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PRELIMINARY REPORT ON DEGROSBOIS AREA, TERREBONNE COUNTY

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PRELIMINARY REPORT

ON

DEGROSBOIS AREA

TERREBONNE COUNTY

BY

J. I. McGERRIGLE

QUEBEC
1961

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INTRODUCTION

The Degrosbois area, which was mapped by the writer during the summer of 1960, is bounded by latitudes 46°05' and 46°10', and by longitudes 74°20' and 74°25'. This area of about 24 square miles is located 70 miles northwest of Montreal. Half of its extent lies in Beresford township, slightly over one-third, in Wolfe township and its extreme northeast corner reaches into Archambault and Doncaster townships, all in Terrebonne county.

No organized towns or villages exist within the area itself, although small centres of habitation have grown up around the railway stops of Nantel and Degrosbois, and around some of the lakes, such as Quenouilles lake in the north, Papineau lake along the east boundary and de la Grise lake on the south boundary of the area. The largest town in the vicinity of the map-area is Ste-Agathe, which is located about 5 miles to the northeast. St-Faustin lies 4 miles to the west of the area, and the village of Ivry-Nord is just south of its southeast corner.

The area is well serviced by road and by rail. Highway No.11 and the Canadian Pacific Railway line (both Montreal to Mont Laurier) pass through its south part. In addition, travel within the area itself is rendered quite easy through a good network of gravel roads.

The geological mapping of the area was carried out on a scale of 1 inch to 500 feet. Pace and compass traverses were run at intervals of about 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 and waterways. Aerial photographs were used as an aid to traversing.

Topography

The Degrosbois area has the uneven topography characteristic of that part of the Laurentian uplands. In the northern three-quarters of the area, the tops of the higher hills generally stand at an elevation of about 1,950 feet. The maximum local relief is of the order of 500 feet. In the southern quarter of the area, south of Highway No. 11, maximum elevations are around 1,600 feet. The minimum elevation, just over 1,200 feet, is found in the extreme southeast corner of the area.

Surface drainage is effected mainly through small streams and brooks. These generally flow in a slightly south of east direction into the Nord river system, which in turn leads into the Ottawa river. An exception to this are the waters of the extreme northern part of the area, which flow into Quenouilles lake. Drainage from this lake is first in a westerly and then in a southerly direction to the Rouge river, and thence to the Ottawa.

GENERAL GEOLOGY

The rocks of the area are all Precambrian in age. The great majority of them belong to the Morin series which here consists of an assemblage of rocks varying in composition from anorthositic to gabbroic, the former variety being greatly predominant. The gabbroic rocks are in fact restricted to discontinuous bands and lenses in the anorthosite, the largest of which is located near Degrosbois Station, in the south part of the map-area. Though irregular in shape, its assumed dimensions are 3,000 by 1,500 feet.

Table of Formations

Pleistocene and Recent		Gravel, sand, clay, till and boulder moraine material
Precambrian	Intrusive Rocks	Diabase Pegmatite and mylonite Anorthosite, gabbroic anorthosite, anorthositic gabbro and gabbro

Intrusive Rocks

Anorthositic and Gabbroic Rocks

With the exception of a few small pegmatite and diabase

dykes, all of the exposed bedrock in the area belongs to an assemblage generally included within the Morin series of rocks and ranging in composition from anorthosite to gabbro. This assemblage is characterized by a predominance of plagioclase feldspar, along with varying amounts of mafic minerals, and an almost complete absence of quartz. All possible gradations between the two end-members exist, but true anorthosite is by far the dominant variety, apparently underlying at least 98 per cent of the map-area. This true anorthosite is assumed to contain less than 10 per cent mafic minerals; gabbroic anorthosite, 10 to 22.5 per cent; anorthositic gabbro, 22.5 to 35 per cent; and gabbro, over 35 per cent.

The true anorthosite is generally quite massive, though it may exhibit a faint layering or gneissosity in places. This vague banding may be due to differential weathering of alternating layers of different grain size, alignment of mafic constituents, partial alignment of a majority of the plagioclase phenocrysts, or a combination of the three. The anorthosite is generally very coarse, although some is medium grained, and a very fine-grained variety has been observed as very narrow dyke-like intrusions cutting the coarser facies of the rock.

The anorthosite varies from light to dark grey, though purplish and dark green types are common. In places, bluish crystals of labradorite are visible. The weathered surface is usually light grey, and presents a rough and mottled appearance. A porphyritic texture is always noticeable, with phenocrysts of glassy plagioclase up to one foot long. Phenocrysts of pyroxene, with a maximum lenght of about 5 inches, have also been observed. A cataclastic structure is also characteristic of much of the anorthosite. This is especially noticeable in thin section. Large, angular, strained and broken plagioclase crystals are surrounded and cemented by a mass of much finer crushed and rounded grains.

Mineralogically, the true anorthosite is made up almost entirely of plagioclase feldspar, generally in the andesine-labradorite range. Pyroxenes (hypersthene and augite) are the main ferromagnesian minerals, along with subordinate hornblende and biotite. Quartz may be present, but rarely in amounts exceeding 5 per cent, and probably averages about 2 per cent. Much of it appears to be secondary. Magnetite-ilmenite, apatite, chlorite, calcite, sericite and pyrite are the main accessory and alteration minerals.

Although generally quite evenly distributed, the mafic portion of the anorthosite may in rare cases be segregated into very irregularly shaped patches or blotches. The largest of these, which may contain as much as 60 per cent ferromagnesian minerals, is about 6 feet across.

Near the southern boundary of the map-area, about 1,000 feet south of Vaseux lake, the anorthosite seems to have a slightly different composition. Here, the mafic minerals are mainly hornblende and biotite, and quartz is present in amounts averaging about 5 per cent. In addition, a mineral tentatively identified as scapolite

has been observed in one of the thin sections from this district. This mineral was also noted in the anorthosite immediately adjacent to a pegmatite dyke about one-half mile southeast of Nantel Station. In view of the fact that pegmatites are fairly abundant in the area south of Vaseux lake, it is possible that the change in composition of the anorthosite in the district might bear some relationship to the intrusions of pegmatite.

Other slight changes in the mineralogy of the anorthosite occur in the vicinity of some of the pegmatite intrusions. For instance, for a few tens of feet on either side of biotite-bearing pegmatite dykes near the northwest corner of the area, the anorthosite is unusually rich in biotite. Orthoclase has also been observed in anorthosite immediately adjacent to some pegmatite dykes.

With an increase in the amount of ferromagnesian minerals, the true anorthosite grades successively into gabbroic anorthosite, anorthositic gabbro and gabbro. Of these three, only the gabbroic anorthosite crops out to any appreciable extent in the map-area. It is found in eight or nine elongate lenses of mappable size. The largest and most important of these is an irregularly shaped lense, with assumed dimensions of 3,000 by 1,500 feet and an approximate east-west trend, located near Degrosbois Station. The Degrosbois titaniferous iron deposit is associated with this lense of gabbroic anorthosite. The only mappable band of anorthositic gabbro is found in sharp contact with anorthosite about 1,000 feet south of Vaseux lake, near the southwest corner of the area. This well-mineralized band has a minimum thickness of 15 feet and an exposed length of about 250 feet. There are a number of other narrow discontinuous bands and elongate lenses of gabbroic rock in the anorthosite, but they are all under 10 feet in width.

The gabbroic rocks are usually finer grained than the anorthosite, and generally show a vague to well developed banding or gneissosity. The mafic minerals have been segregated into narrow discontinuous bands, and the plagioclase of the felsic bands generally shows a higher degree of granulation than is found in the true anorthosite. A porphyroblastic texture is common, with plagioclase porphyroblasts, up to 5 inches in length, aligned roughly parallel to the gneissosity. These gabbroic rocks vary in colour from light grey, through brownish grey, to a dark greenish grey, and exhibit a light grey to dark brown weathered surface. Except for the presence of a larger proportion of mafic minerals, usually accompanied by a higher magnetite-ilmenite content, the mineralogy of these rocks is essentially similar to that of the true anorthosite. Garnet, however, is a prominent accessory mineral in the gabbroic anorthosite surrounding the Degrosbois titaniferous iron deposit.

In addition, thin dyke-like intrusions made up mainly of coarse white-weathering plagioclase and black pyroxene have been observed in the area. Though fairly numerous in places, their maximum observed width is only about 6 inches. They are believed to be a late pegmatitic fraction of the anorthosite magma. They are intruded into the anorthosite-gabbro assemblage, but are in turn cut

by the pegmatite and mylonite dykes described in the following section.

Pegmatite and Mylonite

Intrusions of pegmatitic material are fairly numerous in the area, but none are over 10 feet across. They cut all previously described rock-types. Some of these intrusions are coarse massive pegmatites, composed mainly of pink orthoclase and glassy quartz, with very minor pyroxene and biotite, and, in places, accessory magnetite or ilmenite. In at least two observed locations, the pegmatite is intruded along a contact between anorthosite and a mineralized gabbroic band.

Some of the pegmatite dykes are bordered by a fine-grained to aphanitic grey rock which appears to be a mylonite. In other cases, this mylonitic type of rock forms thin, pinching-and-swelling, isolated dyke-like intrusions. One interesting dyke was observed in an outcrop about 4,000 feet northwest of Degrosbois Station. It has a maximum thickness of about one foot, and is made up of banded grey and pink mylonitic and pegmatitic material. The grey bands are fine grained to aphanitic and display porphyroblasts of quartz, in places rimmed by pink feldspathic material. The ferromagnesian minerals in these bands are very fine grained and generally distributed in streaks. Tourmaline was observed in a specimen from this banded mylonite. The pink pegmatitic bands are made up of coarse orthoclase and quartz, with angular broken crystals showing signs of shearing and fracturing. The contacts of all these intrusions are very sharp. In the case of the mylonitic type, slickensides and indications of shearing are observable along the limits of the dykes.

Diabase

A few diabase dykes were noted in the area. One measures 6 feet across, but the others are much narrower. Contacts with the enclosing rocks are very sharp. The diabase itself is a fine grained to aphanitic dark grey rock showing a brownish weathered surface. A typical ophitic texture is present, although it is difficult to discern in hand specimens of the very fine-grained type. The rock is made up of rectangular laths of plagioclase, usually showing considerable alteration, in a matrix of augite, hypersthene, quartz and plagioclase. Magnetite, biotite, chlorite and apatite are occasional accessory minerals.

These diabase dykes are believed to be the youngest of the Precambrian rocks in the area.

Pleistocene and Recent

Slightly over one-half of the map-area is covered by unconsolidated morainic material, consisting mainly of sand and gravel. Angular to subangular boulders, some up to 20 feet across, are

abundantly interspersed in this material, especially on the slopes of hills. In the adjacent valleys and lowlands, some sorting has taken place, resulting in good sand and gravel deposits. These deposits are particularly abundant in the central part of the area, about one mile northwest of Degrosbois Station, and near the northwest corner of the area.

STRUCTURAL GEOLOGY

The area lies entirely within the Morin anorthosite massif, and thus possesses a relatively simple structure. Discontinuous bands and lenses of gabbroic rock have been mapped in the anorthosite, but these are very limited in extent in the area covered by this report. Though generally quite massive, the anorthosite is occasionally seen to be vaguely foliated. Two separate planes of foliation appear to be present. One is apparently of primary origin and the other, secondary. The primary foliation is expressed in the form of alternating layers of slightly different grain size and chemical composition, or in an irregular banding or "stringing-out" of mafic constituents. The secondary foliation is considerably more evident in the more gabbroic bands, where the mafic minerals are segregated into easily definable, though irregular and discontinuous, layers.

In the northern quarter of the map-area, the primary structures trend roughly east-west and have an average dip of just over 30° to the north. Towards the central part of the area the dips tend to flatten, and some horizontal primary foliations were noted. In the southern part, though structural observations are sparse, the trends are approximately northwest-southeast, with dips averaging 15 or 20° to the southwest.

Superimposed in places on these primary structural features are approximately vertical shear places. These secondary structures, which may be accompanied by mylonites, have a general east-west trend in the limited number of outcrops where they have been observed.

Well developed jointing is common in the anorthositic rocks of the area. The most prominent joints strike either east-west or north-south, though towards the south boundary of the map-area a northwest trend is apparent. Dips are steep to vertical. Other smaller joints with more moderate dips were noted, and some horizontal jointing was observed at a few places. In general, however, the best developed joints seem to be those which strike at right angles to the secondary shear structures mentioned in the preceding paragraph.

ECONOMIC GEOLOGY

The only known mineral deposit of any potential economic importance is the magnetite-ilmenite deposit near Degrosbois Station in the southeastern part of the area. Narrow bands, containing similar but lower grade mineralization, were also observed, but none of

them were found to have an exposed width greater than 20 feet. All are in the southern quarter of the map-area, mainly south of Highway No. 11. The Ivry deposit, an ilmenite-hematite occurrence with bordering magnetite-ilmenite mineralization, is located about 1,500 feet south of the area.

Magnetite-ilmenite mineralization is generally found in close association with the bands and lenses of gabbroic rock in the anorthosite-gabbro assemblage, the main example being the Degrosbois deposit described below.

Degrosbois Deposit

The Degrosbois titaniferous iron deposit is located on lots 38 to 41, range VI of Beresford township. The ore is medium to coarse grained and consists of ilmenite mixed with magnetite containing intergrown ilmenite. It occurs as massive concentrations or as disseminated zones in a gabbroic facies of the anorthosite-gabbro assemblage. Completely unmineralized true anorthosite has been found in sharp contact with the ore, and as inclusions within it. In addition to the ore minerals and the plagioclase and pyroxene of the host rock, apatite is an important constituent of the ore, and quartz, pyrite, pyrrhotite and spinel have been noted.

The deposit has been known since early in the 20th century. In 1913, Dulieux (1) took samples from mineralized outcrops on lots 39 and 40 and subjected them to analysis and beneficiation tests. The deposits was later described in reports by Robinson (2) in 1922 and by Osborne (3) in 1935 and 1944. In 1949, the property, which had been taken by Pershing Amalgamated Mines Ltd., was covered with a dip needle survey. The company then opened a quarry on the north side of a small hill in the middle of lot 39, about 250 feet south of Highway No. 11. This pear-shaped excavation has dimensions of about 160 by 120 feet. Its highest face is towards the southeast and measures 20 feet. The overburden has been stripped back from the south and western edges of the pit for distances reaching 80 feet.

In 1952, two exploratory drill holes were bored by Pershing Amalgamated. One was drilled about 50 feet south of the

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(1) Dulieux, E.; Preliminary Report on Some Iron Ore Deposits of the Province of Quebec; Que. Dept. Col., Mines Branch, Rept. on Min. Oper. 1912.

(2) Robinson, A.H.A.; Titanium; Canada Mines Br., Publ. 579, 1922.

(3) Osborne, F.F.; Ste-Agathe - St-Jovite Map-Area; Que. Br. of Mines, Ann. Rept. 1935, Pt. C, 1936.

(4) Osborne, F.F.; The microtextures of certain Quebec iron ores; Que. Dept. Mines, P.R. No. 186, 1944.

southern edge of the open cut and the other on a small outcrop in lot 40. Later that year, a detailed magnetometer survey was conducted over lots 38 to 41. Two strong magnetic zones were outlined. One (the "A" zone) is located on lot 39 and the west part of lot 38. It extends generally south and east of the open cut, and has dimensions of about 900 by 600 feet. The other (the "B" zone) is situated towards the west side of lot 40 and embraces the mineralized outcrops located in that vicinity. It extends 600 feet in an east-west direction and has a maximum width of about 200 feet. In the summer of 1953, 21 more holes were drilled on the "A" zone. This brought the total number of holes drilled on that zone to 22, for a total of 3,910 feet.

The results of this drilling led officials of Pershing Amalgamated Mines Ltd. to estimate that the "A" zone contains 5,527,443 tons of massive material grading 40.87 per cent Fe and 10.99 per cent TiO_2 over an average thickness of 95.2 feet. In addition, they estimated that there are 1,051,400 tons of disseminated material having a grade of 25.67 per cent Fe and 6.64 per cent TiO_2 over an average thickness of 18.8 feet. The one drill hole drilled on the "B" zone cut 40 feet of titaniferous magnetite grading 44.73 per cent Fe and 11.56 per cent TiO_2.

From 1953 to 1957, the company carried out laboratory work and concentrating tests. Some pilot plant investigation work was also done on the ore by the Department of Mines and Technical Surveys in Ottawa.

In late 1959, Lumau Mining Corporation acquired the mining rights of an area adjacent to the deposit, i.e. of lots 31 to 35, range IV, lots 30 to 34, range V, and lots 30 to 35 and the north half of lots 36 to 41, range VI of Beresford township. The company optioned the south halves of lots 36 to 41, range VI, from Pershing Amalgamated Mines Ltd., thus including the Degrosbois deposit. During the summer of 1960, the company collected and assayed 20 samples from the open cut and vicinity. Further work is planned.

Other Mineral Occurrences

Occurrences of magnetite-ilmenite mineralization were also seen in narrower gabbroic bands in anorthosite at various places in the area. The largest of them, located about 1,000 feet south of Vaseux lake, has been traced for a distance of about 250 feet over a minimum width of 15 feet. It appears to contain about 20 per cent magnetite-ilmenite.

A small outcrop of mineralized gabbroic anorthosite was observed adjacent to the south boundary of the area, near the southeast corner. A 4.5-pound grab sample from this outcrop assayed 20.56 per cent Fe and 5.89 per cent TiO_2; A dip needle survey was conducted in the vicinity of the exposure in an attempt to outline the extent of the mineralization.

A few small crystals of ilmenite are occasionally found

to be sparsely distributed in the true anorthosite itself. Magnetite and ilmenite were also noted as crystals or blebs in the pegmatite dykes, or as thin irregular stringers associated with them.

Pyrite is common throughout the area, but does not seem to favour any particular rock-type or locality. It is, however, unusually abundant in the mineralized rocks of the Degrosbois titaniferous magnetite deposit.

Sand and gravel, mainly of glacial origin, is quite abundant in the area. In places, local re-working by water has resulted in useable deposits of this material. Several sand and gravel pits, including a fairly large one which was being worked during the time the writer was in the area, are located about one mile northwest of Degrosbois Station. In addition, there is a small gravel cut immediately adjacent to the secondary road in the extreme northwest corner of the map-area. These deposits are all used for local road-working,

There is also the possibility that the pure massive type of anorthosite, which is very abundant in the area, could be used as building or monument stone.

Dip Needle Survey

A small area adjacent to the south boundary of the region, in the vicinity of an outcrop of mineralized gabbroic anorthosite, was covered by a dip needle survey. The area covered, which has dimensions of approximately 4,000 by 1,500 feet, is outlined on the map accompanying this report.

Dip needle readings were taken every 100 feet along north-south lines spaced 200 feet apart. The average reading over apparently unmineralized areas seems to be about 64. A reading taken immediately adjacent to the mineralized outcrop was 72. Subsequently, all the 68 readings were contoured. If this contout line is taken as a possible limit of the mineralized zone then such a theoretical zone would have a maximum width of 200 feet and a northwest-striking, but discontinuous, length of at least 4,000 feet. The zone apparently extends, though it is somewhat narrower, into the area to the south of the present map-area. A similar, but much smaller, zone was outlined in the same survey about 300 feet southwest of the north end of the main zone.