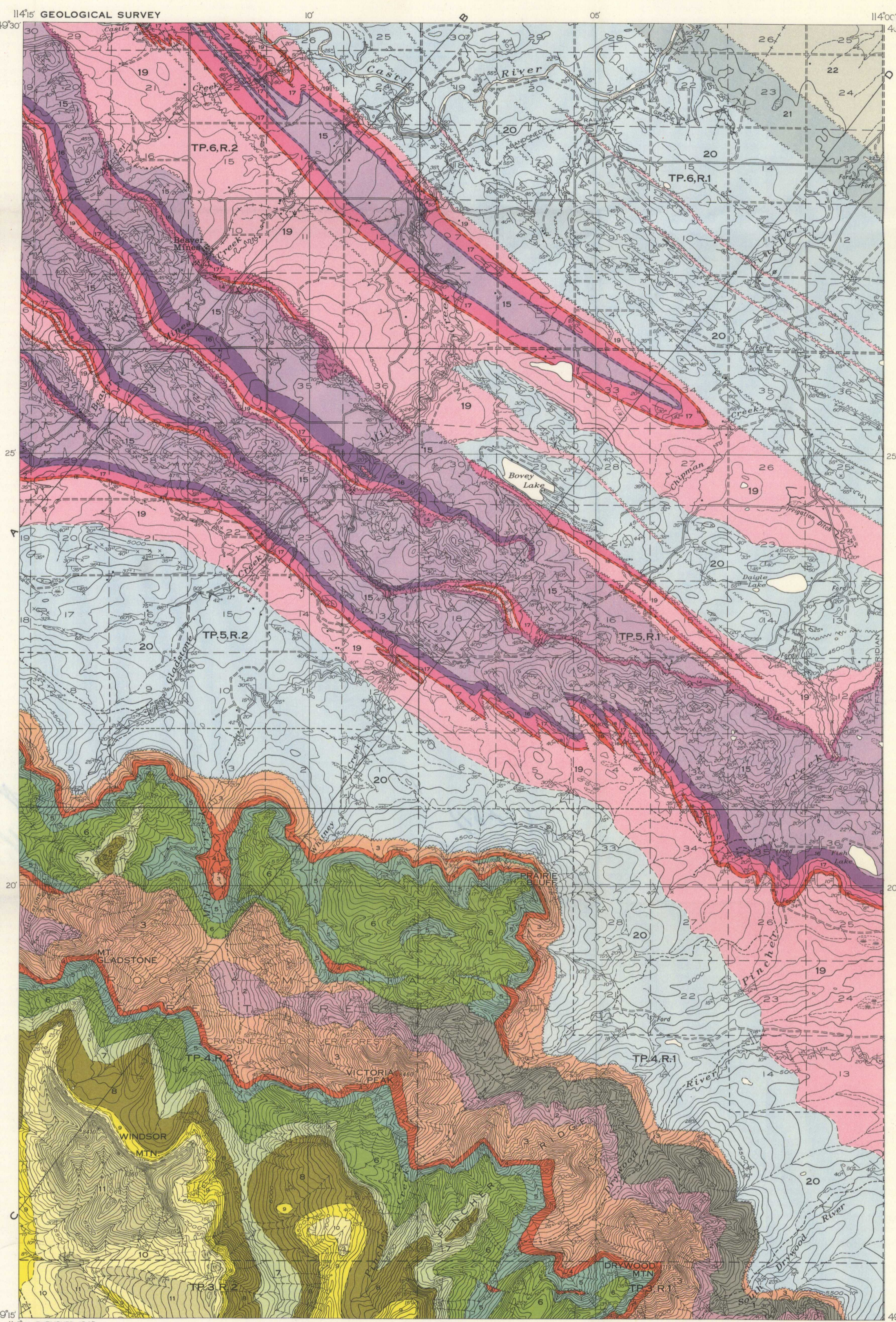


Structure sections along lines A-B and C-D.

LEGEND

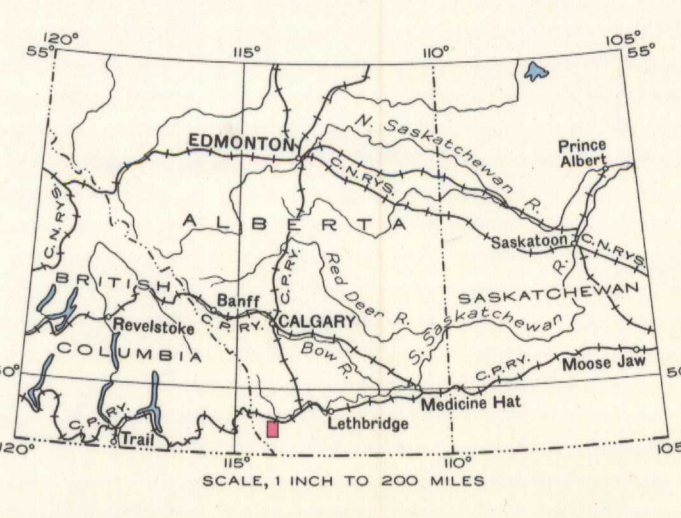
- CRETACEOUS**
- UPPER CRETACEOUS**
- 22 ST. MARY RIVER FORMATION: brown weathering coarse to fine grained cross-bedded sandstone, interbedded with grey shale and carbonaceous shale, coal
- 21 BEARPAW FORMATION: dark grey marine shale with calcareous concretions
- 20 BELLY RIVER FORMATION: grey cross-bedded sandstone, shale with concretions, bentonitic shale, thin carbonaceous beds
- 19 WAPIABI (UPPER ALBERTA) FORMATION: dark grey shale and sandy shale with hard limy beds and brown weathering ironstone concretions
- 18 BIGHORN (CARDIUM) FORMATION: quartzitic sandstone, shale and sandy shale, pebble conglomerate
- 17 BLACKSTONE (LOWER ALBERTA) FORMATION: dark grey, black, and silvery grey shale; siliceous sandstone and sandy shale
- UPPER CRETACEOUS (?)**
- 16 CROWSNEST FORMATION: tuff, agglomerate. Includes interfingering sandstone and shale beds of the Blairmore Group
- LOWER CRETACEOUS**
- 15 BLAIRMORE GROUP: sandstone, green, grey, and maroon shale, conglomerate, limestone. Includes beds of Upper Cretaceous (?) age
- 14 KOOTENAY FORMATION: dark grey and black shale, coarse brown sandstone, coal
- JURASSIC**
- 13 FERNIE FORMATION: dark grey and black shale with phosphatic concretions, brown sandstone. (In structure sections only)
- CARBONIFEROUS**
- 12 Chiefly limestone and dolomite. May include some Triassic beds. (In structure sections only)
- DEVONIAN**
- MIDDLE OR UPPER DEVONIAN**
- 11 Massive dolomite and limestone, bedded argillaceous limestone, shale and conglomerate. May include Lower Devonian or pre-Devonian beds
- CAMBRIAN**
- MIDDLE CAMBRIAN**
- 10 Quartzite, sandstone, shale; some limestone
- 9 KINTLA FORMATION (Member D): green and grey argillite, micaceous shale, oolitic limestone; diorite sills
- 8 KINTLA FORMATION (Member C): thick bedded reddish quartzite, red argillite
- 7 KINTLA FORMATION (Member B): green argillite; diorite sill
- 6 KINTLA FORMATION (Member A): red argillite; grey, buff weathering cross-bedded quartzite; buff siliceous limestone
- PROTEROZOIC (LATE PRE-CAMBRIAN)**
- 5 SHEPPARD FORMATION: brown weathering argillite, arenaceous limestone, feldspathic sandstone
- 4 Dark green and purplish, vesicular and amygdaloidal basalt
- 3 SIYEH FORMATION: grey, greenish, brown-weathering argillite, argillaceous limestone, cryptozoan limestone, quartzite; diorite sill
- 2 GRINNELL FORMATION: red argillite, white and red quartzite
- 1 APPEKUNNY FORMATION: green and grey argillite, brown weathering gritty limestone, calcareous sandstone, quartzite

- Rock outcrop
- Bedding (horizontal, inclined, overturned)
- Anticlinal axis
- Synclinal axis
- Fault
- Well (drilling)
- Well (show of oil and gas)
- Well (abandoned)
- Coal pit or mine
- Adit



MAP 739A
BEAVER MINES
 WEST OF FIFTH MERIDIAN
 ALBERTA

Scale, 63366 or 1 inch to 1 Mile
 Approximate magnetic declination, 23°45' East.



- Road and buildings
- Road not well traveled
- Road along township boundary
- Bush road or trail
- Abandoned building
- Church
- School
- Post Office
- Township boundary (surveyed)
- Township boundary (unsurveyed)
- Section line
- Forest Reserve boundary
- Intermittent lake and stream
- Marsh
- Sand or gravel
- Contours (interval 100 feet)
- Depression contour
- Height in feet above Mean sea level

DESCRIPTIVE NOTES

The map-area lies across the Foothills belt of southern Alberta. To the northeast it extends into the comparatively flat area of the Plains, and to the southwest, into the Front Range of the Rocky Mountains. The Foothills consist of a series of low, parallel ridges that trend northwesterly and are underlain by greatly folded and faulted formations of Cretaceous age. Within the belt the more resistant sandstone members commonly occupy the ridges whereas the broader, intervening valleys are floored by shales. Within the Plains the highly deformed structures of the Foothills give place to gently east-dipping beds of the Alberta syncline. The mountainous area to the southwest is occupied mainly by Precambrian rocks that have been thrust eastward, along the low-angle Lewis fault, onto Mesozoic formations.

The Precambrian formations have been correlated with those of areas to the southwest along the International Boundary. They consist mainly of indurated sedimentary rocks and are mostly shallow water deposits. Argillaceous and quartzitic beds predominate; they are commonly cross-bedded and ripple marked and show distinctive colour variations in the different formations. Limestone is abundant in the Siyeh and is interbedded with quartzite and argillite. A bed of cryptozoan limestone, 50 feet thick, lies 750 feet from the top of the formation. Below it are other limestone beds up to 10 or 15 feet thick. The igneous rocks in the series consist of fine-grained diorite sills, a few feet thick, and basaltic flows. Vesicles in the lavas are in part filled with calcite, quartz, pyrite, and, less commonly, barite and chalcocopyrite. The thicknesses of the several formations of the series, as exposed on the ridge south of Pincher Creek, are as follows: APPEKUNNY, base not exposed, 1,600 feet; GRINNELL, 760 feet; SIYEH, 3,000 feet; basaltic lava, 350 feet; SHEPPARD, 470 feet; Members A, B, C, and D of the KINTLA, 800, 500, 1,000, and 600 feet respectively.

Middle Cambrian strata (10) overlie the Precambrian formations unconformably and carry abundant trilobite fossils in their upper beds. At the base is about 60 feet of quartzite, the lowermost 15 feet of which is quite coarse-grained and carries pebbles of quartz up to one-half inch long. Overlying the quartzite is 270 feet of mainly green shale but including several thin beds of brown-weathering sandstone in the lower 150 feet and bedded and nodular limestone in the upper part.

The Devonian and, possibly, older strata of Windsor Mountain (11) represent a series, 1,450 feet thick, of limestone and dolomite beds with three shale members 50, 20, and 10 feet thick lying 470, 650, and 1,100 feet respectively above the base. The lower shale bed contains fossil plant stems of *Hostimella* appearance. Their age is uncertain. Fossils of Middle or Upper Devonian age were found in limestone beds lying within 200 to 280 feet above the middle shale member. A calcareous sandstone composed mainly of large well-rounded quartz grains and small quartz pebbles overlies the shale and varies in thickness from a few inches to as much as 20 feet.

Formations of post-Devonian and pre-Cretaceous age (12, 13) are not exposed in the map-area, but their occurrence is indicated in the structure sections. They include a great thickness of Carboniferous limestone and shale; perhaps some Triassic beds; and the FERNIE FORMATION of Jurassic age. Dark grey shales of the Fernie were encountered in Alliance No. 1 well (sec. 11, tp. 6, rge. 2) at a depth of 5,694 feet and continued to 6,013 feet, where a fault was intersected and the drill passed into Upper Cretaceous beds.

The KOOTENAY FORMATION (14) is only partly exposed above thrust faults that bring it to the surface and its thickness could not be determined. Only 74 feet of the formation was encountered in the Alliance No. 1 well.

The BLAIRMORE GROUP (15) consists of grey and greenish grey sandstone; grey, green, and maroon shales; conglomerate, and limestone. The group and useful horizon markers include: a uniformly distributed, coarse basal sandstone, 35 to 50 feet thick, carrying scattered quartzite and chert pebbles; thin beds of limestone and hard limy shales 150 to 200 feet above the base, carrying freshwater pelecypod fossils; a conglomerate bed, up to 80 feet thick resting about 850 feet above the base and carrying chert, quartzite, feldspar porphyry, granite, and quartz. Maroon shale beds a few feet thick occur at intervals above the limy beds but are more numerous in the uppermost 200 feet of the group. Along Mill Creek in sec. 25, tp. 5, rge. 2, the Blairmore measured 1,170 feet thick.

The CROWSNEST FORMATION (16) has been mapped separately, though in this map-area its beds of tuff and agglomerate are interfingering with about equal amounts of grey and maroon sandstone and the Blairmore Group. The base of the formation is placed arbitrarily at the bottom of the lowest tuff bed. On Mill Creek, in sec. 25, tp. 5, rge. 2, the formation is 460 feet thick. On Pincher Creek it is 400 feet thick with the base not exposed. It thins markedly to the east, and on Mill Creek in sec. 12, tp. 6, rge. 2, consists of 30 feet of light grey volcanic ash and bentonite interbedded with green shale. The age of the Crowsnest, as determined from fossil plants, is probably Upper Cretaceous.

The BLACKSTONE (Lower Alberta) FORMATION (17) is about 400 feet thick. A characteristic, platy, light silvery-grey shale zone, about 100 feet thick, carrying abundant *Inoceramus labiatus* occurs 100 feet above the base. It is underlain and overlain by black, brown-weathering shale containing brown ironstone concretions. A siliceous sandstone member holding small chert pebbles and sharks teeth lies 30 feet above the base of the formation and may correspond with the Grit member in Turner Valley.

The BIGHORN (CARDIUM) FORMATION (18) has provided no index fossils in this map-area. It varies in thickness from about 40 feet on the east to over 100 feet on the west side of the area but, owing to faulting, no complete sections could be measured. Four miles west of the map-area on Castle River an unbroken section, 138 feet thick, is composed, from bottom to top, of 31 feet of hard sandy shale, 11 feet of massive quartzitic sandstone and sandy shale, 5 feet of sandy grey shale, 10 feet of hard sandstone, 8 inches of fine chert conglomerate, and 80 feet of hard grey sandy shale with black chert pebbles at the top.

The WAPIABI (Upper Alberta) FORMATION (19) is 1,500 to 1,600 feet thick. It includes two characteristic zones of dark grey shale containing numerous small fossiliferous concretions. One of these comprises the lower 500 feet of the formation; the other includes beds 750 to 850 feet above the base. Dark grey shales and sandy shales compose most of the middle and upper parts of the Wapiabi. Thin limestone and bentonite beds occur within 300 feet of the top.

The BELLY RIVER FORMATION (20) varies in thickness from about 2,500 feet on the east to about 4,500 feet on the west side of the area. The lowermost 200 feet of bedded, platy, sandstone and dark grey shale is transitional into the Wapiabi and is overlain by 800 feet of coarse, grey, cross-bedded sandstone, in beds from 30 to 80 feet thick separated by grey shale. Along the west side of the map-area bentonitic sandstone and shale are present in a zone several hundred feet thick about 3,000 feet above the base. Succeeding strata are of grey and greenish grey shales containing numerous small limy nodular concretions and interbedded with grey, brown-weathering sandstone.

The BEARPAW FORMATION (21) as exposed on Castle River is about 600 feet thick. The formation was also observed just west of the map-area south of Beaver Lake. The strata are folded and faulted and their contact with the Belly River formation was not observed.

The ST. MARY RIVER FORMATION (22) has a thickness, on Castle River, of nearly 2,500 feet. An oyster bed, four feet thick and lying above a two-foot coal seam occurs near the base of the formation. Brown-weathering sandstone overlying the oyster bed contains small rusty brown concretions. Numerous thin coal seams and beds of carbonaceous shale were observed throughout the formation. Bentonitic sandstone and shale beds occur in the central part.

Formations within the Foothills belt form parts of three large anticlines, namely: an eastern block of Wapiabi, Belly River, and Bearpaw formations containing the Castle River anticline; a central block of Blairmore to Belly River strata with the Mill Creek anticline along its eastern side; and a western block of Kootenay to Belly River formations bordered on the east by the Kootenay formation extending west to the mountain front. The principal thrust faults have a dip, near the surface, of from 45 to 60 degrees. Presumably they flatten at depth and are joined by subsidiary faults.

Two deep wells, Alberta Gas and Fuel, Castle River No. 1 and the Anglo Canadian, Castle River No. 1, in sec. 11, tp. 6, rge. 1, have been drilled on the Castle River anticline, and three wells, the Mount Royal (Weymarn No. 1) and the Weymarn No. 2, in sec. 7, tp. 6, rge. 1, and the Alliance No. 1, in sec. 11, tp. 6, rge. 2, on the Mill Creek anticline. These wells did not reach their objective, the Palaeozoic limestone, as thrust faults were encountered and the wells passed from either Jurassic or Lower Cretaceous beds back into Upper Cretaceous strata. Oil and gas shows were obtained in the Blairmore formation in Alliance No. 1 well above a thrust fault and in Belly River strata in Weymarn No. 2 well, below a thrust fault.

The western block of the Foothills belt is broken by several subsidiary thrust faults and plunges south from Turtle and Livingstone Mountains. Kelly's well, on Castle River, above the Castlemont Ranger's station, west of the map-area, is the only well drilled on this block. It is 1,500 feet deep and obtained a small flow of gas from basal Belly River strata, the formation in which the well began. A coal seam in the basal St. Mary River formation on Castle River is 24 inches thick and is of high volatile bituminous grade. Thicker seams occur in the upper part of the Kootenay formation. One of these, six to seven feet thick, composed of high volatile bituminous coals, has been mined at several localities.

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