



- LEGEND**
- PLEISTOCENE AND RECENT**
- 30 Sand, gravel and alluvium
- CRETACEOUS**
- 29 BRAZEAU FORMATION: greenish grey sandstone, conglomeratic sandstone and shale
- 28 WAPAHKI FORMATION (Upper part): 28a, lower part, greenish grey sandstone; 28b, upper part, grey mudstone and siltstone
- 27 WAPAHKI FORMATION (Lower part): silty, concretionary, black mudstone, shale and siltstone
- 26 CARDIUM FORMATION: dark grey, fissile, silty, concretionary shale and siltstone
- 25 BLACKSTONE FORMATION: dark grey, fissile, silty, concretionary shale; siltstone
- 24 LOWER CRETACEOUS MOUNTAIN PARK FORMATION (?): greyish green sandstone and siltstone
- 22-23 LUSCAR FORMATION: 22, lower member: silty mudstone, siltstone and sandstone; coal in Pocahontas basin; 23, upper member: sandstone, siltstone, silty mudstone; coal in Foothills
- 21 CADOMIN FORMATION: chert and quartzite-pebble conglomerate and conglomeratic sandstone
- LOWER CRETACEOUS AND JURASSIC**
- 20 NIKANASSIN FORMATION: dark grey, silty mudstone, siltstone and sandstone
- JURASSIC**
- 19 FERNIE GROUP: dark grey to black shale and silty, concretionary shale; light to medium brownish grey, fine-grained sandstone and gneissite. Undivided and includes Upper Fernie shales, Rock Creek member, Toarcian shales and Nordegg member; west of Miette Range also includes 'Grey Beds' and 'Green Beds'
- TRIASSIC**
- 18 SPRAY RIVER FORMATION (17, 18)
- 17 WHITEHORSE MEMBER: light grey, dolomitic siltstone and sandstone; red, green and buff mudstone and siltstone; breccia
- 16 SULPHUR MOUNTAIN MEMBER: dark grey, thin-bedded siltstone and silty mudstone
- PERMIAN AND/OR PENNSYLVANIAN**
- 15 ROCKY MOUNTAIN FORMATION: massive chert and cherty, light grey sandstone
- MISSISSIPPIAN**
- 14 RUNDLE GROUP (14, 15)
- 14 Undivided Formation D: buff, dense, cherty dolomite and argillaceous dolomite; Formation C: greyish brown, fine- to coarse-crystalline, thick-bedded, porous dolomite with relics of fine- to medium-grained, organic calcarenite
- 13 BANEFF FORMATION: dark grey, fine-grained, argillaceous, thin-bedded, nodular limestone; dark brownish grey, thin-bedded to fissile, calcareous shale; thin interbeds of argillaceous organic calcarenite
- 12 EXSHAW FORMATION: black, cherty, fissile shale; brown, fine-grained, quartz sandstone
- DEVONIAN**
- 11 PALLISER FORMATION: dark grey, crypto- to fine-crystalline, massive, mottled, dolomitic limestone; calcarenite; argillaceous calcarenite
- 10 ALEXO FORMATION: yellowish grey, calcareous siltstone; crypto-crystalline limestone; breccia; dolomite
- 9 FAHOLME GROUP (5-9)
- 9 MOUNT HAWK FORMATION: dark grey, argillaceous, thin-bedded, fine-crystalline limestone; calcareous shale
- 8 SOUTHEAST FORMATION: massive, light grey, crypto- to fine-crystalline limestone; in part calcarenitic, dolomitic. Fairly equivalent to 7 and 9, i.e., medium brownish grey, fine-crystalline, crystalloblastic, massive, non-organic dolomite
- 7 PERDRIX FORMATION: dark grey to brown, fissile shale; calcareous mudstone; thin-bedded, argillaceous limestone
- 6 CAIRN FORMATION: massive, brown, fine- to medium-crystalline, cherty dolomitic limestone and calcareous dolomite with Amphipora and stromatopora; equivalent to 5 and part of 7
- 5 Undivided MALIGNÉ FORMATION: dark grey, fine-crystalline, thin-bedded limestone, and FLDME FORMATION: dark grey to brown, fine- to medium crystalline, cherty, dolomitic limestone with Amphipora and stromatopora
- LOWER ORDOVICIAN AND/OR UPPER CAMBRIAN**
- 4 Medium-bedded, light grey, fine- to medium-crystalline dolomite; thin-bedded, grey to brown, finely laminated, argillaceous, silty dolomite; dolomitic limestone; siltstone; intraformational conglomerate
- CAMBRIAN**
- UPPER CAMBRIAN**
- 3 Upper part: thin-bedded, cross-bedded, orange to yellowish grey, dolomitic siltstone and fine-grained sandstone; lower part: thin-bedded, pale green and maroon mudstone; green, argillaceous dolomite; with salt crystal pseudomorphs (trilobite coquina)
- MIDDLE CAMBRIAN (?)**
- 2 Massive, grey, crypto-crystalline, dolomitic, mottled and banded limestone
- MIDDLE CAMBRIAN**
- 1 Grey, thin-bedded and banded, argillaceous limestone; green, very thin-bedded shale and argillite; grey calcareous mudstone



**DESCRIPTIVE NOTES**

The Miette area lies in the Foothills and Front Ranges of the central Alberta Rocky Mountains. Several west-dipping thrust sheets, some of which are folded and faulted, occur within the area. From northeast to southwest the important thrusts and overlying thrust sheets are: Folding Mountain, Boule, Nikanassin, Miette, McConnell, Rocky River, Greenock and Colin. The thrust faults are generally parallel or subparallel to the bedding, with the thrust sheets displaced northeastward relative to underlying units.

The Perdrix, Mystery Lake, Drinnan and Ashlar thrust faults and related folds form a structural complex southwest of the Boule thrust. The faults are thought to merge with the Boule thrust. Another structural complex within which structures are overturned westward, occurs along the Miette Range where the McConnell thrust fault bifurcates and decreases in stratigraphic throw. These westward overturned folds, the Moosehorn fold, and those along Makwa Ridge probably originated through rotation about a horizontal axis. This rotation may have resulted from movement above fault surfaces which are concave upward or from structures developing beneath part of a pre-existing thrust surface, or by later tilting of an underlying thrust sheet. On the west side of Miette Range, the Disaster Point thrust and one other thrust to the northeast, both originally west dipping, have been rotated into their present east dipping attitudes.

Near the east boundary of the area, the Nikanassin thrust is folded, as is a minor splay and the related Fiddle River thrust fault. The Cambrian argillaceous unit (1), more than 450 feet thick, has yielded Zancanoides and cf. Glossopora above the McConnell thrust 4 miles southeast of Utopia Mountain. The resistant Cambrian limestone unit (2) in gradational contact with unit 1 is between 300 and 500 feet thick with a limestone conglomerate at the top. Cambrian unit (3) lies discontinuously above unit 2. It is between 500 and 600 feet thick and consists of a lower khaki dolomitic shale which contains concretionary trilobite remains at the base, with a distinctive maroon bed near the middle, and an upper siltstone unit. Near the southern boundary of the area, a limestone shale unit above the McConnell fault and not present elsewhere in the area yielded fragments of Kormogonius, cf. Madocia and other trilobites.

Over thousand one hundred feet of silty dolomites (4) above the Colin thrust exhibit shallow water features. Because of their stratigraphic position and lithological similarity to strata above Lake which contain Bellefontina (Harker et al., 1954) these beds are probably Lower Ordovician or older. A few feet of similar rocks occur beneath the Devonian on Clingwood Mountain.

A regional angular unconformity occurs at the base of the Devonian although angular discordance is not evident in local exposures of the contact. Thicknesses of the Flume and Maligne formations (5) vary from 100 to 200 feet, and from 30 to 100 feet respectively. The thickness of the Perdrix formation (7) varies between 0 and 400 feet, and that of the Mount Hawk (9) between 0 and 600 feet. A small carbonate complex (7e) occurs for approximately 5 miles along the Miette Range above the McConnell and Miette thrusts immediately south and southeast of Miette Hot Springs. Near the centre of this carbonate mass the Cairn formation (6) is 680 feet thick and the Southeast formation (8) is 530 feet thick. The Cairn formation consists of three lithological units: a thin basal limestone, a middle cherty stromatopora limestone, and an upper non-cherty stromatopora and Amphipora limestone with minor limestone. The lower two units can be traced into the Flume formation. The Southeast formation is divisible into four members: two dense limestones, separated by coral beds overlying silty limestone. All members grade laterally into the Mount Hawk formation. The Cairn-Southeast contact is gradational through approximately 50 feet. The basal part of the Southeast contains thin shales with Amphipora and stromatopora; the upper part extends laterally northwest and east beyond the limits of the Cairn formation to Rocky Miette and the Nikanassin Range. A porous dolomite (8a) occurs southeast of Utopia Mountain and is the stratigraphic equivalent of the lower, dense limestone of the Southeast formation and possibly the upper part of the Cairn formation. The Alexo formation (10) varies markedly in thickness, being about 600 feet on Mount Colin and less than 100 feet on the Jacques, Miette and Fiddle Ranges. The Palliser formation (11) is between 600 and 800 feet thick. All contacts within the Upper Devonian appear conformable though the Alexo formation may overlie Mount Hawk and Southeast formations discontinuously.

The Exshaw formation (12) overlies the Palliser discontinuously and varies in thickness from 7 feet near the north end of Ashlar Ridge to 14 feet on the Miette Range. West of the Rocky River only the thin basal sandstone is present. The Banff formation (13) overlies the Exshaw with discontinuity. It is about 550 feet thick, and is divisible into a lower 400 feet of recessive-weathering shales and argillaceous limestones, up to 50 feet of interbedded crinoidal and argillaceous limestones, 150 feet of argillaceous limestone with thin interbeds of crinoidal limestone, and a 5- to 30-foot siltstone and silty limestone at the top. Rundle group conformably overlies Banff formation. Formations A and B of the Rundle group (14) vary in thickness from 40 to 180 feet and from 260 to 300 feet respectively; formations C and D of the Rundle group (15) vary from 75 to 200 feet and from 150 to 350 feet respectively. Formations A, B, C and D are in part or wholly equivalent to the Peabody Shales of Turner Valley and Mount Head formations of the Rundle group of southern Alberta. All contacts are apparently conformable. The thickness of the Rocky Mountain formation (16) varies from 0 on the Miette Range to 165 feet on the Jacques Range, contact with Rundle group probably discontinuous. A thin pebble-conglomerate occurs locally at the base.

The Rocky Mountain formation is overlain discontinuously by the Sulphur Mountain member (17) of the Spray River formation which varies between 450 and 600 feet thick. The Whitehorse member (18) varies from about 250 feet thick on the Nikanassin Range to about 1,000 feet thick (graphic calculation) southeast of Jacques Creek.

The Whitehorse member is overlain discontinuously by strata of the Fernie group (19). It is between 700 and 850 feet thick and can be divided into the following units: Nordegg member, 25 to 50 feet thick; 'Paper shales' about 50 feet thick; Rock Creek member, 250 to 350 feet thick; 'Grey beds' about 50 feet thick; 'Green beds' about 25 feet thick; and upper Fernie shales with thin siltstone interbeds, approximately 150 feet thick. The 'Green beds' contain Amphipora in the Rocky River outcrops. East of the Miette Range, 'Grey beds' are absent, and 'Green beds' only occur locally in a tributary of Moosehorn Creek and on Folding Mountain.

The upper contact of the Fernie group is gradational with the Nikanassin formation (20) which is about 900 feet thick on Folding Mountain, increasing to 1,800 feet (graphic calculation) near Sulphur Creek. The Cadomin formation (21) is between 10 and 30 feet thick. The Luscar formation which is about 2,000 feet thick, occurs conformably above the Cadomin conglomerate. It can be subdivided into a lower and an upper unit, each about 1,000 feet thick. The lower unit (22) is coal bearing on the Pocahontas anticline. A distinctive sandstone and conglomerate sandstone occurs at the base of the upper Luscar. Thin coal seams occur both above and below this sandstone in the Foothills. Mountain Park (24) strata may occur in the Foothills but beds assigned to this formation may belong to the upper part of the Luscar formation.

Alberta group strata are generally poorly exposed. Blackstone formation (25) is greater than 1,200 feet thick, and a thickness of 1,600 feet has been used in the structure cross-sections. Cardium formation (26) is 290 feet thick on a tributary of the Gregg River immediately east of the map-area. At this locality the lower part of the Wapahki formation (27) is 1,700 feet thick and the upper Wapahki formation (28) is 150 feet thick (including the Solomon sandstone). The Brazeau formation (29) is poorly exposed and probably only the lowermost 1,000 feet occur in the Brazeau syncline. All contacts within the Alberta group are apparently conformable.

Coal occurs near the middle of Luscar formation especially in the east half of the area. No sites favourable for strip mining of the coal were found. One well, Jasper No. 1, sec. 19, T. 47, R. 24, W. 5th, penetrated the west flank of the Folding Mountain anticline and encountered the Folding Mountain fault at 4,900 feet where Cairn formation occurs above Luscar (7) strata. Total depth was 5,076 feet (Lang 1947 p. 65). Structures suitable for the accumulation of gas and/or oil may be present in the thrust sheets beneath the Drinnan Mountain anticline and the surface trace of the Folding Mountain thrust.

- Note: Most of observed outcrops of Mesozoic rocks are indicated by strike and dip symbols. In areas underlain by Palaeozoic strata, rock outcrops are numerous except in the broad valleys.
- Rock outcrop . . . . . x
- Geological boundary (defined, approximate) . . . . .
- Bedding (inclined, vertical, overturned) . . . . .
- Fault (defined, approximate; arrow indicates direction of dip) . . . . .
- Anticline (defined, approximate; arrow indicates direction of plunge) . . . . .
- Syncline (defined, approximate; arrow indicates direction of plunge) . . . . .
- Coal adit . . . . .
- Well, abandoned . . . . .
- Coal outcrop and trace of seam . . . . .

