

Structure sections along lines A-B and C-D

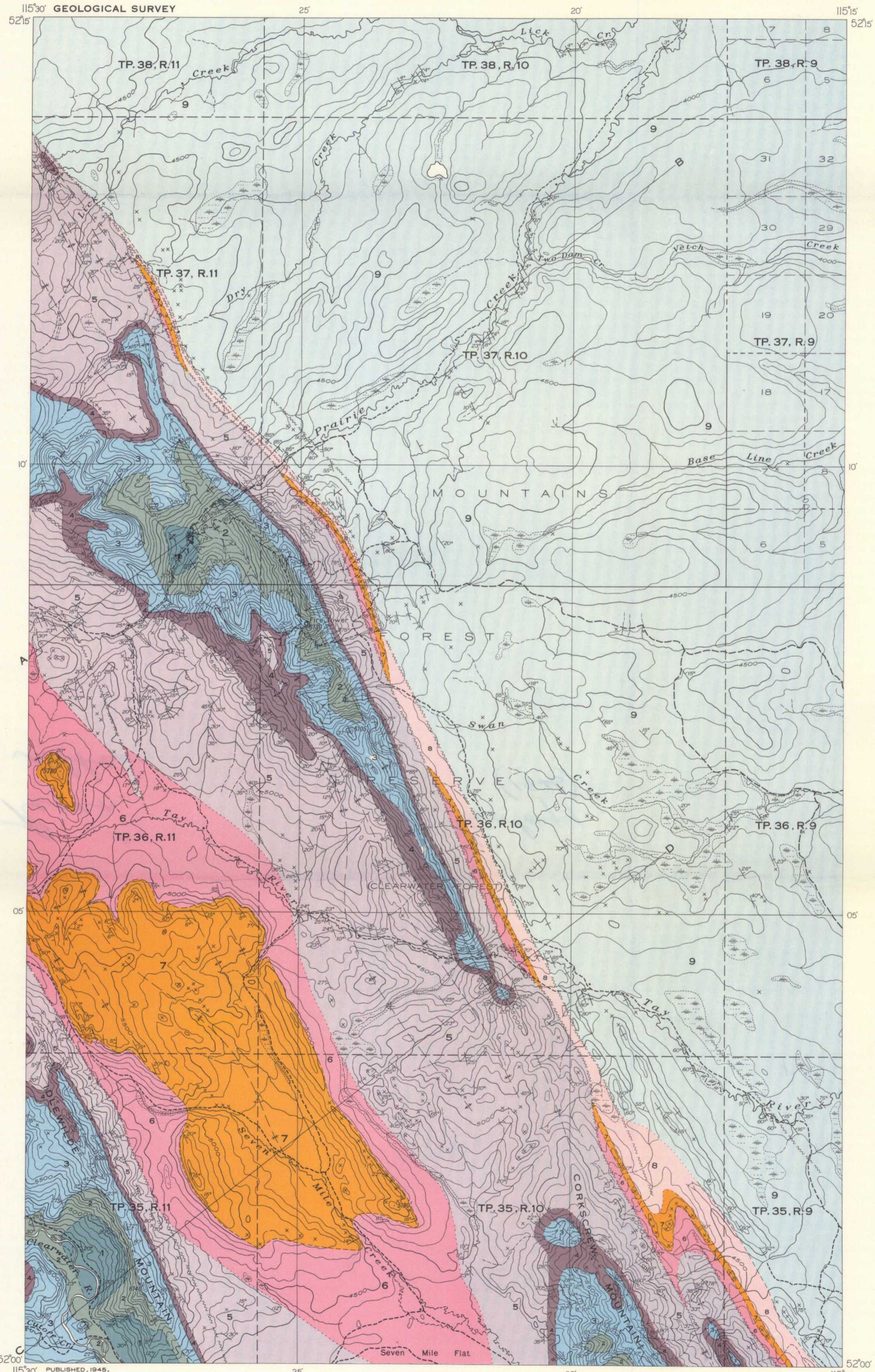
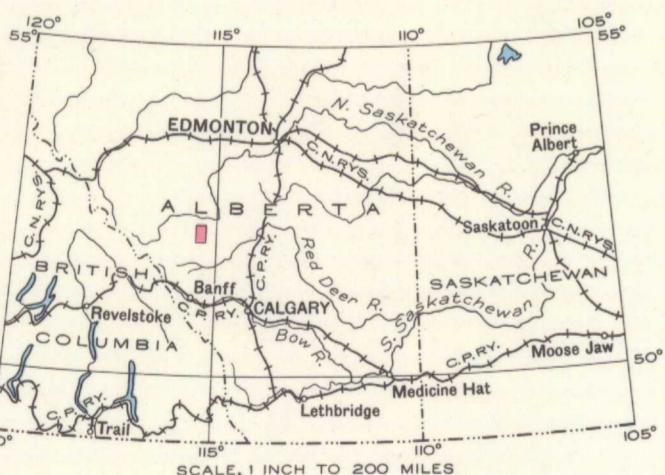
LEGEND

- CRETACEOUS**
- UPPER CRETACEOUS**
- 9 BRAZEAU and EDMONTON FORMATIONS: sandstone, shale, conglomerate
- 8 WAPIABI FORMATION: shale, minor sandstone and limestone
- 7 BIGHORN FORMATION: quartzitic sandstone, sandy shale, pebble-conglomerate
- 6 BLACKSTONE FORMATION: shale, minor thin sandstone beds
- LOWER CRETACEOUS**
- 5 BLAIRMORE GROUP: sandstone, shale, conglomerate, carbonaceous shale
- JURASSIC**
- 4 FERNIE GROUP: platy argillaceous limestone, black phosphatic limestone, cherty limestone, black fissile shale, carbonaceous shale, sandstone. May include Triassic limestone at base and some Cretaceous (Nikanassin) sandstone at top
- CARBONIFEROUS**
- MISSISSIPPIAN AND (?) PENNSYLVANIAN**
- 3 RUNDLE FORMATION: limestone, cherty limestone, argillaceous and arenaceous dolomite
- MISSISSIPPIAN**
- 2 BANFF FORMATION: dark limestone, calcareous platy shale
- DEVONIAN**
- 1 Dark limestone and dolomite

- Bedding (horizontal, inclined, vertical, overturned).....+XXX
- Bedding (direction of dip known, upper side of bed unknown).....X
- Rock outcrop (altitude of beds unknown).....x
- Fault.....~
- Anticlinal axis.....+
- Synclinal axis.....-
- Well (drilled for oil and gas).....•
- Road not well travelled.....- - - - -
- Trail and building.....- - - - -
- Abandoned building.....- - - - -
- Township boundary (surveyed).....- - - - -
- Township boundary (unsurveyed).....- - - - -
- Section line.....- - - - -
- Forest Reserve boundary.....- - - - -
- Intermittent stream.....- - - - -
- Marsh.....- - - - -
- Contours (interval 100 feet).....- - - - -
- Height in feet above Mean sea-level.....6380'

Geology by J. F. Henderson, 1943.

Base-map from surveys and topography by the Topographical Survey, 1940. Cartography by the Drafting and Reproducing Division, 1945.



MAP 840A TAY RIVER WEST OF FIFTH MERIDIAN ALBERTA

Scale, 1:63,360 or 1 inch to 1 mile
Approximate magnetic declination, 25° 15' East.

DESCRIPTIVE NOTES

The map-area has a maximum relief of about 2,500 feet, ranging from 3,900 feet above sea-level at its northeast corner to 6,380 feet on Idlewild Mountain. The topography is controlled by the structure and character of the bedrock formations. Thus, anticlinal structures, with exposed cores of resistant Palaeozoic limestone, form prominent ranges of hills, such as Idlewild and Corkscrew Mountains; intervening synclinal areas, underlain by less resistant Mesozoic sandstones and shales, are of lower relief; and nearly horizontal Mesozoic sandstones form the lowlands in the northeastern part of the map-area.

Devonian strata (1) are exposed along anticlinal crests on Prairie Creek near the oil wells, and on Idlewild Mountain. They consist, from top to bottom, of massive, dark blue-grey limestone and dolomite, with some interbedded calcareous shale.

The Banff formation (2) of lower Mississippian age, is estimated to be 600 to 700 feet thick. It is composed of buff weathering, platy, dark blue-grey limestone, shaly limestone, black calcareous shales, and occasional thick beds of light weathering blue-grey limestone.

The Rundle formation (3) is at least mainly of Mississippian age, but the uppermost beds may be Pennsylvanian. It is exposed along the crests and flanks of the major anticlines, and forms the highest and most rugged ranges. The lower and upper parts of the formation are white weathering, thick-bedded, light grey, coarse-grained limestones, with some interbedded finer grained limestone and chert. Between these massive, cliff forming beds is 125 to 150 feet of poorly exposed, buff weathering, thin-bedded, shaly limestone. The thickness of the entire formation is estimated to be about 700 feet.

Rocks included in the Fernie group (4) are divisible into two lithologic units. The lower unit consists of 100 to 150 feet of thin-bedded, fine-grained, platy, black limestone, with much interbedded chert. The beds weather buff to grey, with a hackly surface, and form conspicuous cliffs and dip slopes on the flanks of the major anticlines. A bed of fine-grained, dark, phosphatic limestone at or near the contact with the overlying shale contains fossils identified tentatively as Lower Jurassic. Apart from this phosphatic bed no fossils were found in this part of the group, and the lowermost beds may be of Triassic age. The upper unit of the Fernie group consists of fissile, black shale and sandstone. In the southern part of the map-area the shale rests on limestone, but, farther northwest, 60 feet or more of clean, fine-grained, white to buff weathering sandstone intervenes between limestone and succeeding black, fissile shale. The passage from shale to the overlying Blairmore conglomerate is abrupt in the southern part of the map-area, but to the northwest 30 feet or more of sandstone is interbedded with the shale near the contact and may represent an occurrence of Lower Cretaceous (Nikanassin) beds.

The base of the non-marine Blairmore group (5) is marked by a massive chert and quartzite pebble-conglomerate 35 to 45 feet thick. The conglomerate is overlain by coarse-grained siliceous sandstones, crossbedded dark brown sandstones, and brown carbonaceous shales. One thin coal seam outcrops on Prairie Creek near the western edge of the map-area. The upper part of the Blairmore is composed of coarse and fine-grained, greenish grey, crossbedded sandstones, olive green crumbly shales, and, near the top, maroon weathering, thin-bedded sandstones. A massive chert pebble-conglomerate as much as 30 feet thick occurs at or near the top. It is somewhat similar to the basal conglomerate, but the pebbles are smaller and less firmly cemented in a lighter grey, finer grained, and more siliceous matrix. The thickness of the Blairmore group is estimated to be at least 1,500 feet.

The Blackstone formation (6) consists largely of black marine shale, sandy shale, and some thin beds of fine-grained sandstone. The formation is poorly exposed; it is estimated to be between 1,000 to 1,300 feet thick.

The Bighorn formation (7) is 250 to 300 feet thick. It may be divided into three members: a lower member consisting of 50 feet or more of siliceous grey sandstone; an intermediate member composed of about 200 feet of soft shales and shaly sandstones; and an upper member, 20 to 30 feet thick, of siliceous sandstone similar to the lower sandstone. The lower and middle members are the upper sandstone members are hard resistant rocks that cap or form many of the higher hills and ridges.

The Wapiabi formation (8) is composed of marine shale. Only one exposure was observed, on the bank of Tay River, and the thickness of the formation is not known, but in the adjoining map-area to the west the Wapiabi shales are estimated to be about 1,500 feet thick.

The non-marine Brazeau and Edmonton formations (9) are composed of interbedded sandstone, shale, and conglomerate. The Brazeau sandstones are mainly yellowish green, brown weathering, crossbedded, medium to coarse-grained, arkosic rocks. Beds and lenses of chert pebble-conglomerate are interbedded with the sandstone and are most abundant near the base of the formation. Dark green sandy shales are also common. About 3,500 feet northeast of the Wapiabi-Brazeau contact the sandstone changes from yellow or brownish green to light grey, becomes more thickly bedded, and conglomeratic beds are rare or lacking. This change in lithology may mark the approximate boundary between the Brazeau and Edmonton formations, but is not sufficiently well defined to map. No reliable estimate of the thickness of the Brazeau and Edmonton can be made, as the structure in the area underlain by these formations is not known.

The larger anticlinal structures are possible sources of oil and gas. In the southeastern part of the map-area the Corkscrew Mountain anticline and a smaller anticline to the northeast are outlined by the Palaeozoic limestone exposed in their cores. Both structures plunge northwest and the Palaeozoic cores disappear beneath a cover of Mesozoic strata. To the southeast, beyond the limits of the map-area, the plunge reverses and the Alberta Clearwater No. 1 well has been drilled on the Corkscrew Mountain anticline about 3 miles south and 1 mile west of the southeastern corner of the map-area. Some oil and gas shows were encountered in Devonian dolomite, but no encouraging indications were reported from the pre-Devonian strata intersected at the bottom of the well.

The Ram structure is outlined by its exposed Palaeozoic limestone core to the northwest of Corkscrew Mountain and may be regarded as the northwesterly extension of the Corkscrew Mountain anticline. It consists of a nearly symmetrical anticline adjoined to the northeast by a narrow syncline and a tightly compressed anticline. A fault along the northeast limb of the structure has thrust Blairmore strata northeast over younger formations. This fault zone begins in the southeast part of the map-area along the northeast flank of the Corkscrew anticline. It extends to the northwest boundary of the area, in which direction the displacement increases so that the Ram structure is thrust over the northwesterly extension of the anticline that lies northeast of the Corkscrew anticline.

Two oil wells have been drilled on the Ram structure where it crosses Prairie Creek. Ram No. 2 well, drilled near the crest of the structure, penetrated 2,960 feet into Devonian limestones, dolomites, and shales dipping at 10 to 20 degrees. At that drilling depth the well passed into steeply dipping, in places, contorted and sheared, dark grey to black fine-grained limestones and continued in these to a drilling depth of 4,140 feet. A medium- to fine-grained, grey to reddish quartzite, dipping at 35 to 40 degrees, was intersected from 4,140 to 4,185 feet and below this to 4,330 feet the well encountered dark limy argillites and platy limestones. The quartzite and underlying argillite and limestone seem similar to strata intersected near the bottom of the Alberta Clearwater No. 1 well, which are believed to be pre-Devonian. A little oil has been obtained from Ram No. 2 well.

Ram No. 3 well penetrated Devonian limestones, dolomites, and shales to a drilling depth of 5,637 feet. The dip of the strata in the core ranges from 20 degrees to nearly vertical, and much shearing is evident in places. In the upper part of the Devonian in these two wells, at drilling depths of from 20 to 220 feet in Ram No. 2 well and from 820 to 960 feet in Ram No. 3 well, the core is a characteristic somewhat porous, brownish grey, saccharoidal dolomite. A similar dolomite was intersected at the bottom of Ram No. 3 well between drilling depths of 5,510 and 5,637 feet. If, as seems probable, this dolomite is the same as that near the surface, the Ram No. 3 well must have intersected a major fault and passed back into the upper part of the Devonian. This interpretation, which also accounts for the absence of pre-Devonian strata in Ram No. 3 well, is given in structure-section A-B.

The Idlewild Mountain structure is a northwesterly plunging asymmetric anticline with an exposed Devonian limestone core and a faulted northeast limb. Only a small part of the structure is in the map-area.

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