# RP 258(A)

Preliminary report on the southwestern part of Pascalis township, Abitibi-East county

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# PRELIMINARY REPORT

# ON THE

# SOUTHWESTERN PART OF PASCALIS TOWNSHIP

# ABITIBI-EAST COUNTY

BY

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# PRELIMINARY REPORT ON THE SOUTHWESTERN PART OF PASCALIS TOWNSHIP ABITIBI-EAST COUNTY

by

David J. McDougall

## I N T R O D U C T I O N

During the field season of 1950 the writer mapped the southwest quarter of Pascalis township and a strip five lots wide on the western edge of the southeast quarter of this township, in all an area of 33½ square miles. Systematic traversing at 500-foot intervals was employed over almost all of the area and the results were plotted on a scale of 1 inch equals 1,000 feet.

The adjoining townships are Senneville to the west and Louvicourt to the south. These have been mapped on a scale of 1 inch equals 1,000 feet by Norman (1) and Ingham (2). Regional mapping, which includes the present area, has been done by Bell and Bell, (3) and MacLaren (4).

The mining village of Pascalis, locally better known as Perron, in the southwest corner of the township, is 17 miles by road from Val d'Or. The Perron mine and the inactive Pascalis, Cournor (Beaufor) and Resenor mines are located in or near the village.

Most of the area is easily accessible by roads, trails and range lines. A good gravel highway runs north from the Val d'Or highway (No. 59) to Perron, with a cut-off a mile south of the village to join the Senneterre highway (No. 58). Three other northerly trending roads are passable to automobiles or trucks over all or most of their length. The numerous trails and winter roads have not been indicated on the accompanying map because access to most of the area by way of the range lines is as easy or easier. The Senneterre-Noranda branch of the Canadian National Railways runs northeasterly through the eastern part of the area, with Pascalis station located at the south boundary of the township.

Much of the area is covered by swamp and sand or gravel deposits, particularly in the northwest and southeast parts. The major portion of the outcrops occur in a broad zone running northeasterly across the map from the southwest corner. The topography is subdued, maximum local relief being of the order of 400 feet and usually only about 50 feet. The terrain rises gradually towards the north, the change in elevation being most noticeable in the main outcrop zone.

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(1) References are at the end of the report.

Two small marshy lakes, Landing lake and Rougias lake, and several small ponds are the only bodies of water in the area. The main branches of the Pascalis "river" and the stream from Landing lake and the lower part of its branch from Block A are probably the only water-courses which maintain a flow throughout the entire summer. A stream at the northeast corner of Block A may also contain some water during warmer months.

## GENERAL GEOLOGY

All the consolidated rocks of the area are Precambrian in age and are overlain by a mantle of Pleistocene and Recent sand, gravel, clay and swamp deposits.

The northwest and south central parts of the area are underlain by a broad band of northwesterly trending volcanic flows, and pyroclastic and sedimentary rocks. Andesitic lavas with some dacite and agglomerate underlie most of the southwestern part of the area, and are also found in two bands farther to the northeast. Beds of banded quartzite are found in one of these northerly bands. Tuff and agglomerate, with some sheared volcanic breccia, appear to overlie the andesite and are overlain in turn by graywacke, impure quartzite and very little fine-grained conglomerate.

The intrusive rocks include peridotite, "granodiorite", diorite, quartz diorite, quartz monzonite and granite. The peridotite occurs as sills in the andesitic lavas in the southwestern part of the area. The eastern tip of the Bourlamaque "granodiorite" batholith occupies the southwest corner of the area. With it are associated narrow, fine-grained basic and medium-grained acidic dikes which cut both the granodiorite and the andesitic lavas. Diorite and quartz diorite occur as sills injected into the andesites and tuffs, but do not cut the sedimentary rocks. The southwestern part of the Tiblemont batholith, consisting principally of quartz monzonite and lesser amounts of granite and diorite, underlies the northeastern part of the area. Numerous quartz stringers and quartz veins cut all formations.

Altered rocks are found close to, or in, both of the batholiths, each having a characteristic type of low grade metamorphism. The lavas adjacent to the Bourlamaque batholith have become more basic, and the lavas, agglomerate and tuffs adjacent to the Tiblemont batholith have become more acidic in composition.

The lavas and the pyroclastic and sedimentary rocks have all suffered intensive folding, most of the dips being close to vertical. Faulting and shearing is in two principal directions — sub-parallel to the northwesterly strike of the formations, and approximately east-west — the second being confined largely to the southwestern part of the area. The contact of the Bourlamaque batholith is offset by several of these east-west faults, which appear to strike more to the northeast when they enter the lavas.

TABLE OF FORMATIONS

| | | | |
|---|---|---|---|
| QUATERNARY | Pleistocene and Recent | Swamp deposits, Lake deposits, Glacial deposits, (non-consolidated) | Silt, muskeg, sand and gravel, stratified drift, till, boulders and angular blocks |
| | Great Unconformity | | |
| PRECAMBRIAN | Post-Keewatin type | Faulting, introduction of quartz veins, sulphide and gold mineralization | |
| | | Tiblemont Batholith | Hybrid border phase; quartz rich lava and pyroclastic rocks<br>Quartz monzonite, granite and diorite (gabbro) |
| | | Bourlamaque Batholith | Hybrid border phase; chlorite rich lava.<br>Acidic and basic dikes. Granodiorite |
| | | | Diorite and quartz diorite (may antedate the sediments) |
| | | | Peridotite (may antedate the pyroclastic rocks) |
| | Intrusive Contacts | | |
| | Major folding and faulting | | |
| | Keewatin type | Sedimentary rocks | Graywacke and impure quartzite with minor conglomerate |
| | | Doubtful Minor Unconformity | |
| | | Pyroclastic rocks | Tuff and agglomerate (water-laid in part); volcanic breccia |
| | | Doubtful Minor Unconformity | |
| | | Lava and Pyroclastic rocks | Dacite; andesite including some tuff, agglomerate and banded quartzite; agglomerate |

## KEEWATIN TYPE

The basal rocks of this group include a series of lavas of basic and intermediate composition with lesser amounts of pyroclastic rocks. These extrusive rocks have been classified in the field as andesite and dacite. Some doubtful cases are possibly more acidic than dacite and others are close to basalt in composition, but they do not appear to form separate bands within the formation.

### Andesite

The lavas classed as andesite all have essentially the same composition but are variable in external appearance. The weathered surface is in general dark green or greenish brown. It is rough and somewhat granular, due to the relative resistance to weathering of the component minerals. The fresh surface is dark green, olive green or greyish green, and usually somewhat lighter in shade than the weathered surface.

The component minerals are fine grained and cannot always be identified, but in general they consist of greenish feldspars with considerable chlorite and other ferromagnesian minerals. Occasionally the rock is porphyritic with small, pale green feldspars set in a darker matrix.

The main groups into which the rocks can be divided in the field are massive andesite, pillowed andesite and andesitic lava with pronounced flow and localized alteration structures.

The massive andesite is medium to fine grained and lacking in structure, except for occasional flow lines. The principal areas in which this type occurs are in range I, lots 6 to 15; the southern part of range II, lots 15 to 19; and the central part of Block A. One of the larger exposures of the porphyritic variety is found in range I, lot 15.

Pillowed andesites are found principally in ranges I, II and III between the Bourlamaque batholith and the C.I.P. road, with additional outcrops in the central part of Block A. There are some excellently developed pillows and some less well developed forms, frequently vesicular around the margins. Other structures undoubtedly were once pillows, but are now either stretched by shearing or highly distorted, probably by a combination of shearing and folding. In many cases the distorted pillows have had their cores replaced by milky quartz. An excellent development of the stretched type may be seen in an outcrop immediately north of the village of Perron, and an equally good exposure of the distorted variety with replaced cores is to be found on lot 19, on the boundary between ranges I and II, immediately west of the C.I.P. road.

The andesitic lava with flow structures is found in numerous outcrops in ranges I and II and consists of elongate, sinuous, greyish-green bodies, in a darker matrix. It superficially resembles the rhyolitic "ribbon" flow breccia illustrated by Wilson (5, p. 157).

An altered variety of the andesite, of peculiar appearance, is frequently found associated with the massive andesite. This is a rock very similar

to the massive andesite, in which there are globular or blob-like bodies ranging in size from about 1 inch to 6 inches in diameter, yellowish green in colour, and consisting of epidote and quartz. In the field the writer called this structure "pseudo-agglomerate". A similar rock has been described in the Noranda area (5, p. 16).

## Dacite

The rocks classified as dacite are silicious rocks of a lighter shade of green than the andesite. They are almost aphanitic and quartz is rarely visible. The principal occurrence is a band in the central part of Block A, with some small outcrops farther south, particularly in range I, lots 11 and 28.

## Basalt

Only two areas of very limited extent are known to be underlain by rocks of a possibly basaltic composition. One is in range I, lot 8, in a large outcrop consisting principally of pillowed andesite. The second is in range I, lot 10, near the south boundary of the township. In both cases the rock is fine grained. It is very dark green, verging on black, on both fresh and weathered surfaces. At the first locality it seems likely that the rock is a basic variety of the andesite. At the second, the basic appearance is probably due to metasomatic alteration connected with the introduction of quartz veins and pyrite mineralization, which are probably related to the Bourlamaque batholith.

## Pyroclastic rocks

Agglomerate and sheared agglomerate are fairly common as small exposures within the andesite, particularly in the south central part of the area. On the weathered surface the colour is usually green or greenish grey, the fragments, which are sub angular, having a distinctly lighter colour than the ground mass. The fresh surface is dark green and the fragments can only be seen with difficulty. The composition of both fragments and ground mass is andesitic. Small outcrops of this rock are located in the central part of range I, lots 12 to 15. In the large outcrop on lot 15 there is an exposure showing a folded contact between sheared andesite and overlying pillow lava at which chilling of pillowed lava margin can be observed. In Block A there are numerous other bands of agglomeratic rock, most of which have been heavily sheared. At least some of this shearing is a form of cleavage due to folding.

Tuffaceous sediments, which in places include some agglomerate, are found in three broad bands within the area. Stratified tuff and agglomerate are a feature of the southern band; several outcrops of this type are located immediately west of Pascalis station. The relative size of the fragments and the sorting suggest that the stratification is due to deposition in water. Most of the other bodies of tuffaceous material are more massive, with small angular to sub-angular light grey or greenish fragments in a darker grey-green or green matrix. The composition is essentially andesitic, but in some outcrops it may be trachytic or dacitic. The band of tuff in range II, lots 15 to 25, includes some very small outcrops of pillowed andesite. Some other outcrops, particularly those close to the assumed contact between the tuff and the sediments, may be more properly classified as graywacke.

In range II, lots 39 to 42, there is a large area of agglomeratic rock, some of which is a volcanic breccia. The breccia fragments are large angular blocks, up to 8 inches across, and include fragments of quartz and of lava of intermediate and basic composition. This formation is probably the extension of some of the sheared breccias in Block A, and is shown as such on the accompanying map.

## Sedimentary Rocks

The members of the sedimentary band are graywacke, an impure "quartzite" and a minor amount of fine-grained conglomerate. Sediments to the southeast, possibly an extension of these, have been called Temiscamian-type by Tolman (6).

The graywacke is a fine-grained, dark green rock which appears to be composed of ferromagnesian minerals with a little quartz and feldspar. It has been found in several outcrops in ranges II and III, lots 19 to 22.

The impure quartzite occurs in numerous outcrops in the southwestern corner of Block A and in range IV, lots 11 to 14. The rock has a grey, dark grey or brown surface, occasionally with a greenish tinge, and is composed of fine-grained quartz and minor ferromagnesian minerals. In many places the rock is silicified. The outstanding megascopic feature of this rock is the banding, which consists of alternate bands of slightly different shades, usually 1/4 inch to 1/2 inch wide, but sometimes as wide as 12 inches. Folding and crumpling of the bands is noted in many places. A distinct grain gradation can be seen at some places in the individual bands. The grain size exercises a notable control on the depth of weathering, the coarser parts being more resistant.

The conglomerate is known to occur in only one small outcrop in range II, lot 22. It consists of a dark green graywacke containing small spindle-shaped fragments of about the same composition as the graywacke. These fragments are about 1 inch long and 1/4 inch wide and are roughly oriented in a common direction. The rock has been considerably altered by shearing.

Two narrow bands of quartzite are found lying conformably in pillowed lava in the west central part of Block A. This rock is greenish white in colour, is composed almost entirely of quartz, and shows distinct banding or stratification.

## POST KEEWATIN TYPE

### Peridotite

Only two areas of peridotite were observed within the area mapped, but an extensive magnetic survey (7) suggests that other bodies may lie beneath the overburden, particularly in a zone parallel to the Bourlamaque batholith.

The rock is fine grained and has a distinctive weathered surface, light brownish grey in colour, which contrasts sharply with the greenish colours of the lava. The surface is marked by irregularly sinuous radiating grooves about

1/4 inch wide, and narrow ridges of a white, asbestiform amphibole, which is brittle and crumbly. The fresh surface is dark green to black, with occasional lighter green veinlets of serpentine or white veinlets of amphibole. Magnetite, picrolite and aggregates of a coarsely crystalline carbonate are also present in small quantities.

### Diorite and Quartz Diorite

On the basis of the relative freshness of the minerals of the rocks under this general heading, they may be of two separate ages of intrusion but structural relationships to substantiate this could not be found. Most of the rock classed as diorite is composed of medium-grained hornblende and feldspar and a very large percentage of chlorite. The quartz diorite is usually finer grained and contains less chlorite. The feldspars and ferromagnesian minerals of the latter rock-type appear less altered and there is a small amount of bluish quartz. The weathered surface of both types has a coarse salt and pepper aspect due to the dark grey hornblende crystals which stand out from the lighter grey feldspar groundmass. Minor pyrite and chalcopyrite mineralization is occasionally noted in the diorite.

These rocks occur as sill-like masses, roughly conforming to the strike of the lava and pyroclastic rocks in which they occur. Where contacts can be observed, they are chilled in some places. Most of the principal exposures are in Block A, with others in range III, lots 22 to 24 and range IV, lots 12 and 13. An isolated outcrop of quartz diorite is located in range II, lot 21.

## BOURLAMAQUE BATHOLITH

### Granodiorite

The portion of the Bourlamaque batholith exposed in Pascalis township contains several varieties of granodiorite (8), but for the present purpose the broad classification employed by the local mines will be used. Under this classification there are two principal varieties - "altered" granodiorite and "unaltered" granodiorite, usually referred to as types A and B.

The unaltered variety consists of plagioclase, masses of chlorite which are believed to represent an original amphibole, and bluish quartz "eyes". The distinctive features of this type are its relatively light colour and the clear-cut, angular character of the feldspar grains. In contrast to this, the altered variety, while consisting of the same minerals, is very high in chlorite and much darker in hue, with the feldspar grains poorly formed and blurry in outline.

In the course of mining operations it has been found that the altered variety predominates in a marginal shell 500 to 1,500 feet thick. Farther from the margin the composition gradually changes to a point where the unaltered type predominates.

## Contact Phases

At the contact with the lava there are several features which indicate that the batholith is of intrusive origin. These include small inclusions of highly altered "greenstone" within the granodiorite and a more or less intense chloritization of the lava. Two curtains of greenstone are indicated on the accompanying map as "hybrid rocks". The northerly one, in the vicinity of the Pascalis shaft, has been well explored in the course of mining operations, bottoming at 800 feet, but the southerly body is only known from a limited amount of diamond drilling. These curtains consist of considerably altered lavas which weather greenish grey and are very rich in carbonate, chlorite and a ferromagnesian mineral, probably amphibole. The doubtful basalt in range I, lot 10, may be a variety of the hybrid rock.

## Dikes

Cutting both the granodiorite and lava are a series of narrow basic and acidic dikes of variable composition, rarely large enough to map.

The basic dikes are the most prevalent, and are found throughout the border phase of the granodiorite and in the lava both adjacent to, and some distance from, the contact. They are generally fine grained to aphanitic, and occasionally porphyritic. Locally many of them are called andesitic dikes, but they are probably altered lamprophyres associated with the late stages of the granodiorite intrusion. Underground they have been found useful as horizon markers in tracing gold veins, since some of them occupy the principal fracture zones in which certain of the veins occur.

The acid dikes are principally aplitic in appearance and composition, having a sugary texture and being composed of feldspar and quartz, with a little fine-grained hornblende of a distinctive green colour. Occasional dikes, of a similar composition but much coarser grained, are found in the greenstone close to the contact. Underground, a third type of acidic dike is found which is composed of medium-grained pink feldspar, a lesser amount of milky quartz and occasional tiny needles of tourmaline. Locally this is called aplite, but it may be a micropegmatite.

In addition to the above, which are related to the granodiorite, other narrow dikes, of basic to intermediate composition and medium grain, of uncertain age relationships, are occasionally found in the southwestern part of the area. One such dike is located in range I, lot 15, in the vicinity of which several diamond-drill holes have been put down. This rock is a gabbro, consisting principally of a ferromagnesian mineral altered to chlorite, with lesser amounts of white feldspar.

## TIBLEMONT BATHOLITH

The portion of the Tiblemont batholith which is located in the map area has several features which make it difficult to describe briefly. The batholith as a whole has been called quartz monzonite, and later, 85 per cent

soda granite (9). Most of the outcrops of the map-area are considered to be quartz monzonite, with some small areas of granite and diorite.

## Quartz Monzonite

The typical quartz monzonite weathers a light bluish grey with a rather rough surface. It is composed of about equal parts of white and greenish white feldspars and a ferromagnesian mineral now altered to chlorite, with a lesser amount of bluish quartz. This rock comprises most of the outcrops found in range II, lots 39 to 42, range V, lots 30 and 37, and in the northeast corner of Block A.

## Granite

The granite has a pinkish grey weathered surface and is composed of pink quartz, comprising 60 per cent or more of the rock, pink and white feldspars and chlorite. The only known outcrop of this type is located in Block A, east of the C.I.P. road and about 400 feet north of the north boundary of the map.

## Diorite

The "diorite" encountered within the batholith is a very heavy, medium- to fine-grained dark rock composed of light grey feldspars and black, fresh-looking hornblende. Bell and Bell (9) classify similar rocks as massive diorite or gabbro (p. 34) and it seems that gabbro is the preferable term. The only known outcrop is at the intersection of the railroad and the range line between ranges IV and V.

## Hybrid Rocks

In the lava, agglomerate and tuff adjacent to the batholith there is a zone of alteration which is indicated on the accompanying map as a "hybrid phase". This hybridization is the result of the addition of silica, and presumably alumina and alkalies, producing a group of rocks which superficially resemble lavas and pyroclastic rocks but internally have a much different appearance. Agglomerate, coarse-grained lava (presumably andesite) and perhaps some tuff, are now composed of an assemblage of minerals that closely resemble those of the quartz monzonite. Other finer-grained rocks are now composed of white feldspar and a small amount of a fine-grained dark mineral. Pillowed rocks having this composition occur in at least one outcrop in Block A. Occasional chalcopyrite mineralization is found near the batholith contact.

Outside of the hybrid zone there is another narrow, poorly defined and discontinuous zone of alteration in which parts of the andesite show streaky, greenish patches parallel to the strike of the shearing. The rocks having this type of alteration appear more resistant to weathering than the hybrid rocks, which in turn are more resistant than the marginal batholith material. This differential weathering produces a step-like arrangement of the topography in the vicinity of the contact. On the basis of the topographic forms and the

two types of alteration, two small cupolas of the batholith material are thought to exist beneath the muskeg west of the hybrid zone, and are indicated on the accompanying map, despite the fact that no actual outcrops of the intrusive rock are visible.

Inclusions of greenstone and angular basic breccia are found a short distance inside the batholith, and it is interesting to note that whereas the breccia is apparently partially assimilated, the same does not appear to hold true for the greenstone inclusions.

## SAND AND GRAVEL DEPOSITS

Extensive parts of the area are covered with sand, gravel and boulder deposits of Pleistocene age. In general the examination of these deposits was of a cursory nature, and, although the outlines of most of the principal and many of the lesser deposits were mapped, it was sometimes found impossible to determine exact boundaries. The deposits represent glacial debris which has been extensively reworked by the waters of post-glacial Barlow-Ojibway lake.

## STRUCTURE

The average strike of the lavas, pyroclastic and sedimentary rocks is approximately N.55°W., ranging between N.65°W. for the lavas and N.45°W. for the sedimentary rocks, with the pyroclastic rocks occupying an intermediate position of N.50°W. Certain anomalous cases in the lavas, where the strike diverges sharply from the normal, are probably due to drag in the vicinity of faults and are discussed under that heading.

The slight difference in average strike of the various formations suggests doubtful minor unconformities or intense folding stresses in materials of differing competency. Exposed contacts between the major extrusive and sedimentary formations are rare. Perhaps the best is in the southwest corner of Block A, where pillowed andesite and banded impure quartzite occur in the same outcrop. The contact is highly sheared, and over a distance of about 20 feet presents a confused schistose zone in which it is impossible to determine the exact relationship between the formations. The contacts between the sedimentary and pyroclastic rocks, and between the pyroclastic rocks and volcanic rocks in the southern part of the area are not exposed. In both cases, the contacts are probably more irregular than shown on the accompanying map.

It will be noted that the principal formations along the south boundary do not conform entirely with the corresponding formations in Louvicourt township to the south, as indicated by earlier mapping (1 and 10). The writer believes that Norman's assumption of a "structural discontinuity" (10) is unnecessary and that the offsetting of the graywacke belt along it in Pascalis township is doubtful. Erosion of an anticlinal fold crest to expose the underlying formations may be a more logical explanation.

## Folding

About two-thirds of the determinations indicate that tops face in a southerly direction. This can be construed to indicate that a major fold axis lies to the south in Louvicourt township, with lesser folds on the limbs to account for the occasional north-facing tops. However, the writer prefers to believe that the relative distribution is fortuitous, rather than representing a regional trend. The probability is that there are a large number of relatively small folds on which north-facing tops could only be determined in rare cases. Some of the fold axes are indicated on the accompanying map, based principally on top determinations, outcrop patterns and, to a lesser degree, on data available from magnetic surveys.

Crests are exposed in two widely separated places, but insufficient data are available to indicate either their magnitude or extent. The probable positions of the axes have not been plotted. The first is in lot 15, range I, and consists of pillowed lava in contact with, and apparently overlying, sheared agglomerate. The folding is anticlinal, plunging steeply to the southeast, and the agglomerate fragments have been sheared and stretched in planes parallel to the fold axes. The second crest is in the north central part of Block A, and consists of sheared agglomerate with a narrow bed of banded tuff running through the outcrop. The folding is apparently synclinal and plunges gently to the northwest. Banding in the tuff shows considerable crumpling, and the alignment of fragments and the planes of shearing in the agglomerate are about perpendicular to the tuff beds.

## Faulting

Faults or shear zones on the scale of the "breaks" in the principal mining districts of Quebec and Ontario do not appear to be present.

Faulting is best developed in the vicinity of the Bourlamaque batholith, where several easterly trending faults offset the contact. These faults probably provided the channels along which mineralizing fluids which formed the local ore deposits entered. Within the batholith the strikes are fairly consistent, but in the lavas they change radically. In general it would appear that they swing a little to the north, but for a distance of about 5,000 feet outside the contact there is such a confusion of subsidiary faults, variable directions of schistosity, and strike of the structure that it is difficult to decide upon even an approximate trend.

Underground work has indicated that, in the Perron "shear", the north wall has moved down and obliquely to the west, with a displacement of the order of 1,000 feet. The fault to the south has apparently dragged the volcanic rocks, as indicated by the varying strikes of the structure. However, the apparent drag and the offset of the contact are in opposition to one another, and this can only be reconciled by assuming a rotational fault movement. Thus, if the north wall of the Perron fault and the north wall of the fault to the south both swung downwards relative to their respective south walls, with hinges located within the batholith, the known data seem to be satisfied. The same type of movement may have affected the other faults which offset the contact.

In range III, south of Landing lake, a fault has been indicated on the accompanying map. At its eastern end this fault is exposed as a talcose shear zone dipping to the northeast at about 80° and containing milky quartz lenses and some sulphide mineralization. The apparent continuation of this zone to the west has been picked up in three drill holes spaced at intervals of about 1,800 feet.

Schistosity and foliation are developed in most of the lavas and pyroclastic rocks, striking parallel or sub-parallel to the formations. It is believed that most, if not all, are the result of folding stresses.

## Magnetic Surveys

A previously mentioned compilation of a group of ground magnetic surveys (7) has proved of considerable aid in interpreting some of the structural features. Many of the high anomalies appear to represent the axes of anticlinal folds. It is on this basis that the diorite bodies have been interpreted as sills, since they do not coincide with the high anomalies, but are parallel to them on one side or another. Similarly, the peridotite bodies appear to underlie the lavas flows at the axes of folds and are thought by the writer to be the cause of some of the anomalies along the anticlinal axes. This conclusion, arrived at independently by the writer, agrees with a similar statement by Norman (11, p. 7). The general statement concerning the interpretation of the anomalies should be applied with considerable caution, since there remains much doubt that all the anomalies, particularly those that are exceptionally high, can be interpreted as indicating the presence of peridotite or of anticlinal structures. This would appear to be particularly true near the Bourlamaque batholith contact, where the complex faulting is believed to be the cause of some of the very high anomalies.

## ECONOMIC GEOLOGY

Gold is the only mineral which is produced economically within the area, its production being restricted to the edge of the granodiorite mass. Some scheelite was produced in 1942 and 1943 as a by-product. Elsewhere, although prospecting has been extensive, and almost every quartz vein larger than 6 inches shows evidence of trenching or sampling, results have not been encouraging. However, in the course of the field work, some miner chalcopyrite mineralization was noted associated with the diorite sills and the hybrid zone of the Tiblemont batholith. Sphalerite in extremely small quantity has also been noted in the hybrid zone. Careful prospecting in these two rock-types might uncover more interesting base metal mineralization, but nothing was observed during the field work which would be worthy of examination on its own merits. There are occurrences of miner chalcopyrite mineralization in Block A. One is 4,000 feet west and 2,100 feet north of the intersection of range-line IV-V and the east boundary of Block A. The other is 1,800 feet east and 2,300 feet north of the intersection of the same range-line and the west boundary of Block A.

Sand and gravel have been used to some extent in read construction, with gravel pits located at intervals of approximately one mile along the north-trending roads. A large gravel pit immediately east of the railroad in range III has supplied ballast for the construction of the railway.

A diligent search failed to find any chrysotile asbestos in the local peridotite exposures, although drilling in similar rock on the Courner property in Louvicourt township is reputed to have interested small asbestos veins.

## DESCRIPTION OF MINING PROPERTIES

Two mines in the area, the Perron and Beaufor, have produced gold and two others, the Pascalis and Resenor, have done exploratory underground work. Various other companies have held, or still hold, claims on which trenching, diamond drilling or geophysical surveys have been done, and at one time or another almost all the area has been staked.

### Perron Gold Mines Ltd.

Ref.: Que. Bur. Mines Ann. Rept. 1931, Pt. B, pp. 114-116
" " " " " 1932, " " pp. 40-43
" " " P.R. No. 116, pp. 68-70
" " " " " " 120, p. 22
" Dept. " Geol. Rept. 20, Vol. III, pp. 267-270
C.I.M., Struct. Geol. of Can. Ore Deposits (1948) pp. 893-898

Perron controls a total area of 1,415 acres in Pascalis and Senneville townships. The portion in Pascalis township consists of two groups of claims. One group comprises lots 15 to 18, and part of lots 13 and 14, range I, and the south halves of lots 14 to 18, range II. The other group, which borders the west boundary of the township, is made up of Blocks 9 to 18 and the northern parts of lots 7 to 13, range II. The mine is in this latter group of claims in the village of Perron.

Mining has been confined to a small portion of the property near the west boundary of the township, where the easterly trending Perron "shear" offsets the Bourlamaque batholith contact. The ore is restricted to the "altered" granodiorite shell and occurs in quartz-tourmaline veins which carry some carbonate and scheelite. Gold occurs free and in close association with coarse crystals of pyrite in the veins and wall rock. Some chalcopyrite is found with the pyrite.

The ore bodies have been classified by Ames (12, p. 897) in order of their importance as follows:

(1) "Quartz veins following along, or branching off as flat offshoots and "horse-tails" from, dike-filled northwest striking fractures. The highly productive No. 32 vein, which extends from the 625-foot level to the 1,375-foot level, is of this type.

(2) "Quartz filled tension fractures lying in echelon between east-west shear zones. Ore bodies of this type are best developed above the 725-foot level.

(3) "Quartz veins filling east-west shear zones. Such veins are irregular in outline and extent, for they pinch and swell with great frequency. However, they are of good grade and can be mined profitably."

A fault, on the south side of the "shear", striking N.33°E. and dipping 55° southeast offsets the vein and other earlier structures.

According to the annual report of the company for the year end of Dec. 31st, 1949, the total tons milled from 1935 to 1949 was 1,640,777 and the bullion produced was valued at $15,522,843.41. The mine manager is Fred Murray.

## Cournor Mining Co. Ltd. (Beaufor property)

Ref.: Que. Bur. Mines Ann. Rept. 1931, Pt. B, pp. 110-114
" " " " " 1932, Pt. B, pp. 32-40
" " " P.R. No. 116, p. 70
" " " " " " 120, p. 22
" Dept. " Geol. Rept. 20, Vol. III, 1949, pp. 270-271.

The Beaufor property consists of eight claims, Blocks 1 to 8, lying in the southwest corner of the township, with Perron and Pascalis adjoining on the north and east. The mine is located in the village of Pascalis.

Granodiorite underlies almost all of the property, with a southerly dipping, east-west fault running through the central part of the claims. Mining has been concentrated between this shear and the Perron boundary, the ore occurring in much the same fashion as in Perron, with some of the principal Perron veins dipping south into the property. The only outstanding difference is said to be a larger amount of chalcopyrite associated with the pyrite in the veins and wall rock.

During the active stage of mining, the ore was treated at the Cournor mill and roughly 40,000 ounces of gold was recovered.

The property was acquired by Beaufor Mining Corporation in 1936 and by Cournor Mining Co. Ltd. in 1939. It became inactive in 1942. Some diamond drilling was done in 1945-46, and at the present time, (fall 1950) crosscuts are being driven from Perron on the 825- and 1,375- foot levels by arrangement with that company.

## Pascalis Gold Mines Ltd.

Ref.: Que. Bur. Mines Ann. Rept. 1931, Pt. B, pp. 104-110
" " " " " 1932, " " pp. 29-30
" " " P.R. No. 116, p. 70
" " " " " " 120, p. 23
" Dept. " Geol. Rept. 20, Vol. III, 1949, pp. 271-272

The property of the Pascalis Gold Mines consists of 21 claims bounded by the south township boundary, Beaufor on the west, Perron on the north and

Pasgil and Perron properties on the east. The claims are numbered as follows: A. 33719-20; A.33723-28; A.33854-60; A.33862-63; A.33885-86 and A.33889-90.

At and near the surface the rock is mostly unprofitable lava, but the contact of the granodiorite dips steeply to the east, and with increasing depth the width of the granodiorite increases. The vein system is apparently similar to that in Perron, and, underground, the extension of some of the principal Perron veins can be seen continuing into the Pascalis property.

A shaft was sunk in 1940 and 6 levels opened. Operations were suspended in 1942. Some exploratory work has been done for Pascalis by Perron from the latter property.

## Resenor Gold Mines Ltd.

Ref.: Que. Bur. Mines P.R. No. 120, pp. 21-22
" " " " " " 205, Pt. III, p. 4
" " " Min. Ind. & Stat. 1937, p. 93
" " " " " 1939, p. 91
" " " " " 1940, p. 71
" Dept. " " " 1941, p. 70
" " " " " 1946, p. 99

This company holds eight claims in Pascalis township which are bounded on the south by Perron Gold Mines, on the west by the township boundary and on the east by Vanacor Gold Mines Ltd. These claims consist on the north half of lots 2 to 6, range II, most of lot 2 and all of lots 3 and 4, range III.

A lobe of granodiorite projects into the Keewatin lavas underlying the property, and is cut by a southeasterly striking fault dipping 55° to the southwest. Quartz veins with coarse pyrite, similar to those found in the Perron mine, cut the altered granodiorite.

Extensive diamond drilling, a magnetometer survey and some exploratory underground work have been done, but the property has been idle since 1948.

The present company took over the property in 1945. Prior to this it had been held by Senore Gold Mines Ltd.

## Pasgil Mines Ltd.

Ref.: Que. Bur. Mines Ann. Rept. 1932, Pt. B, p. 31
" " " P.R. No. 116, p. 70

This property, previously known as Gilbec Mines Ltd., comprises a group of claims numbered C.150, claims 1, 5, 6 and 7 and parts of 2 and 3; A.45405; A.48613-17 and A.48624-26.

The property is entirely underlain by Keewatin volcanic rocks in which some isolated occurrences of visible gold in quartz veins have been found.

Exploration has included surface work, diamond drilling and a magnetometer survey. The property has been inactive since 1947.

## Vanacor Gold Mines Ltd.

Ref.: Que. Dept. Mines, P.R. No. 205, Pt. III, pp. 3-4

Fifteen claims, south and northwest of Landing lake, including lots 5 to 12, range III, and the southern halves of lots 2 to 7, range IV, are the holdings of this company. The area is almost entirely covered by overburden, but on the basis of sparse outcrops, a few diamond-drill holes, and a magnetometer survey it seems probable that it is entirely underlain by Keewatin lavas. Diamond drilling south of Landing lake has located the probable extension of a talcose shear which is exposed immediately to the east of the property. There has been no activity on this property since 1946.

## Miscellaneous Mining Corporation Ltd.

Pasmont Gold Mines Ltd., Pasco, Sencon Gold Mines Ltd., and Senim Ltd. have held ground in the area, but their claims have lapsed. Pasmont held lots 27 to 28, range I. Pasco held lots 27 to 32, range II, and the south half-lots 27 to 30, range III. The Senim property comprised lots 19 to 26, range I, the north half-lots 14 to 18 and lots 19 to 26, range II, lot 13 and the south half-lots 14 to 26, range III. Sencon held the north half-lots 2 to 7, range IV, and lots 2 to 11, range V.

All are probably underlain by rocks other than the granodiorite, principally the Keewatin lavas, but outcrops are generally sparse and there is little precise information. Magnetic surveys have been made on the various properties and some diamond drilling has been done on the Senim property in the vicinity of and east of the talcose shear zone which is exposed on the east boundary of lot 13, range III.

In Block A there is considerable evidence of prospecting activity, but the persons responsible, or results obtained, are unknown to the writer. Several quartz veins, in Keewatin lava, carrying a little pyrite have been trenched. One deep trench in rusty weathering lava with a considerable amount of pyrite, which is cut by some quartz veins, is located 3,300 feet north of the south boundary of Block A and immediately west of the C.I.P. road. This may be the mineralization described by Dresser and Denis (13) p. 282, samples of which contained only traces of gold.

Another trench, 11,600 feet north of the south boundary of Block A and 1,500 feet east of the C.I.P. road, has been cut in rusty rock at the edge of an outcrop of quartz monzonite. The mineralization consists of massive pyrite and much iron oxide in an altered silicious rock, possibly volcanic in origin.

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