GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 94 L

## LEGEND

**CENOZOIC**

QUATERNARY
PLEISTOCENE AND RECENT
15 Fluviatile gravel, sand, and silt; glacial outwash; till and alpine moraine

TERTIARY (?)
14 Glassy, pisolitic, brecciated rhyolite

PALEOCENE AND (?) LATER
13 Conglomerate, sandstone, siltstone, shale; coal

**MESOZOIC**

CRETACEOUS
12 12a, mainly biotite quartz monzonite and granodiorite; 12b, gneissic hornblende diorite

JURASSIC (?)
11 Chert-pebble conglomerate, greywacke, sandstone, argillite, vesicular lava, agglomerate; may be in part Triassic

TRIASSIC (?)
10 Massive greenstone; 10a, bleached and pyritized volcanic rocks; may include some sedimentary rocks

**PALAEOZOIC**

MISSISSIPPIAN
LOWER AND MIDDLE MISSISSIPPIAN
9 Limestone, chert-nodule limestone, chert; siltstone and black argillite at base

DEVONIAN AND MISSISSIPPIAN
UPPER DEVONIAN AND LOWER MISSISSIPPIAN
8 8a, argillite, siliceous argillite, chert; 8b, siltstone, sandstone, chert-pebble conglomerate; age tentative; 8c, agglomerate, vesicular greenstone, tuff; age tentative; 8d, greenstone, limestone, hornfels; may be younger

SILURIAN
MIDDLE SILURIAN
7 Dolomite, chert-nodule dolomite, sandstone, quartzite; may locally include 6 and minor Devonian dolomite

CAMBRIAN AND ORDOVICIAN
MIDDLE (?) AND UPPER CAMBRIAN AND ORDOVICIAN
6 6a, limestone, phyllitic limestone, calcareous phyllite, phyllite, argillite, sandy limestone, sandstone, limestone-cobble conglomerate intruded by greenstone sills and dykes; mainly Lower Ordovician and earlier; 6b, graptolitic and pyritic shale, slate, and siltstone, calcareous shale, argillaceous limestone; mainly post-Cambrian; chert, pebble conglomerate; may include some 8b; 6c, limestone; may be in part older or younger than 6

CAMBRIAN
LOWER CAMBRIAN
5 5a, limestone, in part oolitic, dolomite; minor slate and shale; 5b, oolitic and sandy dolomite, limestone; 5c, limestone, oolitic and sandy dolomite and limestone, limestone conglomerate, chert-nodule limestone, sandstone, siltstone, shale; may be in part equivalent to 4; limestone conglomerate may be Middle (?) Cambrian; 5d, may be Precambrian

4 Quartzite, pebble conglomerate, siltstone, slate, shale

**PRECAMBRIAN AND PALAEOZOIC**

PRECAMBRIAN AND CAMBRIAN
PRECAMBRIAN AND LOWER AND MIDDLE CAMBRIAN
3 Sandstone, siltstone, slate, shale, calcareous sandstone, red and green slate and shale, limestone-cobble and boulder conglomerate, quartz-pebble conglomerate; minor dolomite and black, pyritic shale in highest beds

PROTEROZOIC AND LOWER PALAEOZOIC (?)
2 2a, quartz-mica gneiss, quartzite, crystalline limestone, hornfels, skarn, feldspar-quartz gneiss; Cambro-Ordovician (?) and earlier; 2b, calcareous phyllite, phyllite, micaceous quartzite, schist, granitic gneiss, crystalline limestone, limestone, greenstone, pegmatite, hornfels; may be Cambro-Ordovician and earlier

**PRECAMBRIAN**

1 Limestone, buff and grey shale, sandstone, phyllite, sandy limestone and dolomite, chlorite and muscovite schist, slate, argillite, micaceous crystalline limestone, pebble conglomerate, red and green slate and shale; locally includes small sills and dykes of greenstone; may include some Cambrian rocks

Geological boundary (defined, approximate and assumed)
Bedding (inclined, vertical, overturned)
Schistosity and gneissosity (inclined, vertical)
Fault (defined, approximate, assumed)
Fault (inclined, arrows indicate relative movement)
Fault, thrust (teeth on upthrust side)
Anticline (defined, approximate)
Syncline (defined, approximate)
Anticline, syncline (overturned)
Glacial striae, drift ridge or rock groove (showing direction of ice-movement)
Fossil locality
Mineral prospect or occurrence

Mineral Symbols

| | | | |
|---|---|---|---|
| Copper | Cu | Lead | Pb |
| Fluorite | fl | Silver | Ag |
| | | Zinc | Zn |

Geology by H. Gabrielse, 1957, 1958, 1959, 1960, 1961

Mean magnetic declination, 30° 42' East, decreasing 3.8' annually. Readings vary from 30° 03'E in the SW corner to 31° 11'E in the NE corner of the map area


PUBLISHED, 1962
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA


INDEX MAP

MAP 42-1962

GEOLOGY

# KECHIKA

BRITISH COLUMBIA

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

4 2 0 4 8 12 Miles

LEGEND

Trail
Building
District boundary
Horizontal control point
Intermittent stream
Glacier
Marsh
Contours (interval 500 feet)
Height in feet above mean sea-level

Base-map by the Army Survey Establishment, R. C. E.
Department of National Defence, 1949-52

PRINTED BY THE SURVEYS AND MAPPING BRANCH

## DESCRIPTIVE NOTES

Long pack-train routes lead to the map-area from the Alaska Highway, McDame Post, Dease Lake, and Fort Ware. Good horse-trails are abundant except southwest of the Dall Lake - Ludwig Creek valley. Kechika River, Gataga River up to the rapids about 2½ miles below Through Creek, and Frog River up to Jackstone Creek, are all navigable. Boats brought upstream from mile 539.3, Alaska Highway, however, must pass hazardous stretches on Liard River and lower Kechika River.

The Rocky Mountain Trench separates the Cassiar Mountains to the southwest from the Rocky Mountains to the northeast. The divide between Pacific and Arctic drainage winds irregularly through the southwestern part of the map-area.

Well-bedded Precambrian strata (1), probably more than 4,000 feet thick, outcrop in two southeasterly trending belts between the Rocky Mountain Trench and the Dall Lake - Ludwig Creek valley. Unmetamorphosed carbonate and clastic rocks predominate in exposures along Frog River, whereas crenulated, chloritic and micaceous carbonate and clastic rocks are conspicuous near Moodie Lakes.

A metamorphic terrain (2b) lying between the Dall Lake - Ludwig Creek valley and the Cassiar batholith (12), includes three units of lithologically contrasting rocks. Southwesterly from a point about 10 miles south of the upper end of Dall Lake, a band of granitic gneiss as much as 2 miles wide flanks the eastern contact of the Cassiar batholith. The granitic gneiss is bordered to the northeast by a belt of gneissic feldspathic quartzite, quartzite, schist, and crystalline limestone that, north and south of Rainbow River, attains a maximum width of about 8 miles. These rocks grade easterly, and presumably upward in section, into calcareous phyllites, phyllitic limestones, and limestones forming a belt as much as 6 miles wide along Jackstone Creek.

A distinctive conglomerate from 15 to 50 feet thick, containing angular to subrounded cobbles and boulders of Lower Cambrian limestone, and an overlying sandstone-and-shale assemblage as much as 1,000 feet thick, form the uppermost units of a thick sequence of well-bedded clastic sedimentary rocks (3) that underlies an extensive area in the Rocky Mountains. More than 3,500 feet of strata are exposed beneath the conglomerate. At least one prominent red and green slate member, about 150 feet thick, may be stratigraphically equivalent, in part, to similar rocks in map-unit 1.

Lower Cambrian strata comprise a lower quartzite unit (4) as much as 2,000 feet thick and an upper, fossiliferous carbonate unit (5) at least 750 feet thick. These rocks are apparently conformable with underlying Precambrian rocks and the boundary has been drawn arbitrarily at the top of a red and green slate and shale sequence.

Thin-bedded, incompetent strata of Cambrian and Ordovician age (6), more than 5,000 feet thick, are widespread. Limestone conglomerate, sandy limestone and calcareous sandstone comprise the basal beds south of Gundahoo Pass. Strata relatively high in this sequence have yielded an early Ordovician fauna. Near Netson Lake the lower, predominantly calcareous rocks (6a) are overlain by a predominantly dark weathering clastic sequence (6b) that locally contains Ordovician graptolites.

Near Turnagain River, Middle Silurian rocks (7), more than 1,500 feet thick, disconformably overlie Cambrian and Ordovician strata (6a).

Devonian and Mississippian rocks (8a) unconformably overlie Silurian rocks northwest of Turnagain River, and strata of possibly the same age (8b) unconformably overlie Ordovician beds in the southeastern part of the map-area. Volcanic rocks (8c) of possible Devonian and/or Mississippian age outcrop on Gataga Mountain where they unconformably overlie Ordovician graptolitic shales and Cambrian carbonates. The age of the belt of rocks (8d) that trends easterly through the Cassiar batholith (12) south of Tucho Lake and Lamarque Pass is uncertain. The rocks may be younger than Devono-Mississippian and could be as young as Triassic.

Northwest of Moodie Creek, fossiliferous carbonate rocks of Mississippian age (9) occur as tight infolds in the underlying strata (6a).

In the southwesternmost part of the map-area, two small areas are underlain by Mesozoic volcanic and sedimentary rocks (10, 11).

Cretaceous(?) granitic rocks (12) of the Cassiar batholith occupy much of the southwestern part of the area.

Paleocene rocks (13) outcrop in the Rocky Mountain Trench southeast of the mouth of Rainbow River and in the Dall Lake - Ludwig Creek valley southeast of Frog River and south of Turnagain River.

Small bodies of Tertiary(?) volcanic rocks (14) outcrop northwest of Turnagain River near the mouth of Dall River

Glacial, glacio-fluvial, and fluvial deposits (15) locally form thick overburden in the major valleys.

During Pleistocene time an ice-sheet advanced northeasterly in the Cassiar Mountains and deposited glacial erratics to an elevation of at least 7,200 feet between Denetiah Lake and Frog River. Apparently, ice from the Cassiar Mountains reaching Kechika Valley south of Terminus Mountain was deflected to the northwest by the barrier of the Rocky Mountains. North of Terminus Mountain the movement of ice was again northeasterly. Within the map-area the Rocky Mountains were affected only by local alpine and valley glaciation, except for the relatively low-lying terrain north of Terminus Mountain.

The Rocky Mountain Trench is a locus of faulting that separates two distinct structural provinces. In general, rocks in the Cassiar Mountains to the southwest are more complexly deformed than those in the Rocky Mountains to the northeast. Plunging, overturned and asymmetrical folds, locally complicated by thrust faults, are particularly evident in Lower Cambrian and Precambrian rocks between the Dall Lake - Ludwig Creek valley and the Rocky Mountain Trench. Tight, northeasterly overturned folds and associated thrust faults are also prominent in the range between Kechika River and the Netson Lake valley and in the range between Kechika and Gataga Rivers. Deformation in these ranges, however, has resulted in much more continuous and uniform structures than those in the Cassiar Mountains.

Chevron folds, locally overturned to the northeast, are well displayed in strata of map-unit 3. These folds typically have amplitudes of several hundreds of feet and wave lengths of several thousands of feet. Folds with thickened crests and thinned limbs, commonly exhibiting well-developed axial-plane cleavage, are characteristic of most of the other stratified rocks in the map-area.

Exploration work has been carried out on a lead-silver-copper showing in calcareous phyllite and phyllitic limestone 9.6 miles south of the confluence of Jackstone Creek and Frog River. Fluorite was noted in a greenstone body about 10 miles up a creek that flows west-southwest into Dall River, 2 miles north of Dall Lake. Fluorite also occurs in dolomite of map-unit 6, about 3½ miles northwest of the latter locality. In the same area, float of chalcopyrite and vein quartz was found. Greenstones and associated metamorphosed sedimentary rocks southwest of Tucho Lake have been bleached and pyritized, as have greenstones south of Pitman River. Minor copper stain occurs in a north-northwesterly trending shear zone in granitic rocks on the west side of a peak, elevation 7,950 feet, near the headwaters of Jackstone Creek. Minor chalcopyrite was noted in veinlets cutting silicified limestone on the east shore of Dall Lake about 3 miles from the south end of the lake.