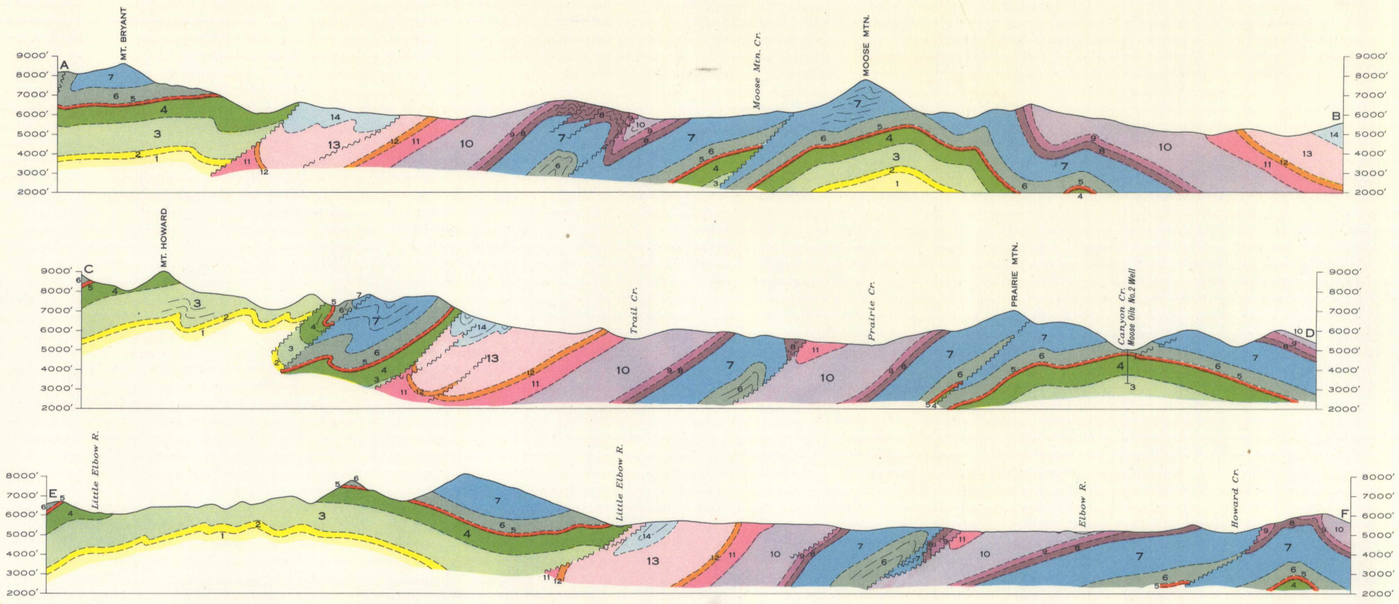
CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY



Structure sections along lines A-B, C-D, and E-F

LEGEND

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS

14 — *BELLY RIVER FORMATION: sandstone, shale, pebble-conglomerate*

13 — *UPPER ALBERTA FORMATION: shale, sandy shale, sandstone*

12 — *CARDIUM FORMATION: sandstone, sandy shale, pebble-conglomerate*

11 — *LOWER ALBERTA FORMATION: shale, sandy shale, minor sandstone*

LOWER CRETACEOUS

10 — *BLAIRMORE FORMATION: sandstone, shale, conglomerate, arkose, limestone*

9 — *KOOTENAY FORMATION: brown, grey, and black sandstone, carbonaceous shale, coal*

JURASSIC

8 — *FERNIE FORMATION: black carbonaceous and phosphatic shale, brown sandstone, minor limestone*

PALAEOZOIC

CARBONIFEROUS

MISSISSIPPIAN AND(?) PENNSYLVANIAN

7 — *RUNDLE FORMATION: massive light and dark grey limestone, black nodular cherty limestone; arenaceous dolomite and calcareous quartzite beds at the top*

MISSISSIPPIAN

6 — *BANFF FORMATION: brown to maroon weathering platy calcareous shale, argillaceous limestone, black nodular cherty limestone*

DEVONIAN

5 — *EXSHAW FORMATION: black fissile shale*

4 — *PALLISER FORMATION (Minnewanka formation; Upper Part): massive dark mottled dolomitic limestone, minor thin-bedded black limestone*

3 — *FAIRHOLME FORMATION (Minnewanka formation; Lower Part): massive light grey dolomite and dull black dolomitic limestone*

CAMBRIAN

MIDDLE CAMBRIAN

2 — *Buff weathering black limestone and light grey arenaceous dolomite*

1 — *Black limestone, dark mottled limestone, calcareous shale, limestone pebble-conglomerate*

Rock outcrop, in Upper Alberta and Lower Alberta formations ×

Outcrop of coal Coal ×

Bedding (inclined, vertical, horizontal, overturned)

Anticlinal axis (arrow shows direction of plunge)

Synclinal axis (arrow shows direction of plunge)

Fault

Fossil locality (F)

Well (oil and gas)

Well (gas, with show of oil)

Well (location or drilling)

Road not well travelled

Trail

Adit

Township boundary, surveyed

Township boundary, unsurveyed

Section line, unsurveyed

Forest Reserve or Park boundary

Intermittent stream

Marsh

Sand or gravel

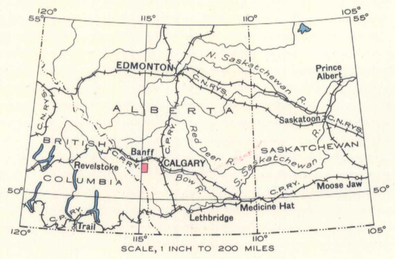
Contours (interval 100 feet)

Depression contour

Height in feet above Mean sea-level 9290'

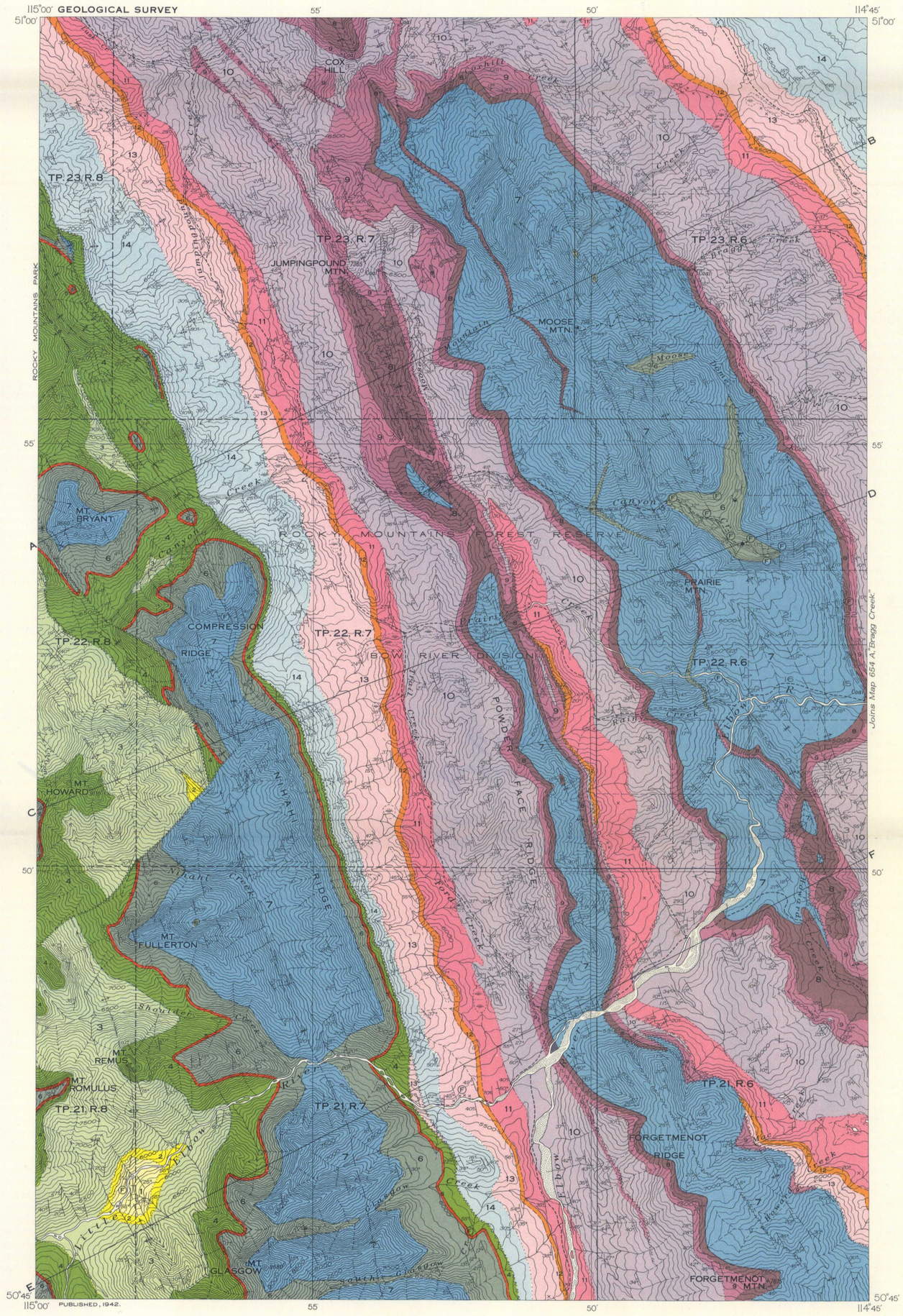
Geology by H. H. Beach, 1939, and 1940.

Base-map from surveys and topography by the Topographical Survey, 1937. Cartography by the Drafting and Reproducing Division, 1942.



SCALE, 1 INCH TO 200 MILES

115°00' GEOLOGICAL SURVEY 55' 50' 114°45'



115°00' PUBLISHED, 1942. 55' 50' 114°45'

DESCRIPTIVE NOTES

The oldest strata (1) have an exposed thickness of about 400 feet and are largely fine-grained black limestones with thin beds of calcareous shale and limestone pebble-conglomerate near the base. Similar beds were penetrated in Moose Oils No. 1 well (L.S. 16, sec. 29, tp. 22, rge. 6) below a drilling depth of 2,275 feet, and in McColl-Frontenac No. 1 well (L.S. 9, sec. 6, tp. 23, rge. 6) below a depth of 2,765 feet.

The oldest strata are overlain by a succession of beds (2) 250 to 300 feet thick, that consists of thinly bedded black limestone passing into light grey arenaceous dolomite at the top. The beds weather a distinctive buff-yellow and carry a Middle Cambrian fauna. They resemble in lithology, thickness, and stratigraphical position the Ghost River formation in the vicinity of Lake Minnewanka to the north. Similar beds were penetrated in Moose Oils No. 1 well at depths between 1,990 and 2,275 feet and in McColl-Frontenac No. 1 well between 2,494 and 2,765 feet.

The FAIRHOLME formation (3) is a new term introduced to represent that succession of strata formerly referred to, in areas to the northwest, as the Minnewanka formation (Lower Part). It is about 1,400 feet thick in the western part of the map-area, but thins eastward. Moose Oils No. 1 well passed through 1,060 feet of this formation below a depth of 930 feet. The relatively greater thickness of 1,434 feet encountered in McColl-Frontenac No. 1 well, below a depth of 1,060 feet, is considered to be due to repetition of the uppermost beds by faulting. The formation is a succession of massive, coarse-grained, light grey dolomite beds alternating with equally massive beds of fine-grained black limestone and dolomite containing abundant bulbous stromatoporoids and fragments of fossil corals and bryozoans. The dark beds predominate in the lower half of the formation. In the western half of the area several porous zones occur in the Fairholme, particularly in the grey dolomites near the top. Within the porous zones in the dark beds individual vugs are commonly filled with white calcite.

The PALLISER formation (4) is also a new term introduced to represent that succession of strata formerly referred to, in areas to the northwest, as the Minnewanka formation (Upper Part). It is composed of massive, dark brownish grey, mottled dolomite, with limestone in the central part and at the top, and is exposed in the most prominent cliffs in the western part of the map-area, where it has an average thickness of 1,000 feet. Farther east it thins to about 800 feet. It was encountered in drilling at depths of 140 feet in Moose Oils No. 1 well; 220 feet in Moose Oils No. 2 well (L.S. 8, sec. 29, tp. 22, rge. 6), and at 260 feet in McColl-Frontenac No. 1 well. Samples from these wells indicate that much anhydrite and gypsum occur near the top and in the lower third of the formation.

The EXSHAW formation (5) is a black fissile shale 20 to 40 feet thick. It has been penetrated in all wells that have entered the Devonian in this region, and forms an excellent horizon marker in drilling.

The BANFF formation (6) of Lower Mississippian age, is 550 to 575 feet thick in the central part of Moose Mountain anticline but thickens to nearly 800 feet in the western mountains. The lower two-thirds of the formation consists mainly of very thinly bedded, argillaceous limestones and calcareous shales that weather commonly deep brown or maroon. The upper third of the formation is largely a fine-grained black limestone containing layers of siliceous limestone nodules. Fossils occur abundantly in certain beds near the top of the Banff.

Most of the RUNDLE formation (7) is of Mississippian age but the uppermost beds may be Pennsylvanian. It is 1,350 feet to 1,400 feet thick in the vicinity of Moose Mountain, but thickens slightly toward the western border of the area. The lower 200 feet is black limestone. Within it are zones containing layers of siliceous limestone nodules similar to those in the Banff. The remainder of the formation is largely massive, light and dark grey, coarse-grained limestone containing abundant fossil fragments, particularly crinoid discs. The uppermost 385 feet of the Rundle consists of arenaceous dolomite, calcareous quartzite, and porous, cherty limestone. The beds bear some resemblance to those of the Rocky Mountain formation, which overlies the Rundle in areas to the northwest, but they carry an older fossil fauna typical of the upper part of the Rundle.

The FERNIE (8) is a marine formation of black carbonaceous and phosphatic shales grading upward into thinly bedded brown sandstones. It is 220 feet thick on Canyon Creek, near its mouth, and thickens to about 250 feet on Cox Hill. At most places where the contact was observed the Fernie rests upon the eroded surface of the Rundle but on Canyon Creek, about one mile above its mouth, a thin chert pebble-conglomerate intervenes. This conglomerate may have formed from the erosion of the Triassic, Spray River formation prior to the deposition of the Fernie.

The KOOTENAY formation (9) is about 320 feet thick. It is well exposed at the headwaters of Bragg Creek, on Cox Hill, and at the confluence of Canyon Creek and Elbow River. A massive, pinkish white weathering, black sandstone member, averaging 50 feet thick, is considered to mark the base of the Kootenay. The remainder consists of thinly bedded brown and grey sandstones alternating with dark carbonaceous shales and coal seams. The seams are generally less than 4 feet thick.

The BLAIRMORE formation (10) is best exposed on Elbow River in Bragg Creek map-area to the east. Other less well exposed sections occur on the western slopes of Forgetmenot Ridge. The formation is about 2,000 to 2,200 feet thick. A massive chert and quartzite pebble-conglomerate, as much as 100 feet thick, forms a conspicuous horizon marker at the base. The conglomerate is overlain by 250 to 400 feet of alternating thin beds of dark sandstone and carbonaceous shale with thin limestone beds at the top. Above these strata the upper and greater part of the formation consists mainly of massive, light greenish grey sandstones interbedded with light green and maroon weathering shales. Chert and porphyry pebble-conglomerates and arkose beds are found in the upper 300 feet of the formation.

The LOWER ALBERTA formation (11) consists of marine black shales, sandy shales, and thin sandstone beds. It has an estimated thickness of 600 feet.

The CARDIUM formation (12) is 200 to 250 feet thick. It comprises two (locally three) massive sandstone beds separated by rusty weathering sandy shales. A persistent bed of pebble-conglomerate occurs at the top of the formation.

The UPPER ALBERTA formation (13) consists of dark marine shales, with some beds of sandstone and ironstone nodules, and is less thinly bedded than the Lower Alberta formation. It is probably between 1,500 and 2,000 feet thick.

Only about 600 feet of the BELLY RIVER formation (14) is represented in the map-area. Along the mountain front the formation is cut off by a low-angle thrust fault and is partly overlain by a thick plate of Palaeozoic limestone. The exposed Belly River strata are largely massive, cross-bedded sandstones, containing fragmentary plant remains, alternating with crumbly, green weathering shales. Thin beds of pebble-conglomerate occur locally near the base.

Two anticlinal structures are of interest as regards the production of oil and gas within the map-area. One of these, Moose Mountain anticline, is roughly outlined by the area of Carboniferous strata exposed in its core. The western limb is duplicated by the Prairie Mountain thrust fault and, as a result, the structure appears to be wider than is actually the case. Toward the northern end of the area there is also some indication that the east limb of the structure is faulted.

The other structure, Forgetmenot anticline, has also an exposed Palaeozoic limestone core. The structure is longer and narrower than Moose Mountain anticline and extends southward beyond the map-area. Within the area the structure plunges northward. Its eastern limb is displaced by a westerly dipping thrust fault. The amount of the displacement increases toward the south.

There seems little possibility of appreciable quantities of oil or gas being found in Moose Mountain or Forgetmenot anticlines in rocks younger than the Devonian as all post-Devonian rocks are exposed by erosion. Moose Oils No. 2 well obtained showings of gas in the Palliser and produces a small amount of oil and gas from the upper part of the Fairholme formation. Moose Oils No. 1 and McColl-Frontenac No. 1 wells were drilled through the Palliser and Fairholme formations and into the underlying Cambrian strata. In neither well are showings of oil reported from the horizon at which Moose Oils No. 2 well produces. Showings of gas were reported from Moose Oils No. 1 well at several horizons in both Devonian and Cambrian formations and oil showings were noted near the base of the upper of the Middle Cambrian formations (2) at a depth of about 2,225 feet. Gas showings are reported in Cambrian beds at depths below 2,600 feet in McColl-Frontenac No. 1 well. Much of the Cambrian and Devonian strata has a low porosity; even where porous zones have been noted in the Fairholme formation, either in outcrops or well cores, the vugs and pores are commonly filled with white calcite.

MAP 688A

MOOSE MOUNTAIN

ALBERTA

Scale, 1/63360 or 1 Inch to 1 Mile

Miles 1 0 1 2 3

Approximate magnetic declination, 23° 45' East.