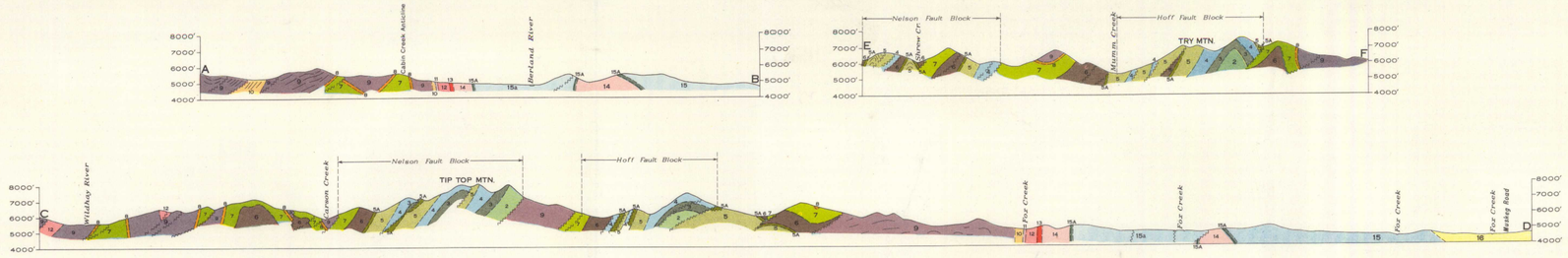
CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH

GEOLOGICAL SURVEY OF CANADA

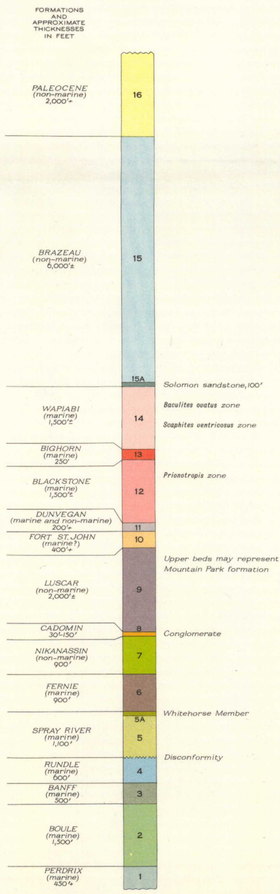


Structure-sections along lines A - B, C - D, and E - F

LEGEND

GENERALIZED COLUMNAR SECTION

SCALE, 1 INCH TO 2,000 FEET



CENOZOIC

TERTIARY

PALEOCENE

16 — *Mainly sandstone and shale*

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS

15, 15A — *BRAZEAU FORMATION: sandstone, shale, conglomerate; minor coal seams and ash beds;* **15A**, *zone of intense faulting;* **15A**. *Solomon sandstone member at base of Brazeau formation*

14 — *WAPIABI FORMATION: shale, sandy shale*

13 — *BIGHORN FORMATION: hard sandstone, sandy shale, shale*

12 — *BLACKSTONE FORMATION: shale, sandy shale, calcareous siltstone*

11 — *DUNVEGAN FORMATION: hard sandstone, sandy shale*

LOWER CRETACEOUS

10 — *FORT ST. JOHN GROUP: shale, sandy shale*

9 — *LUSCAR AND (?) MOUNTAIN PARK FORMATIONS: sandstone, sandy shale, shale, carbonaceous shale, fine conglomerate, coal*

8 — *CADOMIN FORMATION: hard, massive conglomerate*

7 — *NIKANASSIN FORMATION: hard sandstone, sandy shale, black shale*

JURASSIC

6 — *FERNIE GROUP: black shale, minor quartzitic sandstone, some limestone beds*

TRIASSIC

5, 5A — *SPRAY RIVER FORMATION: siltstone, sandstone, calcareous siltstone*
5A. *Whitehorse member: mainly limestone*

PALAEOZOIC

CARBONIFEROUS

MISSISSIPPIAN

4 — *RUNDLE FORMATION: limestone and dolomite, abundant small chert masses*

3 — *BANFF FORMATION: calcareous shale and thin-bedded limestone*

DEVONIAN

UPPER DEVONIAN

2 — *BOULE FORMATION: limestone and dolomite, abundant small chert masses*

1 — *PERDRIX FORMATION: calcareous shale, thin-bedded limestone and dolomite*

Small rock outcrop, area of outcrop

Note: outcrops not shown in the mountain zone

Bedding (inclined, vertical, overturned)

Fault (position defined, position approximate)

Fault (assumed)

Anticlinal axis

Synclinal axis

Fossil locality

Coal outcrop

Approximate trace of coal seam

Building

Road not well travelled

Bush road or trail

Triangulation station

Intermittent stream

Marsh

Sand or gravel

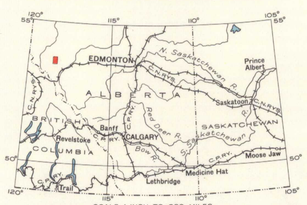
Contours (interval 100 feet)

Height in feet above mean sea-level ...7983

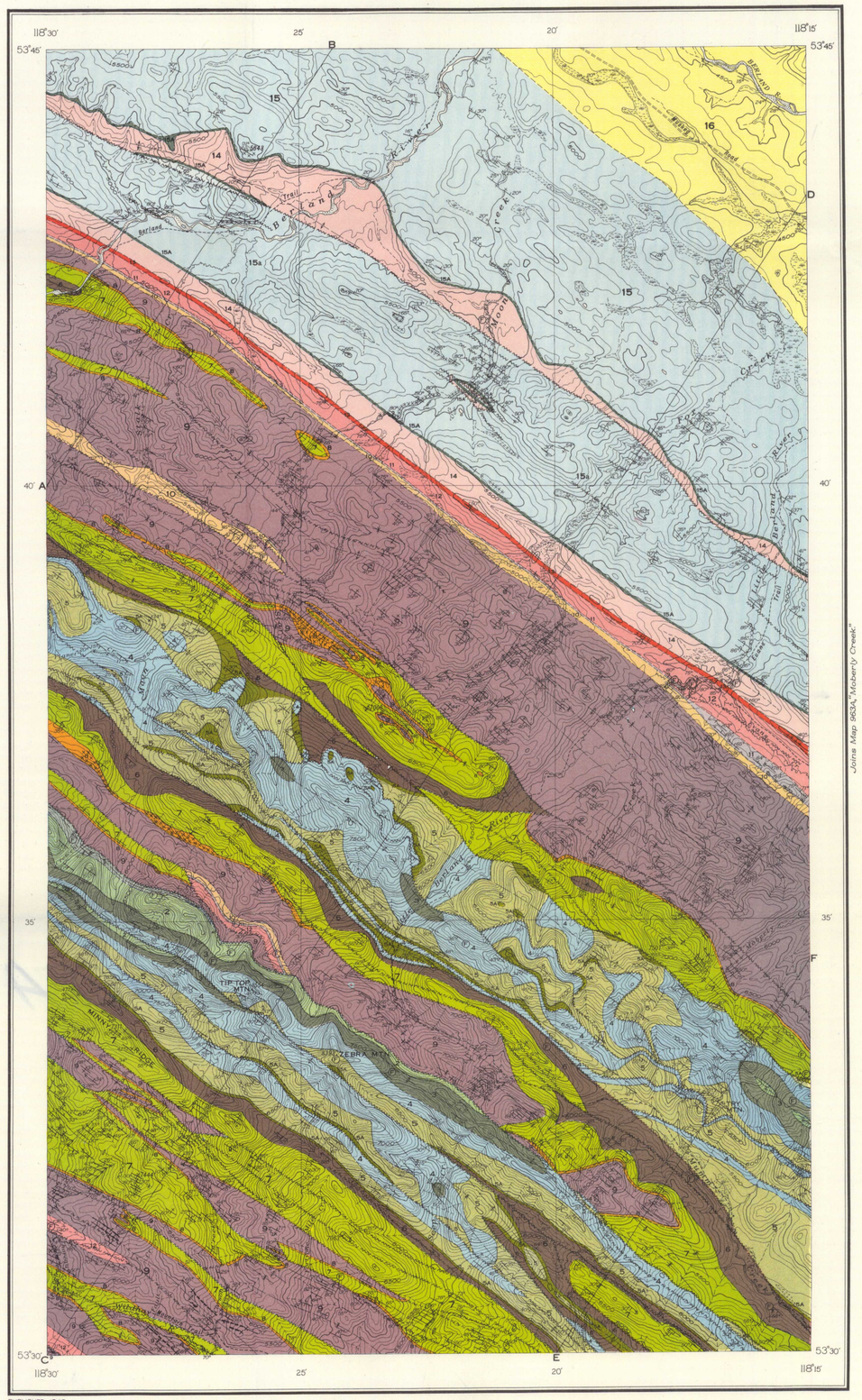
Geology by E. J. W. Irish, 1946, 1947.

Base-map from surveys by the Topographical Survey, 1943, 1944. Compiled by the Topographical Survey, 1946, with air photographs taken in 1943. Cartography by the Geological Mapping Division, 1948.

Approximate magnetic declination, 27°½ East.



SCALE, 1 INCH TO 200 MILES



PUBLISHED, 1949.

MAP 968A

MOON CREEK

WEST OF SIXTH MERIDIAN

ALBERTA

Scale: One Inch to One Mile = 1/63360

Miles

DESCRIPTIVE NOTES

The northeast corner of Moon Creek map-area is accessible by road from Entrance on the Canadian National Railways. Other parts of the area are reached by pack trails that follow Wildhay River, Moberly Creek, and Berland and Little Berland Rivers. Most of the larger valleys are sufficiently open to permit travel with pack-horses even where no cut trails exist.

The map-area includes both mountains and foothills, and these form a series of northwesterly trending ridges, with intervening valleys. Two mountain ridges cross from the southeast corner to the western boundary and divide the area into three topographic units. About one-half of the area lies northeast of these ridges, and a little more than one-quarter to the southwest.

Typical foothills occupy the northeastern division, which is underlain, for the most part, by strata of Cretaceous age. The ridges here are generally rounded, and where not burned are timbered to the top. Valleys between the ridges are relatively wide, with gentle slopes. Structural deformation and relief increase progressively southwestward from the northeast corner of the map-area to where the foothills merge with the mountain ridges. The mountain division is about 5 miles wide, and consists of two parallel thrust blocks forming two ridges of Palæozoic strata separated by Cretaceous beds. The more easterly of these ridges is referred to as the Hoff fault block, and the more westerly as the Nelson fault block. The mountain division is characterized by very rugged topography with steep to precipitous northeasterly slopes and more gentle dip slopes to the southwest. Relief here is about 3,000 feet, with an average elevation, for the mountains, of 7,000 feet, though some peaks reach to more than 8,500 feet above sea-level. Southwest of these mountain ridges, and northeast of the Rocky Mountains proper, elevations are about 1,000 feet lower than those of the bordering ranges on either side, and when viewed from these higher elevations this part of the map-area appears as a basin-like depression about 5 miles wide. It is traversed by well-defined ridges parallel with the mountain blocks, and is underlain by strata of early and late Mesozoic age.

The map-area is underlain by marine and non-marine sedimentary strata, ranging in age from Devonian to Paleocene. These strata have been greatly deformed by northwesterly trending folds, and by great thrust faults striking about parallel with the axes of the folds. As a result, the formations are, in general, exposed in long, relatively narrow, northwesterly trending bands. The two thrust fault blocks that form the mountain belt bring to the surface Upper Devonian formations, the oldest exposed in the area. Carboniferous, Triassic, and Jurassic strata are also exposed on these ridges, whereas to the northeast and southwest bedrock formations become increasingly younger.

Outcrops are plentiful in the mountains and on some of the higher ridges, but elsewhere are found chiefly in stream beds and on the tops of ridges. Northeast of the mountains, outcrops are generally scarce. The positions of contacts and structures in much of the map-area can, therefore, only be inferred from limited outcrop data, and probably many more faults and minor folds are present than are indicated on the map.

The oldest exposed strata in the map-area are those of the PERDRIX formation (1), and consist of thin-bedded, grey to brownish grey, light buff weathering, calcareous shales, with some interbedded thin limestone and dolomite beds. They outcrop along the base of the scarp of the Nelson fault block from the head of Little Berland River northwest to and beyond the boundary of the map-area. The exposed strata range in thickness from a few feet or less near the middle of the map-area to about 400 feet near the western border. The formation is fossiliferous.

The succeeding BOULE formation (2) occurs as a band along the fault scarp of the Nelson fault block from about the middle of the area to the west boundary. Two smaller exposures occur where the anticlinal fold of the Hoff fault block has been cut through by small, southwest-flowing branches of Mumm Creek. The Boule consists of about 1,500 feet of limestone and dolomite; the upper 1,100 feet is thick bedded to massive, and the lower 400 feet more thinly bedded, with minor interbeds of calcareous shale. Both divisions consist of dark grey to black, light grey weathering limestone and dolomite containing small chert nodules and scattered fossils.

The BANFF formation (3), of Mississippian age, conformably overlies the Boule limestone and dolomite, and good exposures occur in both the Nelson and Hoff fault blocks. It consists of relatively thin-bedded, grey to black, argillaceous limestone and calcareous shale, with thin interbeds of grey limestone. The formation weathers light brown or buff, and forms gentle talus slopes of characteristic shaly to platy debris. It ranges in thickness between 470 and 600 feet, and is very fossiliferous.

The succeeding RUNDLE formation (4) of limestone and dolomite overlies the Banff formation conformably, and is well exposed in several bands on both mountain ridges. Within the map-area it is separable into three lithological divisions: the lower 22 feet consists mainly of thick-bedded to massive, light grey weathering limestone; the middle division comprises 200 to 235 feet of relatively thin-bedded dolomite, with some limestone and shaly beds; and the upper division, about 200 feet thick, is predominantly thick-bedded, ash-grey weathering, grey to brown dolomite, containing numerous thin bands and lenses of chert. The upper and lower divisions are cliff forming. Fossils are not plentiful.

The SPRAY RIVER formation (5) overlies the Rundle disconformably, and has, at its base, a conglomerate from 6 inches to 2 feet thick composed of subangular pebbles of limestone similar to the Rundle. The bulk of the formation consists of a succession of hard, grey, very thin-bedded, slabby, reddish brown weathering siltstones and sandstones, which become calcareous toward the top. These strata are about 1,000 feet thick, and occupy large areas of both of the mountain blocks. The Whitehorse member (5A), at the top of the formation, consists of between 80 and 150 feet of grey to chalky white, buff to cream weathering limestone. Poorly preserved fossils occur in it and in the uppermost underlying strata.

The FERNIE group (6) is generally poorly exposed, but occupies long, narrow bands on the southwest sides of the two mountain blocks, and smaller areas on the northeast side of the Hoff fault block and in the core of the Cabin Creek anticline, where it crosses Berland River. The lower part of the group consists of black, fissile shale containing numerous concretionary, ironstone bands. Upward in the formation the shale becomes interbedded with more sandstone, and at the top, hard, grey sandstone is the predominant rock type. The Fernie grades into the overlying Nikanassin formation, and for purposes of field mapping the contact has been placed at the base of the first, 20-foot bed of massive, quartzitic sandstone. Fossils occur throughout the lower half of the group.

The NIKANASSIN formation (7) occupies extensive parts of the map-area to the northeast and southwest of the two mountain blocks, and also between them. The best section, 900 feet thick, is exposed where Berland River cuts through the Cabin Creek anticline. The strata consist of marine and non-marine, hard, grey, light buff weathering sandstone, with some interbedded shale. A few, thin, coaly beds are present in the upper part of the formation.

Overlying the Nikanassin is the CADOMIN formation (8), which occurs as long, narrow, sinuous bands, and as small remnants in the area of Lower Cretaceous rocks southwest of the Nelson fault block, northeast of the Hoff fault block, and between the two mountain blocks. It is a hard, closely packed, and well-cemented conglomerate composed of pebbles of black, green, grey, brown, and red chert, and pink, green, and white quartzite. These are generally from ½ inch to 3 inches in diameter. The formation ranges in thickness between 30 and 100 feet.

The LUSCAR and (?) MOUNTAIN PARK formations (9) conformably overlie the Cadomin conglomerate. Luscar strata occupy a wide, northwest-trending belt on the northeast side of the Hoff fault block. Within it are small areas of Nikanassin and Cadomin rocks. Another narrow strip of Luscar beds lies between the two mountain ridges. Luscar strata also underlie about one-half of the area to the southwest of the Nelson fault block. The formation consists of non-marine, fine- to medium-grained, thin-bedded, greyish green and buff weathering, grey, brown, and greenish sandstone; grey, greenish grey, and black shale; coal seams from 6 inches to 50 feet thick; and scattered, thin ironstone bands in black shale. The lower 150 feet of the formation contains several conglomerate beds or lenses up to 6 feet thick, with pebbles similar to, but much smaller than, those of the Cadomin formation. The Luscar is roughly 2,000 feet thick, is poorly exposed, and is usually contorted. Sandstone beds of the upper part of the map-unit (9) may represent the Mountain Park formation, but their separation from the Luscar has not been attempted. Plant fossils are abundant.

Lying conformably between the Luscar and Dunvegan formations is about 400 feet of black, fissile shale and sandy shale that is thought to represent a thin, southwesterly extension of the FORT ST. JOHN group of Peace River district. Everywhere in the map-area this shale (10) is greatly contorted and sheared, and no recognizable fossils were obtained from it. Poor exposures occur on Little Berland River and Moon Creek, and probably indicate the presence of a narrow belt of Fort St. John shale extending across the map-area. Above this belt on Moon Creek are two other areas of black shale that have been mapped as Fort St. John. The only other recognizable exposure lies between the headwaters of Moon Creek and Little Berland River.

The DUNVEGAN formation (11) overlies the Fort St. John shale, and extends as a narrow band of nearly vertical strata from southeast to northwest across the map-area. Another small exposure occurs between the headwaters of Moon Creek and Little Berland River. The formation consists of bands of hard, grey, quartzitic sandstone, up to 50 feet thick, separated by softer, grey sandstone; dark grey, nodular, fine-grained sandstone; and grey shale. The thickest exposure in the map-area, on Little Berland River, measured 190 feet, but is not a complete section. Both marine and non-marine fossils occur sparingly.

The Dunvegan formation is overlain by a succession of thin-bedded, black, silty shales and black, fissile shales that are referred to the BLACKSTONE formation (12) in consonance with the nomenclature of southern Alberta, though they are not the exact equivalents of the Blackstone farther south. They occupy a belt extending northwesterly from the east to the west border of the map-area just northeast of the large area of Luscar strata; small exposures also occur between the two mountain blocks, and in the southwest corner of the map-area. The formation consists almost entirely of black, fissile, marine shale, with minor interbeds of yellow weathering, concretionary, discontinuous ironstone beds up to 1½ feet thick. The formation is poorly exposed, and is intricately folded and faulted. Its approximate thickness ranges between 1,500 and 1,800 feet. Fossils are poorly preserved because of shearing.

The BIGHORN formation (13) occupies a narrow belt of nearly vertical beds extending from southeast to northwest across the map-area. It outcrops best on Little Berland River, where about 240 feet of strata are exposed, consisting of two bands of hard, thick-bedded sandstone, each about 60 feet thick, separated by 120 feet of softer sandstone and shale. The higher strata of the upper sandstone carry *Cardium soupercilum*. Between the lower massive sandstone and the Blackstone shales is a variable thickness of thin sandstone beds and interbedded shale, which is included with the Bighorn formation in conformity with the common practice of including passage beds with the overlying formation.

Lying conformably above the Bighorn is the marine WAPIABI formation (14), which underlies two nearly parallel zones extending from southeast to northwest in the foothills northeast of the two mountain blocks. It consists of about 1,500 feet of black, silty shale and black, fissile shale, with some interbeds of sandstone and of concretionary ironstone.

Overlying the Wapiabi is the BRAZEAU formation (15) of late Upper Cretaceous age. The Solomon sandstone member (15A) at the base is an excellent horizon marker, consisting of 100 feet of distinctive, slabby, buff weathering, grey to greenish grey, hard sandstone. Most, if not all, of this member is of marine origin. The typical pebble-conglomerate of the formation is separated from the Solomon member by about 100 feet of soft, coarser grained, greenish sandstone and sandy shale. Above the conglomerate the formation consists of about 4,800 feet of interbedded sandstone and shale, with minor amounts of conglomerate, a few ash beds, and a few thin coal seams.

No fossils were collected from the Upper Cretaceous, Brazeau formation in the map-area, and as no outcrops of the basal Paleocene (Entrance) conglomerate could be found, the position of the Cretaceous-Paleocene contact is uncertain, but is assumed to be approximately as shown along its northwesterly continuation from the adjoining Moberly Creek map-area.

Moon Creek map-area is notable for: (1) the regularity of the strike of all structural features, which is about north 50 degrees west; (2) the great number of strike thrust faults, and the regularity of their traces on the surface. In general, the marine shale formations such as the Fernie, Blackstone, and Wapiabi, together with the non-marine Luscar formation, were the incompetent members of the sedimentary sequence, and show intense crumpling and shearing wherever they are exposed. The more competent formations are faulted rather than folded.

Coal seams ranging in thickness from a few inches to 50 feet occur in the Luscar formation in the southwest part of the map-area. Some prospecting was carried on in this district for a few years after 1916, but no mines were developed. According to old analyses, the coal is of high-grade bituminous rank, and it would appear that a large tonnage is available, but the area is yet relatively inaccessible so far as mining is concerned. No significant coal was observed in the Brazeau or Paleocene strata in the map-area, but this may be due to paucity of outcrops.

No wells have been drilled for oil or gas within the map-area. Attention may some day be given to the Cabin Creek anticline and another anticlinal fold to the northeast. In the Cabin Creek structure the Devonian strata are the only possible source rocks, as all younger formations are exposed.