CANADA

DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

PRELIMINARY SERIES

SHEET 82K (East Half)

LEGEND

MESOZOIC

28 Quartz monzonite, granodiorite

TRIASSIC
KASLO SERIES
27 Andesitic volcanic rocks

PENNSYLVANIAN(?), PERMIAN, AND TRIASSIC
MILFORD GROUP
26 Slate, limestone, chert; minor volcanic rocks

DEVONIAN
MIDDLE DEVONIAN
23 HARROGATE FORMATION: nodular, dark grey limestone, grey, calcareous shale; minor quartzite

ORDOVICIAN AND SILURIAN
22 BEAVERFOOT-BRISCO FORMATION: pinkish grey weathering limestone and dolomitic limestone

ORDOVICIAN
21 WONAH FORMATION: white sandstone and quartzite

20 GLENOGLE FORMATION: black, graptolitic shale

PALAEOZOIC

CAMBRIAN AND ORDOVICIAN
18 19 18. McKAY GROUP: blue-grey limestone, black and grey shale, limestone conglomerate
19. GOODSIR GROUP: buff weathering, calcareous shale and shale; blue-grey and grey limestone

CAMBRIAN
MIDDLE AND/OR UPPER CAMBRIAN
12 13 12. JUBILEE FORMATION: thinly laminated and massive dolomite
13. OTTERTAIL FORMATION: uniform, blue-grey and grey limestone

MIDDLE CAMBRIAN (In part)
11 CHANCELLOR FORMATION: reddish brown and grey shale; grey limestone

LOWER CAMBRIAN
10 DONALD FORMATION: buff weathering, gritty limestone, purple and green argillite; minor black limestone

9 ST. PIRAN FORMATION: crossbedded, white and purple grit, white quartzite; minor purple argillite

WINDERMERE
HORSETHIEF CREEK SERIES
8 Grey, black, and green slate and argillite, quartz pebble conglomerate, quartzite, feldspathic quartzite and grit; red slate; minor limestone

7 TOBY FORMATION: pebble, cobble, and boulder conglomerate and breccia (matrix of quartzite, argillite, and limestone)

PURCELL
UPPER PURCELL
6 MT. NELSON FORMATION: buff weathering, grey, dolomitic limestone, purple, grey, and black argillite and slate; white and green quartzite

5 DUTCH CREEK FORMATION: grey, green and black argillite and slate, buff dolomitic slate; thin-bedded, buff weathering dolomite, green, argillaceous quartzite

4 KITCHENER-SIYEH FORMATION: laminated, buff weathering, dolomitic and calcareous argillite and quartzite, green and black argillite; grey and pink quartzite; 4a, green argillite and slate, minor purple argillite

LOWER PURCELL
3 CRESTON FORMATION: massive and laminated, green and grey weathering, green and grey, argillaceous quartzite and quartzite, green argillite

2 ALDRIDGE FORMATION (1, 2)
Upper Division: grey quartzite with partings of black argillite; thin-bedded, argillaceous quartzite and argillite

1 Lower Division: thin-bedded, rusty weathering, light grey quartzite and argillaceous quartzite

PROTEROZOIC

INTRUSIVE ROCKS

A Diorite, quartz diorite

MT. FORSTER AREA

DEVONIAN
UPPER DEVONIAN
25 STARBIRD FORMATION: limestone and gritty limestone

DEVONIAN(?)
24 MT. FORSTER FORMATION: bright red and green argillite; brown weathering limestone

WESTERN PURCELL AND SELKIRK MOUNTAINS

PRE-MISSISSIPPIAN
LARDEAU SERIES
17 Grey quartzite and argillaceous quartzite, green and black phyllite, black, carbonaceous argillite; quartz-muscovite schist, biotite schist; crystalline limestone and dolomite

CAMBRIAN
LOWER CAMBRIAN(?)
16 BADSHOT FORMATION: crystalline, white and and grey limestone; minor dolomite

LOWER CAMBRIAN
HAMILL SERIES (14, 15)
15 UPPER HAMILL: black and grey slate and phyllite, white quartzite, brown, argillaceous quartzite; minor crystaline limestone; 15a, highly metamorphosed equivalents, mainly Upper Hamill

14 LOWER HAMILL: white quartzite, light purple and light green quartzite; minor feldspathic grit and pebble conglomerate, grey phyllite

Drift-covered area

Geological boundary (defined, approximate, assumed)

Limit of geological mapping

Bedding (horizontal, inclined, vertical, overturned)

Bedding (dip known, top of bed unknown)

Lineation (inclined, plunge known; horizontal)

Fault (defined, approximate, assumed)

Anticline (defined, approximate)

Syncline (defined, approximate)

Anticline or syncline (arrow indicates plunge)

Mine

Geology compiled by J. E. Reesor from published reports of The Geological Survey of Canada and from field work by J. E. Reesor 1953 to 1956

Roads paved; other roads

Trail

Abandoned railway

Intermittent stream

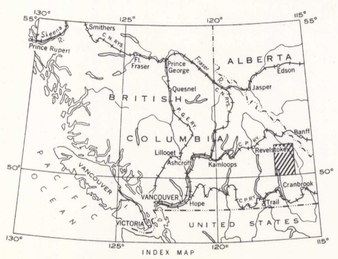
Marsh

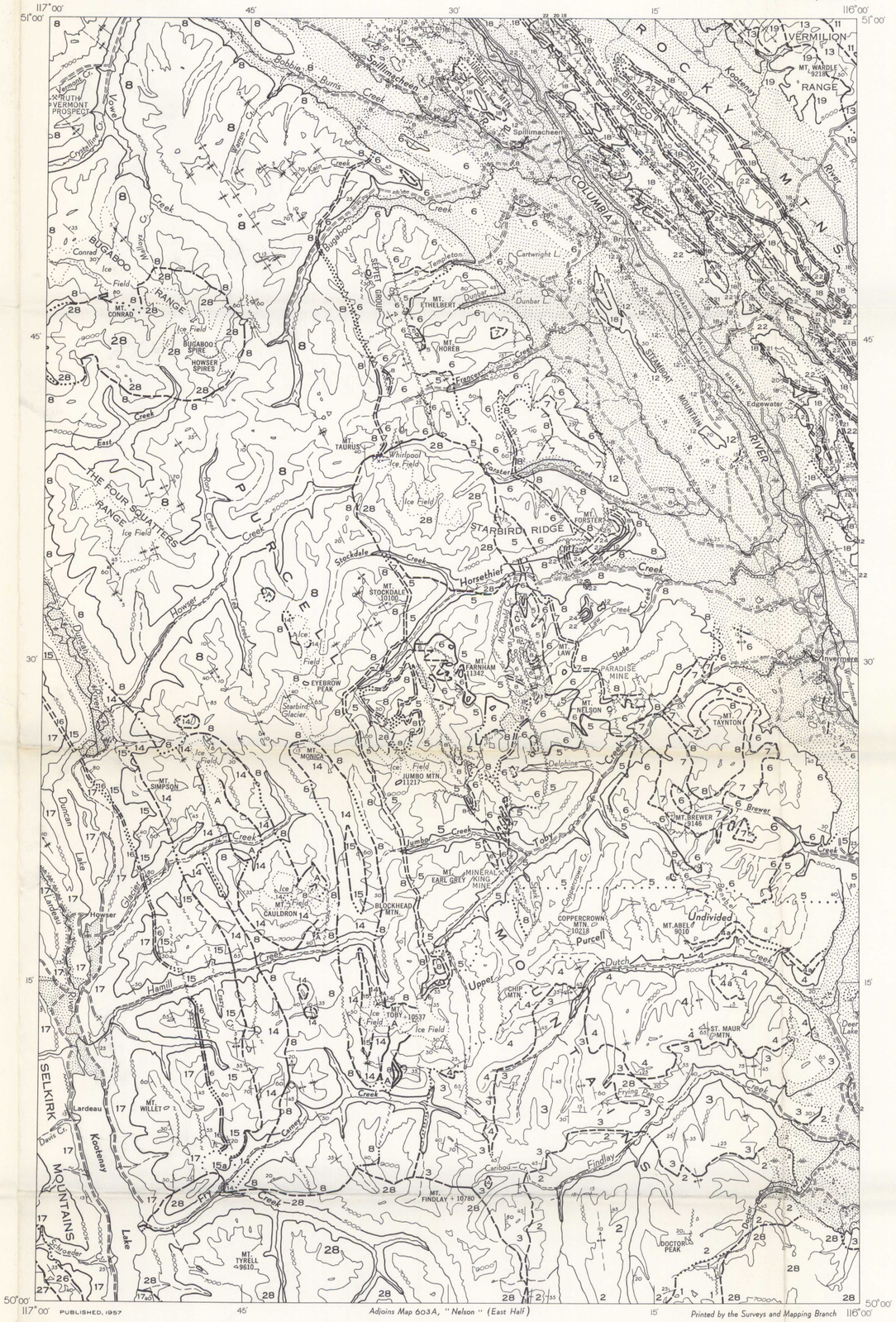
Ice field or glacier

Contours (interval 2000 feet)

Height in feet above mean sea-level

Cartography by the Geological Cartography Unit, 1957





PUBLISHED, 1957

Printed by the Surveys and Mapping Branch

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

In response to public demand for earlier publication, Preliminary Series maps are now being issued in this simplified form, thereby effecting a substantial saving in time. There is no loss of information, but the maps will be clearer to read if all or some of the map-units are hand-coloured.

Geographical names subject to revision

MAP 12-1957

LARDEAU

(EAST HALF)

KOOTENAY DISTRICT

BRITISH COLUMBIA

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

Miles 4 2 0 4 8 12

Approximate magnetic declination, 22° 28' East

DESCRIPTIVE NOTES

The map-area falls into three distinct geological provinces. 1, An area, mainly northeast of the Columbia River, that comprises unmetamorphosed, folded and faulted Palaeozoic sediments. These thin markedly or disappear along the east flank of the Purcell Mountains. 2, An area occupying the eastern and central parts of the Purcell Mountains characterized by lightly metamorphosed sediments of the Purcell and Windermere systems. In addition to the post-tectonic granitic intrusions shown on the map are many dioritic sills and dykes of the Moyie Intrusions most common in the Lower Purcell. In general the strata are warped into a broad, north-plunging geanticline. Minor folds superimposed on the major structure are commonly overturned to the east, and normal faults with the west side down are common. The part of the Rocky Mountain Trench in this area roughly coincides with the east limb of the Purcell geanticline but truncates structural elements on both sides. 3, An area along the western Purcell and Selkirk Mountains underlain by highly deformed and metamorphosed rocks of the Horsethief Creek, Hamill, and Lardeau series as well as a few minor, concordant, syntectonic quartz diorite bodies.

The rocks of the Purcell system (1-6), have hitherto been divided into Lower and Upper Purcell on the basis of the uppermost volcanic flow at the top of the Siyeh formation[3]. No volcanic flows are found in the Siyeh formation north of latitude 50 degrees or west of 116 degrees longitude in this region. Thus the Lower and Upper Purcell are here redefined so that the Lower Purcell (1-3) consists of about 20,000 feet of very fine-grained quartzites and argillaceous quartzites with associated argillites and slates, and the Upper Purcell (4-6) consists of about 12,000 feet of variously coloured argillites and quartzites and their limy and dolomitic equivalents, as well as some limestone and dolomite. By removing the Kitchener-Siyeh formation from the top of the Lower Purcell and placing it at the base of the Upper Purcell the Purcell system is now divided on a lithological basis in which the presence of lime and the predominance of argillite distinguishes rocks of the Upper Purcell from those of the Lower Purcell.

The rocks of the Kitchener, Siyeh, and Dutch Creek formations become more uniformly argillaceous to the west, and, with increasing metamorphism, become an indistinguishable succession of similar phyllites that cannot be subdivided. It is not unlikely indeed that the great thickness of 12,000 feet obtained by adding together formations in different localities, has been in part reached by adding different facies that are stratigraphic equivalents. The true thickness may therefore be much less.

The Toby formation (7) lies with a slight angular unconformity on various formations of the Upper Purcell. This formation varies in thickness from a few feet to 300 feet or more. It is polymictic, pebble to boulder conglomerate, the groundmass forming from 10% to 95% of the rock.

The Horsethief Creek series (8) is a variable succession, about 3,000 feet thick in the southeastern part of the area, but over 6,000 feet thick to the west and north. Rapid, clearly recognizable facies changes occur along and across strike, and as a result a consistent division of this series into component formations is difficult. Pebble conglomerates locally grade to grit and quartzite and these in turn grade to slate or argillite.

Along the divide of the Purcell Mountains the Lower Hamill series (14) lies with apparent conformity over the Horsethief Creek series. This division varies from about 3,000 feet thick at the Purcell Divide to about 5,000 feet at the lower end of Hamill Creek. Considerable facies change is evident, from medium- to fine-grained, in places crossbedded, quartzites at the Purcell Divide to very fine-grained, pure quartzites with interbedded impure, argillaceous quartzite farther west. On the basis of meagre fossil evidence beyond the boundaries of the map-area[1,2] these rocks are questionably assigned to the Lower Cambrian.

The St. Piran formation (9) in the Rocky Mountain Trench is considered to be the equivalent of the Lower Hamill series. These rocks vary from a few tens of feet thick on Steamboat Mountain to several hundred feet on Leed Mountain to the northwest.

The Upper Hamill series (15) lies conformably above the Lower Hamill. These rocks may be tentatively considered equivalent to the Donald formation of Dogtooth Mountains[1]. The Donald formation (10) on Jubilee Mountain consists of perhaps 50 feet of red and green argillite with minor black limestone.

North of Duncan Lake the Badshot formation is well defined and perhaps 300 feet thick; south of Duncan Lake it thins rapidly to less than 50 feet. South of Hamill Creek, it consists of three small bands of limestone, each 10 to 15 feet thick, separated by equivalent amounts of limy phyllite. North of Fry Creek the Badshot is apparently represented by one or all of at least four thin bands of crystalline limestone, separated by phyllite and impure quartzite up to several tens of feet thick.

The Lardeau series (17) is at least 6,000 feet thick and, though of Lower Palaeozoic age, is apparently unfossiliferous.

In the Vermilion Range are found a few hundred feet of the upper Chancellor formation (11). Within 300 feet of the top of the formation poorly preserved fossils indicate the Albertella zone of the Middle Cambrian.

The overlying Ottertail formation (13) has a mapped thickness on Mount Wardle of at least 3,000 feet. Its presumed equivalent, the Jubilee formation (12) of the Rocky Mountain Trench, has a mapped thickness of nearly 2,000 feet on Jubilee Mountain, but thins to about 300 feet to the southwest, on Mount Forster.

The Goodsir formation (19) of Vermilion Range is considered to be the equivalent of the McKay group, of Cambro-Ordovician age, in Brisco Range. The McKay group thins westward from about 4,000 feet[1] in Brisco Range, to zero south of Horsethief Creek. Fossils from the top few feet of the McKay group, on the west side of Steamboat Mountain, indicate that the upper part of the McKay either had not been deposited or had been eroded before the deposition of the succeeding Beaverfoot-Brisco formation in this locality.

The Glenogle formation (20) varies greatly in thickness, from several hundred feet in the central part of Brisco Range to zero along the western limit of the range.

The Wonah formation (21) varies in thickness from a hundred feet in Brisco Range to zero on Steamboat Mountain. In a few localities in Brisco Range it may reach a thickness of 200 to 300 feet.

The Beaverfoot-Brisco formation (22) varies from a mapped thickness of 2,000 feet in Brisco Range to about 25 feet south of Horsethief Creek.

On Mount Forster, about 500 feet of the unfossiliferous Mount Forster formation (24) occurs below the Starbird formation (25) of lower Upper Devonian age.

A considerable search for mineral deposits has been made throughout the map-area, and many small prospects mark the locations of mineralized zones. The main sulphides are galena and sphalerite, though minor chalcopyrite and some associated argentiferous tetrahedrite occur as well. Most mineralized zones are associated with the dolomitic limestones of the Mount Nelson formation and the crystalline limestones of the Lardeau series. These rocks probably offer the best opportunities for further prospecting.

The Mineral King mine on Toby Creek occurs in dolomitic limestone of the Mount Nelson formation. The ore minerals are galena and sphalerite, commonly in a barite gangue, with some chalcopyrite and argentiferous tetrahedrite. Mill capacity is about 500 tons a day.

The Giant Mascot mine on Jubilee Mountain occurs in Jubilee dolomite, in subsidiary fault zones associated with a thrust fault to the immediate southwest that brings Horsethief Creek series against the Jubilee formation. Ore minerals consist of galena in barite gangue with scattered sphalerite and minor chalcopyrite and bornite. Mill capacity is about 500 tons a day. Considerable exploration work is being carried out, both at Giant Mascot and on Lead Mountain a few miles to the northwest (1956).

Placer deposits on Bugaboo, Vowell, and Forster Creeks are held by Quebec Metallurgical Industries. Mineralogical work on the black sand concentrates show the presence of the columbium minerals pyrochlore-microlite, and euxenite-polycrase as well as uraninite, epidote, magnetite, ilmenite, rutile, sphene, apatite, fluorite, zircon, and lipidocrocite. The deposits are concentrated in the upper waters of streams from the outwash of presently active glaciers in the high peaks of Bugaboo and Horsethief batholiths. Quebec Metallurgical Industries have an operating pilot mill on Bugaboo Creek to provide concentrates for extraction tests.

[1]Evans, C. S.: Brisco-Dogtooth Map-Area, B.C.; Geol. Surv., Canada, Sum. Rept. 1932 pt. AII, pp. 106-176 (1933).

[2]Little, H. W.: Salmo Map-Area, British Columbia; Geol. Surv., Canada, Paper 50-19 (1950).

[3]Walker, J. F.: Geology and Mineral Deposits of Windermere Map-Area, B.C., Geol. Surv., Canada, Mem. 148 (1926).

MAP 12-1957
LARDEAU
BRITISH COLUMBIA
SHEET 82K (East Half)