CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

GEOLOGICAL SERIES

SHEET 32 J (East Half)

LEGEND

PROTEROZOIC

10 — MISTASSINI GROUP
Dolomitic limestone, slaty shale

9 — CHIBOUGAMAU GROUP (9)
Conglomerate, arkose, greywacke

11 — *Gabbro, diabase*

8 — *Granite, aplitic granite, granodiorite, quartz monzonite;* **8a**, *hornblende syenite;* **8b**, *porphyritic syenite;* **8c**, *porphyritic granite;* **8d**, *undivided granite, granite-gneiss, and pegmatite*

7 — *Granite-gneiss*

6 — *Gabbro, olivine gabbro, meta-gabbro;* **6a**, *diorite, hornblendite;* **6b**, *altered dunite and peridotite*

ARCHÆAN

5 — OPEMISCA GROUP (4,5)
Porphyritic andesite, tuff

4 — *Conglomerate, greywacke, arkose, tuff, hornblende schist;* **4a**, *mainly conglomerate*

2 — PRE-OPEMISCA GROUP (1,2)
Greywacke, tuff, black shale, hornblende schist

3 — PRE-BROADBACK
Andesite; **3a**, *flow-breccia, tuff, agglomerate, basalt;* **3b**, *amphibole-plagioclase schist with or without epidote;* **3c**, *greywacke, impure quartzite;* **3d**, *diorite;* **3e**, *amphibolite;* **3f**, *greenstone*

1 — *Andesite, tuff, gabbro*

Bedding (horizontal, inclined, overturned, dip unknown)
Bedding, tops unknown (inclined, vertical)
Bedding, tops indicated by pillow structure (inclined, vertical)
Schistosity (inclined, vertical)
Schistosity, tops indicated by pillow structure (inclined, vertical, overturned)
Gneissosity (inclined, vertical)
Lineation (plunge known, horizontal)
Fault (defined, approximate, assumed)
Fault (inclined)
Glacial striæ (direction known, unknown)
Esker

Geology south of latitude 50°30′ by E.D. Kindle, 1941, and north of latitude 50°30′ by G.C. Riley, 1952
Descriptive notes by G.C. Riley, 1956

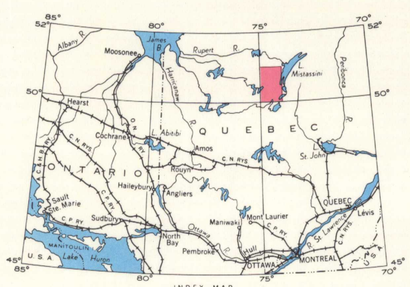
Portage
County boundary
Township boundary (surveyed, unsurveyed)
Intermittent lake and stream
Fall and rapid
Marsh
Height in feet above mean sea-level 1200

Base-map compiled by the Surveys and Mapping Branch, 1940, from air photographs taken by the Royal Canadian Air Force, in July 1937, and from information supplied by the Quebec Department of Lands and Forests

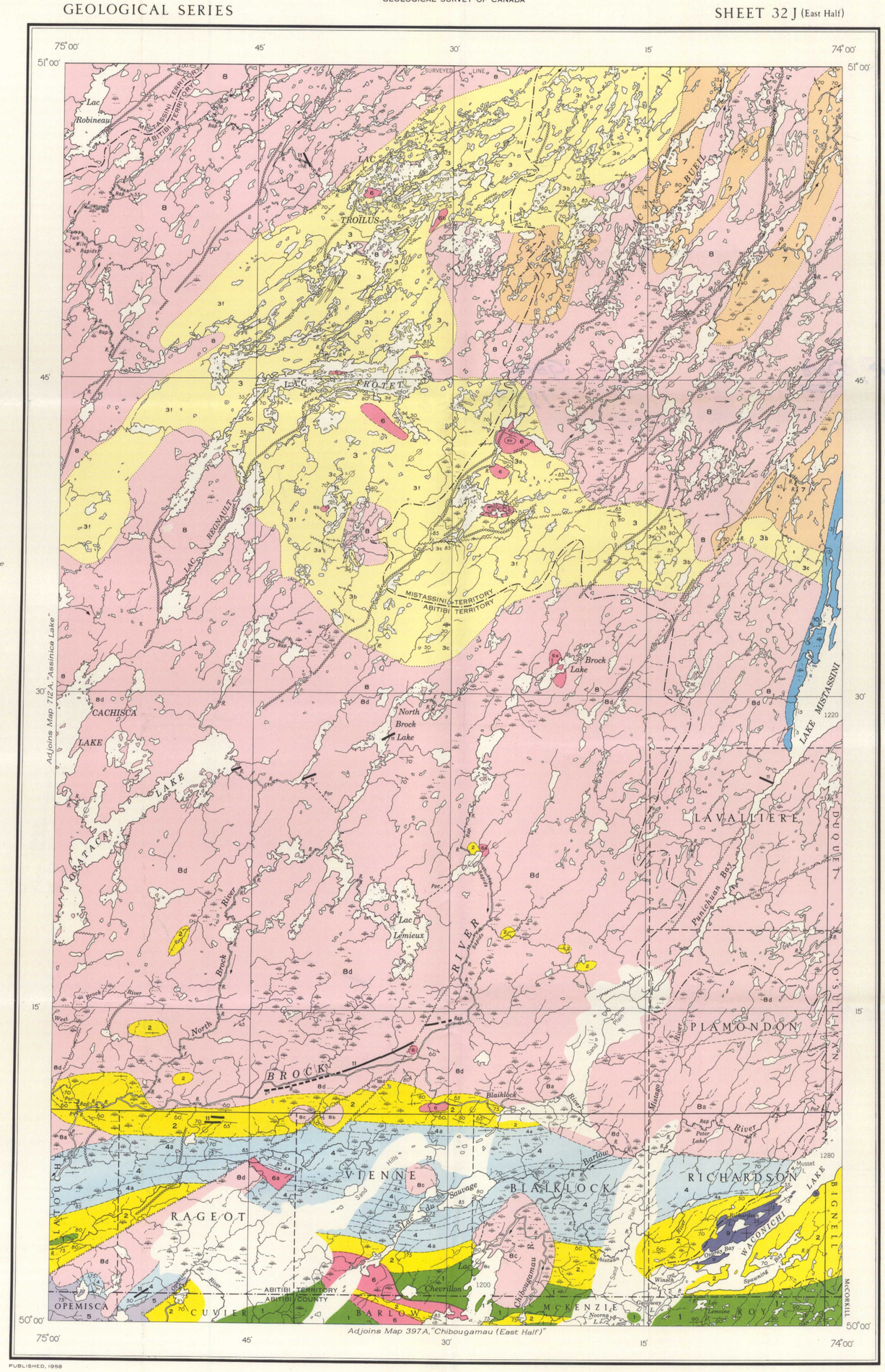
Cartography by the Geological Cartography Unit, 1957

Air photographs covering this map-area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

Approximate magnetic declination, 19°34′ West



INDEX MAP



PUBLISHED, 1958

MAP 1060A

BROCK RIVER

ABITIBI AND MISTASSINI TERRITORIES, AND ABITIBI COUNTY

QUEBEC

Scale: One Inch to Four Miles = $\frac{1}{253{,}440}$

Miles

4 2 0 4 8 12

DESCRIPTIVE NOTES

The area is easily reached by air from Chibougamau, and the southernmost part, by water from Opemisca Lake. The Canadian National Railways Company is constructing a rail line between Roberval and Chibougamau. Good canoe routes, with numerous short portages extend through the map-area.

In the following notes full use has been made of Geological Survey Paper 42-4[1], when referring to the geology of the southern half of the area.

A dominant northeasterly glacial grain has been superimposed on older topography. Single eskers up to 40 feet high are numerous and double ones are common in the northeastern part of the area. Ridges, striking north 40° west, up to 40 feet high, and composed predominantly of sand and gravel are also common in the northeastern section. In the southern half of the area a few morainal ridges from 5 to 15 feet high, strike in a northwesterly direction. These forms, trending at right angles to most of the glacial grooves and eskers, are probably ice marginal features. Sand and gravel ridges, drumlin-shaped hills, scattered dumps of angular boulders and boulder trains, are numerous. An extensive outwash delta is located in the Two Mile Rapids district. The drainage pattern is mainly influenced by glacial drift, and only in part controlled by bedrock.

The pre-Opemisca group of sedimentary and volcanic rocks (1,2) are part of a greenstone belt that extends to the west beyond Opemisca Lake and south to Chibougamau Lake. These rocks commonly strike in an easterly direction and dip steeply. Volcanic rocks (1) are overlain conformably on the north by well-bedded sedimentary rocks (2). Some of the lower members of the sedimentary formation are interbedded with volcanic bands and the contact between the volcanic and sedimentary rocks is arbitrarily placed where the sedimentary rocks constitute 50 per cent of the observed outcrops. A conglomeratic facies of the greywacke contains subangular to rounded pebbles of granite, chert, porphyry, and greenstone, with here and there areas where pebbles are widely scattered through the matrix. Bands of black, rusty weathering slates outcrop here and there and appear to occupy a position slightly below the middle of the pre-Opemisca sedimentary assemblage (2). These sedimentary rocks are close to 7,500 feet thick on the south side of Brock River, 5 miles east of the mouth of the North Brock[1].

An assemblage of volcanic rocks, schists, and sedimentary rocks (3), probably is the eastern extension of pre-Broadback sedimentary and volcanic rocks found in the Assinica Lake map-area[2]. The rocks are characteristically green, aphanitic to fine grained and schistose and are composed predominantly of blue-green amphibole and sodic plagioclase. Most of these rocks contain epidote. On most outcrops the green volcanic rocks are difficult to distinguish from rocks of similar mineralogy but of possible sedimentary or intrusive origin.

The Opemisca conglomerate beds (4a) consist of well-rounded, closely packed boulders and pebbles of granite, gabbro, greywacke and quartz in a greywacke matrix. In a few localities the pebbles are from 1 foot to 3 feet apart. The basal conglomerate together with intercalated greywacke beds has a thickness exceeding 1,500 feet at Lac du Sauvage, and is succeeded by about 2,500 feet of bedded greywacke and arkose[3]. Farther to the north along the shores of the lake other bands of conglomerate are found with intervening beds of greywacke, tuff, and arkose. The Opemisca greywacke and tuff (4) are overlain, apparently conformably, by porphyritic andesite flow rocks (5).

Diorite (6a), green, fine-to medium-grained and equigranular, is difficult to identify, especially when schistose. It has gradational contacts with amphibole-plagioclase-epidote schists (3b), commonly resulting in the formation of hybrid rocks in the contact zone. Chilled contacts with more massive rocks are common. Dark green gabbro (6), ranges from coarse to fine grained, is commonly equigranular, and contains inclusions of andesite, diorite, and amphibolite. It contains 50 to 60 per cent pyroxene, mostly altered to amphibole, and plagioclase altered to zoisite and chlorite. Scattered porphyritic phases show phenocrysts of altered augite distributed from 1 foot to 2 feet apart. Gabbro is closely associated with dark green, medium-grained, equigranular ultrabasic rocks (6b), which are composed predominantly of altered olivine and altered pyroxene. Their most characteristic feature is pronounced magnetism. Contacts with greenstone (3f) and andesite (3) are drift covered and those with gabbro (6) are not clearly defined. Relationships in one outcrop, where olivine gabbro appears to grade into peridotite, suggest that differentiation has taken place. The hornblendite stock (6a) at Brock Lake is cut by small dykes of grey granite and by a pegmatite dyke.

Granite-gneiss (7), predominantly equigranular, and medium-to fine-grained, ranges in composition from aplite to granodiorite. It contains inclusions of greenstone which are partly absorbed. Most of the area between North Brock Lake and the pre-Opemisca sedimentary rocks is underlain by a complex of granite-gneiss and intrusive granite (8d). The gneisses are cut by grey, pink, white, and pegmatitic granites. Southeast off the junction of the North Brock and Brock Rivers, granite-gneiss, in numerous outcrops, grades through hornblende schist to normal greywacke. Four varieties of granite (8) with cross-cutting relationships were distinguished in the field. These represent pre-tectonic and post-tectonic activity within a single period of intrusion. Their composition ranges from aplite to granodiorite. Granites in the northeastern area contain visible amphibole, and in the northwestern part biotite is more common. Hybridization, resulting in a grey-green rock, with amphibole, white and pink feldspars and about 4 per cent quartz is noted at, or near, contacts with the volcanic rocks (3). Inclusions of greenstone (3f) and schist (3b) near the contacts have attitudes parallel to the structural trend of the volcanic rocks (3). Localized areas of migmatites and basic gneisses, as well as small zones of granitized rocks, are scattered through the northeastern granites.

Hornblende syenite (8a) cuts pink granite. Porphyritic syenite (8b) containing pale pink feldspar phenocrysts 0.5 inch wide, becomes progressively finer grained towards the sedimentary contact.

The Chibougamau group (9) at Waconichi Lake is between 1,000 and 1,500 feet thick.[1] It consists of a basal boulder conglomerate containing pebbles of pink and white granite, andesite, rhyolite, and greywacke, averaging from 1 inch to 2 inches in diameter, and a few boulders up to 2 feet. This conglomerate passes upward into, and is interbedded with, arkose and quartzite, which in turn grade into a fine-grained laminated greywacke 200 to 300 feet thick. Here and there pebbles and boulders of chert, quartz and granite are scattered through the greywacke. Basal conglomerate of the relatively unmetamorphosed Chibougamau group (9) rests unconformably upon pre-Opemisca sedimentary rocks (2).

Dolomitic limestone that unconformably overlies the granites, is part of the Mistassini group (10). Dyke-like fingers of the limestone extend into the granite along joints and fractures in the old erosion surface. The basal limestone beds, up to 8 feet thick, are packed with algal-like structures. The beds are either flat lying or dip at very gentle angles.

Diabase dykes (11), fine-to medium-grained and equigranular, cut the granites 3 miles northeast of the mouth of Lake Troïlus and are widely known through the southern part of the area. These dykes are not found in contact with rocks of either the Chibougamau or Mistassini groups.

Greywacke and tuff of the pre-Opemisca group are altered to hornblende and chlorite schists near granitic rocks and locally to quartz-hornblende gneiss. Most of the pre-Broadback rocks and especially those adjacent to granite are altered to amphibole-plagioclase and commonly epidote-bearing schists. Actinolite is a common mineral in these rocks. Olivine in the ultrabasic rocks is completely serpentinized. Sedimentary formations of the Opemisca group, where intruded by, or adjacent to hornblende syenite are altered to hornblende and quartz-hornblende-mica-epidote schists. The grade of metamorphism affecting rocks older than the granite-gneiss appears to be in the albite-epidote-amphibolite facies though it merges retrogressively into the green schist facies.

Metamorphism of the granites, however, is only slight with a few of the pre-tectonic ones showing evidence of granulation and minor development of sodic feldspar.

The pre-Broadback volcanic and sedimentary rocks are tightly folded into anticlines and synclines that plunge gently in a northeasterly direction. The plunge may be seen from the air but is not apparent on the ground. Intrusion of granite has complicated the structural pattern by generally steepening and overturning the strata. Because pillowed volcanic rocks are distorted, top determinations are unreliable.

Northeasterly striking faults are numerous throughout the area. In the northern half of the region faults with left-hand displacement cut pre-Broadback rocks with the development of chlorite and minor amounts of disseminated pyrite along the fault planes. In the southern area the southeast sides of the faults have moved relatively up and to the northeast.[3] The Brock River fault zone[1] probably extends into the northeast part of the area and may explain the apparent dislocation of the volcanic band.

Pyrite mineralization is a common feature of the volcanic rocks and the diorites. Numerous veins of white quartz are scattered through the greenstones, gabbros, and porphyritic syenite. In a few of these veins traces of chalcopyrite and gold are found[1]. Tourmaline is found in a few andesites and at one locality in the southern arm of Lake Troïlus andesite is cut by a vein, 2 feet wide, of vuggy quartz which contains chalcopyrite. Veins of quartz carrying galena and sphalerite outcrop in the limestones on the west shore of Lake Mistassini. At the south end of Lac du Sauvage a shear zone cutting the diorite and gabbro is well mineralized with pyrrhotite[4].

[1]Kindle, E. D.: Brock River Map-area, Abitibi and Mistassini Territories, Quebec; Geol. Surv., Canada, Paper 42-4, 1942.

[2]Shaw, G.: Assinica Lake, Abitibi and Mistassini Territories, Quebec; Map 712A (with descriptive notes); Geol. Surv., Canada, 1942.

[3]Shaw, G.: Waconichi Lake, Abitibi and Mistassini Territories, Quebec; Map 593A (with descriptive notes); Geol. Surv., Canada, 1941.

[4]Sabourin, R. J. E.: Preliminary Report on the Blaiklock Area; Dept. of Mines, Quebec, P.R. No. 323, 1956.