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A REPORT ON PARTS OF DUPARQUET, HEBECOURT, PALMAROLLE AND ROQUEMAURE TOWNSHIPS,
ABITIBI-WEST COUNTY

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MINISTÈRE
DE L'ÉNERGIE
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DIRECTION GÉNÉRALE DE
L'EXPLORATION GÉOLOGIQUE
ET MINÉRALE

PARTS OF DUPARQUET, HEBECOURT, PALMAROLLE
AND ROQUEMAURE TOWNSHIPS

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A Report on Parts of Duparquet, Hébécourt, Palmarolle,
and Roquemaure Townships, Abitibi West County, Quebec.

- 1949 -

INTRODUCTION

Ministère des Richesses Naturelles, Québec	
BUREAU DE LA RECHERCHE GÉOLOGIQUE	
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During the summer of 1949, the writer and assistants mapped some fifty square miles of Abitibi county. The area covered, having the interprovincial boundary as its western boundary, comprised the following areas:

- Duparquet Twp. Ranges IX and X, west half
- Hébécourt Twp. Range X
- Palmarolle Twp. Ranges I and II, west half
- Roquemaure Twp. Ranges I and II

The area thus has as its eastern boundary the centre line (N-S) of Palmarolle township coincident with the LaSarre-Duparquet highway. Mapping was done on a scale of 1" = 1000'.

The area is covered by map 293A of the Geological Survey of Canada, "Palmarolle Sheet, Abitibi County, Que.", which is on a scale of 1" = 1 mile. This sheet bears the date 1932, and is a revision by A.H.Lang of the earlier map produced in 1925-26 by B.S.W. Buffam.

The map area is easily reached from the two nearest centers of any size, Duparquet, some six miles to the south, and LaSarre, fourteen miles to the north. These towns are connected by an excellent gravelled highway which, beyond and to the east of Duparquet connects with the Macamic Road, providing a direct connection with Rouyn-Noranda. LaSarre, a center some thirty-four years old, is situated on the C.N.R.

The map area proper is largely situated within the clay-belt of northwestern Quebec, is largely cleared, and is well supplied with roads. Rangeline roads traverse the area from east to west, and are connected at intervals by north-south roads. The westernmost portions of the roads in Roquemaure Twp. are ungravelled and are quite impassable to ordinary traffic in wet weather. These portions are the only exceptions in a system of otherwise all-weather roads.

With the exception of the eastern two-thirds of Range X, Hébécourt Twp., the entire area is largely under cultivation. The Palmarolle and Duparquet regions are older, in terms of colonization, than the other parts of the map area, and as a result are more readily traversed than other sections. The eastern portion of Range X, Hébécourt Twp., is quite undeveloped, rather taken up with large bare ridges of rock separated by flat-floored draws covered by young, dense, deciduous bush.

The entire map-area is, therefore, readily accessible by motor or truck, and very easily traversed on foot.

The method used in mapping the area represents a new departure, as far as the writer's experience is concerned, one which both greatly speeds mapping and assures a correct end-product.

The area was photographed in the spring of 1949 before deciduous trees had leafed. Thus all exposed bedrock was very plainly visible on the individual photographs, as were all trails and winter roads, features which tend to become obscured by deciduous bush. With such photographs there is little likelihood of overlooking outcrops of almost any size, and in practice the writer feels that very little bedrock was missed.

In conjunction with the recent aerial photographs a controlled mosaic was used. This was simply a corrected aerial mosaic produced by the company commissioned to photograph the area. Roads, rivers, buildings, etc. showing on the mosaic, coincide exactly with the same as positioned on the township plan. During the summer selected roads and distances were chained as a check on the accuracy both of the mosaic and of the township plan.

In the field, from day to day, the geology was mapped directly onto the individual aerial photographs.

This information was then transferred to an acetate sheet cut to cover the mosaic. In this way the outcrops were positioned correctly, since any error due to scale change towards the margins of individual photographs disappeared when identical points were located on the mosaic. At the same time, topography was transferred from the mosaic onto the acetate sheet. In this way both the geology and topography fell into correct position on the working-map, and the need of adjusting traverse errors, as in a pace-and-compass traverse, did not arise.

The system outlined resulted in considerably more ground's being covered in a single field-season than the writer has been able to do heretofore in a comparable length of time.

The writer was ably assisted, during the season, by Mr. T.J. Flanagan, a second-year mining student from the University of Toronto, and by Mr. L.J. Tanguay, a second-year mining student from Laval University.

PHYSIOGRAPHY

The map area lies within the so-called Abitibi plain, the "clay-belt" of northwestern Quebec and north-eastern Ontario. The characteristic topography involves a relatively level plain underlain by clays, both dense and varved. This plain represents the lowest level of the area. Locally, above the clayey plain there rise irregular deposits of sands and gravels. The majority of sand and gravel occurs as heavy mantles across the southern slopes of the third topographic subdivision, the numerous rocky uplands. However, isolated heavy deposits of sand and gravel do occur, and, from place to place, have been opened as a source of road ballast.

The most notable topographic feature involving unconsolidated deposits is an esker which enters the area in lot 19, Range II, Palmarolle township, and which passes in a direction somewhat east of south across the area to leave in lot 21, Range IX, Duparquet township. Locally the summit of this ridge rises some 75 feet above the surrounding countryside. A relatively short, esker-like, hill of sand and gravel lies to the west of the Duparquet River, in lot 56-61, Ranges I and II, Roquemaure Township.

The clayey lowland area is for the most part now under cultivation, supporting both hay and oats. No other crops seemingly have been attempted, and the principal

products of the area are milk and butterfat. A few potatoes are grown and very locally vegetables are attempted. In the lowest, flattest regions, the soils range from black mucks to peat soils, from quite structureless to somewhat fibrous soils. Higher up the slopes of the lowlands the soils become grayer in colour, boasting a thinning layer of dark leaf mold and grading into the grey wooded soils of the uncleared woodland.

The clayey lowlands involve the western half of Range X, Hébécourt township, the so-called "Hébécourt" road, the eastern half of Range I, Roquemaure township, and all of Range II, Roquemaure township. To the east of the Duparquet River, in Palmarolle township, the entire map area, with the exception of a portion of Range II, is involved in clayey lowlands.

Above the clayey lowlands and sandy deposits occurs the third topographic subdivision, the isolated rock hills and ridges.

Isolated hills vary from irregular, though generally roughly circular, hills which rise to some 60' above the plain to the top smooth surfaces of small "roches moutonnées" which barely rise above the general lowland surface. In general the northern portion of the eastern half of Range I and all of Range II, Roquemaure township, are the sites of small, isolated, hills. Elsewhere bedrock occurs as massive extensive ridges.

The ridges within the map area, most conveniently for geologic mapping, are strike-ridges, and thus trend in a general direction of N 75° W, from SE to NW corners of the area. Such ridges are separated by valleys floored at the general level of the Abitibi plain.

Ridge profiles are for the most part smooth, gently rounded, and somewhat asymmetrical in that the northern slope is generally considerably steeper than the southern. There are occasional fault-line scarps, in places giving cliffs some 75-100 feet high. The ridges are more frequent, and more closely spaced, in the area to the west of the Duparquet River. The gentler southern slopes are often due to the heavy deposits of sands and gravels previously mentioned.

The ridges in the eastern half of Range X, Hébécourt township, represent the highest elevations of the map area. The elevations of the crests of several hills were determined by aneroid, which showed them to reach some 320 feet above the surrounding plain.

Little water occurs on the surface of the area. Lakes and natural ponds are absent, and any flooded areas encountered west of the Duparquet River were due to the activities of beavers. East of this river, lie more extensive swampy tracts, which, however, form inconvenient areas only during the early part of the season.

The major waterway of the area is the Duparquet River, which transects the area in a north-south direction, coinciding roughly with the Roquemaure-Palmarolle boundary. This river lies in a wide low valley cut in the glacial clays of the area. Within the map area the Duparquet River is on an average some 1000 feet wide. The river has discovered bedrock at Rapid Danseur, in Range IX, Duparquet township, north of which it lies at the general level of Lake Abitibi. The drop involved in Rapid Danseur is only 7 feet, between the level of Lake Duparquet (875') and Lake Abitibi (868').

Subsidiary drainage within the area is effected by a few rivers which are narrow, deep, muddy and relatively sluggish. These rivers occupy wide, steep-walled valleys across the bottoms of which they pursue meandering courses. None are navigable for more than perhaps one mile above their respective mouths. Where studied, the rivers had in no cases discovered bedrock; rather, the valleys were cut entirely in the unconsolidated deposits of the area. The valley walls in every case show terraces, in places wide, involving some hundreds of feet, in places quite narrow and fragmentary. For the most part the terraces are matched and are taken to indicate the level of grade with respect to various former, higher levels of Lake

Abitibi, which lake represents the local temporary base-level. The rivers presently show a most intricate development of meanders throughout the lower portions of their courses.

The swampy area in lots 14-18, Range II, Roquemare township, stands very little above the level of Lake Abitibi. As a result, a steady westerly wind of much more than one day's duration has the effect of converting the gravel road into a ford. Since Lake Abitibi is a remarkably shallow, though extensive body of water, the local changes in level, due to persistent winds, are quite marked.

Within the map area all land suitable for farming appears to have been taken up and very largely developed, with fields extending to the bases of the several rock ridges. The principal agricultural product is milk, thus the clearings are given over to grazing and to the necessary production of hay. Some oats are also grown. The local income is derived also in part from the cuttings of local timber, and in larger part from outside sources such as various pulp and paper companies who employ the farmers during the winter and spring months.

GENERAL GEOLOGY

The consolidated rocks are all of pre-Cambrian age. They consist of a series of Keewatin-type acid and intermediate volcanics, within which lie beds of flow-breccia, agglomerate, and narrow, discontinuous bands of tuff and iron-formation. The flows dip sharply towards the south and top south. Locally, though infrequently, the flows are overturned.

The volcanics are mainly meta-andesite to the west of the Duparquet River. To the east the bulk of the rock appears rhyolitic, in part trachytic. The rhyolite is largely intruded by felspar-porphry, and, in places, it is most difficult to differentiate the two types, possibly because of near-contemporaneity of emplacement.

The volcanics represent the north limb of a syncline with the axis lying south of the area.

Following the folding of the volcanic series, intrusion of gabbro, diorite and granite occurred. The intrusive rocks also include a small boss of peridotite, dykes of diabase and of felspar and granite porphyries.

Few faults, or shears, as such, are visible within the map-area. With a single exception, any evidence of faulting is purely topographic. This exception, a strong shear-zone visible across a large hill of rhyolite in the north part of lots 48-49, Range I, Roquemaure township, when taken in conjunction with abundant topographic evidence, points to the existence of a possible fault-zone

which crosses the entire area in a direction slightly north of west.

Geologic history included deep erosion, unroofing of the gabbro and granite masses, and production, at some time in the past, of a surface of low relief. This surface was subsequently further dissected, then later glaciated to give the smooth profiles of today.

That little erosion has taken place since the retreat of the ice sheet is shown by the absence of any talus at the bottom of the isolated hills. Any talus which is encountered gives definite indications that it antedates the sand and clays of the Abitibi plain. There appears to be no talus floored on this surface.

The following table lists the geologic data as interpreted within the map-area:

Recent, and Pleistocene	(forest soils (gravels, sands (varved clays (gravels, sands (till
--- great unconformity ---	
post "Algoman"	• (diabase (granite porphyries, felspar porphyries
"Algoman" (?)	(peridotite (granite (diorite (gabbro ("older" diorite)
Keewatin type volcanics	(andesite; pillowed, massive (fragmental, agglomerate (rhyolite (andesite

KEEWATIN TYPE ROCKS

The greater portion of the map area is underlain by Keewatin-like rocks. To the west, in Roquemaure township, they are predominantly intermediate in composition, consisting of meta-andesite and scattered narrow bands of agglomerate and tuff. To the east, in Palmarolle township, the flows are predominantly more acidic, consisting of rhyolite-like lavas. The north east corner of the map sheet is underlain by post-Keewatin granites.

Rhyolite:

A wide belt of rhyolite flows occupies the central portion of the Palmarolle township section of the map area, as well as the northern third of Range I and all of Range II, from the Duparquet River as far west as lot 36, Range II, Roquemaure township. This belt is compounded of many rhyolite flows of various thicknesses, from some 15 feet up. The general trend of this belt of flows is N 72 W and this disposition gives to the rhyolite a thickness of more than 12,000 feet within the map-area. Rhyolite is known to extend north, well into Range III, Roquemaure township.

The rhyolite weathers to a light grey or to an almost white surface. A fresh surface varies from a somewhat pinkish-grey to an almost whitish-grey colour. It is, for the most part, very fine grained and breaks with a conchoidal fracture. Locally the rock is porphyritic, and shows

phenocrysts of quartz and a pinkish to greenish white felspar. To the east, in Palmarolle township, the porphyritic texture becomes more pronounced, giving to the rock the distinct appearance of intrusive material. Many sections in this area also show undoubted extrusive rhyolite apparently intruded by a porphyritic rhyolite. It is felt that this complex can best be explained as the filling of cavities (tunnels, blisters, etc.) within older flows by the liquid material of younger flows. Structural relationships suggest a slight temperature gradient between the intrusive and the intruded rocks, in that there exist gradations between a flow and an undoubted porphyry.

The prominent shear of the area occurs in rhyolite, and here the rock is well-carbonated and of a sugary texture, weathering to a crumbly granular mass lightly cemented with a ferruginous calcite.

Sections of the rhyolite show very high percentages of rhyolitic and tuffaceous fragments, which give the rock the appearance of an agglomerate.

Andesite:

Greenstones, (andesitic lavas), are the predominant rocks of the area west of the Duparquet River, but occupy only two small areas in Palmarolle township east of this river.

A narrow band parallels the rhyolite in the northeast corner of the map area, lying between the rhyolite and the granite. The main mass of andesite parallels the rhyolite in the southern and western two-thirds of the map area.

The andesite normally shows a brownish to rusty weathered surface, and a dark grey to greenish fresh surface. The entire mass is made up of a considerable number of individual flows, ranging in thickness from about 6 feet up to several hundred feet. Thus the grain varies from place to place, from a very fine grained, almost glassy, rock to a coarsely crystalline rock which lends itself to confusion with certain diorites of the area.

Both massive and pillowed flows occur, with the pillowed flows making up the majority of the volume. The trend is generally N 72 W across the area.

In general, both massive and pillowed varieties have a variable proportion of spongy fragmental material mixed with them. Thus it is that in places the massive flows appear to be almost of the nature of an agglomerate, whereas in other places only isolated, somewhat elongated spongy fragments are found. The same variable proportion of fragments also occurs within the pillowed flows. Here, gradations occur from flows which contain 100% pillows to flows which contain, packed between the rims of adjacent pillows, fragments making up to 35% of the volume of the flow. This leads to considerable difficulty with certain flows in which the pillows themselves have been shattered.

The majority of the andesite is pillowed. On the basis of the appearance of the pillows two distinct formations have been tentatively suggested. Of course, within each formation there occur separate member flows of both pillowed and massive andesite; however, the pillows of one "group" of flows are sufficiently markedly different from those of another group to (possibly) warrant a separation.

In both cases a variable proportion of fragmental material has been stirred into the lavas; further, in both cases the pillows show well-vesiculated rims and a high proportion of quartz amygdules.

Since the flows are situated on the north limb of a syncline, steeply dipping towards the south, the "older andesite" is found across the northern edge of Range I, Roquemaure township, east of the center-line passing out of the map-area in lot 15, Range II, Roquemaure township. The "younger andesite" enters the map-area in lot 54, Range X, Hébécourt township, and is last seen in the south section of lot 3, Range II, Roquemaure township.

Pillows of the older andesite vary in size, with long axes ranging from 8 inches to 8 feet and breadth ranging from 4 inches to 3 feet. The rims are intact and the lava within quite massive. Rims show both vesicles and amygdules. In some places the pillows show a very irregular outline, often being quite gourd-shaped, with the long axis perpendicular to the direction of strike of the flow as a whole.

Pillows show both flat bottoms and the classic "v-shaped projections" permitting accomodation to the surface beneath. Wherever rounded tops and v-shaped projections occur tops are established as facing southerly.

The varying amounts of fragments which occur mixed in with the pillows are highly vesicular and are, on the whole, more acidic than the enclosing flows. They would seem to represent explosive debris associated with the parental volcanic activity responsible for the more placid lavas.

The massive lavas associated with the older pillowed lavas show little structure. From place to place, notably at the south end of lot 50, Range II, Roquemaure township, the flow shows bands of quartz amygdules. In this particular instance the amygdules have been sharply truncated, and the truncated surfaces are flat and well polished. These small surfaces now stand some 2.5 mm. above the general surface of the rock; witness of the amount of erosion since the disappearance of the Pleistocene ice-sheet.

Massive andesite in the southern quarter of lot 40, Range II, Roquemaure township, shows large clots of chlorite which give to the lava the appearance of a diorite (cf. Belleterre). Here the degree of metamorphism is perhaps somewhat more intense than elsewhere.

The younger, southern, flows contain smaller pillows of a consistent size, some 8 inches to 12 inches long by an almost identical breadth, giving the flows the appearance

of an accumulation of melons. Rims of these smaller pillows are intact, but within the rims the lava is quite fragmented. The fragments are delineated by two systems of fractures, one radial and one annular. Within individual pillows the fragments have been rotated somewhat.

Agglomerate and Tuff:

As has already been stated, the proportions of fragments appearing in both rhyolite and andesite often gives these rocks the appearance of an agglomerate. The fragments are angular, or sub-angular to fusiform, and range up to 1 foot in longest dimension. The fragments are more or less acidic in composition, set in a more basic matrix.

A 30 foot wide belt of undoubted agglomerate occurs at the top of the rhyolite. In this band, small angular white-weathering, somewhat equidimensional fragments, with diameters of from 1 inch to 3 inches, are set in a matrix of dark-green weathering andesitic material. This band forms a very distinct feature in the north end of lots 48 to 53, Range I, Roquemaure township; on the west bank of the Duparquet River in lots 58 to 59, Range I, Roquemaure township, and in lot 3, Range I, Palmarolle township.

An even more striking agglomerate occurs in an isolated "roche moutonnée" in a field in lot 9, Range IX, Duparquet township. In this band rhyolitic and tuffaceous fragments of diameters of up to 8 inches occur in a rather coarse grained tuffaceous matrix, which is now largely magnetite.

Several narrow bands of highly siliceous tuff, often indistinguishable from chert, are present within the andesites. The most striking of these bands occurs at the south end of lot 49, Range II, Roquemaure township, where the tuff is highly crumpled and presently associated with bands of magnetite. This feature is some 3 feet wide. A cherty tuff also occurs in an outcrop of massive andesite in the north end of lot 33, Range I, Roquemaure township. This band is remarkable in that it now harbours within it, parallelling its own strike, the only lamprophyre dyke found within the map area.

The tuff band mentioned last above can be traced across the extent of a large outcrop forming a high hill in the next adjacent lot, lot 22, to the west. Here the tuff is some 18 inches wide and, from place to place along strike, contains bands of a blood-red jasper. Where the several narrow ribbons of tuff which comprise the band have been crumpled the jasper ribbons advertize the crumpling most strikingly. Associated with the jasper, also in this same tuff band, is considerable hematite, which weathers out to give a fine pebble-grained surface.

In all cases the tuffs occur in narrow discontinuous bands, not exceeding some 200 feet in length. Thus the tuff does not form an adequate marker horizon. Within the bands both grain-gradation and cross-bedding indicate tops facing southerly. The tuffs have the same strike as the

enclosing lavas and nowhere show any evidence of unconformity between themselves and the lavas. They are, therefore considered to represent fillings in local depressions on the surfaces of the fresh lava flows, that is, they are contemporaneous with the andesite.

Post-Keewatin-type Intrusive:

The Keewatin-type volcanics are intruded by numerous dykes, both acidic and basic. The intrusive rocks also include several stock-like masses of gabbro, diorite, and granite, and a single small intrusion of peridotite.

Gabbro:

Gabbro occurs in the form of a long narrow stock which invades the rhyolite along the north boundary of the map area in Roquemaure township.

In length the stock extends from the center of lot 29, Range III, to lot 54, Range III, Roquemaure township, that is, some 23,000 feet; in width a maximum of some 3500 feet is reached in lots 42 to 44, Range II-III. The stock forms a distinct hill, flanked by sands and clays.

In shape, therefore, the gabbro stock is lenticular. Contact with the invaded rhyolite is hidden beneath overburden except in one small outcrop which lies outside the map-area. This outcrop occurs on the north boundary of the stock in the center of Range III, and involves only some 3 feet of rock. Here the contact is very definitely intrusive, the gabbro showing a narrow chilled edge.

North of this contact, some 20 feet, there occurs in the rhyolite a prominent, well carbonatized, shear-zone of width about 5 feet. With the single exception mentioned in the paragraph above, rhyolite and gabbro outcrops face one another across intervening overburden. In all such cases the southerly-facing rhyolite outcrops are bounded by this shear-zone. Were it not for the single small outcrop showing a definite igneous contact, it might be thought that the gabbro-rhyolite contact lay along a fault.

The texture of the gabbro varies enormously from place to place and over very short distances. Some of the coarsest gabbro seen lay within inches of the chilled contact noted above, whilst some of almost basaltic texture lay well within the center of the mass.

Segregations of ferromagnesian minerals are common, and in such segregations epidote is a common mineral. Very coarse-grained gabbro is found in zones along the surfaces of joints, and in many such cases a great deal of epidote has been developed. Within the coarse phases zoned feldspars are common. Alteration of ferromagnesian segregations has given rise to the appearance of considerable actinolite and fibrous serpentine of a cross-fibre variety.

Throughout the gabbro, both in coarse and fine-grained phases, considerable glassy quartz appears as an integral part of the rock. Further, considerable fine, disseminated sulphides occur throughout the gabbro. For the most part

this is pyrite; to a lesser extent chalcopyrite and some pyrrhotite also occurs. In the southern portion of lot 49, Range III, Roquemaure township, the gabbro has been trenched. Within the trench there is a somewhat higher percentage of chalcopyrite than elsewhere; however, the occurrence is quite limited in extent.

Within the coarse-grained sections felspar laths reach a size slightly in excess of $\frac{1}{4}$ inch, with ferromagnesian of comparable size. Within segregations the rock varies from 80% to 100% ferromagnesian.

The gabbro weathers to a rich chocolate brown colour which makes the outcrops of the rock noticeable from a considerable distance.

A small outcrop of coarse-grained gabbro occurs in lots 7-8, Range II, Palmarolle township, by the roadside.

Diorite:

The term diorite has been applied to the rock of a number of scattered outcrops which display rock of a granitic texture, equal or nearly-equal amounts of grey felspar and a black or dark-green ferromagnesian, and intrusive contacts.

The rock varies in grain size from medium to somewhat less than coarse-grained. In too few cases the grains are interlocked in the sense of a textbook granitic texture; more often this texture is somewhat in doubt and the rock has been called diorite on the basis of the proportion of

constituents present. This latter type is very similar to the so-called " spotted " diorite of the Belleterre, Quebec area.

This second type may possibly be merely a metamorphosed andesite. This idea received some support from the fact that the ferromagnesian minerals are highly chloritized, thus possibly representing clots of chlorite developed by metamorphism. The large mass of this problematical diorite which occurs on the north boundary of lot 12, Range X, Hébécourt township, occurs as an isolated outcrop. True, it is surrounded by pillowed andesite, but any contacts are covered, or, in the case of the outcrop next east, the outcrops are separated by an undoubted fault.

The diorite which occurs along the south boundary of Range X, Hébécourt township, enters from Range IX, east half, and has been mapped by Graham (1948) as a diorite. In Range X this example is found in undoubted igneous contact with pillowed andesite.

A large outcrop of diorite also occurs in lots 12-13, Ranges I -II, Palmarolle township.

Several small outcrops which occur close to the gabbro have been mapped as diorite on the basis of the argument stated above. It is perhaps more probable that the rocks of these outcrops represent a facies of the gabbro.

Like the gabbro, the diorite, from place to place, shows considerable glassy quartz, either as rounded eyes or as grains interlocked with the other constituents.

Granite:

The western boundary of an extensive granite batholith occurs in lot 26, Range II, Palmarolle township. As far as was noted this granite forms the major rock type within Ranges I and II, Palmarolle township, east half, and extends further east into Poularies township as well.

The granite is grey-weathering, medium to coarse grained hornblende variety. It cuts both the rhyolite and an older massive andesite which lies to the northeast of the rhyolite. Further, the granite is found cutting the diorite in lots 14-15, Ranges I - II, Palmarolle township. Where noted the granite-volcanic contact was very distinct, unlike the contact-zone suggested earlier by maps, as lying farther to the east.

Macroscopically the granite shows grains of an average of about 3 m.m. diameter. Both a pink orthoclase and a whitish plagioclase are present. The plagioclase contains a finely-divided epidote, which mineral also occurs as distinct grains scattered throughout the rock. Thus the plagioclase possesses a sickly-green colour on the weathered surface. Megascopically the granite appears to contain a good 50% quartz in larger glassy grains. The felspar, as above, is both orthoclase and plagioclase. Fracture surfaces across a fresh sample of rock show a considerable development of sericite. The ferromagnesian mineral is remarkably fresh, a shiny black hornblende.

Locally this has become altered in part to chlorite.

Numerous apophyses of the granite occur cutting the diorite in the site mentioned above. The contact with the rhyolite is largely obscured, but, where seen, was sharp. To the south and east, in the area to be covered during the coming season, a quick reconnaissance showed that the contact becomes very vague and messy.

Peridotite:

A small boss of peridotite occurs in the south-central portion of lots 45-48, Range I, Roquemaure township, where it intrudes massive andesites some 500 feet north of the contact with pillowed flows. The peridotite is best seen along the steep south side of an isolated large hill, readily reached via the east fence-line of lot 44. The north contact of the peridotite forms the south scarp of the hill. Lower, scattered outcrops of the peridotite occur south of the hill for some 300 feet, beyond which bedrock is covered. Some 400 feet further south rock is again found, now consisting of pillowed andesite. The band of peridotite is continuous easterly for some 700 feet of unbroken outcrop. Further to the east, peridotite again occurs in a narrow intrusion in the south end of lot 48, where it again lies within massive andesite. This rock type was not encountered any farther to the east.

A fresh surface shows a dark, dull, medium to fine-grained rock with considerable recognizable hornblende. The rock is heavy and dense.

In contradistinction to the dull black fresh surface, the weathered surface is a whitish-grey. This altered surface is some 1 - 1½ m.m. thick and very soft, scoring easily under a hammer.

A set of irregularly spaced joints contain narrow seams of asbestos. On the average these seams are 2 m.m. thick, and are filled with a rather brittle cross-fibre. Other seams are filled simply with serpentine. The number of seams of asbestos per unit area varies greatly across the surface of the outcrop, so that no attempt was made to estimate the percentage of asbestos present.

Acidic dykes:

A few widely scattered and narrow acidic dykes were encountered, cutting both the gabbro as well as the earlier volcanics. The material include quartz and felspar porphyries, aplites, and a very fine-grained grey-weathering rock similar to a trachyte.

Basic dykes:

The majority of basic dykes within the area are andesitic in appearance. The rock is very fine-grained and weathers to colours varying from bright olive green to the dark greenish-black associated with a basalt. Such dykes intrude all rocks of the area, but occur most commonly in Range X, Hébécourt township, in the neighborhood of the center-line of the township. Excellent chilled

edges occur bounding the dykes, and a number of them show narrow zones of amygdules parallelling both walls.

A narrow lamprophyre sill occurs in the north end of lot 33, Range I, Roquemaure township, where it lies in an outcrop of massive andesite. The lamprophyre occurs as an 18 inch wide sill within a 4 foot wide band of cherty tuff, and is remarkable in that the mica present occurs as fine books of muscovite (sericite), giving a fresh surface of the rock a silky luster.

Few diabase dykes occur within the area. A wide dyke crosses a large outcrop of pillowed andesite in the south end of lot 23, Range I, Roquemaure township, and a similar dyke occurs within pillowed andesite in lot 27, Range X, Hébécourt township, crossing into the central portion of lot 28, Range I, Roquemaure township. The strike in each case is N 10 E. An extrusive dyke with a similar strike occurs in lots 43-44, Range X, Hébécourt township, cutting both the diorite and a massive andesite for some 1500 feet. An ophitic texture is displayed in samples cut close to the contacts of the dykes, but becomes less apparent in the coarser central portion of the dykes.

PLEISTOCENE AND RECENT DEPOSITS

These deposits include glacial sands and gravels, and varved clays.

The low, flat-lying sections of the map-area are underlain by varved clays, as shown by the excavations of several creeks. The varved clays in places overlies extensive deposits of coarse sands and gravels, and are in turn underlain by deposits of the same.

Gravel pits in lot 5, Range II, Palmarolle township, and in lot 55, Range IV, Roquemaure township, have been developed in sand and gravel hills of some extent. These mounds, which are crudely circular in form and which probably represent ice-front features, are in turn mantled by varved clays. These clays dip away from the crests of the hills to merge with the flat-lying varved clays of the surrounding plains. Where the slope of the hills was apparently too steep for the then soft, viscous clays, slumping has taken place. As a result, complicated folding and faulting is now evident in the clays.

The pro-glacial lake which inundated the ice-front features, and in which the varved clays were then deposited, later received further sands and gravels which now cover the varved clays. It is suggested that these later sands represent outwash-plain deposits which developed in front of the ice following drainage of the pro-glacial lake.

Pleistocene features such as drumlins, kames, and kettles are not found within the map-area. Several crudely

oval hills which occur along the west bank of the Duparquet River resemble drumlins. However these hills occur singly, and it is felt that they probably have rock cores, as do a number of low gravel hills within the area.

A single short, well defined esker crosses the map-area from lot 19, Ranges II-III, Palmarolle township, to the central part of lot 23, Range IX, Duparquet township, and has been breached for gravel on the two range roads which cross it. This feature is some 50-75 feet wide across its summit, and rises some 75 feet above the surrounding terrain, which here consists of sand-plain and muskeg.

Sands and coarse gravels occur as well-defined tails in the lee of nearly every rock hill of the area. Especially fine samples are found south of rocky hills in lots 51 and 48, north end, Range II, Roquemaure township. Within the gravels the boulders are predominantly of granite-gneiss and hornblende-gneiss. Felsenmeers occur in the flat-floored valleys between the strike ridges of Range I, Roquemaure township and Range X, Hébécourt township. One of the best examples is found in lot 48, Range X, Hébécourt township - Range I, Roquemaure township. Some 15 feet above this felsenmeer occur remnants of a river-terrace developed in gravels.

STRUCTURE

Folding:

The extrusive rocks form part of the north limb of a syncline, the axis of which lies south of the map-area. The flows strike N 72 W from the east boundary of the area as far west as lot 7, Range II, Roquemaure township. Within the flows, where pillowed, pillow tops face south, and within the intercalated tuffs both cross-bedding and grain-gradation, where recognizable, indicate tops facing south.

To the west of lot 7, Range II, Roquemaure township, the flows swing to strike approximately S 75 W. Over the entire area dips are, for the most part, vertical or steep south. Locally the flows dip steeply north, notably in the south end of lots 5 and 12, Range I, Roquemaure township, and in the north end of lot 12, Range X, Hébécourt township.

Strikes vary from the regional trend considerably in the north end of lots 18-20, Range X, Hébécourt township, and in lots 49-50, Range II, Roquemaure township, in the south ends. These variations appear to represent local dragging, which is certainly the case in the second-mentioned locality.

Faulting:

Within the area one major zone of shearing has been recognized. This trends westerly along the southern border of the area from the south-east corner (i.e. south end of

lot 31, Range IX, Duparquet township) westerly to lot 21, Range IX, Duparquet township, and thence swings N 75 W to cross the map-area, leaving it in the north end of lot 17, Range II, Roquemaure township.

The zone is marked by a belt of intense shearing which has developed a band of vertically-dipping talcy schists of paper-like fissility. The zone is highly carbonatized, and, further, contains finely disseminated pyrite.

The schist is best developed in the rhyolites of the south-eastern corner of the map-area. As the north boundary of the shear-zone is reached, the shearing becomes less intense and the shears less closely-spaced. Here the rock is cut by a set of shears spaced some 4" - 6" apart, dipping vertically and striking N 83 W. These shears are up to $\frac{1}{2}$ inch wide, and in every case the schistosity indicates a movement of the north wall of the shear towards the east, relative to the south wall. The small shears have weathered out to varying depths, and on the whole the weathered surface is faintly coloured a yellowish-green.

At the south end of lot 20 and one-third up lot 14, Range IX, Duparquet township, there occur large rhyolite outcrops which are similarly sheared and carbonatized. The strike of the shearing in lot 20 is E-W, and in lot 14 is N 80 W. A band of agglomerate in the center of lots 11-12, Range IX, Duparquet township is similarly highly sheared.

No further evidence of shearing occurs along strike and to the north-west until the north ends of lots 16-19, Range II, Roquemaure township, are reached. In these lots a steep fault-line scarp bounds the north east face of a large strike-ridge of andesite. The intervening area lies to the north of the prominent strike-ridges of the map-area, and is covered with sands and clays.

A highly sheared rhyolite occurs as a steep hill in the north ends of lots 48-49, Range I, Roquemaure township. The strike of the schistosity here is N 75 W, with dip vertical. This outcrop lies some 2500 feet north of the suggested position of the major shear zone. The inclusion of this outcrop in the major shear is prolematical. It would give the shear a width which is nowhere else indicated. On the other hand, the position of the shear as suggested is simply an interpolation between two far-flung known positions. South of this rhyolite hill and to the west, in lots 46-47, Range I, Roquemaure township, lies a large outcrop of unsheared massive andesite which lies between the sheared rhyolite and the suggested major shear. Projection of the schistosity along strike both towards the northwest and southeast falls across areas covered by sands and gravels. Small outcrops lying in the north end of lot 50, Range I, Roquemaure township, are involved in small drag-folds, and such drag-folds also occur in an outcrop at the south end of lot 49, Range II, Roquemaure township. Possibly, therefore, the sheared rhyolite of lots 48-49, north ends, represents either a separate, intense shear-zone parallel to the

aforementioned major shear-zone, or represents the apex of a large northerly-facing convex bulge of the major shear-zone.

The major shear zone possibly represents a branch of the Porcupine-Destor fault (Zone A of the Graham reports covering the area south of this map-area) which swings northwest to enter Lake Abitibi along the lower reaches of the Riviere Antoine in Range III, Roquemaure township.

Younger faults of apparently small displacement exist which strike, on the average, about N 25 E. The evidence for these small faults is almost purely topographic. The major strike-ridges of the andesite which crosses the map-area show narrow, steep-walled, flat-bottomed draws which trend about N 25 E. The walls of these draws are almost vertical, and the ridge-crests show a certain amount of offset. Further, the strike of the major diabase dykes, as mentioned previously, are similar to the strikes of the transecting draws, and in several cases, the walls of the diabase dykes show a few feet of offset. The offset shown by these small faults shows that the west bloc has moved southerly with respect to the east bloc.

ECONOMIC GEOLOGY

Roquemaure township and Range X of Hébecourt township have practically no prospecting history. The rocks of this portion of the map area are massive, and very probably would be of little interest to the prospector. In spite of one large well-sheared outcrop of rhyolite in Roquemaure township the most interesting-looking portions of the major shear lie in Duparquet township.

The gabbro of the north end of lot 47, Range II, Roquemaure township has been trenched for some 15 feet, showing massive gabbro with a very small amount of disseminated pyrite and chalcopyrite.

In the south end of lot 12, Range II, Palmarolle township, the massive diorite of the large hill occurring here have been intruded by a small diabase dyke. This dyke has been trenched, and shows little finely scattered pyrite and a few specks of pyrrhotite.

Trenching has been carried out across the aforementioned sheared and carbonatized rhyolite in the south part of lot 13, Range IX, Duparquet township. This outcrop represents the major shear of the area, and is most attractive looking from a prospecting point of view. The rhyolite, which has developed a rich chocolate-brown weathered surface, is highly sheared and drag-folded. It contains a great deal of finely disseminated pyrite, as well as some more massive chalcopyrite and attendant bornite.

The southern end of lot 32, Range IX, Duparquet township has also been trenched. Here the major shear-zone enters the map-area from the east and outcrops in a hill of sheared and carbonatized rhyolite. The rhyolite is very fissile, with a soapy feel and silky luster. Considerable fine pyrite is found throughout the shear, as well as smaller, local amounts of coarsely cubic pyrite. Chalcopyrite is also found in the shearing. The shear is also the site of numerous narrow quartz veinlets, which form a stockwork within the shear. The quartz veinlets carry large masses of epidote and serpentine, which give them a sickly yellowish-green tint and a greasy luster.

Results in both these latter cases have apparently been disappointing. Graham (1948) mentions, in his report on a major shear-zone which outcrops farther to the west in Hébécourt township, that "sterility of these zones with regard to gold mineralization is a regional feature". Graham's A zone is a continuation of the zone under discussion above.

Apart from metals, the other deposit of any interest within the map area is represented by a small boss of peridotite which invades the andesites in the south-central portions of lots 45-46, Range I, Roquemaure township. The peridotite, which weathers to a whitish-grey surface, contains numerous narrow seams of asbestos. These are scattered across the surface of the outcrops, in places

some 3 inches apart, in places many feet apart. The seams are on the average about 2 m.m. wide, and of a brittle cross-fibre type of asbestos. The boss, however, is quite small, being not over 700 feet E-W by about 250 - 300 feet N-S.