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PRELIMINARY REPORT ON STE-ADELE AREA, TERREBONNE ELECTORAL DISTRICT

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PRELIMINARY REPORT

ON

STE-ADÈLE AREA

TERREBONNE ELECTORAL DISTRICT

BY

J. I. McGERRIGLE

QUEBEC
1960

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INTRODUCTION

The Ste-Adèle area, mapped by the writer during the summer of 1959, is bounded by latitudes 45°55' and 46°00', and by longitudes 74°05' and 74°10'. It comprises about 25 square miles, of which one-half is in Abercromby township, one quarter in Morin township, and the remainder in Wexford township and Augmentation des Mille Iles, all included within the electoral district of Terrebonne. The area lies immediately west of the St-Hippolyte area (McGerrigle[*]), mapped by the writer during the summer of 1958.

The largest town in the area is Ste-Adèle, which is about 50 miles northwest of Montreal and is located in the west central part of the area. Immediately adjacent to the southeast is the village of Mont-Rolland. Other communities include Ste-Marguerite Station and Val Morin, in the north central part and extreme northwest corner of the area respectively.

From Montreal, the area may be reached quite readily through the new Laurentian autoroute as far as St-Jérôme, and thence by Highway No. 11 (Montreal to Mont-Laurier) which passes through Ste-Adèle. In addition, a Canadian Pacific Railway line (also Montreal to Mont-Laurier) crosses the entire north-south length of the area. A good network of paved and gravel roads makes travel within the region quite easy.

The geological mapping of the area was carried out at a scale of 1 inch to 500 feet. Pace and compass traverses were run at intervals of 500 feet, either east-west or north-south, depending upon the orientation of the most prominent ridges, and were tied to distinct features along the main roads or waterways. Aerial photographs were used as an aid to traversing.

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[*]McGerrigle, J.I., (1959) - St-Hippolyte Area, Electoral Districts of Terrebonne and Montcalm, Que. Dept. Mines, P.R. No. 393.

The Ste-Adèle area has the uneven topography characteristic of that part of the Laurentian uplands, though this is somewhat modified in places by a relatively thick mantle of unconsolidated material, mostly sand and gravel. This is especially noticeable around Mont-Rolland, in the central part of the area. In general, the tops of the higher hills stand at an elevation of about 1,400 feet, and the maximum local relief is of the order of 500 feet.

The principal drainage system in the area is that of the North river, which flows through the area from north to south and eventually empties into the St. Lawrence. Flowing into North river from the northeast is the Doncaster, and, from the west, the Mulets.

GENERAL GEOLOGY

The rocks of the area are all Precambrian in age. About 98 per cent of the exposed bedrock belongs to a series that ranges from anorthositic to gabbroic, with the former variety being greatly predominant. Quartzose rocks, considered as belonging to the same series (Morin), are exposed in an irregular band or lens in the extreme southwest corner of the area. In addition, a fairly large, but isolated, outcrop of gneissic granite was mapped about 1,000 feet southeast of Ste-Marguerite Station. Some of the more quartzitic rocks in the extreme southwest corner of the area are apparently inclusions of the Grenville series within the Morin rocks.

Minor irregular pegmatitic intrusions were noted. A few thin diabase dykes cut the older rock formations.

Table of Formations

Pleistocene and Recent		Gravel, sand, clay, till and boulder moraine material
Precambrian	Intrusive Rocks	Diabase Pegmatites Quartzose rocks of the Morin series Anorthosite, gabbroic anorthosite, anorthositic gabbro and gabbro
	Grenville Series	Impure quartzite and quartzo-feldspathic paragneiss

Grenville Series

Except for one small (3½ feet by 3 inches) inclusion of fairly pure quartzite found in the gabbroic anorthosite about 700 feet southeast of Ste-Marguerite Station, the Grenville series is represented by impure quartzite and quartzofeldspathic paragneisses. These rocks are found in a lens, elongated in a northwest direction and estimated to be about 2,000 feet long and 1,000 feet wide. They are associated with the belt of quartz monzonite type rocks in the extreme southwest corner of the area. Small inclusions of a possible paragneiss were also noted in an outcrop of gabbroic anorthosite about 1,000 feet to the north of this lens.

At least half a dozen exposures were mapped in the main lens. Some are definitely made up of quartzite, whereas in others the rocks contain a considerable amount of orthoclase feldspar. These latter rocks are quite gneissic, and have been classed as quartzofeldspathic paragneisses. In one place at the southern border of the lens, a paragneiss was found to be in sharp contact with anorthositic gabbro.

The impure quartzite is fine to medium grained, quite thickly bedded and pink to light grey in colour. The weathered surface is light grey to white. It is made up of about 90 per cent quartz. The most common impurities are generally distributed in thin irregular bands or streaks, alternating with beds of fairly pure quartz, which are up to 4 feet thick. Orthoclase feldspar may also be present in minor amount.

In some outcrops, the quartzite grades into a quartzofeldspathic paragneiss. Other exposures are entirely made up of this latter rock. The main minerals are quartz and orthoclase, in approximately equal amounts, along with a small percentage of plagioclase. Mafic minerals are biotite, pyroxene and hornblende. Accessory and alteration minerals include apatite, garnet, limonite, magnetite and chlorite. The rock is pink to brownish grey and is very fine to medium grained. It appears to be quite thickly bedded, but a fairly prominent gneissosity has been superimposed over this original feature.

It is interesting to note that, both in this area and in the St-Hippolyte area which is directly to the east (McGerrigle, 1959), the exposures of Grenville rocks seem always to be associated with the quartzose rocks of the Morin series. They may occasionally be found as inclusions in the anorthosite-gabbro assemblage, but always in close proximity to exposures of quartzose Morin rocks.

Anorthositic and Gabbroic Rocks

Except for the exterme southwest corner, almost

all of the exposed bedrock of the area belongs to an assemblage generally included within the Morin series of rocks and ranging in composition from anorthosite to gabbro. All possible gradations between the two types exist, but anorthosite is the dominant variety, comprising about 85 per cent of the rock exposures. The more gabbroic types are found mainly in a discontinuous belt, with a maximum width of about 6,000 feet, which trends north-northeast through the entire length of the area. Some isolated exposures of this rock are also found close to the eastern and the western limits of the area. In general, the anorthosite-gabbro assemblage is characterized by a predominance of plagioclase feldspar, along with varying amounts of mafic minerals, and an almost complete lack of quartz.

The anorthosite is generally very massive, though in places it exhibits a faint gneissic structure. It is medium to coarse grained, and ranges in colour from glassy dark blue to pale green, purple, and various shades of grey. The weathered surface is light grey, and in many places has a rough and mottled appearance. A porphyritic texture is common, with phenocrysts of glassy plagioclase up to 6 inches long. Phenocrysts of pyroxene, up to 2 inches in length, have also been noted. In places, the phenocrysts are so numerous, angular and randomly oriented that the rock takes on a brecciated appearance.

Mineralogically, the anorthosite is made up almost entirely of plagioclase feldspar. Pyroxenes are the main ferromagnesian minerals, along with subordinate hornblende and biotite. These mafic minerals may be present in amounts up to 10 per cent. Magnetite-ilmenite, chlorite, apatite, garnet and pyrite are common as accessory or alteration minerals.

The more mafic types of this assemblage were divided in the field into gabbroic anorthosite, anorthositic gabbro and gabbro, depending upon the abundance of the mafic minerals relative to the plagioclase. Gabbroic anorthosite is by far the most common type. Excepting a few small isolated exposures, the gabbro is confined to the extreme southwest corner of the area, generally being found adjacent to the quartzose rocks of that locality.

These gabbroic rocks are medium to coarse grained, and, though they may be massive, they usually show a vague to well developed gneissosity. They are especially coarse grained and gneissose in the southwest corner of the area. A porphyroblastic texture is common, with plagioclase porphyroblasts, up to 4 inches long, generally aligned parallel to the gneissosity. The colour of these gabbroic rocks ranges from light grey, through brownish grey to a dark grey. The weathered surface is usually light grey to dark brownish grey. Except for a larger proportion of mafics, these rocks contain essentially the same minerals as does the anorthosite. However, the magnetite-ilmenite content is generally higher, averaging close to 5 per cent, and all zones of mineralization in the area

were found to be confined within these more gabbroic rocks.

Quartzose Rocks of the Morin Series

Quartzose rocks, apparently belonging to the Morin series, outcrop in the southwest corner of the area. Examination of individual specimens showed that the composition of these rocks varies from granite to quartz monzonite to granodiorite. However, the average composition would probably be that of a quartz monzonite. These rocks form an irregular belt or lens trending roughly northwest, over a distance of about 4,000 feet. Included within the southeast end of this belt is the lens of Grenville quartzite and paragneiss described in a preceding section of this report.

These quartzose Morin rocks are generally medium grained and fairly equigranular. They range in colour from light grey to brownish grey and have a light to dark grey rough weathered surface. Structurally, they are fairly massive to strongly gneissose. On the average, they are made up of approximately equal amounts of quartz, plagioclase and orthoclase, with augite, hypersthene, biotite and minor hornblende as the mafic minerals. Accessory and alteration minerals include magnetite-ilmenite, apatite, chlorite and limonite. Phenocrysts or porphyroblasts of glassy plagioclase feldspar, up to 2 inches long, were noted in some exposures.

At the northern border of this belt, dykes of anorthositic gabbro, up to 6 feet in thickness, are observed to have been intruded into the quartz monzonite.

An isolated exposure of gneissic granite was mapped about 1,000 feet southeast of Ste-Marguerite Station. It is medium grained, pink to grey in colour and quite fresh. Porphyroblasts of plagioclase, up to 1 inch long, were noted. It is this latter feature which serves to classify this rock as a probable member of the quartzose Morin series.

Pegmatites

A few very thin dykelets of pegmatite, composed mainly of alkali feldspar and quartz, have been intruded into the previously described rocks. None were of sufficient size to be indicated on the accompanying map.

Diabase

Several diabase dykes were observed in the area. They are not shown on the accompanying map, as the widest was only 5 feet across. However, a band of diabase is interpreted as continuing a short distance into the present area from the adjacent area to the east. This band trends N.70°W., is about 100 feet thick

where it enters the area, and apparently lenses out in a distance of 1,000 feet near outcrops where thin dykelets of diabase have been observed.

The diabase of these narrow dykes is fine grained to almost aphanitic. Typical ophitic texture is everywhere present, though it is difficult to discern in hand specimens of the very fine-grained type. These rocks have a light to dark grey fresh surface and a brownish weathered surface. Plagioclase and augite are the main minerals, with accessory hornblende, biotite, apatite, calcite and magnetite.

The diabase dykes were seen to cut most of the formations in the area and are believed to be youngest of the Precambrian rocks.

Pleistocene and Recent

At least one-half of the map-area is covered by various unconsolidated morainic deposits, consisting mainly of sand and gravel. This cover is quite thick near the central part of the area, being found on top of some fairly high hills. In the adjacent valleys, considerable sorting has taken place, resulting in the development of good sand and gravel deposits. Large ice-transported boulders are a common feature practically everywhere in the region.

STRUCTURAL GEOLOGY

The area lies entirely within the Morin anorthosite massif, though near its southern border. A lens of rock, with the average composition of quartz monzonite, outcrops in the extreme southwest corner of the area. This lens, which is apparently surrounded by rocks of the anorthosite-gabbro assemblage, is similar to rocks of the Morin series which outcrop to the south of the anorthosite massif.

Most of that portion of the massif which is included in the present map-area is true anorthosite, and is fairly coarse and massive. A vague gneissosity may be seen in places. However, a more gabbroic type of rock outcrops in an irregular, apparently discontinuous band across the entire north-south length of the area. This band has a maximum width of about 6,000 feet. These rocks are generally quite gneissose, with the direction of gneissosity averaging slightly east of north, parallel to the trend of the band. Dips are vertical, or steep to either the east or west.

In the lens of quartzose Morin rocks mentioned above, a banding or gneissosity is quite prominent. Some varieties may exhibit a vague "augen" structure due to the presence of porphyroblasts of plagioclase up to 2 inches in length. In the more quartzose types, which are apparently of sedimentary origin

(Grenville) and which are enclosed by the Morin rocks, some of the banding probably represents original bedding.

Jointing is very well developed throughout the entire area. There are numerous sets of joints, but the two most prominent trend just north of east and just west of north. Dips are steep to vertical. Horizontal jointing is also common at many places in the anorthosite.

ECONOMIC GEOLOGY

Mineralization in the area is confined to magnetite-ilmenite, with some hematite. The magnetite-ilmenite is generally associated with the more gabbroic phases of the anorthosite-gabbro assemblage, although a few small crystals of ilmenite are occasionally found to be sparsely distributed in the anorthosite itself. Thus, the main mineralized zones are found in the belt of gabbroic rocks which runs in an approximate north-south direction through the area. This mineralization, however, is not very high-grade at any place, except for a few thin non-minable bands. Assay samples (A-1) and (A-2), which are tabulated below on page 8 , are fairly indicative of the highest grade found in these zones when considered over any appreciable length or width.

The ilmenite-hematite type of mineralization is prominent in only one locality. This is on the eastern border of the gabbroic belt, about 4,000 feet southeast of Ste-Marguerite Station. Here, 3 trenches were found on ground formerly held by Laurentian Titanium Mines, Ltd. They are located in the south part of Lots 2 and 3, Range VI, of Wexford township. In only one trench was the bedrock well exposed. In the west end of this trench, which runs east-west, about 100 feet of mineralized anorthositic gabbro was found in sharp contact with pure glassy anorthosite to the east. The anorthositic gabbro is well banded and contains bands varying in amount of mineralization from almost nil to lensy bands, up to 6 inches thick, containing about 60 per cent ilmenite-hematite. The richest portion of the mineralized zone was sampled over a width (across the strike of the bands) of 15 feet. The assay result, (A-3), is tabulated below. Other outcrops in the vicinity showed minor ilmenite-hematite mineralization.

Assay Results

Assay Nos.	Weights	Description	Fe (Per cent)	TiO_2 (Per cent)
A-1	9 lbs.	Chip sample taken every 5 feet for 200 feet along length of outcrop of gabbroic rock	11.87	3.57
A-2	11 lbs.	Chip sample taken every 5 feet for 300 feet along length of outcrop of gabbroic rock	11.54	3.54
A-3	2¾ lbs.	Chip sample taken in a trench across 15 feet of exposure and at right angles to the banding of the anorthositic gabbro	17.06	8.86

Three diamond drill holes were bored by Laurentian Titanium in the immediate vicinity of their trenches. All were drilled from the same set-up, and the length of each was close to 150 feet. One hole was vertical, and the other two were inclined at 45° to the east and west. Only low grade mineralization was encountered and none of the core was assayed. In addition to the drilling and trenching, Laurentian Titanium ran a dip needle survey which covered Lots 1 to 4, Range VI, of Wexford township.

Pyrite is common throughout the area, but does not seem to favour any particular rock type or locality.

Sand and gravel deposits, mainly of glacial origin, are abundant in the area and are particularly thick in the central part, near Mont-Rolland. There are many small gravel cuts where material is periodically taken out for local road-working, but the only relatively large-scale operation is located about 4,000 feet southeast of Ste-Marguerite Station, immediately adjacent to the Canadian Pacific Railway line. This pit is operated by the C.P.R. Both sand and gravel are taken out, and about 20 car-loads per day are sent to the vicinity of Montreal.