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SIMARD (EXPANSE) LAKE MAP-AREA, TEMISCAMINGUE COUNTY, PART B

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PROVINCE OF QUEBEC, CANADA

Department of Mines and Fisheries

Honourable ONÉSIME GAGNON, *Minister* — L.-A. RICHARD, *Deputy-Minister*

BUREAU OF MINES

A.-O. DUFRESNE, *Director*

ANNUAL REPORT

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QUEBEC BUREAU OF MINES

for the calendar year

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JOHN A. DRESSER, *Directing Geologist*

PART B

QUEBEC

RÉDEMPTI PARADIS

PRINTER TO HIS MAJESTY THE KING

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SIMARD (Expanse) LAKE MAP-AREA
TÊMISCAMINGUE COUNTY

by Bertrand-T. Denis

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SIMARD (Expanse) LAKE MAP-AREA
TÉMISCAMINGUE COUNTY

by Bertrand-T. Denis

INTRODUCTION

General Statement

The field work for the season 1936 was essentially the continuation of that done in 1935 (1). The object was to trace the extension, toward the north or east of Guillet township, of the belt within which important gold discoveries had been made in 1935. As two of these discoveries, owned by McIntyre Porcupine Mines, Limited, were already about to enter the production stage, it was obviously worthwhile to establish the limits of the zone which would be favourable for further prospecting and to gather all possible information on the economic possibilities of this new mining field.

The area covered includes parts of the townships of Devlin, Delbreuil, *No. 71*, and *No. 81*. In order to present at the same time a summary of the results of the two seasons' work, the Guillet Township sheet is included in the map which accompanies this report.

Four months were spent in the field. The greater part of the final month was spent in gathering further information on prospecting developments in Guillet township.

Acknowledgments

Thanks are due to the fire rangers of the Ottawa River Fire Protective Association for helpful assistance while in the field.

C. W. Davis, graduate student at McGill University, very ably fulfilled his duties as senior assistant in the field. Richard Martineau and Georges Vaillancourt, students at Laval University and the School of Forestry in Quebec, and Charles Grégoire, of Quebec, all carried out efficiently their share of the work of the party.

The base-map upon which the geological observations were plotted was compiled from maps of the Department of Lands and Forests, Quebec; from an aerial map drawn by the Topographic and Air Surveys Bureau, Ottawa; from aeroplane photographs; and from the map of Guillet township, drawn from aerial pictures of the Topographical Division, Geological Survey, Department of Mines and Resources, Ottawa.

Location and Access

The area is about 60 miles south of Rouyn and 35 miles east of Angliers, the terminus of the Mattawa-Angliers branch of the Canadian Pacific railway.

(1) Denis, B.-T., *Guillet Township, Témiscamingue County;* Que. Bur Mines, Ann. Rept., Part *B*, 1935, pp. 59-80.

It is most easily reached by air, either from Rouyn or from Haileybury. Simard (Expanse) lake and des Quinze lake are navigable from Angliers to Klock's bay or the mouth of the Winneway river, and, from these two points, canoe routes up Devlin creek or the Winneway and Marécageuse rivers provide access to various parts of the area. The portages are well kept by the fire rangers of the Ottawa River Fire Protective Association. There are no canoe routes through the central portion of Devlin township, but the recently-cut survey lines facilitate exploration of the otherwise inaccessible portions of the area. Some of these lines were cut after the area which they cross had been traversed by the writer and his party.

The new road from Latulipe village to the Belleterre mine (McIntyre) in Guillet township will soon be open for traffic, providing an all-land route to that part of the area. This approach avoids the long crossing of des Quinze and Simard lakes, and the delays, for canoes at least, caused by storms or adverse winds on those lakes. The distance by the all-land route from the Belleterre mine to Laverlochère, the nearest point on the Mattawa-Angliers railway line, is 32 miles.

Previous Work

According to *Map 145A*, which accompanies M. E. Wilson's report (1), the area was unexplored, geologically at least, at the time that report was prepared. In 1934, Retty (2) made a reconnaissance exploration in the vicinity of Soufflot lake and Guillet township. In the following year, Guillet township was mapped in greater detail (3), and in the same year Guillet township, together with a small part of Devlin, *No. 81*, and *No. 71* townships, were included in a large area mapped by J. F. Henderson (4).

As was explained in the opening paragraph of this report, the first objective of the field work done in 1936 was to trace, beyond the limits of the areas already mapped, the extension of the greenstone-sediment belt shown on those maps, and to establish the limits of the zone. Depending upon the nature of the formations encountered, pace-and-compass traverses were run approximately across the regional strike of the formations at intervals of one-quarter or one-half mile in areas of greenstone and sedimentary rocks, but where the rock was granite, water-route surveys and occasional more-widely-spaced traverses were deemed ample to assure sufficiently detailed observations for the purpose of this study.

Topography and General Character of the Map-Area

The Simard Lake map-area lies within the Laurentian plateau and possesses the usual topography which characterizes that physiographic unit.

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(1) Geol. Surv. Can., Mem. 103, 1919.

(2) *Travers Lake Area;* Que. Bur. Mines, Ann. Rept., Part *C*, 1934.

(3) Denis, B.-T., *Guillet Township;* Que. Bur. Mines, Ann. Rept., Part *B*, 1935.

(4) *Geology and Mineral Deposits of Ville Marie and Guillet (Mud) Lake Map-Areas, Quebec;* Bur. Econ. Geol., Dept. Mines and Resources, Ottawa, Mem. 201, 1936.

Simard lake itself, which measures 60 square miles, and the northern portion of Devlin township, are included within an embayment of the clay belt, which in this region extends far to the south of the St. Lawrence-Hudson Bay height-of-land (1). The southern limit of the clay-belt area as shown on the map which accompanies this report was established from the map of a land classification survey carried out by the Department of Colonization of the Province of Quebec. The portion of the area which lies within the clay belt is comparatively flat, the minor topographic irregularities having been filled by deposits of stratified clays; rock outcrops are rare. In those parts where the drainage is adequate, the quality of the soil renders this portion of the area by far the most suitable for colonization. The largest areas of muskeg or swamp are shown upon the map which accompanies this report, and, as may be seen, they are not extensive.

The area is, on the whole, densely wooded, the underbrush being as a rule very thick. The eastern portion was swept by forest fires, notably in 1922, but even there the second growth has now attained a density which makes travel on foot difficult and slow. There are still good stands of black spruce, particularly in the northern portion of Devlin township, and a few small stands of red pine have escaped fire and lumbering operations. Pine was formerly abundant, but by far the greater part of it was 'logged' and taken out many years ago.

Natural rock exposures are, in general; poor, except on some of the hills on which the forest fires have partially destroyed the soil. In areas of green timber, and particularly in the southwest corner of Delbreuil township, the exposures are very poor indeed—so much so that it is difficult to distinguish erratic boulders from outcrops and to establish with certainty the attitude of the structural features. Besides the clay-belt section of the area referred to in a preceding paragraph, there are other sections underlain by coarse out-wash fluvio-glacial material. There, also, outcrops are very sparse. The largest such area includes the northeast corner of Guillet township, extends northeast along the west side of the Marécageuse river, and toward the southeast covers a large area in Guillet township. Smaller, similar areas are to be found in other parts of the district.

GENERAL GEOLOGY

The essential features of the regional geology as outlined in the report on Guillet township (2) continue into the Simard Lake map-area. The formations are listed in the table on page 8.

KEEWATIN

The Keewatin volcanics form a rather irregular band which crosses the northern part of Guillet township from west to northeast. The width of the zone varies from two miles on the western boundary to about four and a half miles on the north boundary, and, as outlined in the report on

(1) WILSON, M. E., Geol. Surv. Can., Mem. 103, pp. 140-145.

(2) DENIS, B.-T., *op. cit.*, Que. Bur. Mines, Ann. Rept., Part *B*, 1935.

TABLE OF FORMATIONS

QUATERNARY	Recent	Beach, stream, and swamp deposits
	Pleistocene	Clay, sand and gravel, boulder clay, and moraine
Great unconformity		
PRECAMBRIAN	Keweenawan (?)	Diabase
	Post-Temiscamian (?) (Intrusives)	Granite, aplite, pegmatite, 'granodiorite', feldspar porphyry, granite (albite) porphyry, quartz porphyry, lamprophyre
	Temiscamian (?)	Quartz-biotite schist, amphibolite, greywacke, 'pencil' gneiss, iron formation
	In part Post-Temiscamian (?)	Acidic rocks, mostly porphyritic, including intrusives, flows, pyroclastics, and sediments
	Keewatin	Andesite, basalt, rhyolite, rhyolite quartz porphyry, tuffs, 'diorite'; chloritic, sericitic, and carbonaceous slaty schists; amphibolite; iron formation

Guillet township, the strike of the band swings in a broad arc convex to the east, which follows the outcrop trend of the formation.

In the Simard Lake map-area, beyond the limits of the Guillet Township map-area, the normal projection of the extension of this zone would cross Devlin township toward Poverty bay in Simard lake. It has been established, however, that the continuation of the zone has been interrupted by an intrusion of granite, so that, at about two and a half miles north of the Devlin-Guillet township-line, the Keewatin is divided into two rather narrow bands, one of which extends toward the northwest as far as Klock's bay in Simard lake, while the other extends northward to the east of Canard lake and the boundary between Devlin township and township *No. 81*. The width of the Keewatin is thereby very greatly reduced, for the band which extends toward Klock's bay is only about one mile in width, and that extending northward thins rapidly to less than half a mile, and is apparently cut off completely at a point due east of the north end of Canard lake. The area underlain by Keewatin rocks in Devlin township is therefore relatively small, and, in townships *No. 71* and *No. 81*, the formation is limited to a very narrow strip on or near the western boundaries of the townships.

The petrography of the Keewatin, the 'greenstone belt', has been described in the report on Guillet township (1), where these rocks outcrop over a larger area. Briefly, the rocks are andesitic flows, massive, or with more or less well-developed pillow structure; coarser grained facies, in

(1) DENIS, B.-T., *op. cit.*, Que. Bur. Mines, Part *B*, 1935, pp. 63-67.

which hornblende aggregates form closely spaced clots or spots which weather in relief in such a manner that the rocks may be conveniently termed 'spotted greenstone'; and dioritic facies, some of which may be intrusive, whereas others appear, in the field at least, to be but coarser facies of the flows. Metamorphism, recrystallization, poor exposures, and highly erratic distribution, introduce factors which make it extremely difficult to subdivide these rocks either in the field or in the laboratory, particularly if any appreciable schistosity has been superimposed upon the original structure of the rock. Massive, foliated greenstones, whose chief constituents are chlorite and zoisite, are characteristic of the northwest-southeast band in Devlin township. Amygdaloidal flows are exposed in townships *No. 71* and *No. 81* along the west shore of Soufflot lake, on the island across the opening into the north arm of the lake, and along the shore of the north arm and of the small lake to the north. This horizon was not recognized farther north in the band of Keewatin to the east of Canard lake. The abundant light coloured amygdules, up to one inch in length, afford a ready means of identifying the rock, except where it is much sheared. The groundmass is dark greenish, composed of tiny needles of hornblende; the amygdules consist of zoisite and epidote, with some calcite.

Acidic volcanics and pyroclastic rocks—rhyolite and tuff—are found throughout the 'greenstone' belt, but either the exposures are less good, or these rocks are rarer, in the Simard map-area than they are in Guillet township. Occurrences within the 'greenstone' belt proper are limited to narrow bands.

The contact zone between the typically Keewatin volcanic formation and the overlying sedimentary assemblage of the Temiscamian type, in both the Guillet Township area and the Simard Lake map-area, is a zone of exceptional complexity. In some places, this zone includes highly schistose, finely laminated, sericitic schists; in other places, acidic rocks, mostly porphyritic and apparently including flows, intrusions, and sediments, intervene between the two formations.

While it is a simple matter to distinguish the type rocks which characterize the several facies, the varieties of each are so numerous that it is possible, on lithological grounds alone, to select specimens which appear to be intermediate between the types. As the field relations are in general so poorly exposed, it seems that only very detailed and careful mapping, requiring probably many seasons, would lead to a full understanding of this critical zone.

In the report on Guillet township, it was stated (p. 66) that "careful weighing of the field evidence, together with study of thin sections of the rocks, has led us to the conclusion that this zone marks an important development of acidic volcanic activity toward the close of the Keewatin, and that the rocks—rhyolite porphyries and associated acidic pyroclastics—constitute an extrusive complex which includes flows together with volcanic débris, some stratified and some unsorted. The observed occurrences in which the rock is definitely intrusive . . . are interpreted as dykes and feeders related to the extrusives".

In the Simard Lake map-area, in township *No. 81*, rocks generally similar to those in the Guillet Township band outcrop over a rather large area, mostly to the east of the Marécageuse river but crossing to the west side close to the northeast corner of Guillet township.

At, and beyond, the northern limit of these rocks as shown upon our map is an area of sand and gravel in which outcrops are lacking, but farther north, to the east of Canard lake, there is no such zone of acidic rocks between the Keewatin volcanics and the Temiscamian-type sediments.

In township *No. 81*, the rocks of this zone, and particularly of its northern portion, present, on the whole, the characteristics of massive, fine-grained, acid intrusives. Although, on some outcrops, repeated narrow bands of sericitic schists simulate bedding, they can be interpreted as resulting from shear of the typical massive rock.

The fact that in all these rocks, and in the coarse granite (albite) porphyry described on page 13, and the acidic porphyritic dyke rocks described on the same page, all the feldspars identified are soda-rich plagioclase suggests consanguinity. Partial chemical analyses were made in order to establish the soda-potash ratio in four specimens selected from occurrences comprising types which, according to the field relationships, are of most diverse origin. In the order in which they appear in the table below, the specimens represented:

(1) A syenite porphyry dyke from the Belleterre Mines property, Guillet township.

(2) A banded (and probably meta-sedimentary) 'quartz porphyry' from the occurrence one mile north of the east end of Devlin lake, in the greenstone belt.

(3) Granite (albite) porphyry from the east side of the north arm of Soufflot lake.

(4) A fine-grained, massive granite-textured acidic rock, presumably intrusive, from the north end of the Marécageuse River segment of the zone.

These partial analyses, made in the laboratories of the Quebec Bureau of Mines, show that the rocks contain the following percentages of soda and potash:

	Na_2O	K_2O
(1)	4.50 per cent	0.22 per cent
(2)	3.66 "	0.34 "
(3)	3.83 "	0.16 "
(4)	5.17 "	1.13 "

The results of these analyses confirm the field and petrographical observations that, in the Guillet Township and Simard Lake map-areas, there are acidic rocks of diverse origin—intrusives, meta-sediments, and volcanics—which show such lithological similarity, both texturally and chemically, that it is generally impossible to separate them on the map. The characteristic features common to the rocks of this group are the

porphyritic or porphyroblastic texture, and the high soda-potash ratio which results in the lack of potash feldspar.

Temiscamian

There are some sedimentary rocks — tuffs, contorted sericitic schists, slates, and banded iron formation — within the belt of typically volcanic Keewatin rocks, and these sediments seem to be more abundant toward the top of the formation; but, overlying (see page 9) the Keewatin, there is an extensive development of sedimentary rocks of Temiscamian type. There is no basal conglomerate to this sedimentary formation.

Limited in township *No. 71* to a narrow band to the southeast of Soufflot lake, these sedimentary rocks underlie a relatively large area in the western portion of township *No. 81* and extend north and northwest into the southwest corner of Delbreuil township and to the bay in the southeast corner of Simard lake. In the south-central part of township *No. 81*, they extend eastward beyond Winneway lake, a total width of nearly six miles; but north of Winneway lake, the width of the band is reduced by about one half, that is, to three miles.

The typical rock of this formation is a quartz-biotite schist which, on weathered outcrops, frequently shows the original bedding planes. Massive facies representing either thick beds, or portions of the formation where the stratification has been obliterated, are also frequently encountered. Hornblende needles, in some places parallel to the schistosity, in others porphyroblastic with random orientation, may accompany or replace biotite as the ferromagnesian mineral in these rocks. The more massive hornblende-rich facies grade into typical amphibolites.

An unusual type of metamorphic amphibolite found in the district is characterized by crystals or grains of amphibole attaining one-quarter of an inch in diameter, and forming about fifty per cent of the rock. These stout amphibole crystals contrast with the usual needle-like form characteristic of the mineral, and in the field were mistaken for pyroxene crystals. Examination of thin sections of the rock revealed that the amphibole is not strictly uniform in composition, and that it contains numerous poikilitic inclusions, among which biotite is the most conspicuous mineral. The groundmass is fine grained, composed of epidote, quartz, fresh untwinned feldspar, and altered plagioclase. Apatite, pyrite, and leucoxene are accessory minerals, and in one specimen, taken from an occurrence near porphyritic granite, microcline is abundant in the groundmass.

There are one or several bands of iron formation within that portion of the area mapped as Temiscamian. Occurrences noted were limited to single outcrops, where narrow bands rich in magnetite were observed. One such outcrop is on the boundary between Delbreuil township and township *No. 81*, a few hundred feet to the east of the Winneway river, and other occurrences were found about a mile and a half to the west of the northern end of Winneway lake. For detailed work, it is possible that this rock may provide useful key horizons.

No true conglomerates were found in this large area of sedimentary rocks, but rocks whose character is apparently of structural origin occur,

which, in certain outcrops, resemble conglomerate. These rocks are 'pencil gneiss', of which the best specimens found were among the boulders on the north shore of Soufflot lake. These rocks possess a well developed linear structure, strikingly emphasized by the distribution of the component minerals with the result that certain portions of the rock have the appearance of elongated pebbles, rudely cylindrical in form, with a length of from six to ten times their diameter. Occasionally, these 'pencils' are two to three inches in diameter, and up to eighteen inches in length. They are parallel to one another. Normally, they differ from the enclosing matrix only in the relative abundance of the ferromagnesian constituents in each, the 'pencils' being lighter coloured than the remainder of the rock.

The distribution of these rocks does not suggest the existence of a definite horizon within the sediments nor any apparent relation to the location of the nearest granite contacts. The position of outcrops near the axis of the plunging anticline which is the main feature of the regional structure (page 15), together with the existence of similar structures in amphibolite on the shores of the small lake at Mile 6½ on the boundary between Guillet and *No. 71* townships, and in the rocks of the acidic-porphyry zone to the north of Soufflot lake, all suggest that the structure was formed under the influence of stress in rocks of diverse types, and that the rocks are therefore pseudo-conglomerates rather than metamorphosed conglomerates.

The direction of plunge of the linear schistosity, as established by the 'pencils' described above, has been indicated upon the map which accompanies this report.

Intrusive Rocks

Diorite:

Throughout the greenstone belt, particularly in Guillet township but also in Devlin township, are found dioritic, fine to medium grained, rocks described in our report on Guillet township (1).

The close association of these rocks to the greenstone belt, together with careful study of the available exposures, suggests that many of these 'diorites' are but coarse facies of the volcanics. On the other hand, some of them present many of the characteristics of the 'older-gabbro' of the Rouyn-Harricana district.

Dioritic rocks forming dykes, or masses whose form could not be established on account of the limited exposures, were occasionally found cutting the Temiscamian sediments. As a rule, there is biotite in these diorites and they are more similar to the lamprophyres mentioned on page 14 than to the 'diorite' of the greenstone belt. It therefore seems to be probable that there are in the area dioritic rocks of different ages and origin, of which by far the greater part are closely associated with the greenstone belt and are of Keewatin age.

(1) Que. Bur. Mines, Part *B*, 1935, pp. 64-65.

GRANODIORITE:

The northeast end of the small granodiorite mass to the west of Soufflot lake extends into the northwest corner of township *No. 71*. This typically granite-textured rock was described in our report on Guillet township (1).

GRANITE (Albite) PORPHYRY:

On the east side of the north arm of Soufflot lake, and of the narrow lake to the immediate north, there are outcrops of a coarse granite-porphyry characterized by numerous phenocrysts of feldspar measuring up to one-quarter of an inch in length. In some specimens, less abundant, but prominent, 'eyes' of quartz are also present. The porphyry intrudes the greenstone, of which it contains fragments, and forms a very irregular body, or two small bodies, included within an area about a mile and a half long by half a mile wide. Rocks essentially similar in appearance and composition are found at other points within the area, especially in the region to the north of Soufflot lake, but the relations are as a rule poorly exposed, and no other bodies of considerable size could be outlined. It is presumed that these isolated occurrences are dykes. The relatively large size of the phenocrysts is the feature by which these rocks are identified in the field.

The feldspar phenocrysts, many of which show crystal outlines and zoning, are of very acid oligoclase. The quartz phenocrysts, where present, are rounded and usually composite, being formed of several smaller grains, with various optical orientations, frequently displaying undulatory extinction to a moderate degree. The groundmass is in all cases very fine-grained, composed essentially of quartz and of fresh untwinned feldspar together with a little biotite, chlorite, or hornblende. The foliation, as outlined by the biotite flakes, curves around the feldspar phenocrysts. These are somewhat altered but show little evidence of strain. No orthoclase was identified in any of the thin sections of the rock which we examined.

QUARTZ PORPHYRY AND QUARTZ-FELDSPAR PORPHYRY:

Quartz porphyry and quartz-feldspar porphyry dykes are both widespread and numerous throughout the greenstone belt, and similar rocks are found in the overlying sedimentaries within a short distance of their contact with the volcanics.

In the northern portion of the zone of acidic porphyritic rocks which outcrop along the Marécageuse river, these rocks have, as stated on page 10, the texture of fine-grained intrusive quartz-feldspar porphyries.

To the east of the north arm of Soufflot lake, the rocks of the zone resemble those of Guillet township, which have been classed as volcanics, flows and pyroclastics (see page 9).

In view of the accepted association, in the Rouyn-Bell-River area, of gold deposits with soda-rich intrusive rocks, it is important to note the existence of a similar group of rocks in the Guillet-Simard Lake belt.

(1) Que. Bur. Mines, Part *B*, 1935, p. 68.

GRANITE:

Granite is by far the most widespread and extensive intrusive rock in the region. The principal object of the season's work was to trace the extension of the belt of older volcanics and sedimentaries toward the north and east of Guillet township, and this has been accomplished. The granitic rocks which limit the older formation in *No. 71, No. 81,* Delbreuil, and Devlin townships extend, so far as it is known, far beyond the limit of the map-sheet.

No detailed study of the granitic rocks was undertaken, but it is noteworthy that gneiss is rare within the area examined and that the granitic rocks present so wide a variety of facies that it is reasonable to assume that several periods of intrusion are represented. In the vicinity of the Winneway river, and to the east and northeast of des Fourches lake, pale, almost white, mica-granite is common. To the east and south of Winneway lake, coarse, pink, porphyritic granite and syenite outcrops at many places, particularly in the vicinity of the contact with the sediments. Normal pink or grey equigranular biotite and hornblende granites are the usual types.

APLITE:

Associated granitic dyke rocks—pegmatites and aplites—are common. Within the area underlain by the older rocks they are more abundant near the contact with the granite than at a distance from it.

LAMPROPHYRE:

Lamprophyre dykes, both micaceous and hornblendic, are abundant throughout the area, cutting both the volcanics of the greenstone belt and the meta-sediments. None were identified with certainty within the areas underlain by granite, nor were their relations with the other intrusive rocks of the region exposed in any of the outcrops we examined. Retty, however, reports one such dyke cutting the granite (albite) porphyry on the east shore of the north arm of Soufflot lake (1).

DIABASE:

A dyke at least twenty feet wide of fine-grained quartz-diabase was observed cutting granite on the west side of Ile Verte, in Simard lake, and a similar rock was noted on a small outcrop about three-quarters of a mile to the west of the south end of Winneway lake. On account of the relatively 'fresh' character of the rock, it is assumed that it is of Keweenawan age.

PLEISTOCENE AND RECENT

The Pleistocene and Recent deposits of the region include clays, sand and boulder deposits of the esker type, boulder moraines, unsorted glacial till, and swamp or muskeg.

The northern part of Devlin township is included within an embayment of the clay belt of western Quebec and Ontario (2) and is underlain

(1) RETTY, J. A., *Travers Lake Area;* Que. Bur. Mines, Ann. Rept., Part C, 1934, p. 27.
(2) WILSON, M. E., Geol. Surv. Can., Mem. 103, 1919.

by stratified clay deposits formed in the great lakes which, toward the close of the Glacial epoch, extended to the south of the retreating ice. The limits of the area underlain by the clay belt, as determined by a land classification survey carried out by the Department of Colonization of the Province of Quebec, are shown on the map which accompanies this report. The larger areas of sand and boulders, esker and outwash deposits, have also been outlined.

STRUCTURAL GEOLOGY

The distribution of the belt of greenstones and of sedimentary rocks in a broad arc, convex toward the east, is the most notable feature of the regional structural geology. Although no new detailed evidence has been discovered during the past season, it has been established with reasonable certainty (1) that the sediments overlie the Keewatin volcanic belt. The belt as a whole is therefore a great anticline plunging toward the southeast.

There are, however, within the map-sheet certain areas in which the formations do not conform to the regional structures and in which more closely-spaced observations would be necessary in order to establish the nature of the structural disturbances which appear to be due to cross-folding or to faulting. It is not as yet known that these features are of economic significance. The principal areas in which these structural disturbances are notable are: (1) in the vicinity of the south and southeast shores of Winneway lake; (2) in the southeast corner of Devlin township; and (3) in the southwest corner of Delbreuil township.

ECONOMIC GEOLOGY

Following the discovery of gold in the Soufflot Lake area during 1934 and the discoveries in the spring of 1935 of the ore-bodies later brought into production by McIntyre Porcupine Gold Mines, Limited, in the vicinity of Guillet lake, the district was the centre of intensive prospecting and exploration activities during the summer of 1935. The results of this exploration were outlined in the report on Guillet township (2) and although, in general, they were distinctly encouraging, the only economic ore-bodies outlined were those found on the McIntyre claims.

During the summer of 1936, however, the activity was greatly reduced. The development and bringing into production of the McIntyre property was the only sustained effort of the year. On other properties, work was limited to a certain amount of prospecting and some diamond drilling. A recent discovery of economic importance made on the McIntyre claims (now owned by the McIntyre-controlled Belleterre Mines, Limited) is evidence, however, that the district is still an attractive field for prospecting.

Quartz veins are numerous in the district, but, according to reports, many are barren. In view of the fact that some of those which are gold-

(1) Retty, J. A., *Gaboury-Blondeau Townships, Témiscamingue County;* Que. Bur. Mines, Ann. Rept., Part *B*, 1930, p. 65.
Henderson, J. F., *op. cit,* Bur. Econ. Geol., Mem. 201, 1936, p. 13.
Denis, B.-T., *op. cit.*, Que. Bur. Mines, Part *B*, 1935, p. 70.

(2) Denis, B.-T., *op. cit.*, Que. Bur. Mines, Part *B*, 1935, pp. 70-79.

bearing show very little evidence of mineralization, it is essential that exploration be guided by reliable assays. As far as is known to date, the gold-bearing veins are confined to the 'greenstone' belt, but this may well be due to the fact that this formation has, in general, been more intensively prospected than any other. The fact that no gold-bearing veins have been found in the large area underlain by the sediments of Temiscamian type should not, in our opinion, be regarded as justification for the elimination of that area as attractive prospecting ground.

Known gold-bearing veins cut most of the formations in the greenstone belt—diorite, andesite, iron formation, tuffs, rhyolite, and pyroclastics.

Belleterre Mines, Limited

(Guillet Township)

Belleterre Mines, Limited, is the name of the Company incorporated to work the claims held by McIntyre Porcupine Mines, Limited, in Guillet township. The property has reached the production stage and a 125-ton mill is now in operation.

The property consists of a group of 47 claims to the north and northwest of Guillet lake, and to date three veins of economic importance have been discovered. Two of these have been developed to the 325-foot and 500-foot levels, respectively, and the third, discovered more recently, is being explored by diamond drilling.

The first of these veins, known as No. 2, was described in the report on Guillet township (1), and as development and exploration work was concentrated on the second, No. 11, vein, until the property was brought to the production stage, there is nothing to add at present to the description of the No. 2 vein. It is shown in the composite sketch-map, Figure 1.

On the No. 11, or McDonald, vein, development work has reached the 500-foot level. The surface outcrop of the vein is irregular and discontinuous, suggesting in general outline a reversed *S*. It was found that these irregularities persist underground to the lowest level explored and that the vein is much narrower on the lower horizon than it was on the surface outcrops. The composite sketch-map (Figure 2) well shows the form of the deposit and the persistence of the dip of the vein to the southwest.

The underground work has failed to furnish any evidence to support the view that the vein is related to the narrow tuff band in which the No. 11 vein was traced over a length of 1,500 feet (2). The projection of the tuff band along its strike would so nearly meet the end of the No. 11 vein that a relation between the two had seemed plausible, but the vein underground is enclosed in greenstones which do not show any features suggestive of acid tuffs.

The two developed veins, No. 2 and No. 11, lie about 3,000 feet apart and appear to be quite independent of one another. The most recently discovered vein, No. 12, at present being explored by diamond drilling,

(1) Denis, B.-T., *op. cit.*, Que. Bur. Mines, Part *B*, 1935, p. 72.

(2) *Ibid.*, p. 72.

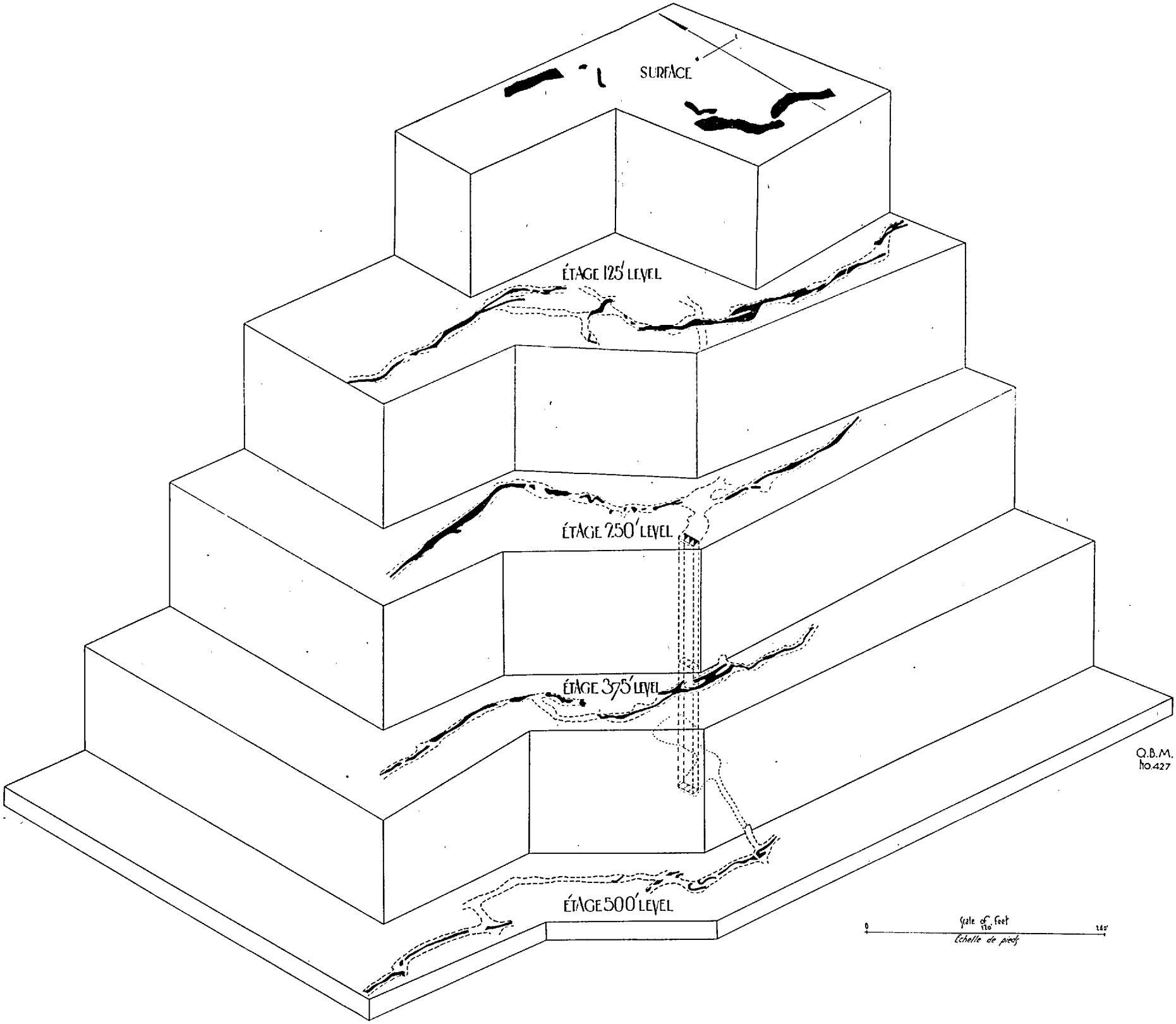

Figure 2. — **Composite sketch-map, No. 11 vein, Belleterre Mines, Limited.**

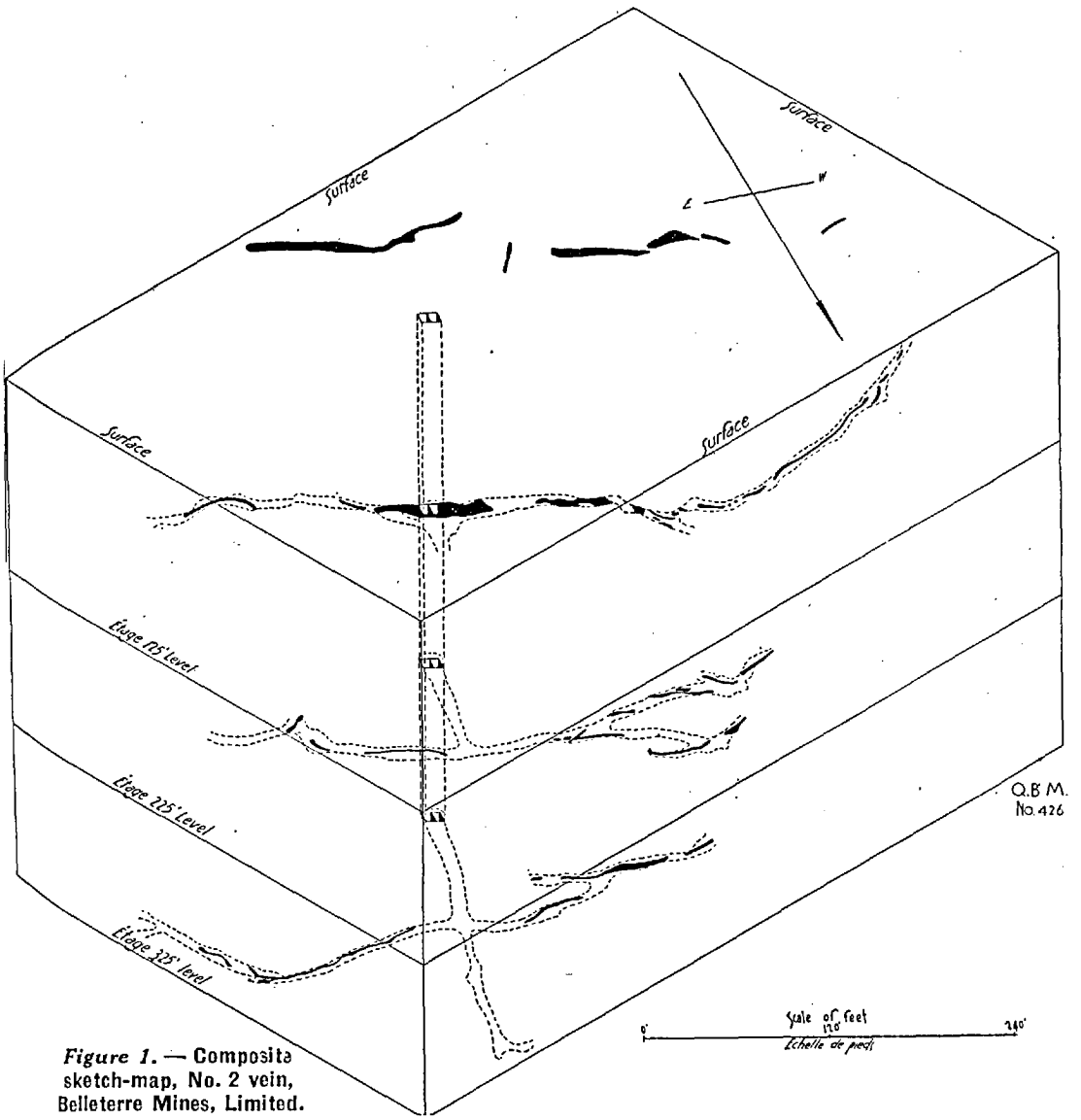

Figure 1. — Composite sketch-map, No. 2 vein, Belleterre Mines, Limited.

lies between them (Figure 3). It was found by careful prospecting following the discovery of gold-bearing quartz float during construction work, and it is interesting to note that, where first encountered in a trench, its width was about four inches and it contained only a few cents worth of gold per ton. The vein strikes about N.80°E. and dips at about 70° to the north.

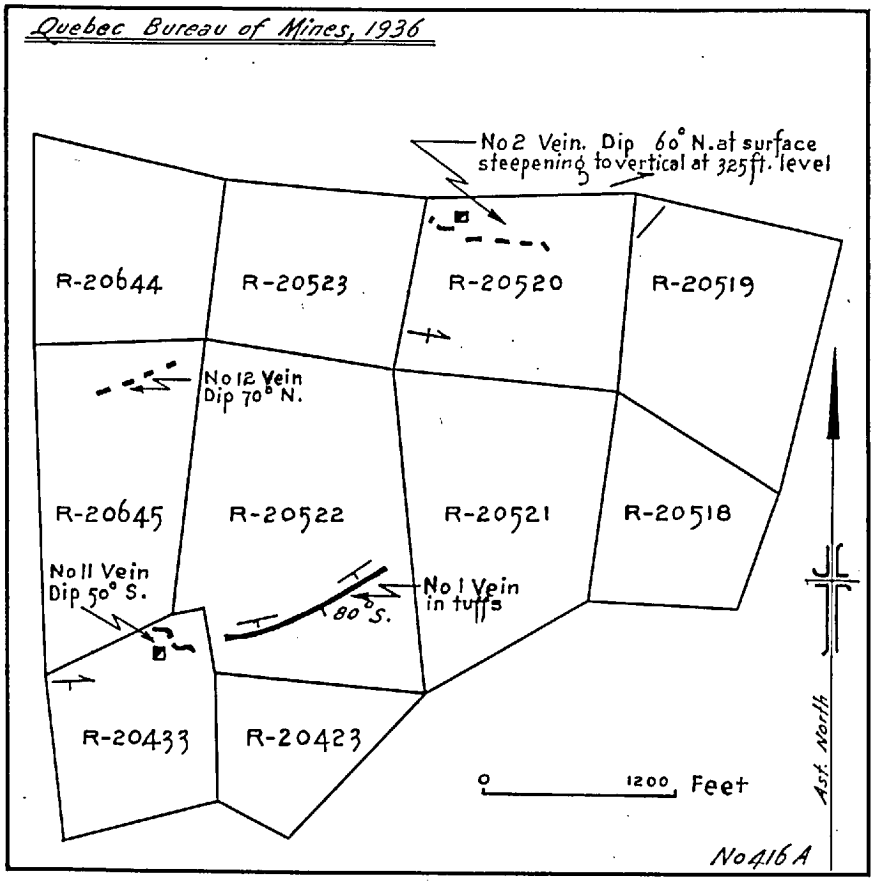

Figure 3. — Sketch-map showing location of veins, Belleterre Mines, Limited.

Subsequent exploration by trenching and diamond drilling is reported to have outlined one ore-shoot, 620 feet in length, carrying $11.00 in gold per ton over a width of 4 feet, and to the southwest there is a shorter but richer section, 120 feet in length, carrying about $24.00 in gold per ton, which may belong to the same vein-system. If, as appears to be the case, it does belong to the same vein-system, the total length over which the vein has been traced so far is about 1,100 feet.

The No. 12 vein is enclosed in 'greenstones' and, on the surface, particularly in the southwest section, it shows a beaded structure with banded walls, suggestive of injection under pressure. It is reported that diamond drilling has shown stronger shearing on the hanging-wall side at depth than is apparent on the surface.

Gaines Moor Gold Mines Syndicate
(Guillet Township)

The Gaines Moor Gold Mines Syndicate carried out diamond drilling during 1936 on the Sharpe vein. Previously, while the property was under option to the Connell Mining and Exploration Company, Limited, the vein had been traced for a length of about 2,000 feet across claims R.20377 and 20378. Its general strike is slightly south of east, and while the width as exposed by trenches and test-pits was distinctly encouraging, it had been reported that gold values were in general low. A grab sample taken by the writer and assayed at the laboratory of the Quebec Bureau of Mines assayed $8.00 in gold per ton.

Four diamond-drill holes were put down, but operations were suspended at the time of our visit and it was not possible to learn exactly what results were obtained.

Sandlac Gold Mines, Limited
(Guillet Township)

Further exploratory trenching was done on a group of ten claims (R.20597 to 20606) to the northeast of aux Sables lake, in Guillet township. These claims were previously held by Lake Expanse Mines, Limited.

Exploratory trenching was also commenced on a group of fifteen claims (R.20302 to 20316) in the vicinity of Caribou lake. This group is on the contact between the Temiscamian-type meta-sediments and the granite which extends far to the south.

Claims R.21197, 21199, 21201
(Guillet Township)

On claims R.21197, 21199, 21201, held by D. S. Johnston, exploratory trenching has uncovered quartz veins cutting greenstones.

On claim 21199, a vein of bluish glassy quartz, 4 to 5 feet wide, has been exposed over a length of more than 100 feet. The strike is N.45°E. (mag.) and the dip about 50°S.E. At the southwest end, the vein narrows to an 8-inch zone in which are quartz lenses and stringers, while to the northeast it seems to be cut off against a lamprophyre dyke. The vein is enclosed in greenstone or sheared dioritic greenstone.

At about 350 and 900 feet to the east of the above vein, but still on the same claim, two small splashes of quartz and carbonate are exposed. They are, presumably, independent of one another and of the larger vein.

On claim 21201, a large stripping has exposed a quartz vein cutting greenstones over a length of 35 feet. The strike is north (mag.) and the dip 30° to 60° to the east. The width varies from 36 inches at the south end to 12 inches at the north end. The quartz is white and sugary to glassy and coarse grained. A little carbonate and a few grains of pyrite or bornite were noted. The sugary quartz is possibly a sheared form of the normal coarser type.

In the northeast corner of the same claim small quartz splashes are exposed in a trench. The country rock here is fine-grained sheared andesite.

On claim 21197, a few small irregular quartz splashes in greenstone are exposed in three short trenches.

Grab samples taken by the writer from the two larger veins were assayed in the laboratory of the Quebec Bureau of Mines and contained only traces of gold.

Vantage Mines, Limited

(Guillet Township)

Vantage Mines, Limited, carried out surface exploration work and some diamond drilling on a group of 15 claims in Guillet township, to the south and southeast of Taché lake. The greater part of the work was done on claim R.24818, to the immediate south of Taché lake at the western boundary of Guillet township. The new road from Latulipe to the McIntyre Porcupine Guillet Lake property crosses the claim in the vicinity of the workings.

Claim 24818 covers a section of the contact zone between the greenstone belt and a granitic quartz-porphyry. This is also in the major contact zone between the greenstone and the granite batholith which extends far to the north.

The local geology is so complicated by intense folding and the injection of dykes and apophyses of granitic rocks of several types that, even on a scale of one inch equals 20 feet, it is impossible to reproduce the details of the distribution of the several rock types, and, despite the fact that much trenching and stripping was done, the irregularity of both the intruding and the intruded formations is such that no attempt can be made to connect the various exposures.

The Keewatin is represented by banded iron formation, greenstone, and diorite, cut by lamprophyric dykes, while the intrusive rocks comprise fine-grained pink aplites, grey quartz porphyry, pink biotite granite, and facies intermediate in appearance between these two.

Quartz veins were discovered at three places, but so disturbed are the local formations that it is preferable that they be regarded as independent until it is proved otherwise.

The first vein has been traced over a length of 25 feet; it is of white, fine-grained quartz, with a little chalcopyrite. At the east end, the width is from 24 to 36 inches, and at the western extremity of the exposure the width is about 8 inches. The enclosing rock is granite, and a little dioritic greenstone.

The second vein is exposed over a length of 25 feet. It is rather irregular and at the eastern end of the exposure, in a pit about 5 feet deep, it has a form suggestive of a saddle, plunging eastward at an angle of 22 degrees. The exposure here is about 30 inches across. The country rock is greenstone and dioritic greenstone. The vein pinches-out to the

west, about 20 feet from the pit. To the east, it plunges beneath the greenstones.

The third vein has been traced over a length of about 40 feet across a portion of a large stripping in which intensely drag-folded iron formation and greenstones are cut by porphyry and aplite dykes. The width is from 4 inches to 8 inches and the vein is not continuous. It is of white, very fine-grained quartz with a somewhat greasy lustre.

There are in the trenches and stripping several other veins and lenses of quartz, but their continuity is entirely conjectural.

Percy White Vein

(Devlin Township)

In Devlin township, on claim R.28515, one of a group of claims held by W. S. Fawcett, a system of parallel stibnite-bearing quartz-albite veins has been traced over a length of more than 1,000 feet. The discovery is about a mile and a quarter northeast of the eastern end of Devlin lake (Shanty bay).

The veins are exposed in a series of trenches cut across the strike. The strike averages N.40°E. and in the successive exposures the variations from this average are slight. The vein-zone cuts across the regional strike of the schistosity of the enclosing greenstone, which is about N.68°W. in this vicinity.

The quartz, which is white, coarse, and glassy, is accompanied by a cream-coloured albite. This mineral is particularly abundant on the borders of the veins, but is also found as seams in the quartz itself. In the quartz and the albite, but more closely associated with the latter, there are a few needles, up to two inches in length, of stibnite. Pyrite and chalcopyrite are also sparingly present.

About three-quarters of a mile to the north of the discovery, the greenstones are in contact with a large body of granite whose northern limit was not determined.

Two grab samples taken from different trenches were assayed in the laboratory of the Quebec Bureau of Mines, who reported that they contained only traces of gold.

Claims about One Mile North of Devlin Lake

(Devlin Township)

Some exploratory trenching has been done on claims in the south-central part of Devlin township.

One series of trenches is in the vicinity of the boundary between claims R.26107, 26108, and 26109, and claims R.27677, 27676, and 25947. An acid zone of what appears to be quartz rhyolite porphyry and associated pyroclastics has been traced over a distance of about a quarter of a mile. These rocks are locally and irregularly mineralized, chiefly with pyrite. At one point, the pyrite is very abundant over a width of about two feet. The general strike of the zone is northwest, conformable to the regional

strike of the enclosing greenstones. The contact between the Keewatin and the granites is but a few hundred feet to the north of these trenches.

In the northeast corner of claim 27672, a little work has been done on a zone essentially similar to that described above. This occurrence is about one mile to the southeast of the other.

About one mile farther to the southeast, some 200 feet west of post No. 2 on claim 26937 and post No. 1 on claim 26936, three short trenches have exposed a similar formation with the same pyritic mineralization.

The regional structure suggests a continuous horizon of these acid rocks, but, because of the distance which separates the occurrences, caution demands that this tempting hypothesis be considered with due reserve.

Claims R.20672 to 20681, 26155 to 26158

(Blondeau Township)

John Renaud and Théo Nadon are holders of a group of fourteen claims in Blondeau township to the west of aux Sables lake, on the eastern boundary of the township.

Exploratory trenching has been carried out on claim R.20673(?) by a series of trenches and pits over a length of about 1,000 feet. This work has disclosed two or three rusted zones, somewhat mineralized with pyrite, accompanied in places by quartz. The width of the zones varies from three to twelve inches. The strike is slightly south of east and the dip is to the north. The zones are twenty-five feet or more apart, and approximately parallel.

At the east end of the site of operations, near aux Sables lake, acid rocks of the quartz-rhyolite-porphyry type outcrop over an area about 200 feet by 250 feet. The relations were not sufficiently well exposed to establish their precise nature.

Connell Mining and Exploration Company, Limited

(Blondeau Township)

The Connell Mining and Exploration Company, Limited, carried out prospecting operations on a group of 64 claims near Kelly lake, in Blondeau township, where, according to a report kindly furnished by the Company, cross-trenching over a length of 400 feet exposed a series of lenses, some of which were almost solid pyrrhotite with minor chalcopyrite. The sulphides are nickeliferous. According to the same report, sampling, diamond drilling, and a magnetometer survey established that the sulphide bodies are of limited dimensions and that the nickel content is far below commercial grade. Work was therefore discontinued.

The nickel-bearing sulphides are reported to be in small masses of gabbro within the Keewatin, and, while the occurrence was not proved to be of economic importance, the presence of nickel in the district is worthy of note and should be borne in mind by prospectors.