GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

75 M/2

LEGEND

PRECAMBRIAN

- 9 — Diabase
- 8 — Grey granite
- 7 — Migmatite
- 6 — Porphyritic and/or porphyroblastic granodiorite
- YELLOWKNIFE GROUP (1-5)
- 5 — 5a, graded beds of greywacke, subgreywacke, shale, slate, argillite, phyllite; 5b, hornfels, knotted schist, quartz-mica schist
- 3, 4 — 3. Rhyolite flows, dykes and sills; 4. Cherty crystalline limestone
- 2 — Meta-gabbro sills
- 1 — Andesite, pillowed andesite; minor tuff and agglomerate; la, crystalline limestone

Drift-covered area

Geological boundary (defined, approximate, gradational)

Limit of geological mapping

Bedding, tops known (inclined, vertical, overturned)

Bedding, tops unknown (inclined, vertical, dip unknown)

Schistosity, cleavage (inclined, vertical, dip unknown)

Foliation (inclined, vertical)

Lineation (inclined, inclined but plunge unknown)

Fault (approximate)

Geology by W. W. Heywood, 1962

Cartography by the Geological Survey of Canada, 1963

Intermittent stream

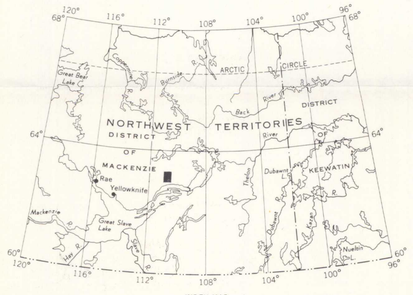
Marsh

Contours (interval 50 feet) 250

Height in feet above mean sea-level 1412

Base-map by the Surveys and Mapping Branch, 1957

Approximate magnetic declination, 30°28' East decreasing 6.8' annually



INDEX MAP

Geographical names subject to revision

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MAP 32-1963

GEOLOGY

BENJAMIN LAKE

DISTRICT OF MACKENZIE

Scale: One Inch to One Mile = 1/63,360

Miles

1 1/2 0 1 2 3

DESCRIPTIVE NOTES

The northern half of the Benjamin Lake map-area has an average elevation of 1,300 feet above sea-level and a maximum relief of about 300 feet. The map-area is near the northern limit of trees, and ranges from barrenlands in the north to thick bush in the south. Topographically high areas are underlain by the more resistant granitic and basic volcanic rocks whereas the metasediments generally occupy the lower ground. Outcrops are reasonably abundant and well distributed except for the slate, phyllite, and crystalline limestone which outcrop poorly in many areas.

The sedimentary and volcanic rocks (1-5) are probably part of the Yellowknife Group although the formations have not been traced continuously from the type area. Dark green to black weathering metamorphosed volcanic rocks (1), probably originally of andesitic composition, are the oldest rocks in the area. They form a moderately high ridge east of, and parallel with Indian Mountain Lake. Massive to pillowed rocks form the bulk of this unit, but highly deformed layers may represent pyroclastic rocks. Amygdules are common in the pillowed flows and are rare or absent in the massive flows. Ropy flow tops are locally preserved. Narrow discontinuous lenses of black crystalline limestone (la) are interlayered with the volcanic rocks.

Meta-gabbro sills (2) intrude the andesite near the southwestern corner of the map-area. They are similar to the andesite in composition, and, as both rocks are metamorphosed to the same degree, they are probably of similar ages.

Overlying, and apparently conformable with the andesite is a sequence of aphanitic to porphyritic light grey to white weathering rhyolites (3). Quartz and feldspar phenocrysts are common in some of the flow rocks, and are abundant in many of the dykes and sills. Flow banding is commonly well preserved although it is modified by shearing in many places. Pillows are poorly preserved and flow tops rarely determinable. Most of these rocks are probably extrusive but many narrow dykes and sills intrude both the rhyolite and andesite assemblages. Included in this formation are thin layers of metavolcanic rocks probably derived from dacite or latite.

A discontinuous series of small outcrops of grey weathering cherty crystalline limestone (4) occurs between the rhyolite and the greywacke (5a). They are most abundant along the eastern rhyolite contact north of Brislane Lake. None was observed along the southwestern contact but the occurrence of crystalline limestone in the float suggests that it may be present. Fragments of chert, as much as 12 inches long and 1 inch thick form up to 30% of the rock.

Well bedded to massive clastic rocks (5) overlying the crystalline limestone and the volcanic rocks constitute a monotonous succession throughout the central part of the map-area. The lower part of this formation consists of thin to thick bedded slate and argillite interlayered with and grading into greywacke and subgreywacke. The upper part consists almost entirely of greywacke and subgreywacke, but contains some thick bedded argillite. These layers, as much as 100 feet thick, can be traced for only a few hundred feet. Thin beds of grey to cream colored impure quartzite are of local occurrence. Crossbedding, graded bedding, and channel scour are well preserved in some outcrops but metamorphism and deformation have destroyed or masked these features in many places. The finer details of primary structures are accentuated by weathering but are commonly hidden by lichen and moss.

Buff to grey weathering granodiorite (6) occurs along the eastern and western boundaries of the area. It is a medium-grained rock, rarely fine or coarse grained, and contains few to abundant phenocrysts or porphyroblasts of subhedral to anhedral microcline as much as 1/2 inch long. Biotite is the predominant mafic mineral, muscovite and hornblende are rarely present. Most of the rock is massive, but in places near the contact with the Yellowknife Group rocks it has a well developed foliation parallel with the contact. This foliation is best exposed on the east side of the Waldron River immediately south of the area mapped.

Migmatitic rocks (7) are well developed on the west side of Indian Mountain Lake and northeast of Benjamin Lake. Those in the latter area grade in a northeasterly direction into porphyritic granodiorite similar to unit 6.

Several small stocks of grey weathering muscovite-biotite granite (8) have intruded the Yellowknife Group rocks. These are massive, medium- to fine-grained equigranular rocks. This granite is probably younger than the porphyritic granodiorite (6) but nowhere were the contacts observed. In most areas the two granitic rocks appear to be separated by a narrow band of metasedimentary rock.

Northwest trending diabase dykes (9) ranging from 2 inches to 350 feet wide are the youngest rocks recognized in the area.

The Yellowknife Group rocks have been slightly to strongly metamorphosed. The basic volcanic rocks are now fine-grained, massive to schistose amphibolite and the acid volcanic rocks are in part quartz-sericite schists. East of the volcanic rocks the greywackes are recrystallized and shales are altered to slate and phyllite (5a), and, farther east, to knotted schists (5b) containing biotite, muscovite, quartz, and feldspar with porphyroblasts of cordierite, andalusite, and locally chiastolite. Garnets are small and of local occurrence. The andalusite and cordierite porphyroblasts are partly to completely altered in a narrow zone around the grey granite (8). Recrystallization and deformation have not destroyed primary structures in all areas, as they are commonly well preserved even where bedding and schistosity intersect at a high angle.

The volcanic rocks lie in a series of isoclinal folds in which bedding generally dips between 70° and 90° although in many places the beds are overturned. The sedimentary rocks have similar steep dips but the folds appear to be more closely spaced. Lineations resulting from mineral alignment, minor folds, intersection of planes, and slippage on bedding planes are commonly clearly displayed. The attitudes and distribution of the lineation suggests two periods of deformation; the first resulting in the tight isoclinal northerly trending folds of the Yellowknife Group rocks, and the second accompanied by more gentle flexures possibly related to the intrusion of the younger granite. Bedding faults can be traced for a few tens to a few hundreds of feet. Northeast trending transverse faults are shown where bedding is apparently offset along linear valleys.

Drumlinoid ridges and striated rock surfaces indicate a southwesterly movement of ice. Erratics, averaging about 1 foot in diameter, occur throughout the area but are most common in, and to the lee of, areas underlain by the more resistant granitic and metavolcanic rocks. Eskers are for the most part small and discontinuous.

No mineral deposits of economic interest were discovered. Rusty zones containing desseminated pyrite and some pyrrhotite occur in the basic volcanic rocks and in the more highly sheared acid volcanic rocks. No mineralization was noted in the cherty crystalline limestone, but outcrops are few and widely spaced. Narrow barren quartz veins are common throughout the area, and several tourmaline-bearing pegmatite dykes and sills outcrop between Benjamin Lake and the northeast corner of the area.

MAP 32-1963
BENJAMIN LAKE
DISTRICT OF MACKENZIE
75 M/2