CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

SHEET 85 P

LEGEND

PROTEROZOIC

8 — *Diabase, diorite, gabbro*

7 — *Muscovite granite, pegmatitic muscovite granite*

5, 6 — *5. Granitic rocks and minor gneiss;* **5a**, *granite, granodiorite, and allied rocks;* **5b**, *porphyritic granodiorite;* **5c**, *granodiorite, with minor inclusions*
6. Orthogneiss, paragneiss, injection gneiss, granitic gneiss; granite, granodiorite, and other intrusive rocks; inclusions of quartz-mica and amphibole schists and gneisses; **6a**, *gneissic granite;* **6b**, *granite, with inclusions of quartz-mica schist;* **6c**, *granite, with inclusions of amphibolite*

4 — *Altered diabase, gabbro, and diorite; amphibolite*

ARCHÆAN

YELLOWKNIFE GROUP (1-3)

2, 3 — *2. Greywacke, slate, argillite, impure arkose, quartzite*
3. Nodular quartz-mica schist and hornfels derived from, and grading into, 2; quartz-mica schist, hornblende gneiss, and injection gneiss mainly derived from 2; **3a**, *quartz-mica schist;* **3b**, *injection gneiss; includes some 6a;* **3c**, *hornblende gneiss*

1 — *Volcanic rocks;* **1a**, *mafic lavas; minor pyroclastic beds; minor felsic lavas, chlorite schist, and amphibolite;* **1b**, *volcanic rocks intruded by granitic rocks (5)*

A — *Massive and gneissic granite and granodiorite; hornblende gneiss, amphibolite, meta-gabbro. Relations to 6 uncertain*

Bedding (inclined, vertical)
Bedding (direction of dip known, upper side of bed unknown)
Bedding (upper side of bed faces as indicated, direction of dip unknown)
Schistosity, gneissosity (inclined, vertical, dip unknown)
Fault (assumed)
Synclinal axis (position approximate)
Glacial striæ

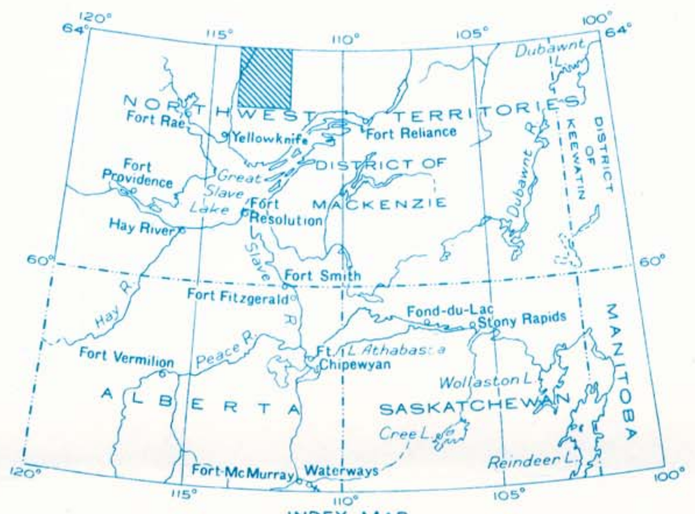
Building
Portage
Survey monument
Stream (position approximate)
Fall and rapid
Marsh
Sand or gravel
Esker
Approximate height in feet above mean sea-level 1000'

Geology by M. L. Miller, 1948; F. Q. Barnes, 1949; J. C. G. Moore, 1950; and from Map 644A, "Gordon Lake", by J. F. Henderson (1941)

Descriptive notes by J. C. G. Moore

Base-map compiled by the Topographical Survey, 1941

Approximate magnetic declination, 37° East



INDEX MAP

PUBLISHED, 1951

DESCRIPTIVE NOTES

Elevations in the map-area range from 1,000 to 1,500 feet above sea-level. Local relief in places exceeds 200 feet, but commonly varies between 50 and 100 feet. Increases in elevation are generally most pronounced in areas underlain by volcanic rocks, but may also occur in areas underlain by schists and gneisses (6). The area is well wooded with the exception of a small part to the northeast, which lies in the barren lands. A line from the northern end of Squalus Lake to the southern end of Lockhart Lake forms the approximate boundary. North of this line, with the exception of rare isolated stands of spruce, the growth is of the tundra type, and includes patches of ground birch, stunted spruce, alders, and willow.

Glacial drift covers at least 75 per cent of the area, and in the barren lands more nearly 90 per cent. Glaciation has produced the usual grooving, rounding, and polishing of the bedrock; most glacial striæ trend west-southwesterly, but a few indicate a westerly movement. Drumlinoid forms, which vary in length from a few hundred feet to more than a mile, parallel the glacial striæ in many places. Eskers reach heights of 75 feet, and roughly parallel the regional glacial striæ except where guided locally by pre-glacial drainage. Areas of huge boulders, up to 15 feet, are commonly found on granite ridges, and produce a rougher terrain than in areas underlain by other rock types.

The volcanic and sedimentary rocks of the area have been mapped with the Yellowknife group, as represented in adjoining map-areas, and are the oldest known rocks in the region. The volcanic rocks (1) are dark green to black, rarely light green to grey. Although only the massive, mafic flows are mappable units, pillowed flows, minor felsic flows, and fragmental beds are present. The mafic volcanic rocks may have been originally dacitic, andesitic, and basaltic flows, but are now predominantly plagioclase amphibolites, the plagioclase varying in amount from 10 to 35 per cent, and in composition from An_{50} to An_{20}. The more albitic variety is common near the exposed granite contact. In places a garnetiferous amphibolite occurs near the granite contact. In the northern part of the map-area, the contact of the volcanic rocks with the granodiorite and gneisses to the west is more easily delimited than to the east, where granitization has produced a wide heterogeneous rock complex (A).

Sedimentary rocks of the Yellowknife group comprise relatively unaltered greywackes and other sedimentary rocks (2) and their more altered equivalents, nodular quartz-mica schists and hornfels (3), into which they grade. Non-nodular quartz-mica schists (3a), and injection gneisses (3b), are also probably altered equivalents of the same rocks. In the less altered beds, a grain gradation may be observed from a massive quartzose base into an argillitic or slaty top, which comprises only a small fraction of the total thickness of the bed. Thicknesses of the beds vary from an inch up to several feet, and include minor arkosic and quartzitic sequences. As the relatively unaltered strata grade into the more altered phases, glistening flakes of blank mica are developed in the argillitic tops of beds, and eventually nodular fine-grained aggregates of quartz and mica appear. It is at this point that the boundary of the nodular sedimentary strata (3) has been drawn. With increasing metamorphism, the more argillitic beds become markedly schistose, but bedding is preserved except in highly altered areas adjacent to granitic masses. The coarser and more siliceous beds are commonly metamorphosed to sugary-textured hornfels. Metacrysts of garnet and andalusite are common, and staurolite is rare. Chiastolite is exceptionally abundant in the schists about a mile south of Thistlethwaite Lake. Cordierite *(var. dichroite)* was found in gneisses east of Nardin Lake and west of the bend of McCrea River northwest of Ames Lake. The northern half of the area lacks nodular schists, but quartz-mica schists (3a) and injection gneisses (3b) are believed to represent the metamorphosed equivalents of the less altered rocks (2). Garnet and sillimanite occur in places. Contacts of sedimentary with volcanic rocks are commonly sharp, and many are marked by abrupt slopes, with the sedimentary material at lower elevations. Top determinations indicate that the sedimentary strata overlie the volcanic rocks, apparently conformably. Steep dips are everywhere characteristic of the sedimentary strata, and the band extending north from Gordon Lake area and east of Nicholson River is a series of closely spaced isoclinal folds. Elsewhere such tight folds are not conspicuous.

In the southwest corner of the map-area, to the west of McCrea River, several narrow, elongate bodies of altered diorite and gabbro (4) appear in the sedimentary rocks of the Yellowknife group, and are mostly conformable with them. They weather dark green to brown to rusty reddish brown, and commonly exhibit a diabasic texture. They are cut by numerous quartz and feldspar veinlets, some of which carry considerable sulphide minerals, and may antedate the intrusions of the main granite bodies.

The granitic bodies (5, 6) comprise a large variety of felsic rocks of variable composition and texture. Those mapped as granite, granodiorite, etc. (5a), include minor syenite, quartz diorite, and diorite. Biotite and hornblende are the most common varietal minerals. Saussuritization of the plagioclase feldspar and chloritization of the biotite are fairly common. These rocks weather light grey to pink, but some border phases of dioritic composition weather greenish grey. They intrude all rocks of the Yellowknife group. Small areas of garnetiferous granodiorite are commonly associated with quartz-mica schist iuclusions. In many places granitic bodies appear to grade into areas of gneissic rocks (6), which in most places in the southern half of the map-area separate granitic areas from areas underlain by rocks of the Yellowknife group. These gneissic bands may be several miles wide. Foliation of the gneisses closely parallels the bedding in the rocks of the Yellowknife group, and contacts as exposed are conformable. It would appear that many of these areas of gneisses represent granitized Yellowknife formations. In addition, the relation of the quartz-mica schists (3a) to the injection gneiss (3b) and gneissic granite suggests strongly that the latter is a result of the granitization of the quartz-mica schists. In the southern part of the area, granites rich in inclusions of amphibole schists (6c) and gneisses and quartz-mica schists (6b) and paragneiss have been mapped with the gneisses (6). A large area of porphyritic granodiorite (5b) is exposed in the northwest part of the map-area. Pink to cream-coloured phenocrysts are commonly about 1 inch long, but may reach 3 inches. Some of the phenocrysts are microcline and many are Carlsbad twins; in places they lie parallel with each other. The groundmass is pink to grey, and varies in grain size from 2 to 5 mm. It is composed largely of plagioclase feldspar with minor microcline and as much as 10 per cent biotite, which is commonly partly chloritized.

Near Hart and Muir Lakes, the quartz-mica schists and related paragneisses are cut by muscovite granite, locally pegmatitic (7). This appears to be a single body, possibly a sill, intruded near the contact of altered sedimentary beds with the granitic rocks. Pegmatite dykes containing quartz, feldspar, muscovite, and occasionally andalusite and garnet are numerous in places.

The youngest rocks of the map-area are fresh-looking mafic dykes (8) of dioritic to gabbroic composition. They weather greenish grey to reddish brown, and commonly exhibit an ophitic texture. There appears to be three main sets of these dykes, trending north-northeast, north-northwest, and east-northeast respectively, but their age relations are not known.

Faults and shear zones in the area commonly occupy linear, drift-filled depressions. Other prominent lineaments visible on the topographic map, and especially on air photographs of the area, may represent loci of fault lines. Fault or shear zones are common in the granite in the southern half of the area, and are characterized by a reddish alteration of the granite, extending, in some instances, for several hundred feet on either side. Rocks within these zones are much sheared, and carry abundant specular hematite.

Mineralization is in evidence throughout the area, both in quartz veins and in shear zones in rocks of the Yellowknife group. Rusty weathering shear zones are particularly prominent in the volcanic rocks, and are mineralized with pyrite, pyrrhotite, chalcopyrite, and arsenopyrite. In sedimentary rocks, the sulphide minerals appear to be confined largely to grey and bluish grey quartz veins, which, in places, contain scattered pyrite and arsenopyrite. Such quartz veins are common in sedimentary rocks north of Gordon Lake and east of Nicholson River, and in those south of Thistlethwaite Lake. In general, the volcanic rocks are more commonly mineralized than the sedimentary rocks; sulphide minerals are also common in some of the altered diorite and gabbro bodies in the southwest corner of the map-area.

Past prospecting activity is evident everywhere in the southern half of the map-area, except in the granite areas. In the northern half of the area, prospecting has been confined to rusty shear zones in the volcanic rocks within half a mile of its western contact. The most conspicuous zone begins at the northerly tip of McCrea Lake, where traces of lead, zinc, and copper were revealed in assays of samples. Some trenching and diamond drilling have been done on properties just east of Nicholson River near Red Lake, and in an area just west of Mac Lake, as well as southwest of the Discovery Yellowknife property. Discovery Yellowknife, which produces gold, is the only mine in the area, and is described by L. P. Tremblay.[1]

Within the Gordon Lake area (latitude 63° to 63° 15', longitude 113° to 113° 30'), "many quartz veins occur in the sedimentary and volcanic rocks. In the sedimentary rocks they have been observed along the axial parts of isoclinal folds; along drag-folded and contorted slate beds between more massive strata; and following bedding planes. Several of the veins have been found to contain gold, but as yet none of commercial size and grade has been developed. The gold-bearing veins are sparsely mineralized with one or more of several sulphides, including pyrite, pyrrhotite, arsenopyrite, chalcopyrite, sphalerite, and galena".[2]

[1] Tremblay, L. P.: Northeast Part of Giauque Lake Map-area, Northwest Territories; Geol. Surv., Canada, Paper 50-18, (pp. 21-27, 1950).

[2] Henderson, J. F.: Gordon Lake, Northwest Territories; Geol. Surv., Canada, Map 644A (1941).

PRELIMINARY MAP 51-8

CARP LAKES
DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

Scale: One Inch to Four Miles = 1/253,440

Miles
4 2 0 4 8 12