive-type boilers, a 500 cu. ft. Rand compressor, a 6 by 8 Jeneks hoist, a 2-5 k.w. dynamo operated by a 10 h.p. steam engine, and a drill sharpener. There is also a saw mill for the preparation of building and mine material from local timber. Comfortable camp buildings were erected during the early summer of 1931 under the direction of L. Germain. In the fall, shaft-sinking was commenced under the supervision of J. C. MacPherson, who succeeded Mr. Germain as manager of the mine. At the time of writing, the shaft is at the 125-foot level, and the principal vein has been opened-up for 225 feet in the drift on this level.

During the summer months, the property is reached from Amos by the Harricana-Colombière River route to the LeRoy landing on the Colombière river, in Bourlamaque township. From the landing to the mine is a trail, about $3\frac{1}{2}$ miles long, over which supplies are transported by horse and 'jumper'. During the winter, transportation is by way of the winter road to Barraute; the newly-completed winter road to Senneterre could, however, also be utilized.

Rock exposures in the vicinity of the mine are not abundant, the area being of uniformly low relief and heavily blanketed by clay, and, to a lesser extent, by sand. Outcrops are sufficient, however, to indicate that the principal vein is located within, but very near the southeastern edge of, the Bourlamaque granodiorite mass.

The outcrop in which the vein occurs is a well defined east-west ridge, 800 by 350 feet in extent, rising out of low ground. It consists chiefly of granodiorite, which is for the most part fairly massive, but somewhat altered. Jointing is common in the more massive phases of the rock, particularly in the vicinity of the shaft, where one set of joints has a strike varying but slightly from true north-south. Foliation or shearing is pronounced only near the vein, where fracturing is strong.

To the northwest of the compressor house, there is a well defined contact, along an east-west direction, between the coarse granodiorite and a fine-grained, light-weathering aplitic rock. The latter extends in a northerly direction to the vicinity of the vein, where it appears to fade out into more typical granodiorite. A second occurrence, consisting of a small, dyke-like mass of similar rock, is exposed near the north-central edge of the main outcrop, where it is clearly intrusive into the granodiorite. Under the microscope, the rock is seen to consist essentially of quartz and small crystals of acid plagioclase in intimate (micrographic) intergrowth.

At a point 230 feet south of the principal granodiorite ridge is a second east-west outcrop, 400 feet in length, and consisting of what would appear to be a volcanic, rhyolitic breccia. This rock may easily be confused with the contact phase of the granodiorite. The outcrop is very near the southern margin of the main granodiorite mass. Between it and the outcrop in which the vein occurs, is a rather low-lying, drift-filled depression.

The LeRoy vein is exposed throughout the length of its intersection of the outcrop, a distance of 430 feet. Somewhat similar mineralization was indicated in a pit in low ground 190 feet to the west along the strike of the vein, and also at a point 110 feet still farther west, where the northwesterly prolongation of the outcrop was stripped of moss. This may indicate that the vein continues to the west of its present continuous exposure for an additional 300 feet, making a possible total of 780 feet in all. Moreover, the vein is strong and well defined at its present most easterly exposure, where the outcrop is terminated by rather heavy drift. It may also be noted that the Connell showing, next to be described, which consists of a series of mineralized and gold-bearing quartz lenses, lies 6,000 feet eastward in the direction of the general strike of the vein, namely N.80°E. While this may not be of great significance, it at least suggests the advisability of very carefully prospecting the intervening ground, in which there are a number of low, scattered outcrops.

The LeRoy vein has a general strike of N.80°E., but its actual course resembles, to a slight extent, the letter *S*. It really consists of three sections, differing slightly in strike, which may be regarded as a series of somewhat discontinuous quartz lenses occupying a common fracture. From west to east, these are as follows: the first section of the vein has a strike of N.72°E., is 145 feet long, and has an approximate width of three feet of vein matter; the second or central portion has a strike of S.78°E. and a total length of 115 feet; and the third or eastern section, which is in itself made up of several quartz lenses, in some cases with slight discontinuity, has a strike of N.75°E. and a total length of 220 feet. The total vein width at some points in this section of the vein is as much as twelve feet, but in general it would average four feet. Lying 35 feet to the north of the western end of this 220-foot portion of the vein is a quartz lens 30 feet in length, occupying a fracture which lies along the projected strike of the most westerly section of the vein.

The westerly, 145-foot portion of the vein consists of quartz very well mineralized with fine, and in some places massive, pyrite. A rich shoot carrying abundant fine, visible gold occurs 30 feet from the western end. Sampling by Mr. A. Paré, who examined the property for the N. A. Timmins interests, indicates that this westerly section of the vein carries an average value of \$8.31 over a length of 130 feet

and an average sampling width of 4.69 feet. Relatively higher values may be obtained by calculating the results over shorter distances

The central, 115-foot section consists of three parts. For 30 feet on the west is a fracture containing no vein matter. This is followed by 40 feet of vein material of an average width of $2\frac{1}{2}$ feet, which widens for the remaining 45 feet to a maximum of 12 to 15 feet consisting of massive quartz and of parallel lenses of quartz in the schist, thus giving the vein a ribbed character. The average value obtained by Mr. Paré in sampling the central 40-foot portion of this section over an average width of 5.42 feet was \$7.74 in gold per ton. A somewhat lower average value was obtained in the wider 45-foot portion to the east.

The most easterly 220-foot section of the vein shows fairly uniform mineralization, consisting essentially of pyrite. Tourmaline is a very common constituent. Sampling by Mr. Paré over a length of 75 feet along the westerly portion of this section gave an average value of \$4.53 over a sampling width of 9 feet. The remaining portion gave a somewhat lower average value.

The vein as a whole occupies a strong fracture characterized by a relatively narrow zone of sheared and schistose rock which provides well defined walls. The several lenses of quartz of varying strike, which together make up the vein, very closely parallel the direction of shearing of the fracture, which varies in its strike in a similar manner. The apparent dip, as indicated by the sheared walls of the vein on the surface, is 65° - 70° south, but underground work is stated to have shown the dip to be 45° - 50° south. Evidence of secondary fracturing or re-opening of the vein is found in the occurrence of quartz with a coating of tourmaline showing grooving or gouging. The direction of movement thus indicated is parallel to the direction of dip of the vein.

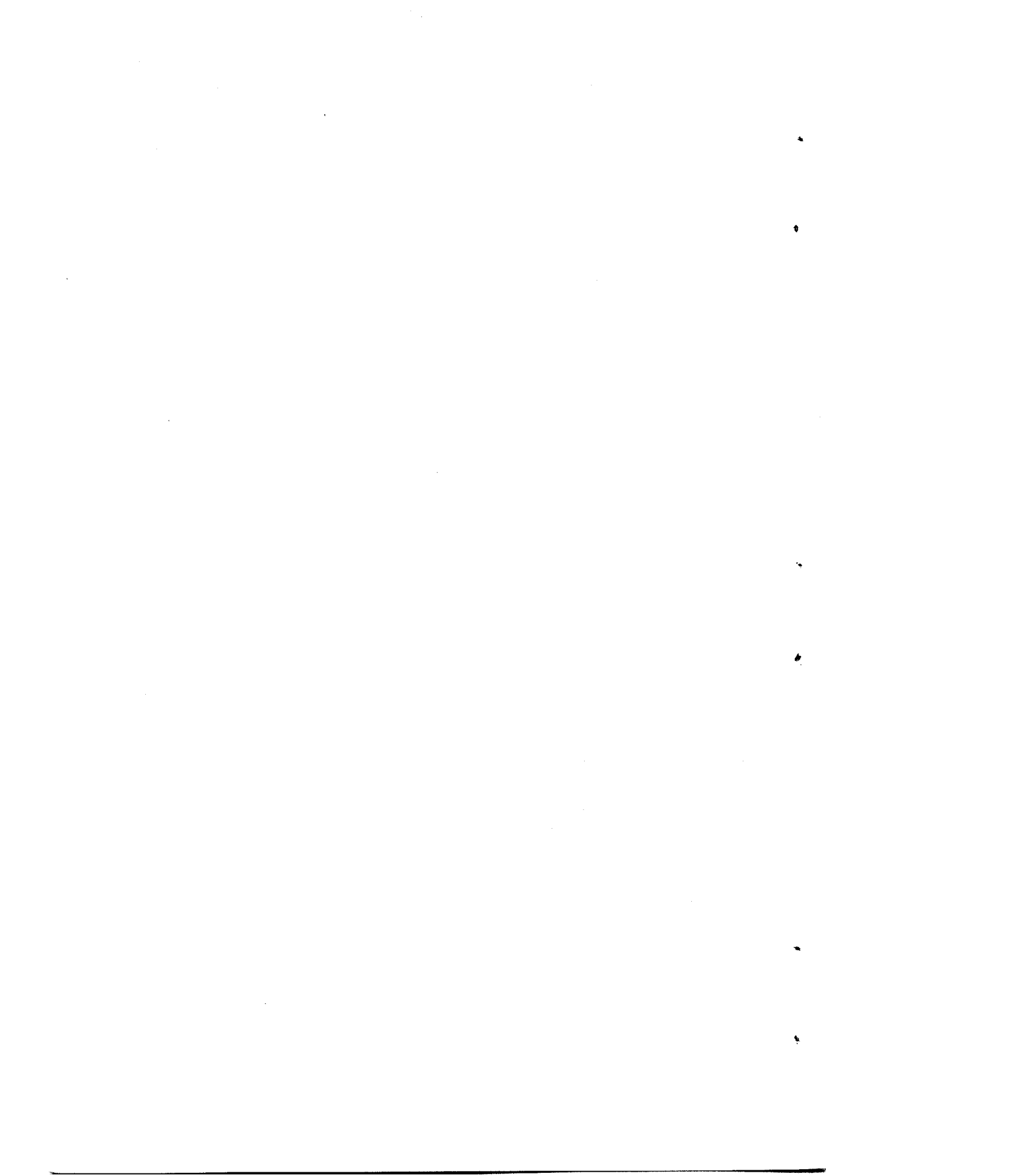
The vein is made up essentially of white, semi-vitreous quartz, quite commonly banded with tourmaline and in general well mineralized with pyrite, which is occasionally massive. The pyrite appears to be concentrated to some extent along the walls of the vein, and also extends into the wall-rock for short distances, usually less than one inch. Films of bornite may be seen, occasionally coating crystals of pyrite, and probably indicating that chalcopyrite is present as a minor constituent from which the bornite was derived. Carbonate is fairly



A.—LeRoy gold mine, Louvicourt township, January 1932.



B.—Treadwell-Yukon mine, Louvicourt township, January 1932.



common and appears to have been formed later than the quartz. Sericite is also present in the quartz. Gold occurs both in the quartz and with the pyrite, quite frequently in visible form.

Tests carried out by the Mines Branch of the Federal Department of Mines indicate that the gold is essentially in the free state, and only loosely held in the pyrite, although to a considerable extent occurring with it. They also indicate that the gold is comparatively fine.

In a recent letter from Mr. J. C. MacPherson, mine manager, it is stated that in addition to the principal vein, termed by him vein No. 3, three other veins have been revealed in the underground workings. The following observations are taken from Mr. MacPherson's notes: A vein 18 inches wide, and dipping flatly to the west, was cut in the shaft at a depth of 110 feet. It is well mineralized with pyrite, and also carries chalcopyrite and visible gold. A second vein, termed vein No. 2, was intersected in the cross-cut 60 feet north of the shaft on the 125-foot level of the mine (the only horizon on which lateral work had been done at time of writing). It is about four feet wide, dips south at an angle of 55° , and is well mineralized with coarse pyrite. It has not been explored by drifting. At a point 50 feet north of where the principal vein was intersected in the cross-cut (94 feet north of the shaft), a fourth vein, termed vein No. 4, was cut. It is 18 inches wide and dips 55° south. This may be the same vein or lens that is exposed on the surface over a length of about 30 feet at a point 35 feet north of the principal or No. 3 vein, but at some little distance to the east of the projection of the cross-cut at the surface.

The probability of finding other veins or lenses parallel with the principal vein would appear to be good, particularly in the contiguous, drift-covered area.

CONNELL MINING AND EXPLORATION COMPANY, LTD.

(Louvicourt township)

The property of the Connell Mining and Exploraiton Company, Ltd., comprises a composite group of 20 claims lying to the east, and in part to the north, of the LeRoy property, and adjoining the Treadwell-Yukon property on the south. The claims, which are numbered

A-33960 to A-33979, inclusive, were staked in the interests of F. M. Connell by Karl Springer and associates during the fall of 1930, shortly after the LeRoy ground had been staked. The principal discovery is exposed in claim A-33977, and consists of a series of more or less parallel mineralized quartz lenses and stringers in foliated granodiorite. The outcrop of granodiorite in which this showing occurs appears to form part of the Bourlamaque granodiorite mass, although it is true there are some small outcrops of Keewatin rocks, and also of altered phases of the granodiorite, to the west of the outcrop in which the vein system occurs, and thus between it and the main granodiorite mass.

With the exception of one large outcrop that appears to consist of a 'hybrid' or contact phase of the granodiorite, and which forms a pronounced east-west ridge at a point a quarter of a mile west of the mineralized vein-system, rock exposures within the group of claims are in general small and scattered. The ground in which they occur is for the most part low-lying.

A length of more than one mile of the eastern margin of the main granodiorite mass lies within the claims. This fact, together with a consideration of the discoveries already made by only a limited amount of surface work, indicates that the property merits intensive prospecting.

The principal discovery occurs in an outcrop of altered, foliated granodiorite, with strike of foliation N.70°E. The outcrop appears to be very near the granodiorite-Keewatin contact, since it is the most easterly exposure of granodiorite in this vicinity, and, moreover, the eastern part of it consists of altered Keewatin rocks. Cutting all these rocks are a number of small dykes of light-greenish to white aplitic material, probably corresponding to the soda-aplite already described in another section of this report.

Within the granodiorite, and extending for about 400 feet in the direction of the foliation, is a series of irregular, branching lenses and stringers of quartz. These tend to form a stockwork throughout a considerable part of the outcrop. The quartz is white, and in some places is banded with black tourmaline; but although a certain amount of the latter is commonly present, it is not abundant. Sulphide mineralization is rather widespread but not uniformly distributed, there being a tendency for the metallic minerals to be concentrated at

certain points in the quartz lenses. The pyrite, which, as usual, is the characteristic sulphide mineral, tends to take the form of friable 'bunches' or massive concentrations at some points, and at others to be somewhat disseminated through the quartz. Chalcopyrite is commonly present with the pyrite.

A sample of the heavily mineralized quartz taken by the writer and submitted for assay was found to carry \$4.20 in gold per ton.

At a point approximately 1,000 feet south of the vein system just described is a small east-west trending outcrop of granodiorite. A well mineralized quartz vein extends in a north-south direction across the outcrop, but it has not been traced for any appreciable distance.

A limited amount of surface exploration of the claims was carried out under the direction of Karl Springer during the spring and early summer of 1931.

CLAIMS OF DOME MINES, LIMITED

(Louvicourt township)

A group of 20 claims, numbered A-35729 to 35743, and A-36072 to 36076 inclusive, were staked during the summer of 1931 by S. B. Jowsey, who was prospecting in the interests of Dr. G. A. Wyeth. The claims were staked on several outcrops of granodiorite, $4\frac{1}{2}$ miles to the east of the main mass of the Bourlamaque granodiorite, and lithologically identical with it, but believed to form part of a related stock. A gold discovery was made by Mr. Jowsey in the course of subsequent careful prospecting of the ground already staked, and as a result the claims were optioned early in the year 1932 by Dome Mines, Ltd., of South Porcupine, Ont.

Rock exposures within, and in the vicinity of, the group of claims are sparse. Most of the granodiorite here exposed outcrops along an east-west ridge that is largely covered by sand. To the north of this ridge is an area of low, swampy ground. Altered Keewatin rocks that show the effects of intrusive action are exposed 1,500 feet southwest of the most westerly outcrop of granodiorite, and Keewatin rocks are also exposed at some distance to the south, although still north of the east-west centre line of Louvicourt township.

Little is known to the writer concerning this mineral deposit owing to the fact that the discovery was made after he had left the field. The following information was supplied through the courtesy of Mr. Jowsey: The deposit is in claim A-35734, and it lies along the northern outcrop of granodiorite in this vicinity. It is believed to consist of a series of mineralized quartz lenses, paralleling an east-west shearing in altered granodiorite. From the surface indication, the zone dips 45° to the south. The mineralized zone has been traced by trenching in low ground for 70 feet and over a width of 50 feet; the shear zone has been traced for an additional 90 feet, or for 160 feet in all. Quartz, in lenses, carries tourmaline and chlorite, is well mineralized with pyrite, and is said to carry some molybdenite. Visible gold was found in the quartz. A trench two feet in depth was blasted in the rock across the strike of the shearing for a distance of 40 feet. Channel sampling of this trench gave very encouraging results. Diamond drilling by Dome Mines, Ltd., has been in progress for some time, but the results of the drilling are not known to the writer.

TREADWELL YUKON COMPANY, LIMITED

(Louvicourt and Bourlamaque townships)

The property of the Treadwell Yukon Company, Limited, comprises two groups of claims in Louvicourt, Bourlamaque, and Senneville townships. The first group consists of a block of 55 claims in western Louvicourt, and an adjacent block of 12 claims in eastern Bourlamaque.

The 55 claims are numbered as follows: A-35950, 35951, 34175 to 34179, 34043, 34044, 34180 to 34189, 34100 to 34103, 34656 to 34658, 34639 to 34653, 34873 to 34882, 37454, 33784, 33779, and 33789. The claims in Bourlamaque bear the following numbers: A-33775 to 33778, 34040 to 34042, 33780 to 33783, 33785 to 33788, and 36113. The claims in Senneville comprise lots 51 to 62, range III.

Up to the time of writing, attention has been devoted chiefly to two of the claims, A-34183 in Louvicourt township, and A-33782 in Bourlamaque, with the main development work in the former.

The western part of the group of claims in Louvicourt and Bourlamaque was staked in the interests of Bussière, Massicotte, and associates, in part during October and November of 1930, and the balance during the early spring of 1931. These claims were subsequently acquired by the Treadwell-Yukon Company, Limited. The eastern part of the group, comprising 10 claims, was later optioned by the Company from W. Hosking and W. Coghlan.

The eastern end of the Bourlamaque granodiorite for a distance of a mile and a half lies largely within the main group of claims in Louvicourt township. With the exception of an indentation caused by a 'bay' of serpentine, the granodiorite-Keewatin contact within this group of claims follows a uniform course which is approximately north-south. The vicinity of the contact, more particularly in the south-central part of the group of claims, is, however, largely obscured by heavy drift-cover. The ground in the vicinity of the contact obviously merits very careful exploration. Already, a considerable amount of work has been carried out, in places where the rock outcrops.

Extending eastward for 1 3-4 miles from a point a quarter of a mile north of Mile IX on the west boundary of Louvicourt township, is an area consisting for the most part of open, burnt-over ground, but in some parts covered by green bush. This area contains the principal outcrops in the Louvicourt group of claims, of which it includes the following: 34180 to 34189, 34100 to 34103, 34043, and 34044. The outcrops are scattered but rather prominent, and they consist of granodiorite. Boulders of the same rock indicate that elsewhere the drift cover is not heavy. In the exposures near the west boundary of the township, the rock is fairly massive, but in the vicinity of its most easterly exposure, where the principal deposit occurs, the rock is strongly foliated. Farther to the east, the ground is low and drift-covered, but diamond drilling is stated to have shown that these most easterly outcrops of granodiorite are quite near its contact with the Keewatin. The general direction of the foliation is N.70-75°E., and the dip approximately vertical. The more massive granodiorite farther to the west usually exhibits two sets of joints, the better defined striking between N.-S. and N.20°E., and the other set at N.75°-85°W.

The principal vein system occurs in an outcrop that extends in a northeast-southwest direction through the central, and greater, part

of claim A-34183. The outcrop has a maximum length of 1,350 feet and a width of 650 feet. It is rather poorly exposed, so that extensive trenching has been found necessary to reveal the vein system.

The rock is granodiorite of medium grain. Cutting it is a short dyke of light-weathering aplitic rock, and there are also several narrow 'andesite' dykes occupying fractures or shear zones, and very much resembling greenstone inclusions. Microscopic examination of this 'andesite' showed it to consist almost entirely of carbonate and secondary quartz. The granodiorite here is quite uniformly foliated or sheared. Locally the shearing is very pronounced and there are shear zones, usually in a direction parallel to the foliation of the rock, but occasionally cutting it at small angles. It is in these parallel shear zones, 'breaks', or fractures, that the mineralized quartz bodies occur.

What has been termed the vein system consists of a series of quartz lenses and stringers occupying more or less closely spaced and parallel local shear zones or fractures. Since there is a general tendency for any given fracture to die out along its strike within a relatively short distance, and since the vein matter occupying such fractures, or parts of such fractures, varies so much in its width and length, the veins are highly lenticular, and it is extremely difficult to subdivide them as individual veins. The shear zones or fractures, taken collectively, are developed throughout the length of the outcrop, for more than a quarter of a mile, and are quite strong at each end of it. The series of lenses may be similarly traced, but with marked variation in the amount of quartz and in the extent of the mineralization. In the surface occurrence, the quartz within the fractures characteristically shows lack of continuity, but it is stated that diamond drilling has indicated more normal vein structures at depth. The several quartz lenses and stringers occupying a zone of fracturing commonly exhibit great diversity in their dip, but it seems probable that these lenses collectively constitute a zone whose attitude may be expected to correspond to that of the series of fractures or shear zones in which they occur, and which is apparently about vertical. The general strike of the lenses, as already pointed out, closely corresponds to that of the shearing, about N.70°E.

The quartz is white and vitreous. It carries abundant tourmaline, sometimes as massive bands parallel to the vein walls and up-

wards of an inch in thickness. Carbonates are rather common as a constituent of the vein matter. Pyrite is the main metallic mineral. It commonly occurs in friable aggregates and has a slightly greenish tinge. Chalcopyrite is also present. Gold not uncommonly occurs in rather coarse, visible form, and occupies fractures both in the quartz and in the pyrite. In most cases it appears to be closely associated with the pyrite.

In order better to illustrate the surface occurrence of the vein system, certain portions of it which have been designated as individual 'veins' will be described in some detail.

Vein No. 1, exposed near the northeastern margin of the outcrop, is the most northerly vein. It has been traced by trenching for a total distance of 145 feet in a westerly direction, but beyond this both vein and fracture are ill defined. At its eastern end, the vein shows a width of 14 feet of massive quartz, but within a very short distance to the west, this changes to a series of irregular quartz lenses and stringers occupying a 5-foot shattered zone. Pyrite is present in considerable amount, and also rusty material indicative of fairly heavy mineralization. It is stated that diamond drilling has shown this vein to be very consistent.

Vein No. 5 is exposed at a point 100 feet southeast of the eastern end of vein No. 1. It consists of a number of quartz lenses distributed across a width of 25 feet but showing little continuity along the strike of foliation of the rock. This zone of quartz lenses is well mineralized with pyrite and chalcopyrite.

Veins Nos. 2, 3, 4 and 6 are really a number of lenses and stringers occupying more or less parallel shear zones within a narrow belt which has a maximum width of 175 feet and a known length of 1,360 feet, *i. e.*, the length of the outcrop. It is scarcely possible to subdivide these into separate veins, but the better defined portions of the system are somewhat as follows.

(a) *Vein No. 2 East*.—This is exposed for a length of 145 feet in a well-defined, sheared fracture at the eastern end of the outcrop. At the extreme east, the fracture dips steeply to the south, but farther west it is almost vertical. It is occupied for the greater part of the length mentioned by a greenish, carbonated 'andesite' dyke, two to four feet wide. There is but little quartz in the fracture, but the

schist of the walls is silicified to some extent, and well mineralized at some points, particularly in the eastern part of the vein. The principal metallic mineral is pyrite, which commonly occurs along minor joints in the sheared rock of the vein zone. A sample of the well mineralized wall-rock containing disseminated pyrite was found on assay to carry \$1.40 in gold per ton. The mineralized quartz of the vein would undoubtedly carry higher values.

(b) *Vein No. 3, easterly portion.*—This lens may be the westerly continuation of that part of the vein-zone described under (a), since it lies along its strike and is only 100 feet distant. The two occurrences are not connected by any well defined fracture, however. At its eastern end, the lens consists of 15 feet of interbanded quartz and sheared rock, with quartz predominating. In a trench 30 feet farther west, the lens of quartz is five feet wide, and beyond this point the fracture becomes narrow and obscure, containing only a little quartz and some scattered grains of pyrite. That part of the lens with appreciable quartz is very well mineralized with pyrite.

(c) *Westerly portion.*—Continuing westward along this 1,360-foot long outcrop of foliated and sheared granodiorite, the western portion of the vein system which includes the so-called 'veins' Nos. 2, 3, 4, and 6 is met with at a point 720 feet westward from the lens (b) just described, but somewhat to the south of its line of strike. Between the two occurrences are a number of fractures forming a continuous series, some of them overlapping or paralleling one another. The quartz-filling in these fractures is for the most part narrow and somewhat discontinuous, and mineralization is not very consistent. There are also a number of irregular, large quartz masses, but apparently without any structural connection with the other occurrences described.

From the point referred to, a number of quartz-tourmaline lenses extend for 50 feet to the west. These are rather sparsely mineralized. About 50 feet still farther west, and occupying a well defined fracture, is a 10-foot zone consisting of very well mineralized quartz, carrying abundant tourmaline. In a second trench beyond this, the quartz is 12 feet wide and is seen to extend for 25 feet to the east of the trench. It is very well mineralized with pyrite. A selected sample of the well mineralized vein matter assayed \$6.20 in gold per ton. The most westerly extension of the zone was revealed by deep trenching in low

ground 70 feet west of this. It there consists of a series of narrow quartz lenses occupying a well defined 'break' and carrying pyrite. The country rock at this point appeared to be somewhat more massive than elsewhere.

The principal showing in Bourlamaque township upon which development work has been done is a large quartz lens or lenticular vein in the central part of claim A-33782, about half a mile west, and at some little distance to the north, of survey plate No. 5 on the western boundary of Louvicourt township. The vein is exposed in a ridge of granodiorite, which is fairly massive and shows jointing in two general directions, namely, N.5°E. and N.75°E. The white quartz, with easterly strike, stands out prominently on the northern slope of the ridge, and is locally termed 'the snowbank'. In its wider portion, the vein is 145 feet long and about 15 feet wide, but it would appear to be highly lenticular, and diamond drilling is said to have shown that the quartz does not persist to any great depth. For the most part, the quartz is rather barren.

To the west of this lens, and connected with it, is a well defined fracture striking N.75°E., and dipping about 70°-80° south. It may be traced for about 250 feet, and for the western 125 feet of this distance it contains vein matter. The fracture is also occupied throughout the greater part of its length by an 'andesite' dyke with a width of roughly four feet. The quartz filling varies in width from five feet to a narrow stringer. It carries tourmaline and is for the most part fairly well mineralized with 'bunches' of pyrite and by chalcopyrite, which occupy fractures in the quartz.

Prior to the commencement of shaft-sinking on the principal showing in claim A-34183, Louvicourt township, extensive development was carried out, comprising surface stripping, trenching, and, subsequently, diamond drilling. The extensive and systematic campaign of diamond drilling was carried out from locations north of the mineralized zone. A three-compartment shaft has been sunk below the 300-foot horizon, and sinking is in progress at the time of writing. A station has been cut, and 375 feet of cross-cutting completed, on the 200-foot level.

A 'jumper trail' has been cut from the camp to connect with the LeRoy trail to the 'landing' on the Colombière river, which is the

route used for summer transportation. During the winter, the property is reached by way of a newly-cut trail that connects with the road extending south from Senneterre along the west shore of lake Tiblemont, *i.e.*, the projected Senneterre-Mont Laurier road. The claims have been surveyed by a Quebec lands surveyor.

Mining equipment includes two 60 h.p. boilers, a double-drum hoist, a 500 cu. ft. steam-driven compressor, a drill sharpener, and accessory equipment. It is the intention of the Company to obtain further power by the establishment of a hydro-electric plant on the stream connecting Villebon and Simon lakes in Vauquelin township. A test-mill is to be erected and will have the following equipment: a 42-in. apron feeder, 10-in. by 20-in. jaw crusher, 16-in. by 36-in. A.C. rolls, Niagara screen, Merrick weightometer, 7 ft. by 5 ft. A.C. ball mill, 26-ft. Duplex Dorr classifier, together with the necessary concentration and amalgamation equipment.

V. C. Clauson is consulting engineer for the Company, and James Norrie is resident manager of the mine. The foregoing data concerning recent developments and mine equipment were very kindly supplied by Mr. Clauson.

PASCALIS GOLD MINES, LIMITED

(Pascalis and Louvicourt townships)

The newly incorporated Pascalis Gold Mines, Ltd., controls three groups of claims, totalling 32 in all, which formerly were owned by four different companies. One block of 12 claims, containing the mineralized zone discovered by 'Hard-Rock' Bill Smith (one of the two original discoveries in the Pascalis-Louvicourt area), was formerly developed by the original Pascalis Gold Mines, Ltd. Another group of six claims was controlled by Mining Corporation, Ltd. The remaining group of 14 claims was the joint property of Prospectors' Airways and Ventures Ltd. The 32 claims are contiguous, one block of 26 being in southern Pascalis, and the remaining 6 immediately across the township line, in northern Louvicourt. They were staked by Smith, Watson, Willans, Cockshutt, and associates during the fall of 1930. In the following, the three original groups will be separately described.

PASCALIS GOLD MINES, LTD. (the original Company):

The twelve claims of this group are numbered A-33719 to 33730, inclusive. Eight of the claims are in Pascalis township and the other four in Louvicourt, adjoining them. The principal mineralization is in claim A-33726, which is in Pascalis, $1\frac{1}{2}$ miles east of the west boundary of the township, and a few hundred feet north of the Louvicourt line.

The mineralized zone is chiefly exposed in one small outcrop, but may also be seen in a somewhat larger outcrop to the north of this. Both outcrops are in relatively low ground, and form the southwestern extremity of an extensive major exposure of Keewatin lavas. The deposit is about three-quarters of a mile east of the main granodiorite-Keewatin contact, and although it is thus within the area of Keewatin rocks, it lies in an altered zone that seems to have resulted from the action of an underlying intrusive, which is probably connected at depth with the main granodiorite. All gradations between typical Keewatin volcanic rocks, and a rock closely approaching a granodiorite in appearance and texture, even to the presence of the typical opalescent quartz 'eyes', are present in the altered zone of the outcrop, and, as a result, no definite boundaries can be drawn between the two rock types. The altered zone is roughly delimited in the accompanying detailed map No. 168. There is an abundance of disseminated magnetite in the altered rock, and this is assumed to have resulted from contact metamorphism due to the intrusive rock.

The only clearly defined intrusive rock noted in the vicinity of the deposit is a small dyke of light-weathering, fine-grained aplitic rock, much altered to secondary minerals. Elsewhere in the area, such rock is known to be closely related to the granodiorite.

The material of the mineralized zone consists of fine-grained, altered greyish rock made up of quartz, albite, and carbonate, and heavily impregnated with disseminated cubes of pyrite. It is a replacement deposit, developed in an irregular, fractured zone.

In the vicinity of the replacement zone are a number of easterly-trending, irregular, glassy, quartz-tourmaline lenses and stringers. These are clearly later than the sulphide mineralization, since the lenses and stringers commonly cut, and frequently contain brecciated fragments of, the pyritized bodies. The glassy quartz is in general

very sparsely mineralized, although in places pyrite may be seen, chiefly near the borders of the lenses. Some of the quartz lenses and stringers are reported to carry visible gold, but none of those yet found are sufficiently consistent, nor sufficiently well mineralized, to be regarded as being of economic significance.

The mineralized zone has been opened-up by a series of north-south trenches, which, in the following description, are referred to as trench *A*, *B*, *C*, etc., commencing at the most easterly one.

Trench A.—Altered rock is exposed, with a few quartz-tourmaline stringers, but little or no mineralization was noted.

Trench B (45 feet west of Trench *A*).—Volcanic rock, showing flow structure, is exposed. It contains two narrow mineralized zones with a width of only two to three inches. In the southern part of the trench is a 12-foot zone cut by glassy quartz stringers, but it is rather sparsely mineralized.

Trench C (56 feet west of Trench *B*).—A mineralized zone is exposed over a width of 30 feet. It consists of heavily pyritized, carbonated rock, and is very rusty-weathering in its surface exposure.

Trench D (approximately 40 feet west of Trench *C*).—Two mineralized zones are exposed in this trench. One, eight feet wide, and assumed to be the main zone, is on the line of strike of that exposed in Trench *C*. The other zone is thirty feet to the south of this and has a width of 22 feet. A chip sample taken across the two zones of mineralized rock gave a negative result on assay, as did a representative sample of the glassy quartz veinlets that cut the mineralized bodies. The better defined of these quartz veinlets has an east-west strike and a dip of 50°–55° to the south.

Trench E (approximately 40 feet west of Trench *D*).—The principal zone, presumably, and the most northerly in the trench, lies along the strike of that in trench *D*. It is 17 feet wide, but to the south of it in the same trench are two other zones, one of which is three feet wide, and the other nine feet. The nine-foot zone shows only scattered mineralization. A sample chipped across the principal, 17-foot zone, yielded \$0.80 in gold per ton on assay.

Trench F (25 feet west of Trench *E*).—The principal mineralized zone is 21 feet wide and is exposed along the strike of the northern zone in the preceding trench.

Trench G (66 feet west of *Trench E*).—Very little rock is exposed, in somewhat lower ground. No mineralization was noted.

Trench H (75 feet west of *Trench G*).—Approximately 14 feet of mineralized material is exposed. The intervening ground between this and the preceding trench is low and with little exposed rock. It is improbable that the mineralized zone is continuous between the two trenches.

From the above description of the mineralized body, as revealed in the trenches, it will be seen that the main portion of it has an east-west length of 160 feet and a width varying from a few inches up to 30 feet. There are also several nearby, related, subsidiary masses. The variation in the width of the zone in the different trenches, together with the erratic nature of the subsidiary masses, illustrates the highly irregular nature of the zone as a whole. The general strike of the zone is very nearly east-west.

A series of eight diamond-drill holes were bored from locations to the south of the mineralized zone. The results of the drilling were not very encouraging, and examination of the cores of several of the holes shows that the width of the zone intersected is narrow. The dip of the zone, as revealed by the drilling, seems to be nearly vertical, or very steep to the south.

Assay results supplied by the Company, and also by J. F. B. Davies from sampling of certain trenches carried out by Noranda interests, indicate good average values over substantial widths. The three sampling results quoted are those of the writer.

In addition to the mineralized zone described above, there is a second occurrence of similar material in a rock outcrop 375 feet to the north, and somewhat west, of the principal zone. It has not been traced for any appreciable distance, and is terminated by low ground to the east of the outcrop. Two holes were drilled in the vicinity of this mineralization.

(B) Claims formerly controlled by MINING CORP'N OF CANADA, LTD.:

A block of six claims, two claims in width and three claims in length (north-south direction)—four of which are in Pascalis township and the other two in Louvicourt—formerly comprised the principal holdings of Mining Corporation of Canada, Ltd., in this district. The claims are numbered A-33885 to 33890 inclusive.

The eastern margin of the Bourlamaque granodiorite would appear to lie within the claims over a distance of very nearly one mile. In the northern part of the group there are rather numerous small outcrops which indicate that only the extreme eastern edge of the granodiorite is here represented. There are also tongues and dykes of granodiorite, and of aplitic rock, cutting the Keewatin volcanics in the vicinity of the contact.

With the exception of a prominent outcrop of granodiorite on the Louvicourt-Pascalis line, the southern part of the group of claims is in low, drift-covered ground. From the location of the outcrop mentioned, as well as others to the south of the claims, it would appear that, as a minimum, a width of over a quarter of a mile of the granodiorite is included in this part of the claims. The contact cannot be accurately determined, although it is assumed to pass in a northerly direction within the eastern boundary of the southern part of the group.

Several quartz lenses, none of which, so far as examined, appear to be very well mineralized, occur in the granodiorite that is exposed at the township line. At a point 320 feet north of claim-post No. 1 of A-33886, is a fracture striking N.60°E. and extending for at least 75 feet. The fracture contains a little quartz, which, however, is not well mineralized. It is also occupied by a sheared 'andesite dyke', and in the vicinity are a number of small dykes of soda-aplite. The rock of the outcrop is for the most part foliated in a direction N.70°E.

A very limited amount of surface work was done on these claims during the spring and early summer of 1931. Further exploration is well merited.

(C) Property formerly controlled by PROSPECTORS' AIRWAYS LIMITED
and VENTURES LIMITED:

The 14 claims comprising this group are numbered A-33854 to 33867 inclusive. They are all in Pascalis township. Four of the westerly claims of the group, numbered A-33854 to 33857, are of particular interest in that they include about half a mile of the eastern margin of the granodiorite, that they contain all the known mineral occurrences in the entire 14 claims, and, finally, in that the granodiorite here is relatively well exposed. The remaining ten claims of the group cover ground underlain by Keewatin rocks, of which there are rather numerous exposures.

A striking feature in connection with the extensive mineralization on the property, by far the greater part of which is confined to one of the four claims mentioned, namely, A-33855, is the remarkable number of highly mineralized occurrences, many of which carry visible gold. None of them has as yet, however, been proved of sufficient size to be regarded as of commercial importance; but the fact that they are so numerous, together with the promising nature of the mineralization, are decidedly encouraging features. Several of the occurrences are narrow and others are irregular, but the better defined zones may prove of importance. Some of these have been revealed by only a limited amount of trenching in low ground, and it is possible that further work will show them to continue for greater distances.

The mineralized occurrences are too numerous for each to be dealt with separately, so that only some of the better known ones will be briefly described. They belong to four general types, as follows:

(1) East-west trending lenses with a general southerly dip, and consisting of white, vitreous quartz carrying tourmaline, well mineralized with pyrite, and carrying gold, *i. e.*, the normal type.

(2) North-south trending veinlets connected with a shear zone. Mineralization similar to (1) and commonly containing spectacular visible gold.

(3) Irregular fractured zones, silicified and pyritized, carrying also chalcopyrite and some values in gold.

(4) East-west trending, narrow veins consisting of non-vitreous quartz carrying abundant chalcopyrite with some values in gold.

Type 1.—At a point 300 feet south of surveyed claim-post No. 1, A-33849, and near the claim-line, is a well mineralized easterly-trending lens carrying much visible gold. It can be traced for about 100 feet and also extends to the west into the property of Beaufor Mines, Ltd. The lens dips very flatly to the south. It has been termed *Vein No. 1*.

Exposed in low ground 150 feet south of the north boundary of claim A-33855 is a quartz lens in granodiorite near its contact with Keewatin rocks. It strikes N.75°E. and dips about 30° south. The quartz is well mineralized and carries abundant visible gold. The

lens has not been traced for any appreciable distance, partly on account of low ground in its vicinity, but it does not appear to persist to the east. This lens, termed *Vein No. 2*, would appear to be very near the major granodiorite-Keewatin contact, which is assumed to have a northwest-southeast trend at this point.

What is termed the *Cockshutt vein* is exposed about 250 feet north of claim-post No. 2, A-33855. Not much is known of this occurrence, since very little rock is exposed and the trenches were filled with water at the time the showing was visited. It is a quartz-tourmaline lens, with a general east-west strike, in granodiorite. The quartz is 2½ to 4 feet wide, and appears to be sparingly mineralized with pyrite.

Type 2.—An occurrence of the second type is found near the border of a shear-zone striking N.95°E. in the central part of the principal claim (A-33855). To the north of the shear-zone are two north-south quartz-tourmaline veinlets up to three inches in width, and with a length of 40 to 50 feet each. They carry spectacular showings of visible gold in association with the bismuth telluride, tetradymite. These two principal stringers are about 50 feet apart. Several related stringers are quite irregular in their strike.

Type 3.—The single occurrence representative of Type 3 is exposed in an outcrop of sheared granodiorite about 250 feet north of the south boundary of claim A-33855. Values within the zone are understood to be uniformly low.

Rather extensive surface work consisting of stripping, trenching, and sampling was carried out on these claims during the summer of 1931 under the direction of J. Perry. The geology of the claims was carefully mapped by Watkin Samuel, and the writer gratefully acknowledges the use of copies of the maps prepared by him.

BEAUFOR GOLD MINES, LTD.

(Pascalis and Louvicourt townships)

The claims comprising the Beaufor Gold Mines, Ltd., consist of a north-south block of eight claims in the southwest corner of Pascalis township, and an adjoining east-west group of eight claims in the northwest corner of Louvicourt. Most of the claims were staked by Georges Bussière in the late fall of 1930. The claims are numbered

as follows: A-33849 to 33852, 34722 to 34725, Pascalis township; and A-33853, 33992 to 33994, 34726 to 34729, Louvicourt township. The mineralized showings occur in claims 33849 and 33850.

Rock outcrops being virtually lacking in all of the Louvicourt claims, as also in the westernmost four claims of the Pascalis group, attention has been focussed on the remaining four claims, where granodiorite is relatively well exposed. The granodiorite thus exposed is approximately a quarter to half a mile west of the granodiorite-Keewatin contact.

The granodiorite is for the most part fairly massive, but shows some evidence of foliation in a general direction of N.70°E. to N.80°E. Locally the rock is intensely sheared, with shear-zones trending east-west.

Broadly speaking, there is a northerly and a southerly area of mineralization, which will be separately described.

(A) THE NORTHERLY ZONE:

There are several mineralized occurrences in a well defined outcrop in the northern part of claim A-33849. Among these, and the most important of any of the several showings on the property, is the *Matthews' vein*. The greater part of the outcrop is granodiorite that shows evidence of foliation in a direction N.80°E. but which is, for the most part, massive. The northern part of the outcrop (on claim 34888) consists of the altered, contact phase of the granodiorite, and is highly carbonated.

In addition to the Matthews' vein there are a number of much smaller veins in the same rock exposure. One of these is near the east boundary of claim 33849 and forms the westerly continuation of that termed vein No. 1 on the adjoining claim of the Pascalis Gold Mines, Ltd. The vein can be traced for only a short distance in an east-west direction, and it is seen to dip very flatly to the south. It is heavily mineralized, and carries visible gold. A second very narrow vein, to the west of the above, strikes slightly south of east and, from its surface indication, dips 50° south. The vein-fracture is occupied by a narrow andesite dyke. A third vein is exposed near the western end of the outcrop, and is very different in the nature of the quartz filling and in its mineralization. The quartz is sugary,

and carries abundant chalcopyrite, and also a considerable amount of molybdenite. This vein is narrow and has not been traced for any appreciable distance. A few veins of similar nature occur on the adjacent claim (33855) and are mentioned in the description of that property (Pascalis Gold Mines, Ltd.). Veins of this nature originated in a different way from the quartz-tourmaline veins, and possibly were mineralized at a different time.

The Matthews' vein is exposed in the outcrop at the north boundary of the Beaufor property. The east-west claim-line cuts across the vein at a rather low angle, so that the vein is in part within the adjoining claim, belonging to Matthews. The vein has been traced in the outcrop, and for some little distance by trenching in low ground to the west of the outcrop, for a total length of very nearly 500 feet, approximately 250 feet of which is in Beaufor ground. The dip of the vein is, however, quite pronounced to the south, and the Matthews' portion of the vein thus dips towards the Beaufor property.

The fracture occupied by the vein strikes 15° south of east, and is well defined throughout. It dies out in the outcrop on the east, however, co-incident with the termination of the vein matter. The fracture is also occupied throughout the greater part of its length by a narrow andesite dyke that is commonly strongly schistose and carbonated. The vein matter is fairly consistent throughout the length of the fracture, and, although it pinches at some points, it would average roughly two feet in thickness. A southerly dip of 40° is stated to have been established as a result of diamond drilling.

The white, semi-vitreous quartz of the vein carries abundant tourmaline, and is very heavily mineralized. Carbonate is quite common and appears to be later than the quartz. Soft, dark greenish masses of chlorite are also present in the quartz. The latter is very well fractured, and 'gouging', with development of tourmaline along slip planes in the quartz, is a common feature. Pyrite is very abundant, and is commonly massive or in the form of friable aggregates. Chalcopyrite and bornite are only sparingly represented. Gold commonly occurs in fine, visible form.

The results of the systematic surface sampling of the vein are not known to the writer, but they are reported to be decidedly encouraging. A selected sample of the highly mineralized vein matter taken by the

writer yielded \$36.80 in gold per ton, which is almost identical with the result obtained from a bulk sample taken from one of the most highly mineralized portions of the vein, and submitted for testing purposes to the Department of Mines in Ottawa.

Four diamond-drill holes have been put down, and machinery is now being installed with the object of sinking an inclined shaft on the vein to an initial depth of 250 feet, from which horizon lateral work will be carried out.

(B) THE SOUTHERLY ZONE:

In relatively low ground in claim 33850 near the western and southwestern end of a high ridge of granodiorite, and in some smaller outcrops to the south of it, are a series of easterly-trending, mineralized veins and lenses, most of which are in proximity to a zone of shearing. They have been revealed chiefly as a result of stripping and by trenching in low ground. Among the several occurrences, which are for the most part short and lenticular, three are more persistent and have been the object of considerable development work.

At a point 50 feet south of the north boundary of the claim is an east-west zone of shearing, 35 feet in width, and seemingly not extending far to the east. Approximately 55 feet south of this shear zone is a well mineralized quartz-tourmaline vein occupying a sheared 'break' or fracture in foliated granodiorite. The quartz has a fairly uniform thickness of one foot to 14 inches. The vein strikes about N.80°E., and from the surface indication dips 40° south. It has been traced by trenching for a total distance of 100 feet, beyond which, on the west, is low ground. A selected sample of the well mineralized vein material assayed \$1.40 in gold per ton. Abundant visible gold was noted with the friable, greenish pyrite of the vein.

Thirty feet to the south is a second quartz vein, quite similar to the above in its strike, dip, thickness, and mineralization. It has been traced for somewhat over 100 feet. It pinches out on the east, and may be concealed by the cover of drift to the west.

Approximately 200 feet south of the last described occurrence, is a third vein, or possibly a series of lenses. It consists of a number of separate, but related, occurrences in small rock outcrops to the south of a drift-filled depression that separates these from the large

granodiorite ridge and the other two veins, Exposures of vein matter occur at intervals over a distance of 400 feet along a direction slightly south of east. According to a plan furnished by the management, development work, including diamond drilling, traced the vein for an additional 500 feet, making 900 feet in all. The dip, as established by the drilling, is 65° south. The westerly part of this vein, where observed, is somewhat wider than either of the other two veins but seemingly not as well mineralized.

In addition to stripping and deep trenching, a series of five diamond-drill holes have been put down to test the three veins, most of them on the more persistent, southerly vein.

The 16 claims making up the property have been surveyed by a Quebec lands surveyor, and the Company also has made an accurate survey of the mineral occurrences and of the topographic features. Development work on the property has been carried on under the direction of the consulting engineer, W. W. Davis.

CLAIMS OF NORANDA MINES, LTD.

(Pascalis, Senneville, and Louvicourt townships)

A total of 64 mining claims, made up of seven groups in Pascalis, Senneville, and Louvicourt townships, are held under option, or are owned, by Noranda Mines, Ltd. The principal of these is known as the Matthews' group, and it is on these claims that the Company has carried out the greater part of the development work, including stripping, trenching, and diamond drilling. It is understood that the option on this group has recently been allowed to lapse.

(A) CLAIMS IN PASCALIS TOWNSHIP (MATTHEWS' GROUP):

The Matthews' group consists of ten claims in Pascalis township, and two adjoining claims in Senneville. The latter two claims will, however, be referred to in the description of the Senneville claims. The ten claims, numbered A-34888 to 34897 inclusive, were staked by J. Matthews during the early spring of 1931.

Although rock outcrops are not abundant, they are sufficient to indicate that the Bourlamaque granodiorite-Keewatin contact passes

in a northwesterly direction through the group of claims. Granodiorite is exposed only in the southwestern part of the group, where the ground is for the most part low and swampy. Keewatin rocks are exposed in somewhat higher ground, chiefly in the north and northeastern part of the claims.

The only mineralized occurrence of importance is the Matthews' vein, which has already been described in some detail in connection with the property of Beaufor Mines, Ltd. It extends from the Beaufor property for a distance of about 250 feet into Matthews' claim A-34888, and is exposed near the southern boundary of the claim. The vein was extensively trenched and systematically sampled during the summer of 1931 by Noranda interests. J. F. B. Davies, engineer in charge, reports that diamond drilling was carried out during the winter months both on the vein and along its westerly strike.

A second block of 15 claims, numbered A-36248 to 36251 and 36296 to 36306 inclusive, is bounded on the south by the southern township line. They lie to the east of the property of Pascalis Gold Mines, Ltd. The claims are within the area of Keewatin rocks, outcrops of which are not abundant. Mineralization that is believed to be within this group of claims has been reported a short distance to the north of the township line. Time did not permit of a visit to the showing.

(B) CLAIMS IN SENNEVILLE TOWNSHIP (MATTHEWS' GROUP):

Lots 61 and 62, the most easterly lots in range II, Senneville township, form the western part of the Matthews' group, ten claims of which, as already stated, are in Pascalis township. In lot 61 (claim 35021), near the boundary of lot 62 (claim 35022), and 1,700 feet south of the range line, is a narrow, mineralized vein carrying coarse, visible gold in spectacular amount. The vein is exposed in an outcrop of granodiorite which is one of a northwesterly-trending series of small outcrops in this vicinity. A greenish andesite dyke cutting the granodiorite forms the walls of the vein, where, as a result of fracturing, the rock is highly sheared and altered. The dyke rock is micaceous and highly carbonated. The fracture occupied by the vein is not very well defined, although the footwall is slickensided. Nearby are several related fractures occupied by rather barren-looking quartz lenses with some mineralization in their vicinity.

The principal vein strikes 20° west of north, and, from the surface indication, dips 40° west. It is about eight inches wide, and, at the time of the writer's visit, had been traced for about 50 feet. The gangue is of white, vitreous quartz with a considerable quantity of carbonate. Pyrite is common, although the vein is not heavily mineralized. Coarse, visible gold was noted in fractures in the quartz in association with tetradymite

Mr. Davies states that the vein persists both laterally and vertically throughout the extent of the diamond drilling

Two groups of claims, A-35235 to 35238 and A-35017 to 35020, comprising lots 53 to 60 inclusive, range III, form a block adjacent on the west to the Matthews' claims, and are under option to the Noranda interests. The claims were not visited by the writer, but are believed to be underlain by granodiorite, very little, if any, of which is exposed

(C) CLAIMS IN LOUVICOURT TOWNSHIP:

A block of 20 claims immediately south of the northern boundary of the township was staked by Cockshutt and McLeod during the spring of 1931, and was subsequently optioned to Noranda Mines, Ltd. Schistose Keewatin lavas are exposed in several relatively large outcrops in the north-central part of the claims. At a point slightly more than half a mile south of Mile III on the north boundary of the township are a series of quartz-tourmaline veinlets in altered, carbonated lavas. The veinlets are similar to those occurring within granodiorite to the west, but are not as well mineralized, although they do carry pyrite. They vary in their strike from $N.60^{\circ}E.$ to $N.105^{\circ}E.$, with average about $N.80^{\circ}E.$, and dip flatly or at high angles, either to the north or, more commonly, to the south. They would average three or four inches in thickness, although some of them are much thicker. None have been traced for any appreciable distance horizontally. It is reliably reported that gold may be panned from the mineralized quartz of the veinlets. Collectively, the occurrences are not sufficiently closely spaced to suggest a stockwork. It is understood that a much more important discovery was made in the Keewatin rocks of these claims after the writer had left the field.

A group of five claims, numbered A-35202 to 35206, and staked by Leo Springer, lie to the southwest of the above group, and to the

east of the Treadwell-Yukon property. No rock outcrops were observed on these claims during the course of the field work, but it is probable that they are underlain principally by Keewatin lavas.

Another group of four claims, numbered A-35152 to 35155, originally the property of Cockshutt and McLeod, are immediately northwest of the former Springer group, and are bounded on three sides by the Treadwell-Yukon claims. The western part of the group is very near the assumed Bourlamaque granodiorite-Keewatin contact.

The writer is indebted to Mr. Davies for several useful plans of these claims.

CLAIMS OF R. A. BRYCE AND J. A. DAWSON

(Pascalis township)

A group of six claims, numbered A-35100, 35101, and 35089 to 35092, in Block A of Pascalis township, were staked during the summer of 1931 by J. A. Dawson, who was prospecting in the interests of Robert A. Bryce, of Toronto. A mineralized quartz vein has been revealed in claim A-35090 in a low outcrop of dense, recrystallized, presumably Keewatin, volcanic rock that occurs very near the contact of the Keewatin with the large, granitic Pascalis-Tiblemont intrusive that lies to the east. To the west of the low outcrop in which the vein occurs is an exposure of somewhat coarser rock containing dense, chert-like inclusions.

The vein occupies a fracture with fairly well defined walls and has a strike corresponding to that of the associated schists, namely N.50°W. The vein dips very steeply (85°) to the southwest. On the northwest, the vein consists of two lenses, respectively two feet and 16 inches in width, both within a 4½-foot zone. The vein has been traced for 60 feet and is seen to pinch out on the northeast. The southeast portion runs into low ground and is not yet further exposed.

The quartz is white and cherty, and is well mineralized with pyrite. Sphalerite was noted in a specimen selected from the material that had been blasted out of the trench. A sample of the mineralized quartz was submitted for assay, and yielded \$0.80 in gold, and a few cents in silver, per ton.

OBASKA MINES, LIMITED

(Louvicourt township)

The deposit formerly developed by the Obaska Mines, Ltd., consists of a sulphide zone exposed principally in claim A-36519, formerly numbered 25729. The group, including the claim mentioned, was re-staked in December, 1931, and is understood to be now the property of Parker and McEwen. The property was examined during the field season of 1930, and fully reported on, by Dr. J. E. Hawley^①.

GOLD BELT MINES SYNDICATE

(Louvicourt township)

A group of three claims, numbered A-35135 to 35137, located some little distance to the west of the northern end of lake Trivio, in the southeastern quarter of Louvicourt township, was staked by B. Parker in the spring of 1931. The claims had originally been staked some few years ago by H. C. Rickaby, who had trenched across the principal area of rock for about a quarter of a mile. On the north, the rock is an andesite with flow structure, but on the south side of the outcrop it resembles an altered amphibolite. Some coarse, fresh-looking phases of the rock may be of intrusive origin. The rock is for the most part foliated, with strike N.75°W. and dip vertical.

Immediately to the south of the trail leading to the property formerly known as Obaska Mines, Ltd., and near the northern edge of the outcrop, is a narrow zone consisting of a number of east-west trending irregular quartz lenses that can be traced for about 120 feet. The quartz is vitreous and carries tourmaline, but is sparsely mineralized. An associated quartz stringer is reported to carry visible gold.

At a point some little distance to the south of this occurrence, and near the northern contact of the amphibolite-like rock, is a zone consisting of a number of small, irregular quartz stringers with some associated pyrite. The zone, somewhat rusty-weathering in its sur-

^① Que. Bur. Mines, Ann. Rept., 1930, Part C, p. 93.

face outcrop, may be traced in the north-south trench across an appreciable distance. It is reported that gold may be panned from the rusty, mineralized material.

CHAS. HUGHES' CLAIMS

(Louvicourt township)

In the southeastern quarter of Louvicourt township, at a point 300 feet east and 200 feet south from survey plate No. 23 on the east-west centre line, is a pyritized zone upon which some work was done several years ago. The showing occurs in the southwestern part of claim A-34516 in an outcrop of altered, feldspathic rock, assumed to be part of a stock of what was originally quartz-diorite. In a narrow zone, sheared along a direction N.70°W., the rock weathers to rusty-looking material and is seen to contain pyrite in tiny quartz veinlets. Pyrite is also sparsely disseminated through the rock in the vicinity of the shearing. A number of irregular, small stringers and lenses of quartz appear to be associated with the mineralization.

Extending in a southwesterly direction from a point 600 feet east of Mile III on the east-west centre line of Louvicourt township, is an outcrop of greyish, highly carbonated Keewatin greenstone. The rock is foliated along an east-west direction, the schistosity dipping 80° to the north. The rock has been trenched across a distance of 450 feet in a direction slightly west of south, throughout which distance are revealed a number of rusty-weathering bands paralleling the schistosity of the rock. The bands are for the most part narrow, but attain a maximum width of 18 feet. They are heavily carbonated, and are fairly well mineralized with fine pyrite, which is disseminated, or forms coatings along parting planes in the rock. The mineralized bands seem to have an association with several east-west fractures. A few flat-lying quartz stringers also occur in the vicinity of the mineralization. A sample of the most highly mineralized material assayed \$1.60 in gold per ton, but carried no copper.

Approximately 700 feet west of the cabin near survey plate No. 15, on the west shore of the Louvicourt river, is a mineralized zone that was explored in an open-cut and in several pits some years ago by La Rose Mines, Ltd. The zone is about 1,500 feet to the southwest

of, and is quite similar to, the carbonated zone above described, which would suggest that the intervening ground should be carefully prospected. The showing is near the boundary between claims A-35515 and 35519. In the open-cut, mineralization is seen to extend across the east-west schistosity of the rock for about 40 feet in all. It consists of disseminated pyrite. Pyrite also occurs as narrow, massive bands along schist planes. The mineralized rock is, for the most part, carbonated. Mineralization extends to the west for about 75 feet, but here it is much more irregular and patchy. To the east of the open-cut the ground is low. A sample of the most highly mineralized material yielded 0.10 per cent copper on assay, but carried no gold.

Another sulphide zone is revealed in a pit in coarse-grained, somewhat carbonated, greenstone which outcrops 250 feet north of the intersection of the east-west centre line of Louvicourt township with the east shore of the Louvicourt river. The rock is foliated in an east-west direction, with dip very steep (85°) to the north. Mineralization, consisting principally of pyrite disseminated through the rock, and to a small extent in massive form, as veinlets, or as coatings on shear planes, is chiefly along a sheared fracture corresponding in direction to the schistosity. Copper carbonate staining, indicating the presence of chalcopyrite, is to be seen in the mineralized material. A few stringers of milky quartz occur in association with the mineralization. A sample of the well mineralized material yielded 0.29 per cent copper on assay, but gave a negative result for gold. Rusty-weathering rock carrying disseminated pyrite is also exposed in a direction N.60W. from the above, but on the west shore of the river.

EASTERN PART OF MAP-AREA

McINTYRE-PORCUPINE MINES, LIMITED

(Pershing township)

Claims were staked by H. H. Holland on the east side of Garden Island lake during the summer of 1931 and some trenching was done on them. The general geology of this region has already been described. Within the greenstones and porphyry dykes that occur

immediately to the north of the sediments on the east side of the lake are a number of parallel shears which have an average strike of N.75°W. and a dip of 60°N. The shears are silicified and carbonated and, especially near the porphyry dykes, are mineralized with pyrite, chalcopyrite, and pyrrhotite. There are also a number of quartz veins, up to 4½ feet in width. A sample of massive pyrite from a sulphide stringer gave an assay of \$4.00 in gold per ton, indicating that the pyrite itself carries some gold values. While a number of bodies of mineralized schist have been found and gold values are reported in places, the work done up to the end of September had not revealed anything that appeared to be of commercial grade. The geological conditions are, however, encouraging.

BRETT-TRETHEWEY MINES, LIMITED

(Pershing township)

Late in the summer of 1931 claims were staked by D. D. Duffy and W. Denis to the south and east of the McIntyre group. The showings are two miles east of Garden Island lake along the line of strike of the shear zones on the McIntyre claims. Three parallel bodies of siliceous carbonate schist have been located and partly exposed in a number of trenches. They strike N.75°W. and dip 60° north. The central body has been traced by trenching over a length of 600 feet and a width of 50 feet. Two hundred feet north of this is a similar body which can be traced over a still greater length. The shears are in highly metamorphosed greenstone which consists now of siliceous carbonate mineralized with fine pyrite and cut by quartz veins. Bluish cherty stringers intrude this locally, and there are associated quartz-feldspar porphyries. At the time of the writer's visit no work had been done on the south showing, but quartz stringers and sulphides were seen in the schist. Free gold was found in one small stringer, at the eastern exposure of the central body. Pannings of coarse gold were reported from samples of the adjacent schist. A chip sample across seven feet of the fresh schist here gave only a trace of gold. In the north body, there is a blue quartz vein, 4½ feet wide and mineralized with fine pyrite and tourmaline, but where exposed this is not known to carry gold values. The geological con-

ditions on these claims are favourable, and further work might reveal more encouraging values.

WEST SIDE OF LAKE MATCHI-MANITOU

(Pershing township)

There are some old workings, consisting of three trenches and two pits, in mineralized iron formation on the west side of lake Matchi-Manitou, on the point south of survey-plate No. 148. The iron formation here has been intruded by porphyry dykes. When visited, these trenches were partly filled with water. Where the iron formation has been sheared, it has been mineralized by pyrrhotite, pyrite, chalcopyrite, and sphalerite. The irregular mineralization appears to extend over a width of 100 feet or more. Material from the more northerly pit showed considerable sphalerite, but neither zinc nor copper are present in commercial quantity. A grab sample of the sulphides contained no gold or silver. A quarter of a mile to the south, trenching has revealed sulphides in a similar magnetite iron-formation.

SOUTHWEST OF SIMON LAKE (R. E. CLEAVER'S CLAIMS)

(Vauquelin township)

Some work was done during the year on what were formerly known as the Picard claims, to the west of the south end of Simon lake. A number of pits have been sunk here on flat-dipping quartz veins in volcanic flows and tuffs. To the north of the entrance to the creek at the southwest of the lake is a rather glassy quartz vein, seven feet thick and dipping 25° to the north, which contains pyrite, chalcopyrite, pyrrhotite, and sphalerite. A grab sample from the pit on this vein gave no gold values. There are a number of other flat-dipping veins in the vicinity and patches of sulphide occur in the volcanics. Free gold has been reported in some of the smaller quartz stringers. A few porphyry dykes cut the volcanics.

PROSPECTS ADJACENT TO THE MAP-AREA

CONNOR-PEACOCK PROPERTY

(Tavernier township)

This property is located in the southeast corner of Tavernier township. Within the greenstone country rock are large carbonate bodies, having a general east and west strike, which are mineralized with pyrite and traversed by irregular quartz veins. Trenches have been dug at intervals over a length of 300 feet on one of these carbonate bodies. To the west of this, a more recent pit has disclosed a body of sheared quartz, with associated green mica, uniformly mineralized with pyrite. This has been exposed for a width of 20 feet, the full width being unknown. A chip sample across 20 feet of fresh material assayed \$2.00 in gold per ton. This occurrence appears to be distinct from the body of carbonate schist to the east of it and to be of a more promising nature.

LEO SPRINGER CLAIMS

(Tiblemont township)

During the summer of 1931, gold was discovered immediately to the east of the northeast bay in Tiblemont lake, near the northern margin of the granite (quartz-monzonite) mass which extends into southern Tiblemont. The rocks in the vicinity of the occurrence appear to be alternating east-west trending bodies of greenstone and granite. A stockwork of quartz veinlets occurs in fractured granite close to the northern margin of the intrusive. There are three intersecting sets of veins, the granite between them being silicified and mineralized with pyrite, chalcopyrite, and pyrrhotite. Coarse, free gold is present in the quartz stringers. While this particular showing is probably not of workable grade, it suggests the possibility that there may be more extensive gold mineralization in the granite at other points, where the rock is more highly fractured.



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