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PRELIMINARY REPORT ON WASWANIPI LAKE AREA (EAST HALF), ABITIBI-EAST COUNTY

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PRELIMINARY REPORT

ON

WASWANIPI LAKE AREA

(EAST HALF)

ABITIBI-EAST COUNTY

BY

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WASWANIPI LAKE AREA

(East Half)

ABITIBI-EAST COUNTY

by Donald A. W. Blake

INTRODUCTION

The east half of the Waswanipi Lake area was examined by the writer during the summer of 1949. It comprises 230 square miles, of which about one-fifth is the eastern part of Waswanipi lake. The map-area is bounded by longitudes 76°15' and 76°30', and by latitude 49°45' and an east-west surveyed line four miles south of latitude 49°30'. Parts of the townships of Ailly, Bellin, Bossé and Nelligan, and also of the projected townships 614 and 615 make up the map-area. The adjoining areas lying to the west (1), north (2), east (3), and south (4) were mapped by geologists of the Quebec Department of Mines in 1948, 1949, 1946, and 1934 respectively.

Waswanipi lake, the centre of which lies about 87 miles north-northeast of the town of Senneterre on the Quebec-Cochrane line of the Canadian National Railways, is most easily reached by hydroplane. Alternatively, there is available a long, but relatively easy, canoe route, from Senneterre down Bell river to Mattagami lake and thence up Waswanipi river through Olga and Goéland lakes to Waswanipi lake. This winter, for the first time, the lake will be accessible by road. From the winter road joining Madeleine (Rose) and Bachelor lakes a branch is being cut northward to the southeast corner of Waswanipi lake.

The greater part of the map-area itself can be conveniently reached from the shores of Waswanipi lake or from one or the other of the only two navigable rivers, Waswanipi river in the north and Bachelor river in the southeast. Taylor lake in the east-central part can be reached either by air or on foot. Taylor creek, the small stream draining this lake southwestward into Waswanipi lake, has many rapids and is obstructed in many places by fallen trees. These conditions make the creek unnavigable, except possibly during extremely high water in the spring. A six-mile stretch of Waswanipi river, which flows westerly and southwesterly across the northern part of the area, is fast-flowing water. Within this stretch there are two major rapids, both of which, however, can be navigated in a freighter canoe powered by outboard motor.

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(1) CLAVEAU, J., Preliminary Report on Waswanipi Lake Area (West Half); Que. Dept. of Mines, P.R. 217, 1948.

(2) IMBAULT, P.-E., Preliminary Report on Maicasagi Area; Que. Dept. of Mines, P.R. 231, 1949.

(3) LONGLEY, W.W., Preliminary Report on Bachelor Lake Area; Que., Dept. of Mines, P.R. 198, 1946.

(4) MACKENZIE, G.S., Pusticamica Lake Map-Area, Abitibi District; Que. Bur. of Mines, Ann. Rept., 1934, Pt.C.

Inexperienced canoemen should avoid these rapids by portaging over Indian trails on the river's northern bank. The section of Bachelor river within the map-area is navigable with some difficulty. Near its mouth a mile-long portage is necessary on the north side of a bad rapid, and upstream there are log jams and numerous meander bends.

TOPOGRAPHY

For the most part the land is a monotonous, even plain which rises gently from shallow Waswanipi lake. In the eastern part of the area some minor dissection has produced a local relief not greater than 100 feet. Elsewhere the land is either virtually flat and swampy, or gently undulating, but with no major hills. The low, flat parts are underlain mainly by post-glacial, layered clay, silt, and sand. These deposits are exposed frequently along the lake shore and the stream banks. The gently rolling terrain owes its existence, for the most part, to the somewhat-dissected accumulations of glacial debris. The higher land along the east side of the map-area contains most of the rock exposures and, here, the tops of the small hills are, in places, nearly completely bare of vegetation other than moss.

Travel on foot is made slow and laborious in the southern part of the area by an old burn, now grown over with small trees and underbrush. North and west of Taylor lake the land is covered with a heavy growth of spruce, but large patches of alders hamper walking in many parts.

GENERAL GEOLOGY

The thick mantle of glacial and post-glacial deposits effectively conceals nearly all of the consolidated rocks of the region. However, from the distribution of the small number of exposures found, it is thought that by far the greater part of the area is underlain by Precambrian granitic rocks. There are, as well, some sedimentary and sedimentary-volcanic rocks of Precambrian age. These are exposed in two main belts that extend northeasterly across the central and southern parts of the map-area, and in a third, small belt in the southwest corner. Three outcrops of Palaeozoic limestone were found, two on the north side of Lay peninsula, and one on the south shore of Waswanipi lake.

Sedimentary and Volcanic Rocks

One of the two principal volcanic-sedimentary belts is in the southernmost part of the area. It is, in fact, only a relatively small part of a much wider zone of these rocks that lies south of the map-area and extends for several miles to the northeast and southwest. The northern margin of the belt crosses the eastern boundary of the area a little more than four miles north of the southeast corner, and it leaves the southern boundary about two miles east of the southwest corner. About three-quarters of a mile southeast of the sharp bend in the general course of Bachelor river, a band of

clearly recognizable andesitic lavas follows the general east-northeast trend of the belt. Here, well-developed, though squeezed, pillow lavas are found, as well as amygdaloidal and brecciated flows. Elsewhere in this belt, because of severe metamorphism, the common, fine-grained, sheared, basic rocks cannot be definitely identified as to origin, but it is believed that most of them were derived from fine-grained, basic, andesitic lavas. However, a narrow band of sedimentary rock extends along the northern margin of the eastern part of the belt. About a mile wide at the eastern boundary, it apparently thins out westward to end about midway across the map-area. The rocks are fine-grained, thinly bedded, and range from a nearly pure quartzite to a dark grey, basic sedimentary rock. The fact that they are cut by many dykes of granite, suggests that their outcrops are not far distant from the granite mass to the north.

The second of the two main belts of Keewatin-like rock is a narrow belt that trends northeastward from about the middle of the east side of Waswanipi lake along the lower part of Taylor creek, passes through Taylor lake, and thence swings sharply east before leaving the map-area about six miles south of the northeast corner of the area. It is evidently the eastward continuation of the volcanic-sedimentary belt that, mapped by Claveau (1), follows Iserhoff river and the north shore of the southwest bay of Waswanipi lake. The exposures seen, although limited in number, indicate that this part of the belt is composed entirely of sedimentary rocks and is not over a mile in width. The boundaries of the sedimentary band as they are mapped are, of course, largely inferred. Although no exposures of this rock were seen on Lay peninsula in the western part of the area, arbitrary contacts have been drawn on the map so as to indicate the trend of the belt towards its western extension as mapped by Claveau. The fresh surface of the rock is typically dark grey or nearly black, and the bedding is extremely fine and regular. The rock is fine-grained to dense, and its composition, which seems to be markedly uniform throughout, is that of an impure quartzite. Locally, the rocks have been intruded by numerous dykes of granite and pegmatite, near which porphyroblasts of feldspar, up to one-third of an inch in length, have developed. The marked schistosity is everywhere parallel to the bedding, which regularly strikes northeasterly and dips to the southeast at about 60 degrees.

In the southwest corner of the map-area, near the mouth of O'Sullivan river, three small outcrops of sedimentary rock were found. They indicate that a narrow band of dark-weathering, fine-grained, impure quartzite extends to the southwest to join the band of magnetic sedimentary rocks mapped by Claveau (1) in 1948. Although none of these magnetic sedimentaries were found in place in the present map-area, a strong magnetic anomaly was detected. In the exposures within the present area, the beds are typically thin and well developed and are often injected in a lit-par-lit manner by white-weathering, fine-grained granite, which has produced partial granitization in some places.

In addition, large and small inclusions of sedimentary and volcanic rocks are found throughout the area in the granites. The largest of these, and the only one shown on the accompanying map, is of sedimentary rock, and is in massive biotite granite on the south bank of Waswanipi river about midway across the area.

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(1) CLAVEAU, J., Preliminary Report on Iserhoff River Area; Que. Dept. of Mines, P.R. 197, 1947; and

Preliminary Report on Waswanipi Lake Area (West Half); Que. Dept. of Mines, P.R. 217, 1948.

Granites

The granites studied by Claveau (1) in the area to the west continue with little change into the present map-area. Each of three easily recognizable granites represents an intrusive stage of major importance. They are as follows:

(a) Gneissic biotite granite
(b) Hornblende granite
(c) Pink, massive biotite granite, pegmatitic granite, and pegmatite.

In the northern part of the area the massive biotite granite cuts across and includes gneissic biotite granite. The hornblende granite, occurring in the south and east and separated from the two northern granites by the sedimentary band, cannot be fixed in age. There is reason to believe, however, that it is older than the massive biotite granite and younger than the gneissic biotite granite.

(a) Gneissic biotite granite

This, the oldest of the granites, is found in the northern part of the area in intimate association with massive biotite granite and related rocks. Elongated areas in which the gneissic biotite granite predominates are shown on the accompanying map. Their outlines, however, are necessarily arbitrary, for the outcrops in them are small and few in number. The gneissic granite is found also as rare inclusions in the massive granite. In the areas of predominantly gneissic granite, as well as at the other places where this rock is found, the gneissic biotite granite is cut by large and small dykes and irregular bodies of the massive biotite granite and related rocks. It would seem that, in general, the gneissic granite occurs as roof pendants in the massive biotite granite.

The older granite is medium-grained, white to grey on its weathered surface, and strongly gneissic. It is made up of about 15 per cent quartz, 15 per cent biotite, and a large amount of white and pink feldspars. In some places there is a porphyritic facies containing phenocrysts of feldspar up to an inch in length. Because these phenocrysts are aligned parallel to the gneissic banding and because the rock shows little sign of deformation, it is thought that the banding is primary in origin.

The gneissic biotite granite frequently contains large and small sedimentary inclusions, oriented parallel to the banding. Many of these inclusions are highly injected and partially granitized by the granite.

(b) Hornblende granite

That section of the map-area lying between the two main belts of sedimentary and volcanic rocks is believed to be underlain almost entirely by granite. This is part of a fairly large batholith that extends, with a general trend of somewhat north of east, for some 40 miles, from near Bell river in the west almost to Bachelor lake in the east. This batholith varies in width between four and nine miles. Roughly one-quarter of its total extent is contained within the present map-area.

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(1) CLAVEAU, J., op. cit., 1948.

The typical rock is pink-weathering hornblende granites. Although massive and equigranular in places, it is typically porphyritic and gneissic. Both phenocrysts of feldspar, which are, in many places, more than one inch long, and lens-shaped basic inclusions, numerous in some exposures, are oriented parallel to the gneissic banding. This fact and the fact that the granite appears fresh and undeformed indicate that the banding was produced during emplacement. In many places the inclusions are partly granitized and contain numerous feldspar porphyroblasts. The surrounding granite, in a few instances, was seen to be more basic than usual as a result of contamination. The typical granite is rich in hornblende and poor in quartz, whereas biotite is present occasionally and in subordinate amount. The grain size, colour, and mineral content, however, vary from place to place.

There are a few exposures of a grey, medium-grained, biotite granite in the southwest corner of the map-area. In one place, this rock was seen to cut across the porphyritic hornblende granite. Apparently, there are several large and small dykes of it striking in a northeasterly direction. Similar, northeast-trending dykes, cutting hornblende granite, have been seen in the area to the west (1)

(c) Pink massive biotite granite, pegmatitic granite, and pegmatite

This group, as previously mentioned, is found usually associated with the older gneissic biotite granite. Together they are thought to underlie the greater part of the northern half of the map-area, that is, most of the area north of the Taylor Creek sedimentary belt. Similar granite rocks extend, as a large batholith, west, north, and east, well beyond the limits of the area.

A great difference in grain size is the major feature distinguishing the three facies of this intrusive complex. The typical biotite is pink-weathering, fine to medium-grained, and generally massive, although, rarely, an alignment of the crystals is noticeable. Quartz in many cases forms as much as 25 per cent of the rock, whereas as the biotite content is low. The pegmatitic facies is very much the same as the above in composition, but is coarser in grain. It is found both cutting the biotite granite and gradational into it. On the other hand, it is in some places cut by, and in other places is gradational into, pegmatite. The pegmatite, which occurs abundantly as dykes and irregular masses, is a coarse-grained aggregate of pink orthoclase, white plagioclase, and quartz. Crystals of these minerals may be as much as two or three feet in their greatest dimension. Except for occasional small flakes of biotite and muscovite, the pegmatite is apparently barren of other minerals.

Palaeozoic Limestone

The presence of large, angular, glacially transported slabs and boulders of Palaeozoic limestone in the Waswanipi Lake region has been known for many years. Although geologists suspected the existence of limestone outcrops, it was not until the summer of 1948 that F.J. Sugden (2), geologist of the Dominion Gulf Company, made the first discovery of the rock in place. On the southern shore of Waswanipi lake, at the mouth of a small creek two miles east of O'Sullivan river, he found five feet of horizontal strata, exposed at low water, along the walls of a miniature canyon. An additional four

(1) CLAVEAU, J., op. cit., 1948.

(2) Manuscript report to Dominion Gulf Company

feet of the rock was seen below the water level. The outcrop extends about 70 feet inland, where it disappears beneath glacial till, and from 15 to 30 feet east and west along the lake shore, where, at both ends, it is covered by sand and gravel.

By a study of the distribution of limestone boulders and by a close examination of the shore of Waswanipi lake at low water, the writer was able to find two other exposures of what appears to be the same limestone formation on the northwest side of Lay peninsula, that is, some eight miles north of the southern exposure. They are exposed only at very low water along a gently sloping boulder shore. Each is about 400 feet long, and their exposed width varies with the lake level. Inland, the formation becomes buried beneath boulders and drift. The distribution of limestone boulders and slabs suggests that this rock is fairly widespread in the district. It is even possible that all the area between the north shore of Lay peninsula and the south shore of Waswanipi lake is mainly underlain by limestone. It also seems probable that this limestone inlier owes its preservation to the protection afforded by its having been deposited in a broad basin in the Precambrian erosion surface.

The weathered surface of the limestone is creamy buff in colour and is typically irregular and pockety. The fresh surface is characteristically dark grey or greyish buff in colour. In some places where fossils are absent, there are calcite crystals up to one-eight of an inch in diameter. In much of the rock, however, individual grains are not visible. The rock breaks readily along nearly horizontal planes, into slabs from one to five inches in thickness. The limestone is highly fossiliferous throughout most of the exposed strata, and some layers are composed almost entirely of a great variety of fossils. Middle Ordovician has been suggested as the formation's probable age.

STRUCTURAL GEOLOGY

Because of the scarcity of rock exposures it is impossible to decipher, at all accurately, the structure in the map-area. The gneissosity of the hornblende granite and of the gneissic biotite granite strikes generally from northeasterly to easterly. The strike of the Precambrian sedimentary and volcanic formations is almost everywhere parallel to the banding of the granite, and their bedding planes dip at high angles.

Quite possibly, one or more fold axes trend across the area in a northeasterly direction, but their location would be only a matter of speculation.

The bedding in the sedimentary band that passes through Taylor lake dips consistently toward the southeast at about 60 degrees. North of this band, sedimentary rocks are contained in the granite as small roof pendants or large inclusions and in these the strata dip uniformly to the north. Drag folding in this section indicates that an anticlinal axis exists to the south. Thus, it is possible that the northern sedimentary remnants represent the nearly engulfed northern limb of an anticline, whereas the sedimentary belt passing through Taylor lake forms the southern limb.

Although major shear zones and faults probably occur throughout the area, only a few can actually be observed. That there is a fault or a

zone of weakness along Waswanipi river seems reasonably certain for the following reasons. Except for a sharp elbow in the western part of the map-area, the river follows an almost straight westerly course for more than 30 miles. A zone of highly fractured rock altered to a red colour is found where the river turns sharply southwestward. In the centre of this zone there is a 30-foot gap, bordered by strong easterly striking shears. In the map-area to the west, the presence of a large diabase dyke paralleling the river and of reversed structures on opposite sides of the river is an additional indication of the existence of a fault with marked displacement.

Small shear zones and faults are found frequently, both in the granites and in the sedimentary and volcanic rocks of the area. Those shear zones or faults that have a reasonable degree of prominence are shown on the accompanying map.

ECONOMIC GEOLOGY

Although the summer's work failed to reveal anything of more than usual interest, the presence of ore deposits is not precluded. The finding, during the past few years, of deposits of considerable interest in the Bachelor Lake area, immediately east of the present area, is proof of gold, lead, zinc, and copper occurring in some parts of the general region.

The granites, for the most part, appear to be practically barren, but signs of mineralizing action were seen on some of the exposures of sedimentary and volcanic rocks. Small veins of quartz and carbonate are in places abundant, and considerable hydrothermal alteration along fractures and shear zones was often noted.

Within, and bordering, the shear zone in the sedimentary rock in the southwest corner of the map-area there is intense hydrothermal alteration and a large amount of finely disseminated pyrite. In the sedimentary and volcanic rocks in the southeastern corner of the area, deposits of pyrite were found in many places, but apparently never as abundantly as in the rocks of the southwest corner. Any sedimentary or volcanic rock bordering, or contained in, the batholith of hornblende granite, as in these two cases, should not be neglected by the prospector. This granite shows many signs of having been thoroughly differentiated, and it is quite possible that the resulting residual solutions formed worthwhile mineral deposits in the included and surrounding rocks and possibly even in the granite itself.

Although evidence of mineralization is meagre in the Taylor Lake sedimentary band, the band's position between two granite masses and the presence of minor zones of hydrothermally altered rock containing some disseminated pyrite indicate that this section of the area may warrant further investigation.

It must be pointed out, however, that the scarcity of rock exposures in the map-area is a definite hindrance to prospecting.