RP 540(A)

PRELIMINARY REPORT, GEOLOGY OF MONT HOG'S BACK AREA, GASPE-NORTH COUNTY

Documents complémentaires

Additional Files

Licence

License

Énergie et Ressources naturelles
Québec

DEPARTMENT OF NATURAL RESOURCES

Honorable DANIEL JOHNSON
Minister

PAUL-EMILE AUGER
Deputy-Minister

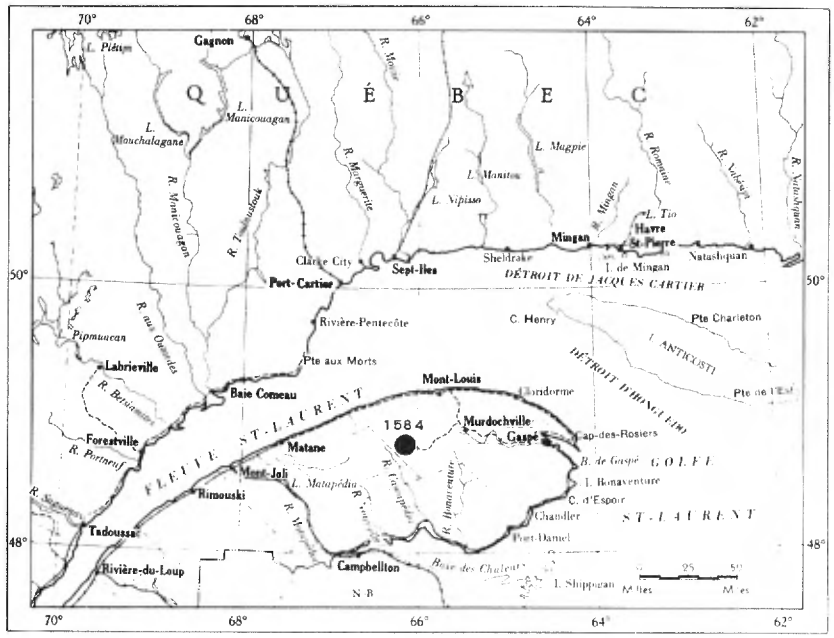
Geology
of
MOUNT HOG'S BACK AREA

GASPÉ NORTH COUNTY

PRELIMINARY REPORT

by

Jean-Louis Robert



QUEBEC
1966

P.R. NO. 540

QUEBEC DEPARTMENT OF NATURAL RESOURCES

Honorable DANIEL JOHNSON
Minister

PAUL-EMILE AUGER
Deputy-Minister

MINERAL DEPOSITS SERVICE

ROBERT ASSAD, Director

Geology
of
MOUNT HOG'S BACK AREA

GASPÉ NORTH COUNTY

PRELIMINARY REPORT

by

Jean-Louis Robert

QUEBEC
1966

P.R. NO. 540

Preliminary Report

on

MOUNT HOG'S BACK AREA*

Gaspé-North County

by

Jean-Louis Robert

INTRODUCTION

The present geological survey, carried out at the scale of one inch to 1,000 feet during the summer of 1963, marks the beginning of a detailed mapping program of an area in the Gaspé region where active prospecting was renewed in 1959.

The area is between the northern boundary of the zinc and lead mining camp of Federal Metals Corporation and the southern boundary of the Mount Albert peridotite body. Several copper showings occur within the map-area, principally within the west-central part. In the fall of 1963, the whole area, as well as large areas to the west, was staked out by approximately fifteen companies and private interests.

The area includes parts of Lemieux and Lesseps townships and covers 30 square miles. It is bounded by latitudes 48°53'20" and 48°47'00" and longitudes 66°11' and 66°05'. The eastern boundary corresponds in large part to the southwest limit of Gaspesian Provincial Park. The Lemieux-Lesseps township-line runs through the northeast part of the area.

---

* Translated from the French.

The Trans-Gaspesian highway, which ties Sainte-Anne-des-Monts, on the north shore of the peninsula, to Grande-Cascapédia, on Chaleurs bay, crosses the eastern part of the area in a north-south direction. The north limit of the area is 25 miles from Sainte-Anne-des-Monts and 5 miles from Mount Albert Inn; the south limit of the area is 45 miles from Grande-Cascapédia. A main road branching off from the Trans-Gaspesian in the south half of the map-area leads to Murdochville, roughly 40 miles to the east.

Access to the western part of the area is by the automobile road built by Cascapédia Manufacturing and Trading Company and known locally as Brandy road. This road follows Brandy brook to its headwaters, where it curves sharply toward the west. Its junction with the Trans-Gaspesian highway is just to the south of the Federal mine. This road also joins the Madawasca Corp. road leading to Causapscal in the Matapédia valley.

Several hauling roads give access to the interior of the area. These roads, easily spotted on aerial photographs, have been traced on the accompanying geological map and the main ones have been named.

Physiographically, the country has the appearance of a highly dissected plateau from which a few mountains rise. The relief is sharp; Mount Lyall, in the southeast corner of the area, rises to 3,000 feet, whereas at the northern edge of the area Sainte-Anne river is only 1,000 feet above sealevel. The altitude of the plateau itself ranges between 1,900 and 2,100 feet. The northern border of the area follows the south flank of Mount Albert, at an altitude of approximately 2,250 feet. Mount Hog's Back has an altitude of 2,650 feet.

The watershed trends northwest through Mount Lyall and the head of Brandy brook. The waters of the northern slope reach the St. Lawrence via Sainte-Anne river and its tributary, Isabelle brook. The waters of the southern slope drain into Chaleurs bay via Cascapédia river; Brandy and Berry-Nord brooks are tributaries of this river.

Reconnaissance geological surveys were made in the area by Mailhiot (1918;1919) and Alcock (1926;1927). The southern part of the map-area was mapped in detail by Auger (1954), and its geochemistry was studied by Riddell (1954). Osborne (1943), Smith (1944), McGregor (1962), and Boone (1962) visited the area to study special problems.

GENERAL GEOLOGY

The rocks of the area are, for the most part, Silurian and Devonian sedimentaries. An anticline, which plunges gently towards the north, covers the south half of the territory and represents the north portion of the Lemieux dome. This fold gives way to the north to a transverse syncline. A band of argillo-calcareous rocks of Silurian age, cut by several acid intrusions, crosses the northern part of the map-area and is overlain to the west and south by lower Devonian sandy and calcareous formations. Basic to acidic intrusions and lava flows appear within the area of the anticlinal and on its periphery. A part of the Mount Albert ultrabasic mass and its metamorphic aureole occur a short distance north of Isabelle brook.

The overburden is only a few feet thick except locally in the north of the area and in some valley bottoms.

Residual soils are found on the tops of a few plateaus. Outcrops are scarce except along the bush roads. The abundant talus and other broken rock debris were used for geological interpretation.

SEDIMENTARY ROCKS

Shickshock Group

The Shickshock Group forms a 2,500-foot-wide band which appears to correspond to the alteration zone around the Mount Albert peridotite mass. It includes amphibolites, hornblende-biotite schists and gneisses, granitic paragneisses, crystalline limestones and quartzites in a stratigraphic sequence strongly inclined to the south. According to certain stratigraphic criteria, the rocks of this group are Middle to Upper Ordovician, but recent radioactive datings (potassium-argon) indicate a minimum age of 495 million years (G.S.C., 1963), therefore pre-Ordovician to Lower Ordovician age.

Table of Formations

Recent and Pleistocene		Morainic and alluvial deposits
Post-Silurian	Intrusive Rocks	Rhyolitic rocks Granite Mount Brèche intrusive complex comprising masses and dikes of mafic rocks and masses of porphyritic felsic rocks
Pre-Silurian(?)	Intrusive Rocks	Mount Albert peridotite
Middle and Lower Devonian	York River Formation	Green and buff feldspathic sandstones with a few thin calcareous siltstone interbeds Mudstones and shales Basic lavas and pyroclastic rocks
Lower Devonian	Grande Grève Formation	Feldspathic sandstone interbeds in the upper part of the formation (York Lake facies) Silty and siliceous limestone with laminae of calcareous siltstone and some cherty limestone beds Key beds: Coquina with interbeds of limestone conglomerate; dark impure siltstone containing rounded dull quartz grains; white orthoquartzite; fossiliferous orthoquartzite
	Cape Bon Ami Formation	Argillaceous and carbonaceous limestone; shales
Upper Silurian	Saint-Léon Formation	Greenish gray calcareous siltstone; red and green shales; a few thin conglomerate and fossiliferous limestone interbeds
Middle Silurian	Sayabec Formation	Dolomitic limestones with a few interbeds of quartzite at the base of the formation and granular limestone at various horizons
	Val-Brillant Formation	White, cream-gray, and red quartzite
Lower Silurian(?)	Awantjish Formation	Green and red shales with interbeds of gray limestone; a few thin beds of calcarenite and limestone conglomerate
D i s c o r d a n c e		
Pre-Silurian	Shickshock Group	Amphibolite; biotite and hornblende schist and gneiss; granitic paragneiss; crystalline limestone; quartzite

Awantjish Formation

Silurian rocks are found solely in the northern part of the area, south of Isabelle brook, where they form a normal stratigraphic sequence dipping gently south.

The Awantjish Formation is composed chiefly of green and red shales with interbeds of gray limestone. A few 2- to 4-inch beds of calcarenite and limestone conglomerate were noted. These rocks form a band approximately 500 feet wide along Isabelle brook.

Five hundred feet west of the Trans-Gaspesian highway, in a curve of Isabelle brook, the upper part of the formation is exposed in fault contact with the Val-Brillant quartzite. The rock consists of shale beds rich in Atrypa reticularis* and of a few calcarenite beds comprising fragments of brachiopods and crinoid disks.

The contact between the Awantjish Formation and the Shickshock Group is covered; thus the unconformity marking the beginning of Silurian sedimentation is not visible in the map-area.

Val-Brillant Formation

The Val-Brillant Formation is composed almost entirely of white, gray-cream, and red quartzite. The grain size ranges from medium to fine and the beds are massive. At a few places the gray quartzite is peppered with about 10% very fine-grained syngenetic pyrite. The red tinge of the quartzite results, in all probability, from the coating of the quartz grains by iron oxide (hematite).

An outcrop south of the junction of the Simard road with the Trans-Gaspesian highway shows the upper contact of the formation. The quartzite is dolomitic and, within 10 feet, gradually changes to the dolomite of the Sayabec Formation.

Sayabec Formation

Dolomitic limestones, apparently thicker than the Awantjish and Val-Brillant formations, characterize the Sayabec

* Identified by A.J. Boucot of the California Institute of Technology.

Formation. They form an eastward-trending band along the south side of Isabelle brook. The limestones of the western part are fine to medium grained; those of the eastern part are recrystallized and show very big crystals in places. The color is beige to pink. The beds are generally thick and massive, but a few sections have thin beds, as indicated by stylolites on the bedding planes.

At the base of the formation a few quartzite beds (Val-Brillant type) are intercalated in the dolomitic limestones which, at this level, contain numerous grains of quartz. Massive, 3- to 5-foot beds of very crystalline, ferruginous dolomite containing large crystals of barite and calcite were noted at two places at the base of the formation.

Beds of gray, granular limestone less than one foot thick were found at several levels of the formation. These beds, very fossiliferous in places, contain several Conchidium cf. C. knighti which indicate a Lower Ludlow age (Boucot).

Saint-Léon Formation

The Saint-Léon Formation forms a wide band in the northern part of the area, and is made up of siltstones and shales. It is much thicker than the other Silurian formations, even though the apparent thickness is exaggerated by the presence of several sills and dikes of acid porphyry and the fact that the beds, which dip to the south elsewhere, are flat-lying in the central part of the band.

Three members were recognized. From top to bottom, they are: red and green shales, calcareous siltstones, red and green shales.

The shales are in two thin bands, one at the base and the other at the top of the formation. They are silty and contain laminae of silty limestone.

The calcareous siltstones form about 9/10 of the formation. They are gray when dry but become greenish when moistened. They form beds which are either well or very poorly sorted and which range in thickness from a fraction of an inch to several feet. The siltstones become more clastic and more calcareous upwards and, in the upper part, include a conglomerate bed 2 inches thick.

Roadcuts along the Trans-Gaspesian highway expose rocks of a slightly different nature. These are mainly argillaceous siltstones and silty or arenaceous slates containing in places some thin, locally fossiliferous, calcareous beds. The siltstones and slates are laminated, and are darker gray and slightly coarser than the calcareous siltstones. These features may be the result of a slight metamorphic alteration.

The Sayabec - Saint-Léon and Saint-Léon - Cape Bon Ami contacts were not seen.

The Saint-Léon Formation outcrops also on the axial trace of the anticline in the southwest part of the area but only the upper section is exposed. This section reappears on the west side of Brandy Brook owing to the normal fault which follows this brook.

Cape Bon Ami Formation

The Cape Bon Ami Formation outcrops chiefly on each side of the anticlinal axis in the south part of the area. Here the rocks are very dark to black, argillaceous to carbonaceous limestones in beds from a fraction of an inch to a few inches thick. The beds are characterized by very even surfaces. Several small brachiopods, identified by Boucot and assigned to the Lower Devonian, were found here.

In the north part of the map-area, the Silurian described above is overlain by a thin succession of very dark, locally calcareous, Cape Bon Ami shales.

Grande Grève Formation

Key beds: Above the typical limestones of the Cape Bon Ami Formation is a sequence consisting of a coquina with interbeds of limestone conglomerate, a white orthoquartzite, a fossiliferous orthoquartzite, and thin beds of dark, silty limestone containing rounded, dull, quartz grains. Although none of the sections show the entire succession of these beds, their lithologies suggest that the order of listing given above is from bottom to top.

These key beds, totalling an approximate thickness of 40 feet, are visible in a few places slightly above the upper beds of argillaceous limestone of the Cape Bon Ami Formation and

contain Costispirifer, a characteristic fossil for the lower Grande Grève limestone, member 7 (Boucot).

The Grande Grève Formation is best exposed on the anticline in the southwest part of the area and the east half of the transverse syncline to the north.

It is composed throughout of lighter and much harder limestones than those of the Cape Bon Ami Formation. Most of these limestones are silty, siliceous, and in beds a fraction of an inch to several inches thick. Laminae of calcareous siltstone and a few massive beds of cherty limestone are intercalated in the limestones.

Intraformational breccias occur at higher levels than the key bed near Mount Brèche, in the southwest part of the area. The blocks and fragments are angular and are similar in composition to the overlying and underlying beds. Many of these blocks are cemented by hydrothermal silica. A trench on top of Mount Brèche reveals a 30-foot bed of breccia, the thickest observed in the area.

Spiral structures formed by argillaceous lamellae occur throughout the formation, and are quite extraordinary locally.

York Lake Facies: This facies shows the lithological transition between the Grande Grève and the York River formations. It is essentially composed of sandstone beds of the York River type and of limestone beds of the Grande Grève type. It extends from the first sandstone bed in the upper part of the Grande Grève to the last limestone bed in the York River Formation. The interbedded zone is well shown along Brandy brook.

York River Formation

The area under study contains only the lowest 300 feet of the York River Formation, consisting of sandstone interbedded with minor siltstones and a few mudstone and shale beds. Basic volcanic rocks are interbedded with the sandstones close to the base of the sequence.

The sandstones consist of quartz and feldspar grains, in about equal proportion, enveloped in a matrix which constitutes about one third of the rock. The grain ranges from fine to coarse, and the color from beige to greenish gray. The

beds are well defined and generally less than one foot thick. Several beds contain a rich fauna of brachiopods and pelecypods along with various plant fragments. Several horizons are characterized by numerous clay disks from a fraction of an inch to a few inches across. Primary structures, such as crossbedding and ripple-marks, can be observed in several beds.

The volcanic rocks are massive flows, tuffs, lapilli-tuffs, and agglomerates. The principal occurrences are the following:

Head of Brandy brook (latitude 48°50'30") - A cut in the road which follows this brook shows a succession of basic lavas and pyroclastic rocks. The succession is highly sheared, approximately 50 feet thick, and underlain by graywacke.

Slopes of Mount Lyall - Here, the volcanic rocks consist of massive and very fresh basalt with numerous pyroclastic interbeds of predominantly basic composition.

Along the Trans-Gaspesian road - The volcanic rocks consist of a basalt identical to the Mount Lyall type. The beds are several feet thick and lie on a tuff containing strongly limonitic bombs.

Anomaly brook - Two types of basalt occur in this area: one is massive, the other vesicular and amygdaloidal.

INTRUSIVE ROCKS

Mount Albert Peridotite

The southern part of the Mount Albert peridotite mass crosses the northern sector of the area. The rock is coarse grained, slightly serpentinized, and carries scattered chromite grains. The weathered surface has the orange-brown color typical of ultrabasic rocks. A distinct layering, gently dipping to the south, was seen in one outcrop and, at right angles to the layering, there are several microveinlets of antigorite.

Relationships with the sedimentary rocks have led previous workers to believe that the age of the peridotite is at least pre-Lower Devonian but recent radioactive dating (G.S.C., 1963) indicates a Lower Ordovician age. The reader should however

keep in mind that the Sayabec limestones (Middle Silurian) are recrystallized and contain millerite and fuchsite crystals, and that, as a consequence, the peridotite intrusion may be younger than indicated by radioactive dating.

Mount Brèche Complex

The Mount Brèche Complex consists of masses of basic and porphyritic felsic rocks, and of diorite and diabase dikes around Mount Brèche, in the southwestern part of the area.

The basic rocks are fine to very coarse grained, the latter generally being ophitic. They are dark and, in many places, greenish. The weathered surface is buff-brown. The plagioclase crystals are red or pink in some of the masses. Some very fine-grained varieties resemble basalts or andesites.

The porphyritic felsic rocks contain rounded or angular fragments of metasedimentary and metavolcanic rocks. Two varieties are noted. In one, the phenocrysts, composed of pink potassic feldspar and a smaller quantity of quartz, range in size between 1/25 and 3/8 inch, and constitute as much as 10% of the volume of the rock. Some altered, pale green fragments, from 1/8 inch to 2 inches in diameter, are erratically scattered and represent only a small proportion of the rock volume. These fragments are of the same nature as the adjoining altered sedimentary rocks. The second variety is characterized by a higher quartz content and by phenocrysts composed exclusively of thoroughly chloritized amphibole or pyroxene. These phenocrysts are dark, average 1/8 inch in diameter, and constitute 5 to 10% of the rock. The rock is greenish, pinkish, or a mixture of green and pink. The matrix is rich in sericite and chlorite, and is devitrified. Some other structures, similar to shards and pumice fragments, suggest that these porphyritic masses are crystal tuffs.

The diorite and diabase dikes are generally massive but some of them contain vesicles, 1/16 to 1 inch in diameter, which are usually filled with quartz, calcite and, in some instances, amethystine quartz. These dikes are not exclusive to the Complex and can be found here and there in the map-area.

Granite

Granite, found only at Mount Hog's Back, is porphyritic, fine grained, red or pink, and composed chiefly of sericitized plagioclase, quartz, and chloritized biotite. The phenocrysts, composed of plagioclase, quartz, and minor biotite, have a diameter of from 1 to 3 mm. and represent about 1/3 of the rock volume. The plagioclase is euhedral and forms about 9/10 of the phenocrysts. The red and pink color of the granite is attributed to hematite granules on the surface of plagioclase grains.

The writer did not observe any relationship between the granite and the other intrusive or sedimentary rocks.

Rhyolitic Rocks

Rocks of rhyolitic composition and, in some places, of porphyritic texture are found in the northern part of the area where they form a series of dikes. Elsewhere, especially on the west limb of the syncline in the east-central part of the area, and on top of Mount Lyall, these rocks appear to be conformable with the sedimentary and volcanic formations. Although their origin is in doubt, it is believed that they are related to the Mount Hog's Back granite. Several outcrops have columnar structures up to 2 1/2 feet in diameter.

These rocks are uniform in texture but they range in color from beige and pale buff to salmon-pink and red. Some sills are greenish. In many places, the weathered surface is kaolinized. The microphenocrysts, composed of feldspar and quartz, are scarce and much smaller than the phenocrysts in the granite. The principal rock minerals are sericitized feldspar, quartz, and iron oxide (hematite). The amount of hematite is greater than in the granite and the porphyritic felsic rocks mentioned above.

Through the microscope, most of the rhyolitic rocks are seen to have a matrix similar to devitrified glass. The phenocrysts are, in order of importance, plagioclase, quartz and, locally, potassic feldspar. Several quartz phenocrysts are in reality concentrations of secondary quartz grains. A few of the more porphyritic specimens show, on a smaller scale, the same characteristics as those of the granite. Other varieties

have tuff textures and contain fragments which, for the most part, are angular; sericite is very abundant in these varieties, constituting as much as 50% of the rock.

Pleistocene and Recent

Almost all the area is covered by a thin mantle consisting mainly of rock debris mixed with dirt along with some glacial till. A few thick unstratified morainic deposits are found in the Isabelle and Brandy Brook valleys. They contain pebble and cobble gravels.

The plateau surfaces are covered mainly with a thin layer of rock debris and humus. At several localities denuded of vegetation residual soils were observed.

Some recent fluviatile deposits containing gravel, sand and silt were found along the main streams of the map-area.

A few glacial striae alongside the Trans-Gaspesian highway indicate an ice movement of S.20°W.

ALTERATION

Two alteration zones are found in the map-area: one in the rocks of the Shickshock Group, south of Mount Albert, and the other in the rocks of the anticline in the southwest part of the map-area.

According to McGregor (1962), alteration of the rocks in the Shickshocks is not due to contact metamorphism. To explain the high degree of metamorphism, he suggests that the altered rocks came from horizons at depth which were raised to their present level as a horst. Although we do not ourselves have enough information to advance any definite hypothesis, we are inclined to think that the alteration is related to the Mount Albert peridotite body as the degree of alteration increases progressively towards the intrusion in the northeast corner of the area. Furthermore, south of the alteration zone, the Silurian limestones are coarsely crystalline in places and contain chrome micas and a few millerite crystals.

In the area of the anticline, the sedimentary rocks are, in general, slightly altered. The alteration is more pronounced in the southwest corner of the area and near Mount Brèche where chlorite, sericite, biotite, and epidote can readily be observed on outcrops, and hornfels and skarns have been intersected in diamond drill holes. The alteration of sedimentary rocks into hornfels was locally accompanied by pronounced silicification. At the moment there is little information concerning the extent of the siliceous alteration. The core of a hole drilled in the south of the area shows calcareous rocks of the Saint-Léon type altered to hornfels and containing as much as 30% colorless garnets.

Much of the porphyritic rock is slightly kaolinized.

STRUCTURAL GEOLOGY

Folds

The formations in the southwest part of the area are oriented N.E. and appear to be arranged in an anticline oriented N.N.W. and plunging gently to the north. This postulated anticline is the extension of the Lemieux dome. A large transverse syncline lies to the north.

There are several drag-folds in the shaly and calcareous sedimentary sequence of the Awantjish Formation. These folds may have been caused by a major break, the trace of which could correspond to Isabelle brook.

Joints

Several extension joints are found on the east limb of the anticline mentioned above. They are at right angles to the stratification. In the south part of the anticline, the joints are filled with mineralized veins of hydrothermal origin. Fractures are abundant on Mount Brèche. Several porphyry and diabase dikes radiate out from the center of the mountain.

Faults and Shear Zones

The formations, specially in the southwest corner of the map-area, were subjected to intense faulting. This is revealed by stratigraphic relationships and the presence of fractures and shear zones. The inferred faults fall into two groups oriented west and east of north.

Northwesterly faults: - The most important of these faults follows roughly the trace of the anticline in the southwest part of the area and appears to extend through Mount Brèche and along the Brandy Brook valley. The fault is evidenced by stratigraphic relationships at its southern end. On Mount Brèche, it is indicated by geophysical data and a zone of silica fragments and breccia; in Brandy Brook valley, fracturing and brecciation of the sedimentary and volcanic rocks occur at several places.

About 3,000 feet west of the south end of this fault, another major break appears to end a short distance south of Mount Brèche.

Stratigraphic relationships in the area of these two faults indicate that the beds on the west sides of the faults are down-faulted.

Southwest of Mount Aigle, a shear zone cuts the sedimentary rocks. Although this shear has been traced for only a short distance, its magnitude may be comparable with the other two faults.

Northeasterly faults: - On the west limb of the anticline in the southwest corner of the map-area, important breaks follow the valleys oriented northeast. The development of these breaks and of the northwesterly faults seems to have dissected the formations into blocks which would have rotated along axes parallel to the northwest-trending faults.

A shear zone of unknown magnitude is indicated along the northern segment of Simard road by a series of small breaks.

A major fault may be present along the course of Isabelle brook. This is indicated by a few drag-folds and minor breaks in the rocks bordering the brook, the data obtained from geophysical surveys, and the much accentuated topography to the south of the brook.

Breccias

Intraformational, intrusive, and tectonic breccias occur in the area.

The intraformational breccias outcrop near Mount Brèche, mainly in Grande Grève limestones overlying the key bed of white, quartzitic sandstone. The angular fragments are similar in composition to the underlying and overlying rocks and range from a fraction of an inch to one foot across. The observed contacts follow the stratification. The bed on top of Mount Brèche is 40 feet thick.

The intrusive breccias occur locally along the walls of intrusions. At the contacts of basic dikes, the breccias are well defined and are a foot or less thick.

The tectonic breccias are found here and there along structural breaks. Along faults, they are hardly recognizable, being generally obliterated by hydrothermal quartz.

ECONOMIC GEOLOGY

During the summer of 1963, almost the whole area was staked by mining companies and private interests. The numerous zones of mineralization and the many basic and acidic intrusions, as well as a few structural elements, render the area particularly promising although no orebody has been discovered so far (1965).

The area can be mineralogically divided into three zones as follows:

1) a southern zinc-lead zone belonging to Federal Metals Corp. The northern part of the mining concessions held by this company straddles the south boundary of the map-area;

2) a central copper zone;

3) a northern copper zone. In this zone there are possibilities of nickeliferous deposits in the sedimentary rocks and of chromite in the peridotite.

All mineral showings are indicated on the map by symbols representing the shape and nature of the mineralization, and also the type of gangue.

SOUTHERN ZONE

Auger (1954) described the zinc and lead veins in the southern part of the area and the reader is referred to his report for more detailed information. Most of these veins have been traced on the accompanying map.

The veins have a hydrothermal origin and are composed of silica and carbonate bands containing layers of zinc, lead and copper sulfides. The silica comprises amethystine and white quartz, the white quartz being less abundant and older. The carbonate belongs to two distinct episodes, the first of which appears to have preceded the white quartz and the second, to have been later than the amethystine quartz. The sulfides are related to both the silica and the carbonate. The veins are generally bleached, locally brecciated, and thin out with depth.

The veins are oriented about north-south, except on the periphery of Lemieux dome where they are more or less radially oriented in relation to the dome's center. Most of the north-south veins occur in tension joints or in structures which may reflect those existing in the basement rocks.

The Big Pioneer vein (No. 2 on the map) is the most economically important vein of the Federal Metals Corporation camp. It is 2,860 feet long and averages 23 1/2 feet in width.

Development work on the Federal Metals property has indicated 600,000 tons of ore grading 3.95% zinc and 1.31% lead.

CENTRAL ZONE

The central zone can be divided into the Brandy Brook - Mount Brèche and the Hog's Back Brook - Mount Hog's Back areas.

Brandy Brook - Mount Brèche Area

Eagle Prospect (9)*

The Eagle prospect is located 1,500 feet northeast of DesRosiers camps on the road following the west side of Brandy Brook valley. In 1959, Noranda Mines Ltd., which has an option on this prospect, dug two trenches and drilled 14 diamond-drill holes. Calvert Gas and Oils is carrying out diamond drilling near this prospect.

The mineralization is in a 50-foot-wide gossan in deeply weathered green argillites. This fractured and brecciated gossan follows the Brandy Brook shear zone. The fragments are surrounded by quartz, much pyrite, and a minor amount of medium-grained chalcopyrite. The fractures range from a fraction of an inch to several inches in width.

Hattie Prospect (10)

The Hattie prospect is 2,300 feet north of the Eagle prospect, in a 400-foot cut along the road going up the slope of Brandy Brook valley. This cut shows some sandstones lying on brecciated, fragmental and basic volcanic rocks. The first 100 feet of the roadcut going down the slope shows sandstones, whereas the remaining 300 feet exposes volcanic rocks. The volcanic rocks are in the Brandy Brook shear zone.

The mineralization in this roadcut is limited to the volcanic rocks and consists of medium- to coarse-grained chalcopyrite with a variable quantity of hydrothermal quartz. The chalcopyrite is in the fractures of the brecciated rocks. The mineralized veinlets are very rusty, less than an inch to 4 inches wide and separated by interspaces 3 inches to several feet wide. An assay of a selected sample gave 7.41% copper.

Noranda Prospect (7)

The Noranda prospect is on the north side of Anomalie brook, near its source. It is in a pink rhyolitic dike, 55 feet wide, cutting the York River sandstones. Some chalcopyrite

* The numerals refer to the red squares on the map.

and a little pyrite appear along the fractures of the rock and also in quartz veinlets up to one inch wide. The mineralization is mainly on the outer 2 feet of the southwest side of the dike, although minor chalcopyrite and malachite are found locally in the remainder of the dike. Two selected samples gave 3.77% and 2.22% copper. The rhyolitic rock is slightly kaolinized except along the mineralized fissures where the kaolinization is more developed.

Anomaly Prospect (11)

Situated about 3,000 feet southwest of the Noranda prospect, the Anomaly prospect consists of a 6-inch-wide quartz vein in a fault plane cutting green siltstone and of smaller quartz veins in fractures developed along the fault. The quartz carries much medium-grained chalcopyrite and minor pyrite. The vein itself, as well as the wall rock, is very rusty. A selected sample assayed 2.74% copper.

Breccia Zone on Mount Brèche (36-37)

A 3,000-foot-long, north-trending breccia zone is found on Mount Brèche. A trench dug in the northern part of the mountain exposes the north end of the zone, which, at this point, consists of an intraformational breccia about 50 feet wide. The fragments are green hornfels cemented by quartz carrying small quantities of sulfides and hematite. The rocks, as well as the overlying residual soil, are highly rusted. Chemical analysis (hot acid) of a sample from this soil indicated the presence of copper, zinc, lead and molybdenum.

The southern part of the Mount Brèche zone is characterized by white quartz and amethystine quartz fragments. Pyrite and hematite can be seen in several places.

Hog's Back Brook - Mount Hog's Back Area

Gauthier Prospect (6)

The Gauthier prospect is on the Trans-Gaspesian highway, about 1,200 feet from its intersection with the Lemieux-Lesseps township-line. A small quantity of fine-grained

chalcopyrite occurs in fractures in gray, brecciated and slightly kaolinized rhyolite. The best mineralized fracture is the southernmost one of the prospect and contains much fine crystalline malachite. Locally, manganese oxide films are present on rhyolite surfaces.

Hematite Veins (26-27)

Two hematite veins of hydrothermal origin outcrop about 800 feet apart on the North road, about 2 1/2 miles north of its junction with the Trans-Gaspesian highway. The hematite oxidation has produced gossans that are readily visible. The West vein averages 15 to 20 feet in width and is brecciated along the walls. It dips steeply and trends north-northeast. It is composed of hematite layers that alternate with thinner layers of white quartz. The hematite layers range from a fraction of an inch to several inches in width. Minor crystalline malachite also occurs in this vein. One assayed sample graded 44% iron.

The East vein is a breccia type and possibly indicates the trace of a fault. Its trend and width are about identical with the West vein. Hematite and minor quartz bind the argillite fragments.

NORTHERN ZONE

Copper

The discovery on the Richstone prospect of rhyolitic float mineralized with copper led to prospecting activity in the northern part of the Mount Hog's Back area. The source-bed of these floats has not yet been found, but a few copper showings have been discovered.

Richstone Prospect (4): This prospect is located on the north group of claims held by Richstone Syndicate. The company dug a large trench in an area strewn with numerous angular blocks of felsic rocks and siltstone mineralized with fine-grained chalcopyrite and a little malachite and limonite.

Although stripping did not reveal the source-bed of the mineralized blocks, it showed 'Saint-Léon' siltstones in fault contact with rhyolitic rocks. The only indications of copper are a few chalcopyrite and malachite grains in the shear planes of the siltstones. On the road near the trench, outcrops of unsheared siltstone have microfractures filled with quartz and a few grains of chalcopyrite.

Pyrite

A few outcrops of the Val-Brillant quartzite are peppered with 5 to 10% very fine-grained pyrite. It has been impossible to ascertain to which horizon they belong and to find out whether they all belong to the same horizon.

Nickel

A short distance west of the map-area, New Jersey Zinc Co. discovered nickeliferous mineralization in siliceous dolomites. The principal mineral is a nickel-magnesium carbonate occurring either as fine disseminations or as pods. The other minerals, which occur as fine disseminations, are annabergite and millerite.

Chromite

Chromite deposits associated with the Mount Albert serpentinized peridotite have attracted the attention of various mining companies since the beginning of the present century. The exploration and development work done in 1943 by Chromium Mining and Smelting Corp. Ltd. resulted in the discovery of five veins of chromite but no economical deposit has been delimited. The most important vein (C_5; Smith, 1944), just outside the northern boundary of the area, is 30 feet long, 10 feet wide and 5 feet deep.

An assay of a chromite sample from Mount Albert by the laboratories of the Department of Natural Resources indicated ore grade:

Cr_2O_3	Fe (Total)	SiO_2	Cr/Fe
49.33%	11.23%	2.27%	3:1

DEVELOPMENT WORK*

Terra Nova Explorations Ltd.

Terra Nova Explorations Ltd. did much work on a 44-claim group located mostly in Lesseps township. The Lemieux-Lesseps township-line runs through the southwest corner of the group. Surface prospecting, diamond drilling, and geological, geophysical and geochemical surveys were carried out by the company.

The geophysical work consisted of a magnetic survey and two electromagnetic surveys, one of which was done with a Ronka.

The company dug ten trenches, and drilled five holes for a total length of 1,000 feet.

Richstone Syndicate

The Richstone Syndicate was formed on February 26, 1963, to investigate two claim groups staked by C.L. Gauthier Syndicate in 1962. The two claim groups are known as the North and the South group and contain respectively 20 and 36 claims. The syndicate did some prospecting, as well as a geochemical and a detailed geological survey, on the claims. Local traces of mineralization were found. Stripping, and diamond drilling for a total length of 608 feet, were carried out. Three holes were drilled on the North group and two on the South group.

Calvert Gas and Oils Ltd.

In March, 1964, Calvert Gas and Oils Ltd. bought a group of 54 claims from Les Explorations de Cuivre Lemieux, Ltée. Exploration work carried out by the latter consisted of surface prospecting over the whole property and of geological and magnetic surveys in the Brandy Brook area; much stripping

---

* Up to the spring of 1964.

was done and a rough airstrip was laid out on a plateau west of Brandy brook. Calvert drilled part of the claim group near the Eagle prospect, a prospect which Noranda Explorations Ltd. investigated in 1959 with 14 diamond-drill holes for a total length of 6,000 feet.

C.G. Cheriton Block

The C.G. Cheriton claim-block borders the property of Calvert Gas and Oils Ltd. Surface prospecting and geophysical and geological surveys were conducted on the claims.

Rio Tinto Canadian Exploration Ltd.

Rio Tinto Canadian Exploration Ltd. holds 38 claims in the south-central part of the map-area. This company has been active during every field season since 1959 except that of 1962. During the summer of 1963, the company conducted geological studies and completed two diamond-drill holes. Previous exploration work included an aeromagnetic survey, a ground magnetic survey, a gravimetric survey, a geological survey, a geochemical survey, and two diamond-drill holes.

Conwest Exploration Co. Ltd.

Conwest Exploration Co. Ltd. holds a group of 17 claims bordering the southeast limit of the property of Rio Tinto Canadian Exploration Ltd. During the summer of 1963, the company did a little prospecting, and conducted a magnetometer survey on the east half of its claim group.

Federal Metals Corporation Ltd.

Federal Metals Corporation drilled several holes on its various claim groups bordering its mining concessions.

Newmont Mining Corp. of Canada Ltd.

In the summer of 1963, Newmont Mining Corp. of Canada Ltd. conducted some regional geological mapping and examined several prospects in and near the Mount Hog's Back map-area.

Other Claim-holders

Claim-holders other than those mentioned above did nothing more than a little general prospecting during the summer of 1963.

BIBLIOGRAPHY

ALCOCK, F.J. (1926) Mount Albert Map-area, Quebec: G.S.C., Mem. 144.

ALCOCK, F.J. (1927) Zinc-lead Field of Central Gaspé, Quebec: G.S.C. Summ. Rpt., Pt. C.

AUGER, P.-E. (1954) Zinc and Lead Deposits in Lemieux Township, Gaspé-North County: Geol. Rpt. 63, Quebec Dept. of Mines.

BEIDELMAN, J.C. (1928) Index to Veins Indicated by Federal Zinc and Lead Co. Ltd., Lemieux Township: Archives of the Quebec Dept. of Nat. Resources, GM-10664.

BEIDELMAN, J.C. (1941) Archives of the Quebec Dept. of Nat. Resources, GM-10673.

BOONE, Gary M. (1962) Feldspar-hematite Relations in Granitic Porphyry, Central Gaspé, Quebec: Abstract, G.S.A. Program, 1962, Annual Meetings.

GILL, J.E. (1941) Archives of the Dept. of Nat. Resources, Quebec, GM-10674.

G.S.C. (1963) Age Determinations and Geological Studies; Geological Survey of Canada, Paper 62-17.

JONES, I.W. (1930) The Berry Mountain Map-area, Gaspé: Ann. Rpt. for the Year 1929, Quebec Bureau of Mines, pt. D.

JONES, I.W. (1933) The Tabletop Map-area, Gaspé Peninsula: Ann. Rpt. for the Year 1932, pt. D, Quebec Bureau of Mines.

MAILHIOT, Adhémar (1918) Geology of a Portion of the Projected Township of Lemieux, Gaspé County: Rpt. on Mining Operations in the Province of Quebec during the Year 1917, Dept. of Col., Mines and Fisheries.

MAILHIOT, Adhémar (1919) Geology of a Portion of the Projected Township of Lemieux; Upper Cascapédia, Gaspé County: Rpt. on Mining Operations in the Province of Quebec during the Year 1918, Dept. of Col., Mines and Fisheries.

McGERRIGLE, H.W. (1950) The Geology of Eastern Gaspé: Geol. Rpt. 35, Quebec Dept. of Mines.

McGERRIGLE, H.W. (1953) Geological Map of the Gaspé Peninsula; Map 1,000: Quebec Dept. of Mines.

McGERRIGLE, H.W. (1954) The Tourelle and Courcelette Areas, Gaspé Peninsula: Geol. Rpt. 62, Quebec Dept. of Mines.

McGREGOR, D.I. (1962) Geology, Petrology and Geochemistry of the Mount Albert and Associated Ultramafic Bodies of Central Gaspé, Quebec: M.Sc. Thesis, Queen's University, Kingston, Ont.

OLLERENSHAW, N.C. (1965) Cuoq-Langis Area, Matane and Matapédia Counties: Geol. Rpt. 121, Quebec, Dept. of Nat. Resources.

OSBORNE, F.F. (1943) Mount Albert Serpentine Area, Gaspé: Manuscript, Quebec Dept. of Nat. Resources.

RIDDELL, J.E. (1954) Geochemical Soil and Water Surveys in Lemieux Township, Gaspé-North County: P. Rpt. 302, Quebec Dept. of Mines.

SMITH, L.G. (1944) Report on the Mount Albert Mining Company Limited; Exploration for Chromite Deposits during the Year 1943: Quebec Dept. of Nat. Resources, Public Archives, GM-9335.