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JEREMIE AND GAUDREAULT LAKES AREA

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JEREMIE AND GAUDREAULT LAKES AREA,

Duplessis County

Preliminary Geological Report

by

K.N.M. Sharma and R.S. Jacoby

Québec

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INTRODUCTION

The area mapped during the summer of 1972 covers about 575 square miles between latitudes 50°45' and 51°00', and longitudes 62°00' and 62°45', and corresponds to topographic maps 12L/15E, 12L/16W, and 12L/16E. Its central part is about 65 miles northeast of Havre-Saint-Pierre.

The area is easily accessible by float-planes based in Havre-Saint-Pierre or in Natashquan. Some parts may also be reached by canoe routes along Aguanus and Nabisipi rivers.

In general, the area has a rugged topography. The topography is quite helpful in most parts in following structures and rock types. Thus, the elongated ridges invariably are metabasalt-metagabbro, whereas the low lying areas are meta-sandstones, quartzites and schists. The granites and rhyolites form irregularly shaped hills. In addition the topography also exhibits the effects of last glaciation.

The majority of the area drains southward. The drainage from streams and creeks goes to Watshishou, Nabisipi and Aguanus rivers and finally to the St. Lawrence river.

The majority of the region is well wooded. Black spruce and fir are the most abundant forest trees. Birch, aspen and red spruce account for less than 5% of the trees. The spruce grows on the sides of the ridges and in swamps, whereas the fir is generally abundant on western slopes. The birch is common in proximity to water, such as near streams, lake shores, etc. Alders are typically good indicators of streams and grow abundantly near lake shores.

The wild-life is represented by fir-bearing animals such as muskrats, otter and beaver. Furred animals appear to have recovered in numbers as trapping has been infrequent in this area for over ten years. Mardi-Gras lake has a sizable beaver population and many beaver-lodges have been seen on most lakes. Moose was not sighted during the summer and although fresh tracks were only infrequently encountered, this game animal is apparently not abundant in the map-area. Spruce partridge, ducks, loons and rabbits were commonly observed.

Speckled trout (up to 24 inches and 4 pounds) are more easily taken in lakes from the time the ice breaks through the month of June after which they move either into the streams and rivers feeding or draining the lakes or into the deepest water of the lake itself. The large Ouananiche can be taken all through the summer.

ACKNOWLEDGEMENTS

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PREVIOUS WORK

Earliest geological work was carried out by Claveau in 1943, immediately west of the area. The areas to the south were mapped by Grenier (1949, 50) and McPhee , whereas the area to the east was mapped by Sharma (1971).

GENERAL GEOLOGY

All the crystalline rocks of the area are Precambrian in age and form part of the Grenville Tectonic Province of the Canadian Shield. All the rocks of the area lie within the "Wakeham Sedimentary Basin" which consists of an assemblage of sedimentary and volcanic rocks, called "Wakeham Group", intruded by later granitic plutons. It is for the first time

that the presence of volcanic rocks has been identified in this basin. The grade of metamorphism ranges from Greenschist facies to lower Amphibolite facies. The major structural trend in these rocks is from NNW to NW.

The majority of the rocks in the map-area are meta-sandstone with some phyllites, paragneisses, quartzites and schists, and belong to the Wakeham Group of supracrustal rocks. They form the oldest exposed rocks in the area and are interlayered with basalt-gabbro, rhyolite, rhyolite tuff with some associated basic tuffs and agglomerates. The basic rocks (basalt and gabbro) are quite helpful in tracing the structure. The basalt-gabbro has been altered in varying degrees to meta-basalt, meta-gabbro and amphibolite in different parts of the area, but relic ophitic texture is still well preserved in many places. Similarly the rhyolites, rhyolite tuffs, basic tuffs and agglomerates preserve their original volcanic textures much more than the basalts and gabbros. However, they also show some effects of metamorphism and recrystallization.

Massive to foliated, coarse, granitic intrusions, younger than the Wakeham Group rocks, outcrop in several sub-circular masses in the area. Pegmatites and quartz veins are the youngest rocks.

METASEDIMENTARY ROCKS

The majority of the metasedimentary rocks in the area are meta-sandstone interbedded with some phyllites,

schists, quartzites and paragneisses. They belong to the Wakeham Group of supracrustal rocks and form the oldest exposed rocks in the area. The meta-sandstones are generally leucocratic rocks, containing more than 90% quartz, light grey in colour, fine grained, homogeneous to very thinly layered and show effervescence with hydrochloric acid to varying degrees due to the presence of carbonate in the matrix of these sandstones. The layering is shown by slight variations in grain size in different layers and by the concentration of mafics into very thin layers. They often exhibit well developed cross-bedding which help in top determinations, generally indicating the beds to be right side up. Very well preserved current ripple-marks and slump-features have also been observed. Other minerals that may be present include feldspars, biotite, muscovite, chlorite, epidote, hematite, magnetite. Sometimes the layering in the rock is manifested by the occurrence of hematite-magnetite concentrated into beds varying in thickness from a fraction of an inch to up to a foot.

More recrystallized meta-sandstones were mapped as quartzites in the field. It forms a thick northwest trending band running through Mess lake and Watshishou river in the western part of the area. In the central and eastern part of the area it occurs intimately interlayered with the basic rocks in the map-unit called 10&4 on the map as it is very difficult to separate the two rock types at the present

TABLE OF FORMATIONS

QUATERNARY	Fluvial, lacustrine and glacial deposits		Sand, gravel, clay, boulders.
PRECAMBRIAN	Acid Intrusive Rocks		Pegmatite dykes and veins. Massive, porphyritic granite. Foliated, gneissic, augen granite.
	Basic Intrusive Rocks		Anorthositic gabbro. Metagabbro and amphibolite.
	WAKEHAM GROUP ROCKS	Metavolcanic Rocks	Rhyolite, rhyolite tuff, with some associated basic lavas, tuffs and agglomerates.
			Basalt, meta-basalt, basic tuff, meta-gabbro and amphibolite with some rhyolite.
		Metasedimentary Rocks	Meta-sandstone, meta-calcareous sandstone, homogeneous to generally well layered with thin layers; sometimes rich in calcite, epidote, or diopside. Some dark phyllitic layers also present. Quartzite.
			Medium to fine grained paragneisses rich in micaceous minerals and becoming schistose in places or only schists.

scale of mapping. It addition, it occurs with the meta-sandstones as locally more recrystallized rocks. The quartzites are fine to medium grained rocks, varying in colour from pure white to light grey to greenish-grey, and contain more than 90% quartz. Other minerals that may be present include feldspars, biotite, muscovite, chlorite, epidote, hematite and magnetite. The quartzites also show good cross-bedding and current ripple marks.

The meta-sandstone and quartzite are interbedded with numerous continuous to discontinuous phyllitic layers varying in thickness from a fraction of an inch to several feet. The rock is dark-grey to nearly black in colour, very fine grained and thinly layered. In places, thin layers and angular pieces of phyllitic rock can be seen associated with meta-sandstone. The phyllites often show a good slaty-cleavage at an angle to its bedding.

A few outcrops of crystalline limestone, interlayered with quartzites and basic rocks, were also encountered in the area. The rock either forms thin continuous bands or occurs in lenses. It is medium grained, equigranular, granoblastic rock, pink to white in colour.

A band of muscovite-chlorite schist has also been mapped in the western part of the area, west of Nabisipi river. The other minerals that may be present in the rock are quartz, feldspars, magnetite, biotite. The rock is fine-grained,

well bedded, white to light grey to light green in colour, depending upon the relative abundances of the various micaceous minerals. It often shows the development of tightly folded minor folds with their axial plane cleavage parallel to the bedding. In places the rock is highly crumpled and shows development of good microcorrugation lineations.

VOLCANIC ROCKS

All the metasedimentary rocks are interlayered with the basic and acid volcanic rocks including some tuffs and agglomerates. They are very helpful in tracing the structure. The basic rock varies from a basalt to a gabbro - a nomenclature used in the field strictly on the grain size consideration. In many cases it can be shown that the increase in grain size has been caused by metamorphism which results in coarser actinolite needles, chlorite, biotite and hornblende grains. But there are some coarse-grained rocks which show little effects of metamorphism and still contain fresh olivine. The coarse-grained varieties of the basic rocks may either represent coarser differentiates of the basic lavas or their intrusive equivalents. Some outcrops of very thinly layered basic tuffs and agglomerates were also encountered during the course of the field work. The basic rocks generally form ridges and are associated with high positive mangetic anomalies on the aeromagnetic maps.

It is rather difficult to make any assertive comments regarding the presence or the absence of volcanic structures,

such as pillows, primarily because of the fact that the presence of volcanic rocks in the Wakeham Group was never reported and it is only after the petrographic examination of the rocks of the area that we know about the existence of the basic and the acid volcanic rocks, tuffs and agglomerates. Thus, the presence or absence of any pillows cannot be proved until further examination of these rocks in future field work in the area.

The basic rocks are generally fine to medium grained, massive to strongly foliated or even schistose, and may be dark grey, black, grey-green or dark green in colour. The ophitic to sub-ophitic texture is observable in many places. Some coarser varieties possess the composition of an anorthositic gabbro. The main minerals present in the rock include plagioclase, pyroxenes, olivine, hornblende, actinolite, chlorite, epidote, etc. In several places the rock contains disseminated pyrite cubes never exceeding 1% of the rock.

The acid volcanic rocks include mostly rhyolite with some rhyolite tuff and agglomerate. They occupy two important areas - one in the north central part and the other in the eastern part of the map-area. The rhyolite may be grey-pink, pink, light grey or dark grey on fresh surface and mostly pinkish on the weathered surface. In general, it is perceptibly porphyritic, with quartz and feldspar as phenocrysts, set in a very fine grained groundmass. Quite often the quartz has a bluish tinge. Petrographic examination

shows the presence of the characteristic textures seen in the rhyolites - such as euhedral quartz and feldspar grains, which often show the results of fracturing and corrosion caused by the surrounding groundmass. In a few places the rock becomes quite coarse grained due to the presence of a high percentage of the quartz and feldspar phenocrysts with only a minor amount of the fine grained groundmass. Generally the rocks show very little effects of metamorphism and recrystallization, but in places a good foliation defined by sericite, muscovite, chlorite or biotite flakes can be seen.

In an outcrop in the north central part of the area the rhyolite contains numerous ellipsoidal to highly stretched pebbles of quartzite and elongated angular pieces of phyllitic rock oriented parallel to a planar structure in the rhyolite, probably representing the flow feature.

INTRUSIVE ROCKS

The only undoubtedly intrusive rocks of the area are the granites, which are younger than the metasedimentary and metavolcanic rocks. Two types of granites can be distinguished - the one is foliated, streaky, augen granite; whereas the other is unfoliated, massive granite. The foliated granites are grey-pink to pink, medium to coarse grained, porphyritic with feldspar phenocrysts upto 3 inches in length. The main minerals present in the rock are - potash feldspar upto 60%, quartz upto 25%, plagioclase upto 20%, biotite, hornblende and magnetite. The foliation is shown by the augen

feldspars and by streaks of mafic minerals.

The unfoliated granites form two sub-circular bodies near Watshishou lake and southwest of Gaudreault lake. They are quite evidently associated with tow sub-circular magnetic anomalies on the aeromagnetic map. The rock is pink, coarse to very coarse grained, consisting of large calsbad twinned pink potash-feldspar phenocrysts. Other minerals present include plagioclase, quartz, hornblende, biotite and minor magnetite and chlorite. It contains 45-80% potash feldspar, 10 to 30% quartz, upto 20% plagioclase, and upto 25% mafics.

Pegmatites, quartz veins and diabase dykes are the youngest intrusive rocks. A few unmetamorphosed diabase dykes were also seen traversing the younger unfoliated granites.

PLEISTOCENE AND RECENT

Glacial striations and grooves, trending south, are commonly observed in outcrops near lake-shores and rivers. Chatter-marks are also quite frequent and correspond well to striations and grooves. Large erratic blocks upto 100 feet in dimension have been observed in many places, especially at Mardi Gras and Des Baie lakes. Unconsolidated glacial deposits consisting of sand, gravel and boulders cover a large part of the area. In addition, there are sand, gravel and clay deposits of lacustrine and fluvial origin.

STRUCTURE

The metasedimentary and metavolcanic rocks have been folded into large scale northwest trending folds which are readily recognizable on the topographic maps, aeromagnetic maps and on the air-photos of the region. Associated with these are small scale structures which possess essentially similar trends. In the present map-area a major anticline,"Gaudreault Lake Anticline", occupies the eastern part, whereas the western part is occupied by a limb of a major syncline, "Wakeham Lake Syncline", mapped in the adjacent Wakeham Lake Area by Claveau.

Structural analysis carried out for the Gaudreault lake anticline indicates that it is a symmetrical fold, about 17 miles in width and with a plunge of 48° towards N 326°. Similarly the structural analysis carried out for the Wakeham lake syncline shows that this is also a symmetrical fold, about 13 miles in width, plunging 35° towards N 166°, and with a nearly vertical axial plane. In order to do this analysis the structural measurements for the western limb of the Wakeham lake syncline were obtained from Claveau's (1943) field notes.

There are several NNE to NE trending faults in the area which have caused left-lateral or right-lateral displacements that can be seen clearly on the air-photos. Some shearing and pegmatite-activity is noted along these faults. There are

only few NNW trending faults. In general, the meta-sandstones, quartzites and the basic rocks are well jointed, whereas the rhyolites and granites are only poorly jointed.

ECONOMICS

Bands of iron-formation were observed for the first time in the rocks of the Wakeham Group. The bands are thinly layered, composed of hematite or specularite, and occur in beds interlayered with meta-sandstone which often displays cross-bedding, compositional layering and slump-features.

The largest exposure of iron-formation is 10 meters long and 26 cms thick. It outcrops on the east shore of Apvril lake and enters the lake, making it impossible to trace. The average thickness of other layers at the same location is 1 to 5 cms. Another occurrence of the iron-formation at this location consists of strings of lenses or nearly boudins, elongated parallel to bedding of the meta-sandstone, giving the impression that what had once been a continuous layer of iron-formation has now been pulled apart into many pieces. Some layers of iron-formation have been almost entirely leached out leaving cavities on the weathered surface.

A common feature observed on the weathered surface of the meta-sandstone units throughout the area is strings of elongated cavities, which in all cases parallel the bedding.

It is possible that these cavities may have contained iron-formation which has since differentially weathered out of the meta-sandstone, and if so, the original abundance of iron-formation would be far greater than that now present in outcrops.

The occurrence of bands of iron-formation in the Wakeham Group, the occurrence of interlayered volcanic rocks, together with their proximity to the Labrador Trough and their structural orientation, suggests that the entire Wakeham Group may possibly be correlated with the rocks of the Labrador Trough.

Disseminated pyrite cubes, in a few cases with chalcopyrite, were observed in some outcrops of meta-basalt, meta-gabbro, amphibolite and meta-sandstone.

Specular hematite upto 2 cms across occurs in some large milky quartz veins associated and interlayered with phyllite zones in the meta-sandstone. The larger veins occur in phyllites at contact of meta-sandstones and basic rocks.

Magnetite is common as disseminations in rhyolite, meta-basalt, meta-gabbro, and amphibolite. One band of coarse grained gabbro contains magnetite patches which compose upto 25% of the rock.

Chalcopyrite, pyrite, malachite, and magnetite occur near the contact between basic rocks and the surrounding phyllite and meta-sandstone about $2\frac{1}{2}$ miles north of the map-area,

just north of Noël lake. In most cases the mineralization is disseminated within the basic rocks. Earlier prospecting work was carried out in three localities as evidenced by diamond drilling and blasting.

The presence of acid and basic volcanic rocks in the area seem favourable sites for mineralization and may prove to be economically important.

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