GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

75 C

LEGEND

PRECAMBRIAN

- 5/ — *Diabase dykes*
- 4 — *Granitic and granodioritic gneiss, granite, granodiorite, diorite, syenite, minor paragneiss and amphibolite;* **4a**, *mainly massive biotite granite;* **4b**, *mainly muscovite granite and pegmatite*
- 3 — *Mixed granitic gneiss and paragneiss; mafic granitoid rocks, amphibolite, schist, quartzite*
- 2 — *Feldspar porphyry; includes minor granite*
- 1 — **TAZIN GROUP** *Quartzite, argillaceous quartzite, quartz-chlorite and quartz-biotite schist;* **1a**, *Quartzite and schist, commonly containing feldspar porphyroblasts (probably equivalent to Tazin Group)*

NONACHO GROUP (A,B)

- A — *Conglomerate, minor grit and arkose*
- B — *Quartzite, minor conglomerate, grit, arkose*
- C — *Aphanitic to brecciated rock*

Drift and outwash covered area
Geological boundary (approximate)
Bedding (inclined, vertical)
Schistosity, gneissosity (inclined, vertical, dip unkown)
Fault (assumed)
Glacial striae
Eskers
Radioactive mineral occurrence
Area containing numerous diabase dykes

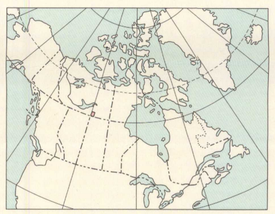
Geology by R. Mulligan, 1954 (west half) and F. C. Taylor, 1954 (east half)

Geological cartography by the Geological Survey of Canada, 1968

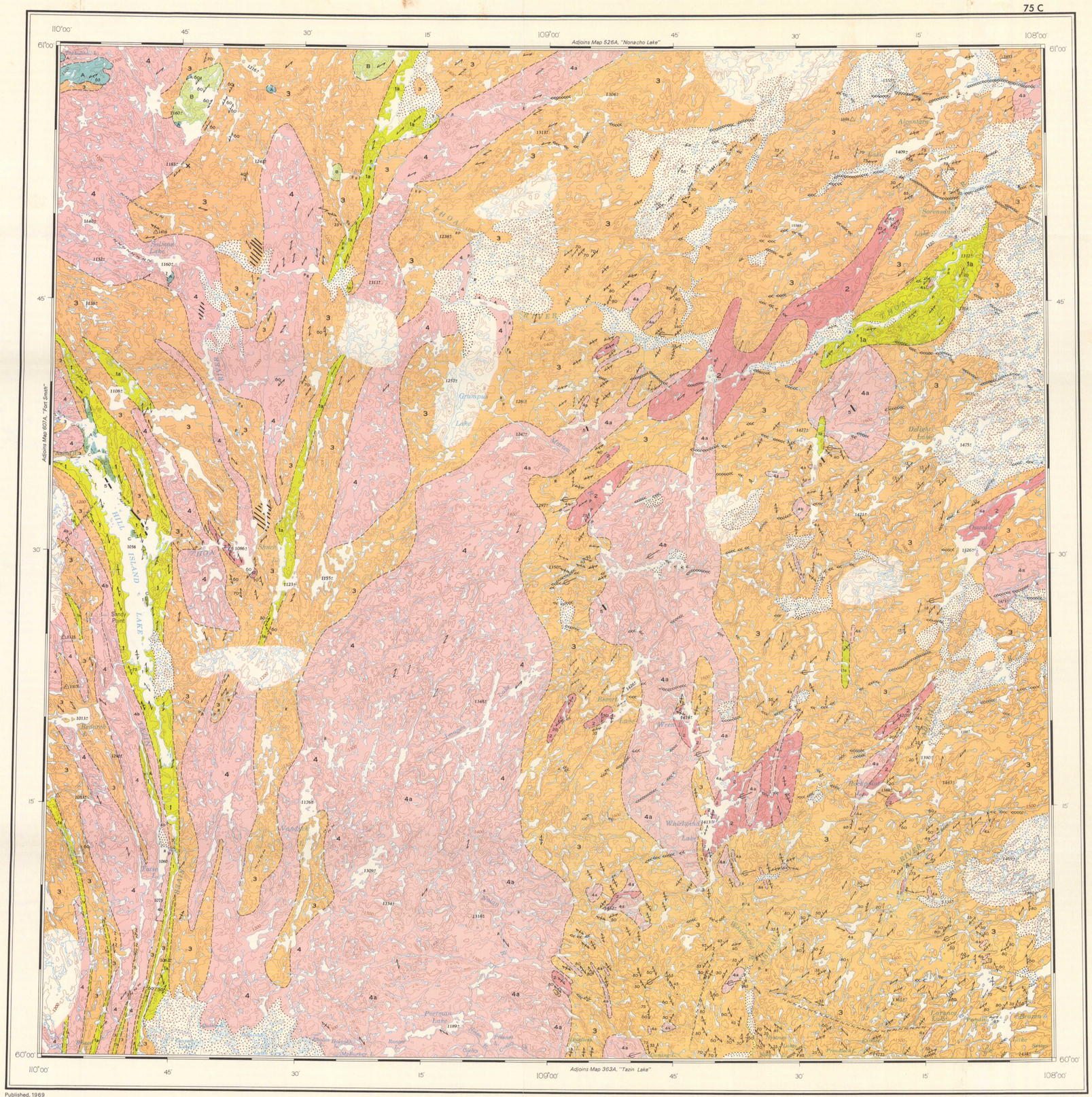
Portage P
Intermittent stream
Rapids, falls R F
Marsh
Contours (interval 100 feet) 1500
Horizontal control point
Height in feet above mean sea-level 1060

Base-map compiled and drawn by the Army Survey Establishment, R.C.E. 1959, 1960 with revisions by the Geological Survey of Canada

Mean magnetic declination, 31° 45′ East decreasing 0.7′ annually. Readings vary from 30° 42′ in the SE corner to 32° 43′ in the NW corner of the map-area



INDEX MAP



Published, 1969
Copies of this map may be obtained from the Geological Survey of Canada, Ottawa

Printed by the Surveys and Mapping Branch

MAP 1203A

GEOLOGY

HILL ISLAND LAKE

DISTRICT OF MACKENZIE

Scale 1:253,440
1 inch to 4 miles

Miles 4 0 4 8 12 Miles
Kilometres 6 0 6 12 18 Kilometres

DESCRIPTIVE NOTES

The map-area is accessible by air from Uranium City, Saskatchewan, or Fort Smith, Northwest Territories. Canoe routes exist from Lake Athabasca via Tazin Lake but require much portaging. Within the area most rivers and streams are navigable although rapids are common.

Rocky hills and ridges, up to 300 feet above lakes and swampy valley flows, characterize most of the surface. However, sand plains, ridges, and drift deposits are common in the north, central, and eastern parts. There, outcrop is scarce and local relief is commonly less than elsewhere.

The map-area has been glaciated by an ice-sheet moving west-southwest. Evidence of glacial action includes striae, ice polish, and friction cracks. Eskers and accompanying outwash deposits, the latter commonly showing sand dunes, are present chiefly in the eastern part. Peat locally forms banks about 8 feet high along some lakes. Forest growth, chiefly black spruce, is sufficient for fuel and small timber.

Quartzites of the Tazin Group (1) are characteristically fine grained and dark grey, varying to bluish or purplish grey, or to black in argillaceous or schistose beds. They are well bedded and commonly finely banded. The schists are generally in thick massive bands, black or dark green. These rocks are cut by quartz veins and in places contain many feldspar crystals and augen, and are intruded by dykes and irregular masses of granite and pegmatite.

Similar metasedimentary rocks, generally more feldspathic, occur in narrow bands through the areas of mixed gneisses, and in a few places (1a) are of sufficient size to map separately.

Feldspar porphyry (2) in the east half of the map-area consists of pink or white feldspar crystals, up to 1 inch long, in a light to dark green chloritic groundmass. The texture ranges from massive to schistose. The contact between the feldspar porphyry and the sedimentary rocks (1) is not exposed and, therefore, their relative ages are not known. The contact between the porphyry and the younger gneisses (3) ranges from gradational to sharp.

A mixed assemblage of granitic and metamorphic rocks (3, 4) underlies most of the map-area. Unit 4, as distinguished in the west half only, includes those areas in which granite and granitoid gneiss are considered to greatly predominate, but the units are gradational into one another and the boundaries are arbitrarily drawn in most places.

The granitic and granodioritic gneisses, with local basic facies, are light to dark grey or reddish rocks consisting of quartz, potash feldspar, plagioclase, biotite, hornblende, and chlorite, in varying proportion. Most are gneissic, with regular or contorted foliation or augen structure marked by streaks and bands of mafic minerals. Locally the mafic minerals predominate in bands and lenses and the rock is classified as biotite gneiss or amphibolite. Magnetite is abundant in some of these gneisses. Where gneissosity is not marked the texture ranges from felsite through granite to pegmatite. The change in texture is imperceptible in most places but in some the granitic facies show crosscutting relationships to the gneisses.

Granite (4a) is a pink to red or grey, medium- to coarse-grained, locally porphyritic, massive rock, consisting of pink potash feldspar, grey plagioclase, and quartz, with minor amounts of biotite and hornblende. Except for texture, it is indistinguishable from much of the gneiss. Contacts between granite and other rock units are gradational and therefore arbitrarily drawn. In some places intrusive relationships occur, but the granite there is in narrow dykes or sills rarely more than 50 feet thick. Locally grey granite is cut by red granite and, therefore, is at least in part older than the red granite. Pegmatite (4b), characterized by crystals of muscovite up to 2 inches across, is most abundant along Tazin River and west of Hill Island Lake.

The relationship of granite to conglomerate (A) and similar rocks in adjacent map-areas suggests that granite of more than one age is present.

Diabase dykes are present only in a few places. Most dykes are too small — rarely more than 25 feet thick — to map individually, and occur in swarms. The diabase is mainly black, some is dark green, and where coarse grained it is difficult to distinguish from mafic gneiss. Diabase of more than one age may be present. Near the outlet of Hill Island Lake, a dyke that cuts granite is penetrated by stringers of quartz emanating from a nearby stockwork.

Conglomerate (A) is of indefinite age relative to the granitic rocks and diabase. In the northwest corner of the map-area it is continuous with conglomerate mapped as "Nonacho Series" in the adjoining Fort Smith map-area[1], and that on Hill Island Lake is lithologically similar. The typical conglomerate is composed of fairly well rounded fragments of pebble to boulder size, chiefly of granite and granitic gneiss with lesser amounts of quartz, quartzite, schist, and greenish aphanitic rocks, in an indistinct greenish matrix. Such conglomerate, in the interior of mapped bodies, appears to be only slightly deformed, and shows no sign of intrusion by granite. Near exposed contacts, however, fragment boundaries are irregular in shape and ill-defined, and no recognizable sharp boundary between conglomerate and bordering granite and gneiss was observed. Locally the outlines of irregular, commonly distorted fragments are recognizable in the bordering granite close to the contact area, and in a few places granitic stringers appear to be intrusive into the conglomerate. On Hill Island Lake the transition is marked chiefly by a cherty, silicification (?) zone (unit C). On the whole it appears that the bordering granite intrudes rather than underlies the conglomerate, but this granite is lithologically indistinguishable from that composing the granitic pebbles. Near the southern margin of the northern body the conglomerate passes into a zone in which only deformed granitic fragments are recognizable in a greenish, rather schistose interstitial mass. Thus, the contact relationships are indefinite, and they may be further complicated by faults. In the adjoining Fort Smith[1] and Nonacho[2] map-areas, similar conglomerate was considered to be intruded in some places and underlain in others by lithologically indistinguishable granites.

Quartzite (B) is also, in part at least, probably contemporaneous with the Nonacho Group. The western body is white sericitic quartzite, with minor gritty, arkosic, and conglomeratic facies. The small body on Thoa River is white, sugary, rather coarse-grained quartzite, with conspicuous cream-coloured cement. The quartzite of the easternmost body is mainly dark and fine grained, and may be equivalent in age to the nearby Tazin-type band (2). The gneisses of the large area that lies between these bodies may be derived in part from similar quartzites.

Grey to pink or green, cherty-looking rock with locally fragmental or brecciated appearance occurs in a restricted belt along Hill Island Lake where it grades into Tazin rocks, granitic gneiss, and conglomerate. The rock may be a mylonite (see below).

The divergent trends in the Tazin-type rocks and derived gneisses suggest relict plunging-fold structures, but these rocks have been intensely deformed and dip mostly at high angles. Numerous topographic lineaments, marking water or drift-floored valleys, suggest faults, and some fault locations were confirmed by exposures of crushed and sheared rocks at the base of linear escarpments. Other faults are marked in places by quartz veins or stockworks. Crushed or mylonitized zones are fairly common. One belt of streaked cherty to brecciated-looking rock (unit C) that outcrops intermittently for 15 miles along Hill Island Lake borders areas of contorted rocks and prominent quartz veins. It appears to be a mylonite zone, but seems to envelop a mass of practically undeformed conglomerate (unit A).

No mineral deposits of economic importance are known in the map-area. In a few places rocks of Tazin type contain pockets of pyrite. A sample of yellow secondary mineral collected from a trench about 50 feet long near latitude 60°53′N, longitude 109°44′30″W contains a small amount of pitchblende. This locality is close to a radioactive showing called the Key Group[3]. Graphite is disseminated through sheared granitic rock in a zone near latitude 60°15′N, longitude 110°00′W. Quartz in veins and irregular masses, 2½ miles south of Thoa River in the central part of the area, is not mineralized. Narrow pegmatite dykes are common, but none are known to contain any economic minerals.

[1]Wilson, J. T.: Fort Smith, District of Mackenzie; Geol. Surv. Can., Map 607A (1941).
[2]Henderson, J. F.: Nonacho Lake, District of Mackenzie; Geol. Surv. Can., Map 526A (1939).
[3]Lang, A. H.: Canadian deposits of uranium and thorium; Geol. Surv. Can., Econ. Geol. Ser. No. 16 (1952).

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