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PRELIMINARY REPORT, GEOLOGY OF GUIGUES - PONTLEROY AREA, TEMISCAMINGUE AND ROUYN-NORANDA COUNTIES

P.R. NO. 511

DEPARTMENT OF NATURAL RESOURCES

RENÉ LÉVESQUE, MINISTER

P.-E. AUGER, DEPUTY MINISTER

Geology

of

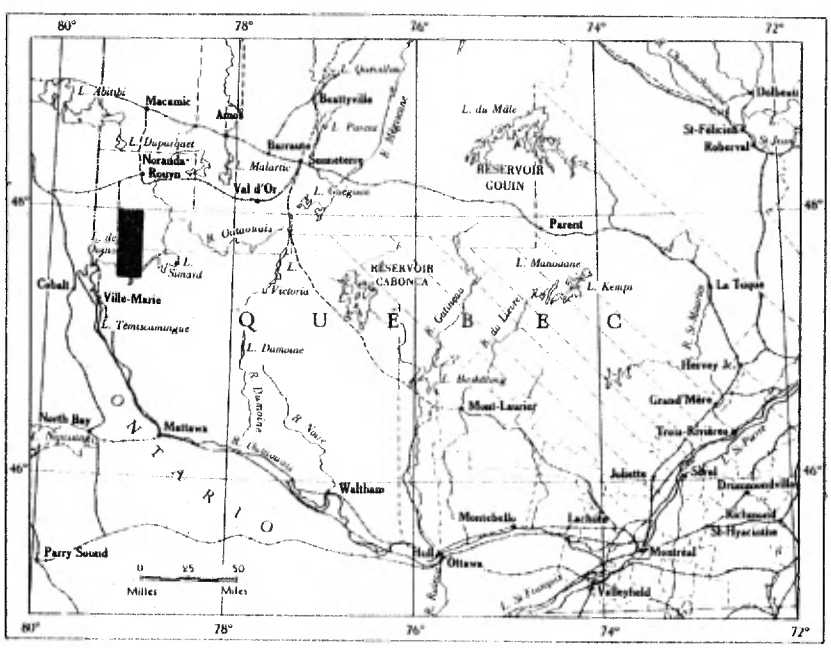
GUIGUES-PONTLEROY AREA

TÉMISCAMINGUE AND ROUYN-NORANDA COUNTIES

PRELIMINARY REPORT

by

Jean-Yves Chagnon



QUEBEC

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GEOLOGICAL SURVEYS BRANCH

H. W. McGERRIGLE, CHIEF

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INTRODUCTION

The Guigues-Pontleroy area, mapped during the summer of 1962, comprises about 430 square miles and is bounded by latitudes 47°30' and 48°00' and longitudes 79°15' and 79°31' (Quebec-Ontario boundary). Its centre lies about 35 miles southwest of Rouyn. The area includes parts of Desandrouins, Guérin, Baby and Guigues townships and all of Pontleroy, Montreuil and Nédelec townships in Témiscamingue county, as well as parts of Dufay and Montbeillard townships in Rouyn-Noranda county.

Highways 46 and 46A between Ville-Marie and Rouyn cross the area and provide access to several secondary roads from which almost all points of the area may be reached. Access to the northwestern part is by a secondary branch road of the highway connecting Larder Lake, in Ontario, and Rouyn.

Forests and hydraulic power are the main resources in the area. Timbering is restricted to the northern part, although numerous fires and intense exploitation have lessened the present value of the forests. Northern Quebec Power Company built on Quinze river a hydro-electric plant, which supplies electricity to adjacent areas. Along Highway 46 and near Témiscamingue lake, there are considerable tracts of arable land that settlers have converted into prosperous farms.

The surface is rolling and has an average local relief of about 200 feet. The altitude ranges from 600 feet near Témiscamingue lake to 1,150 feet near the northern boundary, and the average elevation is 950 feet. In many places, particularly on the shore of Témiscamingue lake, bedrock is covered by a layer of clay and sand, the thickness of which varies with the relief.

The area lies within the Ottawa River drainage basin, and all the waters are channeled into Quinze and Pontleroy rivers, which flow into Témiscamingue lake.

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* Translated from the French.

GENERAL GEOLOGY

Nearly all the consolidated rocks of the area are Precambrian in age, and are either Proterozoic or older. A few outcrops of Ordovician limestone, sandstone and conglomerate are found on a small island and along the east shore of the northern part of Témiscamingue lake.

The oldest rocks occupy the southern part and consist of intermediate volcanic rocks intercalated with metamorphosed sedimentary rocks. Biotite schists and gneisses with associated amphibolite lenses form continuous bands in the centre of the area and more or less regular lenses in granitic terrains. Syenite, hornblende granite and oligoclase-microcline granite are associated with all these rocks and intrude them in places. Oligoclase-microcline granite covers most of the northern part. Isolated outcrops of Huronian quartzite, arkose, argillite and conglomerate unconformably overlie the basement along the east shore of Témiscamingue lake and in the northwest corner. Northerly and northeasterly striking diabase and gabbro dykes cut all the Precambrian rocks.

Glacial and fluvioglacial deposits are abundant in the central and southern parts of the area, mainly in sectors of low relief

PRECAMBRIAN

Andesite, Dacite, Chlorite Schist

Volcanic rocks occur west of Angliers in the southern part of the area in a northeasterly striking band at least 3 miles wide, and a few outcrops of andesite were observed near Arenaine lake. Areas underlain by the volcanic rocks generally have a fairly strong relief.

The rocks, which have a composition that ranges from andesite to dacite, are intermingled and difficult to separate into units, but the andesite is by far the most abundant. It is fine grained, dark green and generally equigranular. The dacite somewhat resembles the andesite, but it is light grey and, in places, porphyritic.

The andesite is fine grained and contains chlorite, epidote, hornblende, plagioclase, and, in places, small amounts of carbonate and disseminated pyrite. The dacite consists mainly of feldspar and quartz with some mafic minerals. In shear zones the andesite is converted to a chlorite schist. The pillows are usually deformed and unidentifiable except near the power house of Northern Quebec Power Company.

TABLE OF FORMATIONS

Pleistocene and Recent			Boulders, gravel, sand, clay
Paleozoic	Ordovician		Limestone, sandstone, basal conglomerate
Precambrian	Keweenawan (?)		Diabase and gabbro
	Middle Huronian	Cobalt Series	Lorrain formation: quartzite and arkose
	Lower Huronian	Cobalt Series	Gowganda formation: argillite conglomerate
	Igneous Rocks		Lamprophyres Pegmatite and aplite Oligoclase-microcline granite Porphyritic oligoclase-microcline granite Grey granitic gneiss Hornblende granite Porphyritic hornblende granite Hornblende-pyroxene syenite Nodular pyroxene syenite
	Pontiac Group		Biotite schist and gneiss Grey biotite schist Amphibolite
			Metamorphosed sediments: quartzite, greywacke Iron-bearing rocks Hornblende schists and gneisses Rhyolite, rhyolitic porphyry (quartz feldspar) Agglomerate Hornblende rock Andesite, dacite, chloritic schist

The contact between the andesite and the Pontiac schist seems to be gradational and the former appear only as lenses in the schist to the north.

Hornblende Rock

South of Quinze river irregular masses of hornblende rock are intercalated between andesite flows and appear to cut them in some places. South of Angliers the same rock is in conformable lenses within the gneisses and the schists.

The hornblende rock is medium to coarse grained and dark green and has a very rough weathered surface on which the amphibole grains stand out about $\frac{1}{4}$ inch. It is composed of about 60% stubby grains of hornblende with feldspar and chlorite. The longer axis of the hornblende porphyroblasts may be as much as $\frac{1}{2}$ inch long.

Agglomerate

A band of agglomerate, 4 miles long and $\frac{1}{2}$ mile wide, lies within the andesitic lavas and the metamorphosed sedimentary rocks south of Quinze river. The rock is made up of rounded fragments, from $\frac{1}{2}$ inch to 5 inches in diameter, set in a fine-grained, grey groundmass. The fragments are fine grained, light grey and somewhat similar to the dacite. They are locally elongated and oriented parallel to the structure of adjacent rocks.

Rhyolite, Quartz-feldspar Porphyry

A few outcrops of rhyolite and rhyolitic, quartz-feldspar porphyry occur in the southeastern corner of the area, west of big Long lake. These rocks form only small masses in this area, but they extend into the adjacent area to the south (Henderson, 1936).

The rhyolite is generally porphyritic, fine grained and light grey. It contains quartz phenocrysts (1/8 inch in diameter) in a fine-grained siliceous matrix. The phenocrysts are resistant to weathering and stand out in relief, thus causing a rough surface. In many places, disseminated pyrite is present.

The rhyolitic porphyry is dark grey to green where fresh and weathers light grey. It consists of 50% quartz and feldspar phenocrysts ($\frac{1}{4}$ inch in diameter) in a fine-grained groundmass of quartz, feldspar and chlorite. The phenocrysts are more resistant to weathering than the groundmass.

Hornblende Schists and Gneisses

In the southeastern corner, the hornblende schists and gneisses form a north-south band that lies between the volcanic and sedimentary rocks and the granites of the adjacent area to the

east (Chagnon, 1962). They could be metamorphic equivalents of the lavas and sedimentary rocks.

The schists and gneisses are generally fine grained and have a foliation defined by the orientation of hornblende grains. They are dark green or black on both fresh and weathered surfaces. The main minerals are hornblende (50%), feldspar and quartz. Disseminated pyrite is common. In places, the hornblende gneiss is medium grained and only slightly foliated.

Iron-bearing Rocks

Bands of iron-bearing rocks from 10 to 30 feet thick crop out here and there in the northern half of the belt of volcanic and sedimentary rocks. The repetition of the bands can be explained to some extent by folding, but it is also possible that they were deposited at different levels.

The iron-bearing rocks are well bedded; orange and black beds, $\frac{1}{4}$ inch to $\frac{1}{2}$ inch thick, alternate regularly with grey beds, $\frac{1}{4}$ inch thick.The orange and black beds are made up of very fine grains of magnetite and quartz. The grey beds are composed mainly of granulose quartz with chlorite and hornblende. Pyrite is a common accessory mineral.

Quartzite, Greywacke

Slightly metamorphosed, sedimentary rocks outcrop along the shore of Quinze river and in a few places to the south. They are generally associated with the lavas, but are also found with agglomerate and iron-bearing rocks.

The sedimentary rocks are fine grained and greenish grey. They contain mainly quartz, feldspar and chlorite. Here and there on weathered surface, pebbles of a fine-grained rock darker than the greywacke may be seen. The beds of variable thickness show in many places graded bedding, load casts and cross-bedding. Although much less metamorphosed, these rocks are somewhat similar to those of the Pontiac group and could be a part of it.

PONTIAC GROUP

Amphibolite

Lenticular masses of amphibolite are associated with the biotite schists, particularly in the centre of the area. The lenses are parallel to the direction of schistosity of the adjacent rocks. They range in width from a few feet to 1,500 feet and in length from 100 feet to one mile.

The rock is generally coarse grained, locally medium grained, and dark green to black on fresh surface. Although normally massive, it is gneissic in some exposures. It is composed

of more than 65% stubby grains of hornblende with white plagioclase and quartz. In some places, hornblende porphyroblasts with a diameter up to ½ inch were seen. Where the amphibolite is in contact with granite or pegmatite, hornblende crystals as much as 2 inches long are developed.

Grey Biotite Schist

This schist is exposed near Highway 46 in the northern part of the area. It is generally in contact with the biotite schist with or without the grey granitic gneiss and forms lenticular masses elongated north-south.

The schist is fine grained, grey or pink on fresh surface, and white weathering. It contains about 40% quartz, 50% pink feldspar and 2-10% biotite. Biotite is commonly concentrated in layers 1/16 inch thick that alternate with layers richer in quartz and feldspar and 1/4 to ½ inch thick.

Biotite Schist and Gneiss

These rocks are abundant in the centre of the area. Elsewhere, they crop out as small, irregular bodies within the intrusive masses. They occur mainly along ridges elongated parallel to the schistosity and constitute distinct topographic features.

The biotite schists and gneisses are fine grained and light to dark grey. They are locally thinly layered with biotite-rich layers alternating with quartz-feldspar layers of an average thickness of ¼ inch. The rock consists of about equal proportions of quartz, feldspar and biotite with,locally, small quantities of hornblende. In the southern part of the area, the rock commonly contains hornblende and disseminated pyrite.

North of the area the oligoclase-microcline granite intrudes and encloses many partly digested inclusions of schists and gneisses.

IGNEOUS ROCKS

Nodular Pyroxene Syenite

Exposures of nodular syenite are found west of Highway 46A and 11 miles south of Rollet in an area 3/4 mile long at the most by an average width of 700 feet. In the Guigues-Pontleroy area, this syenite is everywhere associated with the hornblende granite.

The syenite is medium grained, greenish where fresh, and brownish weathering. It contains nodules composed of an aggregate of feldspar with small amounts of hornblende and pyroxene, in a medium-grained groundmass of pyroxene and feldspar. The nodules are conspicuous on weathered surface, but less so on fresh surface.

Hornblende-pyroxene Syenite

One exposure of hornblende-pyroxene syenite near Highway 46, four miles north of Rollet, is part of the syenite body that extends into the adjacent area to the east.

The rock is generally massive and dark. Near the contact with the biotite schist, the foliation is defined by the orientation of euhedral feldspar crystals. The syenite consists of a coarse-grained aggregate of hornblende and pyroxene (30%), pink feldspar (60%) and biotite. It contains inclusions of biotite schist.

Hornblende Granite, Porphyritic Hornblende Granite

Outcrops of these rocks are abundant in the centre of the area near the eastern boundary. South of Solitaire bay and Quinze river, it is found in small, irregular masses.

The granite is generally massive, medium grained, light grey on weathered surface and white with dark green spots on fresh surface. It is composed mainly of white feldspar, hornblende (20%), biotite (2 - 5%) and quartz (5 - 15%). Sphene, magnetite and pyrite are the accessory minerals. The gneissic structure is shown by the orientation of hornblende crystals.

Inclusions of biotite schist occur in a few places as elongated lenses. Schlieren made up almost entirely of hornblende are also found here and there.

South of Solitaire bay and west of Highway 46A, the granite is porphyritic. Euhedral grains of feldspar, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, form up to 40% of the rock. The hornblende granite is cut by several dykes and bodies of oligoclase-microcline granite and by pegmatite.

Grey Granitic Gneiss

In the northeast corner of the area and 3 miles north of Rollet, irregular masses of grey granitic gneiss are surrounded by oligoclase-microcline granite and biotite schists. Outcrops are scattered along ridges elongated parallel to the gneissic structure. The granitic gneiss cuts, and also contains several more or less assimilated inclusions of, the biotite schists.

The rock is medium grained and light grey on both fresh and weathered surfaces. The main component minerals are quartz (40%), white feldspar (50%), biotite (5%) and hornblende. Some facies have pink feldspar and garnet. The ferromagnesian minerals are oriented parallel to the well-developed gneissic structure.

Oligoclase-microcline Granite, Porphyritic oligoclase-microcline Granite

Oligoclase-microcline granite occupies most of the central and northern parts of the area. Elsewhere, it is in small, isolated masses that intrude the other rocks.

The granite is generally massive, equigranular, and medium grained; locally it is fine to coarse grained. The pink fresh surface weathers light grey. The main minerals are quartz (20 - 40%), biotite and muscovite, or only one of these micas, (5%) and feldspars (60 - 70%). In general, plagioclase is more abundant than microcline, but the proportion of these two minerals is variable. In a few places, the potassic feldspar grains, principally perthitic microcline, have an average diameter of $\frac{1}{4}$ inch. The accessory minerals are magnetite, sphene and apatite.

The oligoclase-microcline granite is generally accompanied by numerous dykes and masses of pegmatite and aplite, and it carries common inclusions of biotite gneiss or schist and hornblende granite.

Pegmatite and Aplite

These rocks are generally closely intermingled with the oligoclase-microcline granite in which they occur as dykes, lenses, sills and irregular masses.

The pegmatite is massive and coarse grained. In places, the crystals may be up to 6 inches in diameter. The aplite is massive, granulose and usually fine grained. The main minerals, and generally the only ones, are perthitic microcline (50%), quartz (30%) and muscovite. The accessory minerals are albite, biotite, magnetite, garnet and apatite. Quartz is generally milky, and much of it is colourless and in graphic intergrowth with microcline. Most muscovite flakes have a diameter of $\frac{1}{2}$ inch, but some with a diameter of 6 inches were seen.

Cobalt Series

Gowganda Formation

Conglomerate

In one locality in the northwest corner of the area, conglomerate rests on the oligoclase-microcline granite. Elsewhere, it is found in isolated outcrops stratigraphically below the argillite.

The rock consists of boulders and cobbles, mostly subangular and of an average diameter of 3 inches, in a greenish grey sandstone matrix. About 75% of the fragments are made up of quartz-rich granite similar to the underlying oligoclase-microcline granite. The other fragments consist of quartz, lavas and greywacke.

Argillite

Argillite, the only other Huronian rock of the northwest corner, overlies the conglomerate just described. It is fine grained and greenish, and has a gritty, weathered surface. It occurs in thin laminated beds.

Lorrain Formation

Quartzite and Arkose

A few outcrops of quartzite and arkose are found in the southwest corner of the area near the shore of Témiscamingue lake. It crops out generally in long masses bordered by cliffs.

For the most part, the rock is homogeneous, medium grained and yellowish green, and is composed of sub-angular quartz fragments in a sericite-rich groundmass. However rounded cobbles of quartz occur and, near the base of some outcrops, the quartzite is darker and contains a large proportion of altered plagioclase. The beds are generally massive, but in places beds 3 to 4 inches thick were noted. Cross-bedding indicates that the rock is in its original position.

Diabase and gabbro

Several outcrops of diabase appear from their distribution to belong to 7 or 8 long dykes that strike north and east-northeast. These dykes have a thickness that ranges from a few inches to 600 feet and a maximum length of 8 miles.

The rock is dark green and generally medium grained, and has a sub-ophitic to ophitic texture. It consists mainly of pyroxene and calcic plagioclase. The accessory minerals are pyrrhotite and magnetite. The edges of some dykes are fine grained, whereas the centres of the thickest are coarse grained.

According to the geological data obtained in adjacent areas, the diabase cuts all the Precambrian rocks, but, in the present area, it was nowhere seen in contact with Huronian rocks.

ORDOVICIAN

(Liskeard Formation)

Limestone, Dolomite, Sandstone and Basal Conglomerate

Outcrops of Paleozoic rocks form the ~~northwest~~ east shore of Témiscamingue lake, where they border the Proterozoic sedimentary rocks, and surround Chief island.

The rock is fine grained, fossiliferous and buff, and has a rough weathered surface. It is made up of crystals of calcite and dolomite with a small quantity of quartz. Towards the base, the proportion of quartz increases and the formation becomes sandy. The contact with the Lorrain quartzite, observed in a few places, is indicated by the presence of rounded cobbles and boulders of quartzite two inches to one foot in diameter in a siliceous matrix.

PLEISTOCENE AND RECENT

The southwestern and western parts of the area, particularly along the shore of Témiscamingue lake, are covered by a layer of clay, sand and gravel.

Raised beaches are found east of Témiscamingue lake and, although difficult to recognize in the field, are very apparent on aerial photographs.

An east-trending, elongated, morainic deposit crosses the centre of the area as well as a south-trending, ½-mile-wide esker.

Glacial striae have a general direction S.10°E. Numerous erratics of variable sizes are scattered throughout the area.

STRUCTURE

The foliation of the Pontiac schists and the layering in the hornblende gneisses and grey granitic gneisses were used to outline the different structures. It is assumed that the foliation in the Pontiac schists is parallel to the bedding of the original rock.

In the northern part of the area, the dominant direction of the foliation in the Pontiac rocks is northwest, and dips are generally moderate. The structure is difficult to interpret, for outcrops are scarce. However, the attitude of the foliation seems to follow a syncline and two anticlines with northwest-trending axes. South of the area, the strikes in the rocks of the Pontiac group are northwest and northeast and follow an anticline, the axis of which is north-northeast.

The main direction of the structure in the volcanic rocks in the southeast is east-northeast. If the outcrops of iron-bearing rocks intercalated with the lava flows belong to the same formation, then it is possible to say that this horizon is folded into an east-northeast anticline. This conclusion is supported by many top determinations in sedimentary rocks and lavas associated with the iron-bearing rocks.

No major fault was seen in the area. However, it is possible that linear features such as topographic depressions and long, narrow lakes are the sites of faults.

Joints in the oligoclase-microcline granite are generally oriented north-northeast and northwest. Horizontal joints are common in pegmatite.

ECONOMIC GEOLOGY

The lavas, biotite schists and gneisses, and hornblende gneiss contain here and there disseminated sulphides, mainly pyrite. The granitic rocks hold in places small amounts of molybdenite. The principal localities where mineralizations were found are indicated on the map by numbers.

Iron (1)

A company is doing exploration work on the iron-bearing rocks just south of Quinze river and east of the power line north of Angliers. A geophysical survey was made along with trenching, blasting and drilling in many places along the formation.

Molybdenite (2)

West of the road on lots 39 and 40, range I, Guérin township, quartz veins that cut the oligoclase-microcline granite are accompanied by molybdenite. Drilling and trenching apparently failed to give encouraging results. The mineralized zone is 15 feet wide and about 30 feet long.

East of the same road on lots 50 and 51, range II, Guérin township (locality 3), some sulphides, mainly molybdenite and pyrite, were exposed by blasting and trenching in granite and biotite schist. The mineralization is 20 feet wide and 100 feet long.

On lot 29, range VII, Nédelec township, molybdenite was found in quartz veins that cut biotite schist and porphyroblastic amphibolite (4). Assays of samples gave 1.8% MoS_2.

Granite Quarry

A granite quarry was operated in 1946 and 1947 at the east end of lot 31, range I, Montreuil township, in pink, fine-grained, equigranular, oligoclase-microcline granite. The rift is vertical, the grain, S.75°E. and the hardway, horizontal.

Sand and Gravel

Sand and gravel deposits are sufficient for local requirements.

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