CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

SHEET 75 $\frac{E}{5}$ (West Half)

LEGEND

PROTEROZOIC

- **10** — *Quartz veins;* **10a**, *'giant quartz veins'*
- **9** — *Diabase, gabbro;* **9a**, *porphyritic varieties*
- **8** — *Muscovite granite and associated pegmatite bodies*
- **7** — *Biotite granite, massive or porphyritic; granite gneiss. Grades into and probably chiefly derived from 1–3*
- **6** — *Light to dark grey, medium- to coarse-grained granodiorite*
- **5a–5c** — *Dykes, sills, and stock-like bodies of meta-diorite and meta-gabbro;* **5a**, *meta-gabbro, commonly massive;* **5b**, *slightly foliated meta-diorite;* **5c**, *meta-diorite with segregations of green, acicular hornblende*

ARCHÆAN

- **4** — *Mylonite; porphyroblasts of feldspar common*
- **2** — *Amphibolite and amphibole gneiss*
- **1** — *Greywacke, argillite, shale, quartzite*
- **3 3A** — *Biotite, oligoclase gneiss, quartz-mica schist, andelusite schist; minor argillaceous greywacke and hornblendic and arkosic quartzite; mainly derived from 1 and 2;* **3A**, *sillimanite, garnet gneiss with much granitic and pegmatitic material*

Bedding (inclined, vertical)
Gneissosity (inclined, vertical, dip unknown)
Foliation (inclined, vertical, dip unknown)
Lineation (plunge known)
Fault, shear zone
Anticlinal axis
Synclinal axis
Glacial striae
Shaft

INDEX TO MINING PROPERTIES

1. M.W.K. No. 6 claim, No. 1 vein
2. M.W.K. No. 8 claim, No. 2 vein
3. M.W.K. No. 3, 4 claims (gossan)
4. M.C.O. No. 17 claim
5. Best group
6. B.S.M. No. 11 claim, No. 1 vein
7. B.S.M. No. 8 claim, No. 2 vein
8. B.J. No. 13 (Rex No. 5) claim

Geology by A. B. Irwin and B. D. Prusti, 1952; B. D. Prusti, 1953

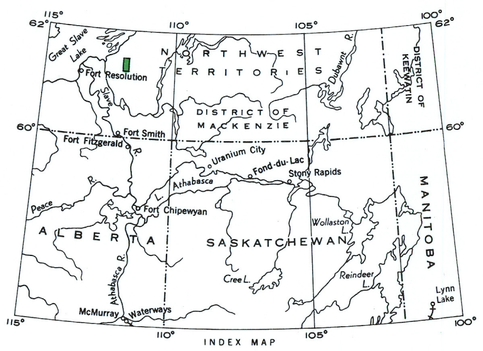
Intermittent stream
Marsh
Sand or gravel

Approximate magnetic declination, 30° 51′ East

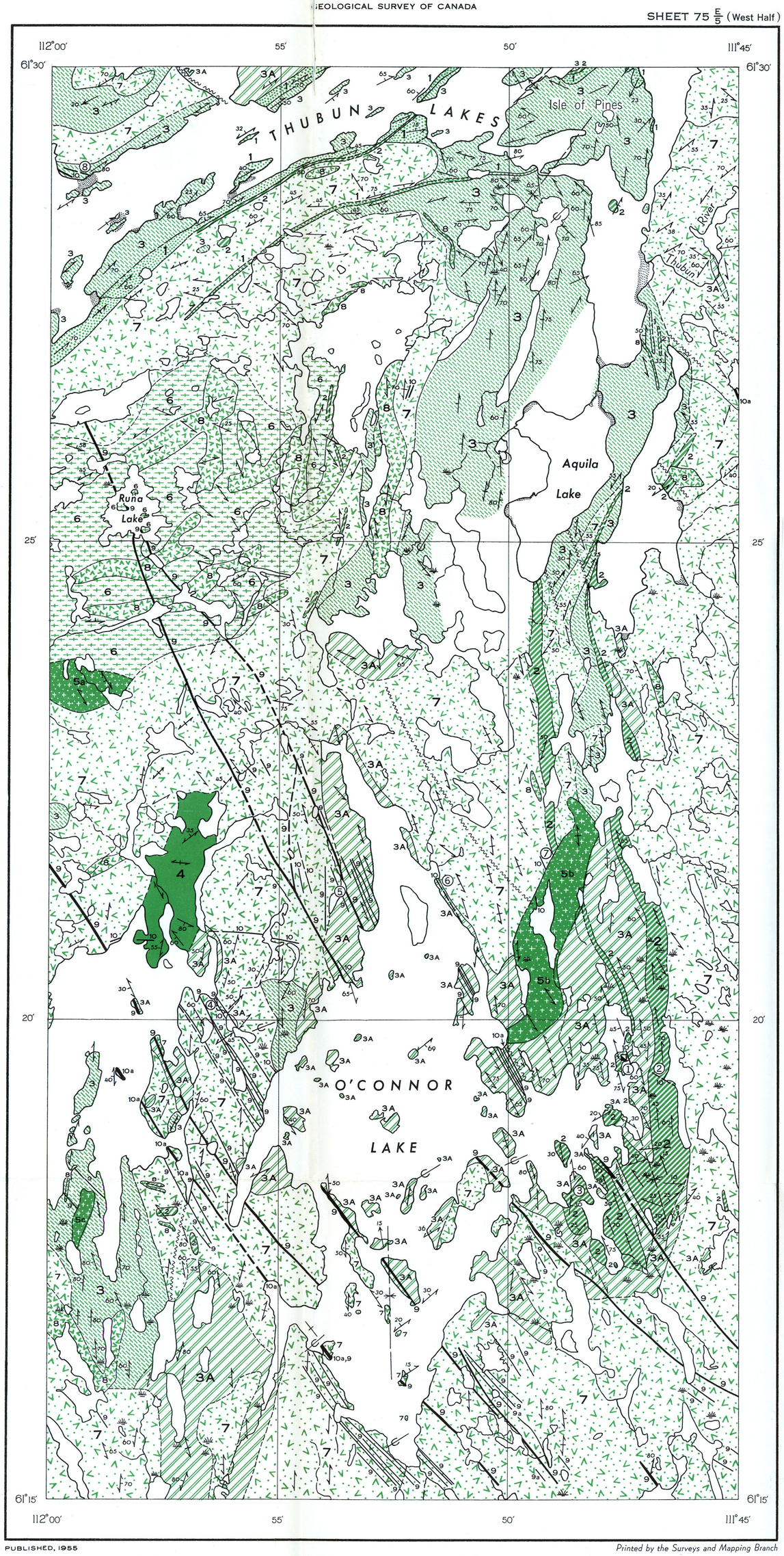
Cartography by the Geological Cartography Unit, 1955

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

Geographical names subject to revision



INDEX MAP



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PRELIMINARY MAP 55-9

O'CONNOR LAKE

(WEST HALF)

DISTRICT OF MACKENZIE

NORTHWEST TERRITORIES

Scale: One Inch to One Mile = $\frac{1}{63,360}$

Miles 1 ½ 0 1 2 3

DESCRIPTIVE NOTES

The area represents an old peneplain with an even skyline when viewed from the air. Relief is low. The highest hills rise to about 200 feet above the level of the larger lakes, but most of the prominent hills average less than 100 feet in height. The area slopes gently from the Runa Lake granodiorite mass in the centre towards the larger lake basins in the south and north. About 30 per cent of the total area is water covered, and more than half of the land surface consists of bedrock outcrop.

Continental glaciation has eroded the lake basins in the softer rock formations. Striæ and grooves show that the glaciers moved in a direction varying from south 30 degrees west to south 70 degrees west, this direction corresponding to the direction of the rock foliation. Glacial deposits are represented mainly by erratic boulders on the slopes and in the valleys.

All the consolidated rocks (1-10) of the O'Connor Lake area are of Precambrian age. The oldest rocks (1-3) consist of strongly metamorphosed paragneisses and schists (3) with minor amounts of less altered sedimentary rocks (1) consisting of greywacke, argillite, shale, and quartzite. These sedimentary rocks are possibly Archæan in age and may be equivalent to the Wilson Island phase of the Point Lake-Wilson Island group exposed on the south shore of Great Slave Lake.

Biotite-rich gneisses and schists (3) form a wide, arcuate band from South Thubun Lake around through Aquila Lake to O'Connor Lake. Veins and segregations of quartz are abundant in the quartz-mica schist, especially on the islands of South Thubun Lake, either as conformable veins or filling fractures. Bands and porphyroblasts of potash feldspar are conspicuous in some of the argillaceous greywacke. In thin sections the quartzites are seen to be composed of quartz, oligoclase, orthoclase, biotite, muscovite, staurolite, cordierite, and chlorite. Garnet and tourmaline are locally present in the gneisses.

Much of this unit was found to consist of garnet gneiss (3A), commonly with sillimanite, particularly around O'Connor Lake. It contains appreciable amounts of granitic material in the form of lenticular bodies of pegmatite or as ***lit-par-lit*** injections, thus grading into migmatite and granite-gneiss. Study of thin section shows microcline to predominate over oligoclase. Perthitic and myrmekitic textures are plentiful and graphite flakes are common in some bands.

Amphibolite and amphibole gneiss (2) occur as thin persistent bands interbedded with the paragneisses. They contain mainly hornblende and plagioclase (andesine), with biotite, quartz, and sulphides as accessories. Diopside, graphite, and almandine are found in certain bands. These rocks are probably of sedimentary origin.

The mylonite (4) is a dark porphyritic to gneissic rock having the appearance of a breccia. Large oval grains of feldspar, mostly oligoclase and microperthite, are embedded in a dark chloritic matrix. Elongated to fibrous quartz is present in the fine-grained groundmass. Features indicating mylonitization and albitization are common. Evidence of mylonitization and silicification is also found in other rocks, especially in the quartzite.

Dykes, sills, and stock-like bodies of dioritic and gabbroic rocks (5) are exposed in the area. Meta-diorite, composed of plagioclase with some hornblende and biotite, outcrops as a lenticular body east of O'Connor Lake. Meta-gabbro occurs as a small body south of Runa Lake. These intrusions are slightly gneissic and vary from light to dark grey. They are cut by dykes of granite-pegmatite.

Granitic rocks (6-8) are widespread on uplands bordering the main lakes and underlie large areas to the east and south of the map-area. The granodiorite (6) is an irregular body rich in xenoliths of amphibolitic rocks. In some places it appears to be intrusive although its origin is still uncertain. It is composed essentially of plagioclase, hornblende, orthoclase, quartz, and biotite with apatite, pyrite, pyrrhotite, and magnetite as accessories. Orbicular structures showing concentric arrangement of dark and felsic layers were observed near the southeast shore of Runa Lake.

Biotite-granite and associated granite-gneiss (7) occupies most of the area. These rocks are grey to pink, of medium to coarse grain, and may show gneissic to porphyritic textures. They vary in composition from a granite to a granodiorite. They are composed of quartz, oligoclase, and biotite, with minor microcline and orthoclase. Accessory minerals are sphene, apatite, pyrite, and zircon. Garnet and sillimanite occur near the contact with garnetiferous paragneisses. The granite-gneiss grades into the paragneiss (3) and all gradations between the sedimentary rocks and true granite, including migmatite, banded gneiss, and augen-gneiss, were observed. The one is believed to have been derived by the granitization of the other.

Muscovite-granite (8) outcrops as small, irregularly shaped bodies and appears to cut both the sedimentary rocks and the biotite granite. It is a grey to pink rock with a typical granitoid texture, and is composed of quartz, microcline, orthoclase, muscovite, and biotite. Pegmatites associated with this granite commonly carry coarse muscovite and tourmaline.

Diabase dykes (9) are prominent in the southern part of the area and intrude all other rocks. They have a persistent northwesterly trend and vary from 5 to 100 feet in width. They are commonly dark on weathered surfaces except a porphyritic variety that weathers brick-red.

Quartz veins (10) are numerous in the area and penetrate all types of rocks, including granite and diabase. Most of them are between 2 and 5 feet in width and commonly trend north 50 degrees west although a few have a northeasterly trend. The larger quartz veins (10a) called 'giant quartz veins' have a maximum width of 100 feet and consist of a stock-work of ramifying veinlets of quartz and pink feldspar. They commonly enclose brecciated country rocks. These large quartz veins are generally barren and occur either within or close to diabase dykes. The smaller quartz veins are commonly mineralized.

The major structural trend of the rocks varies from due north in the south to northeast in the north. The major structure is a southwest-plunging syncline whose axis passes through the Isle of Pines in South Thubun Lake. The west limb of the fold has been overturned to the northwest. The east limb has been further folded giving rise to subsidiary folds on the east shore of O'Connor Lake. The granitic rocks are well jointed in northwest and northeast directions.

Fissure-type quartz veins containing significant amounts of lead and zinc and some copper occur in several localities. The most important of these is the No. 1 vein on the M.W.K. No. 6 claim, on the southeast shore of O'Connor Lake. The property was explored by X-ray diamond drilling and open-cut mining by the O'Connor Lake Lead Syndicate in 1948-49 and by standard sized diamond drilling, geological mapping, and underground development through a shaft by American Yellowknife Mines Limited in 1951-52. No further work has been reported.

Other quartz veins containing sulphides of zinc, lead, and copper have been explored by trenching and, in a few places, by drilling. However, their economic importance is still uncertain.

Certain conclusions may be drawn from the location of known mineral occurrences:

(1) They are mainly confined to the biotite-gneiss and schist, amphibolite, and amphibole gneiss. Of these the amphibole-bearing rock is host to the largest and richest lead-zinc deposit known in the area.

(2) The mineral occurrences lie in, or close to, the broad zone of dykes and 'giant quartz veins'.

PRELIMINARY MAP 55-9
O'CONNOR LAKE
NORTHWEST TERRITORIES
SHEET 75 $\frac{E}{5}$ (West Half)

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