GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 74M AND PART OF 74L

LEGEND

CENOZOIC

PLEISTOCENE AND RECENT

13 — Glacial drift, fluviatile sand, gravel, and silt; straight line sand ridges; outcrops scarce

PALAEOZOIC

DEVONIAN AND EARLIER

12 — Limestone, dolomite, evaporites, sandstone, granite wash

PROTEROZOIC OR LATER

11 — ATHABASCA FORMATION: sandstone; relationships to 10 not known

10 — Fine-grained to aphanitic basic dykes; feldspar amphibolite

PRECAMBRIAN

9 — Undivided granitic plutonic rocks and minor felsic and mafic gneisses containing scattered layers of metasediments: Undivided 1 and 4-8

8 — Undivided granitic plutonic rocks; biotite granite, granodiorite; relationships to 6 and 7 not known

7 — 7a, fine- to medium-grained, equigranular, in part garnetiferous, pink and grey granite; 7b, syenite; 7c, medium-grained, equigranular, in part garnetiferous, grey granite; 7d, complex of 7 and 6

6 — 6a, mainly porphyritic, here and there lineated, coarse- to medium-grained pink granite; 6b, porphyritic, mainly foliated, medium- to fine-grained pink granite; 6c, porphyroblastic and porphyritic, strongly foliated, medium-grained pink granite, in part gneiss; 6d, porphyroblastic feldspar-quartz-biotite granite, in part intensely foliated, in places gneiss and migmatite, containing scattered bands of garnetiferous quartzite (cut by 7)

5 — 5a, granite-gneiss, gneiss containing feldspar, quartz, biotite, and amphibole in various combinations; 5b, gneiss containing amphibole, feldspar, and biotite in various combinations; 5c, undivided granitic and minor quartzite gneiss

4 — 4a, rock containing porphyroblastic feldspar in various combinations of biotite, chlorite, feldspar and quartz, fine to coarse grained, in part massive, in part gneiss, in part schistose, commonly granitic; 4b, porphyroblastic feldspar-feldspar-quartz-biotite-chlorite rock, here and there foliated or migmatic, containing scattered lenses of impure quartzite and schist; 4c, porphyroblastic feldspar gneiss, in part intensely foliated, containing feldspar, biotite, chlorite, and quartz in various combinations; 4d, complex of 4, granite-gneiss, and metasediments

3 — Granite gneiss with significant amounts of sediments; metasedimentary schist and gneiss, quartzose gneiss; minor pink granite; scattered bands of mylonite

2 — Undivided sediments, metasedimentary schist and gneiss, granitic and mafic gneiss; red and pink granite; mylonite bands up to 1,000 feet wide

1 — 1a, black and grey impure quartzite; greywacke; arkose, shale, chert; bands of mylonite; relatively unmetamorphosed; 1b, quartzite gneiss with or without garnet, chlorite and biotite schists; meta-quartzite, argillite, slate

Rock outcrop . . . . ×
Geological boundary (defined, approximate or assumed) . . . .
Bedding (tops known; inclined) . . . .
Bedding (tops not known; inclined) . . . .
Schistosity (inclined). . . . .
Gneissosity (inclined, vertical, dip unknown). . . . . . .
Lineation (plunge known, unknown) 15
Anticline (direction of plunge known). . . . .
Syncline . . . .
Fault (defined, approximate or assumed) . . . . . .
Glacial striae (direction of movement known, unknown) . . . .
Approximate Western limit of Precambrian Rocks . .

Geology by G.C. Riley, 1959

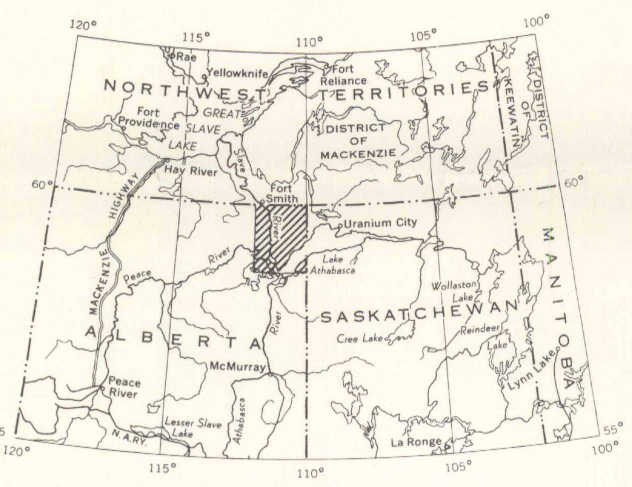
Road . . . .
Trail or portage . . . .
Cart track . . . .
Cabin . . . .
Post Office . . . . P
Interprovincial boundary . . . .
Park boundary . . . .
Intermittent stream . . . .
Falls and rapids. . . . . F. R.
Marsh . . . .
Sand and gravel . . . .
Height in feet above mean sea-level 695

Cartography by the Geological Survey of Canada, 1960

Approximate magnetic declination, 27° 34' East

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

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured



DESCRIPTIVE NOTES

Access to the map-area is by aircraft from Uranium City or Fort Smith, or by canoe from Fort Fitzgerald, up the Dog River and into the Leland Lakes district. No other good canoe routes exist and most streams are exceedingly shallow and boulder or swamp filled. The topography is monotonously flat with few hilly parts. Local relief does not exceed 200 feet. Drainage is relatively haphazard and swamps and marsh-filled lakes are numerous. Many longitudinal sand ridges are present south and west of Cornwall Lake. Morainal ridges are common. Raised beaches extend inland for several miles from Lake Athabasca; the highest is about 150 feet above the present lake-level.

Complete granitization and some refusion of sedimentary strata, perhaps including some tuffaceous material, probably resulted in the formation of pink granite (6a). Stages in its progressive evolution are expressed by the development of the porphyroblastic rocks (4) and gneisses (5).

Sediments (1a) are relatively undeformed and unmetamorphosed. Lithologically they resemble parts of sedimentary sequences mapped as Tazin near Tazin Lake, N.W.T., and Harper Lake, Sask., and in parts of the Fort Smith map-area immediately to the north. Conglomerate is reported by Godfrey[1] east of Andrew Lake. Scattered areas of metamorphosed sediments (1b) retain sufficient primary sedimentary characteristics to enable their comparison with equivalent unmetamorphosed sediments. Unit 2, along Charles Lake, consists of at least three continuous bands of sedimentary and metasedimentary rocks separated by areas of gneisses and granitic rocks. The sedimentary bands range in width from a few thousand to less than 100 feet. The sediments are similar to those of units 1 and 3. Mineralogical and textural differences in metamorphic grade are apparent both across and along the strikes of the strata. In the Potts Lake area, metasedimentary rocks (2) are more metamorphosed and less easily defined as individual components. However, some components can be traced along strike for several hundred yards. Outcrops of sediments and metasediments are scattered through the area mapped as unit 3 but cannot be mapped separately on this scale. That they retain some of their sedimentary characteristics in a granitic environment is due probably to incomplete granitization. It is also related to their chemical composition and structural position.

The porphyroblastic rocks (4a) in the vicinity of Colin Lake exhibit a complete gradation from a fine-grained, in part schistose, chlorite-rich rock to a coarse-grained porphyroblastic or porphyritic granite. South of Turtle Lake a porphyroblastic rock (4b) containing a core of metasediments grades to the west into a porphyroblastic granitic rock (6d) of almost identical mineral composition, and to the east into a well-foliated, finer-grained porphyroblastic rock (4a). Unit 4a, a few miles to the northeast, grades into, or is intimately associated with, metasediments (1b) and granite-gneiss (5).

Mineral assemblages in areas mapped as gneisses (5) range from those relatively stable in the greenschist facies, to an assemblage in granite-gneiss north of St. Agnes Lake, of quartz, plagioclase, cordierite, biotite, sillimanite, and garnet which is characteristic of certain rocks in the high part of the amphibolite facies.

Granites (6) underlying the central part of the map-area apparently reflect different levels of emplacement. Granitic rocks (6c) west of Turtle Lake, which exhibit inherited fold structures, are at a higher level in the crust than those farther to the north (6a), which possess a greater degree of linear structure and also some intrusive characteristics. The composition of the granites comprising map-unit 6 are markedly similar. These granites are synkinematic. Probably late-kinematic or post-kinematic younger granite (7) cuts the porphyritic and porphyroblastic variety (6) in many places. The younger granites exhibit few deformational characteristics except where locally sheared although scattered linear elements may reflect closing stages of deformation. They are relatively uniform in composition, comprising quartz, potash feldspar, minor plagioclase, less than 1% ferromagnesian minerals, and commonly pink garnet. These granites probably represent a higher level of emplacement and a later stage of development of the granite (6a) west of Mercredi Lake. Granitic rocks (8) emplaced in the porphyroblastic rocks (4) have obscure contact relationships. Just west of Wylie Lake a mafic gneiss shows both sharp and gradational contacts with granodiorite.

The general map-unit is necessary because of the scale of mapping and, in places, because of the lack of specific information and scarcity of outcrop.

Purple sandstone (11) with quartzite-pebble layers overlie metasediments unconformably in the area of Fidler Point (1). These sandstones are presumably part of the Athabasca formation. Palaeozoic strata (12) along the Slave River have been described by Norris[2].

The structure of the map-area is complex although northeasterly and northerly trends are general. Isoclinal folding is common in the metasediments and many of the gneisses have been intensely deformed with much evidence of plastic flow. A northerly plunging synclinal structure with numerous flexures is apparent in the granitic rocks underlying the central and north-central parts of the map-area. This structure is bounded by northerly and northeasterly striking major fault systems, which occupy respectively the Charles Lake and Leland Lakes basins. To the east of Charles Lake the region appears to have been one of broad, northerly striking folds. This pattern has been modified by complicated structures including recumbent isoclinal folds, in such a way that locally, as south of Andrew Lake and in the vicinity of Colin Lake, easterly striking structures are common. The different structures in the map-area may result from flexures along the limbs of the major folds, but it is more probable that they are indicative of more than one period of deformation.

Northerly, northeasterly and northwesterly striking faults and fault systems cut most of the rock types. Intense shearing along many of the faults has led to the development of augen and metacrystic gneiss and mylonite. West of Andrew Lake and in the Charles Lake basin, numerous bands of mylonite are apparently unconnected with any visible fault. The Allan fault near Alexander Lake is characterized by intense shearing which is shown by elongation of minerals in parts of the porphyroblastic rock (4c). Strike-slip or oblique-slip movement has taken place along much of its length. However, the preservation of some relatively undeformed sediments along Charles Lake perhaps is indicative of some downfaulting. A similar fault system is exposed along Leland Lakes. A west-northwesterly striking fault follows the course of the eastern extension of La Butte Creek. It is possibly related to the faults occupying the Leland Lakes and Charles Lake basins. Other faults of similar strike are exposed along the shores of Ryan Lake.

It is possible that hinge movements between the Allan Lake and Leland Lakes fault systems, which border the central granitic area (6), might have resulted in some type of differential uplift, thus explaining what appears to be a section along the plunge of the proposed syncline in the granitic rocks.

Exploration has gone on in the map-area in recent years. Technical Mining Consultants Limited reported on a property near Fidler Point in 1953[3]. Some drilling was done. Scattered sulphides occur in the core, which at some footages, is slightly radioactive. At Spider Lake[4] southwest of Andrew Lake, moderately strong radioactive material was obtained from pegmatitic rock in metasediments (1b). This showing was trenched in 1958 and counts of more than twice background were measured here and there in the metasediments (1b and 3). Little activity was noticed in the map-area during the 1959 field season.

[1] J.D. Godfrey: Res. Council Alta.; personal communication 1959.
[2] A.W. Norris: Devonian Stratigraphy of Northeastern Alberta and North Saskatchewan; Geol. Surv.; Canada, Bull. in press.
[3] A.B. Ferguson: Western Miner and Oil Rev.; vol. 26, p. 41, Dec. 1953.
[4] J.D. Godfrey: Mineralization in the Andrew, Waugh, and Johnson Lakes area, Northeastern Alberta; Res. Council Alta, Geol. Div.; Prel. Rept. 58-4.

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MAP 12-1960

GEOLOGY

FORT FITZGERALD

WEST OF FOURTH MERIDIAN

ALBERTA

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

Miles 4 2 0 4 8 12

MAP 12-1960
FORT FITZGERALD
ALBERTA
SHEET 74M AND PART OF 74L