

Diagrammatic cross-sections along lines A-B-C, D-E and F-G

GEOLOGICAL SERIES

SHEET 82 1/2 (East Half)

LEGEND

- CRETACEOUS**
- UPPER CRETACEOUS**
- 15 BELLY RIVER FORMATION: crossbedded sandstone; green and grey shale; nodular limestone
 - 14 WAPIABI (Upper Alberta) FORMATION: dark grey, silty shale; fine-grained, grey sandstone
 - 13 BIGHORN (Cardium) FORMATION: fine- to coarse-grained sandstone; silty shale; conglomerate
 - 12 BLACKSTONE (Lower Alberta) FORMATION: dark grey, silty and concretionary shale; grey sandstone; basal chert-conglomerate
- LOWER CRETACEOUS**
- BLAIRMORE GROUP**
- 11 Green and grey sandstone; green, grey, maroon, and carbonaceous shale; conglomerate
 - 10 KOOTENAY FORMATION: undivided; 10a, lower part; thin-bedded, fine-grained, grey and brown sandstone; grey and carbonaceous shale; coal; basal, coarse-grained, black sandstone; 10b, upper part; massive-bedded, coarse-grained, black sandstone; grey and carbonaceous shale; conglomerate
- JURASSIC**
- 9 FERNIE GROUP: Dark grey shale; grey and brown sandstone; includes thin Spray River formation (9) on eastern side of Highwood Range
- TRIASSIC**
- 8 SPRAY RIVER FORMATION: dull black sandstone; dark grey shale; black, phosphate conglomerate
- PENNSYLVANIAN (?)**
- 7 ROCKY MOUNTAIN FORMATION: arenaceous dolomite and sandstone; massive chert
- MISSISSIPPIAN**
- RUNDLE GROUP (4-6)**
- 6 ETHERINGTON FORMATION: buff and grey dolomite and limestone; green shale; arenaceous limestone and dolomite
 - 5 MOUNT HEAD FORMATION: dark grey and brown, crypto-crystalline to coarsely crystalline limestone; calcareous and green shale; fine- to medium-crystalline dolomite; arenaceous dolomite and limestone
 - 4 LIVINGSTONE FORMATION: massive-bedded, coarsely crystalline, grey limestone and finely crystalline, cherty, grey limestone and dolomite
 - 3 BANFF FORMATION: thin-bedded, argillaceous and cherty limestone; shale; arenaceous dolomite
- DEVONIAN**
- 2 EXSHAW FORMATION: black, fissile shale
 - 1 PALLISER FORMATION: massive-bedded, mottled limestone and dolomite; laminated dolomite; breccia

DESCRIPTIVE NOTES

The map-area is underlain by folded and thrust-faulted Mesozoic and Palaeozoic strata. The latter rocks outcrop in the southwestern part of the area along the High Rock Range, which marks the boundary between British Columbia and Alberta, and in the Highwood Range, which extends northerly through the central part of the map-area. Mesozoic strata from Triassic to Upper Cretaceous in age lie between these two ranges and east of the Highwood Range.

Four major thrust faults outcrop within or underlie parts of the map-area. The northern extension of the Lewis thrust underlies the Palaeozoic strata of the High Rock Range in the southwestern part of the map-area. It dips westward at a low angle. The McConnell thrust, in its southern part, causes little stratigraphic repetition as it lies entirely within the Spray River formation close to the western boundary of the Highwood Range; north of Highwood River, Palaeozoic strata lie above it, their southern limit being marked by a tear fault. The northern part of the McConnell thrust is folded into several anticlines and synclines, and continues northward into the Dyson Creek map-area. The Dyson Mountain thrust, the surface trace of which lies in the Pekisko Creek and Dyson Creek map-areas, to the east and north respectively, underlies the northeastern part of the map-area. Palaeozoic strata lie above it beneath the Sullivan Creek anticline.

The Livingstone thrust lies on the west limb of the Sullivan Creek anticline and, southward, rapidly increases in displacement. A short distance south of Highwood River (see structure-section F-G), the thrust plane is folded into an anticline and a syncline, the anticlinal fold superimposed over the Sullivan Creek anticline and the syncline to the east. The strata above the Livingstone thrust show similar structures, with two higher fault planes also folded conformably, the uppermost of which has least closure. For much of their length these folded faults follow close to the bedding-planes of the Kootenay and Fernie strata, and, on their southward continuation, have been folded over the Palaeozoic strata of the Sullivan Creek anticline above the Dyson Mountain thrust. All folds in both strata and fault planes plunge southward.

The strata above the four major thrusts are broken by other subsidiary faults that merge with them at depth or repeat only part of the observed stratigraphic succession. Folds result from drag due to displacement along the faults, or are produced simultaneously with the folding of the major thrust planes.

Of particular importance to the evaluation of the coal prospects of the area are numerous tear faults, most common to the Mesozoic strata adjacent to the northwest part of the Highwood Range. The dip of these faults, far as can be determined, is vertical, and are the result of differential displacement of the strata above the underlying thrust faults. The apparent horizontal offset of the beds may vary from a few feet to more than 1,000 feet. Only those tear faults that have large displacement and which have been given names are shown on the map. Others may be present, especially in the areas underlain by the Kootenay formation, and would render mining of the coal seams of this part of the area difficult.

The oldest rocks exposed within the map-area are about 300 feet of the upper part of the PALLISER formation (1) of Upper Devonian age. The top 25 feet comprise finely laminated, argillaceous dolomite and limestone, and breccias. These are underlain by finely crystalline grey limestone, grey weathering, and mottled with light brown dolomite weathering brown. The overlying EXSHAW formation (2) is 12 feet thick.

The Mississippian BANFF formation (3) is 896 feet thick on Flat Creek. The basal 166 feet consist of laminated black shale with basal and upper argillaceous and arenaceous dolomites 16 and 15 feet thick. The middle part, 604 feet thick, is mainly argillaceous limestone and dolomite. The upper part, 126 feet thick, is argillaceous fine- to medium-crystalline limestone with a median siltstone 38 feet thick. The overlying LIVINGSTONE formation (4) has been divided into three formations. The LIVINGSTONE formation (4) is 1,073 feet thick on Flat Creek. It is divided into a lower or Pekisko member, 484 feet thick composed mainly of coarsely crystalline limestone with interbedded finely crystalline limestone, more argillaceous and cherty in the basal 224 feet, and an upper or Turner Valley member. The Turner Valley member consists of basal Dark Limestone beds, 82 feet of mainly finely crystalline cherty limestone and dolomite, succeeded by Lower Porous beds, 147 feet of coarsely crystalline porous limestone and medium-crystalline porous dolomite. The Hard beds, 153 feet of finely crystalline dolomitic limestone and coarsely crystalline limestone, and Upper Porous beds, 207 feet of mainly coarsely crystalline limestone and finely crystalline limestone and dolomite. The MOUNT HEAD formation (5) is 597 feet thick on the westernmost spur north of Highwood River. It is divisible into six members. The basal Willem member consists of 25 feet of arenaceous dolomite succeeded by the Baril member, 41 feet of mainly medium-crystalline limestone and arenaceous dolomite. The Saller member, 96 feet of argillaceous and arenaceous dolomite and dolomitic limestone with breccia at the top, the Loomis member, 148 feet of cliff-forming massive-bedded mainly coarsely crystalline limestone, the Marston member, 122 feet of alternating thin beds of argillaceous dolomite, cherty limestone and green shale, and the uppermost Carnarvon member, 165 feet of mainly cryptocrystalline limestone and black calcareous shale with cherty medium-crystalline limestone at the top. The ETHERINGTON formation (6) is 191 feet thick at the mouth of Cataract Creek. The basal 86 feet are five cyclical alternations of green shale and finely crystalline limestone and dolomite. The middle 51 feet contain arenaceous cherty limestone and medium-crystalline porous dolomite. The upper 54 feet are fine-grained and cryptocrystalline dolomite and arenaceous dolomite, cherty, and weathering buff. The formation thickens to 290 feet on Flat Creek where much limestone is present in the middle part. In the northwest, the upper part becomes more arenaceous suggesting it may possibly pass laterally into the basal part of the Rocky Mountain formation of the Banff area.

The ROCKY MOUNTAIN formation (7), of probable Pennsylvanian age, varies in thickness from about 20 to 75 feet, being thickest in the northwest. The Triassic SPRAY RIVER formation (8) may be as much as 300 to 600 feet thick northwest and southwest of the Highwood Range. It is only 90 feet or less thick along the eastern Highwood Range and is included with the overlying Fernie group. The FERNIE group (9) is commonly highly contorted and underlies broad areas, but probably does not exceed 1,000 feet in thickness.

The KOOTENAY formation (10), west of the Highwood Range is divisible into two parts: the lower part (10a), 350 to 670 feet thick along Highwood River, contains most of the coal seams observed and all those at present being prospected; the upper part (10b) is 378 feet thick along Highwood River. Both parts thicken rapidly to the west and northwest, and thin to the southeast. East of the Highwood Range the entire formation (10) is about 500 to 600 feet thick, and similar lithologically to the lower part of formation of the west.

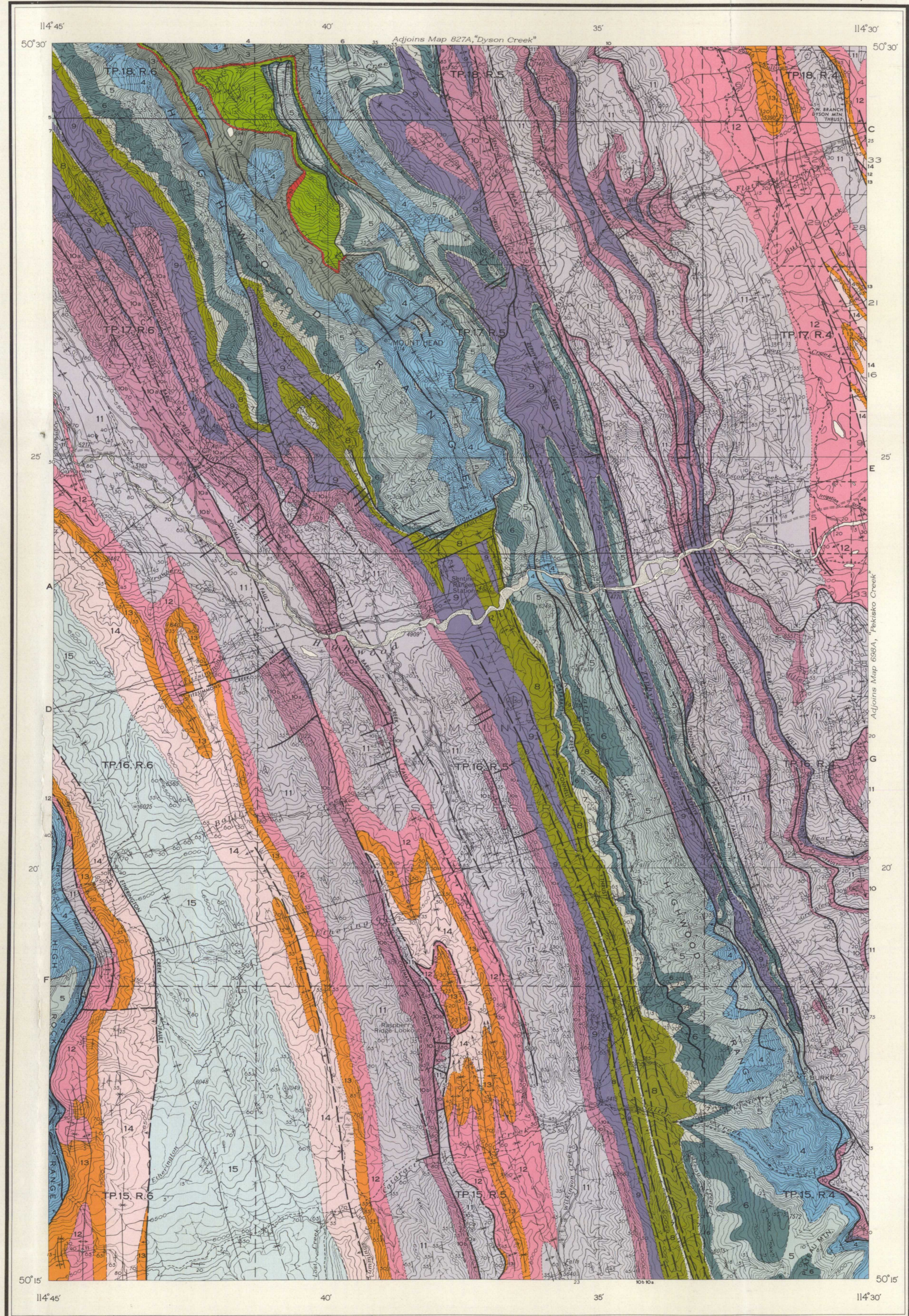
The BLAIRMORE group (11) is about 2,500 feet thick over much of the region west of Highwood Range, and thins to about 1,800 feet east of it. Distinctive beds are: the basal chert and quartzite conglomerate; the overlying 250 feet, with fine- to coarse-grained, quartz sandstone; a massive-bedded fine- to coarse-grained, green, arkosic sandstone, locally containing igneous and quartzite pebbles, and lying from 800 to 1,350 feet above the base of the group; and the upper 200 feet, with fine- to coarse-grained quartz sandstone, locally carrying chert and quartzite pebbles.

The base of the BLACKSTONE (Lower Alberta) formation (12) west of the Highwood Range is commonly marked by 0.5 foot of black chert conglomerate. The formation is about 800 feet thick in the northeast, and about 1,000 feet in the southwest, where sandstones are common and the shales silty. The BIGHORN (Cardium) formation (13) varies greatly in thickness and composition throughout the map-area. In the northeast, it is only about 100 feet thick, composed of two, fine-grained sandstones with interbedded silty and concretionary shale, but west of the Highwood Range the formation thickens several times, reaching a maximum of about 1,000 feet in the extreme southwest, where it contains several beds of sandstone, with interbedded silty shales. The overlying WAPIABI (Upper Alberta) formation (14) is exposed only in the west, where it is about 2,000 feet thick. A minimum thickness only of about 3,700 feet can be inferred for the BELLY RIVER formation (15) the youngest in the map-area.

The coal seams of the Kootenay formation, in the area west of the Highwood Range between the Highwood River and the Sullivan Creek anticline, and several adits have been driven along some of the wider seams. The Kootenay strata there are repeated by five, high-angle thrust faults, and are offset between these faults by numerous vertical tear faults. The coal seams vary in thickness due to squeezing, and are commonly highly sheared.

The Dalhousie Oil Syndicate Flat Creek No. 1 well, in s. 13, sec. 26, tp. 17, r. 5, W. 5th. mer., encountered Rundle strata on the west flank of the Sullivan Creek anticline and below the Dyson Mountain thrust in the Flat Creek structure. The well commenced in Kootenay strata. Drilling depths to the various formations encountered are as follows: Fernie group at 510, 840, 1,140, 4,330, 4,530 and 5,330 feet; Etherington formation, at 2,270, 4,880, and 5,670 feet; Mount Head formation, at 2,480, 4,970 and 5,720 feet; Livingstone formation, at 3,500 and 6,390 feet. The Dyson Mountain thrust was encountered at 4,270 feet depth and faults of small displacement at 720, 1,030, 1,560, 4,380 and 5,330 feet depth. The well reached a total depth of 6,500 feet, ending in the upper 110 feet of the Livingstone formation. Flows of natural gas were obtained at about 2,900 and 5,750 feet depth.

Structures potentially oil- and gas-bearing are the Flat Creek structure beneath the Sullivan Creek anticline, the structurally highest part of which may be in the adjoining Dyson Creek map-area, and the Salt Creek structure, a fault slice of Rundle strata above the Livingstone thrust and below the Sentinel Peak fault.



MAP 1052A
MOUNT HEAD
WEST OF FIFTH MERIDIAN
ALBERTA

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

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REFERENCE

- Road
- Road not well travelled
- Trail
- Telephone line
- Building
- Horizontal control point
- Township boundary (surveyed)
- Township boundary (unsurveyed)
- Section line
- Forest Reserve boundary
- Intermittent stream
- Marsh
- Sand or gravel
- Contours (interval 100 feet)
- Contours (position approximate)
- Depression contour
- Height: in feet above mean sea-level

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