

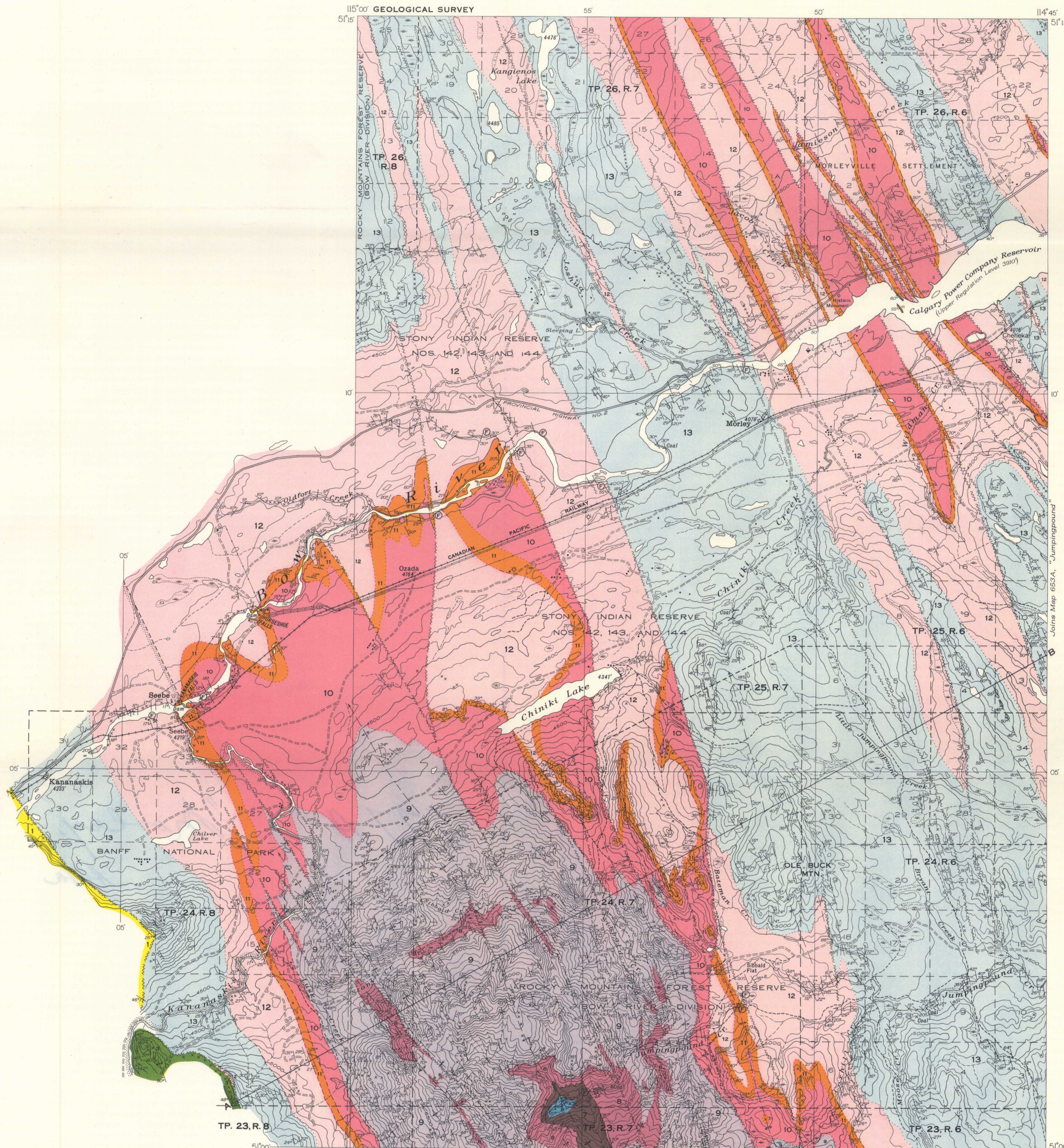
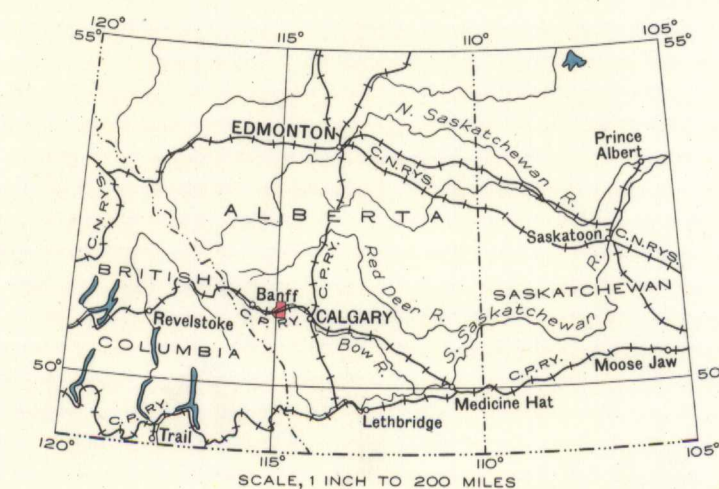
LEGEND

- CRETACEOUS**
- UPPER CRETACEOUS**
- 13 BELLY RIVER FORMATION: sandstone, shale, pebble-conglomerate; coal
- 12 UPPER ALBERTA (Wapiabi) FORMATION: shale, sandy shale, minor sandstone
- 11 CARDIUM (Bighorn) FORMATION: sandstone, sandy shale, pebble-conglomerate
- 10 LOWER ALBERTA (Blackstone) FORMATION: shale, sandy shale, minor sandstone
- LOWER CRETACEOUS**
- 9 BLAIRMORE GROUP: sandstone, shale, conglomerate, arkose, limestone; coal
- 8 KOOTENAY FORMATION: brown, black, and grey sandstone; carbonaceous shale; coal
- JURASSIC**
- 7 FERNIE FORMATION: black shale, carbonaceous shale, brown sandstone, minor limestone
- CARBONIFEROUS**
- MISSISSIPPIAN AND/OR PENNSYLVANIAN**
- 6 RUNDLE FORMATION: light grey and dull black limestone; arenaceous dolomite and calcareous quartzite
- MISSISSIPPIAN**
- 5 BANFF FORMATION (in structure section only): black argillaceous limestone, calcareous shale
- DEVONIAN**
- 4 EXSHAW FORMATION (in structure section only): black fissile shale
- 3 PALLISER FORMATION: massive dark mottled dolomite limestone, minor thin-bedded black limestone
- 2 FAIRHOLME FORMATION (in structure section only): massive light grey dolomite and dull black dolomite and limestone
- CAMBRIAN**
- 1 Massive dark limestone, dolomitic limestone

- Rock outcrop..... x
- Outcrop of coal..... Coal x
- Bedding (horizontal, inclined, vertical, overturned)..... + x x x
- Anticlinal axis (arrow indicates direction of plunge)..... - - - - -
- Synclinal axis (arrow indicates direction of plunge)..... - - - - -
- Fault..... - - - - -
- Fossil locality..... @
- Well (dry hole with show of oil)..... @
- Well (dry hole with show of gas)..... @
- Shale quarry..... x
- Provincial highway..... =
- Road and buildings..... =
- Road not well travelled..... =
- Trail..... - - - - -
- Adit..... - - - - -
- Power line..... - - - - -
- Church..... +
- School..... +
- Post Office..... +
- Cemetery..... +
- Triangulation station..... +
- Township boundary..... - - - - -
- Section line..... - - - - -
- Indian Reserve boundary..... - - - - -
- Forest Reserve boundary..... - - - - -
- Park boundary..... - - - - -
- Intermittent lake and stream..... - - - - -
- Marsh..... - - - - -
- Contours (interval 100 feet)..... - - - - -
- Depression contour..... - - - - -
- Height in feet above Mean sea-level..... 4078'

Geology by G. S. Hume, 1930; H. H. Beach, 1940.

Base-map from surveys and topography by the Topographical Survey, 1926, 1927, and 1937. Cartography by the Drafting and Reproducing Division, 1944.



MAP 777A
MORLEY
WEST OF FIFTH MERIDIAN
ALBERTA

Scale, 1 inch to 1 mile
Approximate magnetic declination, 23° 10' East.

DESCRIPTIVE NOTES

Outcrops of Cambrian and Devonian strata are confined to a large overthrust block the eastern margin of which marks the eastern edge of the Rocky Mountains at the south-western boundary of the map-area. Cambrian strata (1) form precipitous cliffs north of Kananaskis River. They are massive beds of grey weathering grey to black limestone, dolomitic limestone, and minor dolomite.

The FAIRHOLME formation (2) is not known to outcrop within the map-area but is well exposed in the first ranges of the Rockies to the west, where it has an average thickness of about 1,400 feet. The formation is known to thin eastward, being about 1,100 feet thick in Moose Mountain dome in the map-area to the south. It was penetrated in Roxana No. 1 well (L. S. sec. 18, tp. 24, r. 7) from a drilling depth of 5,420 feet to the base of the hole at 6,502 feet. Light grey, coarsely crystalline dolomite predominates in the upper part of the formation and fine grained, dull black dolomite and limestone in the lower part. Porous zones in the formation are confined largely to the grey dolomite.

The PALLISER formation (3) is approximately 1,200 feet thick in mountains bordering the map-area on the west but thins eastward and is 800 to 900 feet thick in Moose Mountain dome. The upper part of the formation was penetrated in Roxana No. 1 well below a drilling depth of 3,110 feet, but is cut off by a fault at an approximate depth of 3,730 feet. Below the fault the entire formation was intersected between drilling depth of 4,830 and 5,420 feet. The formation consists of massive beds of dark brownish grey mottled dolomite, with thin beds of fine grained dull black limestone at the top. Most of it is very low porosity.

The EXSHAW formation (4) consists of 30 to 40 feet of black fissile shale. It was reached in the Roxana No. 1 well at a drilling depth of 3,070 feet and again, beneath the fault, at 4,600 feet.

The BANFF formation (5) is not exposed in the Morley map-area. It was encountered in the Roxana No. 1 well at a depth of 2,490 feet and has an apparent thickness of 580 feet. This compares with thickness determinations made near Exshaw and on Moose Mountain dome. The formation is a dark grey to black, fine grained argillaceous limestone that grades into platy calcareous shale toward the base.

The upper part of the RUNDLE formation (6) was reached in Wabash No. 1 well (2 miles southwest of the west end of Chiniki Lake) at a depth of 1,480 feet. The entire formation was penetrated in Roxana No. 1 well between depths of 940 and 2,490 feet. This is regarded as about the true thickness of the Rundle in the central part of the map-area. The formation thickens appreciably to the west. The lower part is largely dark grey to black limestone with some coarse-grained light grey limestone. The latter predominates in the central part of the formation. Light grey arenaceous dolomite and calcareous quartzite, considered to represent the uppermost beds of the Rundle, are exposed in the core of a large anticline on Jumpingpound Creek.

No strata of Permian or Triassic age are known within the map-area and the FERNIE formation (7), of Jurassic age, rests upon the eroded surface of the Rundle. The Fernie is a marine formation of black shales, stratified with a few thin beds of limestone, grading upward into thinly bedded brown sandstones and some interbedded carbonaceous shale. Where exposed, on Jumpingpound Creek, the formation is closely folded and faulted. Thickness determinations made in the northern part of Moose Mountain map-area indicate that the Fernie is there about 250 feet thick. It undoubtedly thins to the east. It has a drilled thickness of 220 feet in the Wabash No. 1 well and in Roxana No. 1 well. Folding may have contributed to the greater thickness in the latter well.

The KOOTENAY formation (8) is exposed only in small sections of folded and faulted rocks and its thickness in this map-area could not be measured. Estimates made on Cox Hill, at the northern edge of the Moose Mountain map-area, indicate, however, that the formation is 270 to 350 feet thick, but, like the Fernie it is expected to thin eastward. A massive pinkish-white weathering, dull black sandstone averaging 50 feet in thickness is considered to mark the base of the formation. Overlying strata consist of thinly bedded brown and grey sandstones alternating with carbonaceous shales and thin coal seams.

The BLAIRMORE group (9) outcrops over an extensive area but is so folded and faulted that no reliable thickness determinations could be made. To the south, in Moose Mountain map-area, it is about 2,000 to 2,200 feet thick. A massive chert and quartzite-pebble conglomerate marks the base of the formation. This is overlain by about 250 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 shales weathering light greenish grey and, locally, maroon. Massive, coarse grained sandstones and conglomerate beds carrying pebbles of chert, quartzite, and porphyry, occur in the upper 300 to 400 feet of the formation. A thin coal seam is also present in the upper part but its stratigraphic position is not known.

The LOWER ALBERTA (Blackstone) formation (10) has an estimated thickness of 600 feet. The formation is poorly exposed and in many places its position is inferred from outcrops of the underlying Blairmore and the overlying Cardium formations. It consists of marine black shales, sandy shales, and minor thin sandstone beds.

The CARDIUM (Bighorn) formation (11) is well exposed on Bow and Kananaskis Rivers. It is 200 to 250 feet thick and 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 (Wapiabi) formation (12) is about 1,500 to 1,700 feet thick. It consists largely of dark marine shale, and sandy shale but is distinguishable from the Lower Alberta in that it is appreciably more sandy, more thickly bedded, contains many ironstone nodules in its lower and upper parts, and carries a different fossil fauna.

The BELLY RIVER formation (13) is not fully represented in the map-area. It is mainly a succession of massive, grey to greenish grey, cross-bedded sandstones alternating with crumbly green shales. Individual beds vary markedly in thickness within limited areas. Thin coal seams occur in the lower part of the formation. One of these, outcropping in a ravine 2 miles east of Chiniki Lake, has been worked intermittently. A major feature of the area is an anticlinal structure, about five miles wide, that plunges northwesterly from the south-central margin of the map-area and at least as far north as Bow River. This structure is intersected by many faults, particularly along its eastern margin. The strata within the individual fault blocks are closely folded. It is probable that in the poorly exposed areas extending westward and southeastward from Chiniki Lake the structure is even more complex than represented on the map. Investigations of outcrops and drilling samples from Roxana No. 1 well, indicate that a westerly dipping low-angle thrust fault has displaced the upper part of the major fold. The fault is encountered in the well at a depth of about 3,730 feet. Strata penetrated beneath the fault are regarded as structurally continuous with those of Moose Mountain dome.

At least six wells have been drilled in the map-area for oil and gas. None of those on Bow River flats has penetrated strata below the Blairmore group. Most of them have encountered small showings of gas but only Melbourne No. 1 well (on Bow River northeast of Morley) is reported to have had an oil showing, probably in the Lower Alberta formation. Little significance can be attached to the showing as wells in other areas have found such indications in this formation but no commercial production. Wabash No. 1 well obtained a small flow of gas from the upper part of the Rundle formation. In as much as the Rundle is exposed on Jumpingpound Creek and over extensive areas on Moose Mountain the possibilities of it yielding commercial quantities of oil are not attractive. Roxana No. 1 is the only well to have tested the Devonian formations in the map-area. It yielded small amounts of gas and a flow of salt water. No oil showings are reported.

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