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Geology of the SOSCUMICA LAKE AREA Abitibi Territory

Preliminary Report

by

T. Ahmedali and J.H. Remick

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INTRODUCTION

The Soscumica lake map-area, about 3,600 square miles in extent, is bounded by latitudes 50^{o} 00' and 50^{o} 45' and longitudes 77^{o} 00' and 78^{o} 30'. It is covered by topographic maps 32K and 32L (1:250,000) and by aeromagnetic maps 5370-72, 5366-68 and 5362-64 -- all of the Quebec-Ottawa "G" series.

The area was mapped on nine base maps at a scale of 1 inch to 1 mile. The map-area, a one year project, had not been geologically mapped previously, although all the surrounding area has been mapped.

The center of the map-area is approximately 50 miles north of Matagami. Daily non-stop jet service is now available between Montreal and Matagami (Monday-Friday) as well as bus service three times daily.

Access

The Nottaway river provides good access to the central part of the map-area and may be reached from Matagami via Bell river and Matagami lake with only two very short portages. The

Kitchigama river provides access to part of the western area although rapids in the northern part make travel generally difficult. The Matagami-L.G. 2 all-weather road now traverses the eastern part of the area and provides good access to this sector which is in general devoid of lakes and rivers. Soscumica lake can be reached from the Matagami-L. G. 2 road at milage 60 via Muskiki river, a journey of about three hours with four short portages.

Topography

The terrain is quite flat with isolated hills rising up to 300 feet (generally less than 200 feet) above sea level. Much of the southern third of the map-area is covered by varved clay. Rock exposures are generally restricted to isolated hills, the banks of Nottaway river and the shores of larger lakes. Rock exposure is particularly abundant east of Nottaway river and south of the Frotet-Evans volcanic zone and including it.

GENERAL GEOLOGY

The map-area lies within the Superior tectonic province. The bedrock is of Precambrian age consisting mostly of Archean gneisses and granitic rocks. The western termination of the Frotet-Evans volcanic zone crosses the northern part of the map-area. Within the map-area the volcanic zone has a maximum width of four miles and gradually narrows westward pinching out near Nottaway river (for details of the volcanic zone see Preliminary Open File Report DP-194 "Region du Lac Wagama" by Antoine Franconi, December 1973, Dept. Nat. Res., Quebec). Narrow zones of metavolcanics and metasediments as well as zones and discontinuous bands and lenses of amphibolite occur in a few other places.

Diabase and gabbro dykes, generally northeasterly trending and considered to be late Precambrian in age, form the youngest unit of the bedrock.

Varved Pleistocene clays were observed throughout the southern part of the area. They are generally overlain by peat but in places are overlain by till or sand. Glacial striae in the eastern half of the area trend at approximately N. 30° E. Glacial fluting on the surface of the soil in the western half of the area trend south-southeast but do not extend into the eastern half of the area.

Metavolcanics, Metasediments, Mafic and Ultramafic Intrusives

A description of these rock types is given in Preliminary Open File Report DP-194 "Region du Lac Wagama" by Antoine Franconi, December 1973, 28 pages and 1 map, Quebec Department of Natural Resources.

Amphibolite

Amphibolite occurs in prominant areas of outcrop in the western extremity of the Frotet-Evans volcanic zone underlying the northern part of the map-area and in the vicinity of the northern part of Soscumica lake. It occurs as discontinuous bands, screens and lensoid structures in various rock types throughout the area. Wherever amphibolite occurs enclosed within banded gneisses or metasediments its foliation is concordant to the enclosing rock, but it is generally markedly discordant to all other rock types. In texture it varies from fine-grained dark homogeneous rock, through unevenly banded varieties to migmatitic types. Some of the best exposures are in the vicinity of the northern part of Soscumica lake where the amphibolite is interpreted as being of volcanic origin. Garnet was noted in many boulders of amphibolite

along the west shore of Soscumica lake near the large east-west bend but not in outcrops near the north or south shore.

TABLE OF LITHOLOGIC UNITS IN THE SOSCUMICA LAKE AREA

CENOZOIC

Quaternary

Varved clay, till, sand, peat and other unconsolidated sediments

PRECAMBRIAN

Proterozoic

Gabbro and diabase dykes

Archean

Aplite

Pegmatite

Graphic granite

Biotite granite and granodiorite

Syenite, grading to monzonite

Diorite, grading to diorite gneiss

Migmatites: agmatitic, banded to nebulitic

Biotite- (hornblende) plagioclase gneiss

Banded biotite-plagioclase gneiss

Biotite paragneiss

Hornblende paragneiss

Garnet-actinolite-quartz schist

Amphibolite

Mafic and ultramafic intrusives

Metasediments

Metavolcanics

Garnet-Actinolite-Quartz Schist

Garnet-actinolite quartz schist crops out on the north and south shores of the east-side of Soscumica lake as well as in the Frotet-Evans volcanic zone at its southern intersection with the L.G. 2-Matagami road. The exposures on Soscumica lake are probably part of a zone of metasedimentary and metavolcanic rock which continues inland. The rock is dark green to grey, fine to medium grained, with porphyroblasts of garnet and actinolite in groups of grains up to $1\frac{1}{2}$ inches in diameter. The content of biotite increases with intensity of shearing. The mineralogy of the outcrops on Soscumica lake is: pink garnet 5-25%, actinolite 20-30%, biotite 1-8% and fine feldspar 40-65%; quartz veins, a few granitic veins, as well as small lenses of disseminated sulphides were also noted.

Hornblende paragneiss

Hornblende paragneiss occurs as thin, fine-grained mottled bands such as the one near the Hydro camp (Nottaway Village) exposed on both banks of Nottaway river. This particular band varies in width from 1-7 feet and displays tight folds with a near vertical axis. Mineralogically it consists essentially of feldspar and quartz with up to 25% hornblende and accessory biotite.

Biotite Paragneiss

Exposures of biotite paragneiss were noted on the shore and islands in the northern half of Soscumica lake. Rock outcrops are somewhat slabby, show a good dip surface, and are flat to slightly round. Jointing is irregular. Layering ($\frac{1}{4}$ to 2" average) is not pronounced and is due to small changes in the biotite content or grain size.

The rock consists of up to 8% biotite, quartz, feldspar and accessory magnetite. Small amounts of hornblende as well as thin 1 to 4 inch thick layers of amphibolite were noted in a few places. Fresh and weathered surfaces are light grey. Then layers of white microcline porphyroblasts up to 3/4 of an inch as well as lit-par-lit injections of coarse-grained, granite and pegmatite occur in some outcrops. Individual outcrops are fairly uniform but there is a tendancy for a decrease in grain size southward from the northern-most exposure.

The biotite paragneiss together with the amphibolite just north of it may be remnants of a volcanic-sedimentary zone, now roof pendants in a sea of granite and migmatite.

Banded Biotite-Plagioclase Gneiss and Biotite-(Hornblende) Plagioclase Gneiss

Banded biotite-plagioclase gneiss occurs in the vicinity of "Nottaway Village" and north of it. The rock is medium-grained, medium grey in color with lighter quartzo-feldspathic bands generally quite well defined. In a few localities it was noted that these gneisses grade into augen gneisses -- a minor rock unit in the map-area. The average mineralogy of the banded variety as well as that of the non-banded one is estimated as follows: feldspar 60-80% and biotite 10-20%. Hornblende and quartz in varying proportions make up the rest of the rock.

Migmatite

Except for small areas underlain by homegeneous granitic plutons, most granitic outcrops contain at least a few lenses, layers or blocks of older rocks such as gneiss, schist or amphibolite. Some areas of outcrop consist of an intimate, swirly, well digested mixture

of granitic material and inclusions. The exact boundary between migmatite and granite is generally difficult to draw (except in the case of a few homogeneous plutonic granite masses) as variation between migmatite and granite is irregular and "jumpy" rather than progressive. However mapable areas of rock containing more than 30% inclusions are designated as migmatite.

Amphibolite migmatite occurs on the south shore of Montreuil lake and to the south. Here outcrops vary sometimes in a space of less than a hundred feet between pure granite and amphibolite migmatite with over 50% amphibolite blocks.

Diorite to Diorite Gneiss

The main body of diorite occurs around Westcapis lake and Lady Beatrix lake. South of Westcapis lake, the diorite gradually becomes more and more gneissic until at the southern limit of the map-area it may be described as a hornblende-plagioclase gneiss. It is a light grey rock, mottled with dark hornblende when massive, and streaked with it in its extreme gneissic stage. Its essential mineralogy is estimated as follows: hornblende up to 30%, feldspar 65-80% and accessory amounts of biotite and quartz.

Gneissic Syenite to Monzonite

Gneissic syenite to monzonite occur as plutons in the Frotet-Evans volcanic zone; in the extreme north part of the map area; and in the area west of Nottaway river where due to poor outcrop it was not possible to outline them. These rocks are generally porphyritic, weathering to a greyish-buffish color. They consist essentially of feldspar (K-feldspar dominent) and biotite with accessory quartz and hornblende.

Granite and Granodiorite

Massive to gneissic biotite granite and granodiorite along with biotite-plagioclase gneiss form the major rock types in the map-area. Emplacement of the granitic rocks appears to have been initiated during the waning period of tectonism and then continued beyond it resulting in a gradual variation in texture from gneissic to massive, the post-tectonic crystallization product.

A small granodioritic pluton underlies the very north part of Soscumica lake. The rock is very uniform and homogeneous throughout its extent. Shoreline outcrops are in the form of rounded joint blocks. It is medium grained, light grey, well jointed and is almost entirely free from inclusions. The few large roof pendants of amphibolite at its southern contact show very little assimilation. The rock is strongly foliated; biotite is in flat lenticular eyes 1 to 2 inches long and quartz is in elongated granulated lenses. Mineralogically it consists of 15% quartz (often stained pink), 5% biotite in places chloritized, accessory magnetite, in a few outcrops sphene, and both plagioclase and potash feldspar.

Light pink, porphyritic granite with microcline phenocrysts was noted in the very south central part of the map-area.

Graphic Granite

Graphic granite was noted in a few scattered localities west of Nottaway river intrusive into biotite granite. The graphic texture is well preserved and shows no sign of deformation.

Pegmatite and Aplite

Pegmatite veins or masses generally associated specially with aplite are widespread in the map-area. The pegmatite

consists essentially of pink to salmon potash feldspar (sometime perthitic), quartz, biotite generally in accessory amounts and in a few outcrops hornblende. These pegmatites may contain Fe-Ti oxides but sulphides have never been observed in them. This point is made here because another rock type of an entirely different association resembles these granitic pegmatites. This pegmatitic material is the leucocratic mobilizate occurring with migmatitic amphibolites. It stains yellowish-brown due to the presence of sulphides(mostly pyrite) probably derived from the basic parental material.

Gabbro and Diabase Dykes

As is shown on aeromagnetic maps, four regional dykes of gabbro, three northeasterly and one northerly, cut the rocks in the map-area and continue into adjoining map-areas. A number of dykes of gabbro and of diabase, having no magnetic anomaly, trend northeast, and in a few instances north or northwest and are confined to the map-area. They are the youngest rocks in the map-area and are believed to be of late Precambrian age.

The rock is usually massive and quite fresh with texture and mineralogy preserved. The larger dykes of gabbro are up to 100 feet in width; the smaller ones are no more than a few inches to a few feet. Contacts against the country rock are knife sharp and chilled. A well developed set of joints occurs normal to the strike of the dyke and in few dykes a less pronounced set is parallel to its strike. Accessory pyrite occurs in some dykes giving them a tan weathered surface.

Varved Clay, Till, Sand, Peat and Other Unconsolidated Sediments

Large thicknesses of varved Pleistocene clay,

overlain by peat and in a few places by sand or till, cover much of the southern part of the area. The darker varves are from 3/4 to $1\frac{1}{2}$ inches thick and the lighter colored varves are from $\frac{1}{4}$ to 3/8 inches thick. A few very large blocky erratics were noted resting on top of the clay in the western part of the area. The clay within the map-area is believed to have been deposited in a fresh-water lake; marine clay was not observed.

Large pieces of trees were noted in cuts in banks of peat from 10 to 15 feet in thickness along Soscumica and Montreuil lakes.

Glacial striae in the eastern half of the area trend at approximately N. 30^{o} E. Glacial fluting on the surface of the soil in the western half of the area trend south-southeast, but do not extend into the eastern half of the area. These glacial flutings are believed to have been caused by the late re-advancement of a tongue of ice from the James Bay area after the formation of the varved clay.

CORRELATION OF GEOLOGY WITH AEROMAGNETIC DATA

Areas of magnetic highs underlain by gneissic or granitic rock are believed to be caused by disseminated magnetite. Several percent magnetite was noted in an outcrop of granitic rock in the center of a small anomaly on the east shore of Montreuil lake near its north end.

Disseminated magnetite outlines the strike of a zone of metasedimentary rock on the east shore of Soscumica lake near its north end.

The trace of four regional gabbro dykes, three northeasterly and one northerly, are well outlined by disseminated magnetite.

A prominant easterly-trending lenticular anomaly in the center of Du Tast, La Forest and Paramé townships may be coincident with an area of volcanic, sedimentary and basic intrusive rock. The boundary between the Chibougamau-Matagami volcanic zone which outcrops south of the map-area and the granitic and gneissic rocks in the map-area is not known as the above-mentioned area is flat, covered by a large thickness of clay and devoid of rock outcrop.

Mafic intrusives and iron formation outline much of the western end of the Frotet-Evans volcanic zone.

STRUCTURAL GEOLOGY

Foliation

Schistosity and foliation trends in the area are both irregular and variable, except locally in small areas. In general they vary from northerly to northwesterly, although easterly directions were noted. In consequence the dip direction varies from easterly to northeasterly; the amount being in general 15^{o} to 80^{o}.

Jointing

Two sets of steeply-dipping joints are well developed in the area; one set trending NE-SW and the other NW-SE. In the western part of the area shearing was noted in places along the latter set of joints. Horizontal joints are characteristic of some granitic plutons. Epidote and pink siliceous fillings were noted along some joints.

Faulting

Several regional faults were noted on air photos taken from satellite.

The most prominant fault strikes northwesterly (305^{o}) from the very north end of Westcapis lake (just east of the map-area) and continues almost to Nottaway river. A prominant and fairly wide northwesterly-trending magnetic anomaly is coincident with this fault. The terrain north of the fault appears to have been moved eastward in relation to the terrain south of the fault as is evidenced by the shape of the very north end of Westcapis lake which appears to have been pulled slightly to the east.

A possible northeasterly fault appears along the south shore of Southwest Bay of Evans lake continuing westward almost to Nottaway river. While there is no indication on the satellite photo of its continuation northeasterly from Southwest Bay, its northeasterly prolongation into the adjoining map-area to the east intersects the rapids just south of Crow Bay at the outlet of Broadback river where the writer observed a great deal of shearing; a high degree of schistosity; a number of different rock types including small intrusive masses; and small amounts of sulphide mineralization. The very northern part of a gabbroic mass southwest of Crow Bay and south of Evans lake shows a fairly high degree of schistosity near the possible trace of the fault. This is perhaps hypothetical, but it is mentioned here as a possibility.

It is possible that a regional fault may run from the extreme southwest end of Pancheville lake (southeast corner of the map-area) northwesterly, terminating in the big point of land on the east shore of Soscumica lake at the north end of the lake.

ECONOMIC GEOLOGY

Very little prospecting has been carried out in the map-area except for a few geophysical surveys of limited extent and a small amount of drilling in areas of pyrite-bearing gneisses in the western part.

Bodies of granitic rock containing disseminated chalcopyrite appear to be the most favorable hosts for sulphide ore deposits within the map-area.

Disseminated pyrite, pyrrhotite and/or chalcopyrite were noted in a few outcrops of gneiss and schist within the map-area. However, sulphide mineralization in the map-area is not common outside the Frotet-Evans volcanic zone which crosses the northern part of the area (see Preliminary Open File Report DP-194 "Region du Lac Wagama" by Antoine Franconi, December 1973, Dept. Nat. Res., Quebec for details on the mineralization in the volcanic zone).

About 0.2% disseminated chalcopyrite and smaller amounts of pyrrhotite were noted in a large slump-block of foliated granitic rock on the east bank of Kitchigama river (latitude 50^{o} 42' and longitude 70^{o} 21').

Rusty-weathering lenses of cubical pyrite with a few grains of chalcopyrite in a quartz gangue are exposed over a strike length of 200 feet in a rapid on Kitchigama river approximately half-a-mile north of the map-area. The lenses are 1 to 6 inches in width and occur in an outcrop of migmatite at the contact of amphibolite bands and pegmatite. An assay of a selected grab sample from one of the lenses

gave the following results: 0.03% Cu, 0.019% Zn, 0.001 oz/ton Au and 0.032 oz/ton Ag.

Rusty-weathering lenses, usually less than a foot in length, and about 10 inches in width, containing disseminated pyrite, pyrrhotite and minor chalcopyrite occur in an outcrop of garnet-actinolite-quartz schist on the north shore of Soscumica lake. A selected grab sample was assayed with the following results: 0.10% Cu, 0.25% Zn, 0.003 oz/ton Au and 0.006 oz/ton Ag. Smaller amounts of sulphides and magnetite were noted inland to the south in the same rock unit. This rock unit appears to be quite narrow: disseminated magnetite helps to outline it on the aeromagnetic map.

A few cubes of galena and up to 5% pyrite were noted along fractures in an outcrop of metasedimentary rock in the Frotet-Evans volcanic zone about 0.6 miles west of mile 101.7 on the Matagami L.G. 2 road. A grab sample assayed 0.01% Cu, 0.02% Zn, 0.02% Pb, 0.001 oz/ton Au and 0.017 oz/ton Ag.