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PRELIMINARY REPORT ON BEETZ LAKE AREA (EAST HALF), SAGUENAY COUNTY

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PRELIMINARY REPORT
ON
BEETZ LAKE AREA (EAST HALF)
SAGUENAY COUNTY

BY
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PRELIMINARY REPORT

ON

BEETZ LAKE AREA (EAST HALF)

Saguenay County

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I N T R O D U C T I O N

The eastern half of Beetz Lake area, which was mapped during the summer of 1950, is bounded by longitudes 62°30'W. and 62°45'W., and latitudes 50°30'N. and 50°45'N. Its southwest corner is about 42 miles northeast of Havre St-Pierre, a town on the north shore of the gulf of St-Lawrence. The western part of the Beetz Lake area was mapped in the summer of 1949 (1).

Means of Access

An aeroplane is the best means of access to the area, where several lakes provide landing places. The nearest seaplane base is at Sept Isles, which is 125 miles west of Havre St-Pierre. From Johan Beetz bay, which is 40 miles east of Havre St-Pierre, three canoe routes may be used to reach the map-area. One follows Piashtibaie river (also known as Rivière de la Grande Baie), which empties into Quétachou bay, a deep bay three miles east of Johan Beetz. This route, after crossing several lakes, the largest of which are Bellenger and Napoléon, reaches Beetz lake. This lake, shaped like a "V" opening northward, has its northeast arm in the southwest corner of the map-area. Between Quétachou bay and Beetz lake, a distance of $16\frac{1}{2}$ miles, there are 16 portages, most of which are short.

Another route is along Petite Piashti river, which enters the gulf of St-Lawrence at Johan Beetz bay. The first mile of the river, from Johan Beetz to Salé lake, is passable with difficulty at low tide; the stream is wide and shallow, and the bottom is strewn with boulders. The route continues northward along the river to Petit Piashti lake and thence across the height of land to the Grande Piashtibaie drainage basin. It then crosses, successively, Cabane Brûlée, Croche, Cabane Plate, Napoléon, and Beetz lakes. The total distance is $21\frac{1}{2}$ miles and includes 17 portages, some of which may be by-passed at times of high water.

(1) Grenier, P.E., Beetz Lake Area (Western Half), Saguenay County; Que. Dept. Mines, P.R. No. 240, 1950.

The third route follows Grande Watshishou river, which empties into the gulf of St-Lawrence $5\frac{1}{4}$ miles east of Johan Beetz. This route crosses Véronique lake and follows the west branch of the river to a point about three-quarters of a mile below Théodule lake. From here, a portage leads to Prudent lake, the head of which is in the southeastern part of the map-area. The route from the mouth of Watshishou river to the southeast corner of the area is about 21 miles long, with 13 portages. The first portage, which is a mile long and avoids closely spaced rapids, may be shortened by running stretches of quiet water between some of the rapids.

Of the three canoe routes, the one following Petite Piashti river is the easiest at times of high water. The Grande Piashtibaie route is recommended in dry seasons. The Grande Watshishou route is useful for reaching the eastern part of the area.

TOPOGRAPHY

The area is topographically similar to the region to the west (1), and shows considerable relief. Long ridges with steep slopes alternating with narrow valleys, many of which are occupied by lakes, trend north-northwest and are the dominant topographic feature. One ridge crosses the whole area and extends both north and south of the map-sheet. The summits of the individual ridges are slightly undulating. The ridges mark outcrops of gabbro or of gabbro-injected quartzite. Most of the valleys are underlain by quartzite which is more readily eroded than the gabbro. North of Bellenger lake, however, there is little gabbro and ridges are formed on resistant beds of quartzite.

GENERAL GEOLOGY

All the consolidated rocks in the area are Precambrian in age. They may be divided into two main groups, namely, gabbros and metamorphosed sedimentary rocks. Each type forms parallel bands trending north-northwest. Each stratigraphic unit has a constant thickness, but the width of the different bands varies a great deal throughout the area. The belts of metasedimentary rocks are from one-eighth of a mile to three miles wide, and the sills of gabbro from one-eighth of a mile to one mile wide. Sills and sedimentary beds alternate throughout the area, except in the south-central part along the axis of a syncline, where metasedimentary rocks outcrop over a width of three miles and gabbro sills are few and thin.

The metasedimentary rocks underlie an area slightly greater than that underlain by the intrusive rocks.

(1) Grenier, P.E., op. cit.

Table of Formations

Cenozoic (Pleistocene)	Clay, sand, gravel, erratic blocks	
Great unconformity		
	Intrusive rocks	Dykes and sills of altered gabbro
	Intrusive contact	
	Metasedimentary rocks	Grey quartzite Hematite- and rutile- bearing quartzite Quartzose mica schist Phyllite Calcareous quartzite Biotite gneiss

Precambrian

Metasedimentary Rocks

The oldest rocks in the area are metamorphosed sediments. Single beds are from a fraction of an inch to three feet thick.

These rocks are of various compositions: the more abundant types are biotite gneiss, calcareous quartzite, phyllite, quartzose mica schist, hematite- and rutile-bearing quartzite, and grey quartzite.

Exposures of biotite gneiss are few and all are in the southeastern part of the area. The gneiss is dark in colour, fine-grained, very tough, and has a rough weathered surface. Because bedding and foliation are not apparent in the gneiss, and because the quartz is not easily recognized with a hand lens, especially in the fine-grained facies, some exposures of gneiss are easily mistaken in the field for fine-grained gabbro. Quartz, biotite, and even feldspars are easily identified in the coarser gneiss.

Calcareous quartzite predominates east and south of Leclerc lake. It is also exposed, in places, between Beetz lake and Gerry lake, and west of Iles lake. The quartzite is dark grey, fine-grained, and has a pitted weathered surface. It contains lenticules of carbonate one-quarter of an inch in diameter, and thin seams of carbonates along the bedding planes. The matrix of the rock effervesces with hydrochloric acid. A crushed specimen, when treated with

hydrochloric acid until no more solution takes place, loses 14 per cent of its weight. The other constituents are quartz, feldspars, and mica. In some exposures of fine-grained, thin-bedded quartzite, phyllitic beds are intercalated in the quartzite, and the weathered surfaces closely resemble those of the phyllites described below. One exposure of medium-grained calcareous quartzite, 150 feet from the east shore of Beetz lake and two miles south of the end of the northwestern bay, contains porphyroblasts of scapolite up to half an inch in diameter.

Exposures of phyllite interbedded with the other metasedimentary rocks are scattered throughout the area. They are particularly abundant near the northeast shore of Beetz lake, west of Iles and Croix lakes, on the large island in François lake, and east of Eau Claire lake. They are very fine-grained and dark to light grey, with the lustre characteristic of phyllites apparent on the schistosity surfaces. The beds, which are generally very thin, are conspicuous only on weathered surfaces. In places, the schistosity is parallel to the bedding, and in some exposures quartz veinlets follow the foliae. The surface of some exposures is pitted; the cavities are about 1.5 mm. diameter, and are the result of weathering of porphyroblasts, which may be seen on fresh fractures.

Quartzose mica schist is exposed on the small island that lies close to the western shore of Napoléon lake, and also southeast of Beetz lake. The schist is dark grey and fine-grained, and occurs as thin beds interstratified with the quartzites.

The hematite- and rutile-bearing quartzite occurs here and there in the western half of the area, particularly west of Beetz lake, south of Gerry lake, and west of Iles lake. It is composed of alternating black beds and white beds, averaging $1/32$ of an inch in thickness. In places, the white beds are much thicker than the dark ones, the former being up to 6 inches wide, whereas the latter are $1/32$ of an inch or less thick. The white beds are composed chiefly of quartz, whereas the dark ones are mainly hematite and rutile with a little magnetite. On the northwestern shore of Napoléon lake, just beyond the boundary of the map-area, a three-inch bed of hematite and rutile strikes southeast and is exposed for a length of five feet. This bed is probably lenticular; its southeastern extremity thins out to a point where it passes beneath the surface of the lake, but to the northwest it is not exposed.

The grey quartzite is the principal metasedimentary rock of the area; all the other types are interstratified with it. It is tough, massive, fine-grained, and from light to dark grey. The beds have a maximum thickness of three feet. Quartz is the major constituent; biotite, and two black metallic minerals, one of which is strongly magnetic and the other weakly so, also occur. The dark mineral content of the rock determines its colour. In places, thin seams of these dark minerals reveal cross-bedding. A metamorphosed siltstone, which is exposed in a few places, has been mapped with the grey quartzite.

Intrusives Younger than the Metasedimentary Rocks

The altered gabbro is exposed in all parts of the map-area. In places it forms dykes cutting across the quartzites, but most of it is between beds of metasedimentary rocks. The sills are from 300 feet to a mile wide and they vary

greatly in length; some cover a distance of $17\frac{1}{2}$ miles within the map-area and extend beyond it, whereas others are only one-quarter of a mile long.

There are several gabbro facies, each with a characteristic weathered surface. The most common type is heavy, massive, black, and medium-grained. The constituents recognized with the naked eye are abundant amphibole, some feldspar, and two black metallic minerals, one of which is attracted by a magnet and is probably magnetite. The non-magnetic one is anisotropic under reflected light; very hard, and is probably ilmenite. Biotite, pyrite, and chalcopyrite also were noted in places. Weathered surfaces are not as dark as fresh fractures, because of surficial alteration. In some places, where the gabbro is in contact with metasedimentary rocks, it is very fine-grained. In the eastern part of the area, particularly near Watshishou lake, the amphibole content is less and the feldspar correspondingly more abundant. The feldspar is also better developed; cleavage faces, milky white in colour, are easily recognized, and the rock has a greenish tinge. In the same district, there are schistose gabbros.

At two places of Robe Noire lake, there are exposures of a medium-grained granitoid rock composed of feldspar, a little quartz, and some ferromagnesian minerals. This rock is probably satellitic to one of two nearby granite masses: one of these is about a mile north of the map-area, on the north shore of Watshishou lake; the other is about seven miles west of the area.

Cenozoic

The Pleistocene glaciers, which crossed the area in a direction parallel to the trend of the topography, eroded the valleys and ridges but left few deposits. The summits of the highest hills are generally bare, but granite blocks, about five feet in diameter, were found on hilltops east of Eau Claire lake. Most valley bottoms have thin covers of grey sandy clays. On the shores of Watshishou lake, there are sandy beaches and boulders formed from material carried by ice. The lake is dammed by till at its southern extremity - which is outside of the map-area - and it flows into Holt lake instead of draining directly southward. The top of the till is only five feet above the level of the lake, and 50 feet to the south a small stream, probably fed in part by water filtering through the till from the lake, flows lazily southward. At some time before the deposition of the till, this stream was probably the outlet of the lake.

Recent unconsolidated sediments consist of glacial clays and sands reworked by present streams. Such deposits are few and thin. Gabbro hills are flanked by tali of gabbro blocks, some of which are 12 feet in diameter. The talus slopes are steep, and up to 200 feet long.

STRUCTURAL GEOLOGY

The structural trends of the area are clearly outlined by the topography. In the northern part of the area, the overall strike of the bedding is S.25°E. Progressing southward, this direction becomes gradually more southerly, and even southwest in places. On the point that separates the two arms of Beetz

lake, and southwest of Eau Claire lake, minor folds are indicated by pronounced curvature of the bedding.

Dips vary in amount (18° to 86°) and in direction. A wavy line drawn from a point on the northern boundary of the map-area, three miles from its western limit, to the bay that forms the northeast part of Bellenger lake divides the area into two parts with respect to the attitudes of dips. East of this line, dips are generally west, except south of Eau Claire lake where they are variable. West of the line, dips are mostly east, except near Napoléon lake where they are westerly, and also on the point between the two main arms of Beetz lake, where both east and west dips occur.

Cross-bedding in several exposures of grey quartzite, and ripple marks, observed only along the east shore of Watshishou lake, are well enough preserved to indicate the tops of some beds. In all cases, the tops were found to face east where the dips are east, and west where the dips are west.

Several drag folds occur in the metasedimentary rocks on the islands in the northeastern and southeastern parts of Robe Noire lake, and on the west shore of the long point that separates the southeast and southwest bays of the same lake. Other drag folds were noted near Gerry lake, on an island in Eau Claire lake, and along the east shore of Prudent lake. The axis of each of these folds plunges between 15° and 30° in a S. 50° E. direction, except some near Robe Noire lake, which have northerly plunges. On the island in Eau Claire lake most plunges are 5° in the direction N. 80° W., but in one fold the axis is undulating and the plunge changes from north to south.

Southwest of Eau Claire lake, the attitudes of bedding in the meta-sedimentary rocks and of gabbro sills indicate a minor anticline and a minor syncline, both plunging south. Similar folding is apparent, though not so clearly, in the northwestern part of Robe Noire lake. Another minor fold out-crops between the two arms of Beetz lake.

From these observations it is inferred that all the metasedimentary rocks and gabbro sills of the map-area belong to one major syncline plunging from 15° to 40° south-southeast. The trace of the axial plane is the line, referred to above, which divides the area in two with respect to the direction of the dips of the formations. This line, projected beyond the northern limit of the map-area, coincides closely with the synclinal axis described by Claveau (1). Other structural observations near Napoléon lake, as well as in the adjacent map-area to the west (2), indicate the presence of an anticline plunging to the southeast, the axial plane of which strikes generally N. 30° W. and passes through the western bay of Beetz lake.

ECONOMIC GEOLOGY

Siderite

Siderite was found on an island half a mile west of the outlet of Watshishou lake. This iron carbonate occurs in lenses, about half an inch in

- (1) Claveau J., Wakeham Lake Area, Saguenay County; Que. Dept. Mines; G.R. 37, 1949.
- (2) Grenier, P.E., op. cit.

diameter, in a dark schistose rock composed chiefly of feldspar, biotite, chlorite, and an opaque mineral. Part of the exposure, an area about three feet in diameter, is very rusty. Under the rusty crust, the rock consists of siderite with some dark remnants of the same schists, and looks like a breccia.

The dark schist containing siderite is probably a member of the gabbro complex. The siderite is thought to be of hydrothermal origin, and to indicate that hydrothermal veins containing minerals of economic value may occur in the region.

Magnetite and Ilmenite

Magnetite and ilmenite are accessory constituents of the gabbro. One hand specimen from the west shore of the east arm of Beetz lake, one mile north of the falls, contains enough magnetite to attract a compass needle.

Hematite and Rutile

Quartz veins occur in the metasedimentary rocks and many contain thin leaves of specular hematite filling fractures in the quartz. The largest masses of hematite are half an inch in diameter and 1/16 of an inch thick. They are too small and scattered to have any economic value.

The hematite- and rutile-bearing quartzite described above is exposed mostly west of Beetz lake, south of Gerry lake, and west of Iles lake. Beds containing much hematite and rutile alternate with quartz-rich beds; the former have an average thickness of 1/32 of an inch, whereas the quartz-rich beds are up to six inches thick. Along the northwestern part of Napoléon lake, one hematite-rutile bed containing some quartz is three inches thick. It strikes N.38°W. and dips 80°E. The bed is exposed for a distance of only five feet; its south end terminates in a point under water, and its northward extension is hidden by drift. The bed, in itself, does not contain enough hematite to be of economic interest. No other beds of hematite were found, and, because the bed-rock is everywhere well-exposed, it is unlikely that any hematite deposit of commercial size has been overlooked in the map-area. However, the occurrence of sedimentary hematite within a quartzitic formation is interesting, and indicates the possible existence of commercial iron ore deposits in sedimentary rocks in neighbouring areas. The rutile content of the bed just described is even more significant; rutile ores need not occur in so large tonnage nor so pure as hematite ores to be profitable.

Chalcopyrite and Pyrite

Very small quantities of chalcopyrite, in fine grains disseminated through the gabbro, were noted at a few places. No occurrences of chalcopyrite in veins, such as have been found west of the present area, were observed.

Disseminated pyrite in the gabbro, particularly in the fine-grained facies, is common. The pyrite occurs as small irregular grains or well-formed cubes, but the quantity is small.

Pyrite is associated with chalcopyrite wherever the latter occurs, and the two minerals were probably deposited from the same solutions.

It should be noted that pyrite and chalcopyrite occur here and there in all the adjacent map-areas - to the northwest (1) (2), to the west (3), and along the coast of the St-Lawrence (4) (5). Copper-bearing solutions must have circulated through the rocks of this whole region.

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- (1) Longley, W.W., Forget Lake Area, Saguenay County; Que. Dept. Mines, G.R. 36, 1948.
 - (2) Claveau, Jacques, op. cit.
 - (3) Grenier, P.E., op. cit.
 - (4) Longley, W.W., North Shore of the Saint-Lawrence from Mingan to Aguanish; Que. Dept. Mines, G.R. 42, Pt. I, 1950.
 - (5) Claveau, Jacques, North Shore of the Saint-Lawrence from Aguanish to Washicoutai Bay, Saguenay County; Que. Dept. Mines, G.R. 43, 1950.