GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

105 H

LEGEND

CENOZOIC

QUATERNARY

16 Unconsolidated glacial and alluvial deposits

MESOZOIC

CRETACEOUS (?)

15 Fine- to medium-grained biotite-quartz monzonite, granodiorite, minor diorite and gneiss; 15a, fine- and medium-grained biotite hornblende quartz monzonite and granodiorite, in part porphyritic; 15b, hornblende syenite

PALAEOZOIC

DEVONIAN AND (?) MISSISSIPPIAN

13 Brown and black shale, black and grey chert, quartzite, greywacke, chert-pebble conglomerate; 13a, fine-grained light grey limestone and minor dolomite; 13b, greenstone; 13c, serpentinite

14 Rusty brown weathering fine-grained schistose and spotted biotite hornfels, fine-grained quartzite, black pyritic argillite, dense light green to grey calc-silicate hornfels and fine-grained marble; minor slate, silty limestone and greywacke; 14a, light grey thin-bedded fine-grained marble and calc-silicate hornfels. May include some 1 and 2

SILURIAN AND DEVONIAN (?)

12 Fine-grained light to dark grey dolomite and quartzite; minor buff-grey dolomitic quartzite and silty to sandy dolomite

ORDOVICIAN AND SILURIAN

11 Black shale, slate; minor chert, siltstone, dark limestone Road River/Kechika

CAMBRIAN

MIDDLE AND LATE CAMBRIAN

9 Light grey and brownish grey weathering, intercalated platy argillaceous silty limestone, siltstone, and fine-grained grey limestone

10 Dark grey and brown silty shale and finely laminated siltstone, dark grey slate, thin-bedded brown-grey fine-grained sandstone; minor hornfels

EARLY AND/OR MIDDLE CAMBRIAN

7 Buff-weathering dolomite, silty and sandy dolomite; minor sandstone and shale

6 Bright yellow and orange-weathering silty and sandy dolomite

8 Dark brown-grey to black, in part pyritic, calcareous argillite, slate, shale, and minor thin-bedded argillaceous limestone

EARLY CAMBRIAN

5 Sandstone, buff-weathering sandy and silty dolomite, dolomite, minor quartzite and argillaceous limestone; basic volcanic flows

4 'Swiss-cheese' limestone, irregular interbanded dolomitic siltstone and argillaceous to silty limestone; pods and lenses of limestone; minor blue-grey fine-grained limestone and orange-weathering dolomite

PROTEROZOIC

CAMBRIAN AND/OR EARLIER

3 Brown to red-brown weathering slate, phyllite, siltstone and fine-grained quartzite; 3a, green-grey slate and phyllite

1 Brown, grey, maroon and green shale; grey to green slate and phyllite, gritty feldspathic quartzite, quartz- and feldspar-pebble conglomerate, sandstone; 1a, minor limestone; 1b, light grey weathering, fine-grained grey limestone; 1c, mainly grey to green slate and phyllite; 1d, maroon and green shale and slate; 1e, mainly brown and grey shale and slate, minor maroon and green shale. 1d and 1e are probably equivalent and perhaps correlative with 1c

2 Quartz-feldspar-mica gneiss and schist, granitoid gneiss, feldspathic and micaceous quarzite, biotite schist, minor marble and skarn; numerous small granitic bodies, aplite and pegmatite; 2a, fine- to coarse-grained marble

A Highly altered, green to brown, megacrystic, coarse-grained biotite-quartz monzonite or granodiorite. Age uncertain

Geological boundary (defined, approximate or assumed)
Bedding (inclined, vertical)
Foliation (horizontal, inclined, vertical)
Lineation (horizontal, inclined)
Fault (defined, approximate)
Anticline (defined, approximate, arrow indicates plunge)
Syncline (defined, approximate, overturned)
Fossil locality (F)
Mineral occurrence or prospect (tungsten, W; copper, Cu; zinc, Zn) ×W
Areas of mineral prospects (zinc, Zn; lead, Pb; copper, Cu; silver, Ag) Zn,Pb
Hot spring H.S.O
Glacier (GI)

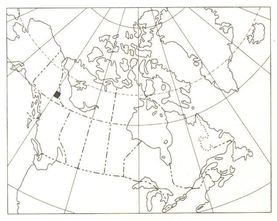
Geology by E. F. Roots, 1953; L. H. Green and J. A. Roddick, 1960
S. L. Blusson, 1962 and 1965

Geological cartography by the Geological Survey of Canada, 1966

Road, all weather
Airstrip
Mine
Horizontal control point
Provincial boundary
Intermittent stream
Marsh
Contours (interval 500 feet) 5000
Height in feet above mean sea-level 6365

Base-map compiled and drawn by the Army Survey Establishment, RCE, 1949-1952

Mean magnetic declination 33°24' East, decreasing 5.3' annually.
Readings vary from 32°42' in the SW corner to 34°06' in the NE corner of the map-area



INDEX MAP

Published, 1966
Copies of this map may be obtained from the Director, Geological Survey of Canada, Ottawa

Printed by the Surveys and Mapping Branch

MAP 6-1966

GEOLOGY

FRANCES LAKE

YUKON TERRITORY AND DISTRICT OF MACKENZIE

Scale 1:253,440
1 inch to 4 miles

Miles 4 0 4 8 12 Miles
Kilometres 6 0 6 12 18 Kilometres

inches 0 1 2
0 1 2 3 4 5 centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

DESCRIPTIVE NOTES

Access is provided by well maintained gravel roads linking Watson Lake on the Alaska Highway, Ross River on the Canol Road, and the Canada Tungsten mining community near the headwaters of Flat River.

An ice-sheet covered all but the highest peaks at least once during the Pleistocene Epoch, leaving erratics at elevations greater than 6,600 feet. Little evidence of direction of ice movement remains in the upland areas, but forms of drumlinoid ridges indicate that ensuing valley glaciers flowed southward down the major drainage systems.

Unit 1 comprises two main divisions with a combined thickness probably well in excess of 10,000 feet. A lower division is characterized by granule-pebble conglomerate and gritty quartzite and an upper one, at least 1,500 feet thick, is composed almost entirely of shale. The upper division is represented by map-unit 1d east of Hyland River and probably by units 1c and 1e, but owing to complex structure has not been separated elsewhere from unit 1.

Unit 3 contains appreciable siltstone and fine-grained quartzite near Flat River. Southwestward it changes progressively to shale and phyllite that may be correlative in part with uppermost strata of unit 1. A minimum thickness of 10,000 feet is estimated in the coarser grained facies northeast of Flat River. The base of unit 3 is ill-defined in the shaly facies near Little Hyland River and some basal strata may be included within 1c. Unit 3a is tentatively correlated with unit 3 on the basis of lithologic similarity, but may be older.

Unit 4, informally termed the 'Swiss-cheese limestone', forms a distinctive and persistent marker 100 to 200 feet thick above unit 3. It is characterized by recessively weathering oval-shaped pods and lenses of limestone in a more resistant siltstone matrix.

Units 5 and 7 total a minimum of 4,000 feet in thickness northeast of Flat River where they are separated by a thin but conspicuous bright orange weathering dolomite unit (6). They comprise various mixtures of dolomite, sandstone, siltstone, minor limestone and shale. Individual members and beds lense out or interfinger abruptly and diastems appear to be numerous. Basic volcanic flows and tuffaceous beds occur in the upper part of unit 5. An abrupt change in facies occurs westerly across Flat River where at least the lower part of this carbonate section (5), (6), and (7) changes to calcareous shale and argillite of unit 8. A discontinuous limestone member, about 100 feet thick, at the base of unit 8 is the host rock for the principal tungsten deposits at and near the Canada Tungsten mine. It gradually lenses out about 2½ miles northwest and 4 miles southeast of the mine. Apparent thinning or absence of unit 3 or equivalent strata northeast of Hyland River airstrip is believed due to an unconformity at the base of unit 8.

Intercalated siltstone and limestone of unit 9 characteristically occurs in wavy, undulatory or anastomosing bands, which on weathering impart a very rough pitted surface. An important regional unconformity at the base of this unit in places sharply bevels Lower Cambrian and older strata. Unit 9 is at least 4,000 feet thick near the Yukon - Northwest Territories boundary, but is itself bevelled by an unconformity beneath unit 11, so that apparently its thickness varies markedly. Exposures of unit 11 are limited to stream cuts along Flat River valley where it overlies unit 9 unconformably. Graptolites collected from the lowermost 500 feet are Upper Ordovician, but as the overlying part of unit 11 is much thicker, it may be in part of Silurian age.

Units 10 and 12 are lithologically correlated with strata previously mapped in adjacent regions.

Unmetamorphosed, predominantly pelitic, strata (13) are believed correlative with Devono-Mississippian rocks in adjacent regions. Characteristic are chert-pebble conglomerate, varicoloured chert, and black quartz-bearing greywacke and gritty quartzite. In the Campbell Range unit 13 includes numerous small bodies of greenstone, many intrusive, but most of the greenstone, mapped as 13b, appears to be volcanic and probably overlies or occurs within the upper part of unit 13. Serpentinite (13c) is thought to be an integral part of the Devono-Mississippian assemblage. A profound angular unconformity occurs at the base of this sequence.

Unit 14 comprises mainly hornfelsed pelitic rocks whose age and correlation are in doubt. Overall lithologic character, lack of regional metamorphism in rocks near the gneissic belt (2) and one collection of Middle or Upper Devonian fossils (near the south boundary at 128°40'W) suggest that probably most, if not all, of this unit is correlative with Devono-Mississippian strata of unit 13.

Granitic rocks (15) generally have sharply defined contacts, but in the schist-gneiss belt (2) they are commonly bordered by complex zones as much as 1/4 mile wide in which massive plutonic rock is interspersed with lit-par-lit migmatites and partly granitized inclusions. There mapped boundaries are largely arbitrary, based on proportion of intrusive to host rocks.

Outside the complexly deformed central crystalline terrain, regional structures trend northwest except in the northern part of the map-area where they become westerly. Regional metamorphism appears unrelated to Cretaceous (?) granitic intrusion and probably predates the Devono-Mississippian strata. These strata overlie schist and gneiss of unit 1 unconformably and are essentially non-schistose. Northwest-trending regional folds near Flat River, which may be related to tectonism in the central belt, are post Late Ordovician, as they involve rocks of this age and older. These folds clearly predate and are modified by intrusion of granitic rocks.

Sphalerite with minor amounts of galena, pyrrhotite and chalcopyrite occur in silicated calcareous members in several localities throughout the schist-gneiss terrain (2) and in hornfelses that may be equivalent to unit 13. Pyrrhotite with some chalcopyrite was noted in black slate and argillite of unit 13, west of Hyland River road at mile 53. Scheelite is reported in the north-central part of the map-area near 61°48' in contact zones with calcareous beds of unit 1.

A high-grade tungsten deposit on Flat River is presently being mined by Canada Tungsten Mining Corporation. Scheelite, with pyrrhotite and minor amounts of chalcopyrite occurs with skarn minerals in massive Lower Cambrian limestone. The deposit is several hundred feet from nearest exposed granitic rocks, but within a zone of moderate to high-grade contact metamorphism.

MAP 6-1966
FRANCES LAKE
YUKON TERRITORY AND
DISTRICT OF MACKENZIE
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