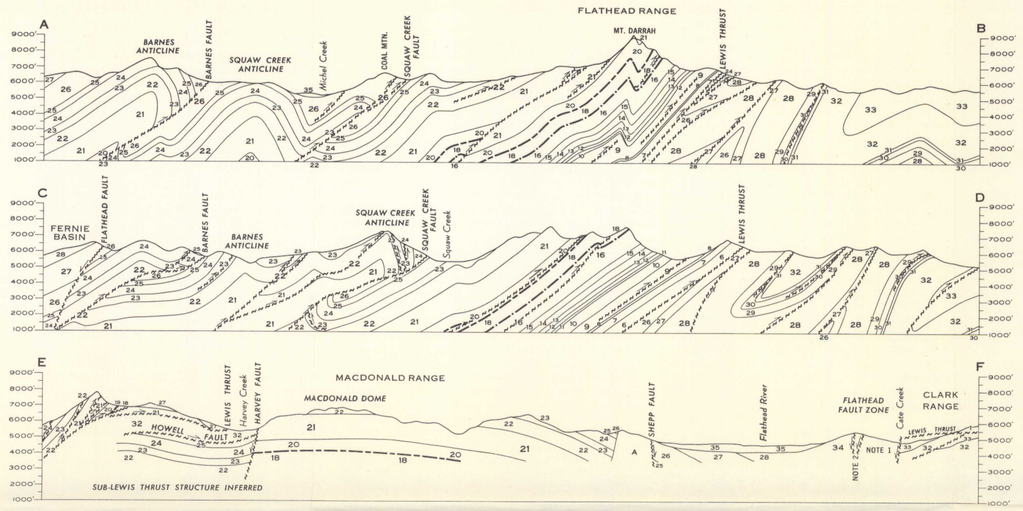


SECTIONS ALONG LINES A-B, C-D AND E-F

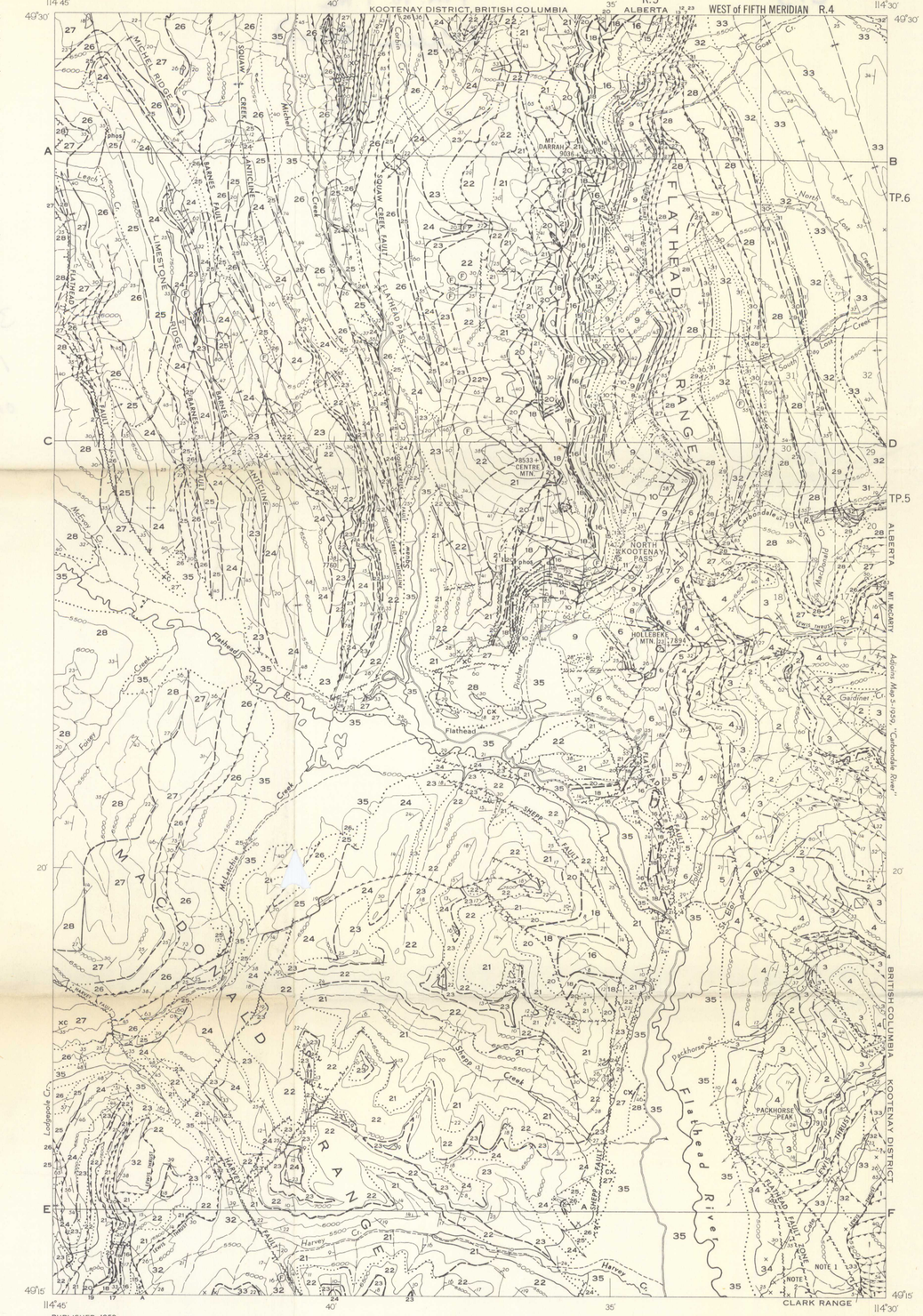
PRELIMINARY SERIES

SHEET 82 G/7 (East Half)

KOOTENAY DISTRICT, BRITISH COLUMBIA

ALBERTA

WEST of FIFTH MERIDIAN



PUBLISHED, 1959
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LEGEND

CENOZOIC

QUATERNARY
PLEISTOCENE AND RECENT
35 Till, gravel, sand, silt, alluvium

TERTIARY
EOCENE (?) AND OLIGOCENE (?)
34 KISHENEHN FORMATION (?): conglomerate

MESOZOIC

CRETACEOUS
UPPER CRETACEOUS
33 BELLY RIVER FORMATION: green and grey sandstone, mudstone and shale

ALBERTA GROUP (30-32)
32 WAPIABI FORMATION: dark grey shale, silty shale, and siltstone

31 CARDIUM FORMATION: dark grey sandstone, siltstone, and silty shale

30 BLACKSTONE FORMATION: dark grey shale, silty shale, and siltstone

LOWER CRETACEOUS (?)
29 CROWSNEST FORMATION: agglomerate; tuff; volcanic sandstones and mudstone

LOWER CRETACEOUS
BLAIRMORE GROUP
28 Grey and greenish grey sandstone; green and red mudstone; conglomerate; minor dark brown limestone

JURASSIC (?) AND CRETACEOUS
27 KOOTENAY FORMATION: dark grey carbonaceous sandstone, siltstone, shale, and conglomeratic sandstone; coal

JURASSIC
FERNIE GROUP
26 Light grey calcareous siltstone, shale and sandstone; dark grey to black shale; dark grey siltstone and sandstone; light grey sandy limestone; black limestone

TRIASSIC
25 SPRAY RIVER FORMATION: grey dolomitic siltstone and sandstone; brown shale and silty shale

PALAEOZOIC

PENNSYLVANIAN AND PERMIAN
24 ROCKY MOUNTAIN FORMATION: light grey quartzite, quartzitic sandstone and dolomitic sandstone; cherty dolomite

MISSISSIPPIAN
RUNDLE GROUP (21-23)
23 ETHERINGTON FORMATION: light grey crinoidal limestone; grey sandy and silty limestone; cherty dolomite; minor green shale

22 MOUNT HEAD FORMATION: dark grey to black, fine- and crypto-crystalline limestone; light grey, coarse- and medium-crystalline, crinoidal limestone; dark grey, silty dolomite and shale; light grey, silty and sandy, cherty, fine-crystalline dolomite

21 LIVINGSTONE FORMATION: massive, light grey, fine- to coarse-crystalline, crinoidal limestone; coarse-grained, crinoidal calcarenite; minor fine-crystalline dolomite

20 BANFF FORMATION: medium grey, fine- to medium-crystalline, cherty and argillaceous limestone; dark grey and black, fine-crystalline, chert-banded, argillaceous limestone; black, silty shale and banded chert

19 EXSHAW FORMATION: black shale

DEVONIAN
18 PALLISER FORMATION: massive, dark grey and brownish grey, mottled, fine-crystalline limestone and dolomite; brown, medium crystalline dolomite

17 ALEXO FORMATION: silty dolomite and limestone; sandstone; limestone and dolomite breccia

'FAIRHOLME GROUP' (15,16)
16 Upper Part: brown, crystalline dolomite; black shale; dark grey, argillaceous and silty limestone; massive, light grey, coarse-crystalline dolomite ('reefs'); bedded, light grey, coarse-crystalline dolomite

15 Lower Part: dark grey, fine-crystalline limestone; brown and grey, fine-crystalline dolomite; limestone and dolomite breccia

CAMBRIAN
MIDDLE CAMBRIAN (?)
14 Massive, light grey, mottled, crystalline dolomite; light and dark grey, mottled dolomite and limestone

MIDDLE CAMBRIAN
13 Platy, green shale; mottled, nodular limestone and dolomite

MIDDLE CAMBRIAN OR EARLIER
12 Light grey and yellowish brown, coarse-grained quartzite

PRECAMBRIAN

PURCELL
11 KINTLA FORMATION (Member C): red and purplish red quartzite and sandstone; hematitic sandstone

10 KINTLA FORMATION (Member B): green argillite and dolomitic argillite

9 KINTLA FORMATION (Member A): red siltstone, arenaceous siltstone, and argillite

8 SHEPPARD FORMATION: brown-weathering, grey dolomite; algal dolomite; red and grey quartzite and siltstone; green argillite

7 PURCELL LAVA: dark green and purplish green, chloritized, amygdaloidal andesite and pillow andesite

6 SIYEH FORMATION: grey dolomite; greyish blue limestone; green, red, and black argillite; sandy and conglomeratic limestone

5 GRINNELL FORMATION: red argillite; white and red quartzitic sandstone; argillite-pebble conglomerate

4 APPEKUNNY FORMATION: green argillite; green and white quartzite and quartzitic sandstone

ALTYN FORMATION (2,3)
3 Middle and Upper Parts: yellowish brown-weathering, grey, fine-crystalline dolomite and nodular dolomite; sandy dolomite; black argillite

2 Lower Part: dark grey argillite; dark grey, thin-bedded, colour-laminated limestone and dolomite

1 WATERTON FORMATION: grey, banded, laminated and streaked limestone and dolomite; dark grey argillite and dolomite; red and green, fine-crystalline, argillaceous dolomite; white crypto-crystalline limestone

A Trachyte, syenite; post-Lower Cretaceous, may be Tertiary

Note 1: Few exposures; undifferentiated Purcell lava and Kintla formation

Note 2: Few exposures; undifferentiated Palliser and Alexo formations and 'Fairholme group'

Rock outcrop (attitude not attainable)
Geological boundary (defined, approximate, assumed)
Bedding (horizontal, inclined, vertical, overturned)
Cleavage (inclined)
Lineation (fold or crinkle axis)
Thrust fault (defined, approximate, assumed) (solid triangles indicate upthrust side)
Normal fault (defined, approximate, assumed) (solid circles indicate downthrow side)
Tear fault (defined, approximate, assumed) (arrows indicate relative movement)
Anticline (defined, approximate, arrow indicates plunge)
Syncline (defined, approximate, arrow indicates plunge)
Fossil locality
Mineral prospect or occurrence (c, coal; phos, phosphate rock)
Coal adit

Geology by R.A. Price, 1956; R.A. Price and D.U. Wise, 1957. Compilation by R.A. Price

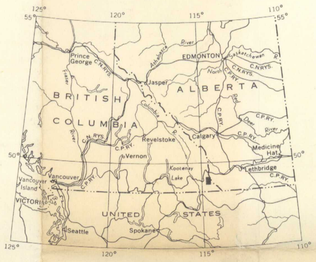
Roads (loose surface)
Cart track
Trail
Buildings
Interprovincial boundary
Township boundary (surveyed)
Township boundary (unsurveyed)
Section line and number
Intermittent stream
Contour (interval 500 feet)
Height in feet above mean sea-level

Cartography by the Geological Survey of Canada, 1959

Approximate magnetic declination, 21° 20' East

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.



INDEX MAP

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

MAP 1-1959
GEOLOGY
FLATHEAD
BRITISH COLUMBIA AND ALBERTA

Scale: One Inch to One Mile = 1/63,360
Miles
1 1/2 0 1 2 3

Geographical names subject to revision

1-1959

DESCRIPTIVE NOTES

The Flathead map-area in the southern Rocky Mountains of Alberta and British Columbia, embraces parts of the Foothills and the Flathead, Clark, and MacDonald Ranges.

Two genetically and temporally distinct groups of structures occur: an older group characterized by thrust faults, generally sub-parallel to bedding, along which the pre-Cenozoic strata have undergone relative eastward and northeastward displacement; and a younger group consisting of normal faults, along which blocks have been displaced vertically and tilted.

The Lewis thrust dominates the older group with a minimum horizontal displacement of 25 miles. Other elements in the group can be dynamically related to it. In a window in the Lewis thrust sheet on Cate Creek, the Alberta group (30-32) and the Belly River formation (33) are exposed beneath a northwest-plunging anticline in the Lewis thrust surface. Northwest-trending folds and associated thrust faults within the Lewis thrust sheet indicate that it has undergone a relative northeastward displacement. A prominent, transverse, northwest-facing monocline in strata above the Lewis thrust surface extends from North Kootenay Pass to Lodgepole Creek, and marks the locus of a change in stratigraphic position of the Lewis thrust surface relative to overlying beds. At North Kootenay Pass for example, this monocline lies above a transverse zone along which the Waterton (1), Altyn (2, 3), Appekunny (4) and Grinnell (5) formations are successively truncated toward the northwest against the thrust surface. This truncation occurs along a monocline in the thrust surface, sub-parallel to that above the thrust surface, but facing southeast. The southeast-facing monocline is expressed in the southeast- and south-dipping parts of the Lewis thrust surface along the north end of the Clark Range.

The Howell, Barnes and Squaw Creek faults, together with other less prominent thrust faults and associated folds, indicate a relative eastward thrust displacement supe imposed discordantly on the earlier northwest-trending structures. Stratigraphic omissions occur locally across these later discordant thrust faults. The Howell fault cuts the Lewis thrust and displaces a western part of the Lewis thrust sheet over an eastern part. At the headwaters of Harvey and Lodgepole Creeks, a window in the Lewis thrust sheet exposes strata of the Alberta group (30-32) and the Belly River formation (33) which lie above the Howell fault. Northwest-striking, overturned folds in the Foothills beneath the Lewis thrust sheet have been overridden discordantly during the relative eastward displacement of the thrust sheet.

The Flathead fault, a west- and south-dipping normal fault, dominates the younger group of structures, and other elements in the group can be related directly to it. The stratigraphic throw across the Flathead fault and related step faults is about 20,000 feet at Cate Creek; it decreases progressively to less than 1,000 feet in the northwest corner of the area. The block lying to the west and south has been tilted towards the fault and is cut by a complex of minor normal faults. An assymetrical graben, lying adjacent to the Flathead fault on the west, is the site of a prominent physiographic 'trench', the Flathead Valley, which was the site of rapid accumulation of sediments of the Kishenehn formation (?) during an interval in the active life of the fault.

Thickness of lithologic units in the Purcell succession are as follows: Waterton formation (1), at least 500 feet in the valley of St. Eloi Brook; lower part of the Altyn formation (2), approximately 425 feet at the headwaters of St. Eloi Brook; middle and upper parts of the Altyn formation (undifferentiated) (3), 825 feet at the headwaters of St. Eloi Brook; Appekunny formation (4), 1,700 feet (graphic calculation) in the vicinity of Pollock Creek; Grinnell formation (5), 350 feet at the head of Pollock Creek; Siyeh formation (6), 1,130 feet 1.25 miles south of North Kootenay Pass, comprising a basal argillite and dolomite unit 30 feet thick, a middle dolomite unit 1,000 feet thick, and an upper argillite unit 100 feet thick; Purcell lava (7), 320 feet between the north and south branches of Lost Creek, including a 30-foot zone of chloritized andesite pillow lavas in a matrix of chloritized 'tuff-breccia' at the base; Sheppard formation (8), 120 to 160 feet along the east side of Flathead Range; Members A (9), B (10), and C (11) of the Kintla formation - 650, 500, and 400 feet respectively at North Kootenay Pass.

Chloritized diorite sills 5 to 35 feet thick occur in the Altyn, Appekunny, Siyeh, Sheppard, and Kintla formations.

The Cambrian quartzite unit (12), approximately 150 feet thick, is unconformable over Purcell strata without local evidence of discordance. Between North Kootenay Pass and Goat Creek there is a progressive northward truncation of 1,000 feet of Kintla strata against its base.

The Cambrian shale unit (13), approximately 210 feet thick, has yielded Albertella from within the upper 110 feet.

The Cambrian dolomite unit (14), 285 feet thick on Mount Darrah and 350 feet thick at North Kootenay Pass, has a 'regolith-like' deposit of calcareous mudstone filling depressions and fractures in its upper surface in exposures between the north and south branches of Lost Creek.

The lower part of the 'Fairholme group' (15), 325 to 400 feet thick, comprises a basal, recessive-weathering, dolomite, limestone, and breccia unit, 100 to 170 feet thick; and an upper, dark grey, very fine-crystalline limestone unit, 210 to 240 feet thick.

The upper part of the 'Fairholme group' (16), 680 to more than 850 feet thick, embraces a complex of intertonguing lithologic units. A basal zone, up to 150 feet thick, grades laterally from dark brownish grey, medium- and coarse-crystalline, bedded dolomite to black shale. The remainder of the upper part includes the Mount Hawk formation. It consists of dark grey, fine-crystalline, argillaceous and silty limestone, generally with the Arcs member of light grey, coarse-crystalline, bedded dolomite at the top, underlain by the Grotto member of dark brownish grey, medium- and fine-crystalline dolomite. Locally, as at the head of Goat Creek and the south branch of Lost Creek, the Mount Hawk formation is abruptly gradational laterally into the Southesk formation. The latter comprises the Peechee member of massive, very coarse-crystalline, light grey, dolomite 'reefs', and in part, the overlying Grotto and Arcs members.

The Alexo formation (17), 25 to 100 feet thick along the Flathead Range, is thinnest where it overlies the Southesk formation.

The Palliser formation (18), 660 feet thick on Mount Darrah, comprises the Morro member, 500 feet thick, and the Costigan member, 160 feet thick.

The Banff formation (20), approximately 600 feet thick, is divisible into three lithologic units as follows: 110 feet of recessive-weathering black shale, limestone, and banded chert; overlain by 230 feet of dark grey and black, dense, cherty, argillaceous limestone; with 270 feet of medium and dark grey, fine- to medium-crystalline, chert-limestone at the top.

The Livingstone formation (21), 1,370 feet thick on Centre Mountain, is marked at the base by the lowest bed of coarse crinoidal limestone.

The Mount Head formation (22), 860 feet thick, is divisible into the following sequence of lithologic units: Salter member, 160 feet (on Centre Mountain), of recessive-weathering, fine- and medium-crystalline, sandy and silty dolomite; Loomis member, 300 feet (on Centre Mountain), of light grey weathering, cliff-forming, crinoidal limestone; Marston member, 100 feet (on Centre Mountain), of recessive-weathering, silty and argillaceous dolomite and limestone; Carnarvon member, 300 feet (2 miles north of Centre Mountain), of black and dark grey, fine- to crypto-crystalline limestone and argillaceous limestone.

The Etherington formation (23), 430 feet thick 2 miles north of Centre Mountain comprises: a recessive-weathering basal unit 100 feet thick, consisting of cyclical alternations of light grey, medium- to coarse-crystalline limestone; platy, yellowish grey, fine-crystalline, silty limestone and dolomite; green shale; a cliff-forming middle unit, 250 feet thick, consisting mainly of light grey, coarse-grained, colitic and bioclastic calcarenite; and an upper recessive-weathering unit, 100 feet thick, consisting of light and dark grey, silty and cherty limestone and dolomite with minor dolomitic siltstone and sandstone. The top is drawn where sandstone is dominant.

The Rocky Mountain formation (24) embraces two lithologic units. At the southwest headwaters of Michel Creek in the west limb of the Barnes anticline, the lower part, consisting of quartzite, sandstone, and dolomitic sandstone, is 610 feet thick; the upper part is 50 feet thick, consisting of fine-crystalline, grey, silty and cherty dolomite with minor shale, bedded chert, quartz-pebble conglomerate, and conglomeratic sandstone. Fossils collected from the lower 265 feet of the formation are reported to be of Pennsylvanian age. Plagioglypta canna White has been collected from the upper part.

The Spray River formation (25), estimated to be 300 feet thick, comprises a lower, recessive-weathering shale and silty shale unit, and an upper, dolomitic or sideritic, argillaceous siltstone and fine-grained sandstone unit.

Six and one half miles west of Mount Darrah, the Fernie group (26) is 1,230 feet thick. The lower part, comprising black shale and limestone with a basal phosphate bed, is poorly exposed, but is approximately 280 feet thick. The 'Grey beds', 640 feet thick (may be tectonically thickened), consist of light grey, silty, sandy, and shaly, argillaceous limestone with interbedded calcareous shale. The 'Green beds' are absent, but occur on Coal Mountain. The 'Passage beds' overlying the 'Grey beds' with sharp contact, are 310 feet thick.

The Kootenay formation (27) is approximately 1,600 feet thick within the Lewis thrust sheet in the northwestern part of the area, but it is less than 600 feet thick below the thrust sheet in the northeastern part.

The Blairmore group (28) is 1,800 feet thick (graphic calculation) beneath the Lewis thrust sheet in the Foothills, where the basal non-feldspathic sandstone unit is less than 250 feet thick including less than 50 feet of conglomerate at its base. Within the Lewis thrust sheet, in the vicinity of Foisey Creek, the group is more than 3,500 feet thick, and non-feldspathic sandstone and conglomerate occur throughout the basal 500 feet. Higher beds are feldspathic and include reworked alkaline volcanic debris.

The Crowsnest formation (29) is known only from below the Lewis thrust sheet, where graphic calculations indicate a thickness of 500 feet.

Strata of the Alberta group (30-32) and the Belly River formation (33) are known only from below the Lewis thrust sheet and are generally poorly exposed.

Indurated conglomerates assigned to the Kishenehn formation (?) (34) are composed exclusively of Palaeozoic fragments and show crude stratification that consistently dips towards the Flathead fault.

Trachyte and syenite bodies (A) are common in MacDonald Range where they vary in form from narrow dykes to irregular anastomosing masses. They occur within strata ranging from the Cambrian shale unit to the basal conglomerate of the Blairmore group.

MAP 1-1959
FLATHEAD
BRITISH COLUMBIA-ALBERTA
SHEET 82 G/7 (East Half)